STORMWATER POLLUTION PREVENTION PLAN & DRAINAGE ANALYSIS

Self Storage Addition
416 Waverly Avenue
Mamaroneck - New York

February 8, 2018

Hudson Engineering & Consulting, P.C.
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Elmsford, NY 10523

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2.) NYSDEC Contractor Certification Statement

CONTRACTOR and SUBCONTRACTOR CERTIFICATION STATEMENT

for the New York State Department of Environmental Conservation (DEC) State Pollutant Discharge Elimination System Permit for Stormwater Discharges from Construction Activity (GP-0-15-002)

As per *Part III.A.5* on page 19 of *GP-0-15-002* (effective January 29, 2015):

'Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP. The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor*. The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.'

The *owner or operator* shall have each contractor and subcontractor involved in soil disturbance sign a copy of the following certification statement before they commence any *construction activity*:

416 Waverly Avenue	**NYR** _____	Mamaronecl (V)
Name of Construction Site	*DEC Permit ID*	*Municipality (MS4)*

"I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations."

Responsible Corporate Officer/Partner Signature	Date
Name of above Signatory	Name of Company
Title of above Signatory	Mailing Address
Telephone of Company	City, State and Zip

Identify the specific elements of the SWPPP the contractor or subcontractor is responsible for:
The contractor shall be responsible for the installation and maintenance of all temporary and permanent erosion
and sediment control practices for the duration of construction activities.

***'TRAINED CONTRACTOR'* FOR THE CERTIFIED CONTRACTOR OR SUBCONTRACTOR**

Name of Trained Employee	*Title of Trained Employee*	*NYSDEC SWT #*

A copy of this signed contractor certification statement must be maintained at the SWPPP on site

3.) Narrative

STORMWATER POLLUTION PREVENTION PLAN
Self Storage Addition
416 Waverly Avenue
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A. INTRODUCTION

This Stormwater Pollution Prevention Plan & Stormwater Analysis presents the proposed Best Management Practices (BMPs) to control erosion, sedimentation, and manage stormwater during the construction of a new two (2) story addition to an existing self storage building, and associated parking and landscaping, located at 416 Waverly Avenue (SBL 8-25-70) in the Village of Mamaroneck, Westchester County, New York.

This Plan consists of this narrative and a plan set entitled: "Self Storage Building Addition, 416 Waverly Avenue, Village of Mamaroneck, Westchester County, New York", all as prepared by Hudson Engineering and Consulting, P.C., Elmsford, New York, date, Febraury 8, 2018. The design is in accordance with the Village of Mamaroneck requirements. The plans have also been prepared to meet the requirements of the New York State Department of Environmental Conservation (NYSDEC), per the Village code.

B. METHODOLOGY

The stormwater analysis was developed utilizing the Soil Conservation Service (SCS) TR-20 methodologies (HydroCad®) to assist with the drainage analysis and design of the mitigating practice. The "Complex Number" (CN) value determination is based on soil type, vegetation and land use. *See Soil Map & Report contained herein.* The "Time of Concentration" (T_c) is determined by the time wise longest flow path within each watershed. The CN and T_c data is input into the computer model. This project involves modifications to an existing developed property; therefore, this will be classified as redevelopment per the NYSDEC Phase II regulations.

In accordance with Village of Mamaroneck code, exceptions to providing attenuation are allowed if "*In the opinion of the Stormwater Management Officer, the retention of stormwater on such site would exacerbate flooding on the property and/or contribute to and increase in the one-hundred-year floodplain*." The location of the project site within the lower reach of the Sheldrake River basin should preclude the use of attenuation practices on the site. Providing attenuation of the stormwater and delaying its release to the stormwater system would result in the coincidence with upstream peak flows and a potential increase of the hydraulic flood line in the immediate area. It is more beneficial to allow this runoff to exit the site prior to the arrival of the upstream peak flows. This being the case, the stormwater design for this site includes only water quality, since there is an overall decrease in impervious area and the release of un-attenuated runoff will not exacerbate the current flooding conditions.

The Pre and Post Impervious Area coverage was calculated as follows:

Pre and Post Impervious Coverage	
Total Existing Impervious Area	41,494-square feet
Total Proposed Impervious Area	40,877-square feet
Total Decrease in Impervious Area	617-square feet
Percent Decrease	1.49%

Per Section 9.2.1, B-III of the NYSDEC Manual, 75% of the Water Quality Volume from the disturbed, impervious area, as well as any additional runoff from tributary areas that are undisturbed, cab be treated with the use of Alternative Stormwater Management Practices (SMPs), as listed in Section 9.4 of the NYSDEC Stormwater Management Design Manual.

The stormwater management design is based on the NYSDEC "New York State Stormwater Management Design Manual", latest edition and "Controlling Urban Runoff: A practical Manual for Planning and Designing Urban BMP'S", by the Metropolitan Washington Council of Governments. Stormwater quality has been analyzed in accordance with the guidelines set forth in the New York State General Permit for Storm Water Discharge, GP-0-15-002.

C. LIST OF PERMITS

The following is a list of permits and approvals required for the project along with the status.

- Village of Mamaroneck – Building Permit – Pending
- Village of Mamaroneck – Zoning Board Approval – Pending
- Village of Mamaroneck – Planning Board Approval – Pending
- Harbor Coastal Zone Management Commission – Pending

D. PRE-DESIGN INVESTIGATIVE ANALYSIS

Due to the site's location partially within the 100-year flood limit line, it has been determined that percolation is not a viable option for stormwater on this site, and cconventional stormwater management practices could not be utilized in the stormwater design (i.e. infiltration chambers, infiltration basins, etc.). Therefore, no deep hole testing or percolation testing was performed.

E. WATER QUALITY VOLUME

The overall tributary area of the proposed redevelopment project was divided into seven (7) watersheds: Watershed 1A, 1B, 1C, 1D, 2, 3 and 3A.

Watershed 1A is made up of the portion of the proposed parking area adjacent to the proposed building addition. This watershed contains 4,579-square feet of tributary area, which consists of 4,546-square feet of impervious area, with the remaining 33-square feet of area in the form of lawn and landscaping. This watershed has a weighted complex number (CN) value of 98 and a calculated Time of Concentration (Tc) of 0.8 minutes. Stormwater from this area flows overland to an existing catch basin. From here the runoff is captured and conveyed to an existing hydrodynamic separator, where it meets with the runoff from Watersheds 1B, 1C, 1D and 2. The hydrodynamic separator is capable of treating the entire water quality volume from the tributary area. The treated runoff is then conveyed to an existing catch basin located at the corner of Waverly Avenue and Fenimore Road.

Watershed 1B is made up of the portion of the proposed parking area adjacent to the entrance to the existing storage building. This watershed contains 3,076-square feet of tributary area, which consists of 2,690-square feet of impervious area, with the remaining 386-square feet of area in the form of lawn and landscaping. This watershed has a weighted complex number (CN) value of 95 and a calculated Time of Concentration (Tc) of 0.8 minutes. Stormwater from this area flows overland to a relocated catch basin located adjacent to a proposed loading area. From here the runoff is captured and conveyed to an existing hydrodynamic separator, where it meets with the runoff from Watersheds 1A, 1C, 1D and 2. As previously mentioned, the hydrodynamic separator is capable of treating the entire water quality volume from the tributary area. The treated runoff is then conveyed to an existing catch basin located at the corner of Waverly Avenue and Fenimore Road.

Watershed 1C is made up of the portion of the proposed parking area adjacent to the existing stucco building to remain. This watershed contains 3,283-square feet of tributary area, which consists of 3,039-square feet of impervious area, with the remaining 244-square feet of area in the form of lawn and landscaping. This watershed has a weighted complex number (CN) value of 96 and a calculated Time of Concentration (Tc) of 0.9 minutes. Stormwater from this area flows overland to an existing catch basin located just upstream of the existing hydrodynamic separator. From here the runoff is captured and conveyed to the existing hydrodynamic separator, where it meets with the runoff from Watersheds 1A, 1B, 1D and 2. As previously mentioned, the hydrodynamic separator is capable of treating the entire water quality volume from the tributary area. The treated runoff is then conveyed to an existing catch basin located at the corner of Waverly Avenue and Fenimore Road.

Watershed 1D is made up of the portion of the proposed parking area adjacent to the main driveway entrance. This watershed contains 1,455-square feet of tributary area, which consists of 1,411-square feet of impervious area, with the remaining 44-square feet of area in the form of lawn and landscaping. This watershed has a weighted complex number (CN) value of 97 and a calculated Time of Concentration (Tc) of 0.7 minutes. Stormwater from this area flows overland to a proposed trench drain located across the driveway entrance. From here the runoff is captured and conveyed to an existing hydrodynamic separator, where it meets with the runoff from Watersheds 1A, 1B, 1C and 2. As previously mentioned, the hydrodynamic separator is capable of treating the entire water quality volume from the tributary area. The treated runoff is then conveyed to an existing catch basin located at the corner of Waverly Avenue and Fenimore Road.

Watershed 2 is made up of the existing roof area and associated stormwater planter. This watershed contains 10,755-square feet of tributary area, which consists of 10,086-square feet of impervious area, with the remaining 669-square feet of area in the form of an existing stormwater planter. This watershed has a weighted complex number (CN) value of 97 and a direct entry Time of Concentration (Tc) of 1.0 minute. Stormwater from this area is collected via a series of roof drains and is conveyed directly to an existing stormwater planter located adjacent to the existing building. The stormwater planter is sized to treat the entire water quality volume from the watershed, as well as bypass storm events up to and including the 25-year storm. From here the treated runoff is conveyed to an existing hydrodynamic separator, where it meets with the runoff from Watersheds 1A, 1B, 1C and 1D. The runoff is then conveyed to an existing catch basin located at the corner of Waverly Avenue and Fenimore Road.

Watershed 3A is made up of the proposed roof area and associated stormwater planter. This watershed contains 14,755-square feet of tributary area, which consists of 14,082-square feet of impervious area, with the remaining 673-square feet of area in the form of a proposed stormwater planter. This watershed has a weighted complex number (CN) value of 97 and a direct entry Time of Concentration (Tc) of 1.0 minute. Stormwater from this area is collected via a series of roof drains and is conveyed directly to a proposed stormwater planter, which has been sized to treat the entire water quality volume from the watershed, as well as bypass storm events up to and including the 25-year storm. From here the treated runoff is conveyed to an existing hydrodynamic separator, where it meets with the runoff from Watersheds 1A, 1B, 1C and 1D. The runoff is then conveyed to an existing catch basin located at the corner of Waverly Avenue and Fenimore Road.

The Water Quality Volume (WQv) calculations were performed for each watershed as follows:

WATERSHEDS 1A, 1B, 1C & 1D

P= 90% Rainfall 1.5 -inches

A_i = Impervious Area = 16,849 -square feet

A_i = 0.3868 -acres

A_t = Tributary Area = 18,712 -square feet

A_t = 0.4296 -acres

I = % Impervious = 90.04%

R_v= 0.05+0.009(I); where I = Percent Impervious written as a percent

R_v= 0.860 **(0.20 minimum)**

R_v= 0.860

$$WQ_v = \frac{(P \times R_v \times A_t)}{12} = 0.04620 \text{ acre-feet} = 2012.46 \text{ cubic feet}$$

Rainfall = 1.38 -inches → 0.04700 acre-feet OKAY

The Water Quality Volume (WQv) from the proposed parking area comprises of approximately 41.15% of the overall WQv for the entire property. This volume is equal to a 1.38-inch storm event from the watershed, which produces a flow rate of approximately 0.43-cfs. The entire volume is treated via an existing AquaSwirl AS-2 hydrodynamic device, which is capable of treating up to 1.10-cfs. The existing device is also capable of bypassing the 25-year storm event from the watershed. *Water Quality routing calculations are contained within Section 7 of this report. The AquaSwirl Sizing Chart is contained within Section 8 of this report.*

WATERSHED 2

P= 90% Rainfall 1.5 -inches

A_i = Impervious Area = 10,086 -square feet

A_i = 0.2315 -acres

A_t = Tributary Area = 10,755 -square feet

A_t = 0.2469 -acres

I = % Impervious = 93.78%

R_v= 0.05+0.009(I); where I = Percent Impervious written as a percent

R_v= 0.894 **(0.20 minimum)**

R_v= 0.894

$$WQ_v = \frac{(P \times R_v \times A_t)}{12} = 0.02759 \text{ acre-feet} = 1201.89 \text{ cubic feet}$$

Rainfall = 1.66 -inches → 0.02800 acre-feet OKAY

The Water Quality Volume (WQv) from the existing roof area comprises of approximately 24.94% of the overall WQv for the entire property. This volume is equal to a 1.66-inch storm event. The entire volume is treated via an existing Stormwater Planter, which was previously approved by the Village and was designed to treat the entire WQV from this watershed. The existing planter is also capable of bypassing the 25-year storm event from the watershed without overflow. *Water Quality routing calculations are contained within Section 7 of this report. The AquaSwirl Sizing Chart is contained within Section 8 of this report.*

WATERSHED 3A

P= 90% Rainfall 1.5 -inches

A_i = Impervious Area = 14,082 -square feet

A_i = 0.3233 -acres

A_t = Tributary Area = 14,755 -square feet

A_t = 0.3387 -acres

I = % Impervious = 95.44%

R_v= 0.05+0.009(I); where I = Percent Impervious written as a percent

R_v= 0.909 **(0.20 minimum)**

R_v= 0.909

$$WQ_v = \frac{(P \times R_v \times A_t)}{12} = 0.03849 \text{ acre-feet} = 1676.44 \text{ cubic feet}$$

Rainfall = 1.74 -inches → 0.04000 acre-feet OKAY

The Water Quality Volume (WQv) from the proposed roof area comprises of approximately 33.91% of the overall WQv for the entire property. This volume is equal to a 1.66-inch storm event. The entire volume is treated via a proposed Stormwater Planter, which has been sized to treat the entire WQv from this watershed. The proposed planter is also capable of bypassing the 25-year storm event from the watershed without overflow. *Water Quality routing calculations are contained within Section 7 of this report. The AquaSwirl Sizing Chart is contained within Section 8 of this report.*

100% of the Water Quality Volume is treated with a combination of a proposed stormwater planter for all new roof area, an existing stormwater planter for the existing roof area, and an AquaSwirl AS-2 hydrodynamic device for the existing parking area. All practices have also been sized to bypass the 25-year storm event. Each practice is an approved Alternate SMP, as listed in Section 9.4 of the NYSDEC Stormwater Management Design Manual.

F. NYSDEC TABLE 3.1 DESIGN REGULATIONS:

Each mitigation practice is contained in Table 3.1 of the NYSDEC design regulations and is discussed below.

- Preservation of Undisturbed Areas: Permanent conservation easements of undisturbed areas are not proposed for this site
- Preservation of Buffers. See above.
- Reduction of Clearing and Grading: All construction is occurring in areas previously disturbed.
- Locating Development in Less Sensitive Areas: No development is planned within sensitive areas.
- Open Space Design: Not applicable to this application.
- Soil Restoration: As required, all disturbed soil areas will be "deep tilled" prior to the establishment of ground cover. Deep tilling restores the absorptive quality of the soil.
- Roadway Reduction: No roadways are being proposed as part of this application.
- Sidewalk Reduction: All sidewalks have been designed to the minimum extent possible per the Village of Mamaroneck requirements, in order meet the required pedestrian traffic on and off-site.
- Driveway Reduction: All driveways have been desiged to the minimum extent possible to provide adequate access for the proposed use.
- Cul-de-sac Reduction: No Cul-de-sacs are being proposed as part of this application.
- Building Footprint Reduction: The proposed building footprint is considered the minimum footprint desired for this use.
- Parking Reduction: Parking for the proposed use has been provided to the maximum extent possible.
- Conservation of Natural Areas: Not applicable to this application.
- Sheet Flow to riparian buffers or filter strips: Not applicable to this application.
- Vegetated Open Swale: An "O-Type Swale" is not applicable to this site.
- Tree Planting/Tree Boxes: Landscaped Islands have been provided wherever possible.
- Disconnection of Rooftop Runoff: Not applicable to this application.
- Stream Daylighting for Redevelopment Projects: Not applicable to this application.
- Rain Gardens: Due to the location of the property within the existing 100-year flood zone, standard exfiltration practices were determined to be ineffective for this application.
- Green Roof: Green roof technology could be incorporated into the design if desired, however, 100% of the water quality volume is already being treated via existing and proposed stormwater planters and an existing hydrodynamic separator.

- Stormwater Planters: Stormwater Planters have been incorporated into the design to treat the runoff from both existing and proposed roof areas.
- Rain tank/Cistern: Rain tanks/Cisterns could be incorporated if desired.
- Porous Pavement: Porous Pavement could be incorporated into the design, however, due to the location of the property within the existing 100-year flood zone, standard exfiltration practices were determined to be ineffective for this application.

G. CONSTRUCTION PHASE

During the construction phase of the project, a sediment and erosion control plan shall be implemented in accordance with the New York State Department of Environmental Conservation's Best Management Practices (BMP). The primary goals of the sediment and erosion control plan are to prevent the tracking of dirt and mud onto adjacent roads, to prevent mud and silt from entering into existing and proposed drainage facilities, and to protect the receiving waters from contamination during the construction.

<u>During construction, the party responsible for implementing the temporary (during construction) Stormwater Management facilities Maintenance Program will be the owner. Contact information will be filed with the Village.</u>

A New York State Professional Engineer or Certified Professional In Erosion and Sediment Control (P.E. or CPESC) shall conduct an assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate erosion and sediment controls shown on the plan have been adequately installed and/or implemented to ensure overall preparedness of the site for construction. Following the commencement of construction, site inspections shall be conducted by the P.E. or CPESC at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

During each inspection, the representative shall record the following:

1. On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

2. Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

3. Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

4. Inspect all sediment control practices and record approximate degree of sediment accumulation as a percentage of the sediment storage volume;

5. Inspect all erosion and sediment control practices and record all maintenance requirements. Identify any evidence of rill or gully erosion

occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along the barrier. Record the depth of sediment within containment structures and any erosion near outlet and overflow structures.

6. All identified deficiencies.

The construction manager shall maintain a record of all inspection reports in a site logbook. The site logbook shall be maintained on-site and be made available to the Village of Mamaroneck. A summary of the site inspection activities shall be posted on a monthly basis in a public accessible location at the site.

The projects anticipated start date is Fall 2018 and the anticipated completed date is Fall of 2019.

H. CONSTRUCTION SEQUENCING

The following erosion control schedule shall be utilized:

1. Install construction entrance to the development area.
2. Establish construction staging area.
3. Install tree protection on trees as noted on plans.
4. Selective vegetation removal for silt fence installation.
5. Install silt fence down slope of all areas to be disturbed as shown on the plan.
6. Remove trees where necessary (clear & grub) for the proposed construction.
7. Strip topsoil and stockpile at the locations specified on the plans (up gradient of erosion control measures). Temporarily stabilize topsoil stockpiles (hydroseed during may 1st through october 31st planting season or by covering with a tarpaulin(s) november 1st through april 30th. Install silt fence around toe of slope.
8. Demolish any existing site features and/or structures noted as being removed on the construction documents, and dispose of off-site.
9. Rough grade site.
10. Install additional silt fencing as necessary.

11. Rough grade parking lot and install trench drains and drain inlets, as well as all associated onsite piping.

12. Obtain street opening permit for drainage connection to existing catch basin in fenimore road, as well as proposed curb cut widenings.

13. Install drainage work tributary to existing municipal catch basin in fenimore road up to location of proposed stormwater planter18. Excavate and construct foundations for new building.

14. Construct stormwater planter adjacent to building addition.

15. Construct building. Install and connect all roof drain leaders to previously installed stormwater planter.

16. Install curbing, and sub-base courses. Fine grade and seed all disturbed areas. Spread salt hay over seeded areas.

17. Install bituminous concrete top course.

18. Clean pavement, drain lines, catch basins and pretreatment devices. Clean exfiltration/attenuation galleries.

19. Remove all temporary soil erosion and sediment control measures after the site is stabilized with vegetation.

* Soil erosion and sediment control maintenance must occur weekly and prior to and after every ½" or greater rainfall event.

I. EROSION AND SEDIMENT CONTROL COMPONENTS

The primary aim of the soil and sediment control measures is to reduce soil erosion from areas stripped of vegetation during and after construction and to prevent silt from reaching the off-site drainage structures and downstream properties. As outlined in the Construction Sequencing schedule, the Sediment and Erosion Control Components are an integral component of the construction sequencing and will be implemented to control sedimentation and re-establish vegetation as soon as practicable.

Planned erosion and sedimentation control practices during construction include the installation, inspection and maintenance of the inlet protection, soil stockpile areas, diversion swales, sediment traps and silt fencing. General land grading practices, including land stabilization and construction sequencing are also integrated into the Sediment and Erosion Control Plan. Dust control is not expected to be a problem due to the relatively limited area of exposure, the undisturbed perimeter of trees around the project area and the relatively short time of exposure. Should excessive dust be generated, it will be controlled by sprinkling.

All proposed soil erosion and sediment control practices have been designed in accordance with the following publications:

- New York State standards and Specifications for Urban Erosion and Sediment Control, latest edition.
- New York State General Permit for Stormwater Discharges, GP-0-15-002 (General permit).
- "Reducing the Impacts of Stormwater Runoff from New Development", as published by the New York State Department of Environmental Conservation (NYSDEC), second edition, April, 1993.

The proposed soil erosion and sediment control devices include the planned erosion control practices outlined below. Maintenance procedures for each erosion control practice have also been outlined below.

- **SILT FENCE**

  Silt fence (geo-textile filter cloth) shall be placed in locations depicted on the approved plans. The purpose of the silt fence is to reduce the veloTown/Village of sediment laden stormwater from small drainage areas and to intercept the transported sediment load. In general, silt fence shall be used at the toe of slopes or intermediately within slopes where obvious channel concentration of stormwater is not present.

  Maintenance

  Silt fencing shall be inspected at a minimum of once per week and prior to and within 48 hours following a rain event ½" or greater. Inspections shall include ensuring that the fence material is tightly secured to the woven wire and the wire is secured to the wood posts. In addition, overlapping filter fabric shall be secure and the fabric shall be maintained a minimum of six (6) inches below grade. In the event that any "bulges" develop in the fence, that section of fence shall be replaced within 48 hours with new fence section. Any sediment build-up against the fence shall be removed within 48 hours and deposited on-site a minimum of 100 feet outside of any wetland or watercourse.

- **INLET PROTECTION**

  After driveway catch basins and surface inlets have been installed, these drain inlets will receive stormwater from the driveway, Temporary Diversion Swales and surrounding overland watersheds. In order to protect the receiving waters from sedimentation, the contractor shall install ¾ inch stone aggregate around the perimeter of all catch basins and surface inlets as illustrated on the approved plans. This barrier will allow stormwater to be filtered prior to reaching the basin inlet grate.

Maintenance

The stone aggregate shall be inspected weekly prior to and within 48 hours following a rain event ½" or greater. Care shall be taken to ensure that all stone aggregate are properly located and secure and do not become displaced. The stone aggregate shall be inspected for accumulated sediments and any accumulated sediment shall be removed from the device and deposited not less than 100 feet from wetland or watercourse.

- **TREE PROTECTION**

All significant trees to be preserved located within the limits of disturbance and on the perimeter of the disturbance limits shall be protected from harm by erecting a 3' high (minimum) snow fence completely surrounding the tree. Snow fence should extend to the drip-line of the tree to be preserved. Trees designated to be protected shall be identified during the staking of the limits of disturbance for each construction phase.

Maintenance

The snow fence shall be inspected daily to ensure that the perimeter of the fence remains at the drip-line of the tree to be preserved. Any damaged portions of the fence shall be repaired or replaced within 48 hours. Care shall also be taken to ensure that no construction equipment is driven or parked within the drip-line of the tree to be preserved.

- **SOIL/SHOT ROCK STOCKPILING**

All soil and shot rock stripped from the construction area during grubbing and mass grading shall be stockpiled in locations approved by the Town/Village's representative, but in no case shall they be placed within 100' of a wetland or watercourse. The stockpiled soils shall be re-used during finish-grading to provide a suitable growing medium for plant establishment. Soil stockpiles shall be protected from erosion by vegetating the stockpile with rapidly – germinating grass seed or covering the stockpile with tarpaulin and surrounding it with either silt fence.

Maintenance

Sediment controls (silt fence) surrounding the stockpiles shall be inspected according to the recommended maintenance outline above. All stockpiles shall be inspected for signs of erosion or problems with seed establishment weekly and prior to and within 48 hours following a rain event ½" or greater.

- **GENERAL LAND GRADING**

The intent of the Erosion & Sediment Control Plan is to control disturbed areas such that soils are protected from erosion by temporary methods and,

ultimately, by permanent vegetation. Where practicable, all cut and fill slopes shall be kept to a maximum slope of 2:1. In the event that a slope must exceed a 2:1 slope, it will be stabilized with stone riprap. On fill slopes, all material will be placed in layers not to exceed 12 inches in depth and adequately compacted. Where practicable, diversion swales shall be constructed on the top of all fill embankments to divert any overland flows away from the fill slopes.

- **SURFACE STABILIZATION**

  All disturbed will be protected from erosion with the use of vegetative measures (i.e., grass seed mix, sod) hydromulch netting or hay. When activities temporarily cease during construction, soil stockpiles and exposed soil should be stabilized by seed, mulch or other appropriate measures as soon as possible, but in no case more than 14 days after construction activity has ceased. All seeded areas will be re-seeded areas as necessary and mulch according to the site plan to maintain a vigorous, dense vegetative cover,

  Erosion control barriers consisting of silt fencing shall be placed around exposed areas during construction. Where exposed areas are immediately uphill from a wetland or watercourse, the erosion control barrier will consist of double rows of silt fencing. Any areas stripped of vegetation during construction will be vegetated and/or mulch as soon as possible, but in no case more than 14 days to prevent erosion of the exposed soils. And topsoil removed during construction will be temporarily stockpiled for future use in grading and landscaping.

  As mentioned above, temporary vegetation will be established to protect exposed soil areas during construction. If growing conditions are not suitable for the temporary vegetation, mulch will be used to the satisfaction of the Commissioner of Public Works. Materials that may be used for mulching include straw, hay, salt hay, wood fiber, synthetic soil stabilizers, mulch netting, sod or hydromulch. In site areas where significant erosion potential exists (steep slopes) and where specifically directed by the Town/Village's representative, Curlex Excelsior erosion control blankets (manufactured by American Excelsior, or approved equal) shall be installed. A permanent vegetative cover will be established upon completion of construction of those areas that have been brought to finish-grade and to remain undisturbed.

- **DEWATERING**

  Prevent surface water and subsurface or ground water from flowing into excavations and trenches. Pump out any accumulated water.

  Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms,

undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

J. CONSTRUCTION PRACTICES TO MINIMIZE STORMWATER CONTAMINATION

General:

Adequate measures shall be taken to minimize contaminant particles arising from the discharge of solid materials, including building materials, grading operations, and the reclamation and placement of pavement, during project construction, including but not limited to:

- Building materials, garbage, and debris shall be cleaned up daily and deposited into dumpsters, which will be periodically removed from the site and appropriately disposed of. All dumpsters and containers left on-site shall be covered and surrounded with silt fence in order to prevent contaminants from leaving the site. Silt fencing shall be inspected on a weekly basis.

- Dump trucks hauling material from the construction site will be covered with a tarpaulin.

- The paved street adjacent to the site entrance will be swept daily to remove excess mud, dirt, or rock tracked from the site.

- Petroleum products will be stored in tightly sealed containers that are clearly labeled.

- All vehicles on site will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.

- All spills will be cleaned up immediately upon discovery. Spills large enough to reach the storm system will be reported to the National Response Center at 1-800-424-8802.

- Materials and equipment necessary for spill cleanup will be kept in the temporary material storage trailer onsite. Equipment will include, but not

be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, saw dust, and plastic and metal trash containers.

- All paint containers and curing compounds will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm system, but will be properly disposed according to the manufacturer's instructions.

- Sanitary waste will be collected from portable units a minimum of two times a week to avoid overfilling. All sanitary waste units shall be surrounded by silt fence to prevent contaminants from leaving the site. Silt fencing shall be inspected on a weekly basis.

- Any asphalt substances used on-site will be applied according to the manufacturer's recommendation.

- Fertilizers will be stored in a covered shed and partially used bags will be transferred to a sealable bin to avoid spills and will be applied only in the minimum amounts recommended by the manufacturer and worked into the soil to limit exposure to stormwater.

- No disturbed area shall be left un-stabilized for longer than 14 days during the growing season.

- When erosion is likely to be a problem, grubbing operations shall be scheduled and performed such that grading operations and permanent erosion control features can follow within 24 hours thereafter.

- As work progresses, patch seeding shall be done as required on areas previously treated to maintain or establish protective cover.

- Drainage pipes and swales/ditches shall generally be constructed in a sequence from outlet to inlet in order to stabilize outlet areas and ditches before water is directed to the new installation or any portion thereof, unless conditions unique to the location warrant an alternative method.

Spill Control & Spill Response:

- For all hazardous materials stored on site, the manufacturer's recommended methods for spill clean up will be clearly posted. Site personnel will be made aware of the procedures, and the locations of the information and cleanup supplies.
- Appropriate cleanup materials and equipment will be maintained by the Contractor in the materials storage area on-site. As appropriate, equipment and materials may include items such as booms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for clean up purposes.

- All spills will be cleaned immediately after discovery and the materials disposed of properly.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- After a spill, a report will be prepared describing the spill, what caused it, and the cleanup measures taken. The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring, as well as clean up instructions in the event of reoccurrences.
- The Contractor's site superintendent, responsible for day-to-day operations, will be the spill prevention and cleanup coordinator. The Contractor is responsible for ensuring that the site superintendent has had appropriate training for hazardous materials handling, spill management, and cleanup.
- The Contractor's site superintendent will be notified immediately when a spill or the threat of a spill is observed. The superintendent will assess the situation and determine the appropriate response.
- If spills represent an imminent threat of escaping erosion and sediment controls and entering receiving waters, personnel will be directed to respond immediately to contain the release and notify the superintendent after the situation has been stabilized.
- Spill kits containing appropriate materials and equipment for spill response and cleanup will be maintained by the Contractor at the site.
- If oil sheen is observed on surface water, action will be taken immediately to remove the material causing the sheen. The Contractor will use appropriate materials to contain and absorb the spill. The source of the oil sheen will also be identified and removed or repaired as necessary to prevent further releases.
- If a spill occurs the superintendent or the superintendent's designee will be responsible for completing the spill reporting form and for reporting the spill to the contacts listed below.
- Personnel with primary responsibility for spill response and clean up will receive training by the Contractor's site superintendent or designee. The training must include identifying the location of the spill kits and other spill response equipment and the use of spill response materials.
- Spill response equipment will be inspected and maintained as necessary to replace any materials used in spill response activities.

Spill Control Notification:

- A reportable spill is a quantity of five (5) gallons or more or any spill of oil which: (1) violates water quality standards, (2) produces a ”sheen” on a surface water, or (3) causes a sludge or emulsion. This spill must be reported immediately to the agencies listed below.

- Any spill of oil or hazardous substance to waters of the state must be reported immediately by telephone to the following agencies:

  - 911 – Police, Fire and EMS
  - Village of Mamaroneck Engineering Department
    169 Mount Pleasant Avenue
    Phone: (914) 777-7731
  - Mamaroneck Fire Department
    123 Mamaroneck Avenue
    Phone: (914) 825-8777
  - NYS Department of Environmental Conservation (NYSDEC)
    Spill Reporting Hotline
    (1800) 457–7362
  - National Response Center: (1800) 424-8802
  - Local Emergency Planning Committee (LEPC)
    Westchester County Office of Emergency Management
    200 Bradhurst Avenue
    Hawthorne, NY 10532
    (914) 864–5450
  - Westchester County Department of Health (WCDOH)
    Spill Reporting Hotline
    (914) 813-5000
  - U.S. Environmental Protection Agency (USEPA)
    EPCRA Information Hotline
    1(800) 535–0202
  - U.S. Department of Labor and Occupational Safety and Health Administration (OSHA)
    Tarrytown, NY
    (914) 524–7510

K. STORMWATER MANAGEMENT FACILITIES MAINTENANCE PROGRAM

The following maintenance plan has been developed to maintain the proper function of all drainage and erosion and sediment control facilities:

- Erosion & Sediment Control Maintenance:

  During the construction of the project, the site erosion and sediment control measures as well as basin embankments and outlet structures will be inspected by the project superintendent once a week and/or within 24 hours following a rainstorm ½" or greater. Any repairs required shall be performed in a timely manner. All sediment removal and/or repairs will be followed within 24 hours by re-vegetation. Remove sediment and correct erosion by re-seed eroded areas and gullies within 7 days.

- General Stormwater Facilities Maintenance (Storm Sewer, Catch Basins/Drain Inlets, Manholes, Pre-treatment Device and Subsurface Infiltration System)

  All stormwater facilities shall be inspected immediately after completion of construction, and then monthly for the first three (3) months following the completion of the Project. Within the first three (3) months, inspections shall immediately be performed following a large storm event (i.e. producing 1/2" (one-half inch) of rain or greater. Thereafter, these facilities shall be inspected as described as follows. Upon inspection, facilities shall be immediately maintained and/or cleaned as may be required. Any site areas exhibiting soil erosion of any kind shall be immediately restored and stabilized with vegetation, mulch or stone, depending on the area to be stabilized.

  Upon each inspection, all visible debris including, but not limited to, twigs, leaf and forest litter shall be removed from the swales, overflow discharge points and frames and grates of drainage structures.

- Sumps − Catch Basin/Drain Inlets and Drain Manholes

  All catch basin/drain inlets and drain manholes with sumps have been designed to trap sediment prior to its transport to the infiltration practice and, ultimately, downstream. These sumps will require periodic inspection and maintenance to ensure that adequate depth is maintained within the sumps.

  All sumps shall be inspected once per month for the first three (3) months (after drainage system has been put into service). Thereafter, all sumps shall be inspected every four (4) months. The Owner, or their duly authorized representative, shall take measurements of the sump depth.

  If sediment has accumulated to 1/2 (one-half) the depth of the sump, all sediment shall be removed from the sump. Sediments can be removed with hand-labor or with a vacuum truck.

The use of road salt shall be minimized for maintenance of roadway and driveway areas.

- Hydrodynamic Separator:

  The hydrodynamic separator (First Defense Unit) shall be inspected every six (6) months (Spring and Fall) for excess sediment accumulation. During dry weather conditions, accumulated sediments shall be vacuumed out when sediment has reached 1/2 (one-half) the capacity of the isolated sump, or when an appreciable level of hydrocarbons and trash has accumulated, whichever occurs first.

  Upon completion of construction, the First Defense Unit should be inspected quarterly during the first year in order to develop an appropriate schedule of maintenance. When the sediment pile is within 30 to 36 inches of the water surface, the system should be maintained. A vacuum truck shall be used to remove the accumulated sediment and debris. Refer to manufacturer's literature for detailed maintenance instructions.

- Stormwater Planter:

  The stormwater planters shall be inspected twice within the first six (6) months, and after each storm event greater than 0.5-inches (Spring and Fall) for excess sediment accumulation and for surface ponding. After the first year, the planter shall be inspected every four (4) months and after storm events greater than the 1-year storm.

  During dry weather conditions, all accumulated sediment shall be removed from the planter, and the existing topsoil shall be retiled to promote exfiltration of the stormwater thought the practice.

  Routine maintenance activities shall be performed weekly, and shall include running and replacing dead or dying vegetation, plant thinning, and erosion repair.

L. CONCLUSION:

The stormwater management plan proposed meets and exceeds all the requirements set forth by the Village of Mamaroneck and the New York State Department of Environmental Conservation (NYSDEC) for redevelopment projects. Design modification requirements that may occur during the approval process, will be performed and submitted for review to the Village of Mamaroneck.

3.) Extreme Precipitation Table

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	73.825 degrees West
Latitude	41.133 degrees North
Elevation	0 feet
Date/Time	Wed, 14 Jun 2017 14:13:45 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.51	0.63	0.83	1.04	1.30	**1yr**	0.90	1.24	1.49	1.84	2.26	2.78	3.17	**1yr**	2.46	3.05	3.55	4.26	4.90	**1yr**
2yr	0.40	0.62	0.77	1.02	1.28	1.60	**2yr**	1.10	1.49	1.84	2.27	2.79	3.42	3.85	**2yr**	3.02	3.70	4.27	5.04	5.72	**2yr**
5yr	0.47	0.73	0.92	1.23	1.57	1.99	**5yr**	1.36	1.84	2.30	2.85	3.51	4.30	4.89	**5yr**	3.81	4.70	5.46	6.31	7.08	**5yr**
10yr	0.53	0.83	1.04	1.42	1.84	2.35	**10yr**	1.59	2.15	2.73	3.39	4.18	5.13	5.86	**10yr**	4.54	5.64	6.58	7.49	8.33	**10yr**
25yr	0.61	0.97	1.24	1.71	2.28	2.94	**25yr**	1.97	2.66	3.43	4.28	5.29	6.48	7.46	**25yr**	5.73	7.17	8.43	9.39	10.33	**25yr**
50yr	0.69	1.11	1.42	1.99	2.68	3.49	**50yr**	2.31	3.13	4.08	5.11	6.32	7.73	8.96	**50yr**	6.84	8.62	10.17	11.14	12.16	**50yr**
100yr	0.78	1.27	1.63	2.31	3.16	4.14	**100yr**	2.72	3.68	4.85	6.10	7.55	9.24	10.77	**100yr**	8.18	10.36	12.27	13.22	14.32	**100yr**
200yr	0.89	1.45	1.88	2.69	3.72	4.92	**200yr**	3.21	4.33	5.78	7.29	9.03	11.05	12.95	**200yr**	9.78	12.45	14.82	15.70	16.87	**200yr**
500yr	1.06	1.75	2.28	3.31	4.64	6.17	**500yr**	4.00	5.37	7.29	9.22	11.44	14.02	16.54	**500yr**	12.41	15.91	19.04	19.71	20.96	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.44	0.53	0.71	0.88	1.15	**1yr**	0.76	1.13	1.36	1.67	2.16	2.41	2.93	**1yr**	2.13	2.82	3.30	3.75	4.27	**1yr**
2yr	0.39	0.60	0.73	0.99	1.23	1.47	**2yr**	1.06	1.44	1.69	2.17	2.70	3.32	3.73	**2yr**	2.94	3.59	4.12	4.85	5.53	**2yr**
5yr	0.43	0.66	0.82	1.13	1.43	1.72	**5yr**	1.24	1.68	1.97	2.51	3.15	4.04	4.53	**5yr**	3.57	4.36	5.03	5.88	6.59	**5yr**
10yr	0.47	0.72	0.89	1.24	1.61	1.92	**10yr**	1.39	1.87	2.21	2.76	3.54	4.61	5.25	**10yr**	4.08	5.05	5.85	6.51	7.10	**10yr**
25yr	0.52	0.79	0.98	1.41	1.85	2.21	**25yr**	1.60	2.16	2.57	3.13	4.14	5.59	6.42	**25yr**	4.95	6.17	7.23	7.70	8.04	**25yr**
50yr	0.56	0.86	1.07	1.53	2.07	2.46	**50yr**	1.78	2.40	2.90	3.43	4.66	6.48	7.47	**50yr**	5.74	7.18	8.44	8.74	8.77	**50yr**
100yr	0.61	0.93	1.16	1.68	2.31	2.73	**100yr**	1.99	2.67	3.25	3.73	5.23	7.53	8.72	**100yr**	6.67	8.39	9.86	9.91	9.52	**100yr**
200yr	0.67	1.00	1.27	1.84	2.56	3.02	**200yr**	2.21	2.96	3.67	4.06	5.90	8.79	10.21	**200yr**	7.78	9.82	11.52	11.22	10.29	**200yr**
500yr	0.74	1.11	1.43	2.07	2.95	3.47	**500yr**	2.54	3.39	4.31	4.50	6.94	10.80	12.60	**500yr**	9.56	12.12	14.18	13.22	11.31	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.38	0.58	0.71	0.95	1.17	1.41	**1yr**	1.01	1.38	1.62	2.13	2.54	3.00	3.40	**1yr**	2.65	3.27	3.86	4.64	5.30	**1yr**
2yr	0.42	0.65	0.80	1.08	1.33	1.60	**2yr**	1.15	1.57	1.82	2.37	2.91	3.54	3.99	**2yr**	3.14	3.84	4.41	5.26	6.05	**2yr**
5yr	0.51	0.79	0.99	1.35	1.72	2.02	**5yr**	1.48	1.98	2.34	3.04	3.81	4.60	5.25	**5yr**	4.07	5.05	5.89	6.72	7.51	**5yr**
10yr	0.61	0.94	1.17	1.63	2.11	2.44	**10yr**	1.82	2.38	2.83	3.71	4.66	5.68	6.49	**10yr**	5.03	6.24	7.34	8.50	9.40	**10yr**
25yr	0.78	1.18	1.47	2.10	2.77	3.13	**25yr**	2.39	3.06	3.66	4.89	6.09	7.43	8.58	**25yr**	6.58	8.25	9.68	11.22	12.20	**25yr**
50yr	0.93	1.42	1.77	2.54	3.42	3.81	**50yr**	2.95	3.72	4.44	6.03	7.46	9.10	10.59	**50yr**	8.06	10.18	12.04	13.84	14.88	**50yr**
100yr	1.13	1.71	2.14	3.10	4.25	4.62	**100yr**	3.67	4.52	5.39	7.46	9.15	11.16	13.06	**100yr**	9.87	12.56	14.98	17.08	18.18	**100yr**
200yr	1.37	2.06	2.62	3.79	5.28	5.62	**200yr**	4.56	5.49	6.55	9.23	11.20	13.67	16.09	**200yr**	12.09	15.47	18.63	21.07	22.22	**200yr**
500yr	1.79	2.67	3.43	4.99	7.09	7.29	**500yr**	6.12	7.12	8.47	12.32	14.66	17.86	21.20	**500yr**	15.80	20.38	24.88	27.87	29.03	**500yr**

Powered by ACIS Northeast Regional Climate Center

4.) Soils Maps & Soils Data

Soil Map—Westchester County, New York
(416 Waverly Avenue)

Map Scale: 1:838 if printed on A size (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

MAP LEGEND

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

Soils
- Soil Map Units

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

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

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

MAP INFORMATION

Map Scale: 1:838 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

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

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 4, Dec 14, 2006

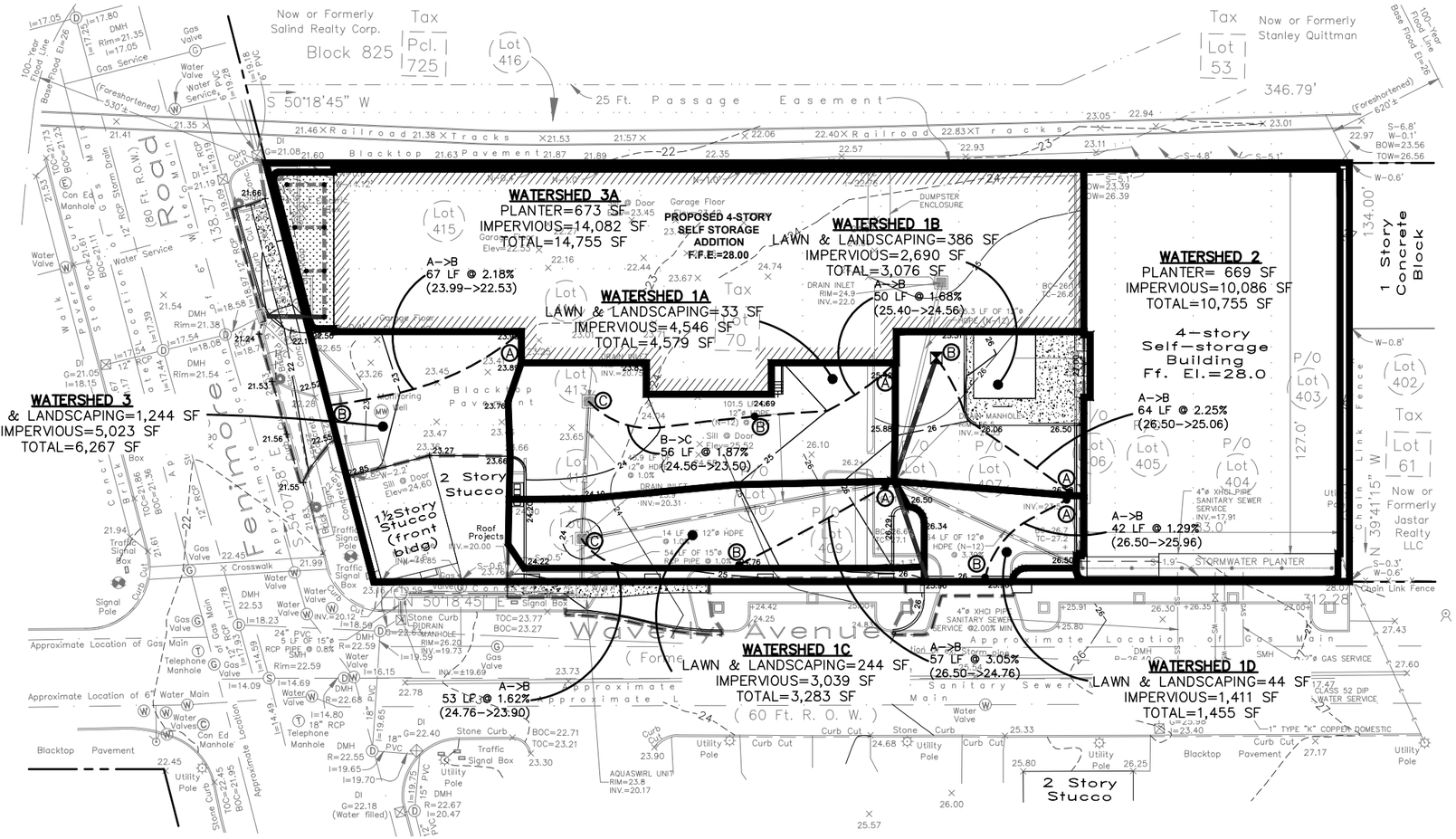
Date(s) aerial images were photographed: 7/31/2006

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

Map Unit Legend

Westchester County, New York (NY119)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Uf	Urban land	1.3	100.0%
Totals for Area of Interest		**1.3**	**100.0%**

5.) Watershed Map



GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

ANY ALTERATIONS OR REVISIONS OF THESE PLANS, UNLESS DONE BY OR UNDER THE DIRECTION OF THE NYS LICENSED AND REGISTERED ENGINEER THAT PREPARED THEM, IS A VIOLATION OF THE NYS EDUCATION LAW.

No.	Description	Date
	Revisions	

THIS PLAN NOT VALID FOR CONSTRUCTION WITHOUT ENGINEERS SEAL & SIGNATURE

PROJECT:
SELF STORAGE BUILDING ADDITION
416 WAVERLY AVENUE
VILLAGE OF MAMARONECK
WESTCHESTER COUNTY – NEW YORK

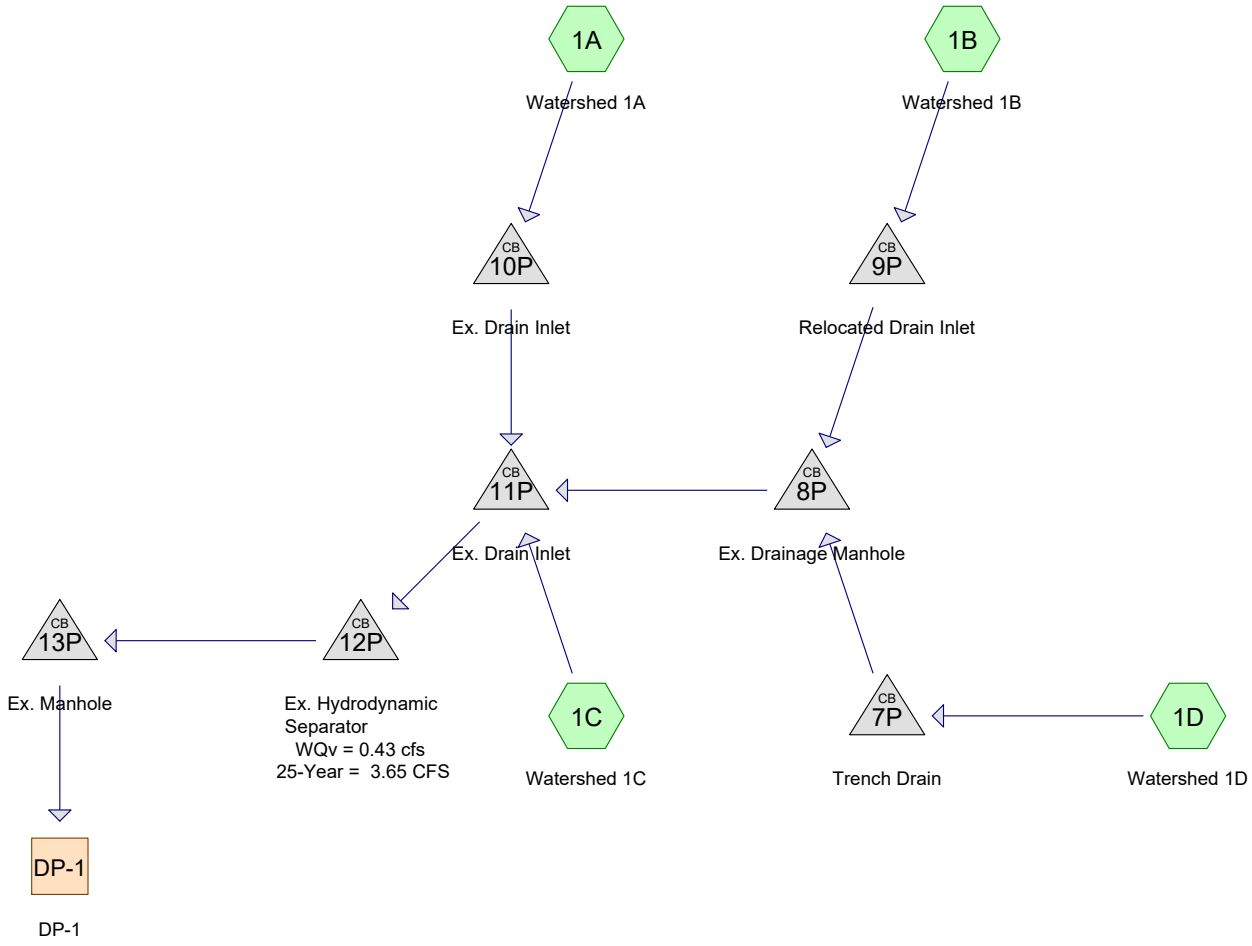
STATE OF NEW YORK · MICHAEL F. STEIN · No. 80957 · LICENSED PROFESSIONAL ENGINEER

WATERSHED MAP – PROPOSED

HEC
HUDSON ENGINEERING & CONSULTING, P.C.
48 Knollwood Road – Suite 201
Elmsford, New York 10523
T: 914-909-0420
F: 914-560-2086
© 2018

Date: 1/18/18 Sheet: 1
Scale: 1" = 20' 1
Designed By: D.C.
Checked By: M.S.
Sheet No. WS-P

6.) Water Quality Calculations



Subcat Reach Pond Link

Routing Diagram for Proposed
Prepared by Microsoft, Printed 1/23/2018

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.016	74	>75% Grass cover, Good, HSG C (1A, 1B, 1C, 1D)
0.268	98	Parking Lot (1A, 1B, 1C, 1D)

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.016	HSG C	1A, 1B, 1C, 1D
0.000	HSG D	
0.268	Other	1A, 1B, 1C, 1D

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.016	0.000	0.000	0.016	>75% Grass cover, Good	1A, 1B, 1C, 1D
0.000	0.000	0.000	0.000	0.268	0.268	Parking Lot	1A, 1B, 1C, 1D

Summary for Subcatchment 1A: Watershed 1A

Runoff = 0.79 cfs @ 12.01 hrs, Volume= 0.054 af, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
	33	74	>75% Grass cover, Good, HSG C
*	4,546	98	Parking Lot
	4,579	98	Weighted Average
	33		0.72% Pervious Area
	4,546		99.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	79	0.0330	1.66		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.45"

Summary for Subcatchment 1B: Watershed 1B

Runoff = 0.52 cfs @ 12.01 hrs, Volume= 0.034 af, Depth= 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
	386	74	>75% Grass cover, Good, HSG C
*	2,690	98	Parking Lot
	3,076	95	Weighted Average
	386		12.55% Pervious Area
	2,690		87.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	64	0.0225	1.37		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.45"

Summary for Subcatchment 1C: Watershed 1C

Runoff = 0.56 cfs @ 12.01 hrs, Volume= 0.037 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
	244	74	>75% Grass cover, Good, HSG C
*	3,039	98	Parking Lot
	3,283	96	Weighted Average
	244		7.43% Pervious Area
	3,039		92.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	57	0.0305	1.51		**Sheet Flow, A->B** Smooth surfaces n= 0.011 P2= 3.45"
0.3	53	0.0162	2.58		**Shallow Concentrated Flow, B->C** Paved Kv= 20.3 fps
0.9	110	Total			

Summary for Subcatchment 1D: Watershed 1D

Runoff = 0.25 cfs @ 12.01 hrs, Volume= 0.017 af, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
	44	74	>75% Grass cover, Good, HSG C
*	1,411	98	Parking Lot
	1,455	97	Weighted Average
	44		3.02% Pervious Area
	1,411		96.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	42	0.0129	1.01		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.45"

Summary for Pond 7P: Trench Drain

Inflow Area = 0.033 ac, 96.98% Impervious, Inflow Depth = 6.05" for 25-Year event
Inflow = 0.25 cfs @ 12.01 hrs, Volume= 0.017 af
Outflow = 0.25 cfs @ 12.01 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.01 hrs, Volume= 0.017 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 24.37' @ 12.02 hrs
Flood Elev= 25.96'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.35'	**12.0" Round 12" HDPE** L= 31.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 23.35' / 21.33' S= 0.0652 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.01 hrs HW=24.21' TW=24.27' (Dynamic Tailwater)
1=12" HDPE (Controls 0.00 cfs)

Summary for Pond 8P: Ex. Drainage Manhole

Inflow Area = 0.351 ac, 92.81% Impervious, Inflow Depth = 6.01" for 25-Year event
Inflow = 2.57 cfs @ 12.02 hrs, Volume= 0.176 af
Outflow = 2.57 cfs @ 12.02 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.0 min
Primary = 2.57 cfs @ 12.02 hrs, Volume= 0.176 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 24.37' @ 12.02 hrs
Flood Elev= 26.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	21.33'	**12.0" Round 12" HDPE** L= 101.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.33' / 20.31' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.55 cfs @ 12.02 hrs HW=24.35' TW=23.52' (Dynamic Tailwater)
1=12" HDPE (Outlet Controls 2.55 cfs @ 3.24 fps)

Summary for Pond 9P: Relocated Drain Inlet

Inflow Area = 0.071 ac, 87.45% Impervious, Inflow Depth = 5.82" for 25-Year event
Inflow = 0.52 cfs @ 12.01 hrs, Volume= 0.034 af
Outflow = 0.52 cfs @ 12.01 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.01 hrs, Volume= 0.034 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 24.39' @ 12.02 hrs
Flood Elev= 25.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	22.15'	**12.0" Round 12" HDPE** L= 38.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 22.15' / 21.33' S= 0.0215 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.01 hrs HW=24.25' TW=24.28' (Dynamic Tailwater)
1=12" HDPE (Controls 0.00 cfs)

Summary for Pond 10P: Ex. Drain Inlet

Inflow Area = 0.105 ac, 99.28% Impervious, Inflow Depth = 6.17" for 25-Year event
Inflow = 0.79 cfs @ 12.01 hrs, Volume= 0.054 af
Outflow = 0.79 cfs @ 12.01 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min
Primary = 0.79 cfs @ 12.01 hrs, Volume= 0.054 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.59' @ 12.02 hrs
Flood Elev= 23.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.75'	**12.0" Round 12" HDPE** L= 43.9' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.75' / 20.31' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.45 cfs @ 12.01 hrs HW=23.53' TW=23.51' (Dynamic Tailwater)
↑—**1=12" HDPE** (Inlet Controls 0.45 cfs @ 0.57 fps)

Summary for Pond 11P: Ex. Drain Inlet

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 6.03" for 25-Year event
Inflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af
Outflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min
Primary = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.54' @ 12.02 hrs
Flood Elev= 23.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.31'	**12.0" Round 12" HDPE** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.31' / 20.17' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.89 cfs @ 12.02 hrs HW=23.52' TW=21.82' (Dynamic Tailwater)
↑—**1=12" HDPE** (Inlet Controls 3.89 cfs @ 4.95 fps)

Summary for Pond 12P: Ex. Hydrodynamic Separator WQv = 0.43 cfs 25-Year = 3.65 CFS

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 6.03" for 25-Year event
Inflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af
Outflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min
Primary = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 21.83' @ 12.02 hrs
Flood Elev= 24.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.17'	**15.0" Round Ex. 15" HDPE** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.17' / 19.73' S= 0.0081 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.89 cfs @ 12.02 hrs HW=21.82' TW=21.12' (Dynamic Tailwater)
1=Ex. 15" HDPE (Inlet Controls 3.89 cfs @ 3.17 fps)

Summary for Pond 13P: Ex. Manhole

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 6.03" for 25-Year event
Inflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af
Outflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min
Primary = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 21.13' @ 12.02 hrs
Flood Elev= 24.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.73'	**15.0" Round Ex. 15" HDPE** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 19.73' / 19.69' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.89 cfs @ 12.02 hrs HW=21.12' TW=0.00' (Dynamic Tailwater)
1=Ex. 15" HDPE (Barrel Controls 3.89 cfs @ 3.55 fps)

Summary for Reach DP-1: DP-1

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 6.03" for 25-Year event
Inflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af
Outflow = 3.91 cfs @ 12.02 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3

Summary for Subcatchment 1A: Watershed 1A

Runoff = 0.16 cfs @ 12.01 hrs, Volume= 0.010 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Parking Rainfall=1.38"

	Area (sf)	CN	Description
	33	74	>75% Grass cover, Good, HSG C
*	4,546	98	Parking Lot
	4,579	98	Weighted Average
	33		0.72% Pervious Area
	4,546		99.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	79	0.0330	1.66		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.45"

Summary for Subcatchment 1B: Watershed 1B

Runoff = 0.09 cfs @ 12.01 hrs, Volume= 0.005 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Parking Rainfall=1.38"

	Area (sf)	CN	Description
	386	74	>75% Grass cover, Good, HSG C
*	2,690	98	Parking Lot
	3,076	95	Weighted Average
	386		12.55% Pervious Area
	2,690		87.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	64	0.0225	1.37		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.45"

Summary for Subcatchment 1C: Watershed 1C

Runoff = 0.10 cfs @ 12.01 hrs, Volume= 0.006 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Parking Rainfall=1.38"

	Area (sf)	CN	Description
	244	74	>75% Grass cover, Good, HSG C
*	3,039	98	Parking Lot
	3,283	96	Weighted Average
	244		7.43% Pervious Area
	3,039		92.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	57	0.0305	1.51		**Sheet Flow, A->B** Smooth surfaces n= 0.011 P2= 3.45"
0.3	53	0.0162	2.58		**Shallow Concentrated Flow, B->C** Paved Kv= 20.3 fps
0.9	110	Total			

Summary for Subcatchment 1D: Watershed 1D

Runoff = 0.05 cfs @ 12.01 hrs, Volume= 0.003 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Parking Rainfall=1.38"

	Area (sf)	CN	Description
	44	74	>75% Grass cover, Good, HSG C
*	1,411	98	Parking Lot
	1,455	97	Weighted Average
	44		3.02% Pervious Area
	1,411		96.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	42	0.0129	1.01		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.45"

Summary for Pond 7P: Trench Drain

Inflow Area = 0.033 ac, 96.98% Impervious, Inflow Depth = 1.07" for WQv Parking event
Inflow = 0.05 cfs @ 12.01 hrs, Volume= 0.003 af
Outflow = 0.05 cfs @ 12.01 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.01 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.47' @ 12.01 hrs
Flood Elev= 25.96'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.35'	**12.0" Round 12" HDPE** L= 31.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 23.35' / 21.33' S= 0.0652 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.05 cfs @ 12.01 hrs HW=23.47' TW=21.55' (Dynamic Tailwater)
↑—**1=12" HDPE** (Inlet Controls 0.05 cfs @ 0.93 fps)

Summary for Pond 8P: Ex. Drainage Manhole

Inflow Area = 0.351 ac, 92.81% Impervious, Inflow Depth = 1.03" for WQv Parking event
Inflow = 0.17 cfs @ 12.01 hrs, Volume= 0.030 af
Outflow = 0.17 cfs @ 12.01 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.01 hrs, Volume= 0.030 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 21.56' @ 12.01 hrs
Flood Elev= 26.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	21.33'	**12.0" Round 12" HDPE** L= 101.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 21.33' / 20.31' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.17 cfs @ 12.01 hrs HW=21.55' TW=20.71' (Dynamic Tailwater)
↑—**1=12" HDPE** (Inlet Controls 0.17 cfs @ 1.27 fps)

Summary for Pond 9P: Relocated Drain Inlet

Inflow Area = 0.071 ac, 87.45% Impervious, Inflow Depth = 0.90" for WQv Parking event
Inflow = 0.09 cfs @ 12.01 hrs, Volume= 0.005 af
Outflow = 0.09 cfs @ 12.01 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min
Primary = 0.09 cfs @ 12.01 hrs, Volume= 0.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.31' @ 12.01 hrs
Flood Elev= 25.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	22.15'	**12.0" Round 12" HDPE** L= 38.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 22.15' / 21.33' S= 0.0215 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.09 cfs @ 12.01 hrs HW=22.31' TW=21.55' (Dynamic Tailwater)
↑—**1=12" HDPE** (Inlet Controls 0.09 cfs @ 1.08 fps)

Summary for Pond 10P: Ex. Drain Inlet

Inflow Area = 0.105 ac, 99.28% Impervious, Inflow Depth = 1.16" for WQv Parking event
Inflow = 0.16 cfs @ 12.01 hrs, Volume= 0.010 af
Outflow = 0.16 cfs @ 12.01 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min
Primary = 0.16 cfs @ 12.01 hrs, Volume= 0.010 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 20.99' @ 12.01 hrs
Flood Elev= 23.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.75'	**12.0" Round 12" HDPE** L= 43.9' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.75' / 20.31' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.16 cfs @ 12.01 hrs HW=20.99' TW=20.71' (Dynamic Tailwater)
↑—**1=12" HDPE** (Outlet Controls 0.16 cfs @ 1.70 fps)

Summary for Pond 11P: Ex. Drain Inlet

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 1.05" for WQv Parking event
Inflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af
Outflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 20.71' @ 12.01 hrs
Flood Elev= 23.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.31'	**12.0" Round 12" HDPE** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.31' / 20.17' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.43 cfs @ 12.01 hrs HW=20.71' TW=20.52' (Dynamic Tailwater)
↑—**1=12" HDPE** (Outlet Controls 0.43 cfs @ 2.16 fps)

Summary for Pond 12P: Ex. Hydrodynamic Separator WQv = 0.43 cfs 25-Year = 3.65 CFS

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 1.05" for WQv Parking event
Inflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af
Outflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 20.52' @ 12.01 hrs
Flood Elev= 24.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	20.17'	**15.0" Round Ex. 15" HDPE** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 20.17' / 19.73' S= 0.0081 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.43 cfs @ 12.01 hrs HW=20.52' TW=20.11' (Dynamic Tailwater)
1=Ex. 15" HDPE (Outlet Controls 0.43 cfs @ 2.28 fps)

Summary for Pond 13P: Ex. Manhole

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 1.05" for WQv Parking event
Inflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af
Outflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 20.12' @ 12.01 hrs
Flood Elev= 24.12'

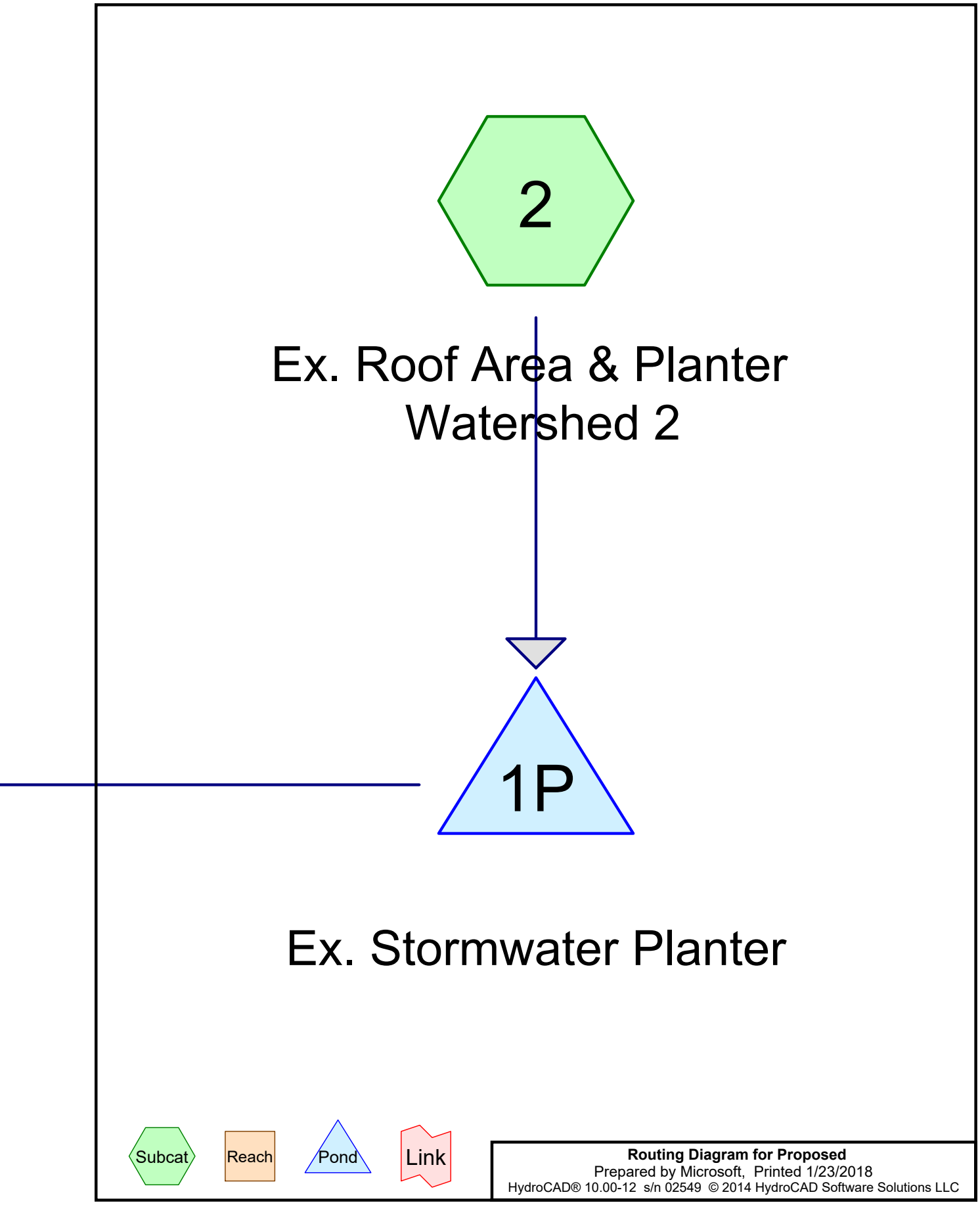
Device	Routing	Invert	Outlet Devices
#1	Primary	19.73'	**15.0" Round Ex. 15" HDPE** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 19.73' / 19.69' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.43 cfs @ 12.01 hrs HW=20.11' TW=0.00' (Dynamic Tailwater)
1=Ex. 15" HDPE (Barrel Controls 0.43 cfs @ 2.01 fps)

Summary for Reach DP-1: DP-1

Inflow Area = 0.531 ac, 94.06% Impervious, Inflow Depth = 1.05" for WQv Parking event
Inflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af
Outflow = 0.43 cfs @ 12.01 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3



Routing Diagram for Proposed
Prepared by Microsoft, Printed 1/23/2018

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.015	79	Planter (2)
0.232	98	Roof (2)

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.247	Other	2

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.015	0.015	Planter	2
0.000	0.000	0.000	0.000	0.232	0.232	Roof	2

Summary for Pond 1P: Ex. Stormwater Planter

Inflow Area = 0.247 ac, 93.78% Impervious, Inflow Depth = 6.05" for 25-Year event
Inflow = 1.84 cfs @ 12.01 hrs, Volume= 0.125 af
Outflow = 1.81 cfs @ 12.02 hrs, Volume= 0.125 af, Atten= 1%, Lag= 0.5 min
Primary = 1.81 cfs @ 12.02 hrs, Volume= 0.125 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 27.86' @ 12.02 hrs Surf.Area= 669 sf Storage= 907 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 132.4 min (878.7 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1	26.50'	1,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.50	669	0	0
28.00	669	1,004	1,004

Device	Routing	Invert	Outlet Devices
#1	Primary	23.50'	**12.0" Round Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 23.50' / 21.33' S= 0.0339 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	27.75'	**6.0" Horiz. Orifice/Grate X 10.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	26.50'	**2.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=1.81 cfs @ 12.02 hrs HW=27.86' TW=24.32' (Dynamic Tailwater)
↑**1=Culvert** (Passes 1.81 cfs of 5.61 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 1.78 cfs @ 1.07 fps)
3=Exfiltration (Exfiltration Controls 0.03 cfs)

Summary for Subcatchment 2: Ex. Roof Area & Planter Watershed 2

Runoff = 1.84 cfs @ 12.01 hrs, Volume= 0.125 af, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
*	10,086	98	Roof
*	669	79	Planter
	10,755	97	Weighted Average
	669		6.22% Pervious Area
	10,086		93.78% Impervious Area

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

Summary for Pond 1P: Ex. Stormwater Planter

Inflow Area = 0.247 ac, 93.78% Impervious, Inflow Depth = 1.34" for WQv Ex. Roof event
Inflow = 0.44 cfs @ 12.01 hrs, Volume= 0.028 af
Outflow = 0.03 cfs @ 11.59 hrs, Volume= 0.028 af, Atten= 93%, Lag= 0.0 min
Primary = 0.03 cfs @ 11.59 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 27.18' @ 12.96 hrs Surf.Area= 669 sf Storage= 452 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 111.4 min (891.7 - 780.3)

Volume	Invert	Avail.Storage	Storage Description
#1	26.50'	1,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.50	669	0	0
28.00	669	1,004	1,004

Device	Routing	Invert	Outlet Devices
#1	Primary	23.50'	**12.0" Round Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 23.50' / 21.33' S= 0.0339 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	27.75'	**6.0" Horiz. Orifice/Grate X 10.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	26.50'	**2.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.03 cfs @ 11.59 hrs HW=26.52' TW=21.46' (Dynamic Tailwater)
↑**1=Culvert** (Passes 0.03 cfs of 4.74 cfs potential flow)
↑**2=Orifice/Grate** (Controls 0.00 cfs)
3=Exfiltration (Exfiltration Controls 0.03 cfs)

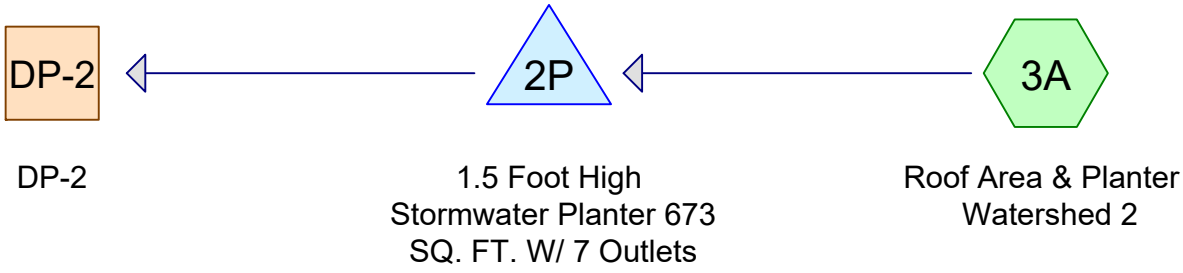
Summary for Subcatchment 2: Ex. Roof Area & Planter Watershed 2

Runoff = 0.44 cfs @ 12.01 hrs, Volume= 0.028 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Ex. Roof Rainfall=1.66"

	Area (sf)	CN	Description
*	10,086	98	Roof
*	669	79	Planter
	10,755	97	Weighted Average
	669		6.22% Pervious Area
	10,086		93.78% Impervious Area

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



Subcat Reach Pond Link

Routing Diagram for Proposed
Prepared by Microsoft, Printed 1/23/2018

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.015	79	Planter (3A)
0.323	98	Roof (3A)

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.339	Other	3A

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.015	0.015	Planter	3A
0.000	0.000	0.000	0.000	0.323	0.323	Roof	3A

Summary for Pond 2P: 1.5 Foot High Stormwater Planter 673 SQ. FT. W/ 7 Outlets

Inflow Area = 0.339 ac, 95.44% Impervious, Inflow Depth = 6.05" for 25-Year event
Inflow = 2.53 cfs @ 12.01 hrs, Volume= 0.171 af
Outflow = 2.48 cfs @ 12.02 hrs, Volume= 0.171 af, Atten= 2%, Lag= 0.5 min
Primary = 2.48 cfs @ 12.02 hrs, Volume= 0.171 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.42' @ 12.02 hrs Surf.Area= 673 sf Storage= 954 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 114.3 min (860.6 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1	22.00'	1,010 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.00	673	0	0
23.50	673	1,010	1,010

Device	Routing	Invert	Outlet Devices
#1	Primary	19.15'	**12.0" Round Culvert** L= 19.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 19.15' / 18.97' S= 0.0095 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	23.25'	**7.0" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	22.00'	**2.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=2.47 cfs @ 12.02 hrs HW=23.42' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 2.47 cfs of 5.79 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 2.44 cfs @ 1.33 fps)
3=Exfiltration (Exfiltration Controls 0.03 cfs)

Summary for Subcatchment 3A: Roof Area & Planter Watershed 2

Runoff = 2.53 cfs @ 12.01 hrs, Volume= 0.171 af, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
*	14,082	98	Roof
*	673	79	Planter
	14,755	97	Weighted Average
	673		4.56% Pervious Area
	14,082		95.44% Impervious Area

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

Summary for Reach DP-2: DP-2

Inflow Area = 0.483 ac, 90.88% Impervious, Inflow Depth = 5.91" for 25-Year event
Inflow = 3.50 cfs @ 12.02 hrs, Volume= 0.238 af
Outflow = 3.50 cfs @ 12.02 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3

Summary for Pond 2P: 1.5 Foot High Stormwater Planter 673 SQ. FT. W/ 7 Outlets

Inflow Area = 0.339 ac, 95.44% Impervious, Inflow Depth = 1.42" for WQv Prop. Roof event
Inflow = 0.64 cfs @ 12.01 hrs, Volume= 0.040 af
Outflow = 0.03 cfs @ 11.28 hrs, Volume= 0.040 af, Atten= 95%, Lag= 0.0 min
Primary = 0.03 cfs @ 11.28 hrs, Volume= 0.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.14' @ 13.79 hrs Surf.Area= 673 sf Storage= 765 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 208.6 min (987.4 - 778.8)

Volume	Invert	Avail.Storage	Storage Description
#1	22.00'	1,010 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.00	673	0	0
23.50	673	1,010	1,010

Device	Routing	Invert	Outlet Devices
#1	Primary	19.15'	**12.0" Round Culvert** L= 19.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 19.15' / 18.97' S= 0.0095 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	23.25'	**7.0" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	22.00'	**2.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.03 cfs @ 11.28 hrs HW=22.02' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 0.03 cfs of 4.59 cfs potential flow)
↑**2=Orifice/Grate** (Controls 0.00 cfs)
3=Exfiltration (Exfiltration Controls 0.03 cfs)

Summary for Subcatchment 3A: Roof Area & Planter Watershed 2

Runoff = 0.64 cfs @ 12.01 hrs, Volume= 0.040 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Prop. Roof Rainfall=1.74"

	Area (sf)	CN	Description
*	14,082	98	Roof
*	673	79	Planter
	14,755	97	Weighted Average
	673		4.56% Pervious Area
	14,082		95.44% Impervious Area

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

Summary for Reach DP-2: DP-2

Inflow Area = 0.483 ac, 90.88% Impervious, Inflow Depth = 1.32" for WQv Prop. Roof event
Inflow = 0.25 cfs @ 12.01 hrs, Volume= 0.053 af
Outflow = 0.25 cfs @ 12.01 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3

7.) AquaSwirl Sizing Chart & Spec Sheet

Aqua-Swirl™ Sizing Chart *(English)*

Aqua-Swirl™ Model	Swirl Chamber Diameter (ft.)	Maximum Stub-Out Pipe Outer Diameter (in.)		Water Quality Treatment Flow[2] (cfs)	Oil/Debris Storage Capacity (gal)	Sediment Storage Capacity (ft^3)
		On/Offline	CFD[1]			
AS-2	2.50	8	12	1.1	37	10
AS-3	3.25	10	16	1.8	110	20
AS-4	4.25	12	18	3.2	190	32
AS-5	5.00	12	24	4.4	270	45
AS-6	6.00	14	30	6.3	390	65
AS-7	7.00	16	36	8.6	540	90
AS-8	8.00	18	42	11.2	710	115
AS-9	9.00	20	48	14.2	910	145
AS-10	10.0	22	54	17.5	1130	180
AS-12	12.0	24	48	25.2	1698	270
AS-XX	Custom	--	--	>26	--	--

***Higher water quality treatment flow rates can be designed with multiple swirls.**

1) *The **Aqua-Swirl™ Conveyance Flow Diversion (CFD)** provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe. Please refer to your local representative for more information.*

2) *Many regulatory agencies are establishing "water quality treatment flow rates" for their areas based on the initial movement of pollutants into the storm drainage system. The treatment flow rate of the Aqua-Swirl™ system is engineered to meet or exceed the local water quality treatment criteria. This **"water quality treatment flow rate"** typically represents approximately 90% to 95% of the total annual runoff volume.*

The design and orientation of the Aqua-Filter™ generally entails some degree of customization. For assistance in design and specific sizing using historical rainfall data, please refer to an AquaShield™ representative or visit our website at www.AquaShieldInc.com. CAD details and specifications are available upon request.

Aqua-Swirl®
Stormwater Treatment System

Inspection and Maintenance Manual

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Chattanooga, TN 37343
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Phone: (423) 870-8888
Fax: (423) 826-2112
Email: info@aquashieldinc.com
www.aquashieldinc.com

March 2014

Table of Contents

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Fax (423) 870-2112
www.aquashieldinc.com

AquaShield™, Inc
Stormwater Treatment Solutions

The highest priority of AquaShield™, Inc. (AquaShield™) is to protect waterways by providing stormwater treatment solutions to businesses across the world. These solutions have a reliable foundation based on over 20 years of water treatment experience.

Local regulators, engineers, and contractors have praised the AquaShield™ systems for their simple design and ease of installation. All the systems are fabricated from high performance, durable and lightweight materials. Contractors prefer the quick and simple installation of our structures that saves them money.

The patented line of AquaShield™ stormwater treatment products that provide high levels of stormwater treatment include the following:

- **Aqua-Swirl® Stormwater Treatment System:** hydrodynamic separator, which provides a highly effective means for the removal of sediment, floating debris and free-oil.

- **Aqua-Filter™ Stormwater Filtration System:** treatment train stormwater filtration system capable of removing gross contaminants, fine sediments, waterborne hydrocarbons, heavy metals and total phosphorous.

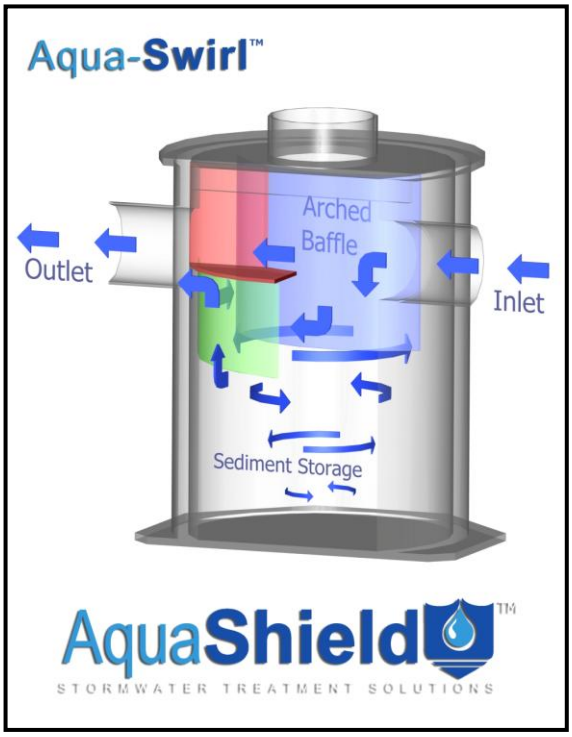
Aqua-Swirl® Stormwater Treatment System

Aqua-Filter™ Stormwater Filtration System

Aqua-Swirl® Stormwater Treatment System

The patented Aqua-Swirl® Stormwater Treatment System is a single chamber hydrodynamic separator which provides a highly effective means for the removal of sediment, free oil, and floating debris. Both treatment and storage are accomplished in the swirl chamber without the use of multiple or "blind" chambers. Independent laboratory and field performance verifications have shown that the Aqua-Swirl® achieves over 80% suspended solids removal efficiency on a net annual basis.

The Aqua-Swirl® is most commonly installed in an "off-line" configuration. Or, depending on local regulations, an "in-line" (on-line) conveyance flow diversion (CFD) system can be used. The CFD model allows simple installation by connecting directly to the existing storm conveyance pipe thereby providing full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe.



The patented Aqua-Swirl® Stormwater Treatment System provides a highly effective means for the removal of sediment, floating debris, and free oil. Swirl technology, or vortex separation, is a proven form of treatment utilized in the stormwater industry to accelerate gravitational separation.

Floatable debris in the Aqua-Swirl®

Each Aqua-Swirl® is constructed of high performance, lightweight and durable materials including polymer coated steel (PCS), high density polyethylene (HDPE), or fiberglass reinforced polymer (FRP). These materials eliminate the need for heavy lifting equipment during installation.

System Operation

The treatment operation begins when stormwater enters the Aqua-Swirl® through a tangential inlet pipe that produces a circular (or vortex) flow pattern that causes contaminates to settle to the base of the unit. Since stormwater flow is intermittent by nature, the Aqua-Swirl® retains water between storm events providing both dynamic and quiescent settling of solids. The dynamic settling occurs during each storm event while the quiescent settling takes place between successive storms. A combination of gravitational and hydrodynamic drag forces encourages the solids to drop out of the flow and migrate to the center of the chamber where velocities are the lowest.

The treated flow then exits the Aqua-Swirl® behind the arched outer baffle. The top of the baffle is sealed across the treatment channel, thereby eliminating floatable pollutants from escaping the system. A vent pipe is extended up the riser to expose the backside of the baffle to atmospheric conditions, preventing a siphon from forming at the bottom of the baffle.

Custom Applications

The Aqua-Swirl® system can be modified to fit a variety of purposes in the field, and the angles for inlet and outlet lines can be modified to fit most applications. The photo below demonstrates the flexibility of Aqua-Swirl® installations using a “twin” configuration in order to double the

water quality treatment capacity. Two Aqua-Swirl® units were placed side by side in order to treat a high volume of water while occupying a small amount of space.

Custom designed AS-9 Twin Aqua-Swirl®

Retrofit Applications

The Aqua-Swirl® system is designed so that it can easily be used for retrofit applications. With the invert of the inlet and outlet pipe at the same elevation, the Aqua-Swirl® can easily be connected directly to the existing storm conveyance drainage system. Furthermore, because of the lightweight nature and small footprint of the Aqua-Swirl®, existing infrastructure utilities (i.e., wires, poles, trees) would be unaffected by installation.

AquaShield™ Product System Maintenance

The long term performance of any stormwater treatment structure, including manufactured or land based systems, depends on a consistent maintenance plan. Inspection and maintenance functions are simple and easy for the AquaShield™ Stormwater Treatment Systems allowing all inspections to be performed from the surface.

It is important that a routine inspection and maintenance program be established for each unit based on: (a) the volume or load of the contaminants of concern, (b) the frequency of releases of contaminants at the facility or location, and (c) the nature of the area being drained.

In order to ensure that our systems are being maintained properly, AquaShield™ offers a maintenance solution to all of our customers. We will arrange to have maintenance performed.

Inspection

All AquaShield™ products can be inspected from the surface, eliminating the need to enter the systems to determine when cleanout should be performed. In most cases, AquaShield™ recommends a quarterly inspection for the first year of operation to develop an appropriate schedule of maintenance. Based on experience of the system's first year in operation, we recommend that the inspection schedule be revised to reflect the site-specific conditions encountered. Typically, the inspection schedule for subsequent years is reduced to semi-annual inspection.

Aqua-Swirl® Maintenance

The Aqua-Swirl® has been designed to minimize and simplify the inspection and maintenance process. The single chamber system can be inspected and maintained entirely from the surface thereby eliminating the need for confined space entry. Furthermore, the entire structure (specifically, the floor) is accessible for visual inspection from the surface. There are no areas of the structure that are blocked from visual inspection or periodic cleaning. Inspection of any free-floating oil and floatable debris can be directly observed and maintained through the manhole access provided directly over the swirl chamber.

Aqua-Swirl® Inspection Procedure

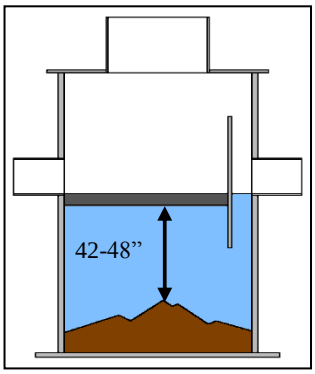
To inspect the Aqua-Swirl®, a hook is needed to remove the manhole cover. AquaShield™ provides a customized manhole cover with our distinctive logo to make it easy for maintenance crews to locate the system in the field. We also provide a permanent metal information plate

affixed inside the access riser which provides our contact information, the Aqua-Swirl® model size, and serial number.

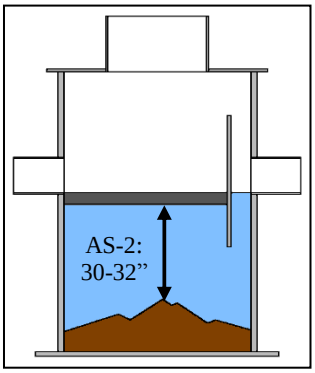
The only tools needed to inspect the Aqua-Swirl® system are a flashlight and a measuring device such as a stadia rod or pole. Given the easy and direct accessibility provided, floating oil and debris can be observed directly from the surface. Sediment depths can easily be determined by lowering a measuring device to the top of the sediment pile and to the surface of the water.

Sediment inspection using a stadia rod in a single chamber

The maintenance trigger for Aqua-Swirl® Models AS-3 through AS-13 occurs when the sediment pile is within 42 to 48 inches of the standing water surface. For the Aqua-Swirl® Model AS-2, maintenance is needed when the top of the sediment pile is measured to be 30 to 32 inches below the standing water surface.



Maintenance trigger for Aqua-Swirl® Models AS-3 through AS-13 occurs when sediment pile is 42-48 inches below water surface.



Maintenance trigger for Aqua-Swirl® Model AS-2 occurs when sediment pile is 30 to 32 inches below water surface.

It should be noted that in order to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the *top* of the sediment pile. Keep in mind that the finer sediment at the top of the pile may offer less resistance to the measuring device than the larger particles which typically occur deeper within the sediment pile.

The Aqua-Swirl® design allows for the sediment to accumulate in a semi-conical fashion as illustrated above. That is, the depth to sediment as measured below the water surface may be less in the center of the swirl chamber; and likewise, may be greater at the edges of the swirl chamber.

Aqua-Swirl® Cleanout Procedure

Cleaning the Aqua-Swirl® is simple and quick. Free-floating oil and floatable debris can be observed and removed directly through the 30-inch service access riser provided. A vacuum truck is typically used to remove the accumulated sediment and debris. An advantage of the Aqua-Swirl® design is that the entire sediment storage area can be reached with a vacuum hose from the surface (reaching all the sides). Since there are no multiple or limited (hidden or "blind") chambers in the Aqua-Swirl®, there are no restrictions to impede on-site maintenance tasks.

Disposal of Recovered Materials

Disposal of recovered material is typically handled in the same fashion as catch basin cleanouts. AquaShield™ recommends that all maintenance activities be performed in accordance with appropriate health and safety practices for the tasks and equipment being used.

AquaShield™ also recommends that all materials removed from the Aqua-Swirl® and any external structures (e.g, bypass features) be handled and disposed in full accordance with any applicable local and state requirements.

Vacuum truck quickly cleans the Aqua-Swirl® from a single chamber

Aqua-Swirl® Inspection and Maintenance Work Sheets on following pages

Aqua-Swirl® Inspection and Maintenance Manual
Work Sheets

SITE and OWNER INFORMATION

Site Name: _____

Site Location: _____

Date: _____ Time: _____

Inspector Name: _____

Inspector Company: _____ Phone #: _____

Owner Name: _____

Owner Address: _____

Owner Phone #: _____ Emergency Phone #: _____

INSPECTIONS

I. Floatable Debris and Oil

1. Remove manhole lid to expose liquid surface of the Aqua-Swirl®.
2. Remove floatable debris with basket or net if any present.
3. If oil is present, measure its depth. Clean liquids from system if one half (½) inch or more oil is present.

   Note: Water in Aqua-Swirl® can appear black and similar to oil due to the dark body of the surrounding structure. Oil may appear darker than water in the system and is usually accompanied by oil stained debris (e.g. Styrofoam, etc.). The depth of oil can be measured with an oil/water interface probe, a stadia rod with water finding paste, a coliwasa, or collect a representative sample with a jar attached to a rod.

II. Sediment Accumulation

1. Lower measuring device (e.g. stadia rod) into swirl chamber through service access provided until top of sediment pile is reached.
2. Record distance to top of sediment pile from top of standing water: _____ inches
3. For Aqua-Swirl® Models AS-3 through AS-13, schedule cleaning if value in Step #2 is 48 to 42 inches or less.
4. For Aqua-Swirl® Model AS-2, schedule cleaning if value in Step #2 is 32 to 30 inches or less.

III. Diversion Structures (External Bypass Features)

If a diversion (external bypass) configuration is present, it should be inspected as follows:

1. Inspect weir or other bypass feature for structural decay or damage. Weirs are more susceptible to damage than off-set piping and should be checked to confirm that they are not crumbling (concrete or brick) or decaying (steel).
2. Inspect diversion structure and bypass piping for signs of structural damage or blockage from debris or sediment accumulation.
3. When feasible, measure elevations on diversion weir or piping to ensure it is consistent with site plan designs.
4. Inspect downstream (convergence) structure(s) for sign of blockage or structural failure as noted above.

CLEANING

Schedule cleaning with local vactor company or AquaShield™ to remove sediment, oil and other floatable pollutants. The captured material generally does not require special treatment or handling for disposal. Site-specific conditions or the presence of known contaminants may necessitate that appropriate actions be taken to clean and dispose of materials captured and retained by the Aqua-Swirl®. All cleaning activities should be performed in accordance with property health and safety procedures.

AquaShield™ always recommends that all materials removed from the Aqua-Swirl® during the maintenance process be handled and disposed in accordance with local and state environmental or other regulatory requirements.

MAINTENANCE SCHEDULE

I. During Construction

Inspect the Aqua-Swirl® every three (3) months and clean the system as needed. The Aqua-Swirl® should be inspected and cleaned at the end of construction regardless of whether it has reached its maintenance trigger.

II. First Year Post-Construction

Inspect the Aqua-Swirl® every three (3) months and clean the system as needed.

Inspect and clean the system once annually regardless of whether it has reached its sediment or floatable pollutant storage capacity.

III. Second and Subsequent Years Post-Construction

If the Aqua-Swirl® did not reach full sediment or floatable pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned once annually.

If the Aqua-Swirl® reached full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once

every six (6) months and cleaned as needed. The Aqua-Swirl® should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.

IV. Bypass Structures

Bypass structures should be inspected whenever the Aqua-Swirl® is inspected. Maintenance should be performed on bypass structures as needed.

MAINTENANCE COMPANY INFORMATION

Company Name: _____

Street Address: _____

City: _____ State/Prov.:_____ Zip/Postal Code: _____

Contact: _____ Title: _____

Office Phone: _____ Cell Phone: _____

ACTIVITY LOG

Date of Cleaning: _____ (Next inspection should be 3 months from this data for first year).

Time of Cleaning: Start: _____ End: _____

Date of Next Inspection: _____

Floatable debris present: Yes No

Notes: _____

_____

_____

Oil present: Yes No Oil depth (inches): _____

Measurement method and notes: _____

_____

_____

STRUCTURAL CONDITIONS and OBSERVATIONS

Structural damage: Yes No Where: _____

Structural wear: Yes No Where: _____

Odors present: Yes No Describe: _____

Clogging: Yes No Describe: _____

Other Observations: _____

_____

_____

NOTES

Additional Comments and/or Actions To Be Taken	Time Frame

ATTACHMENTS

- Attach site plan showing Aqua-Swirl® location.
- Attach detail drawing showing Aqua-Swirl® dimensions and model number.
- If a diversion configuration is used, attach details showing basic design and elevations (where feasible).

Aqua-Swirl®

TABULAR MAINTENANCE SCHEDULE

Date Construction Started: _____

Date Construction Ended: _____

During Construction

	Month											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Inspect and Clean as needed			X			X			X			X
Inspect Bypass and maintain as needed			X			X			X			X
Clean System*												X*

* The Aqua-Swirl® should be cleaned **once a year** regardless of whether it has reached full pollutant storage capacity. In addition, the system should be cleaned at the **end of construction** regardless of whether it has reach full pollutant storage capacity.

First Year Post-Construction

	Month											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Inspect and Clean as needed			X			X			X			X
Inspect Bypass and maintain as needed			X			X			X			X
Clean System*												X*

* The Aqua-Swirl® should be cleaned **once a year** regardless of whether it has reached full pollutant storage capacity.

Second and Subsequent Years Post-Construction

	Month											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Inspect and Clean as needed												X*
Inspect Bypass, maintain as needed												X*
Clean System*												X*

* If the Aqua-Swirl® did **not** reach full sediment or floatable pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned once annually.

If the Aqua-Swirl® **reached** full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once every six (6) months or more frequently if past history warrants, and cleaned as needed. The Aqua-Swirl® should be cleaned annually regardless of whether it reaches its full sediment or floatable pollutant capacity.

8.) Stormwater Management Construction Checklists

APPENDIX H

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION SITE LOG BOOK

Table of Contents

Properly completing forms such as those contained in Appendix H meet the inspection requirement of NYS-DEC SPDES GP for Construction Activities. Completed forms shall be kept on site at all times and made available to authorities upon request.

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name _____

Permit No. _____ **Date of Authorization** _____

Name of Operator _____

Prime Contractor _____

a. Preamble to Site Assessment and Inspections

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Operators Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law.

Name (please print): _____

Title _____ **Date:** _____

Address: _____

Phone: _____ **Email:** _____

Signature: _____

c. Qualified Professional's Credentials & Certification

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print): _____

Title _____ **Date:** _____

Address: _____

Phone: _____ **Email:** _____

Signature: _____

d. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page _____
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? _____

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:
Inspection Forms will be filled out during the entire construction phase of the project.
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

(4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass
water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

CONSTRUCTION DURATION INSPECTIONS **Page 1 of _____**

SITE PLAN/SKETCH

Inspector (print name)	**Date of Inspection**
Qualified Professional (print name)	**Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions

Yes No NA
[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Runoff Control Practices

1. Excavation Dewatering

Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader

Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No NA
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Runoff Control Practices (continued)

4. Stone Check Dam
Yes No NA
[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles
Yes No NA
[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation
Yes No NA
[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Stabilized Construction Entrance
Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence
Yes No NA
[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices)

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:
1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

III. Monthly Summary of Site Inspection Activities

Name of Permitted Facility:	Today's Date:	Reporting Month:
Location:	Permit Identification #:	
Name and Telephone Number of Site Inspector:		

Date of Inspection	Regular / Rainfall based Inspection	Name of Inspector	Items of Concern

Owner/Operator Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

Name of Permittee or Duly Authorized Representative Date

Duly authorized representatives must have written authorization, submitted to DEC, to sign any permit documents.

NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity
Permit Number GP-02-01
Monthly Summary of Site Inspection Activities

Name of Permitted Facility:	**Permit Identification #:**	
Location:	**Today's Date:**	**Reporting Month:**
Name and Telephone Number of Site Inspector:	**Name and Telephone Number of Site Inspector:**	

Permit Reference; Part III.D.3.b (page 15):

"The operator shall post at the site, in a publicly-accessible location, a summary of the site inspection activities on a monthly basis."

Date of Inspection	Type of Inspection and 24 hr Rainfall	Name of Qualified Professional conducting Site Inspections	Major items of concern related to compliance of the SWPPP with all conditions of the general permit	Date Corrected

Owner/Operator Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative | Name of Permittee or Duly Authorized Representative | Date

Duly authorized representatives of the Permittee (Owner/Operator) must have written authorization, submitted to DEC, to sign any permit documents.

Inspection and Maintenance Checklist
Catch Basins, Manholes, and Inlets

Date: _____

Type of Inspection: Storm ☐ Weekly ☐ Monthly ☐ Annual ☐

Site: _____ Inspector(s): _____

Description or location of Project: _____

Defect	Conditions when Maintenance is Needed	Maintenance (1 or 2)*	Comments
General			
Trash and Debris	Trash and debris which are located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.		
	Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.		
	Trash or debris in any inlet or outlet pipe blocking more then 1/3 of its height.		
	Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).		
Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.		
Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider then ¼ inch.		
	Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab. Frame not securely attached.		

*Maintenance: Enter 1 if maintenance is needed. Enter 2 if maintenance was preformed same day.

Defect	Conditions when Maintenance is Needed	Maintenance (1 or 2)*	Comments
Fractures or Cracks in Basin Walls/Bottom	Maintenance person judges that structure is unsound.		
	Grout fillet has separated or cracked wider then ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.		
Settlement/Misalignment	If failure of basin has created a safety, function, or design problem.		
Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.		
	Vegetation growing in inlet/outlet pipe joints that is more than 6 inches tall and less than 6 inches apart.		
Contamination and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.		
Catch Basin Cover			
Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.		
Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than ½ inch of thread.		
Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance).		
Ladder			
Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.		
Metal Grates (If Applicable)			
Grate opening Unsafe	Grate with opening wider than 7/8 inch.		
Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.		
Damaged or Missing	Grate missing or broken member(s) of the grate.		

*Maintenance: Enter 1 if maintenance is needed. Enter 2 if maintenance was preformed same day.

Inspection and Maintenance Checklist
Conveyance Systems (Pipes & Ditches)

Date: _____

Type of Inspection: Storm ☐ Weekly ☐ Monthly ☐ Annual ☐

Site: _____ Inspector(s): _____

Defect	Conditions When Maintenance is Needed	Maintenance (1 or 2)*	Comments
Pipes			
Sediment & Debris	Accumulated Sediment that exceeds 20% of the diameter of the pipe.		
Vegetation	Vegetation that reduces free movement of water through pipes		
Damaged Pipe	Protective coating is damaged; rust is causing more than 50% deterioration to any part of pipe.		
	Any dent that decreases the cross section area of pipe by more than 20% or puncture that impacts performance.		
Open Ditches			
Trash and Debris	Trash and debris > 5 cf/1000 sf (one standard size garbage can) Visual evidence of dumping		
Sediment	Accumulated sediment that exceeds 20% of the design depth.		
Vegetation	Vegetation that reduces free movement of water through ditches.		
Erosion Damage to Slopes and Channel Bottom	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.		
Rock Lining Out of Place or Missing (If Applicable)	Maintenance person can see native soil beneath the rock lining.		

*Maintenance: Enter 1 if maintenance is needed. Enter 2 if maintenance was preformed same day.