STORMWATER MANAGEMENT PLAN & DRAINAGE ANALYSIS

191 Ashford Avenue
Village of Dobbs Ferry – New York

March 23, 2021
Revised June 15, 2021

Hudson Engineering & Consulting, P.C.
45 Knollwood Road – Suite 201
Elmsford, NY 10523
(914) 909-0420

STORMWATER MANAGEMENT
PLAN & DRAINAGE ANALYSIS
191 Ashford Avenue
Village of Dobbs Ferry – New York

INTRODUCTION

This Stormwater Management Plan presents the proposed Best Management Practices (BMPs) to control erosion and sedimentation and manage stormwater during and upon construction of proposed mixed-use building, parking, and driveway 191 Ashford Avenue in the Village of Dobbs Ferry, Westchester County, New York.

This Plan consists of this narrative and a plan set entitled: "Proposed Building, Village of Dobbs Ferry, Westchester County - New York", all as prepared by Hudson Engineering and Consulting, P.C., Elmsford, New York, revised June 15, 2021. The design is in accordance with the Village of Dobbs Ferry requirements. Since the project disturbance is less than one acre the New York State Department of Environmental Conservation [NYSDEC] stormwater regulations are not applicable.

METHODOLOGY

The stormwater analysis was developed utilizing the Soil Conservation Service (SCS) TR-20, 24-hour Type III storm events (HydroCad®) to assist with the design of the mitigating practices. The "Curve Number" (CN) value determination is based on soil type, vegetation and land use. The design is in accordance with the Village of Dobbs Ferry stormwater regulations. The "Time of Concentration" (T_c) was determined as a direct entry of one-minute. The CN and T_c data are input into the computer model. The project site was modeled for the 100-year Type III – 24-hour storm event.

PRE-DESIGN INVESTIGATIVE ANALYSIS

A pre-design investigative analysis was performed including percolation and deep-hole tests in the location shown on the plans.

Percolation tests were completed as follows: A 42-inch deep test hole was excavated from grade with an approximate diameter of 8-inches. 4-inch diameter pipes were inserted into the percolation holes and backfilled around. The holes were pre-soaked for 24 hours prior to running the tests:

- TP-1: A percolation rate of 0.33-minutes per inch (181.82-inches per hour) was observed. A 30-inches per hour was utilized in the design.

A deep-hole test was also excavated and labeled TP-1 as shown on the plan.

- TP-1 was excavated to a depth of 98-inches. The test revealed topsoil to a depth of 6-inches, concrete and stone to a depth of 12-inches, brown sandy silt with rocks to a depth of 48-inches, loosely compact brown sandy loam with rocks to a depth of 98-inches. Ledge rock was observed at a depth of 98 inches. No groundwater was encountered during the testing.

The deep-hole test log and percolation test data sheets are attached.

PRE-DEVELOPED CONDITION

In the pre-developed condition, the site is characterized as sloping from the west to east. The soil classification, based upon Westchester County Soils Mapping is urban land-Paxton complex 8-15 percent slopes and urban land-Woodbridge complex 3-8 percent slopes. The site vegetation can be characterized as a building and parking lot. The site is located along the north side of Ashford Avenue.

POST-DEVELOPED CONDITION

The project site was modeled as one watershed, Watershed 1, analyzed as follows:

Watershed 1 contains a tributary area of approximately 15,160 square feet, all of which are impervious in the form of proposed building and parking lot. The CN value for this area is 98 and the Time of Concentration (Tc) is a direct entry of 1 minute. The runoff from this tributary area is conveyed via a comprehensive drainage system to twenty-seven (27) Cultec Recharger® 330XLHD, set in one foot of gravel at the sides and invert. The system is designed to fully accept (no release) the entire stormwater runoff volume for the 100-year storm event from the watershed and ex-filtrate the runoff into the surrounding soil sub-strata. An existing 12” overflow pipe will remain to capture any storm event over the 100-year storm.

CONSTRUCTION SEQUENCING

The following erosion control schedule shall be utilized:

1. Establish a construction entrance to the development area.
2. Establish construction staging area.
3. Selective vegetation removal for silt fence installation.
4. Install silt fence down slope of all areas to be disturbed as shown on the plan.

5. 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.

6. Demolish any existing site features and/or structures noted as being removed on the construction documents, and dispose of off-site.

7. Rough grade site.

8. Excavate and install exfiltration systems per manufacturer's recommendations and requirements. Exfiltration systems shall be temporarily plugged until the completion of construction and the site is stabilized.

9. Install all pretreatment devices, catch basins and piping.

10. Excavate and construct foundation.

11. Construct building

12. Fine grade and seed all disturbed areas. Clean drain lines, catch basins, pretreatment devices and exfiltration systems. Ensure grass stand is achieved.

13. Unplug infiltration/exfiltration/ systems. Connect all proposed piping to previously installed exfiltration/attenuation galleries.

14. Install 4"-6" topsoil, fine grade, seed the entire project site and install landscape plantings. Spread salt hay over seeded areas.

15. De-compact and aerate all disturbed areas to be planted (lawn & landscaping) utilizing Model AE401H5T Aerator as manufactured by Billy Goat.

16. Pave parking lot as shown on plans

17. 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.

EROSION ANDSEDIMENT 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. 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.

Planned erosion and sedimentation control practices during construction include the installation, inspection and maintenance of the inlet protection, soil stockpile areas, and diversion swales 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 Erosion and Sediment Control, November 2016
- New York State General Permit for Stormwater Discharges, GP-0-20-001 (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 velocity 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.

  <u>Maintenance</u>

  Silt fencing shall be inspected at a minimum of once per week and prior to and within 24 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 secured 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 24 hours with new fence section. Any sediment build-up against the fence shall be removed within 24 hours and deposited on-site a minimum of 100 feet outside of any wetland or watercourse.

The installation of silt fencing will be maintained or replaced until the fencing is no longer necessary. Once the site is stabilized, all silt fences shall be removed. The immediate area occupied by the silt fence will be shaped to an acceptable grade and stabilized.

- **INLET PROTECTION**

After catch basins and surface inlets have been installed, these drain inlets will receive stormwater from the roadways, driveways, and surrounding overland watersheds. In order to protect the receiving waters from sedimentation, the contractor shall install stone and block inlet protection as shown on the plans. Once installed, ¾ inch stone aggregate shall be installed 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.

The stone barrier should have a minimum height of 1 foot and a maximum height of 2 feet. Do not use mortar. The height should be limited to prevent excess ponding and bypass flow. Recess the first course of blocks at least 2 inches below the crest opening of the storm drain for lateral support. Subsequent courses can be supported laterally if needed by placing a 2x4 inch wood stud through the block openings perpendicular to the course. The bottom row should have a few blocks oriented so flow can drain through the block to dewater the basin area. The stone should be placed just below the top of the blocks on slopes of 2:1 or flatter. Place hardware cloth of wire mesh with ½ inch openings over all block openings to hold stone in place.

As an optional design, the concrete blocks may be omitted and the entire structure constructed of stone, ringing the outlet (“doughnut”). The stone should be kept at a 3:1 slope toward the inlet to keep it from being washed into the inlet.

A level area 1 foot wide and four inches below the crest will further prevent wash. Stone on the slope toward the inlet should be at least 3 inches in size for stability and 1 inch or smaller away from the inlet to control flow rate. The elevation of the top of the stone crest must be maintained 6 inches lower than the ground elevation down slope from the inlet to ensure that all storm flows pass over the stone into the storm drain and not past the structure.

The barrier should be inspected after each rain event and repairs made within 24 hours. Remove sediment as necessary to provide for accurate storage volume for subsequent rains. Upon stabilization of contributing drainage

area, remove all materials and any unstable soil and dispose of properly. Bring the disturbed area to proper grade, smooth, compact and stabilized in a manner appropriate to the site.

Maintenance

Stone Aggregate: The stone aggregate shall be inspected weekly prior to and within 24 hours following a rain event ½" or greater. Care shall be taken to ensure that all stone aggregate is 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 24 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 ROCKSTOCKPILING**

All soil and shot rock stripped from the construction area during grubbing and mass grading shall be stockpiled in locations shown on the plans, 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 (during the May 1st – October 30th) planting season or covering the stockpile with tarpaulin the remainder of the year. Install silt fence around toe of slope.

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 or tarpaulin and prior to and within 24 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. 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 areas will be protected from erosion with the use of vegetative measures (i.e., grass seed mix, sod) hydro mulch netting or hay. When activities temporarily cease during construction, soil stockpiles and exposed soil should be stabilized by seed, mulch or other appropriate measures within7 days after construction activity has ceased, or 24 hours prior to a rain event ½" or greater.

  All seeded areas will be re-seeded areas as necessary and mulched according to the site plan to maintain a vigorous, dense vegetative cover,

  Erosion control barriers (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, 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 Town Engineer. Materials that may be used for mulching include straw, hay, salt hay, wood fiber, synthetic soil stabilizers, mulch netting, sod or hydro mulch. In site areas where significant erosion potential exists (steep slopes) and where specifically directed by the Town'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.

- **Temporary Stabilization(May 1st through October 31st planting season)**

  The following seeding application should be used depending on the time of year.

- Spring/summer or early fall, seed the area with ryegrass (annual or perennial) at 30 lbs. per acre (Approximately 0.7 lb/1000 sq. ft. or use 1 lb/1000 sq. ft.).

- Late fall or early winter, seed Certified 'Aroostook' winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs/1000 sq. ft.).

- **Permanent Stabilization(May 1st through October 31st planting season)**

1. Provide minimum of four (4) inches topsoil for all new lawn areas. Top dress all existing disturbed lawn areas with two (2) inches of topsoil.

2. Grass seed shall be evenly sown by mechanical seeder at a rate of 3.0-4.0 pounds per 1,000 square feet.

3. Fine rake, roll and water to a depth of one inch all seeded areas.

4. Apply air-dried hay or straw mulch to provide 90% coverage of surface (approximately 90 lbs. per 1,000 SF). Use small grain straw where mulch is maintained for more than three months

5. Contractor shall provide, at his own expense, protection against trespassing and other damage to lawn areas.

6. Lawn seed mix shall include:

a. General Recreation areas and lawns:

- 65% Kentucky Bluegrass blend
- 20% Perennial Rye
- 15% Fine fescue

Sod may be used as an alternate to seeding in select areas.

Slow release fertilizers will be applied by hand to horticultural plantings as part of regular horticultural maintenance program and shall be limited to a single spring application.

CONSTRUCTION PRACTICES TO MINIMIZE STORMWATER CONTAMINATION

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.

- 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.

- 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.

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:

- Minimize the use of road salt for maintenance of driveway areas.

- Drainage inlets shall be vacuum swept twice a year, at the conclusion of the landscape season in the fall and at the conclusion of the sand and de-icing season in the spring. Inspect exfiltration/attenuation gallery for sediment and remove same if found.

The permanent maintenance program will be managed by the future homeowners upon completion of construction and acceptance of the improvements.

CONCLUSION

The stormwater management plan proposed meets all the requirements set forth by the Village of Dobbs ferry. Design modification requirements that may occur during the approval process will be performed and submitted for review to the Village of Dobbs Ferry.

Map Scale: 1:355 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 15 30 60 90

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 16, Jun 11, 2020

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

Date(s) aerial images were photographed: Jul 21, 2014—Aug 27, 2014

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
UpC	Urban land-Paxton complex, 8 to 15 percent slopes	D	0.1	14.3%
UwB	Urban land-Woodbridge complex, 3 to 8 percent slopes	D	0.4	85.7%
Totals for Area of Interest			**0.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

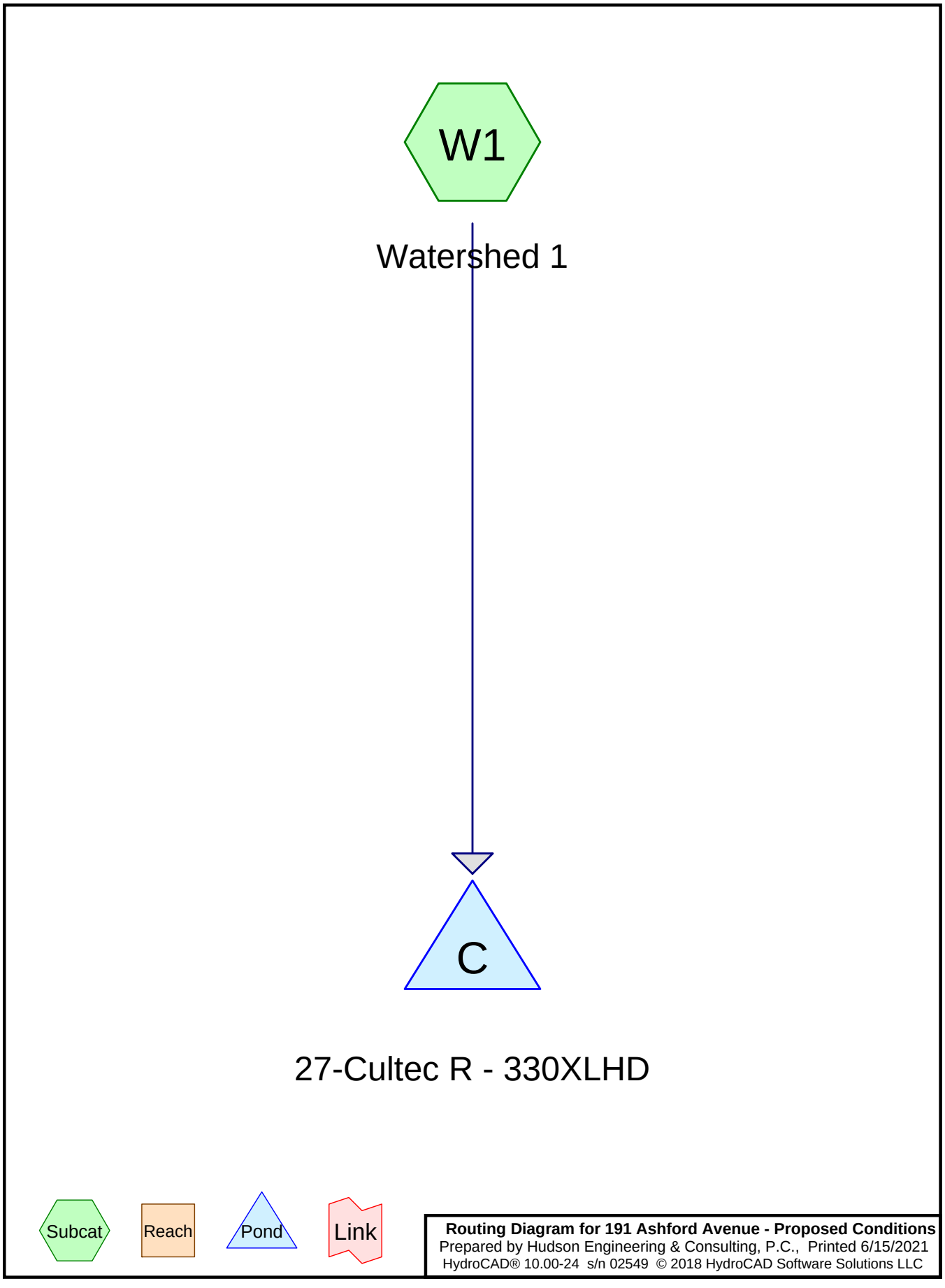
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Routing Diagram for 191 Ashford Avenue - Proposed Conditions
Prepared by Hudson Engineering & Consulting, P.C., Printed 6/15/2021
HydroCAD® 10.00-24 s/n 02549 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment W1: Watershed 1

Runoff = 1.15 cfs @ 12.01 hrs, Volume= 3,321 cf, Depth= 2.63"

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 1-Year Rainfall=2.86"

	Area (sf)	CN	Description
*	7,713	98	Parking Lot
*	7,447	98	Building
	15,160	98	Weighted Average
	15,160		100.00% Impervious Area

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

Summary for Pond C: 27-Cultec R - 330XLHD

Inflow Area = 15,160 sf,100.00% Impervious, Inflow Depth = 2.63" for 1-Year event
Inflow = 1.15 cfs @ 12.01 hrs, Volume= 3,321 cf
Outflow = 0.74 cfs @ 11.96 hrs, Volume= 3,321 cf, Atten= 36%, Lag= 0.0 min
Discarded = 0.74 cfs @ 11.96 hrs, Volume= 3,321 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 0.35' @ 12.08 hrs Surf.Area= 1,064 sf Storage= 111 cf

Plug-Flow detention time= 0.5 min calculated for 3,321 cf (100% of inflow)
Center-of-Mass det. time= 0.5 min (754.7 - 754.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	698 cf	**16.00'W x 66.50'L x 3.54'H Field A** 3,768 cf Overall - 1,442 cf Embedded = 2,327 cf x 30.0% Voids
#2A	1.00'	1,442 cf	**Cultec R-330XLHD** x 27 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		2,140 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**30.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.74 cfs @ 11.96 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.74 cfs)

Summary for Subcatchment W1: Watershed 1

Runoff = 1.39 cfs @ 12.01 hrs, Volume= 4,064 cf, Depth= 3.22"

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 2-Year Rainfall=3.45"

	Area (sf)	CN	Description
*	7,713	98	Parking Lot
*	7,447	98	Building
	15,160	98	Weighted Average
	15,160		100.00% Impervious Area

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

Summary for Pond C: 27-Cultec R - 330XLHD

Inflow Area = 15,160 sf,100.00% Impervious, Inflow Depth = 3.22" for 2-Year event
Inflow = 1.39 cfs @ 12.01 hrs, Volume= 4,064 cf
Outflow = 0.74 cfs @ 11.94 hrs, Volume= 4,064 cf, Atten= 47%, Lag= 0.0 min
Discarded = 0.74 cfs @ 11.94 hrs, Volume= 4,064 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 0.67' @ 12.10 hrs Surf.Area= 1,064 sf Storage= 213 cf

Plug-Flow detention time= 0.9 min calculated for 4,063 cf (100% of inflow)
Center-of-Mass det. time= 0.9 min (751.1 - 750.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	698 cf	**16.00'W x 66.50'L x 3.54'H Field A** 3,768 cf Overall - 1,442 cf Embedded = 2,327 cf x 30.0% Voids
#2A	1.00'	1,442 cf	**Cultec R-330XLHD** x 27 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		2,140 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**30.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.74 cfs @ 11.94 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.74 cfs)

Summary for Subcatchment W1: Watershed 1

Runoff = 2.08 cfs @ 12.01 hrs, Volume= 6,169 cf, Depth= 4.88"

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 10-Year Rainfall=5.12"

	Area (sf)	CN	Description
*	7,713	98	Parking Lot
*	7,447	98	Building
	15,160	98	Weighted Average
	15,160		100.00% Impervious Area

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

Summary for Pond C: 27-Cultec R - 330XLHD

Inflow Area = 15,160 sf,100.00% Impervious, Inflow Depth = 4.88" for 10-Year event
Inflow = 2.08 cfs @ 12.01 hrs, Volume= 6,169 cf
Outflow = 0.74 cfs @ 11.86 hrs, Volume= 6,169 cf, Atten= 64%, Lag= 0.0 min
Discarded = 0.74 cfs @ 11.86 hrs, Volume= 6,169 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 1.31' @ 12.18 hrs Surf.Area= 1,064 sf Storage= 583 cf

Plug-Flow detention time= 2.9 min calculated for 6,168 cf (100% of inflow)
Center-of-Mass det. time= 2.9 min (745.8 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	698 cf	**16.00'W x 66.50'L x 3.54'H Field A** 3,768 cf Overall - 1,442 cf Embedded = 2,327 cf x 30.0% Voids
#2A	1.00'	1,442 cf	**Cultec R-330XLHD** x 27 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		2,140 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**30.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.74 cfs @ 11.86 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.74 cfs)

Summary for Subcatchment W1: Watershed 1

Runoff = 2.61 cfs @ 12.01 hrs, Volume= 7,797 cf, 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
*	7,713	98	Parking Lot
*	7,447	98	Building
	15,160	98	Weighted Average
	15,160		100.00% Impervious Area

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

Summary for Pond C: 27-Cultec R - 330XLHD

Inflow Area = 15,160 sf,100.00% Impervious, Inflow Depth = 6.17" for 25-Year event
Inflow = 2.61 cfs @ 12.01 hrs, Volume= 7,797 cf
Outflow = 0.74 cfs @ 11.77 hrs, Volume= 7,797 cf, Atten= 72%, Lag= 0.0 min
Discarded = 0.74 cfs @ 11.77 hrs, Volume= 7,797 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 1.83' @ 12.28 hrs Surf.Area= 1,064 sf Storage= 1,016 cf

Plug-Flow detention time= 5.4 min calculated for 7,795 cf (100% of inflow)
Center-of-Mass det. time= 5.4 min (744.9 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	698 cf	**16.00'W x 66.50'L x 3.54'H Field A** 3,768 cf Overall - 1,442 cf Embedded = 2,327 cf x 30.0% Voids
#2A	1.00'	1,442 cf	**Cultec R-330XLHD** x 27 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		2,140 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**30.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.74 cfs @ 11.77 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.74 cfs)

Summary for Subcatchment W1: Watershed 1

Runoff = 3.63 cfs @ 12.01 hrs, Volume= 10,965 cf, Depth= 8.68"

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 100-Year Rainfall=8.92"

	Area (sf)	CN	Description
*	7,713	98	Parking Lot
*	7,447	98	Building
	15,160	98	Weighted Average
	15,160		100.00% Impervious Area

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

Summary for Pond C: 27-Cultec R - 330XLHD

Inflow Area = 15,160 sf,100.00% Impervious, Inflow Depth = 8.68" for 100-Year event
Inflow = 3.63 cfs @ 12.01 hrs, Volume= 10,965 cf
Outflow = 0.74 cfs @ 11.66 hrs, Volume= 10,965 cf, Atten= 80%, Lag= 0.0 min
Discarded = 0.74 cfs @ 11.66 hrs, Volume= 10,965 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 3.35' @ 12.38 hrs Surf.Area= 1,064 sf Storage= 2,070 cf

Plug-Flow detention time= 12.3 min calculated for 10,964 cf (100% of inflow)
Center-of-Mass det. time= 12.2 min (747.5 - 735.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	698 cf	**16.00'W x 66.50'L x 3.54'H Field A** 3,768 cf Overall - 1,442 cf Embedded = 2,327 cf x 30.0% Voids
#2A	1.00'	1,442 cf	**Cultec R-330XLHD** x 27 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		2,140 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**30.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.74 cfs @ 11.66 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.74 cfs)

Summary for Subcatchment W1: Watershed 1

Runoff = 0.64 cfs @ 12.01 hrs, Volume= 1,804 cf, Depth= 1.43"

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 Rainfall=1.65"

	Area (sf)	CN	Description
*	7,713	98	Parking Lot
*	7,447	98	Building
	15,160	98	Weighted Average
	15,160		100.00% Impervious Area

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

Summary for Pond C: 27-Cultec R - 330XLHD

Inflow Area = 15,160 sf,100.00% Impervious, Inflow Depth = 1.43" for WQv event
Inflow = 0.64 cfs @ 12.01 hrs, Volume= 1,804 cf
Outflow = 0.64 cfs @ 12.02 hrs, Volume= 1,804 cf, Atten= 1%, Lag= 0.3 min
Discarded = 0.64 cfs @ 12.02 hrs, Volume= 1,804 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 0.03' @ 12.02 hrs Surf.Area= 1,064 sf Storage= 10 cf

Plug-Flow detention time= 0.3 min calculated for 1,804 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (768.2 - 768.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	698 cf	**16.00'W x 66.50'L x 3.54'H Field A** 3,768 cf Overall - 1,442 cf Embedded = 2,327 cf x 30.0% Voids
#2A	1.00'	1,442 cf	**Cultec R-330XLHD** x 27 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		2,140 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**30.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.74 cfs @ 12.02 hrs HW=0.03' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.74 cfs)

HUDSON ENGINEERING & CONSULTING, P.C.

SITE ADDRESS: 191 Ashford Avenue

TOWN/VILLAGE: Dobbs Ferry

DATE: 03-09-2021 TIME: 10:40am

WEATHER: Sunny TEMP. 55° F

WITNESSED BY: Nicholas Shirriah

DEEP TEST HOLE DATA SHEET – STORMWATER MANAGEMENT SYSTEM

DEPTH	HOLE NO. 1	HOLE NO. 2	HOLE NO. 3	HOLE NO. 4
G.L.	0 – 6" Topsoil			
6"				
12"	6 – 12"			
18"	Concrete/Stone			
24"				
30"	12 – 48"			
36"	Brown Sandy			
42"	Silt w/ rocks			
48"				
54"	48 – 98"			
60"	Loosely Compact			
66"	Brown sandy			
72"	Loam w/ rocks			
78"				
84"	No GW			
90"	Ledge @ 98"			
96"				
102"				
108"				

- *Indicate level at which Ground Water (GW), Mottling and/or Ledge Rock is encountered.*
- *Indicate level for which water level rises after being encountered.*

EXCAVATION PERFORMED BY: Cortese Construction

45 Knollwood Road - Elmsford, NY 10523 (914) 909-0420 Fax (914) 560-2086

HUDSON ENGINEERING & CONSULTING, P.C.

SITE ADDRESS: 191 Ashford Avenue

TOWN/VILLAGE: Dobbs Ferry

DATE: 03-09-2021 TIME: 10:45am

WEATHER: Sunny TEMP. 53˚ F

WITNESSED BY: Nicholas Shirriah

PERCOLATION TEST HOLE DATA SHEET – STORMWATER MANAGEMENT SYSTEM

Owner _____

HOLE #	CLOCK TIME				PERCOLATION				
					Depth to Water From Ground Surface			Soil Rate	
Hole Number	Run No.	Start	Stop	Elapse Time (Min.)	Start Inches	Stop Inches	Water Level in Inches Drop in inches	Min. per inch	Inches per Hour
# 1	1	11:15	11:22	8	22	46	24	0.33	181.82
	2	11:22	11:30	8	22	46	24	0.33	181.82
4" Ø	3	11:31	11:39	8	22	46	24	0.33	181.82
	4								
	5								
# ___	1								
	2								
4" Ø	3								
	4								
	5								
# ___	1								
	2								
4" Ø	3								
	4								
	5								

Notes:

1) Tests to be repeated at the same depth until approximately equal soil rates are obtained at each percolation test hole. All data to be submitted for review.
2) Depth measurements to be made from top of hole