



Storm Water Pollution Prevention Plan (SWPPP)

FOR
Costco Wholesale
at Crossgates Mall
Town of Guilderland
Albany County, New York

October 28, 2019

Prepared For
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MC Project No. 13001204A





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INTRODUCTION

The parcel consists of approximately 14.86 acres which exist in the TOD (Transit Oriented Development) Zoning District. It is proposed to develop the site into a Costco Wholesale with associated infrastructure. The site will be serviced by municipal water and sewer. The proposed development and site improvements on this site require a study of the impacts on watercourses in and around the site. This study reviews the existing drainage conditions, as well as the proposed improvements to provide measures that will be used to control potential impacts due to storm water runoff. Due to the size and type of the project, a State Pollutant Discharge Elimination System Permit (SPDES GP-0-15-002) is required from the New York State Department of Environmental Conservation (NYSDEC).

Runoff from the site flows towards the north property line. This runoff discharges into a storm sewer system in Crossgates Mall Road which discharges to a tributary to Krum Kill. The tributary to Krum Kill (stream ID H-221-4-3) has a class A water quality. Mitigation for the increase in peak flow and to provide water quality benefits for this runoff shall be accomplished using a subsurface infiltration system, based on the requirements of Section 6.3 of the New York State Stormwater Management Design Manual. The infiltration system designed for the site provides the required water quality benefits, channel protection, overbank flood protection, and extreme flood protection. Runoff Reduction shall also be achieved through the aforementioned infiltration practices which are a standard Stormwater Management Practice (SMP) with Runoff Reduction Capacity as described in Table 3.5 of the updated New York State Storm Water Management Design Manual (NYSSMDM). An outlet control structure will be used in conjunction with the infiltration system to mitigate for peak flows prior to discharging off-site. Prior to entering the subsurface system, however, the runoff shall be pretreated through approved NYSDEC verified proprietary devices.

Also within the SWPPP is a discussion of the Erosion and Sediment Control Plan to be implemented during construction, and a long-term Operation & Maintenance Plan to be followed after construction is complete.

METHODOLOGY

1. The drainage areas are divided into subareas, by topography and land use. A summary of the drainage areas, composite curve numbers, and travel times are shown in Table 1.
2. Rainfall depths used for this analysis are those published by the Northeast Regional Climate Center for the project location for each storm event as directed in the NYSSMDM.
3. The required WQv was calculated in accordance with the Section 4.2 of the NYSSMDM. This is also the required RRv as per Section 4.3 of the NYSSMDM.
4. The peak flows from the drainage areas in the existing condition are computed using the runoff curve numbers taken from TR-55 to determine undeveloped peak runoff and runoff hydrographs at the design points. The existing peak flows are presented in the Table 2.
5. In the post-development condition, the peak flows from the proposed development are computed using the runoff curve numbers taken from TR-55. The drainage areas are adjusted for the proposed improvements and grading of the site. The runoff flows are hydraulically routed for updated travel times, diversions, and new storage structures as necessary. The resulting proposed peak flows at each design point are presented in Table 2.

6. Three Contech CDS Units were sized to pre-treat runoff from the site prior to its entrance into the subsurface infiltration system.
7. A full Erosion & Sediment Control Plan (plans and construction sequencing) was designed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (aka the “blue book”) and is included in this report.
8. A Long term Operation & Maintenance Plan was developed for the proposed post-construction stormwater control practices and is included in this report.
9. Maps indicating the various drainage conditions are enclosed in the appendix of this report. Schematic diagrams of the flow models in the existing and proposed conditions are enclosed in the HydroCAD output included in the appendix of this report.
10. The methods used are those presented in the HydroCAD computer program. The 100, 10, and 1-year frequency storms are studied. The SCS Type II - 24-hour storm distribution is used throughout. Soil types and hydrologic groups are based on soil maps from the NRCS online Web Soil Survey (included in appendix). Topographical mapping is taken from site-specific aerial mapping, confirmed by using ground survey techniques. Additional off-site information taken from USGS maps.

TABLE 1: Summary Table

Predevelopment			
Drainage Area	Area, Ac	CN	Tc, Hrs
Pre DA #1	7.436	52	0.1167
Pre DA #2A	3.818	48	0.0517
Pre DA #2B	0.778	44	0.2867
Pre DA #2C	2.545	54	0.0933
Pre DA #3	1.227	45	0.1233
Pre DA #4	2.347	53	0.1267
Total	18.151	51	
Post Development			
Post DA #1A	0.139	47	0.0867
Post DA #1B	0.017	59	0.0833
Post DA #1C	1.005	44	0.1433
Post DA #2	15.312	89	0.1667
Post DA #3	0.961	52	0.1133
Post DA #4	0.717	62	0.0833
Total	18.151	89	

The Time of Concentration (Tc) paths are shown on the Drainage Area Maps found in the Appendix.

TABLE 2: Predevelopment and Post Development Peak Flow Summary to the Design Points

Design Point	Storm Event (Yr)	Predevelopment Peak Flow (Cfs)	Post Development Peak Flow (Cfs)	Net Change (Cfs)	Percent Change Over Prior Conditions
POI #1	10	10.27	0.63	-9.64	-94%
	100	22.10	1.59	-20.51	-93%
POI #2	10	4.17	3.55	-0.62	-15%
	100	8.04	6.94	-1.10	-14%
AOI #3	10	0.63	1.15	+0.52	+83%
	100	1.68	2.34	+0.66	+39%
LOI #4	10	2.89	1.63	-1.26	-44%
	100	5.77	2.98	-2.79	-48%
Combined	10	17.96	6.96	-11.00	-61%
	100	37.59	13.85	-23.74	-63%

Reduced peak flows at POI #1 are a result of diversions from the proposed grading/drainage design that creates a smaller area draining to this point (Pre DA #1 to Post DA #1A, Post DA #1B, and Post DA #1C).

Reduced peak flows at POI #2 are a result of the subsurface infiltration basin and its outlet control structure. While more area is draining to POI #2 (Pre DA #2A, Pre DA #2B, Pre DA #2C to Post DA #2), the infiltration basin and outlet control structure more than account for this increase in area.

The areas draining to POI #1, POI #2, and AOI #3 all discharge to the storm sewer system in Crossgates Mall Road. While there is an increase in peak flows at AOI #3, the reductions in peak flows entering the storm sewer system in Crossgates Mall Road at POI #1 and POI #2 are greater than the increased flow at AOI #3. Therefore, the peak flows entering the storm sewer system are reduced overall.

Reduced peak flows at LOI #4 are a result of diversions from the proposed grading/drainage design that creates a smaller area draining to this line (Pre DA #4 to Post DA #4).

The peak flow analysis demonstrates that the proposed development will result in a reduction in flow rates entering the tributary to Krum Kill. Additionally, the proposed development will not have any adverse impacts on the storm sewer system in Crossgates Mall Road nor the adjacent properties to the east of the subject property.

DISCUSSION

Zero-Net Increase:

The proposed storm water improvements for the site provide the required channel protection, overbank flood protection, and extreme flood protection. Reductions in peak flows have been accomplished, exceeding the zero net increase in peak flow requirement at the design points with the exception of AOI #3 which is explained on the previous page. For example, the peak runoff flow for the 100-year storm event was reduced from 8.04 cfs in the existing condition to 6.94 cfs in the proposed condition at Design Point POI #2, which is a 14% reduction. A 94% and 93% reduction is realized at DP POI #1 during the 10 and 100 year storm events respectively.

Pipe-Sizing:

The proposed drainage network (pipes, inlets, end sections) has been sized to adequately convey the 100-year storm event. Calculations and references for the pipe-sizing can be found in the Appendix of this document.

NRCS Soils:

The Web Soil Survey of Albany County, New York shows the site situated in an area having soil types, "CoC," "CoD," "EnA," "Gr," & "St." The hydrologic soil type for "CoC" and "CoD" is A. The hydrologic soil type for "EnA," "Gr," & "St" is A/D.

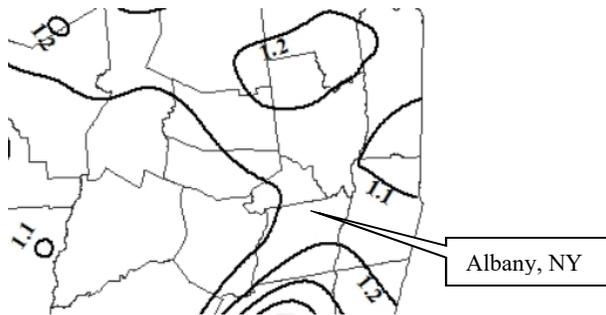
Wetlands & Floodplain:

A small strip of wetlands, approximately 10 to 20 feet wide and 350 feet long of some 4,051 square feet (0.093 ac.), is present on the site and is currently under Federal wetland regulatory jurisdiction. These wetlands occur at the bottom of a steeply-sided, man-altered drainage ditch. They occur to the northeast of the old Rapp Road (where an old drainage culvert exists) and extend to the northeast. At their terminus, they flow into an underground drainage system along Crossgates Mall Rd. They do not qualify as New York State Department of Environmental Conservation (NYSDEC) wetlands. An ACOE Nationwide Permit #39 is being sought to allow for the area to be piped into the existing underground drainage system and filled.

According to FEMA Flood Insurance Rate Maps 36001C0178D and 36001C0186D, which were both effective March 16, 2015, the site is outside the 100-year floodplain. The maps referenced in this section are included in the Appendix.

Water Quality Volume (WQv):

The Water Quality Volume (WQv) is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume. The WQv is directly related to the impervious cover created at a site. The 90% rainfall event value (P) used in the calculations (1.17) is shown below in the portion of Figure 4.1 from page 4.2 in the NYSSMDM.



90% Rule:

$$WQ_v = [(P)(R_v)(A)] / 12$$

$$R_v = 0.05 + 0.009(I)$$

I = Impervious Cover (Percent)

Minimum $R_v = 0.2$

P = 90% Rainfall Event Number (See Figure 4.1)

A = site area in acres

Maser Consulting (MC) determined the total impervious area for the project site. The Runoff Coefficient “ R_v ” in the computation of Water Quality Volume WQ_v is dependent on the percent impervious cover. As per Section 4.2 of the NYSSMDM, 100% of the water quality volume shall be treated.

Drainage Area	Area A Acres	90% Rainfall Event Number P Inches	Percent Impervious I %	Runoff Coefficient R_v	Required WQ_v Ac-ft	Required WQ_v Cf
Entire Site	18.151	1.17	75.14	0.726	1.285	55,989

Total Water Quality Volume provided is defined as the volume stored below the first major orifice, in this case the orifice at elevation 273.00. Therefore, the WQ_v provided is 57,577 cf. 24-Hour detention is provided within the proposed basin and can be seen on the Hydrograph provided within the HydroCAD output that can be found at the end of this report.

The Channel Protection Volume (CP_v) required calculation can be found in the Appendix. The CP_v provided is equal to the volume provided within the basin at the 10-year storm elevation which in this case is 2.289 acre-feet. This is greater than the 1.320 acre-feet required.

Runoff Reduction Volume (RR_v):

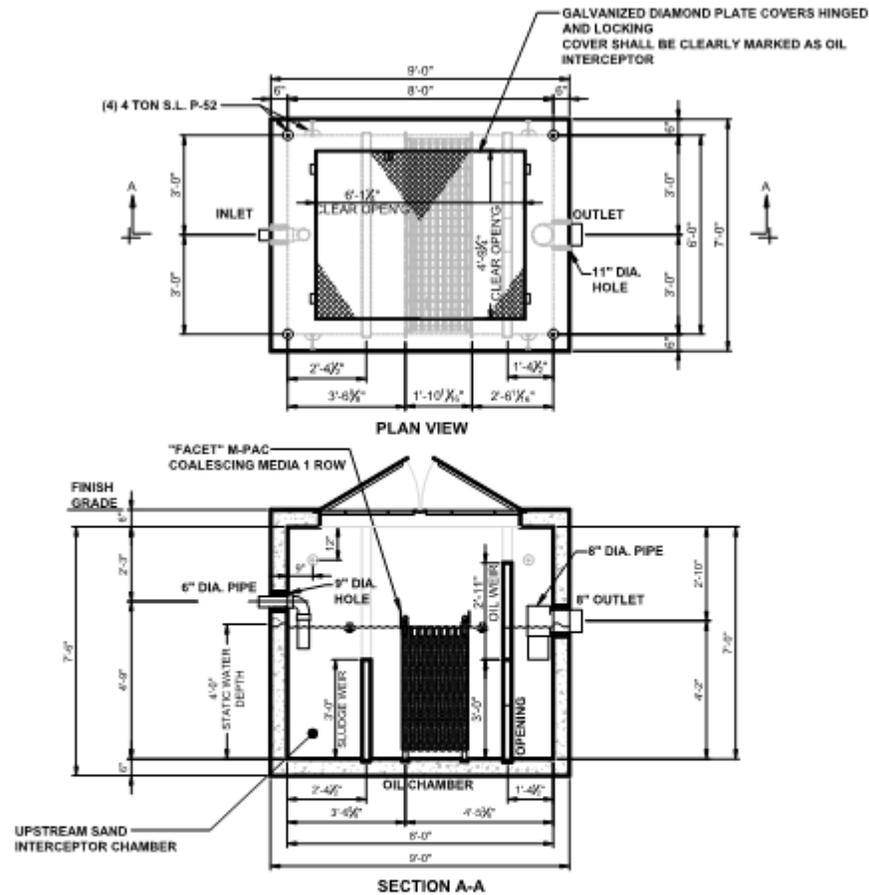
The runoff reduction volume requirements have been met through infiltrating the entire WQ_v using a subsurface StormTrap DoubleTrap infiltration system.

Hotspot treatment:

A stormwater hotspot is defined by NYSDEC as a land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants that are found in typical stormwater runoff, based on monitoring studies. If a site is designated a hotspot, stormwater runoff cannot be allowed to infiltrate untreated into groundwater, where it may contaminate water supplies. Table 4.3 in the NYSSMDM classifies vehicle fueling stations as stormwater hotspots.

An oil/water separator is proposed for this project to treat the runoff from the fuel facility. In addition, three CDS Stormwater Treatment Systems by Contech will be installed to pretreat all

runoff entering the subsurface infiltration basin to prevent pollutants from entering the facility and infiltrating into the ground or from being discharged into the receiving watercourse.



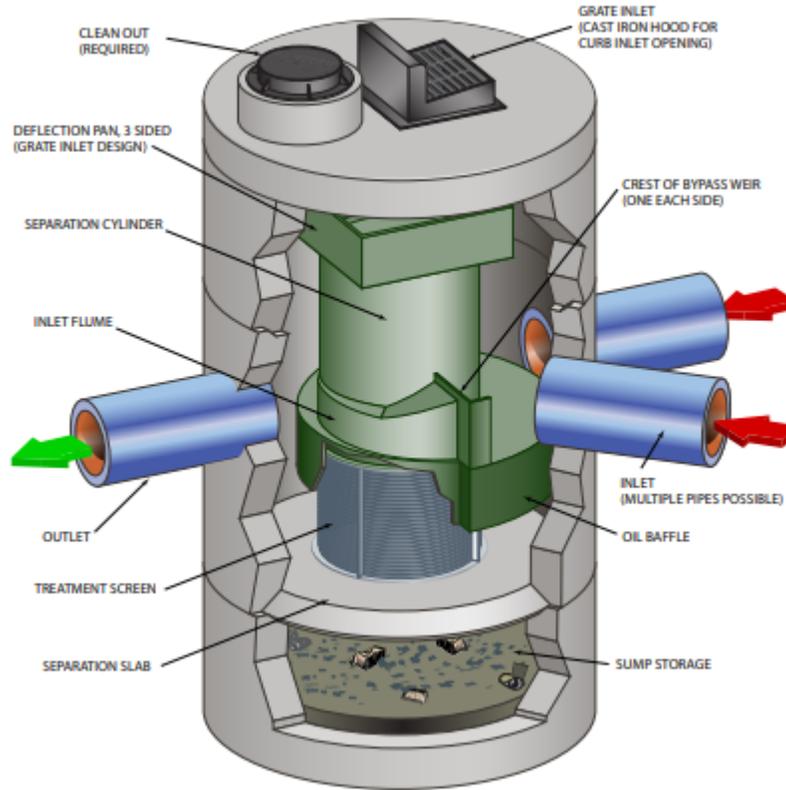
GENERAL NOTES:

1. CONCRETE: 28 DAY COMPRESSIVE STRENGTH = 5,000 PSI
2. STEEL REINFORCEMENT: ASTM A-615, GRADE 60
3. COVER TO STEEL: 1" MINIMUM
4. VAULTS ARE TO BE DESIGNED TO MEET ASTM C368 AND ACI 318 WITH AASHTO HS-20 LOADING
5. CONSTRUCTION JOINTS TO BE SEALED WITH 1" DIAMETER BUTYL RUBBER OR EQUIVALENT
6. OIL/WATER SEPARATOR TO BE AS MANUFACTURED BY "OLDCASTLE PRECAST" OR APPROVED EQUAL
7. OIL/WATER SEPARATOR SHALL MEET 2009 N.S.P.C. SECTION 6.3.2.

OIL/WATER SEPARATOR 1,400 GALLON CAPACITY

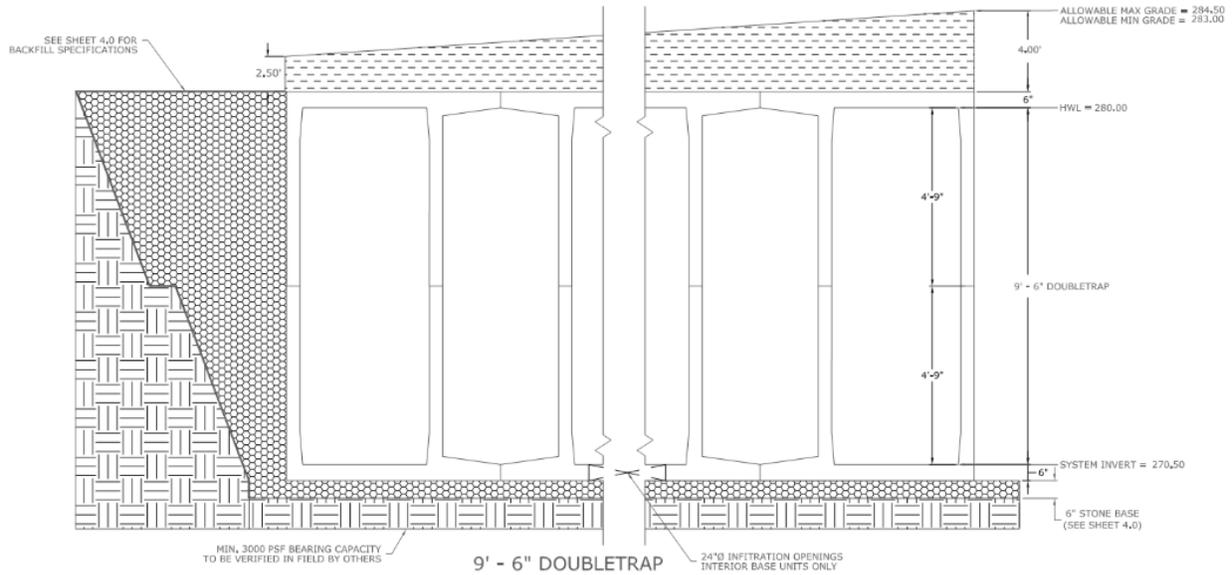
NOT TO SCALE

The oil/water separator is an underground concrete box with a weir walls and a coalescing media that separate sediment, debris, oils, and grease from the stormwater runoff prior to discharging downstream.



The CDS Stormwater Treatment System is a high-performance hydrodynamic separator. Using continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The CDS systems were designed by Contech, and the design documents can be found in the Appendix of this report.

StormTrap DoubleTrap:



The StormTrap DoubleTrap is a concrete chamber that allows the storage of large volumes. Maser Consulting has designed an underground system of chambers that stores 201,665 cubic feet of volume within the chambers and stone voids (StormTrap assumes a porosity of 40%). The system discharges through an outlet control structure which consist of multiple orifices which reduce the peak rate of discharge from the system to meet the peak rate requirements. The system is designed to infiltrate the volume beneath the lowest orifice. The lowest orifice is at elevation 273.00 which provides an infiltration volume of 57,577 cf which is greater than the required WQv of 55,989 cf.

Erosion Control Measures:

A phased construction sequence has been developed for the project which incorporates stabilized construction accesses, compost filter sock, inlet protection, and temporary/permanent stabilization techniques to minimize erosion and sedimentation.

Construction Sequence:

Below is the phased construction sequence for the project. This info can also be found on the Erosion and Sediment Control Plan within the plan set.

Demolition Phase total disturbance = 17.41 acres

1. The Town of Guilderland and the Soil Conservation District shall be notified 72 hours prior to any land disturbance.
2. Install filter sock sediment control barriers as shown on this plan.
3. Install sediment control devices over existing storm sewer structures.
4. Locate and decommission all on-site utilities. Remove existing utility service features and connections. Utility removal shall be coordinated with each respective utility service provider.
5. Begin demolition of above ground structures and foundations.
6. Relocate or remove underground utilities.
7. Demolish remaining existing site elements and below grade structures including but not limited to building foundations, utility foundations, site lighting structures and foundations, underground vaults, wiring and piping. Remove and dispose all debris off site.
8. Backfill all voids created from demolition and utility removal with structural fill material placed and compacted in accordance with technical specification.
9. Remove asphalt paving, pavers and concrete pads. Dispose of debris off site.
10. Inspect and recondition erosion control measures in preparation for the next phase of site development.

Initial Site Prep Phase total disturbance = 17.41 acres

1. The Town of Guilderland and the Soil Conservation District shall be notified 72 hours prior to any land disturbance.
2. Inspect sediment control barriers installed as part of the demolition procedures. Re-establish sediment control barriers as necessary. Refer to details.
3. Verify all on site utilities have been located, decommissioned and removed. Utility removal shall be coordinated with each respective utility service provider.
4. Clear and grub areas of construction.
5. Strip and stockpile topsoil from construction areas. Stabilize topsoil stockpile with temporary seeding requirements.
6. Construct sanitary sewer main and storm sewers to the extents shown on this plan. Start placing fill for the building pad.
7. Demolish and remove the existing sanitary sewer main. Demolish and remove sections of storm sewer noted on this plan
8. Backfill all voids created from construction procedures with structural fill material placed and compacted in accordance with technical specification.
9. Inspect and recondition erosion control measures in preparation for the next phase of site development.

Rough Grading Phase total disturbance = 17.41 acres

1. Inspect all soil erosion / sediment control measures constructed as part of the initial site preparation activities including but not limited to sediment control barriers, inlet protection and construction access. Repair or replace as necessary.
2. Begin rough grading, filling and compacting site.
3. Construct storm sewers as rough grading operations permit.
4. All storm inlets constructed during rough grading operations are to have hoods raised on bricks to facilitate runoff entering the inlet during rough grading. All inlet boxes to have crushed stone sediment protection installed as soon as inlet tops are set.
5. Construction of sanitary sewers, water mains and gas service can be constructed as rough grading operations permit.
6. Curbing can be constructed as rough grading progresses and conditions allow.
7. Paving stone base can be placed as rough grading progresses and conditions allow.
8. Complete rough grading of site.
9. As soon as subgrade elevation has been established within the limits of the building, place and compact crushed stone building pad. Establish finish pad elevation.
10. Construct crushed stone laydown areas and 25 ft. Wide crushed stone access drive as indicated on this plan.
11. Construction of building can begin as soon as the building pad and laydown areas are in place and have been approved.
12. Construction of gasoline fueling facilities can begin as soon as the building pad and laydown areas are in place and have been approved.

13. Construct building utility service connections to within 5 feet of the building limits.
14. Inspect and recondition erosion control measures in preparation for the next phase of construction.

Final Phase total disturbance = 17.41 acres

1. Inspect all soil erosion / sediment control measures including but not limited to sediment control barriers and stone construction access. Repair or replace as necessary.
2. Construct underground stormwater management system complete with discharge control structure.
3. Finish construction of all remaining storm sewers.
4. Finish construction of all on site underground utilities and building service connections. Construct foundations for area light standards and run electric service to foundations and all locations for illuminated signs (directional, monument, and pylon).
5. Finish construction of all curbing around perimeter of new parking and driveway areas. Construct curbing around building. Construct curbing around landscape islands.
6. Finish placement of paving stone base course on areas to be paved and compacted.
7. All inlets set during rough grading operations with temporary grate elevations are to be set to permanent grate elevations as soon as paving stone base has been placed around the inlet. Replace crushed stone inlet protection with filter bag inlet protection.
8. Construct all concrete pads and concrete pavement.
9. Install asphalt paving binder course.
10. Install all signage on the site including traffic control and directional signs.
11. Spread topsoil in all areas to be landscaped or seeded and establish permanent ground cover and landscaping as specified by landscaping plan. Mulch all exposed areas as specified by these plans.
12. Install final paving wearing surface. Apply parking area and traffic control pavement paint.
13. Remove all temporary soil erosion and sediment controls. Establish permanent vegetation on all area disturbed by the removal of the temporary controls. An area shall be considered to have achieved final stabilization when it has a minimum uniform 85 percent perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements.

For additional, general Erosion and Sediment Control notes including seeding, please refer to the Erosion and Sediment Control Plans.



Operation & Maintenance Plan:

During construction, the contractor is responsible for maintaining all permanent stormwater mitigation features including catch basins, pipes, the CDS water quality structures, the StormTrap DoubleTrap system, as well as temporary measures including compost filter sock, stabilized construction accesses, and inlet protection.

After construction is complete, the property owner shall be responsible for the maintenance of the proposed stormwater mitigation features, including catch basins, pipes, the CDS water quality structures, and the StormTrap DoubleTrap system.

As per the Notice of Termination for stormwater discharges authorized under the SPDES GP-0-15-002 for construction activity, for post-construction stormwater management practices that will be privately owned, the deed of record must be modified to include a deed covenant that requires operation and maintenance of the practices in accordance with the operation and maintenance plan.

A complete Operation & Maintenance Plan is included within the Appendix of this report.

Lastly, the owner of a post-construction stormwater management practice shall erect or post, in the immediate vicinity of the stormwater management practice, a conspicuous and legible sign as directed by section 3.5 of the NYSSMDM. The sign should read:

STORMWATER MANAGEMENT PRACTICE – (Type of Practice)
Project Identification – SPDES Permit # NYR _____
Must Be Maintained In Accordance With O&M Plan
DO NOT REMOVE OR ALTER

Summary of Proposed Stormwater Improvements:

Reductions in peak flow have been provided for the project for all storm events studied. The combination of peak flow reductions, runoff reduction volume treatment through green infrastructure techniques and additional water quality volume treatment should provide long-term treatment of runoff in keeping with the relevant standards.

CONCLUSION

As the proposed storm water pollution prevention plan provides reductions in peak flows for the required storms, and runoff reduction/water quality mitigation meeting the applicable standards, there should be no adverse impacts due to storm water, on-site or off-site, as a result of the proposed development.



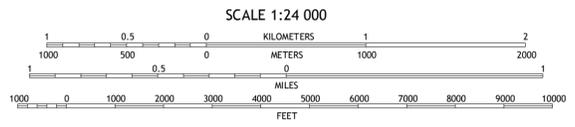
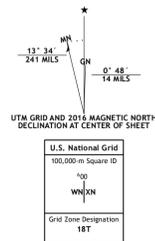
MC Project No. 13001204A

APPENDIX 1

PROJECT MAPS



Produced by the United States Geological Survey North American Datum of 1983 (NAD83) World Geodetic System of 1984 (WGS84)...



ROAD CLASSIFICATION table with symbols for Expressway, Secondary Hwy, Ramp, Interstate Route, Local Connector, Local Road, 4WD, US Route, and State Route.

ADJOINING QUADRANGLES table with a grid of numbers 1-8 and corresponding place names like Schenectady, Troy North, etc.

ALBANY, NY 2016

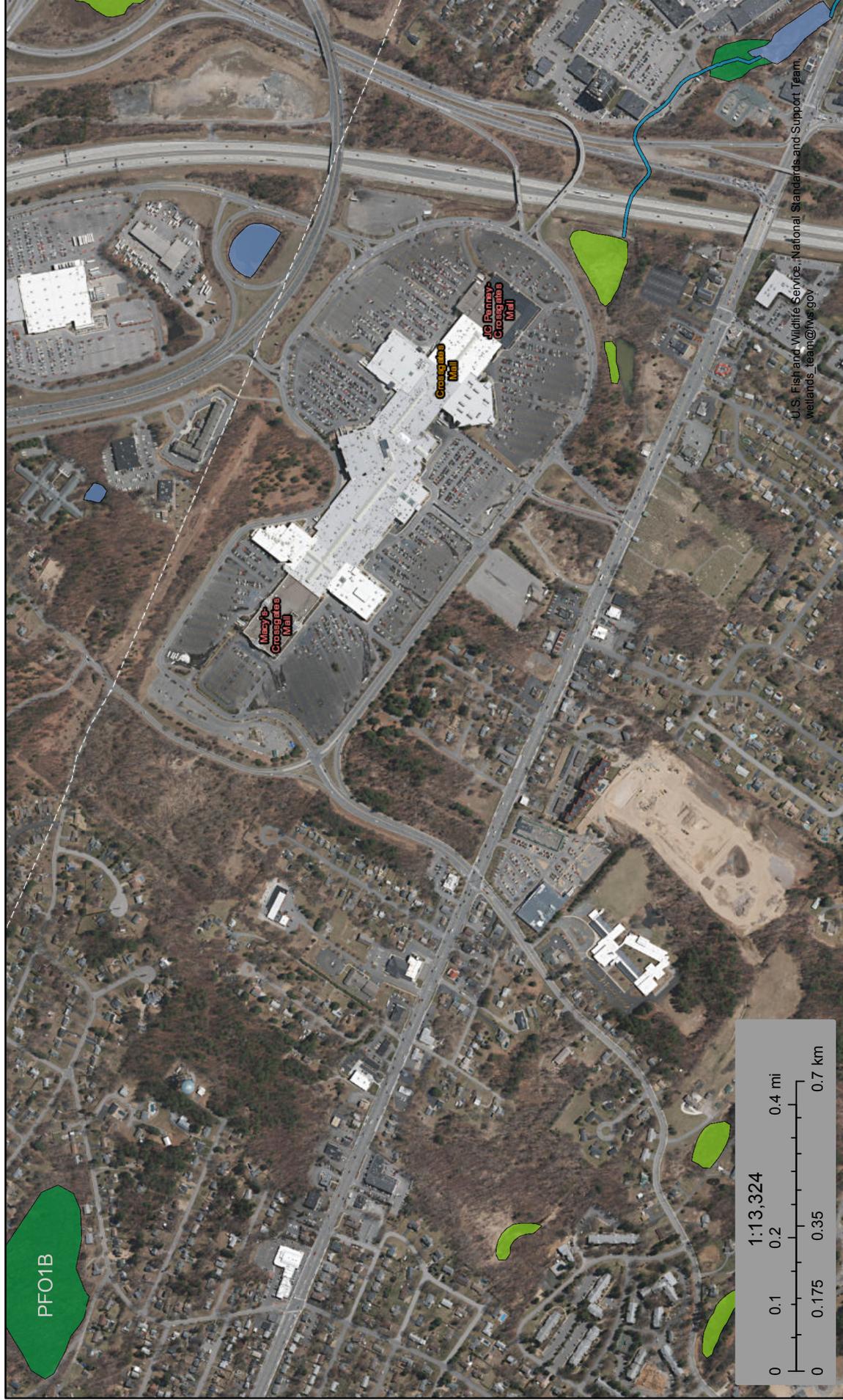




U.S. Fish and Wildlife Service

National Wetlands Inventory

RAPP RD AND CROSSGATES MALL ROAD



U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov

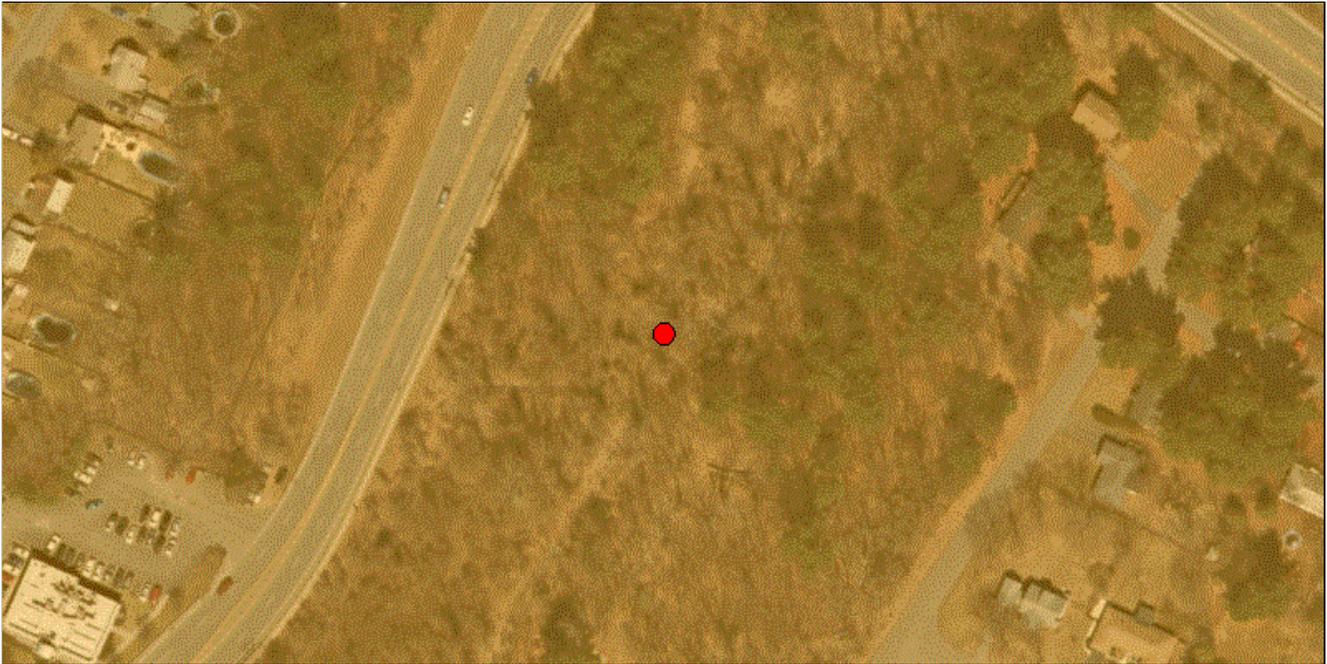
July 16, 2018

Wetlands

-  Estuarine and Marine Deepwater
-  Estuarine and Marine Wetland
-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond
-  Lake
-  Other
-  Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Environmental Resource Mapper



The coordinates of the point you clicked on are:

UTM 18	Easting: 593575.541	Northing: 4726933.470
Longitude/Latitude	Longitude: -73.858	Latitude: 42.689

The approximate address of the point you clicked on is:

Crossgates Mall Rd, Albany, New York, 12203

County: Albany

Town: Guilderland

USGS Quad: ALBANY

DEC Region

Region 4:

(Capital Region/Northern Catskills) Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady and Schoharie counties. For more information visit <http://www.dec.ny.gov/about/611.html>.

Old or Potential Records (Not displayed on the map)

Common Name: Whip Nutrush

Scientific Name: Scleria triglomerata

Date Last Documented: 1937-08-24

Location: Blueberry Hill

NYS Protected: Endangered

Rare Plants and Rare Animals

This location is in the vicinity of Rare Animals and/or Rare Plants

If your project or action is within or near an area with a rare animal, a permit may be required if the species is listed as endangered or threatened and the department determines the action may be harmful to the species or its habitat.

If your project or action is within or near an area with rare plants and/or significant natural communities, the environmental impacts may need to be addressed.

The presence of a unique geological feature or landform near a project, unto itself, does not trigger a requirement for a NYS DEC permit. Readers are advised, however, that there is the chance that a unique feature may also show in another data layer (ie. a wetland) and thus be subject to permit jurisdiction.

Please refer to the "Need a Permit?" tab for permit information or other authorizations regarding these natural resources.

Disclaimer: If you are considering a project or action in, or near, a wetland or a stream, a NYS DEC permit may be required. The Environmental Resources Mapper does not show all natural resources which are regulated by NYS DEC, and for which permits from NYS DEC are required. For example, Regulated Tidal Wetlands, and Wild, Scenic, and Recreational Rivers, are currently not included on the maps.

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

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NCS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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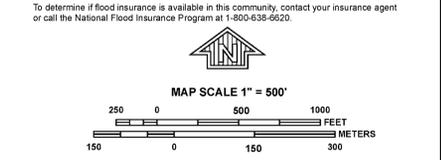
This digital FIRM was produced through a unique cooperative partnership between the New York State Department of Environmental Conservation (NYSDEC) and FEMA. As part of the effort, NYSDEC has joined in a Cooperative Technical Partnership agreement to produce and maintain FEMA's digital FIRM.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD. The 1% annual chance flood (100-year flood) also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, X, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
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- ZONE AE** Base Flood Elevations determined.
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- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS. **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1% annual chance flood. **ZONE D** Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
- OTHERWISE PROTECTED AREAS (OPAs). CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary 0.2% Annual Chance Floodplain Boundary Floodway boundary Zone D boundary CBRS and OPA boundary Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities. Base Flood Elevation line and value; elevation in feet* Base Flood Elevation value where uniform within zone; elevation in feet*
 *Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- Limited Detail Cross section line
- Culvert
- Bridge
- 45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT 5000-foot ticks: New York State Plane East Zone (FIPS Zone 3101), Transverse Mercator projection
- 8900000 N 1000-meter Universal Transverse Mercator grid values, zone 18N
- DX5510 X Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 River Mile
- MAP REPOSITORIES Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP MARCH 16, 2015
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
- For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
- To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0186D

FIRM

FLOOD INSURANCE RATE MAP

ALBANY COUNTY, NEW YORK (ALL JURISDICTIONS)

PANEL 186 OF 434
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BETHLEHEM, TOWN OF	361540	0186	D
GUILDERLAND, TOWN OF	360010	0186	D
NEW SCOTLAND, TOWN OF	360013	0186	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 36001C0186D

EFFECTIVE DATE MARCH 16, 2015

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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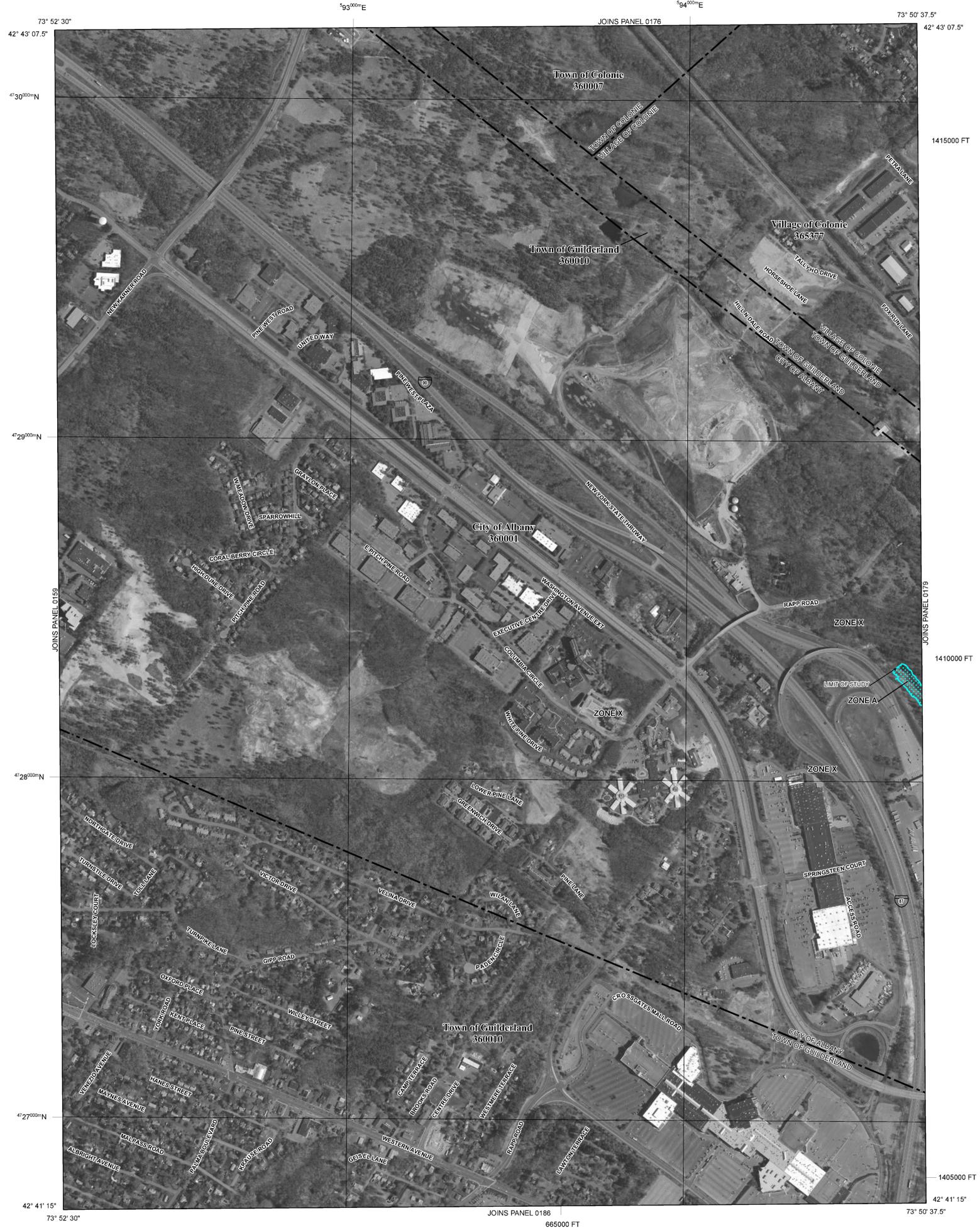
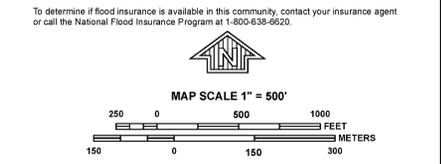


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- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
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- *Referenced to the North American Vertical Datum of 1988
- Cross section line
- Transect line
- Limited Detail Cross section line
- Culvert
- Bridge
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 5000-foot ticks: New York State Plane East Zone (FIPS Zone 3101), Transverse Mercator projection 1000-meter Universal Transverse Mercator grid values, zone 18N
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile
- MAP REPOSITORIES
Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 16, 2015
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0178D

FIRM
FLOOD INSURANCE RATE MAP
ALBANY COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL 178 OF 434
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBANY CITY OF	360001	0178	D
COLONIE TOWN OF	360007	0178	D
COLONIE VILLAGE OF	365377	0178	D
GUILDERLAND TOWN OF	360010	0178	D

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MAP NUMBER
36001C0178D
EFFECTIVE DATE
MARCH 16, 2015
Federal Emergency Management Agency



MC Project No. 13001204A

APPENDIX 2

DRAINAGE AREA MAPS



APPENDIX 3

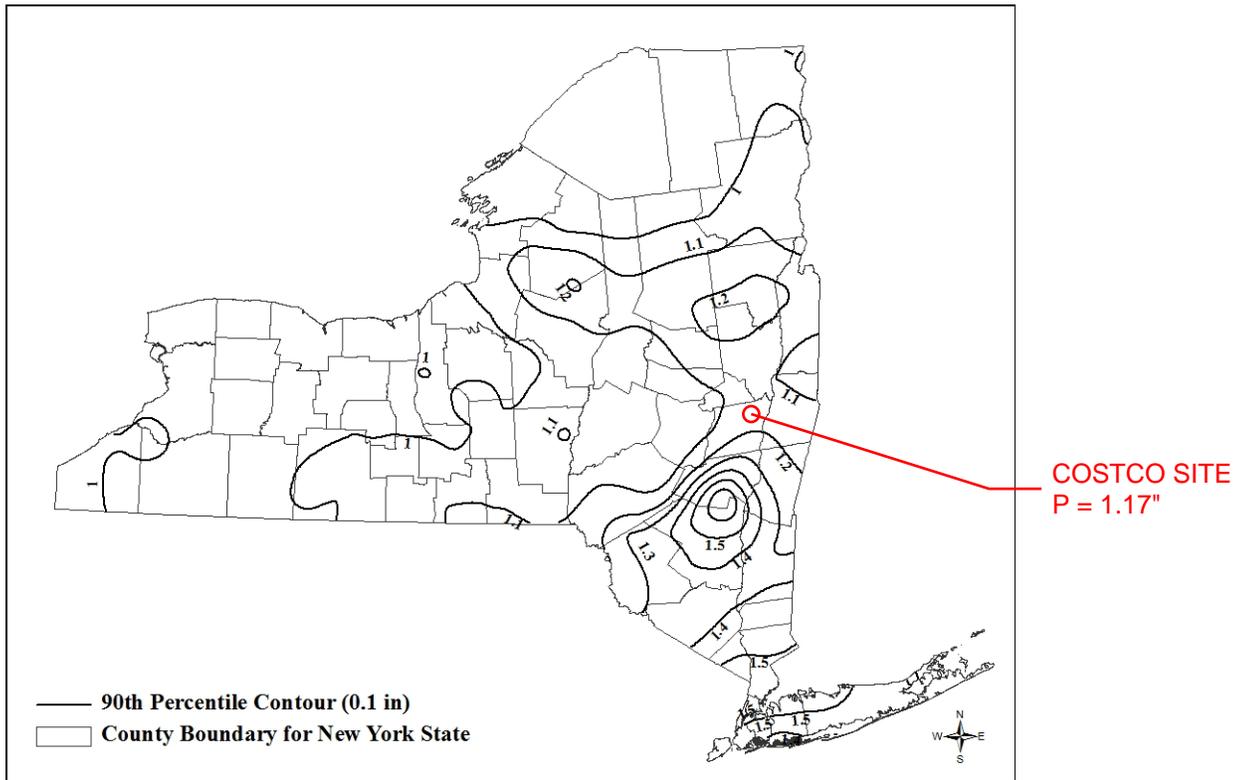
RAINFALL DATA AND RUNOFF COEFFICIENTS

New York State Stormwater Management Design Manual

Chapter 4: Unified Stormwater Sizing Criteria

Section 4.2 Water Quality Volume (WQv)

Figure 4.1: 90th Percentile Rainfall in New York State (NYSDEC, 2013)



Basis of Design for Water Quality

As a basis for design, the following assumptions may be made:

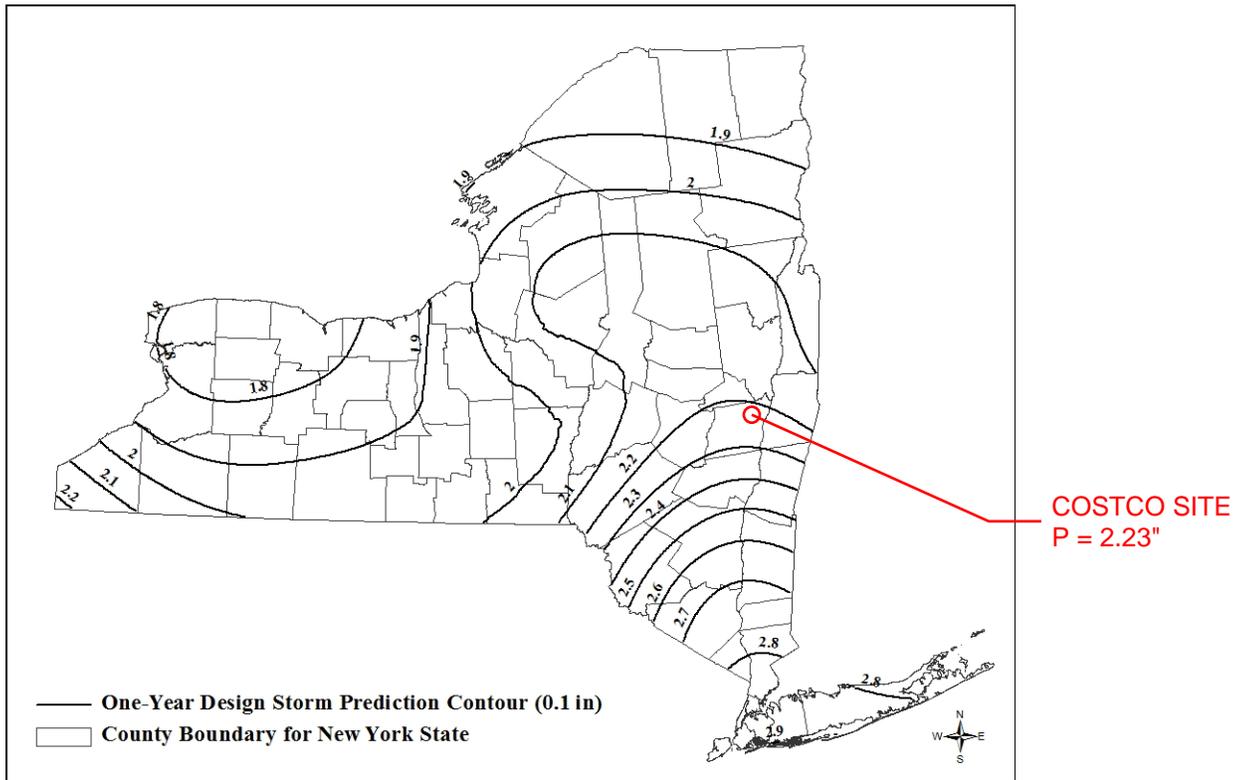
Measuring Impervious Cover: the measured area of a site plan that does not have permanent vegetative or permeable cover shall be considered total impervious cover. Impervious cover is defined as all impermeable surfaces and includes: paved and gravel road surfaces, paved and gravel parking lots, paved driveways, building structures, paved sidewalks, and miscellaneous impermeable structures such as patios, pools, and sheds. Where site size makes direct measurement of impervious cover impractical, the land use/impervious cover relationships presented in Table 4.2 can be used to initially estimate impervious cover. In site specific planning impervious cover must be calculated based the specific proposed impervious cover.

New York State Stormwater Management Design Manual

Chapter 4: Unified Stormwater Sizing Criteria

Section 4.5 Overbank Flood Control Criteria (Q_p)

Figure 4.2: One-Year Design Storm in New York State (NYSDEC, 2013)



Section 4.5 Overbank Flood Control Criteria (Q_p)

The primary purpose of the overbank flood control sizing criterion is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development (i.e., flow events that exceed the bankfull capacity of the channel, and therefore must spill over into the floodplain).

Overbank control requires storage to attenuate the post development 10-year, 24-hour peak discharge rate (Q_p) to predevelopment rates.

The overbank flood control requirement (Q_p) does not apply in certain conditions, including:

- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams. Refer to Section 4.3 for instructions.
- A downstream analysis reveals that overbank control is not needed (see section 4.10).

Basis for Design of Overbank Flood Control

When addressing the overbank flooding design criteria, the following represent the minimum basis for design:

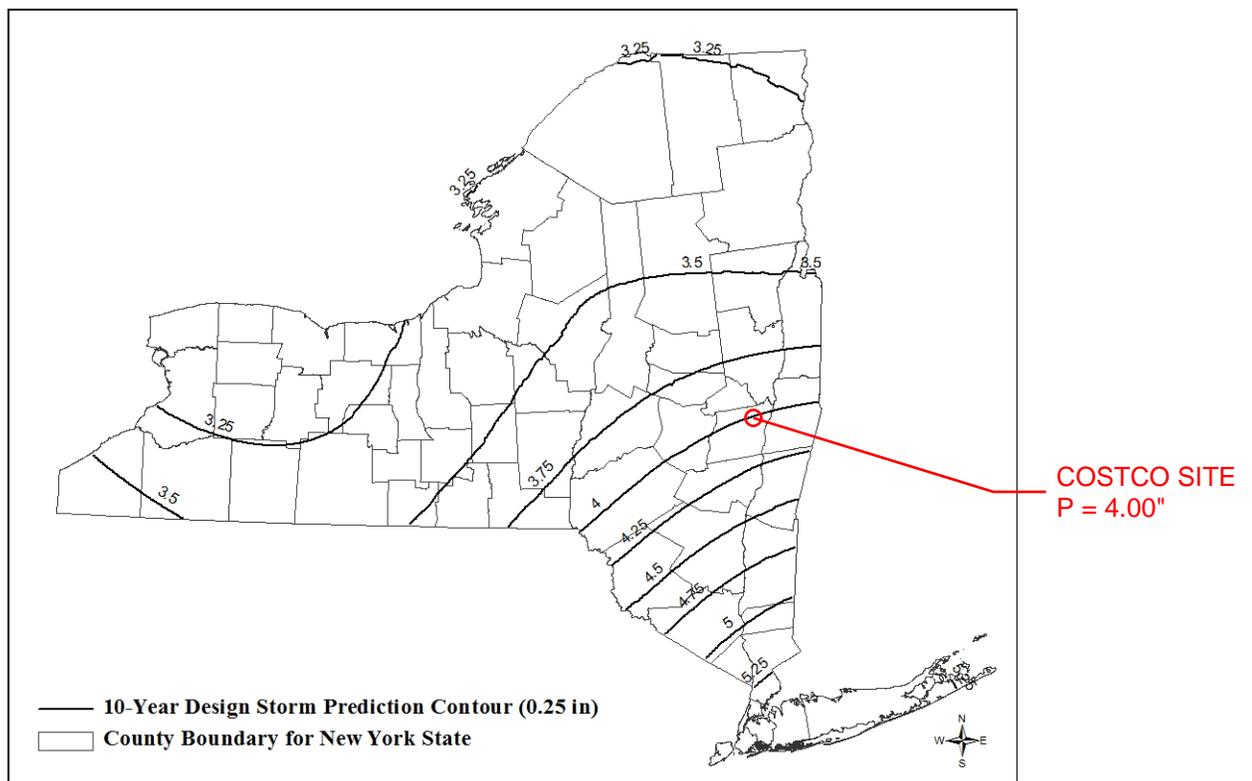
New York State Stormwater Management Design Manual

Chapter 4: Unified Stormwater Sizing Criteria

Section 4.5 Overbank Flood Control Criteria (Qp)

- TR-55 and TR-20 (or approved equivalent) will be used to determine peak discharge rates.
- When the predevelopment land use is agriculture, the curve number for the pre-developed condition shall be “taken as meadow”.
- Off-site areas should be modeled as "present condition" for the 10-year storm event.
- Figure 4.3 indicates the depth of rainfall (24 hour) associated with the 10-year storm event throughout the State of New York.
- The length of overland flow used in t_c calculations is limited to no more than 150 feet for predevelopment conditions and 100 feet for post development conditions. On areas of extremely flat terrain (<1% average slope), this maximum distance is extended to 250 feet for predevelopment conditions and 150 feet for post development conditions.

Figure 4.3: Ten-Year Design Storm in New York State (NYSDEC, 2013)



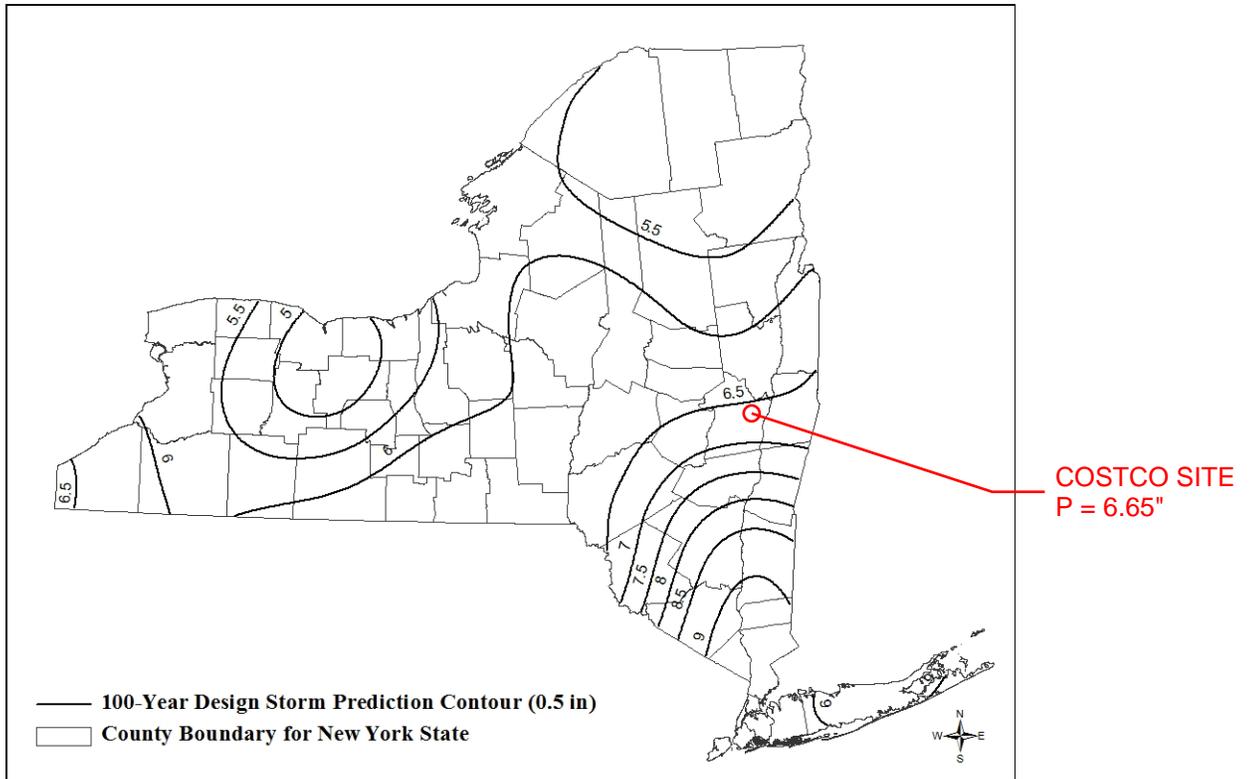
New York State Stormwater Management Design Manual

Chapter 4: Unified Stormwater Sizing Criteria

Section 4.7 Alternative Method

- When determining the storage required to reduce 100-year flood peaks, model off-site areas under current conditions.
- When determining storage required to safely pass the 100-year flood, model off-site areas under ultimate conditions.

Figure 4.4: One Hundred-Year Design Storm in New York State (NYSDEC, 2013)



Section 4.7 Alternative Method

New development causes changes to runoff volume, flow rates, timing of runoff and, most importantly, habitat destruction and degradation of the physical and chemical quality of the receiving waterbody. Traditionally, event based design storms are used for evaluation of hydrology and sizing of stormwater management practices. With an increasing need for assessment of the long term effects of development and maintenance of pre-development hydrology, the necessity of continuous simulation modeling as an effective tool for analysis and evaluation of flow-duration, downstream quality, quantity, biological, and hydro-habitat sustainability has been acknowledged.

HIGHWAY DRAINAGE

8-23

Table 8-3 Values of Runoff Coefficient (C) for Use in the Rational Method

Type of Surface	Runoff Coefficient (C) ¹
Rural Areas	
Concrete, or Hot Mix Asphalt pavement	0.95 - 0.98
Gravel roadways or shoulders	0.4 - 0.6
Steep grassed areas (1:2, vert.:horiz.)	0.6 - 0.7
Turf meadows	0.1 - 0.4
Forested areas	0.1 - 0.3
Cultivated fields	0.2 - 0.4
Urban/Suburban Areas	
Flat residential, @ 30% of area impervious	0.40
Flat residential, @ 60% of area impervious	0.55
Moderately steep residential, @ 50% of area impervious	0.65
Moderately steep built up area, @ 70% of area impervious	0.80
Flat commercial, @ 90% of area impervious	0.80

1. For flat slopes and/or permeable soil, use lower values. For steep slopes and/or impermeable soil, use the higher values.



APPENDIX 4

HYDROCAD MODEL OUTPUT



Project: Albany Costco - SWM Areas Sheet: 1 of 1
 Project #: 13001204A Scale: _____
 Calculated By: SVD Date: 3/27/2019 Checked By: _____ Date: _____
 Office Submitted by: _____ Date: _____
 Engineers | Planners | Surveyors | Landscape Architects | Environmental Scientists

PRE-DEVELOPMENT DRAINAGE AREA BREAKDOWNS

Drainage Area	Impervious		Lawn		Woods		Total Area	
	S.F.	Acres	S.F.	Acres	S.F.	Acres	S.F.	Acres
Pre DA #1	15,159	0.348	43,035	0.988	265,701	6.100	323,895	7.436
Pre DA #2A	32,895	0.755	80,185	1.841	53,251	1.222	166,331	3.818
Pre DA #2B	4,719	0.108	16,364	0.376	12,788	0.294	33,871	0.778
Pre DA #2C	28,628	0.657	74,212	1.704	8,023	0.184	110,863	2.545
Pre DA #3	5,108	0.117	48,188	1.106	162	0.004	53,458	1.227
Pre DA #4	23,514	0.540	78,721	1.807	0	0.000	102,235	2.347
Totals	110,023	2.526	340,705	7.822	339,925	7.804	790,653	18.151

POST-DEVELOPMENT DRAINAGE AREA BREAKDOWNS

Drainage Area	Impervious		Lawn		Woods		Total Area	
	S.F.	Acres	S.F.	Acres	S.F.	Acres	S.F.	Acres
Post DA #1A	814	0.019	5,247	0.120	0	0.000	6,061	0.139
Post DA #1B	254	0.006	483	0.011	0	0.000	737	0.017
Post DA #1C	4,074	0.094	39,714	0.912	0	0.000	43,788	1.005
Post DA #2	567,547	13.029	99,443	2.283	0	0.000	666,990	15.312
Post DA #3	9,178	0.211	32,687	0.750	0	0.000	41,865	0.961
Post DA #4	12,264	0.282	18,948	0.435	0	0.000	31,212	0.717
Totals	594,131	13.639	196,522	4.512	0	0.000	790,653	18.151

PEAK RATE SUMMARY

Drainage Area	10-Year Storm (4 inches)			100-Year Storm (6.65 inches)		
	Pre	Post	Reduction	Pre	Post	Reduction
POI #1	10.27	0.63	9.64	22.1	1.59	20.51
POI #2	4.17	3.55	0.62	8.04	6.94	1.1
AOI #3	0.63	1.15	-0.52	1.68	2.34	-0.66
LOI #4	2.89	1.63	1.26	5.77	2.98	2.79
Combined Total	17.96	6.96	11	37.59	13.85	23.74

Water Quality Volume per NY State SWM Design Manual Chapter 4

WQv = P * Rv * A * (1/12) = 1.285 Ac-ft = **55,989 CF**

P = 1.17 inches (90% rainfall event number from NY SWM Manuel Fig 4.1)

Rv = 0.05 + 0.009 * I = 0.726

I = 75.14 % (% Impervious cover)

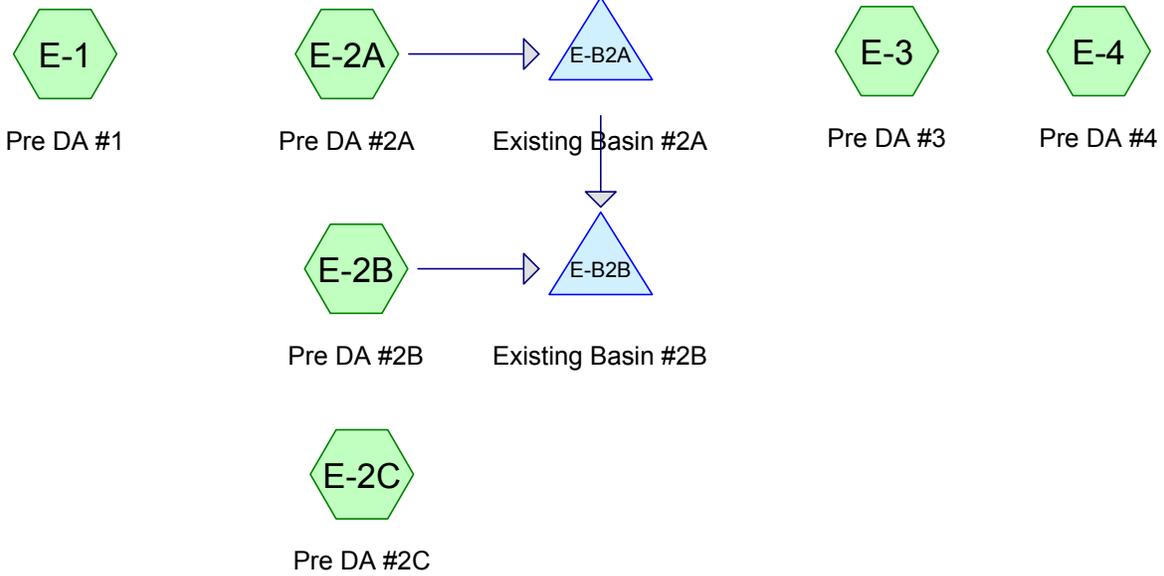
A = 18.151 acres (Total Area)

Runoff Reduction Volume per NY State SWM Design Manual Chapter 4

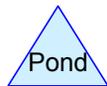
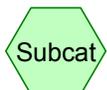
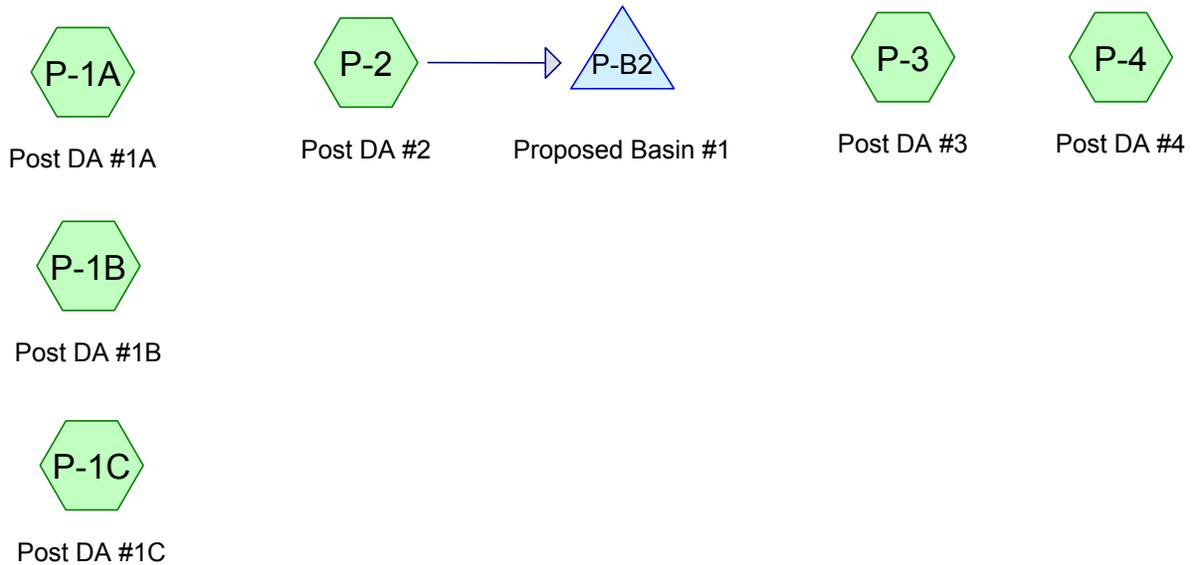
RRv = WQv = 1.285 Ac-ft = **55,989 CF**

Infiltration Volume Provided = **57,577 CF** (volume provided below lowest orifice)

PRE-DEVELOPMENT



POST-DEVELOPMENT



Albany Costco

Prepared by Maser Consulting PA

HydroCAD® 10.00-20 s/n 10208 © 2017 HydroCAD Software Solutions LLC

Type II 24-hr 10-Year Rainfall=4.00"

Printed 3/27/2019

Summary for Subcatchment E-1: Pre DA #1

Runoff = 10.27 cfs @ 11.99 hrs, Volume= 0.522 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

	Area (sf)	CN	Description
*	15,159	98	Impervious, HSG A
	43,035	39	>75% Grass cover, Good, HSG A
	147,570	30	Woods, Good, HSG A
*	118,131	77	Woods, Good, HSG D
	323,895		Weighted Average
	308,736	49	95.32% Pervious Area
	15,159	98	4.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	62	0.0900	2.10		Shallow Concentrated Flow, A-B Short Grass Pasture Kv= 7.0 fps
1.9	141	0.0070	1.25		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
3.6	399	0.0150	1.84		Shallow Concentrated Flow, C-D Grassed Waterway Kv= 15.0 fps
0.2	79	0.0100	6.91	386.68	Channel Flow, D-E Area= 56.0 sf Perim= 27.0' r= 2.07' n= 0.035 Earth, dense weeds
0.3	85	0.0056	4.45	55.90	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
0.5	358	0.0100	11.68	2,453.64	Channel Flow, F-G Area= 210.0 sf Perim= 46.0' r= 4.57' n= 0.035 Earth, dense weeds
7.0	1,124	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment E-2A: Pre DA #2A

Runoff = 4.38 cfs @ 11.95 hrs, Volume= 0.244 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 32,895	98	Impervious, HSG A
80,185	39	>75% Grass cover, Good, HSG A
53,251	30	Woods, Good, HSG A
166,331		Weighted Average
133,436	35	80.22% Pervious Area
32,895	98	19.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	93	0.0480	1.53		Shallow Concentrated Flow, A-B Short Grass Pasture Kv= 7.0 fps
0.9	173	0.0480	3.29		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
1.2	58	0.0260	0.81		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
3.1	324	Total, Increased to minimum Tc = 5.0 min			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment E-2B: Pre DA #2B

Runoff = 0.43 cfs @ 12.08 hrs, Volume= 0.035 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 4,719	98	Impervious, HSG A
16,364	39	>75% Grass cover, Good, HSG A
12,788	30	Woods, Good, HSG A
33,871		Weighted Average
29,152	35	86.07% Pervious Area
4,719	98	13.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	150	0.0150	0.15		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 2.56"
0.1	23	0.0200	2.87		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.1	12	0.0600	1.71		Shallow Concentrated Flow, C-D
					Short Grass Pasture Kv= 7.0 fps
17.2	185	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment E-2C: Pre DA #2C

Runoff = 3.74 cfs @ 11.96 hrs, Volume= 0.213 af, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 28,628	98	Impervious, HSG A
74,212	39	>75% Grass cover, Good, HSG A
8,023	30	Woods, Good, HSG A
110,863		Weighted Average
82,235	38	74.18% Pervious Area
28,628	98	25.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	16	0.3100	2.78		Shallow Concentrated Flow, A-B Woodland Kv= 5.0 fps
2.4	87	0.0150	0.61		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
0.4	35	0.0100	1.50		Shallow Concentrated Flow, C-D Grassed Waterway Kv= 15.0 fps
2.5	214	0.0050	1.44		Shallow Concentrated Flow, D-E Paved Kv= 20.3 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, E-F Grassed Waterway Kv= 15.0 fps
5.6	382	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment E-3: Pre DA #3

Runoff = 0.63 cfs @ 11.98 hrs, Volume= 0.041 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 5,108	98	Impervious, HSG A
48,188	39	>75% Grass cover, Good, HSG A
162	30	Woods, Good, HSG A
53,458		Weighted Average
48,350	39	90.44% Pervious Area
5,108	98	9.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	54	0.0300	0.16		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 2.56"
1.7	154	0.0100	1.50		Shallow Concentrated Flow, B-C
					Grassed Waterway Kv= 15.0 fps
7.4	208	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment E-4: Pre DA #4

Runoff = 2.89 cfs @ 11.98 hrs, Volume= 0.176 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

	Area (sf)	CN	Description
*	23,514	98	Impervious, HSG A
	78,721	39	>75% Grass cover, Good, HSG A
	0	30	Woods, Good, HSG A
	102,235		Weighted Average
	78,721	39	77.00% Pervious Area
	23,514	98	23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	266	0.0015	0.58		Shallow Concentrated Flow, A-B Grassed Waterway Kv= 15.0 fps

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment P-1A: Post DA #1A

Runoff = 0.11 cfs @ 11.96 hrs, Volume= 0.006 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 814	98	Impervious, HSG A
5,247	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
6,061		Weighted Average
5,247	39	86.57% Pervious Area
814	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	41	0.1100	0.25		Sheet Flow, A*-A Grass: Short n= 0.150 P2= 2.56"
0.4	84	0.0250	3.21		Shallow Concentrated Flow, A-B Paved Kv= 20.3 fps
0.8	296	0.0200	6.42	5.04	Pipe Channel, B-C 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.3	56	0.0020	3.22	10.12	Pipe Channel, C-D 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
0.0	26	0.0500	19.03	59.78	Pipe Channel, D-E 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
1.0	537	0.0056	8.55	107.49	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.013 Concrete pipe, bends & connections
5.2	1,040	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment P-1B: Post DA #1B

Runoff = 0.03 cfs @ 11.95 hrs, Volume= 0.002 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 254	98	Impervious, HSG A
483	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
737		Weighted Average
483	39	65.54% Pervious Area
254	98	34.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Calculated to be <5 minutes

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment P-1C: Post DA #1C

Runoff = 0.49 cfs @ 11.99 hrs, Volume= 0.033 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 4,074	98	Impervious, HSG A
39,714	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
43,788		Weighted Average
39,714	39	90.70% Pervious Area
4,074	98	9.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	58	0.0600	0.21		Sheet Flow, A-B Grass: Short n= 0.150 P2= 2.56"
2.9	345	0.0180	2.01		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
0.0	6	0.0500	12.75	15.65	Pipe Channel, C-D 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.1	189	0.0500	22.86	161.57	Pipe Channel, D-E 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
1.0	537	0.0056	8.55	107.49	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.013 Concrete pipe, bends & connections
8.6	1,135	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment P-2: Post DA #2

Runoff = 64.62 cfs @ 12.01 hrs, Volume= 4.097 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
567,547	98	Paved parking, HSG A
99,443	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
666,990		Weighted Average
99,443	39	14.91% Pervious Area
567,547	98	85.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0350	0.19		Sheet Flow, A-B Grass: Short n= 0.150 P2= 2.56"
0.8	118	0.0260	2.42		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
0.1	39	0.0100	7.20	22.62	Pipe Channel, C-D 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
0.3	110	0.0050	6.67	47.16	Pipe Channel, D-E 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
10.0	367	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment P-3: Post DA #3

Runoff = 1.15 cfs @ 11.97 hrs, Volume= 0.069 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 9,178	98	Impervious, HSG A
32,687	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
41,865		Weighted Average
32,687	39	78.08% Pervious Area
9,178	98	21.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	75	0.0600	0.22		Sheet Flow, A-B Grass: Short n= 0.150 P2= 2.56"
0.8	43	0.0120	0.85		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 2.56"
0.2	65	0.0460	4.35		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.1	32	0.0100	5.26	6.46	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.1	52	0.0100	5.94	74.69	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
6.8	267	Total			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Subcatchment P-4: Post DA #4

Runoff = 1.63 cfs @ 11.95 hrs, Volume= 0.090 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=4.00"

Area (sf)	CN	Description
* 12,264	98	Impervious, HSG A
18,948	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
31,212		Weighted Average
18,948	39	60.71% Pervious Area
12,264	98	39.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	78	0.0380	2.92		Shallow Concentrated Flow, A-B Grassed Waterway Kv= 15.0 fps
0.4	78	Total, Increased to minimum Tc = 5.0 min			

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Pond E-B2A: Existing Basin #2A

Inflow Area = 3.818 ac, 19.78% Impervious, Inflow Depth = 0.77" for 10-Year event
 Inflow = 4.38 cfs @ 11.95 hrs, Volume= 0.244 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Peak Elev= 276.80' @ 24.32 hrs Surf.Area= 14,835 sf Storage= 10,628 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	275.00'	54,829 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
275.00	739	0	0
276.00	4,833	2,786	2,786
277.00	17,376	11,105	13,891
278.00	20,000	18,688	32,579
279.00	24,500	22,250	54,829

Device	Routing	Invert	Outlet Devices
#1	Primary	278.00'	5.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=275.00' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Pond E-B2B: Existing Basin #2B

Inflow Area = 4.596 ac, 18.79% Impervious, Inflow Depth = 0.09" for 10-Year event
 Inflow = 0.43 cfs @ 12.08 hrs, Volume= 0.035 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Peak Elev= 277.07' @ 25.00 hrs Surf.Area= 2,796 sf Storage= 1,543 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	276.00'	7,029 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
276.00	398	0	0
277.00	2,330	1,364	1,364
278.00	9,000	5,665	7,029

Device	Routing	Invert	Outlet Devices
#1	Primary	277.50'	5.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=276.00' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

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Type II 24-hr 10-Year Rainfall=4.00"

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Summary for Pond P-B2: Proposed Basin #1

Inflow Area = 15.312 ac, 85.09% Impervious, Inflow Depth = 3.21" for 10-Year event
 Inflow = 64.62 cfs @ 12.01 hrs, Volume= 4.097 af
 Outflow = 3.55 cfs @ 13.02 hrs, Volume= 2.775 af, Atten= 95%, Lag= 60.9 min
 Primary = 3.55 cfs @ 13.02 hrs, Volume= 2.775 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 275.97' @ 13.02 hrs Surf.Area= 23,170 sf Storage= 120,407 cf

Plug-Flow detention time= 419.1 min calculated for 2.774 af (68% of inflow)
 Center-of-Mass det. time= 319.3 min (1,071.8 - 752.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	269.50'	4,634 cf	47.23'W x 490.58'L x 11.00'H Field A 254,868 cf Overall - 243,283 cf Embedded = 11,585 cf x 40.0% Voids
#2A	270.00'	201,183 cf	StormTrap ST2 DoubleTrap 9-6x 124 Inside #1 Inside= 101.7"W x 114.0"H => 74.82 sf x 15.40'L = 1,152.0 cf Outside= 101.7"W x 126.0"H => 89.03 sf x 15.40'L = 1,370.7 cf 4 Rows of 31 Chambers 33.92' x 477.27' Core + 6.66' Border = 47.23' x 490.58' System
		205,817 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	272.90'	18.0" Round Culvert L= 72.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 272.90' / 272.54' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	273.00'	21.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	276.00'	8.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	279.75'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=3.55 cfs @ 13.02 hrs HW=275.97' (Free Discharge)

- ↑ **1=Culvert** (Passes 3.55 cfs of 11.73 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 3.55 cfs @ 8.12 fps)
- ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
- ↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Subcatchment E-1: Pre DA #1

Runoff = 22.10 cfs @ 11.98 hrs, Volume= 1.199 af, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=6.65"

	Area (sf)	CN	Description
*	15,159	98	Impervious, HSG A
	43,035	39	>75% Grass cover, Good, HSG A
	147,570	30	Woods, Good, HSG A
*	118,131	77	Woods, Good, HSG D
	323,895		Weighted Average
	308,736	49	95.32% Pervious Area
	15,159	98	4.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	62	0.0900	2.10		Shallow Concentrated Flow, A-B Short Grass Pasture Kv= 7.0 fps
1.9	141	0.0070	1.25		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
3.6	399	0.0150	1.84		Shallow Concentrated Flow, C-D Grassed Waterway Kv= 15.0 fps
0.2	79	0.0100	6.91	386.68	Channel Flow, D-E Area= 56.0 sf Perim= 27.0' r= 2.07' n= 0.035 Earth, dense weeds
0.3	85	0.0056	4.45	55.90	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
0.5	358	0.0100	11.68	2,453.64	Channel Flow, F-G Area= 210.0 sf Perim= 46.0' r= 4.57' n= 0.035 Earth, dense weeds
7.0	1,124	Total			

Summary for Subcatchment E-2A: Pre DA #2A

Runoff = 8.40 cfs @ 11.96 hrs, Volume= 0.519 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 32,895	98	Impervious, HSG A
80,185	39	>75% Grass cover, Good, HSG A
53,251	30	Woods, Good, HSG A
166,331		Weighted Average
133,436	35	80.22% Pervious Area
32,895	98	19.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	93	0.0480	1.53		Shallow Concentrated Flow, A-B Short Grass Pasture Kv= 7.0 fps
0.9	173	0.0480	3.29		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
1.2	58	0.0260	0.81		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
3.1	324	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment E-2B: Pre DA #2B

Runoff = 0.85 cfs @ 12.10 hrs, Volume= 0.082 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 4,719	98	Impervious, HSG A
16,364	39	>75% Grass cover, Good, HSG A
12,788	30	Woods, Good, HSG A
33,871		Weighted Average
29,152	35	86.07% Pervious Area
4,719	98	13.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	150	0.0150	0.15		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 2.56"
0.1	23	0.0200	2.87		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.1	12	0.0600	1.71		Shallow Concentrated Flow, C-D
					Short Grass Pasture Kv= 7.0 fps
17.2	185	Total			

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Subcatchment E-2C: Pre DA #2C

Runoff = 7.19 cfs @ 11.97 hrs, Volume= 0.445 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 28,628	98	Impervious, HSG A
74,212	39	>75% Grass cover, Good, HSG A
8,023	30	Woods, Good, HSG A
110,863		Weighted Average
82,235	38	74.18% Pervious Area
28,628	98	25.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	16	0.3100	2.78		Shallow Concentrated Flow, A-B Woodland Kv= 5.0 fps
2.4	87	0.0150	0.61		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
0.4	35	0.0100	1.50		Shallow Concentrated Flow, C-D Grassed Waterway Kv= 15.0 fps
2.5	214	0.0050	1.44		Shallow Concentrated Flow, D-E Paved Kv= 20.3 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, E-F Grassed Waterway Kv= 15.0 fps
5.6	382	Total			

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Subcatchment E-3: Pre DA #3

Runoff = 1.68 cfs @ 12.01 hrs, Volume= 0.122 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 5,108	98	Impervious, HSG A
48,188	39	>75% Grass cover, Good, HSG A
162	30	Woods, Good, HSG A
53,458		Weighted Average
48,350	39	90.44% Pervious Area
5,108	98	9.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	54	0.0300	0.16		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 2.56"
1.7	154	0.0100	1.50		Shallow Concentrated Flow, B-C
					Grassed Waterway Kv= 15.0 fps
7.4	208	Total			

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Subcatchment E-4: Pre DA #4

Runoff = 5.77 cfs @ 12.00 hrs, Volume= 0.386 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=6.65"

	Area (sf)	CN	Description
*	23,514	98	Impervious, HSG A
	78,721	39	>75% Grass cover, Good, HSG A
	0	30	Woods, Good, HSG A
	102,235		Weighted Average
	78,721	39	77.00% Pervious Area
	23,514	98	23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	266	0.0015	0.58		Shallow Concentrated Flow, A-B Grassed Waterway Kv= 15.0 fps

Summary for Subcatchment P-1A: Post DA #1A

Runoff = 0.25 cfs @ 11.98 hrs, Volume= 0.016 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 814	98	Impervious, HSG A
5,247	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
6,061		Weighted Average
5,247	39	86.57% Pervious Area
814	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	41	0.1100	0.25		Sheet Flow, A*-A Grass: Short n= 0.150 P2= 2.56"
0.4	84	0.0250	3.21		Shallow Concentrated Flow, A-B Paved Kv= 20.3 fps
0.8	296	0.0200	6.42	5.04	Pipe Channel, B-C 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.3	56	0.0020	3.22	10.12	Pipe Channel, C-D 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
0.0	26	0.0500	19.03	59.78	Pipe Channel, D-E 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
1.0	537	0.0056	8.55	107.49	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.013 Concrete pipe, bends & connections
5.2	1,040	Total			

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Summary for Subcatchment P-1B: Post DA #1B

Runoff = 0.06 cfs @ 11.96 hrs, Volume= 0.004 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=6.65"

	Area (sf)	CN	Description
*	254	98	Impervious, HSG A
	483	39	>75% Grass cover, Good, HSG A
	0	30	Woods, Good, HSG A
	737		Weighted Average
	483	39	65.54% Pervious Area
	254	98	34.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Calculated to be <5 minutes

Summary for Subcatchment P-1C: Post DA #1C

Runoff = 1.28 cfs @ 12.02 hrs, Volume= 0.099 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 4,074	98	Impervious, HSG A
39,714	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
43,788		Weighted Average
39,714	39	90.70% Pervious Area
4,074	98	9.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	58	0.0600	0.21		Sheet Flow, A-B Grass: Short n= 0.150 P2= 2.56"
2.9	345	0.0180	2.01		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
0.0	6	0.0500	12.75	15.65	Pipe Channel, C-D 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.1	189	0.0500	22.86	161.57	Pipe Channel, D-E 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
1.0	537	0.0056	8.55	107.49	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.013 Concrete pipe, bends & connections
8.6	1,135	Total			

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Subcatchment P-2: Post DA #2

Runoff = 108.95 cfs @ 12.01 hrs, Volume= 7.084 af, Depth= 5.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
567,547	98	Paved parking, HSG A
99,443	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
666,990		Weighted Average
99,443	39	14.91% Pervious Area
567,547	98	85.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0350	0.19		Sheet Flow, A-B Grass: Short n= 0.150 P2= 2.56"
0.8	118	0.0260	2.42		Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps
0.1	39	0.0100	7.20	22.62	Pipe Channel, C-D 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
0.3	110	0.0050	6.67	47.16	Pipe Channel, D-E 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.013 Corrugated PE, smooth interior
10.0	367	Total			

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Summary for Subcatchment P-3: Post DA #3

Runoff = 2.34 cfs @ 11.99 hrs, Volume= 0.153 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 9,178	98	Impervious, HSG A
32,687	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
41,865		Weighted Average
32,687	39	78.08% Pervious Area
9,178	98	21.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	75	0.0600	0.22		Sheet Flow, A-B Grass: Short n= 0.150 P2= 2.56"
0.8	43	0.0120	0.85		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 2.56"
0.2	65	0.0460	4.35		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.1	32	0.0100	5.26	6.46	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.1	52	0.0100	5.94	74.69	Pipe Channel, E-F 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.025 Corrugated metal
6.8	267	Total			

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Subcatchment P-4: Post DA #4

Runoff = 2.98 cfs @ 11.96 hrs, Volume= 0.174 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=6.65"

Area (sf)	CN	Description
* 12,264	98	Impervious, HSG A
18,948	39	>75% Grass cover, Good, HSG A
0	30	Woods, Good, HSG A
31,212		Weighted Average
18,948	39	60.71% Pervious Area
12,264	98	39.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	78	0.0380	2.92		Shallow Concentrated Flow, A-B Grassed Waterway Kv= 15.0 fps
0.4	78	Total, Increased to minimum Tc = 5.0 min			

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Pond E-B2A: Existing Basin #2A

Inflow Area = 3.818 ac, 19.78% Impervious, Inflow Depth = 1.63" for 100-Year event
 Inflow = 8.40 cfs @ 11.96 hrs, Volume= 0.519 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Peak Elev= 277.48' @ 24.32 hrs Surf.Area= 18,643 sf Storage= 22,589 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	275.00'	54,829 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
275.00	739	0	0
276.00	4,833	2,786	2,786
277.00	17,376	11,105	13,891
278.00	20,000	18,688	32,579
279.00	24,500	22,250	54,829

Device	Routing	Invert	Outlet Devices
#1	Primary	278.00'	5.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=275.00' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

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Type II 24-hr 100-Year Rainfall=6.65"

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Summary for Pond E-B2B: Existing Basin #2B

Inflow Area = 4.596 ac, 18.79% Impervious, Inflow Depth = 0.21" for 100-Year event
 Inflow = 0.85 cfs @ 12.10 hrs, Volume= 0.082 af
 Outflow = 0.02 cfs @ 24.10 hrs, Volume= 0.005 af, Atten= 98%, Lag= 720.0 min
 Primary = 0.02 cfs @ 24.10 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Peak Elev= 277.51' @ 24.10 hrs Surf.Area= 5,744 sf Storage= 3,430 cf

Plug-Flow detention time= 1,121.4 min calculated for 0.005 af (6% of inflow)
 Center-of-Mass det. time= 617.7 min (1,432.2 - 814.5)

Volume	Invert	Avail.Storage	Storage Description
#1	276.00'	7,029 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
276.00	398	0	0
277.00	2,330	1,364	1,364
278.00	9,000	5,665	7,029

Device	Routing	Invert	Outlet Devices
#1	Primary	277.50'	5.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.02 cfs @ 24.10 hrs HW=277.51' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 0.02 cfs @ 0.25 fps)

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Summary for Pond P-B2: Proposed Basin #1

Inflow Area = 15.312 ac, 85.09% Impervious, Inflow Depth = 5.55" for 100-Year event
 Inflow = 108.95 cfs @ 12.01 hrs, Volume= 7.084 af
 Outflow = 6.94 cfs @ 12.85 hrs, Volume= 5.762 af, Atten= 94%, Lag= 50.7 min
 Primary = 6.94 cfs @ 12.85 hrs, Volume= 5.762 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 279.74' @ 12.85 hrs Surf.Area= 23,170 sf Storage= 200,256 cf

Plug-Flow detention time= 431.8 min calculated for 5.762 af (81% of inflow)
 Center-of-Mass det. time= 351.7 min (1,098.4 - 746.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	269.50'	4,634 cf	47.23'W x 490.58'L x 11.00'H Field A 254,868 cf Overall - 243,283 cf Embedded = 11,585 cf x 40.0% Voids
#2A	270.00'	201,183 cf	StormTrap ST2 DoubleTrap 9-6x 124 Inside #1 Inside= 101.7"W x 114.0"H => 74.82 sf x 15.40'L = 1,152.0 cf Outside= 101.7"W x 126.0"H => 89.03 sf x 15.40'L = 1,370.7 cf 4 Rows of 31 Chambers 33.92' x 477.27' Core + 6.66' Border = 47.23' x 490.58' System
		205,817 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	272.90'	18.0" Round Culvert L= 72.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 272.90' / 272.54' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	273.00'	21.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#3	Device 1	276.00'	8.0" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	279.75'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=6.94 cfs @ 12.85 hrs HW=279.74' (Free Discharge)

- ↑ **1=Culvert** (Passes 6.94 cfs of 20.17 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 5.42 cfs @ 12.38 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 1.53 cfs @ 9.15 fps)
- ↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type II 24-hr 100-Year Rainfall=6.65"

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Stage-Area-Storage for Pond P-B2: Proposed Basin #1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
269.50	0	271.06	16,493	272.62	49,530
269.53	278	271.09	17,129	272.65	50,165
269.56	556	271.12	17,764	272.68	50,800
269.59	834	271.15	18,399	272.71	51,436
269.62	1,112	271.18	19,034	272.74	52,071
269.65	1,390	271.21	19,670	272.77	52,706
269.68	1,668	271.24	20,305	272.80	53,341
269.71	1,946	271.27	20,940	272.83	53,977
269.74	2,224	271.30	21,576	272.86	54,612
269.77	2,502	271.33	22,211	272.89	55,247
269.80	2,780	271.36	22,846	272.92	55,883
269.83	3,058	271.39	23,482	272.95	56,518
269.86	3,336	271.42	24,117	272.98	57,153
269.89	3,614	271.45	24,752	273.01	57,789
269.92	3,893	271.48	25,388	273.04	58,424
269.95	4,171	271.51	26,023	273.07	59,059
269.98	4,449	271.54	26,658	273.10	59,695
270.01	4,634	271.57	27,294	273.13	60,330
270.04	4,634	271.60	27,929	273.16	60,965
270.07	4,634	271.63	28,564	273.19	61,601
270.10	4,634	271.66	29,200	273.22	62,236
270.13	4,634	271.69	29,835	273.25	62,871
270.16	4,634	271.72	30,470	273.28	63,507
270.19	4,634	271.75	31,105	273.31	64,142
270.22	4,634	271.78	31,741	273.34	64,777
270.25	4,634	271.81	32,376	273.37	65,412
270.28	4,634	271.84	33,011	273.40	66,048
270.31	4,634	271.87	33,647	273.43	66,683
270.34	4,634	271.90	34,282	273.46	67,318
270.37	4,634	271.93	34,917	273.49	67,954
270.40	4,634	271.96	35,553	273.52	68,589
270.43	4,634	271.99	36,188	273.55	69,224
270.46	4,634	272.02	36,823	273.58	69,860
270.49	4,634	272.05	37,459	273.61	70,495
270.52	5,058	272.08	38,094	273.64	71,130
270.55	5,693	272.11	38,729	273.67	71,766
270.58	6,328	272.14	39,365	273.70	72,401
270.61	6,963	272.17	40,000	273.73	73,036
270.64	7,599	272.20	40,635	273.76	73,672
270.67	8,234	272.23	41,270	273.79	74,307
270.70	8,869	272.26	41,906	273.82	74,942
270.73	9,505	272.29	42,541	273.85	75,578
270.76	10,140	272.32	43,176	273.88	76,213
270.79	10,775	272.35	43,812	273.91	76,848
270.82	11,411	272.38	44,447	273.94	77,483
270.85	12,046	272.41	45,082	273.97	78,119
270.88	12,681	272.44	45,718	274.00	78,754
270.91	13,317	272.47	46,353	274.03	79,389
270.94	13,952	272.50	46,988	274.06	80,025
270.97	14,587	272.53	47,624	274.09	80,660
271.00	15,223	272.56	48,259	274.12	81,295
271.03	15,858	272.59	48,894	274.15	81,931

STORAGE AT
LOWEST ORIFICE
AT ELEVATION
273.00 = 57,577 CF

4B - Albany Costco

Prepared by Maser Consulting PA

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Type II 24-hr 100-Year Rainfall=6.65"

Printed 3/28/2019

Stage-Area-Storage for Pond P-B2: Proposed Basin #1 (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
274.18	82,566	275.74	115,602	277.30	148,639
274.21	83,201	275.77	116,238	277.33	149,274
274.24	83,837	275.80	116,873	277.36	149,909
274.27	84,472	275.83	117,508	277.39	150,545
274.30	85,107	275.86	118,144	277.42	151,180
274.33	85,743	275.89	118,779	277.45	151,815
274.36	86,378	275.92	119,414	277.48	152,451
274.39	87,013	275.95	120,050	277.51	153,086
274.42	87,649	275.98	120,685	277.54	153,721
274.45	88,284	276.01	121,320	277.57	154,357
274.48	88,919	276.04	121,956	277.60	154,992
274.51	89,554	276.07	122,591	277.63	155,627
274.54	90,190	276.10	123,226	277.66	156,263
274.57	90,825	276.13	123,862	277.69	156,898
274.60	91,460	276.16	124,497	277.72	157,533
274.63	92,096	276.19	125,132	277.75	158,169
274.66	92,731	276.22	125,767	277.78	158,804
274.69	93,366	276.25	126,403	277.81	159,439
274.72	94,002	276.28	127,038	277.84	160,075
274.75	94,637	276.31	127,673	277.87	160,710
274.78	95,272	276.34	128,309	277.90	161,345
274.81	95,908	276.37	128,944	277.93	161,980
274.84	96,543	276.40	129,579	277.96	162,616
274.87	97,178	276.43	130,215	277.99	163,251
274.90	97,814	276.46	130,850	278.02	163,886
274.93	98,449	276.49	131,485	278.05	164,522
274.96	99,084	276.52	132,121	278.08	165,157
274.99	99,720	276.55	132,756	278.11	165,792
275.02	100,355	276.58	133,391	278.14	166,428
275.05	100,990	276.61	134,027	278.17	167,063
275.08	101,625	276.64	134,662	278.20	167,698
275.11	102,261	276.67	135,297	278.23	168,334
275.14	102,896	276.70	135,933	278.26	168,969
275.17	103,531	276.73	136,568	278.29	169,604
275.20	104,167	276.76	137,203	278.32	170,240
275.23	104,802	276.79	137,838	278.35	170,875
275.26	105,437	276.82	138,474	278.38	171,510
275.29	106,073	276.85	139,109	278.41	172,146
275.32	106,708	276.88	139,744	278.44	172,781
275.35	107,343	276.91	140,380	278.47	173,416
275.38	107,979	276.94	141,015	278.50	174,051
275.41	108,614	276.97	141,650	278.53	174,687
275.44	109,249	277.00	142,286	278.56	175,322
275.47	109,885	277.03	142,921	278.59	175,957
275.50	110,520	277.06	143,556	278.62	176,593
275.53	111,155	277.09	144,192	278.65	177,228
275.56	111,791	277.12	144,827	278.68	177,863
275.59	112,426	277.15	145,462	278.71	178,499
275.62	113,061	277.18	146,098	278.74	179,134
275.65	113,696	277.21	146,733	278.77	179,769
275.68	114,332	277.24	147,368	278.80	180,405
275.71	114,967	277.27	148,004	278.83	181,040

4B - Albany Costco

Type II 24-hr 100-Year Rainfall=6.65"

Prepared by Maser Consulting PA

Printed 3/28/2019

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Stage-Area-Storage for Pond P-B2: Proposed Basin #1 (continued)

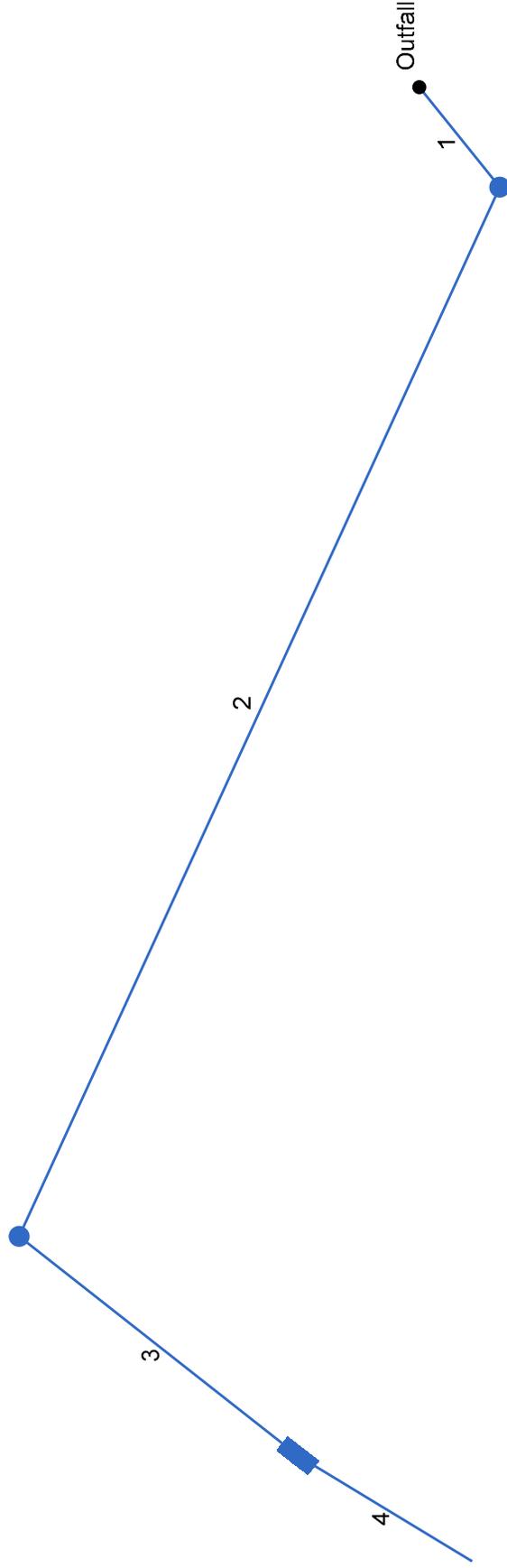
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
278.86	181,675	280.42	205,817
278.89	182,311	280.45	205,817
278.92	182,946	280.48	205,817
278.95	183,581		
278.98	184,217		
279.01	184,852		
279.04	185,487		
279.07	186,122		
279.10	186,758		
279.13	187,393		
279.16	188,028		
279.19	188,664		
279.22	189,299		
279.25	189,934		
279.28	190,570		
279.31	191,205		
279.34	191,840		
279.37	192,476		
279.40	193,111		
279.43	193,746		
279.46	194,382		
279.49	195,017		
279.52	195,652		
279.55	196,287		
279.58	196,923		
279.61	197,558		
279.64	198,193		
279.67	198,829		
279.70	199,464		
279.73	200,099		
279.76	200,735		
279.79	201,370		
279.82	202,005		
279.85	202,641		
279.88	203,276		
279.91	203,911		
279.94	204,547		
279.97	205,182		
280.00	205,817		
280.03	205,817		
280.06	205,817		
280.09	205,817		
280.12	205,817		
280.15	205,817		
280.18	205,817		
280.21	205,817		
280.24	205,817		
280.27	205,817		
280.30	205,817		
280.33	205,817		
280.36	205,817		
280.39	205,817		



APPENDIX 5

STORM SEWER CALCULATIONS

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow (cfs)	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 3/27/2019						
					Incr-ment (ac)	Sub-Total (ac)	Sum CA							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Vel (ft/s)	Cap (cfs)	Frequency: 100 yrs			
																									Line description	Slope (%)	Size (in)
1	End	MIH	0.012	28	0.00	0.00	0.00	7.14	0.12	0.00	0.00	284.25	272.34	272.28	270.78	18	0.37	3.93	6.94	S-1 TO EX MH							
2	1	MIH	0.012	250	0.00	0.00	0.00	6.07	1.06	0.00	0.00	281.81	272.43	273.72	270.98	18	0.35	4.24	6.94	S-2 TO S-1							
3	2	Comb	0.012	77	0.00	0.00	0.00	5.75	0.33	0.00	0.00	282.80	273.90	274.30	273.92	18	0.31	4.71	6.94	S-3 TO S-2							
4	3	None	0.012	44	0.00	0.00	0.00	5.00	0.75	0.00	0.00	282.80	276.00	276.00	273.00	36	0.01	0.98	6.94	BASIN TO S-3							

NOTES: Intensity = 45.80 / (inlet time + 3.80) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow.

Project File: Storm (Basin Outfall).stm

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow (cfs)	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 3/27/2019							
					C1 = 0.2	C2 = 0.6	C3 = 0.95							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Vel (ft/s)	Cap (cfs)					
																								Incr-ment (ac)	Sub-Total (ac)	Sum CA	Size (in)	Slope (%)
1	End	MIH	0.012	44	0.00	0.00	0.00	10.17	0.32	7.12	3.85	0.00	282.33	279.76	279.75	0.01	48	0.03	2.18	27.40	S-4 TO BASIN							
					0.00	0.61	0.37					27.40	275.44	275.22	0.22	48	0.50	8.75	109.9									
					0.00	3.68	3.49						271.44	271.22		Cir												
2	1	DrGrt	0.012	65	0.00	0.00	0.00	9.72	0.45	7.29	3.85	0.00	281.14	279.80	279.77	0.02	48	0.03	2.23	28.05	S-5 TO S-4							
					0.09	0.61	0.37					28.05	275.96	275.64		48	0.49	8.71	109.5									
					0.81	3.68	3.49						271.96	271.64	0.32	Cir												
3	2	DrGrt	0.012	8	0.00	0.00	0.00	9.66	0.05	7.31	3.03	0.00	281.14	279.84	279.83	0.00	42	0.04	2.30	22.14	S-6 TO S-5							
					0.40	0.52	0.31					22.14	275.86	275.66		42	2.50	17.91	172.3									
					0.70	2.87	2.72						272.36	272.16	0.20	Cir												
4	3	Comb	0.012	80	0.00	0.00	0.00	8.91	0.76	7.62	2.13	0.00	281.02	280.02	280.00	0.02	42	0.02	1.68	16.19	S-7 TO S-6							
					0.09	0.12	0.07					16.19	276.46	276.06		42	0.50	8.02	77.17									
					0.25	2.17	2.06						272.96	272.56	0.40	Cir												
5	4	MIH	0.012	93	0.00	0.00	0.00	7.92	0.99	8.07	1.84	0.00	283.24	280.06	280.05	0.02	42	0.02	1.54	14.85	S-8 TO S-7							
					0.00	0.04	0.02					14.85	277.13	276.66		42	0.50	8.04	77.32									
					0.00	1.92	1.83						273.63	273.16	0.47	Cir												
6	5	DrGrt	0.012	135	0.00	0.00	0.00	7.42	0.50	8.32	1.65	0.00	282.65	280.52	280.10	0.42	24	0.31	4.36	13.69	S-9 TO S-8							
					0.02	0.03	0.02					13.69	276.51	275.83		24	0.50	5.53	17.37									
					0.21	1.73	1.64						274.51	273.83	0.68	Cir												
7	6	DrGrt	0.012	122	0.00	0.00	0.00	6.93	0.49	8.59	1.43	0.00	283.50	281.04	280.73	0.31	24	0.25	3.92	12.32	S-10 TO S-9							
					0.00	0.00	0.00					12.32	277.32	276.71		24	0.50	5.51	17.30									
					0.06	1.52	1.44						275.32	274.71	0.61	Cir												
8	7	DrGrt	0.012	69	0.00	0.00	0.00	6.64	0.28	8.75	1.38	0.00	283.68	281.53	281.36	0.17	24	0.24	3.84	12.05	S-11 TO S-10							
					0.00	0.00	0.00					12.05	277.87	277.53		24	0.49	5.48	17.21									
					0.07	1.45	1.38						275.87	275.53	0.34	Cir												
9	8	DrGrt	0.012	143	0.00	0.00	0.00	5.00	1.64	9.87	0.18	0.00	283.32	282.16	282.07	0.09	15	0.06	1.45	1.78	S-12 TO S-11							
					0.00	0.00	0.00					1.78	280.57	279.14		15	1.00	5.70	6.99									
					0.19	0.19	0.18						279.32	277.89	1.43	Cir												
10	5	DrGrt	0.012	54	0.00	0.00	0.00	5.00	0.57	9.87	0.20	0.00	280.23	280.14	280.10	0.04	15	0.08	1.57	1.93	S-13 TO S-8							
					0.01	0.01	0.01					1.93	277.48	277.21		15	0.50	4.04	4.96									
					0.20	0.20	0.19						276.23	275.96	0.27	Cir												

Project File: Storm (North Run to Basin).stm

NOTES: Intensity = 45.80 / (inlet time + 3.80) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow.

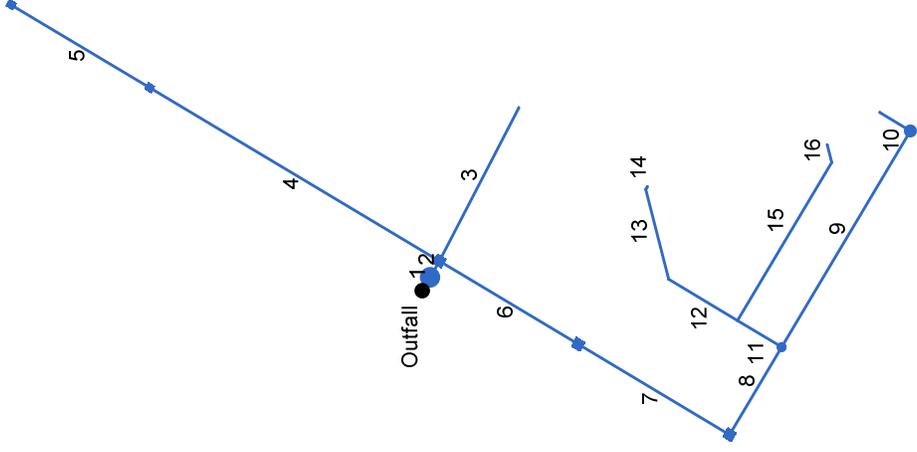
FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 3/27/2019								
					C1 = 0.2	C2 = 0.6	C3 = 0.95					Total Flow	Q (cfs)		Up (ft)	Down (ft)	Fall (ft)			Size (in)	Slope (%)		Vel (ft/s)	Cap (cfs)	Frequency: 100 yrs	Proj: Storm (North Run to Basin)				
																											Incr-ment (ac)	Sub-Total (ac)	Sum CA	Line description
11	8	MIH	0.012	34	0.00	0.00	0.00	5.00	0.16	9.87	1.13	0.00	284.38	281.97	278.75	276.75	24	0.21	3.55	11.16	3/27/2019									
					0.00	0.00	0.00					11.16		278.07	276.07	0.68	24	2.01	11.05	34.71										
					1.19	1.19	1.13										24 Cir													

NOTES: Intensity = 45.80 / (inlet time + 3.80) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow.

Project File: Storm (North Run to Basin).stm

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q Total Flow	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 3/27/2019									
					C1 = 0.2	C2 = 0.6	C3 = 0.95							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Vel (ft/s)	Cap (cfs)	Frequency: 100 yrs						
																									Incr-ment (ac)	Sub-Total (ac)	Sum CA	Size (in)	Slope (%)	Line description
1	End	MIH	0.012	6	0.00	0.00	0.00	7.40	0.02	8.33	5.00	283.30	279.77	279.75	0.02	36	0.33	5.88	41.59	S-14 TO BASIN										
					0.00	0.22	0.13					41.59	276.26	276.23	0.03	36	0.49	7.18	50.77											
					0.00	5.09	4.84						273.26	273.23		Cir														
2	1	DrGrt	0.012	7	0.00	0.00	0.00	7.38	0.02	8.34	5.00	283.15	279.88	279.85	0.03	36	0.33	5.89	41.65	S-15 TO S-14										
					0.06	0.22	0.13					41.65	276.50	276.46	0.04	36	0.54	7.48	52.86											
					0.88	5.09	4.84						273.50	273.46		Cir														
3	2	None	0.012	68	0.00	0.00	0.00	5.00	1.06	9.87	0.09	284.38	281.64	281.61	0.03	12	0.05	1.07	0.84	RD-3 TO S-15										
					0.00	0.00	0.00				0.84	278.67	277.30	277.30	1.37	12	2.01	6.96	5.47											
					0.09	0.09	0.08					277.67	276.30	276.30		Cir														
4	2	DrGrt	0.012	134	0.00	0.00	0.00	5.73	0.68	9.33	1.08	283.15	281.70	281.47	0.23	24	0.17	3.21	10.07	S-16 TO S-15										
					0.13	0.14	0.09				10.07	280.08	279.41	279.41	0.67	24	0.50	5.51	17.33											
					0.78	1.04	0.99					278.08	277.41	277.41		Cir														
5	4	DrGrt	0.012	64	0.00	0.00	0.00	5.00	0.73	9.87	0.26	283.15	281.94	281.90	0.03	18	0.05	1.45	2.57	S-17 TO S-16										
					0.02	0.02	0.01				2.57	280.40	280.08	280.08	0.32	18	0.50	4.55	8.04											
					0.26	0.26	0.25					278.90	278.58	278.58		Cir														
6	2	DrGrt	0.012	64	0.00	0.00	0.00	7.19	0.20	8.44	2.96	283.15	281.43	281.23	0.20	30	0.32	5.09	24.96	S-18 TO S-15										
					0.01	0.02	0.01				24.96	276.82	276.50	276.50	0.32	30	0.50	6.40	31.42											
					0.36	3.08	2.93					274.32	274.00	274.00		Cir														
7	6	DrGrt	0.012	70	0.00	0.00	0.00	6.95	0.24	8.57	2.61	283.15	281.89	281.71	0.18	30	0.25	4.56	22.37	S-19 TO S-18										
					0.01	0.01	0.01				22.37	277.37	277.02	277.02	0.35	30	0.50	6.40	31.42											
					0.19	2.72	2.59					274.87	274.52	274.52		Cir														
8	7	DrGrt	0.012	40	0.00	0.00	0.00	6.81	0.14	8.65	2.42	283.15	282.50	282.41	0.09	30	0.22	4.27	20.95	S-20 TO S-19										
					0.01	0.01	0.00				20.95	277.77	277.57	277.57	0.20	30	0.50	6.37	31.29											
					0.13	2.54	2.41					275.27	275.07	275.07		Cir														
9	8	MIH	0.012	100	0.00	0.00	0.00	5.03	0.38	9.85	2.20	284.03	283.16	282.93	0.24	30	0.24	4.42	21.70	S-21 TO S-20										
					0.00	0.00	0.00				21.70	278.47	277.97	277.97	0.50	30	0.50	6.41	31.47											
					0.00	2.32	2.20					275.97	275.47	275.47		Cir														
10	9	None	0.012	14	0.00	0.00	0.00	5.00	0.03	9.87	2.20	284.38	283.58	283.47	0.11	24	0.79	6.93	21.76	RD-2 TO S-21										
					0.00	0.00	0.00				21.76	278.75	278.47	278.47	0.28	24	1.99	10.99	34.53											
					2.32	2.32	2.20					276.75	276.47	276.47		Cir														

Project File: Storm (West Run to Basin).stm

NOTES: Intensity = 45.80 / (inlet time + 3.80) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow.

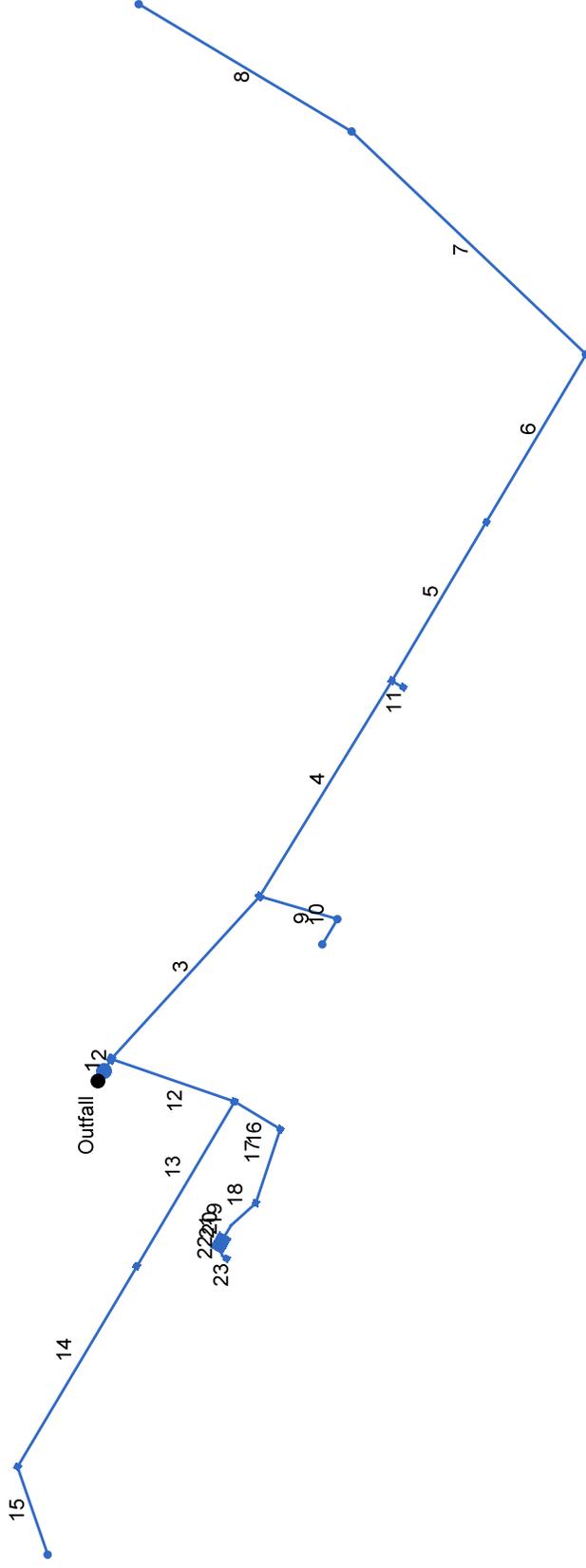
FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow Q (cfs)	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 3/27/2019							
					C1 = 0.2	C2 = 0.6	C3 = 0.95							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Vel (ft/s)	Cap (cfs)					
																								Increment (ac)	Sub-Total (ac)	Sum CA	Size (in)	Slope (%)
11	8	None	0.012	20	0.00	0.00	0.00	6.66	0.15	8.74	0.09	0.00	283.46	283.20	277.87	277.20	8	0.33	2.14	0.75	RD-4 TO S-20 (1)							
					0.00	0.00	0.00				0.75		277.87	277.87	277.00			3.71	1.29									
					0.00	0.09	0.08		0.20				277.20	277.00	0.20	Cir												
12	11	None	0.012	32	0.00	0.00	0.00	5.39	0.34	9.57	0.06	0.00	283.79	283.36	278.19	277.52	8	0.17	1.56	0.55	RD-4 TO S-20 (2)							
					0.00	0.00	0.00				0.55		278.19	277.87	0.06	8	1.00	3.76	1.31									
					0.00	0.06	0.06		0.32				277.52	277.20	0.32	Cir												
13	12	None	0.012	37	0.00	0.00	0.00	5.01	0.38	9.86	0.06	0.00	283.90	283.46	278.56	277.89	8	0.18	1.61	0.56	RD-4 TO S-20 (3)							
					0.00	0.00	0.00				0.56		278.56	278.19	0.07	8	1.01	3.77	1.31									
					0.00	0.06	0.06		0.37				277.89	277.52	0.37	Cir												
14	13	None	0.012	1	0.00	0.00	0.00	5.00	0.01	9.87	0.06	0.00	283.90	283.49	278.57	277.90	8	0.19	1.61	0.56	RD-4 TO S-20 (4)							
					0.00	0.00	0.00				0.56		278.57	278.56	0.00	8	0.80	3.36	1.17									
					0.06	0.06	0.06		0.01				277.90	277.89	0.01	Cir												
15	11	None	0.012	73	0.00	0.00	0.00	5.15	1.51	9.76	0.03	0.00	283.90	283.37	278.60	277.93	8	0.05	0.80	0.28	RD-5 TO S-20 (1)							
					0.00	0.00	0.00				0.28		278.60	277.87	0.03	8	1.00	3.75	1.31									
					0.00	0.03	0.02		0.73				277.93	277.20	0.73	Cir												
16	15	None	0.012	7	0.00	0.00	0.00	5.00	0.15	9.87	0.03	0.00	283.90	283.38	278.67	278.00	8	0.05	0.81	0.28	RD-5 TO S-20 (2)							
					0.00	0.00	0.00				0.28		278.67	278.60	0.00	8	0.99	3.73	1.30									
					0.03	0.03	0.02		0.07				278.00	277.93	0.07	Cir												

Project File: Storm (West Run to Basin).stm

NOTES: Intensity = 45.80 / (inlet time + 3.80) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow.

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow Q (cfs)	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 3/27/2019							
					C1 = 0.2	C2 = 0.6	C3 = 0.95							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Vel (ft/s)	Cap (cfs)					
																								Incr-ment (ac)	Sub-Total (ac)	Sum CA	Size (in)	Slope (%)
1	End	MIH	0.012	6	0.00	0.00	0.00	10.96	0.03	6.86	4.80	283.20	279.76	275.76	271.76	48	0.09	3.77	47.39	S-22 TO BASIN								
					0.00	1.45	0.87					47.39	275.76	275.73	0.03	48	0.49	8.68	109.1									
					0.00	4.13	3.92						271.76	271.73		Cir												
2	1	DrGrt	0.012	7	0.00	0.00	0.00	10.92	0.03	6.87	4.80	283.15	279.80	275.76	271.76	48	0.09	3.77	47.39	S-23 TO S-22								
					0.00	1.45	0.87					47.39	275.80	275.76	0.01	48	0.54	9.08	114.1									
					0.05	4.13	3.92						271.80	271.76	0.04	Cir												
3	2	Comb	0.012	115	0.00	0.00	0.00	10.20	0.73	7.12	2.57	282.16	280.30	280.23	0.06	42	0.05	2.64	25.41	S-24 TO S-23								
					0.03	0.97	0.58					25.41	276.58	276.00	0.06	42	0.50	8.04	77.34									
					0.40	2.09	1.99						273.08	272.50	0.58	Cir												
4	3	Comb	0.012	132	0.00	0.00	0.00	9.39	0.81	7.42	1.36	282.28	280.57	280.44	0.12	30	0.09	2.73	13.41	S-25 TO S-24								
					0.00	0.43	0.26					13.41	277.24	276.58	0.66	30	0.50	6.39	31.39									
					0.29	1.16	1.10						274.74	274.08	0.66	Cir												
5	4	Comb	0.012	97	0.00	0.00	0.00	8.67	0.72	7.72	0.71	282.28	280.86	280.78	0.08	24	0.08	2.23	6.99	S-26 TO S-25								
					0.05	0.10	0.06					6.99	277.72	277.24	0.48	24	0.50	5.50	17.27									
					0.26	0.68	0.65						275.72	275.24	0.48	Cir												
6	5	Comb	0.012	102	0.00	0.00	0.00	7.96	0.70	8.04	0.43	282.28	281.04	280.90	0.14	18	0.14	2.41	4.27	S-27 TO S-26								
					0.04	0.04	0.03					4.27	278.23	277.72	0.51	18	0.50	4.55	8.04									
					0.12	0.43	0.40						276.73	276.22	0.51	Cir												
7	6	Comb	0.012	169	0.00	0.00	0.00	6.77	1.19	8.67	0.29	283.32	281.47	281.18	0.29	15	0.17	2.37	2.91	S-28 TO S-27								
					0.00	0.00	0.00					2.91	279.07	278.23	0.84	15	0.50	4.02	4.93									
					0.15	0.31	0.29						277.82	276.98	0.84	Cir												
8	7	Comb	0.012	130	0.00	0.00	0.00	5.00	1.77	9.87	0.15	283.32	281.64	281.58	0.06	15	0.05	1.22	1.50	S-29 TO S-28								
					0.00	0.00	0.00					1.50	280.57	279.27	1.30	15	1.00	5.70	7.00									
					0.16	0.16	0.15						279.32	278.02	1.30	Cir												
9	3	DrGrt	0.012	42	0.00	0.00	0.00	5.13	0.27	9.77	0.82	280.90	280.50	280.45	0.05	24	0.11	2.59	8.14	S-30 TO S-24								
					0.47	0.52	0.31					8.14	278.15	277.94	0.21	24	0.49	5.48	17.23									
					0.32	0.54	0.51						276.15	275.94	0.21	Cir												
10	9	Comb	0.012	15	0.00	0.00	0.00	5.00	0.13	9.87	0.24	282.38	280.72	280.70	0.02	15	0.12	1.93	2.37	S-31 TO S-30								
					0.05	0.05	0.03					2.37	278.92	278.15	0.77	15	5.00	12.75	15.64									
					0.22	0.22	0.21						277.67	276.90	0.77	Cir												

NOTES: Intensity = 45.60 / (inlet time + 3.60) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow ; Total flows limited to inlet captured flows

Project File: Storm (South Run to Basin).stm

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 3/27/2019				
					Incre-ment (ac)	Sub-Total (ac)	Sum CA							Elev of Crown		Span			Pipe	Full Flow					
														Up (ft)	Down (ft)					Fall (ft)		Size (in)	Slope (%)	Vel (ft/s)	Cap (cfs)
C1 = 0.2		C2 = 0.6		C3 = 0.95																					
11	4	DrGrt	0.012	7	0.00	0.00	0.00	5.00	0.04	9.87	0.37	281.50	280.76	280.74	0.02	15	0.28	3.01	3.70	S-32 TO S-25					
					0.33	0.20	0.20						278.75	278.68	15	1.01	5.74	7.04							
					0.18	0.17	0.17						277.50	277.43	Cir										
12	2	DrGrt	0.012	68	0.00	0.00	0.00	6.33	0.26	8.94	2.18	282.23	280.28	280.12	0.16	30	0.23	4.38	21.52	S-33 TO S-23					
					0.03	0.48	0.29						278.47	278.13	30	0.50	6.38	31.32							
					0.30	1.99	1.89						275.97	275.63	Cir										
13	12	DrGrt	0.012	100	0.00	0.00	0.00	5.95	0.38	9.18	1.39	282.77	281.15	280.84	0.32	24	0.32	4.38	13.75	S-34 TO S-33					
					0.02	0.34	0.20						278.97	278.47	24	0.50	5.51	17.31							
					0.39	1.25	1.18						276.97	276.47	Cir										
14	13	DrGrt	0.012	122	0.00	0.00	0.00	5.31	0.64	9.63	1.01	283.00	281.65	281.44	0.20	24	0.17	3.18	9.99	S-35 TO S-34					
					0.31	0.32	0.19						279.58	278.97	24	0.50	5.51	17.32							
					0.52	0.86	0.81						277.58	276.97	Cir										
15	14	Comb	0.012	48	0.00	0.00	0.00	5.00	0.31	9.87	0.32	282.81	281.99	281.89	0.10	15	0.21	2.60	3.19	S-36 TO S-35					
					0.00	0.00	0.00						280.06	279.58	15	0.99	5.67	6.96							
					0.33	0.33	0.32						278.81	278.33	Cir										
16	12	DrGrt	0.012	28	0.00	0.00	0.00	5.84	0.12	9.26	0.49	282.50	281.03	280.90	0.13	15	0.47	3.91	4.80	S-37 TO S-33					
					0.08	0.11	0.06						278.64	278.36	15	1.00	5.71	7.01							
					0.28	0.45	0.43						277.39	277.11	Cir										
17	16	Comb	0.012	41	0.00	0.00	0.00	5.35	0.49	9.61	0.17	282.71	281.61	281.59	0.02	15	0.06	1.39	1.70	S-38 TO S-37					
					0.02	0.02	0.01						279.25	278.84	15	1.00	5.71	7.01							
					0.11	0.17	0.16						278.00	277.59	Cir										
18	17	None	0.012	18	0.00	0.00	0.00	5.17	0.18	9.74	0.06	282.98	281.67	281.64	0.03	8	0.19	1.61	0.56	ESOV TO S-38 (1)					
					0.00	0.00	0.00						279.80	279.45	8	2.00	5.29	1.85							
					0.00	0.06	0.06						279.13	278.78	Cir										
19	18	MIH	0.012	7	0.00	0.00	0.00	5.09	0.08	9.80	0.06	283.52	281.70	281.68	0.01	8	0.19	1.61	0.56	ESOV TO S-38 (2)					
					0.00	0.00	0.00						279.95	279.80	8	2.05	5.37	1.87							
					0.00	0.06	0.06						279.28	279.13	Cir										
20	19	MIH	0.012	3	0.00	0.00	0.00	5.06	0.03	9.83	0.06	283.55	281.71	281.70	0.01	8	0.19	1.61	0.56	OWS TO ESOV					
					0.00	0.00	0.00						280.00	279.94	8	1.91	5.18	1.81							
					0.00	0.06	0.06						279.33	279.27	Cir										

Project File: Storm (South Run to Basin).stm
 NOTES: Intensity = 45.60 / (inlet time + 3.60) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow. ; Total flows limited to inlet captured flows

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow (cfs)	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 3/27/2019								
					Incr-ment (ac)	Sub-Total (ac)	Sum CA							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Vel (ft/s)	Cap (cfs)						
																								C1 = 0.2	C2 = 0.6	C3 = 0.95	Elev of Crown	Size (in)	Slope (%)
Line No	To Line	Type of struc	n - Value	Len (ft)	Incr-ment (ac)	Sub-Total (ac)	Sum CA	Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow (cfs)	Inlet elev (ft)	Up (ft)	Down (ft)	Fall (ft)	Span	Pipe	Vel (ft/s)	Cap (cfs)	Date: 3/27/2019								
21	20	None	0.012	1	0.00	0.00	0.00	5.05	0.01	9.83	0.06	0.00	283.60	281.73	281.71	0.01	6	0.86	2.87	0.56	S-39 TO OWS (1)								
					0.00	0.00	0.00					0.56		280.51	280.50		6	0.74	2.67	0.52									
					0.00	0.06	0.06							280.01	280.00	0.01	Cir												
22	21	None	0.012	6	0.00	0.00	0.00	5.02	0.03	9.86	0.06	0.00	283.60	281.87	281.82	0.05	6	0.86	2.87	0.56	S-39 TO OWS (2)								
					0.00	0.00	0.00					0.56		280.57	280.51		6	1.04	3.15	0.62									
					0.00	0.06	0.06							280.07	280.01	0.06	Cir												
23	22	Comb	0.012	3	0.00	0.00	0.00	5.00	0.02	9.87	0.06	0.00	283.10	281.99	281.97	0.02	6	0.86	2.87	0.56	S-39 TO OWS (3)								
					0.00	0.00	0.00					0.56		280.60	280.57		6	1.05	3.17	0.62									
					0.06	0.06	0.06							280.10	280.07	0.03	Cir												

NOTES: Intensity = 45.60 / (inlet time + 3.60) ^ 0.71 (in/hr) ; Time of flow in section is based on full flow. ; Total flows limited to inlet captured flows



APPENDIX 6

SPDES GENERAL PERMIT GP- 0-15-002



Department of
Environmental
Conservation

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP-0-15-002

Issued Pursuant to Article 17, Titles 7, 8 and Article 70
of the Environmental Conservation Law

Effective Date: January 29, 2015

Expiration Date: January 28, 2020

Modification Date:

July 14, 2015 – Correction of typographical error in definition of “New Development”,
Appendix A

November 23, 2016 – Updated to require the use of the New York State Standards and
Specifications for Erosion and Sediment Control, dated November
2016. The use of this standard will be required as of February 1,
2017.

John J. Ferguson
Chief Permit Administrator


Authorized Signature

11.14.16
Date

Address: NYS DEC
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act (“CWA”), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System (“NPDES”)* permit or by a state permit program. New York’s *State Pollutant Discharge Elimination System (“SPDES”)* is a NPDES-approved program with permits issued in accordance with the *Environmental Conservation Law (“ECL”)*.

This general permit (“permit”) is issued pursuant to Article 17, Titles 7, 8 and Article 70 of the ECL. An *owner or operator* may obtain coverage under this permit by submitting a Notice of Intent (“NOI”) to the Department. Copies of this permit and the NOI for New York are available by calling (518) 402-8109 or at any New York State Department of Environmental Conservation (“the Department”) regional office (see Appendix G). They are also available on the Department’s website at:

<http://www.dec.ny.gov/>

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of “*construction activity*”, as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a point source and therefore, pursuant to Article 17-0505 of the ECL, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. They cannot wait until there is an actual *discharge* from the construction site to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES
 FROM CONSTRUCTION ACTIVITIES**

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(Part I)

Part I. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;
2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State*.
3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

B. Effluent Limitations Applicable to Discharges from Construction Activities

Discharges authorized by this permit must achieve, at a minimum, the effluent limitations in Part I.B.1. (a) – (f) of this permit. These limitations represent the degree of effluent reduction attainable by the application of best practicable technology currently available.

1. Erosion and Sediment Control Requirements - The *owner or operator* must select, design, install, implement and maintain control measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. The selection, design, installation, implementation, and maintenance of these control measures must meet the non-numeric effluent limitations in Part I.B.1.(a) – (f) of this permit and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, using sound engineering judgment. Where control measures are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must include in the Stormwater Pollution Prevention Plan (“SWPPP”) the reason(s) for the deviation or alternative design and provide information

(Part I.B.1)

which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

a. **Erosion and Sediment Controls.** Design, install and maintain effective erosion and sediment controls to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such controls must be designed, installed and maintained to:

- (i) *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharges*;
- (ii) Control stormwater *discharges* to *minimize* channel and streambank erosion and scour in the immediate vicinity of the *discharge* points;
- (iii) *Minimize* the amount of soil exposed during *construction activity*;
- (iv) *Minimize* the disturbance of *steep slopes*;
- (v) *Minimize* sediment *discharges* from the site;
- (vi) Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharges*, unless *infeasible*;
- (vii) *Minimize* soil compaction. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted; and
- (viii) Unless *infeasible*, preserve a sufficient amount of topsoil to complete soil restoration and establish a uniform, dense vegetative cover.

b. **Soil Stabilization.** In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) days from the date the current soil disturbance activity ceased. For construction sites that *directly discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. See Appendix A for definition of *Temporarily Ceased*.

c. **Dewatering.** *Discharges* from dewatering activities, including *discharges*

(Part I.B.1.c)

from dewatering of trenches and excavations, must be managed by appropriate control measures.

d. **Pollution Prevention Measures.** Design, install, implement, and maintain effective pollution prevention measures to *minimize the discharge of pollutants* and prevent a violation of the *water quality standards*. At a minimum, such measures must be designed, installed, implemented and maintained to:

- (i) *Minimize the discharge of pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. This applies to washing operations that use clean water only. Soaps, detergents and solvents cannot be used;
- (ii) *Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to stormwater.* Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a *discharge of pollutants*, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use) ; and
- (iii) Prevent the *discharge of pollutants* from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Prohibited Discharges.** The following *discharges* are prohibited:

- (i) Wastewater from washout of concrete;
- (ii) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
- (iii) Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance;
- (iv) Soaps or solvents used in vehicle and equipment washing; and
- (v) Toxic or hazardous substances from a spill or other release.

f. **Surface Outlets.** When discharging from basins and impoundments, the outlets shall be designed, constructed and maintained in such a manner that sediment does not leave the basin or impoundment and that erosion

(Part I.B.1.f)

at or below the outlet does not occur.

C. Post-construction Stormwater Management Practice Requirements

1. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must select, design, install, and maintain the practices to meet the *performance criteria* in the New York State Stormwater Management Design Manual (“Design Manual”), dated January 2015, using sound engineering judgment. Where post-construction stormwater management practices (“SMPs”) are not designed in conformance with the *performance criteria* in the Design Manual, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.
2. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must design the practices to meet the applicable *sizing criteria* in Part I.C.2.a., b., c. or d. of this permit.

a. Sizing Criteria for New Development

- (i) Runoff Reduction Volume (“RRv”): Reduce the total Water Quality Volume (“WQv”) by application of RR techniques and standard SMPs with RRv capacity. The total WQv shall be calculated in accordance with the criteria in Section 4.2 of the Design Manual.
- (ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.a.(i) of this permit due to *site limitations* shall direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv shall be documented in the SWPPP. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible*.

In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 4.3 of the Design Manual. The remaining portion of the total WQv

(Part I.C.2.a.ii)

that cannot be reduced shall be treated by application of standard SMPs.

- (iii) Channel Protection Volume (“Cpv”): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
 - (1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
 - (2) The site *discharges* directly to tidal waters, or fifth order or larger streams.
- (iv) Overbank Flood Control Criteria (“Qp”): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
 - (1) the site *discharges* directly to tidal waters or fifth order or larger streams, or
 - (2) A downstream analysis reveals that overbank control is not required.
- (v) Extreme Flood Control Criteria (“Qf”): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
 - (1) the site *discharges* directly to tidal waters or fifth order or larger streams, or
 - (2) A downstream analysis reveals that overbank control is not required.

b. Sizing Criteria for New Development in Enhanced Phosphorus Removal Watershed

- (i) Runoff Reduction Volume (RRv): Reduce the total Water Quality Volume (WQv) by application of RR techniques and standard SMPs with RRv capacity. The total WQv is the runoff volume from the 1-year, 24 hour design storm over the post-developed watershed and shall be calculated in accordance with the criteria in Section 10.3 of the Design Manual.
- (ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.b.(i) of this permit due to *site limitations* shall direct runoff from all newly constructed *impervious areas* to a RR technique or

(Part I.C.2.b.ii)

standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv shall be documented in the SWPPP. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible*.

In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 10.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

- (iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
 - (1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
 - (2) The site *discharges* directly to tidal waters, or fifth order or larger streams.
- (iv) Overbank Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
 - (1) the site *discharges* directly to tidal waters or fifth order or larger streams, or
 - (2) A downstream analysis reveals that overbank control is not required.
- (v) Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
 - (1) the site *discharges* directly to tidal waters or fifth order or larger streams, or
 - (2) A downstream analysis reveals that overbank control is not required.

c. Sizing Criteria for Redevelopment Activity

(Part I.C.2.c.i)

- (i) Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.
- (1) Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the Design Manual must be applied to all newly created pervious areas, or
 - (2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or
 - (3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or
 - (4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

If there is an existing post-construction stormwater management practice located on the site that captures and treats runoff from the *impervious area* that is being disturbed, the WQv treatment option selected must, at a minimum, provide treatment equal to the treatment that was being provided by the existing practice(s) if that treatment is greater than the treatment required by options 1 – 4 above.

- (ii) Channel Protection Volume (Cpv): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.
- (iii) Overbank Flood Control Criteria (Qp): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(Part I.C.2.c.iv)

- (iv) Extreme Flood Control Criteria (Qf): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

d. Sizing Criteria for Combination of Redevelopment Activity and New Development

Construction projects that include both *New Development* and *Redevelopment Activity* shall provide post-construction stormwater management controls that meet the *sizing criteria* calculated as an aggregate of the *Sizing Criteria* in Part I.C.2.a. or b. of this permit for the *New Development* portion of the project and Part I.C.2.c of this permit for *Redevelopment Activity* portion of the project.

D. Maintaining Water Quality

The Department expects that compliance with the conditions of this permit will control *discharges* necessary to meet applicable *water quality standards*. It shall be a violation of the *ECL* for any discharge to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;
2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and
3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

If there is evidence indicating that the stormwater *discharges* authorized by this permit are causing, have the reasonable potential to cause, or are contributing to a violation of the *water quality standards*; the *owner or operator* must take appropriate corrective action in accordance with Part IV.C.5. of this general permit and document in accordance with Part IV.C.4. of this general permit. To address the *water quality standard* violation the *owner or operator* may need to provide additional information, include and implement appropriate controls in the SWPPP to correct the problem, or obtain an individual SPDES permit.

If there is evidence indicating that despite compliance with the terms and conditions of this general permit it is demonstrated that the stormwater *discharges* authorized by this permit are causing or contributing to a violation of *water quality standards*, or

(Part I.D)

if the Department determines that a modification of the permit is necessary to prevent a violation of *water quality standards*, the authorized *discharges* will no longer be eligible for coverage under this permit. The Department may require the *owner or operator* to obtain an individual SPDES permit to continue discharging.

E. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity to surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph F. of this Part.
2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater *discharges* from *construction activities*.
3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater *discharges* may be authorized by this permit: *discharges* from firefighting activities; fire hydrant flushings; waters to which cleansers or other components have not been added that are used to wash vehicles or control dust in accordance with the SWPPP, routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; uncontaminated *groundwater* or spring water; uncontaminated *discharges* from construction site de-watering operations; and foundation or footing drains where flows are not contaminated with process materials such as solvents. For those entities required to obtain coverage under this permit, and who *discharge* as noted in this paragraph, and with the exception of flows from firefighting activities, these *discharges* must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.
4. The *owner or operator* must maintain permit eligibility to *discharge* under this permit. Any *discharges* that are not compliant with the eligibility conditions of this permit are not authorized by the permit and the *owner or operator* must either apply for a separate permit to cover those ineligible *discharges* or take steps necessary to make the *discharge* eligible for coverage.

F. Activities Which Are Ineligible for Coverage Under This General Permit

All of the following are **not** authorized by this permit:

(Part I.F)

1. *Discharges after construction activities* have been completed and the site has undergone *final stabilization*;
2. *Discharges* that are mixed with sources of non-stormwater other than those expressly authorized under subsection E.3. of this Part and identified in the SWPPP required by this permit;
3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII.K. of this permit;
4. *Construction activities* or *discharges from construction activities* that may adversely affect an endangered or threatened species unless the *owner or operator* has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.C.2 of this permit.
5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;
6. *Construction activities* for residential, commercial and institutional projects:
 - a. Where the *discharges* from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and
 - b. Which disturb one or more acres of land with no existing *impervious cover*; and
 - c. Which are undertaken on land with a Soil Slope Phase that is identified as an E or F, or the map unit name is inclusive of 25% or greater slope, on the United States Department of Agriculture (“USDA”) Soil Survey for the County where the disturbance will occur.
7. *Construction activities* for linear transportation projects and linear utility projects:
 - a. Where the *discharges* from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and
 - b. Which disturb two or more acres of land with no existing *impervious cover*; and
 - c. Which are undertaken on land with a Soil Slope Phase that is identified as an E or F, or the map unit name is inclusive of 25% or greater slope, on the USDA Soil Survey for the County where the disturbance will occur.

(Part I.F.8)

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.C.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:
 - a. Documentation that the *construction activity* is not within an archeologically sensitive area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the construction site within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the construction site within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant.
 - 1-5 acres of disturbance - 20 feet
 - 5-20 acres of disturbance - 50 feet
 - 20+ acres of disturbance - 100 feet, or
 - b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
 - (i) the State Environmental Quality Review (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or
 - (ii) documentation from OPRHP that the *construction activity* will result in No Impact; or
 - (iii) documentation from OPRHP providing a determination of No Adverse Impact; or
 - (iv) a Letter of Resolution signed by the owner/operator, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA); or
 - c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:
 - (i) No Affect
 - (ii) No Adverse Affect

(Part I.F.8.c.iii)

- (iii) Executed Memorandum of Agreement, or
- d. Documentation that:
 - (i) SHPA Section 14.09 has been completed by NYS DEC or another state agency.
- 9. *Discharges from construction activities* that are subject to an existing SPDES individual or general permit where a SPDES permit for *construction activity* has been terminated or denied; or where the *owner or operator* has failed to renew an expired individual permit.

Part II. OBTAINING PERMIT COVERAGE

A. Notice of Intent (NOI) Submittal

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a *regulated, traditional land use control MS4* must first prepare a SWPPP in accordance with all applicable requirements of this permit and then submit a completed NOI form to the Department in order to be authorized to *discharge* under this permit. An *owner or operator* shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (<http://www.dec.ny.gov/>). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address.

**NOTICE OF INTENT
NYS DEC, Bureau of Water Permits
625 Broadway, 4th Floor
Albany, New York 12233-3505**

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first prepare a SWPPP in accordance with all applicable requirements of this permit and then have its SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the "MS4 SWPPP Acceptance" form signed in accordance with Part VII.H., and then submit that form along with a completed NOI to the Department. An *owner or operator* shall use either the electronic (eNOI) or paper version of the NOI.

The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the address in Part II.A.1.

(Part II.A.2)

The requirement for an *owner or operator* to have its SWPPP reviewed and accepted by the *MS4* prior to submitting the NOI to the Department does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.E. (Change of *Owner or Operator*) or where the *owner or operator* of the *construction activity* is the *regulated, traditional land use control MS4*.

3. The *owner or operator* shall have the SWPPP preparer sign the “SWPPP Preparer Certification” statement on the NOI prior to submitting the form to the Department.
4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

B. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.
2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:
 - a. project review pursuant to the State Environmental Quality Review Act (“SEQRA”) have been satisfied, when SEQRA is applicable. See the Department’s website (<http://www.dec.ny.gov/>) for more information,
 - b. where required, all necessary Department permits subject to the *Uniform Procedures Act (“UPA”)* (see 6 NYCRR Part 621) have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators of construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,
 - c. the final SWPPP has been prepared, and
 - d. a complete NOI has been submitted to the Department in accordance with the requirements of this permit.
3. An *owner or operator* that has satisfied the requirements of Part II.B.2 above

(Part II.B.3)

will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

- a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:
 - (i) Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.; or
 - (ii) Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for *construction activities* with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C., the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, or;
 - (iii) Ten (10) business days from the date the Department receives a complete paper version of the NOI for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.
- b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:
 - (i) Five (5) business days from the date the Department receives both a complete electronic version of the NOI (eNOI) and signed “MS4 SWPPP Acceptance” form, or
 - (ii) Ten (10) business days from the date the Department receives both a complete paper version of the NOI and signed “MS4 SWPPP Acceptance” form.

4. The Department may suspend or deny an *owner’s or operator’s* coverage

(Part II.B.4)

under this permit if the Department determines that the SWPPP does not meet the permit requirements. In accordance with statute, regulation, and the terms and conditions of this permit, the Department may deny coverage under this permit and require submittal of an application for an individual SPDES permit based on a review of the NOI or other information pursuant to Part II.

5. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department. The *owner or operator* shall not *commence construction activity* on the future or additional areas until their authorization to *discharge* under this permit goes into effect in accordance with Part II.B. of this permit.

C. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination (“NOT”) has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4. of this permit.
2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-15-002), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, and all documentation necessary to demonstrate eligibility with this permit at the construction site until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.
3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:
 - a. The *owner or operator* shall

(Part II.C.3.a)

have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. of this permit every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

- b. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.
 - c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.
 - d. The *owner or operator* shall install any additional site specific practices needed to protect water quality.
 - e. The *owner or operator* shall include the requirements above in their SWPPP.
4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.
5. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the *regulated, traditional land use control MS4* in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *regulated, traditional land use control MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *regulated, traditional land use control MS4* prior to commencing construction of the post-construction stormwater management practice

(Part II.D)

D. Permit Coverage for Discharges Authorized Under GP-0-10-001

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-10-001), an *owner or operator* of a *construction activity* with coverage under GP-0-10-001, as of the effective date of GP-0-15-002, shall be authorized to *discharge* in accordance with GP-0-15-002, unless otherwise notified by the Department.

An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-15-002.

E. Change of *Owner or Operator*

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.A.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or operator* was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

(Part III)

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. A SWPPP shall be prepared and implemented by the *owner or operator* of each *construction activity* covered by this permit. The SWPPP must document the selection, design, installation, implementation and maintenance of the control measures and practices that will be used to meet the effluent limitations in Part I.B. of this permit and where applicable, the post-construction stormwater management practice requirements in Part I.C. of this permit. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*. A copy of the completed, final NOI shall be included in the SWPPP.
2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the *pollutants* in stormwater *discharges* and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.
3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.
4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP:
 - a. whenever the current provisions prove to be ineffective in minimizing *pollutants* in stormwater *discharges* from the site;
 - b. whenever there is a change in design, construction, or operation at the construction site that has or could have an effect on the *discharge* of *pollutants*; and
 - c. to address issues or deficiencies identified during an inspection by the *qualified inspector*, the Department or other regulatory authority.
5. The Department may notify the *owner or operator* at any time that the

(Part III.A.5)

SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit or require the *owner or operator* to obtain coverage under an individual SPDES permit in accordance with Part II.C.4. of this permit.

6. 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 of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

"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"

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the

(Part III.A.6)

trained contractor responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the construction site. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:
 - a. Background information about the scope of the project, including the location, type and size of project;
 - b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); floodplain/floodway boundaries; wetlands and drainage patterns that could be affected by the *construction activity*; existing and final contours ; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater *discharge(s)*;
 - c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);
 - d. A construction phasing plan and sequence of operations describing the intended order of *construction activities*, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other

(Part III.B.1.d)

activity at the site that results in soil disturbance;

- e. A description of the minimum erosion and sediment control practices to be installed or implemented for each *construction activity* that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;
- f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;
- g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;
- h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;
- i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;
- j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a *pollutant* source in the stormwater *discharges*;
- k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the construction site; and
- l. Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Include the reason for the deviation or alternative design

(Part III.B.1.I)

and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. Post-construction stormwater management practice component – The *owner or operator* of any construction project identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the applicable *sizing criteria* in Part I.C.2.a., c. or d. of this permit and the *performance criteria* in the technical standard, New York State Stormwater Management Design Manual dated January 2015

Where post-construction stormwater management practices are not designed in conformance with the *performance criteria* in the technical standard, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

The post-construction stormwater management practice component of the SWPPP shall include the following:

- a. Identification of all post-construction stormwater management practices to be constructed as part of the project. Include the dimensions, material specifications and installation details for each post-construction stormwater management practice;
- b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;
- c. A Stormwater Modeling and Analysis Report that includes:
 - (i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points;
 - (ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;
 - (iii) Results of stormwater modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre and post-development runoff rates and volumes for the different storm events;
 - (iv) Summary table, with supporting calculations, which demonstrates

(Part III.B.2.c.iv)

that each post-construction stormwater management practice has been designed in conformance with the *sizing criteria* included in the Design Manual;

- (v) Identification of any *sizing criteria* that is not required based on the requirements included in Part I.C. of this permit; and
 - (vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the Design Manual. Include the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the Design Manual;
- d. Soil testing results and locations (test pits, borings);
 - e. Infiltration test results, when required; and
 - f. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.
3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the applicable *sizing criteria* in Part I.C.2. b., c. or d. of this permit and the *performance criteria*, Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.f. above.

C. Required SWPPP Components by Project Type

Unless otherwise notified by the Department, *owners or operators of construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1 of this permit. *Owners or operators of the construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3 of this permit.

(Part IV)

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices (including pollution prevention measures) and all post-construction stormwater management practices identified in the SWPPP are inspected and maintained in accordance with Part IV.B. and C. of this permit.
2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York, or protect the public health and safety and/or the environment.

B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity* identified in Tables 1 and 2 of Appendix B shall have a *trained contractor* inspect the erosion and sediment control practices and pollution prevention measures being implemented within the active work area daily to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, the contractor shall begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.
2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *trained contractor* can stop conducting the maintenance inspections. The *trained contractor* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. of this permit as soon as soil disturbance activities resume.
3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *trained contractor* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

C. Qualified Inspector Inspection Requirements

(Part IV.C)

The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. and IV.B. of this permit **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- Registered Landscape Architect, or
- someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, with the exception of:
 - a. the construction of a single family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;
 - b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;
 - c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and
 - d. *construction activities* located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.
2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:
 - a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.
 - b. For construction sites where soil disturbance activities are on-going and

(Part IV.C.2.b)

the *owner or operator* has received authorization in accordance with Part II.C.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

- c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to reducing the frequency of inspections.
- d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization*, and all temporary, structural erosion and sediment control measures have been removed; and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the “*Final Stabilization*” and “*Post-Construction Stormwater Management Practice*” certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.A.1 of this permit.
- e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall

(Part IV.C.2.e)

be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization*, all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site, and all points of *discharge* from the construction site.
4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:
 - a. Date and time of inspection;
 - b. Name and title of person(s) performing inspection;
 - c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;
 - d. A description of the condition of the runoff at all points of *discharge* from the construction site. This shall include identification of any *discharges* of sediment from the construction site. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;
 - e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;
 - f. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance;
 - g. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;
 - h. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection;

(Part IV.C.4.i)

- i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;
 - j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s);
 - k. Identification and status of all corrective actions that were required by previous inspection; and
 - l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.
5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.
 6. All inspection reports shall be signed by the *qualified inspector*. Pursuant to Part II.C.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.A.1 of this permit. The NOT form shall be one which is associated with this permit, signed in accordance with Part VII.H of this permit.

(Part V.A.2)

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:
 - a. Total project completion - All *construction activity* identified in the SWPPP has been completed; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;
 - b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;
 - c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.E. of this permit.
 - d. The *owner or operator* obtains coverage under an alternative SPDES general permit or an individual SPDES permit.
3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the “*Final Stabilization*” and “*Post-Construction Stormwater Management Practice certification statements*” on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.
4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *regulated, traditional land use control MS4* sign the “*MS4 Acceptance*” statement on the NOT in accordance with the requirements in Part VII.H. of this permit. The *regulated, traditional land use control MS4* official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The *regulated, traditional land use control MS4* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector’s* final site inspection certification(s) required in Part V.A.3. of this permit.

(Part V.A.5)

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:
 - a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,
 - b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),
 - c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has a mechanism in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the *owner or operator's* deed of record,
 - d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university, hospital), government agency or authority, or public utility; the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION OF RECORDS

A. Record Retention

The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the Department receives a complete NOT submitted in accordance with Part V. of this general permit.

B. Addresses

With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.A.1 of this permit), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate DOW Water (SPDES) Program contact at the Regional Office listed in Appendix F.

(Part VII)

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

If any human remains or archaeological remains are encountered during excavation, the *owner or operator* must immediately cease, or cause to cease, all *construction activity* in the area of the remains and notify the appropriate Regional Water Engineer (RWE). *Construction activity* shall not resume until written permission to do so has been received from the RWE.

B. Continuation of the Expired General Permit

This permit expires five (5) years from the effective date. If a new general permit is not issued prior to the expiration of this general permit, an *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the terms and conditions of this general permit, if it is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, until a new general permit is issued.

C. Enforcement

Failure of the *owner or operator*, its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to \$37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

(Part VII.E)

E. Duty to Mitigate

The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to *minimize* or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. Duty to Provide Information

The *owner or operator* shall furnish to the Department, within a reasonable specified time period of a written request, all documentation necessary to demonstrate eligibility and any information to determine compliance with this permit or to determine whether cause exists for modifying or revoking this permit, or suspending or denying coverage under this permit, in accordance with the terms and conditions of this permit. The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review these documents. Copying of documents will be done at the requester's expense.

G. Other Information

When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any of the documents required by this permit, or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or *impervious area*), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department using the contact information in Part II.A. of this permit. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:
 - a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
 - (i) a president, secretary, treasurer, or vice-president of the

(Part VII.H.1.a.i)

corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

- (ii) the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

- (i) the chief executive officer of the agency, or

- (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Part VII.H.1. of this permit;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of *equivalent* responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named

(Part VII.H.2.b)

individual or any individual occupying a named position) and,

- c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.
3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.
4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4*, or by a duly authorized representative of that person.

It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

J. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any *owner or operator* authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any *discharger* authorized by a general permit to apply for an individual SPDES permit, it shall notify the *discharger* in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the *owner or operator* to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from *owner or operator* receipt of the notification letter, whereby the authorization to

(Part VII.K.1)

discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. When an individual SPDES permit is issued to a discharger authorized to *discharge* under a general SPDES permit for the same *discharge(s)*, the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. Proper Operation and Maintenance

The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. Inspection and Entry

The *owner or operator* shall allow an authorized representative of the Department, EPA, applicable county health department, or, in the case of a construction site which *discharges* through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the *owner's or operator's* premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and
3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.
4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

(Part VII.N)

N. Permit Actions

This permit may, at any time, be modified, suspended, revoked, or renewed by the Department in accordance with 6 NYCRR Part 621. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions

Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with *construction activity* covered by this permit, the *owner or operator* of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.
2. Any Department initiated permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports

In accordance with 6NYCRR Part 750-2.4 and 750-2.5, any person who knowingly makes any false material statement, representation, or certification in any application, record, report or other document filed or required to be maintained under this permit, including reports of compliance or noncompliance shall, upon conviction, be punished in accordance with ECL §71-1933 and or Articles 175 and 210 of the New York State Penal Law.

R. Other Permits

Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A

Definitions

Alter Hydrology from Pre to Post-Development Conditions - means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer - means a sewer that is designed to collect and convey both “sewage” and “stormwater”.

Commence (Commencement of) Construction Activities - means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for “*Construction Activity(ies)*” also.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Direct Discharge (to a specific surface waterbody) - means that runoff flows from a construction site by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a construction site to a separate storm sewer system and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

Discharge(s) - means any addition of any pollutant to waters of the State through an outlet or point source.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Equivalent (Equivalence) – means that the practice or measure meets all the performance, longevity, maintenance, and safety objectives of the technical standard and will provide an equal or greater degree of water quality protection.

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied

on all disturbed areas that are not covered by permanent structures, concrete or pavement.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 and Section 70-0117 of the ECL authorizing a category of discharges.

Groundwater(s) - means waters in the saturated zone. The saturated zone is a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Historic Property – means any building, structure, site, object or district that is listed on the State or National Registers of Historic Places or is determined to be eligible for listing on the State or National Registers of Historic Places.

Impervious Area (Cover) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Infeasible – means not technologically possible, or not economically practicable and achievable in light of best industry practices.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct *construction activities* are occurring, or will occur, under one plan. The term “plan” in “larger common plan of development or sale” is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) environmental assessment form or other documents, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that *construction activities* may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same “common plan” is not concurrently being disturbed.

Minimize – means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practices.

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters,

ditches, man-made channels, or storm drains):

- (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State;
- (ii) Designed or used for collecting or conveying stormwater;
- (iii) Which is not a *combined sewer*; and
- (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

New Development – means any land disturbance that does not meet the definition of Redevelopment Activity included in this appendix.

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from *construction activity*.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the *construction activity* is occurring; and/or an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications.

Performance Criteria – means the design criteria listed under the “Required Elements” sections in Chapters 5, 6 and 10 of the technical standard, New York State Stormwater Management Design Manual, dated January 2015. It does not include the Sizing Criteria (i.e. WQv, RRv, Cpv, Qp and Qf) in Part I.C.2. of the permit.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in 6 NYCRR Parts 700 et seq .

Qualified Inspector - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York..

Redevelopment Activity(ies) – means the disturbance and reconstruction of existing impervious area, including impervious areas that were removed from a project site within five (5) years of preliminary project plan submission to the local government (i.e. site plan, subdivision, etc.).

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is required to gain coverage under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s).

Routine Maintenance Activity - means *construction activity* that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Stream bank restoration projects (does not include the placement of spoil material),
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that makes the transition between the road shoulder and the ditch or embankment,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

Site limitations – means site conditions that prevent the use of an infiltration technique and or infiltration of the total WQv. Typical site limitations include: seasonal high groundwater, shallow depth to bedrock, and soils with an infiltration rate less than 0.5 inches/hour. The existence of site limitations shall be confirmed and documented using actual field testing (i.e. test pits, soil borings, and infiltration test) or using information from the most current United States Department of Agriculture (USDA) Soil Survey for the County where the project is located.

Sizing Criteria – means the criteria included in Part I.C.2 of the permit that are used to size post-construction stormwater management control practices. The criteria include; Water Quality Volume (WQv), Runoff Reduction Volume (RRv), Channel Protection Volume (Cpv), Overbank Flood (Qp), and Extreme Flood (Qf).

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Steep Slope – means land area with a Soil Slope Phase that is identified as an E or F, or

the map unit name is inclusive of 25% or greater slope, on the United States Department of Agriculture (“USDA”) Soil Survey for the County where the disturbance will occur.

Surface Waters of the State - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporarily Ceased – means that an existing disturbed area will not be disturbed again within 14 calendar days of the previous soil disturbance.

Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Loads (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet *water quality standards*, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for point source discharges, load allocations (LAs) for nonpoint sources, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* is responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part

621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B

Required SWPPP Components by Project Type

Table 1
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP
THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:

- Single family home not located in one of the watersheds listed in Appendix C or not directly discharging to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E
- Construction of a barn or other agricultural building, silo, stock yard or pen.

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Bike paths and trails
- Sidewalk construction projects that are not part of a road/ highway construction or reconstruction project
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
- Spoil areas that will be covered with vegetation
- Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields), excluding projects that *alter hydrology from pre to post development* conditions
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of less than five acres and construction activities that include the construction or reconstruction of impervious area

The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:

- All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

Table 2
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES
POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other agricultural building(e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional, includes hospitals, prisons, schools and colleges
- Industrial facilities, includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's and water treatment plants
- Office complexes
- Sports complexes
- Racetracks, includes racetracks with earthen (dirt) surface
- Road construction or reconstruction
- Parking lot construction or reconstruction
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover*, and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- All other construction activities that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C

Watersheds Where Enhanced Phosphorus Removal Standards Are Required

Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual (“Design Manual”).

- Entire New York City Watershed located east of the Hudson River - Figure 1
- Onondaga Lake Watershed - Figure 2
- Greenwood Lake Watershed -Figure 3
- Oscawana Lake Watershed – Figure 4
- Kinderhook Lake Watershed – Figure 5

Figure 1 - New York City Watershed East of the Hudson

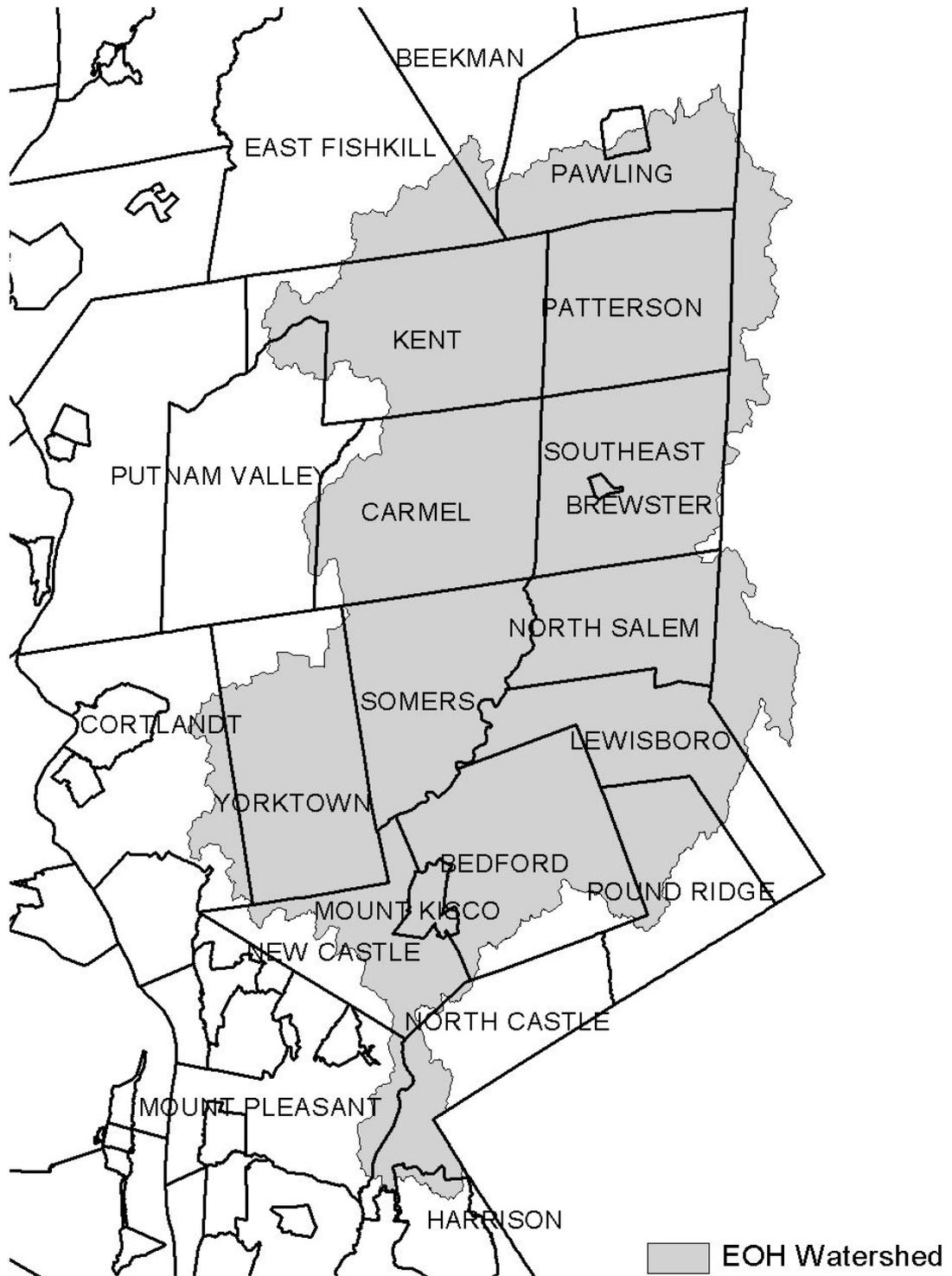


Figure 2 - Onondaga Lake Watershed



Figure 3 - Greenwood Lake Watershed

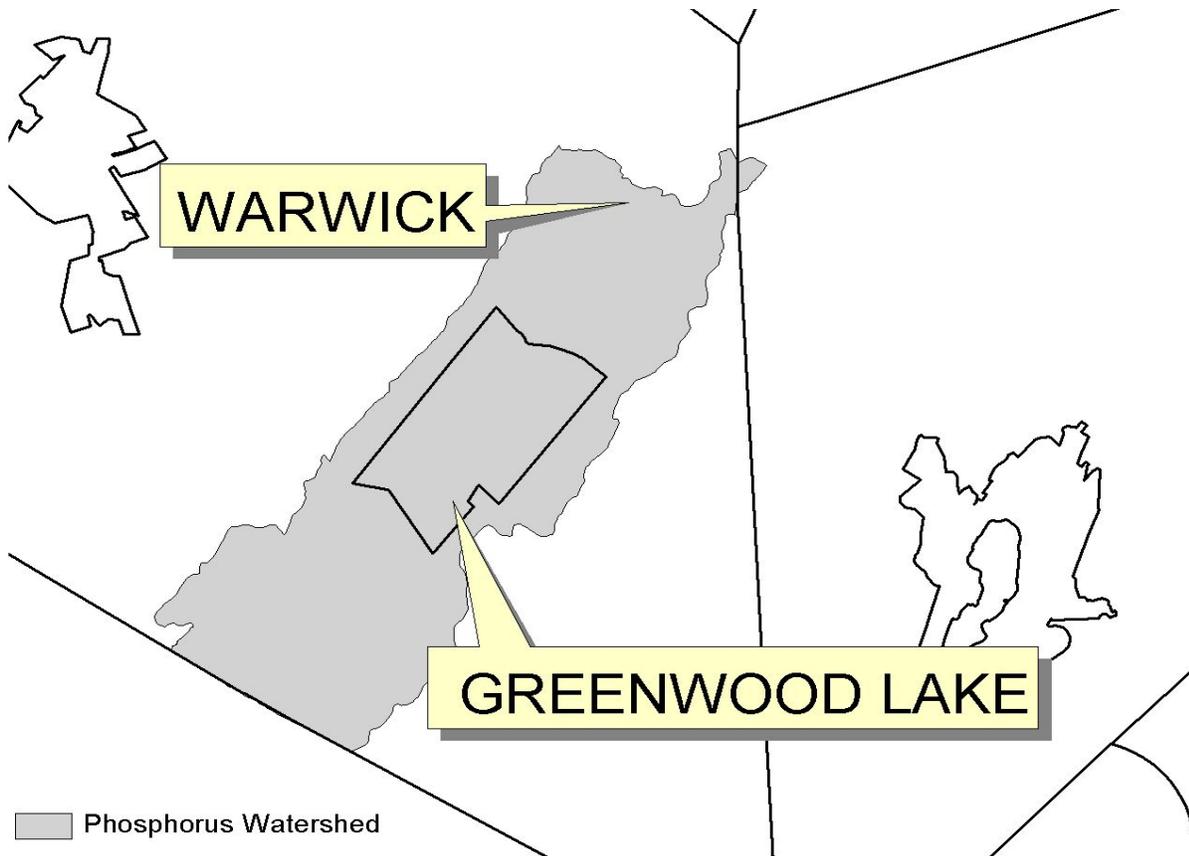


Figure 4 - Oscawana Lake Watershed

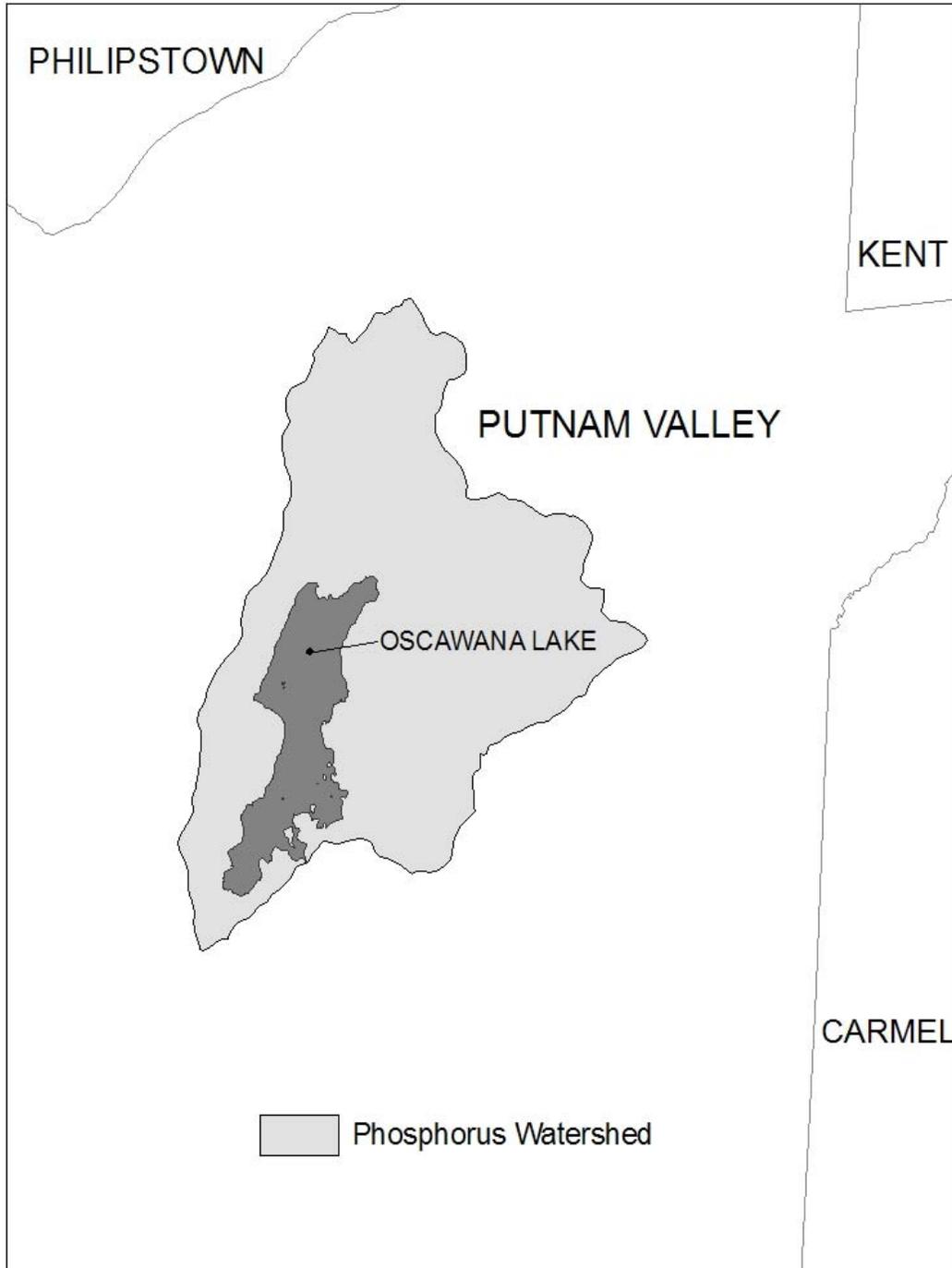
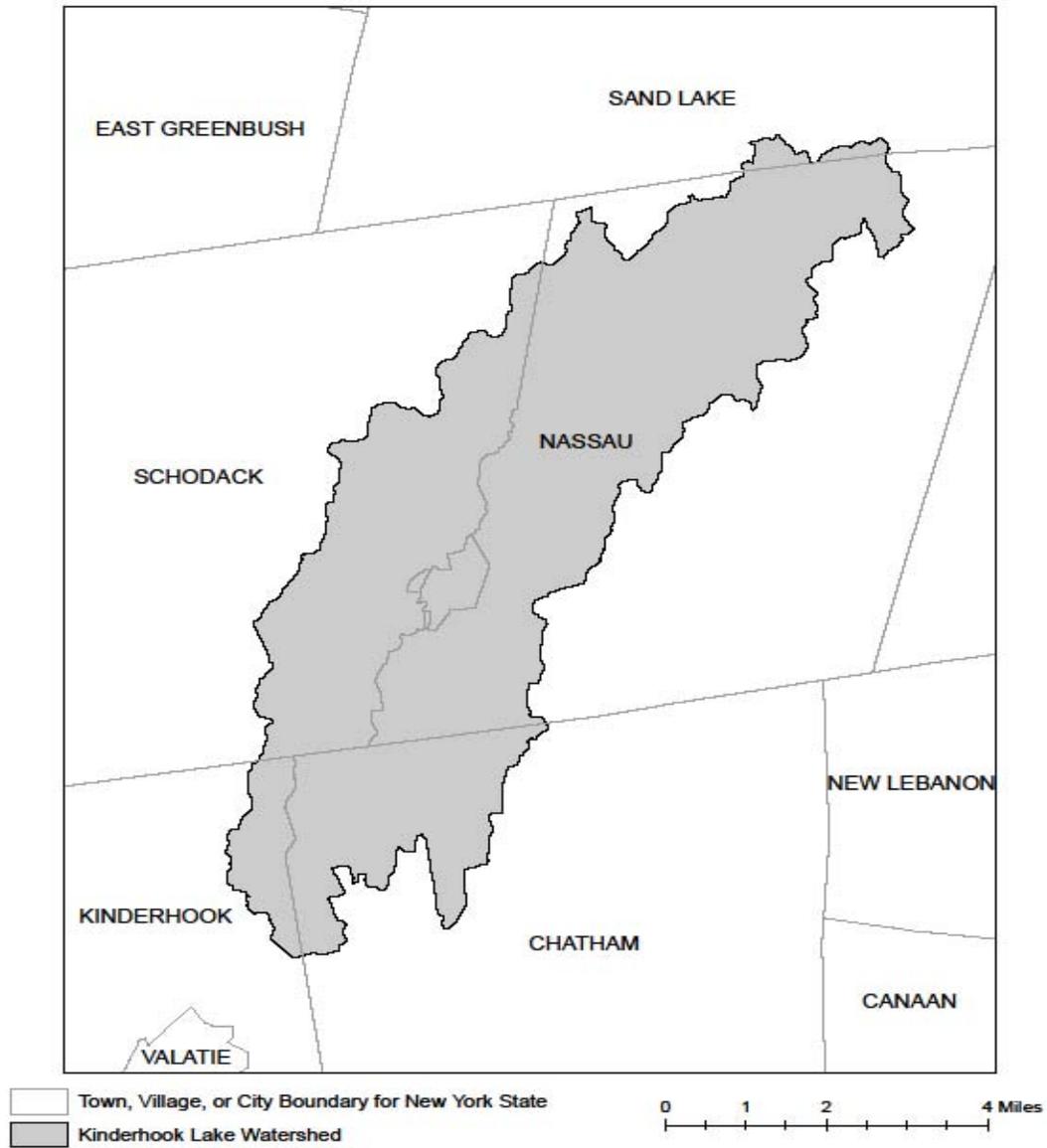


Figure 5: Kinderhook Lake Watershed



APPENDIX D

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River - See Figure 1 in Appendix C

APPENDIX E

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual (“Design Manual”), dated January 2015.

COUNTY	WATERBODY	COUNTY	WATERBODY
Albany	Ann Lee (Shakers) Pond, Stump Pond	Greene	Sleepy Hollow Lake
Albany	Basic Creek Reservoir	Herkimer	Steele Creek tribs
Allegheny	Amity Lake, Saunders Pond	Kings	Hendrix Creek
Bronx	Van Cortlandt Lake	Lewis	Mill Creek/South Branch and tribs
Broome	Whitney Point Lake/Reservoir	Livingston	Conesus Lake
Broome	Fly Pond, Deer Lake	Livingston	Jaycox Creek and tribs
Broome	Minor Tribs to Lower Susquehanna (north)	Livingston	Mill Creek and minor tribs
Cattaraugus	Allegheny River/Reservoir	Livingston	Bradner Creek and tribs
Cattaraugus	Case Lake	Livingston	Christie Creek and tribs
Cattaraugus	Linlyco/Club Pond	Monroe	Lake Ontario Shoreline, Western
Cayuga	Duck Lake	Monroe	Mill Creek/Blue Pond Outlet and tribs
Chautauqua	Chautauqua Lake, North	Monroe	Rochester Embayment - East
Chautauqua	Chautauqua Lake, South	Monroe	Rochester Embayment - West
Chautauqua	Bear Lake	Monroe	Unnamed Trib to Honeoye Creek
Chautauqua	Chadakoin River and tribs	Monroe	Genesee River, Lower, Main Stem
Chautauqua	Lower Cassadaga Lake	Monroe	Genesee River, Middle, Main Stem
Chautauqua	Middle Cassadaga Lake	Monroe	Black Creek, Lower, and minor tribs
Chautauqua	Findley Lake	Monroe	Buck Pond
Clinton	Great Chazy River, Lower, Main Stem	Monroe	Long Pond
Columbia	Kinderhook Lake	Monroe	Cranberry Pond
Columbia	Robinson Pond	Monroe	Mill Creek and tribs
Dutchess	Hillside Lake	Monroe	Shipbuilders Creek and tribs
Dutchess	Wappinger Lakes	Monroe	Minor tribs to Irondequoit Bay
Dutchess	Fall Kill and tribs	Monroe	Thomas Creek/White Brook and tribs
Erie	Green Lake	Nassau	Glen Cove Creek, Lower, and tribs
Erie	Scajaquada Creek, Lower, and tribs	Nassau	LI Tribs (fresh) to East Bay
Erie	Scajaquada Creek, Middle, and tribs	Nassau	East Meadow Brook, Upper, and tribs
Erie	Scajaquada Creek, Upper, and tribs	Nassau	Hempstead Bay
Erie	Rush Creek and tribs	Nassau	Hempstead Lake
Erie	Ellicott Creek, Lower, and tribs	Nassau	Grant Park Pond
Erie	Beeman Creek and tribs	Nassau	Beaver Lake
Erie	Murder Creek, Lower, and tribs	Nassau	Camaans Pond
Erie	South Branch Smoke Cr, Lower, and tribs	Nassau	Halls Pond
Erie	Little Sister Creek, Lower, and tribs	Nassau	LI Tidal Tribs to Hempstead Bay
Essex	Lake George (primary county: Warren)	Nassau	Massapequa Creek and tribs
Genesee	Black Creek, Upper, and minor tribs	Nassau	Reynolds Channel, east
Genesee	Tonawanda Creek, Middle, Main Stem	Nassau	Reynolds Channel, west
Genesee	Oak Orchard Creek, Upper, and tribs	Nassau	Silver Lake, Lofts Pond
Genesee	Bowen Brook and tribs	Nassau	Woodmere Channel
Genesee	Bigelow Creek and tribs	Niagara	Hyde Park Lake
Genesee	Black Creek, Middle, and minor tribs	Niagara	Lake Ontario Shoreline, Western
Genesee	LeRoy Reservoir	Niagara	Bergholtz Creek and tribs
Greene	Schoharie Reservoir	Oneida	Ballou, Nail Creeks
		Onondaga	Ley Creek and tribs
		Onondaga	Onondaga Creek, Lower and tribs

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity, cont'd.

COUNTY	WATERBODY	COUNTY	WATERBODY
Onondaga	Onondaga Creek, Middle and tribs	Suffolk	Great South Bay, West
Onondaga	Onondaga Creek, Upp, and minor tribs	Suffolk	Mill and Seven Ponds
Onondaga	Harbor Brook, Lower, and tribs	Suffolk	Moriches Bay, East
Onondaga	Ninemile Creek, Lower, and tribs	Suffolk	Moriches Bay, West
Onondaga	Minor tribs to Onondaga Lake	Suffolk	Quantuck Bay
Onondaga	Onondaga Creek, Lower, and tribs	Suffolk	Shinnecock Bay (and Inlet)
Ontario	Honeoye Lake	Sullivan	Bodine, Montgomery Lakes
Ontario	Hemlock Lake Outlet and minor tribs	Sullivan	Davies Lake
Ontario	Great Brook and minor tribs	Sullivan	Pleasure Lake
Orange	Monhagen Brook and tribs	Sullivan	Swan Lake
Orange	Orange Lake	Tompkins	Cayuga Lake, Southern End
Orleans	Lake Ontario Shoreline, Western	Tompkins	Owasco Inlet, Upper, and tribs
Oswego	Pleasant Lake	Ulster	Ashokan Reservoir
Oswego	Lake Neatahwanta	Ulster	Esopus Creek, Upper, and minor tribs
Putnam	Oscawana Lake	Ulster	Esopus Creek, Lower, Main Stem
Putnam	Palmer Lake	Ulster	Esopus Creek, Middle, and minor tribs
Putnam	Lake Carmel	Warren	Lake George
Queens	Jamaica Bay, Eastern, and tribs (Queens)	Warren	Tribs to L.George, Village of L George
Queens	Bergen Basin	Warren	Huddle/Finkle Brooks and tribs
Queens	Shellbank Basin	Warren	Indian Brook and tribs
Rensselaer	Nassau Lake	Warren	Hague Brook and tribs
Rensselaer	Snyders Lake	Washington	Tribs to L.George, East Shr Lk George
Richmond	Grasmere, Arbutus and Wolfes Lakes	Washington	Cossayuna Lake
Rockland	Congers Lake, Swartout Lake	Washington	Wood Cr/Champlain Canal, minor tribs
Rockland	Rockland Lake	Wayne	Port Bay
Saratoga	Ballston Lake	Wayne	Marbletown Creek and tribs
Saratoga	Round Lake	Westchester	Lake Katonah
Saratoga	Dwaas Kill and tribs	Westchester	Lake Mohegan
Saratoga	Tribs to Lake Lonely	Westchester	Lake Shenorock
Saratoga	Lake Lonely	Westchester	Reservoir No.1 (Lake Isle)
Schenectady	Collins Lake	Westchester	Saw Mill River, Middle, and tribs
Schenectady	Duane Lake	Westchester	Silver Lake
Schenectady	Mariaville Lake	Westchester	Teatown Lake
Schoharie	Engleville Pond	Westchester	Truesdale Lake
Schoharie	Summit Lake	Westchester	Wallace Pond
Schuyler	Cayuta Lake	Westchester	Peach Lake
St. Lawrence	Fish Creek and minor tribs	Westchester	Mamaroneck River, Lower
St. Lawrence	Black Lake Outlet/Black Lake	Westchester	Mamaroneck River, Upp, and tribs
Steuben	Lake Salubria	Westchester	Sheldrake River and tribs
Steuben	Smith Pond	Westchester	Blind Brook, Lower
Suffolk	Millers Pond	Westchester	Blind Brook, Upper, and tribs
Suffolk	Mattituck (Marratooka) Pond	Westchester	Lake Lincolndale
Suffolk	Tidal tribs to West Moriches Bay	Westchester	Lake Meahaugh
Suffolk	Canaan Lake	Wyoming	Java Lake
Suffolk	Lake Ronkonkoma	Wyoming	Silver Lake
Suffolk	Beaverdam Creek and tribs		
Suffolk	Big/Little Fresh Ponds		
Suffolk	Fresh Pond		
Suffolk	Great South Bay, East		
Suffolk	Great South Bay, Middle		

Note: The list above identifies those waters from the final New York State "2014 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy", dated January 2015, that are impaired by silt, sediment or nutrients.

APPENDIX F

LIST OF NYS DEC REGIONAL OFFICES

<u>Region</u>	<u>COVERING THE FOLLOWING COUNTIES:</u>	<u>DIVISION OF ENVIRONMENTAL PERMITS (DEP) PERMIT ADMINISTRATORS</u>	<u>DIVISION OF WATER (DOW) WATER (SPDES) PROGRAM</u>
1	NASSAU AND SUFFOLK	50 CIRCLE ROAD STONY BROOK, NY 11790 TEL. (631) 444-0365	50 CIRCLE ROAD STONY BROOK, NY 11790-3409 TEL. (631) 444-0405
2	BRONX, KINGS, NEW YORK, QUEENS AND RICHMOND	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4997	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4933
3	DUTCHESS, ORANGE, PUTNAM, ROCKLAND, SULLIVAN, ULSTER AND WESTCHESTER	21 SOUTH PUTT CORNERS ROAD NEW PALTZ, NY 12561-1696 TEL. (845) 256-3059	100 HILLSIDE AVENUE, SUITE 1W WHITE PLAINS, NY 10603 TEL. (914) 428 - 2505
4	ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE	1150 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2069	1130 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2045
5	CLINTON, ESSEX, FRANKLIN, FULTON, HAMILTON, SARATOGA, WARREN AND WASHINGTON	1115 STATE ROUTE 86, Po Box 296 RAY BROOK, NY 12977-0296 TEL. (518) 897-1234	232 GOLF COURSE ROAD WARRENSBURG, NY 12885-1172 TEL. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVE. BUFFALO, NY 14203-2999 TEL. (716) 851-7070



APPENDIX 7

DRAFT MS4 STORMWATER POLLUTION PREVENTION PLAN (SWPPP) ACCEPTANCE FORM



Department of
Environmental
Conservation

NYS Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

**MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance
Form**

for

Construction Activities Seeking Authorization Under SPDES General Permit
*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information

1. Owner/Operator Name:

2. Contact Person:

3. Street Address:

4. City/State/Zip:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/State/Zip:

III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information

8. SWPPP Reviewed by:

9. Title/Position:

10. Date Final SWPPP Reviewed and Accepted:

IV. Regulated MS4 Information

11. Name of MS4:

12. MS4 SPDES Permit Identification Number: NYR20A

13. Contact Person:

14. Street Address:

15. City/State/Zip:

16. Telephone Number:

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).
Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

Title/Position:

Signature:

Date:

VI. Additional Information



APPENDIX 8

DRAFT NOTICE OF INTENT (NOI)

5. NOI Preparer:

First Name

Last Name

Title

Phone

 - -

Department

eMail

6. Cooperating Partners Including Regional Stormwater Entity

Identify contractors/partners that will be assisting with and/or implementing any aspect of your Stormwater Management Program:

Contractor/Partner Name

Contact First Name

Contact Last Name

Address

City

State

Zip

 -

Phone

 - -

eMail

Contractor/Partner Name

Contact First Name

Contact Last Name

Address

City

State

Zip

 -

Phone

 - -

eMail

7. Regulated MS4s on whose behalf one or more minimum control measures will be implemented.

This section must be completed if the NOI is being submitted to gain coverage for a Single Entity. All others leave blank.

Contractor/Partner Name

[Grid for Contractor/Partner Name]

Contact First Name

[Grid for Contact First Name]

Contact Last Name

[Grid for Contact Last Name]

Address

[Grid for Address]

City

[Grid for City]

State

[Grid for State]

Zip

[Grid for Zip]

[Grid for Zip extension]

Phone

[Grid for Phone]

eMail

[Grid for eMail]

Check all minimum control measures that will be implemented on behalf of this MS4.

- MCM 1 MCM 2 MCM 3 MCM 4 MCM 5 MCM 6

Contractor/Partner Name

[Grid for Contractor/Partner Name]

Contact First Name

[Grid for Contact First Name]

Contact Last Name

[Grid for Contact Last Name]

Address

[Grid for Address]

City

[Grid for City]

State

[Grid for State]

Zip

[Grid for Zip]

[Grid for Zip extension]

Phone

[Grid for Phone]

eMail

[Grid for eMail]

Check all minimum control measures that will be implemented on behalf of this MS4.

- MCM 1 MCM 2 MCM 3 MCM 4 MCM 5 MCM 6

Contractor/Partner Name

[Grid for Contractor/Partner Name]

Contact First Name

[Grid for Contact First Name]

Contact Last Name

[Grid for Contact Last Name]

Address

[Grid for Address]

City

[Grid for City]

State

[Grid for State]

Zip

[Grid for Zip]

[Grid for Zip extension]

Phone

[Grid for Phone]

eMail

[Grid for eMail]

Check all minimum control measures that will be implemented on behalf of this MS4.

- MCM 1 MCM 2 MCM 3 MCM 4 MCM 5 MCM 6

7. Regulated MS4s on whose behalf one or more minimum control measures will be implemented.

This section must be completed if the NOI is being submitted to gain coverage for a Single Entity. All others leave blank.

Contractor/Partner Name

[Grid for Contractor/Partner Name]

Contact First Name

[Grid for Contact First Name]

Contact Last Name

[Grid for Contact Last Name]

Address

[Grid for Address]

City

[Grid for City]

State

[Grid for State]

Zip

[Grid for Zip]

[Grid for Zip extension]

Phone

[Grid for Phone]

eMail

[Grid for eMail]

Check all minimum control measures that will be implemented on behalf of this MS4.

- MCM 1 MCM 2 MCM 3 MCM 4 MCM 5 MCM 6

Contractor/Partner Name

[Grid for Contractor/Partner Name]

Contact First Name

[Grid for Contact First Name]

Contact Last Name

[Grid for Contact Last Name]

Address

[Grid for Address]

City

[Grid for City]

State

[Grid for State]

Zip

[Grid for Zip]

[Grid for Zip extension]

Phone

[Grid for Phone]

eMail

[Grid for eMail]

Check all minimum control measures that will be implemented on behalf of this MS4.

- MCM 1 MCM 2 MCM 3 MCM 4 MCM 5 MCM 6

Contractor/Partner Name

[Grid for Contractor/Partner Name]

Contact First Name

[Grid for Contact First Name]

Contact Last Name

[Grid for Contact Last Name]

Address

[Grid for Address]

City

[Grid for City]

State

[Grid for State]

Zip

[Grid for Zip]

[Grid for Zip extension]

Phone

[Grid for Phone]

eMail

[Grid for eMail]

Check all minimum control measures that will be implemented on behalf of this MS4.

- MCM 1 MCM 2 MCM 3 MCM 4 MCM 5 MCM 6

SECTION C. INITIAL IDENTIFICATION OF STORMWATER MANAGEMENT PROGRAM COMPONENTS

Provide the planned development and implementation schedule for completing the required program components by indicating which programs or activities have already been adequately* developed and are effectively being implemented and what programs or activities are either to be developed or expanded upon and the expected completion date.

* For required elements adequate is defined as meeting permit requirements. For non-required elements adequate is defined as addressing the reduction of POCs in stormwater discharges.

1. MCM 1: Public Education and Outreach on Storm Water

Compliance Schedule

Adequately* developed and implemented	To be developed or expanded upon	Expected completion date (mm/yyyy).
---------------------------------------	----------------------------------	-------------------------------------

Education and Outreach Program Requirements

Identify POCs, waterbodies of concern, geographic areas of concern, target audiences (required) -----○----- or -----○----- and ___/____

Develop and implement an on going public education and outreach program (required) -----○----- or -----○----- and ___/____

Identify from the list below the appropriate Education and Outreach programs or activities that are or will be developed to ensure the reduction of all POCs in stormwater discharges

Educational Programs or Activities

Events and Programs -----○----- or -----○----- and ___/____

Outreach to commercial entities -----○----- or -----○----- and ___/____

Media campaign -----○----- or -----○----- and ___/____

Presentations to community groups -----○----- or -----○----- and ___/____

Economic incentives -----○----- or -----○----- and ___/____

Webpage -----○----- or -----○----- and ___/____

Printed material -----○----- or -----○----- and ___/____

Displays -----○----- or -----○----- and ___/____

Posters and signs of varying sizes (magnets to billboards) -----○----- or -----○----- and ___/____

Classroom education/school programs -----○----- or -----○----- and ___/____

Library of educational materials -----○----- or -----○----- and ___/____

Promotional giveaways -----○----- or -----○----- and ___/____

-----○----- or -----○----- and ___/____

Residential Programs or Activities

Proper lawn and garden care (fertilizer and pesticide use, sweeping, etc.) -----○----- or -----○----- and ___/____

Residential car washing and auto maintenance control measures -----○----- or -----○----- and ___/____

Off-pavement automobile parking -----○----- or -----○----- and ___/____

Proper disposal of household hazardous waste -----○----- or -----○----- and ___/____

Snow removal activities -----○----- or -----○----- and ___/____

Trash management -----○----- or -----○----- and ___/____

Water conservation practices -----○----- or -----○----- and ___/____

Pet waste management -----○----- or -----○----- and ___/____

-----○----- or -----○----- and ___/____

Industrial/Commercial Programs or Activities

Automobile repair and maintenance control measures -----○----- or -----○----- and ___/____

Pollution prevention for businesses -----○----- or -----○----- and ___/____

Equipment and vehicle maintenance and repair -----○----- or -----○----- and ___/____

Proper disposal of vacuum truck and sweeping equipment waste -----○----- or -----○----- and ___/____

Snow removal activities -----○----- or -----○----- and ___/____

Illicit discharge detection and elimination observations -----○----- or -----○----- and ___/____

Low impact development -----○----- or -----○----- and ___/____

-----○----- or -----○----- and ___/____

SECTION C. INITIAL IDENTIFICATION OF STORMWATER MANAGEMENT PROGRAM COMPONENTS

Provide the planned development and implementation schedule for completing the required program components by indicating which programs or activities have already been adequately* developed and are effectively being implemented and what programs or activities are either to be developed or expanded upon and the expected completion date.

* For required elements adequate is defined as meeting permit requirements. For non-required elements adequate is defined as addressing the reduction of POCs in stormwater discharges.

2. MCM 2: Public Involvement and Participation

	Compliance Schedule		
	Adequately* developed and implemented	To be developed or expanded upon	Expected completion date (mm/yyyy).
<u>Public Involvement and Participation Requirements</u>			
Comply with State Open Meetings law and local public notice requirements (required) -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Develop and implement a public involvement/participation program (required) -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Present annual report publicly and provide public notice (required) -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Provide responses to comments and include with annual report to NYS DEC (required) -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Ensure that annual report and SWMP Plan are available for public inspection (required) -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____

Identify from the list below the appropriate Public Involvement and Participation programs or activities that are or will be developed to ensure the reduction of all POCs in stormwater discharges.

Public Involvement Programs and Activities

Advisory/partner committees -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Watershed organizations -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Attitude surveys -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Community hot lines -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Stakeholder meetings -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Mailing list development and use -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
<input type="checkbox"/> -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____

Participation Activities

Adopt-a-stream -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Reforestation program -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Storm drain stenciling -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Stream, beach, roadway cleanup -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Volunteer Monitoring -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
Wetland plantings -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____
<input type="checkbox"/> -----	<input type="radio"/>	or <input type="radio"/>	and ____ / ____

SECTION C. INITIAL IDENTIFICATION OF STORMWATER MANAGEMENT PROGRAM COMPONENTS

Provide the planned development and implementation schedule for completing the required program components by indicating which programs or activities have already been adequately* developed and are effectively being implemented and what programs or activities are either to be developed or expanded upon and the expected completion date.

* For required elements adequate is defined as meeting permit requirements. For non-required elements adequate is defined as addressing the reduction of POCs in stormwater discharges.

3. MCM 3: Illicit Discharge Detection and Elimination

Illicit Discharge and Elimination Program developed in accordance with:

- NYS DEC Outfall and System Mapping Requirements for Illicit Discharge Detection and Elimination (IDDE) assistance document
- Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment (EPA/Center for Watershed Protection)

Compliance Schedule

Adequately* developed and implemented	or	To be developed or expanded upon	Expected completion date (mm/yyyy).
---------------------------------------	----	----------------------------------	-------------------------------------

Illicit Discharge Detection and Elimination Program Requirements

Develop, implement and enforce a program to detect and eliminate illicit discharges to the MS4 (required) -----	○	or	○	and	__ / ____
Outfall and storm sewershed boundary mapping (required) -----	○	or	○	and	__ / ____
Field verify outfalls (required) -----	○	or	○	and	__ / ____
Outfall reconnaissance inventory (required) -----	○	or	○	and	__ / ____
Prohibit illicit discharges (required) -----	○	or	○	and	__ / ____
Public, employees, businesses informed of hazards of illicit discharge (required) -----	○	or	○	and	__ / ____
Adopt and enforce local law to prohibit illicit discharges (required for traditional MS4s)-----	○	or	○	and	__ / ____
Adopt available mechanisms to prohibit illicit discharges (required) -----	○	or	○	and	__ / ____
Address exempt non-stormwater discharges as necessary (required)-----	○	or	○	and	Continual

Identify from the list below the appropriate Illicit Discharge Detection and Elimination BMPs that are or will be developed to ensure the reduction of all POCs in stormwater discharges.

Proper storage/disposal of grease and used oil -----	○	or	○	and	__ / ____
Cleaning up debris around trash bins -----	○	or	○	and	__ / ____
Cover outdoor work and storage areas -----	○	or	○	and	__ / ____
Clean up spills before they reach the drain -----	○	or	○	and	__ / ____
Proper disposal of Carpet Cleaning wastewater -----	○	or	○	and	__ / ____
Dye testing -----	○	or	○	and	__ / ____
Shoreline surveys -----	○	or	○	and	__ / ____
System inspections -----	○	or	○	and	__ / ____
<input type="checkbox"/> -----	○	or	○	and	__ / ____

Priority Areas or Types of Discharges to Target

Failing septic systems -----	○	or	○	and	__ / ____
Areas with a history of illegal dumping -----	○	or	○	and	__ / ____
Industrial/residential/business or other mixed use areas -----	○	or	○	and	__ / ____
Recreational sewage -----	○	or	○	and	__ / ____
Sanitary sewer overflows or older sewer lines -----	○	or	○	and	__ / ____
Areas upstream of impaired or impacted waterbodies -----	○	or	○	and	__ / ____
<input type="checkbox"/> -----	○	or	○	and	__ / ____

SECTION C. INITIAL IDENTIFICATION OF STORMWATER MANAGEMENT PROGRAM COMPONENTS

Provide the planned development and implementation schedule for completing the required program components by indicating which programs or activities have already been adequately* developed and are effectively being implemented and what programs or activities are either to be developed or expanded upon and the expected completion date.

* For required elements adequate is defined as meeting permit requirements. For non-required elements adequate is defined as addressing the reduction of POCs in stormwater discharges.

4. MCM 4: Construction Site Runoff Control

<u>Construction Program Requirements</u>	<u>Compliance Schedule</u>		
	Adequately* developed and implemented	To be developed or expanded upon	Expected completion date (mm/yyyy).
Develop, implement, and enforce a program that provides protection equivalent to the General Permit for Stormwater Discharges for Construction Activity. (required) -----○----- or -----○----- and ___/____			
Procedures for receipt/follow-up on information submitted by the public regarding construction site runoff (required) -----○----- or -----○----- and ___/____			
Program to educate construction site owner/operators about the MS4s construction stormwater requirements (required) -----○----- or -----○----- and ___/____			
Procedures to ensure construction site operators receive erosion and sediment control training (required) -----○----- or -----○----- and ___/____			
Establish and implement procedures to track and inventory of active construction sites (required) -----○----- or -----○----- and ___/____			
<input type="checkbox"/> -----○----- or -----○----- and ___/____			
Development of a local law or other regulatory mechanism to require a SWPPP for applicable construction activities (required for traditional land use control MS4s) -----○----- or -----○----- and ___/____			

This local law or other regulatory mechanism must include (but is not limited to):

Requirements for SWPPPs to meet the most current NYS DEC erosion and sediment control technical standards (required for traditional land use control MS4s) -----○----- or -----○----- and ___/____			
Requirements for construction site operators to implement erosion and sediment controls as per up-to-date NYS DEC technical standards i.e. New York State Standards and Specifications for Erosion and Sediment Control (required for traditional land use control MS4s) -----○----- or -----○----- and ___/____			
Procedures for SWPPP review and issuance of SWPPP Acceptance Form (required for traditional land use control MS4s) -----○----- or -----○----- and ___/____			
Procedures for site inspections and enforcement of erosion and sediment controls, including steps to identify priority sites for inspection (required for traditional land use control MS4s) -----○----- or -----○----- and ___/____			
Requirements for overall construction site waste management traditional land use control MS4s) -----○----- or -----○----- and ___/____			
Process for documenting/certifying equivalence of local law (required for traditional land use control MS4s) -----○----- or -----○----- and ___/____			
<input type="checkbox"/> -----○----- or -----○----- and ___/____			

SECTION C. INITIAL IDENTIFICATION OF STORMWATER MANAGEMENT PROGRAM COMPONENTS

Provide the planned development and implementation schedule for completing the required program components by indicating which programs or activities have already been adequately* developed and are effectively being implemented and what programs or activities are either to be developed or expanded upon and the expected completion date.

* For required elements adequate is defined as meeting permit requirements. For non-required elements adequate is defined as addressing the reduction of POCs in stormwater discharges.

5. MCM 5: Post-Construction Stormwater Management

	<u>Compliance Schedule</u>		
	Adequately* developed and implemented	To be developed or expanded upon	Expected completion date (mm/yyyy).
<u>Post-Construction Program Requirements</u>			
Develop, implement and enforce a program that addresses stormwater runoff from development and redevelopment projects equivalent to the General Permit for Stormwater Discharges for Construction Activity. (required) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Procedures to ensure long-term operation and maintenance of post-construction stormwater management practices (required) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Establish and implement procedures to track and inventory of post-construction stormwater management practices (required) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Develop and implement a program to inspect development and redevelopment sites. Includes providing adequate resources with proper training for inspection. Program shall include provisions for enforcement of violations (required for traditional land use control MS4s) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Development of a local law or other regulatory mechanism to require post-construction runoff controls from new development and redevelopment projects (required for traditional land use control MS4s) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____

This local law or other regulatory mechanism must include (but is not limited to):

Requirements for SWPPPs to meet current NYS Stormwater Design Manual (required) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Procedures for SWPPP review and issuance of SWPPP Acceptance Form (required for traditional land use control MS4s) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Process for documenting/certifying equivalence of local law (required for traditional land use control MS4s) -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____

Identify from the list below additional Post-Construction Stormwater Management programs or activities that are or will be developed to ensure the reduction of all POCs in stormwater discharges.

Encouraged Additional Local Law Inclusions

Open space preservation -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Watershed plans -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Municipal comprehensive plan -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Land use regulations -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Natural resource protection -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Impervious area reduction -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Riparian buffers -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Setbacks -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____

Encouraged Additional Components

Green Infrastructure, Low Impact Development and better site design -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Deep ripping and decompaction -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____
Development of banking and credits system -----	<input type="radio"/>	or <input type="radio"/>	and ___ / ____

SECTION C. INITIAL IDENTIFICATION OF STORMWATER MANAGEMENT PROGRAM COMPONENTS

Provide the planned development and implementation schedule for completing the required program components by indicating which programs or activities have already been adequately* developed and are effectively being implemented and what programs or activities are either to be developed or expanded upon and the expected completion date.

* For required elements adequate is defined as meeting permit requirements. For non-required elements adequate is defined as addressing the reduction of POCs in stormwater discharges.

6. MCM 6: Pollution Prevention/Good Housekeeping for Municipal Operations

	Compliance Schedule		
	Adequately* developed and implemented	To be developed or expanded upon	Expected completion date (mm/yyyy).
<i>Pollution Prevention/Good Housekeeping Program Requirements</i>			
Develop and implement a pollution prevention / good housekeeping program that addresses operations and facilities that contribute POCs to the MS4 (required) ----- ○ ----- or ----- ○ ----- and			__ / ____
Develop and implement procedures to perform and document a self assessment of all municipal operations addressed by the SWMP at a minimum frequency of every three years (required) ----- ○ ----- or ----- ○ ----- and			__ / ____
Develop and implement an employee pollution prevention and good housekeeping training program that ensures staff receive and utilize this training (required) ----- ○ ----- or ----- ○ ----- and			__ / ____
Requires third party contractors to certify that the services/activities they perform to meet the requirements of the General Permit for Stormwater Discharges Associated with MS4s (required) ----- ○ ----- or ----- ○ ----- and			__ / ____
Require operations and facilities otherwise subject to the NYS Mult-Sector General Permit (MSGP) to prepare and implement provisions in the SWMP that comply with PARTS III.A, C, D, E, F and Part IV of the MSGP (GP-0-12-001) (required) ----- ○ ----- or ----- ○ ----- and			__ / ____

Identify from the list below the operations and facilities that are or will be addressed in the Pollution Prevention/Good Housekeeping Program to ensure the reduction of all POCs in stormwater discharges.

Street and bridge maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
Winter road maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
Salt storage maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
Solid waste management ----- ○ ----- or ----- ○ ----- and			__ / ____
New municipal construction and land disturbances ----- ○ ----- or ----- ○ ----- and			__ / ____
Right-of-Way maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
Marine operations ----- ○ ----- or ----- ○ ----- and			__ / ____
Hydraulic habitat modifications ----- ○ ----- or ----- ○ ----- and			__ / ____
Parks and open space maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
Municipal building maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
Stormwater system maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
Vehicle and fleet maintenance ----- ○ ----- or ----- ○ ----- and			__ / ____
----- ○ ----- or ----- ○ ----- and			__ / ____
----- ○ ----- or ----- ○ ----- and			__ / ____
----- ○ ----- or ----- ○ ----- and			__ / ____

SECTION D. INITIAL IDENTIFICATION OF ADDITIONAL WATERSHED IMPROVEMENT STRATEGY BEST MANAGEMENT PRACTICES (BMPs)

(Refer to the General Permit for Stormwater Discharges Associated with MS4s for list of Watershed Improvement Strategy Areas)

NEW YORK CITY EAST OF HUDSON WATERSHED MS4s

- Educational program concerning the impacts of phosphorus on waterbodies (required)
- Develop and maintain a map showing the entire small MS4 conveyance system (required)
- Program to ensure that on-site wastewater treatment systems are inspected and maintained once every five years (required for traditional MS4s)
- Develop, implement, and enforce a program, equivalent to the General Permit for Stormwater Discharges Associated with Construction Activity, to reduce pollutants in stormwater runoff to the MS4 from construction activities that result in a land disturbance of five thousand square feet (required for traditional land use control MS4s)
- Ensure, through local law or other regulatory mechanism, that post-construction stormwater management controls are in accordance with the New York State Stormwater Design Manual and the Enhanced Phosphorus Removal Design Standards (required for traditional land use control MS4s)
- Retrofit Program to correct or reduce existing erosion and/or pollutant loading problems, with emphasis on phosphorus (required)
- Stormwater Conveyance System Inspection and Maintenance Program (required)
- Turf management practices and procedures policy (required)

OTHER PHOSPHORUS WATERSHED MS4s

- Educational program concerning the impacts of phosphorus on waterbodies (required)
- Program to ensure that on-site wastewater treatment systems are inspected and maintained once every five years (required for traditional MS4s)
- Require the use of the Enhanced Phosphorus Removal Design Standards in accordance with the New York State Stormwater Design Manual (required for traditional land use control MS4s)
- Retrofit Program to correct or reduce existing erosion and/or pollutant loading problems, with emphasis on phosphorus (required)
- Turf management practices and procedures policy (required)

PATHOGEN IMPAIRED WATERSHED MS4s

- Educational program concerning the impacts of pathogens on waterbodies (required)
- Program to ensure that on-site wastewater treatment systems are inspected and maintained once every five years (required for traditional MS4s)
- Develop and maintain a map showing the entire small MS4 conveyance system (required)
- Retrofit Program to correct or reduce pollutant loading problems, with emphasis on pathogens (required)
- Local law prohibiting pet waste on municipal properties and prohibiting goose feeding (required)
- Pet waste bag program (required)
- Program to manage goose populations (required)

NITROGEN IMPAIRED WATERSHED MS4s

- Educational program concerning the impacts of nitrogen on waterbodies (required)
- Program to ensure that on-site wastewater treatment systems are inspected and maintained once every five years (required for traditional MS4s)
- Develop and maintain a map showing the entire small MS4 conveyance system (required)
- Retrofit Program to correct or reduce existing erosion and/or pollutant loading problems, with emphasis on nitrogen (required)
- Turf management practices and procedures policy (required)

SECTION E. INITIAL IDENTIFICATION OF MEASURABLE GOALS

1. MCM 1 Public Education and Outreach measurable goals. List and describe all essential tasks that will need to be complete in order to demonstrate that progress is being made to meet all program deadlines (Part VII.A.1.f or Part VIII.A.1.g). Where applicable include start and end dates and work to be done by partners.

[Empty response box for MCM 1 Public Education and Outreach measurable goals]

2. MCM 2 Public Involvement/Participation measurable goals. List and describe all essential tasks that will need to be complete in order to demonstrate that progress is being made to meet all program deadlines (Part VII.A.2.h or Part VIII.A.2.h). In addition, describe how the annual report will be presented to the public and how comments will be received. Where applicable include start and end dates and work to be done by partners.

[Empty response box for MCM 2 Public Involvement/Participation measurable goals]

SECTION E. INITIAL IDENTIFICATION OF MEASURABLE GOALS

3. MCM 3 Illicit Discharge Detection and Elimination measurable goals. List and describe all essential tasks that will need to be complete in order to demonstrate that progress is being made to meet all program deadlines (Part VII.A.3.m or Part VIII.A.3.m). Describe how outfall and sewershed mapping will be performed. Where applicable include start and end dates and work to be done by partners.

4. MCM 4 Construction Site Runoff Control measurable goals. List and describe all essential tasks that will need to be complete in order to demonstrate that progress is being made to meet all program deadlines (Part VII.A.4.c or Part VIII.A.4.c). Where applicable include start and end dates and work to be done by partners.

SECTION E. INITIAL IDENTIFICATION OF MEASURABLE GOALS

5. MCM 5 Post-Construction Stormwater Management measurable goals. List and describe all essential tasks that will need to be complete in order to demonstrate that progress is being made to meet all program deadlines (Part VII.A.5.f and Part VIII.A.5.f). Where applicable include start and end dates and work to be done by partners.

[Empty response box for MCM 5 goals]

6. MCM 6 Pollution Prevention/Good Housekeeping measurable goals. List and describe all essential tasks that will need to be complete in order to demonstrate that progress is being made to meet all program deadlines (Part VII.A.6.g and Part VIII.A.6.g). Where applicable include start and end dates and work to be done by partners.

[Empty response box for MCM 6 goals]

**Instructions for Completing the Notice of Intent (NOI) for coverage under the NYS DEC
SPDES General Permit for Storm Water Discharges from Municipal Separate Storm
Sewer Systems (MS4s), GP-0-10-002**

Who Must File a Notice of Intent?

Under the provisions of §402(p) of the Clean Water Act (CWA) and regulations at 40 CFR Part 122, Federal law prohibits "point source" discharges of storm water from municipal separate storm sewer systems (MS4s) to waters of the U.S. without a State Pollutant Discharge Elimination System (SPDES) permit. If you are an operator of a regulated small MS4 **designated under §122.32(a)(1) or §122.32(a)(2)**¹ you must apply for coverage under GP-0-10-002, a new individual permit or apply for a modification of an existing individual SPDES permit.

When to File the NOI Form

DO NOT FILE THE NOI UNTIL YOU HAVE READ AND UNDERSTAND THE NYS DEC SPDES General Permit for Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s). You will need to determine your eligibility, prepare your storm water management plan, and correctly answer all questions on the NOI form, all of which must be done before you can sign the certification statement on the NOI in good faith (and without risk of committing perjury). The NOI must be submitted in accordance with the deadlines established in the NYS DEC SPDES General Permit for Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s)

Where to File the NOI Form

Submit the NOI, signed in accordance with the NYS DEC SPDES General Permit for Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s), Part VI.J.1, to:

Notice of Intent
NYSDEC, Bureau of Water Permits
625 Broadway, 4th Floor
Albany, NY 12233-3505

Completing the NOI Form

To complete this form, type or print, in the appropriate areas only. Please make sure you have completely filled out every section of this form and have retained a copy for your records before sending the completed form to the address above.

Section A. MS4 Owner/Operator Information

1. Provide the legal name of the governmental entity, or other legal entity that operates the MS4 described in this application.
2. Provide the mailing address of the MS4 operator. Include the street address or PO Box, city, state, and zip code. All correspondence regarding the permit will be sent to this address.
3. Identify the Principal Executive Officer or Ranking Elected Official. The principal executive officer includes (1) the chief executive officer of the municipal entity, or (2) a senior executive having responsibility for the overall operations of a principal geographic unit of the agency.
4. Identify the Stormwater Management Program (SWMP) Coordinator. The Stormwater Management Program (SWMP) Coordinator is the person responsible for the implementation/coordination of the SWMP within the MS4.
5. List the contractors or partners such as Regional Stormwater Entities that will be assisting you with and/or implementing any aspect of your SWMP. Describe the service, activity, or work to be performed. Indicate the schedule for implementation.

6. Single Entities seeking coverage under the MS4 permit must identify all regulated MS4s on whose behalf one or more minimum control measures will be implemented.

Section B. Local Water Quality Information

1. Identify any waters listed in Appendix 2 to which the MS4 discharges.
2. Identify the Improvement Strategy Watershed to/within which the MS4 discharges, if any.

Section C. Initial Identification of Best Management Practices (BMPs)

1. Check the management practices that you have selected to meet the requirements for each Minimum Control Measure. Management practices listed in **BOLD type** are required and **MUST** be checked. **FOR COMPLETE DESCRIPTION OF REQUIREMENTS, PLEASE REFER TO THE NYS DEC SPDES GENERAL PERMIT FOR STORM WATER DISCHARGES FROM MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s).** Attach additional pages as necessary.

Section D. Initial Identification of Additional Improvement Strategy Watershed Best Management Practices

1. MS4 permittees within Improvement Strategy Watersheds shall modify their SWMPs to meet the additional requirements as set forth in Part IX of the NYS DEC SPDES General Permit for Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s). The best management practices for each improvement strategy watershed listed in Section D of the NOI are required of MS4s that discharge to/within those watersheds.

Section E. Initial Identification of Measurable Goals

1. Provide a narrative description of the measurable goals, with start and end dates, that will be used for each best management practice for each of the minimum control measures. Indicate the month and year in which you will start and fully implement each of the minimum control measures, or indicate the frequency of the action in the description. Attach additional pages as necessary.

Section F. Certification

1. Certification statement and signature. (CAUTION: An unsigned or undated NOI form will prevent the granting of permit coverage.) Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed by either a principal executive or ranking elected official as described in Part VI.J. of the NYS DEC SPDES General Permit for Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s).



APPENDIX 9

DRAFT NOTICE OF TERMINATION (NOT)

**New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
*(NOTE: Submit completed form to address above)***

**NOTICE OF TERMINATION for Storm Water Discharges Authorized
under the SPDES General Permit for Construction Activity**

Please indicate your permit identification number: NYR _____

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person:

4a. Telephone:

4b. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

III. Reason for Termination

9a. All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. ***Date final stabilization completed** (month/year): _____

9b. Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR _____
(Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. Other (Explain on Page 2)

IV. Final Site Information:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? yes no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? yes no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

**NOTICE OF TERMINATION for Storm Water Discharges Authorized under the
SPDES General Permit for Construction Activity - continued**

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? yes no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

- Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.
- Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).
- For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.
- For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? _____
(acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? yes
 no
(If Yes, complete section VI - "MS4 Acceptance" statement)

V. Additional Information/Explanation:
(Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:

Title/Position:

Signature:

Date:

**NOTICE OF TERMINATION for Storm Water Discharges Authorized under the
SPDES General Permit for Construction Activity - continued**

VII. Qualified Inspector Certification - Final Stabilization:

I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:

Title/Position:

Signature:

Date:

VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):

I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:

Title/Position:

Signature:

Date:

IX. Owner or Operator Certification

I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:

Title/Position:

Signature:

Date:



MC Project No. 13001204A

APPENDIX 10

DRAFT CONTRACTOR CERTIFICATION FORM

Contractor / Subcontractor SPDES Permit Certification

Contract No.: _____ PIN: _____

Description: _____

Town, Village, City: _____

County: _____

Check Applicable Box: Prime Contractor Subcontractor

Name of Contractor/
Subcontractor: _____

Address: _____

City: _____ State: _____ ZIP: _____

Phone: _____ Fax: _____

Core Pay Item Groups for which the Contractor/Subcontractor will be responsible (e.g. 203, 207, 209, etc.): _____

Mandatory Certification: The SPDES General Permit for Stormwater Discharges from Construction Activities requires the Prime Contractor and subcontractors to certify they understand the Stormwater Pollution Prevention Plan (SWPPP), the General Permit conditions, and their responsibilities for compliance. The certification must be signed prior to performing any contract work. The certification shall be signed by an Owner, Principal, President, Secretary or Treasurer of the firm in accordance with the signature requirements of 102-05 *Proposal Submission* of the Standard Specifications.

"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."

Signature: _____ Date: _____

Name: _____ Title: _____

Required Training: Effective April 30, 2010, the SPDES General Permit also requires the Prime Contractor and all subcontractors **performing earthwork or soil-disturbing activities** to identify at least one trained individual **from each company** who will be responsible for implementing the SWPPP and who shall be on-site on a daily basis when the company is performing soil disturbance activities. These activities include clearing, grubbing, grading, filling, excavation, stockpiling, demolition, landscaping, and installation and maintenance of Erosion & Sediment Control practices. Training must consist of 4 hours of NYSDEC-endorsed Erosion & Sediment Control Training every 3 years. (Training is not required if the individual is a licensed Professional Engineer, registered licensed Landscape Architect, or CPESC.) Provide the information below for trained individuals who will be on-site and responsible for SWPPP implementation on this Contract (attach a separate sheet if needed for additional Trained Individuals):

Trained Individual Name/Title : _____

Name of Training Course: _____

Trainee Number: _____ Date of Training: _____

Trained Individual Name/Title : _____

Name of Training Course: _____

Trainee Number: _____ Date of Training: _____



APPENDIX 11

NEW YORK STANDARDS AND SPECS FOR EROSION
AND SEDIMENT CONTROL APPENDIX F:
CONSTRUCITON SITE LOG BOOK

**APPENDIX F
CONSTRUCTION SITE INSPECTION
AND MAINTENANCE LOG BOOK**

**STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION
ACTIVITIES**

SAMPLE CONSTRUCTION SITE LOG BOOK

Table of Contents

- I. Pre-Construction Meeting Documents
 - a. Preamble to Site Assessment and Inspections
 - b. Pre-Construction Site Assessment Checklist

- II. Construction Duration Inspections
 - a. Directions
 - b. Modification to the SWPPP

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 inspector¹ conduct an assessment of the site prior to the commencement of construction² 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. A preconstruction meeting should be held to review all of the SWPPP requirements with construction personnel.

When construction starts, site inspections shall be conducted by the qualified inspector at least every 7 calendar days. 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.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified inspector perform a final site inspection. The qualified inspector shall certify that the site has undergone final stabilization³ 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 Refer to “Qualified Inspector” inspection requirements in the current SPDES General Permit for Stormwater Discharges from Construction Activity for complete list of inspection requirements.
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. 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 Access

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. 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.

SITE PLAN/SKETCH

Inspector (print name)

Date of Inspection

Qualified Inspector (print name)

Qualified Inspector 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 at the outfalls?
- Is there residue from oil and floating substances, visible oil film, or globules or grease at the outfalls?
- 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, debris and spoils 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.

3. Stabilized Construction Access

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?

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.

Runoff Control Practices (continued)

2. Flow 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

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. Silt Fence and Linear Barriers

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)

2. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated; Filter Sock or Manufactured 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.
 - Manufactured insert fabric is free of tears and punctures.
 - Filter Sock is not torn or flattened and fill material is contained within the mesh sock.
- Sediment accumulation ___% of design capacity.

3. 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 trap slopes and disturbed areas are stabilized.
- Sediment accumulation is ___% of design capacity.

4. 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 basin dewatering pool is dewatering at appropriate rate.
- 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. All practices shall be maintained in accordance with their respective standards.

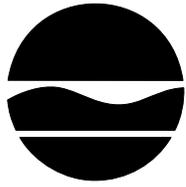
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.



MC Project No. 13001204A

APPENDIX 12

NYSDEC CONSTRUCTION STORMWATER INSPECTION MANUAL



**NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION**

Construction Stormwater Inspection Manual
Primarily for Government Inspectors Evaluating Compliance with Construction
Stormwater Control Requirements

New York State
Department of Environmental Conservation

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Version 1.05 (8/27/07)

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1.0 INTRODUCTION AND PURPOSE

The New York State Department of Environmental Conservation Division of Water (DOW) considers there to be two types of inspections germane to construction stormwater; compliance inspections and self-inspections.

This manual is for use by DOW and other regulatory oversight construction stormwater inspectors in performing compliance inspections, as well as for site operators in performing self inspections. The manual should be used in conjunction with the *New York State Standards and Specifications for Erosion and Sediment Control*, August 2005.

1.1 Compliance Inspections

Regulatory compliance inspections are performed by regulatory oversight authorities such as DOW staff, or representatives of DOW and local municipal construction stormwater inspectors. These inspections are intended to determine compliance with the state or local requirements for control of construction stormwater through erosion and sediment control and post construction practices. Compliance inspections focus on determinations of compliance with legal and water quality standards. Typically, compliance inspections can be further sub-categorized to include comprehensive inspections, and follow-up or reconnaissance inspections.

Compliance inspectors will focus on determining whether:

- the project is causing water quality standard violations;
- the required Stormwater Pollution Prevention Plan (SWPPP) includes appropriate erosion and sediment controls and, to some extent, post construction controls;
- the owner/operator is complying with the SWPPP;
- where required, self-inspections are being properly performed; and
- where self-inspections are required, the owner/operator responds appropriately to the self-inspector's reports.

1.1.1 Comprehensive Inspection

Comprehensive inspections are designed to verify permittee compliance with all applicable regulatory requirements, effluent controls, and compliance schedules. This inspection involves records reviews, visual observations, and evaluations of management practices, effluents, and receiving waters.

Comprehensive inspections should be conducted according to a neutral or random inspection scheme, or in accordance with established priorities. A neutral monitoring scheme provides some objective basis for scheduling inspections and sampling visits by establishing a system (whether complex factor-based, alphabetic, or geographic) for setting priorities to ensure that a particular facility is not unfairly selected for inspection or sampling. The selection of which

facility to inspect must be made without bias to ensure that the regulatory oversight authority, if challenged for being arbitrary and capricious manner, can reasonably defend itself.

A neutral inspection scheme should set the criteria the inspector uses to choose which facilities to inspect, but the schedule for the actual inspection should remain confidential, and may be kept separate from the neutral plan.

A routine comprehensive compliance inspection is most effective when it is unannounced or conducted with very little advance warning.

1.1.2 Reconnaissance Inspection

A reconnaissance inspection is performed in lieu of, or following a comprehensive inspection to obtain a preliminary overview of an owner/operator's compliance program, to respond to a citizen complaint, or to assess a non-permitted site. The inspector performs a brief (generally about an hour) visual inspection of the site, discharges and receiving waters. A reconnaissance inspection uses the inspector's experience and judgement to summarize potential compliance problems, without conducting a full comprehensive inspection. The objective of a reconnaissance inspection is to expand inspection coverage without increasing inspection resource expenditures. The reconnaissance inspection is the shortest and least resource intensive of all inspections.

Reconnaissance inspections may be initiated in response to known or suspected violations, a public complaint, a violation of regulatory requirements, or as follow-up to verify that necessary actions were taken in response to a previous inspection.

1.2 Self-inspections

For some projects, the site owner/operator is required by their State Pollutant Discharge Elimination System (SPDES) Permit and/or local requirements to have a qualified professional¹ perform a "self-inspection" at the site. In self-inspections, the qualified professional determines whether the site is being managed in accordance with the SWPPP, and whether the SWPPP's recommended erosion and sediment controls are effective. If activities are not in accordance with the SWPPP, or if the SWPPP erosion and sediment controls are not effective, the qualified professional inspecting the site recommends corrections to the owner/operator.

¹ A "Qualified professional" is a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed professional engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed landscape architect or soil scientist.

2.0 PRE-INSPECTION ACTIVITIES

2.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf, such as county Soil and Water Conservation District staff. Examples of other regulatory oversight authorities include: the United States Environmental Protection Agency (EPA); New York City Department of Environmental Protection (DEP), Adirondack Park Agency (APA); the Lake George Park Commission (LGPC), and the Skaneateles Lake Watershed Authority (SLWA). Before arriving on-site to conduct the inspection, considerations concerning communication, documentation and equipment must be made.

Regulatory oversight authority is granted by state or local law to government agencies or, depending upon the particular law, an authorized representative of state or local government. SPDES rules 6 NYCRR 750-2.3 and Environmental Conservation Law 17-0303(6) and 17-0829(a) all allow for authorized representatives of the (NYSDEC) commissioner to perform all the duties of an inspector.

2.1.1 Communication

Coordination with Other Entities

Where appropriate, prior to selecting sites for inspection, compliance inspectors should communicate with other regulatory oversight authorities to avoid unnecessary duplication or to coordinate follow-up to inspections performed by other regulatory oversight authorities.

Announced vs. Unannounced Inspection

Inspections may be announced or unannounced. Each method has its own advantages and disadvantages. Unannounced inspections are preferred, however many job sites are not continuously manned, or not always staffed by someone who is familiar with the SWPPP, thus necessitating an announced inspection. As an alternative, when an announced inspection is necessary, inspectors should try to give as little advanced warning as possible (24 hours is suggested).

Itinerary

For obvious safety reasons, inspectors should be sure to inform someone in their office which site or sites they will be visiting prior to leaving the to perform inspections.

2.1.2 Documentation

Data Review

The inspector should review any available information such as:

- Notice of Intent
- Stormwater Pollution Prevention Plan
- Past inspection records
- Phasing plan

- Construction sequence
- Inspection and Maintenance schedules
- Site specific issues
- Consent Orders
- Access agreements

Inspection Form

The inspector should have copies of, and be familiar with, the inspection form used by their regulatory oversight authority (example in Attachment 1) before leaving the office. Static information such as name, location and permit number can be entered onto the inspection form prior to arriving at the inspection site.

Credentials

Inspectors should always carry proper identification to prove that they are employed by an entity with jurisdictional authority. Failure to display proper credentials may be legal grounds for denial of entry to a site.

2.1.3 Equipment

Personal Protective Equipment

DOW employees must conform to the DOW Health and Safety policy as it relates to personal protective equipment. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at: www.osha.gov/dep/etools/ehasp/ to develop a health and safety plan.

The following is a list of some of the most common health and safety gear that may be needed:

- Hard hat (Class G, Type I or better)
- Safety toe shoes
- Reflective vest
- Hearing protection (to achieve 85 dBA - 8 hr TWA)
- Safety glasses with side shields

If the construction is on an industrial site or a hazardous waste site, special training may be required prior to entering the site. The inspector should consult with OSHA or NYSDEC prior to entering such a site.

Monitoring Equipment

The following is a list of some equipment that may be helpful to document facts and verify compliance:

- Digital Camera
- Measuring tape or wheel
- Hand level or clinometer
- Turbidity meter (in limited circumstances)

2.2 Permittee's Self-inspection

This section is intended for qualified professionals who conduct site self-inspections on behalf of owner/operators. Self-inspectors are responsible for performing inspections in accordance with permit requirements and reporting to site owners and operators the results and any recommendations resulting from the inspection.

Prior to conducting inspections, qualified professionals should ensure familiarity with the Stormwater Pollution Prevention Plan and previous inspection reports.

3.0 ON-SITE INSPECTION PROCESS

3.1 Compliance Inspections

3.1.1 Professionalism

Don't Pretend to Possess Knowledge

Unless the inspector has experience with a particular management practice, do not pretend to possess knowledge. Inspectors cannot be expert in all areas; their job is to collect information, not to demonstrate superior wisdom. Site operators are often willing to talk to someone who is inquisitive and interested. Within reason, asking questions to obtain new information about a management practice, construction technique or piece of equipment is one of the inspector's main roles in an inspection.

Don't Recommend Solutions

The inspector should not recommend solutions or endorse products. The solution to a compliance problem may appear obvious based on the inspector's experience. However, the responsibility should be placed on the site owner to implement a workable solution to a compliance problem that meets NYSDEC standards. The inspector should refer the site operator to the New York Standards and Specifications for Erosion and Sediment Control (the Blue Book) or the New York State Stormwater Management Design Manual (the Design Manual).

Key advice must be offered carefully. One experienced stormwater inspector suggests saying: "I can't direct you or make recommendations, but what we've seen work in other situations is ..."

The way inspectors present themselves is important to the effectiveness of the inspection. An inspector cannot be overly familiar, but will be more effective if able to establish a minimum level of communication.

3.1.2 Safety

DOW employees must conform to Division health and safety policies when on a construction site. Other regulatory oversight authorities should have their own safety policies or, if not, may

wish to consult the OSHA health and safety tool at:

www.osha.gov/dep/etools/ehasp to develop a health and safety plan.

Some general protections for construction sites are:

- Beware of heavy equipment, avoid operator blind spots and make sure of operator eye contact around heavy equipment.
- Avoid walking on rock rip-rap if possible. Loose rock presents a slip hazard.
- Stay out of confined spaces like tanks, trenches and foundation holes.
- Avoid lightning danger. Monitor weather conditions, get out of water, avoid open areas and high points, do not huddle in groups or near trees.
- Protect yourself from sun and heat exposure. Use sun screen or shading clothing. Remain hydrated by drinking water, watching for signs of heat cramps, exhaustion (fatigue, nausea, dizziness, headache, cool or moist skin), or stroke (high body temperature; red, hot and dry skin)
- Protect yourself from cold weather. Wear multiple layers of thin clothing. Wear a warm hat. Drink warm fluids or eat hot foods, and keep dry.
- Avoid scaffolding in excess of 4 feet above grade.
- Beware of ticks, stinging insects, snakes and poison ivy or sumac.

3.1.3 Legal access

DOW has general powers, set forth under ECL 17-0303, subparagraph 6, to enter premises for inspections. In addition, ECL 3-0301.2 conveys general statutory authority granting the DOW the power to access private property to fulfill DOW obligations under the law.

ECL 15-0305 gives the DOW the authority to enter at all times in or upon any property, public or private, for the purpose of inspecting or investigating conditions affecting the construction of improvements to or developments of water resources for the public health, safety or welfare.

ECL 17-0829 allows an authorized DOW representative, upon presentation of their credentials, to enter upon any premises where any effluent source is located, or in which records are required to be maintained. The representative may at reasonable times have access to, and sample discharges/pollutants to the waters or to publicly owned treatment plants where the effluent source is located. This subparagraph provides DOW representatives performing their duties authority to enter a site to pursue administrative violations. Pursuing criminal violations may require a warrant or the owner's permission to enter the site.

For sites that are permitted, DOW has authority under the permit to enter the site.

If the owner/operator's representatives onsite deny access, the inspector *should not* physically force entry. Under these circumstances the attorney representing the inspector should be immediately notified and consideration should be given to soliciting the aid of a law officer to obtain entry.

DOW staff have the right to enter at any reasonable time. If no one is available, and the site is fenced or posted, DOW staff should make all reasonable efforts to identify, contact and notify the owner that the DOW is entering the site. If the inspector has made all reasonable efforts to contact site owners, but was unable to do so, the site can then be accessed. All efforts should be taken not to cause any damage to the facility.

Other regulatory oversight authorities should seek advice on their legal authorities to enter a job site. Municipalities that have adopted Article 6 of the New York State Sample Local Law for Stormwater Management and Erosion and Sediment Control (NYSDEC, 2004, updated 2006) will have legal authority to enter sites in accordance with that chapter and any other existing municipal authority .

Agents of DOW have authority similar DOW staff authority to enter sites. However, DOW staff enjoy significant personal liability protections as state employees. That liability protection may not be the same for authorized representatives of DOW. For authorized representatives of DOW (or other regulatory oversight authorities), it is prudent to obtain permission to enter the site. If such permission is denied, the authorized representatives should inform the appropriate DOW contact, usually the regional water manager.

3.1.4 Find the Legally Responsible Party (Construction Manager, Self-inspector)

The first action a compliance inspector should take upon entering a construction site is to find the construction trailer or the construction or project manager if they are available. The inspector should present appropriate identification to the site's responsible party and state the reason for the inspection; construction stormwater complaint response or neutral construction stormwater inspection. If the inspection is initiated as a response to a complaint, frequently the responsible party will ask who made the complaint. DOW keeps private individual complainants confidential. If the complainant is another regulatory oversight authority, DOW tends to make that known to the site's responsible party.

3.1.5 On-site records review (NOI, SWPPP, Self-inspection Reports, Permit)

Generally, the compliance inspector should next review the on-site records. Verify that a copy of the construction stormwater permit and NOI are on-site. Verify that the acreage, site conditions, and receiving water listed on the NOI are accurate. Compare the on-site documentation with documentation already submitted to, or obtained by the compliance inspector.

If the SWPPP has not been reviewed in the office, verify that it exists and contains the minimum required components (16 for a basic plan and 22 for a full plan). On-site review of the SWPPP should determine if: there is an appropriate phasing plan; the acreage disturbed in each phase, construction sequence for each phase; proposed implementation of erosion and sediment control measures; and, where required, post construction controls. For each of the erosion and sediment control practices, the SWPPP must show design details in accordance with the NYS Standards for Erosion and Sediment Controls. The SWPPP must also include provisions for maintenance of practices during construction. On-site review of post construction controls is generally limited to verification that the proposed stormwater management practices are shown on the site plan.

Where self-inspections are required, self-inspection reports are a significant tool for the compliance inspector to determine the performance history of the site. The self-inspection reports should be done with the required frequency. Self-inspection reports must include all the details required by the permit. Generally, it is desirable for permit information to be shown on a site plan. The compliance inspector should become familiar with the report and use that familiarity to judge whether the self-inspections are being performed correctly and that the site operator is correcting deficiencies noted in the report.

3.1.6 Walk the Site

During wet weather conditions, it may be advantageous to observe the receiving waters prior to walking the rest of the site. At some point during the inspection, the receiving water conditions must be observed and noted. It is critical to note if there is a substantial visible contrast to natural conditions, or evidence of deposition, streambank erosion, construction debris or waste materials (e.g. concrete washdown) in the receiving stream.

Each inspector should evaluate actual implementation and maintenance of practices on-site compared to how implementation and maintenance is detailed in the SWPPP. At a minimum, the compliance inspector should observe all areas of active construction. Observing equipment or materials storage, recently stabilized areas, or stockpile areas is also appropriate to evaluate the effectiveness of management practices.

3.1.7 Taking Photographs

Evidence of poor receiving water conditions and poor or ineffective practices should be documented with digital photographs. Those photographs should be logged date stamped and stored on media that cannot be edited (e.g. write only CDs). Photos should also be appended to the site inspector's report.

It is also beneficial to take photographs of good practices for educational and technology transfer reasons.

3.1.8 Exit Interview

Clearly communicate expectations and consequences. If it is clear from the inspection that the owner/operator must modify the SWPPP, or modify management practices within an assigned period (e.g. 24 hours, 48 hours, one week, two weeks), then that finding should be communicated at the time of the exit interview. The inspector should assign the period based on factors such as how long it would reasonably take to complete such modifications and the level of risk to water quality associated with failure to make such modifications.

The inspector should make clear that NYSDEC reserves rights to future enforcement actions. If the inspector's supervisor or enforcement coordinator determines additional enforcement actions are necessary, the inspector *should not* reassure the owner/operator that the current situation is acceptable.

3.2 Non-permitted Site Inspections

For sites not authorized in accordance with state or local laws, the process will be abbreviated. First verify the need for authorization and observe receiving waters to detect water quality standard violations. If there is a violation, notify the owner of the violation or other compliance actions in response to their illicit activity. For DOW staff, Attachment 2 or a similar notice can be used to notify the site owner/operator that stormwater authorization is required.

3.3 Self-inspections

The role of the self-inspector is to verify that the site is complying with stormwater requirements. In particular, the self-inspector verifies that the SWPPP is being properly implemented. The self-inspector also documents SWPPP implementation so regulatory agencies can review implementation activities.

It is not the role of the self-inspector to report directly to regulatory authorities.

Appendix H of *The New York Standards and Specifications for Erosion and Sediment Control* - August 2005 (the Blue Book) includes a Construction Duration Inspection checklist that can be used by the owner/operators qualified professional for self-inspections. The Blue Book is available on the NYSDEC website.

3.3.1 Purpose

The self inspector should ensure that the project's SWPPP is being properly implemented. This includes ensuring that the erosion and sediment control practices are properly installed and being maintained in accordance with the SWPPP/Blue Book.

The project must be properly phased to limit the disturbance to less than five acres, and the construction sequence for each phase must be followed. The SWPPP must also be modified to address evolving circumstances. Finally, and most importantly, receiving waters must be protected.

If a soil disturbance will be greater than five acres at any given time, the site operator must obtain written permission from the DOW regional office.

3.3.2 Pre-construction Conference

The parties responsible for various aspects of stormwater compliance should be identified at the pre-construction conference. Responsible parties may include, but are not limited to, owner's engineer, owner/operator/permittee, contractors, and subcontractors.

Typical responsibilities include: installation of erosion and sediment control (E & SC) practices; maintenance of E & SC practices, inspection of E&SC practices, installation of post construction stormwater management practices (SMPs), inspection of post construction SMPs, SWPPP revisions, and contractor direction.

All parties should clearly know what is expected of them. Responsible parties should complete the Pre-construction Site Assessment Checklist provided in Appendix H of the Blue Book.

3.3.3 Inspection Preparation

The inspector should review the project's SWPPP (including the phasing plan, construction sequence and site specific issues) and the last few inspection reports (if the inspector has them available).

3.3.4 Self-inspection Components

Inspect installation, performance and maintenance of all E&SC practices

The self inspector should inspect all areas that are under active construction or disturbance and areas that are vulnerable to erosion. The self-inspector should also inspect areas that will be disturbed prior to the next inspection for measures required prior to construction (e.g. silt barriers, stabilized construction entrance, diversions). Finally, self-inspectors should inspect post-construction controls during and after installation.

Identify site deficiencies and corrective measures

The self-inspector's reports must be maintained in a log book on site and the log book must be made available to the regulatory authorities. Although the legal responsibility for filing a Notice of Termination lies with the owner/operator, the self-inspector may also be called upon to perform a final site inspection, including post construction SMPs, prior to filing the Notice of Termination.

4.0 POST-INSPECTION ACTIVITIES

4.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf (such as County Soil and Water Conservation District staff.) Upon completion of an inspection, inspection results should be documented for the record.

4.1.1 Written Notification

The inspector should inform the permittee or the on-site representative of their inspection results in writing by sending the permittee a complete, signed copy of the inspection report. The inspection report should be transmitted under a cover letter which elaborates on any deficiencies noted in the inspection report. It is not a good idea to commend exceptional efforts by the owner/operator in a letter, because such letters tend to undermine enforcement efforts when compliance status at a site degrades.

The inspector should consider providing a copy of the cover letter and inspection report to other parties with including:

- Permittee
- Contractor(s)
- Other regulatory oversight authorities
- Other parties present during the inspection (e.g. SWPPP preparer, permittee's self-inspector, etc.)

For DOW staff, an example of the inspection cover letter is included as Attachment 3.

4.1.2 Inspection Tracking

DOW staff must enter their inspection results into the electronic *Water Compliance System*.

Local municipalities and other regulatory oversight authorities are encouraged to develop an electronic tracking system in which to record their inspections.

4.2 Permittee's Self-inspections

This section is intended for qualified professionals who conduct site inspections for permittees in accordance with a SPDES permit or local requirements.

4.2.1 Written Records

Inspection Reports

The inspector shall prepare a written report summarizing inspection results. The inspection report is then provided to the permittee, or the permittee's duly authorized representative, and to the contractor responsible for implementing stormwater controls on-site in order to correct deficiencies noted in the inspection report. Finally, the inspection report must be added to the site log book that is required to be maintained on-site, and be available to regulatory oversight authorities for review.

4.2.2 Stormwater Pollution Prevention Plan Revisions

The inspector must inform the permittee of his/her duty to amend the Stormwater Pollution Prevention Plan (SWPPP) whenever an inspection proves the SWPPP to be ineffective in:

- Eliminating or significantly minimizing pollutants from on-site sources
- Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity
- Eliminating discharges that cause a substantial visible contrast to natural conditions

Water Quality Observations

Describe the discharge(s) [source(s), impact on receiving water(s), etc.] _____

Describe the quality of the receiving water(s) both upstream and downstream of the discharge _____

Describe any other water quality standards or permit violations _____

Additional Comments: _____

Photographs attached

ATTACHMENT 2

**** NOTICE ****

On March 10, 2003, provisions of the Federal Clean Water Act went into effect that apply to many construction operations.

If your construction operations result in the disturbance of one acre or greater and stormwater runoff from your site reaches surface waters (i.e., lake, stream, road side ditch, swale, storm sewer system, etc.), the stormwater runoff from your site must be covered by a State Pollutant Discharge Elimination System (SPDES) Permit issued by the New York State Department of Environmental Conservation (NYSDEC).

To facilitate your compliance with the law, NYSDEC has issued a General Permit which may be applicable to your project. To obtain coverage under this General Permit, you need to prepare a Stormwater Pollution Prevention Plan (SWPPP) and then file a Notice of Intent (NOI) to the NYSDEC headquarters in Albany. The NOI form is available on the DEC website. You may also obtain a copy of the NOI form at the nearest NYSDEC regional offices.

When you file your NOI you are certifying that you have developed a SWPPP and that it will be implemented prior to commencing construction. When you submit the NOI you need to indicate if your SWPPP is in conformance with published NYSDEC technical standards; if it is, your SPDES permit coverage will be effective in as few as five business days. If your SWPPP does not conform to the DEC technical standards, coverage will not be available for at least 60 business days.

Failure to have the required permit can result in legal actions which include Stop Work Orders and/or monetary penalties of up to \$37,500/day

If your construction operations are already in progress and you are not covered by an appropriate NYSDEC permit contact the NYSDEC Regional Water Engineer as soon as possible. If your construction field operations have not yet commenced, review the NOI and the General Permit on the DEC's website or at the DEC regional office for your area. When you are comfortable that you understand and comply with the requirements, file your NOI.

The requirement to file an NOI does not replace any local requirements. Developers/Contractors are directed to contact the Local Code Enforcement Officer or Stormwater Management Officer for local requirements.

ATTACHMENT 3

<< Date >>

Mr. John Smith
123 Main Street
Ferracane, NY 12345

**Re: Stormwater Inspection
SPDES Permit Identification No. NYR10Z000 (through SPDES No. GP-02-01)
Blowing Leaves Subdivision
Gasper (T), Eaton (Co.)**

Dear Mr. Smith:

On the afternoon of << date >> I conducted an inspection of the construction activities associated with the Blowing Leaves Subdivision located on County Route 1 in the town of Gasper, Eaton County. The inspection was conducted in the presence of you and Mr. Samuel Siltfence of Acme Excavating Co., Inc. The purpose of the inspection was to verify compliance with the *State Pollutant Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activity* ("the general permit").

The overall rating for the project at the time of the inspection was *unsatisfactory*. A copy of my inspection report is attached for your information. In addition to the report, I would like to elaborate on the following:

SPDES Authority

- In accordance with subdivision 750-2.1 (a) of Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (6 NYCRR), a copy of your permit must be retained at the construction site. You did not have a copy of the general permit at the site. **Your failure to retain a copy of the general permit at the construction site is a violation of 6 NYCRR Part 750-2.1 (a).** Please retain a copy of the general permit at the site from this point forward.

SWPPP Content

- In accordance with Part III.E.2. of the general permit, contractors and subcontractors must certify that they understand the terms and conditions of the general permit and the SWPPP before undertaking any construction activity at the site. Your SWPPP does not include a certification statement from Acme Excavating Co., Inc. **The failure of your contractor to sign this certification before undertaking construction activity at the site is a violation of Part III.E.2. of the general permit.** Please obtain copies of all necessary certifications and provide copies of them to each party who holds a copy of your SWPPP.
- In accordance with Part V.H.2. of the general permit, SWPPP's must be certified by the permittee. Your SWPPP was not certified by you. **Your failure to certify your SWPPP is a**

Mr. John Smith
Re: SPDES Inspection
Blowing Leaves Subdivision
Gasper (T), Eaton (Co.)

<< Date >>

violation of Part V.H.2. of the general permit. Please certify your SWPPP.

Recordkeeping

- In accordance with Parts III.D.3.a. and III.D.3.b. of the general permit, permittees must have a qualified professional conduct site inspections within 24 hours of the end of 0.5" or greater rain events and at least once per week. A review of your records revealed that your "self-inspections" are only being conducted about two or three times per month. **Your failure to have a qualified professional conduct inspections at the required frequency is a violation of Part III.D.3.b. of the general permit.** Please immediately direct your qualified professional to conduct your site inspections at the required frequency.
- Although the frequency of self-inspections does not meet requirements, the quality of them is very good. Your qualified professional has accurately noted the same SWPPP deficiencies and necessary maintenance activities that I also observed, and prepared thorough sketches on the self-inspection site maps.
- In accordance with Part V.H.2. of the general permit, the permittee must certify all reports required by the permit. A review of your records showed that your self-inspection reports were not certified. **Your failure to certify your self-inspection reports is a violation of Part V.H.2. of the general permit.** Please sign and certify any and all existing and future self-inspection reports.

Visual Observations

- In accordance with Parts III.A.2. and III.A.3. of the general permit, all erosion and sediment controls (E&SC) measures must be installed (as detailed in the SWPPP) prior to the initiation of construction. During the inspection, I noted all of your E&SC measures have been correctly installed at the right times and locations.
- In accordance with Part V.L. of the general permit, all of the E&SC measures at your site must be maintained properly. While on site I observed that, among other things, the section of silt fence in place parallel to County Route 1 is in various stages of disrepair. **The failure of your contractor to adequately maintain the E&SC measures currently in place at your site is a violation of Part V.L. of the general permit.** Please direct your contractor to repair this silt fence immediately and to diligently maintain all of the other required E&SC measures as they are brought to his attention by your qualified professional.
- This inspection was conducted during a rain event which resulted in a stormwater discharge to the municipal separate storm sewer system (MS4) being operated by the Eaton County Department of Public Works. Your discharge was visibly turbid whereas upstream water MS4 was clear. As a result, the discharge from the MS4 outfall into Karimipour Creek was causing

Mr. John Smith
Re: SPDES Inspection
Blowing Leaves Subdivision
Gasper (T), Eaton (Co.)

<< Date >>

slight turbidity. Please be advised that the narrative water quality standard for turbidity in Karimipour Creek is “no increase that will cause a substantial visible contrast to natural conditions.” I attribute the lack of maintenance of your E&SC measures to be the primary cause of the turbid discharge. Please be reminded that the general permit does not authorize you cause or contribute to a condition in contravention of any water quality standards.

If you have any questions or comments, please feel free to contact me at (999) 456-5432.

Sincerely,

Hector D. Inspector, CPESC
Environmental Program Specialist 2

HDI:ms
Attachment

cc w/att.: Chester Checkdam, (T) Gasper Code Enforcement Officer
Samuel Siltfence, Acme Excavating Co., Inc.



MC Project No. 13001204A

APPENDIX 13

NRCS SOILS REPORT



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Albany County, New York**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

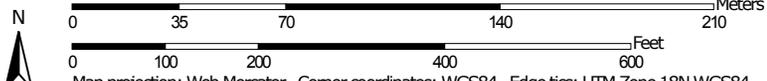
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.

Map Scale: 1:2,460 if printed on A landscape (11" x 8.5") sheet.



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 Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

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

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 1:15,800.

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: Albany County, New York
 Survey Area Data: Version 15, Oct 8, 2017

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

Date(s) aerial images were photographed: Oct 7, 2013—Nov 9, 2016

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CoC	Colonie loamy fine sand, rolling	2.6	17.4%
CoD	Colonie loamy fine sand, hilly	0.9	6.1%
EnA	Elnora loamy fine sand, 0 to 3 percent slopes	6.4	42.3%
Gr	Granby loamy fine sand	4.6	30.2%
St	Stafford loamy fine sand	0.6	4.0%
Totals for Area of Interest		15.1	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

Custom Soil Resource Report

pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Albany County, New York

CoC—Colonie loamy fine sand, rolling

Map Unit Setting

National map unit symbol: 9pff
Elevation: 150 to 1,000 feet
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Colonie, rolling, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colonie, Rolling

Setting

Landform: Deltas, beach ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy glaciofluvial or eolian deposits

Typical profile

H1 - 0 to 7 inches: loamy fine sand
H2 - 7 to 68 inches: loamy fine sand
H3 - 68 to 74 inches: loamy fine sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 9 percent

Claverack

Percent of map unit: 5 percent

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Hydric soil rating: No

Granby

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

CoD—Colonie loamy fine sand, hilly

Map Unit Setting

National map unit symbol: 9pfg

Elevation: 150 to 1,000 feet

Mean annual precipitation: 36 to 41 inches

Mean annual air temperature: 45 to 48 degrees F

Frost-free period: 100 to 170 days

Farmland classification: Not prime farmland

Map Unit Composition

Colonie, hilly, and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colonie, Hilly

Setting

Landform: Beach ridges, deltas

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Riser

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Sandy glaciofluvial or eolian deposits

Typical profile

H1 - 0 to 7 inches: loamy fine sand

H2 - 7 to 68 inches: loamy fine sand

H3 - 68 to 74 inches: loamy fine sand

Properties and qualities

Slope: 15 to 25 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

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Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent

Elnora

Percent of map unit: 5 percent
Hydric soil rating: No

Unadilla

Percent of map unit: 5 percent
Hydric soil rating: No

Stafford

Percent of map unit: 3 percent
Hydric soil rating: No

Hudson

Percent of map unit: 2 percent
Hydric soil rating: No

EnA—Elnora loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9pfn
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Elnora and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elnora

Setting

Landform: Beach ridges, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Sandy glaciofluvial, eolian, or deltaic deposits

Typical profile

H1 - 0 to 11 inches: loamy fine sand
H2 - 11 to 27 inches: fine sand
H3 - 27 to 65 inches: loamy fine sand

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Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: About 18 to 24 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: A/D

Hydric soil rating: No

Minor Components

Stafford

Percent of map unit: 5 percent

Hydric soil rating: No

Colonie

Percent of map unit: 5 percent

Hydric soil rating: No

Unnamed soils

Percent of map unit: 4 percent

Granby

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Gr—Granby loamy fine sand

Map Unit Setting

National map unit symbol: 9pfx

Elevation: 600 to 1,000 feet

Mean annual precipitation: 36 to 41 inches

Mean annual air temperature: 45 to 48 degrees F

Frost-free period: 100 to 170 days

Farmland classification: Not prime farmland

Map Unit Composition

Granby and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Granby

Setting

Landform: Depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Sandy glaciofluvial deposits or sandy glaciolacustrine deposits

Typical profile

H1 - 0 to 11 inches: loamy fine sand

H2 - 11 to 25 inches: fine sand

H3 - 25 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Calcium carbonate, maximum in profile: 15 percent

Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: A/D

Hydric soil rating: Yes

Minor Components

Adrian

Percent of map unit: 5 percent

Landform: Swamps, marshes

Hydric soil rating: Yes

Stafford

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed soils

Percent of map unit: 3 percent

Medihemists

Percent of map unit: 3 percent

Landform: Swamps, marshes

Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 2 percent

Landform: Flood plains

Hydric soil rating: Yes

Hydraquents

Percent of map unit: 2 percent
Landform: Marshes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Elnora

Percent of map unit: 2 percent
Hydric soil rating: No

St—Stafford loamy fine sand

Map Unit Setting

National map unit symbol: 9phr
Mean annual precipitation: 36 to 41 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 170 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Stafford and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stafford

Setting

Landform: Beach ridges, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Sandy glaciofluvial or glaciolacustrine deposits

Typical profile

H1 - 0 to 12 inches: loamy fine sand
H2 - 12 to 30 inches: loamy fine sand
H3 - 30 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None

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Frequency of ponding: None

Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A/D

Hydric soil rating: No

Minor Components

Colonie

Percent of map unit: 5 percent

Hydric soil rating: No

Unnamed soils

Percent of map unit: 5 percent

Elnora

Percent of map unit: 5 percent

Hydric soil rating: No

Granby

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

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MC Project No. 13001204A

APPENDIX 14
GEOTECHNICAL REPORT



Report of Geotechnical Exploration

FOR
Proposed COSCTO Wholesale
City of Albany
Albany County, New York

March 2, 2018

Prepared For
Heidi Macomber
COSTCO Wholesale
45940 Horseshoe Drive
Suite 150
Sterling, VA 20166

Prepared By
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March 2, 2018

Ms. Heidi Macomber
COSTCO Wholesale
45940 Horseshoe Drive
Suite 150
Sterling, VA 20166

Re: Report of Geotechnical Exploration
Proposed COSTCO Wholesale
Crossgates Mall Road
City of Albany, Albany County, New York
Maser File: 13001204A

Dear Ms. Macomber:

Maser Consulting, P.A. is pleased to present the results of a geotechnical exploration performed for the referenced project. The exploration program was performed in accordance with our Agreement dated February 1, 2018, as well as COSTCO Wholesale Development Requirements Version 2016, dated September 19, 2016. The scope of this program included 46 subsurface explorations, laboratory testing, engineering evaluation, and preparation of this report. The findings of the field and laboratory testing, as well as our geotechnical recommendations for design and construction of the project are included in this report.

Maser appreciates the opportunity to assist you with this project. Please contact this office should you have questions regarding this report.

Sincerely,
MASER CONSULTING P.A.



John C. Walton, P.E.
Principal Associate



Matthew J. Church
Associate

MJC/jcw
Attachments
Cc: Russell T. McFall, II, P.E. (Maser)

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EXECUTIVE SUMMARY

Introduction

- This report presents the results of a geotechnical exploration performed for a proposed COSTCO Wholesale store with fuel facility considered for construction at a site in the City of Albany, Albany County, New York. The property is generally located in the southeast quadrant of the intersection formed by Rapp Road and Crossgates Mall Road.
- The subject property is bounded to the west by Rapp Road, to the south by Western Avenue (SR 20), to the southeast by multiple residential and commercial properties, to the east by several residential properties as well as Gabriel Terrace, and to the north by Crossgates Mall Road. At the time of this study, the western portion of the COSTCO parcel was occupied by wooded areas encompassing an abandoned roadway and existing stream, and the eastern portion of the site was occupied by an existing residential development.
- A conceptual site plan and preliminary survey plan prepared by Maser Consulting were used as the basis for this study. The plans indicate the proposed construction will include a 148K prototype COSTCO store with Liquor in the northeastern portion of the site and a fuel facility in the southwest corner of the site, with parking and landscaped areas throughout the remainder of the site. The fuel facility will consist of 3 underground fuel storage tanks (USTs), and 3 fuel dispenser islands with an overhead canopy structure.
- Finished floor of the building is assumed to be established at EL ± 288 feet, nominal mass cuts and mass fills ranging up to ± 8 feet on average throughout the majority of the site. Isolated fills ranging up to ± 20 feet in the area of the stream/drainage ditch in the northwestern portion of the site are anticipated. It should be noted that a retaining wall may be required in the northwestern corner of the site, which may be as high ± 10 feet.

Exploration and Testing

- This study included 33 borings and 13 test pits performed throughout the proposed COSTCO parcel, extending to depths ranging from ± 6.5 to ± 25 feet below the ground surface (BGS). Laboratory testing was performed on representative samples obtained from the explorations.
- A surficial layer of topsoil was encountered at the ground surface of the explorations and averaged ± 5.8 inches thick.
- Soil identified as existing fill was encountered below the surficial layers of topsoil in 6 of the 46 explorations (B-24, TP-2, TP-6, TP-7, TP-10, and TP-12) and extended to depths ranging from ± 1.3 to ± 4.5 feet BGS. The existing fill primarily consisted of sand with variable, but generally minor, quantities of silt and gravel.
- Evidence of groundwater was encountered in 23 of the 46 explorations performed for this program at depths ranging from ± 2.5 feet to ± 18.0 feet BGS, averaging ± 14.3 feet BGS. Long-term (>24 Hr.) groundwater readings were obtained at borings B-13 and B-22, and were recorded at ± 14.2 feet and ± 12.3 feet, respectively.

Conclusions and Recommendations

- It is our understanding that this project will likely be constructed through cooperation with COSTCO Wholesale and a Site Developer. The Site Developer is responsible for following and implementing the recommendations contained herein to satisfy the final Site Development

Agreement (SDA) and the relevant version of the COSTCO Wholesale Development Requirements upon which the SDA is based.

- Based on the results of this study, construction of the proposed COSTCO is feasible; however, geotechnical issues have been identified that will impact site development costs:
 - The need to demolish the existing structures and associated site features.
 - The presence of loose sandy site soils and anticipated grading will dictate building support options and construction sequencing.
 - Currently proposed grading allows construction of conventional spread footings after site settlements have mobilized; however,
 - If proposed grading is reduced or minimized, ground improvement will need to be considered for building and fuel facility support, as there is risk for excessive settlements.
 - The potential to encounter groundwater in utility excavations.
 - Loose natural soils below the UST field may impact installation sequencing of the USTs.
 - The stream/drainage ditch area is estimated to receive fills ranging up to ± 20 feet, which will induce settlements of any structure used to carry the current flow. Ground improvement may be required at this location.
- The existing trees and vegetation not to remain should be cleared and topsoil should be stripped from the proposed building and pavement areas and stockpiled on-site. Topsoil will require amendment for reuse on-site.
- The project should be designed assuming a Seismic Site Class D – Stiff Soil profile.
- Based on groundwater levels encountered and the anticipated mass fill, it is expected that groundwater should not be a significant problem during mass earthwork activities in most areas of the site. The UST design may require tie-downs.
- It is our opinion the proposed building and fuel canopy can be supported by conventional shallow spread footings established in improved natural soils or new compacted structural fill. foundations can be designed for a maximum allowable net bearing pressure of 3,000 psf for improved ground and 2,000 psf for unimproved ground.
- Standard thickness pavement sections are acceptable for this project, provided the earthwork recommendations herein are followed.

This executive summary is provided as an abbreviated general discussion of the geotechnical considerations that will impact development of the subject project, and should not be relied upon without reading the report in its entirety. The following sections of the report present a detailed discussion of the findings of this study and our recommendations for design and construction of the subject project.

INTRODUCTION

This report presents the results of a geotechnical exploration program performed for a proposed COSTCO Wholesale store with fuel facility considered for construction at a site in the City of Albany, Albany County, New York. The subject property is generally located in the southeastern quadrant of the intersection formed by Rapp Road and Crossgates Mall Road. Please refer to Figure 1 - Site Location Map included in Appendix A.

The following information was provided and used as the basis for the subsurface exploration program and preparation of this report:

- Site plan entitled “Concept Plan SK-2 Revised COSTCO Wholesale, Crossgates Mall, Albany, New York” prepared by Maser Consulting P.A. dated November 1, 2017.
- A preliminary survey plan entitled “ALTA/NSPS Land Title Survey for COSTCO, Inc; Albany Crossgates Mall,” prepared by Maser Consulting P.A. dated January 5, 2018.

The plan(s) indicate the property boundaries, existing site features, existing topography, and conceptual site layout.

The scope of this exploration program included the following services:

- Develop and execute a subsurface exploration program consisting of 33 borings and 13 test pits.
- Perform laboratory testing of representative soil samples obtained from the explorations to characterize engineering properties of the subsurface materials.
- Prepare this report, which includes our findings and recommendations regarding:
 - Earthwork
 - Suitability of excavated materials for reuse as fill and backfill, including compaction requirements
 - Foundation and floor slab support, including bearing capacity and settlements
 - Lateral earth pressure parameters
 - Groundwater control
 - Seismic considerations
 - Pavement design parameters

SITE CONDITIONS

Location and Surface Features

The subject property is bounded to the west by Rapp Road, to the south by Western Avenue (SR 20), to the east by commercial properties, and to the north by Crossgates Mall Road. At the time of this exploration program, the eastern portion of the COSTCO parcel was occupied by an existing residential development which included eleven one to two story homes located along Lawton Terrace, Rielton Court, Gabriel Terrace, and Tiernan Court. The western portion of the COSTCO parcel was heavily wooded including a stream/drainage ditch. An abandoned roadway is located near the western boundary of the site, parallel with Rapp Road, and includes asphalt pavement, guardrails, traffic signs, and mapped utility easements. The existing stream/drainage ditch bisects the northwestern portion of the property and includes three culverts: one below the abandoned roadway and two located at the stream's endpoints, crossing Rapp Road and Crossgates Mall Road, respectively.

Based on the referenced plans, the ground surface throughout the developed eastern portion of the COSTCO parcel is relatively flat with surface grades generally sloping gently downward from south to north ranging from elevation (EL) ± 276 feet to EL ± 282 feet. Surface grades within the western wooded areas of the property are somewhat undulating with surface grades generally sloping downward from southeast to northwest, toward the existing stream/drainage ditch, ranging from EL ± 275 feet to EL ± 287 feet. Surface grades in the northwest corner of the site abruptly slope downward from northwest to southeast, toward the stream/drainage ditch, ranging from EL ± 267.5 feet to EL ± 303 feet. Additionally, an existing berm is located along the northern boundary of the COSTCO parcel, between the residential development and Crossgates Mall Road, ranging from EL ± 280 feet to EL ± 291 feet at its highest point.

Geology

The National Resource Conservation Service (NRCS) Soil Survey indicates approximately 43% of near-surface overburden soils at the site are classified as *Elnora loamy fine sand (EnA)* which is generally described as "loamy fine sand". Approximately 30% of the near-surface soils are classified as *Granby loamy find sand (Gr)*, which is general described as loamy fine sand, which transitions from loamy fine sand to sand with depth. Approximately 23% of the near-surface soils are classified as *Colonie Loamy find sand, rolling (CoC)*, which is generally described as loamy fine

sand. A small portion of the project site (approximately 4%), in the the southwest corner, is mapped as *Stafford loamy fine sand (St)*, which is generally described as loamy fine sand to fine sand.

According to the *Geologic Map of New York (1970)* the project site is situated within the Hudson-Mohawk Lowland physiographic province and underlain by the Middle Ordovician Age Normanskill Shale (On), which is predominantly sedimentary rock consisting of clastic mudstone shale; and minor clastic mudstone & sandstone.

PROPOSED CONSTRUCTION

The proposed construction will include a 148k prototype COSTCO Wholesale store with a Liquor Pod located in the northeastern portion of the site. A truck loading dock will be provided at the northwestern corner of the store, and the trash compactor slab will be located along the northern building wall. Based on similar projects, we anticipate that the Point of Service (POS) freezer will be located within the northeastern portion of the building. A fuel facility will be located in the southwest corner of the site, which will consist of three (3) underground storage tanks (USTs), an additive tank, and three (3) fuel dispenser islands with an overhead canopy structure. At-grade parking areas, drive lanes, and landscaped islands will be provided throughout the remainder of the site. The referenced plans indicate that ingress/egress to the site is proposed from four (4) locations: two locations along Rapp Road and two locations along Gabriel Terrace.

The proposed building construction will consist of a steel frame with exterior CMU and/or metal panel walls. Typical design loads include maximum column and wall loads of 150 kips and 4.5 kips per lineal foot, respectively, total (dead and live) floor slab loads of 500 psf, and fuel canopy column loads of 50 kips.

It should be noted that proposed grading was actively being evaluated by the design team at the time of this report. Based on the referenced site plans and conversations with the design team, the site grades will generally be graded away from the proposed building which will have an estimated finished floor elevation (FFE) of EL ± 288.0 feet. As such, we anticipate nominal mass cuts and mass fills ranging up ± 8 feet on average throughout the majority of the site. Isolated fills ranging up to ± 20 feet in the area of the stream/drainage ditch in the northwestern portion of the site are anticipated. It should be noted that a retaining wall may be required in the northwestern corner

of the site, which may be as high as ± 10 feet. We anticipate confined excavations ranging up to ± 4 feet below finished grade (BFG) to construct footings at the building, up to ± 10 feet BFG to construct footings at the loading dock, and excavations up to ± 20 feet BFG for installation of the USTs. We anticipate that utility excavations will generally extend up to ± 5 feet BFG; however, due to lack of proposed utility information excavations could be deeper.

EXPLORATION AND TESTING

Subsurface Exploration Program

The subsurface exploration program included 33 Standard Penetration Test (SPT) borings (B-1 through B-33) and 13 test pit excavations (TP-1 through TP-13). ATV-mounted CME-550X drilling equipment was used to perform the borings, and the test pits were performed using a CAT 312E trackhoe and a CAT PC78 mini-trackhoe. Borings B-1 through B-21 were located within the proposed building footprint, B-22 and B-23 were located within the proposed UST field, B-24 and B-25 were located at the proposed fuel facility canopy, and B-26 through B-33 were located within proposed parking areas and drive lanes. Test Pits TP-1, TP-2, TP-3, and TP-4 were located at or near the proposed building walls, TP-5 was located near the proposed Point of Service (POS) freezer, TP-6 was located at the proposed loading dock, TP-7 was completed in the proposed fuel facility stacking lanes, and TP-8 through TP-13 were located in proposed parking areas. It should be noted that some exploration locations were offset from their planned location due to existing utility conflicts and property access constraints. The borings extended to depths ranging from ± 10 to ± 25 feet BGS and the test pit depths ranged from ± 6.5 to ± 15 feet BGS.

Maser selected the exploration locations and used hand-held GPS equipment and/or measured from existing site features using conventional taping methods to field locate each exploration. Laboratory tests were performed on representative soil samples obtained from the explorations as discussed in the *Laboratory Testing* section of this report.

The approximate locations of the explorations performed for this program are shown on Figure 2 - Exploration Location Plan in Appendix A. Example interpretations of subsurface profiles are presented on Figures 3, 4, & 5 in Appendix A. Detailed logs of the individual explorations are included in Appendix B. The descriptions provided on the logs are based on visual-manual classification of the soil samples supplemented by laboratory test data results as indicated herein.

The ground surface elevations reported on the logs were estimated from topographic contours shown on the referenced survey plan and should be considered approximate.

Subsurface Conditions

A layer of topsoil was encountered at the ground surface in 45 of the 46 explorations performed for this program, ranging in thickness from ± 2 inches to ± 10 inches, averaging ± 5.8 inches. A layer of coarse alluvial soil (stream bed), approximately 6 inches thick, was encountered at the ground surface of TP-8.

Soil identified as existing fill was encountered below the surficial layers of topsoil in 6 of the 46 explorations (B-24, TP-2, TP-6, TP-7, TP-10, and TP-12) performed for this program and extended to depths ranging from ± 1.3 to ± 4.5 feet BGS. The existing fill primarily consisted of sand with variable, but generally minor, quantities of silt and gravel. The soils appear to have originated from on-site or local sources during previous site development; however, the presence of occasional debris as well as variations in color, composition, and density suggest these materials were not placed by natural processes.

Natural soils were encountered below the topsoil or existing fill and extended to the completion depths of the explorations performed for this program. The natural soils consisted of predominantly sand with minor quantities of silt. Based on SPT 'N' values, the natural soils have in-situ densities ranging from 'very loose' to 'medium dense,' averaging 'loose.'

Groundwater

Evidence of groundwater was encountered in 23 of the 46 explorations performed for this program at depths ranging from ± 2.5 feet to ± 18.0 feet BGS. Temporary groundwater observation pipes were installed in B-13 and B-22 to obtain long-term (>24 Hr.) groundwater readings, which were recorded at ± 14.2 feet and ± 12.3 feet BGS, respectively. It should be noted that fluctuations in groundwater levels can occur due to several factors, including variations in precipitation, seasonal changes, and site development activities. A summary of the groundwater depths encountered during this exploration program is presented in the following table:

GROUNDWATER SUMMARY

Exploration	Approximate G.S. Elev.	Depth to Groundwater	Groundwater Elev.
B-1	280.5	18.0	262.5
B-2	280.5	18.0	262.5
B-3	279.6	NE	NE
B-4	279.0	NE	NE
B-5	279.4	NE	NE
B-6	279.4	18.0	261.4
B-7	280.0	18.0	262.0
B-8	280.5	NE	NE
B-9	280.5	18.0	262.5
B-10	279.5	14.3	265.2
B-11	281.0	18.0	263.0
B-12	278.0	18.0	260.0
B-13	276.4	14.2	262.2
B-14	276.7	15.0	261.7
B-15	278.0	14.0	264.0
B-16	275.3	13.0	262.3
B-17	276.7	15.0	261.7
B-18	279.0	15.0	264.0
B-19	279.3	13.0	266.3
B-20	279.5	13.0	266.5
B-21	278.8	13.0	265.8
B-22	280.0	12.3	267.7
B-23	280.8	13.0	267.8
B-24	281.7	13.0	268.7
B-25	281.8	14.0	267.8
B-26	278.1	NE	NE
B-27	277.0	9.5	267.5
B-28	277.3	NE	NE
B-29	277.0	NE	NE
B-30	276.8	NE	NE
B-31	285.3	NE	NE
B-32	274.6	NE	NE
B-33	281.7	NE	NE
TP-01	281.2	NE	NE
TP-02	280.7	NE	NE
TP-03	278.5	NE	NE
TP-04	280.3	NE	NE
TP-05	279.1	NE	NE
TP-06	276.7	NE	NE
TP-07	279.0	NE	NE
TP-08	267.5	2.5	265.0
TP-09	280.0	NE	NE

Exploration	Approximate G.S. Elev.	Depth to Groundwater	Groundwater Elev.
TP-10	281.6	NE	NE
TP-11	281.8	NE	NE
TP-12	302.5	NE	NE
TP-13	299.9	NE	NE

*Notes: NE=Not Encountered. All depth and elevation units are in feet and values are approximate.

Laboratory Testing

Representative soil samples obtained from the explorations were subjected to laboratory testing to supplement the visual classification of the soils. The testing performed for this geotechnical exploration included natural moisture contents, particle size analyses, Atterberg (liquid and plastic) limits, moisture-density (M-D) relationship, California Bearing Ratio (CBR), and topsoil testing. The following table presents a summary of the laboratory testing performed for this program, and detailed test results are included in Appendix C.

LABORATORY TESTING SUMMARY

Exploration	Approx. G.S. Elev.	Sample Depth (Elev.)	General Soil Description	Moisture Content (%)	Particle Size (% passing #200 Sieve)
B-1	280.5'	4.0' (276.5')	mf(+) SAND, trace Silt/Clay	4.6	2.2
B-3	279.6'	4.0' (275.6')	mf(+) SAND, trace Silt/Clay	2.6	2.9
B-12	278.0'	4.0' (274.0')	mf(+) SAND, trace Silt/Clay	7.0	7.7
B-13	276.4'	4.0' (272.4')	mf(+) SAND, little(-) Silt/Clay	13.6	10.2
B-18	279.0'	2.0' (277.0')	f SAND, trace Silt/Clay	9.1	7.3
B-22	280.0'	4.0' (276.0')	mf(+) SAND, trace Silt/Clay	7.1	3.4
Bulk	-	2.0' to 6.0' (N/A)	mf(+) SAND, trace Silt/Clay	3.5	9.1

A composite soil sample of near-surface soils was subjected to a M-D relationship test and a CBR test. A summary of the M-D and CBR test results are presented in the following table and detailed test results are included in Appendix C.

MOISTURE-DENSITY AND CBR SUMMARY

Sample	Maximum Dry Density	Optimum Moisture Content (%)	CBR Value (@95%MDD)
	(ASTM D-1557)		
Bulk	105.3	13.2	10

A composite of near-surface soil samples was subjected to Sulfate, Sulfide, Chloride, pH, and Redox Potential testing to evaluate corrosion potential for buried concrete and steel. Electrical Resistivity testing was not performed due to the predominantly coarse-grained texture of the site soils. A summary of the corrosion test results are presented in the following table and detailed test results are included in Appendix C.

CORROSION TESTING SUMMARY

Sample	Sulfate (mg/kg)*	Sulfide (mg/kg)**	Chloride (mg/kg)***	Redox Potential (mV)	pH	Resistivity (Ohm-cm)
Composite (B-6, B-15, B-18, B-20, B-24, B-25, B-29, B-33)	32.1	2.9	3.23	537	7.1	-

Note: *Reporting limit (RL) =6.31 mg/kg **RL=9.2 mg/kg ***RL=1.26 mg/kg

A composite sample of topsoil collected from the test pit explorations was subjected to analytical testing to evaluate organic content and essential nutrients and minerals. Detailed test results are included in Appendix C and a discussion of the test results and topsoil recommendations is presented in the *Earthwork* Section of this report.

CONCLUSIONS AND RECOMMENDATIONS

Site Developer Considerations

It is our understanding that this project will likely be constructed through cooperation with COSTCO Wholesale and a Site Developer. Typically, the Developer is responsible for performing all site work, including mass earthwork, utility installation, curbing, and pavements, as well as preparation of the building pad. It should be noted that the Developer is responsible for following and implementing the recommendations contained herein to satisfy the final Site Development

Agreement (SDA) and the relevant version of the COSTCO Wholesale Development Requirements upon which the SDA is based.

General

Based on the results of this geotechnical exploration, it is our opinion that construction of the proposed COSTCO as planned is feasible, provided the recommendations contained herein are followed and the standard level of care is maintained during construction. The following geotechnical considerations will likely impact site development costs associated with this project:

- The need to demolish the existing structures and associated site features.
- The presence of loose sandy site soils and anticipated grading will dictate building support options and construction sequencing.
 - Currently proposed grading allows construction of conventional spread footings after site settlements have mobilized; however,
 - If proposed grading is reduced or minimized, ground improvement will need to be considered for building and fuel facility support, as there is risk for excessive settlements.
- The potential to encounter groundwater in utility excavations.
- Loose natural soils below the UST field may impact installation sequencing of the USTs.
- The stream/drainage ditch area is estimated to receive fills ranging up to ± 20 feet, which will induce settlements of any structure used to carry the current flow. Ground improvement may be required at this location.

The following sections of this report provide further discussion of these issues and present our recommendations for design and construction of the subject project.

Demolition

Demolition and off-site disposal of the existing buildings and site improvements not to remain, including their below-grade components, such as foundations, utilities, and storage tanks, will be required prior to new construction activities. Should excavations to remove existing site features extend below the proposed building and pavement subgrade levels, the excavations should be backfilled with structural fill, placed and compacted in accordance with the recommendations presented in the *Fill and Backfill Materials* Section of this report.

Existing durable below-grade structural elements, such as existing foundations, may remain in-place below proposed pavement areas provided the top of the elements remain at least 3 feet below the finished pavement surface and will not interfere with subsequent underground utility installation. Existing utilities to be abandoned below proposed pavements may also remain in-place, provided they remain at least 3 feet below the finished pavement surface and are permanently sealed, if structurally intact, or otherwise in-filled with grout or flowable fill.

Earthwork

Prior to mass earthwork, the existing trees and vegetation not to remain should be cleared and topsoil should be stripped from the proposed building and pavement areas and stockpiled on-site. The thickness of topsoil encountered during this exploration program ranged from ± 2 inches to ± 10 inches, averaging ± 5.8 inches; however, it should be anticipated that the clearing and stripping operations could reduce the amount of topsoil available for reuse by as much as 50%. Based on the laboratory test results of a composite topsoil sample, the existing topsoil will need amendment to bring the topsoil properties to within COSTCO standards. The test results indicate that the topsoil has a pH of 6.50, which is in the optimal range of 6.20 – 6.80 for the growth of most ornamental shrubs and small trees that are non-acid loving. Additional calcitic limestone is not recommended for the soil. The organic matter of the tested topsoil is 2.3%; however, a minimum of 6% organic matter derived from vegetative compost is required. It is recommended that a minimum of 4 cubic feet of organic vegetative compost be blended with the topsoil for every 100 square feet of topsoil area. After the organic material has been blended into the topsoil, the pH of the topsoil should be retested to ensure the pH remains within the recommended optimal range. A 1-0-1 fertilizer, which represents the fertilizer's relative amounts of nitrogen (N), phosphorus as P_2O_5 , and potassium as K_2O , should be mixed into the top 6 to 8 inches of topsoil.

We anticipate that nominal mass cuts less than 2 feet and mass fills ranging up to ± 8 feet will be required to achieve proposed site grades in areas outside of the existing stream/drainage ditch. Fill within the existing stream/drainage ditch is anticipated to range up to ± 20 feet. We also anticipate an isolated cut ranging up to ± 10 feet in the northwestern corner of the site to facilitate the construction of a retaining wall which is discussed in the Retaining Wall section of this report. It should be noted that due to the loose natural soils, settlement will occur throughout the site as a result of the proposed fill, see the *Site Settlements* section of this report for detail.

Following demolition, clearing, and stripping operations, subgrade soils exposed in proposed areas to remain at-grade or receive fill should be compacted by several passes with a minimum 10-ton roller and proof-rolled with a loaded tandem-axle dump truck under the observation of the geotechnical engineer. Other proof-rolling methods may be deemed appropriate by the geotechnical engineer depending on the prevailing weather and subgrade conditions at the time earthwork is performed. Any subgrade areas that are observed to be soft, loose, or otherwise unstable during proof-rolling operations should be selectively excavated under the direct observation of the geotechnical engineer and replaced with structural fill, placed and compacted in accordance with the *Fill and Backfill Materials* Section of this report. To the extent possible, construction traffic should travel in designated areas to prevent widespread destabilization of the surface soils. In areas of heavy construction traffic, the use of 8 inches of crushed stone over a layer of geogrid and filter fabric may be prudent to protect the subgrade and provide a stabilized base for the transport of construction equipment. If possible, peak earthwork activities should be scheduled for the drier summer months, which will limit the amount of precipitation that the soils are exposed to and will provide better opportunity to air-dry soils which are too moist.

All construction excavations should be sloped or shored in compliance with current OSHA excavation regulations and any local governing safety codes. We anticipate that the site soils will be classified as “Type C” soils per OSHA criteria. However, excavation stability and corresponding side slopes and/or support requirements should be evaluated by a qualified professional at the time of construction and should take into consideration the adverse impacts of groundwater seepage, if encountered. Permanent slopes should be designed no steeper than 3H:1V (three horizontal to one vertical).

Fill and Backfill Materials

Due to the extensive fills required at this site, it is anticipated that minimal excavated site soils will be available for re-use as compacted structural fill. Of the soils that are excavated, the majority will consist primarily of granular soil and will be suitable for re-use as compacted structured fill, provided they are screened of any large and/or deleterious debris fragments. Although the site soils are predominantly granular, excavated soils left unprotected during precipitation events can become unsuitable for compaction. As such, depending on the prevailing weather conditions at the time earthwork is performed, moisture conditioning of the excavated soils

may be required prior to their reuse as fill or backfill. If air-drying of the soil is not possible due to precipitation and/or colder temperatures, or if the project schedule cannot accommodate the time required for air-drying of the soil, it should be anticipated that unsuitable soils will need to be exported from the site and suitable structural fill materials will need to be imported. Consideration should be given to placing tarps or similar protective cover over stockpiles prior to precipitation events to help reduce the amount of moisture conditioning and/or soil amendment that may be required prior to reuse.

If imported material is required for use as structural fill, the material should consist of well-graded predominantly granular material conforming to COSTCO specifications and be tested and approved by the geotechnical engineer prior to use. If open-graded stone is used for structural fill or backfill, the stone should be completely separated from surrounding soils with geotextile filter fabric to prevent particle migration. The maximum particle size of material used in structural fill should be limited to 6 inches for mass fills and 3 inches in the vicinity of utilities, wall backfill, and the upper 2 feet of the subgrade.

Fill materials supporting loads from buildings and pavements is considered structural fill and should be installed under the observation of the geotechnical engineer. Mass structural fill can be placed in lifts ranging up to 12 inches in loose thickness and compacted using a smooth drum roller. Backfill placed in confined areas, such as utility and foundation excavations, should be spread in thinner layers and compacted using the largest equipment possible without damaging the utilities or compromising the subgrade soils. Backfill placed within 3 feet of below-grade walls or retaining walls should be compacted with manually operated compaction equipment. Fill and backfill should be compacted to the following minimum requirements:

COMPACTION REQUIREMENTS

Location	Percent of Maximum Dry Density (ASTM D-1557)
Structural fill below foundations, floor slabs, and pavements	95%
Backfill for retaining walls, below-grade walls, and utility trenches	92%
General fill for landscaped and other non-structural areas	90%

The 2015 IBC requires that subgrades to receive fill should be evaluated for stability by the geotechnical engineer, and compactive effort for each lift of fill should be verified by in-place density testing prior to placement of subsequent lifts. Adjustments to the lift thickness and/or compaction equipment may be required, as directed by the geotechnical engineer, based on prevailing weather conditions at the time of fill placement and performance of the compacted soils.

Site Settlements

As previously stated, up to ± 8 feet of structural fill is currently expected to achieve the proposed site grades; however, fills up to ± 20 feet are expected in the stream/drainage ditch area, based on our conversations with the design team. It should be noted that grading is still in progress and the recommendations herein should be reevaluated if proposed grading deviates substantially from what is anticipated in this report. Based on preliminary calculations, total site settlements are estimated to range up to ± 3 inches and settlements at the stream/drainage ditch area could range up to ± 8 inches but is difficult to predict. The settlement that will occur will be immediate due to the coarse-grained nature of the site soils. As such, we do not anticipate a waiting period for site settlements to occur but we recommend that utility installation not commence until mass filling operations have been completed. It should be noted that we anticipate marginal settlements due to liquefaction.

Surface Water and Groundwater Control

Evidence of groundwater was encountered in 23 of the 48 explorations performed for this program. Groundwater was generally encountered at an average EL of ± 264.2 feet and will be approximately 24 feet below finished grade (BFS). A test pit, TP-8, was performed near the referenced stream and encountered groundwater at EL ± 265.0 feet. Groundwater encountered at the fuel facility ranged from EL ± 267.7 feet to EL ± 268.7 feet with a 24-hr reading measured at B-24 at EL ± 267.7 feet. Since the building is anticipated to be established at EL ± 288.0 feet, within structural fill, it is anticipated that perimeter foundation drains will not be required for the building.

Based on groundwater levels encountered and the anticipated mass fill, it is expected that groundwater should not be a significant problem during mass earthwork activities in most areas of the site. However, it should be anticipated that groundwater may impact structural fill placement in the stream/drainage ditch area. At this time, we anticipate that a concrete culvert will be utilized to

maintain the stream's current path, see *Stream/Drainage Ditch* section of this report for additional detail. It should also be anticipated that seepage could be encountered in excavations for the proposed USTs. Particularly following periods of precipitation or snowmelt, it is possible that seepage of water perched or trapped atop relatively impermeable soil layers, or emanating from within relatively porous zones, may occur in open excavations. It is expected that such seepage can be controlled by pumping from sumps located within the excavations. Sump pits should be lined with geotextile filter fabric and filled with minimum ¾-inch clean stone to prevent soil migration. Pumped water should be discharged away from the building pad and open excavations.

Surface grading should be maintained on a continual basis during construction to direct surface water runoff away from open excavations and prevent water from pooling on subgrade soils. Subgrade soils should be roller compacted daily to seal the ground surface and inhibit infiltration of rain water, which could otherwise result in significant destabilization of the subgrade. The contract documents should require the contractor to provide whatever means and methods are necessary to maintain stable excavations and subgrade conditions at all times during construction.

It is assumed that the fuel facility will be established at a similar grade as the proposed building (EL ±288.0 feet). UST excavations typically extend to depths ranging up to ±20 feet BFG and since groundwater was encountered at an average EL of ±268.0 feet in the proposed UST field, groundwater is not expected to be a significant issue. However, this is based on assumed grading and should be reevaluated after grading has been finalized. Depending on final site grades, the proposed UST excavation will be established at or near the observed groundwater level. As such, if less than 2 feet of water is present above the bottom of the UST field it can likely be controlled by sump pumps as described above. If greater than 2 feet of groundwater is present above the bottom of the proposed UST field, temporary dewatering measures may be required to install the USTs, which may include the use of high capacity pumps. The UST design should incorporate tie-down straps to account for buoyant uplift pressures on the tanks if final grading resets in tank invert EL below the observed groundwater levels. See the *Fuel Facility* section of this report for additional detail.

Frost Considerations

Due to the regional climate of the project site, we recommend the use of finger drains and pavement underdrains in accordance with COSTCO's cold climate standard details. Finger drains

should be installed on each side of catch basins in pavement areas and should consist of minimum 4-inch diameter perforated pipe surrounded by at least 6 inches of clean stone, and the stone should be wrapped in geotextile filter fabric. The finger drain pipes should penetrate the catch basin and extend a minimum of 15 feet from the catch basins. The finger drains should be located deep enough to allow construction of the full pavement section above, including the aggregate subbase layer. Pavement underdrains should be provided at the interface of flush asphalt and concrete flatwork. The underdrains should consist of pipe, stone, and fabric, similar to the finger drains; however, the underdrains should be a minimum of 2 feet wide and extend a minimum of 3 feet below finished surface grades.

Subsurface Utilities

The natural soils and new structural fill materials will be suitable for support of subsurface utilities. However, should unsuitable soils be encountered at the utility invert levels, the subgrade should be over-excavated a minimum depth of 6 inches and backfilled with well-graded granular material to provide uniform support. Utility excavations should be backfilled using structural fill, placed and compacted in accordance with the *Fill and Backfill Materials* section of this report. It should be noted that based on anticipated grades and associated site settlements, utility construction should not commence until site settlements are complete.

Stream/Drainage Ditch

As previously stated, the flow of water referenced stream/drainage ditch is expected to be carried with a concrete box in the culvert. The stream/drainage ditch is underlain by the same loose fine sand mentioned previously and this area will receive structural fill ranging up to ± 20.0 feet to achieve site grades. Settlements within this area are estimated to range up to ± 8.0 inches in magnitude due to the weight of the new fill. If it is not feasible to relocate the culvert to an area that will receive less fill, ground improvement prior to construction of the culvert should be anticipated. We recommend Rapid Impact Compaction along the proposed culvert as likely the most feasible and cost-effective option. Other methods were eliminated from further consideration due to cost and/or feasibility.

Corrosion Potential

Samples of the overburden soils were tested to evaluate the potential for corrosion of ductile iron, steel, or concrete that will be in direct contact with the soils. The samples were tested for pH,

Redox Potential, Chloride, Sulfides, and Sulfate. The test results indicate that the soils have low potential for corrosion to ductile iron and steel in accordance with AWWA C105 Appendix A. Based on the Sulfate test results and ACI 318, the risk for sulfate attack on concrete is negligible; as such, Type I Portland cement is recommended for mix design, per COSTCO specifications. A summary of the test results is presented in the *Laboratory Testing* section of this report and detailed test results are presented in Appendix C.

Foundations

Based on the results of this study and the anticipated grades, it is our opinion that the proposed building and fuel canopy can be supported by conventional shallow spread footings established in new compacted structural fill. Based on the design loads, and provided the earthwork recommendations contained herein are followed, foundations can be designed for a maximum allowable net bearing pressure of 3,000 psf.

It should be noted that should proposed grading deviate from the understandings stated in this report and the height of fill required to achieve the proposed site grades are reduced, alternate building support options may be required, such as reducing the bearing capacity or utilizing ground improvement techniques. We have detailed some of the potential alternate building support options in the *Foundation/Building Support Options* section of this report.

Subgrade soils exposed in foundation excavations should be evaluated by the geotechnical engineer prior to placement of structural fill, reinforcing steel, or concrete, to confirm stability of the subgrade materials and verify adequate bearing exists. The evaluation should consist of proof-rolling and compacting the subgrade soils with the largest practical equipment and observation or testing as deemed necessary by the geotechnical engineer. Any subgrade soils that are determined to be soft, loose, wet, or otherwise unstable should be selectively excavated and replaced with structural fill, placed and compacted in accordance with the recommendations presented in the *Fill and Backfill Materials* section of this report.

The bottom of exterior foundations should be established at least 48 inches below finished grade or deeper if required by the local building code, to provide protection from frost action.

Interior foundations in permanently heated portions of the building may be established at convenient depths below the floor slab that will not interfere with subsequent floor slab construction.

The minimum dimensions of continuous and isolated footings should be 24 inches and 36 inches, respectively, to prevent a punching-type shear failure regardless of the actual applied bearing pressure. Based on the structural loads, total settlements of less than 1 inch and differential settlements of less than ½ inch can be anticipated for footings established on new compacted structural fill.

Unless foundation construction proceeds within 24 hours of foundation subgrade preparation, including approval by the geotechnical engineer, subgrades should be protected from the elements to reduce exposure and potential weakening of the subgrade materials, particularly if precipitation or freezing temperatures are expected prior to foundation construction. Preventative measures such as placing a lean concrete “mud mat” on the subgrade or providing suitable cover for the excavations may be considered appropriate, depending on the prevailing weather conditions. Foundation excavations should be protected from frost and water infiltration until the foundations have been constructed and backfilled.

Floor Slab

It is our opinion that the proposed floor slab can be constructed as a slab-on-grade. Based on the anticipated finished floor level, it is anticipated that the floor slab will be supported by newly compacted structural fill. As such, we recommend the floor slab be designed assuming a Modulus of Subgrade Reaction of 150 pounds per cubic inch. Given that the floor slab will be supported by soil with a minimum allowable bearing pressure of 3,000 psf, steel reinforcement within the slab should not be required; however, the project structural engineer should provide specific reinforcement recommendations for the slab if necessary.

It should be noted that if proposed grading deviates from the understandings stated in this report and the height of fill required to achieve the proposed site grades are reduced, reinforcement of the floor slab may be required. Reinforcement will be dictated by the method of building support selected and is detailed in the *Foundation/Building Support Options* section of this report.

Areas of the floor slab to remain at grade or receive fill should be compacted and proof-rolled under the direct observation of the geotechnical engineer to evaluate stability. Any areas that are determined to be unstable should be selectively excavated and replaced. Fills required to achieve the proposed floor slab subgrade level should consist of structural fill that is placed and compacted in accordance with the *Fill and Backfill Materials* section of this report.

We recommend a minimum 6-inch thick bedding of free-draining aggregate be placed below the floor slab in accordance with COSTCO criteria to interrupt the rise of capillary moisture through the slab and allow for proper curing of the concrete. The floor slab may bear on footing projections; however, control joints should be provided at the slab and wall/column interfaces to reduce the potential for slab cracking, should the building settle differentially from the floor slab.

Foundation/Building Support Options

As previously discussed herein, if the height of structural fill is reduced to less than ± 3 feet, the risk increases for excessive foundation settlement and slab cracking without taking preventative measures. The risk is due to the presence of the loose sands as they are susceptible to significant settlements from applied loads. Such measures should consist of either reducing the design bearing capacity or employing a ground improvement method.

Since reducing the bearing capacity will result in increased costs to standard construction, i.e. larger footings and reinforced slab, ground improvement should be considered. Ground improvement in general will densify the loose sands, minimize settlement risk, minimize liquefaction potential, and allow for standard construction methods.

As such, the following table summarizes the various ground improvement methods we considered, as well as conventional spread footings and slab-on-grade designed for a reduced bearing capacity. Again, these options are based on the potential scenario that proposed grading will result in fill heights of generally less than 3 feet.

BUILDING SUPPORT OPTIONS

Option	Feasible?	Risk	Pros	Cons
Spread Ftgs and Slab-on-grade on unimproved ground w/ lower bearing capacity	Yes	Moderate to High	-Least expensive initial cost	-Significant risk of excessive settlements -Additional costs associated with reinforced slab and larger footings. -Does not minimize liquefaction potential.
Spread Footings and Floor Slab on improved ground via surcharge	Yes	Low	-No specialty equipment / subcontractors required -Maintain conventional spread footing foundation approach -Minimizes liquefaction potential.	-Time impacts to schedule -Cost to import/export fill and instrumentation
Spread Footings and Floor Slab on improved ground via deep dynamic compaction (DDC) or Rapid Impact Compaction (RIC)	Yes	Low	-Densifies soils in place. -Predictable construction schedule. -Minimizes liquefaction potential.	-Vibrations near existing building & highway infrastructure -Limited depth of soil improvement
Conv. Ftgs on improved ground via Rammed Aggregate Piers (RAP) or vibrocompaction	Yes	Low	-Improved soil bearing capacity -Maintain spread footing approach -Fast installation time -Minimizes liquefaction potential.	-Vibrations near existing building & highway infrastructure

It should be noted that designing conventional spread footings with slab-on-grade is possible by reducing the design bearing capacity to minimize settlements but may not be a cost-effective option when compared to some of the ground improvement methods detailed herein. As such, it is our opinion that conventional spread footings on improved ground via DDC/RIC or surcharge are likely the most cost-effective options that introduce the least amount of risk, pending evaluation of costs associated with import/handling of surcharge soil.

The next most cost-effective ground improvement option would likely be RAPs or vibrocompaction. It is our opinion that RAPs or vibrocompaction are viable options but will likely be the most expensive options. It should be noted that other ground improvement techniques as well as deep foundations were eliminated from further consideration, as they will likely not be cost effective. As such, the following sections of this report detail the options for building as summarized in the preceding table.

Reduced Bearing Capacity Considerations

If reducing the soil bearing capacity is considered, we recommend designing for 2,000 psf for the footings at the building and fuel facility to control settlements. A reduction of the bearing capacity will generally result in larger footings, additional reinforcement of the foundations, additional concrete, and reinforcement of concrete slab-on-grade. It is our opinion that a reduction of the bearing capacity will control settlements to within tolerable limits of 1 inch total and ½-inch differential. Refer to the *Foundations* section of this report for additional detail if necessary.

The proposed concrete slab-on-grade can be constructed on unimproved ground on natural site soils; however, we recommend the floor slab be designed assuming a Modulus of Subgrade Reaction of 40 pounds per cubic inch (pci). Given that the floor slab will be supported by soil with an allowable bearing pressure of 2,000 psf, steel reinforcement within the slab will be required. The project structural engineer should provide specific reinforcement recommendations for the slab. Refer to the *Floor Slab* section of this report for additional detail if necessary.

Ground Improvement via DDC/RIC

DDC involves dropping a heavy weight from a crane repeatedly on the ground surface over a pre-determined grid pattern to densify the soils in-place. This method of ground improvement can be effective to depths ranging up to 30 feet BGS, depending on groundwater levels, soil type, and the weight and height of drop. The depth to groundwater at this site will minimize the effectiveness of the ground improvement.

The DDC program should consist of two (2) passes with drop points on a predetermined grid pattern. The second pass should be, centrally offset between the drop points of the first pass. A third and final “ironing” pass may be required depending on the performance of the first two passes. The ironing pass should consist of overlapping drop points to create a smooth surface. It should be noted

that the DDC program will result in a net lowered ground surface elevation, which could range up to 24 inches. Any material required to restore subgrade elevations during or after the DDC program should consist of previously approved granular structural fill. It should be noted that all aspects of the DDC program can be adjusted in the field at the time of construction based on performance of the soils, including number of drops, height of drops, and location of drop points. For preliminary planning purposes, we recommend designing spread footings supported by DDC improved ground for a maximum allowable net bearing pressure of 3,000 psf.

RIC consists of a similar procedure to DDC; however, RIC uses a smaller excavator-mounted compaction hammer dropped from a lower height at a higher frequency. The advantages of RIC include smaller, more mobile, equipment and lower ground vibrations than a DDC program. The disadvantages include a smaller grid pattern and lesser densification of the soils in-place.

Ground Improvement via Surcharge

Surcharging the building pad and fuel facility area will pre-load the loose natural soils and allow for construction of conventional shallow spread footings.

Settlement plates will need to be installed prior to construction of surcharge piles and monitored during and following placement of the surcharge to determine when removal of the surcharge can be coordinated.

It is expected the settlements will be elastic in nature and occur during or shortly after load application. The maximum surcharge time is estimated to be less than 30 days. As such, a phased approach could be considered to limit the volume of surcharge material required.

Surcharge piles should be constructed with structural fill compacted to a minimum of 95% of maximum dry density because portions of the surcharge will likely remain in-place to support the proposed floor slab depending on the final site grades. For preliminary planning purposes, we recommend designing spread

footings supported by surcharge improved ground for a maximum allowable net bearing pressure of 3,000 psf.

Ground Improvement via Vibrocompaction or RAPs

Vibrocompaction involves the use of a vibrator hung from a crane which is lowered into the soil under its own weight and vibrated into the ground in a pre-determined grid pattern. Penetration can be aided by water jets integrated within the vibrator. The vibrator is lowered to the target depth/bottom of the zone of treatment and raised and lowered in successive lifts. The ground surface will be lowered during the vibration process as the soils densify and structural fill can be added during the vibration process to maintain current grades if necessary. The treated soil will have improved density, friction angle, and overall stiffness.

Spacing can range from 6 feet to 14 feet on-center in square or triangular spacing. Zone of treatment is typically from 15 feet to 50 feet BGS. Design bearing pressures generally range from 5,000 to 10,000 psf, resulting in decreased footing sizes. For preliminary planning purposes, we recommend designing spread footings supported by vibrocompaction for a maximum allowable net bearing pressure of 5,000 psf.

RAPs consist of drilling or driving a 2 to 3 foot diameter hole in the ground and backfilling the hole with successive lifts of gravel that are compacted with a tapered down-hole ram. This ground improvement method creates stiffened columns and improves the overall soil mass by densifying the soils surrounding the columns. RAPs are generally feasible and cost effective to depths of 35 feet BGS. For this project, we estimate RAP depths of approximately 12 to 15 feet BGS.

There are two methods of RAP installation, including replacement and displacement. The replacement method consists of drilling the hole with an auger and replacing the excavated soil with compacted gravel. Shallow groundwater can be problematic for the replacement method as an open hole must be maintained after removal of the auger to allow placement of the gravel backfill. Additionally, a significant volume of spoil material can be generated depending on the total

number of RAPs installed. The displacement method provides a solution for both of these issues by driving a specially designed tamper foot and mandrel into the ground using static and dynamic energy. The tamper foot used to create the hole displaces the soils downward and laterally resulting in no spoils. Gravel is then transferred to the bottom of the hole through the hollow mandrel, eliminating the need to maintain an open hole. Considering the shallow groundwater at this site and cost implications of exporting spoil materials, the displacement method is considered the most cost-effective method of RAP installation for this site.

RAPs will bring total and differential settlements within tolerable levels across the site and will allow design of conventional shallow spread footings for bearing pressures ranging from 5,000 to 10,000 pounds per square foot (psf), resulting in decreased footing sizes. For preliminary planning purposes, we recommend designing spread footings supported by RAPs for a maximum allowable net bearing pressure of 5,000 psf.

RAPs can also be designed to resist uplift from seismic or wind loads acting on the canopy and pylon sign structures. Uplift resistance is achieved by installing anchors within the RAP element, which are then structurally connected to the footings. RAPs can support tensile loads of up to 75 kips; however, the RAP designer should establish uplift capacities for this project.

RAPs should be installed prior to installation of new subsurface utilities to prevent potential vibration induced damage from the RAP installation process.

A modulus test and uplift load test should be performed on at least one non-production RAP in general accordance with ASTM D-1143 and ASTM D-3689, respectively. Additionally, a representative number of RAPs designated by the designer should be subjected to bottom stabilization verification testing, and dynamic cone penetrometer testing (ASTM STP-399) within the upper 1/3 of the RAP shaft length. The geotechnical engineer should provide full-time observation and quality control testing during installation and load-testing of the

RAPs. The RAP system should be designed and installed by a qualified design-build contractor.

Seismic Considerations

New structures must be designed in accordance with the 2015 International Building Code Section 1613 - Earthquake Loads. The site classification for the seismic design is determined by the properties of the soil profile within a depth of 100 feet of the ground surface. Based on the results of this exploration program, information contained in the Code, and our local experience, we recommend that the building be designed assuming a Site Class D – Stiff Soil Profile. The following table presents corresponding seismic design parameters.

SEISMIC DESIGN PARAMETERS

Parameter	0.2-Second Period	1.0-Second Period
Mapped Spectral Response Acceleration (S_S/S_1)	0.183g	0.070g
Site Coefficient (F_a/F_v)	1.600	2.400
Maximum Considered Spectral Response Acceleration (S_{MS}/S_{M1})	0.293g	0.168g
Design Spectral Response Acceleration (S_{DS}/S_{D1})	0.195g	0.112g

Lateral Earth Pressure Parameters

The predominantly granular excavated site soils or imported well-graded granular soils are well-suited for backfill of below-grade walls. Imported fill materials containing elevated fine-grained (silt and clay) soil content is not well-suited as backfill of below-grade walls or within the reinforced zone of segmental block retaining walls and should be avoided. These soils will be sensitive to moisture-related compaction problems and their inherently poor drainage characteristics typically result in hydrostatic pressures exerted on the back-face of walls. The maximum particle size in wall backfill materials should be limited to 3 inches, and the backfill should be free of deleterious matter and debris. Retaining walls should be designed with a zone of free-draining material directly behind the back face of the wall to prevent the buildup of hydrostatic pressures, and include discharge channels, such as weep holes to direct drainage away from the wall. Walls constructed in cut areas should be designed with back drainage to intercept seepage that may occur from the excavated soil face. Recommended soil parameters for design of below-grade walls and retaining walls are presented in the following table.

LATERAL EARTH PRESSURE PARAMETERS

	Existing Fill	Natural Soil	Granular Structural Fill
In-Situ Moist Unit Weight (pcf)	115	100	n/a
Compacted Moist Unit Weight (pcf)	120	105	140
Angle of Internal Friction (ϕ, degrees)	32	30	36
Coeff. of Friction at Base (Concrete on Soil)	0.3	0.3	0.8

*These values are based on industry standard empirical correlations w/ SPT N-values, soil parameters should be verified prior to final design of structures.

Walls restrained from lateral movement at the top of the wall and/or intermediate points should be designed using the at-rest earth pressure coefficient. Walls that are not restrained from lateral displacement (free to rotate) should be designed using active earth pressure coefficients. We recommend that passive earth pressures be omitted from the wall designs. Surcharge loads imposed by sloping backfill, pavements, terraced walls, material stockpiles, construction equipment, etc. must be considered in the wall designs. Retaining wall design should consider internal stability and external global stability at all critical stages during and following construction. Retaining walls should be designed assuming a maximum allowable net bearing pressure of 3,000 psf on improved ground and 2,000 psf on unimproved ground.

Light pole bases can be designed assuming a maximum allowable lateral soil pressure of 150 psf per foot of base depth below the ground surface in addition to a coefficient of lateral sliding resistance of 0.25 at the contact between the pole base and subgrade materials.

As previously stated, a retaining wall is likely required in the northwestern corner of the site. We understand that the wall may be up to ± 10 feet in height and cut into the existing slope in that portion of the site. The predominately granular excavated natural soils will be suitable for reuse as backfill of retaining walls, provided they are screened of any large and/or deleterious materials.

At the time of this exploration program, the dimensions and type of retaining wall system had not been selected. Depending on final grades and site layout, a traditional reinforced segmented

block wall is possible; however, the disturbed area for the reinforced zone will impact the Rapp Road embankment at that location and needs to be considered in the design. A cast-in-place concrete wall or soldier pile wall may also be feasible and will have a smaller relative footprint area.

Pavements

Prior to new pavement construction, the pavement subgrade should be compacted with a minimum 10-ton vibratory compactor, and proof-rolled with a loaded tandem-axle dump truck under the observation of the geotechnical engineer to evaluate stability. Any subgrade materials that are observed to be soft, loose, wet, or otherwise unstable should be selectively excavated and replaced with compacted structural fill or granular subbase material. It should be noted that site settlements should be complete before pavement construction begins

Standard and heavy-duty pavement sections were designed based on the traffic loading criteria specified in the COSTCO Wholesale Development Requirements. As such, the design incorporates a 20-year service life, 30 five-axle trucks per day, and 6,600 cars per day. The CBR test results indicate a CBR value of ± 10 when compacted to 95% of maximum dry density per ASTM D1557. Based on these design parameters, the following tables present recommended minimum sections for flexible and rigid pavements:

FLEXIBLE ASPHALT PAVEMENT

Material	Standard Duty (inches)	Heavy Duty (inches)
Wearing Course	2.0	2.0
Base Course	2.5	4.0
Aggregate Subbase	6.0	6.0

RIGID CONCRETE PAVEMENT

Material	Heavy-Duty (inches)
4,000 psi Reinforced Concrete	6.0
Aggregate Subbase	6.0

The flexible asphalt and rigid concrete pavement materials and construction procedures should meet the requirements of the COSTCO Master Specifications Section 321216 and 321313, respectively. The asphalt wearing and binder course mix designs and placement methods should conform to local and state (NYSDOT) regulations. Asphalt pavements with up to 20% RAP should

be constructed with Performance Grade Binder Oil with a rating of PG64-22. Asphalt pavements with between 20% and 30% RAP should be constructed with Performance Grade Binder Oil with a rating of PG58-28. The subbase material should meet the requirements of NYSDOT Construction and Materials Standard Specifications - Subbase Course. We recommend that rigid concrete pavements be reinforced with minimum No. 3 bars at 18 inches on-center, each way. These recommended pavement sections may be subject to municipal approval.

Fuel Facility

As previously stated, the fuel facility will be located in the southwest corner of the site, which will consist of three (3) USTs, an additive tank, and three (3) fuel dispenser islands with an overhead canopy structure. As stated in the *Foundations* section of this report, the proposed fuel canopy can be supported by conventional shallow spread footings established in new compacted structural fill. As such, the foundations at the proposed fuel canopy should be designed for a maximum allowable net bearing pressure of 3,000 psf on improved ground and 2,000 psf on unimproved ground.

The proposed canopy slab and UST slab should conform to the rigid concrete pavement section provided in the *Pavements* section of this report. The proposed canopy slab and UST slab can be constructed as a slabs-on-grade on structural fill and designed assuming a Modulus of Subgrade Reaction of 150 pci. The concrete slabs at the fuel facility are typically reinforced and should be evaluated by the structural engineer for the specific reinforcement schedule.

Underground Storage Tanks (USTs)

As previously stated, there will be three (3) USTs and an additive tank installed within the UST field. The UST field excavation typically extends up to ± 20 feet BFG and is often 60 feet by 60 feet in size. As stated in the *Fill and Backfill Materials* section of this report, the natural soils excavated from the UST field will be suitable for reuse as structural fill.

The UST bedding and backfill should consist of 'pea gravel' or predominantly granular material with a maximum particle size of 1/2-inch and contain no more than 5% of material passing the No. 8 sieve, unless otherwise specified by the tank manufacturer. We recommend the UST bedding and backfill material be separated from surrounding soils with a geotextile filter fabric. The fabric will reduce the potential for particle migration, while maintaining subsurface drainage.

Particle migration could result in development of concentrated point loads on the tanks, loss of support below the tanks, and/or propagate upward resulting in loss of support for adjacent utility lines or the surficial concrete slabs.

Groundwater was encountered at the gas station at depths ranging from ± 12.3 to ± 14.0 feet BGS (EL ± 267.7 feet to EL ± 268.7 feet) with a 24-hr reading measured at B-24 at ± 12.3 feet. It should be anticipated that seepage could be encountered in excavations for the proposed USTs. Depending on final site grades, it is likely that a portion of the proposed UST field may be established below the groundwater level. As such, if less than 2 feet of water is present above the bottom of the UST field it can likely be controlled by sump pumps as described above. If greater than 2 feet of groundwater is present above the proposed UST field, temporary dewatering measures may be required to install the USTs, which may include the use of high capacity pumps. The UST design will also require tie-down straps to account for buoyant uplift pressures on the tanks.

Particularly following periods of precipitation or snowmelt, it is possible that seepage of water perched or trapped atop relatively impermeable soil layers, or emanating from within relatively porous zones, may occur in the UST excavations. It is expected that such seepage can be controlled by pumping from sumps located within the excavations. Sump pits should be lined with geotextile filter fabric and filled with minimum $\frac{3}{4}$ -inch clean stone to prevent soil migration. Pumped water should be discharged away from the canopy pad and open excavations.

Given the limited groundwater expected in the UST excavation, we recommend a dry-set. However, if wet-set construction methods will be utilized, some of the primary challenges associated with a wet-set installation are as follows:

- After excavation, it is difficult to confirm that a uniform subgrade level has been established below the groundwater level.
- The stability of the subgrade soils cannot be visually or physically evaluated.
- The excavation process will loosen the saturated granular subgrade soils, which will reconsolidate as the bedding stone, tanks, and backfill are placed, potentially causing the tanks to settle.
- The required overlap of the fabric that lines the excavation cannot be confirmed below the groundwater level.

- Compaction/consolidation of the bedding and backfill materials below the groundwater level cannot be performed using conventional compaction methods, nor can compaction levels be confirmed.

Most of these logistic challenges should be addressed by construction means and methods; however, if there are concerns, pre-loading the subgrade soils could be considered. Pre-loading the subgrade soils would entail installation of the temporary sheet piles, lining the excavation with fabric, and placing all of the pea-gravel intended for bedding and backfill of the USTs. Based on the volume differential without the tanks in the hole, we estimate this will allow the excavation to be filled with 12 to 14 feet of pea gravel. It should be noted that the entire excavation does not have to be filled to the top because the net differential loading between the excavated soils and the available pea gravel is accounted for by the lower unit weight of the tanks when filled with fuel.

Due to the granular soils below the UST excavation, it is expected that any reconsolidation settlements will be elastic and should occur effectively immediately upon placing the pea gravel. However, consideration should be given to installing at least one settlement plate prior to placing the pre-load pea gravel to monitor reconsolidation and establish when the pea gravel can be removed and installation of the tanks can begin.

After reconsolidation, the excess pea gravel can then be removed to the tank subgrade elevation and the deadmen and tanks can be set and the excavation backfilled. Care should be exercised when excavating the pea gravel to not disturb the liner fabric. Given that the manufacturer requires a minimum of 18 inches of pea gravel bedding for a wet-set, this should not be a significant logistic concern, but still to be cautious of nonetheless.

The benefits of pre-loading are that it will reconsolidate the disturbed subgrade soils, provide a more uniform bearing surface, and any net settlements expected from the proposed complete UST system will have occurred due to the weight of the pea gravel.

Environmental Considerations

We understand that an environmental due diligence process is being conducted by others. Environmental considerations have not been taken into account during this investigation.

Geophysical Considerations

At the time of this report, a geophysical study is planned to be completed at the site and will be conducted by this office and submitted under separate cover at a later date. This report will be reevaluated, as necessary, based on the results of that study.

LIMITATIONS

This geotechnical exploration has been performed in accordance with the COSTCO Wholesale Development Requirements Version 2016 dated September 19, 2016 and generally accepted engineering practice. This report and all supporting documentation have been prepared exclusively for the use of COSTCO Wholesale (COSTCO) pursuant to the Agreement between Maser Consulting P.A. (Maser) and COSTCO. All provisions set forth in the Agreement and the General Terms and Conditions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein.

The findings, conclusions, and recommendations contained in this report are based on data revealed by limited exploration and testing of the subsurface at the referenced project site. The explorations indicate subsurface conditions at the specific locations, depths, and times explored. Should deviations from the described subsurface conditions be encountered at any time prior to or during construction, Maser should be notified to determine whether the findings necessitate modification of our recommendations.

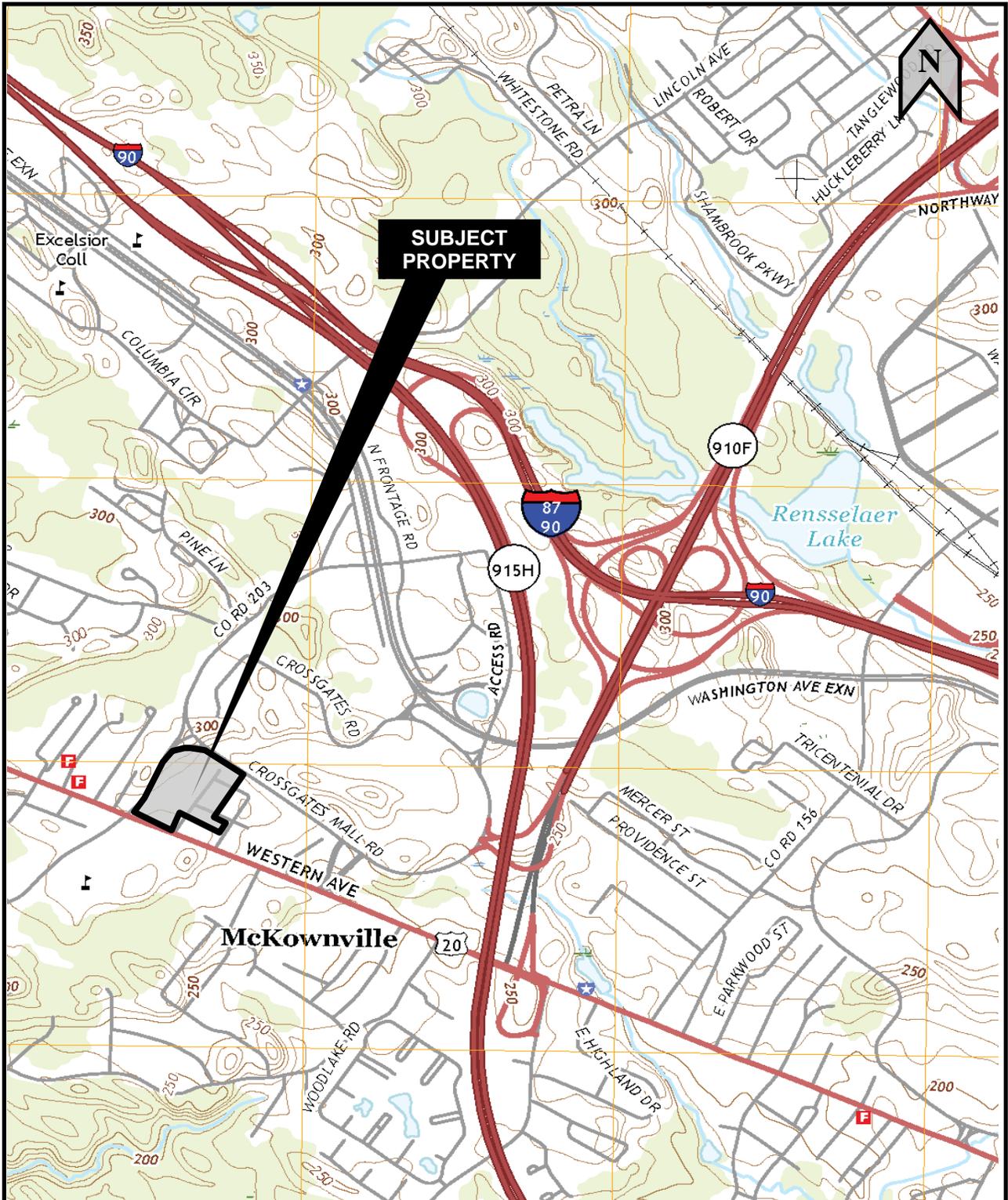
This report is applicable only to the contemplated site design described herein; any changes in the design should be brought to our attention so that we may evaluate whether our recommendations will be affected. Maser is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Maser. As such, the conclusions and recommendations contained in this report are pending our review of final plans and specifications, and verification of subsurface conditions by direct observation at the time of construction.

This report and supporting documentation are instruments of service. The subject matter of this report is limited to the facts and matters stated herein.

The scope of this geotechnical exploration did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

APPENDIX A

(FIGURES)



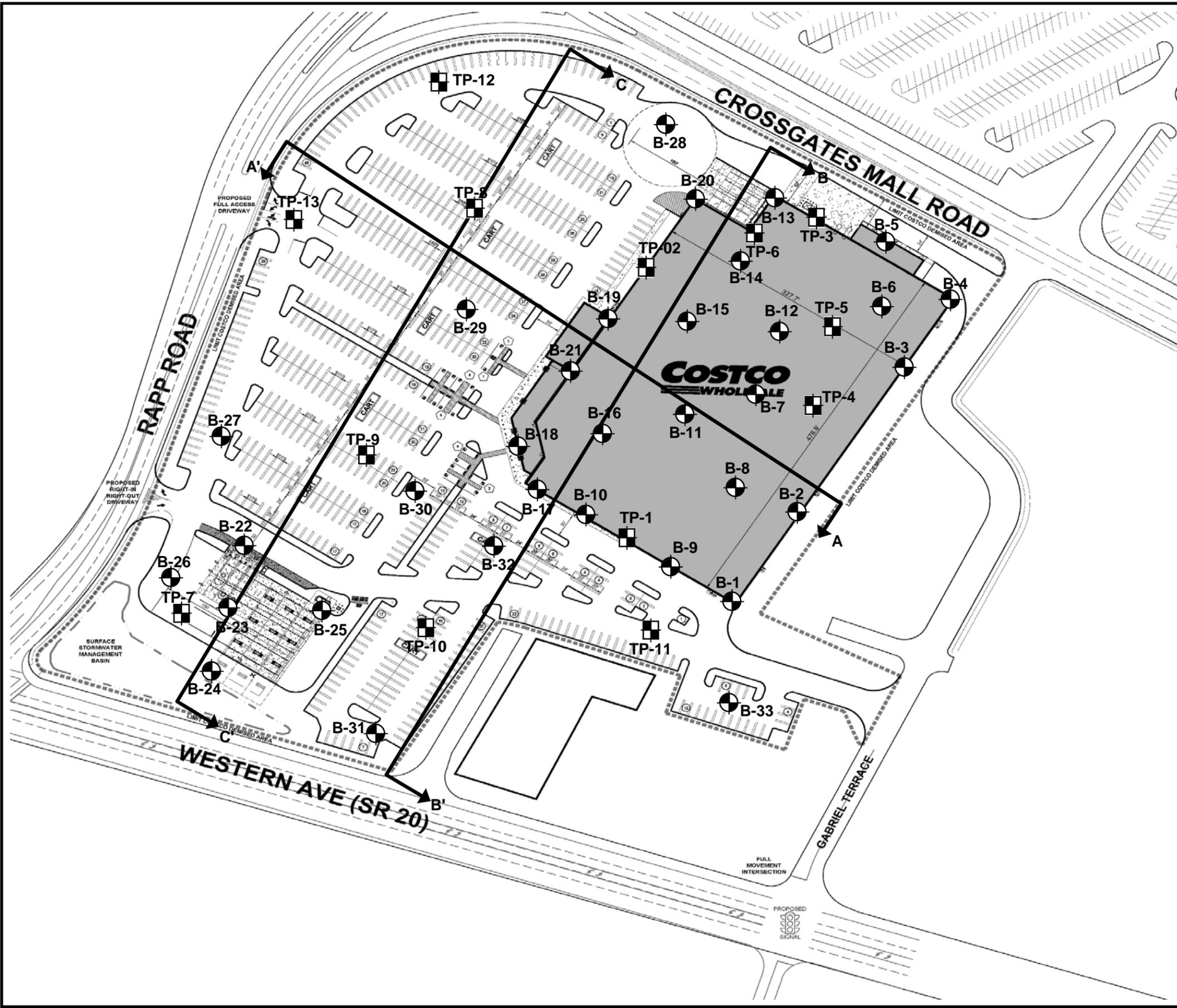
(*BASE MAP SOURCE: USGS.gov)



MASER
CONSULTING P.A.

Consulting, Municipal & Environmental Engineers
Planners ■ Surveyors ■ Landscape Architects

TITLE: SITE LOCATION MAP		
PROJECT: PROPOSED COSTCO WHOLESALE CITY OF ALBANY ALBANY COUNTY, NEW YORK		
DRAWN BY:	*	CHECKED BY: JCW
SCALE:	N.T.S.	PROJECT NO.: 13001204A
	DATE: 01/02/2018	FIGURE NO.: 1



LEGEND:

- B-1** INDICATES THE NUMBERS AND APPROXIMATE LOCATIONS OF TEST BORINGS PERFORMED FOR THIS EXPLORATION PROGRAM.
- TP-1** INDICATES THE NUMBERS AND APPROXIMATE LOCATIONS OF TEST PITS PERFORMED FOR THIS EXPLORATION PROGRAM.

NOTES:

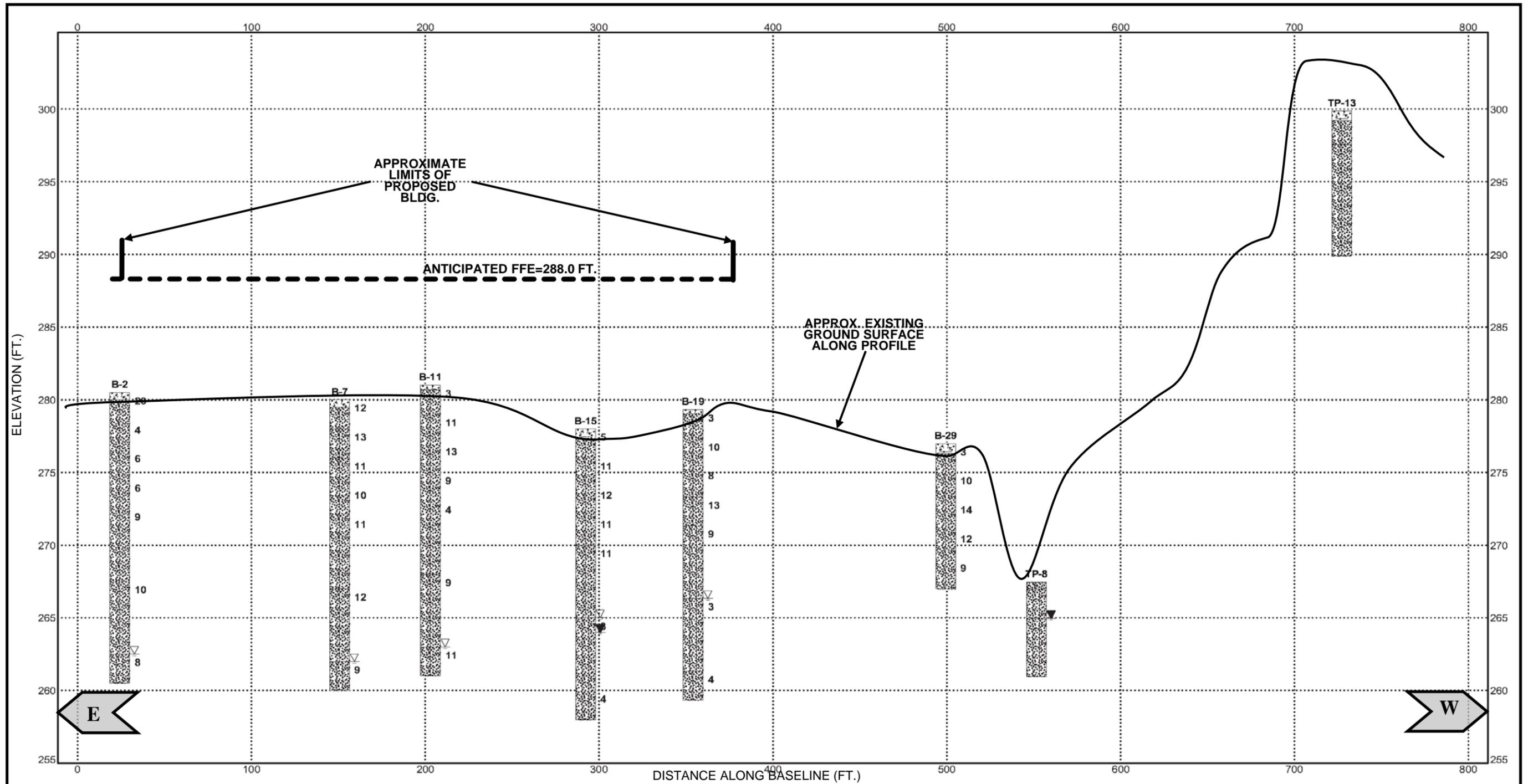
- 1.) *CONCEPT PLAN PREPARED BY MASER CONSULTING P.A. ENTITLED "CONCEPT PLAN SK-2 REVISED" DATED NOVEMBER 01, 2017.
- 2.) THIS DRAWING IS PART OF MASER'S GEOTECHNICAL REPORT (PROJECT NO. 13001204A) DATED FEBRUARY 2018 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.

Consulting, Municipal & Environmental Engineers
Planners ■ Surveyors ■ Landscape Architects

TITLE: **EXPLORATION LOCATION PLAN**

PROJECT: **PROPOSED COSTCO WHOLESALE
CITY OF ALBANY
ALBANY COUNTY, NEW YORK**

PROFESSIONAL ENGINEER:		DATE:
JOHN C. WALTON, P.E.		LICENSE NO.: 85339
DRAWN BY: *	CHECKED BY: JCW	PROJECT NO.: 13001204A
SCALE: N.T.S.	DATE: 01/02/2018	FIGURE NO.: 2

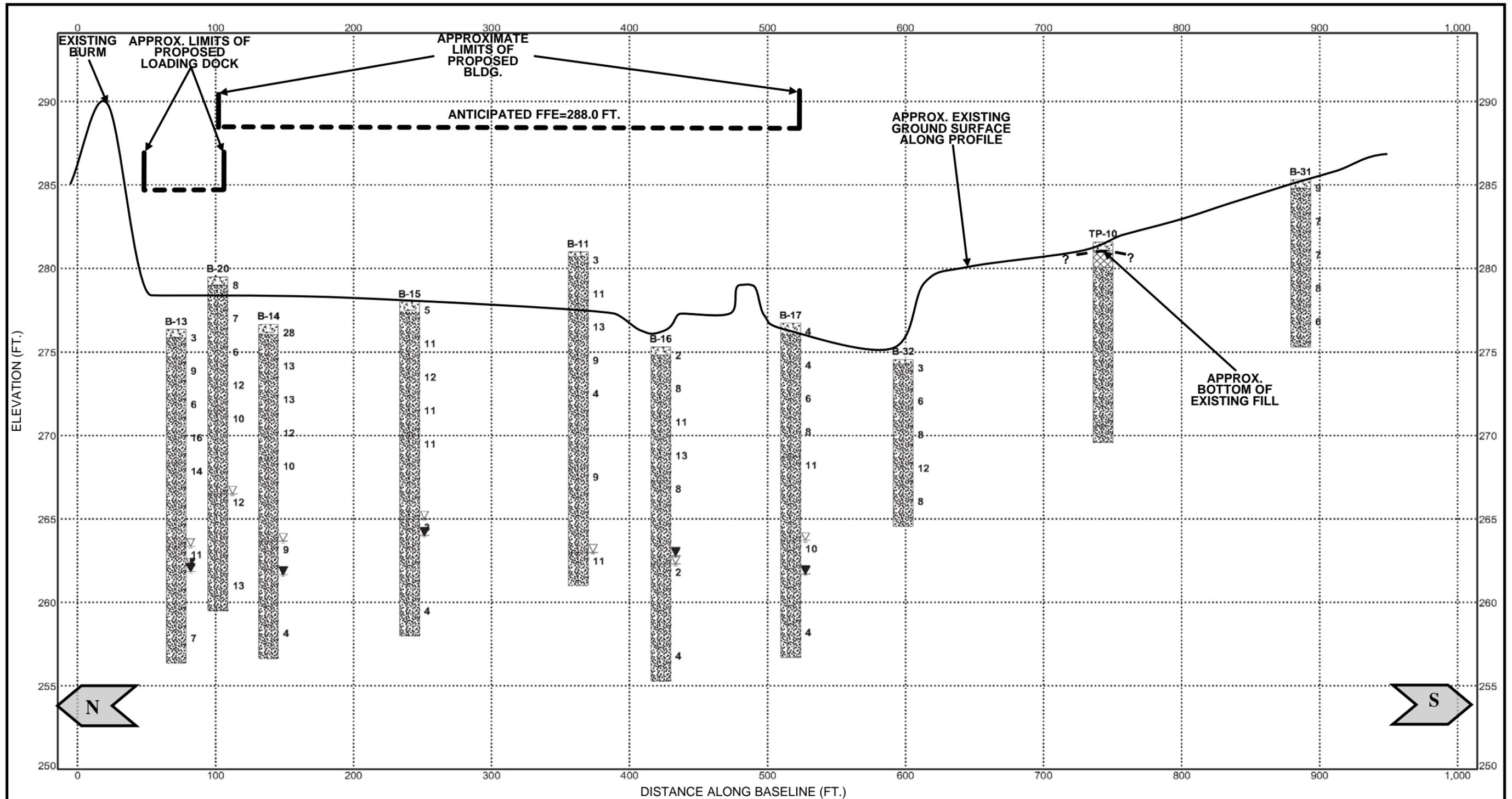


NOTES:

- 1.) THIS DRAWING IS PART OF MASER'S GEOTECHNICAL REPORT (PROJECT NO. 13001204A) DATED FEBUARY 2018 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.
- 2.) STRATA LINES SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY AND DO NOT NECESSARILY REPRESENT CONDITIONS BETWEEN EXPLORED LOCATIONS.
- 3.) ALL DEPTHS, ELEVATIONS, AND LOCATIONS ARE APPROXIMATE.



Title: SUBSURFACE PROFILE A-A'		
Project: PROPOSED COSTCO WHOLESALE CITY OF ALBANY ALBANY COUNTY, NEW YORK		
PROFESSIONAL ENGINEER:	DATE:	
JOHN C. WALTON, P.E.		LICENSE NO.: 85339
DRAWN BY: NRC	CHECKED BY: JCW	PROJECT NO.: 13001204A
SCALE: AS SHOWN	DATE: 2/9/2018	FIGURE NO.: 3

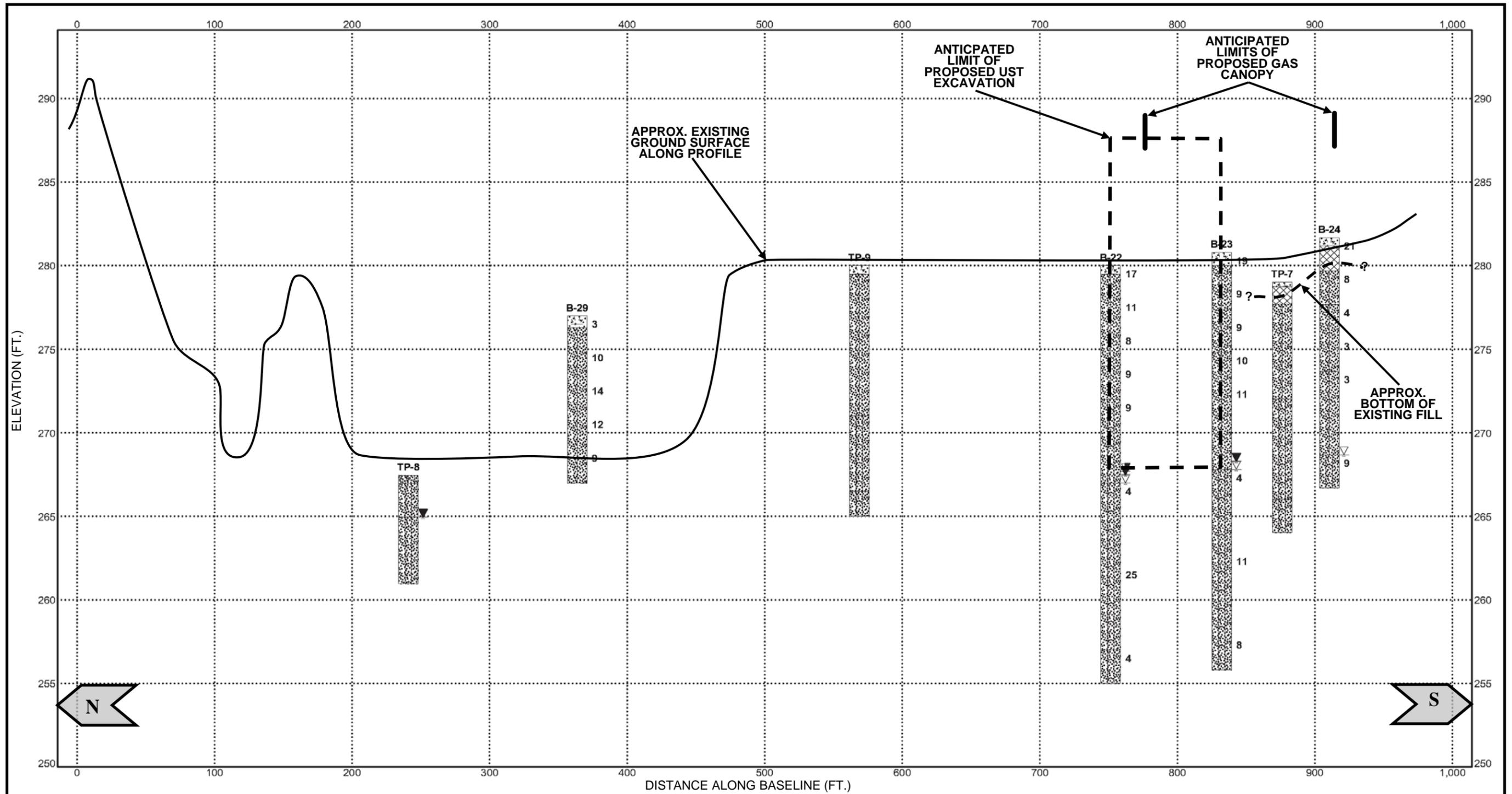


NOTES:

- 1.) THIS DRAWING IS PART OF MASER'S GEOTECHNICAL REPORT (PROJECT NO. 13001204A) DATED FEBRUARY 2018 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.
- 2.) STRATA LINES SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY AND DO NOT NECESSARILY REPRESENT CONDITIONS BETWEEN EXPLORED LOCATIONS.
- 3.) ALL DEPTHS, ELEVATIONS, AND LOCATIONS ARE APPROXIMATE.



Title: SUBSURFACE PROFILE B-B'	
Project: PROPOSED COSTCO WHOLESALE CITY OF ALBANY ALBANY COUNTY, NEW YORK	
PROFESSIONAL ENGINEER:	DATE:
JOHN C. WALTON, P.E.	LICENSE NO.: 85339
DRAWN BY: NRC	CHECKED BY: JCW
SCALE: AS SHOWN	DATE: 2/12/2018
	PROJECT NO.: 13001204A
	FIGURE NO.: 4



NOTES:

- 1.) THIS DRAWING IS PART OF MASER'S GEOTECHNICAL REPORT (PROJECT NO. 13001204A) DATED FEBRUARY 2018 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.
- 2.) STRATA LINES SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY AND DO NOT NECESSARILY REPRESENT CONDITIONS BETWEEN EXPLORED LOCATIONS.
- 3.) ALL DEPTHS, ELEVATIONS, AND LOCATIONS ARE APPROXIMATE.



Title: SUBSURFACE PROFILE C-C'		
Project: PROPOSED COSTCO WHOLESALE CITY OF ALBANY ALBANY COUNTY, NEW YORK		
PROFESSIONAL ENGINEER:	DATE:	
JOHN C. WALTON, P.E.		LICENSE NO.: 85339
DRAWN BY: NRC	CHECKED BY: JCW	PROJECT NO.: 13001204A
SCALE: AS SHOWN	DATE: 2/12/2018	FIGURE NO.: 5

APPENDIX B

(EXPLORATION LOGS)



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

BORING B-1
 PAGE 1 OF 2

Date Started: <u>1/12/18</u>	Ground Surface Elevation (ft.): <u>280.5</u>
Date Completed: <u>1/12/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>18</u> <u>1/12/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/12/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	3 inches of Topsoil	0	280.5	S-01	13	7-4-2-1	6	
	Light brown, m(-)f SAND, trace Silt							
	Light brown, m(-)f SAND, trace Silt			S-02	16	0-0-0-1	0	
		5	275.5	S-03	9	1-1-1-2	2	
				S-04	15	4-4-5-6	9	
				S-05	9	4-5-6-6	11	
		10	270.5					
				S-06	13	4-5-5-4	10	
		15	265.5					
				S-07	10	1-2-2-5	4	
		20	260.5					

(Continued Next Page)

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:03 - \\MVCAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	Gray, m(+f) SAND, trace Silt (wet) <i>(continued)</i>							
	24.5			S-08	10	2-2-4-0/0"	6	
Bottom of Boring at 24.5 Ft.								

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:03 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/17/18</u>	Ground Surface Elevation (ft.): <u>280.5</u>
Date Completed: <u>1/17/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>18</u> <u>1/17/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/17/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH	ELEVATION	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		(ft.)	(ft.)					
	6 inches of Topsoil	0	280.5	S-01	17	19-14-6-4	20	
	Light brown, mf SAND, trace Silt (Moist)			S-02	22	4-2-2-4	4	
	Light brown, mf SAND, trace Silt (Dry)			S-03	20	2-2-4-2	6	
		5	275.5	S-04	20	2-2-4-2	6	
				S-05	19	4-4-5-5	9	
		10	270.5	S-06	21	4-4-6-6	10	
	Light brown with occasional orange-brown staining, mf SAND, trace Silt (Moist)			S-07	18	6-4-4-4	8	
	Brown, mf SAND, little Silt (Wet)	15	265.5					
		18						
		20	260.5					

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:05 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/17/18 Ground Surface Elevation (ft.): 279.59
 Date Completed: 1/17/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered NE 1/17/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) NR 1/17/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) NR 1/17/2018

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS	
		0	279.6						
	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	19	1-1-2-4	3		
				S-02	15	5-5-6-5	11		
				S-03	20	4-4-5-5	9		
			5	274.6					
					S-04	20	5-4-5-5	9	
					S-05	19	4-6-6-8	12	
			10	269.6					
				S-06	23	5-4-5-5	9		
				S-07	19	2-2-4-2	6		
		15	264.6						
		20	259.6						

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:07 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/17/18 Ground Surface Elevation (ft.): 279
 Date Completed: 1/17/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: Depth (ft.) Date
 Equipment: CME-550X - ATV Mounted First Encountered NE 1/17/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) NR 1/17/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) NR 1/17/2018

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS	
		0	279.0						
	8 inches of Topsoil			S-01	16	1-1-4-4	5		
	Brown, mf SAND, trace Silt (Moist)	0.7		S-02	20	5-2-2-2	4		
	Light brown/dark brown, mf SAND, trace Silt (Dry)	4		S-03	19	2-2-2-4	4		
	Light brown, mf(+) SAND, trace Silt (Dry)	6	5	274.0	S-04	18	2-2-5-7	7	
					S-05	19	5-6-7-7	13	
	Gray, mf SAND, trace Silt; occasional orange-brown seam (Moist)	13	10	269.0	S-06	19	4-5-6-6	11	
					S-07	18	4-5-7-8	12	
	Bottom of Boring at 20.0 Ft.	20	20	259.0					

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:07 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/16/18 Ground Surface Elevation (ft.): 279.38
 Date Completed: 1/16/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered ∇ NE 1/16/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) ∇ NR 1/16/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	279.4					
	7 inches of Topsoil			S-01	20	17-10-5-4	15	
	Brown, mf SAND, trace Silt (Moist)	0.6		S-02	18	4-2-2-2	4	
	Brown/dark brown, mf SAND, trace Silt; occasional Roots (Moist)	4		S-03	16	2-2-2-2	4	
	Light brown, mf SAND, trace Silt (Dry)	6		S-04	19	1-4-6-7	10	
	Light brown, mf SAND, trace Silt, occasional orange-brown seam (Dry)	8		S-05	21	6-6-7-7	13	
	Gray, mf(+) SAND, little(-) Silt (Moist)	13		S-06	20	4-5-7-10	12	
		15	264.4	S-07	18	2-4-5-4	9	
	20	259.4						

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:08 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/16/18 Ground Surface Elevation (ft.): 279.44
 Date Completed: 1/16/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered ∇ 18 1/16/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) ∇ NR 1/16/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	279.4					
	6 inches of Topsoil			S-01	18	13-7-7-5	14	
	Light brown/dark brown, mf SAND, trace Silt (Moist)			S-02	20	7-5-4-4	9	
				S-03	20	4-2-2-2	4	
			5	274.4				
	Light brown, mf SAND, trace Silt (Moist)			S-04	21	2-4-4-6	8	
				S-05	18	4-7-6-7	13	
			10	269.4				
				S-06	19	2-4-5-5	9	
		15	264.4					
				S-07	16	2-2-2-2	4	
	Gray, mf(+) SAND, little(-) Silt (Wet)							
		18						
		20	259.4					

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:08 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/17/18 Ground Surface Elevation (ft.): 280
 Date Completed: 1/17/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John **Groundwater:** **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered ∇ 18 1/17/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) ∇ NR 1/17/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	280.0					
	6 inches of Topsoil			S-01	14	13-6-6-5	12	
	Light brown, mf SAND, trace Silt (Moist)	0.5						
	Light brown, dark brown, mf SAND, trace Silt; occasional Root (Moist)	2		S-02	5	4-6-7-6	13	
	Light brown, mf SAND, trace Silt (Dry)	4		S-03	12	7-6-5-5	11	
		5	275.0	S-04	13	4-5-5-6	10	
		10	270.0	S-05	19	5-4-7-6	11	
	Light brown with occasional orange-brown seams, mf(+) SAND, trace Silt (Moist)	13		S-06	18	4-6-6-6	12	
	15	265.0						
Gray, mf(+) SAND, little Silt (Wet)	18		S-07	19	5-5-4-5	9		
	20	260.0						

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:08 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/17/18 Ground Surface Elevation (ft.): 280.5
 Date Completed: 1/17/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered NE 1/17/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) NR 1/17/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) NR 1/17/2018

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	280.5					
	4 inches of Topsoil			S-01	20	11-12-12-14	24	
	Light brown, mf SAND, trace Silt (Moist)	0.3						
	Light brown, mf SAND, trace Silt (Dry)	2		S-02	20	8-6-5-5	11	
				S-03	19	4-4-4-4	8	
			5	275.5				
				S-04	23	4-2-5-4	7	
	Light brown, mf SAND, trace Silt (Moist)	8		S-05	21	4-4-5-5	9	
		10	270.5					
		13		S-06	19	4-5-5-6	10	
Light brown/dark brown, mf(+) SAND, little Silt (Moist)								
		15	265.5					
		18		S-07	20	2-5-5-5	10	
Dark brown, mf(+) SAND, little Silt (Very Moist)								
		20	260.5					

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:08 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/12/18</u>	Ground Surface Elevation (ft.): <u>279.48</u>
Date Completed: <u>1/12/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>14.3</u> <u>1/12/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/12/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	5 inches of Topsoil	0	279.5	S-01	12	2-2-4-5	6	
	Light brown, mf SAND, trace Silt (Moist)			S-02	12	7-10-12-16	22	
		5	274.5	S-03	18	6-10-8-8	18	
				S-04	20	6-6-5-5	11	
				S-05	20	2-5-6-7	11	
		10	269.5					
				S-06	16	2-4-5-2	9	
	Dark brown, mf SAND, trace Silt (Wet)	15	264.5					
				S-07	18	2-5-5-4	10	
		20	259.5					

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:03 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/16/18</u>	Ground Surface Elevation (ft.): <u>278</u>
Date Completed: <u>1/16/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>18</u> <u>1/16/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/16/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	278.0					
0.5	6 inches of Topsoil			S-01	22	11-5-4-4	9	
2	Brown, mf SAND, trace Silt (Moist)			S-02	21	4-2-1-4	3	
	Light brown, mf SAND, trace Silt (Dry)			S-03	21	2-2-4-2	6	
5		5	273.0	S-04	22	4-6-6-7	12	
8	Light brown, mf SAND, trace Silt; occasional orange-brown seam (Moist)			S-05	13	4-5-6-5	11	
10		10	268.0					
13	Gray, mf SAND, little Silt (Moist)			S-06	19	2-2-4-4	6	
15		15	263.0					
18	Gray, mf SAND, little Silt (Wet)			S-07	20	1-4-6-8	10	
20		20	258.0					
Bottom of Boring at 20.0 Ft.								

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:03 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/16/18</u>	Ground Surface Elevation (ft.): <u>276.36</u>
Date Completed: <u>1/17/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/16/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>14.5</u> <u>1/16/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ <u>14.2</u> <u>1/17/2018</u>
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	276.4					
	6 inches of Topsoil			S-01	19	1-1-2-4	3	
	Light brown, mf SAND, trace Silt (Moist)	0.5		S-02	20	4-4-5-5	9	
				S-03	19	2-2-4-4	6	
		5	271.4	S-04	19	5-6-10-11	16	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)	8		S-05	13	4-7-7-6	14	
		10	266.4					
	Gray, mf SAND, trace Silt (Wet)	13		S-06	17	5-5-6-6	11	
	15	261.4						
			S-07	20	1-2-5-4	7		
	20	256.4						

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:03 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/16/18</u>	Ground Surface Elevation (ft.): <u>276.66</u>
Date Completed: <u>1/16/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/16/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>15</u> <u>1/16/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	276.7					
0.6	7 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	19	20-22-6-5	28	
				S-02	12	7-7-6-7	13	
		5	271.7	S-03	15	4-6-7-6	13	
				S-04	20	5-5-7-7	12	
8	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)			S-05	14	4-5-5-5	10	
		10	266.7					
13	Gray, mf SAND, little Silt (Wet)			S-06	14	2-4-5-5	9	
		15	261.7					
				S-07	22	1-2-2-5	4	
		20	256.7					
Bottom of Boring at 20.0 Ft.								

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:04 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/15/18</u>	Ground Surface Elevation (ft.): <u>278</u>
Date Completed: <u>1/15/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/15/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) \blacktriangledown <u>14</u> <u>1/15/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) \blacktriangledown _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	8 inches of Topsoil	0	278.0	S-01	16	1-1-4-5	5	
	Light brown, mf SAND, trace Silt (Moist)			S-02	20	5-5-6-7	11	
				S-03	18	5-6-6-8	12	
		5	273.0	S-04	19	6-5-6-10	11	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)			S-05	15	4-6-5-6	11	
		10	268.0					
	Gray, mf SAND, little Silt (Wet)			S-06	18	1-2-1-1	3	
		15	263.0					
				S-07	20	1-2-2-1	4	
		20	258.0					
Bottom of Boring at 20.0 Ft.								

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:04 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/18/18</u>	Ground Surface Elevation (ft.): <u>275.3</u>
Date Completed: <u>1/18/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/18/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>12.5</u> <u>1/18/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS	
		0	275.3						
	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	12	1-1-1-2	2		
				S-02	19	4-4-4-5	8		
			5	270.3	S-03	16	2-5-6-6	11	
					S-04	15	6-6-7-7	13	
		Light brown, mf SAND, trace Silt; occasional orange-brown staining (Very Moist)			S-05	22	4-4-4-5	8	
			10	265.3					
		Gray, mf SAND, little Silt (Wet)			S-06	19	1-1-1-2	2	
		15	260.3						
				S-07	19	1-2-2-4	4		
	Bottom of Boring at 20.0 Ft.	20	255.3						

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:04 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

BORING B-17
 PAGE 1 OF 1

Date Started: <u>1/18/18</u>	Ground Surface Elevation (ft.): <u>276.71</u>
Date Completed: <u>1/18/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/18/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>15</u> <u>1/18/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	8 inches of Topsoil	0	276.7	S-01	20	1-2-2-2	4	
	Light brown, mf SAND, trace Silt (Moist)			S-02	19	1-2-2-4	4	
				S-03	18	4-4-2-4	6	
		5	271.7	S-04	20	2-2-6-7	8	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)			S-05	17	6-6-5-5	11	
		10	266.7					
	Gray, mf SAND, little Silt (Wet)			S-06	17	4-5-5-6	10	
		15	261.7					
				S-07	16	1-2-2-4	4	
	Bottom of Boring at 20.0 Ft.	20	256.7					

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:04 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:

BORING B-17
 PAGE 1 OF 1



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/18/18</u>	Ground Surface Elevation (ft.): <u>279</u>
Date Completed: <u>1/18/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/18/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>15</u> <u>1/18/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	279.0					
	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	16	1-1-1-1	2	
				S-02	19	2-4-4-5	8	
		5	274.0	S-03	22	4-5-7-7	12	
				S-04	22	7-6-8-7	14	
				S-05	18	4-4-4-4	8	
		10	269.0					
				S-06	18	1-2-1-4	3	
		15	264.0					
				S-07	19	2-2-2-4	4	
		20	259.0					

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:04 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/12/18</u>	Ground Surface Elevation (ft.): <u>279.33</u>
Date Completed: <u>1/12/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/12/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/12/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	4 inches of Topsoil	0	279.3	S-01	16	1-1-2-5	3	
	Light brown, mf SAND, trace Silt (Moist)			S-02	14	6-5-5-4	10	
		5	274.3	S-03	13	4-4-4-5	8	
	Tan, mf(+) SAND, little Silt (Moist)	6		S-04	20	5-6-7-7	13	
	Light gray, mf SAND, little(+) Silt (Moist)	8		S-05	14	4-5-4-4	9	
		10	269.3					
	Gray with occasional orange-brown staining, mf(+) SAND, little Silt (Wet)	13		S-06	13	2-2-1-2	3	
		15	264.3					
	Gray, mf SAND, trace Silt (Wet)	18		S-07	18	2-2-2-2	4	
		20	259.3					
Bottom of Boring at 20.0 Ft.								

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:04 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/15/18</u>	Ground Surface Elevation (ft.): <u>279.5</u>
Date Completed: <u>1/15/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/15/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/15/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS	
		0	279.5						
	6 inches of Topsoil			S-01	16	7-4-4-5	8		
	Light brown, mf SAND, trace Silt (Moist)	0.5		S-02	12	6-5-2-4	7		
				S-03	18	4-2-4-5	6		
			5	274.5	S-04	20	5-5-7-7	12	
					S-05	18	4-5-5-6	10	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)	8							
			10	269.5					
				S-06	16	4-6-6-8	12		
Gray, mf SAND, little Silt (Wet)	13								
		15	264.5						
				S-07	22	4-5-8-11	13		
		20	259.5						

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:05 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/15/18 Ground Surface Elevation (ft.): 278.82
 Date Completed: 1/15/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered ∇ 13 1/15/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) ∇ NR 1/15/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	278.8					
	6 inches of Topsoil			S-01	14	1-1-2-4	3	
	Light brown, mf SAND, trace Silt (Moist)	0.5		S-02	12	4-4-4-4	8	
				S-03	18	2-4-4-5	8	
		5	273.8	S-04	18	6-7-10-12	17	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)	8		S-05	16	4-5-6-6	11	
		10	268.8					
	Gray, mf SAND, little Silt (Wet)	13		S-06	16	1-2-4-2	6	
	15	263.8						
			S-07	19	2-2-1-2	3		
	20	258.8						

Bottom of Boring at 20.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:05 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/18/18</u>	Ground Surface Elevation (ft.): <u>280</u>
Date Completed: <u>1/19/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/18/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>12.5</u> <u>1/18/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ <u>12.3</u> <u>1/19/2018</u>
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS	
		0	280.0						
	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	16	10-10-7-7	17		
				S-02	17	6-6-5-4	11		
				S-03	15	4-4-4-5	8		
			5	275.0					
					S-04	15	4-5-4-5	9	
					S-05	20	2-4-5-5	9	
			10	270.0					
				S-06	18	1-2-2-4	4		
				S-07	12	4-11-14-18	25		
		15	265.0						
		20	260.0						

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Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:05 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	Light gray, mf SAND, little Silt (Wet) <i>(continued)</i>							
	Light gray, mf(+) SAND, some(-) Silt (Wet)	23		S-08	8	1-2-2-4	4	
		25	255.0					

Bottom of Boring at 25.0 Ft.

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:05 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/19/18</u>	Ground Surface Elevation (ft.): <u>280.8</u>
Date Completed: <u>1/19/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/19/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>12.5</u> <u>1/19/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	10 inches of Topsoil	0	280.8	S-01	13	7-12-7-6	19	
	Light brown, mf SAND, trace Silt (Moist)			S-02	18	6-5-4-4	9	
		5	275.8	S-03	15	4-4-5-5	9	
	Light brown/orange brown, mf SAND, trace Silt (Moist)			S-04	16	4-5-5-5	10	
		10	270.8	S-05	13	4-5-6-5	11	
	Light gray, mf(+) SAND, little Silt (Wet)			S-06	15	2-2-2-2	4	
		15	265.8	S-07	18	5-6-5-7	11	
		20	260.8					

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:05 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

(Continued Next Page)

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	Light gray, mf(+) SAND, little Silt (Wet) <i>(continued)</i>							
	25	25	255.8	S-08	20	1-2-6-7	8	
Bottom of Boring at 25.0 Ft.								

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:05 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/19/18</u>	Ground Surface Elevation (ft.): <u>281.68</u>
Date Completed: <u>1/19/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>13</u> <u>1/19/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/19/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	6 inches of Topsoil	0	281.7					
	Gray, cmf SAND, some mf Gravel, trace Silt (Moist) (FILL)	0.5		S-01	15	10-7-14-13	21	
	Light brown, mf SAND, trace Silt (Dry)	2		S-02	12	7-2-6-4	8	
	Light brown/orange-brown, mf SAND, trace Silt (Dry)	4		S-03	6	4-2-2-2	4	
		5	276.7					
				S-04	0	2-1-2-2	3	
	Light brown, mf SAND, trace Silt (Moist)	8		S-05	12	2-2-1-2	3	
		10	271.7					
	Light gray, mf SAND, some(-) Silt (Wet)	13		S-06	12	4-5-4-4	9	
		15	266.7					
Bottom of Boring at 15.0 Ft.								

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:06 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/19/18 Ground Surface Elevation (ft.): 281.81
 Date Completed: 1/19/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered ∇ 14 1/19/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) ∇ NR 1/19/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS	
		0	281.8						
	6 inches of Topsoil			S-01	15	12-14-7-11	21		
	Light brown, mf SAND, trace Silt (Moist)			S-02	16	4-5-4-4	9		
				S-03	12	2-4-5-4	9		
			5	276.8	S-04	18	2-5-5-4	10	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)			S-05	18	5-5-7-7	12		
			10	271.8					
		13		S-06	20	5-5-5-6	10		
	Gray, mf(+) SAND, some Silt (Wet)								
		15							
		15	266.8						

Bottom of Boring at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:06 - \\MVCAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/19/18 Ground Surface Elevation (ft.): 278.13
 Date Completed: 1/19/18 Datum: Topo
 Drilling Contractor: QA/QC Labs Groundwater: **Depth (ft.)** **Date**
 Driller: John First Encountered NE 1/19/2018
 Equipment: CME-550X - ATV Mounted End of Drilling (0 Hrs.) NR 1/19/2018
 Drilling Method: Hollow Stem Auger After Drilling (≥ 24 Hrs.) NR
 Sampling Method: Split Spoon

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	278.1					
	6 inches of Topsoil			S-01	10	2-1-2-2	3	
	Light brown, mf SAND, trace Silt (Moist)			S-02	18	4-4-5-4	9	
		5	273.1	S-03	16	4-2-5-5	7	
				S-04	15	5-6-6-7	12	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)	8		S-05	16	5-6-8-6	14	
	10	10	268.1					Bottom of Boring at 10.0 Ft.

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:06 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/19/18</u>	Ground Surface Elevation (ft.): <u>277</u>
Date Completed: <u>1/19/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>9.5</u> <u>1/19/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/19/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	277.0					
0.3	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	15	1-1-4-6	5	
				S-02	0	6-8-10-12	18	
		5	272.0	S-03	10	4-6-7-6	13	
6	Light brown, mf SAND, trace Silt (Very Moist)			S-04	12	5-5-5-6	10	
8	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Very Moist)			S-05	18	5-4-4-2	8	
9.5	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Wet)	10	267.0					
	Bottom of Boring at 10.0 Ft.							

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:06 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/18/18</u>	Ground Surface Elevation (ft.): <u>277.3</u>
Date Completed: <u>1/18/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered <input type="checkbox"/> <u>NE</u> <u>1/18/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) <input checked="" type="checkbox"/> <u>NR</u> <u>1/18/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (≥ 24 Hrs.) <input checked="" type="checkbox"/> _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	277.3					
	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	18	14-6-5-5	11	
				S-02	17	4-5-5-7	10	
		5	272.3	S-03	23	5-7-8-10	15	
				S-04	24	6-8-6-6	14	
	Light brown, mf SAND, trace Silt; occasional orange-brown staining (Moist)			S-05	20	5-5-4-5	9	
		10	267.3					

Bottom of Boring at 10.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:06 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/18/18</u>	Ground Surface Elevation (ft.): <u>276.99</u>
Date Completed: <u>1/18/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered <input type="checkbox"/> <u>NE</u> <u>1/18/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) <input checked="" type="checkbox"/> <u>NR</u> <u>1/18/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) <input checked="" type="checkbox"/> _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	8 inches of Topsoil	0	277.0					
0.7	Light brown, mf SAND, trace Silt (Moist)			S-01	16	2-1-2-4	3	
				S-02	18	5-5-5-6	10	
		5	272.0	S-03	20	6-7-7-8	14	
				S-04	23	6-6-6-7	12	
				S-05	22	7-4-5-5	9	
		10	267.0					

Bottom of Boring at 10.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:06 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/19/18 Ground Surface Elevation (ft.): 276.8
 Date Completed: 1/19/18 Datum: Topo
 Drilling Contractor: QA/QC Labs Groundwater: **Depth (ft.)** **Date**
 Driller: John First Encountered NE 1/19/2018
 Equipment: CME-550X - ATV Mounted End of Drilling (0 Hrs.) NR 1/19/2018
 Drilling Method: Hollow Stem Auger After Drilling (\geq 24 Hrs.) NR 1/19/2018
 Sampling Method: Split Spoon

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	276.8					
	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	15	1-1-2-1	3	
				S-02	13	1-1-2-1	3	
		5	271.8	S-03	12	4-6-4-6	10	
				S-04	18	5-6-6-8	12	
				S-05	14	5-6-6-4	12	
	Bottom of Boring at 10.0 Ft.	10	266.8					

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:07 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/18/18 Ground Surface Elevation (ft.): 285.31
 Date Completed: 1/18/18 Datum: Topo
 Drilling Contractor: QA/QC Labs Groundwater: **Depth (ft.)** **Date**
 Driller: John First Encountered NE 1/18/2018
 Equipment: CME-550X - ATV Mounted End of Drilling (0 Hrs.) NR 1/18/2018
 Drilling Method: Hollow Stem Auger After Drilling (≥ 24 Hrs.) NR
 Sampling Method: Split Spoon

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS	
		0	285.3						
	6 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	19	6-5-4-4	9		
				S-02	18	4-5-2-2	7		
				S-03	17	2-2-5-5	7		
			5	280.3	S-04	17	5-4-4-4	8	
					S-05	20	4-2-4-4	6	
		10	275.3						

Bottom of Boring at 10.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:07 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: 1/19/18 Ground Surface Elevation (ft.): 274.55
 Date Completed: 1/19/18 Datum: Topo
 Drilling Contractor: QA/QC Labs
 Driller: John Groundwater: **Depth (ft.)** **Date**
 Equipment: CME-550X - ATV Mounted First Encountered NE 1/19/2018
 Drilling Method: Hollow Stem Auger End of Drilling (0 Hrs.) NR 1/19/2018
 Sampling Method: Split Spoon After Drilling (\geq 24 Hrs.) NR 1/19/2018

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
		0	274.6					
	4 inches of Topsoil Light brown, mf SAND, trace Silt (Moist)			S-01	13	1-1-2-2	3	
				S-02	18	2-2-4-4	6	
		5	269.6	S-03	20	4-4-4-5	8	
				S-04	18	5-6-6-6	12	
				S-05	21	5-4-4-2	8	
	Bottom of Boring at 10.0 Ft.	10	264.6					

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:07 - \\MVCAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Date Started: <u>1/18/18</u>	Ground Surface Elevation (ft.): <u>281.66</u>
Date Completed: <u>1/18/18</u>	Datum: <u>Topo</u>
Drilling Contractor: <u>QA/QC Labs</u>	Groundwater: Depth (ft.) Date
Driller: <u>John</u>	First Encountered ∇ <u>NE</u> <u>1/18/2018</u>
Equipment: <u>CME-550X - ATV Mounted</u>	End of Drilling (0 Hrs.) ∇ <u>NR</u> <u>1/18/2018</u>
Drilling Method: <u>Hollow Stem Auger</u>	After Drilling (\geq 24 Hrs.) ∇ _____
Sampling Method: <u>Split Spoon</u>	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS (per 6 in.)	N-VALUE	REMARKS
	6 inches of Topsoil	0	281.7					
	Light brown, mf SAND, trace Silt (Moist)			S-01	16	2-2-5-5	7	
				S-02	19	7-5-2-4	7	
		5	276.7	S-03	20	4-2-2-1	4	
				S-04	19	1-1-1-2	2	
				S-05	18	2-1-2-2	3	
		10	271.7					Bottom of Boring at 10.0 Ft.

MASER BORING - KZA DATA TEMPLATE.GDT - 3/2/18 19:07 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-1
 PAGE 1 OF 1

Date Started: <u>1/10/18</u>	Ground Surface Elevation (ft.): <u>281.16</u>
Date Completed: <u>1/10/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered ∇ <u>NE</u> <u>1/10/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) ∇ <u>NE</u> <u>1/10/2018</u>
	After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	281.2	
	4 inches of Topsoil Light brown, mf SAND, trace mf Gravel, trace Silt (Moist)			
		5	276.2	
		10	271.2	
		14.5		
	Brown, orange brown, mf SAND, little Silt (Moist)	15	266.2	
	Bottom of Test Pit at 15.0 Ft.			

Hand-probe= 6 inches @ 3.0 ft

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:10 - \\MVCAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-2
 PAGE 1 OF 1

Date Started: 1/10/18 Ground Surface Elevation (ft.): 280.65
 Date Completed: 1/10/18 Datum: Topo
 Contractor: Rifenburg Contracting Corp.
 Operator: PJ
 Equipment: Trackhoe CAT 312E
 Groundwater: **Depth (ft.)** **Date**
 First Encountered ∇ NE 1/10/2018
 At Completion (0 Hrs.) ∇ NE 1/10/2018
 After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)		ELEVATION (ft.)	REMARKS
		0	280.7		
	10 inches of Topsoil	0.8			
	Light brown, occasional orange brown, dark gray lenses, mf SAND, trace Silt, occasional Roots (Moist) (FILL)	2.8			
	Light brown, mf SAND, trace Silt, occasional Roots (Moist) (FILL)	4.2			
	Dark gray, mf(+) SAND, little Silt, occasional Roots	5.5	5	275.7	
	Light gray, mf(+) SAND, little Silt, occasional Roots	7			
	Light brown, mf SAND, trace Silt (Moist)	13			
	Dark gray, mf(+) SAND, little Silt (Moist)	15	15	265.7	
Bottom of Test Pit at 15.0 Ft.					
Logged By: <u>NRC</u> Checked By: <u>MJC</u>					
Notes:					

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MVCAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

TEST PIT TP-2
 PAGE 1 OF 1



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-3
 PAGE 1 OF 1

Date Started: <u>1/10/18</u>	Ground Surface Elevation (ft.): <u>278.5</u>
Date Completed: <u>1/10/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered <u>NE</u> <u>1/10/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) <u>NE</u> <u>1/10/2018</u>
	After Completion (≥ 24 Hrs.) <u>NE</u> <u>1/10/2018</u>

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	278.5	
1.7	2 inches of Topsoil	0.2		
	Light brown, dark gray, mf SAND, trace mf Gravel, trace Silt, occasional Roots			
1.7	Light brown, mf SAND, trace Silt, frequent dark gray seams			
		5	273.5	
	Light brown with frequent orange brown mottles, mf(+) SAND, little Silt			
		10	268.5	
	Gray, occasional light brown mottles, mf(+) SAND, little Silt			
		15	263.5	

Bottom of Test Pit at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

TEST PIT TP-3
 PAGE 1 OF 1



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-4
 PAGE 1 OF 1

Date Started: <u>1/11/18</u>	Ground Surface Elevation (ft.): <u>280.3</u>
Date Completed: <u>1/11/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered ∇ <u>NE</u> <u>1/11/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) ∇ <u>NE</u> <u>1/11/2018</u>
	After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	280.3	
	4 inches of Topsoil with occasional roots			
	Light brown, mf SAND, trace Silt, frequent roots (Moist)	0.3		
	Brown, mf SAND, trace Silt (Moist)	3		
		5	275.3	
		10	270.3	
	Brown, mf SAND, trace Silt; frequent orange-brown and light gray layers (Moist)	11		
		15	265.3	

Bottom of Test Pit at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MVCAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-5
 PAGE 1 OF 1

Date Started: <u>1/10/18</u>	Ground Surface Elevation (ft.): <u>279.09</u>
Date Completed: <u>1/10/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered ∇ <u>NE</u> <u>1/10/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) ∇ <u>NE</u> <u>1/10/2018</u>
	After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	279.1	
	4 inches of Topsoil with Roots Light brown, m(-)f SAND, trace Silt, frequent roots (Moist)			Hand-probe= 6 inches @ 3.0 ft
		5	274.1	
	Light brown, occasional lens of gray, m(-)f SAND, trace Silt, frequent roots (Moist)			
		7.5		Hard digging from 6.0 ft to 8.0 ft
	Tan, mf(+) SAND, little(-) Silt (Moist)			
		10	269.1	
		11		
	Tan, occasional orange brown mottles, mf(+) SAND, little(-) Silt (Moist)			
		15	264.1	

Bottom of Test Pit at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-6
 PAGE 1 OF 1

Date Started: <u>1/10/18</u>	Ground Surface Elevation (ft.): <u>276.7</u>	
Date Completed: <u>1/10/18</u>	Datum: <u>Topo</u>	
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date	
Operator: <u>PJ</u>	First Encountered ∇ <u>NE</u> <u>1/10/2018</u>	
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) ∇ <u>NE</u> <u>1/10/2018</u>	
	After Completion (\geq 24 Hrs.) ∇ _____	

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	276.7	
	3 inches of Topsoil	0.3		
	Light brown, mf SAND, trace Silt, frequent Roots (FILL)	1.4		
	Dark gray, mf SAND, trace Silt (Moist) (FILL)	2.1		
	Light brown, mf SAND (Moist)	4.2		
	Light brown, occasional orange brown mottles, mf SAND (Moist)	5	271.7	
	Tan, occasional orange brown and light gray mottles, mf(+) SAND, little Silt (Moist)	5.5		
	Gray, occasional orange brown mottles, mf(+) SAND, little Silt (Moist)	7		NE sidewall caving at 7.0 ft
		10	266.7	
		15	261.7	

Bottom of Test Pit at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:12 - \\MVCAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-7
 PAGE 1 OF 1

Date Started: <u>1/10/18</u>	Ground Surface Elevation (ft.): <u>279.02</u>
Date Completed: <u>1/10/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered <u>NE</u> <u>1/10/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) <u>NE</u> <u>1/10/2018</u>
	After Completion (≥ 24 Hrs.) <u>NE</u> <u>1/10/2018</u>

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	279.0	
	4 inches of Topsoil with Roots			
	Orange brown, red brown, mf SAND, trace mf Gravel (FILL)	0.3		
	Light brown with orange brown staining, mf SAND, trace Silt, occasional Roots (Moist)	1.3		Metal pipe at 0.7 ft
		5	274.0	
	Gray with orange brown staining, mf(+) SAND, little Silt (Moist)	7		
		10	269.0	
	Dark gray with orange brown mottles, cmf(+) SAND, some Silt (Moist)	13		
		15	264.0	

Bottom of Test Pit at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:12 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-8
 PAGE 1 OF 1

Date Started: <u>1/11/18</u>	Ground Surface Elevation (ft.): <u>267.46</u>
Date Completed: <u>1/11/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered ∇ <u>2.5</u> <u>1/11/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) ∇ <u>2.5</u> <u>1/11/2018</u>
	After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	267.5	
	Dark gray, cmf SAND and mf Gravel, trace Silt (Very Moist) (6 inch Stream Bed) ----- Light to dark brown, mf SAND, little Silt: occasional orange brown staining (Very Moist) ----- 2.5 ----- Light to dark brown, mf SAND, little Silt: frequent orange brown staining (Wet)		∇ 2.5	Heavy seepage and caving starting at 2.5 feet
		5	262.5	
		6.5		

Bottom of Test Pit at 6.5 Ft.

Test pit concluded at 6.5 ft due to caving

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:12 - \\MVCAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-9
 PAGE 1 OF 1

Date Started: <u>1/11/18</u>	Ground Surface Elevation (ft.): <u>280</u>
Date Completed: <u>1/11/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered <u>NE</u> <u>1/11/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) <u>NE</u> <u>1/11/2018</u>
	After Completion (≥ 24 Hrs.) <u>NE</u> <u>1/11/2018</u>

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:12 - \\MVCAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	280.0	
	6 inches of Topsoil with Roots			
	Light brown, mf SAND, trace Silt (Moist)	0.5		
		5	275.0	Hand-probe= 6 inches @ 4.0 ft
		9		
	Light gray cm(+)f SAND, little Silt (Moist)	10	270.0	
		13.5		
	Light gray cm(+)f SAND, little Silt (Very Moist to Wet)	15	265.0	

Bottom of Test Pit at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-10
 PAGE 1 OF 1

Date Started: <u>1/10/18</u>	Ground Surface Elevation (ft.): <u>281.58</u>
Date Completed: <u>1/10/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered ∇ <u>NE</u> <u>1/10/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) ∇ <u>NE</u> <u>1/10/2018</u>
	After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	281.6	
	6 inches of Topsoil			
	Light brown, mf SAND, little Silt, occasional Cobbles (Moist) (FILL)	0.5		
	Light brown, m(+)-f SAND, trace Silt (Moist)(loose)	1.5		Sidewalls caving starting at 1.5 ft
		5	276.6	Hand-probe= 8 inches @ 3.0 ft
		10	271.6	
	Light brown, occasional light gray mottles, m(+)-f SAND, trace Silt (Moist)(loose)	11		
		12		

Bottom of Test Pit at 12.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MVCAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-11
 PAGE 1 OF 1

Date Started: <u>1/10/18</u>	Ground Surface Elevation (ft.): <u>281.79</u>
Date Completed: <u>1/10/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered <u>NE</u> <u>1/10/2018</u>
Equipment: <u>Trackhoe CAT 312E</u>	At Completion (0 Hrs.) <u>NE</u> <u>1/10/2018</u>
	After Completion (≥ 24 Hrs.) <u>NE</u> <u>1/10/2018</u>

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	281.8	
	4 inches of Topsoil Light brown, m(+f) SAND, little mf Gravel, trace Silt, occasional roots and cobbles (Moist)			0.3
		5	276.8	
		10	271.8	
		13.5		
	Light brown, with orange brown, dark gray mottles, mf SAND, little Silt			
		15	266.8	

Bottom of Test Pit at 15.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MV\CAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-12
 PAGE 1 OF 1

Date Started: <u>1/25/18</u>	Ground Surface Elevation (ft.): <u>302.5</u>
Date Completed: <u>1/25/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered ∇ <u>NE</u> <u>1/25/2018</u>
Equipment: <u>Mini-Trackhoe CAT PC78</u>	At Completion (0 Hrs.) ∇ <u>NE</u> <u>1/25/2018</u>
	After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	302.5	
	6 inches of Topsoil; mf(+) SAND, little Silt			
	Light brown mf SAND, trace Silt; occasional Roots (Moist) (FILL)	0.5		
	Tan, mf SAND, trace Silt; occasional Roots (Dry) (FILL)	1.8		
	Dark Tan, mf SAND, little Silt (Moist)	4.5		Hand-probe= 6 inches @ 2.0 ft
		5	297.5	Hand-probe= 12 inches @ 3.3 ft
		10	292.5	

Bottom of Test Pit at 10.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MVCAD01\GEOTECH\INT\PROJECTS\13001204A - COSTCO ALBANY.GPJ



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

TEST PIT TP-13
 PAGE 1 OF 1

Date Started: <u>1/25/18</u>	Ground Surface Elevation (ft.): <u>299.88</u>
Date Completed: <u>1/25/18</u>	Datum: <u>Topo</u>
Contractor: <u>Rifenburg Contracting Corp.</u>	Groundwater: Depth (ft.) Date
Operator: <u>PJ</u>	First Encountered ∇ <u>NE</u> <u>1/25/2018</u>
Equipment: <u>Mini-Trackhoe CAT PC78</u>	At Completion (0 Hrs.) ∇ <u>NE</u> <u>1/25/2018</u>
	After Completion (\geq 24 Hrs.) ∇ _____

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft.)	ELEVATION (ft.)	REMARKS
		0	299.9	
	8 inches of Topsoil with Roots; Dark gray, mf SAND, little Silt	0.7		
	Light brown, mf SAND, trace Silt; frequent Roots (Moist)			Caving starting at 2.5 ft
	Light brown, mf SAND, trace Silt (Moist)	2.3		Hand-probe= 8 inches @ 3.0 ft
		5	294.9	
		10	289.9	

Bottom of Test Pit at 10.0 Ft.

Logged By: NRC Checked By: MJC

Notes:

MASER TEST PIT - KZA DATA TEMPLATE.GDT - 3/2/18 19:11 - \\MVCAD01\GEOTECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

APPENDIX C
(LABORATORY DATA)

Summary of Laboratory Test Results

Source	Sample I.D.	Depth (Ft.)	Moisture Content (%)	<#200 Sieve (%)	Liquid Limit	Plasticity Index	K-Class	Dry Density (pcf)	Optimum Moisture Content (%)	Void Ratio	Saturation (%)		
B-01	S-02	2.0	9.0										
B-01	S-03	4.0	4.6	2.2									
B-01	S-04	6.0	5.2										
B-01	S-05	8.0	6.1										
B-03	S-03	4.0	2.6	2.9									
B-12	S-03	4.0	7.0	7.7									
B-13	S-02	2.0	14.0										
B-13	S-03	4.0	13.6	10.2									
B-13	S-04	6.0	6.1										
B-13	S-05	8.0	4.5										
B-13	S-06	13.0	33.2										
B-13	S-07	18.0	33.3										
B-18	S-02	2.0	9.1	7.3									
B-22	S-02	2.0	6.7										
B-22	S-03	4.0	7.1	3.4									
B-22	S-04	6.0	9.1										
B-22	S-05	8.0	12.3										
B-22	S-06	13.0	24.4										
B-22	S-07	18.0	22.2										

LAB SUMMARY: NON KZA PROJECTS - US_LAB.GDT - 2/1/18 11:36 - \\MV\CAD01\GEO\TECH\GINT\PROJECTS\13001204A - COSTCO ALBANY.GPJ

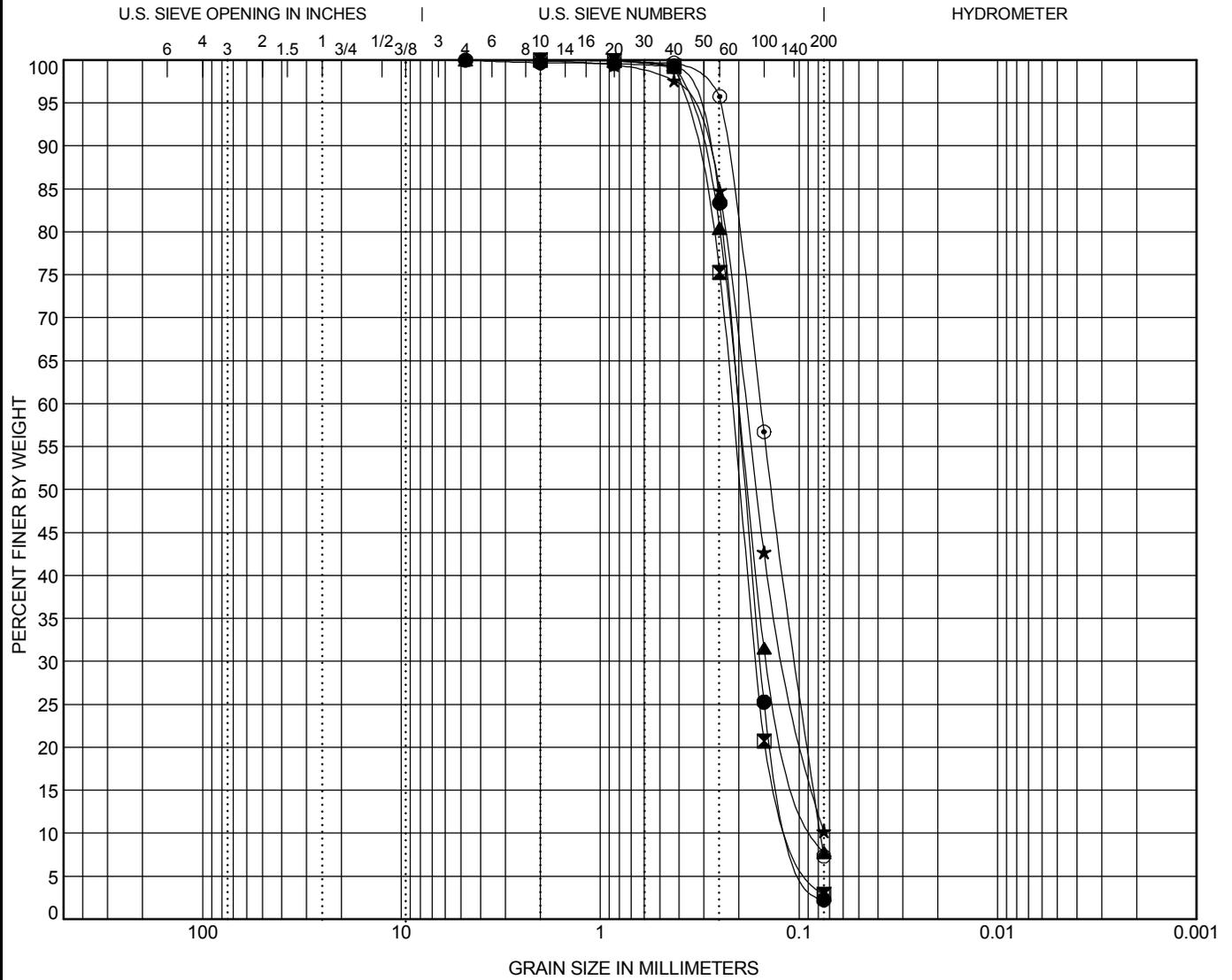


Project: **PROPOSED COSTCO WHOLESALE**

Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**

Number: **13001204A**

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

Source	I.D.	Depth	Classification				LL	PL	PI	Cc	Cu	
●	B-01	S-03	4.0	mf(+) SAND, trace Silt/Clay							1.27	2.15
⊠	B-03	S-03	4.0	mf(+) SAND, trace Silt/Clay							1.25	2.19
▲	B-12	S-03	4.0	mf(+) SAND, trace Silt/Clay							1.27	2.52
★	B-13	S-03	4.0	mf(+) SAND, little(-) Silt/Clay							0.95	2.48
⊙	B-18	S-02	2.0	f SAND, trace Silt/Clay							0.87	2.01
Source	I.D.	Depth	W (%)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	B-01	S-03	4.0	4.6	4.75	0.2	0.16	0.09	0.3	97.4	2.2	
⊠	B-03	S-03	4.0	2.6	2	0.22	0.16	0.1	0.0	97.1	2.9	
▲	B-12	S-03	4.0	7.0	4.75	0.2	0.14	0.08	0.0	92.2	7.7	
★	B-13	S-03	4.0	13.6	4.75	0.19	0.11		0.1	89.7	10.2	
⊙	B-18	S-02	2.0	9.1	2	0.16	0.1	0.08	0.0	92.7	7.3	

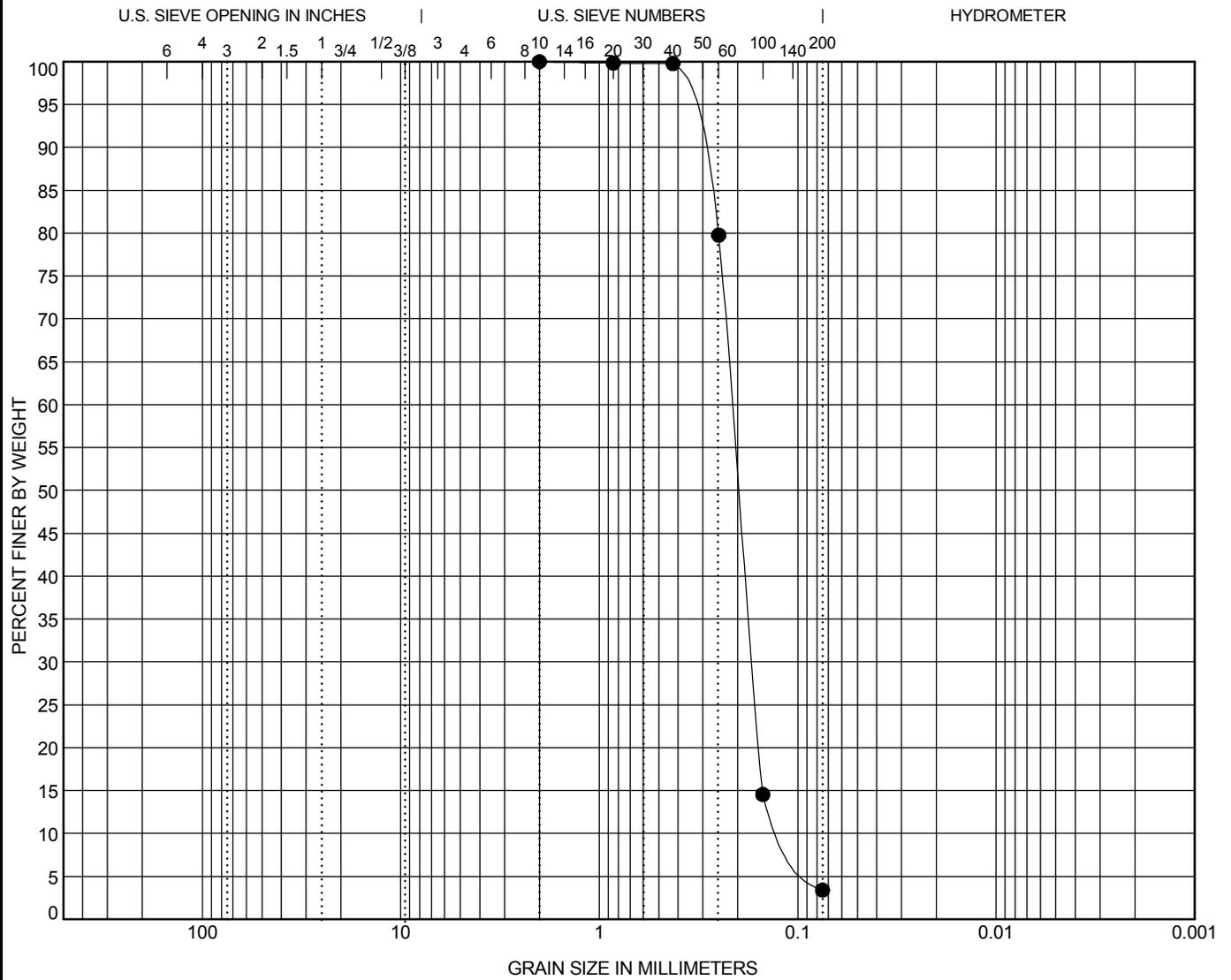
*Testing performed in accordance with ASTM Standards



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Figure GS- 1

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

Source	I.D.	Depth	Classification						LL	PL	PI	Cc	Cu
● B-22	S-03	4.0	mf(+) SAND, trace Silt/Clay									1.18	1.89
Source	I.D.	Depth	W (%)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-22	S-03	4.0	7.1	2	0.21	0.17	0.11	0.0	96.6	3.4			

*Testing performed in accordance with ASTM Standards



Project: **PROPOSED COSTCO WHOLESALE**
 Location: **CITY OF ALBANY, ALBANY COUNTY, NEW YORK**
 Number: **13001204A**

Figure GS- 2

Project: COSTCO - Albany
Project No.: 60506207



SUMMARY OF LABORATORY TEST RESULTS

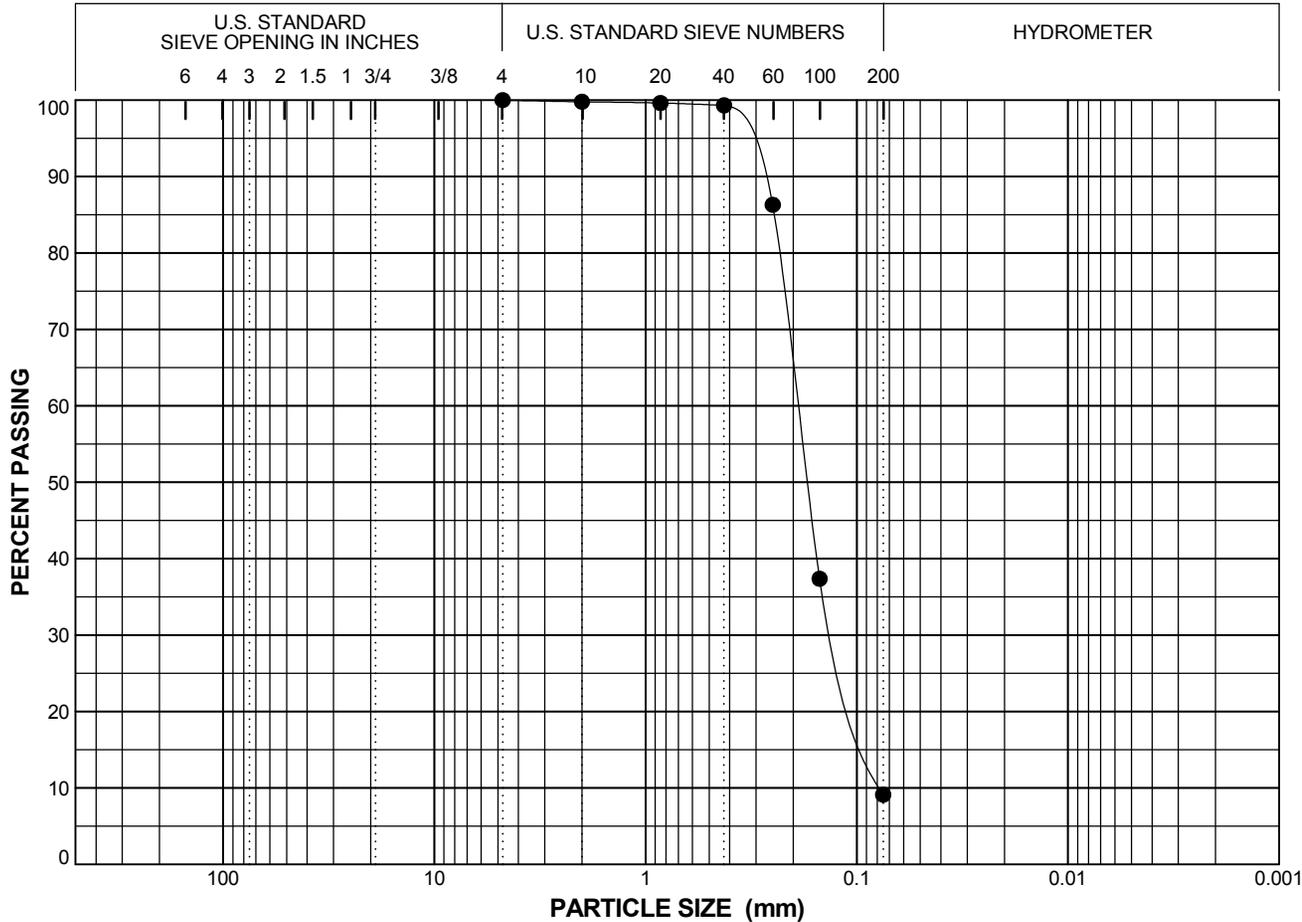
Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2µ (%)			Stress (psi)	Strain (%)	UU	CIU		
Composite Test Pit	2.0-6.0	Brown gray POORLY GRADED SAND with SILT	SP-SM	3.5						9		*							

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves

SIEVE_BLUEBELL_NEW 60506207_2018-02-01_COSTCO-ALBANY.GPJ_URS_BLUE.GDT 2/7/18

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



SYMBOL	●		
Boring Sample Spec	Composite Test Pit		
Depth (ft)	2.0-6.0		
% +3"	0.0		
% Gravel	0.0		
% Sand	90.9		
% Fines	9.1		
% -2μ			
Cc	1.08		
Cu	2.48		
LL			
PL			
PI			
USCS	SP-SM		
w (%)	3.5		

Particle Size (Sieve #)	PERCENT FINER		
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
4	100.0		
10	99.8		
20	99.6		
40	99.3		
60	86.3		
100	37.4		
200	9.1		

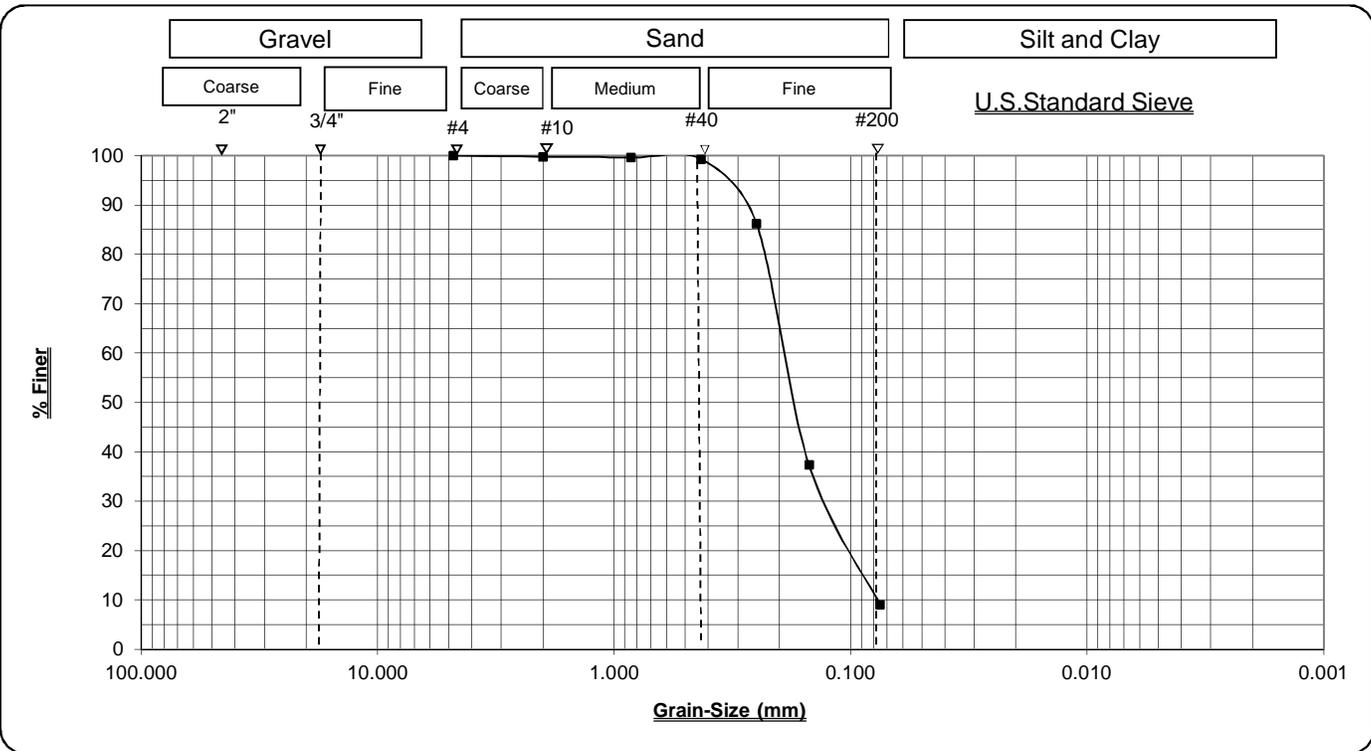
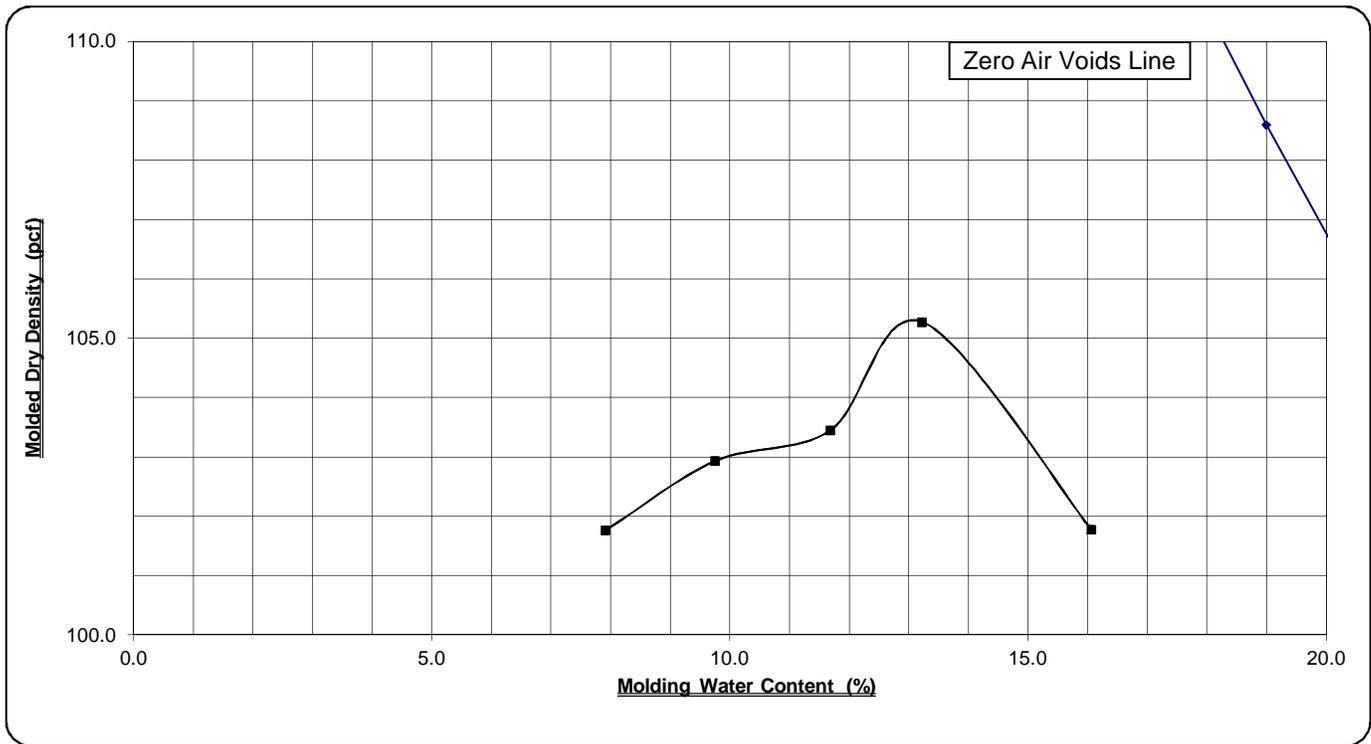
SYMBOL	DESCRIPTION AND REMARKS
●	Brown gray POORLY GRADED SAND with SILT (SP-SM)

PARTICLE SIZE DISTRIBUTION		
COSTCO - Albany		
Project Number 60506207	February 2018	Figure 1
AECOM		

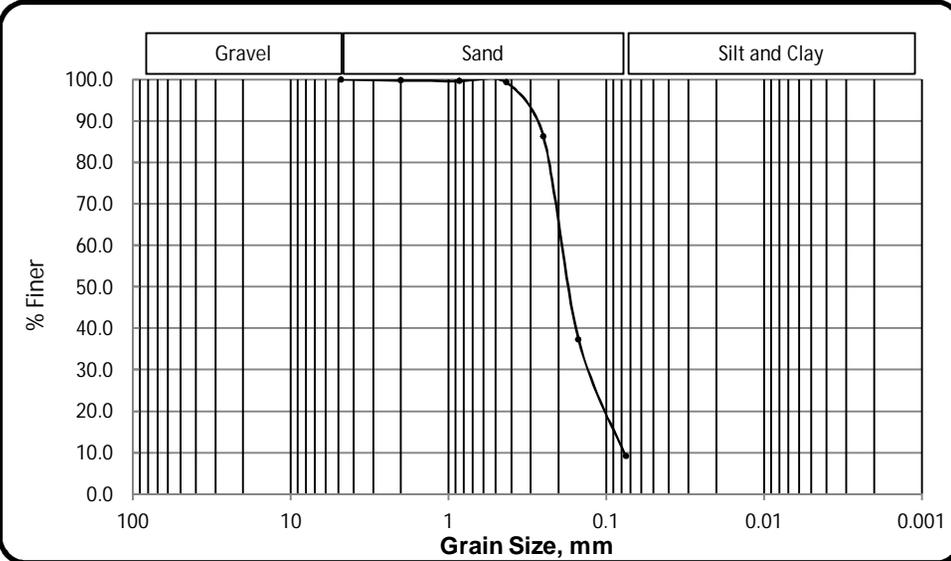
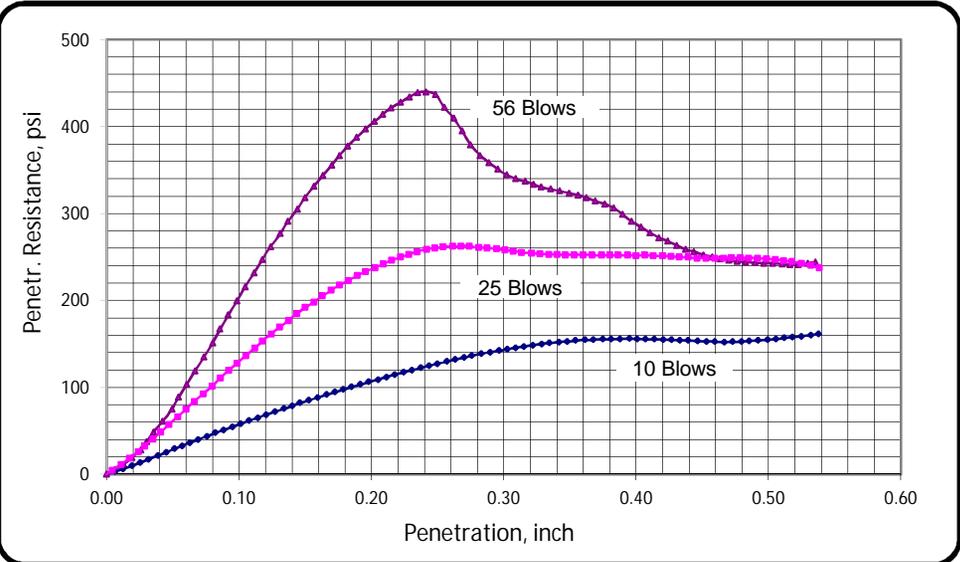
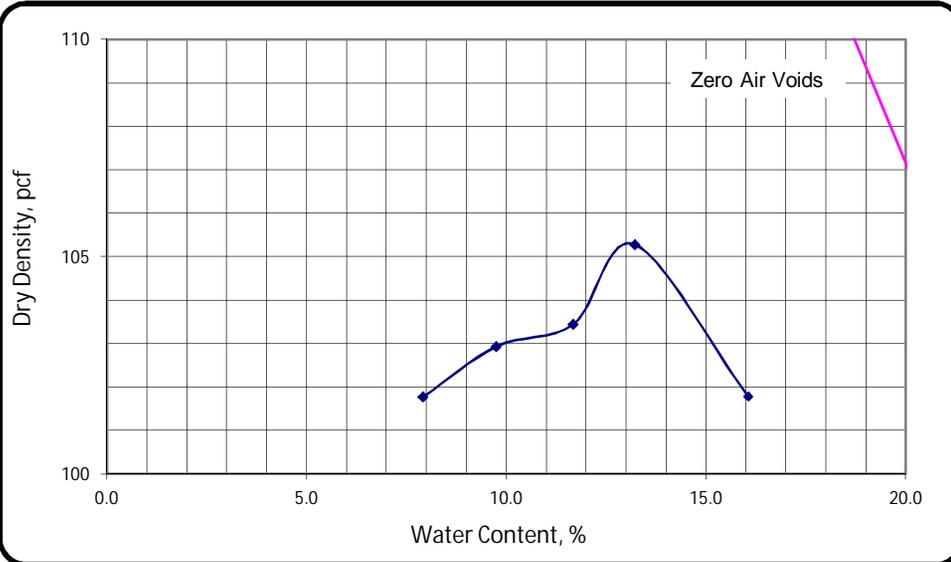


Laboratory Compaction Characteristic of Soil Using Modified Effort (ASTM D 1557) Method C

Job No.	60506207	Date	7-Feb-18
File No.	2018-02-01	Assumed Specific Gravity (-10 Sieve Mat.)	2.60
Job Name:	COSTCO - Albany	Assumed Specific Gravity (+#4 Sieve Mat.)	2.60
Boring No.:	Composite Sample: Test Pit 2.0-6.0 ft	Average Specific Gravity	2.60
Description:	Brown gray POORLY GRADED SAND with SILT	Maximum Dry Density, pcf	105.3
Liquid Limit:	NA	Optimum Water Content, %	13.2
Plastic Limit:	NA	Corrected Max. Dry Density, pcf	105.3
Plastic Index:	NA	Corrected Optimum Water Content, %	13.2
As-Received Water Content, %	3.5		



California Bearing Ratio ASTM D1883/1557



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Edison
777 New Durham Road
Edison, NJ 08817
Tel: (732)549-3900

TestAmerica Job ID: 460-149690-1

Client Project/Site: ALBANY NEW YORK

For:

Maser Consulting P.A.
410 Eagleview Blvd.
Suite 104
Exton, Pennsylvania 19341

Attn: Matt Church



Authorized for release by:
2/15/2018 8:58:04 AM

Sapna Nayyar, Project Manager I
(732)549-3900
sapna.nayyar@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: Maser Consulting P.A.
Project/Site: ALBANY NEW YORK

TestAmerica Job ID: 460-149690-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
U	Indicates the analyte was analyzed for but not detected.
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Maser Consulting P.A.
Project/Site: ALBANY NEW YORK

TestAmerica Job ID: 460-149690-1

Job ID: 460-149690-1

Laboratory: TestAmerica Edison

Narrative

**Job Narrative
460-149690-1**

Comments

No additional comments.

Receipt

The sample was received on 2/6/2018 9:30 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 17.5° C.

Receipt Exceptions

No TAT listed on COC.

The following sample(s) was received at the laboratory without a sample collection time documented on the chain of custody. There was a date only written on sample container.

The following sample(s) was received at the laboratory outside the required temperature criteria. Sample was received through Fedex in envelope.No cooler or ice present.

Method(s) Moisture: The sample duplicate precision for the following sample associated with analytical batch 460-495284 was outside control limits: composite sample bag (460-149690-1), (460-149677-A-9) and (460-149677-A-9 DU).

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Client Sample Results

Client: Maser Consulting P.A.
Project/Site: ALBANY NEW YORK

TestAmerica Job ID: 460-149690-1

Client Sample ID: composite sample bag

Lab Sample ID: 460-149690-1

Date Collected: 02/02/18 00:00

Matrix: Solid

Date Received: 02/06/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.1	HF			SU			02/14/18 15:53	1
Corrosivity	7.1	HF			SU			02/14/18 15:53	1
Percent Moisture	5.4		1.0	1.0	%			02/06/18 12:24	1
Percent Solids	94.6		1.0	1.0	%			02/06/18 12:24	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Oxidation Reduction Potential	537				millivolts			02/12/18 19:51	1

Client Sample ID: composite sample bag

Lab Sample ID: 460-149690-1

Date Collected: 02/02/18 00:00

Matrix: Solid

Date Received: 02/06/18 09:30

Percent Solids: 94.6

Method: 9056A - Anions, Ion Chromatography - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.23		1.26	0.50	mg/Kg	☼		02/14/18 03:44	1
Sulfate	32.1		6.31	2.10	mg/Kg	☼		02/14/18 03:44	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	2.9	U F1	9.2	2.9	mg/Kg	☼	02/09/18 11:30	02/09/18 15:30	1

Lab Chronicle

Client: Maser Consulting P.A.
Project/Site: ALBANY NEW YORK

TestAmerica Job ID: 460-149690-1

Client Sample ID: composite sample bag

Lab Sample ID: 460-149690-1

Date Collected: 02/02/18 00:00

Matrix: Solid

Date Received: 02/06/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9045C		1	497245	02/14/18 15:53	YAH	TAL EDI
Total/NA	Analysis	Moisture		1	495284	02/06/18 12:24	BJP	TAL EDI
Soluble	Leach	DI Leach			496655	02/12/18 15:00	YAH	TAL EDI
Soluble	Analysis	SM 2580B		1	496656	02/12/18 19:51	YAH	TAL EDI

Client Sample ID: composite sample bag

Lab Sample ID: 460-149690-1

Date Collected: 02/02/18 00:00

Matrix: Solid

Date Received: 02/06/18 09:30

Percent Solids: 94.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Soluble	Leach	DI Leach			495616	02/07/18 13:31	SOK	TAL EDI
Soluble	Analysis	9056A		1	496797	02/14/18 03:44	MJA	TAL EDI
Total/NA	Prep	9030B			496865	02/09/18 11:30	HTV	TAL EDI
Total/NA	Analysis	9034		1	496873	02/09/18 15:30	HTV	TAL EDI

Laboratory References:

TAL EDI = TestAmerica Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Accreditation/Certification Summary

Client: Maser Consulting P.A.
 Project/Site: ALBANY NEW YORK

TestAmerica Job ID: 460-149690-1

Laboratory: TestAmerica Edison

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
New Jersey	NELAP	2	12028	06-30-18

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids
SM 2580B		Solid	Oxidation Reduction Potential

Pennsylvania	NELAP	3	68-00522	02-28-18
--------------	-------	---	----------	----------

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids
SM 2580B		Solid	Oxidation Reduction Potential

Method Summary

Client: Maser Consulting P.A.
Project/Site: ALBANY NEW YORK

TestAmerica Job ID: 460-149690-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL EDI
9034	Sulfide, Acid Soluble and Insoluble (Titrimetric)	SW846	TAL EDI
9045C	pH	SW846	TAL EDI
Moisture	Percent Moisture	EPA	TAL EDI
SM 2580B	Reduction-Oxidation (REDOX) Potential	SM	TAL EDI

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL EDI = TestAmerica Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Sample Summary

Client: Maser Consulting P.A.
Project/Site: ALBANY NEW YORK

TestAmerica Job ID: 460-149690-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
460-149690-1	composite sample bag	Solid	02/02/18 00:00	02/06/18 09:30

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Login Sample Receipt Checklist

Client: Maser Consulting P.A.

Job Number: 460-149690-1

Login Number: 149690

List Source: TestAmerica Edison

List Number: 1

Creator: Fernandez, Diana X

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	no cooler , no ice
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Soil Test Report Lab #: 2018-65555

Maser Consulting
Matthew Church
410 Eagleview Blvd.
Suite 104
Exton, PA 19341

Date Received: 2018-01-23

Date Reported: 2018-02-01

mchurch@maserconsulting.com
(610)254-9140
(610)254-9141(fax)

Crop or Plant

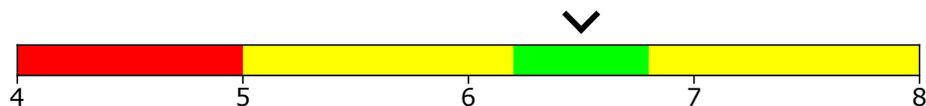
NewOrnamental shrubs and small trees, non-acid-loving

Sample ID: 13001204A-180110-Topsoil

Results and Interpretations

Loamy Sand

pH: 6.50 Slightly acidic; optimum pH range of many plants except acid-loving species.



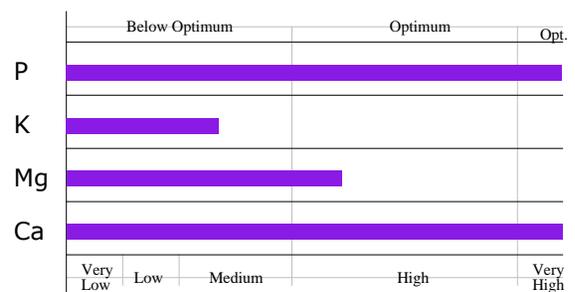
Lime Requirement Index: 7.59

The Lime Requirement Index (LRI) is a measure of the buffering capacity of the soil, its resistance to pH change, and is used to determine the appropriate amount of limestone, when necessary. LRI value near 8.0 indicates low buffering capacity of soil and a lower rate of limestone amendment compared to soil with high buffering capacity (LRI near 7.0).

Macronutrients (pounds per acre)

by Mehlich 3 extraction

Phosphorus: 150 (Above Optimum)
Potassium: 103 (Below Optimum)
Magnesium: 177 (Optimum)
Calcium: 2287 (Above Optimum)



Micronutrients (parts per million)

Zinc(Zn) 5.92 (Adequate)	Copper(Cu) 0.95 (Adequate)	Manganese(Mn) 75.32 (High)	Boron(B) 0.42 (Low)	Iron(Fe) 216.90 (High)
------------------------------------	--------------------------------------	--------------------------------------	-------------------------------	----------------------------------

Special Tests Results

Visual Description: Moist Color: Very Dark Brown. As received: Moist, Aggregated (friable), Coarse-loamy Material.
Coarse rock fragments: Few. Organic detritus: Common Roots.

Soluble Salts- Electrical conductivity= 0.09 mmho/cm
(Low)

Organic Matter by Carbon Analysis: Organic Matter=2.3%
Very High for Loamy Sand

Gravel Content- Larger than 2mm: 2.7%

Mechanical Analysis- Sand= 83% Silt=9% Clay= 8% Texture: Loamy Sand

pH, Calcium, and Magnesium Recommendations

The soil pH is in the optimum range of 6.20 to 6.80 for the growth of most Ornamental shrubs and small trees, non-acid-loving. Do not apply any limestone.

Fertilizer Recommendations

BEFORE PLANTING

Target ratio for fertilizer product is: 1-0-1 ,which represents the fertilizer's relative amounts of nitrogen (N), phosphorus as P₂O₅, and potassium as K₂O.

Nitrogen requirement is 2 pounds per 1000 square feet (or, equivalent to 0.2 pound per 100 square feet). New plantings provide opportunity to amend the whole root zone of soil for long term fertility and tilth; subsequent management for established plantings will be limited to surface applications.

DO THIS: Broadcast a fertilizer with the indicated N:P:K ratio at a rate to achieve the desired Nitrogen requirement, and mix into the surface 6- to 8-inches. On soils that are low in organic matter or in poor tilth, amend with 4 to 5 cubic feet of organic matter, such as peat moss or compost, for each 100 square feet of area. Blend into the soil. Do not include dry fertilizer in the backfill hole; young, tender roots are especially susceptible to tissue burn. Delay surface fertilization until after the first growing season.

WHAT ABOUT NEXT YEAR?

The fertilizer prescription above is intended to bring soil nutrients to optimal or near-optimal conditions, and subsequent management recommendations are intended to maintain soil nutrients levels near optimum. The best nutrient ratio for maintenance fertilization of the ornamental shrubs and small trees beyond 2 years is best determined by another soil test.

DO THIS: Broadcast a fertilizer with 2-1-1 ratio of N:P:K at a rate to achieve 1 pound Nitrogen per 1000 square feet (or/equivalent to 0.1 pound Nitrogen per 100 square feet) on the soil surface. Rake to improve contact with soil and water lightly.

How do I find the proper fertilizer product?

For help finding appropriate fertilizers and rates, consult the Rutgers Soil Testing Laboratory website: rci.rutgers.edu/~soilslab/FertProducts/. The website lists commercially available products according to their nutrient analyses to assist you with product selection and calculation of amount required.

Select a fertilizer that has a nutrient grade (also known as guaranteed minimum analysis) the same as or a multiple of the values recommended, or select a close match to that ratio. When no single fertilizer product matches or approximates the recommended N:P₂O₅:K₂O nutrient ratio, it will be necessary to use two or more fertilizers to reach the correct balance of nutrients. The proper amount of fertilizer to apply in a single application depends on the actual fertilizer grade of the fertilizer product selected, the total area (square feet) to be treated, and the total number of fertilizer applications to be made throughout the year.

Micronutrient Statements

Zinc does not appear to be a limiting factor. For information about zinc in soil for plant nutrition, see FS721.

Copper does not appear to be a limiting factor. As with most other micronutrients, copper availability is related to soil pH. Do not over-lime. For more information about soil copper, see FS720.

Manganese may be toxic to sensitive crops when grown on low pH soil. Adding lime to the soil raises the pH and decreases manganese toxicity. Liming is generally not recommended for acid-loving plants, which are more tolerant of high levels of manganese. In excessive amounts, soil manganese can cause plant damage. This occurs primarily in low pH soil. Lime soil as recommended to decrease availability of manganese to plants. Avoid fertilizers that contain manganese. See FS973 for more information.

Plant types differ in their susceptibility to boron deficiency; certain fruit, vegetable, and field crops are most susceptible. Symptoms include improper development or dieback of growing tips, poor flowering or fruit set, twisting and yellowing of young leaves from base to tip, and black heart of roots. Lime only as necessary, since pH above 7.0 limits boron availability. Building up organic matter content of soil will increase boron availability. Use of boron fertilizer must be done only with extreme care because of the toxicity that might occur if over-applied and the difficulty of applying the low rates necessary. See FS873 for more information and follow recommendations above.

Plant availability to iron is highly dependent on soil pH. Although soil iron appears plentiful, high soil pH could limit its availability. On the other hand, plant damage due to iron toxicity, though not common, could occur at low soil pH (acidic soil). Maintain soil pH in the optimum range as described in Recommendations. See FS971 for more information.

Comments:

Find Rutgers Cooperative Extension Fact Sheets at www.njaes.rutgers.edu/pubs



APPENDIX D

(PAVEMENT DESIGN DATA)

Project: 13001204A – Proposed COSTCO Wholesale
 City of Albany, Albany County, NY

=====
 Based on AASHTO '93 -- Pavement Analysis Program
 =====

Standard Duty Flexible Asphalt Pavement

***** Flexible Analysis *****

- * Structural Number = 2.13
- * Design E 18's = 65,000
- * Reliability = 95.00 percent
- * Overall Deviation = 0.45
- * Resilient Modulus = 9,388.70 psi
- * Initial Serviceability = 4.20
- * Terminal Serviceability = 2.00

Layer Number	Layer Coefficient a(i)	Drainage Coefficient (Cd)	Layer Thickness (t)(in.)	a(i) *Cd*t
1	0.44	1.00	2.00	0.88
2	0.38	1.00	2.50	0.95
3	0.10	1.00	6.00	0.60
Total SN:				2.43

Project: 13001204A – Proposed COSTCO Wholesale
 City of Albany, Albany County, NY

=====
 Based on AASHTO '93 -- Pavement Analysis Program
 =====

Heavy Duty Flexible Asphalt Pavement

***** Flexible Analysis *****

- * Structural Number = 3.00
- * Design E 18's = 485,000
- * Reliability = 95.00 percent
- * Overall Deviation = 0.45
- * Resilient Modulus = 9,388.70 psi
- * Initial Serviceability = 4.20
- * Terminal Serviceability = 2.00

Layer Number	Layer Coefficient a(i)	Drainage Coefficient (Cd)	Layer Thickness (t)(in.)	a(i) *Cd*t
1	0.44	1.00	2.00	0.88
2	0.38	1.00	4.00	1.52
3	0.10	1.00	6.00	0.60
			Total SN:	3.00

Project: 13001204A – Proposed COSTCO Wholesale
City of Albany, Albany County, NY

=====
Based on AASHTO '93 -- Pavement Analysis Program
=====

Heavy Duty Rigid Concrete Pavement

***** Rigid Analysis *****

- * **Pavement Depth** = **6.00 inches**
- * Design E 18's = 1,151,700
- * Reliability = 95.00 percent
- * Overall Deviation = 0.35
- * Modulus of Rupture = 550.0 psi
- * Modulus of Elasticity = 3,700,000 psi
- * Load Transfer, J = 3.20
- * Mod. of Subgrade Reaction = 428 psi/in
- * Drainage Coefficient = 1.25
- * Initial Serviceability = 4.50
- * Terminal Serviceability = 2.00

For k determination:

- * Resilient Mod. Subgrade = 9,388.7 psi
- * Resilient Mod. Base = 10,000 psi
- * Base Thickness = 6.0 in.
- * Depth to Rigid Foundation = 0.0 ft.
- * Loss of Support Value = 0



APPENDIX 15

CHANNEL PROTECTION VOLUME CALCULATIONS

Costco Wholesale

March 2019

Town of Guilderland, Albany County, NY
Maser Consulting Project No. 13001204A

Channel Protection Volume (CPv) Calculation

Area (A)	=	18.151	acres (taken from HydroCAD)
CN	=	89	Composite (taken from HydroCAD)
Time of Concentration	=	0.08333	hours (taken from HydroCAD)
P, 1-year Design Storm	=	2.23	inches (taken from HydroCAD IDF)
Q, runoff	=	28.52	cfs (taken from HydroCAD)
Q, runoff	=	1.36	inches

$$I_a = (200/CN) - 2$$

$$I_a = (200/CN) - 2 = 0.247$$

$$I_a/P = (I_a/P) = 0.111$$

$$Q_u = 640 \quad (\text{taken from Exhibit 4-III in TR-55})$$

$$Q_o/Q_i = 0.03 \quad (\text{taken from Fig 8.5 in NYSSMDM})$$

$$V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.69(q_o/q_i)^2 - 0.804(q_o/q_i)^3$$

$$V_s/V_r = 0.64$$

$$\text{Solve for } V_s \text{ (a.k.a CPv Required)} = V_s/V_r * Q * A / 12$$

$$V_s = CPv = 1.320 \quad \text{acre-feet}$$

CPv Provided equal to Volume provided at 10-year Storm Elevation within Basin

$$CPv = 2.289 \quad \text{acre-feet}$$

Is minimum CPv Provided: Yes



MC Project No. 13001204A

APPENDIX 16

CDS DESIGN DOCUMENTS

CDS Design Summary

Prepared by Taylor Murdock on January 15, 2019

Commercial Development

Albany, NY

Information provided by Maser Consulting

Site information:

Structure ID	Area (ac)	Percent Impervious	Tc (min)	Water Quality Flow (cfs)
WQ #1	5.60	74.60%	6	1.81

Assumptions:

- NYSDEC has adopted the NJCAT/NJDEP verified flow rates for the CDS system. NYSDEC has effectively created three categories of treatment, new development (standalone), redevelopment and pretreatment. Specific approval and sizing criteria are applied to each category. Per the specifying engineer, this project requires pretreatment of 25% of the WQv prior to infiltration.

CDS System Sizing:

The CDS Stormwater Treatment System is a high-performance hydrodynamic separator. Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, preventing re-suspension and release of previously trapped pollutants.

Contech typically selects the CDS model that based on the NJCAT/NJDEP verified flow rates meets or exceeds the Water Quality Flow generated by the Water Quality Volume. The NJCAT/NJDEP verification uses the TARP protocol and as such meets the requirement laid out by NYSDEC on page 9-8 of the New York State Stormwater Management Design Manual for redevelopment projects. No such specification exists for pretreatment projects, but in the best interest of the environment Contech holds to those flows for pretreatment projects as well. Based on the flows above, Contech recommends:

Structure ID	Treatment Device	NYSDEC Approved Treatment Flow (cfs)
WQ #1	CDS3030-6 (CDS-6)	2.10

Maintenance:

Like any stormwater best management practice, the CDS system requires regular inspection and maintenance to ensure optimal performance. Maintenance frequency will be driven by site conditions. Quarterly visual inspections are recommended, at which time the accumulation of pollutants can be determined. On average, the CDS system requires annual removal of accumulated pollutants.

Please contact us if you have any questions or need any additional information. Again, thank you for your interest in the CDS system. We look forward to receiving your feedback and working with you.

CDS Design Summary

Prepared by Taylor Murdock on January 15, 2019

Commercial Development

Albany, NY

Information provided by Maser Consulting

Site information:

Structure ID	Area (ac)	Percent Impervious	Tc (min)	Water Quality Flow (cfs)
WQ #2	5.47	95.30%	6	2.23

Assumptions:

- NYSDEC has adopted the NJCAT/NJDEP verified flow rates for the CDS system. NYSDEC has effectively created three categories of treatment, new development (standalone), redevelopment and pretreatment. Specific approval and sizing criteria are applied to each category. Per the specifying engineer, this project requires pretreatment of 25% of the WQv prior to infiltration.

CDS System Sizing:

The CDS Stormwater Treatment System is a high-performance hydrodynamic separator. Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, preventing re-suspension and release of previously trapped pollutants.

Contech typically selects the CDS model that based on the NJCAT/NJDEP verified flow rates meets or exceeds the Water Quality Flow generated by the Water Quality Volume. The NJCAT/NJDEP verification uses the TARP protocol and as such meets the requirement laid out by NYSDEC on page 9-8 of the New York State Stormwater Management Design Manual for redevelopment projects. No such specification exists for pretreatment projects, but in the best interest of the environment Contech holds to those flows for pretreatment projects as well. Based on the flows above, Contech recommends:

Structure ID	Treatment Device	NYSDEC Approved Treatment Flow (cfs)
WQ #2	CDS3535-7 (CDS-7)	2.80

Maintenance:

Like any stormwater best management practice, the CDS system requires regular inspection and maintenance to ensure optimal performance. Maintenance frequency will be driven by site conditions. Quarterly visual inspections are recommended, at which time the accumulation of pollutants can be determined. On average, the CDS system requires annual removal of accumulated pollutants.

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CDS Design Summary

Prepared by Taylor Murdock on January 15, 2019

Commercial Development

Albany, NY

Information provided by Maser Consulting

Site information:

Structure ID	Area (ac)	Percent Impervious	Tc (min)	Water Quality Flow (cfs)
WQ #3	4.34	86.70%	6	1.62

Assumptions:

- NYSDEC has adopted the NJCAT/NJDEP verified flow rates for the CDS system. NYSDEC has effectively created three categories of treatment, new development (standalone), redevelopment and pretreatment. Specific approval and sizing criteria are applied to each category. Per the specifying engineer, this project requires pretreatment of 25% of the WQv prior to infiltration.

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The CDS Stormwater Treatment System is a high-performance hydrodynamic separator. Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, preventing re-suspension and release of previously trapped pollutants.

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Structure ID	Treatment Device	NYSDEC Approved Treatment Flow (cfs)
WQ #3	CDS3030-6 (CDS-6)	2.10

Maintenance:

Like any stormwater best management practice, the CDS system requires regular inspection and maintenance to ensure optimal performance. Maintenance frequency will be driven by site conditions. Quarterly visual inspections are recommended, at which time the accumulation of pollutants can be determined. On average, the CDS system requires annual removal of accumulated pollutants.

Please contact us if you have any questions or need any additional information. Again, thank you for your interest in the CDS system. We look forward to receiving your feedback and working with you.



APPENDIX 17

NJCAT TECHNOLOGY VERIFICATION CDS STORMWATER TREATMENT DEVICE

NJCAT TECHNOLOGY VERIFICATION

Continuous Deflective Separator (CDS®) Stormwater Treatment Device

(For Models that meet New Jersey's Unique Sizing Requirements)

Contech Engineered Solutions LLC

September, 2014

(Revised Table A-2 January 2017)

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1. Description of Technology

The CDS is a stormwater treatment device intended to remove pollutants, including suspended solids, trash and debris and floating oils from stormwater runoff. The CDS unit is typically comprised of a manhole that houses flow and screening controls designed around patented, continuous deflective separation technology. Figure 1 is a schematic representation of the solid separation mechanism of the CDS technology.

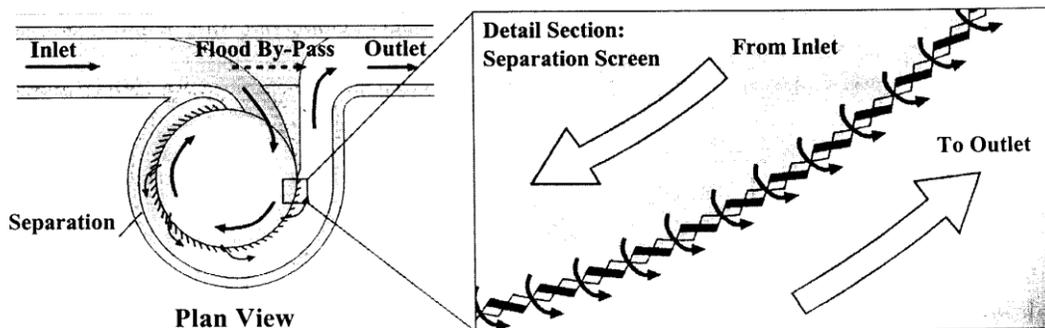


Figure 1 Schematic Representation of the CDS Solid Separation Mechanism

Stormwater runoff enters the CDS unit's diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed. The separation and containment chamber consist of a containment sump in the lower section and an upper separation section. Gross pollutants are separated within the chamber using a perforated screen plate allowing the filtered water to pass through to a volute return system and thence to the outlet pipe. The water and associated gross pollutants contained within the separation chamber are kept in continuous motion by the energy generated by the incoming flow. This has the effect of preventing the separation plate (screen) from being blocked by the gross solids separated from the inflow. The heavier solids ultimately settle into the containment sump. Figure 2 is a schematic representation of a typical CDS unit including critical components. For more details on the functionality of the CDS including drawings, videos and maintenance procedures please visit <http://www.conteches.com/Products/Stormwater-Management/Treatment/CDS.aspx>

The primary purpose of this verification testing was to establish the ability of the CDS to remove suspended solids from runoff as specified in the testing requirements detailed in the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" (NJDEP HDS Protocol) dated January 25, 2013 (NJDEP 2013a). In particular, the CDS was tested to determine the maximum operating rate that would enable retention of more than 50% of the "NJDEP Particle Size Distribution" as calculated using the weighted annualized formula that is described in Appendix A of the NJDEP HDS Protocol. Since the CDS is most effective at removing the coarser fraction of the suspended solids load it is recommended that the CDS be used as the first component of a treatment train.

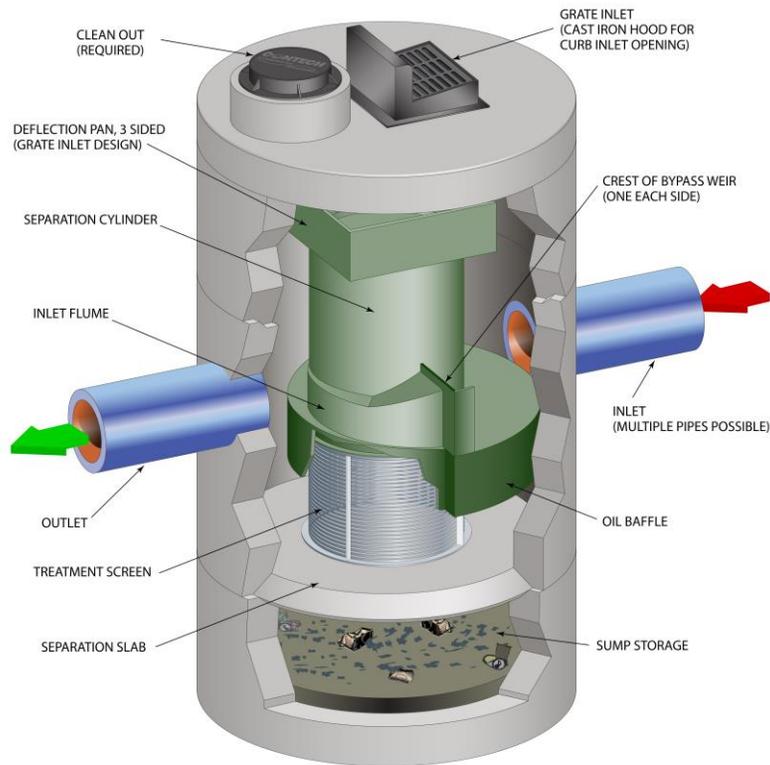


Figure 2 Graphic of Typical Inline CDS Unit and Core Components

2. Laboratory Testing

All TSS removal efficiency testing for this project was carried out at Contech's Scarborough, Maine laboratory under the direct supervision of FB Environmental Associates Inc. (FB). FB is a Portland, Maine based environmental consulting firm with past experience in a diverse suite of stormwater quality projects including past oversight of manufactured BMP testing initiatives. All water quality samples collected during this testing process were analyzed by Maine Environmental Laboratory, which is an independent analytical testing facility. Since Maine Environmental Laboratory does not conduct particle size analysis, and an alternate qualified facility was not identified locally, all particle size distribution (PSD) analysis was completed in-house at Contech's laboratory under the direct supervision of FB for the duration of all PSD analysis.

2.1 Test Setup

A CDS-4 Model (4 ft. diameter) unit was tested in accordance with the NJDEP HDS Protocol. A schematic of the CDS-4 unit is shown in Figure 3. The CDS-4 test unit did not have a sediment weir, as traditionally units sold in NJ have had in the past. (Note: Contech plans to move away from units with a sediment weir.) The CDS-4 is a commercially available unit with a 2 ft diameter x 1.5 ft high 2400 micron perforated screen plate and is offered in New Jersey and other

areas that formally adopt New Jersey’s unique sizing requirements. Since New Jersey has very specific criteria in place that govern scaling and determination of treatment flow, as well as a unique weighted 50% removal efficiency calculation tied to historical New Jersey rainfall measurements, CDS models have been specifically tailored to comply with these requirements. Like many technologies, different CDS model configurations are available in different regions depending on local sizing and performance criteria.

Total Suspended Solids Removal Efficiency Laboratory Setup

The laboratory CDS-4 prototype is housed in a 4 ft. diameter cylindrical aluminum tank with a depth of 4.7 ft. below the inlet and outlet inverts to the sump floor. These dimensions are consistent with the commercially available CDS-4. The CDS-4 was TSS removal efficiency tested in a closed loop, re-circulatory laboratory system that is detailed in Figure 4. Inlet and outlet piping consists of 12 in. diameter schedule 40 PVC. Water enters the inlet pipe 12 ft. upstream from the test unit and the test sediment is dry fed through a 6 in. port located 6 ft. upstream from the test unit. Treated effluent is able to freely discharge through a downturned 90 degree elbow into an aluminum catch tank. The catch tank is configured with two filter partitions that filter remaining fines from the effluent prior to recirculation in order to maintain background concentrations at levels less than 20 mg/L. The first partition consists of 24-1 um nominal rated pre-filter bags while the second partition consists of 24-0.5 um rated primary filter bags. Filtered water is re-circulated into the 12 in. inlet pipe through a 10 hp pump. Flows are controlled by a 6 in. gate valve and monitored by a SeaMetrics Online Magmeter (model WMX104) coupled with SeaMetrics model EX201 flow computer.

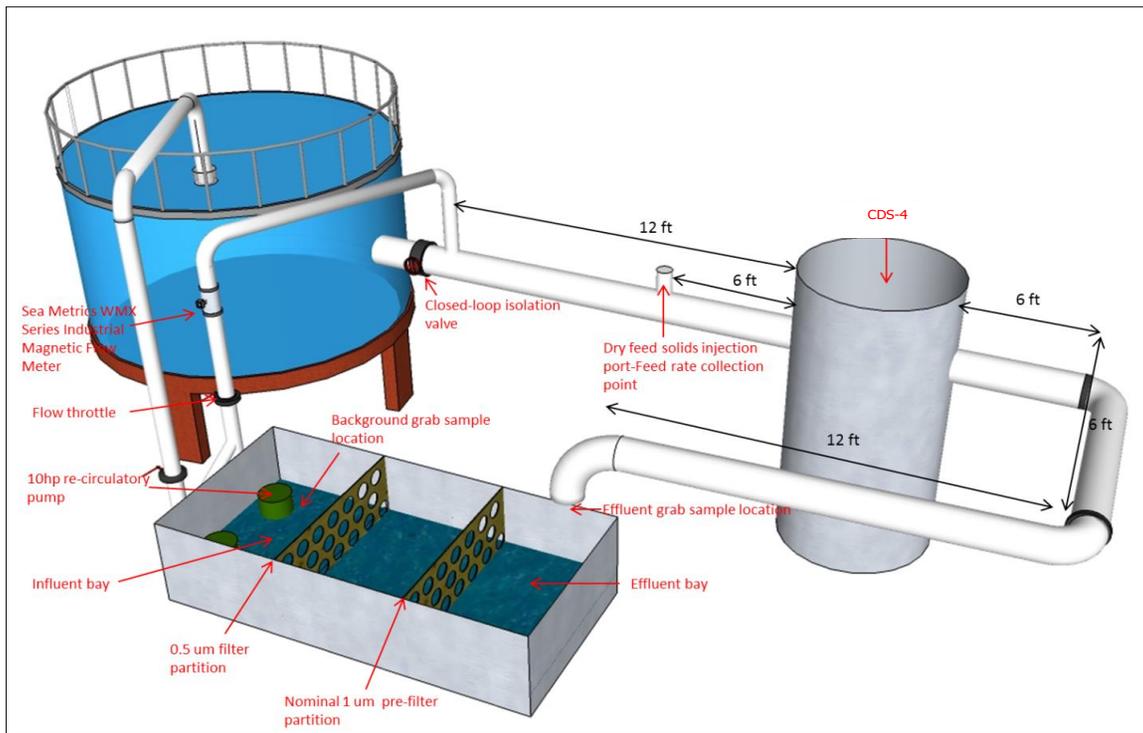


Figure 4 Schematic of TSS Removal Efficiency Laboratory Setup

Scour Test Laboratory Setup

Concerns were raised during the public comment review process on the CDS December 2013 posted verification report relative to the online scour testing procedure followed for the CDS-4 during testing originally completed and submitted to NJCAT in 2013. As a result, Contech agreed to alter the scour testing procedure and repeat the scour testing requirements described in the NJDEP laboratory protocol for hydrodynamic separators. Specifically, commenters questioned whether in addition to the dedicated sedimentation sump, sediment may also accumulate in the annular area outside of the screening chamber. Contech's experience with the CDS has demonstrated that sediment accumulation in this area is generally minimal. Since the possibility of some sediment accumulating in this area during low flows could not be ruled out, Contech agreed to repeat the scour testing procedure after preloading scour testing sediment in the sedimentation sump as well as on top of the annular area outside of the screening chamber.

The scour testing and associated procedures described herein were completed at Contech's full scale laboratory in Portland, Oregon since the Scarborough Maine laboratory was no longer available. All testing and procedures conducted at Contech's facility in Portland were overseen by Dr. Chris Berger, PhD., a colleague of Dr. Scott Wells, from Portland State University who has an extensive background in water quality research. Samples prepared for particle size analysis were sent to Apex Labs in Tigard, Oregon. Apex Labs is an independent certified analytical laboratory. All background and effluent samples collected during the scour testing procedure were also sent to Apex Labs for SSC analysis.

Testing was conducted on a full scale 4 ft. diameter (CDS-4) laboratory unit consistent in all dimensions with the commercially available CDS-4. The CDS-4 unit was housed in a 4 ft. diameter cylindrical aluminum tank. The 50% sediment storage capacity is defined as a sediment depth of 1 ft. and a vertical distance of 1 ft. from the bottom of the 6-inch separation slab. To simulate this condition a false floor was constructed eight inches from the sump floor and covered with four inches of the scour test sediment.

The scour testing on the CDS-4 was completed on a closed loop, re-circulatory laboratory system that is detailed in Figure 5. Water is provided to the unit via a 10 HP pump that pulls water from the HDPE open source tank and directs the water into a 12 in. diameter pipe 11.25 ft. upstream from the test unit. Flow is controlled through three 4 in. actuated valves, and one 4 in. manual bypass valve. Flow is monitored by a SeaMetrics Online Magmeter (model WMX104) coupled with a SeaMetrics FT420 rate indicator and a SeaMetrics DL76 data logger. Treated effluent is able to freely discharge through a downturned 90 degree elbow into an HDPE catch tank (discharge tank). A second 10 HP pump moves water from the discharge tank through two in-line filters of 5um and 1um respectively to remove particulate from the effluent prior to recirculation.

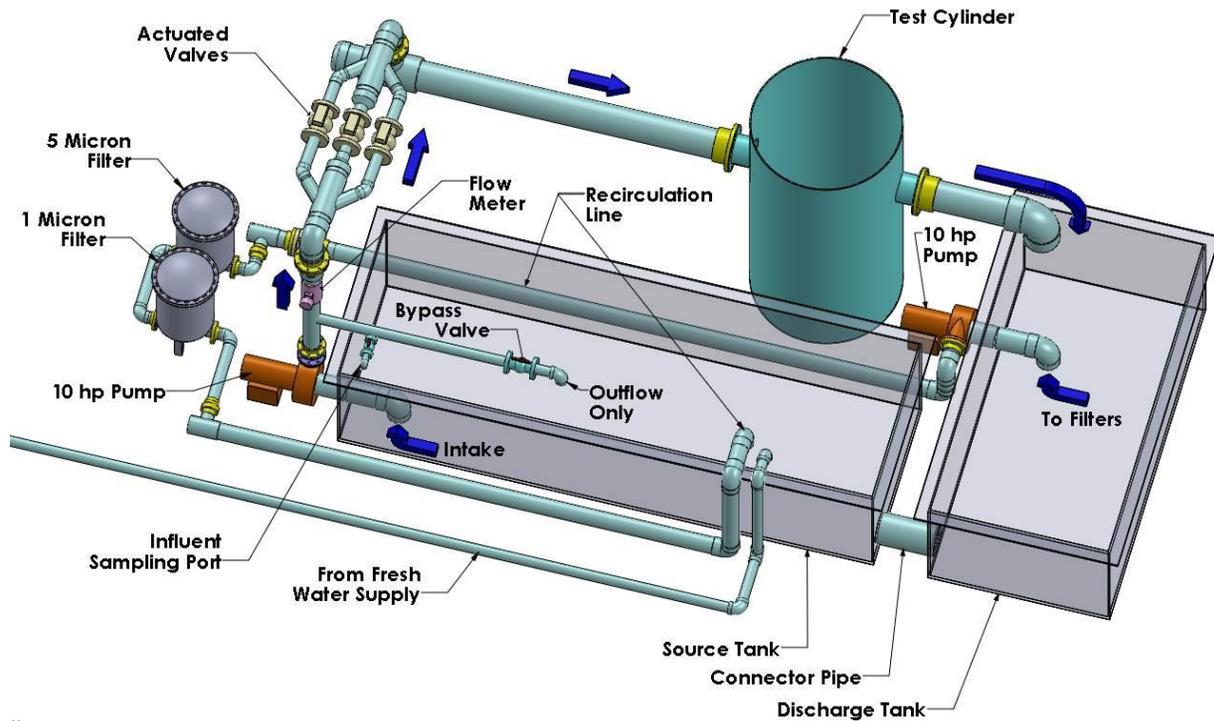


Figure 5 Schematic of Scour Testing Laboratory Setup

2.2 Test Sediment

Test Sediment Feed for Suspended Solids Removal Efficiency Testing

Sediment used for all solids removal testing was high purity silica (SiO_2 99.8%) material (Sp. gr. -2.65) with a particle size distribution (PSD) approximating 55% sand, 40% silt, and 5% clay. Sediment for the entire project was supplied by an outside vendor, blended together in a single batch and then packaged and shipped in fifty 50-lb. bags to Contech. Batch PSD was confirmed by Contech prior to testing by collecting subsamples from 20% of the bags (10 bags/subsamples) and compositing the subsamples into a single sample for PSD analysis. Each of the 50 bags was numbered 1-50 prior to subsample collection. The numbers 1-50 were then written on individual slips of paper and placed into a container. Numbers were pulled from the container at random to determine which of the 10 bags subsamples would be collected from. This process was repeated three times for a total of three separate PSD analyses, each of which was comprised of 10 subsamples.

The mean of the three PSD samples was calculated and plotted as a single PSD curve representing the batch of material. Sediment sampling for PSD analysis was conducted in-house with oversight from FB Environmental Associates, Inc. The three PSD analyses were also carried out in-house under the direct supervision of FB in accordance with ASTM D422-63 (reapproved 2007).

Scour Test Sediment

Prior to the start of testing, Contech procured a batch of scour sediment manufactured to be compliant with the scour sediment PSD specification defined in the NJDEP laboratory protocol. The scour sediment was packaged by the manufacturer into 50 lb. bags for delivery and storage. To ensure that the scour sediment was compliant with the PSD specifications, three composite samples comprised of 12 randomly pulled subsamples were collected and analyzed for PSD. The compositing procedure was as follows: 59 bags of washout sediment were numbered 1-59 prior to subsample collection. Microsoft Excel randomizer function was used to determine 3 sets of 12 randomly determined values using the RANDBETWEEN (x, y) function, where x = 1, and y= 59. Bags with numbers matching each set of randomly determined values were well mixed and then subsamples were collected and mixed together into a sample jar. Each subsample consisted of two level tablespoons of material with a combined weight of approximately 50 grams. The 3 composite samples were sent to Apex Labs in Tigard, Oregon for PSD testing following ASTM D422-63 (Reapproved 2007).

2.3 Removal Efficiency Testing Procedure

Removal efficiency testing utilized the “Effluent Grab Sampling Method,” as described in section 5D of the NJDEP HDS Protocol. FB Environmental provided third party oversight for the duration of all testing. Prior to each test, the flow rate was stabilized at the desired test rate. Once the flow rate was stabilized dry feed of the surrogate test contaminant commenced subsequently initiating the testing procedure. A vibratory hopper and auger (manufactured by Vibra-Screw Inc.) was used to meter solids into the flow stream at a rate calculated to yield 200 mg/L ($\pm 10\%$). Target feed rate (mg/min) was determined by the following formula:

$$\text{Feed Rate} = \text{Target Concentration} \times \text{Target Influent Flow Rate}$$

The grab sampling method was used to directly obtain each effluent, background and feed rate calibration sample. Effluent samples were collected by sweeping bottles in a circular motion through the freely discharging effluent stream. The duration required to obtain each feed rate sample was measured and recorded to the nearest second. The first effluent and background sample were collected simultaneously three detention times after the target flow rate was achieved. Detention time of the test unit was determined through the following formulas:

$$\text{Volume of CDS-4} = \pi \times (2\text{ft})^2 \times 3.7\text{ft} = 46.5\text{ft}^3$$

$$\text{Detention time: } \frac{46.5 \text{ ft}^3}{\text{Target flow rate (cfs)}}$$

Collection of the first feed rate calibration sample occurred immediately following the collection of the first effluent and background samples. Since the feed rate sampling procedure temporarily disrupts the introduction of solids, a period of three detention times was allowed to elapse before obtaining the second effluent sample. Since feed rate and background samples were collected immediately following and during collection of each odd numbered effluent sample, the collection interval for treated effluent consisted of three detention times after odd numbered

effluent samples and one minute after even numbered effluent samples. After the sixth and final feed rate sample was collected, sampling continued in one minute increments for the remainder of the test until a total of 15 effluent samples were collected.

Following each test all feed rate calibration samples were weighed to the nearest milligram in-house on a calibrated balance. The resultant mass of each sample was divided by the duration required to obtain the sample. FB Environmental oversaw all in-house measurements and calculations. After each test, effluent and background samples were packed for delivery and sent to Maine Environmental Laboratory for analysis in accordance with ASTM D3977-97 (SSC) (re-approved 2007).

The test procedure was repeated for each flow rate corresponding to 25%, 50%, 75%, 100% and 125% of the target MTFR.

2.4 Scour Testing Procedure

Prior to the start of testing, sediment was loaded into the sedimentation sump and leveled at a depth of 4 inches bringing the top of the sediment pile to an elevation consistent with 50% of the maximum sediment storage capacity (12 inches below separation slab). In order to be conservative, 4 inches of sediment was also loaded onto the top surface of the separation slab and leveled accordingly. To gain access to the top of the separation slab the screen and upper internals were temporarily removed from the test unit. After loading and leveling the sediment on the separation slab, the screen and internals were carefully installed to insure minimal disturbance of the pre-loaded sediment.

After sediment had been loaded into the sedimentation sump and onto the separation slab and the unit was fully assembled, the CDS-4 was filled with water using a spray nozzle adjusted to a gentle spray and attached to a garden hose. Water was directed into the center of the sump and an effort was made to minimize disturbance of the sediment. The unit was filled with water to the invert of the inlet and outlet pipe which is consistent with the dry weather condition of the CDS. Filling was terminated just before water reached the height of the inverts. The scour test was carried out 68 hours after filling the unit with water. During testing, the flow was monitored and recorded using a SeaMetrics Online Magmeter (model WMX104) coupled with a SeaMetrics FT420 rate indicator and a SeaMetrics DL76 data logger.

Testing commenced by gradually introducing and increasing flow into the system until a minimum 200% MTFR was achieved. The target tested flow rate was achieved (+/- 10%) within four minutes of introducing flow to the system. The first background and effluent samples were collected five minutes after the introduction of water to the system. Effluent samples were collected by sweeping the sample container through the free discharge of the outlet pipe. Effluent grab sampling continued in two minute increments until a total of 15 samples were obtained. Background samples were collected in new 500ml HDPE bottles through a sample port in the influent pipe upstream of the test unit in evenly spaced intervals throughout the duration of the test. A total of 8 background samples were collected. At the conclusion of testing the effluent and background samples were sent to Apex Laboratories in Tigard, Oregon for suspended solids concentration (SSC) analysis in accordance with ASTM D3977-97.

3. Performance Claims

Per the NJDEP verification procedure document (NJDEP, 2013a), the following are the performance claims made by Contech and/or established via the laboratory testing conducted.

Total Suspended Solids Removal Rate

Based on the laboratory testing conducted, the Contech Continuous Deflective Separation (CDS) Stormwater Treatment Device achieved greater than 50% removal efficiency of suspended solids. In accordance with the NJDEP procedure for obtaining verification of a stormwater manufactured treatment device from NJCAT (NJDEP 2013a) the TSS removal efficiency is rounded down to 50%.

Maximum Treatment Flow Rate (MTFR)

For all of the commercially available model sizes, the hydraulic loading rate used to calculate the MTFR is 33.2 gpm/ft².

Maximum sediment storage depth and volume

The maximum sediment storage depth for each CDS model is one foot. One-foot represents 50% of the 2 ft. sediment sump that is part of each CDS standard model. The available volume is dependent on the size of the manhole. The CDS-4 tested (4' diameter manhole) has 25.1 cubic feet of available storage volume.

Effective treatment area

The effective treatment area is dependent on the size of the CDS model used and is the surface area of the CDS model selected.

Detention time and volume

The CDS-4 detention time at the MTFR is 50 seconds and the total wet volume including sediment sump is 50.3 ft³.

Effective sedimentation area

The effective sedimentation area and effective treatment area for the CDS Stormwater Treatment System are identical.

Online installation

Based on the testing results shown in Section 4.4 the CDS Stormwater Treatment System qualifies for online installation.

4. Supporting Documentation

The NJDEP Procedure (NJDEP, 2013a) for obtaining verification of a stormwater manufactured treatment device (MTD) from the New Jersey Corporation for Advanced Technology (NJCAT) requires that “copies of the laboratory test reports, including all collected and measured data; all

data from performance evaluation test runs; spreadsheets containing original data from all performance test runs; all pertinent calculations; etc.” be included in this section. This was discussed with NJDEP and it was agreed that as long as such documentation could be made available by NJCAT upon request that it would not be prudent or necessary to include all this information in this verification report.

4.1 Test Sediment PSD Analysis – Removal Efficiency Testing

Prior to the start of removal efficiency testing Contech procured 2500 pounds of test sediment deemed compliant with the PSD specification detailed in the NJDEP HDS Protocol and had it packaged into fifty 50 lb bags for delivery and storage. To ensure that sediment was uniformly mixed across the entire batch, three composite samples were created and analyzed for PSD. Test sediment batch PSD for the project was verified by collecting subsamples from 20% of the bags (10 bags/subsamples per composite) and compositing the subsamples into a single sample for PSD analysis. Each of the 50 bags was numbered 1-50 prior to subsample collection. The numbers 1-50 were then written on individual slips of paper and placed into a container. Numbers were pulled from the container at random to determine which of the 10 bags subsamples would be collected from. This process was repeated three times to create a total of three separate composite samples for PSD analyses, each of which was comprised of 10 subsamples from 10 different bags. Sediment sampling for PSD analysis was conducted in-house with oversight from FB Environmental Associates, Inc. The three PSD analyses were also carried out in-house under the direct supervision of FB in accordance with ASTM D422-63 (reapproved 2007).

Results of the three PSD analyses completed on the batch of test sediment are provided in Table 1. The median particle size (d_{50}) of the test material is less than 75 microns for all three samples.

Table 1 Removal Efficiency Sediment Particle Size Distribution Analysis

Contech Test Sediment Particle Distribution Results							
Contech PSD Sample 1		Contech PSD Sample 2		Contech PSD Sample 3		Contech Mean PSD	
Particle Size (µm)	Percent Finer	Particle Size (µm)	Percent Finer	Particle Size (µm)	Percent Finer	Particle Size (µm)	Percent Finer
2000	100.0	2000	100.0	2000	100.0	2000	100.0
1000	99.6	1000	99.7	1000	99.6	1000	99.7
500	96.2	500	96.1	500	96.1	500	96.1
250	87.9	250	87.6	250	93.4	250	89.6
212	83.7	212	83.4	212	89.9	212	85.7
150	74.2	150	73.6	150	80.1	150	76.0
125	67.9	125	67.6	125	73.9	125	69.8
106	62.0	106	61.8	106	68.0	106	63.9
75	51.9	75	51.4	75	57.7	75	53.7
53	45.8	53	45.4	53	51.6	53	47.6
32.9	44.0	32.9	44.0	32.7	45.0	32.8	44.4
21.2	38.0	21.2	38.0	21.2	38.4	21.2	38.2
12.5	32.0	12.5	32.0	12.5	32.0	12.5	32.0
9.1	27.0	9.0	27.0	9.1	26.0	9.0	26.7
6.4	22.0	6.4	23.0	6.4	22.0	6.4	22.3
3.3	15.0	3.3	14.0	3.2	14.0	3.2	14.3
1.4	7.0	1.4	8.0	1.4	8.0	1.4	7.7

The mean PSD for the 3 samples was also calculated and presented in Table 1. As described in the NJDEP HDS Protocol the mean PSD serves as the PSD of the batch of test sediment.

The mean PSD of Contech’s test sediment complies with the PSD criteria established by the NJDEP HDS protocol. Figure 6 plots the Contech PSD against the NJDEP PSD specification. The Contech sediment gradation is equivalent to or finer than the NJDEP gradation at all points along the curve. Overall, the Contech sediment blend contains more fines than the NJDEP gradation, particularly below 50 microns. The median particle size of the Contech gradation is approximately 60 microns.

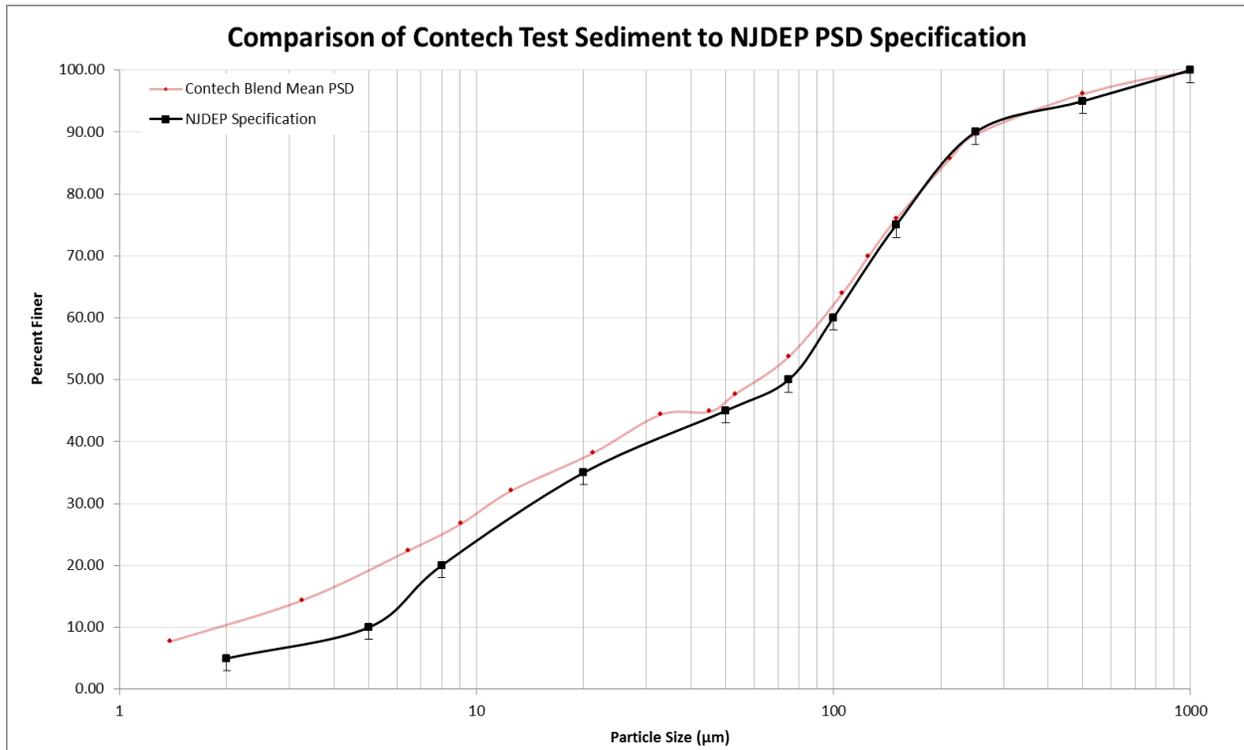


Figure 6 Comparison of the Mean Contech Test Sediment PSD to the NJDEP Removal Efficiency Test Sediment PSD Specification

4.2 Removal Efficiency Testing

In accordance with the NJDEP HDS Protocol, removal efficiency testing was executed on the CDS-4 laboratory unit in order to establish the ability of the CDS to remove the specified test sediment at 25%, 50%, 75%, 100% and 125% of the target MTR. Prior to the start of testing Contech reviewed existing data and decided to utilize a target MTR of 0.93 cfs. This target was chosen based on the ultimate goal of demonstrating greater than 50% annualized weighted solids removal as defined in the NJDEP HDS Protocol. The Mean Influent Concentration was

calculated from the mean feed rate and the mean flow rate; while the mean effluent concentration was adjusted by subtraction of the background concentration.

25% MTFR Results

To establish the performance of the CDS-4 at 25% MTFR a test was conducted in accordance with the criteria in the NJDEP HDS Protocol at a target flow rate of 0.23 cfs. Table 2 provides an overview of the test conditions and a summary of the results for the 25% MTFR test. The feed rate calibration sample results are provided in Table 3. Background and effluent sampling results for the trial are presented in Table 4. The CDS-4 removed 67.0% of the test sediment at an operating rate of 0.24 cfs. Each of the QA/QC parameters that pertain to sampling and flow measurement are presented in Table 5 and are in compliance with the thresholds defined in the NJDEP HDS Protocol.

Table 2 Summary of CDS-4 25% MTFR Laboratory Test

CDS-4 25% MTFR Trial Summary					
Trial Date	Target Flow (cfs)	Detention Time (sec)	Target Sediment Concentration (mg/l)	Target Feed Rate (mg/min)	Test Duration (Min)
4-Apr-13	0.23	199	200mg/l	78,547	83.73
Measured Values					
Mean Flow Rate (cfs)	Mean Influent Concentration (mg/l)	Mean Water Temperature F	Mean Adjusted Effluent Concentration (mg/l)	Average Removal Efficiency	QA/QC Compliance
0.24cfs	194	52	64	67.0%	Yes

Table 3 CDS-4 25% MTFR Feed Rate Calibration Sample Results

CDS-4 25% MTFR Feed Rate Calibration Sample Results					
Target Concentration	200 mg/l	Target Feed Rate		78,547 mg/min	
Sample ID	Sample Time (min)	Sample Weight (mg)	Sample Duration (sec)	Feed Rate (mg/min)	Calculated Influent Concentration (mg/L)
Feed Rate 1	9.96	84605	60.31	84170	205
Feed Rate 2	21.92	79959	60.28	79588	193
Feed Rate 3	33.88	78509	60.25	78183	190
Feed Rate 4	45.85	77831	60.25	77508	188
Feed Rate 5	57.81	77270	60.31	76873	187
Feed Rate 6	69.77	82288	60.47	81648	198
			Mean	79662	194

Table 4 CDS-4 25% MTFR Background and Effluent Sample Results

CDS-4 25% of MTFR Test Background and Effluent Sample Results					
Sample ID	Time (min)	Concentration (mg/L)			
Background 1	9.96	2			
Background 2	21.92	2			
Background 3	33.88	2			
Background 4	45.85	2			
Background 5	57.81	2			
Background 6	69.77	2			
Background 7	81.73	2			
Background 8	83.73	2			
Note that the analytical laboratory established a limit of quantification (LOQ) for SSC of 4mg/l. Values below this threshold are reported as non detect (ND) by the laboratory. In following standard reporting practices ND values have been reported at 1/2 the LOQ which is 2mg/l for this study.					
Sample ID	Time (min)	Concentration (mg/L)	Associated Background Concentration (mg/l)	Adjusted Concentration (mg/l)	Temperature F
Effluent 1	9.96	67	2	65	61
Effluent 2	20.92	68	2	66	57
Effluent 3	21.92	68	2	66	56
Effluent 4	32.88	62	2	60	55
Effluent 5	33.88	65	2	63	55
Effluent 6	44.85	63	2	61	54
Effluent 7	45.85	71	2	69	53
Effluent 8	56.81	66	2	64	50
Effluent 9	57.81	66	2	64	51
Effluent 10	68.77	67	2	65	48
Effluent 11	69.77	68	2	66	48
Effluent 12	80.73	71	2	69	47
Effluent 13	81.73	63	2	61	47
Effluent 14	82.73	63	2	61	47
Effluent 15	83.73	66	2	64	47
	Mean	66	2	64	52

Table 5 CDS-4 25% MTFR QA/QC Parameters

CDS-4 25% of MTFR QA/QC Parameters				
Flow Rate				
Target (gpm)	Mean (gpm)	Coef. of Variance	Acceptable Parameters Target	Acceptable Parameters Coef. Of Variance
103.75	108.7	0.01		<0.03
Feed Rate				
Target (mg/min)	Mean (mg/min)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
78547	79662	0.04		<0.1
Influent Concentration				
Target (mg/L)	Mean (mg/L)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
200	194	0.04		<0.1
Background Concentration				
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)	
2	2	2	<20	

50% MTFR Results

To establish the performance of the CDS-4 at 50% MTFR a test was conducted in accordance with the criteria in the NJDEP HDS Protocol at a target flow rate of 0.46 cfs. Table 6 provides an overview of the test conditions and a summary of the results for the 50% MTFR test. The feed rate calibration sample results are provided in Table 7. Background and effluent sampling results for the trial are presented in Table 8. The CDS-4 removed 54.3% of the test sediment at an operating rate of 0.46 cfs. Each of the QA/QC parameters that pertain to sampling and flow measurement are presented in Table 9 and are in compliance with the thresholds defined in the NJDEP HDS Protocol.

Table 6 Summary of CDS-4 50% MTFR Laboratory Test

CDS-4 50% MTFR Trial Summary					
Trial Date	Target Flow (cfs)	Detention Time (sec)	Target Sediment Concentration (mg/l)	Target Feed Rate (mg/min)	Test Duration (Min)
4-Apr-13	0.46	100	200mg/l	157,095	48.87
Measured Values					
Mean Flow Rate (cfs)	Mean Influent Concentration (mg/l)	Mean Water Temperature F	Mean Adjusted Effluent Concentration (mg/l)	Average Removal Efficiency	QA/QC Compliance
0.46cfs	195	48	89	54.3%	Yes

Table 7 CDS-4 50% MTFR Feed Rate Calibration Sample Results

CDS-4 50% MTFR Feed Rate Calibration Sample Results					
Target Concentration	200 mg/l	Target Feed Rate		157,095 mg/min	
Sample ID	Sample Time (min)	Sample Weight (mg)	Sample Duration (sec)	Feed Rate (mg/min)	Calculated Influent Concentration (mg/L)
Feed Rate 1	4.98	103404	40.32	153875	196
Feed Rate 2	11.96	104049	40.28	154989	198
Feed Rate 3	18.94	105251	40.59	155582	199
Feed Rate 4	25.92	107070	40.32	159330	203
Feed Rate 5	32.90	97634	40.35	145181	185
Feed Rate 6	39.88	99647	40.32	148284	189
			Mean	152873	195

Table 8 CDS-4 50% MTFR Background and Effluent Sample Results

CDS-4 50% of MTFR Background and Effluent Sample Results					
Sample ID	Time (min)	Concentration (mg/L)			
Background 1	4.98	2			
Background 2	11.96	2			
Background 3	18.94	2			
Background 4	25.92	2			
Background 5	32.90	2			
Background 6	39.88	2			
Background 7	46.87	2			
Background 8	48.87	2			
Note that the analytical laboratory established a limit of quantification (LOQ) for SSC of 4mg/l. Values below this threshold are reported as non detect (ND) by the laboratory. In following standard reporting practices ND values have been reported at 1/2 the LOQ which is 2mg/l for this study.					
Sample ID	Time (min)	Concentration (mg/L)	Associated Background Concentration (mg/l)	Adjusted Concentration (mg/l)	Temperature F
Effluent 1	4.98	83	2	81	52
Effluent 2	10.96	87	2	85	49
Effluent 3	11.96	91	2	89	49
Effluent 4	17.94	91	2	89	48
Effluent 5	18.94	88	2	86	48
Effluent 6	24.92	88	2	86	49
Effluent 7	25.92	92	2	90	49
Effluent 8	31.90	87	2	85	48
Effluent 9	32.90	94	2	92	47
Effluent 10	38.88	95	2	93	47
Effluent 11	39.88	99	2	97	47
Effluent 12	45.87	86	2	84	47
Effluent 13	46.87	92	2	90	47
Effluent 14	47.87	102	2	100	46
Effluent 15	48.87	93	2	91	46
	Mean	91	2	89	48

Table 9 CDS-4 50% MTFR QA/QC Parameters

CDS-4 50 % of MTFR QA/QC Parameters				
Flow Rate				
Target (gpm)	Mean (gpm)	Coef. of Variance	Acceptable Parameters Target	Acceptable Parameters Coef. Of Variance
207.5	205.3	0.01		<0.03
Feed Rate				
Target (mg/min)	Mean (mg/min)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
157095	152873	0.03		<0.1
Influent Concentration				
Target (mg/L)	Mean (mg/L)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
200	195	0.03		<0.1
Background Concentration				
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)	
2	2	2	<20	

75% MTFR Results

To establish the performance of the CDS-4 at 75% MTFR a test was conducted in accordance with the criteria in the NJDEP HDS Protocol at a target flow rate of 0.69 cfs. Table 10 provides an overview of the test conditions and a summary of the results for the 75% MTFR test. The feed rate calibration sample results are provided in Table 11. Background and effluent sampling results for the trial are presented in Table 12. The CDS-4 removed 45.7% of the test sediment at an operating rate of 0.71 cfs. Each of the QA/QC parameters that pertain to sampling and flow measurement are presented in Table 13 and are in compliance with the thresholds defined in the NJDEP HDS Protocol.

Table 10 Summary of CDS-4 75% MTFR Laboratory Test

CDS-4 75% MTFR Trial Summary					
Trial Date	Target Flow (cfs)	Detention Time (sec)	Target Sediment Concentration (mg/l)	Target Feed Rate (mg/min)	Test Duration (Min)
5-Apr-13	0.69	66	200mg/l	235,453	37.26
Measured Values					
Mean Flow Rate (cfs)	Mean Influent Concentration (mg/l)	Mean Water Temperature F	Mean Adjusted Effluent Concentration (mg/l)	Average Removal Efficiency	QA/QC Compliance
0.71	198	59	108	45.7%	Yes

Table 11 CDS-4 75% MTFR Feed Rate Calibration Sample Results

CDS-4 75% MTFR Feed Rate Calibration Sample Results					
Target Concentration	200 mg/l	Target Feed Rate		238,394 mg/min	
Sample ID	Sample Time (min)	Sample Weight (mg)	Sample Duration (sec)	Feed Rate (mg/min)	Calculated Influent Concentration (mg/L)
Feed Rate 1	3.32	118724	30.28	235252	195
Feed Rate 2	8.65	120157	30.29	238013	197
Feed Rate 3	13.97	120241	30.34	237787	197
Feed Rate 4	19.29	117986	30.31	233559	194
Feed Rate 5	24.62	124367	30.47	244897	203
Feed Rate 6	29.94	121793	30.34	240856	200
			Mean	238394	198

Table 12 CDS-4 75% MTFR Background and Effluent Sample Results

CDS-4 75% of MTFR Background and Effluent Sample Results					
Sample ID	Time (min)	Concentration (mg/L)			
Background 1	3.32	2			
Background 2	8.65	4			
Background 3	13.97	2			
Background 4	19.29	5			
Background 5	24.62	8			
Background 6	29.94	9			
Background 7	35.26	14			
Background 8	37.26	14			
Note that the analytical laboratory established a limit of quantification (LOQ) for SSC of 4mg/l. Values below this threshold are reported as non detect (ND) by the laboratory. In following standard reporting practices ND values have been reported at 1/2 the LOQ which is 2mg/l for this study.					
Sample ID	Time (min)	Concentration (mg/L)	Associated Background Concentration (mg/l)	Adjusted Concentration (mg/l)	Temperature F
Effluent 1	3.32	98	2	96	66
Effluent 2	7.65	99	3	96	63
Effluent 3	8.65	104	3	101	63
Effluent 4	12.97	101	3	98	61
Effluent 5	13.97	106	3	103	61
Effluent 6	18.29	107	5	102	60
Effluent 7	19.29	117	5	112	60
Effluent 8	23.62	118	7	111	59
Effluent 9	24.62	115	7	108	58
Effluent 10	28.94	122	9	113	57
Effluent 11	29.94	122	10	112	56
Effluent 12	34.26	118	12	106	55
Effluent 13	35.26	134	13	121	54
Effluent 14	36.26	137	14	123	54
Effluent 15	37.26	125	15	110	54
	Mean	115	7	108	59

Table 13 CDS-4 75% MTFR QA/QC Parameters

75% of MTFR QA/QC Parameters				
Flow Rate				
Target (gpm)	Mean (gpm)	Coef. of Variance	Acceptable Parameters Target	Acceptable Parameters Coef. Of Variance
311	318.4	0.01		<0.03
Feed Rate				
Target (mg/min)	Mean (mg/min)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
235453	238394	0.02		<0.1
Influent Concentration				
Target (mg/L)	Mean (mg/L)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
200	198	0.02		<0.1
Background Concentration				
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)	
2	14	7	<20	

100% MTFR Results

To establish the performance of the CDS-4 at 100% MTFR a test was conducted in accordance with the criteria in the NJDEP HDS Protocol at a target flow rate of 0.93 cfs. Table 14 provides an overview of the test conditions and a summary of the results for the 100% MTFR test. The feed rate calibration sample results are provided in Table 15. Background and effluent sampling results for the trial are presented in Table 16. The CDS-4 removed 39.2% of the test sediment at an operating rate of 0.93 cfs. Each of the QA/QC parameters that pertain to sampling and flow measurement are presented in Table 17 and are in compliance with the thresholds defined in the NJDEP HDS Protocol.

Table 14 Summary of CDS-4 100% MTFR Laboratory Test

CDS-4 100% MTFR Trial Summary					
Trial Date	Target Flow (cfs)	Detention Time (sec)	Target Sediment Concentration (mg/l)	Target Feed Rate (mg/min)	Test Duration (Min)
3-Apr-13	0.925	49.8	200mg/l	314,189	31.43
Measured Values					
Mean Flow Rate (cfs)	Mean Influent Concentration (mg/l)	Mean Water Temperature F	Mean Adjusted Effluent Concentration (mg/l)	Average Removal Efficiency	QA/QC Compliance
0.93	198	67	120	39.2%	Yes

Table 15 CDS-4 100% MTFR Feed Rate Calibration Sample Results

CDS-4 100% MTFR Feed Rate Calibration Sample Results					
Target Concentration	200 mg/l	Target Feed Rate		314,189 mg/min	
Sample ID	Sample Time (min)	Sample Weight (mg)	Sample Duration (sec)	Feed Rate (mg/min)	Calculated Influent Concentration (mg/L)
Feed Rate 1	2.49	107412	20.25	318258	202
Feed Rate 2	6.98	102117	20.28	302121	192
Feed Rate 3	11.47	104403	20.35	307822	195
Feed Rate 4	15.96	105087	20.43	308626	196
Feed Rate 5	20.45	109563	20.72	317267	201
Feed Rate 6	24.94	105835	20.19	314517	200
			Mean	311435	198

Table 16 CDS-4 100% MTFR Background and Effluent Sample Results

CDS-4 100% of MTFR Background and Effluent Sample Results					
Sample ID	Time (min)	Concentration (mg/L)			
Background 1	2.49	2			
Background 2	6.98	6			
Background 3	11.47	10			
Background 4	15.96	9			
Background 5	20.45	13			
Background 6	24.94	11			
Background 7	29.43	13			
Background 8	31.43	14			
Note that the analytical laboratory established a limit of quantification (LOQ) for SSC of 4mg/l. Values below this threshold are reported as non detect (ND) by the laboratory. In following standard reporting practices ND values have been reported at 1/2 the LOQ which is 2mg/l for this study.					
Sample ID	Time (min)	Concentration (mg/L)	Associated Background Concentration (mg/l)	Adjusted Concentration (mg/l)	Temperature F
Effluent 1	2.49	101	2	99	78
Effluent 2	5.98	119	6	113	75
Effluent 3	6.98	120	7	113	74
Effluent 4	10.47	127	8	119	72
Effluent 5	11.47	127	9	118	71
Effluent 6	14.96	128	10	118	69
Effluent 7	15.96	135	10	125	69
Effluent 8	19.45	138	11	127	66
Effluent 9	20.45	132	11	121	65
Effluent 10	23.94	136	12	124	64
Effluent 11	24.94	129	12	117	63
Effluent 12	28.43	134	13	121	61
Effluent 13	29.43	143	13	130	60
Effluent 14	30.43	142	13	129	59
Effluent 15	31.43	144	13	131	59
	Mean	130	10	120	67

Table 17 CDS-4 100% MTFR QA/QC Parameters

100% of MTFR QA/QC Parameters				
Flow Rate				
Target (gpm)	Mean (gpm)	Coef. of Variance	Acceptable Parameters Target	Acceptable Parameters Coef. Of Variance
415	416.1	0.01		<0.03
Feed Rate				
Target (mg/min)	Mean (mg/min)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
314189	311435	0.02		<0.1
Influent Concentration				
Target (mg/L)	Mean (mg/L)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
200	198	0.02		<0.1
Background Concentration				
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)	
2	14	10	<20	

125% MTFR Results

To establish the performance of the CDS-4 at 125% MTFR a test was conducted in accordance with the criteria in the NJDEP HDS Protocol at a target flow rate of 1.16 cfs. Table 18 provides an overview of the test conditions and a summary of the results for the 125% MTFR test. The feed rate calibration sample results are provided in Table 19. Background and effluent sampling results for the trial are presented in Table 20. The CDS-4 removed 25.1% of the test sediment at an operating rate of 1.18 cfs. Each of the QA/QC parameters that pertain to sampling and flow measurement are presented in Table 21 and are in compliance with the thresholds defined in the NJDEP HDS Protocol.

Table 18 Summary of CDS-4 125% MTFR Laboratory Test

CDS-4 125% MTFR Trial Summary					
Trial Date	Target Flow (cfs)	Detention Time (sec)	Target Sediment Concentration (mg/l)	Target Feed Rate (mg/min)	Test Duration (Min)
18-Apr-13	1.16	40	200mg/l	392,926	27.94
Measured Values					
Mean Flow Rate (cfs)	Mean Influent Concentration (mg/l)	Mean Water Temperature F	Mean Adjusted Effluent Concentration (mg/l)	Average Removal Efficiency	QA/QC Compliance
1.18	207	55	155	25.1%	Yes

Table 19 CDS-4 125% MTFR Feed Rate Calibration Sample Results

CDS-4 125% MTFR Feed Rate Calibration Sample Results					
Target Concentration	200 mg/l	Target Feed Rate		392926 mg/min	
Sample ID	Sample Time (min)	Sample Weight (mg)	Sample Duration (sec)	Feed Rate (mg/min)	Calculated Influent Concentration (mg/L)
Feed Rate 1	1.99	140782	20.28	416515	208
Feed Rate 2	5.98	140724	20.25	416960	208
Feed Rate 3	9.97	139761	20.29	413290	207
Feed Rate 4	13.97	136840	20.25	405452	203
Feed Rate 5	17.96	136211	20.28	402991	201
Feed Rate 6	21.95	143011	19.9	431189	216
			Mean	414400	207

Table 20 CDS-4 125% MTFR Background and Effluent Sample Results

CDS-4 125% of MTFR Background and Effluent Sample Results					
Sample ID	Time (min)	Concentration (mg/L)			
Background 1	1.99	2			
Background 2	5.98	7			
Background 3	9.97	10			
Background 4	13.97	11			
Background 5	17.96	11			
Background 6	21.95	15			
Background 7	25.94	16			
Background 8	27.94	18			
Note that the analytical laboratory established a limit of quantification (LOQ) for SSC of 4mg/l. Values below this threshold are reported as non detect (ND) by the laboratory. In following standard reporting practices ND values have been reported at 1/2 the LOQ which is 2mg/l for this study.					
Sample ID	Time (min)	Concentration (mg/L)	Associated Background Concentration (mg/l)	Adjusted Concentration (mg/l)	Temperature F
Effluent 1	1.99	130	3	127	63
Effluent 2	4.98	137	5	132	
Effluent 3	5.98	171	6	165	
Effluent 4	8.97	145	8	137	
Effluent 5	9.97	161	9	152	
Effluent 6	12.97	174	10	164	
Effluent 7	13.97	176	11	165	
Effluent 8	16.96	171	12	159	
Effluent 9	17.96	170	13	157	
Effluent 10	20.95	174	14	160	
Effluent 11	21.95	162	15	147	52
Effluent 12	24.94	170	16	154	
Effluent 13	25.94	172	16	156	
Effluent 14	26.94	191	17	174	
Effluent 15	27.94	196	17	179	50
	Mean	167	12	155	55

Table 21 CDS-4 125% MTFR QA/QC Parameters

125% of MTFR QA/QC Parameters				
Flow Rate				
Target (gpm)	Mean (gpm)	Coef. of Variance	Acceptable Parameters Target	Acceptable Parameters Coef. Of Variance
519	528.5	0.02		<0.03
Feed Rate				
Target (mg/min)	Mean (mg/min)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
392926	414400	0.02		<0.1
Influent Concentration				
Target (mg/L)	Mean (mg/L)	Coef. of Variance	Acceptable Parameter Target	Acceptable Parameters Coef. Of Variance
200	207	0.02		<0.1
Background Concentration				
Low (mg/L)	High (mg/L)	Mean (mg/L)	Acceptable Threshold (mg/L)	
2	18	11	<20	

Excluded Data/Results

The NJDEP HDS Protocol requires that any data collected as part of the testing process that is ultimately excluded from the reported results be discussed during the reporting process. No data

was excluded from the datasets that make up each of the 5 qualifying test trials reported herein and ultimately used to determine the annualized weighted TSS Removal Efficiency.

During the testing process four trials were conducted at the target 125% MTFR flow condition that were not included in the qualifying data set. On 4/5/2013, a trial was executed at the target 125% MTFR, but was suspended before the completion of sampling due to a pump failure in the laboratory. On 4/9/2013, a second attempt was made to complete a 125% of MTFR test. This data was disqualified because one of the background samples exceeded the maximum allowable threshold of 20 mg/l. A third 125% MTFR trial was conducted on 4/9/2013 but deemed out of compliance because an issue with the dry feed auger resulted in average influent concentrations below 180 mg/l, which falls below the allowable range of influent concentrations. A fourth attempt to complete the 125% MTFR testing on 4/9/2013 was quickly suspended after a circuit breaker tripped, effectively disabling the laboratory in the middle of the test.

This disclosure represents the only data not otherwise reported and included in the calculations herein.

Annualized Weighted TSS Removal Efficiency

The results of TSS removal efficiency testing at 25%, 50%, 75%, 100% and 125% of a target MTFR of 0.93 cfs and reported herein were entered into the NJDEP specified annualized weighted TSS removal efficiency calculation. The results are presented in Table 22.

Testing in accordance with all of the provisions detailed in the NJDEP HDS Protocol demonstrate that the CDS-4 achieved 50.57% annualized weighted TSS removal at an MTFR of 0.93 cfs (33.2 gpm/ft²). This testing also demonstrates that the CDS-4 exceeds the NJDEP requirement for HDS devices of demonstrating greater than 50% weighted annualized TSS Removal Efficiency at the chosen MTFR.

Table 22 Annualized Weighted TSS Removal of the CDS-4 Tested in Accordance with the NJDEP HDS Protocol at a MTFR of 0.93 cfs.

CDS-4 Annualized Weighted TSS Removal at 0.93cfs MTFR					
Tested Flow Rate as Percentage of MTFR	Actual Tested Flow Rate (cfs)	Actual Percent MTFR	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
25%	0.24	26%	67.0	0.25	16.75%
50%	0.46	49%	54.3	0.3	16.29%
75%	0.71	76%	45.7	0.2	9.14%
100%	0.93	100%	39.2	0.15	5.88%
125%	1.18	127%	25.1	0.1	2.51%
Weighted Annualized TSS Removal Efficiency					50.57%

4.3 Test Sediment PSD Analysis - Scour Testing

As described in Section 2.2 *Scour Test Sediment*, prior to the start of testing Contech procured a batch of scour sediment deemed compliant with the scour sediment PSD specification defined in the NJDEP HDS Protocol and had it packaged into fifty-nine 50 lb bags for delivery and storage. To ensure that the scour sediment was uniformly mixed across the entire batch, three composite samples were created and analyzed for PSD as previously described.

The results of the PSD analysis performed on the three samples are presented in Table 23 along with the mean PSD for the batch of sediment used for the scour testing. This analysis confirmed that the batch of scour test sediment procured by Contech is in compliance with the NJDEP scour test PSD specification. A visual comparison of the Contech scour sediment PSD and the NJDEP scour test PSD is provided in Figure 7.

Table 23 Results of Scour Testing Sediment Particle Size Distribution Analysis

Contech Scour Test Sediment Particle Distribution Results						
NJDEP Specifications		Contech Scour Sediment				
Particle size (um)	Percent Finer	Particle size (um)	Percent Finer Sample 1	Percent Finer Sample 2	Percent Finer Sample 3	Percent Finer Mean Contech Samples
1000	100	1000	100	100	100	100.0
500	90	500	92.1	91.77	91.22	91.7
250	55	250	56.37	55.28	54.44	55.4
150	40	150	42.15	41.13	40.38	41.2
100	25	106	31.44	30.58	29.97	30.7
75	10	75	11.41	11.08	10.97	11.2
50	0	63	1.64	1.59	1.54	1.6
		53	0	0	0	0

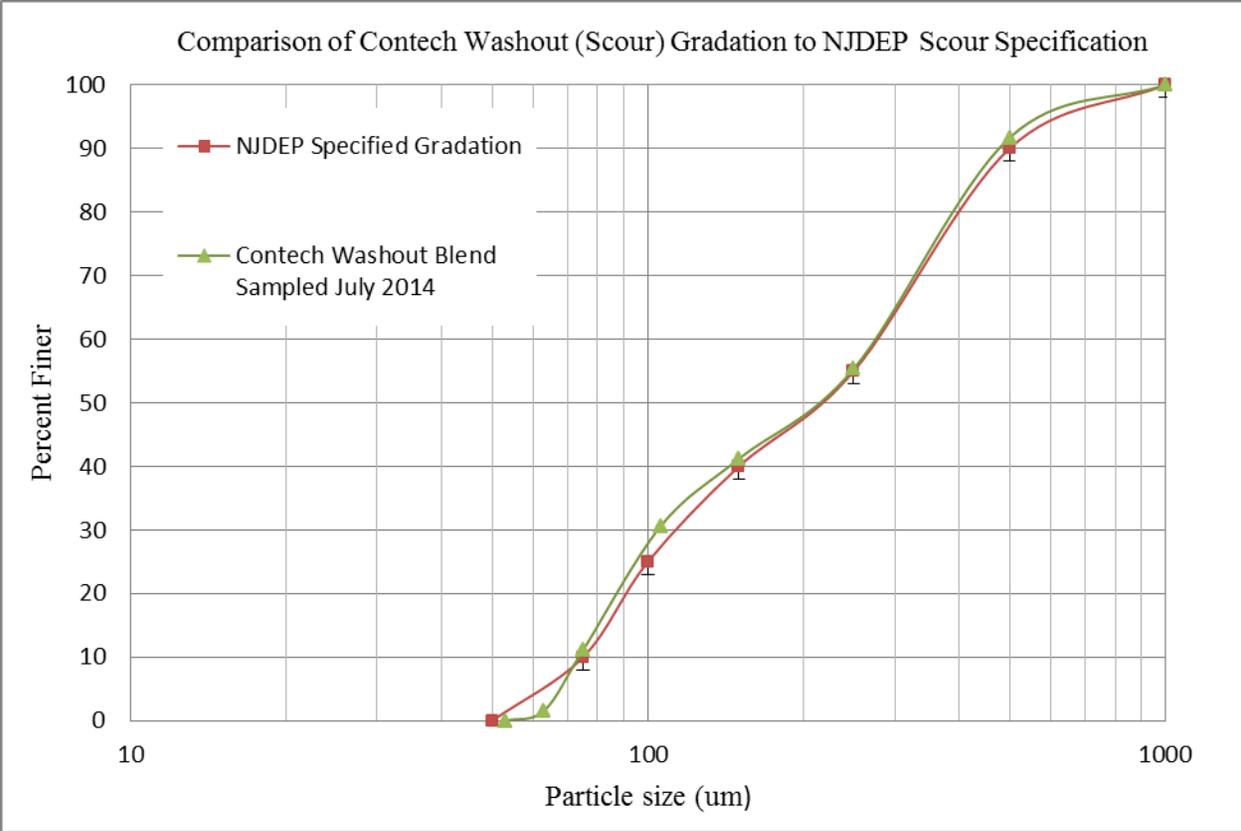


Figure 7 Comparison of Contech Scour Test Sediment PSD to NJDEP Scour Sediment PSD Specification

4.4 Scour Testing for Online Installation

In order to demonstrate the ability of the CDS to be used as an online treatment device scour testing was conducted at greater than 200% of the MTFR in accordance with the NJDEP HDS Protocol. The average flow rate during the online scour test was 838.9 gpm (1.87 cfs), which is 201% of the MTFR (MTFR = 0.93 cfs). The COV for the flow rate during the test period was 0.009, which is less than the allowable maximum COV of 0.03. The water temperature during the testing was 73 degrees. All 8 of the background samples collected during the test were reported as non-detect for suspended solids by the analytical laboratory. All non-detect values of concentration have been reported as 1/2 of the limit of quantification herein. The limit of quantification was calculated by the laboratory and provided in the laboratory report for each sample. Background results and sample times are provided in Table 24. All background concentrations are well below the 20 mg/l maximum for suspended solids.

Table 24 Concentrations of Background Samples during CDS Scour Testing

Sample	Sample Time (minute)	Reported Result (mg/L)	Reporting Limit (Limit of Quantification) (mg/L)	Background Concentration (mg/l)
Background 1	5	ND	2.00	1.00
Background 2	9	ND	1.98	0.99
Background 3	13	ND	2.04	1.02
Background 4	17	ND	2.00	1.00
Background 5	21	ND	1.98	0.99
Background 6	25	ND	1.98	0.99
Background 7	29	ND	2.00	1.00
Background 8	33	ND	1.98	0.99

A total of 15 effluent grab samples were collected during the testing process. The majority of effluent samples (10 of 15) were reported as non-detect by the analytical lab. The 5 remaining samples all had effluent concentrations less than 5mg/l. Non-detect values were reported at ½ the limit of quantification as calculated by the analytical laboratory. The resulting effluent concentrations were then adjusted to account for the applicable background concentration at the time the sample was collected. The applicable background sample is defined as the background sample/concentration associated with a given effluent sample based on sample time. Note that there are 15 effluent samples vs. 8 background samples as a result of effluent samples being collected more frequently. As a result, multiple effluent samples correspond to most background samples. Since background sample concentration is essentially constant throughout the test period the applicable adjustment to the effluent concentration is also consistent at ~1mg/l for all samples. The resulting effluent concentrations are all 3mg/l or less and well below the 20mg/l threshold established by the NJDEP scour protocol. All effluent sample results are presented in Table 25.

Testing at greater than 200% of the proposed MTFR for the CDS-4 with sediment preloaded in both the sedimentation sump and on top of the unit’s separation slab has confirmed that previously captured sediment does not wash out and that the CDS meets the criteria for online use.

Table 25 Results of CDS-4 Online Scour Testing at 201% MTR

Sample	Sample Time (minute)	Reported Result (mg/L)	Reporting Limit (Limit of Quantification) (mg/L)	Effluent Concentration (mg/l)	Adjusted Effluent Concentration (mg/l)
Effluent 1	5	3.33	2.38	3.33	2.33
Effluent 2	7	ND	3.08	1.54	0.54
Effluent 3	9	ND	2.86	1.43	0.43
Effluent 4	11	ND	2.67	1.34	0.34
Effluent 5	13	ND	2.63	1.32	0.32
Effluent 6	15	4.00	2.35	4.00	3.00
Effluent 7	17	ND	2.78	1.39	0.39
Effluent 8	19	2.41	2.41	2.41	1.41
Effluent 9	21	2.33	2.33	2.33	1.33
Effluent 10	23	3.15	2.25	3.15	2.15
Effluent 11	25	ND	2.44	1.22	0.22
Effluent 12	27	ND	2.38	1.19	0.19
Effluent 13	29	ND	2.90	1.45	0.45
Effluent 14	31	ND	3.17	1.59	0.59
Effluent 15	33	ND	2.33	1.17	0.17

5. Design Limitations

Contech’s engineering staff typically works with the site design engineer to ensure all potential constraints are addressed during the specification process and that the CDS Stormwater Treatment System will function as intended.

Required Soil Characteristics

The CDS is an enclosed system that is typically housed within a concrete manhole. The functionality of the CDS system is not influenced by the existing soil conditions at the install location and as such the CDS system can be installed in all soil types.

Slope

It is generally not advisable to install the CDS unit on steep slopes. When the CDS is being considered on slopes exceeding 10% Contech recommends contacting their engineering staff to evaluate the design prior to specification.

Maximum Flow Rate

The MTR is 33.2 gpm/ft².

Maintenance Requirements

The CDS system must be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants depends heavily on site activities. See Section 6 for a more detailed discussion of maintenance and inspection requirements.

Driving Head

The driving head required for a given CDS model at MTFR or greater flows (for online units) is typically a function of the model size and storm sewer characteristics. Contech's engineering staff consults with the design engineer on each project to ensure there will not be any adverse impacts to the hydraulic grade-line as a result of installing the CDS unit.

Installation limitations

Prior to installation Contech provides contractors detailed installation and assembly instructions and is also available to consult onsite during installation. Pick weights for CDS components are provided prior to delivery so that the contractor can secure proper equipment for lifting CDS units into place.

Configurations

CDS units can be installed online or offline. Online units are equipped with an internal bypass to convey extreme flows around the treatment chamber of the unit.

Structural Load Limitations

CDS units are typically designed for HS-20 loading (32,000 pounds per truck axle). If additional loading is expected it is advisable to contact Contech to assess loading options

Pretreatment Requirements

There are no pre-treatment requirements for the CDS Stormwater Treatment System.

Limitations in Tailwater

If tail-water is present it is important to increase the available driving head within the unit to ensure that the full MTFR is still treated prior to any internal bypass.

Depth to Seasonal High Water Table

CDS unit performance is not typically impacted by high groundwater. Occasionally, when groundwater is expected to be within several feet of finished grade it may be necessary to add a base extension to the unit to counter buoyant forces. If high groundwater is expected Contech's engineering staff can evaluate whether anti-buoyancy measures are required during the design process, but buoyancy issues are relatively uncommon for concrete manhole structures like the CDS.

6. Maintenance Plans

The CDS system must be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, e.g., unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping will slow accumulation. Additional information on maintenance, including a simple CDS Inspection & Maintenance Log form, can be found in the CDS Inspection and Maintenance Guide – New Jersey at:

<http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info>

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help insure that the system is cleaned out at the appropriate time. At a minimum, inspections must be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid pollutant accumulations, or in equipment wash-down areas. Additionally, installations where excessive amounts of trash are expected should be inspected more frequently.

The visual inspection must ascertain that the system components are in working order and that there are no blockages or obstructions to the inlet and/or separation screen. The inspection must also identify accumulations of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick such as a stadia rod, tape measure or other measuring instrument. If sorbent material is used for enhanced removal of hydrocarbons then the level of discoloration of the sorbent material should also be identified during inspection. Sorbent material must be replaced when it is predominantly dark in color (similar to oil). It is useful and often required as part of a permit to keep a record of each inspection.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (screen/cylinder) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained behind the screen. For units possessing a sizable depth below grade (depth to pipe), a single access point allows for both sump cleanout and access behind the screen.

The CDS system must be cleaned when the level of sediment in the sump has reached a depth of 18 inches or more to avoid exceeding the maximum 24 inch sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine if the height of

the sediment pile off the bottom of the sump floor exceeds 75% (18 inches) of the total height of isolated sump.

Cleaning

Cleaning of the CDS systems should be done during dry weather conditions when no flow is entering the system. Cleanout of the CDS with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be pumped out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill must be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis must be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads since they are usually less expensive to dispose of than the oil/water emulsion that may be created by vacuuming the oily layer. Trash can be netted out if you wish to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. Confined Space Entry procedures need to be followed.

Disposal of all material removed from the CDS system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

7. Statements

The following signed statements from the manufacturer, third-party observer and NJCAT are required to complete the NJCAT verification process.

In addition, it should be noted that this report has been subjected to public review (e.g. stormwater industry) and all comments and concerns have been satisfactorily addressed.



STATEMENT OF THIRD PARTY OBSERVER

To: Derek Berg, Contech Engineered Solutions, Scarborough, Maine
From: Forrest Bell, FB Environmental Associates
Subject: Third Party Review Under *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)¹
Date: September 16, 2013
cc: Cayce Dalton, FB Environmental Associates

Statement of Third Party Observer

FB Environmental has served as the third-party observer for tests performed by Contech Engineered Solutions (Contech) in March through June of 2013. The tests measured the performance of the CDS-4 hydrodynamic separator, including particle size distribution tests for the sediment used in testing. Tests were performed by Contech at their laboratory at 200 Enterprise Drive, Scarborough, Maine, to meet the standards described in *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)¹. On March 12, 2013, we submitted a statement of our qualifications and disclosure record stating we have no conflict of interests, as required by NJCAT MTD process.

A member of our staff verified compliance with the laboratory test protocol above, and our staff member was physically present to observe the full duration of all laboratory testing. We have also reviewed the data, calculations, and conclusions associated with CDS and particle size distribution testing in the *Verification Testing Report for the CONTINUOUS DEFLECTIVE SEPARATOR (CDS®) Stormwater Treatment Device*, by Contech Engineered Solutions, dated July 1, 2013, and state that they conform to what we saw during our supervision as third-party observer.

September 16, 2013

Signed:

Date

¹ Available at <http://www.nj.gov/dep/stormwater/treatment.html>

July 2, 2013

Dr. Richard Magee
Technical Director
New Jersey Corporation for Advanced Technology
c/o Center for Environmental Systems
Stevens Institute of Technology
One Castle Point on Hudson
Hoboken, NJ 07030

RE: 2013 Verification of the CDS Stormwater Treatment Device

Dr. Magee,

This correspondence is being sent to you in accordance with the "*Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology*" (Process Document) dated January 25, 2013. Specifically, the process document requires that manufacturers submit a signed statement confirming that all of the procedures and requirements identified in the aforementioned process document and the accompanying NJDEP HDS Laboratory Testing Protocol have been met. We believe that the testing executed at Contech's laboratory in Scarborough, ME on the CDS stormwater treatment system during the spring of 2013 under the direct supervision of FB Environmental Associates was conducted in full compliance with all applicable protocol and process criteria. Additionally, we believe that all of the required documentation of the testing and resulting performance calculations has been provided within the submittal accompanying this correspondence.

Please do not hesitate to contact me with any additional questions related to this matter.

Respectfully,



Derek M. Berg
Regulatory Manager- Stormwater

CONTECH Engineered Solutions LLC
71 US Route 1, Suite F | Scarborough, ME 04074
T: 207.885.6174 F: 207.885.9825
DBerg@conteches.com
www.ContechES.com



**Center for Environmental Systems
Stevens Institute of Technology
Castle Point on Hudson
Hoboken, NJ 07030-0000**

September 15, 2013

Elizabeth Dragon
Environmental Engineer
New Jersey Department of Environmental Protection
Bureau of Nonpoint Pollution Control
401-02B, PO Box 420
Trenton, NJ 08625-0420

Derek M. Berg
CONTECH Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Forrest Bell
FB Environmental Associates Inc.
97A Exchange Street, Suite 305
Portland, ME 04101

To all,

Based on my review, evaluation and assessment of the testing conducted on the Continuous Deflective Separator (CDS®) by Contech and observed by FB Environmental Associates, the test protocol requirements contained in the “New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device” (NJDEP HDS Protocol) were met or exceeded. Specifically:

Test Sediment Feed

The mean PSD of Contech’s test sediment complies with the PSD criteria established by the NJDEP HDS protocol. The Contech PSD was plotted against the NJDEP PSD specification.

The Contech sediment gradation is equivalent to or finer than the NJDEP gradation at all points along the curve. Overall, the Contech sediment blend contains more fines than the NJDEP gradation, particularly below 50 microns. The median particle size of the Contech gradation is approximately 60 microns.

Prior to the start of testing Contech procured a 2500 lbs. batch of scour sediment deemed compliant with the scour sediment PSD specification defined in the NJDEP HDS Protocol. The results of the three scour sediment PSD analysis confirmed that the batch of scour test sediment procured by Contech is in compliance with the NJDEP scour test PSD specification.

Removal Efficiency Testing

In accordance with the NJDEP HDS Protocol, removal efficiency testing was executed on the CDS-4 laboratory unit in order to establish the ability of the CDS to remove the specified test sediment at 25%, 50%, 75%, 100% and 125% of the target MTFR. Prior to the start of testing Contech reviewed existing data and decided to utilize a target MTFR of 0.93 cfs. This target was chosen based on the ultimate goal of demonstrating greater than 50% annualized weighted solids removal as defined in the NJDEP HDS Protocol. The flow rates, feed rates and influent concentration all met the Test protocol's coefficient of variance requirements and the background concentration for all five test runs never exceeded 20 mg/L.

Scour Testing

In order to demonstrate the ability of the CDS to be used as an online treatment device scour testing was conducted at greater than 200% of MTFR in accordance with the NJDEP HDS Protocol. The average flow rate during the online scour test was 1.99 cfs, which is equivalent to 214% of the MTFR (MTFR = 0.93 cfs). With the exception of one background sample and one effluent sample that both had concentrations of 4 mg/l all background and effluent samples were measured as Non Detect during the online scour testing. These results confirm that the CDS-4 did not scour at 214% MTFR and meets the criteria for online use.

Maintenance Frequency

The predicted maintenance frequency for all models is 96 months.

Sincerely,



Richard S. Magee, Sc.D., P.E., BCEE

Memorandum

August 11, 2014

To: Deborah Beck, Contech Engineered Solutions LLC

From: Dr. Chris Berger and Dr. Scott Wells

Handwritten signatures of Chris Berger and Scott Wells.

Re: NJDEP Scour Testing Results for the CDS-4

Scour testing of the Contech CDS-4 were overseen by Dr. Chris Berger during July, 2014 at the Contech Portland, Oregon laboratory. Except for the particle size analysis which was conducted by an outside laboratory, all phases of the test were observed. This included the randomized mixing of the test sediment, preloading and filling of the CDS-4, and the scour test itself. During preloading the initial sediment depths measured in the sedimentation sump and within annular area outside of the screening chamber were confirmed by the observer. The flow rates and frequency of sampling reported for the scour test were also observed and are reported accurately. The test used applicable NJCAT protocol and that their report accurately reflects the testing observed by Dr. Berger.

August 13, 2014

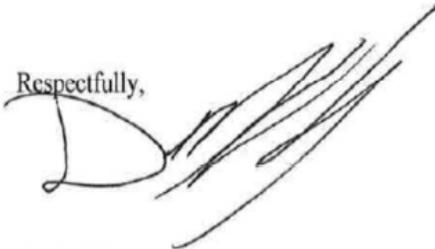
Dr. Richard Magee
Technical Director
New Jersey Corporation for Advanced Technology (NJCAT)
c/o Center for Environmental Systems
Stevens Institute of Technology
One Castle Point on Hudson
Hoboken, NJ 07030

RE: Updated CDS-4 Scour Test Results

Dr. Magee,

This correspondence is to confirm that Contech has successfully completed online scour testing on a full-scale CDS-4 in full compliance with the applicable policies and procedures detailed in the "2013 NJDEP Laboratory Protocol for Hydrodynamic Separators". Specifically testing was limited to completion of the applicable scour testing criteria for use as an online BMP. Also, said scour testing was completed according to the additional conditions described to and agreed upon by NJCAT and the commenters that had raised concern with scour testing previously completed and reported to NJCAT for public review and comment. Please do not hesitate to contact me at any time if you need any additional information about this testing.

Respectfully,



Derek M. Berg
Regulatory Manager- Stormwater

CONTECH Engineered Solutions LLC
71 US Route 1, Suite F | Scarborough, ME 04074
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**Center for Environmental Systems
Stevens Institute of Technology
One Castle Point
Hoboken, NJ 07030-0000**

August 27, 2014

Lisa Schafer
Environmental Engineer
New Jersey Department of Environmental Protection
Bureau of Nonpoint Pollution Control
401-02B, PO Box 420
Trenton, NJ 08625-0420

To all,

Based on my review, evaluation and assessment of the scour retesting conducted on the Continuous Deflective Separator (CDS®) by Contech and observed by Dr. Chris Berger, a colleague of Dr. Scott Wells, from Portland State University, the scour test protocol requirements contained in the “New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device” (NJDEP HDS Protocol) were met or exceeded. The scour retesting was conducted to address concerns raised during the public comment process that sediment that may have been deposited in the annular area outside of the screening chamber during removal efficiency testing could subsequently washout at higher flows.

During the retesting sediment meeting the NJDEP PSD scour test requirement was loaded to a depth of four inches in this annular region and the scour testing repeated. The results confirmed the earlier testing that the resulting effluent concentrations are all 3mg/l or less and well below the 20mg/l threshold established by the NJDEP scour protocol. Therefore the CDS meets the criteria for online use.

Sincerely,

A handwritten signature in blue ink that reads 'Richard S. Magee'. The signature is written in a cursive, flowing style.

Richard S. Magee, Sc.D., P.E., BCEE

8. References

Contech 2013. *Verification Testing Report for the CONTINUOUS DEFLECTIVE SEPARATOR (CDS®) Stormwater Treatment Device*. Prepared by Contech Engineered Solutions LLC. July 1.

Contech 2014. *NJDEP Scour Testing Results for the CDS-4*. Prepared by Contech Engineered Solutions, LLC. August 1.

NJDEP 2013a. *New Jersey Department of Environmental Protection Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology*. Trenton, NJ. January 25.

NJDEP 2013b. *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device*. Trenton, NJ. January 25.

VERIFICATION APPENDIX

Introduction

- Manufacturer – Contech Engineered Solutions LLC, 9025 Centre Pointe Drive, West Chester, OH 45069. *General Phone:* 800-338-1122. *Website:* <http://www.conteches.com/>
- MTD – Continuous Deflective Separator (CDS®) Stormwater Treatment Device. Model numbers verified are shown in Table A-1 and Table A-2. Other CDS models (e.g. CDS3020) may be available, however only the models listed in Tables A-1 and A-2 are NJCAT verified/NJDEP certified. CDS units not listed in the Tables within the CDS-4 classification family are acceptable under the verification/certification as long as they maintain the approved hydraulic loading rate, 2400 micron screen aperture and proportional scaling to the test unit.
- TSS Removal Rate – 50%
- On-line installation
- 2400 micron perforated screen plate
- No sediment weir

Detailed Specification

- NJDEP sizing tables attached (Table A-1 and Table A-2).
- New Jersey requires that the peak flow rate of the NJWQ Design Storm event of 1.25 inch in 2 hours shall be used to determine the appropriate size for the MTD.
- Prior to installation Contech provides contractors detailed installation and assembly instructions and is also available to consult onsite during installation.
- Maximum sediment depth prior to cleaning is 12 inches
- See Contech CDS® Inspection and Maintenance Guide – New Jersey for New Jersey verified models maintenance guidance at:
<http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info>
- A hydrodynamic separator, such as CDS, cannot be used in series with another hydrodynamic separator to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

Table A-1 MTFRs and Required Sediment Removal Intervals for Common CDS Models

CDS Model	Manhole Diameter (ft)	Maximum Treatment Flow Rate (cfs)	Effective Treatment Area (ft ²)	Hydraulic Loading Rate (gpm/ft ²)	50% Max Sediment Storage Volume (ft ³)	Required Sediment Removal Interval (Months)
CDS-3	3	0.52	7.07	33.22	7.1	96
CDS-4	4	0.93	12.57	33.22	12.6	96
CDS-5	5	1.5	19.63	33.22	19.6	96
CDS-6	6	2.1	28.27	33.22	28.3	96
CDS-7	7	2.8	38.48	33.22	38.5	96
CDS-8	8	3.7	50.27	33.22	50.3	96
CDS-10	10	5.8	78.54	33.22	78.5	96
CDS-12	12	8.4	113.10	33.22	113.1	96

*Sediment Removal Interval Calculated Using The "Monthly" Calculation In Section B, Appendix A of the NJDEP HDS Protocol

**Note that in some areas CDS units are available in additional diameters. Units not listed here are sized not to exceed 33.22gpm/ft² of effective treatment during the peak water quality flow and maintain proper geometric proportioning to the tested CDS-4

*** 50% Sediment Storage Capacity is equal to manhole diameter x 1ft of sediment depth. Each CDS has a 2ft deep sediment sump

Table A-2 Dimensional Overview for Common CDS Models
(Revised January 2017)

CDS Model	Manhole Diameter (ft)	Treatment Chamber Depth* (ft)	Treatment Chamber Wet Volume (ft ³)	Aspect Ratio Depth/Dia**	Detention Time at MTFR (sec)	Sediment Sump Depth*** (ft)	Screen Plate Dia./Depth (ft)	50% Max Sediment Storage Volume (ft ³)	Total Wet Volume Including Sediment Sump (ft ³)
CDS-3	3	3.5	24.74	1.17	71	2	1.5/1.5	7.1	31.81
CDS-4	4	3.50	43.98	0.88	70	2	2/1.5	12.6	56.55
CDS-5	5	3.75	73.63	0.75	74	2	2.5/2	19.6	93.26
CDS-6	6	4.50	127.23	0.75	84	2	3/3	28.3	155.50
CDS-7	7	5.25	202.04	0.75	94	2	3.5/3.5	38.5	240.52
CDS-8	8	6.00	301.58	0.75	104	2	4/4	50.3	351.85
CDS-10	10	7.50	589.03	0.75	124	2	5/5	78.5	667.57
CDS-12	12	9.00	1017.85	0.75	145	2	6/6	113.1	1130.94

*Treatment Chamber Depth is defined as the depth below the invert to the top of the false floor installed at 50% sedimentation depth

**The aspect ratio of treatment chamber depth/unit diameter for the tested unit is 0.88. Unit depth is within 85% of the depth required to maintain this ratio across all models

***Each CDS model has 2ft of sump depth below the separation slab to accommodate sediment accumulation



APPENDIX 18

OPERATION & MAINTENANCE PLAN



Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

STORMWATER OPERATION & MAINTENANCE PLAN

COSTCO WHOLESale

AT CROSSGATES MALL
TOWN OF GUILDERLAND
ALBANY COUNTY, NEW YORK

PREPARED FOR

COSTCO WHOLESale CORPORATION

MARCH 2019

MC PROJECT No. 13001204A



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APPENDIX A

STORMTRAP DOUBLETRAP OPERATION AND MAINTENANCE

APPENDIX B

CDS SYSTEM OPERATION AND MAINTENANCE



Project Description

The project proposes the construction of a Costco Wholesale and Fuel Facility, as well as associated parking lots and infrastructure on the approximately 14.86 acre lot. To mitigate the impacts of this development on the receiving watercourse, a StormTrap DoubleTrap infiltration system and three CDS Stormwater Treatment Systems will be constructed as a part of this project. These systems, along with all catch basins, inlets, and roof leaders will need to be regularly inspected/maintained as described in this report to ensure they function as designed.

Site Drainage

A State Pollutant Discharge Elimination System Permit (SPDES GP 0-15-002) is required from the New York State Department of Environmental Conservation (NYSDEC) and a Storm Water Pollution Prevention Plan (SWPPP) has been prepared for review/approval by the Town of Guilderland (an MS4 community). The site improvements made to the parcel required this study of impacts on watercourses in and around the site. The study provides reviews the existing drainage conditions as well as the proposed improvements to provide measures that will be used to control potential impacts due to storm water runoff.

Constructed Stormwater Control Practices

Catch Basins:

Catch basins on-site are utilized to collect stormwater run-off and melting snow from the paved parking areas, driveway and sidewalks. These are located along the centerline of roadside swales.

Drain/Yard Inlets:

Drain/yard inlets are located within the landscaped areas and are utilized to collect overland stormwater run-off and snow melt.

Roof leaders:

Roof leaders are utilized to collect stormwater run-off from the roof and discharge it into the subsurface chamber system.

Subsurface StormTrap DoubleTrap System:

A subsurface StormTrap DoubleTrap system is proposed to provide water quality and quantity mitigation in keeping with the requirements in the New York State Storm Water Management Design Manual (NYSSMDM). The system also has an outlet control structure which regulates the out-flow of stormwater.

CDS Systems:

The CDS systems are below grade stormwater treatment systems that provide water quality mitigation. These systems are located at three locations to the west of the proposed warehouse along the eastern edge of the proposed StormTrap DoubleTrap. They intercept flow from the storm sewer system prior to its introduction into the StormTrap DoubleTrap system.



See Design Plans and Details for these improvements.

Typical Maintenance for Stormwater Practices

As a consequence of its function, the stormwater conveyance system collects and transports runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, the CDS systems, and the StormTrap DoubleTrap system on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly to avoid flooding.

Catch Basins:

Catch basins should be inspected monthly and after heavy rain fall to ensure they are functioning properly. Typical maintenance of catch basins includes removal of debris from the grate and sump. This can be done manually or using a vehicle equipped with a vacuum pump. Catch basins should be cleaned out at least one (1) time per year. A good time to clean out catch basins is in the spring to remove the build-up of leaves, sand used for traction, dirt, and other debris that accumulates during winter months.

Drain/Yard Inlets:

Drain/yard inlets, similar to the catch basins, require typical maintenance which includes removal of debris from the grate and sump manually. For this site, use of a vac truck may cause damage to the lawn areas around these structures. Inspections of the structures should occur monthly and after heavy rain fall to ensure they are still functioning properly. These should be cleaned out at least one (1) time per year.

Roof leaders:

Roof leaders, similar to the catch basins, require typical maintenance which includes removal of debris manually. Inspections of the leaders should occur monthly and after heavy rain fall to ensure they are still functioning properly. These should be cleaned out at least one (1) time per year.

StormTrap DoubleTrap System:

The StormTrap DoubleTrap System should be inspected at regular intervals and maintained when necessary to ensure optimum performance. At a minimum, inspections should be performed at least annually (chambers, outlet control structure, etc.) and after each major storm event. The system should be cleaned out when the level of sediment occupies more than 10% to 15% of the originally designed system's volume or if any blockages are observed.

Refer to Appendix A for Manufacturers recommended Operation & Maintenance of the StormTrap DoubleTrap system.

CDS Systems:

The CDS systems should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly, but regular sweeping will slow accumulation.



At a minimum, inspections should be performed quarterly however more frequent inspections may be necessary in equipment washdown areas and in climates where winter sanding operations may lead to rapid accumulations of a large volume of sediment. The CDS systems should be cleaned when the level of sediment has reached 75% of the capacity in the isolated sump or when significant level of hydrocarbons or trash has accumulated.

Cleaning of the CDS systems should be done during dry weather conditions when no flow is entering the system. Cleanout of the CDS systems with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Disposal of all material removed from the CDS systems should be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes.

Refer to Appendix B for Manufacturers recommended Operation & Maintenance of the CDS systems.

In general, any deficiencies identified during the regular inspections or otherwise for all the stormwater management facilities should be corrected immediately. See appendices for forms to record inspection and maintenance work for the stormwater facilities.



Costco Wholesale
Project #13001204A
March 2019

APPENDIX A

STORMTRAP DOUBLETRAP OPERATION AND MAINTENANCE

STORMTRAP MAINTENANCE MANUAL

1. Introduction

Regular inspections are recommended to ensure that the system is functioning as designed. Please call your Authorized StormTrap Representative if you have questions in regards to the inspection and maintenance of the StormTrap system. Prior to entry into any underground storm sewer or underground detention systems, appropriate OSHA and local safety regulations and guidelines should be followed.

2. Inspection Schedules for Municipalities

StormTrap Stormwater Management Systems are recommended for inspection whenever the upstream and downstream catch basins and stormwater pipes of the stormwater collection system are inspected or maintained. This will economize the cost of the inspection if it is done at the same time the Municipal crews are visiting the area.

3. Inspection Schedules for Private Development

StormTrap Stormwater Management Systems, for a private development, are recommended for inspection after each major storm water event. At a minimum, until a cleaning schedule can be established, an annual inspection is recommended. If inspected on an annual basis, the inspection should be conducted before the stormwater season begins to be sure that everything is functioning properly for the upcoming storm season.

4. Inspection Process

Inspections should be done such that at least 2-3 days has lapsed since the most recent rain event to allow for draining. Visually inspect the system at all manhole locations. Utilizing a sediment pole, measure and document the amount of silt at each manhole location (Figure 1). Inspect each pipe opening to ensure that the silt level or any foreign objects are not blocking the pipes. Be sure to inspect the outlet pipe(s) because this is typically the smallest



pipe in the system. It is common that most of the larger materials will be collected upstream of the system in catch basins, and it is therefore important at time of inspections to check these structures for large trash or blockages.

Remove any blockages if you can during the inspection process only if you can do so safely from the top of the system without entering into the system. **Do not go into the system under any circumstances** without proper ventilation equipment and training. Pass any information requiring action onto the appropriate maintenance personnel if you cannot remove the blockages from above during the inspection process. Be sure to describe the location of each manhole and the type of material that needs to be removed.

The sediment level of the system should also be measured and recorded during the inspection process. Recording the sediment level at each manhole is very important in order get a history of sediment that can be graphed over time (i.e. years) in order to estimate when the system will need to be maintained next. It is also important to keep these records to verify that the inspection process was actually performed if anyone asks for your records in the future.

The sediment level in the underground detention system can be determined from the outside of the system by opening up all the manholes and using a sediment pole to measure the amount of sediment at each location. Force the stick to the bottom of the system and then remove it and measure the amount of sediment at that location. Again, do not go into the system under any circumstances without proper ventilation equipment and training.

5. When to Clean the System

Any blockages should be safely removed as soon as practical so that the Stormwater detention system will fill and drain properly before the next stormwater event.

The Dry Detention System should be completely cleaned whenever the sediment occupies more than 10% to 15% of the originally designed system's volume. The Wet Detention System should be cleaned when the sediment occupies more than 30% or 1/3rd of the originally designed system's volume. NOTE: Check with your municipality in regards to



cleaning criteria, as the allowable sediment before cleaning may be more or less than described above.

6. How to Clean the StormTrap

The system should be completely cleaned back to 100% of the originally designed storage volume whenever the above sediment levels have been reached. Be sure to wait at least 3 days after a stormwater event to be sure that the system is completely drained (if it is a Dry Detention System), and all of the sediments have settled to the bottom of the system (if it is a Wet Detention System).

Do not enter the System unless you are properly trained, equipped, and qualified to enter a confined space as identified by local occupational safety and health regulations.

There are many maintenance companies that are in business to help you clean your underground stormwater detention systems and water quality units. Please call your StormTrap representative for referrals in your area.

A. Dry Detention System Cleaning

Maintenance is typically performed using a vacuum truck. Sediment should be flushed towards a vacuum hose for thorough removal. For a Dry Detention System, remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the StormTrap system. Open up the manhole at the opposite end of the StormTrap and use sewer jetting equipment to force water in the same row from one end of the StormTrap row to the opposite side. The rows of the StormTrap are completely open in one contiguous channel from one end to the other for easy cleaning.

Place the vacuum hose and the sewer jetting equipment in the next row and repeat the process until all of the rows have been cleaned.

When finished, replace all covers that were removed and dispose of the collected material properly.

B. Wet Detention System Cleaning

If the system was designed to maintain a permanent pool of water, floatables and any oil should be removed in a separate procedure prior to the removal of all sediment.

The floatable trash is removed first by using a bucket strainer to capture and remove any floating debris.

The floatable oils are then removed off the top of the water by using the vacuum truck to suck off any floatable fluids and liquids.

The next step is to use the vacuum truck to gently remove the clarified water above the sediment layer.

The final step is to clean the sediment for each row as described above in the paragraph "A. Dry Detention System Cleaning". For smaller systems, the vacuum truck can remove all of the sediment in the basin without using the sewer jetting equipment because of the smaller space.

7. Inspection Reports

Proof of these inspections is the responsibility of the property owner. All inspection reports and data should be kept on site or at a location where they will be accessible for years in the future. Some municipalities require these inspection and cleaning reports to be forwarded to the proper governmental permitting agency on an annual basis.

Refer to your local and national regulations for any additional maintenance requirements and schedules not contained herein. Inspections should be a part of your standard operating procedure.

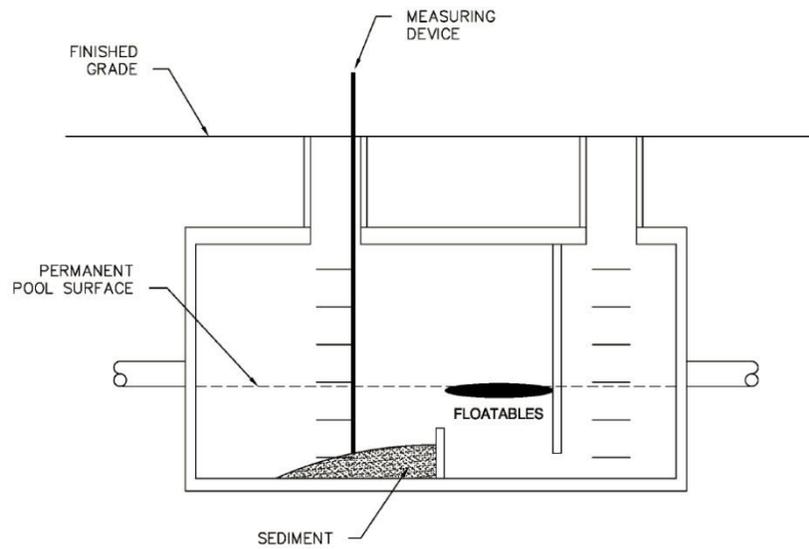


Figure 1. During inspection, measure the distance from finished grade to the top of the sediment inside the system.

Sample inspection and maintenance log

Date	Depth of Sediment	Accumulated Trash	Maintenance Performed	Maintenance Personnel	Comments
2/5/2012	3"	None	Sediment Removal/Vac	B. Johnson	



Costco Wholesale
Project #13001204A
March 2019

APPENDIX B

CDS SYSTEM OPERATION AND MAINTENANCE

CDS[®] Inspection and Maintenance Guide



Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allow both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y ³	m ³
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.

ANNUAL RECORD OF OPERATION AND MAINTENANCE

OWNER _____
 ADDRESS _____
 OWNER REPRESENTATIVE _____ PHONE _____

INSTALLATION:
 MODEL DESIGNATION _____ DATE _____
 SITE LOCATION _____

INSPECTIONS:

DATE/ INSPECTOR	SCREEN/INLET INTEGRITY	FLOATABLES DEPTH	DEPTH TO SEDIMENT (inches)	SEDIMENT VOLUME* (CUYDS)	SORBENT DISCOLORATION

DEPTH FROM COVER TO BOTTOM OF SUMP (SUMP INVERT) _____

DEPTH FROM COVER TO SUMP @ 75% FULL _____

VOLUME OF SUMP @ 75% FULL = _____ CUYD

VOLUME/INCH DEPTH _____ CUFT/IN OF SUMP

VOLUME/FOOT DEPTH _____ CUYD/FT OF SUMP

***Calculate Sediment Volume = (Depth to Sump Invert – Depth to Sediment)*(Volume/inch)**

OBSERVATIONS OF FUNCTION: _____

CLEANOUT:

DATE	VOLUME FLOATABLES	VOLUME SEDIMENTS	METHOD OF DISPOSAL OF FLOATABLES, SEDIMENTS, DECANT AND SORBENTS

OBSERVATIONS:

SCREEN MAINTENANCE:

DATE OF POWER WASHING, INSPECTION AND OBSERVATIONS:

CERTIFICATION: _____ TITLE: _____ DATE: _____

INSPECTION CHECKLIST

1. During the rainfall season, inspect and check condition of unit at least once every 30 days
2. Ascertain that the unit is functioning properly (no blockages or obstructions to inlet and/or separation screen)
3. Measure amount of solid materials that have accumulated in the sump (Unit should be cleaned when the sump is 75-85% full)
4. Measure amount of fine sediment accumulated behind the screen
5. Measure amount of floating trash and debris in the separation chamber

MAINTENANCE CHECKLIST

1. Cleanout unit at the end and beginning of the rainfall season
2. Pump down unit (at least once a year) and thoroughly inspect separation chamber, separation screen and oil baffle
3. No visible signs of damage or loosening of bolts to internal components observed *

*** If there is any damage to the internal components or any fasteners are damaged or missing please contact CONTECH (800.338.1122).**

OPERATIONS AND MAINTENANCE GUIDELINES

CDS Stormwater Treatment Unit

INTRODUCTION

The CDS unit is an important and effective component of your storm water management program and proper operation and maintenance of the unit are essential to demonstrate your compliance with local, state and federal water pollution control requirements.

The CDS technology features a patented non-blocking, indirect screening technique developed in Australia to treat water runoff. The unit is highly effective in the capture of suspended solids, fine sands and larger particles. Because of its non-blocking screening capacity, the CDS unit is unmatched in its ability to capture and retain gross pollutants such as trash and debris. In short, CDS units capture a very wide range of organic and in-organic solids and pollutants that typically result in tons of captured solids each year such as: Total suspended solids (TSS) and other sedimentitious materials, oil and greases, trash, and other debris (including floatables, neutrally buoyant, and negatively buoyant debris). These pollutants will be captured even under very high flow rate conditions.

CDS units are equipped with conventional oil baffles to capture and retain oil and grease. Laboratory evaluations show that the CDS units are capable of capturing up to 70% of the free oil and grease from storm water. CDS units can also accommodate the addition of oil sorbents within their separation chambers. The addition of the oil sorbents can ensure the permanent removal of 80% to 90% of the free oil and grease from the storm water runoff.

OPERATIONS

The CDS unit is a non-mechanical self-operating system and will function any time there is flow in the storm drainage system. The unit will continue to effectively capture pollutants in flows up to the design capacity even during extreme rainfall events when the design capacity may be exceeded. Pollutants captured in the CDS unit's separation chamber and sump will be retained even when the units design capacity is exceeded.

CDS UNIT INSPECTION

Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection (and clean out) of the separation chamber (screen/cylinder) & sump and another allows inspection (and cleanout) of sediment captured and retained behind the screen.

The unit should be periodically inspected to determine the amount of accumulated pollutants and to ensure that the cleanout frequency is adequate to handle the predicted pollutant load being processed by the CDS unit. The unit should be periodically inspected for indications of vector infestation, as well. The recommended cleanout of

solids within the CDS unit's sump should occur at 75% to 85% of the sump capacity. However, the sump may be completely full with no impact to the CDS unit's performance.

CONTECH Stormwater Solutions (previously CDS Technologies) recommends the following inspection guidelines: For new initial operation, check the condition of the unit after every runoff event for the first 30 days. For ongoing operations, the unit should be inspected after the first six inches of rainfall at the beginning of the rainfall season and at approximately 30-day intervals. The visual inspection should ascertain that the unit is functioning properly (no blockages or obstructions to inlet and/or separation screen), evidence of vector infestation, and to measure the amount of solid materials that have accumulated in the sump, fine sediment accumulated behind the screen, and floating trash and debris in the separation chamber. This can be done with a calibrated dipstick, tape measure or other measuring instrument so that the depth of deposition in the sump can be tracked.

CDS UNIT CLEANOUT

The frequency of cleaning the CDS unit will depend upon the generation of trash and debris and sediments in your application. Cleanout and preventive maintenance schedules will be determined based on operating experience unless precise pollutant loadings have been determined.

Access to the CDS unit is typically achieved through two manhole access covers – one allows cleanout of the separation chamber (screen/cylinder) & sump and another allows cleanout of sediment captured and retained behind the screen. For units possessing a sizable depth below grade (depth to pipe), a single manhole access point would allow both sump cleanout and access behind the screen.

CONTECH Stormwater Solutions Recommends The Following:

NEW INSTALLATIONS: Check the condition of the unit after every runoff event for the first 30 days. The visual inspection should ascertain that the unit is functioning properly (no blockages or obstructions to inlet and/or separation screen), measuring the amount of solid materials that have accumulated in the sump, the amount of fine sediment accumulated behind the screen, and determining the amount of floating trash and debris in the separation chamber. This can be done with a calibrated “dip stick” so that the depth of deposition can be tracked. Refer to the “Cleanout Schematic” (**Appendix B**) for allowable deposition depths and critical distances. Schedules for inspections and cleanout should be based on storm events and pollutant accumulation.

ONGOING OPERATION: During the rainfall season, the unit should be inspected at least once every 30 days. The floatables should be removed and the sump cleaned when the sump is 75-85% full. If floatables accumulate more rapidly than the settleable solids, the floatables should be removed using a vactor truck or dip net before the layer thickness exceeds approximately one foot.

Cleanout of the CDS unit at the end of a rainfall season is recommended because of the nature of pollutants collected and the potential for odor generation

from the decomposition of material collected and retained. This end of season cleanout will assist in preventing the discharge of pore water from the CDS[®] unit during summer months.

USE OF SORBENTS –The addition of sorbents is **not a requirement** for CDS units to effectively control oil and grease from storm water. The conventional oil baffle within a unit assures satisfactory oil and grease removal. However, the addition of sorbents is a unique enhancement capability unique to CDS units, enabling increased oil and grease capture efficiencies beyond that obtainable by conventional oil baffle systems.

Under normal operations, CDS units will provide effluent concentrations of oil and grease that are less than 15 parts per million (ppm) for all dry weather spills where the volume is less than or equal to the spill capture volume of the CDS unit. During wet weather flows, the oil baffle system can be expected to remove between 40 and 70% of the free oil and grease from the storm water runoff.

CONTECH Stormwater Solutions only recommends the addition of sorbents to the separation chamber if there are specific land use activities in the catchment watershed that could produce exceptionally large concentrations of oil and grease in the runoff, concentration levels well above typical amounts. If site evaluations merit an increased control of free oil and grease then oil sorbents can be added to the CDS unit to thoroughly address these particular pollutants of concern.

Recommended Oil Sorbents

Rubberizer[®] Particulate 8-4 mesh or OARS[™] Particulate for Filtration, HPT4100 or equal. Rubberizer is supplied by Haz-Mat Response Technologies, Inc. 4626 Santa Fe Street, San Diego, CA 92109 (800) 542-3036. OARS is supplied by AbTech Industries, 4110 N. Scottsdale Road, Suite 235, Scottsdale, AZ 85251 (800) 545-8999.

The amount of sorbent to be added to the CDS separation chamber can be determined if sufficient information is known about the concentration of oil and grease in the runoff. Frequently the actual concentrations of oil and grease are too variable and the amount to be added and frequency of cleaning will be determined by periodic observation of the sorbent. As an initial application, CDS recommends that approximately 4 to 8 pounds of sorbent material be added to the separation chamber of the CDS units per acre of parking lot or road surface per year. Typically this amount of sorbent results in a ½ inch to one (1") inch depth of sorbent material on the liquid surface of the separation chamber. The oil and grease loading of the sorbent material should be observed after major storm events. Oil Sorbent material may also be furnished in pillow or boom configurations.

The sorbent material should be replaced when it is fully discolored by skimming the sorbent from the surface. The sorbent may require disposal as a special or hazardous waste, but will depend on local and state regulatory requirements.

CLEANOUT AND DISPOSAL

A vactor truck is recommended for cleanout of the CDS unit and can be easily accomplished in less than 30-40 minutes for most installations. Standard vactor operations should be employed in the cleanout of the CDS unit. Disposal of material from the CDS unit should be in accordance with the local municipality's requirements. Disposal of the decant material to a POTW is recommended. Field decanting to the storm drainage system is not recommended. Solids can be disposed of in a similar fashion as those materials collected from street sweeping operations and catch-basin cleanouts.

MAINTENANCE

The CDS unit should be pumped down at least once a year and a thorough inspection of the separation chamber (inlet/cylinder and separation screen) and oil baffle performed. The unit's internal components should not show any signs of damage or any loosening of the bolts used to fasten the various components to the manhole structure and to each other. Ideally, the screen should be power washed for the inspection. If any of the internal components is damaged or if any fasteners appear to be damaged or missing, please contact CONTECH at 800.338.2211 to make arrangements to have the damaged items repaired or replaced.

The screen assembly is fabricated from Type 316 stainless steel and fastened with Type 316 stainless steel fasteners that are easily removed and/or replaced with conventional hand tools. The damaged screen assembly should be replaced with the new screen assembly placed in the same orientation as the one that was removed.

CONFINED SPACE

The CDS unit is a confined space environment and only properly trained personnel possessing the necessary safety equipments should enter the unit to perform particular maintenance and/or inspection activities beyond normal procedure. Inspections of the internal components can, in most cases, be accomplished by observations from the ground surface.

VECTOR CONTROL

Most CDS units do not readily facilitate vector infestation. However, for CDS units that may experience extended periods of non-operation (stagnant flow conditions for more than approximately one week) there may be the potential for vector infestation. In the event that these conditions exist, the CDS unit may be designed to minimize potential vector habitation through the use of physical barriers (such as seals, plugs and/or netting) to seal out potential vectors. The CDS unit may also be configured to allow drain-down under favorable soil conditions where infiltration of storm water runoff is permissible. For standard CDS units that show evidence of mosquito infestation, the

application of larvicide is one control strategy that is recommended. Typical larvicide applications are as follows:

SOLID B.t.i. LARVICIDE: ½ to 1 briquet (typically treats 50-100 sq. ft.) one time per month (30-days) or as directed by manufacturer.

SOLID METHOPRENE LARVICIDE (not recommended for some locations): ½ to 1 briquet (typically treats 50-100 sq. ft.) one time per month (30-days) to once every 4-½ to 5-months (150-days) or as directed by manufacturer.

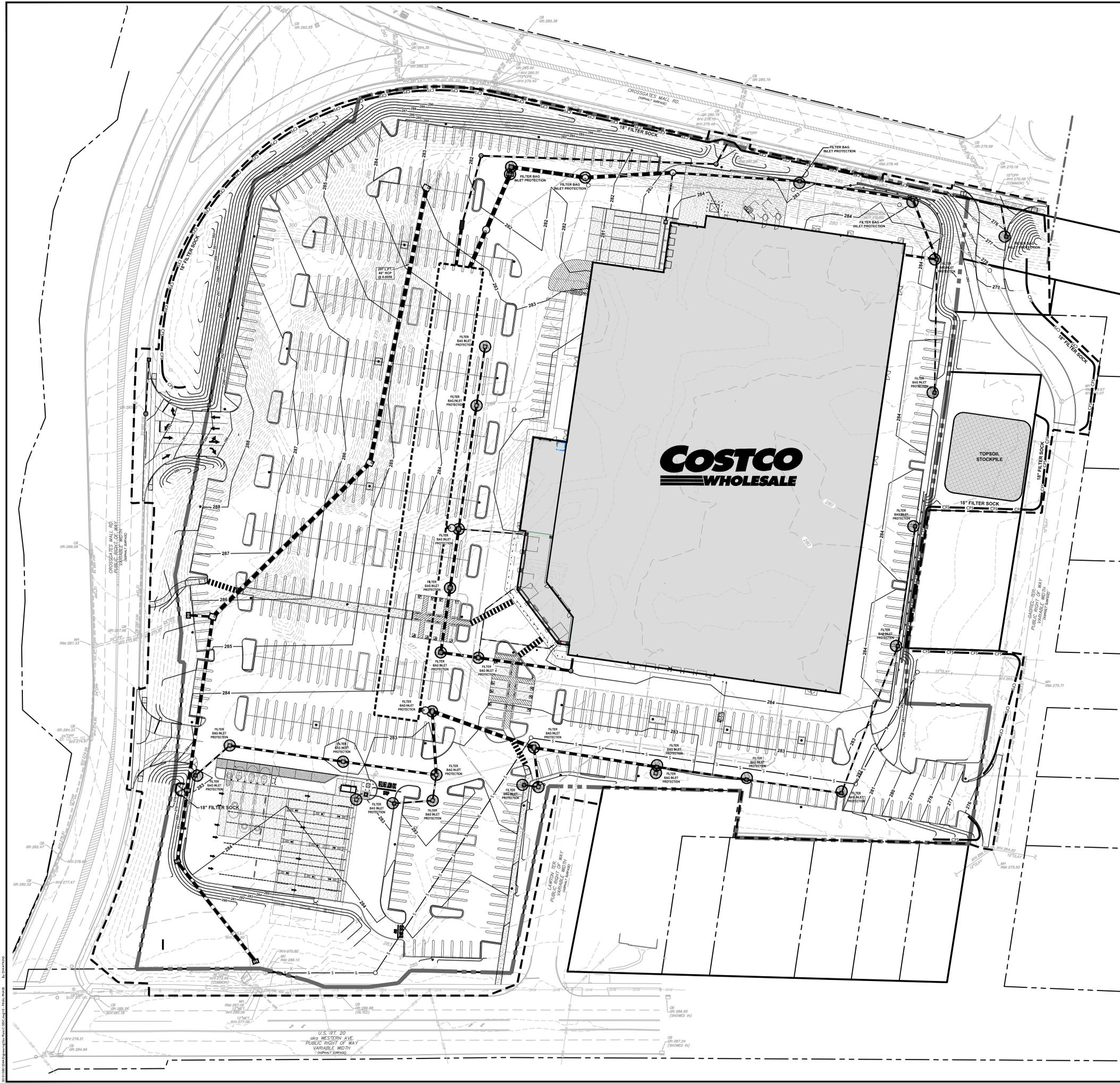
RECORDS OF OPERATION AND MAINTENANCE

CONTECH Stormwater Solutions recommends that the owner maintain annual records of the operation and maintenance of the CDS unit to document the effective maintenance of this important component of your storm water management program. The attached **Annual Record of Operations and Maintenance** form (see **Appendix A**) is suggested and should be retained for a minimum period of three years.



APPENDIX 19

EROSION & SEDIMENT CONTROL PLANS AND DRAINAGE DETAILS



COSTCO
WHOLESALE

TOPSOIL STOCKPILE
18" FILTER SOCK

FINAL SEQUENCE OF ACTIVITIES:

AT LEAST SEVEN (7) DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, THE OPERATOR SHALL INVITE ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES, THE LANDOWNER, ALL APPROPRIATE MUNICIPAL OFFICIALS, THE EROSION AND SEDIMENT CONTROL PREPARER, AND THE SOIL CONSERVATION DISTRICT TO AN ON-SITE MEETING.

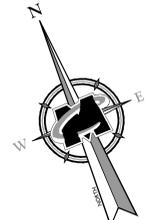
AT LEAST THREE (3) DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, ALL CONTRACTORS INVOLVED ON THOSE ACTIVITIES SHALL NOTIFY THE NEW YORK UTILITY ONE-CALL SYSTEM AT 811 TO ORDER A UTILITY MARK-OUT AT THE SITE.

ALL STRUCTURES ASSOCIATED WITH THE CONSTRUCTION OF SEDIMENT REMOVAL FACILITIES MUST BE ON-SITE PRIOR TO EARTH DISTURBANCE.

CONTRACTOR SHALL TAKE IMMEDIATE ACTION TO INSTITUTE ADDITIONAL MEASURES IF ANY EROSION AND SEDIMENTATION CONTROL PROBLEMS ARISE PRIOR TO THE STABILIZATION OF EROSION AND SEDIMENTATION CONTROL MEASURES ON-SITE.

THIS PLAN IS A CONTINUATION OF PROCEDURES INITIATED ON THE DEMOLITION, INITIAL SITE PREPARATION AND ROUGH GRADING PLANS.

1. INSPECT ALL SOIL EROSION / SEDIMENT CONTROL MEASURES INCLUDING BUT NOT LIMITED TO SEDIMENT CONTROL BARRIERS AND STONE CONSTRUCTION ACCESS, REPAIR OR REPLACE AS NECESSARY.
2. CONSTRUCT UNDERGROUND STORMWATER MANAGEMENT SYSTEM COMPLETE WITH DISCHARGE CONTROL STRUCTURE.
3. FINISH CONSTRUCTION OF ALL REMAINING STORM SEWERS.
4. FINISH CONSTRUCTION OF ALL ON-SITE UNDERGROUND UTILITIES AND BUILDING SERVICE CONNECTIONS. CONSTRUCT FOUNDATIONS FOR AREA LIGHT STANDARDS AND RUN ELECTRIC SERVICE TO FOUNDATIONS AND ALL LOCATIONS FOR ILLUMINATED SIGNS (DIRECTIONAL, MARKING, AND PYLON).
5. FINISH CONSTRUCTION OF ALL CURBING AROUND PERIMETER OF NEW PARKING AND DRIVEWAY AREAS. CONSTRUCT CURBING AROUND BUILDING. CONSTRUCT CURBING AROUND LANDSCAPE ISLANDS.
6. FINISH PLACEMENT OF PAVING STONE BASE COURSE ON DRIVEWAY AND COMPACTED.
7. ALL INLETS SET DURING ROUGH GRADING OPERATIONS WITH TEMPORARY GRATE ELEVATIONS ARE TO BE SET TO PERMANENT GRATE ELEVATIONS AS SOON AS PAVING STONE BASE HAS BEEN PLACED AROUND THE INLET. REPLACE CRUSHED STONE INLET PROTECTION WITH FILTER BAG INLET PROTECTION.
8. CONSTRUCT ALL CONCRETE PADS AND CONCRETE PAVEMENT.
9. INSTALL ASPHALT PAVING BINDER COURSE.
10. INSTALL ALL SIGNAGE ON THE SITE INCLUDING TRAFFIC CONTROL AND DIRECTIONAL SIGNS.
11. SPREAD TOPSOIL IN ALL AREAS TO BE LANDSCAPED OR SEEDED AND ESTABLISH PERMANENT GROUND COVER AND LANDSCAPING AS SPECIFIED BY LANDSCAPING PLAN. MULCH ALL EXPOSED AREAS AS SPECIFIED BY THESE PLANS.
12. INSTALL FINAL PAVING WEARING SURFACE, APPLY PARKING AREA AND TRAFFIC CONTROL PAVEMENT PAINT.
13. REMOVE ALL TEMPORARY SOIL EROSION AND SEDIMENT CONTROLS. ESTABLISH PERMANENT VEGETATION ON ALL AREA DISTURBED BY THE REMOVAL OF THE TEMPORARY CONTROLS. AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 85 PERCENT PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS.



SCALE: 1" = 40'

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RUSSELL T. McFALL II
NEW YORK LICENSED PROFESSIONAL
ENGINEER - LICENSE NUMBER: 09030

PRELIMINARY/FINAL
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TOWN OF GUILDERLAND
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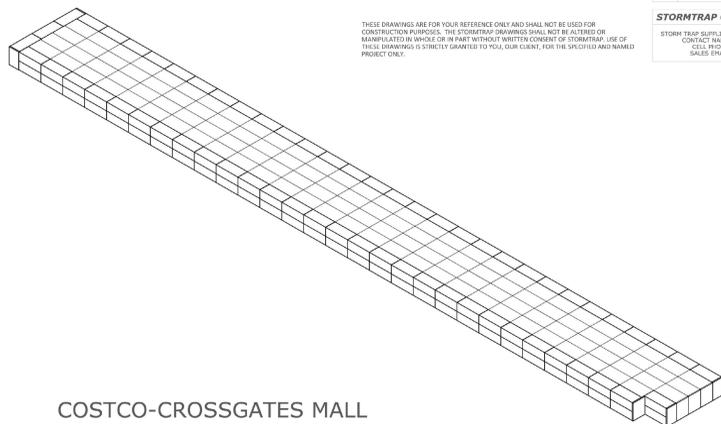
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PROJECT NUMBER	DRAWING NAME		
13001204A	C-55C		

SHEET TITLE
**EROSION CONTROL
FINAL PHASE**



MODULAR CONCRETE STORMWATER MANAGEMENT



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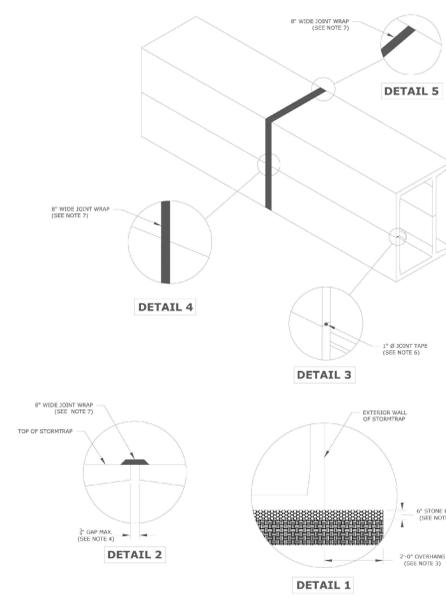
COSTCO-CROSSGATES MALL ALBANY, NY

SHEET INDEX table with columns: PAGE, DESCRIPTION

STORMTRAP CONTACT INFORMATION

StormTrap project information: PROJECT INFORMATION, CURRENT ISSUE DATE, ISSUED FOR, PRELIMINARY, REV. DATE, SHEET NUMBER: 0.0

- STORMTRAP INSTALLATION SPECIFICATIONS 1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C913... 2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR...



StormTrap project information: PROJECT INFORMATION, CURRENT ISSUE DATE, ISSUED FOR, PRELIMINARY, REV. DATE, SHEET NUMBER: 3.0

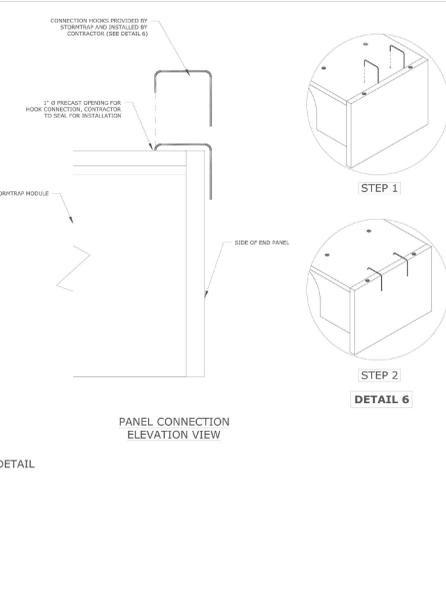
STRUCTURAL DESIGN LOADING CRITERIA table

STORMTRAP SYSTEM INFORMATION table

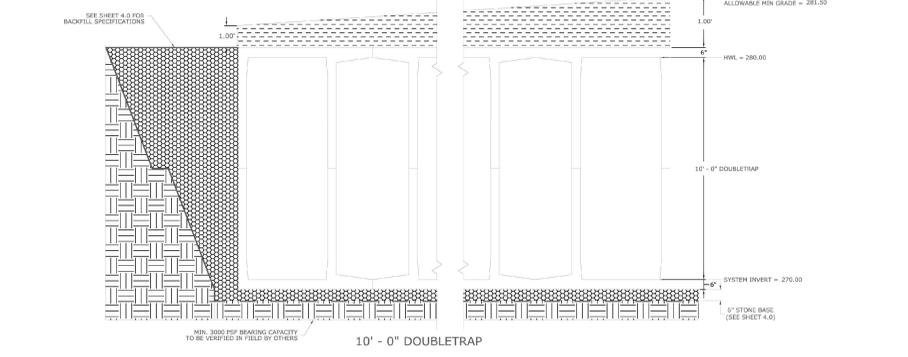
- SITE SPECIFIC DESIGN CRITERIA 1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR...

StormTrap project information: PROJECT INFORMATION, CURRENT ISSUE DATE, ISSUED FOR, PRELIMINARY, REV. DATE, SHEET NUMBER: 1.0

- END PANEL ERECTION/INSTALLATION NOTES 1. END PANELS WILL BE SUPPLIED TO CLOSE OFF ENDS OF ROWS... 2. PANELS SHALL BE INSTALLED IN A TILT POSITION DIRECTLY ADJACENT TO OPEN END OF MODULE...



StormTrap project information: PROJECT INFORMATION, CURRENT ISSUE DATE, ISSUED FOR, PRELIMINARY, REV. DATE, SHEET NUMBER: 3.1



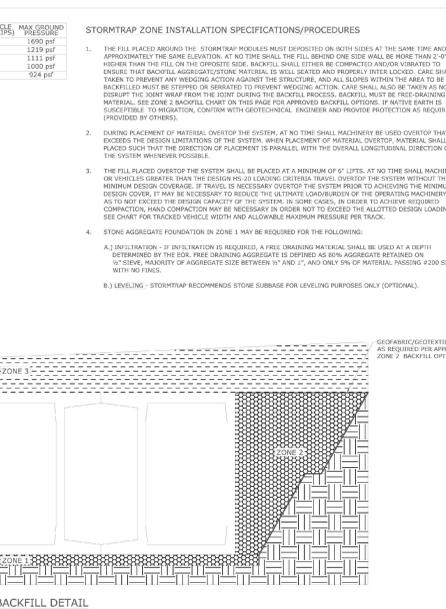
BILL OF MATERIALS table

LOADINGS DISCLAIMER STORMTRAP IS NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADINGS FROM NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP...

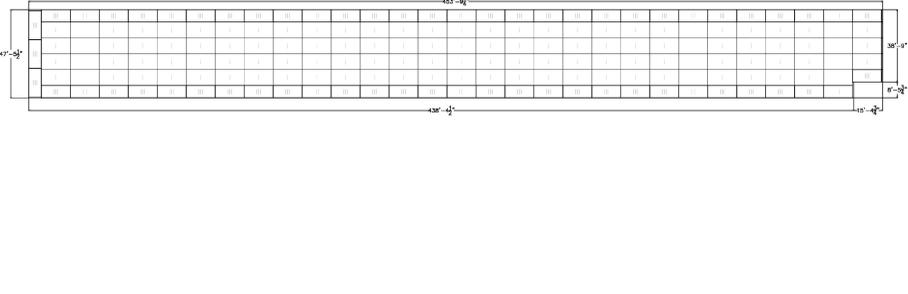
- DESIGN CRITERIA ALLOWABLE MAX GRADE = 281.50 ALLOWABLE MIN GRADE = 281.50 INSIDE HEIGHT ELEVATION = 280.00 SYSTEM INVERT = 270.00

StormTrap project information: PROJECT INFORMATION, CURRENT ISSUE DATE, ISSUED FOR, PRELIMINARY, REV. DATE, SHEET NUMBER: 2.0

ZONE CHART table with columns: ZONE, ZONE DESCRIPTIONS, REMARKS



StormTrap project information: PROJECT INFORMATION, CURRENT ISSUE DATE, ISSUED FOR, PRELIMINARY, REV. DATE, SHEET NUMBER: 4.0



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VERTICAL SCALE: 1/8\"/>

