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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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A circular professional engineer seal for the State of New York. The seal contains the text 'STATE OF NEW YORK', 'RUSSELL T. McFALL II', 'LICENSED PROFESSIONAL ENGINEER', and '090030'. A blue signature is written over the seal.

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
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Post DA #1C	1.005	44	0.1433
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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.

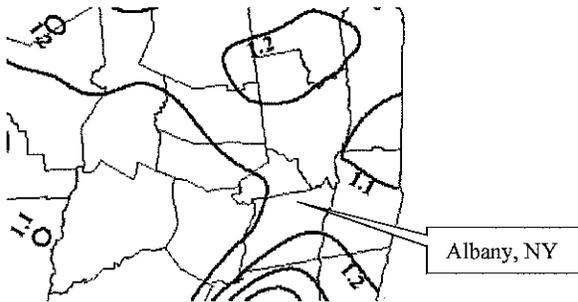
Wetlands & Floodplain:

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.

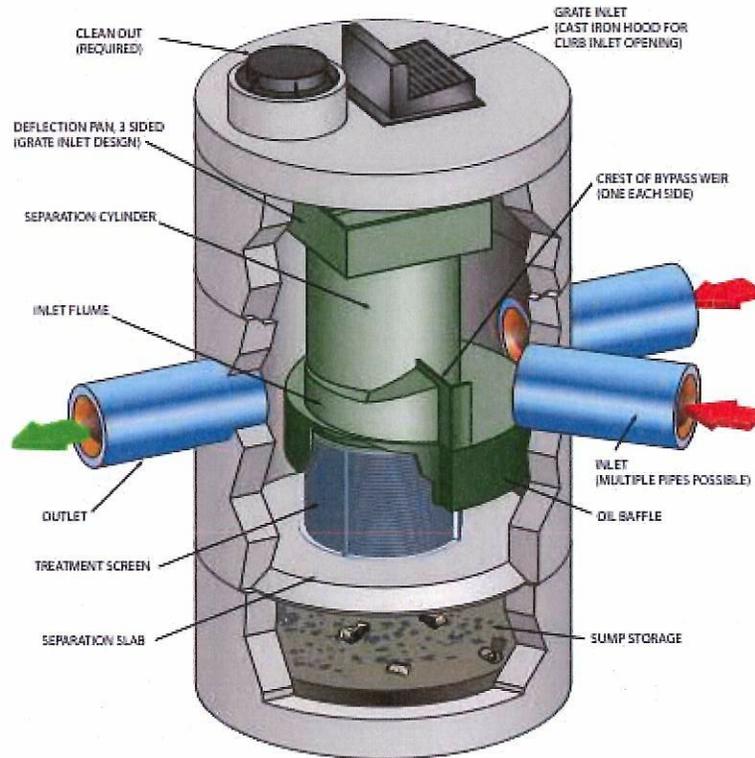
Runoff Reduction Volume (RR v):

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



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.



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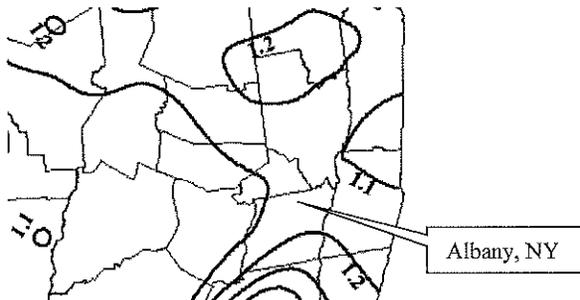
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The Water Quality Volume (WQv) is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume. The WQv is directly related to the impervious cover created at a site. The 90% rainfall event value (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.

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Entire Site	18.151	1.17	75.14	0.726	1.285	55,989

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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):

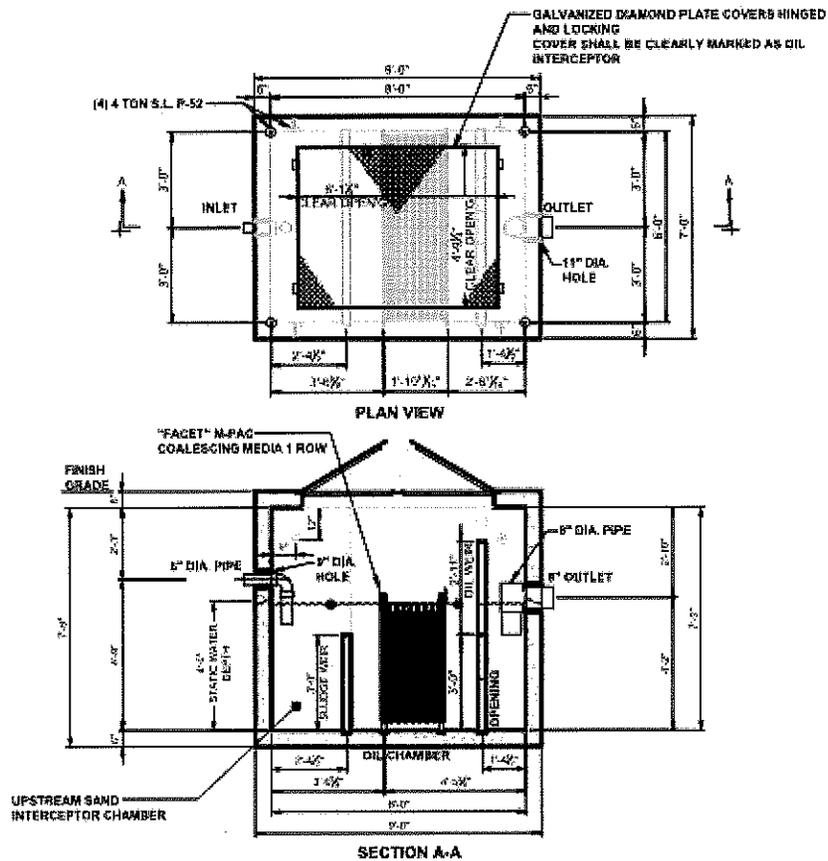
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An oil/water separator is proposed for this project to treat the runoff from the fuel facility. In addition, three CDS Stormwater Treatment Systems by Contech will be installed to pretreat all

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.

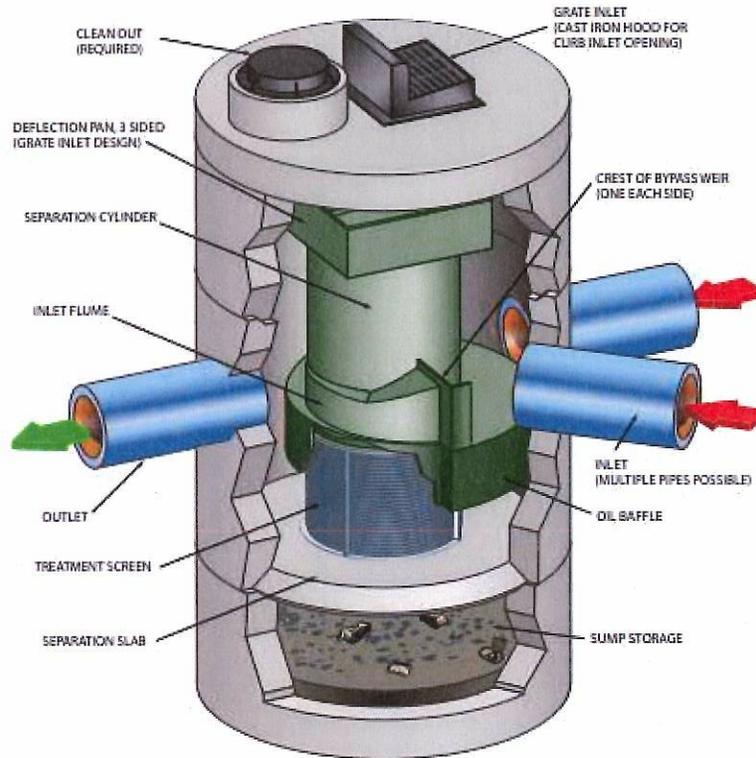


- GENERAL NOTES:**
1. CONCRETE: 28 DAY COMPRESSIVE STRENGTH = 5,000 PSI
 2. STEEL REINFORCEMENT: ASTM A-615, GRADE 60
 3. COVER TO STEEL: 1" MINIMUM
 4. VAULTS ARE TO BE DESIGNED TO MEET ASTM C401 AND ACI 318 WITH AASHTO HS-20 LOADING
 5. CONSTRUCTION JOINTS TO BE SEALED WITH 1" DIAMETER BUTYL RUBBER OR EQUIVALENT
 6. OIL/WATER SEPARATOR TO BE AS MANUFACTURED BY "OLDCASTLE PRECAST" OR APPROVED EQUAL
 7. OIL/WATER SEPARATOR SHALL MEET 2009 M.B.P.C. SECTION 6.3.2.

OIL/WATER SEPARATOR 1,400 GALLON CAPACITY

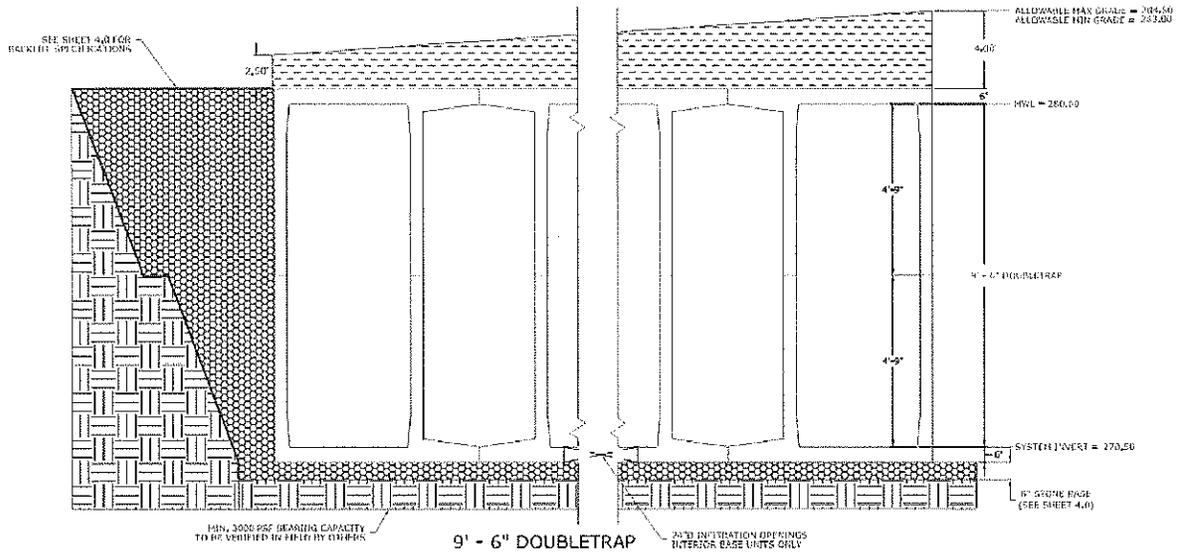
NOT TO SCALE

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.