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STORMWATER POLLUTION PREVENTION PLAN

Saratoga BioChar Solutions, LLC
Farnan Road
Town of Moreau, NY

October 29, 2021

DRAFT

OWNER:

Saratoga Biochar Solutions, LLC
26 F Congress St. #346
Saratoga Springs, NY 12866

CONTRACTOR:

Munter Enterprises
881 Murray Road
Middle Grove, NY 12850

PREPARED BY:

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APPENDICIES

DESCRIPTION OF EXISTING SITE

The project site is comprised of two parcels located at the terminus of Farnan Road within the Moreau Industrial Park in the Town of Moreau, NY (Tax Map IDs 50.-4-22 and 50.-4-16). The site is approximately 5.89 ±acres of undeveloped land. The western portion is wooded while the eastern extremities are primarily grassed. A portion of a cul-de-sac located at the end of Farnan Road is positioned within the southeast bounds of the site. The site is zoned General Manufacturing and Industrial (M-1) in accordance with the Town of Morea Comprehensive Land Use Plan. Majority of the surrounding parcels are undeveloped with the exception of roads, a sanitary sewer pump station with perimeter fencing located at the southeast corner of the site, and a chemical manufacturing facility, Hexion, Inc., located across Farnan Road to the east of the project site.

The eastern parcel generally slopes from northwest to southeast at grades varying from ±1% to ±17% along the western confines of the existing woods, approaching Farnan Road. The site is located greater than 1,000 feet west of the Hudson River. No other water bodies or wetlands exist within proximity of the site. A stormwater sewer collection system exists within the Moreau Industrial Park for management of stormwater, with catch basins existing near the northeast corner of the site in Farnan Road.

DESCRIPTION OF EXISTING SOILS

The United States Department of Agriculture (USDA) Soil Survey obtained from the Natural Resource Conservation Service website indicates the surficial soil type on the site to be Windsor loamy sand (WnB).

The WnB series is identified by the USDA as hydrologic soil group "A" and is characterized by being excessively drained with low runoff potential when thoroughly wet. These soils typically consist of loamy sand and sand material.

A geotechnical survey was performed by Terracon Consultants-NY, Inc. to evaluate the subsurface conditions at the site, the results are summarized and provided in the report titled "Geotechnical Engineering Report, Proposed Manufacturing Facility, Farnan Road, Moreau, New York" Dated July 21, 2021 (Geotechnical Report). A total of eight soil borings and four infiltration tests were performed in the vicinity of proposed development as part of the subsurface exploration efforts. Results of the soil borings indicate site soils to consist of poorly graded sand, sandy silt and some silt clay encountered at depths greater than 22 feet below existing grade. Results of the subsurface exploration indicate that the water table exists at the elevations of 273.5 - 274.5 feet. Four infiltration tests were performed in accordance with requirements of the NYS Stormwater Management Design Manual and results indicate stabilized infiltration rates to be equal or exceeding 45 inches per hour. Results of the soil borings and infiltration tests are presented in Terracon's Geotechnical Report, provided in Appendix C of this report.

DESCRIPTION OF PROPOSED DEVELOPMENT

Proposed site development includes the construction of a new industrial facility, an asphalt parking lot, landscaping and lighting, municipal utility connections, and an extensive stormwater

management system. Existing forested areas will be preserved to the extent possible. Perimeter areas boarding the north and south property lines will be reforested or landscaped to implement screening from abutting properties. Pervious areas remaining after development will be landscaped with native plants, ornamental trees, or restored with grass, meadow, and flowering seed mixes. Proposed grading will generally preserve existing drainage patterns within the exception of new stormwater basins. Anticipated disturbance areas, pervious and impervious areas are as follows:

	Existing Conditions	Phase 1	Phase 2/3
Disturbance Area	N/A	±188,762 ft^2	±21,406 ft^2
Site Impervious	±2,340 ft^2	±120,124 ft^2	±143,743 ft^2
Site Pervious	±254,228 ft2	±136,444 ft^2	±112,825 ft^2
Total Site Permeability	99%	53%	44%

CONSTRUCTION PHASING

Construction of proposed development will proceed in three phases. Majority of development will be completed during Phase 1, including the construction of the main building, asphalt driveway, utility connections, landscaping and lighting, and stormwater controls. Phases 2 and 3 will include two building expansions extending off the eastern side of the initial building footprint. Silt fence shall be installed in accordance with the construction drawings prior to any disturbance of the existing ground surface. Immediately following the installation of silt fence, a stabilized construction entrance consisting of crushed stone and geotextile stabilization fabric will be installed as shown on the construction drawings.

POLLUTION PREVENTION MEASURES

Any litter on site, including construction debris, will be picked up each day and disposed of into solid waste containers. The contractor shall provide an approved secondary containment system for all fuel and petroleum temporarily stored on site. During the placement of concrete for the building foundation, measures will be taken to ensure that fresh concrete does not enter any defined drainage paths and a concrete washout area will be provided by the contractor in accordance with the construction drawings. Topsoil and imported fill materials will be stock piled in the protected areas indicated on the construction drawings.

SEDIMENTATION AND EROSION CONTROL

Prior to commencing any land clearing silt fence will be installed in accordance with the construction drawings, and in accordance with the New York State Stormwater Management Design Manual, January 2015 and the New York Standards and Specifications for Erosion and Sediment Control.

A stabilized temporary construction entrance(s) at the location indicated on the construction drawings will be required for all construction traffic entering and leaving the site. The contractor

is required to maintain all silt fences and the temporary construction entrance(s) throughout the duration of construction.

All exposed surfaces not covered with paving, structures, and similar finished surfaces will be covered with topsoil and seeded within 14-days following substantial completion of construction to establish a turf covering or will be landscaped in accordance with the construction drawings. The areas receiving seed will be mulched to minimize erosions. Silt fences shall be installed downslope of the newly seeded areas. The silt fences shall be maintained and replaced as required during the course of construction until a well-established vegetative cover is established.

PERMANENT STORMWATER CONTROLS

Permanent stormwater controls for the proposed development will include the construction of stormwater runoff reduction and standard management practices (SMP) designed to meet water quality reduction and treatment goals. Runoff generated by the parking lot and building will be conveyed via sheet flow and catch basins to a series of subsurface infiltration chambers or infiltration basins. Vegetated swales will be implemented in the southern extremities to convey runoff to an infiltration basin. Culverts will be installed beneath the parking lot and entrance drives to facilitate conveyance of runoff to management practices.

Green infrastructure (GI) and standard stormwater management practices (SMP), sized in accordance with the New York State Department of Environmental Conservation Stormwater Management Design Manual, were applied under the proposed stormwater management system to provide a total Runoff Reduction Volume (RRv) greater than or equal to the minimum RRv generated from the proposed development. Applied GI techniques include a series of prefabricated infiltration chambers and two infiltration basins. The remaining WQv, after the application of the RRv practices, is then treated within the infiltration basins. Pre-treatment for the infiltration chambers is provided in an isolated row, wrapped in two layers of geotextile fabric to provide filtering and settling of sediment laden stormwater. Runoff entering the infiltration basins will be pre-treated via sediment forebays and stone aprons. The peak runoff discharge passing through the stormwater system for the channel protection volume (Cpv: 1 year 24-hour storm event), overbank flood (Qp:10-year storm event) and extreme storm ((Qf)h: 100-year storm event) will be attenuated to less than or equal to the pre-development flow rates at design points common to both the pre- and post-development conditions.

Based on the soil hydrologic group in the proposed construction areas, the following curve numbers were assumed for the hydrologic analyses:

Land Cover Type	Curve Number
50-75% Grass cover, Fair, HSG A	CN 49
>75% Grass cover, Good, HSG A	CN 39
Woods, Good, HSG A	CN 30
Woods/grass Combo, Good, HSG A	CN 32
Impervious surfaces (Roof/Paving/Wall)	CN 98

The site was divided into six subcatchment areas based on the flow direction of runoff generated from the proposed development. Subcatchment land cover and runoff control descriptions are provided in Table 1.

Table 1. Subcatchment Area Descriptions

Subcatchment	Landcover	Stormwater Control Measures
1S	Undisturbed woods, grassed area, and a portion of the parking lot	Runoff generated from the parking lot surface will sheet flow to a low point where it will be captured by a catch basin. Flow will outlet the catch basin to the infiltrator chamber sediment treatment rows. Overflow will discharge from the treatment rows to the remaining infiltration chambers and underlying stone bed.
2S	Undisturbed woods, grassed area, parking lot area, a portion of the building roof.	Runoff generated from the pavement and roof surface will be conveyed via sheet flow to a low point in the parking lot where it will be captured by a catch basin. Flow will then outlet the catch basin to the infiltration chamber sediment treatment rows. Overflow will discharge from the treatment rows to the remaining infiltration chambers and underlying stone bed.
3S	Undisturbed woods, landscaped areas, a portion of the parking lot area, a portion of the building roof and the entirety of the Phase 2&3 building expansion roofs.	Runoff generated from the building roof and pavement surface will be conveyed via sheet flow to a low spot in a landscaped parking lot island area. Runoff will then be conveyed via overland flow to a culvert that will discharge runoff beneath the parking lot surface to a sediment forebay. Overflow will discharge from the forebay to infiltration basin 5P. Excess runoff will outlet the basin via a stone lined weir where it will follow drainage pathways through Subcatchment 5 to Design Point #2.
4S	Landscaped areas, undisturbed woods, a portion of the parking lot, and a portion of the building roof.	Runoff generated from the pavement and roof surfaces will be conveyed via sheet flow to vegetated swales. Runoff will then be discharged to treatment practices including a gravel apron and a sediment

		forebay (6P) to intercept and filter sediment from flow. Flow will then be discharged to infiltration basin 8P. Excess runoff will discharge from the basin via a stone lined weir to Design Point #2.
5S	Landscaped areas, entrance drives, and asphalt area to be constructed during Phase 2&3 building expansions.	Runoff will primarily follow existing drainage pathways through the subcatchment area to the southeast extremities of the site where flow will be managed via natural infiltration within the enhanced grassed buffer area, and ultimately discharge to Design Point #2.
6S	Undisturbed woods	Runoff will follow existing drainage pathways through this subcatchment and ultimately discharge to Design Point #1.

Notes:
1.Refer to the Construction Drawings for permanent runoff control measure locations and details.
2. Stormwater management control measures shall be in accordance with New York State Stormwater Management Design Manual, January 2015

Design storm events were assumed to be customized storm curves based upon Extreme Precipitation Data in New York & New England available through a joint collaboration between the Northeast Regional Climate Center and Natural Resources Conservation Service for Type II, 24-hour 1-year, 10-year, 25-year, 50-year and 100-year storm events. Rainfall magnitudes for the storm events were determined as follows: 2.22 inches, 3.69 inches, 4.54-inches, 5.30-inches and 6.20 inches. The runoff rates were modeled using HydroCAD version 10.0 software which calculates runoff based on the modified SCS TR-20 method. The peak runoff discharge passing through the proposed stormwater management system will be attenuated to be less than or equal to the pre-development flow rates for the 100-year 24-hour storm at established discharge design points. Peak off-site discharge rates for the channel protection volume (Cpv: 1 year 24-hour storm event), overbank flood (Qp:10-year storm event), 25-year storm event, 50-year storm event and extreme storm ((Qf)h: 100-year storm event) are summarized in the following table:

Table 2. Peak Off-site Discharge Rates

Location	1-year Storm Peak Discharge (ft^3/s)		10-year Storm Peak Discharge (ft^3/s)		25-year Storm Peak Discharge (ft^3/s)		50-year Storm Peak Discharge (ft^3/s)		100-year Storm Peak Discharge (ft^3/s)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Design Point #1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Design Point #2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.6	0.0

Water Quality volumes (WQv) were established in accordance with the New York State Department of Environmental Conservation Stormwater Management Design Manual, January 2015, with a 90% recurrence interval storm event rainfall magnitude assumed to be 1.20-inches based on site locality. The following table summarizes the RRv and treated WQv values of the

Green Infrastructure Practices and Standard Management Practices used to pre-treat a RRv min.= 6,031 cubic feet and a WQv = 11,757 cubic feet.:

Table 3. Green Infrastructure and Standard Management Practice Summary

Subcatchment	Green Infrastructure/SMP Provided	RRv Provided (ft^3)	WQv Treated (ft^3)
1S	Infiltration Chambers	2,836	2,204
2S	Infiltration Chambers	2,537	2,503
3S	Infiltration Basin	2,831	715
4S	Infiltration Basin	2,160	140

RRv total = 10,365 ft^3 ≥ Min. RRv; RRv + $WQv_{treated}$ = 15,927 ft^3 > WQv

SITE INSPECTIONS DURING CONSTRUCTION

A qualified inspector as defined in Appendix A of the New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity Permit No. GP-0-20-001 shall conduct construction inspections in accordance with Part IV.C of GP-0-20-001 and in accordance with requirements of the Town of Moreau Local Law 1, Chapter 120.

MAINTENANCE OF STORMWATER MANAGEMENT SYSTEM

All vegetated swales (where applicable) shall maintain a grass height of 4 to 6 inches and shall be monitored for excessive sediment build-up within the bottom of the channel. Catch basin inlets, overflow weirs, and culverts should be periodically checked for the accumulation of debris that may constrict runoff from flowing freely at the inlet/outlet invert elevations. Infiltration basins shall be checked periodically to confirm connections are secured and sediment has not accumulated such that infiltration into stone bed and underlying soils is restricted. In addition to the maintenance of the stormwater practices described, the lawns and landscaped areas shall be maintained in good condition to prevent erosion. Any deteriorated areas of lawn shall be re-seeded, and a stable turf reestablished. In accordance with Town requirements, the property owner shall provide arrangements for the future maintenance of the post-construction stormwater control measures in accordance with the *Sample Stormwater Control Facility Maintenance Agreement*, available on file at the Town of Moreau offices, to be recorded in the office of the Town Clerk or its terms shall be incorporated into covenants appearing in the deed, declarations of covenants and restrictions or other such documents to ensure that record notice of its terms is provided to future owners of the site.

RETENTION OF RECORDS

The contractor shall maintain at the project site a copy of this Storm Water Pollution Prevention Plan (SWPPP). In addition, the contractor shall maintain a site logbook which will contain all storm water and erosion control inspection reports to be prepared by the qualified professional.

A current copy of the construction drawings shall also be kept in the logbook with comments that may have been added by the qualified inspector.

SWPPP Report Prepared by:

Matthew E. Huntington, PE
Principal
For
Studio A | Landscape Architecture + Engineering

APPENDIX A
PROJECT LOCATION

Figure 1. Project Location Map

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

Map Scale: 1:1,550 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

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 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Saratoga County, New York
Survey Area Data: Version 20, Jun 11, 2020

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

Date(s) aerial images were photographed: Jun 10, 2015—Mar 29, 2017

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
WnB	Windsor loamy sand, 3 to 8 percent slopes	12.0	100.0%
Totals for Area of Interest		**12.0**	**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 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.

Saratoga County, New York

WnB—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf
Elevation: 0 to 1,210 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Outwash terraces, deltas, outwash plains, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley, loamy sand

Percent of map unit: 10 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Deerfield, loamy sand

Percent of map unit: 5 percent
Landform: Terraces, deltas, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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APPENDIX C
GEOTECHNICAL ENGINEERING REPORT

Geotechnical Engineering Report

Proposed Manufacturing Facility
Farnan Road
Moreau, New York
July 21, 2021
Terracon Project No. JB215105

Prepared for:
Northeastern Biochar Solutions
Saratoga Springs, New York

Prepared by:
Terracon Consultants - NY, Inc.
Albany, New York

July 21, 2021

Northeastern Biochar Solutions
26F Congress Street, Suite No. 346
Saratoga Springs, New York 12866

Attn: Mr. Raymond Apy
p: (518) 391 0566
e: rapy@northeasternbiochar.com

Re: Geotechnical Engineering Report
Proposed Manufacturing Facility
Farnan Road
Moreau, New York
Terracon Project No. JB215105

Dear Mr. Apy:

We have completed the Geotechnical Engineering services for the referenced project. This study was performed in general accordance with Terracon proposal no. PJB215105, as authorized by Northeastern Biochar Solutions on June 15, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us at your convenience.

Sincerely,
Terracon Consultants-NY, Inc.

Jared Hall, G.I.T.
Staff Engineer

Joseph Robichaud, Jr., P.E.
Sr. Associate / Office Manager

Additional review by: John S. Hutchison, P.E.

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents

Geotechnical Engineering Report

Proposed Manufacturing Facility

Farnan Road

Moreau, New York

Terracon Project No. JB215105

July 21, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed manufacturing facility in the town of Moreau, New York. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Lateral earth pressures
- Temporary excavation support
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per NYSBC
- Pavement design and construction
- Frost considerations

The geotechnical engineering scope of services for this project included the advancement of nine test borings (B-1 thru B-9) and four infiltration test borings (I-1 thru I-4) to depths ranging from 8.0 to 52.0 feet below existing site grades. Additionally, our scope included infiltration testing, the visual classification and limited laboratory testing of recovered soil samples, and preparation of this summary report.

Maps indicating the site and test boring locations are included as the attached **Site Location** and **Exploration Plan**, respectively.

SITE CONDITIONS

Existing conditions at the site are summarized in the following table:

Item	Description
Parcel Information	The project is located west of Farnan Road, at the southwest corner of its intersection with Electric Drive (currently a paper street), in the town of Moreau, New York. Approximate geographic coordinates: 43.2831 N, -73.6049 W.
Existing Improvements	None. Site is currently undeveloped.

Item	Description
Current Ground Cover	Wooded within the western portion and grassy within the eastern portion of the site.
Existing Topography	Site slopes moderately downward toward the southeast from about elevation 286 to 276 feet.
Geology	On the Surficial Geologic Map of New York, soils in the area are mapped as alluvial sand and gravel along with glaciolacustrine silt and clay.

Based upon review of available historic aerial photography, the project site appears to have been largely undisturbed from 1946 onward, with the exception of some dirt trails traversing the parcel and occasional clearing of wooded areas.

PROJECT DESCRIPTION

Our understanding of the project is summarized as follows:

Item	Description
Information Provided	■ Topographic plan entitled “Grading, Drainage, Utilities Plan”, no preparer or date indicated. ■ Site layout concepts by Element Carbon dated April 30, 2021 (schematic plans) ■ Telephone and email correspondence with project team
General Description	Construction of a new manufacturing facility with associated paved and landscaped areas.
Proposed Structures	The facility will include a manufacturing building with an office, central processing area, and a receiving bay with deep pit. Also included will be a loadout area, overhead bins/hoppers, and a truck scale along the entrance roadway.
Building Construction	Assumed steel frame with metal cladding and cast-in-place concrete foundations.
Maximum Loads	No loading information provided – we assume the following: ■ Maximum column loads: 150 kips ■ Maximum wall loads: 5 kips per lineal foot (klf) ■ Maximum slab loads: 250 pounds per square foot (psf)
Finished Floor Elevation	Not provided. Assumed to be at elevation 284 feet.
Grading/Slopes	It appears that any cuts and fills required to establish proposed grades will be minor, on the order of two feet or less within the proposed building footprint. However, fills upwards of about five feet may be required in the future expansion area.

Item	Description
Below-Grade Structures	The deep receiving pit structure will extend about 25 feet below finished floor elevation. The pit will be about 50 feet long by 25 feet wide and its sides will taper inward with depth at an inclination of 4V:1H such that the width of the pit bottom will be narrower, about 12.5 feet.
Free-Standing Retaining Walls	No site retaining walls are indicated on the plans provided to us. However, the receiving pit walls will retain earth, as may walls at the loadout area.
Pavements	We understand both asphalt and gravel-paved surfaces are being considered. The site will be subjected to routine daily tractor-trailer traffic with highway legal axle loads.

If any of the above information is incorrect, please let us know so we can review the conclusions and recommendations provided in this report for applicability to the actual design and update the report as appropriate.

As the design of the project progresses and site grading plans and building loads are fully developed, we should be retained to assess this site-specific information relative to the recommendations contained herein.

SUBSURFACE CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical analysis and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual subsurface logs. The individual logs can be found in the **Exploration Results** and the GeoModel in the **Figures** sections of this report.

Subsurface Profile

The following model layers were identified within the subsurface profile. For a more detailed view of the model layers with depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Native Sand**	Predominately sand with lesser amounts of silt, generally loose to medium dense
2	**Sandy Silt**	Silt with lesser amounts of sand, along with occasional clay seams or partings, medium stiff to very stiff
3	**Silt and Clay**	Banded silt and clay with lesser amounts of sand, generally very soft to stiff

Subsurface Conditions

About 2 to 9 inches of topsoil was encountered at the ground surface at our test boring locations. The topsoil was underlain by granular native sands which in turn graded to cohesive silts and clays at depths of about 18 to 23 feet at most locations. A sandy silt deposit was encountered below the depth of about 12 feet in borehole B-3 and between the depths of about 38 and 48 feet at B-5. No soils readily identifiable as fill were found.

The native sands consisted predominately of fine to coarse sand with lesser amounts of silt and gravel. The silts and clays generally exhibited depositional banding and fine sand partings, while occasional clay seams or partings were noted in the sandy silt deposits. Based on the standard penetration N-values, the soils were generally loose to medium dense where essentially granular and very soft to stiff where essentially fine-grained.

Bedrock was not encountered within the depths explored for this study, 52 feet. For informational purposes, the Geologic Map of New York (New York State Education Department, 1970) maps bedrock underlying the project area as Canajoharie Shale. The mapping suggests that bedrock may be shallow west of the project area.

Groundwater Conditions

Groundwater was encountered in borings B-1 thru B-6 and I-3 and I-4 at depths of about 4.3 to 10.3 feet below existing grade during our drilling procedure, as tabulated below. Groundwater was not immediately observed in the remaining borings; however, “wet” soil samples were generally recovered within this vicinity indicating the water table was likely within the range of about 273.5 to 274.5 feet throughout the site at the time of our explorations.

Exploration No.	Depth to Groundwater (feet)	Approximate Groundwater Elevation (ft) [1]
B-1	10.3	274.7
B-2	9.4	274.6
B-3	9.6	274.4
B-4	9.4	273.6
B-5	9.3	274.7
B-6	4.3	274.7
I-3	4.6	273.4
I-4	4.3	273.7

1. Determined using ground surface elevations interpolated from the site-specific topographic survey plan provided for our use.

In addition, mottled soils were encountered throughout the site, generally at depths of about 4 to 9 feet; however, mottling was observed at B-7 near the ground surface (between 0 to 2 feet).

Mottling may be indicative of a seasonally high water table and/or temporarily perched water within the upper soils.

Groundwater conditions, and the extent of any perched water, should be expected to vary with seasonal fluctuations in precipitation and runoff. Additionally, grade adjustments on and around the site, as well as surrounding drainage improvements, may affect the water table. The possibility of groundwater level fluctuations should be considered when developing design and construction plans for the project.

Infiltration Testing

Infiltration tests were performed adjacent to test borings I-1 through I-4 and numbered correspondingly. The testing was conducted in general accord with the guidelines in Appendix D of the NYS Stormwater Management Design Manual. Results of this testing are presented for your use in the **Exploration Results** section of this report and summarized in tabular form below.

Test No.	Approximate Test Depth (feet)	Soil Classification	Infiltration Rate (in/hr) [1]
I-1	4.0	Poorly graded sand, trace silt, fine grained	>24
I-2	4.0	Poorly graded sand, trace silt, fine to medium grained	>24
I-3	2.5	Poorly graded sand, trace silt, fine to medium grained	>24
I-4	2.0	Poorly graded sand, trace silt, fine to medium grained	>24

1. Based on the final infiltration test trial.

GEOTECHNICAL OVERVIEW

The project site is considered suitable for support of the proposed facility using conventional shallow spread foundations and slab-on-grade design, although the deep receiving pit and relatively shallow groundwater will impact on planning for design and construction. Based on the conditions disclosed by our investigation, the following general conclusions.

- New foundations and floor slabs may be supported on undisturbed native soils, or on imported structural fill which is placed over the native soils after all topsoil is removed, along with any existing fill or otherwise unsuitable material which may be found.

- The sandy soils excavated onsite should generally be suitable for reuse as fill and backfill, once cleansed of any oversize particles and unsuitable debris or organics, subject to the

approval of the Geotechnical Engineer and based upon the conditions encountered at the time of construction.

- The receiving pit invert elevation will be situated well below static groundwater level at the site, as shown on the building cross-section attached to this report. For this reason, it should be expected that appreciable dewatering effort will be necessary to allow construction to proceed in relative dryness and to promote stable excavation sidewall and bottom conditions. The pit must also be designed to resist hydrostatic uplift forces (buoyancy) when complete. These considerations are discussed further in the Temporary Excavations and Uplift sections herein.

- Elsewhere (i.e., outside the receiving pit area), groundwater is expected to be below foundation excavation depths and should not be a significant factor in planning for design and construction of the building. If perched water is encountered during construction, it is expected to be limited in volume and standard sump and pump methods should be sufficient for its removal. Dewatering is a means and methods consideration for the contractor.

- It is noted that grade increases upwards of five feet may be necessary in the future expansion area. Consideration should be given to placement of whatever fill may ultimately be required in the expansion area at the time of initial facility construction, so as to allow whatever consolidation settlement may occur in the soft clays at depth under the weight of the fill to occur in advance of future construction. Otherwise, the fill should be placed at least four to six weeks in advance of any future expansion so as to limit post-construction settlement.

The following sections of this report provide more detailed recommendations to assist in planning for the geotechnical aspects of the project. We should be provided with the opportunity to review plans and specifications prior to their release for bidding to confirm that our recommendations were properly understood and implemented, and to allow us to refine our recommendations, if warranted, based upon the final design. The **General Comments** section provides an understanding of the report limitations.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site classification is required to determine the Seismic Design Category for a structure. The seismic Site Class is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC).

Seismic Site Classification

In our estimation, the Seismic Site Class is D. This determination is made based upon the results of shear wave velocity testing completed in similar subsurface profiles at several sites in the general project area, where this testing has found that average shear wave velocities in the upper 100 feet consistently exceed 600 feet per second. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth, if desired.

Liquefaction

Evaluation of the potential for soil liquefaction to occur was made using the computer software program Liquefy Pro by CivilTech Corporation. An earthquake magnitude of 6.0 was assumed, and a peak ground acceleration (PGA) of 0.10g for the project area was used, this representing a two percent probability of exceedance in 50 years (as obtained from USGS earthquake hazards mapping). Based on these parameters and site-specific conditions determined through the subsurface investigation, the calculated factor of safety against liquefaction is no less than 2. As such, liquefaction potential at the project site is considered low.

EARTHWORK

Earthwork is anticipated to include clearing and grubbing, foundation excavation and associated site fill and backfill. It should be understood that excavation and dewatering considerations with respect to the receiving pit are substantial and out of the ordinary. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered suitable in our geotechnical engineering evaluation for foundations and floor slabs.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility is neither implied nor shall it be inferred.

Site Preparation

Site preparation should begin with stripping of any existing topsoil, vegetation and/or root mat from the ground surface. Any existing fill or disturbed soils, if encountered, should be removed in its entirety from beneath the proposed building footprint, extending at least five feet beyond its perimeter.

Prior to placing fills to raise site grades and/or after cuts are made to the plan subgrade elevations, the subgrades should be proof-rolled using a steel drum roller with a static weight of at least 10

tons. The roller should operate in its vibratory mode, unless requested otherwise by the Geotechnical Engineer observing the work, and travel at a speed not exceeding three feet per second (two miles per hour). The roller should complete at least four passes over all subgrade surfaces in opposing directions. The method of proof-rolling may be modified by the Geotechnical Engineer based upon the conditions revealed at the time of construction.

Soft areas identified by the proof-rolling should be investigated to determine the cause and stabilized accordingly. These investigations may include the excavation of test pits. Where existing fills are found and determined by to be unsuitable by the Geotechnical Engineer, they should be removed and replaced as deemed necessary.

Fill Material Types

Imported Structural Fill should be used as fill/backfill within the proposed building area. The imported fill should consist of sand and gravel which meets the limits of gradation given below. Any imported materials should be free of recycled concrete, asphalt, bricks, glass, and pyritic shale rock.

IMPORTED STRUCTURAL FILL

Sieve Size	Percent Finer
3”	100
¼”	30 to 75
No. 40	5 to 40
No. 200	0 to 10

The reuse of excavated site soils may be considered if approved by the Geotechnical Engineer and pending the conditions encountered at the time of construction. Reuse of the onsite soils would require that excessively silty material, organics, oversized particles or unsuitable foreign matter found therein be separated and reused in landscape areas only or wasted off-site as appropriate.

Fill Compaction Requirements

Fills beneath the building pad should be placed in uniform loose layers no more than about one-foot thick where heavy vibratory compaction equipment is used. Thinner lifts should be used where hand operated equipment is required for compaction. Each lift should be compacted to no less than 95 percent of its maximum dry density as determined by the Modified Proctor Compaction Test, ASTM D1557. In landscape areas, if any, the compaction requirement may be relaxed to 90 percent of maximum dry density.

Grading and Drainage

All grades should provide effective drainage away from the building during and after construction, with such drainage maintained throughout the life of the structure. Water retained next to buildings

can result in soil movements greater than those outlined in this report, which may in turn lead to unsatisfactory differential floor slab and/or foundation displacements, cracked slabs and walls, or roof leaks.

Temporary Excavations

Excavations must be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P and its appendices, along with any state and local codes, as applicable. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed OSHA regulations. Flatter slopes than those stipulated by the regulations or temporary shoring may be required depending upon the soil/groundwater conditions encountered and other external factors. OSHA regulations are strictly enforced and if they are not followed, the owner, contractor, and/or earthwork and utility subcontractor could be liable and subject to substantial penalties.

If temporary excavation bracing is required, it should be designed by a professional engineer experienced in such work. The parameters given in the **Excavation Support** section below may be assumed for the bracing design.

It should be understood the lower extents of the proposed receiving pit are situated well below static groundwater level, and dewatering will be required to complete the works in relatively dry conditions. Further, the sand deposit in which the receiving pit will for the most part be situated is highly permeable, and for this reason it may be necessary to dewater from closely spaced well points. Excavated grades will become unstable in the absence of adequate dewatering. Dewatering is a means and methods consideration for the contractor.

Also note that the lowest extent of the receiving pit at a depth of about 25 feet below grade will extend near or into wet, soft silt and clay soils. It should be understood these fine-grained soils are subject to weakening and softening through construction activity and foot traffic, especially when wet. Accordingly, the receiving pit subgrades should be improved/protected upon excavation with a gravel stabilization/drainage layer consisting of clean crushed stone 24 inches in thickness. The stone should be an ASTM C33 Blend 57 aggregate which is enveloped with a non-woven synthetic filter fabric meeting the requirements of NYSDOT standard specifications table 737-01C for drainage geotextile to inhibit migration of fines.

Excavation Support

Where supported excavations are required to excavate to the planned grades for the proposed receiving pit or elsewhere, the type and design of the excavation support system must be compatible with the site geometry, subsurface conditions, the planned building foundation construction, and provide adequate support for adjacent structures or utilities. Any temporary support walls to be constructed at this site and components thereof should be designed for the maximum combination of loading that may occur in each stage of excavation and bracing, and

during construction. Recommended soil parameters for use in the design of excavation support at this site are presented below.

Excavation support can be designed and bid or left to the contractor and their consultant to design and install. If the design of temporary earth support is to be performed by the contractor, it should be submitted to the design team for review. Their submittal should include assumptions made regarding soil properties, geometry of the excavation, lateral pressure diagrams, base stability of the excavation with respect to hydrostatic head/dewatering, locations and magnitudes of all surcharge loads and wall design calculations, including deflection analyses and a proposed monitoring program for the construction period. The temporary earth support should be designed and stamped by a Professional Engineer licensed in the State of New York.

The following soil parameters may be assumed for design of temporary excavation support:

Material	Approx. Elevation Range (ft)	Total Moist Unit Weight (pcf)	Angle of Internal Friction (degrees)	Cohesion (psf)
Native sand (GeoModel Layer 1)	> 261	115	30	0
Native sandy silt (GeoModel Layer 2)	Varies	115	28	0
Native silt and clay (GeoModel Layer 3)	< 261	115	26	0

* Long-term effective stress parameters as presented in the table are recommended for use

Groundwater may be assumed at a depth of 10 feet below existing grade (or at about elevation 275 feet) for the purposes of excavation support design in the proposed building area.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of topsoil and any unsuitable fills, proof-rolling, and mitigation of any areas identified as needing improvement through proof-rolling. Each lift of new compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts.

Foundation bearing grades and subgrades for floor slabs should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

It should be understood that subsurface conditions will be more fully known when the site is excavated. The continuation of the Geotechnical Engineer into the construction phase of the project will allow for validation of the subsurface conditions assumed to exist for this study and in

the development of the design recommendations in this report, along with assessing any variations, providing interim recommendations as necessary and reviewing associated design changes.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted previously in the **Earthwork** section and below under the **Foundation Construction Considerations**, the following design parameters may be assumed.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing Pressure [1, 2] **Native Sand (GeoModel Layer 1)** **Native Silt and Clay (GeoModel Layer 3)**	 3,000 pounds per square foot (psf) 2,000 psf
Required Bearing Stratum [3]	Undisturbed native soils or structural fill placed over the native soils after removal of existing fill or otherwise unsuitable material that may be found
Minimum Foundation Dimensions	Columns: 36 inches Continuous: 24 inches
Ultimate Coefficient of Sliding Friction [4]	0.25 (concrete on native silt and clay) 0.45 (concrete on native sand or imported Structural Fill)
Minimum Embedment below Finished Grade [5]	Exterior footings: 48 inches Interior footings in heated areas: 24 inches Interior footings in unheated areas: 48 inches
Estimated Total Settlement from Structural Loads [2]	Less than about one (1) inch
Estimated Differential Settlement [2, 6]	About 75% of total settlement

1. The maximum net allowable bearing pressure is the pressure which exceeds the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied.
2. Values provided are for maximum loads noted in **Project Description**. The settlements should occur relatively quickly as construction proceeds and load increments are applied.
3. The bearing grades should be prepared per the recommendations presented below in the **Foundation Construction Considerations**.
4. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
5. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure. Interior footings in heated area may be seated at the 24-inch depth if allowed by local building codes.
6. Differential settlements are as measured over a span of 50 feet.

As site soils are relatively free-draining, and groundwater is several feet below presumed (non-receiving pit) foundation grades, the provision of a standard perimeter foundation drain is considered unnecessary.

Foundation Construction Considerations

The foundations may be seated directly on undisturbed native soils, or on imported structural fill placed over the native soils after removal of existing fill, remains of former structures or otherwise unsuitable materials that may be found. If over-excavation is required beneath the foundations to remove unsuitable material, the excavation should extend horizontally beyond each side of the foundation a distance equal to at least one-half the depth of the undercut below the final bearing grade elevation. Replacement material should meet the specification and compaction guidelines for Structural Fill as outlined herein.

Foundation bearing grades (other than those of the receiving pit, which are addressed below) should be proof-compacted using a mechanical or large reversible plate tamper to densify the soils loosened by the excavation process unless otherwise directed by the Geotechnical Engineer observing the grades. If groundwater seepage occurs, proof-compacting should be eliminated, and a minimum six-inch thick base of clean crushed stone placed over a geotextile fabric should be provided to establish a more uniform and stable base for construction and to assist in dewatering. The stone should be an ASTM C33 Blend 57 aggregate and the fabric a non-woven type meeting the requirements of NYSDOT standard specifications table 737-01C for drainage geotextile.

As previously indicated, the lowest extent of the receiving pit at a depth of about 25 feet below grade will extend near or into wet, soft silt and clay soils. It should be understood these fine-grained soils are subject to weakening and softening through construction activity and foot traffic, especially when wet. Accordingly, the receiving pit subgrades should be improved/protected upon excavation with an aggregate stabilization/drainage layer consisting of clean crushed stone 24 inches in thickness. The stone should be an ASTM C33 Blend 57 aggregate which is enveloped with a non-woven synthetic filter fabric as described above. As an alternative to over-excavation and placement of the crushed stone stabilization/drainage layer, consideration may be given to protection of the grades with a lean concrete mud mat (minimum 2 inches in thickness with $f'c$ equal to or greater than 2,000 psi) placed immediately after their excavation and acceptance.

All final bearing grades should be relatively firm, stable, and free of loose soil, mud, water and frost. The Geotechnical Engineer should approve the condition of the foundation bearing grades immediately prior to placement of reinforcing steel and concrete.

UPLIFT

The receiving pit will extend some 15 feet below the water table and will therefore be subject to uplift pressures (buoyancy). As such, the structure should be made sufficiently heavy to resist uplift pressure under the worst-case design conditions (i.e., when the pit is empty). Base extensions may be used to provide additional uplift resistance. Permanent drilled-in tiedown anchors or helical anchors could also be considered to provide uplift resistance, if necessary, but the underlying soft silt and clay soils will provide limited capacity. Assume water table elevation at about 275 feet for the purposes of uplift resistance design.

FLOOR SLABS

Floor Slab Design Parameters

The floor slabs should be constructed upon a minimum six-inch thick subbase course which conforms to the requirements for NYSDOT Type 2 Subbase or ASTM C33 Blend 57 aggregate. Consideration should be given to using a thicker subbase course in areas subject to heavier loads and/or use, or those exposed to freezing temperatures.

The use of a vapor retarder along with a base course of ASTM C33 Blend 57 aggregate should be considered beneath concrete slabs-on-grade to be covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding its use and placement.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual.

Floor slab subgrades should be prepared as outlined in the Earthwork section herein. Under these conditions, a modulus of subgrade reaction equal to 200 pounds per cubic inch (psi/in) may be assumed at the top of the stone base layer for slab design purposes.

Floor Slab Construction Considerations

Even with the base course recommended above, we caution that the subgrades may not support repeated heavy construction traffic or telehandlers without suffering rutting and weaving that may be especially severe during wet seasons. If the grades are to be repeatedly traversed by these types of equipment, they should be reinforced as necessary to support them. Areas which become disturbed should be excavated and stabilized accordingly.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab subbase course. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

EARTH RETAINING WALL DESIGN

All permanent earth-retaining foundation walls or structures should be designed to resist the lateral pressures generated by earth backfill and any temporary or permanent surcharge loads. Active earth pressures may be assumed for walls that are free to deflect as the backfill is placed and surcharge loads applied. At-rest earth pressures should be assumed for walls that are braced prior to backfilling or applying surcharge loads. The following design parameters are provided to assist in determining the lateral wall loads, whichever apply, and to analyze the stability of unbraced walls by sliding and overturning.

- Soil angle of internal friction - 30 degrees
- Coefficient of At-Rest earth pressure (k_o) - 0.50
- Coefficient of Active earth pressure (k_a) - 0.33
- Coefficient of Passive earth pressure (k_p) - 3.00
- Total unit weight of compacted soil - 130 pcf
- Coefficient of sliding friction - 0.25 (concrete on native silt and clay)
  0.45 (concrete on native sand or imported Structural Fill)

The recommended design parameters assume that backfill consists of imported Structural Fill as described in the **Earthwork** section herein, idealized non-sloping conditions on each side of the wall, and that the backfill remains permanently well-drained. Water must not be allowed to collect against the wall unless the wall is designed to accommodate the added hydrostatic pressure (as will evidently be the case with the receiving pit walls – assume water table elevation at about 275 feet in this instance). Drainage system recommendations are provided below.

Subsurface Drainage for Earth-Retaining Walls

Earth retaining structures or foundation walls above the water table should be provided with a foundation level drain which may consist of a nominal 4-inch diameter perforated PVC or corrugated HDPE pipe embedded at the base of a minimum 12-inch wide column of clean crushed stone (e.g., NYSDOT no. 1 and no. 2 size aggregate or ASTM C33 Blend 57 stone). The stone should be enveloped in an appropriate non-woven filter fabric (meeting NYSDOT standard specifications section 737-01 for drainage geotextile) to inhibit siltation. Backfill soils behind the crushed stone drainage layer should consist of imported Structural Fill. The drain line should be sloped to provide positive gravity drainage to daylight, to a stormwater system, or to a sump pit and pump.

PAVEMENTS

Pavement Design

The asphalt pavement sections presented below were developed in general accord with AASHTO procedures using a reduced subgrade strength and local experience to account for frost, and to keep the anticipated pavement heave and cracking within generally tolerable limits. A subgrade resilient modulus (M_r) equal to 5,000 psi has been assumed for design purposes.

Two conventional pavement sections were developed, a Light Duty section for automobile parking areas and a Heavy-Duty section for entrance drives or areas subject to routine truck traffic. For design purposes, it has been assumed that the pavement design life is 20 years, and that daily equivalent single axle loads (ESALs) are equal to 1 for the Light Duty section and 10 for the Heavy Duty section. If the traffic loads vary from these, we should be provided the opportunity to refine the pavement section accordingly.

All materials should meet the requirements specified in the latest edition of the New York State Department of Transportation (NYSDOT) Standard Specifications for Construction and Materials.

Flexible Pavement Design				
Layer	Material Description	NYSDOT Reference	Thickness (inches)	
			Light Duty	Heavy Duty
Top	Asphaltic Concrete	Item 402.127303	1.5	1.5
Binder	Asphaltic Concrete	Item 402.257903	2.0	3.0
Stone Subbase	Crusher-Run Stone	Section 733-04, Type 2	8	16
Geotextile	Stabilization Geotextile	Table 737-01E	Single Ply	Single Ply

Where surfaces will be gravel paved, we recommend a section consisting of a minimum 6 inches of gravel Surface Course and a minimum 16 inches of gravel Base Course as described in section 667 of the NYSDOT Standard Specifications (Local Road Gravel Surface, Base and Subbase Courses) for Heavy Duty use. A Light Duty section may consist of 4 inches of Surface Course and a minimum 8 inches of Base Course. A suitable stabilization geotextile as stipulated in the table above should be provided between the gravel base and the underlying subgrade in either case.

Where truck and equipment traffic or activity will be concentrated and/or where usage will be especially severe (e.g., areas subject to frequent stationary turning operations, heavy equipment, tracked vehicles, etc.) rigid concrete pavement may be a better alternative. Rigid pavements should be provided with a minimum eight-inch thick base of crusher-run stone (NYSDOT section 733-04, Type 2 material) placed over a suitable stabilization geotextile. The rigid pavements may

be designed assuming a modulus of subgrade reaction equal to 200 pounds per cubic inch at the top of the base layer.

Temporary Construction Access Roadways

The recommended pavement sections are not designed to support heavy construction traffic which may require thicker sections. The contractor should construct temporary haul routes and construction roadways onsite as appropriate for the weather conditions and the equipment in use, with consideration to the soil conditions encountered in specific areas.

Pavement Drainage

Accumulation of water on pavement subgrades should be avoided by grading the subgrade to a slope of at least two percent, and/or by providing underdrains. Failure to provide adequate drainage will shorten pavement life.

Pavement Maintenance

All pavements require periodic care, and preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing, patching, leveling, etc.) and global maintenance (e.g., surface sealing).

Frost Considerations

Frost may penetrate beneath sidewalks and pavements and cause them to heave, and resulting displacements may be differential, particularly where sidewalks and pavements meet building doorways and along curbs. To limit the magnitude of heave and creation of such uneven joints to generally tolerable magnitudes for most winters, a 16-inch thick base of ASTM C33 Blend 57 crushed stone should be placed beneath sensitive sidewalk or pavement areas, along with an underdrain to relieve any collected waters. The crushed stone should be separated from the surrounding granular soils with a non-woven synthetic filter fabric meeting the requirements of NYSDOT standard specifications table 737-01C for drainage geotextile.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we

can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements and design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

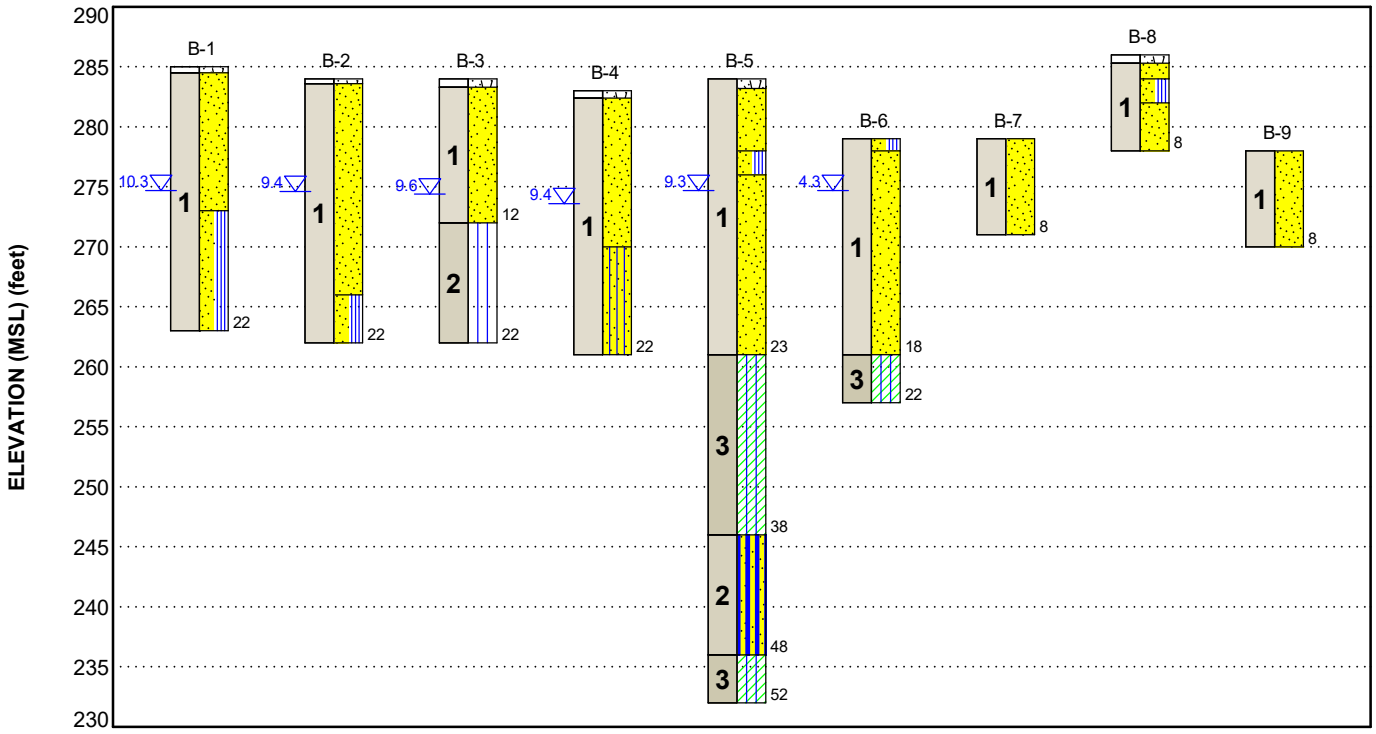
FIGURES

Contents:

GEOMODEL

Proposed Manufacturing Facility ■ Moreau, New York
Terracon Project No. JB215105

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Native Sand	Predominately sand with lesser amounts of silt, generally loose to medium dense
2	Sandy Silt	Silt with lesser amounts of sand, along with occasional clay seams or partings, medium stiff to very stiff
3	Silt and Clay	Banded silt and clay with lesser amounts of sand, generally very soft to stiff

LEGEND

- Topsoil
- Poorly-graded Sand
- Poorly-graded Sand with Silt
- Silt
- Silty Sand
- Silty Clay
- Sandy Silt

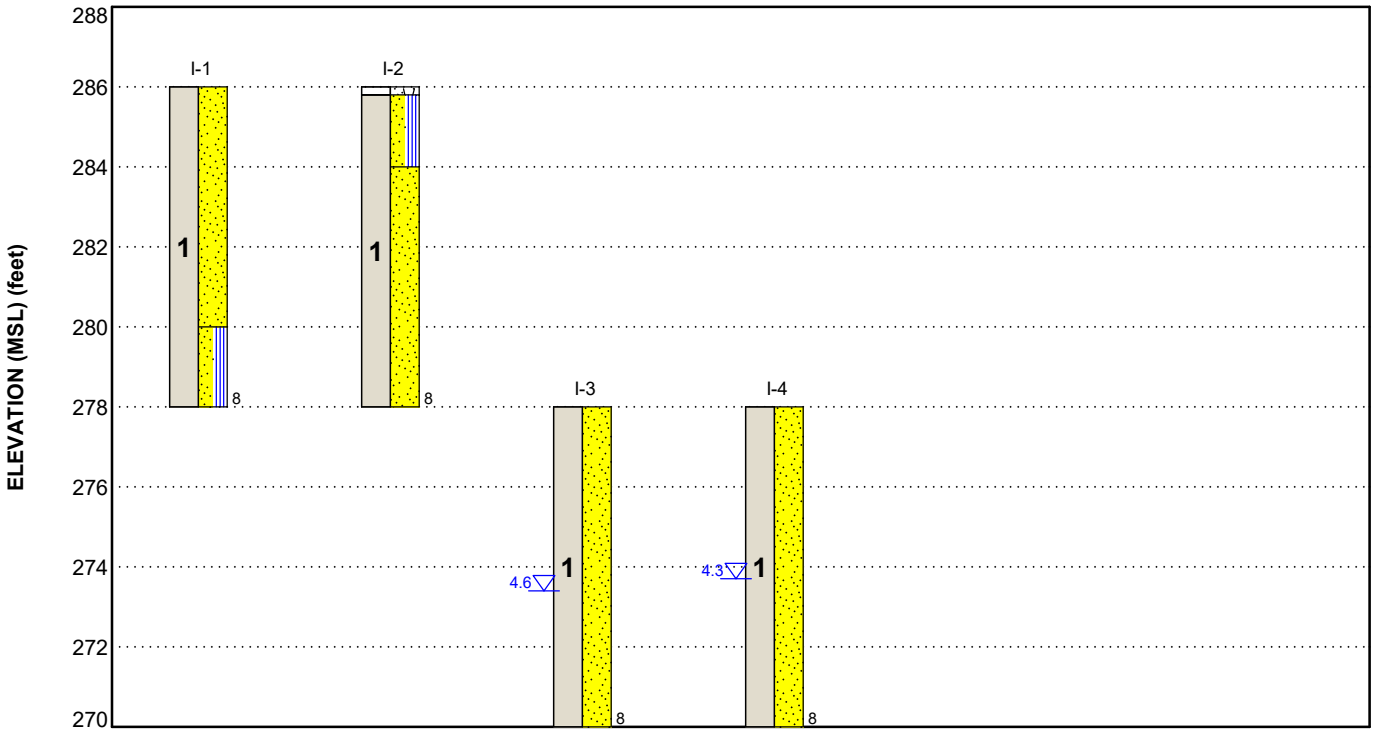
▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

GEOMODEL

Proposed Manufacturing Facility ■ Moreau, New York
Terracon Project No. JB215105



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Native Sand	Predominately sand with lesser amounts of silt, generally loose to medium dense
2	Sandy Silt	Silt with lesser amounts of sand, along with occasional clay seams or partings, medium stiff to very stiff
3	Silt and Clay	Banded silt and clay with lesser amounts of sand, generally very soft to stiff

LEGEND

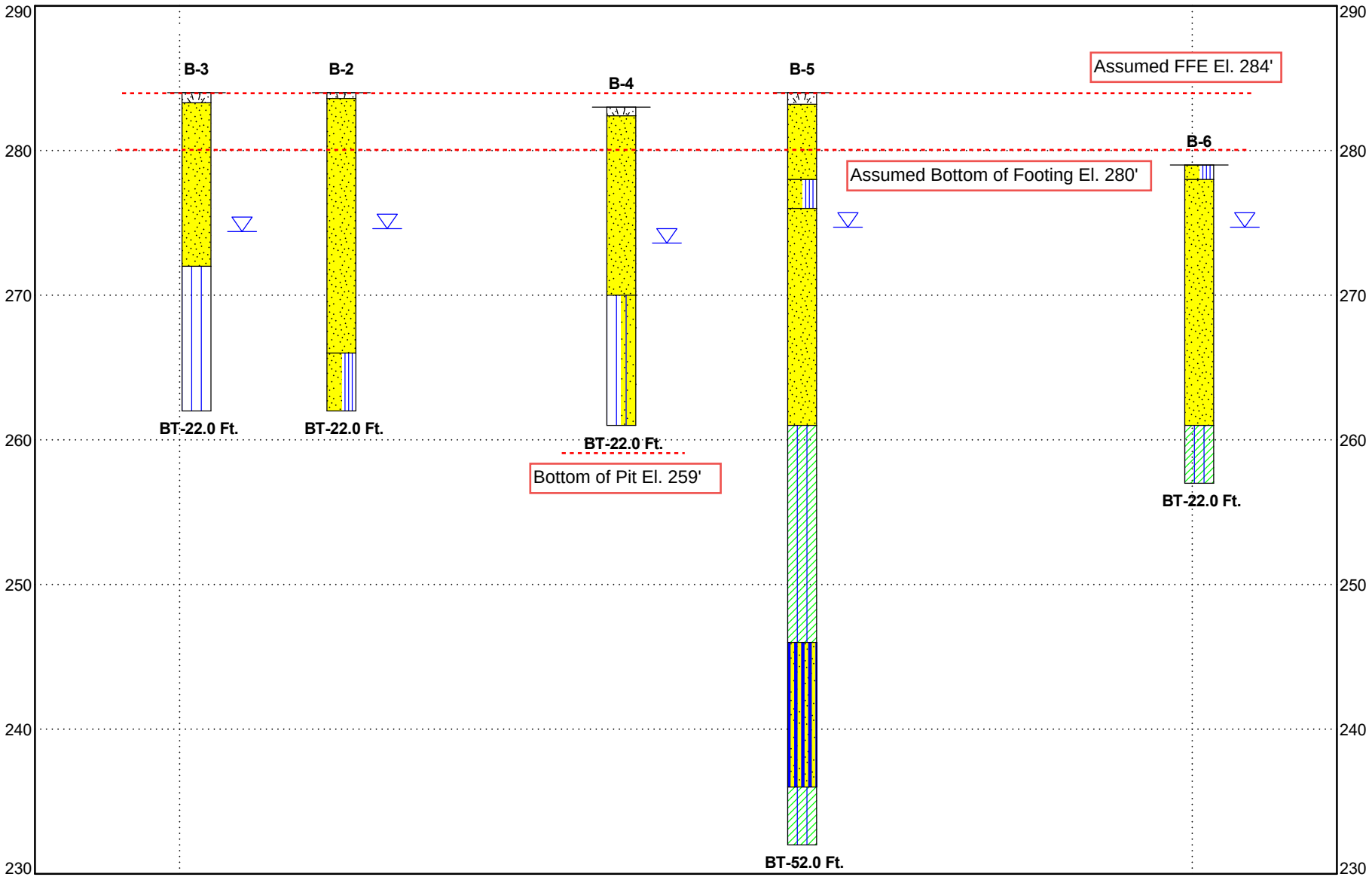
- Poorly-graded Sand
- Poorly-graded Sand with Silt
- Topsoil

▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

◄ West East ►



Explanation

B-2 — Borehole Number
— Borehole Lithology
AR / BT — Borehole Termination Type
Water Level Reading at time of drilling.

See Exploration Plan for orientation of soil profile.
See General Notes in Supporting Information for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
AR - Auger Refusal
BT - Boring Termination

Project Manager: JH	Project No.: JB215105
Drawn by: JCH	Scale: N.T.S.
Approved by:	File Name: JB215105.1
Date: 7/1/2021	

Terracon
30 Corporate Cir Ste 201
Albany, NY
PH. 518-266-0310 FAX.

SUBSURFACE PROFILE

BUILDING CROSS SECTION SCHEMATIC
PROPOSED MANUFACTURING FACILITY FARNAN ROAD
MOREAU, NEW YORK

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Test ID	Depth (feet)	Location
B-1 thru B-6	22.0 to 52.0	Proposed building footprint
B-7 thru B-9	8.0	Proposed pavement areas
I-1 thru I-4	8.0	Infiltration test locations

Test Boring Layout and Elevations: The test locations were selected by Terracon and were established in the field using a hand-held GPS unit, taped measurements and/or visual reference from existing site features. The borehole locations were determined on the basis of the proposed building layout described to us, within the limitations of access, existing structures and utilities.

A number of schematic plant layout configurations were under consideration at the time of this report; the layout upon which the test boring locations were selected and upon which this report is based was mutually agreed upon between Terracon and the design team at the proposal stage.

Existing ground surface elevation at each borehole location was estimated based upon our interpolation between topographic contours shown on the site plan provided to us. If more precise locations and/or elevations are desired, the as-completed test locations should be surveyed.

Subsurface Exploration Procedures: The test borings were completed using a standard rotary drill rig equipped with hollow stem augers. As the augers were advanced, the soils were sampled at intervals of five feet or less in accordance with the Standard Method for Penetration Test and Split-Barrel Sampling of Soils, ASTM D1586. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling 30-inches. The number of blows required to advance the sampling spoon the middle 12-inches of a normal 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the corresponding test depths. Upon completion of drilling the boreholes were backfilled with auger cuttings, concrete cylinders and/or sand and the surface restored in kind.

Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. The sampling depths, penetration distances, and other sampling information were recorded on the field boring logs.

The samples were placed in appropriate containers and taken to our laboratory for visual classification by a Geologist or Geotechnical Engineer. The soils were described based on the material's color, texture, plasticity and moisture Soil classifications are in general accordance with

the Unified Soil Classification System (USCS) as summarized herein. Final boring logs were prepared, and they represent the Geotechnical Engineer's interpretation based on the field logs and visual classifications, along with any laboratory testing performed.

Laboratory Testing

Selected samples recovered from the test borings were submitted for laboratory testing as part of the subsurface investigation, to confirm the visual classifications and to provide quantitative index properties for use in the geotechnical evaluation. This testing was performed in general accordance with the following standard methods:

- ASTM D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil - and Rock by Mass (6 samples tested)
- ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils (2 samples tested w/ hydrometer, 3 samples tested w/o hydrometer)
- ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (1 sample tested)

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above

SITE LOCATION

Proposed Manufacturing Facility ■ Moreau, New York
July 21, 2021 ■ Terracon Project No. JB215105

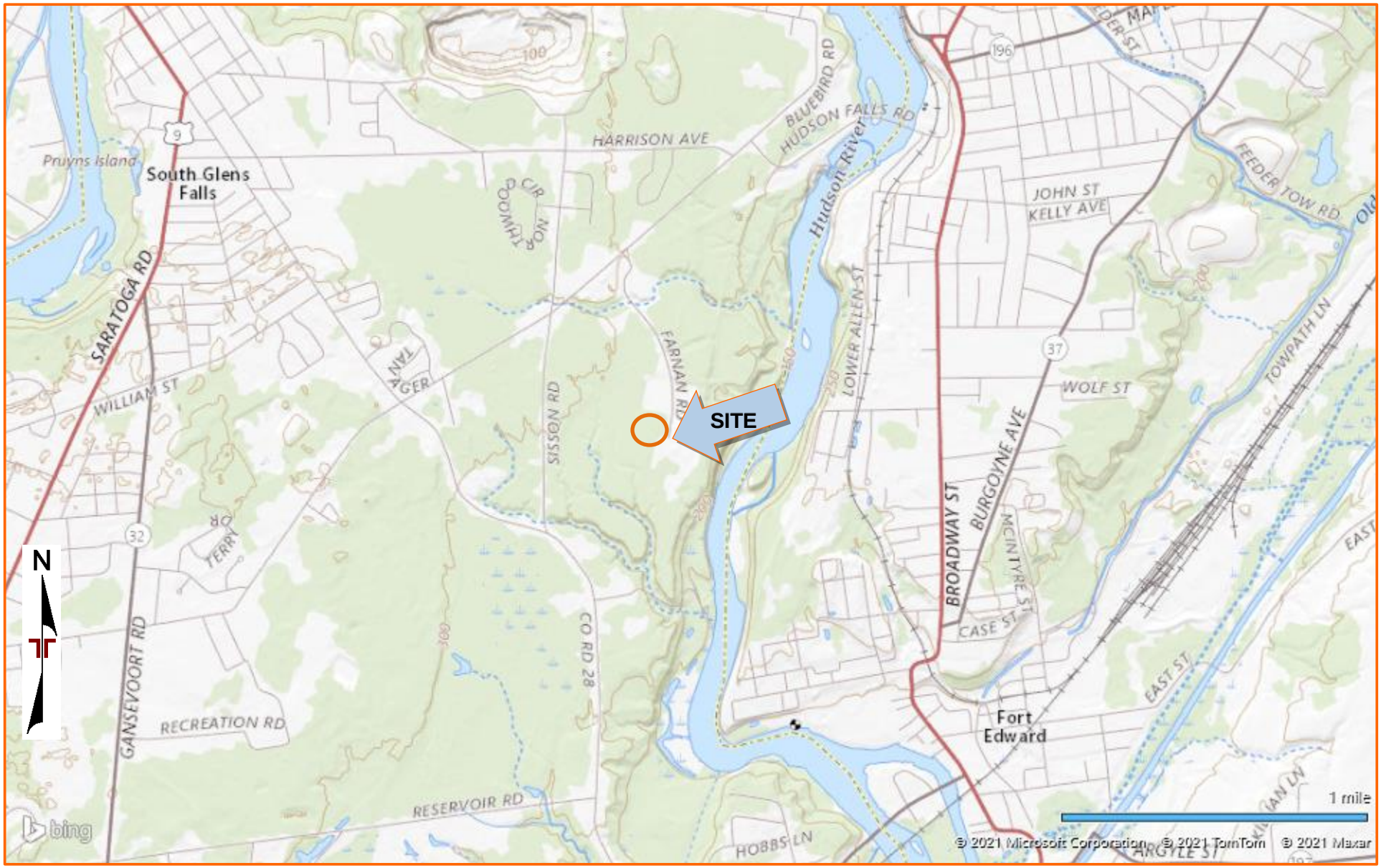


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: GLENS FALLS, NY and HUDSON FALLS, NY.

EXPLORATION PLAN

Proposed Manufacturing Facility ■ Moreau, New York
July 21, 2021 ■ Terracon Project No. JB215105

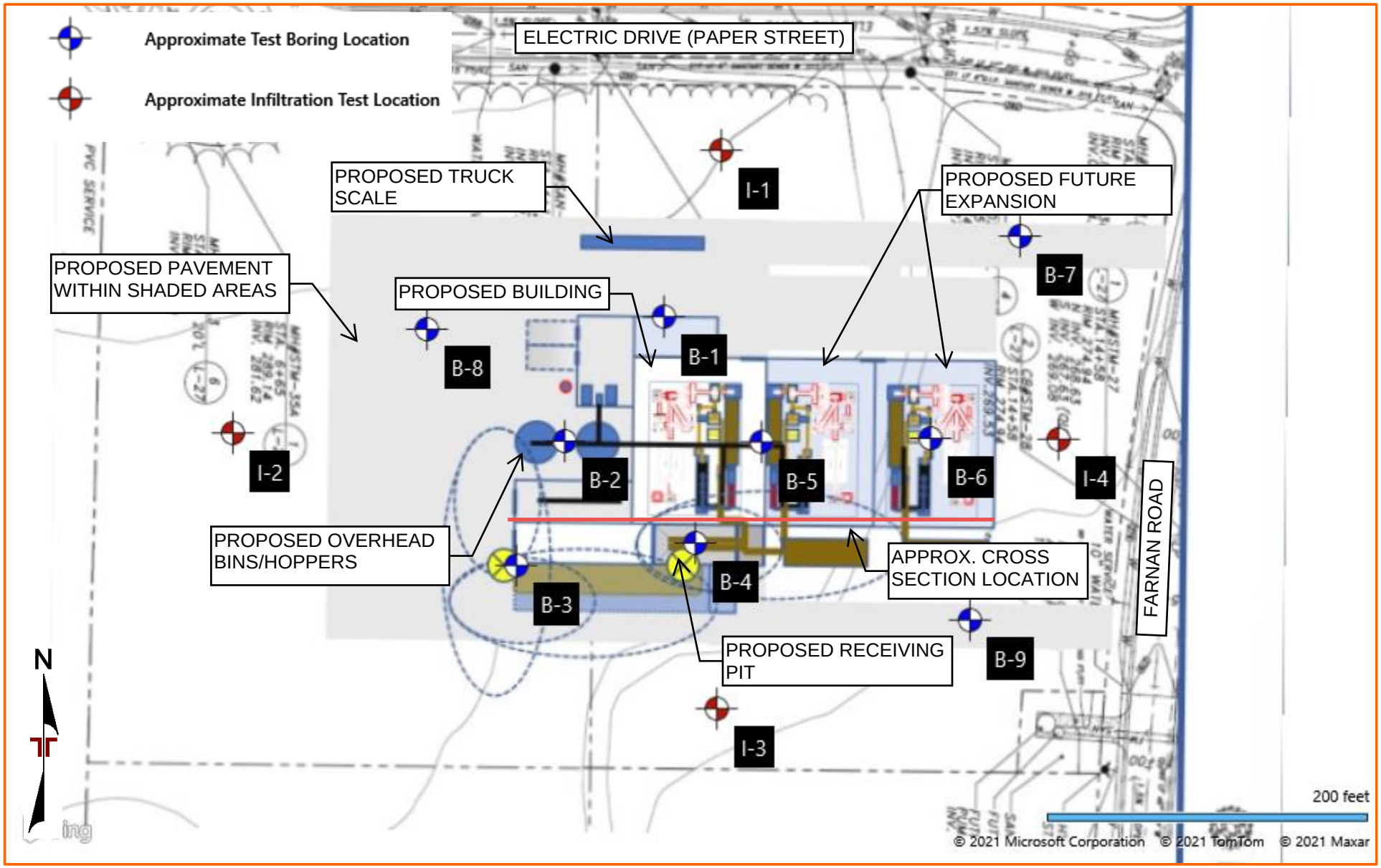


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Note: All attachments are one page unless noted above

BORING LOG NO. B-1

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan

Latitude: 43.2834° Longitude: -73.6052°

Approximate Surface Elev.: 285 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)		INSTALLATION DETAILS	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
	0.5	284.5+/-	**TOPSOIL**						
1			**POORLY GRADED SAND (SP)**, trace silt and gravel, fine to coarse grained, brown to orange, very loose to loose				20	1-2-1-2 N=3	
							20	3-3-4-4 N=7	
			Trace rootlets noted from about 5 to 9 feet				22	2-3-2-3 N=5	
							20	2-2-2-3 N=4	6.9
					▽		22	4-3-4-5 N=7	
	12.0	273+/-	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown, loose to medium dense				24	3-3-3-3 N=6	
	22.0	263+/-					24	WH-6-7-4 N=13	
			Boring Terminated at 22 Feet						

DEPTH (Ft.): 5, 10, 15, 20

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

Logged by: ORB
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

▽ *10.3' after 10-12' sample*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-17-2021 | Boring Completed: 06-17-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. B-2

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan

Latitude: 43.2831° Longitude: -73.6054°

Approximate Surface Elev.: 284 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0.4	283.5+/-							
			TOPSOIL							
			POORLY GRADED SAND (SP), trace silt, fine grained, orange to brown, very loose to medium dense							
			No recovery at the 2-4' sample					20	1-2-2-2 N=4	
								0	3-4-6-6 N=10	
					5			20	2-3-5-5 N=8	6.8
								19	3-4-5-5 N=9	
						▽				
					10			24	1-1-2-4 N=3	
					15			20	4-4-5-9 N=9	
		18.0	266+/-		20			22	4-6-7-7 N=13	
			POORLY GRADED SAND WITH SILT (SP-SM), fine grained, brown, medium dense							
		22.0	262+/-							
			Boring Terminated at 22 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

Logged by: ORB

WATER LEVEL OBSERVATIONS

▽ *9.4' after 6-8' sample*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-17-2021 | Boring Completed: 06-17-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. B-3

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan

Latitude: 43.2829° Longitude: -73.6055°

Approximate Surface Elev.: 284 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		0.7	283.5+/-							
1			**TOPSOIL** **POORLY GRADED SAND (SP)**, trace silt and rootlets, fine grained, orange to brown, very loose to medium dense **Slight mottling observed between 5 to 9'**		5			19	1-1-1-3 N=2	
								19	3-3-4-5 N=7	
								24	4-6-6-6 N=12	
								20	4-4-4-4 N=8	
					10	▽				
		12.0	272+/-					22	2-3-3-4 N=6	
2			**SILT WITH SAND (ML)**, with fine sand partings, brown, medium stiff to very stiff **Grades to clay partings and seams between 15 to 17'**		15			24	4-2-3-3 N=5	33.2
					20			22	6-7-10-10 N=17	
		22.0	262+/-							
			Boring Terminated at 22 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

Logged by: ORB

WATER LEVEL OBSERVATIONS

▽ *9.6' after 10-12' sample*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-18-2021 | Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. B-4

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2830° Longitude: -73.6051°
Approximate Surface Elev.: 283 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0.6	282.5+/-							
			TOPSOIL							
			POORLY GRADED SAND (SP), trace silt, fine to medium grained, brown to orange, very loose to loose					19	1-1-1-1 N=2	
								20	2-3-2-3 N=5	
					5			20	2-3-3-4 N=6	
								19	4-4-4-4 N=8	
						▽				
			Grades to fine to coarse grained		10			22	1-1-3-5 N=4	
		13.0	270+/-							
			SILTY SAND (SM), fine grained, brown, stiff to very stiff							
			Clay partings noted from about 15 to 17'		15			22	8-10-4-4 N=14	
					20			13	4-10-10-9 N=20	27.1
		22.0	261+/-							
			Boring Terminated at 22 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

▽ *9.4' after 10-12' sample*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-17-2021 | Boring Completed: 06-17-2021
Drill Rig: Diedrich D-50 | Driller: S. Morey
Project No.: JB215105

BORING LOG NO. B-5

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan

Latitude: 43.2831° Longitude: -73.6050°

Approximate Surface Elev.: 284 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0.8	283+/-							
			TOPSOIL							
			POORLY GRADED SAND (SP), trace silt and rootlets, fine to coarse grained, brown to orange, very loose to loose					22	1-1-2-1 N=3	
								19	2-2-2-3 N=4	
			Grades to fine grained		5			22	2-3-4-4 N=7	
		6.0	278+/-							
			POORLY GRADED SAND WITH SILT (SP-SM), trace rootlets, some mottling, fine grained, brown, loose					20	3-3-3-4 N=6	
		8.0	276+/-							
			POORLY GRADED SAND (SP), trace to with silt, fine to medium grained, brown, loose to medium dense			▽				
					10			20	4-4-3-4 N=7	
					15			19	5-6-8-11 N=14	
					20			20	6-8-7-8 N=15	
		23.0	261+/-							
3			**BANDED SILT AND CLAY (CL)**, with fine sand partings, gray, very soft to soft		25			24	WH/24"	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

Logged by: ORB

WATER LEVEL OBSERVATIONS

▽ *9.3' after 10-12' sample*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-15-2021 | Boring Completed: 06-15-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. B-5

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan

Latitude: 43.2831° Longitude: -73.6050°

Approximate Surface Elev.: 284 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
3			**BANDED SILT AND CLAY (CL)**, with fine sand partings, gray, very soft to soft *(continued)*	30		X	24	WH/12"-1/12"	47.0
				35		X	24	WH-2-1-2 N=3	
2		38.0	246+/- **SANDY SILT (ML)**, with clay seams, fine grained, gray, medium stiff to stiff	40		X	24	3-6-7-10 N=13	
				45		X	24	3-3-6-9 N=9	
3		48.0	236+/- **BANDED SILT AND CLAY (CL-ML)**, gray, stiff	50		X	24	3-5-6-6 N=11	
		52.0	232+/- ***Boring Terminated at 52 Feet***						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

▽ *9.3' after 10-12' sample*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-15-2021 | Boring Completed: 06-15-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. B-6

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2831° Longitude: -73.6046°
Approximate Surface Elev.: 279 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)		INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		1.0	278+/-	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine to medium grained, dark brown, medium dense					22	3-7-10-13 N=17	
				POORLY GRADED SAND (SP), trace silt, fine to medium grained, brown, loose to medium dense **No recovery at the 2-4' sample**				0	14-14-14-14 N=28	
				Mottling observed from 4 to 9'		5	▽		20	3-3-4-5 N=7	
									24	3-3-5-10 N=8	25.7
						10			22	4-4-7-7 N=11	
						15			22	4-6-7-7 N=13	
3		18.0	261+/-	**BANDED SILT AND CLAY (CL-ML)**, gray, medium stiff		20			24	2-3-2-2 N=5	
		22.0	257+/-	***Boring Terminated at 22 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

▽ *4.3' after 6-8' sample*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-18-2021 | Boring Completed: 06-18-2021
Drill Rig: Diedrich D-50 | Driller: S. Morey
Project No.: JB215105

BORING LOG NO. B-7

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2835° Longitude: -73.6044°
Approximate Surface Elev.: 279 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0	279+/-					22	1-5-8-9 N=13	
								20	8-10-12-10 N=22	
					5			22	6-7-7-6 N=14	
								24	2-2-2-3 N=4	
		8.0	271+/-							

POORLY GRADED SAND (SP), trace silt, fine grained, loose to medium dense
Mottled observed from 0 to 2'

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-21-2021 | Boring Completed: 06-21-2021
Drill Rig: Diedrich D-50 | Driller: S. Morey
Project No.: JB215105

BORING LOG NO. B-8

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2833° Longitude: -73.6058°
Approximate Surface Elev.: 286 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		0.7	285.5+/-							
1		0.7	**TOPSOIL**							
		2.0	**POORLY GRADED SAND (SP)**, trace silt, fine to coarse grained, brown to orange, very loose 284+/-					20	2-1-2-2 N=3	
		4.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown, loose 282+/-					22	3-3-3-4 N=6	
		8.0	**POORLY GRADED SAND (SP)**, trace silt, fine to medium grained, brown, loose 278+/-		5			22	4-4-5-5 N=9	
								20	4-4-5-6 N=9	
			Boring Terminated at 8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-17-2021 | Boring Completed: 06-17-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. B-9

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2828° Longitude: -73.6045°
Approximate Surface Elev.: 278 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0						22	1-2-3-3 N=5	
								19	3-4-4-5 N=8	
					5			24	3-3-3-3 N=6	
								24	2-2-3-8 N=5	
		8.0	270+/-							

POORLY GRADED SAND (SP), trace silt, fine to medium grained, brown, loose

Mottling observed from about 6 to 8'

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-21-2021 | Boring Completed: 06-21-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. I-1

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2836° Longitude: -73.6051°
Approximate Surface Elev.: 286 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0.0	286+/-	4" ID PVC installed to 4'				18	1-1-2-1 N=3	
								22	2-1-2-2 N=3	
					5			20	3-3-3-3 N=6	
		6.0	280+/-					22	3-3-3-4 N=6	
		8.0	278+/-							

POORLY GRADED SAND (SP), trace silt, gravel, and roots, fine to coarse grained, brown to orange, very loose to loose

Grades to fine grained

POORLY GRADED SAND WITH SILT (SP-SM), trace roots, fine grained, brown to orange, loose

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-18-2021 | Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. I-2

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan

Latitude: 43.2832° Longitude: -73.6062°

Approximate Surface Elev.: 286 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0.2	286+/- **TOPSOIL**							
			POORLY GRADED SAND WITH SILT (SP-SM), trace silt, fine grained, brown to orange, very loose					18	1-1-2-2 N=3	
		2.0	284+/-							
			POORLY GRADED SAND (SP), trace silt, fine to coarse grained, brown, loose	4" ID PVC installed to 4'				22	2-3-4-4 N=7	
					5			22	3-4-4-4 N=8	
								20	3-3-2-2 N=5	
		8.0	278+/-							
			Boring Terminated at 8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

Logged by: ORB

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-17-2021 | Boring Completed: 06-17-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. I-3

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2827° Longitude: -73.6051°
Approximate Surface Elev.: 278 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0	278+/-	4" ID PVC installed to 2.5'				24	3-6-8-11 N=14	
								19	8-12-15-12 N=27	
					5	▽		24	10-8-6-8 N=14	
								24	4-6-4-9 N=10	
		8.0	270+/-							

POORLY GRADED SAND (SP), trace silt, fine to coarse grained, dark brown to brown, medium dense

Grades to trace gravel, silt partings

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

▽ *4.6' after boring completion*

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 06-18-2021 | Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

BORING LOG NO. I-4

PROJECT: Proposed Manufacturing Facility

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

SITE: Farnan Road
Moreau, New York

LOCATION See Exploration Plan
Latitude: 43.2831° Longitude: -73.6043°
Approximate Surface Elev.: 278 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		0	270+/-	4" ID PVC installed to 2'	5	▽		22	2-3-5-7 N=8	
								22	6-7-6-6 N=13	
								20	4-4-4-4 N=8	
								24	2-2-4-4 N=6	
		8.0	270+/-							

Boring Terminated at 8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4 1/4" ID HSA

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:
Logged by: ORB

WATER LEVEL OBSERVATIONS

▽ *4.3' after boring completion*

Terracon
30 Corporate Cir Ste 201
Albany, NY

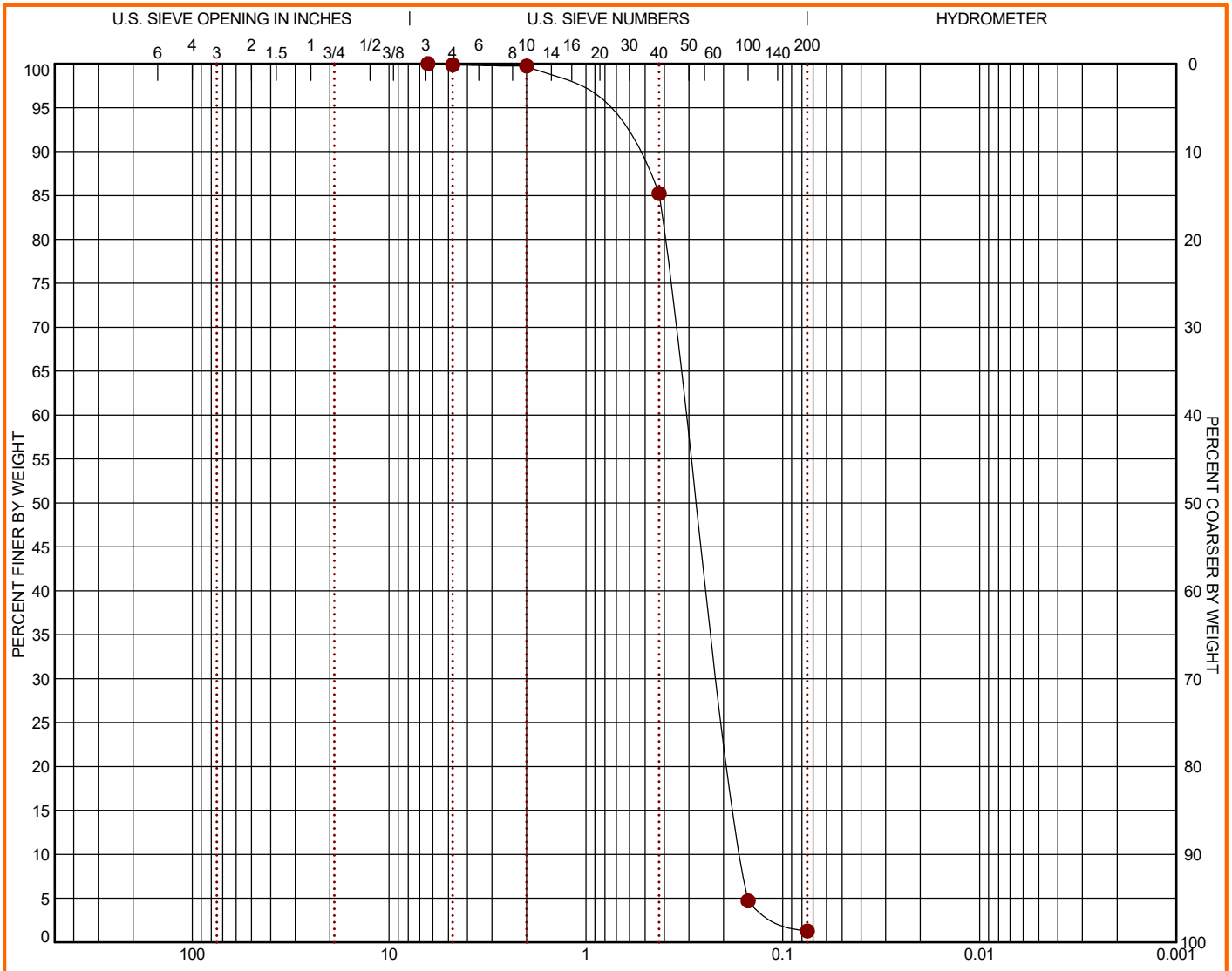
Boring Started: 06-18-2021 | Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50 | Driller: S. Morey

Project No.: JB215105

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-1	6 - 8	0.0	0.1	98.6		1.3		SP

GRAIN SIZE			
	●		
D_{60}	0.307		
D_{30}	0.208		
D_{10}	0.161		

COEFFICIENTS			
	●		
C_C	0.88		
C_U	1.91		

●					
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
1/4"	100.0				
#4	99.87				
#10	99.74				
#40	85.22				
#100	4.72				
#200	1.28				

SOIL DESCRIPTION	
●	POORLY GRADED SAND (SP)

REMARKS	
●	

PROJECT: Proposed Manufacturing Facility

SITE: Farnan Road
Moreau, New York

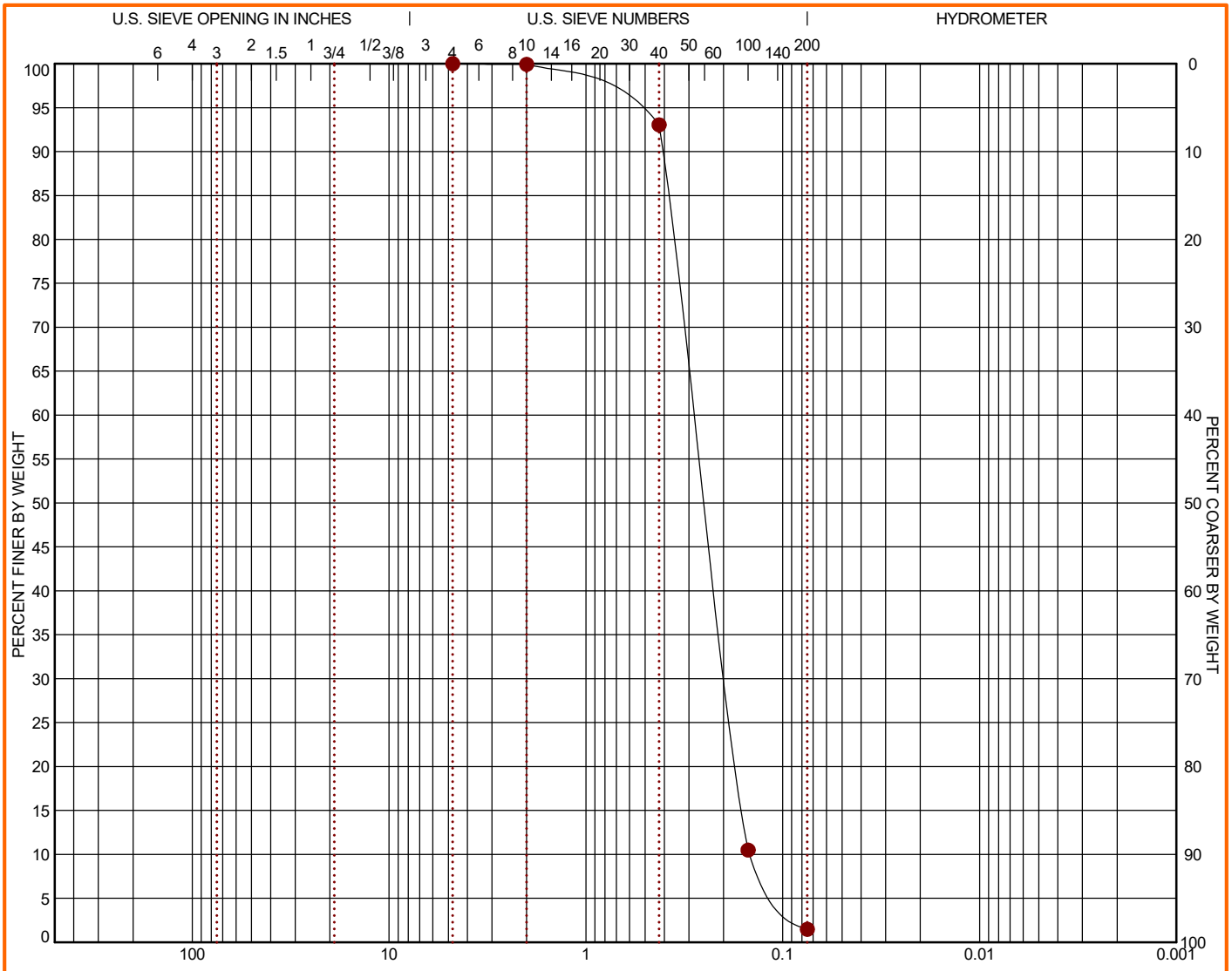
Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-2	4 - 6	0.0	0.0	98.5		1.5		SP

GRAIN SIZE

	●		
D_{60}	0.28		
D_{30}	0.192		
D_{10}	0.144		

COEFFICIENTS

	●		
C_C	0.91		
C_U	1.94		

● Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#4	100.0				
#10	99.92				
#40	93.04				
#100	10.49				
#200	1.48				

SOIL DESCRIPTION

● POORLY GRADED SAND (SP)

REMARKS

●

PROJECT: Proposed Manufacturing Facility

SITE: Farnan Road
Moreau, New York

Terracon
30 Corporate Cir Ste 201
Albany, NY

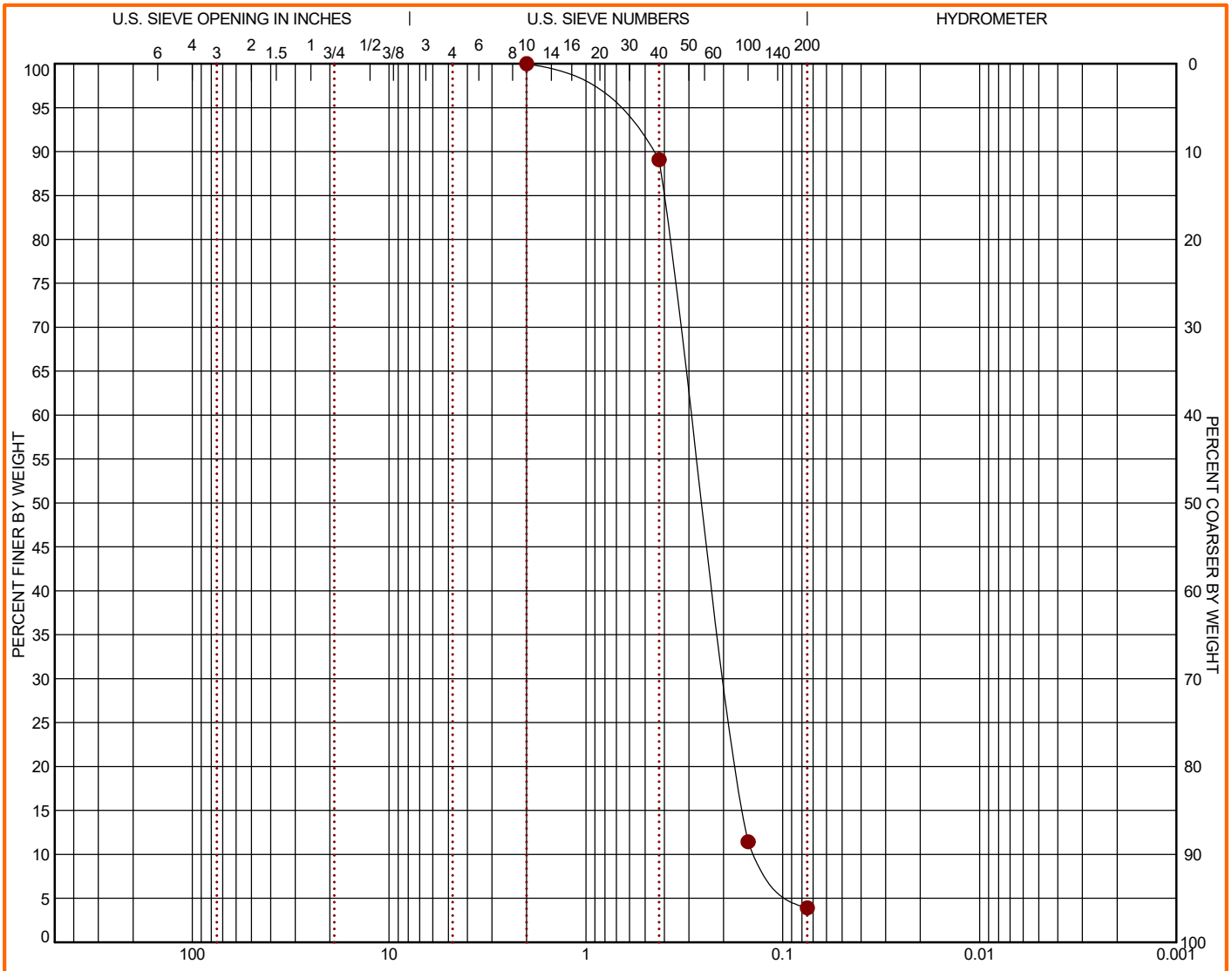
PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 JB215105 PROPOSED MANUFACT.GPJ TERRACON_DATATEMPLATE.GDT 7/13/21

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-6	6 - 8	0.0	0.0	96.1		3.9		SP

GRAIN SIZE

	●		
D_{60}	0.288		
D_{30}	0.192		
D_{10}	0.131		

COEFFICIENTS

	●		
C_C	0.98		
C_U	2.19		

●					
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#10	100.0				
#40	89.07				
#100	11.44				
#200	3.92				

SOIL DESCRIPTION

● POORLY GRADED SAND (SP)

REMARKS

●

PROJECT: Proposed Manufacturing Facility

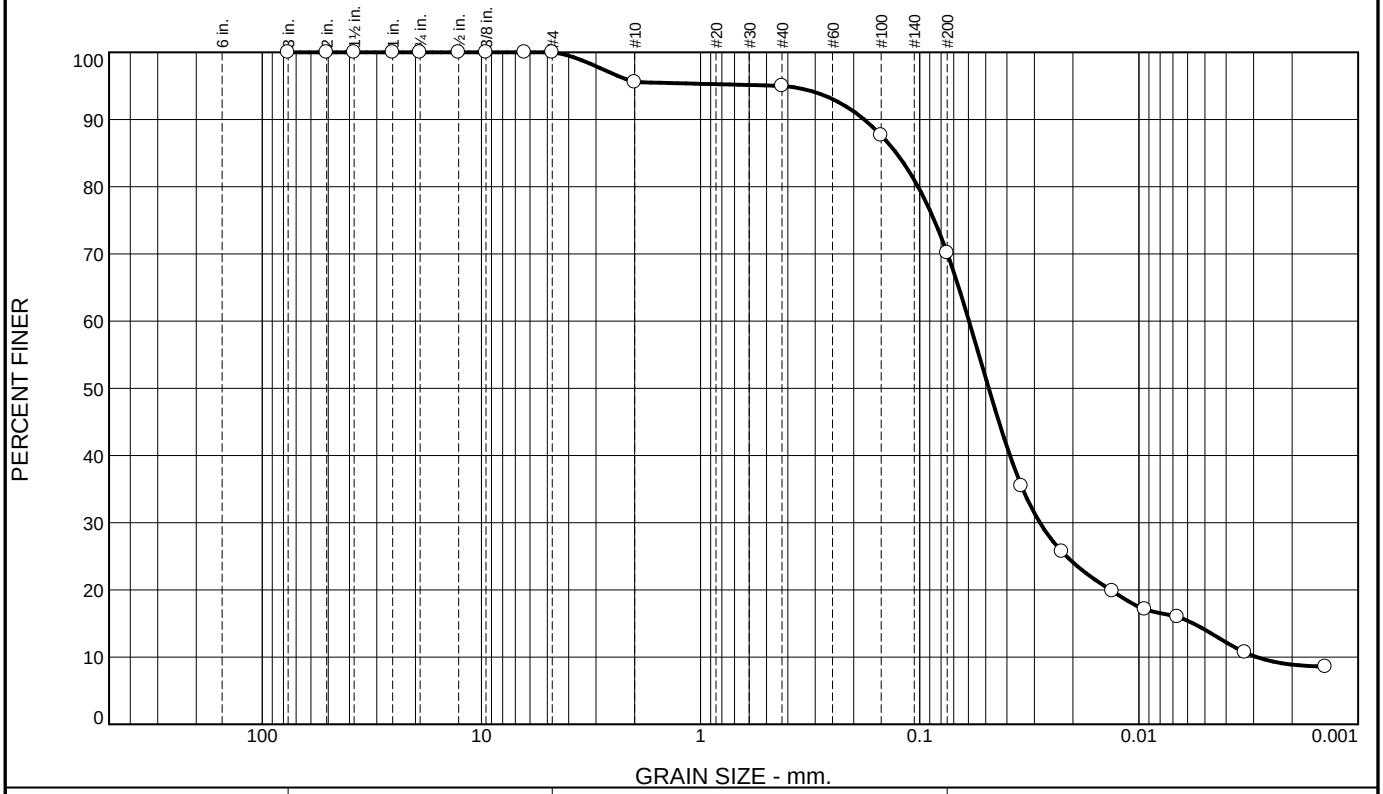
SITE: Farnan Road
Moreau, New York

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	4.4	0.6	24.9	56.0	14.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1.5"	100.0		
1"	100.0		
0.75"	100.0		
0.5"	100.0		
0.375"	100.0		
0.25"	100.0		
#4	100.0		
#10	95.6		
#40	95.0		
#100	87.6		
#200	70.1		

* (no specification provided)

Material Description

Silt with sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1792 D_{85}= 0.1279 D_{60}= 0.0596
D_{50}= 0.0484 D_{30}= 0.0283 D_{15}= 0.0056
D_{10}= 0.0029 C_u= 20.56 C_c= 4.64

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Per ASTM D422

Source of Sample: B-3 15'-17'

Date: 7-7-21

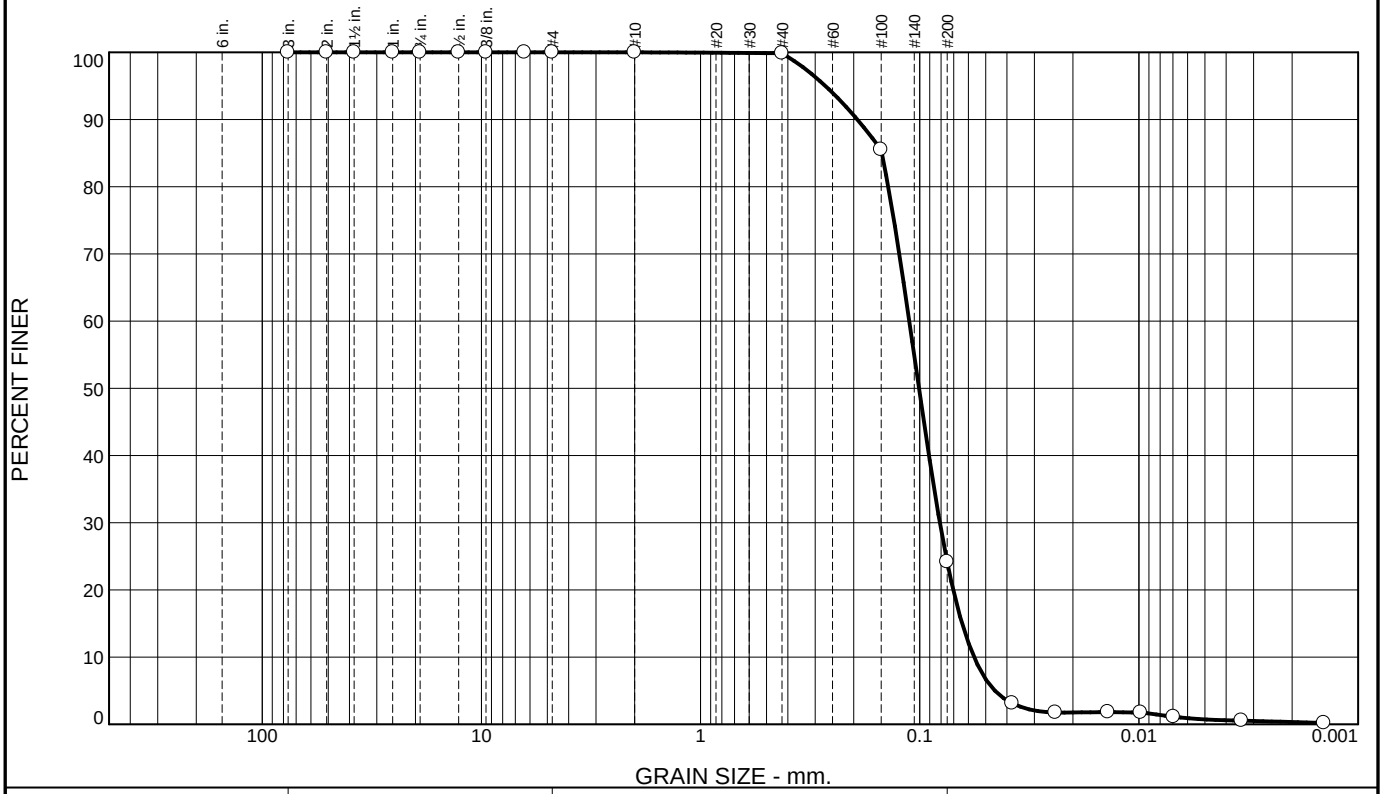
Terracon Consultants-NY, Inc.

Albany, NY

Client: Northeastern Biochar Solutions LLC
Project: Proposed Manufacturing Facility
Moreau, NY
Project No: JB215105 **Figure** B-3 15'-17'

Tested By: AB **Checked By:** JH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	75.7	23.5	0.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1.5"	100.0		
1"	100.0		
0.75"	100.0		
0.5"	100.0		
0.375"	100.0		
0.25"	100.0		
#4	100.0		
#10	100.0		
#40	99.9		
#100	85.5		
#200	24.2		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1927 D_{85}= 0.1489 D_{60}= 0.1116
D_{50}= 0.1008 D_{30}= 0.0810 D_{15}= 0.0641
D_{10}= 0.0566 C_u= 1.97 C_c= 1.04

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Per ASTM D422

Source of Sample: B-4 20'-22'

Date: 7-7-21

Terracon Consultants-NY, Inc.

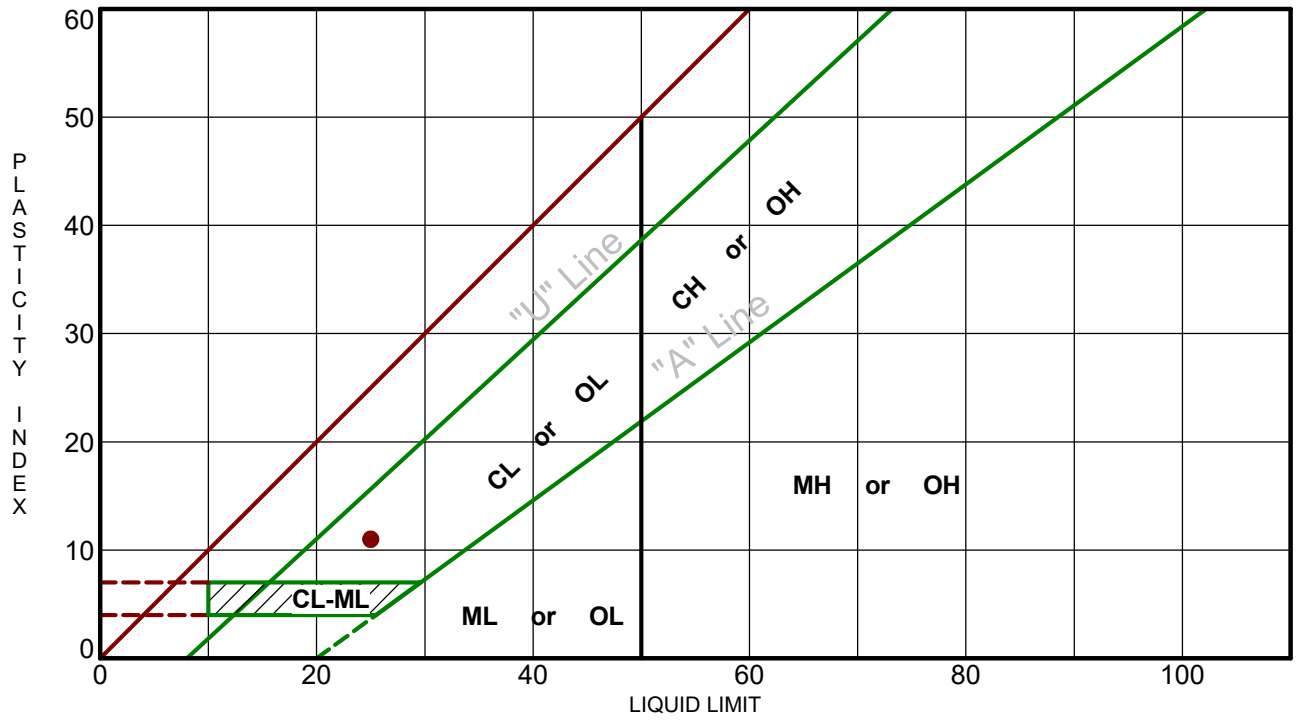
Albany, NY

Client: Northeastern Biochar Solutions LLC
Project: Proposed Manufacturing Facility
Moreau, NY
Project No: JB215105 **Figure** B-4 20'-22'

Tested By: AB **Checked By:** JH

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
● B-5	30 - 32	25	14	11		CL	Lean Clay

PROJECT: Proposed Manufacturing Facility

SITE: Farnan Road
Moreau, New York

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC
Saratoga Springs, New York

INFILTRATION TEST RESULTS					
PROJECT: Proposed Manufacturing Facility				**PROJECT NO.** JB215105	
PROJECT LOCATION: Moreau, New York				**TEST DATE:** 6/21/21	
WEATHER: Hot, humid, 90 degrees				**TESTER:** SM & SL	
Test Location	**Test Depth (feet)**	**Trial No.**	**Water Drop (in)**	**Elapsed Time (min)**	**Infiltration Rate (inches/hour)**
I-1	4.0	1	24	11	>24
		2	24	14	>24
		3	24	23	>24
		4	24	32	>24
		Infiltration rate for trial no. 4 = >24 inches per hour Average infiltration rate for trials nos. 1-4 = >24inches per hour			
I-2	4.0	1	24	18	>24
		2	24	20	>24
		3	24	22	>24
		4	24	25	>24
		Infiltration rate for trial no. 4 = >24 inches per hour Average infiltration rate for trials nos. 1-4 = >24 inches per hour			

Notes:

(1) Testing was conducted in general accord with the “Infiltration Testing Requirements” outlined in Appendix D of the New York State Stormwater Management Design Manual.

(2) Infiltration tests were located alongside companion test borings numbered correspondingly.

SOIL CLASSIFICATION AT TEST DEPTH

Test Location I-1: Poorly graded sand, trace silt, fine grained

Test Location I-2: Poorly graded sand, trace silt, fine to medium grained

INFILTRATION TEST RESULTS

PROJECT: Proposed Manufacturing Facility	**PROJECT NO.** JB215105
PROJECT LOCATION: Moreau, New York	**TEST DATE:** 6/21/21
WEATHER: Hot, humid, 90 degrees	**TESTER:** SM & SL

Test Location	Test Depth (feet)	Trial No.	Water Drop (in)	Elapsed Time (min)	Infiltration Rate (inches/hour)
I-3	2.5	1	24	4	>24
		2	24	4	>24
		3	24	5	>24
		4	24	5	>24
		Infiltration rate for trial no. 4 = >24 inches per hour Average infiltration rate for trials nos. 1-4 = >24 inches per hour			
I-4	2.0	1	24	7	>24
		2	24	9	>24
		3	24	10	>24
		4	24	10	>24
		Infiltration rate for trial no. 4 = >24 inches per hour Average infiltration rate for trials nos. 1-4 = >24 inches per hour			

Notes:

(1) Testing was conducted in general accord with the “Infiltration Testing Requirements” outlined in Appendix D of the New York State Stormwater Management Design Manual.

(2) Infiltration tests were located alongside companion test borings numbered correspondingly.

SOIL CLASSIFICATION AT TEST DEPTH

Test Location I-3: Poorly graded sand, trace silt, fine to medium grained

Test Location I-4: Poorly graded sand, trace silt, fine to medium grained

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
Proposed Manufacturing Facility ■ Moreau, New York
Terracon Project No. JB215105

SAMPLING	WATER LEVEL	FIELD TESTS
Split Spoon	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

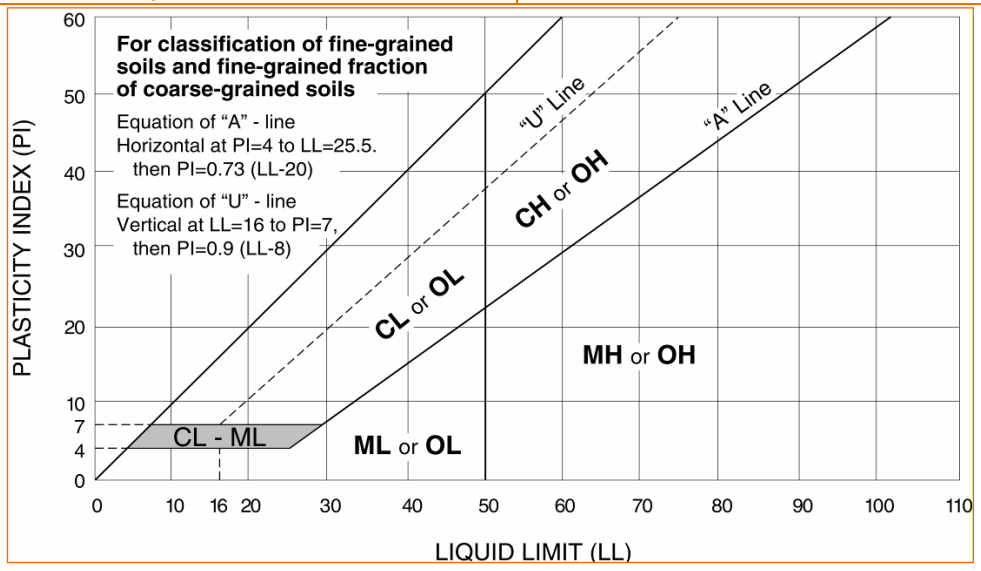
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



APPENDIX D
SUBCATCHMENT PLANS

MAP REFERENCE:
BASE MAP INFORMATION OBTAINED FROM "MAP OF TOPOGRAPHIC SURVEY MADE FOR NORTHEAST BIOCHAR SOLUTIONS, INC., TOWN OF MOREAU, SARATOGA COUNTY, NEW YORK" PREPARED BY VAN DUSEN & STEVES SURVEYORS, DATED JULY 28, 2021.

DIG SAFE NOTE:
THIS PLAN SET WAS DRAFTED WITHOUT THE BENEFIT OF "DIG SAFE" MARKINGS. UTILITIES SHOWN ARE NOT WARRANTED TO BE EXACT OR COMPLETE. THE CONTRACTOR SHALL CONTACT "DIG SAFE" AT 811 BEFORE COMMENCING ANY WORK AND SHALL PRESERVE EXISTING UTILITIES WHICH ARE NOT SPECIFIED TO BE REMOVED IN THIS PLAN SET.

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SARATOGA SPRINGS, NY 12866
(518) 450-4030

DRAWINGS NOT FOR CONSTRUCTION

REVISIONS		
DATE	DESCRIPTION	

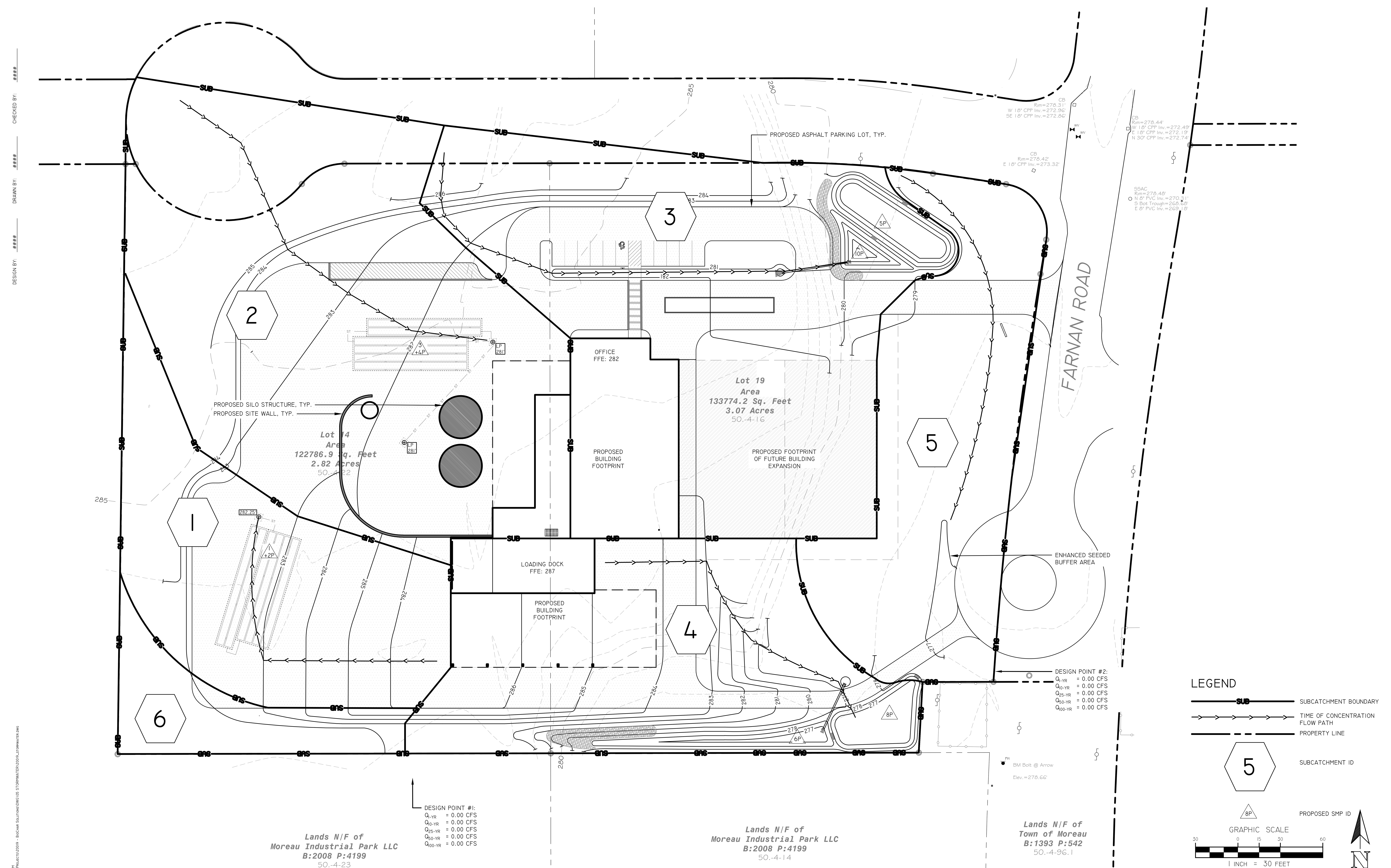
northeastern BIOCHAR SOLUTIONS — WASTE NOT

PREPARED FOR
SARATOGA BIOCHAR SOLUTIONS, LLC
26 F CONGRESS ST. #346
SARATOGA SPRINGS, NY 12866

PROJECT
SARATOGA BIOCHAR SOLUTIONS, LLC

DRAWING TITLE
PRE- CONSTRUCTION SUBCATCHMENT PLAN

DATE: 10/20/2021
PROJECT NO. 20019
DRAWING NO.
SC-1
DWG 1 OF 2


PROPOSED ASPHALT PARKING LOT, TYP.
PROPOSED SILO STRUCTURE, TYP.
PROPOSED SITE WALL, TYP.
OFFICE
FFE: 282
PROPOSED BUILDING FOOTPRINT
LOADING DOCK
FFE: 287
PROPOSED BUILDING FOOTPRINT
Lot 14
Area
122786.9 Sq. Feet
2.82 Acres
50.-4-22
Lot 19
Area
133774.2 Sq. Feet
3.07 Acres
50.-4-16
PROPOSED FOOTPRINT OF FUTURE BUILDING EXPANSION
FARNAN ROAD
ENHANCED SEEDED BUFFER AREA
DESIGN POINT #1:
Q1-YR = 0.00 CFS
Q10-YR = 0.00 CFS
Q25-YR = 0.00 CFS
Q50-YR = 0.00 CFS
Q100-YR = 0.00 CFS
DESIGN POINT #2:
Q1-YR = 0.00 CFS
Q10-YR = 0.00 CFS
Q25-YR = 0.00 CFS
Q50-YR = 0.00 CFS
Q100-YR = 0.00 CFS
Lands N/F of
Moreau Industrial Park LLC
B:2008 P:4199
50.-4-23
Lands N/F of
Moreau Industrial Park LLC
B:2008 P:4199
50.-4-14
Lands N/F of
Town of Moreau
B:1393 P:542
50.-4-96.1
BM Bolt @ Arrow
Elev.=278.66'
LEGEND
SUBCATCHMENT BOUNDARY
TIME OF CONCENTRATION FLOW PATH
PROPERTY LINE
SUBCATCHMENT ID
PROPOSED SMP ID
GRAPHIC SCALE
1 INCH = 30 FEET

MAP REFERENCE:
BASE MAP INFORMATION OBTAINED FROM "MAP OF TOPOGRAPHIC SURVEY MADE FOR NORTHEAST BIOCHAR SOLUTIONS, INC., TOWN OF MOREAU, SARATOGA COUNTY, NEW YORK" PREPARED BY VAN DUSEN & STEVES SURVEYORS, DATED JULY 28, 2021.

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DRAWINGS NOT FOR CONSTRUCTION

REVISIONS	
DATE	DESCRIPTION

northeastern BIOCHAR SOLUTIONS — WASTE NOT

PREPARED FOR
SARATOGA BIOCHAR SOLUTIONS, LLC
26 F CONGRESS ST. #346
SARATOGA SPRINGS, NY 12866

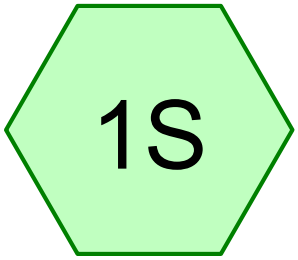
PROJECT
SARATOGA BIOCHAR SOLUTIONS, LLC

DRAWING TITLE
POST- CONSTRUCTION SUBCATCHMENT PLAN

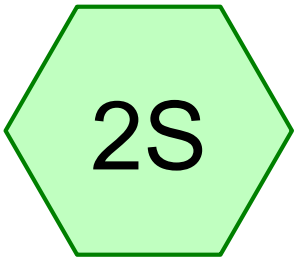
DATE: 10/29/2021
PROJECT NO. 20019
DRAWING NO. SC-2
DWG 2 OF 2

APPENDIX E
STORMWATER CALCULATIONS

PRE-DEVELOPMENT



SC-1



SC-2

Subcat Reach Pond Link

Routing Diagram for 20019_EXIST
Prepared by Microsoft, Printed 10/20/2021

Summary for Subcatchment 1S: SC-1

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.22"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
40.8	653	Total			

Summary for Subcatchment 2S: SC-2

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.22"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			

Summary for Subcatchment 1S: SC-1

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.69"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
40.8	653	Total			

Summary for Subcatchment 2S: SC-2

Runoff = 0.0 cfs @ 23.99 hrs, Volume= 0.005 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.69"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			

Summary for Subcatchment 1S: SC-1

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.54"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
40.8	653	Total			

Summary for Subcatchment 2S: SC-2

Runoff = 0.0 cfs @ 13.58 hrs, Volume= 0.027 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.54"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			

Summary for Subcatchment 1S: SC-1

Runoff = 0.0 cfs @ 24.07 hrs, Volume= 0.005 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=5.30"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
40.8	653	Total			

Summary for Subcatchment 2S: SC-2

Runoff = 0.2 cfs @ 12.48 hrs, Volume= 0.062 af, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=5.30"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			

Summary for Subcatchment 1S: SC-1

Runoff = 0.0 cfs @ 15.91 hrs, Volume= 0.027 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=6.20"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
40.8	653	Total			

Summary for Subcatchment 2S: SC-2

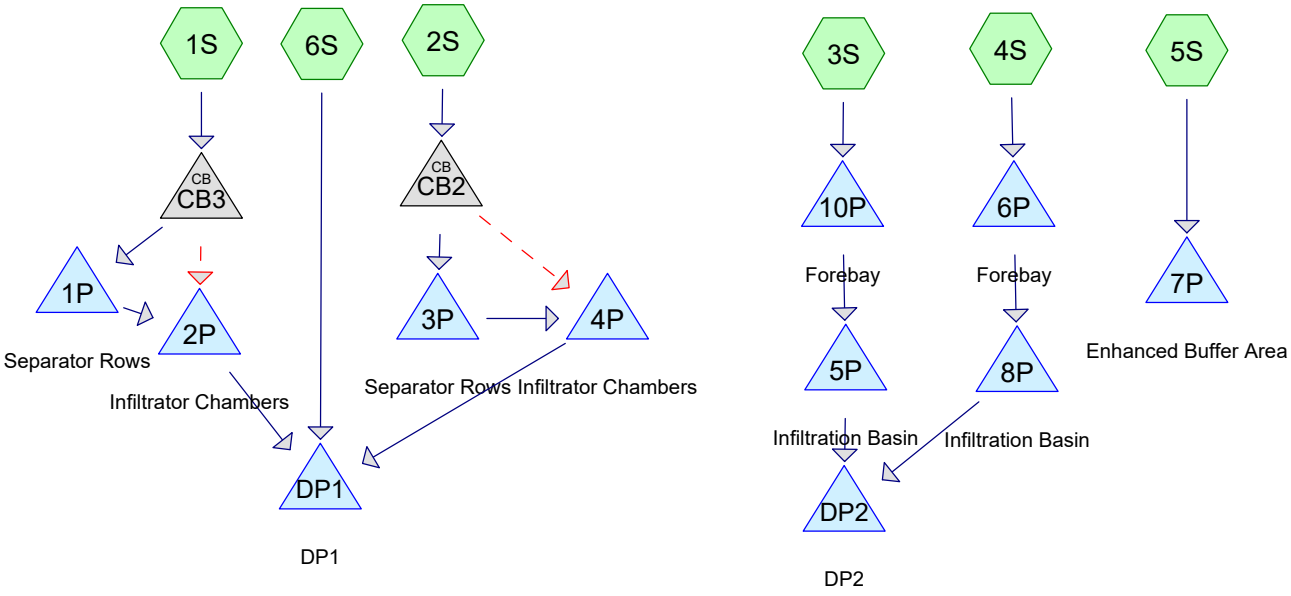
Runoff = 0.6 cfs @ 12.25 hrs, Volume= 0.118 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=6.20"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			

POST-CONSTRUCTION



Subcat Reach Pond Link

Routing Diagram for 20019_POST
Prepared by Microsoft, Printed 10/28/2021

Summary for Subcatchment 1S:

Runoff = 0.7 cfs @ 12.01 hrs, Volume= 0.037 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

	Area (sf)	CN	Description
*	23,164	98	PAVEMENT
	9,267	30	Woods, Good, HSG A
	1,329	32	Woods/grass comb., Good, HSG A
	33,760	77	Weighted Average
	10,596		31.39% Pervious Area
	23,164		68.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0300	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
0.1	30	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.0	230	Total			

Summary for Subcatchment 2S:

Runoff = 0.2 cfs @ 12.41 hrs, Volume= 0.040 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

	Area (sf)	CN	Description
	27,167	30	Woods, Good, HSG A
	33,313	98	Paved parking, HSG A
	7,145	39	>75% Grass cover, Good, HSG A
*	8,333	98	ROOF
*	357	98	WALL
	76,315	68	Weighted Average
	34,312		44.96% Pervious Area
	42,003		55.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
1.7	47	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	23	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	139	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
25.1	284	Total			

Summary for Subcatchment 3S:

Runoff = 0.7 cfs @ 12.18 hrs, Volume= 0.069 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

Area (sf)	CN	Description
27,687	98	Roofs, HSG A
17,972	98	Paved parking, HSG A
19,500	39	>75% Grass cover, Good, HSG A
7,919	30	Woods, Good, HSG A
73,078	75	Weighted Average
27,419		37.52% Pervious Area
45,659		62.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	23	0.0330	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	7	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	63	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	26	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	30	0.0010	1.55	1.22	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
13.1	314	Total			

Summary for Subcatchment 4S:

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 0.021 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

	Area (sf)	CN	Description
*	11,641	98	ROOF
*	12,206	98	paving
	1,352	30	Woods, Good, HSG A
	19,773	32	Woods/grass comb., Good, HSG A
	44,972	67	Weighted Average
	21,125		46.97% Pervious Area
	23,847		53.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	30	0.0150	6.02	4.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	243	Total			

Summary for Subcatchment 5S:

Runoff = 0.0 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

	Area (sf)	CN	Description
*	9,070	98	paving
	26,306	32	Woods/grass comb., Good, HSG A
	35,376	49	Weighted Average
	26,306		74.36% Pervious Area
	9,070		25.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

Summary for Subcatchment 6S:

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

Area (sf)	CN	Description
9,905	30	Woods, Good, HSG A
9,905		100.00% Pervious Area

Summary for Pond 1P: Separator Rows

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 0.57" for 1-yr event
Inflow = 0.7 cfs @ 12.01 hrs, Volume= 0.037 af
Outflow = 0.1 cfs @ 12.63 hrs, Volume= 0.028 af, Atten= 88%, Lag= 37.4 min
Primary = 0.1 cfs @ 12.63 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.37' @ 12.63 hrs Surf.Area= 0.026 ac Storage= 0.013 af

Plug-Flow detention time= 240.1 min calculated for 0.028 af (77% of inflow)
Center-of-Mass det. time= 141.0 min (1,030.6 - 889.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.026 af	**12.75'W x 88.83'L x 4.00'H Field A** 0.104 af Overall - 0.039 af Embedded = 0.065 af x 40.0% Voids
#2A	278.00'	0.039 af	**Cultec R-360HD** x 46 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 46 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		0.065 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	278.15'	**10.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.15' / 278.15' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=0.1 cfs @ 12.63 hrs HW=278.37' (Free Discharge)
1=Culvert (Barrel Controls 0.1 cfs @ 1.04 fps)

Summary for Pond 2P: Infiltrator Chambers

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth > 0.44" for 1-yr event
Inflow = 0.1 cfs @ 12.63 hrs, Volume= 0.028 af
Outflow = 0.1 cfs @ 12.64 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.1 cfs @ 12.64 hrs, Volume= 0.028 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.50' @ 12.64 hrs Surf.Area= 0.045 ac Storage= 0.000 af

Plug-Flow detention time= 0.3 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (1,030.8 - 1,030.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.044 af	**24.25'W x 81.50'L x 4.00'H Field A** 0.181 af Overall - 0.072 af Embedded = 0.110 af x 40.0% Voids
#2A	278.00'	0.072 af	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.116 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	280.21'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 12.64 hrs HW=277.50' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 3P: Separator Rows

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 0.27" for 1-yr event
Inflow = 0.2 cfs @ 12.41 hrs, Volume= 0.040 af
Outflow = 0.1 cfs @ 13.64 hrs, Volume= 0.032 af, Atten= 69%, Lag= 74.2 min
Primary = 0.1 cfs @ 13.64 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.45' @ 13.64 hrs Surf.Area= 1,039 sf Storage= 505 cf

Plug-Flow detention time= 216.9 min calculated for 0.032 af (80% of inflow)
Center-of-Mass det. time= 130.8 min (1,093.9 - 963.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,037 cf	**12.75'W x 81.50'L x 4.00'H Field A** 4,157 cf Overall - 1,565 cf Embedded = 2,592 cf x 40.0% Voids
#2A	277.10'	1,565 cf	**Cultec R-360HD** x 42 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 42 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		2,602 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	277.25'	**12.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.25' / 277.25' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.1 cfs @ 13.64 hrs HW=277.45' (Free Discharge)
1=Culvert (Barrel Controls 0.1 cfs @ 0.87 fps)

Summary for Pond 4P: Infiltrator Chambers

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth > 0.22" for 1-yr event
Inflow = 0.1 cfs @ 13.64 hrs, Volume= 0.032 af
Outflow = 0.1 cfs @ 13.65 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.1 cfs @ 13.65 hrs, Volume= 0.032 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 276.60' @ 13.65 hrs Surf.Area= 1,976 sf Storage= 1 cf

Plug-Flow detention time= 0.3 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (1,094.2 - 1,093.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,910 cf	**24.25'W x 81.50'L x 4.00'H Field A** 7,906 cf Overall - 3,130 cf Embedded = 4,776 cf x 40.0% Voids
#2A	277.10'	3,130 cf	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		5,040 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	276.60'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	278.10'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 13.65 hrs HW=276.60' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=276.60' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 0.32" for 1-yr event
Inflow = 0.1 cfs @ 12.90 hrs, Volume= 0.044 af
Outflow = 0.1 cfs @ 12.91 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.4 min
Discarded = 0.1 cfs @ 12.91 hrs, Volume= 0.044 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.00' @ 12.91 hrs Surf.Area= 1,497 sf Storage= 3 cf

Plug-Flow detention time= 0.4 min calculated for 0.044 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (1,015.1 - 1,014.7)

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,655 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,496	192.0	0	0	1,496
279.00	2,101	211.0	1,790	1,790	2,138
280.00	2,764	230.0	2,425	4,215	2,840
280.50	2,998	237.0	1,440	5,655	3,125

Device	Routing	Invert	Outlet Devices
#1	Primary	279.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.6 cfs @ 12.91 hrs HW=278.00' (Free Discharge)
2=Exfiltration (Exfiltration Controls 1.6 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=278.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 6P: Forebay

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 0.25" for 1-yr event
Inflow = 0.2 cfs @ 12.11 hrs, Volume= 0.021 af
Outflow = 0.0 cfs @ 16.73 hrs, Volume= 0.009 af, Atten= 92%, Lag= 277.3 min
Primary = 0.0 cfs @ 16.73 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.77' @ 16.73 hrs Surf.Area= 1,105 sf Storage= 554 cf

Plug-Flow detention time= 430.0 min calculated for 0.009 af (43% of inflow)
Center-of-Mass det. time= 239.1 min (1,189.2 - 950.0)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	1,620 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	392	246.0	0	0	392
278.00	1,386	358.0	838	838	5,784
278.50	1,747	364.0	782	1,620	6,173

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.0 cfs @ 16.73 hrs HW=277.77' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.0 cfs @ 0.37 fps)

Summary for Pond 7P: Enhanced Buffer Area

Inflow Area = 0.812 ac, 25.64% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.0 cfs @ 24.03 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 24.03 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 24.03 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.00' @ 24.03 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.000 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (1,359.5 - 1,359.5)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	7 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	**45.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.7 cfs @ 24.03 hrs HW=277.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.7 cfs)

Summary for Pond 8P: Infiltration Basin

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 0.11" for 1-yr event
Inflow = 0.0 cfs @ 16.73 hrs, Volume= 0.009 af
Outflow = 0.0 cfs @ 16.74 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.0 cfs @ 16.74 hrs, Volume= 0.009 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.00' @ 16.74 hrs Surf.Area= 1,555 sf Storage= 0 cf

Plug-Flow detention time= 0.2 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (1,189.4 - 1,189.2)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.6 cfs @ 16.74 hrs HW=277.00' (Free Discharge)
2=Exfiltration (Exfiltration Controls 1.6 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 10P: Forebay

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 0.49" for 1-yr event
Inflow = 0.7 cfs @ 12.18 hrs, Volume= 0.069 af
Outflow = 0.1 cfs @ 12.90 hrs, Volume= 0.044 af, Atten= 81%, Lag= 43.5 min
Primary = 0.1 cfs @ 12.90 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 279.56' @ 12.90 hrs Surf.Area= 829 sf Storage= 1,129 cf

Plug-Flow detention time= 240.2 min calculated for 0.044 af (64% of inflow)
Center-of-Mass det. time= 105.0 min (1,014.7 - 909.7)

Volume	Invert	Avail.Storage	Storage Description
#1	276.00'	2,105 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	12	17.0	0	0	12
277.00	119	54.0	56	56	224
278.00	336	92.0	218	275	672
279.00	596	125.0	460	734	1,252
280.00	1,041	167.0	808	1,543	2,238
280.50	1,212	174.0	563	2,105	2,447

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**4.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.1 cfs @ 12.90 hrs HW=279.56' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.1 cfs @ 0.61 fps)

Summary for Pond CB2:

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 0.27" for 1-yr event
Inflow = 0.2 cfs @ 12.41 hrs, Volume= 0.040 af
Outflow = 0.2 cfs @ 12.41 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min
Primary = 0.2 cfs @ 12.41 hrs, Volume= 0.040 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.63' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	278.25'	**10.0" Round Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.25' / 278.10' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf
#2	Primary	277.38'	**12.0" Round Culvert** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.38' / 277.25' S= 0.0108 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.2 cfs @ 12.41 hrs HW=277.63' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.2 cfs @ 1.35 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.38' (Free Discharge)
└**1=Culvert** (Controls 0.0 cfs)

Summary for Pond CB3:

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 0.57" for 1-yr event
Inflow = 0.7 cfs @ 12.01 hrs, Volume= 0.037 af
Outflow = 0.7 cfs @ 12.01 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
Primary = 0.7 cfs @ 12.01 hrs, Volume= 0.037 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 280.08' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	279.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 279.60' / 279.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	280.21'	**8.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.21' / 280.00' S= 0.0124 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.7 cfs @ 12.01 hrs HW=280.08' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.7 cfs @ 2.61 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=279.60' (Free Discharge)
└**2=Culvert** (Controls 0.0 cfs)

Summary for Pond DP1: DP1

Inflow Area = 2.754 ac, 54.31% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: DP2

Inflow Area = 2.710 ac, 58.88% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 1S:

Runoff = 1.9 cfs @ 12.01 hrs, Volume= 0.102 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 10-yr Rainfall=3.69"

	Area (sf)	CN	Description
*	23,164	98	PAVEMENT
	9,267	30	Woods, Good, HSG A
	1,329	32	Woods/grass comb., Good, HSG A
	33,760	77	Weighted Average
	10,596		31.39% Pervious Area
	23,164		68.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0300	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
0.1	30	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.0	230	Total			

Summary for Subcatchment 2S:

Runoff = 1.3 cfs @ 12.35 hrs, Volume= 0.148 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 10-yr Rainfall=3.69"

	Area (sf)	CN	Description
	27,167	30	Woods, Good, HSG A
	33,313	98	Paved parking, HSG A
	7,145	39	>75% Grass cover, Good, HSG A
*	8,333	98	ROOF
*	357	98	WALL
	76,315	68	Weighted Average
	34,312		44.96% Pervious Area
	42,003		55.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
1.7	47	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	23	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	139	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
25.1	284	Total			

Summary for Subcatchment 3S:

Runoff = 2.5 cfs @ 12.16 hrs, Volume= 0.201 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 10-yr Rainfall=3.69"

Area (sf)	CN	Description
27,687	98	Roofs, HSG A
17,972	98	Paved parking, HSG A
19,500	39	>75% Grass cover, Good, HSG A
7,919	30	Woods, Good, HSG A
73,078	75	Weighted Average
27,419		37.52% Pervious Area
45,659		62.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	23	0.0330	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	7	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	63	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	26	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	30	0.0010	1.55	1.22	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
13.1	314	Total			

Summary for Subcatchment 4S:

Runoff = 1.4 cfs @ 12.02 hrs, Volume= 0.082 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 10-yr Rainfall=3.69"

	Area (sf)	CN	Description
*	11,641	98	ROOF
*	12,206	98	paving
	1,352	30	Woods, Good, HSG A
	19,773	32	Woods/grass comb., Good, HSG A
	44,972	67	Weighted Average
	21,125		46.97% Pervious Area
	23,847		53.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	30	0.0150	6.02	4.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	243	Total			

Summary for Subcatchment 5S:

Runoff = 0.0 cfs @ 12.60 hrs, Volume= 0.015 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 10-yr Rainfall=3.69"

	Area (sf)	CN	Description
*	9,070	98	paving
	26,306	32	Woods/grass comb., Good, HSG A
	35,376	49	Weighted Average
	26,306		74.36% Pervious Area
	9,070		25.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

Summary for Subcatchment 6S:

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 10-yr Rainfall=3.69"

Area (sf)	CN	Description
9,905	30	Woods, Good, HSG A
9,905		100.00% Pervious Area

Summary for Pond 1P: Separator Rows

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 1.55" for 10-yr event
Inflow = 1.8 cfs @ 12.01 hrs, Volume= 0.100 af
Outflow = 1.0 cfs @ 12.12 hrs, Volume= 0.092 af, Atten= 41%, Lag= 6.9 min
Primary = 1.0 cfs @ 12.12 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.97' @ 12.12 hrs Surf.Area= 0.026 ac Storage= 0.025 af

Plug-Flow detention time= 98.4 min calculated for 0.092 af (92% of inflow)
Center-of-Mass det. time= 55.0 min (895.4 - 840.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.026 af	**12.75'W x 88.83'L x 4.00'H Field A** 0.104 af Overall - 0.039 af Embedded = 0.065 af x 40.0% Voids
#2A	278.00'	0.039 af	**Cultec R-360HD** x 46 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 46 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		0.065 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	278.15'	**10.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.15' / 278.15' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=1.0 cfs @ 12.12 hrs HW=278.97' (Free Discharge)
1=Culvert (Barrel Controls 1.0 cfs @ 2.40 fps)

Summary for Pond 2P: Infiltrator Chambers

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 1.44" for 10-yr event
Inflow = 1.0 cfs @ 12.11 hrs, Volume= 0.093 af
Outflow = 1.0 cfs @ 12.12 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.4 min
Discarded = 1.0 cfs @ 12.12 hrs, Volume= 0.093 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.52' @ 12.12 hrs Surf.Area= 0.045 ac Storage= 0.000 af

Plug-Flow detention time= 0.3 min calculated for 0.093 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (893.5 - 893.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.044 af	**24.25'W x 81.50'L x 4.00'H Field A** 0.181 af Overall - 0.072 af Embedded = 0.110 af x 40.0% Voids
#2A	278.00'	0.072 af	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.116 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	280.21'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 12.12 hrs HW=277.52' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 3P: Separator Rows

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 1.01" for 10-yr event
Inflow = 1.3 cfs @ 12.35 hrs, Volume= 0.148 af
Outflow = 1.1 cfs @ 12.47 hrs, Volume= 0.140 af, Atten= 15%, Lag= 7.7 min
Primary = 1.1 cfs @ 12.47 hrs, Volume= 0.140 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.03' @ 12.47 hrs Surf.Area= 1,039 sf Storage= 982 cf

Plug-Flow detention time= 66.6 min calculated for 0.140 af (95% of inflow)
Center-of-Mass det. time= 38.9 min (926.5 - 887.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,037 cf	**12.75'W x 81.50'L x 4.00'H Field A** 4,157 cf Overall - 1,565 cf Embedded = 2,592 cf x 40.0% Voids
#2A	277.10'	1,565 cf	**Cultec R-360HD** x 42 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 42 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		2,602 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	277.25'	**12.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.25' / 277.25' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.1 cfs @ 12.47 hrs HW=278.03' (Free Discharge)
1=Culvert (Barrel Controls 1.1 cfs @ 2.25 fps)

Summary for Pond 4P: Infiltrator Chambers

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 0.96" for 10-yr event
Inflow = 1.1 cfs @ 12.47 hrs, Volume= 0.140 af
Outflow = 1.1 cfs @ 12.48 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.3 min
Discarded = 1.1 cfs @ 12.48 hrs, Volume= 0.140 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 276.62' @ 12.48 hrs Surf.Area= 1,976 sf Storage= 17 cf

Plug-Flow detention time= 0.3 min calculated for 0.140 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (926.7 - 926.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,910 cf	**24.25'W x 81.50'L x 4.00'H Field A** 7,906 cf Overall - 3,130 cf Embedded = 4,776 cf x 40.0% Voids
#2A	277.10'	3,130 cf	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		5,040 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	276.60'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	278.10'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 12.48 hrs HW=276.62' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=276.60' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 1.26" for 10-yr event
Inflow = 2.4 cfs @ 12.20 hrs, Volume= 0.176 af
Outflow = 1.7 cfs @ 12.33 hrs, Volume= 0.176 af, Atten= 29%, Lag= 8.0 min
Discarded = 1.7 cfs @ 12.33 hrs, Volume= 0.176 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.26' @ 12.33 hrs Surf.Area= 1,646 sf Storage= 416 cf

Plug-Flow detention time= 1.2 min calculated for 0.176 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (881.5 - 880.4)

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,655 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,496	192.0	0	0	1,496
279.00	2,101	211.0	1,790	1,790	2,138
280.00	2,764	230.0	2,425	4,215	2,840
280.50	2,998	237.0	1,440	5,655	3,125

Device	Routing	Invert	Outlet Devices
#1	Primary	279.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.7 cfs @ 12.33 hrs HW=278.26' (Free Discharge)
2=Exfiltration (Exfiltration Controls 1.7 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=278.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 6P: Forebay

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 0.96" for 10-yr event
Inflow = 1.4 cfs @ 12.02 hrs, Volume= 0.082 af
Outflow = 0.6 cfs @ 12.15 hrs, Volume= 0.070 af, Atten= 55%, Lag= 8.3 min
Primary = 0.6 cfs @ 12.15 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.00' @ 12.15 hrs Surf.Area= 1,382 sf Storage= 834 cf

Plug-Flow detention time= 109.1 min calculated for 0.070 af (85% of inflow)
Center-of-Mass det. time= 40.9 min (911.1 - 870.2)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	1,620 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	392	246.0	0	0	392
278.00	1,386	358.0	838	838	5,784
278.50	1,747	364.0	782	1,620	6,173

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.6 cfs @ 12.15 hrs HW=278.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.6 cfs @ 1.27 fps)

Summary for Pond 7P: Enhanced Buffer Area

Inflow Area = 0.812 ac, 25.64% Impervious, Inflow Depth = 0.22" for 10-yr event
Inflow = 0.0 cfs @ 12.60 hrs, Volume= 0.015 af
Outflow = 0.0 cfs @ 12.60 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 12.60 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.00' @ 12.60 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (988.1 - 988.1)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	7 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	**45.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.7 cfs @ 12.60 hrs HW=277.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.7 cfs)

Summary for Pond 8P: Infiltration Basin

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 0.82" for 10-yr event
Inflow = 0.6 cfs @ 12.15 hrs, Volume= 0.070 af
Outflow = 0.6 cfs @ 12.16 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.6 cfs @ 12.16 hrs, Volume= 0.070 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.01' @ 12.16 hrs Surf.Area= 1,558 sf Storage= 9 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (911.3 - 911.1)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.6 cfs @ 12.16 hrs HW=277.01' (Free Discharge)
2=Exfiltration (Exfiltration Controls 1.6 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 10P: Forebay

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 1.44" for 10-yr event
Inflow = 2.5 cfs @ 12.16 hrs, Volume= 0.201 af
Outflow = 2.4 cfs @ 12.20 hrs, Volume= 0.176 af, Atten= 3%, Lag= 2.3 min
Primary = 2.4 cfs @ 12.20 hrs, Volume= 0.176 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 279.88' @ 12.20 hrs Surf.Area= 980 sf Storage= 1,420 cf

Plug-Flow detention time= 84.2 min calculated for 0.176 af (88% of inflow)
Center-of-Mass det. time= 25.3 min (880.4 - 855.1)

Volume	Invert	Avail.Storage	Storage Description
#1	276.00'	2,105 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	12	17.0	0	0	12
277.00	119	54.0	56	56	224
278.00	336	92.0	218	275	672
279.00	596	125.0	460	734	1,252
280.00	1,041	167.0	808	1,543	2,238
280.50	1,212	174.0	563	2,105	2,447

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**4.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.4 cfs @ 12.20 hrs HW=279.88' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.4 cfs @ 1.60 fps)

Summary for Pond CB2:

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 1.01" for 10-yr event
Inflow = 1.3 cfs @ 12.35 hrs, Volume= 0.148 af
Outflow = 1.3 cfs @ 12.35 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.0 min
Primary = 1.3 cfs @ 12.35 hrs, Volume= 0.148 af
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.09' @ 12.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	278.25'	**10.0" Round Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.25' / 278.10' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf
#2	Primary	277.38'	**12.0" Round Culvert** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.38' / 277.25' S= 0.0108 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.3 cfs @ 12.35 hrs HW=278.09' (Free Discharge)
└**2=Culvert** (Barrel Controls 1.3 cfs @ 3.00 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.38' (Free Discharge)
└**1=Culvert** (Controls 0.0 cfs)

Summary for Pond CB3:

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 1.57" for 10-yr event
Inflow = 1.9 cfs @ 12.01 hrs, Volume= 0.102 af
Outflow = 1.9 cfs @ 12.01 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.0 min
Primary = 1.8 cfs @ 12.01 hrs, Volume= 0.100 af
Secondary = 0.2 cfs @ 12.01 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 280.48' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	279.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 279.60' / 279.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	280.21'	**8.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.21' / 280.00' S= 0.0124 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=1.7 cfs @ 12.01 hrs HW=280.47' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.7 cfs @ 3.19 fps)

Secondary OutFlow Max=0.2 cfs @ 12.01 hrs HW=280.47' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.2 cfs @ 1.38 fps)

Summary for Pond DP1: DP1

Inflow Area = 2.754 ac, 54.31% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: DP2

Inflow Area = 2.710 ac, 58.88% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 1S:

Runoff = 2.7 cfs @ 12.01 hrs, Volume= 0.145 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 25-yr Rainfall=4.54"

	Area (sf)	CN	Description
*	23,164	98	PAVEMENT
	9,267	30	Woods, Good, HSG A
	1,329	32	Woods/grass comb., Good, HSG A
	33,760	77	Weighted Average
	10,596		31.39% Pervious Area
	23,164		68.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0300	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
0.1	30	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.0	230	Total			

Summary for Subcatchment 2S:

Runoff = 2.1 cfs @ 12.33 hrs, Volume= 0.228 af, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 25-yr Rainfall=4.54"

	Area (sf)	CN	Description
	27,167	30	Woods, Good, HSG A
	33,313	98	Paved parking, HSG A
	7,145	39	>75% Grass cover, Good, HSG A
*	8,333	98	ROOF
*	357	98	WALL
	76,315	68	Weighted Average
	34,312		44.96% Pervious Area
	42,003		55.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
1.7	47	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	23	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	139	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
25.1	284	Total			

Summary for Subcatchment 3S:

Runoff = 3.6 cfs @ 12.15 hrs, Volume= 0.291 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 25-yr Rainfall=4.54"

Area (sf)	CN	Description
27,687	98	Roofs, HSG A
17,972	98	Paved parking, HSG A
19,500	39	>75% Grass cover, Good, HSG A
7,919	30	Woods, Good, HSG A
73,078	75	Weighted Average
27,419		37.52% Pervious Area
45,659		62.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	23	0.0330	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	7	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	63	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	26	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	30	0.0010	1.55	1.22	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
13.1	314	Total			

Summary for Subcatchment 4S:

Runoff = 2.2 cfs @ 12.01 hrs, Volume= 0.128 af, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 25-yr Rainfall=4.54"

	Area (sf)	CN	Description
*	11,641	98	ROOF
*	12,206	98	paving
	1,352	30	Woods, Good, HSG A
	19,773	32	Woods/grass comb., Good, HSG A
	44,972	67	Weighted Average
	21,125		46.97% Pervious Area
	23,847		53.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	30	0.0150	6.02	4.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	243	Total			

Summary for Subcatchment 5S:

Runoff = 0.2 cfs @ 12.34 hrs, Volume= 0.032 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 25-yr Rainfall=4.54"

	Area (sf)	CN	Description
*	9,070	98	paving
	26,306	32	Woods/grass comb., Good, HSG A
	35,376	49	Weighted Average
	26,306		74.36% Pervious Area
	9,070		25.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

Summary for Subcatchment 6S:

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 25-yr Rainfall=4.54"

Area (sf)	CN	Description
9,905	30	Woods, Good, HSG A
9,905		100.00% Pervious Area

Summary for Pond 1P: Separator Rows

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 2.18" for 25-yr event
Inflow = 2.2 cfs @ 12.01 hrs, Volume= 0.141 af
Outflow = 1.5 cfs @ 12.12 hrs, Volume= 0.132 af, Atten= 34%, Lag= 6.7 min
Primary = 1.5 cfs @ 12.12 hrs, Volume= 0.132 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 279.22' @ 12.12 hrs Surf.Area= 0.026 ac Storage= 0.030 af

Plug-Flow detention time= 75.8 min calculated for 0.132 af (94% of inflow)
Center-of-Mass det. time= 43.8 min (872.5 - 828.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.026 af	**12.75'W x 88.83'L x 4.00'H Field A** 0.104 af Overall - 0.039 af Embedded = 0.065 af x 40.0% Voids
#2A	278.00'	0.039 af	**Cultec R-360HD** x 46 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 46 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		0.065 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	278.15'	**10.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.15' / 278.15' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=1.5 cfs @ 12.12 hrs HW=279.22' (Free Discharge)
1=Culvert (Barrel Controls 1.5 cfs @ 2.73 fps)

Summary for Pond 2P: Infiltrator Chambers

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 2.11" for 25-yr event
Inflow = 1.7 cfs @ 12.01 hrs, Volume= 0.136 af
Outflow = 1.7 cfs @ 12.02 hrs, Volume= 0.136 af, Atten= 1%, Lag= 0.3 min
Discarded = 1.7 cfs @ 12.02 hrs, Volume= 0.136 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.53' @ 12.02 hrs Surf.Area= 0.045 ac Storage= 0.001 af

Plug-Flow detention time= 0.3 min calculated for 0.136 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (868.4 - 868.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.044 af	**24.25'W x 81.50'L x 4.00'H Field A** 0.181 af Overall - 0.072 af Embedded = 0.110 af x 40.0% Voids
#2A	278.00'	0.072 af	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.116 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	280.21'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 12.02 hrs HW=277.53' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.50' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 3P: Separator Rows

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 1.56" for 25-yr event
Inflow = 2.0 cfs @ 12.33 hrs, Volume= 0.227 af
Outflow = 1.9 cfs @ 12.43 hrs, Volume= 0.220 af, Atten= 8%, Lag= 5.9 min
Primary = 1.9 cfs @ 12.43 hrs, Volume= 0.220 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.34' @ 12.43 hrs Surf.Area= 1,039 sf Storage= 1,229 cf

Plug-Flow detention time= 47.5 min calculated for 0.220 af (97% of inflow)
Center-of-Mass det. time= 28.4 min (898.7 - 870.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,037 cf	**12.75'W x 81.50'L x 4.00'H Field A** 4,157 cf Overall - 1,565 cf Embedded = 2,592 cf x 40.0% Voids
#2A	277.10'	1,565 cf	**Cultec R-360HD** x 42 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 42 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		2,602 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	277.25'	**12.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.25' / 277.25' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.9 cfs @ 12.43 hrs HW=278.34' (Free Discharge)
1=Culvert (Barrel Controls 1.9 cfs @ 2.70 fps)

Summary for Pond 4P: Infiltrator Chambers

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 1.51" for 25-yr event
Inflow = 1.9 cfs @ 12.42 hrs, Volume= 0.220 af
Outflow = 1.9 cfs @ 12.42 hrs, Volume= 0.220 af, Atten= 0%, Lag= 0.3 min
Discarded = 1.9 cfs @ 12.42 hrs, Volume= 0.220 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 276.64' @ 12.42 hrs Surf.Area= 1,976 sf Storage= 29 cf

Plug-Flow detention time= 0.3 min calculated for 0.220 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (898.7 - 898.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,910 cf	**24.25'W x 81.50'L x 4.00'H Field A** 7,906 cf Overall - 3,130 cf Embedded = 4,776 cf x 40.0% Voids
#2A	277.10'	3,130 cf	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		5,040 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	276.60'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	278.10'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 12.42 hrs HW=276.64' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=276.60' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 1.90" for 25-yr event
Inflow = 3.6 cfs @ 12.18 hrs, Volume= 0.266 af
Outflow = 2.1 cfs @ 12.38 hrs, Volume= 0.266 af, Atten= 42%, Lag= 11.5 min
Discarded = 2.1 cfs @ 12.38 hrs, Volume= 0.266 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.77' @ 12.38 hrs Surf.Area= 1,951 sf Storage= 1,317 cf

Plug-Flow detention time= 3.5 min calculated for 0.266 af (100% of inflow)
Center-of-Mass det. time= 3.5 min (862.9 - 859.4)

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,655 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,496	192.0	0	0	1,496
279.00	2,101	211.0	1,790	1,790	2,138
280.00	2,764	230.0	2,425	4,215	2,840
280.50	2,998	237.0	1,440	5,655	3,125

Device	Routing	Invert	Outlet Devices
#1	Primary	279.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=2.1 cfs @ 12.38 hrs HW=278.77' (Free Discharge)
2=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=278.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 6P: Forebay

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 1.49" for 25-yr event
Inflow = 2.2 cfs @ 12.01 hrs, Volume= 0.128 af
Outflow = 1.4 cfs @ 12.12 hrs, Volume= 0.116 af, Atten= 35%, Lag= 6.6 min
Primary = 1.4 cfs @ 12.12 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.17' @ 12.12 hrs Surf.Area= 1,506 sf Storage= 1,089 cf

Plug-Flow detention time= 74.4 min calculated for 0.116 af (90% of inflow)
Center-of-Mass det. time= 27.2 min (879.3 - 852.2)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	1,620 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	392	246.0	0	0	392
278.00	1,386	358.0	838	838	5,784
278.50	1,747	364.0	782	1,620	6,173

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.4 cfs @ 12.12 hrs HW=278.17' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.4 cfs @ 1.70 fps)

Summary for Pond 7P: Enhanced Buffer Area

Inflow Area = 0.812 ac, 25.64% Impervious, Inflow Depth = 0.47" for 25-yr event
Inflow = 0.2 cfs @ 12.34 hrs, Volume= 0.032 af
Outflow = 0.2 cfs @ 12.34 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.2 cfs @ 12.34 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.00' @ 12.34 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (937.8 - 937.8)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	7 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	**45.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.7 cfs @ 12.34 hrs HW=277.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.7 cfs)

Summary for Pond 8P: Infiltration Basin

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 1.35" for 25-yr event
Inflow = 1.4 cfs @ 12.12 hrs, Volume= 0.116 af
Outflow = 1.4 cfs @ 12.13 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.2 min
Discarded = 1.4 cfs @ 12.13 hrs, Volume= 0.116 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.01' @ 12.13 hrs Surf.Area= 1,562 sf Storage= 21 cf

Plug-Flow detention time= 0.2 min calculated for 0.116 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (879.6 - 879.3)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.6 cfs @ 12.13 hrs HW=277.01' (Free Discharge)
2=Exfiltration (Exfiltration Controls 1.6 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 10P: Forebay

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 2.08" for 25-yr event
Inflow = 3.6 cfs @ 12.15 hrs, Volume= 0.291 af
Outflow = 3.6 cfs @ 12.18 hrs, Volume= 0.266 af, Atten= 2%, Lag= 1.7 min
Primary = 3.6 cfs @ 12.18 hrs, Volume= 0.266 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 279.99' @ 12.18 hrs Surf.Area= 1,035 sf Storage= 1,531 cf

Plug-Flow detention time= 61.7 min calculated for 0.266 af (91% of inflow)
Center-of-Mass det. time= 18.3 min (859.4 - 841.1)

Volume	Invert	Avail.Storage	Storage Description
#1	276.00'	2,105 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	12	17.0	0	0	12
277.00	119	54.0	56	56	224
278.00	336	92.0	218	275	672
279.00	596	125.0	460	734	1,252
280.00	1,041	167.0	808	1,543	2,238
280.50	1,212	174.0	563	2,105	2,447

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**4.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=3.6 cfs @ 12.18 hrs HW=279.99' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 3.6 cfs @ 1.82 fps)

Summary for Pond CB2:

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 1.56" for 25-yr event
Inflow = 2.1 cfs @ 12.33 hrs, Volume= 0.228 af
Outflow = 2.1 cfs @ 12.33 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min
Primary = 2.0 cfs @ 12.33 hrs, Volume= 0.227 af
Secondary = 0.0 cfs @ 12.33 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.34' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	278.25'	**10.0" Round Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.25' / 278.10' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf
#2	Primary	277.38'	**12.0" Round Culvert** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.38' / 277.25' S= 0.0108 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.0 cfs @ 12.33 hrs HW=278.34' (Free Discharge)
└**2=Culvert** (Barrel Controls 2.0 cfs @ 3.33 fps)

Secondary OutFlow Max=0.0 cfs @ 12.33 hrs HW=278.34' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.0 cfs @ 0.82 fps)

Summary for Pond CB3:

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 2.24" for 25-yr event
Inflow = 2.7 cfs @ 12.01 hrs, Volume= 0.145 af
Outflow = 2.7 cfs @ 12.01 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.0 min
Primary = 2.2 cfs @ 12.01 hrs, Volume= 0.141 af
Secondary = 0.5 cfs @ 12.01 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 280.66' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	279.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 279.60' / 279.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	280.21'	**8.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.21' / 280.00' S= 0.0124 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=2.2 cfs @ 12.01 hrs HW=280.65' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.2 cfs @ 2.83 fps)

Secondary OutFlow Max=0.4 cfs @ 12.01 hrs HW=280.65' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.4 cfs @ 1.79 fps)

Summary for Pond DP1: DP1

Inflow Area = 2.754 ac, 54.31% Impervious, Inflow Depth = 0.00" for 25-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: DP2

Inflow Area = 2.710 ac, 58.88% Impervious, Inflow Depth = 0.00" for 25-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 1S:

Runoff = 3.4 cfs @ 12.01 hrs, Volume= 0.186 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 50-yr Rainfall=5.30"

	Area (sf)	CN	Description
*	23,164	98	PAVEMENT
	9,267	30	Woods, Good, HSG A
	1,329	32	Woods/grass comb., Good, HSG A
	33,760	77	Weighted Average
	10,596		31.39% Pervious Area
	23,164		68.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0300	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
0.1	30	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.0	230	Total			

Summary for Subcatchment 2S:

Runoff = 2.8 cfs @ 12.33 hrs, Volume= 0.306 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 50-yr Rainfall=5.30"

	Area (sf)	CN	Description
	27,167	30	Woods, Good, HSG A
	33,313	98	Paved parking, HSG A
	7,145	39	>75% Grass cover, Good, HSG A
*	8,333	98	ROOF
*	357	98	WALL
	76,315	68	Weighted Average
	34,312		44.96% Pervious Area
	42,003		55.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
1.7	47	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	23	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	139	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
25.1	284	Total			

Summary for Subcatchment 3S:

Runoff = 4.7 cfs @ 12.15 hrs, Volume= 0.377 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 50-yr Rainfall=5.30"

Area (sf)	CN	Description
27,687	98	Roofs, HSG A
17,972	98	Paved parking, HSG A
19,500	39	>75% Grass cover, Good, HSG A
7,919	30	Woods, Good, HSG A
73,078	75	Weighted Average
27,419		37.52% Pervious Area
45,659		62.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	23	0.0330	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	7	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	63	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	26	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	30	0.0010	1.55	1.22	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
13.1	314	Total			

Summary for Subcatchment 4S:

Runoff = 3.0 cfs @ 12.01 hrs, Volume= 0.173 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 50-yr Rainfall=5.30"

	Area (sf)	CN	Description
*	11,641	98	ROOF
*	12,206	98	paving
	1,352	30	Woods, Good, HSG A
	19,773	32	Woods/grass comb., Good, HSG A
	44,972	67	Weighted Average
	21,125		46.97% Pervious Area
	23,847		53.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	30	0.0150	6.02	4.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	243	Total			

Summary for Subcatchment 5S:

Runoff = 0.4 cfs @ 12.29 hrs, Volume= 0.051 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 50-yr Rainfall=5.30"

	Area (sf)	CN	Description
*	9,070	98	paving
	26,306	32	Woods/grass comb., Good, HSG A
	35,376	49	Weighted Average
	26,306		74.36% Pervious Area
	9,070		25.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

Summary for Subcatchment 6S:

Runoff = 0.0 cfs @ 23.99 hrs, Volume= 0.000 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 50-yr Rainfall=5.30"

Area (sf)	CN	Description
9,905	30	Woods, Good, HSG A
9,905		100.00% Pervious Area

Summary for Pond 1P: Separator Rows

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 2.76" for 50-yr event
Inflow = 2.6 cfs @ 12.01 hrs, Volume= 0.178 af
Outflow = 1.8 cfs @ 12.11 hrs, Volume= 0.170 af, Atten= 30%, Lag= 6.4 min
Primary = 1.8 cfs @ 12.11 hrs, Volume= 0.170 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 279.39' @ 12.11 hrs Surf.Area= 0.026 ac Storage= 0.034 af

Plug-Flow detention time= 64.2 min calculated for 0.170 af (95% of inflow)
Center-of-Mass det. time= 37.8 min (857.2 - 819.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.026 af	**12.75'W x 88.83'L x 4.00'H Field A** 0.104 af Overall - 0.039 af Embedded = 0.065 af x 40.0% Voids
#2A	278.00'	0.039 af	**Cultec R-360HD** x 46 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 46 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		0.065 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	278.15'	**10.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.15' / 278.15' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=1.8 cfs @ 12.11 hrs HW=279.39' (Free Discharge)
1=Culvert (Barrel Controls 1.8 cfs @ 3.33 fps)

Summary for Pond 2P: Infiltrator Chambers

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 2.74" for 50-yr event
Inflow = 2.3 cfs @ 12.01 hrs, Volume= 0.177 af
Outflow = 2.1 cfs @ 11.99 hrs, Volume= 0.177 af, Atten= 10%, Lag= 0.0 min
Discarded = 2.1 cfs @ 11.99 hrs, Volume= 0.177 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.58' @ 12.04 hrs Surf.Area= 0.045 ac Storage= 0.001 af

Plug-Flow detention time= 0.3 min calculated for 0.177 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (851.7 - 851.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.044 af	**24.25'W x 81.50'L x 4.00'H Field A** 0.181 af Overall - 0.072 af Embedded = 0.110 af x 40.0% Voids
#2A	278.00'	0.072 af	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.116 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	280.21'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 11.99 hrs HW=277.54' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.50' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 3P: Separator Rows

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 2.06" for 50-yr event
Inflow = 2.5 cfs @ 12.33 hrs, Volume= 0.300 af
Outflow = 2.3 cfs @ 12.45 hrs, Volume= 0.293 af, Atten= 8%, Lag= 7.2 min
Primary = 2.3 cfs @ 12.45 hrs, Volume= 0.293 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.58' @ 12.45 hrs Surf.Area= 1,039 sf Storage= 1,415 cf

Plug-Flow detention time= 38.2 min calculated for 0.292 af (97% of inflow)
Center-of-Mass det. time= 23.7 min (883.1 - 859.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,037 cf	**12.75'W x 81.50'L x 4.00'H Field A** 4,157 cf Overall - 1,565 cf Embedded = 2,592 cf x 40.0% Voids
#2A	277.10'	1,565 cf	**Cultec R-360HD** x 42 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 42 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		2,602 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	277.25'	**12.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.25' / 277.25' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.3 cfs @ 12.45 hrs HW=278.58' (Free Discharge)
1=Culvert (Barrel Controls 2.3 cfs @ 2.90 fps)

Summary for Pond 4P: Infiltrator Chambers

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 2.04" for 50-yr event
Inflow = 2.5 cfs @ 12.37 hrs, Volume= 0.298 af
Outflow = 2.1 cfs @ 12.26 hrs, Volume= 0.298 af, Atten= 19%, Lag= 0.0 min
Discarded = 2.1 cfs @ 12.26 hrs, Volume= 0.298 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.12' @ 12.61 hrs Surf.Area= 1,976 sf Storage= 427 cf

Plug-Flow detention time= 1.3 min calculated for 0.298 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (881.3 - 880.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,910 cf	**24.25'W x 81.50'L x 4.00'H Field A** 7,906 cf Overall - 3,130 cf Embedded = 4,776 cf x 40.0% Voids
#2A	277.10'	3,130 cf	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		5,040 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	276.60'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	278.10'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 12.26 hrs HW=276.64' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=276.60' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 2.52" for 50-yr event
Inflow = 4.6 cfs @ 12.18 hrs, Volume= 0.352 af
Outflow = 2.4 cfs @ 12.41 hrs, Volume= 0.352 af, Atten= 48%, Lag= 13.8 min
Discarded = 2.4 cfs @ 12.41 hrs, Volume= 0.352 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 279.20' @ 12.41 hrs Surf.Area= 2,227 sf Storage= 2,225 cf

Plug-Flow detention time= 5.7 min calculated for 0.352 af (100% of inflow)
Center-of-Mass det. time= 5.7 min (851.0 - 845.3)

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,655 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,496	192.0	0	0	1,496
279.00	2,101	211.0	1,790	1,790	2,138
280.00	2,764	230.0	2,425	4,215	2,840
280.50	2,998	237.0	1,440	5,655	3,125

Device	Routing	Invert	Outlet Devices
#1	Primary	279.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=2.4 cfs @ 12.41 hrs HW=279.20' (Free Discharge)
2=Exfiltration (Exfiltration Controls 2.4 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=278.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 6P: Forebay

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 2.01" for 50-yr event
Inflow = 3.0 cfs @ 12.01 hrs, Volume= 0.173 af
Outflow = 2.1 cfs @ 12.06 hrs, Volume= 0.161 af, Atten= 28%, Lag= 3.1 min
Primary = 2.1 cfs @ 12.06 hrs, Volume= 0.161 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.30' @ 12.06 hrs Surf.Area= 1,598 sf Storage= 1,285 cf

Plug-Flow detention time= 58.2 min calculated for 0.161 af (93% of inflow)
Center-of-Mass det. time= 21.5 min (860.3 - 838.8)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	1,620 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	392	246.0	0	0	392
278.00	1,386	358.0	838	838	5,784
278.50	1,747	364.0	782	1,620	6,173

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.1 cfs @ 12.06 hrs HW=278.30' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 2.1 cfs @ 1.94 fps)

Summary for Pond 7P: Enhanced Buffer Area

Inflow Area = 0.812 ac, 25.64% Impervious, Inflow Depth = 0.76" for 50-yr event
Inflow = 0.4 cfs @ 12.29 hrs, Volume= 0.051 af
Outflow = 0.4 cfs @ 12.29 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.4 cfs @ 12.29 hrs, Volume= 0.051 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.00' @ 12.29 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (909.3 - 909.3)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	7 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	**45.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.7 cfs @ 12.29 hrs HW=277.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.7 cfs)

Summary for Pond 8P: Infiltration Basin

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 1.87" for 50-yr event
Inflow = 2.1 cfs @ 12.06 hrs, Volume= 0.161 af
Outflow = 1.7 cfs @ 12.18 hrs, Volume= 0.161 af, Atten= 20%, Lag= 7.1 min
Discarded = 1.7 cfs @ 12.18 hrs, Volume= 0.161 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.15' @ 12.18 hrs Surf.Area= 1,630 sf Storage= 236 cf

Plug-Flow detention time= 0.6 min calculated for 0.161 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (860.9 - 860.3)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.7 cfs @ 12.18 hrs HW=277.15' (Free Discharge)
2=Exfiltration (Exfiltration Controls 1.7 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 10P: Forebay

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 2.69" for 50-yr event
Inflow = 4.7 cfs @ 12.15 hrs, Volume= 0.377 af
Outflow = 4.6 cfs @ 12.18 hrs, Volume= 0.352 af, Atten= 2%, Lag= 1.6 min
Primary = 4.6 cfs @ 12.18 hrs, Volume= 0.352 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 280.08' @ 12.18 hrs Surf.Area= 1,066 sf Storage= 1,624 cf

Plug-Flow detention time= 49.8 min calculated for 0.352 af (93% of inflow)
Center-of-Mass det. time= 15.1 min (845.3 - 830.2)

Volume	Invert	Avail.Storage	Storage Description
#1	276.00'	2,105 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	12	17.0	0	0	12
277.00	119	54.0	56	56	224
278.00	336	92.0	218	275	672
279.00	596	125.0	460	734	1,252
280.00	1,041	167.0	808	1,543	2,238
280.50	1,212	174.0	563	2,105	2,447

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**4.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=4.6 cfs @ 12.18 hrs HW=280.08' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 4.6 cfs @ 1.98 fps)

Summary for Pond CB2:

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 2.10" for 50-yr event
Inflow = 2.8 cfs @ 12.33 hrs, Volume= 0.306 af
Outflow = 2.8 cfs @ 12.33 hrs, Volume= 0.306 af, Atten= 0%, Lag= 0.0 min
Primary = 2.5 cfs @ 12.33 hrs, Volume= 0.300 af
Secondary = 0.3 cfs @ 12.33 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.58' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	278.25'	**10.0" Round Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.25' / 278.10' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf
#2	Primary	277.38'	**12.0" Round Culvert** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.38' / 277.25' S= 0.0108 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.5 cfs @ 12.33 hrs HW=278.58' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.5 cfs @ 3.18 fps)

Secondary OutFlow Max=0.3 cfs @ 12.33 hrs HW=278.58' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.3 cfs @ 1.54 fps)

Summary for Pond CB3:

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 2.88" for 50-yr event
Inflow = 3.4 cfs @ 12.01 hrs, Volume= 0.186 af
Outflow = 3.4 cfs @ 12.01 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min
Primary = 2.6 cfs @ 12.01 hrs, Volume= 0.178 af
Secondary = 0.8 cfs @ 12.01 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 280.86' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	279.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 279.60' / 279.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	280.21'	**8.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.21' / 280.00' S= 0.0124 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=2.6 cfs @ 12.01 hrs HW=280.85' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.6 cfs @ 3.30 fps)

Secondary OutFlow Max=0.7 cfs @ 12.01 hrs HW=280.85' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.7 cfs @ 2.15 fps)

Summary for Pond DP1: DP1

Inflow Area = 2.754 ac, 54.31% Impervious, Inflow Depth = 0.00" for 50-yr event
Inflow = 0.0 cfs @ 23.99 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 23.99 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: DP2

Inflow Area = 2.710 ac, 58.88% Impervious, Inflow Depth = 0.00" for 50-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 1S:

Runoff = 4.1 cfs @ 12.00 hrs, Volume= 0.236 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 100-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	23,164	98	PAVEMENT
	9,267	30	Woods, Good, HSG A
	1,329	32	Woods/grass comb., Good, HSG A
	33,760	77	Weighted Average
	10,596		31.39% Pervious Area
	23,164		68.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0300	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
0.1	30	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.0	230	Total			

Summary for Subcatchment 2S:

Runoff = 3.8 cfs @ 12.32 hrs, Volume= 0.405 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 100-yr Rainfall=6.20"

	Area (sf)	CN	Description
	27,167	30	Woods, Good, HSG A
	33,313	98	Paved parking, HSG A
	7,145	39	>75% Grass cover, Good, HSG A
*	8,333	98	ROOF
*	357	98	WALL
	76,315	68	Weighted Average
	34,312		44.96% Pervious Area
	42,003		55.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
1.7	47	0.0086	0.46		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	23	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	139	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
25.1	284	Total			

Summary for Subcatchment 3S:

Runoff = 5.9 cfs @ 12.15 hrs, Volume= 0.483 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 100-yr Rainfall=6.20"

Area (sf)	CN	Description
27,687	98	Roofs, HSG A
17,972	98	Paved parking, HSG A
19,500	39	>75% Grass cover, Good, HSG A
7,919	30	Woods, Good, HSG A
73,078	75	Weighted Average
27,419		37.52% Pervious Area
45,659		62.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	23	0.0330	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	7	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	63	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	26	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	30	0.0010	1.55	1.22	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
13.1	314	Total			

Summary for Subcatchment 4S:

Runoff = 3.9 cfs @ 12.01 hrs, Volume= 0.231 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 100-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	11,641	98	ROOF
*	12,206	98	paving
	1,352	30	Woods, Good, HSG A
	19,773	32	Woods/grass comb., Good, HSG A
	44,972	67	Weighted Average
	21,125		46.97% Pervious Area
	23,847		53.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	30	0.0150	6.02	4.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	243	Total			

Summary for Subcatchment 5S:

Runoff = 0.7 cfs @ 12.27 hrs, Volume= 0.079 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 100-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	9,070	98	paving
	26,306	32	Woods/grass comb., Good, HSG A
	35,376	49	Weighted Average
	26,306		74.36% Pervious Area
	9,070		25.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

Summary for Subcatchment 6S:

Runoff = 0.0 cfs @ 13.49 hrs, Volume= 0.002 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
RAIN DATA 24-hr S0P 100-yr Rainfall=6.20"

Area (sf)	CN	Description
9,905	30	Woods, Good, HSG A
9,905		100.00% Pervious Area

Summary for Pond 1P: Separator Rows

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 3.46" for 100-yr event
Inflow = 3.1 cfs @ 12.00 hrs, Volume= 0.223 af
Outflow = 2.1 cfs @ 12.12 hrs, Volume= 0.215 af, Atten= 31%, Lag= 6.7 min
Primary = 2.1 cfs @ 12.12 hrs, Volume= 0.215 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 279.61' @ 12.12 hrs Surf.Area= 0.026 ac Storage= 0.038 af

Plug-Flow detention time= 54.6 min calculated for 0.215 af (96% of inflow)
Center-of-Mass det. time= 33.4 min (845.6 - 812.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.026 af	**12.75'W x 88.83'L x 4.00'H Field A** 0.104 af Overall - 0.039 af Embedded = 0.065 af x 40.0% Voids
#2A	278.00'	0.039 af	**Cultec R-360HD** x 46 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 46 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		0.065 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	278.15'	**10.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.15' / 278.15' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=2.1 cfs @ 12.12 hrs HW=279.61' (Free Discharge)
1=Culvert (Inlet Controls 2.1 cfs @ 3.89 fps)

Summary for Pond 2P: Infiltrator Chambers

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 3.52" for 100-yr event
Inflow = 3.0 cfs @ 12.01 hrs, Volume= 0.228 af
Outflow = 2.1 cfs @ 11.95 hrs, Volume= 0.228 af, Atten= 32%, Lag= 0.0 min
Discarded = 2.1 cfs @ 11.95 hrs, Volume= 0.228 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.01' @ 12.17 hrs Surf.Area= 0.045 ac Storage= 0.010 af

Plug-Flow detention time= 0.9 min calculated for 0.227 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (839.6 - 838.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	277.50'	0.044 af	**24.25'W x 81.50'L x 4.00'H Field A** 0.181 af Overall - 0.072 af Embedded = 0.110 af x 40.0% Voids
#2A	278.00'	0.072 af	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.116 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.50'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	280.21'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 11.95 hrs HW=277.54' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.50' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 3P: Separator Rows

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 2.63" for 100-yr event
Inflow = 2.9 cfs @ 12.32 hrs, Volume= 0.384 af
Outflow = 2.8 cfs @ 12.42 hrs, Volume= 0.377 af, Atten= 4%, Lag= 5.5 min
Primary = 2.8 cfs @ 12.42 hrs, Volume= 0.377 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.76' @ 12.42 hrs Surf.Area= 1,039 sf Storage= 1,547 cf

Plug-Flow detention time= 32.2 min calculated for 0.377 af (98% of inflow)
Center-of-Mass det. time= 20.7 min (873.6 - 852.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,037 cf	**12.75'W x 81.50'L x 4.00'H Field A** 4,157 cf Overall - 1,565 cf Embedded = 2,592 cf x 40.0% Voids
#2A	277.10'	1,565 cf	**Cultec R-360HD** x 42 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 42 Chambers in 2 Rows Cap Storage= +6.5 cf x 2 x 2 rows = 25.8 cf
		2,602 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	277.25'	**12.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.25' / 277.25' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.8 cfs @ 12.42 hrs HW=278.76' (Free Discharge)
1=Culvert (Barrel Controls 2.8 cfs @ 3.57 fps)

Summary for Pond 4P: Infiltrator Chambers

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 2.72" for 100-yr event
Inflow = 3.6 cfs @ 12.36 hrs, Volume= 0.397 af
Outflow = 2.1 cfs @ 12.18 hrs, Volume= 0.397 af, Atten= 42%, Lag= 0.0 min
Discarded = 2.1 cfs @ 12.18 hrs, Volume= 0.397 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.95' @ 12.77 hrs Surf.Area= 1,976 sf Storage= 1,770 cf

Plug-Flow detention time= 5.0 min calculated for 0.397 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (871.4 - 866.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	276.60'	1,910 cf	**24.25'W x 81.50'L x 4.00'H Field A** 7,906 cf Overall - 3,130 cf Embedded = 4,776 cf x 40.0% Voids
#2A	277.10'	3,130 cf	**Cultec R-360HD** x 84 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 84 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		5,040 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	276.60'	**45.000 in/hr Exfiltration over Surface area**
#2	Primary	278.10'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.1 cfs @ 12.18 hrs HW=276.64' (Free Discharge)
1=Exfiltration (Exfiltration Controls 2.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=276.60' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 3.28" for 100-yr event
Inflow = 5.8 cfs @ 12.18 hrs, Volume= 0.458 af
Outflow = 2.7 cfs @ 12.44 hrs, Volume= 0.458 af, Atten= 53%, Lag= 15.8 min
Discarded = 2.7 cfs @ 12.44 hrs, Volume= 0.458 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 279.71' @ 12.44 hrs Surf.Area= 2,565 sf Storage= 3,451 cf

Plug-Flow detention time= 8.3 min calculated for 0.458 af (100% of inflow)
Center-of-Mass det. time= 8.3 min (843.0 - 834.7)

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,655 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,496	192.0	0	0	1,496
279.00	2,101	211.0	1,790	1,790	2,138
280.00	2,764	230.0	2,425	4,215	2,840
280.50	2,998	237.0	1,440	5,655	3,125

Device	Routing	Invert	Outlet Devices
#1	Primary	279.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=2.7 cfs @ 12.44 hrs HW=279.71' (Free Discharge)
2=Exfiltration (Exfiltration Controls 2.7 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=278.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 6P: Forebay

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 2.68" for 100-yr event
Inflow = 3.9 cfs @ 12.01 hrs, Volume= 0.231 af
Outflow = 3.0 cfs @ 12.05 hrs, Volume= 0.219 af, Atten= 24%, Lag= 2.6 min
Primary = 3.0 cfs @ 12.05 hrs, Volume= 0.219 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 278.44' @ 12.05 hrs Surf.Area= 1,700 sf Storage= 1,512 cf

Plug-Flow detention time= 46.5 min calculated for 0.219 af (95% of inflow)
Center-of-Mass det. time= 18.0 min (846.6 - 828.6)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	1,620 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	392	246.0	0	0	392
278.00	1,386	358.0	838	838	5,784
278.50	1,747	364.0	782	1,620	6,173

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**2.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=3.0 cfs @ 12.05 hrs HW=278.44' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.0 cfs @ 2.16 fps)

Summary for Pond 7P: Enhanced Buffer Area

Inflow Area = 0.812 ac, 25.64% Impervious, Inflow Depth = 1.17" for 100-yr event
Inflow = 0.7 cfs @ 12.27 hrs, Volume= 0.079 af
Outflow = 0.7 cfs @ 12.27 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.7 cfs @ 12.27 hrs, Volume= 0.079 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 277.00' @ 12.27 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.079 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (889.3 - 889.3)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	7 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	**45.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.7 cfs @ 12.27 hrs HW=277.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.7 cfs)

Summary for Pond 8P: Infiltration Basin

Inflow Area = 1.032 ac, 53.03% Impervious, Inflow Depth = 2.54" for 100-yr event
Inflow = 3.0 cfs @ 12.05 hrs, Volume= 0.219 af
Outflow = 1.9 cfs @ 12.23 hrs, Volume= 0.219 af, Atten= 37%, Lag= 10.8 min
Discarded = 1.9 cfs @ 12.23 hrs, Volume= 0.219 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 277.45' @ 12.23 hrs Surf.Area= 1,790 sf Storage= 754 cf

Plug-Flow detention time= 1.9 min calculated for 0.219 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (848.5 - 846.6)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	**45.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.9 cfs @ 12.23 hrs HW=277.45' (Free Discharge)
2=Exfiltration (Exfiltration Controls 1.9 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=277.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 10P: Forebay

Inflow Area = 1.678 ac, 62.48% Impervious, Inflow Depth = 3.45" for 100-yr event
Inflow = 5.9 cfs @ 12.15 hrs, Volume= 0.483 af
Outflow = 5.8 cfs @ 12.18 hrs, Volume= 0.458 af, Atten= 2%, Lag= 1.5 min
Primary = 5.8 cfs @ 12.18 hrs, Volume= 0.458 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 280.18' @ 12.18 hrs Surf.Area= 1,101 sf Storage= 1,734 cf

Plug-Flow detention time= 41.1 min calculated for 0.458 af (95% of inflow)
Center-of-Mass det. time= 12.9 min (834.7 - 821.7)

Volume	Invert	Avail.Storage	Storage Description
#1	276.00'	2,105 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	12	17.0	0	0	12
277.00	119	54.0	56	56	224
278.00	336	92.0	218	275	672
279.00	596	125.0	460	734	1,252
280.00	1,041	167.0	808	1,543	2,238
280.50	1,212	174.0	563	2,105	2,447

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**4.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=5.8 cfs @ 12.18 hrs HW=280.18' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 5.8 cfs @ 2.15 fps)

Summary for Pond CB2:

Inflow Area = 1.752 ac, 55.04% Impervious, Inflow Depth = 2.78" for 100-yr event
Inflow = 3.8 cfs @ 12.32 hrs, Volume= 0.405 af
Outflow = 3.8 cfs @ 12.32 hrs, Volume= 0.405 af, Atten= 0%, Lag= 0.0 min
Primary = 2.9 cfs @ 12.32 hrs, Volume= 0.384 af
Secondary = 0.8 cfs @ 12.32 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 278.84' @ 12.32 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	278.25'	**10.0" Round Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 278.25' / 278.10' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf
#2	Primary	277.38'	**12.0" Round Culvert** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.38' / 277.25' S= 0.0108 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.9 cfs @ 12.32 hrs HW=278.84' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.9 cfs @ 3.72 fps)

Secondary OutFlow Max=0.8 cfs @ 12.32 hrs HW=278.84' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.8 cfs @ 2.83 fps)

Summary for Pond CB3:

Inflow Area = 0.775 ac, 68.61% Impervious, Inflow Depth = 3.65" for 100-yr event
Inflow = 4.1 cfs @ 12.00 hrs, Volume= 0.236 af
Outflow = 4.1 cfs @ 12.00 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Primary = 3.1 cfs @ 12.00 hrs, Volume= 0.223 af
Secondary = 1.0 cfs @ 12.00 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 281.16' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	279.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 279.60' / 279.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	280.21'	**8.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.21' / 280.00' S= 0.0124 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=3.1 cfs @ 12.00 hrs HW=281.16' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.1 cfs @ 3.92 fps)

Secondary OutFlow Max=1.0 cfs @ 12.00 hrs HW=281.16' (Free Discharge)
└**2=Culvert** (Inlet Controls 1.0 cfs @ 2.99 fps)

Summary for Pond DP1: DP1

Inflow Area = 2.754 ac, 54.31% Impervious, Inflow Depth = 0.01" for 100-yr event
Inflow = 0.0 cfs @ 13.49 hrs, Volume= 0.002 af
Primary = 0.0 cfs @ 13.49 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: DP2

Inflow Area = 2.710 ac, 58.88% Impervious, Inflow Depth = 0.00" for 100-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

APPENDIX F
DRAFT NOI

NOI for coverage under Stormwater General Permit for Construction Activity

version 1.31

(Submission #: HPC-QV22-AM7WJ, version 1)

Details

Originally Started By	Matthew Huntington
Submission ID	HPC-QV22-AM7WJ
Submission Reason	New
Status	Draft

Form Input

Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)
Saratoga Biochar Solutions, LLC

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Apy

Owner/Operator Contact Person First Name
Raymond

Owner/Operator Mailing Address
26 F Congress St. #346

City
Saratoga Springs

State
NY

Zip
12866

Phone
518-391-0566

Email
rapy@northeasternbiochar.com

Federal Tax ID
NONE PROVIDED

Project Location

Project/Site Name
Saratoga Biochar Solutions, LLC

Street Address (Not P.O. Box)
Farnan Road

Side of Street
West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Moreau

State
NY

Zip
12803

DEC Region
NONE PROVIDED

County
SARATOGA

Name of Nearest Cross Street
Bluebird Road

Distance to Nearest Cross Street (Feet)
3696

Project In Relation to Cross Street
South

Tax Map Numbers Section-Block-Parcel
50.-4-22 and 50.-4-16

Tax Map Numbers
50.-4-22; 50.-4-16

1. Coordinates

Provide the Geographic Coordinates for the project site. The two methods are:
- Navigate to the project location on the map (below) and click to place a marker and obtain the XY coordinates.
- The "Find Me" button will provide the lat/long for the person filling out this form. Then pan the map to the correct location and click the map to place a marker and obtain the XY coordinates.

Navigate to your location and click on the map to get the X,Y coordinates
43.28299536171419,-73.60429419726917

Project Details

2. What is the nature of this project?
New Construction

3. Select the predominant land use for both pre and post development conditions.

Pre-Development Existing Landuse
Forest

Post-Development Future Land Use
Industrial

3a. If Single Family Subdivision was selected in question 3, enter the number of subdivision lots.
NONE PROVIDED

4. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area.

*** ROUND TO THE NEAREST TENTH OF AN ACRE. ***

Total Site Area (acres)
5.28

Total Area to be Disturbed (acres)
4.8

Existing Impervious Area to be Disturbed (acres)
0

Future Impervious Area Within Disturbed Area (acres)
3.25

5. Do you plan to disturb more than 5 acres of soil at any one time?
No

---

6. Indicate the percentage (%) of each Hydrologic Soil Group(HSG) at the site.

A (%)
100

B (%)
0

C (%)
0

D (%)
0

7. Is this a phased project?
Yes

8. Enter the planned start and end dates of the disturbance activities.

Start Date
3/1/2022

End Date
10/1/2027

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.
Hudson River

9a. Type of waterbody identified in question 9?
River Off Site

Other Waterbody Type Off Site Description
NONE PROVIDED

9b. If "wetland" was selected in 9A, how was the wetland identified?
NONE PROVIDED

10. Has the surface waterbody(ies in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001?
No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001?
No

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters?
No

If No, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey?
NONE PROVIDED

If Yes, what is the acreage to be disturbed?
NONE PROVIDED

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area?
No

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)?
Yes

16. What is the name of the municipality/entity that owns the separate storm sewer system?
Town of Moreau

17. Does any runoff from the site enter a sewer classified as a Combined Sewer?
No

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law?
No

19. Is this property owned by a state authority, state agency, federal government or local government?
No

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.)
No

Required SWPPP Components

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)?
Yes

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)?
Yes

If you answered No in question 22, skip question 23 and the Post-construction Criteria and Post-construction SMP Identification sections.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual?
Yes

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:
Professional Engineer (P.E.)

SWPPP Preparer
Studio A Landscape Architecture & Engineering, DPC

Contact Name (Last, Space, First)
Huntington Mathew

Mailing Address
38 High Rock Ave, Suite 3

City
Saratoga Springs

State
NY

Zip
12866

Phone
5184504030

Email
mhuntington@studioadpc.com

Download SWPPP Preparer Certification Form
Please take the following steps to prepare and upload your preparer certification form:

1) Click on the link below to download a blank certification form
2) The certified SWPPP preparer should sign this form

3) Scan the signed form
4) Upload the scanned document
Download SWPPP Preparer Certification Form

Please upload the SWPPP Preparer Certification
NONE PROVIDED
Comment
NONE PROVIDED

Erosion & Sediment Control Criteria

25. Has a construction sequence schedule for the planned management practices been prepared?
Yes

26. Select all of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural
Silt Fence
Stabilized Construction Entrance

Biotechnical
None

Vegetative Measures
Topsoiling
Protecting Vegetation
Seeding

Permanent Structural
Land Grading
Rock Outlet Protection

Other
NONE PROVIDED

Post-Construction Criteria

*** IMPORTANT: Completion of Questions 27-39 is not required if response to Question 22 is No.**

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.
Preservation of Undisturbed Area
Preservation of Buffers

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).
All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout). (Acre-feet)
0.27

29. Post-construction SMP Identification
Use the Post-construction SMP Identification section to identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity that were used to reduce the Total WQv Required (#28).

Identify the SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use the Post-Construction SMP Identification section to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29. (acre-feet)
.202

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28)?
No

If Yes, go to question 36. If No, go to question 32.

32. Provide the Minimum RRv required based on HSG. [Minimum RRv Required = (P) (0.95) (Ai) / 12, Ai=(s) (Aic)] (acre-feet)
.138

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?
Yes

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. SMPs
Use the Post-construction SMP Identification section to identify the Standard SMPs and, if applicable, the Alternative SMPs to be used to treat the remaining total WQv (=Total WQv Required in #28 - Total RRv Provided in #30).

Also, provide the total impervious area that contributes runoff to each practice selected.

NOTE: Use the Post-construction SMP Identification section to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question #29. (acre-feet)
.210

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).
.412

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)?
Yes

If Yes, go to question 36.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv required and provided or select waiver (#36a), if applicable.

CPv Required (acre-feet)
0.167

CPv Provided (acre-feet)
0.167

36a. The need to provide channel protection has been waived because:
NONE PROVIDED

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (#37a), if applicable.

Overbank Flood Control Criteria (Qp)

Pre-Development (CFS)
0

Post-Development (CFS)
0

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)
0.6

Post-Development (CFS)
0.4

37a. The need to meet the Qp and Qf criteria has been waived because:
NONE PROVIDED

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?
Yes

If Yes, Identify the entity responsible for the long term Operation and Maintenance
Property Owner

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). (See question #32a) This space can also be used for other pertinent project information.
WQv was not 100% reduced due to high groundwater encountered in the eastern extremities of the site. Thought, adequate treatment capacity has been provided to reduce and treat a volume greater than total WQv.

Post-Construction SMP Identification

Runoff Reduction (RR) Techniques, Standard Stormwater Management Practices (SMPs) and Alternative SMPs
Identify the Post-construction SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

RR Techniques (Area Reduction)

Round to the nearest tenth

Total Contributing Acres for Conservation of Natural Area (RR-1)
NONE PROVIDED

Total Contributing Impervious Acres for Conservation of Natural Area (RR-1)
NONE PROVIDED

Total Contributing Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
NONE PROVIDED

Total Contributing Impervious Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
NONE PROVIDED

Total Contributing Acres for Tree Planting/Tree Pit (RR-3)
NONE PROVIDED

Total Contributing Impervious Acres for Tree Planting/Tree Pit (RR-3)
NONE PROVIDED

Total Contributing Acres for Disconnection of Rooftop Runoff (RR-4)
NONE PROVIDED

RR Techniques (Volume Reduction)

Total Contributing Impervious Acres for Disconnection of Rooftop Runoff (RR-4)
NONE PROVIDED

Total Contributing Impervious Acres for Vegetated Swale (RR-5)
NONE PROVIDED

Total Contributing Impervious Acres for Rain Garden (RR-6)
NONE PROVIDED

Total Contributing Impervious Acres for Stormwater Planter (RR-7)
NONE PROVIDED

Total Contributing Impervious Acres for Rain Barrel/Cistern (RR-8)
NONE PROVIDED

Total Contributing Impervious Acres for Porous Pavement (RR-9)
NONE PROVIDED

Total Contributing Impervious Acres for Green Roof (RR-10)
NONE PROVIDED

Standard SMPs with RRv Capacity

Total Contributing Impervious Acres for Infiltration Trench (I-1)
NONE PROVIDED

Total Contributing Impervious Acres for Infiltration Basin (I-2)
2.39

Total Contributing Impervious Acres for Dry Well (I-3)
NONE PROVIDED

Total Contributing Impervious Acres for Underground Infiltration System (I-4)
NONE PROVIDED

Total Contributing Impervious Acres for Bioretention (F-5)
NONE PROVIDED

Total Contributing Impervious Acres for Dry Swale (O-1)
NONE PROVIDED

Standard SMPs

Total Contributing Impervious Acres for Micropool Extended Detention (P-1)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Pond (P-2)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Extended Detention (P-3)
NONE PROVIDED

Total Contributing Impervious Acres for Multiple Pond System (P-4)
NONE PROVIDED

Total Contributing Impervious Acres for Pocket Pond (P-5)
NONE PROVIDED

Total Contributing Impervious Acres for Surface Sand Filter (F-1)
NONE PROVIDED

Total Contributing Impervious Acres for Underground Sand Filter (F-2)
NONE PROVIDED

Total Contributing Impervious Acres for Perimeter Sand Filter (F-3)
NONE PROVIDED

Total Contributing Impervious Acres for Organic Filter (F-4)
NONE PROVIDED

Total Contributing Impervious Acres for Shallow Wetland (W-1)
NONE PROVIDED

Total Contributing Impervious Acres for Extended Detention Wetland (W-2)
NONE PROVIDED

Total Contributing Impervious Acres for Pond/Wetland System (W-3)
NONE PROVIDED

Total Contributing Impervious Acres for Pocket Wetland (W-4)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Swale (O-2)
NONE PROVIDED

Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Total Contributing Impervious Area for Hydrodynamic
NONE PROVIDED

Total Contributing Impervious Area for Wet Vault
NONE PROVIDED

Total Contributing Impervious Area for Media Filter
NONE PROVIDED

"Other" Alternative SMP?
NONE PROVIDED

Total Contributing Impervious Area for "Other"
NONE PROVIDED

Provide the name and manufaturer of the alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

Manufacturer of Alternative SMP
NONE PROVIDED

Name of Alternative SMP
NONE PROVIDED

Other Permits

40. Identify other DEC permits, existing and new, that are required for this project/facility.
NONE PROVIDED

If SPDES Multi-Sector GP, then give permit ID
NONE PROVIDED

If Other, then identify
NONE PROVIDED

41. Does this project require a US Army Corps of Engineers Wetland Permit?
No

If "Yes," then indicate Size of Impact, in acres, to the nearest tenth
NONE PROVIDED

42. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned.
NONE PROVIDED

MS4 SWPPP Acceptance

43. Is this project subject to the requirements of a regulated, traditional land use control MS4?
No

If No, skip question 44

44. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI?
NONE PROVIDED

MS4 SWPPP Acceptance Form Download
Download form from the link below. Complete, sign, and upload.
MS4 SWPPP Acceptance Form

MS4 Acceptance Form Upload
NONE PROVIDED
Comment
NONE PROVIDED

Owner/Operator Certification

Owner/Operator Certification Form Download
Download the certification form by clicking the link below. Complete, sign, scan, and upload the form.
Owner/Operator Certification Form (PDF, 45KB)

Upload Owner/Operator Certification Form

NONE PROVIDED

Comment

NONE PROVIDED