FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT (FGEIS)
DOLSONTOWN CORRIDOR
Town of Wawayanda, Orange County, New York

Lead Agency: Planning Board, Town of Wawayanda

Lead Agency Contact: John Razzano, Chairperson
80 Ridgebury Hill Road
Slate Hill, NY 10973
(845) 355-5700

APPENDIX C:
DOLSONTOWN EAST, RDM #5

FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT (FGEIS)
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APPENDIX C: DOLSONTOWN EAST, RDM #5

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Section 1

May 21, 2021

Sean Brady
Landscape Architect
Colliers Engineering & Design
555 Hudson Valley Avenue Suite 101
New Windsor, NY 12553

Re: USACE
Dolsontown East: Parcel Consolidation & Warehouse Construction
Town of Wawayanda, Orange County, NY
21PR03257

Dear Sean Brady:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

Based upon this review, it is the opinion of the New York SHPO that no historic properties, including archaeological and/or historic resources, will be affected by this undertaking.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Roger Daniel Mackay

R. Daniel Mackay

Deputy State Historic Preservation Officer
Division for Historic Preservation

Section 2

Threatened and Endangered Species
Habitat Suitability Assessment Report

Dolsontown East Site
Dolsontown Road
Town of Wawayanda, New York

November 24, 2021

Prepared by:

Michael Nowicki
Ecological Solutions, LLC
121 Leon Stocker Drive
Stratton, VT 05360
(203) 910-4716

1.0 INTRODUCTION

Ecological Solutions, LLC completed a threatened and endangered species habitat suitability assessment on the Dolsontown East site (1-1-52.1, 1-1-4.2, 6-1-3.2) located on Dolsontown Road in the Town of Waywayanda, Orange County, New York (*Figure 1*). The site totals 48.63 acres of vacant wooded land, wetlands, and upland meadow. The Applicant is proposing to construct two warehouses (471,000 sq. ft. and 61,000 sq. ft.) with associated improvements including access road, parking areas, and stormwater management.

The New York State Department of Environmental Conservation (NYSDEC) Environmental Assessment Form indicates that the Indiana bat (*Myotis sodalis*) may be located in the vicinity of the site. The US Fish and Wildlife Service (USFWS) also lists the Northern long-eared bat (*Myotis septentrionalis*) and small whorled pogonia (*Isotria medeoloides*) as threatened and endangered species potentially located on the site and monarch butterfly (*Danaus plexippus*) as a candidate species that also is potentially located on the site (*Attachments 1 and 2*). This assessment was completed to determine if suitable habitat exists on the site for this species and determine potential impacts to suitable habitat and recommends measures to mitigate the impacts that can not be avoided or minimized. Habitat was observed on the site on November 20, 2021 and is listed in Table 1.

TABLE 1
COVER TYPES IDENTIFIED ON THE SITE

HABITAT COVER TYPES			
NO.	**DESCRIPTION**	**COVERAGE (ACRES)**	**DISTURBANCE (ACRES)**
1	Wetlands	8.9	0.0
2	Upland Forest	4.0	0.0
3	Upland Meadow	36.6	25

Upland Hardwood Forest - The site contains upland hardwood forest which is a young forest type with soils that are well drained. The canopy is dominated by a mixture of oaks and maples. The oaks include one or more of the following: black oak (*Quercus velutina*), red oak (*Q. rubra*), and white oak (*Q. alba*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), and black cherry (*Prunus serotina*) are common associates occurring at low densities. Sizes of the trees vary from saplings to mature trees with a wide range of dbh from 3--4 inches and tree conditions including dead wood, crevices, and holes.

Wetlands - Wetlands on the site are Federal and State regulated forested wetlands dominated by red maple and schrub/shrub swamp species.

Upland Meadow - The majority of the site is maintained / mowed upland field.

2.0 HABITAT SUITABILITY ASSESSMENT/CONCLUSION

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2.1 Small whorled pogonia

The small whorled pogonia is a member of the orchid family. It usually has a single grayish-green stem that grows about 10 inches tall when in flower and about 14 inches when bearing fruit. The plant is named for the whorl of five or six leaves near the top of the stem and beneath the flower. The leaves are grayish-green, somewhat oblong and 1 to 3.5 inches long. The single or paired greenish-yellow flowers are about 0.5 to 1 inch long and appear in May or June. The fruit, an upright ellipsoid capsule, appears later in the year. This orchid grows in older hardwood stands of beech, birch, maple, oak, and hickory that have an open understory. Sometimes it grows in stands of softwoods such as hemlock. It prefers acidic soils with a thick layer of dead leaves, often on slopes near small streams.

Conclusion - There is no potential habitat for this species since there is no older growth forest on the site but rather young woods with a thick dense understory.

2.2 Indiana and Northern long-eared bats

The Indiana bat typically hibernates in caves/mines in the winter and roosts under bark or in tree crevices in the spring, summer, and fall. Suitable potential summer roosting habitat is characterized by trees (dead, dying, or alive) or snags with exfoliating or defoliating bark, or containing cracks or crevices that could potentially be used by Indiana bats as a roost. The minimum diameter of roost trees observed to date is 2.5 inches for males and 4.3 inches for females. However, maternity colonies generally use trees greater than or equal to 9 inches dbh. Overall, roost tree structure appears to be more important to Indiana bats than a particular tree species or habitat type. Females appear to be more habitat specific than males presumably because of the warmer temperature requirements associated with gestation and rearing of young. As a result, they are generally found at lower elevations than males may be found. Roosts are warmed by direct exposure to solar radiation, thus trees exposed to extended periods of direct sunlight are preferred over those in shaded areas. However, shaded roosts may be preferred in very hot conditions. As larger trees afford a greater thermal mass for heat retention, they appear to be preferred over smaller trees.

Streams associated with floodplain forests, and impounded water bodies (ponds, wetlands, reservoirs, etc.) where abundant supplies of flying insects are likely found provide preferred foraging habitat for Indiana bats, some of which may fly up to 2-5 miles from upland roosts on a regular basis. Indiana bats also forage within the canopy of upland forests, over clearings with early successional vegetation (*e.g.,* old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. While Indiana bats appear to forage in a wide variety of habitats, they seem to tend to stay fairly close to tree cover.

The northern long eared bat requires/occupies practically the same habitat niche as the Indiana bat. Impacts to habitat and mitigation would be consistent with the recommendations for the Indiana bat.

Conclusion - This proposed project will not require any forest removal. No mitigation measures are proposed since there are no impacts that will result in adverse effects to Indiana bats.

2.3 Monarch butterfly

Monarchs, like all other butterflies and moths, go through egg, larval (caterpillar), chrysalis (pupa), and adult stages. Monarch caterpillars ingest milkweed that contains a toxic compound. The presence of this toxin is used by the monarch butterfly as a defense against predators.

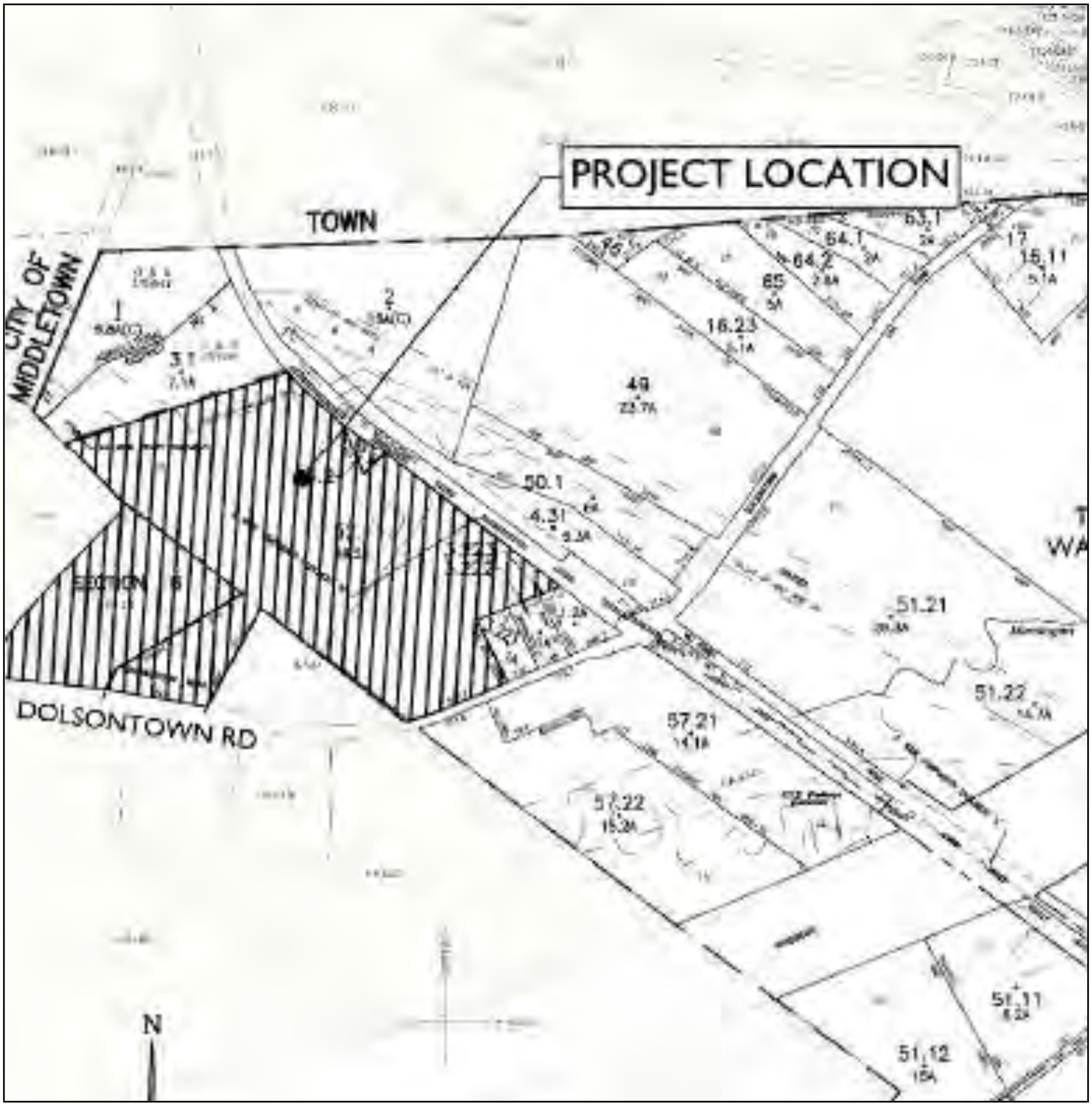
In late August, masses of monarch butterflies begin an epic migration stretching thousands of miles from areas across the United States and as far north as Canada (east of the Rocky Mountains) to overwinter in mountaintops of Central Mexico.

Conclusion – The site is maintained / mowed field. No milkweed plants occur on the site and the impacts from the project are minor and will not impact this species directly or through the loss of habitat (i.e milkweed plants).

3.0 PHOTOGRAPHS

Existing field/meadow on the site.

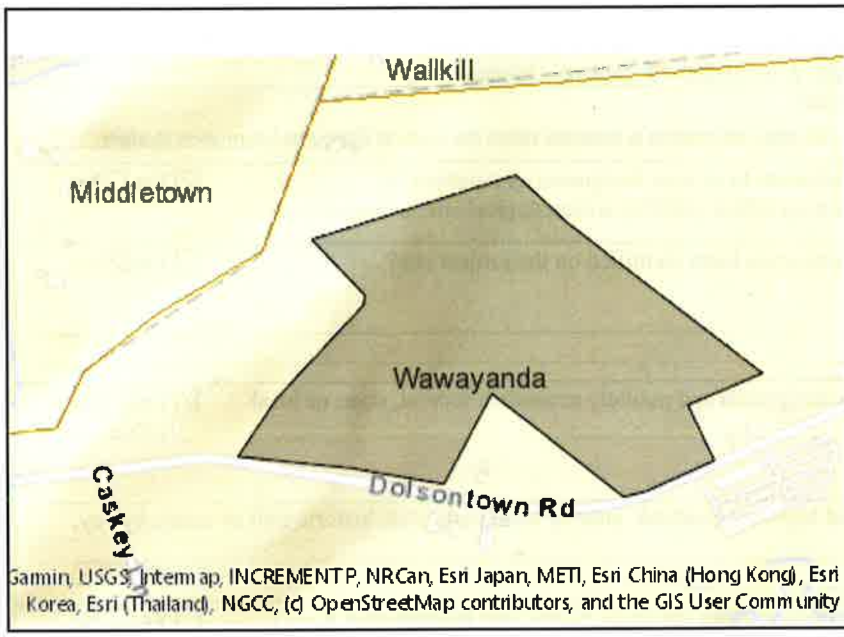
Figure 1 Location Map



Attachment 1 - NYSDEC Mapper

EAF Mapper Summary Report

Thursday, May 6, 2021 6:47 PM



Disclaimer: The EAF Mapper is a screening tool intended to assist project sponsors and reviewing agencies in preparing an environmental assessment form (EAF). Not all questions asked in the EAF are answered by the EAF Mapper. Additional information on any EAF question can be obtained by consulting the EAF Workbooks. Although the EAF Mapper provides the most up-to-date digital data available to DEC, you may also need to contact local or other data sources in order to obtain data not provided by the Mapper. Digital data is not a substitute for agency determinations.

B.i.i [Coastal or Waterfront Area]	No
B.i.ii [Local Waterfront Revitalization Area]	No
C.2.b. [Special Planning District]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h [DEC Spills or Remediation Site - Potential Contamination History]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Listed]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Environmental Site Remediation Database]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.iii [Within 2,000' of DEC Remediation Site]	Yes
E.1.h.iii [Within 2,000' of DEC Remediation Site - DEC ID]	V00289, 336029
E.2.g [Unique Geologic Features]	No
E.2.h.i [Surface Water Features]	Yes
E.2.h.ii [Surface Water Features]	Yes
E.2.h.iii [Surface Water Features]	Yes - Digital mapping information on local and federal wetlands and waterbodies is known to be incomplete. Refer to EAF Workbook.
E.2.h.iv [Surface Water Features - Stream Name]	855.5-180
E.2.h.iv [Surface Water Features - Stream Classification]	C
E.2.h.iv [Surface Water Features - Wetlands Name]	Federal Waters
E.2.h.v [Impaired Water Bodies]	No
E.2.i. [Floodway]	No

E.2.j. [100 Year Floodplain]	No
E.2.k. [500 Year Floodplain]	No
E.2.l. [Aquifers]	Yes
E.2.l. [Aquifer Names]	Principal Aquifer
E.2.n. [Natural Communities]	No
E.2.o. [Endangered or Threatened Species]	Yes
E.2.o. [Endangered or Threatened Species - Name]	Indiana Bat
E.2.p. [Rare Plants or Animals]	No
E.3.a. [Agricultural District]	Yes
E.3.a. [Agricultural District]	ORAN002
E.3.c. [National Natural Landmark]	No
E.3.d [Critical Environmental Area]	No
E.3.e. [National or State Register of Historic Places or State Eligible Sites]	Yes - Digital mapping data for archaeological site boundaries are not available. Refer to EAF Workbook.
E.3.e.ii [National or State Register of Historic Places or State Eligible Sites - Name]	
E.3.f. [Archeological Sites]	Yes
E.3.i. [Designated River Corridor]	No

Attachment 2 - USFWS List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9385
Phone: (607) 753-9334 Fax: (607) 753-9699
http://www.fws.gov/northeast/nyfo/es/section7.htm

In Reply Refer To: March 23, 2022
Project Code: 2022-0023421
Project Name: RDM - Dolsontown East

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. **Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.**

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9385
(607) 753-9334

Project Summary

Project Code: 2022-0023421
Event Code: None
Project Name: RDM - Dolsontown East
Project Type: Commercial Development
Project Description: Warehouse
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.424885599999996,-74.41432903461995,14z

Counties: Orange County, New York

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Small Whorled Pogonia *Isotria medeoloides* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency: Ecological Solutions, LLC
Name: Michael Nowicki
Address: 121 Leon Stocker Drive
City: Stratton
State: VT
Zip: 05360
Email ecolsol@aol.com
Phone: 2039104716

Section 3

Storm Water Pollution Prevention Plan (SWPPP)

January 2022

Revised January 2023

Dolsontown East
Town of Wawayanda
SBL: 1-1-52.1, 1-1-4.2, & 6-1-3.2
Orange County, New York

Prepared for:

Dolsontown Road East LLC
1 International Boulevard, Suite 410
Mahwah, NJ 07430

Prepared by:

Cory D. Robinson, P.E.
New York Professional
Licensed Professional Engineer
License No. 103788

Colliers Engineering & Design
555 Hudson Valley Avenue Suite 101
New Windsor, New York 12553
Main: 845.564.4495
Colliersengineering.com

Project No. 20006912B

Accelerating success.

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List of Appendices

I. EXECUTIVE SUMMARY

Project Name:	Operator Name and Address:
Dolsontown East Town of Wawayanda Orange County, NY	Dolsontown Road East LLC 1 International Boulevard, Suite 410 Mahwah, NJ 07430
Project Engineer and Firm:	**Contractor Name and Address:**
Cory D. Robinson, P.E. Colliers Engineering & Design CT, P.C. 555 Hudson Valley Avenue, Suite 101 New Windsor, NY 12553 (845) 564-4495	**TBD**
Project Location:	**MS4 Contact:**
79 Dolsontown Road SBL: 1-1-52.1, 1-1-4.2, & 6-1-3.2 Town of Wawayanda, Orange County, NY	Town of Wawayanda (NYR20A279) 80 Ridgebury Hill Road Slate Hill, NY 10973

Figure 1: Project Location

(Source: Google Earth)

II. INTRODUCTION

Three (3) existing parcels make up the approximately 48 acre project site which has frontage along Dolsontown Road to the south. The parcels are currently undeveloped with a mixture of woodlands and wetlands. The site contains approximately 8.0 acres of wetlands anticipated to be under NYSDEC jurisdiction. There is no proposed wetland or adjacent area disturbance as part of the project. The project is within the Town of Wawayanda MC-1 (Mixed Commercial) zoning district. The parcel is within the Town's Sanitary Sewer District #1 and Water District #1. Within the MC-1 (Mixed Commercial) zoning district, a "Warehouse, storage and distribution facilities" use requires a special use permit subject to site plan approval by the Planning Board. The project will create two (2) tax lots for the proposed warehouse facilities.

Lot 1 will contain a 402,000 sq. ft. warehouse/distribution facility along with associated site stormwater & utility improvements. Other associated site improvements include 200 vehicle parking spaces, 106 loading docks, and 85 trailer parking spaces. The lot has a proposed driveway entrance on Dolsontown Road towards the west side of the site suitable for vehicular access to the facility and another proposed driveway entrance on Dolsontown Road towards the east side of the site suitable for truck access to the facility.

Lot 2 will contain a 61,000 sq. ft. warehouse/distribution facility along with associated site stormwater & utility improvements. Other associated site improvements include 61 vehicle parking spaces & 11 loading docks. The lot has a proposed driveway entrance on Dolsontown Road suitable for vehicular and truck access to the facility.

Stormwater runoff currently sheet flows from the east & west edges of the site towards the wetland in the center of the site. The wetlands drain to a Class 'C' stream which flows from north to south through the site and ultimately discharges through a metal culvert beneath Dolsontown Road.

The proposed condition will convey stormwater via sheet flow across the parking lots, into inlets and pipes, and into a variety of Green Infrastructure techniques, including bioretention ponds, infiltration ponds, and pocket ponds, where the runoff will be treated for Water Quality (WQ) and Runoff Reduction (RRv) before the excess runoff is discharged towards the wetland. Stormwater 'Hotspot' runoff from truck loading bays and trailer storage/parking areas has been pretreated using oil-water separating swirl chambers, and another form of pretreatment to provide 'double pretreatment' prior to any infiltration practice where applicable. Stormwater facilities on site have been designed in accordance with the 2015 New York State Stormwater Management Design Manual and local requirements.

The site has been analyzed as new development and stormwater practices sized to manage the new impervious area. The study area was generally limited to the project site, utilizing the stream in the center of the wetland as the design point. The proposed improvements will result in the addition of roughly 20 acres of impervious area.

Due to the size of the project, coverage under the State Pollutant Discharge Elimination System Permit (SPDES GP 0-20-001) administered by New York State Department of Environmental Conservation (NYSDEC) is required.

Due to the size of the proposed buildings and associated earthwork/site improvements the project will disturb more than 5 acres of soil at one time, therefore the applicant will be seeking a waiver from the MS4 to create more than 5 acres of soil disturbance at one time. Phasing the project to limit the disturbance below 5 acres is not practical due to the size of the buildings and the existing topography. Enhanced erosion control measures have been included on the plans to mitigate this additional soil disturbance and ensure compliance with the permit requirements, and general enhanced erosion control measures applicable to this project have been listed later in this report.

III. STORMWATER MANAGEMENT GOALS

GOALS

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared in compliance with the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity, Permit No. GP-0-20-001 (See Appendix 4). The SWPPP is a plan for controlling runoff and pollutants from a site during and after construction activities. The principle objective of this document is to comply with the SPDES Permit for construction activities by planning and implementing the following practices:

- Reduction or elimination of erosion and sediment loading to water bodies during and after construction.
- Control of the impact of stormwater runoff on the water quality of the receiving waters.
- Control of the peak rate of runoff during and after construction.
- Maintenance of stormwater controls during and after completion of construction.
- Minimize impacts to the Monhagen Brook, which is on the NYSDEC's 303(d) list as an impaired water.

CLASSIFICATION & STANDARDS

The activities associated with this project are eligible for coverage under this permit. Using the General Permit guidelines for coverage, a summary of classification and requirements is provided below:

Project Type:

- Commercial development and redevelopment.
- Parking lot construction and reconstruction.
- All other construction activities that include the construction or reconstruction of impervious area or alter the hydrology from pre to post development conditions and are not listed in Table 1 of GP-0-20-001.

Classification: **GP-0-20-001 Appendix B, Table 2 - "Construction activities that require the preparation of a SWPPP that includes Post Construction Stormwater Practices".**

This project is located within the Town of Wawayanda regulated traditional land use MS4. The following guidance documents, in addition to various resources located on the NYS Department of Environmental Conservation website, were used in preparation of this SWPPP.

The New York State Stormwater Management Design Manual, by New York State Department of Environmental Conservation, August 2015 (NYSSMDM).

New York Standard Specifications for Erosion and Sediment Control, by New York State Department of Environmental Conservation, November 2016 ("Blue Book").

The SWPPP is intended to be a *'living'* document and should be revised and updated whenever site conditions dictate. Any proposed modifications shall be reviewed by the owner/operator prior to incorporation in the SWPPP and implementation at the project site. The certifying engineer of this SWPPP document shall be notified of any proposed modifications to this document. Any proposed modifications shall be in accordance with the NYSDEC technical standards.

IV. METHODOLOGY

1. The watersheds are divided into subareas, by topography, soils, and land use. A summary of the watershed areas, composite curve numbers, and travel times are shown in Table 1 below.
2. Rainfall depths used for this analysis are those published by the Northeast Regional Climate Center for the project location for the 100, 10, and 1-year frequency storms as directed in the NYSSMDM.
3. Boundary & Topographical mapping is taken from a survey titled "Outbound & Topographic Survey Prepared for 79 Dolsontown Road Section 1 Block 1 Lot 52.1 & 4.2 – Section 6 Block 1 Lot 3.2" prepared by John W. McCord, Sr. PLS (License #050904) revised 06/22/2021.
4. The required water quality volume (WQv) was calculated in accordance with the Section 4.2 of the NYSSMDM. This is also the required RRv as per Section 4.3 of the NYSSMDM.
5. The provided RRv was calculated through the use of the Green Infrastructure (GI) Worksheets, Version 1.6, provided by NYSDEC. The GI worksheets are included in Appendix 3.
6. The peak flows from the watersheds in the existing condition are computed using the runoff curve numbers taken from TR-55 to determine undeveloped peak runoff and runoff hydrographs at the design points. The existing condition peak flows are presented in the report.
7. In the post-development condition, the peak flows from the proposed development are computed using the runoff curve numbers taken from TR-55. The watersheds are adjusted for the proposed improvements and grading of the site. The runoff flows are hydraulically routed for updated travel times, diversions, and new storage structures, as necessary. The resulting proposed peak flows at the design point are presented in the report.
8. A full Erosion & Sediment Control Plan (plans, details and construction sequencing) was designed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (aka the "bluebook") and has been included as an appendix of this report.
9. A long term Operation & Maintenance Plan was developed for the proposed post-construction stormwater control practices and is included as an appendix of this report.

10. Maps indicating the various drainage conditions are enclosed in the appendices of this report. Schematic diagrams of the flow models in the existing and proposed conditions are included in the HydroCAD output within the Appendix.
11. A draft MS4 SWPPP Acceptance form, Notice of Termination (NOT), and Notice of Intent (NOI) have been included in the Appendix of this report to be executed as part of the SPDES permit. The MS4 form is to be completed by the municipality at the time of SWPPP acceptance and replaced in this report with the executed version. The NOI shall be filed electronically with the NYSDEC at the time of permit activation and replaced in this report with the executed version. The NOT is to be completed and filed with the municipality and NYSDEC at the time of permit closure.

V. DISCUSSION

Discussion of Design Points

The Project has one design point, the Class 'C' stream in the wetland at the center of the site. The drainage areas were limited, wherever possible to the area of proposed development.

The design points evaluated in this report is described as follows:

Design Point 1 is the Class 'C' stream in the wetland at the center of the site. The site runoff generally sheets from the east and west edges of the parcel towards the wetland and the stream at the center of the site.

The Design Point location, the pre- and post-development land use, travel times flow paths, and watersheds are clearly identified on the watershed maps found in the Appendix of this report. The pre-development (hereafter "existing") and post-development (hereafter "proposed") watershed characteristics can be found in Table 1 below.

TABLE 1: WATERSHED CHARACTERISTICS

Existing Conditions			
	Area *(acres)*	**CN**	**Tc** *(minutes)*
EW1	48.61	74	31.4
Totals	48.61	74	-
Proposed Conditions			
	Area *(acres)*	**CN**	**Tc**
PW 1A	2.45	93	6.0
PW 1BE	6.55	96	6.0
PW 1BW	4.62	98	6.0

PW 1C	0.41	80	6.0
PW 1D	2.94	94	6.0
PW 1E	4.68	92	6.0
PW 2A	1.40	96	6.0
PW 2B	0.67	95	6.0
PW 2C	2.03	92	6.0
PREM	22.85	75	36.7
Totals	48.6	85	-

The minimum Tc of 6 minutes, or 0.10 hours, is shown above for the catchment areas where the composite travel time did not meet this minimum. Watersheds with a Tc greater than the minimum have been identified with the travel path on the Watershed Maps in the Appendix.

SOIL TYPES

Soil data for this project was obtained from the USDA Natural Resources Conservation Service Web Soil Survey (NRCS WSS). A copy of the report generated for the site can be found in the Appendix of this report.

Several different soil designations are identified throughout the entire project. A further detailed description of the soil characteristics and properties can be found in the NRCS WSS included as an Appendix to this report.

HYDROLOGIC SOIL GROUP (HSG)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long duration storms. The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). Dual class soil groups are conservatively considered “D” soils.

The majority of the soils existing on site have been identified through the NRCS WSS as HSG ‘D’ Soils, while a section of HSG ‘A’ soils exists in the northeast corner of the site.

4.3.3 SOIL BORING AND INFILTRATION TESTING

A Geotechnical Investigation Report has been prepared by Kevin L. Patton, P.E. which includes the results of soil borings around the site within the proposed building pads. The results indicate what is believed to be relatively shallow bedrock roughly 10’ below grade along the western wall of the 400k sf building on lot 1. In the east building area (lot 2) groundwater was indicated below elevations of 441 to 449 in the borings, per the report. Additional information can be found in the report which has been included in the Appendix.

Site specific stormwater infiltration testing has been conducted for the project in May 2022 by Kevin L. Patton, P.E. and the results can be found in the appendix of this report. In summary, the soils and groundwater conditions encountered in the stormwater investigation were generally consistent with those found in the soil borings for the buildings. The soils were predominately fine-grained and were mostly wet, but with highly variable depths to groundwater and several areas favorable to infiltration practices were identified within the western portion of the site. Conservative infiltration rates have been used for the design.

ZERO-NET INCREASE:

The proposed storm water improvements for the site provide the required channel protection (CPv), overbank flood protection (Qp), and extreme flood protection (Qf). Peak flows have been reduced at the selected design point in the proposed condition for the 100, 10, and 1-year storms. These peak flow reductions can also be found in Table 2 below.

As is evident in the table below, attenuation of the peak flows by reduction of impervious areas in the redeveloped areas, utilization of SMP's with RRv capacity, and site planning, have effectively reduced the peak discharge while providing the required runoff reduction, which will be further discussed below.

TABLE 2: Existing and Proposed Peak Flow Summary to the Design Point

Design Point	Storm Events (yr)	Existing (cfs)	Proposed (cfs)	Diff. (cfs)	Percent
DP1	1	19.5	12.13	-7.37	-38%
	10	65.9	42.35	-23.55	-36%
	100	161.57	143.24	-18.33	-11%

HOTSPOT RUNOFF

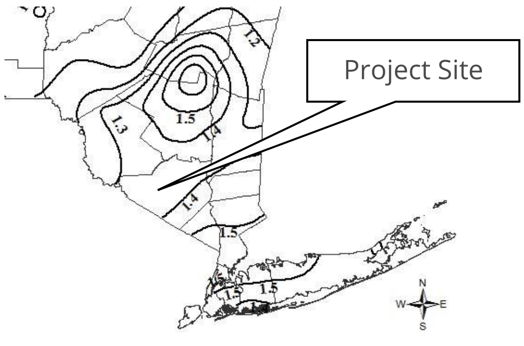
As defined in section 4.11 of the NYSSMDM, stormwater "hotspots" are land uses and activities that generate higher concentration of hydrocarbons, trace metals or toxicants that are found in typical stormwater runoff. The loading docks and trailer storage/parking areas fall under the definition of a hotspot.

To meet the design criteria for hot spot runoff, pretreatment is provided using swirl chambers designed to separate floatable and contaminants, and runoff has not been allowed to infiltrate prior to treatment.

Double pretreatment has been provided for hotspot runoff using swirl chambers directed to a pretreatment forebay prior to entering infiltration ponds.

WATER QUALITY VOLUME (WQV):

The Water Quality Volume (WQv) requirement is designed to improve water quality. The WQv is directly related to the impervious cover created at a site. The design captures and treats 90% of the average annual stormwater runoff volume. The 90% rainfall event value (P) used in the calculations (1.4”) is shown below in the portion of Figure 4.1 from Section 4.2, page 4-3 in the NYSSMDM (depicted below).



90% Rule:

$WQ_v = [(P)(R_v)(A)] / 12$
$Rv = 0.05+0.009(I)$
I = Impervious Cover (Percent)
Minimum Rv = 0.2
P = 90% Rainfall Event Number (See Figure 4.1)
A = site area in acres

The Runoff Coefficient “Rv” in the computation of Water Quality Volume WQv is dependent on the percent impervious cover. As per Section 4.2 of the NYSSMDM, 100% of the water quality volume shall be treated.

TABLE 3: REQUIRED WATER QUALITY CALCULATION

Description (HydroCAD designation)	Catchment (GI Worksheet numbering)	Total Area (acres)	Impervious Area (acres)	Percent Impervious (I) %	Runoff Coefficient Rv	Required WQv (cf)	Provided WQv (cf)
INFIL 1A-1 [PW1A]	1	2.45	1.71	70%	0.68	8,430	7,088
INFIL-1A-2 [PW1A]	2	0.00	0.00				1,343
INFIL 1BE [1BE & 1BW]	3	11.18	10.40	93%	0.89	50,405	50,405
WET 1D [PW 1D]	4	2.94	2.29	78%	0.75	11,221	11,221
INFIL 1E [PW 1E]	5	4.68	3.07	66%	0.64	15,231	15,231
WET 2C [PW2A, PW2B, PW2C]	6	4.10	3.13	76%	0.74	15,363	15,363
-	**TOTAL**	25.35	20.60	81%	0.78	**100,650**	**100,650**

Infiltration Pond 1A-1 (Catchment 1, PW 1A) is designed to treat the WQv in series with the downstream infiltration Pond 1A-2 (catchment 2, PW1A) therefore the WQv for Pond 1A-1 is taken as 90% of the storage volume in the pond (7,088 cf) and the remainder of the WQv (1,343 cf) is direct to Pond 1A-2. The WQv for Pond 1A-2 is taken as the WQv (1,343) since the volume provided in the pond is greater than the minimum volume required.

The provided WQv for the Pocket Ponds Wet 1D and Wet 2C (Catchment 4, PW 1D and Catchment 6, PW2A-PW2B-PW2C) is calculated as the volume below the extended detention orifice (or the WQv whichever value is less), with a low-flow orifice set to an elevation corresponding to roughly 50% of the total WQv.

Pocket Pond Wet 1D (Catchment 4, PW 1D) Summary:

Permanent Pool: Elevation= 451.50, Volume = 13,422 cf

Extended Detention Overflow Elevation= 452.50, Volume= 28,620 cf

Pocket Pond Wet 2C (Catchment 6, PW2A-PW2B-PW2C) Summary:

Permanent Pool: Elevation= 451.30, Volume = 8,306 cf

Extended Detention Overflow Elevation= 452.50, Volume= 17,904 cf

The current design exceeds the requirement for treating the WQv for the impervious areas of new construction.

RUNOFF REDUCTION VOLUME

The runoff reduction volume (RRv) is designed to reduce the stormwater volume leaving the site by capturing an amount equal to the computed water quality volume and infiltrating it onsite. However, for sites that cannot reduce runoff in the amount equal to the water quality volume, a minimum RRv is allowed if the project demonstrates acceptable limitations. The minimum RRv requirement (in acre-feet) was calculated as follows:

RRv_{min} = [(P)($\bar{R}$v)(S)(Aic)]/12 where,
I = Percent Impervious Cover (must be 100%)
P = 90% rainfall event = 1.4
$\bar{R}$v = 0.05+ [(0.009) (I)] = 0.95
S = Hydrologic Soil Group Reduction Factor = 0.20 for HSG D
Aic = Total Area of new impervious cover (acres) = **20.59**

$$RRv_{min} = \frac{[(P)(\bar{R}v)(S)(Aic)]}{12} = \frac{[(1.4)(0.95)(0.20)(20.59)]}{12}$$ = 0.456 ac-ft = **19,881 cf**

Runoff from the development has been treated/reduced using infiltration ponds. Within these proposed practices the entire WQv has not been reduced through the use of standard SMPs with RRv capacity. The RRv and for each proposed practice is included in Table 4 below.

TABLE 4 –RRv Volumes Provided

Catchment (GI Worksheet numbering)	Description (HydroCAD designation)	RRv Provided (cf)
1	PW 1A	7,088
2	PW 1A	1,253
3	PW 1BE & PW 1BW	47,871
5	PW 1E	15,231
TOTAL	-	**71,443**

The proposed design exceeds the minimum requirement by providing an RRv in excess of the minimum amount required and provides >100% of the water quality volume set forth by the NYSDEC requirements. This aspect of the design has been met.

RUNOFF REDUCTION VOLUME (RRV) THROUGH SITE PLANNING:

The application of site planning and green infrastructure to reduce water quality volume with runoff reduction practices can either reduce the required water quality volume to be treated or can completely account for the required water quality volume, which is recommended; the summary of this analysis can be found below. The combination of practices provided on site exceeds the minimum required water quality and runoff reduction for the proposed development.

The basic premise of runoff reduction is to recognize the water quality benefits of certain practices by allowing for a reduction in the water quality treatment volume. Runoff reduction is first achieved through better site design during the planning stages and has been implemented in the planning and design of this project as described in this report.

In accordance with Section 5.2 "Planning for Green Infrastructure: Reduction of Impervious Cover" of the NYSDEC Stormwater Management Design Manual, the proposed site plan has been designed to meet the planning techniques as follows:

TABLE 5: GREEN INFRASTRUCTURE SITE PLANNING

Preservation of Undisturbed Areas	
Delineate and place into permanent conservation undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	This practice has not been applied to this project.

Preservations of Buffers	
Define, delineate, and preserve naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	Existing state regulated wetland areas and associated buffers exist on site which have not been disturbed.
Reduction of Clearing & Grading	
Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	The development has been limited as much as possible while still meeting the developer's requirements.
Locating Development in Less Sensitive Areas	
Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.	Existing state regulated wetland areas and associated buffers exist on site which have not been disturbed.
Open Space Design	
Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	Not applicable to this project.
Soil Restoration	
Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of post construction practices.	Compacted soils located in open areas without shallow utilities will be tilled in order to restore the original properties of the soil prior to seeding.
Roadway Reduction	
Minimize roadway widths and lengths to reduce site impervious area	Roadway widths were reduced wherever possible while still maintaining the necessary access.
Sidewalk Reduction	
Minimize sidewalk lengths and widths to reduce site impervious area	Sidewalks added where needed to serve the pedestrian needs adequately and safely of the facility.
Driveway Reduction	
Minimize driveway lengths and widths to reduce site impervious area	The proposed driveways have been minimized wherever possible.
Cul-de-Sac Reduction	

Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	Not applicable to this project.
Building Footprint Reduction	
Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	The building footprints have been designed to meet the developer's needs.
Parking Reduction	
Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	The site has been developed to meet the developer's needs and the applicable requirements.

GREEN INFRASTRUCTURE TECHNIQUES (GITS):

After taking into account the reductions through Site Planning mentioned above, RRv remains to be treated through GITs and/or Standard SMPs. Chapter 5 of the NYSSMDM outlines the various Green Infrastructure Techniques which can be implemented on-site to achieve runoff reduction. The GI Worksheets included in the Appendix of this report provide the calculations for the green infrastructure techniques chosen to treat the Runoff Reduction Volume for this project. Below is a brief description of each Green Infrastructure Technique along with a discussion regarding the feasibility of each technique with respect to this project.

TABLE 6: GREEN INFRASTRUCTURE FEASIBILITY

Conservation of Natural Areas	
Retain the pre-development hydrologic and water quality characteristics of undisturbed natural areas, stream and wetland buffers by restoring and/or permanently conserving these areas on a site.	Existing state regulated wetland areas and associated buffers exist on site which have not been disturbed.
Sheetflow to Riparian Buffers or Filter Strips	
Undisturbed natural areas such as forested conservation areas and stream buffers or vegetated filter strips and riparian buffers can be used to treat and control stormwater runoff from some areas of a development project.	Wetlands and associated buffers remain on site, however these features have not been quantified as stormwater mitigation.
Vegetated Open Swale	

The natural drainage paths, or properly designed vegetated channels, can be used instead of constructing underground storm sewers or concrete open channels to increase time of concentration, reduce the peak discharge, and provide infiltration.	Overland sheet flow and vegetated swales have been implemented as feasible, however these features have not been quantified as a stormwater mitigation.
Tree Planting/Tree Box	
Plant or conserve trees to reduce stormwater runoff, increase nutrient uptake, and provide bank stabilization. Trees can be used for applications such as landscaping, stormwater management practice areas, conservation areas and erosion and sediment control.	Tree planting has been proposed through the site but has not been quantified as a stormwater mitigation.
Disconnection of Rooftop Runoff	
Direct runoff from residential rooftop areas and upland overland runoff flow to designated pervious areas to reduce runoff volumes and rates.	Not applicable to this project.
Stream Daylighting for Redevelopment Projects	
Stream Daylight previously-culverted/piped streams to restore natural habitats, better attenuate runoff by increasing the storage size, promoting infiltration, and help reduce pollutant loads.	Not applicable to the project.
Rain Garden	
Manage and treat small volumes of stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression.	Rain gardens are not proposed as part of this project since the use of other GITs is more practicable.
Green Roof	
Capture runoff by a layer of vegetation and soil installed on top of a conventional flat or sloped roof. The rooftop vegetation allows evaporation and evapotranspiration processes to reduce volume and discharge rate of runoff entering conveyance system.	Not used.
Stormwater Planter	
Small landscaped stormwater treatment devices that can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and	Landscaping in green areas and planted beds are proposed throughout the development, but planters have not been proposed for treatment. No credit has been taken in the SWPPP.

biogeochemical processes to decrease stormwater quantity and improve quality.	
Rain Tank or Cistern	
Capture and store stormwater runoff to be used for irrigation systems or filtered and reused for non-contact activities.	Not used.
Porous Pavement	
Pervious types of pavements that provide an alternative to conventional paved surfaces, designed to infiltrate rainfall through the surface, thereby reducing stormwater runoff from a site and providing some pollutant uptake in the underlying soils.	Porous pavers have not been used in this design.

The bioretention practices, infiltration ponds, & subsurface infiltration chambers account for the runoff reduction as required.

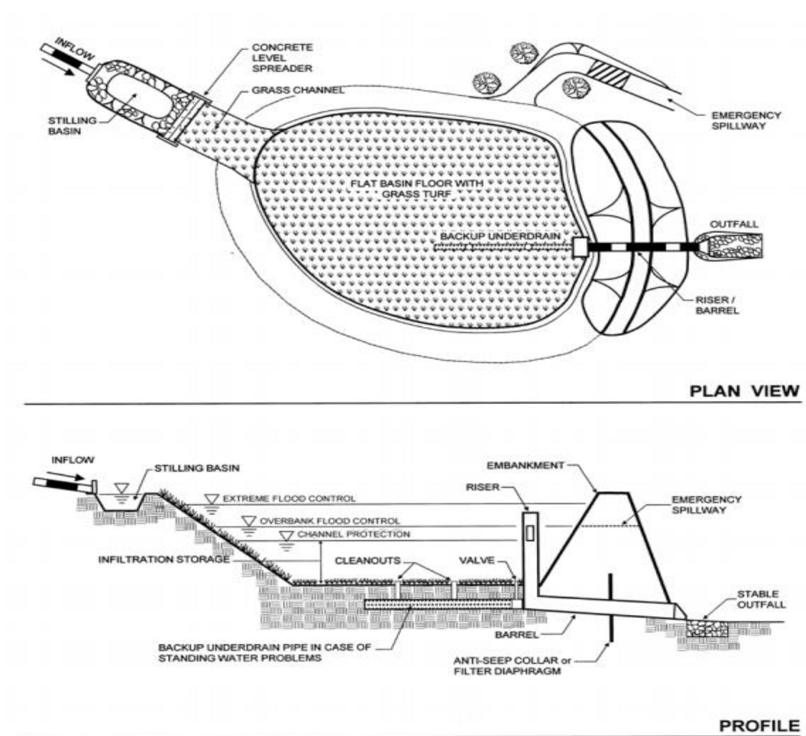
Refer to Tables 5 and 6 above for the decision-making matrices utilized herein. The design for the project utilized a standard SMPs with RRV capacity to attain the required runoff reduction volume and water quality for new construction. NYSDEC Green Infrastructure (GI) worksheets can be found in the appendix summarizing the calculations.

INFILTRATION BASIN:

The proposed design utilizes infiltration basins for RRv/WQv of the new construction. The basins were designed to meet the requirements of the NYSSWDM. The infiltration rates used for ponds in the design is the minimum rate allowed based on the drainage areas per the design manual and will be confirmed with site specific infiltration testing at a later date. The pretreatment has been provided through a series of upstream swirl chambers (hydrodynamic separator) and/or in-line bioretention treatment facilities providing pretreatment of 100% of the total WQv. The proposed outlet control structures have been sized to attenuate larger storm events while maintaining the required 1’ of freeboard.

The stage/storage information of the infiltration basin can be found in the HydroCAD output within the Appendix of this report. The NYSDEC GI worksheet for runoff reduction and water quality treatment can be found in the Appendix for RRv capacity calculations (See NYSDEC GI worksheet). A summary of the water quality provided in these facilities can be found in the tables above.

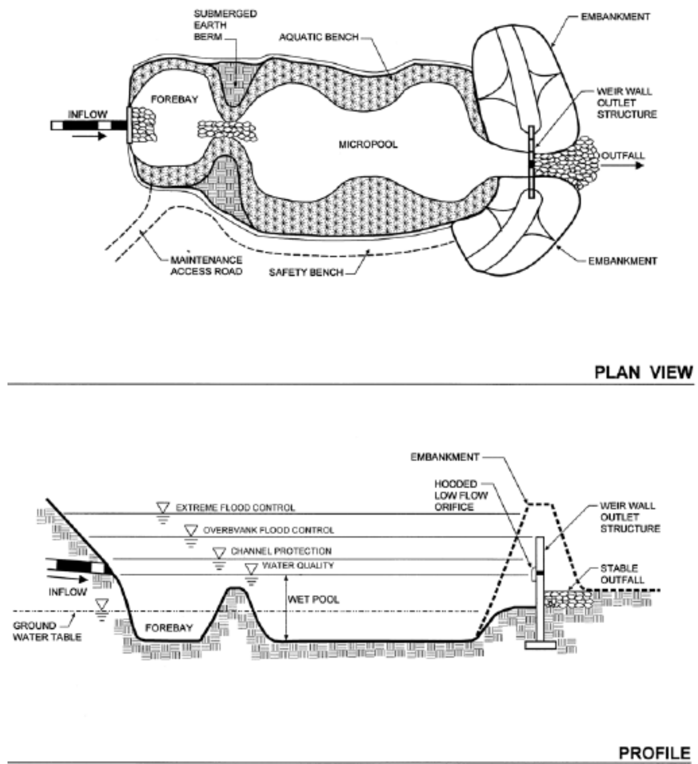
Figure 6.12 Infiltration Basin (I-2)



POCKET POND:

The proposed design utilizes a pocket pond, which is a suitable stormwater practice to treat hotspot runoff while providing quality and quantity mitigation in keeping with the requirements in the New York State Storm Water Management Design Manual (NYSSMDM). A pocket pond is a stormwater basin suitable for the treatment of runoff from small drainage areas by maintaining a permanent pool elevation and providing extended detention capacity. Since a permanent pool is proposed with no infiltration capacity accounted for, the HydroCAD model reservoir routing begins at the normal pool elevation. Due to site limitations, a swirl chamber device has been utilized for pretreatment of the piped conveyance which accounts for the majority of the inflow into this practice.

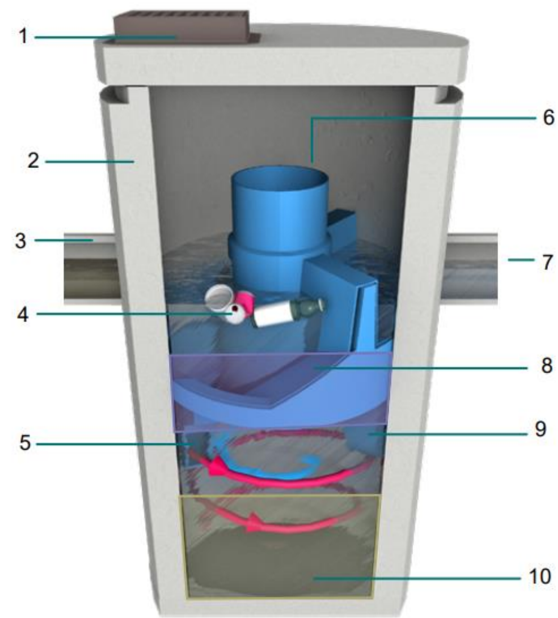
Figure 6.5 Pocket Pond (P-5)



Hydrodynamic Separator (Swirl Chamber):

The applicant proposes to install a hydrodynamic separator to provide water quality pre-treatment and hotspot treatment as part of the “treatment train” upstream of the standard mitigation practices with Runoff reduction capacity. Hydrodynamic separators are devices that move water in a circular, centrifugal manner to accelerate the separation and deposition of primarily sediment from the water. They are suitable for removal of coarse particles, oils, and fuels over small drainage areas. The NYSDEC refers to the New Jersey Department of Environmental Protection for a list of Stormwater Manufactured Treatment Devices which have received Interim Certification (included in the Appendix). One of the products on the list is the Hydro International First Defense unit.

Sizing of the First Defense system (an alternative stormwater practice), requires the application of a “rate-based” sizing approach for water quality treatment (See Section 9.4 of the NYSSMDM). This is a derivation of the standard water quality volume (WQv) calculation generally used and found in chapters 4, 10, and Appendix B, which is a “volume-based” sizing approach. Section 9.2.1.B.III requires treatment of 75% of the water quality volume via the implementation of alternative practices if a “volume based” sizing approach is used. In the “rate-based” approach, the device should be sized to treat the peak rate of runoff from the WQv storm; utilizing the WQv storm precipitation depth, the peak runoff for each tributary area can then be determined, and the associated devices sized appropriately. HydroCAD was used to determine the water quality flow rate for treatment sizing of the First Defense system. The table below lists the water quality storm event, its associated flowrate for the treatment structure, the tributary catchments, and the appropriately sized First Defense system capacity which provides in excess of the required flow, for the location shown on the plans



Components

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

Table 1. First Defense® High Capacity Design Criteria.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates			Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	106µm	230µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	0.3 / 8.77	0.53 / 15.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	0.7 / 20	1.2 / 34	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	1.3 / 37.9	2.2 / 62.2	20 / 566	24 / 609	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	2.2 / 63	3.8 / 108	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	5.1 / 144	8.6 / 243	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

[1] Contact Hydro International when larger pipe sizes are required.
[2] Contact Hydro International when custom sediment storage capacity is required.
[3] Minimum distance for models depends on pipe diameter.

The First Defense treatment system has the capacity of bypassing high flow rates internally as well as controlling flow through the treatment chamber so as to avoid wash-out of previously captured pollutants. The HydroCAD output can be found in the Appendix of this report. Specifications for the First Defense Systems can also be found in the appendix of this report along with certification from NYSDEC that it is an accepted proprietary device. The NJCAT testing certification is also included within the Appendix.

Table 7: Swirl Chamber Sizing Calculations

Proposed First Defense System	90% Rainfall Event Number (P) Inches	Tributary Catchment Areas (WS-#)	Required Water Quality Flow, cfs	Hydro International First Defense Model	Treatment Capacity, cfs
H-1	1.40	PW 1A	2.2	FD-5HC	2.34
H-2		PW 1E	2.86	FD-6HC	3.38
H-3		(PORTION OF) PW 1BE	<6.00	FD-8HC	6.00
H-4		(PORTION OF) PW 1BE	<1.50	FD-4HC	1.50
H-5		PW 1BW	5.87	FD-8HC	6.00
H-6		PW 1E	3.86	FD-8HC	6.00
H-7		PW 2B & PW 2C	2.28	FD-6HC	3.38

VI. EROSION & SEDIMENT CONTROL

Construction operations shall be carried out in such a manner that erosion will be controlled and sediment migration minimized. Federal, State, and Local laws concerning pollution reduction will be followed. The control practices indicated on attached Erosion & Sediment Control Plans shall be installed and used on this project.

The list of measures and practices below are contained on the Erosion and Sediment Control Plans in the appendix of this report and shall be installed and maintained per the most current edition of the New York Standard Specifications for Erosion and Sediment Control Handbook ("Bluebook"). All erosion control measures implemented shall be in accordance with the construction sequence schedule as described in Section VIII of this narrative.

Infiltration areas must be protected from sedimentation at all times during construction until all tributary areas have met the criteria of final stabilization. Engineered bioretention soils cannot be installed in the ponds until tributary areas have been stabilized unless the soil media is otherwise protected runoff that could compromise the composition of the soil media.

Temporary Measures

Silt Fence – Silt fence shall be placed along the toe of all fill areas or any location where surface sheet flow could be expected in accordance with temporary soil erosion and sediment control plans serving to reduce runoff velocity and effect deposition of transported sediment load. Where silt fence ends, the end shall turn and run perpendicular to contours for a length of ten (10) feet, or for a difference in elevation of two (2) feet, whichever comes first.

Mulching – Mulching of all disturbed surfaces will be mandatory. Hydroseeding with mulch only mixes will be the preferred method.

Stabilized Construction Access - A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area. The purpose of stabilized construction access is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

The access shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately. When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

Concrete Washout Station - A temporary concrete washout station is to be used near the entrance to the site. The station will have a depth of 24 inches and shall be a minimum of 10 feet by 10 feet. Station shall be lined with a 10mil waterproof plastic membrane. Any tools or equipment that were used for concrete work will be cleaned here before leaving the site.

Permanent Measures

Topsoil, Seed & Mulch – Final vegetative stabilization shall be used at all locations where the ground has been disturbed and impervious covers are not specified. Mulch shall be applied with, or immediately after seeding.

Rock outlet protection- Stone riprap is to be placed at the outlet end of the culverts beneath the flared end section to slow down the flow of the runoff and reduce erosion.

Maintenance and Inspection of Measures

All temporary and permanent soil erosion and sediment measures shall be maintained by the contractor during the life of the project. The contractor shall have a trained contractor, as defined in the GP-0-20-001 (See Appendix 4) on site at all times. The trained contractor shall be responsible for the day to day construction and maintenance of all erosion and sediment control measures.

All temporary measures (silt fence, inlet protection, silt sock, sediment basins, etc.) and permanent measures (landscaping) shall be inspected by the Qualified Inspector every seven calendar days. The Qualified Inspector role and inspection requirements are outlined in Part IV.C of the GP-0-20-001 (See Appendix 4). All inspections are required to be completed within one calendar day. Any comments, suggestions or corrective actions the Qualified Inspector notes shall be addressed by the contractor within 24 hours of the inspection.

General Enhanced Erosion and Sediment Control Plan:

- Enlarged sediment ponds or sediment storage traps utilizing the maximum practical area in excess of the minimum amount recommended in the Bluebook
- Apply slope protection measures within 3 days after earthmoving on a particular slope is complete.
- Install reinforced silt fences with hay bale or silt sock backing along wetlands or other sensitive areas.
- Install bonded fiber matrix hydraulically applied mulch as temporary stabilization (hay/straw mulch and unbonded hydraulically applied mulches are not acceptable)
- Install flexible growth medium with seed, soil amendment, and fertilizer to seek final stabilization
- Perform equipment (cat) tracking for bare slopes to be protected. (See page 4.56 of the Bluebook)
- Install slope crest protection (perimeter dike/swale) measures to divert flow from going down the newly graded slope. (See page 3.36 of the Bluebook)
- Install pipe slope drains. (See page 3.37 of the Bluebook) Install reverse slope bench on the long slopes to convey water to a stable outlet. (See page 4.24 of the Bluebook)
- Install Geosynthetic Turf Reinforcement Mats available from Profile Products or equal on the embankments of sediment basins; immediately following construction. (See pages 5.19 to 5.41 of the Bluebook)
- Install Geosynthetic Turf Reinforcement Mats available from Profile Products or equal in temporary diversion ditches within two days of construction to stabilize the ditch.
- Install floating water skimmers connected to the outlet riser pipe in sedimentation ponds (See attached diagrams)
- Install sediment filter bags on the downstream end of the outlet pipe. (See page 5.16 of the Bluebook)
- Design sedimentation pond to maximize the sediment residence time. (See pages 5.19 to 5.41 of the Bluebook)
- Address the disposal or storage of sediment cleaned from sediment control devices, sediment ponds, ditches, and drainage inlets.

- Stabilize construction access roads with crushed stone, item 4, etc.
- Assign a dedicated and trained crew to maintain and repair erosion and sediment control measures daily.
- Install hydroseed & erosion control matting on all disturbed slopes 3H:1V or steeper
- Follow NYSDEC guidelines which limit the maximum soil disturbance area to 18 acres at any given time (or 5 acres max for projects not seeking 5-acre disturbance waiver). Temporary stabilization must be utilized in inactive areas to manage the amount of active open soil disturbance.

Construction Sequence:

All work is to be done in accordance with the New York Standards and Specifications for Erosion and Sediment Control. See the Erosion & Sediment Control Plan included in the appendix of this report which has general erosion and sediment control notes and a sequence of construction, which can also be found below.

The erosion control practices designed specifically for the site phasing are to be implemented during construction. These include sediment traps, inlet protection, a stabilized construction entrance, staging areas, silt fence, temporary swales, temporary stockpiles, temporary sediment ponds, silt socks, erosion control matting/blankets, and temporary/permanent stabilization. The E&SC Plan and Details found in the appendix of this report depict the location and size of the proposed erosion control practices to be used during construction.

A sediment trap detail and sizing criteria have been provided on the plans. These sizes and volumes are required through the device and can be relocated as practical by the Contractor (note: traps must be sized to provide 3,600 CF of storage per 1-acre of disturbance and tributary to each location). It is recommended to provide increased storage in excess of the required volume.

Sediment Pond Restoration: When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposits are to be leveled or otherwise disposed of. Sediment can be disposed of by exporting it off site for disposal or be used as fill in lawn areas. Sediment ponds in future open space or lawn areas may be pumped dry, graded, and backfilled. Sediment ponds in paved or structural areas must have the basin material and trapped sediments removed, safely disposed of, and backfilled with structural fill. Sediment ponds in locations of future stormwater ponds must have the trapped sediment removed leaving the basin area open for the development of the final stormwater pond.

The applicant and the applicant's contractor are required to attend a preconstruction meeting with representatives from the Town Building Departments, Highway Departments, Engineers and any other parties deemed necessary to review all protocols, bonding requirements, agreements and the sequence and scheduling of the work being undertaken, as applicable.

Construction Sequencing:

Refer to the erosion & sediment controls plans included as an appendix to this report for construction limit of disturbance, recommended temporary sediment basin sizing, and other recommended erosion control measures.

1. The contractor must first delineate and protect the wetlands and associated buffer areas. Install construction entrances and all applicable erosion control measures as shown on the plan, including silt fencing and temporary swales. Establish staging areas.
2. Contractor shall install the temporary sediment basins as indicated on the site plan and/or as required to construct the project while maintaining functionality of the necessary storage. Contractor to construct additional temporary diversion swales and sediment traps as needed to direct and capture runoff from disturbed areas. Locations and size of the erosions and sediment control practices are noted on the plan. These may vary depending on the contractor's schedule and approach but 3,600 cf of storage must be provided at a minimum per acre of upstream disturbance. Sediment traps shall be installed in accordance with the plans and details. Sediment traps and basins shall be sized in accordance with the New York Standards and Specifications for Erosion and Sediment Control Manual. Sediment ponds should have non-erosive inlets and the embankments should be stabilized with vegetation or mechanical control measures to minimize turbidity of the stored water to the maximum extent practical.
3. Disturbed soils shall be temporarily stabilized as soon as practical. Materials stored in stockpiles shall be cordoned off with silt fence per the appropriate specifications and details. The operator shall initiate stabilization measures as soon as practical in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than (14) days after the construction activity in that portion of the site has temporarily or permanently ceased.

   Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats). Stabilization shall be maintained per SPDES General Permit for stormwater runoff from construction activity, GP-0-20-001 or as amended.

4. The Contractor shall grade the site systematically, installed stone roadways in heavily trafficked areas and installing pavement subbase materials as soon as practical to minimize the amount of actively open soil area. Remove soil/rock/stockpile excess material as necessary. The contractor will then install the site utilities and remaining retaining walls. Temporary swales must be used throughout the grading process to ensure runoff is always directed towards a sediment pond prior to discharging the site.
5. The subbase and curbing shall be installed as soon as practicable to provide a stabilized surface.
6. Once the areas upland of the sediment traps/basins have been stabilized, the bioretention systems, underdrains, and soil media can be installed. All upstream structures must have adequate inlet protection prior to the system being place on-line.
7. Grade and spread topsoil on all lawn areas and seed, install sidewalks. Maintain all seeded and planted areas to insure a viable stabilized vegetative cover.

8. The project site must meet *final stabilization* criteria prior to removing all erosion and sediment control devices and closing out the project. Litter and construction debris shall be removed as practical throughout the life of the project.

    - *Final Stabilization* means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

9. Upon final stabilization being met, Contractor shall clear the drainage system, drainage pipe, and all existing and new structures on site of any sediment which may have accumulated during construction.
10. Additional erosion control measures shall be installed, as may be necessary, required and/or requested by authorities, to prevent the incidental discharge of silt laden runoff from entering a water course or a drainage system. The general permit for stormwater discharges from construction activities states that it is unlawful for any person to cause or contribute to a violation of water quality standards.

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

VII. GOOD HOUSEKEEPING

Good housekeeping practices are inexpensive, relatively easy to implement and are often effective in preventing stormwater contamination. Specific activities that should be completed by the contractor are listed below:

SPILL INVENTORY

The materials or substances listed below are expected to be present on-site during construction:

- Concrete
- Fertilizers
- Piping
- Paints (enamel & latex)
- Treated and non-treated wood
- Seed
- Tar
- Petroleum-based products
- Reinforcing steel
- Cleaning solvents
- Masonry block
- Paving materials

MATERIAL MANAGEMENT PRACTICES

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff:

- Products shall be kept in original containers unless they are not re-sealable.
- Original labels and material safety data sheets (MSDS) shall be retained; they contain important product information.
- An effort shall be made to store only enough products required to do the job.
- All materials stored onsite shall be stored in a neat, orderly manner in their appropriate containers, and if possible, under a roof or other enclosure and/or on non-porous blacktop.
- Products shall be kept in their original containers with the original manufacturer's label.
- Substances shall not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product shall be used up before disposing of the container.
- Manufacturer's recommendations for proper use and disposal shall be followed.
- The contractor's site superintendent shall inspect daily to ensure proper use and disposal of materials on site.

SPILL CONTROL PRACTICES

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup.

- Spills, of any size, of toxic or hazardous material and/or petroleum products shall be reported to the NYSDEC and Central Hudson's Environmental Affairs division.
- Manufacturer's recommended methods for spill cleanup shall be clearly posted and site personnel shall be made aware of the procedures and the locations of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup shall be kept in the material storage area onsite. Equipment and materials shall include but not be limited to brooms, dust pans, mops, rags, gloves, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills shall be cleaned up immediately after discovery.
- The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- The spill prevention plan shall be adjusted to include measures to prevent toxic or hazardous material of spills from recurring and how to clean up the spill. A description of the spill, what caused it, and the cleanup measures shall also be included.

The contractor's site superintendent is responsible for the day-to-day site operations and shall be the spill prevention and cleanup coordinator.

PRODUCT SPECIFIC PRACTICES

The following product specific practices shall be followed onsite.

- Petroleum Products – All onsite vehicles shall be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used on site shall be applied according to manufacturer's recommendations.

- Fertilizers- Fertilizers shall be applied only in the minimum amounts recommended by the manufacturer. Use only fertilizers that have 5 or less parts phosphorous. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed. The contents of any partially used bags of fertilizer shall be transferred to a sealable plastic bin to avoid spills.

- Paints – All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged to the storm sewer system but shall be properly disposed of according to the manufacturer's instructions or state and local regulations.

- Concrete Trucks – Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water on the site, unless in approved clean-out areas.

- Waste Disposal – All waste materials shall be collected and stored in a securely lidded metal dumpster rented from a licensed solid waste management company. The dumpster shall meet all local and any State solid waste management regulations. All trash and construction debris from the site shall be deposited in the dumpster. The dumpster shall be emptied as necessary, and the trash shall be hauled to a NYSDEC permitted landfill. No construction waste materials shall be buried onsite. All personnel shall be instructed regarding the correct procedure for waste disposal.

- Hazardous Waste – All hazardous waste materials shall be disposed of in a manner specified by local or State regulations or the manufacturer. Site personnel shall be instructed in these practices.

- Sanitary Waste – All sanitary waste shall be collected from the portable units by a licensed sanitary waste management contractor, as required by local regulation and as required to protect public health and safety.

- Recyclable Waste – All recyclable waste (cardboard, wood, etc.) shall be collected and recycled on a weekly schedule.

VIII. RESPONSIBLE PARTIES

IMPLEMENTATION OF SWPPP

The owner/operator is responsible for implementing the provisions of the SWPPP and ensuring that the appropriate contractors and subcontractors on the site provide certification in accordance with the provisions of the GP-0-20-001.

The owner/operator is also responsible to have a trained contractor and Qualified Inspector inspect the active construction site in accordance with section 6.3 of this report and all provisions for inspections defined in the GP-0-20-001, (See Appendix 4) A trained contractor cannot conduct

Qualified Inspector site inspections unless they meet the Qualified Inspector qualifications listed in appendices of the GP-0-20-001.

INSPECTION REQUIREMENTS
The owner/operator is responsible for implementing inspections of all erosion and sediment control measures. To do so, the owner/operator shall have a Qualified Inspector inspect the site in accordance with the guidelines of Part IV of the GP-0-20-001. A sample inspection template is provided in the Appendix of this report.

The owner/operator shall maintain a record of all inspection reports in a site logbook. The site logbook shall be kept on site and be made available to the permitting authority upon request. The owner/operator shall also retain a copy of this SWPPP document at the construction site during the life of the project.

IX. END OF PROJECT – TERMINATION OF PERMIT

FINAL INSPECTION
Prior to filing the Notice of Termination (NOT), or at the end of permit term, the owner/operator shall have a *Qualified Inspector* perform a final site inspection. The inspector shall certify that the site has undergone final stabilization using either vegetative or structural stabilization methods. Final stabilization means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of 80% has been established on all unpaved areas and areas not covered by permanent structures.

NOTICE OF TERMINATION
When the site has been finally stabilized, the owner/operator must submit a Notice of Termination (NOT) form to terminate coverage under SPDES General Permit GP-0-20-001. The permittee must identify all of the permanent stormwater management structures that have been constructed. In addition, a manual describing the operation and maintenance practices that will be necessary for the structures(s) to function as designed after the site is stabilized must be developed and in place. The permittee must also certify that the permanent structure(s) have been constructed in conformance with this document. A copy of the Notice of Termination (NOT) is provided in the Appendix of this report.

RECORD KEEPING
The owner/operator shall retain copies of SWPPP, any reports submitted in conjunction with this permit, and records of all data used to complete the NOI & NOT for a period of at least five (5) years from the date that the site is finally stabilized.

X. SUMMARY OF PROPOSED STORMWATER IMPROVEMENTS

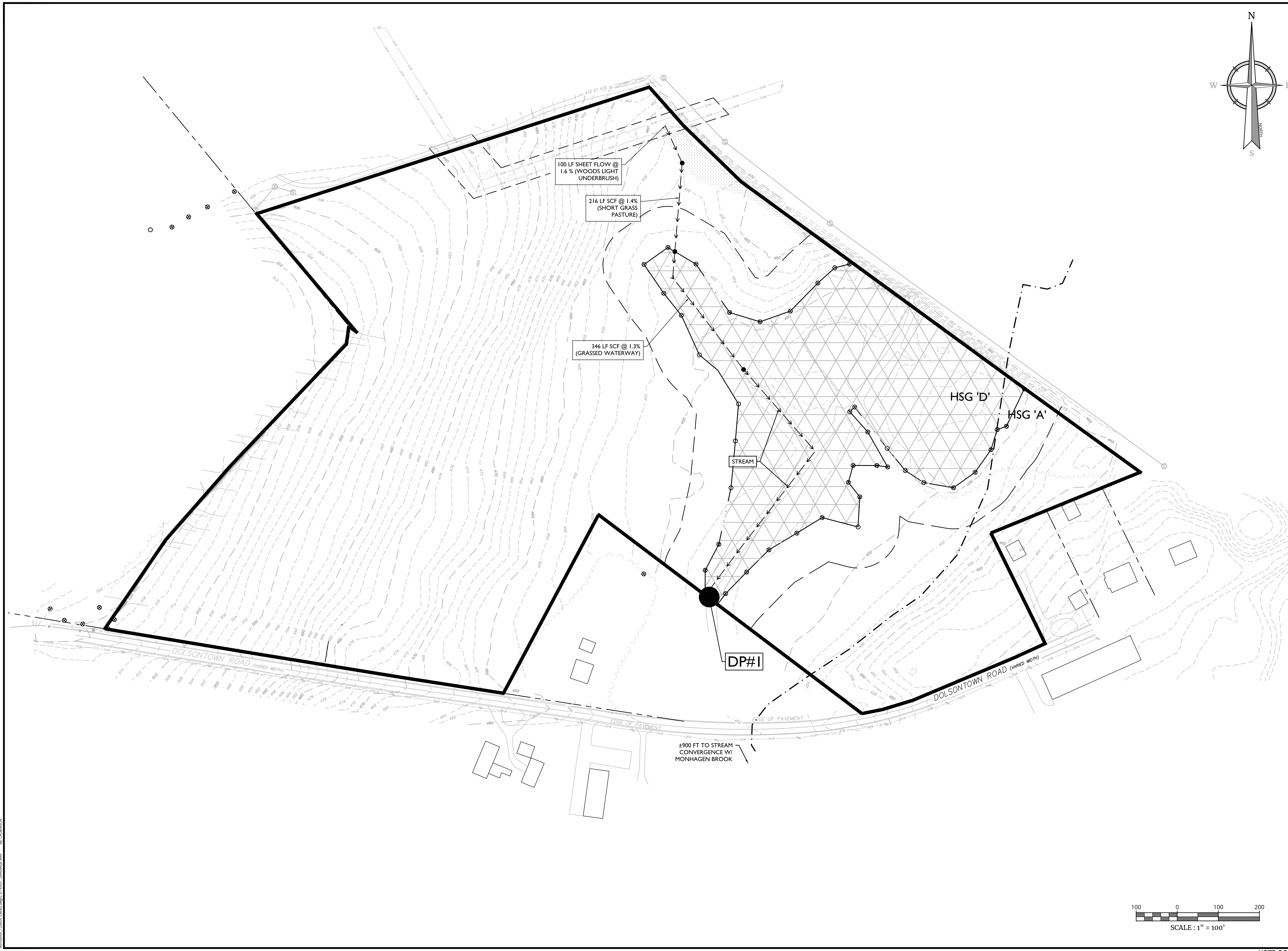
The site runoff has been attenuated for peak flows in the peak design storms. The new impervious area has been treated for the required water quality and runoff reduction through the use of bioretention ponds and infiltration basins. The design utilizes DEC approved practices that help maintain the existing hydrology.

XI. CONCLUSION

As the storm water pollution prevention plan provides water quality treatment and peak flow mitigation meeting the applicable standards, there should be no adverse impacts due to storm water, on-site or off-site, as a result of the proposed development.

r:\projects\2020\20006912b\reports\drainage\jan 2023 - swppp - rev1\pieces\report\230202_swppp - dolsontown east.docx

Appendix 1 | Watershed Maps



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FOR STATE SPECIFIC DIRECT PHONE NUMBERS VISIT: WWW.CALL811.COM

REV	DATE	DRAWN BY	DESCRIPTION
1	01/23/23	CDR	REVISED PER STORMWATER INFILTRATION TESTING RESULTS.

WATERSHED MAPS
FOR
DOLSONTOWN EAST

TAX LOTS:
1-1-52.1
1-1-4.2
&
6-1-3.2

TOWN OF WAWAYANDA
ORANGE COUNTY
NEW YORK STATE

Colliers Engineering & Design

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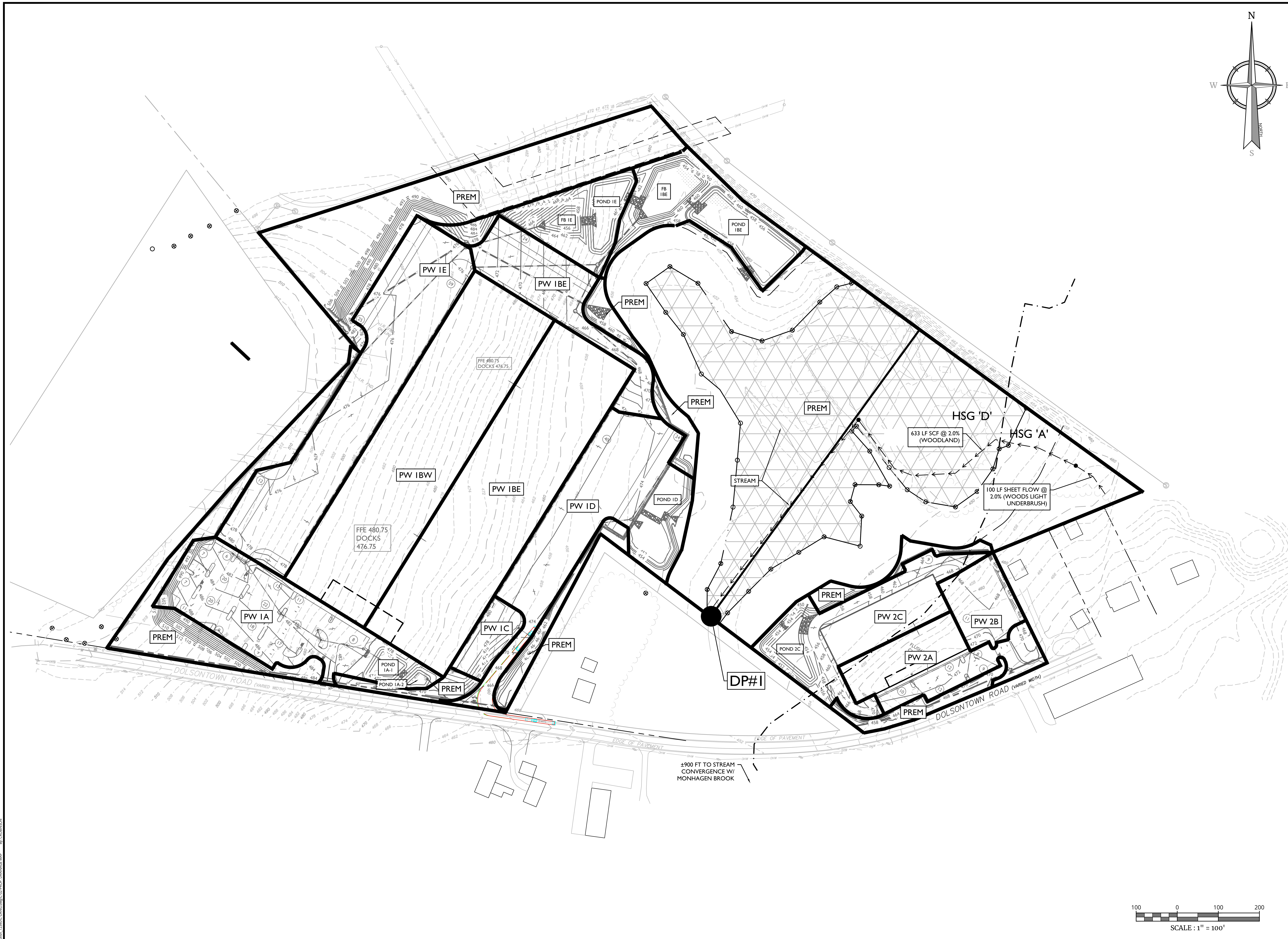
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/18/2022	CDR	ABF

PROJECT NUMBER:	DRAWING NAME:
20006912B	C-DRNG

SHEET TITLE:
EXISTING CONDITIONS DRAINAGE MAP

SHEET NUMBER:
1 of 2

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



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REV	DATE	DRAWN BY	DESCRIPTION
1	01/23/23	CDR	REVISED PER STORMWATER INFILTRATION TESTING RESULTS.

WATERSHED MAPS

FOR

DOLSONTOWN EAST

TAX LOTS:
1-1-52.1
1-1-4.2
&
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SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/18/2022	CDR	ABF

PROJECT NUMBER:	DRAWING NAME:
20006912B	C-DRNG

SHEET TITLE:

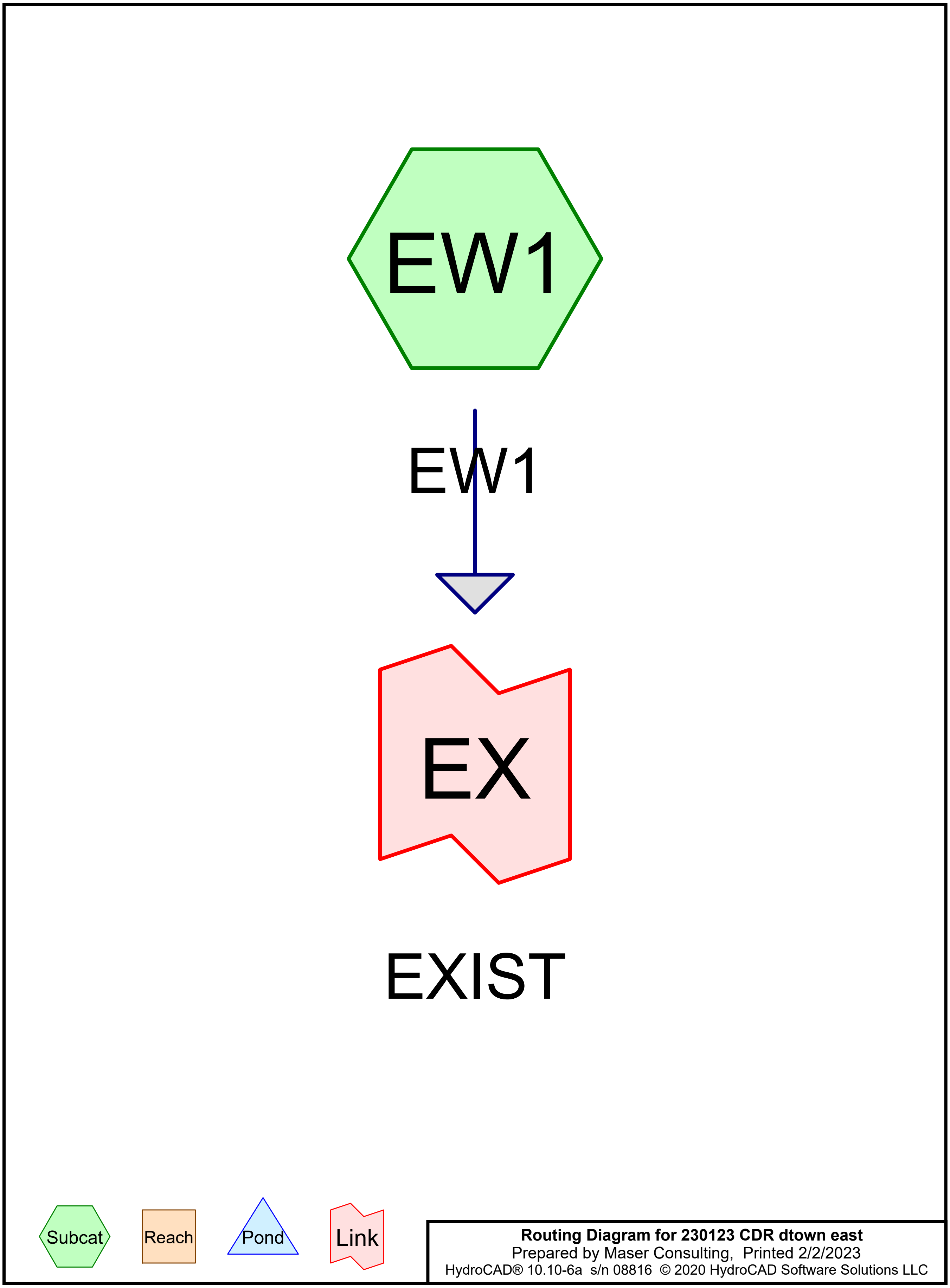
PROPOSED CONDITIONS DRAINAGE MAP

SHEET NUMBER:

2 of 2

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

Appendix 2a | HydroCAD Data (Existing)



Routing Diagram for 230123 CDR dtown east
Prepared by Maser Consulting, Printed 2/2/2023

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	Type III 24-hr		Default	24.00	1	2.64	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.17	2
3	10-yr	Type III 24-hr		Default	24.00	1	4.68	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.23	2
5	WQv	Type III 24-hr		Default	24.00	1	1.40	2

Summary for Subcatchment EW1: EW1

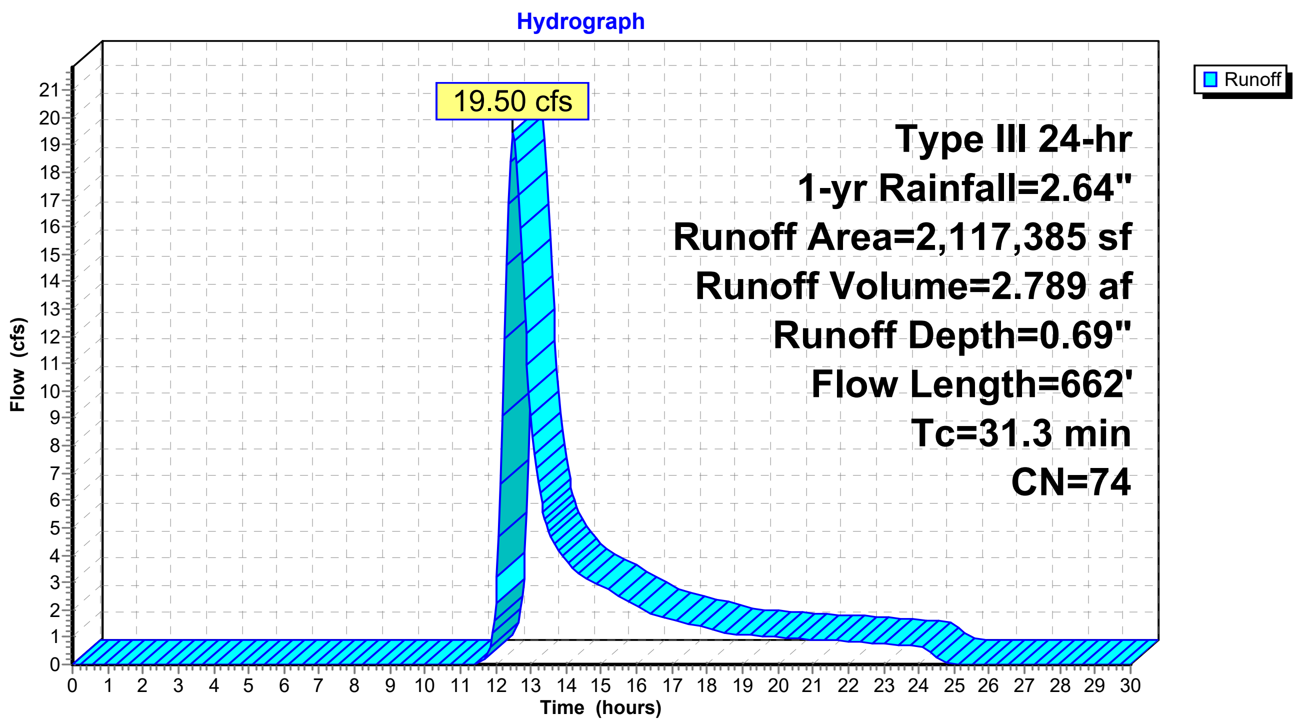
Runoff = 19.50 cfs @ 12.50 hrs, Volume= 2.789 af, Depth= 0.69"
Routed to Link EX : EXIST

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
131,317	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
146,071	30	Meadow, non-grazed, HSG A
1,796,564	78	Meadow, non-grazed, HSG D
2,117,385	74	Weighted Average
2,117,385		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.6	100	0.0160	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
4.3	216	0.0140	0.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	346	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
31.3	662	Total			

Subcatchment EW1: EW1

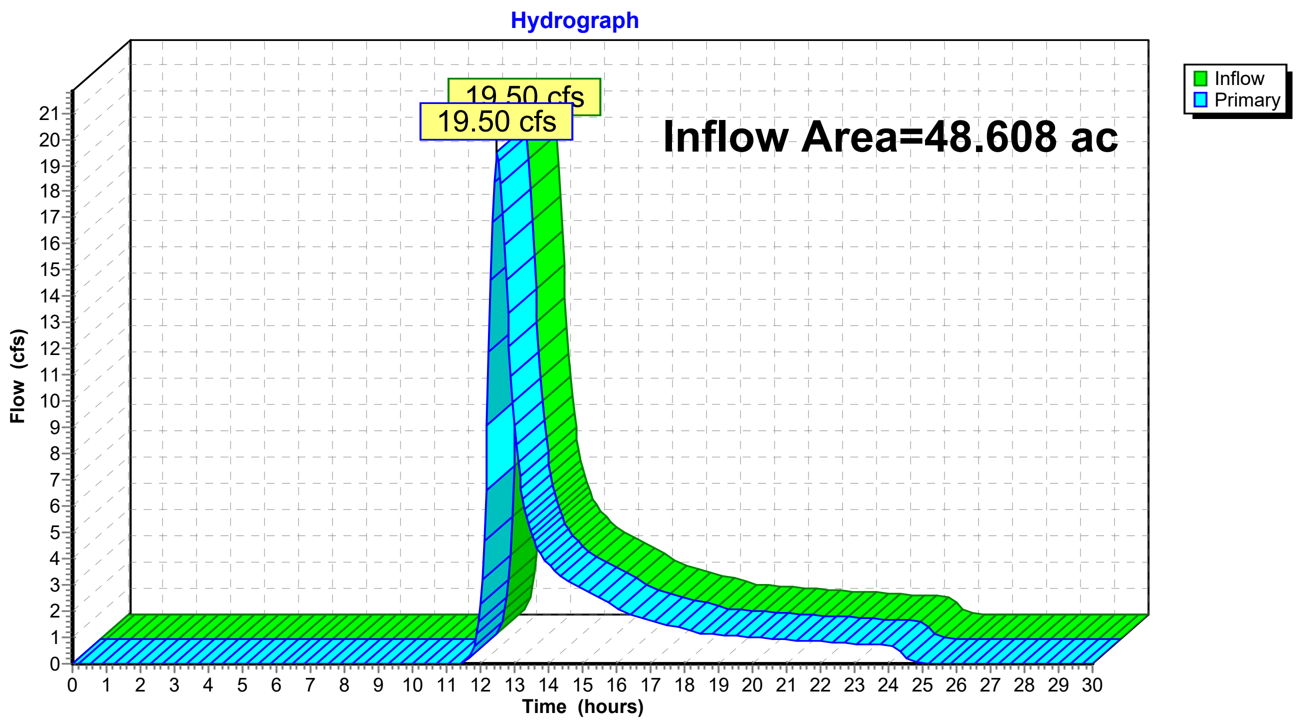


Summary for Link EX: EXIST

Inflow Area =	48.608 ac,	0.00% Impervious,	Inflow Depth = 0.69"	for 1-yr event	
Inflow =	19.50 cfs @	12.50 hrs,	Volume=	2.789 af	
Primary =	19.50 cfs @	12.50 hrs,	Volume=	2.789 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link EX: EXIST



Summary for Subcatchment EW1: EW1

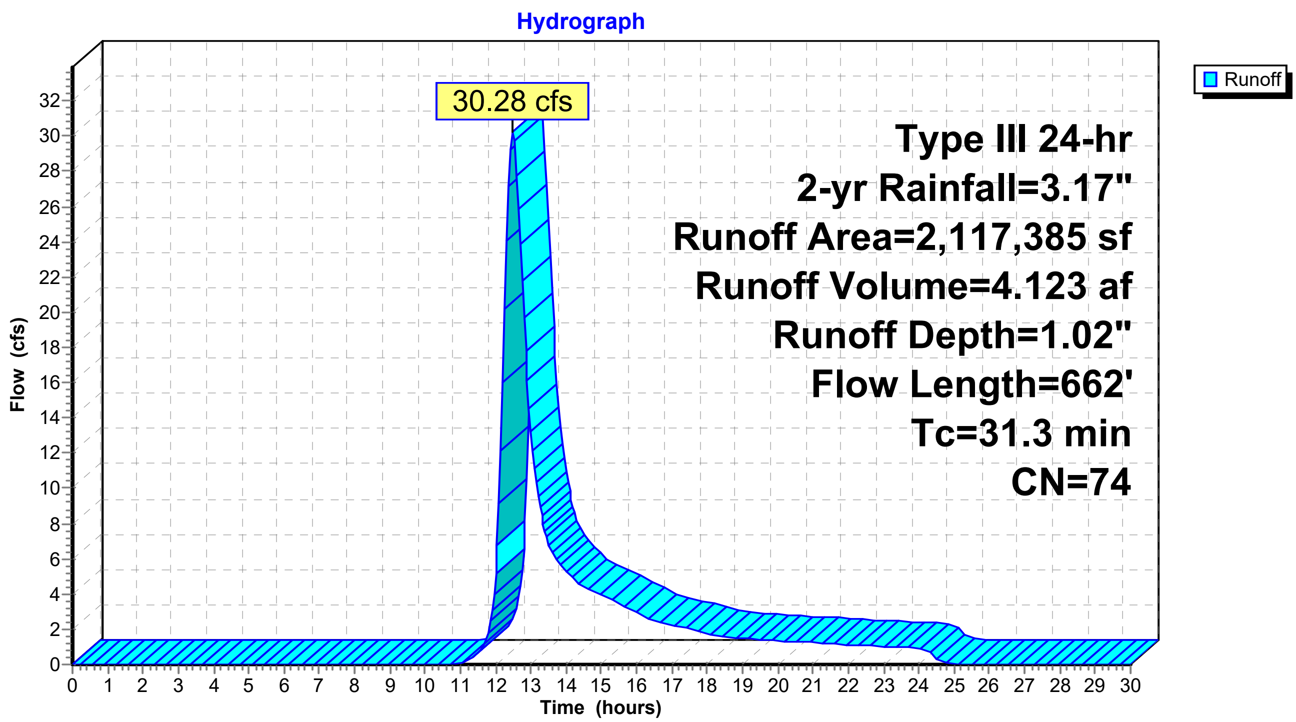
Runoff = 30.28 cfs @ 12.48 hrs, Volume= 4.123 af, Depth= 1.02"
Routed to Link EX : EXIST

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
131,317	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
146,071	30	Meadow, non-grazed, HSG A
1,796,564	78	Meadow, non-grazed, HSG D
2,117,385	74	Weighted Average
2,117,385		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.6	100	0.0160	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
4.3	216	0.0140	0.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	346	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
31.3	662	Total			

Subcatchment EW1: EW1

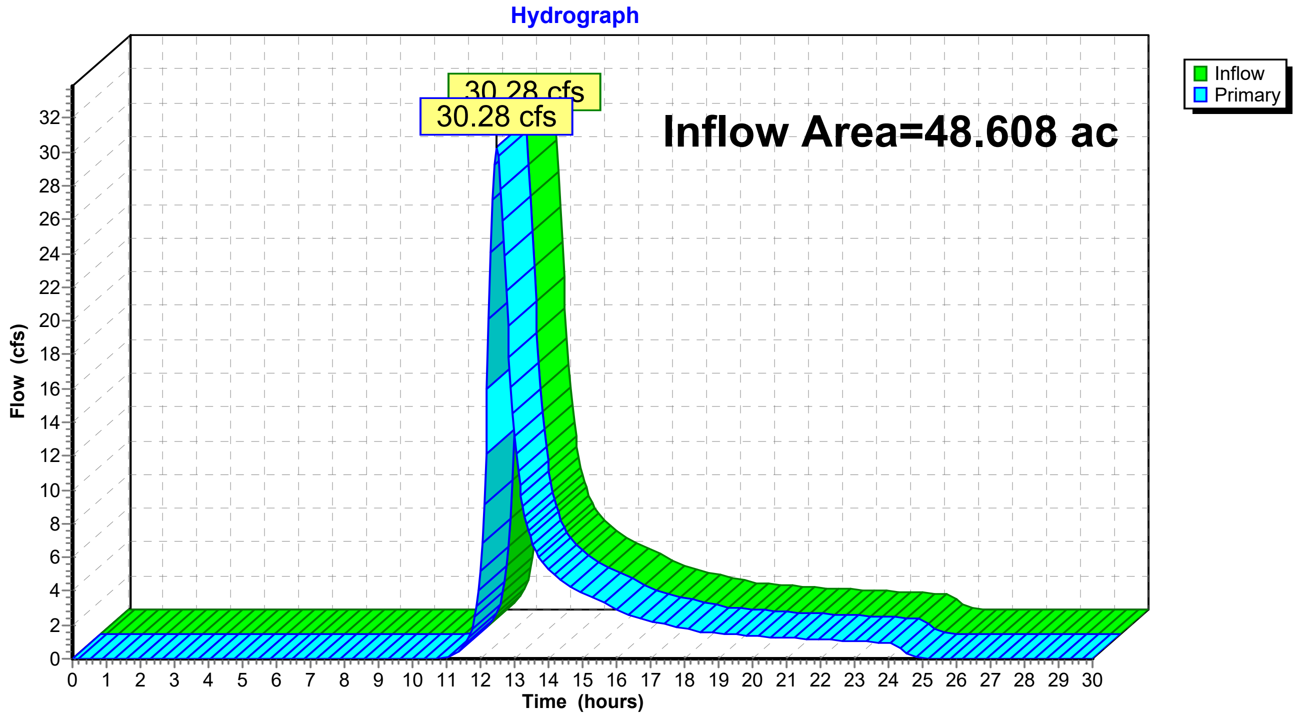


Summary for Link EX: EXIST

Inflow Area = 48.608 ac, 0.00% Impervious, Inflow Depth = 1.02" for 2-yr event
Inflow = 30.28 cfs @ 12.48 hrs, Volume= 4.123 af
Primary = 30.28 cfs @ 12.48 hrs, Volume= 4.123 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link EX: EXIST



Summary for Subcatchment EW1: EW1

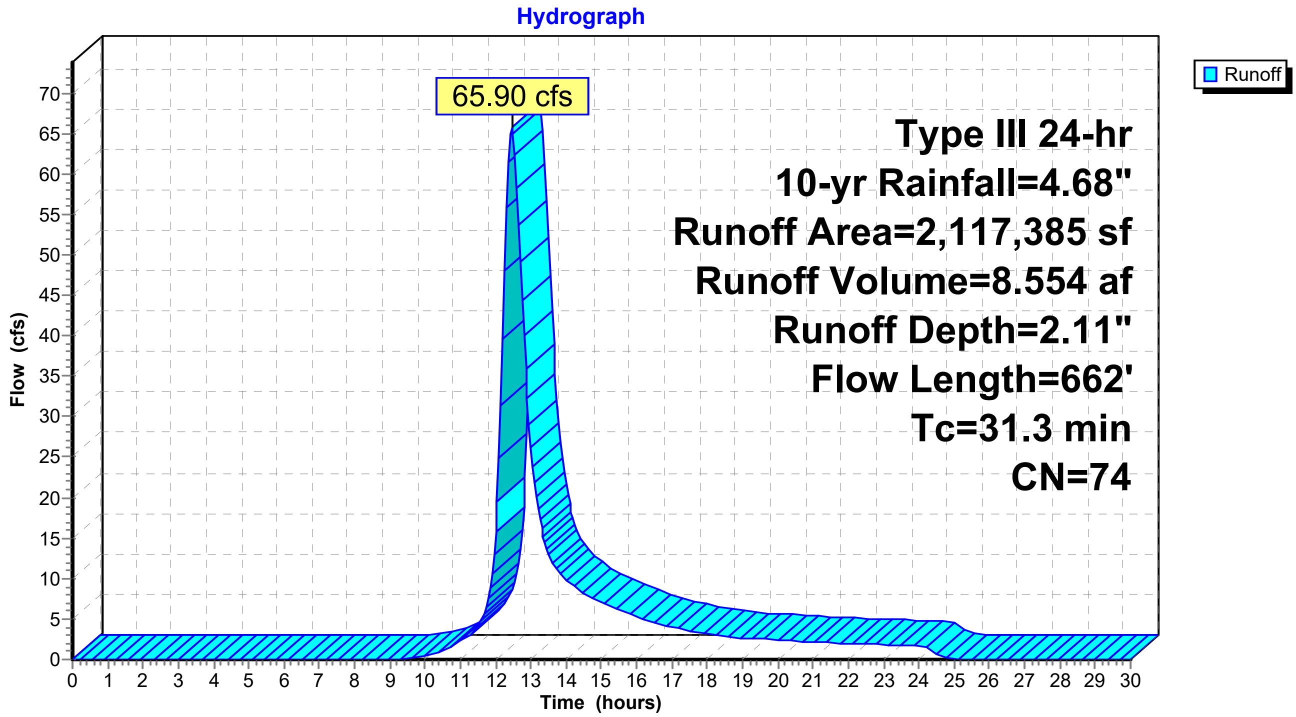
Runoff = 65.90 cfs @ 12.45 hrs, Volume= 8.554 af, Depth= 2.11"
Routed to Link EX : EXIST

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
131,317	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
146,071	30	Meadow, non-grazed, HSG A
1,796,564	78	Meadow, non-grazed, HSG D
2,117,385	74	Weighted Average
2,117,385		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.6	100	0.0160	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
4.3	216	0.0140	0.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	346	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
31.3	662	Total			

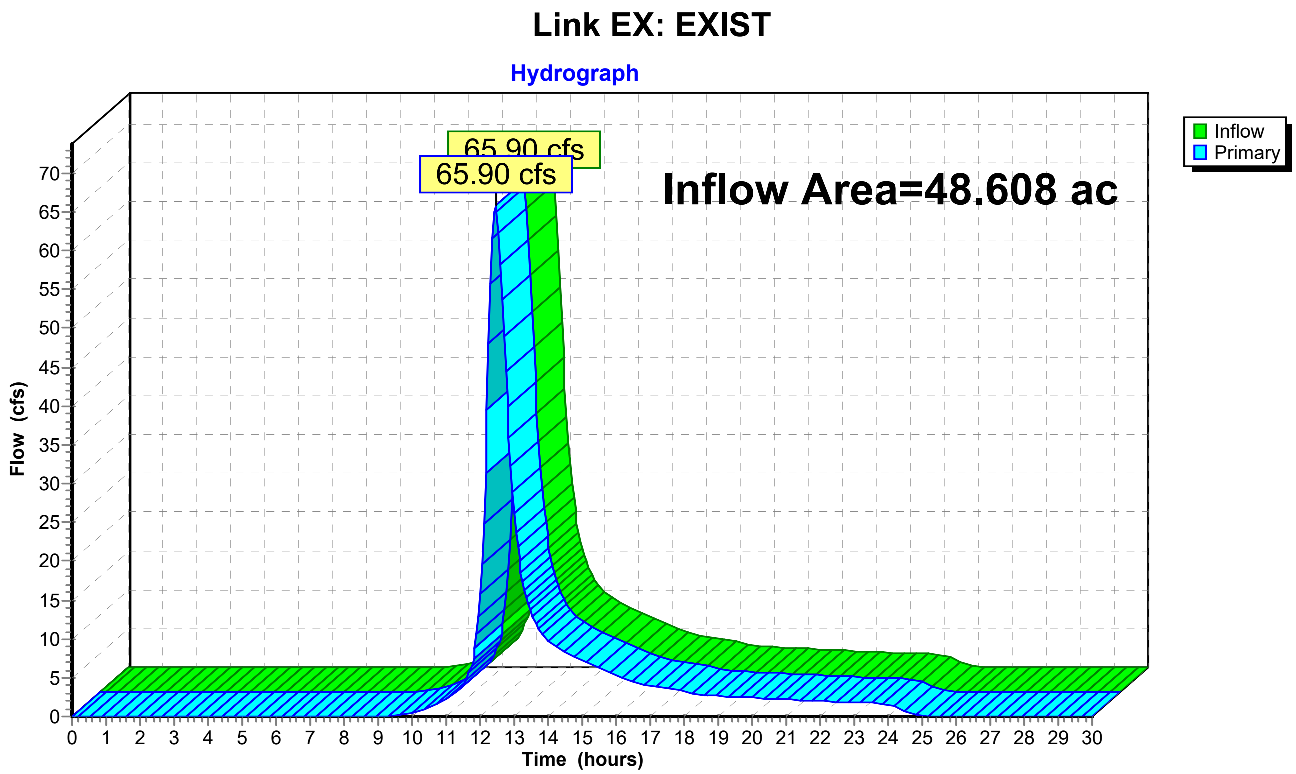
Subcatchment EW1: EW1



Summary for Link EX: EXIST

Inflow Area = 48.608 ac, 0.00% Impervious, Inflow Depth = 2.11" for 10-yr event
Inflow = 65.90 cfs @ 12.45 hrs, Volume= 8.554 af
Primary = 65.90 cfs @ 12.45 hrs, Volume= 8.554 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Summary for Subcatchment EW1: EW1

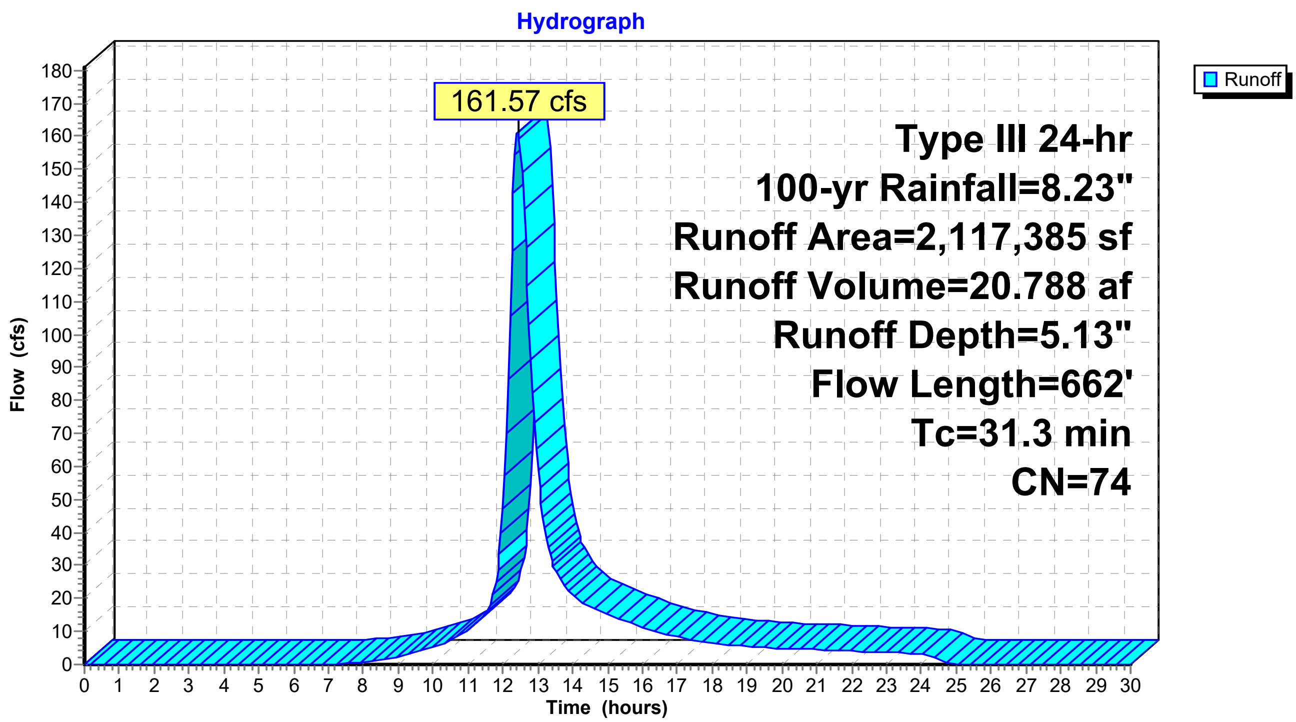
Runoff = 161.57 cfs @ 12.43 hrs, Volume= 20.788 af, Depth= 5.13"
Routed to Link EX : EXIST

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
131,317	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
146,071	30	Meadow, non-grazed, HSG A
1,796,564	78	Meadow, non-grazed, HSG D
2,117,385	74	Weighted Average
2,117,385		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.6	100	0.0160	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
4.3	216	0.0140	0.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	346	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
31.3	662	Total			

Subcatchment EW1: EW1

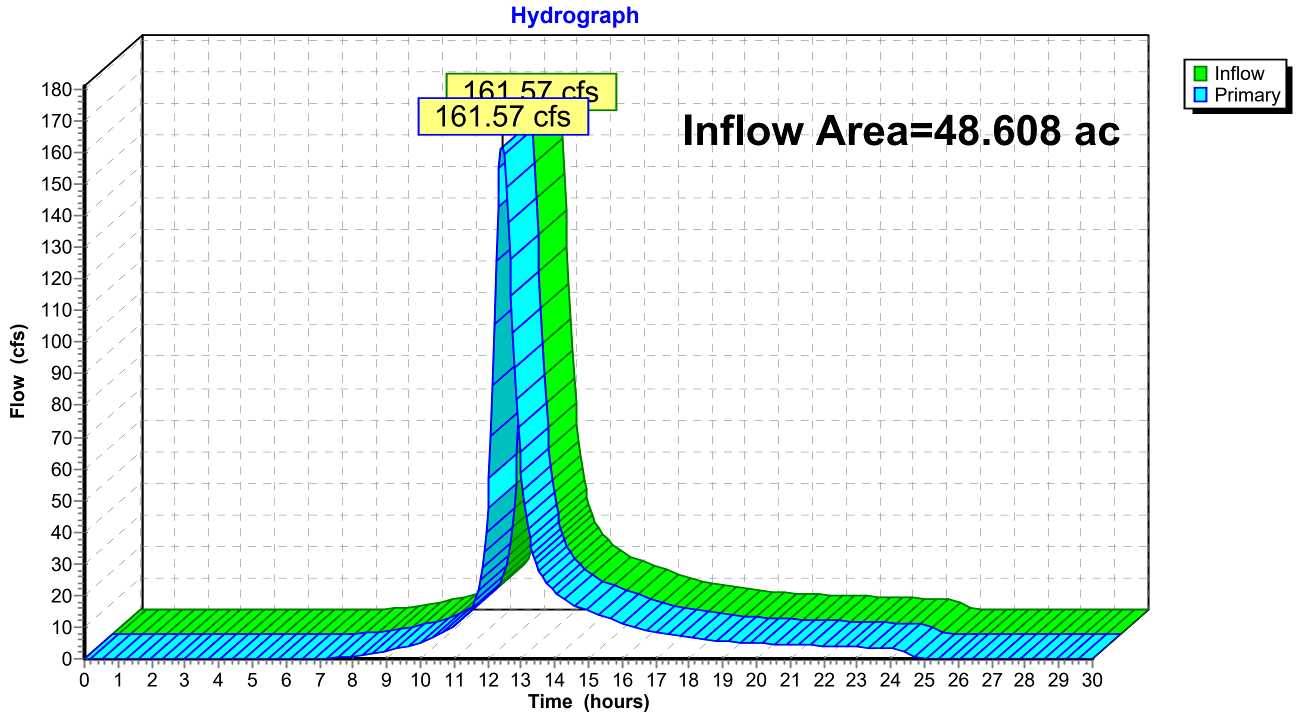


Summary for Link EX: EXIST

Inflow Area = 48.608 ac, 0.00% Impervious, Inflow Depth = 5.13" for 100-yr event
Inflow = 161.57 cfs @ 12.43 hrs, Volume= 20.788 af
Primary = 161.57 cfs @ 12.43 hrs, Volume= 20.788 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link EX: EXIST



Summary for Subcatchment EW1: EW1

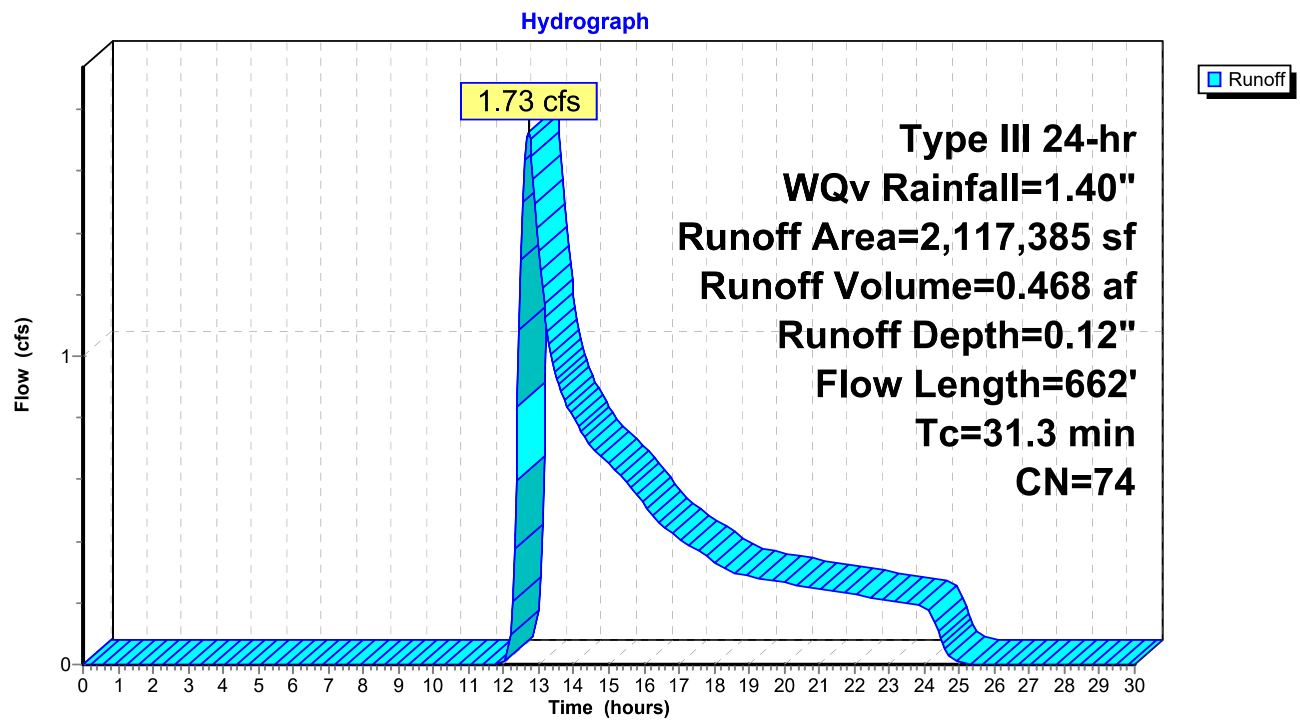
Runoff = 1.73 cfs @ 12.70 hrs, Volume= 0.468 af, Depth= 0.12"
Routed to Link EX : EXIST

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
131,317	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
146,071	30	Meadow, non-grazed, HSG A
1,796,564	78	Meadow, non-grazed, HSG D
2,117,385	74	Weighted Average
2,117,385		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.6	100	0.0160	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
4.3	216	0.0140	0.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	346	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
31.3	662	Total			

Subcatchment EW1: EW1

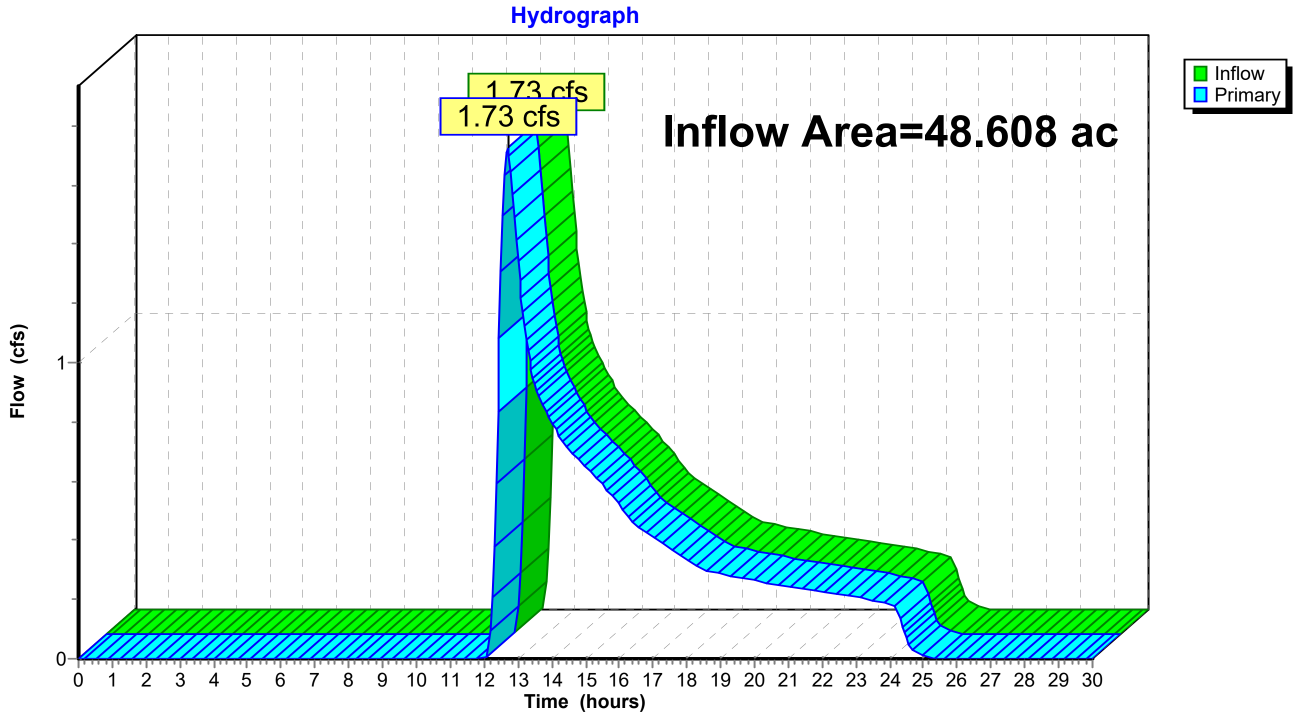


Summary for Link EX: EXIST

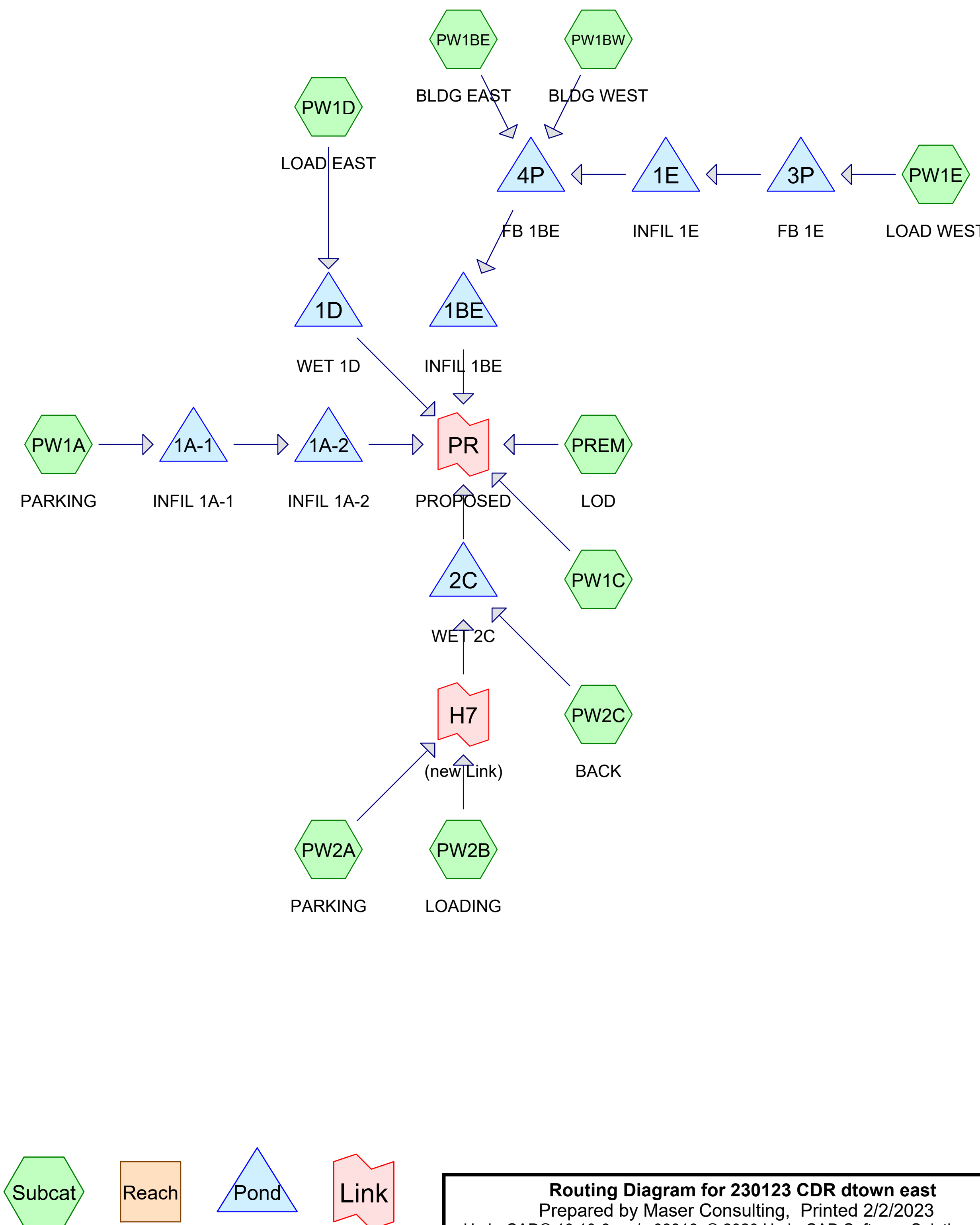
Inflow Area = 48.608 ac, 0.00% Impervious, Inflow Depth = 0.12" for WQv event
Inflow = 1.73 cfs @ 12.70 hrs, Volume= 0.468 af
Primary = 1.73 cfs @ 12.70 hrs, Volume= 0.468 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link EX: EXIST



Appendix 2b | HydroCAD Data (Proposed)



Routing Diagram for 230123 CDR dtown east
Prepared by Maser Consulting, Printed 2/2/2023
HydroCAD® 10.10-6a s/n 08816 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	Type III 24-hr		Default	24.00	1	2.64	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.17	2
3	10-yr	Type III 24-hr		Default	24.00	1	4.68	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.23	2
5	WQv	Type III 24-hr		Default	24.00	1	1.40	2

Summary for Subcatchment PREM: LOD

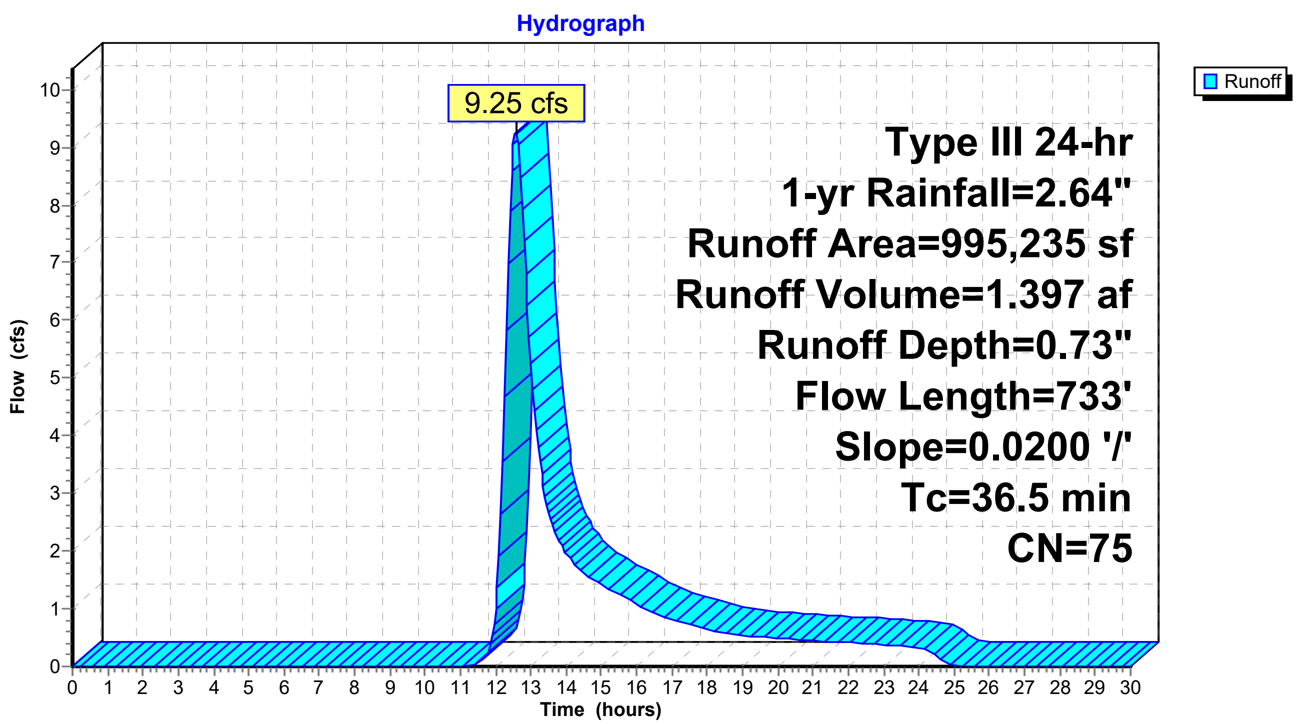
Runoff = 9.25 cfs @ 12.56 hrs, Volume= 1.397 af, Depth= 0.73"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
113,433	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
28,688	30	Meadow, non-grazed, HSG A
532,740	78	Meadow, non-grazed, HSG D
276,941	80	>75% Grass cover, Good, HSG D
995,235	75	Weighted Average
995,235		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
14.9	633	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.5	733	Total			

Subcatchment PREM: LOD



Summary for Subcatchment PW1A: PARKING

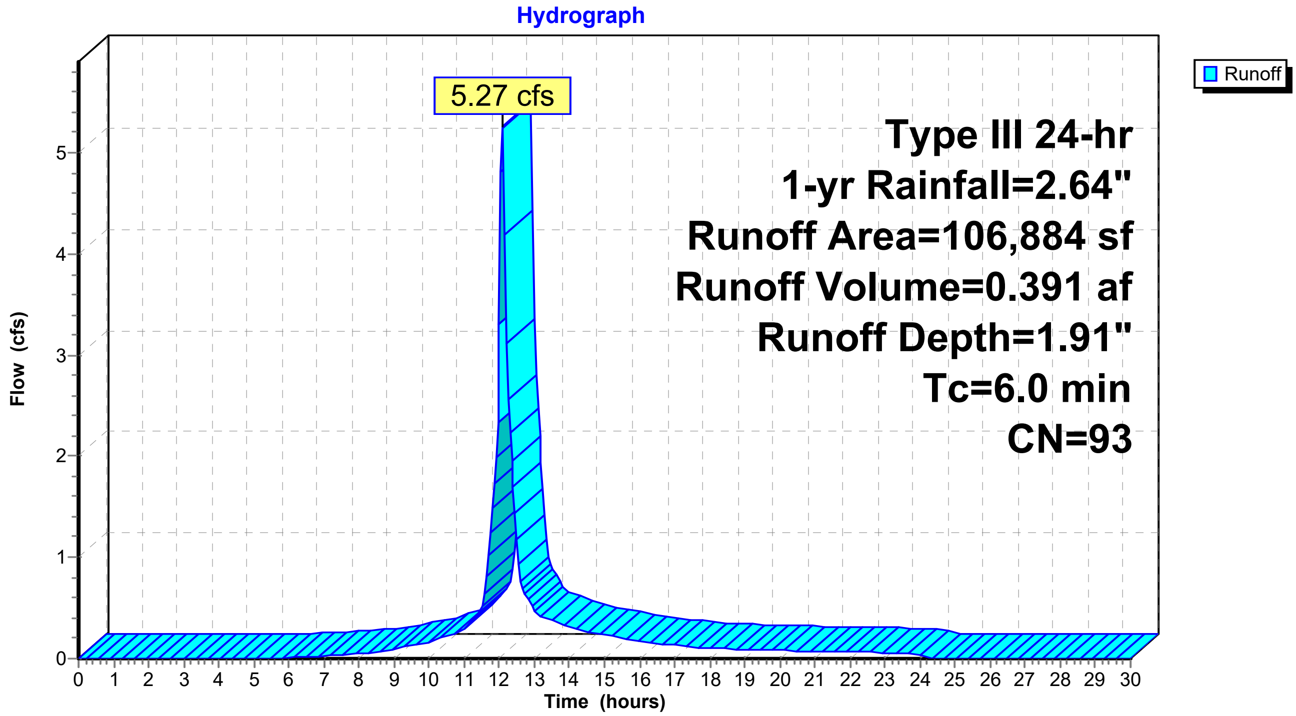
Runoff = 5.27 cfs @ 12.09 hrs, Volume= 0.391 af, Depth= 1.91"
Routed to Pond 1A-1 : INFIL 1A-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
32,522	80	>75% Grass cover, Good, HSG D
74,362	98	Paved parking, HSG D
106,884	93	Weighted Average
32,522		30.43% Pervious Area
74,362		69.57% Impervious Area

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

Subcatchment PW1A: PARKING



Summary for Subcatchment PW1BE: BLDG EAST

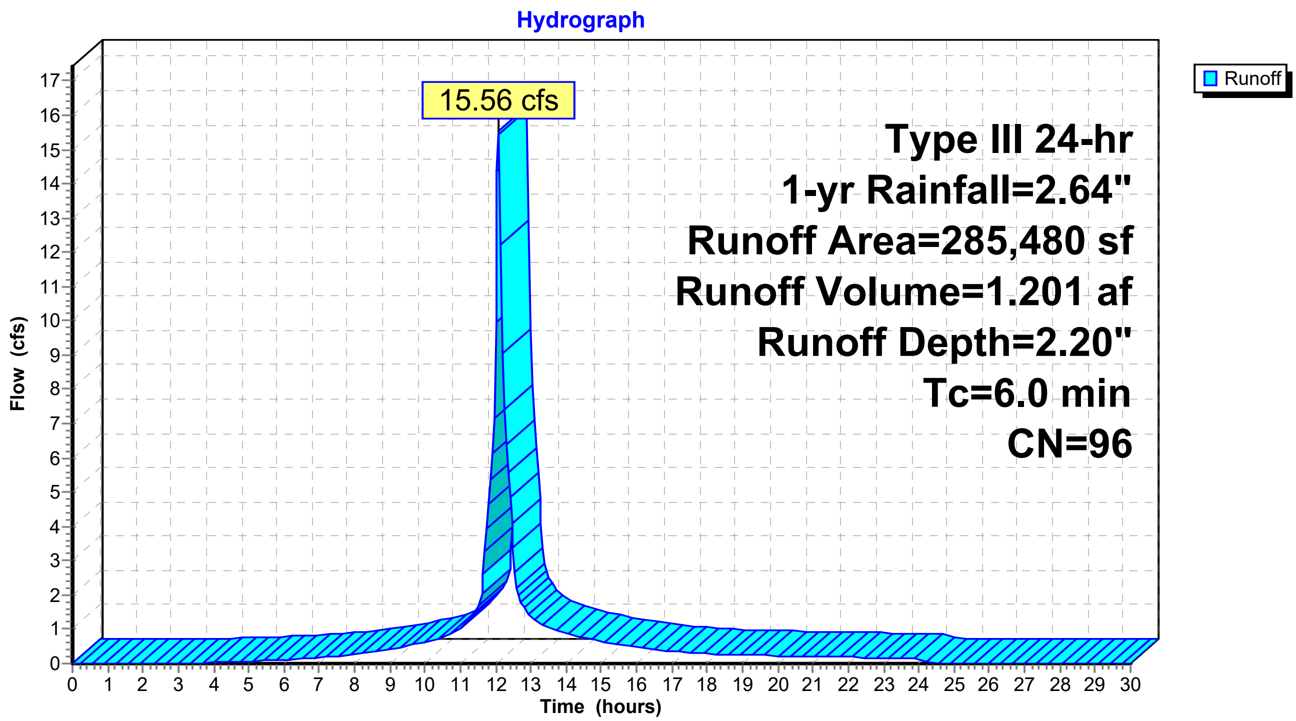
Runoff = 15.56 cfs @ 12.09 hrs, Volume= 1.201 af, Depth= 2.20"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
33,786	80	>75% Grass cover, Good, HSG D
251,694	98	Paved parking, HSG D
285,480	96	Weighted Average
33,786		11.83% Pervious Area
251,694		88.17% Impervious Area

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

Subcatchment PW1BE: BLDG EAST



Summary for Subcatchment PW1BW: BLDG WEST

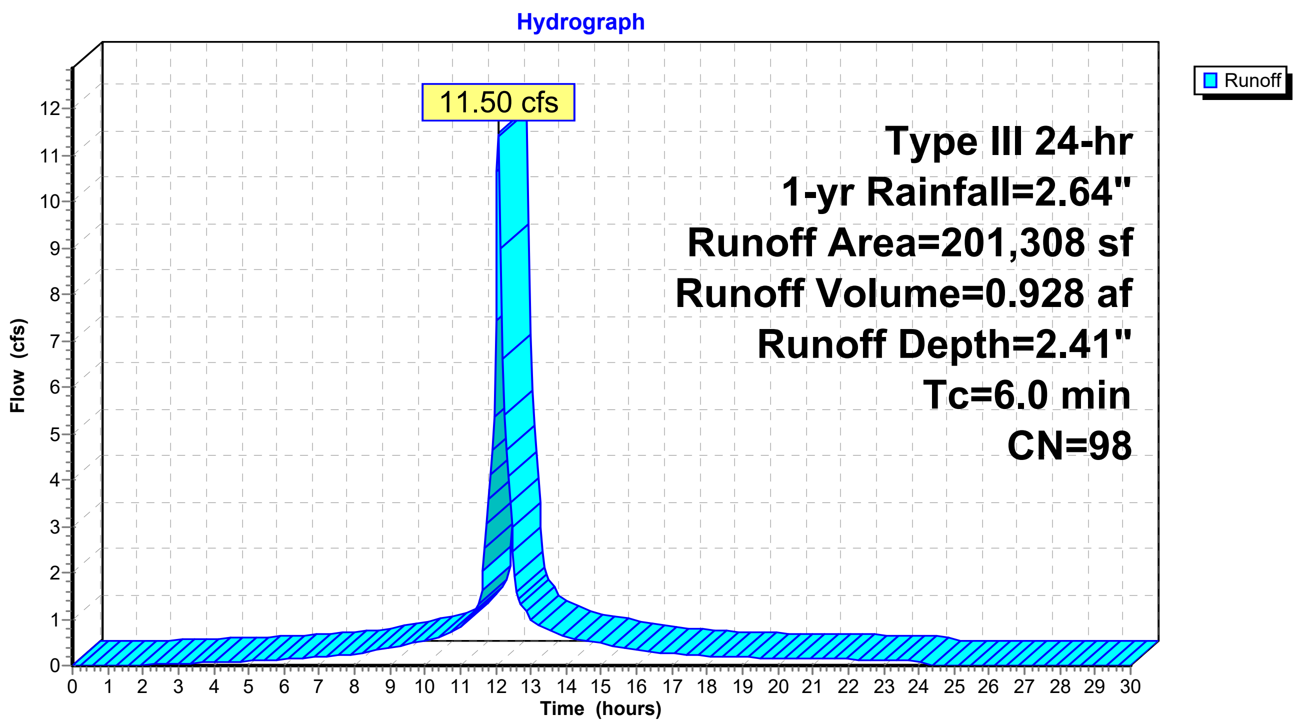
Runoff = 11.50 cfs @ 12.09 hrs, Volume= 0.928 af, Depth= 2.41"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
201,308	98	Paved parking, HSG D
201,308	98	Weighted Average
201,308		100.00% Impervious Area

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

Subcatchment PW1BW: BLDG WEST



Summary for Subcatchment PW1C:

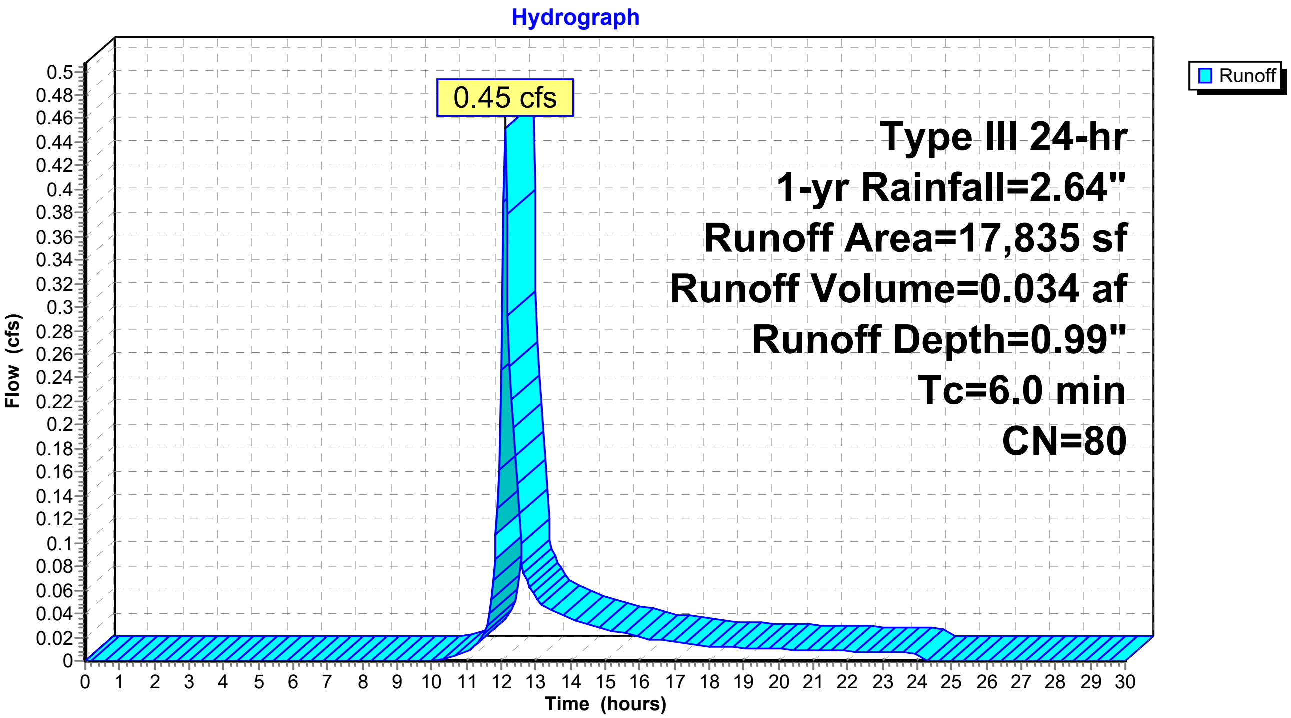
Runoff = 0.45 cfs @ 12.10 hrs, Volume= 0.034 af, Depth= 0.99"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
17,835	80	>75% Grass cover, Good, HSG D
0	98	Paved parking, HSG D
17,835	80	Weighted Average
17,835		100.00% Pervious Area

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

Subcatchment PW1C:



Summary for Subcatchment PW1D: LOAD EAST

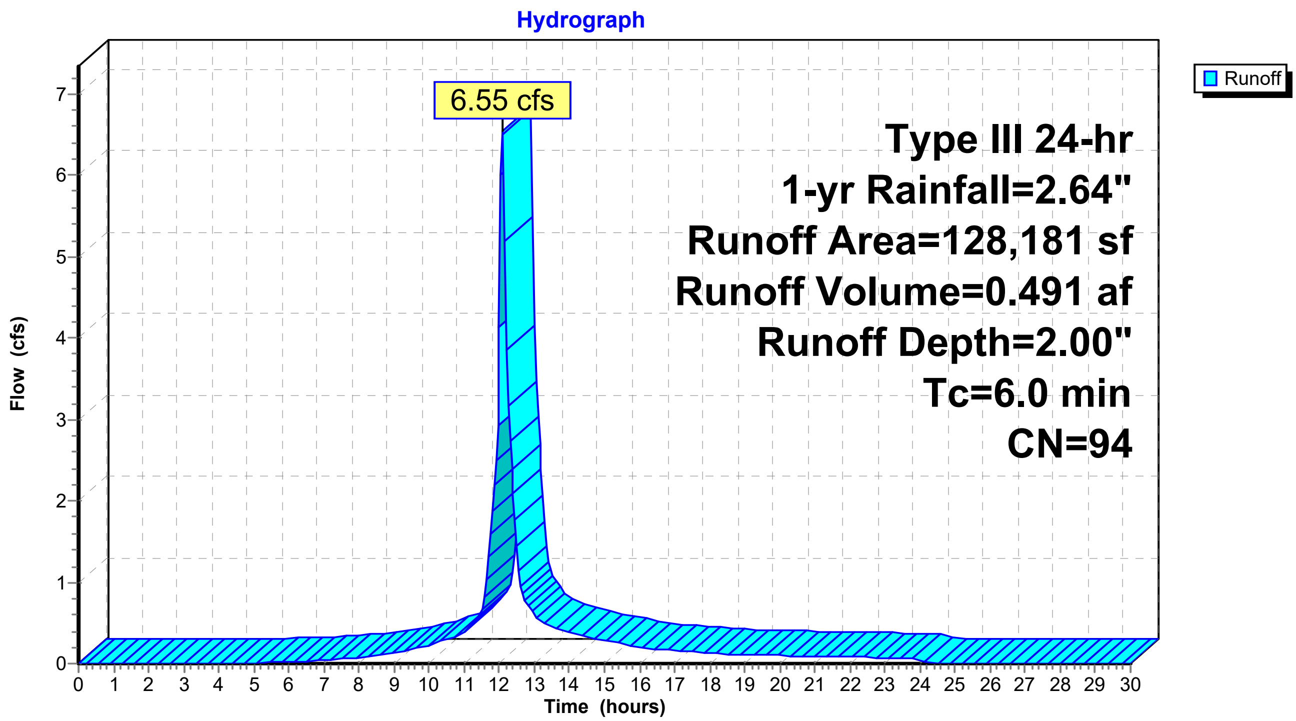
Runoff = 6.55 cfs @ 12.09 hrs, Volume= 0.491 af, Depth= 2.00"
Routed to Pond 1D : WET 1D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
28,504	80	>75% Grass cover, Good, HSG D
99,677	98	Paved parking, HSG D
128,181	94	Weighted Average
28,504		22.24% Pervious Area
99,677		77.76% Impervious Area

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

Subcatchment PW1D: LOAD EAST



Summary for Subcatchment PW1E: LOAD WEST

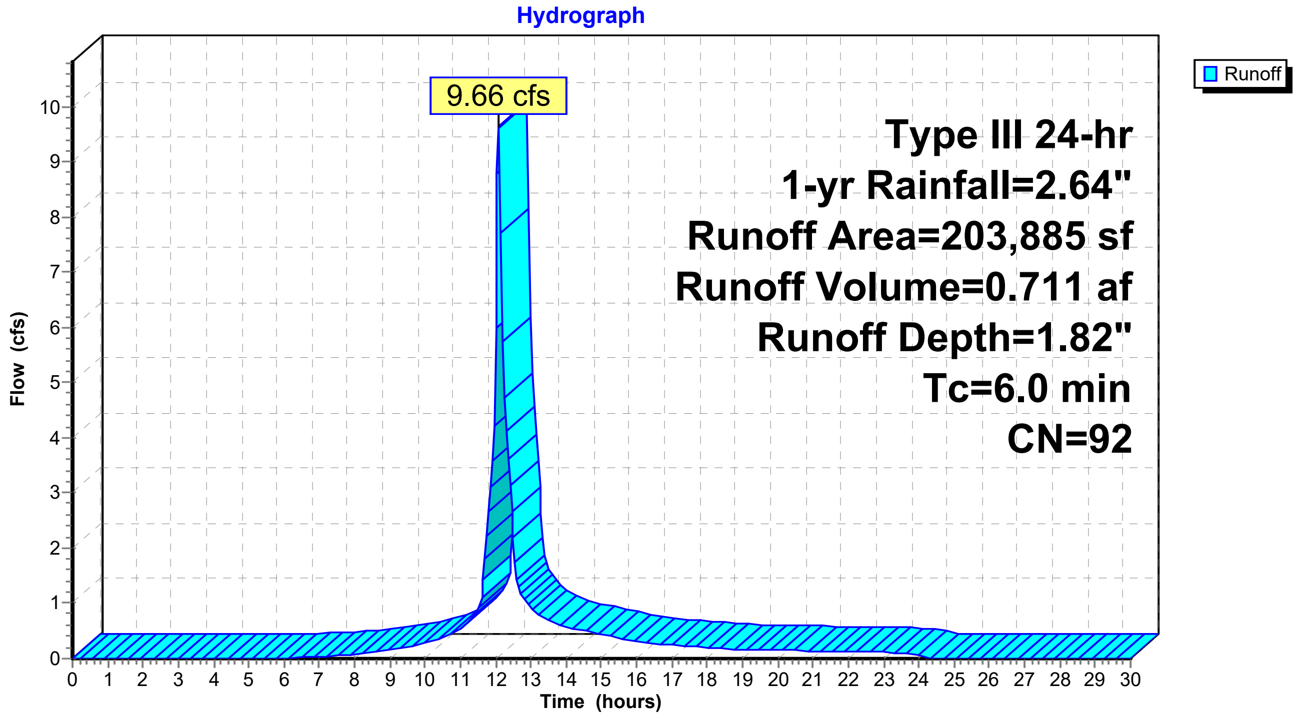
Runoff = 9.66 cfs @ 12.09 hrs, Volume= 0.711 af, Depth= 1.82"
Routed to Pond 3P : FB 1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
70,197	80	>75% Grass cover, Good, HSG D
133,688	98	Paved parking, HSG D
203,885	92	Weighted Average
70,197		34.43% Pervious Area
133,688		65.57% Impervious Area

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

Subcatchment PW1E: LOAD WEST



Summary for Subcatchment PW2A: PARKING

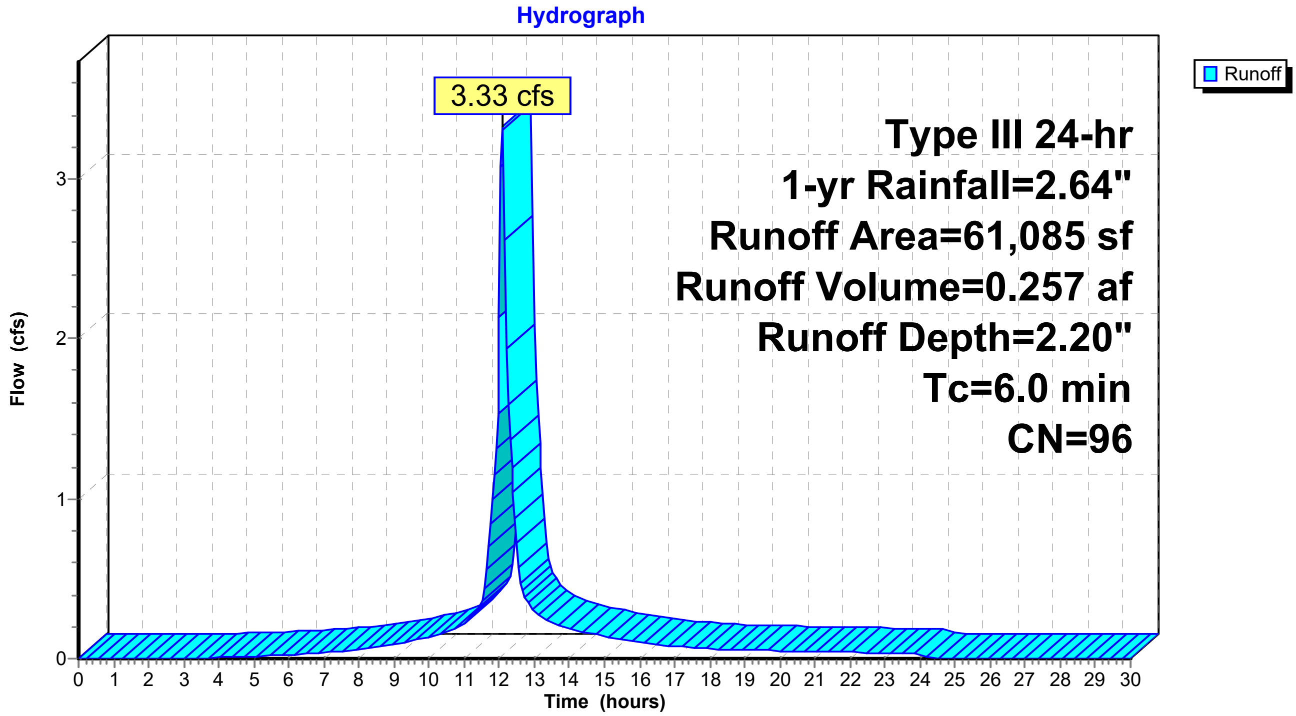
Runoff = 3.33 cfs @ 12.09 hrs, Volume= 0.257 af, Depth= 2.20"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
5,846	80	>75% Grass cover, Good, HSG D
55,239	98	Paved parking, HSG D
61,085	96	Weighted Average
5,846		9.57% Pervious Area
55,239		90.43% Impervious Area

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

Subcatchment PW2A: PARKING



Summary for Subcatchment PW2B: LOADING

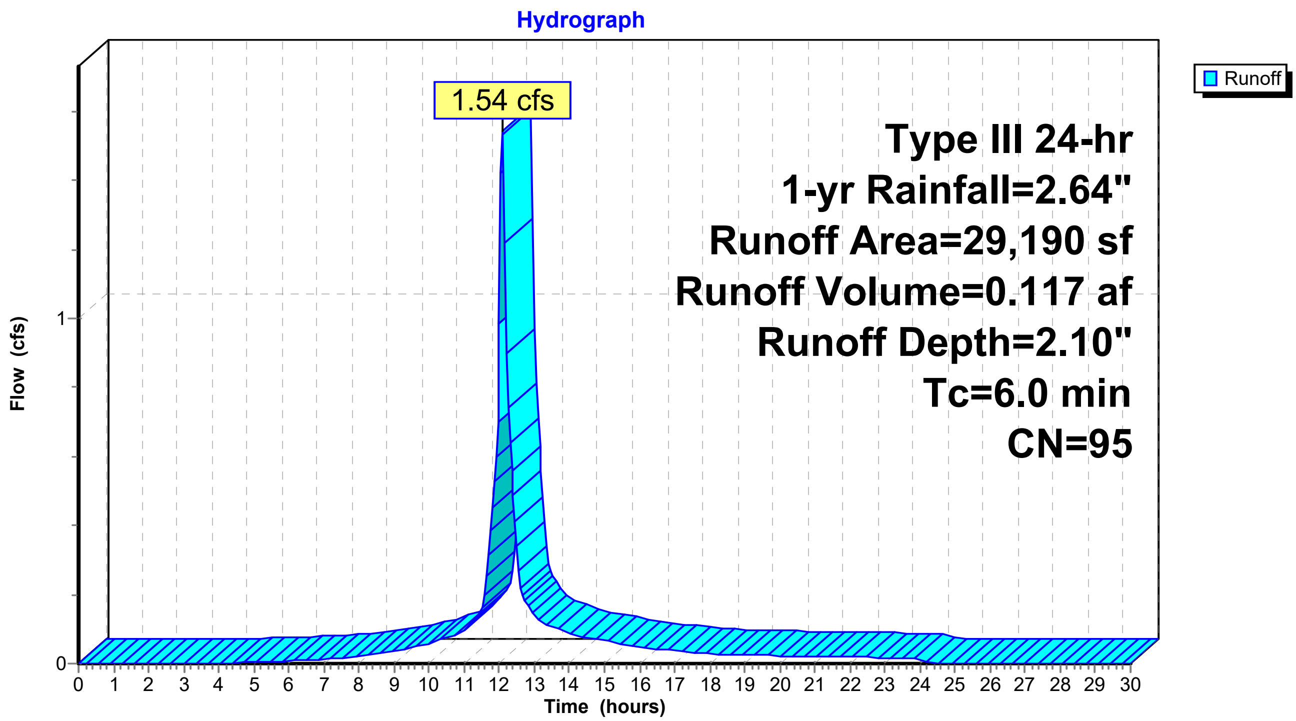
Runoff = 1.54 cfs @ 12.09 hrs, Volume= 0.117 af, Depth= 2.10"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
5,233	80	>75% Grass cover, Good, HSG D
23,957	98	Paved parking, HSG D
29,190	95	Weighted Average
5,233		17.93% Pervious Area
23,957		82.07% Impervious Area

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

Subcatchment PW2B: LOADING



Summary for Subcatchment PW2C: BACK

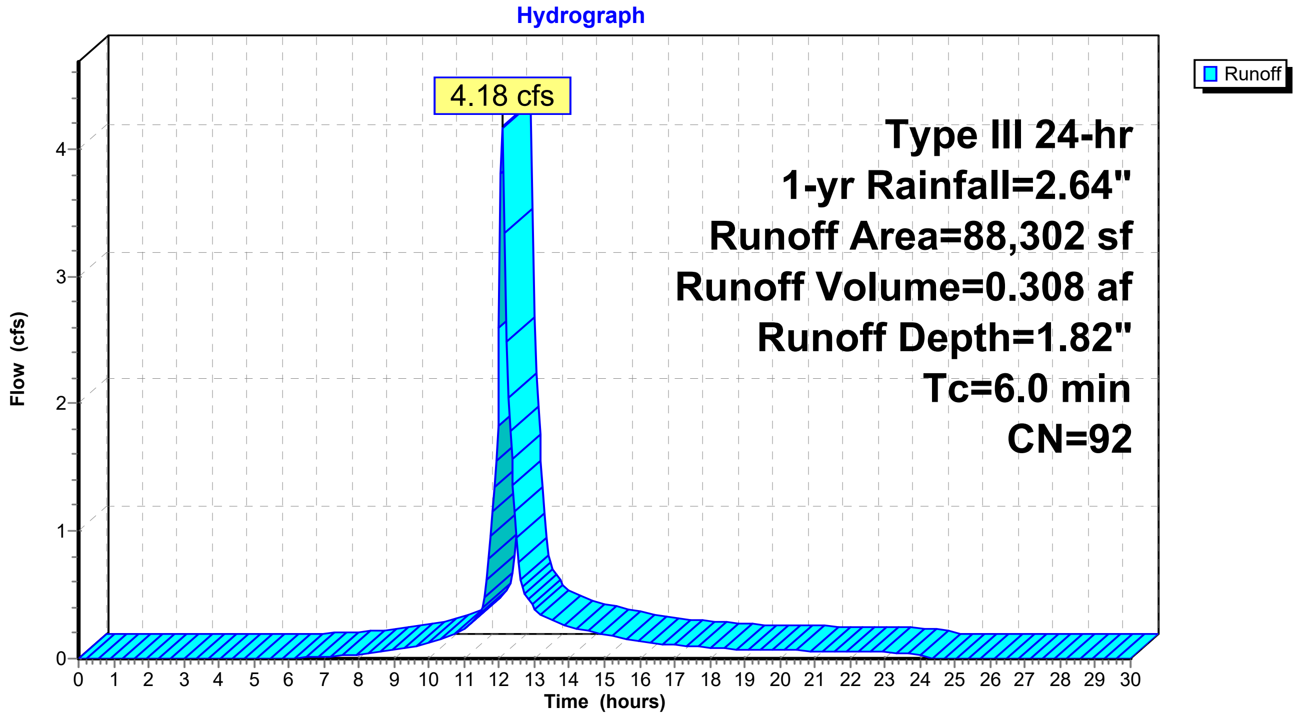
Runoff = 4.18 cfs @ 12.09 hrs, Volume= 0.308 af, Depth= 1.82"
Routed to Pond 2C : WET 2C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.64"

Area (sf)	CN	Description
31,111	80	>75% Grass cover, Good, HSG D
57,191	98	Paved parking, HSG D
88,302	92	Weighted Average
31,111		35.23% Pervious Area
57,191		64.77% Impervious Area

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

Subcatchment PW2C: BACK



Summary for Pond 1A-1: INFIL 1A-1

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 1.91" for 1-yr event
Inflow = 5.27 cfs @ 12.09 hrs, Volume= 0.391 af
Outflow = 0.49 cfs @ 12.99 hrs, Volume= 0.391 af, Atten= 91%, Lag= 53.9 min
Discarded = 0.49 cfs @ 12.99 hrs, Volume= 0.391 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1A-2 : INFIL 1A-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 475.79' @ 12.99 hrs Surf.Area= 4,265 sf Storage= 6,642 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 115.6 min (915.1 - 799.5)

Volume	Invert	Avail.Storage	Storage Description
#1	474.00'	17,580 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

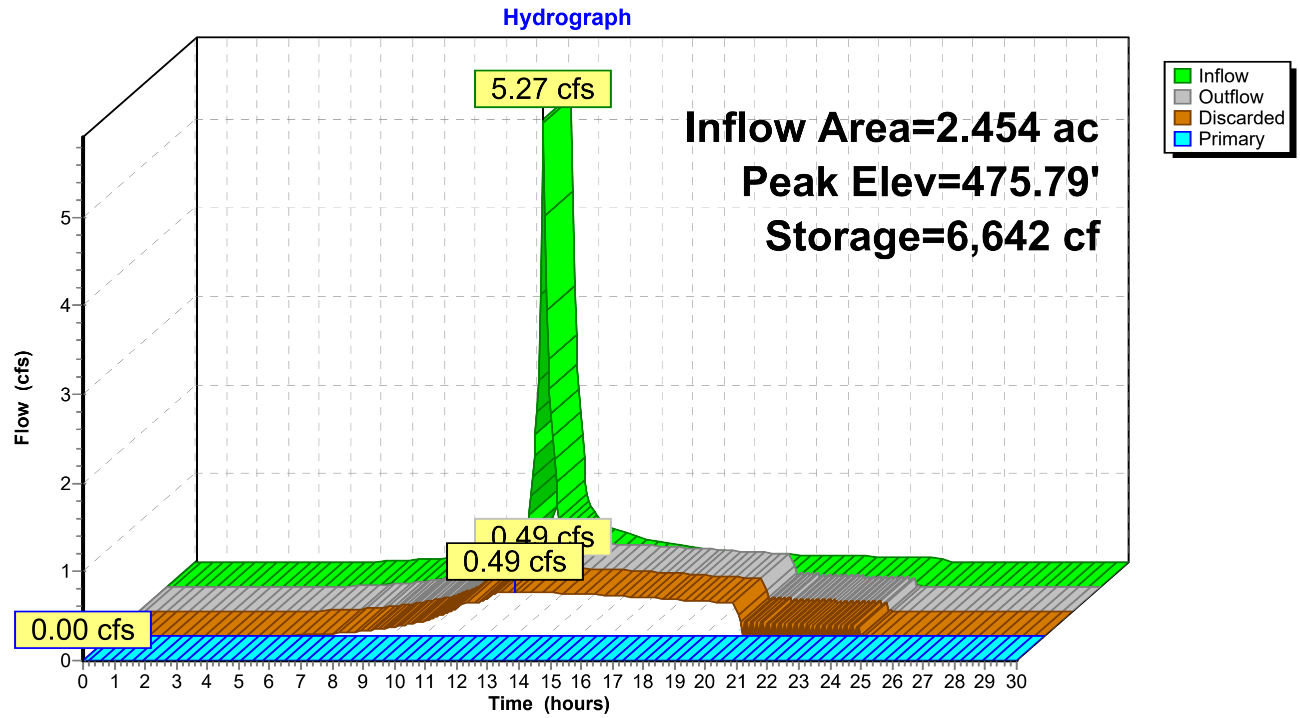
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
474.00	3,150	0	0
478.00	5,640	17,580	17,580

Device	Routing	Invert	Outlet Devices
#1	Discarded	474.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	476.50'	**20.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.49 cfs @ 12.99 hrs HW=475.79' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=474.00' TW=468.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1A-1: INFIL 1A-1



Stage-Area-Storage for Pond 1A-1: INFIL 1A-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
474.00	3,150	0	476.65	4,800	10,533
474.05	3,181	158	476.70	4,831	10,774
474.10	3,212	318	476.75	4,862	11,016
474.15	3,243	480	476.80	4,893	11,260
474.20	3,274	642	476.85	4,924	11,506
474.25	3,306	807	476.90	4,955	11,753
474.30	3,337	973	476.95	4,986	12,001
474.35	3,368	1,141	477.00	5,018	12,251
474.40	3,399	1,310	477.05	5,049	12,503
474.45	3,430	1,481	477.10	5,080	12,756
474.50	3,461	1,653	477.15	5,111	13,011
474.55	3,492	1,827	477.20	5,142	13,267
474.60	3,524	2,002	477.25	5,173	13,525
474.65	3,555	2,179	477.30	5,204	13,785
474.70	3,586	2,358	477.35	5,235	14,046
474.75	3,617	2,538	477.40	5,266	14,308
474.80	3,648	2,719	477.45	5,298	14,572
474.85	3,679	2,902	477.50	5,329	14,838
474.90	3,710	3,087	477.55	5,360	15,105
474.95	3,741	3,273	477.60	5,391	15,374
475.00	3,773	3,461	477.65	5,422	15,644
475.05	3,804	3,651	477.70	5,453	15,916
475.10	3,835	3,842	477.75	5,484	16,189
475.15	3,866	4,034	477.80	5,516	16,464
475.20	3,897	4,228	477.85	5,547	16,741
475.25	3,928	4,424	477.90	5,578	17,019
475.30	3,959	4,621	477.95	5,609	17,299
475.35	3,990	4,820	478.00	**5,640**	**17,580**
475.40	4,021	5,020			
475.45	4,053	5,222			
475.50	4,084	5,425			
475.55	4,115	5,630			
475.60	4,146	5,837			
475.65	4,177	6,045			
475.70	4,208	6,255			
475.75	4,239	6,466			
475.80	4,271	6,678			
475.85	4,302	6,893			
475.90	4,333	7,109			
475.95	4,364	7,326			
476.00	4,395	7,545			
476.05	4,426	7,766			
476.10	4,457	7,988			
476.15	4,488	8,211			
476.20	4,519	8,436			
476.25	4,551	8,663			
476.30	4,582	8,892			
476.35	4,613	9,121			
476.40	4,644	9,353			
476.45	4,675	9,586			
476.50	4,706	9,820			
476.55	4,737	10,056			
476.60	4,769	10,294			

Summary for Pond 1A-2: INFIL 1A-2

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 0.00" for 1-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 468.00' @ 0.00 hrs Surf.Area= 928 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	468.00'	3,903 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

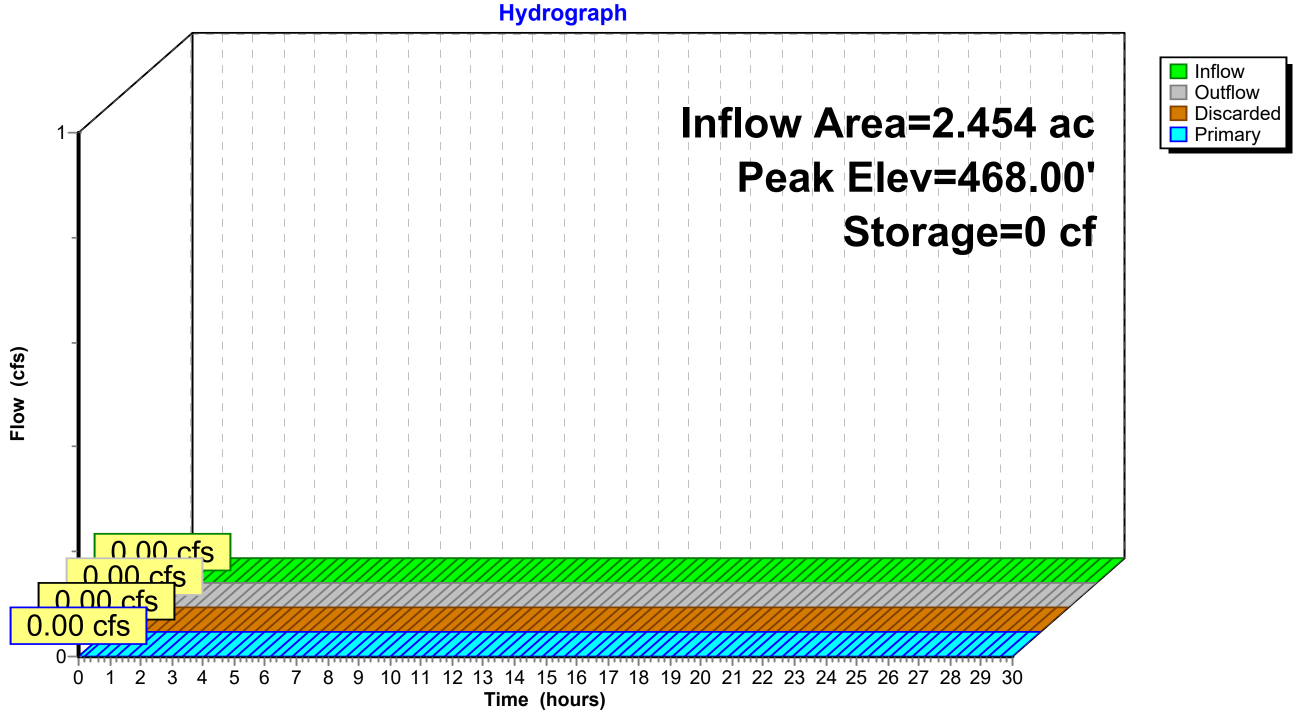
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
468.00	928	0	0
471.00	1,674	3,903	3,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	468.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Device 3	469.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	466.50'	**24.0" Round Culvert** L= 68.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 466.50' / 464.00' S= 0.0368 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=468.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.11 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=468.00' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 0.00 cfs of 10.54 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A-2: INFIL 1A-2



Stage-Area-Storage for Pond 1A-2: INFIL 1A-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
468.00	928	0	470.65	1,587	3,332
468.05	940	47	470.70	1,599	3,412
468.10	953	94	470.75	1,612	3,492
468.15	965	142	470.80	1,624	3,573
468.20	978	191	470.85	1,637	3,655
468.25	990	240	470.90	1,649	3,737
468.30	1,003	290	470.95	1,662	3,820
468.35	1,015	340	471.00	**1,674**	**3,903**
468.40	1,027	391			
468.45	1,040	443			
468.50	1,052	495			
468.55	1,065	548			
468.60	1,077	602			
468.65	1,090	656			
468.70	1,102	711			
468.75	1,115	766			
468.80	1,127	822			
468.85	1,139	879			
468.90	1,152	936			
468.95	1,164	994			
469.00	1,177	1,052			
469.05	1,189	1,111			
469.10	1,202	1,171			
469.15	1,214	1,232			
469.20	1,226	1,293			
469.25	1,239	1,354			
469.30	1,251	1,417			
469.35	1,264	1,479			
469.40	1,276	1,543			
469.45	1,289	1,607			
469.50	1,301	1,672			
469.55	1,313	1,737			
469.60	1,326	1,803			
469.65	1,338	1,870			
469.70	1,351	1,937			
469.75	1,363	2,005			
469.80	1,376	2,073			
469.85	1,388	2,142			
469.90	1,400	2,212			
469.95	1,413	2,282			
470.00	1,425	2,353			
470.05	1,438	2,425			
470.10	1,450	2,497			
470.15	1,463	2,570			
470.20	1,475	2,643			
470.25	1,488	2,717			
470.30	1,500	2,792			
470.35	1,512	2,867			
470.40	1,525	2,943			
470.45	1,537	3,020			
470.50	1,550	3,097			
470.55	1,562	3,175			
470.60	1,575	3,253			

Summary for Pond 1BE: INFIL 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 1.61" for 1-yr event
Inflow = 22.87 cfs @ 12.14 hrs, Volume= 2.129 af
Outflow = 4.73 cfs @ 12.67 hrs, Volume= 2.131 af, Atten= 79%, Lag= 31.6 min
Discarded = 4.73 cfs @ 12.67 hrs, Volume= 2.131 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 456.28' @ 12.67 hrs Surf.Area= 20,440 sf Storage= 24,427 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 31.0 min (815.2 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	115,118 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

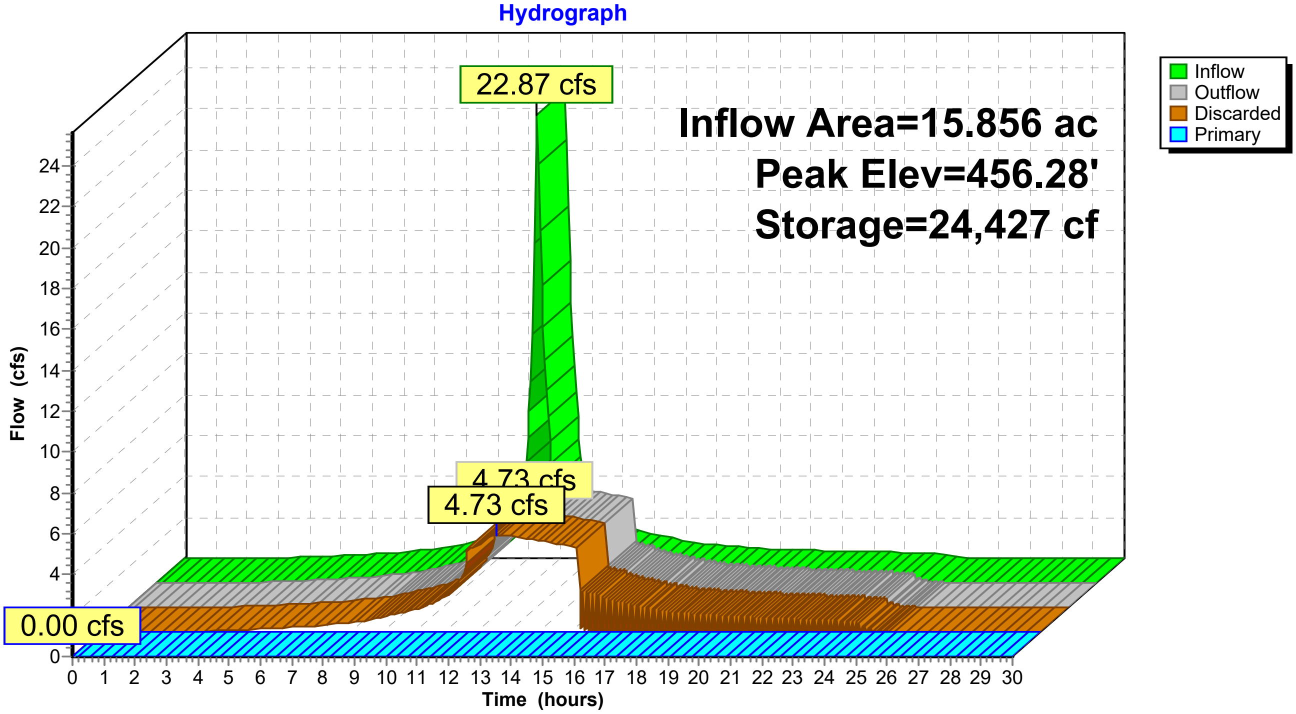
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
455.00	17,730	0	0
460.00	28,317	115,118	115,118

Device	Routing	Invert	Outlet Devices
#1	Primary	458.00'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	455.00'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=4.73 cfs @ 12.67 hrs HW=456.28' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 4.73 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=455.00' TW=0.00' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1BE: INFIL 1BE



Stage-Area-Storage for Pond 1BE: INFIL 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
455.00	17,730	0	457.65	23,341	54,419
455.05	17,836	889	457.70	23,447	55,589
455.10	17,942	1,784	457.75	23,553	56,764
455.15	18,048	2,683	457.80	23,659	57,944
455.20	18,153	3,588	457.85	23,765	59,130
455.25	18,259	4,499	457.90	23,870	60,321
455.30	18,365	5,414	457.95	23,976	61,517
455.35	18,471	6,335	458.00	24,082	62,718
455.40	18,577	7,261	458.05	24,188	63,925
455.45	18,683	8,193	458.10	24,294	65,137
455.50	18,789	9,130	458.15	24,400	66,354
455.55	18,895	10,072	458.20	24,506	67,577
455.60	19,000	11,019	458.25	24,612	68,805
455.65	19,106	11,972	458.30	24,717	70,038
455.70	19,212	12,930	458.35	24,823	71,277
455.75	19,318	13,893	458.40	24,929	72,521
455.80	19,424	14,862	458.45	25,035	73,770
455.85	19,530	15,835	458.50	25,141	75,024
455.90	19,636	16,815	458.55	25,247	76,284
455.95	19,742	17,799	458.60	25,353	77,549
456.00	19,847	18,789	458.65	25,459	78,819
456.05	19,953	19,784	458.70	25,564	80,095
456.10	20,059	20,784	458.75	25,670	81,375
456.15	20,165	21,790	458.80	25,776	82,662
456.20	20,271	22,801	458.85	25,882	83,953
456.25	20,377	23,817	458.90	25,988	85,250
456.30	20,483	24,838	458.95	26,094	86,552
456.35	20,588	25,865	459.00	26,200	87,859
456.40	20,694	26,897	459.05	26,305	89,172
456.45	20,800	27,934	459.10	26,411	90,490
456.50	20,906	28,977	459.15	26,517	91,813
456.55	21,012	30,025	459.20	26,623	93,141
456.60	21,118	31,078	459.25	26,729	94,475
456.65	21,224	32,137	459.30	26,835	95,814
456.70	21,330	33,201	459.35	26,941	97,159
456.75	21,435	34,270	459.40	27,047	98,508
456.80	21,541	35,344	459.45	27,152	99,863
456.85	21,647	36,424	459.50	27,258	101,224
456.90	21,753	37,509	459.55	27,364	102,589
456.95	21,859	38,599	459.60	27,470	103,960
457.00	21,965	39,695	459.65	27,576	105,336
457.05	22,071	40,796	459.70	27,682	106,718
457.10	22,177	41,902	459.75	27,788	108,104
457.15	22,282	43,013	459.80	27,894	109,496
457.20	22,388	44,130	459.85	27,999	110,894
457.25	22,494	45,252	459.90	28,105	112,296
457.30	22,600	46,380	459.95	28,211	113,704
457.35	22,706	47,512	460.00	**28,317**	**115,118**
457.40	22,812	48,650			
457.45	22,918	49,793			
457.50	23,024	50,942			
457.55	23,129	52,096			
457.60	23,235	53,255			

Summary for Pond 1D: WET 1D

Inflow Area = 2.943 ac, 77.76% Impervious, Inflow Depth = 2.00" for 1-yr event
Inflow = 6.55 cfs @ 12.09 hrs, Volume= 0.491 af
Outflow = 0.18 cfs @ 16.38 hrs, Volume= 0.335 af, Atten= 97%, Lag= 257.7 min
Primary = 0.18 cfs @ 16.38 hrs, Volume= 0.335 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.50' Surf.Area= 14,310 sf Storage= 13,422 cf
Peak Elev= 452.33' @ 16.38 hrs Surf.Area= 15,789 sf Storage= 25,966 cf (12,543 cf above start)

Plug-Flow detention time= 1,239.2 min calculated for 0.027 af (6% of inflow)
Center-of-Mass det. time= 265.6 min (1,059.2 - 793.6)

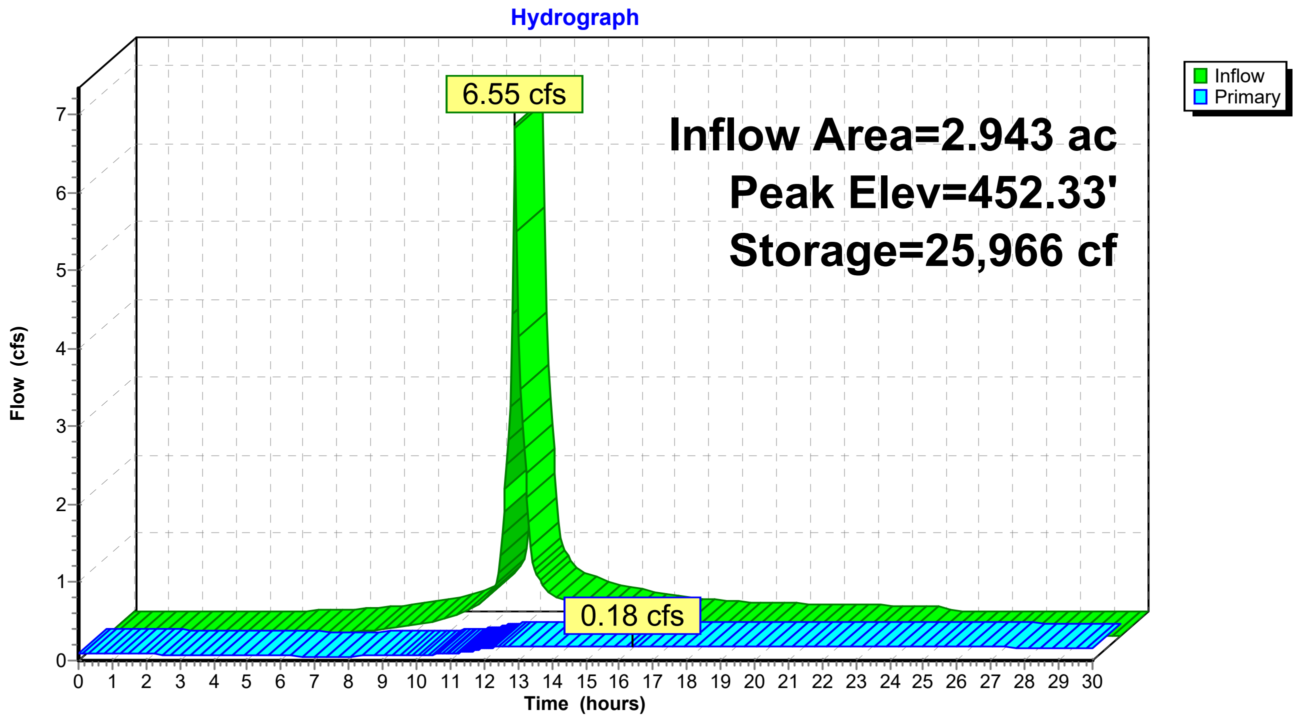
Volume	Invert	Avail.Storage	Storage Description
#1	450.50'	54,744 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.50	12,535	0	0
454.00	18,747	54,744	54,744

Device	Routing	Invert	Outlet Devices
#1	Primary	452.50'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#2	Primary	451.10'	**6.0" Round Culvert** L= 20.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.10' / 450.00' S= 0.0550 '/' Cc= 0.900 n= 0.120, Flow Area= 0.20 sf

Primary OutFlow Max=0.18 cfs @ 16.38 hrs HW=452.33' TW=0.00' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Barrel Controls 0.18 cfs @ 0.93 fps)

Pond 1D: WET 1D



Stage-Area-Storage for Pond 1D: WET 1D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.50	12,535	0
450.55	12,624	629
450.60	12,712	1,262
450.65	12,801	1,900
450.70	12,890	2,542
450.75	12,979	3,189
450.80	13,067	3,840
450.85	13,156	4,496
450.90	13,245	5,156
450.95	13,334	5,820
451.00	13,422	6,489
451.05	13,511	7,163
451.10	13,600	7,840
451.15	13,689	8,523
451.20	13,777	9,209
451.25	13,866	9,900
451.30	13,955	10,596
451.35	14,044	11,296
451.40	14,132	12,000
451.45	14,221	12,709
451.50	14,310	13,422
451.55	14,399	14,140
451.60	14,487	14,862
451.65	14,576	15,589
451.70	14,665	16,320
451.75	14,754	17,055
451.80	14,842	17,795
451.85	14,931	18,540
451.90	15,020	19,288
451.95	15,109	20,042
452.00	15,197	20,799
452.05	15,286	21,561
452.10	15,375	22,328
452.15	15,464	23,099
452.20	15,552	23,874
452.25	15,641	24,654
452.30	15,730	25,438
452.35	15,818	26,227
452.40	15,907	27,020
452.45	15,996	27,818
452.50	16,085	28,620
452.55	16,173	29,426
452.60	16,262	30,237
452.65	16,351	31,052
452.70	16,440	31,872
452.75	16,528	32,696
452.80	16,617	33,525
452.85	16,706	34,358
452.90	16,795	35,196
452.95	16,883	36,038
453.00	16,972	36,884
453.05	17,061	37,735
453.10	17,150	38,590
453.15	17,238	39,450
453.20	17,327	40,314
453.25	17,416	41,182
453.30	17,505	42,055
453.35	17,593	42,933
453.40	17,682	43,815
453.45	17,771	44,701
453.50	17,860	45,592
453.55	17,948	46,487
453.60	18,037	47,387
453.65	18,126	48,291
453.70	18,215	49,199
453.75	18,303	50,112
453.80	18,392	51,030
453.85	18,481	51,951
453.90	18,570	52,878
453.95	18,658	53,808
454.00	**18,747**	**54,744**

Summary for Pond 1E: INFIL 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 1.82" for 1-yr event
Inflow = 8.76 cfs @ 12.13 hrs, Volume= 0.711 af
Outflow = 0.95 cfs @ 12.95 hrs, Volume= 0.712 af, Atten= 89%, Lag= 49.0 min
Discarded = 0.95 cfs @ 12.95 hrs, Volume= 0.712 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 4P : FB 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 461.17' @ 12.95 hrs Surf.Area= 10,275 sf Storage= 10,990 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 99.1 min (913.5 - 814.3)

Volume	Invert	Avail.Storage	Storage Description
#1	460.00'	61,063 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

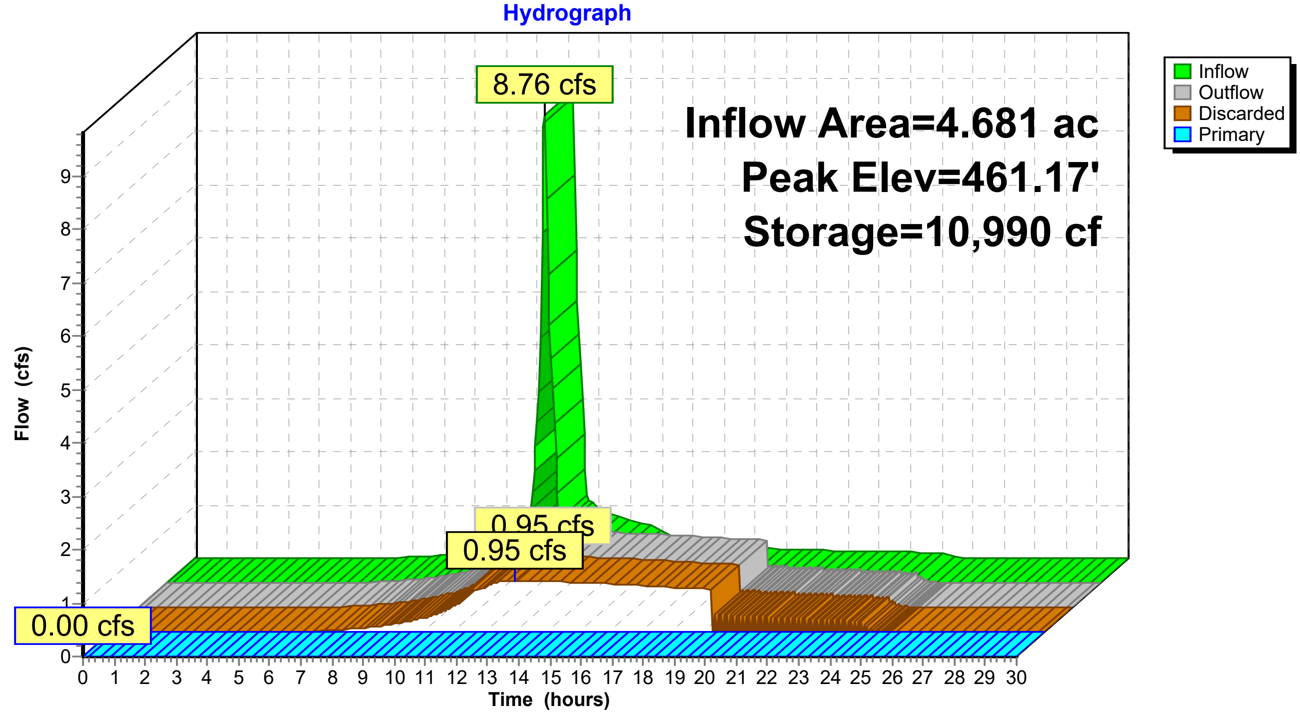
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
460.00	8,583	0	0
465.00	15,842	61,063	61,063

Device	Routing	Invert	Outlet Devices
#1	Discarded	460.00'	**4.000 in/hr EXFIL over Surface area**
#2	Primary	462.00'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.95 cfs @ 12.95 hrs HW=461.17' (Free Discharge)
└─**1=EXFIL** (Exfiltration Controls 0.95 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=460.00' TW=457.50' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1E: INFIL 1E



Stage-Area-Storage for Pond 1E: INFIL 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
460.00	8,583	0	462.65	12,430	27,843
460.05	8,656	431	462.70	12,503	28,466
460.10	8,728	866	462.75	12,575	29,093
460.15	8,801	1,304	462.80	12,648	29,723
460.20	8,873	1,746	462.85	12,721	30,358
460.25	8,946	2,191	462.90	12,793	30,996
460.30	9,019	2,640	462.95	12,866	31,637
460.35	9,091	3,093	463.00	12,938	32,282
460.40	9,164	3,549	463.05	13,011	32,931
460.45	9,236	4,009	463.10	13,084	33,583
460.50	9,309	4,473	463.15	13,156	34,239
460.55	9,381	4,940	463.20	13,229	34,899
460.60	9,454	5,411	463.25	13,301	35,562
460.65	9,527	5,886	463.30	13,374	36,229
460.70	9,599	6,364	463.35	13,447	36,899
460.75	9,672	6,846	463.40	13,519	37,574
460.80	9,744	7,331	463.45	13,592	38,251
460.85	9,817	7,820	463.50	13,664	38,933
460.90	9,890	8,313	463.55	13,737	39,618
460.95	9,962	8,809	463.60	13,809	40,306
461.00	10,035	9,309	463.65	13,882	40,999
461.05	10,107	9,812	463.70	13,955	41,695
461.10	10,180	10,320	463.75	14,027	42,394
461.15	10,253	10,830	463.80	14,100	43,097
461.20	10,325	11,345	463.85	14,172	43,804
461.25	10,398	11,863	463.90	14,245	44,515
461.30	10,470	12,385	463.95	14,318	45,229
461.35	10,543	12,910	464.00	14,390	45,946
461.40	10,616	13,439	464.05	14,463	46,668
461.45	10,688	13,972	464.10	14,535	47,393
461.50	10,761	14,508	464.15	14,608	48,121
461.55	10,833	15,048	464.20	14,681	48,853
461.60	10,906	15,591	464.25	14,753	49,589
461.65	10,978	16,138	464.30	14,826	50,329
461.70	11,051	16,689	464.35	14,898	51,072
461.75	11,124	17,243	464.40	14,971	51,819
461.80	11,196	17,801	464.45	15,044	52,569
461.85	11,269	18,363	464.50	15,116	53,323
461.90	11,341	18,928	464.55	15,189	54,081
461.95	11,414	19,497	464.60	15,261	54,842
462.00	11,487	20,070	464.65	15,334	55,607
462.05	11,559	20,646	464.70	15,406	56,375
462.10	11,632	21,226	464.75	15,479	57,147
462.15	11,704	21,809	464.80	15,552	57,923
462.20	11,777	22,396	464.85	15,624	58,703
462.25	11,850	22,987	464.90	15,697	59,486
462.30	11,922	23,581	464.95	15,769	60,272
462.35	11,995	24,179	465.00	**15,842**	**61,063**
462.40	12,067	24,780			
462.45	12,140	25,386			
462.50	12,213	25,994			
462.55	12,285	26,607			
462.60	12,358	27,223			

Summary for Pond 2C: WET 2C

Inflow Area = 4.100 ac, 76.37% Impervious, Inflow Depth = 2.00" for 1-yr event
Inflow = 9.06 cfs @ 12.09 hrs, Volume= 0.682 af
Outflow = 4.16 cfs @ 12.27 hrs, Volume= 0.670 af, Atten= 54%, Lag= 11.2 min
Primary = 4.16 cfs @ 12.27 hrs, Volume= 0.670 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.30' Surf.Area= 7,226 sf Storage= 8,306 cf
Peak Elev= 452.66' @ 12.27 hrs Surf.Area= 8,982 sf Storage= 19,365 cf (11,058 cf above start)

Plug-Flow detention time= 298.9 min calculated for 0.479 af (70% of inflow)
Center-of-Mass det. time= 124.9 min (917.3 - 792.3)

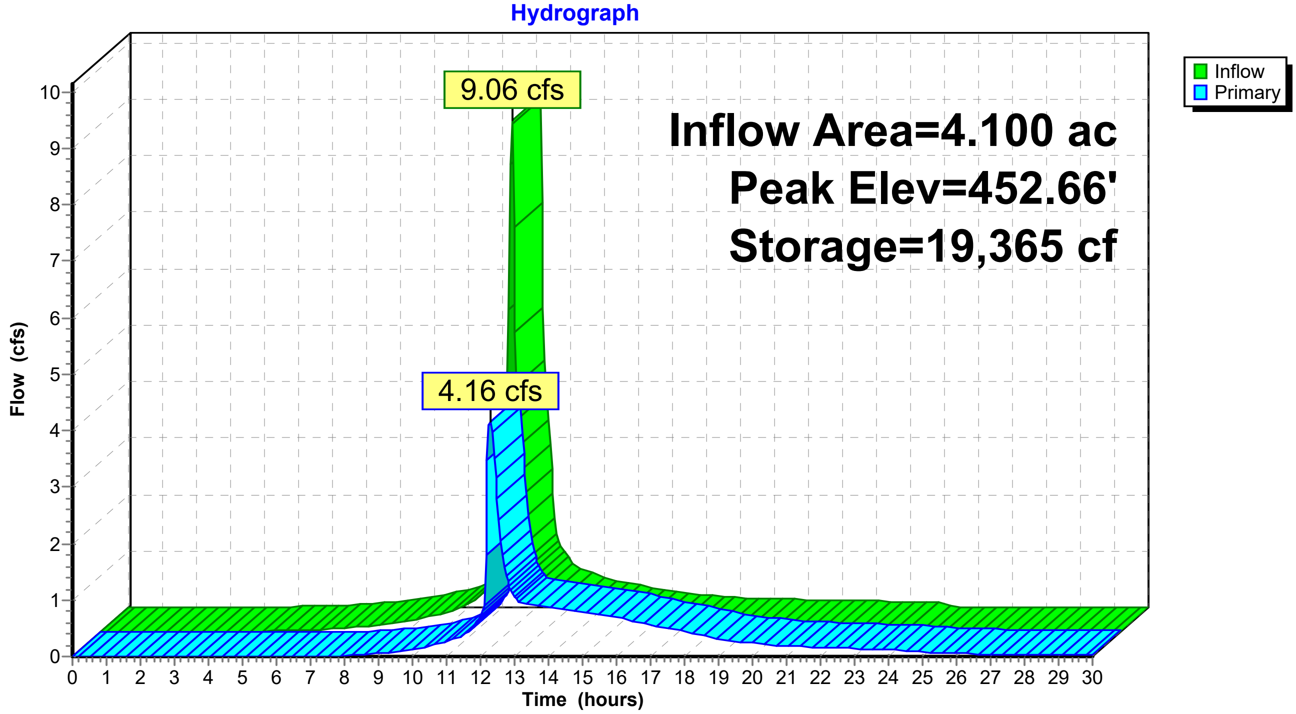
Volume	Invert	Avail.Storage	Storage Description
#1	450.00'	43,659 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.00	5,553	0	0
453.00	9,414	22,451	22,451
455.00	11,794	21,208	43,659

Device	Routing	Invert	Outlet Devices
#1	Device 3	452.50'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Device 3	451.30'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	449.50'	**18.0" Round Culvert** L= 25.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 449.50' / 449.25' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=4.08 cfs @ 12.27 hrs HW=452.66' TW=0.00' (Dynamic Tailwater)
3=Culvert (Passes 4.08 cfs of 13.21 cfs potential flow)
1=Broad-Crested Rectangular Weir (Weir Controls 3.09 cfs @ 0.95 fps)
2=Orifice/Grate (Orifice Controls 1.00 cfs @ 5.08 fps)

Pond 2C: WET 2C



Stage-Area-Storage for Pond 2C: WET 2C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.00	5,553	0	452.65	8,964	19,234
450.05	5,617	279	452.70	9,028	19,684
450.10	5,682	562	452.75	9,092	20,137
450.15	5,746	847	452.80	9,157	20,593
450.20	5,810	1,136	452.85	9,221	21,053
450.25	5,875	1,428	452.90	9,285	21,516
450.30	5,939	1,724	452.95	9,350	21,981
450.35	6,003	2,022	453.00	9,414	22,451
450.40	6,068	2,324	453.05	9,474	22,923
450.45	6,132	2,629	453.10	9,533	23,398
450.50	6,197	2,937	453.15	9,592	23,876
450.55	6,261	3,249	453.20	9,652	24,357
450.60	6,325	3,563	453.25	9,712	24,841
450.65	6,390	3,881	453.30	9,771	25,328
450.70	6,454	4,202	453.35	9,831	25,818
450.75	6,518	4,527	453.40	9,890	26,311
450.80	6,583	4,854	453.45	9,949	26,807
450.85	6,647	5,185	453.50	10,009	27,306
450.90	6,711	5,519	453.55	10,069	27,808
450.95	6,776	5,856	453.60	10,128	28,313
451.00	6,840	6,197	453.65	10,187	28,821
451.05	6,904	6,540	453.70	10,247	29,332
451.10	6,969	6,887	453.75	10,307	29,846
451.15	7,033	7,237	453.80	10,366	30,363
451.20	7,097	7,590	453.85	10,426	30,882
451.25	7,162	7,947	453.90	10,485	31,405
451.30	7,226	8,306	453.95	10,544	31,931
451.35	7,290	8,669	454.00	10,604	32,460
451.40	7,355	9,035	454.05	10,664	32,991
451.45	7,419	9,405	454.10	10,723	33,526
451.50	7,484	9,777	454.15	10,782	34,063
451.55	7,548	10,153	454.20	10,842	34,604
451.60	7,612	10,532	454.25	10,902	35,148
451.65	7,677	10,914	454.30	10,961	35,694
451.70	7,741	11,300	454.35	11,021	36,244
451.75	7,805	11,688	454.40	11,080	36,796
451.80	7,870	12,080	454.45	11,139	37,352
451.85	7,934	12,475	454.50	11,199	37,910
451.90	7,998	12,874	454.55	11,259	38,472
451.95	8,063	13,275	454.60	11,318	39,036
452.00	8,127	13,680	454.65	11,377	39,603
452.05	8,191	14,088	454.70	11,437	40,174
452.10	8,256	14,499	454.75	11,497	40,747
452.15	8,320	14,914	454.80	11,556	41,324
452.20	8,384	15,331	454.85	11,616	41,903
452.25	8,449	15,752	454.90	11,675	42,485
452.30	8,513	16,176	454.95	11,734	43,070
452.35	8,577	16,603	455.00	**11,794**	**43,659**
452.40	8,642	17,034			
452.45	8,706	17,467			
452.50	8,771	17,904			
452.55	8,835	18,345			
452.60	8,899	18,788			

Summary for Pond 3P: FB 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 1.82" for 1-yr event
Inflow = 9.66 cfs @ 12.09 hrs, Volume= 0.711 af
Outflow = 8.76 cfs @ 12.13 hrs, Volume= 0.711 af, Atten= 9%, Lag= 2.3 min
Primary = 8.76 cfs @ 12.13 hrs, Volume= 0.711 af
Routed to Pond 1E : INFIL 1E

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 6,027 sf Storage= 16,913 cf
Peak Elev= 461.30' @ 12.13 hrs Surf.Area= 6,438 sf Storage= 18,773 cf (1,860 cf above start)

Plug-Flow detention time= 261.1 min calculated for 0.322 af (45% of inflow)
Center-of-Mass det. time= 9.5 min (814.3 - 804.9)

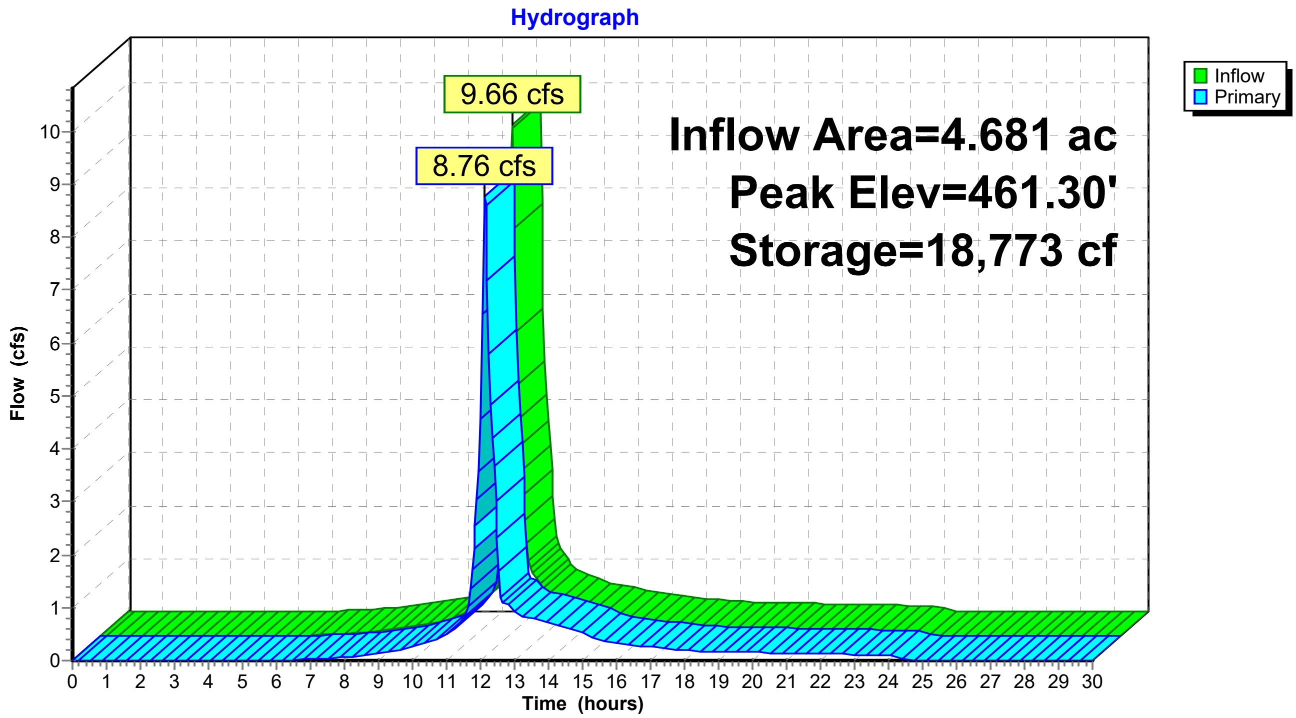
Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	52,051 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
456.00	1,140	0	0
460.00	4,648	11,576	11,576
465.00	11,542	40,475	52,051

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=8.57 cfs @ 12.13 hrs HW=461.29' TW=460.55' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 8.57 cfs @ 1.46 fps)

Pond 3P: FB 1E


Hydrograph
9.66 cfs
8.76 cfs
Inflow Area=4.681 ac
Peak Elev=461.30'
Storage=18,773 cf
Inflow
Primary
Flow (cfs)
0
1
2
3
4
5
6
7
8
9
10
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Stage-Area-Storage for Pond 3P: FB 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
456.00	1,140	0	461.30	6,440	18,783
456.10	1,228	118	461.40	6,578	19,434
456.20	1,315	246	461.50	6,716	20,099
456.30	1,403	381	461.60	6,854	20,778
456.40	1,491	526	461.70	6,992	21,470
456.50	1,579	680	461.80	7,130	22,176
456.60	1,666	842	461.90	7,268	22,896
456.70	1,754	1,013	462.00	7,406	23,630
456.80	1,842	1,193	462.10	7,543	24,377
456.90	1,929	1,381	462.20	7,681	25,138
457.00	2,017	1,579	462.30	7,819	25,913
457.10	2,105	1,785	462.40	7,957	26,702
457.20	2,192	1,999	462.50	8,095	27,505
457.30	2,280	2,223	462.60	8,233	28,321
457.40	2,368	2,455	462.70	8,371	29,151
457.50	2,456	2,697	462.80	8,509	29,995
457.60	2,543	2,947	462.90	8,647	30,853
457.70	2,631	3,205	463.00	8,784	31,725
457.80	2,719	3,473	463.10	8,922	32,610
457.90	2,806	3,749	463.20	9,060	33,509
458.00	2,894	4,034	463.30	9,198	34,422
458.10	2,982	4,328	463.40	9,336	35,349
458.20	3,069	4,630	463.50	9,474	36,289
458.30	3,157	4,942	463.60	9,612	37,243
458.40	3,245	5,262	463.70	9,750	38,211
458.50	3,333	5,591	463.80	9,887	39,193
458.60	3,420	5,928	463.90	10,025	40,189
458.70	3,508	6,275	464.00	10,163	41,198
458.80	3,596	6,630	464.10	10,301	42,222
458.90	3,683	6,994	464.20	10,439	43,259
459.00	3,771	7,367	464.30	10,577	44,309
459.10	3,859	7,748	464.40	10,715	45,374
459.20	3,946	8,138	464.50	10,853	46,452
459.30	4,034	8,537	464.60	10,990	47,545
459.40	4,122	8,945	464.70	11,128	48,650
459.50	4,210	9,362	464.80	11,266	49,770
459.60	4,297	9,787	464.90	11,404	50,904
459.70	4,385	10,221	465.00	**11,542**	**52,051**
459.80	4,473	10,664			
459.90	4,560	11,116			
460.00	4,648	11,576			
460.10	4,786	12,048			
460.20	4,924	12,533			
460.30	5,062	13,032			
460.40	5,200	13,546			
460.50	5,337	14,072			
460.60	5,475	14,613			
460.70	5,613	15,167			
460.80	5,751	15,736			
460.90	5,889	16,318			
461.00	6,027	16,913			
461.10	6,165	17,523			
461.20	6,303	18,146			

Summary for Pond 4P: FB 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 1.61" for 1-yr event
Inflow = 27.06 cfs @ 12.09 hrs, Volume= 2.129 af
Outflow = 22.87 cfs @ 12.14 hrs, Volume= 2.129 af, Atten= 15%, Lag= 3.4 min
Primary = 22.87 cfs @ 12.14 hrs, Volume= 2.129 af
Routed to Pond 1BE : INFIL 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 457.50' Surf.Area= 14,084 sf Storage= 43,509 cf
Peak Elev= 458.06' @ 12.14 hrs Surf.Area= 14,617 sf Storage= 51,603 cf (8,094 cf above start)

Plug-Flow detention time= 238.4 min calculated for 1.130 af (53% of inflow)
Center-of-Mass det. time= 12.8 min (784.2 - 771.4)

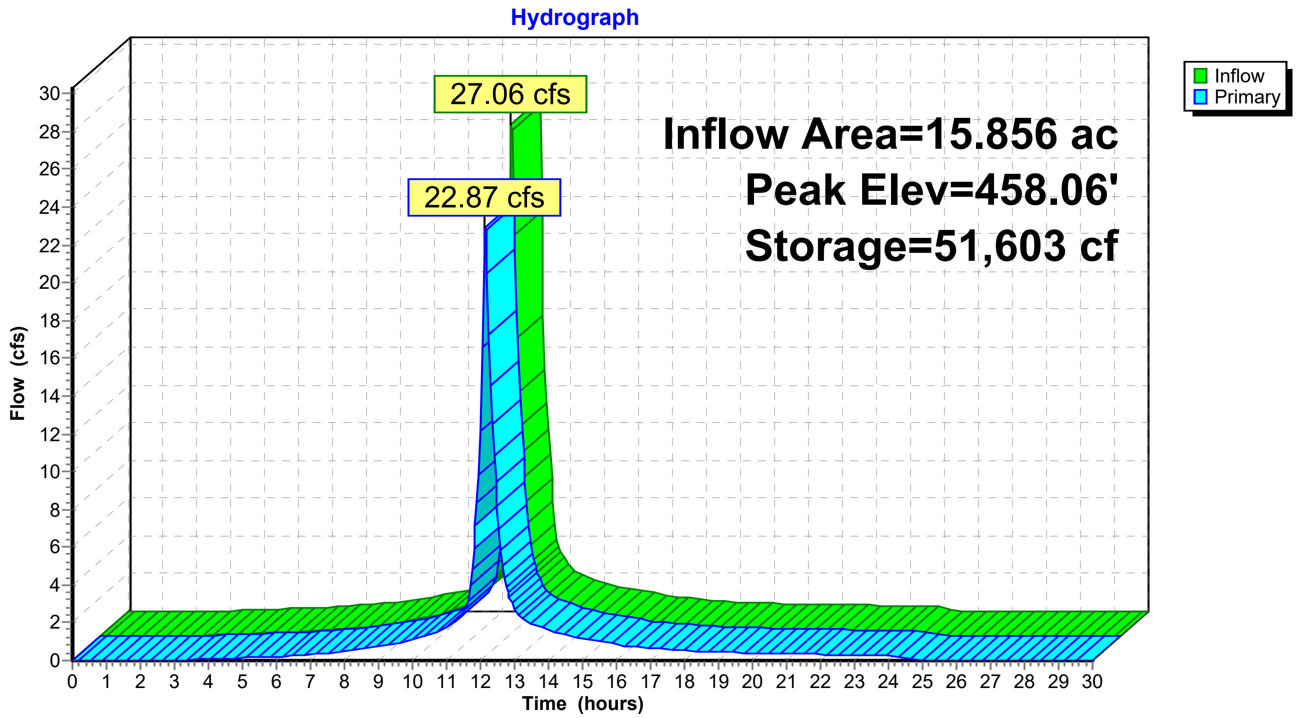
Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	81,672 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
454.00	10,778	0	0
460.00	16,446	81,672	81,672

Device	Routing	Invert	Outlet Devices
#1	Primary	457.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.65 cfs @ 12.14 hrs HW=458.06' TW=455.59' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 22.65 cfs @ 2.02 fps)

Pond 4P: FB 1BE



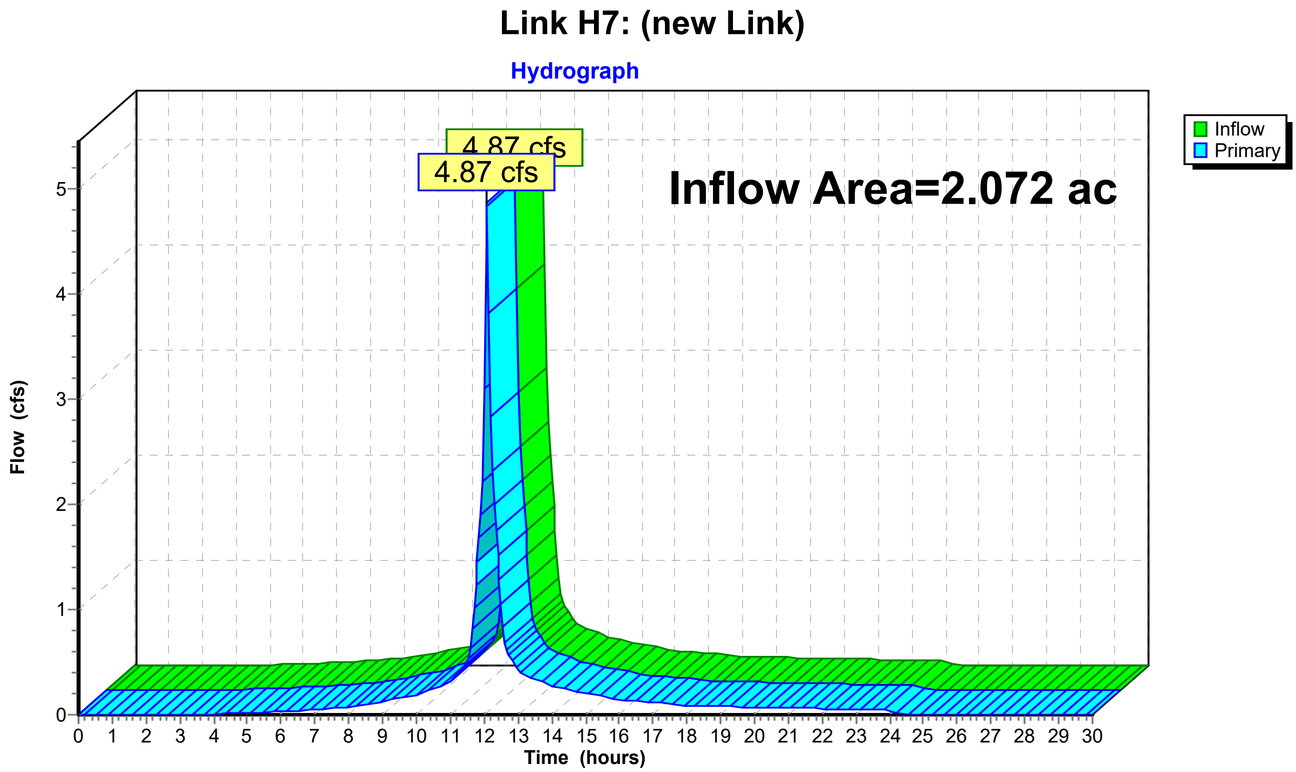
Stage-Area-Storage for Pond 4P: FB 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
454.00	10,778	0	459.30	15,785	70,391
454.10	10,872	1,083	459.40	15,879	71,974
454.20	10,967	2,174	459.50	15,974	73,567
454.30	11,061	3,276	459.60	16,068	75,169
454.40	11,156	4,387	459.70	16,163	76,781
454.50	11,250	5,507	459.80	16,257	78,402
454.60	11,345	6,637	459.90	16,352	80,032
454.70	11,439	7,776	460.00	**16,446**	**81,672**
454.80	11,534	8,925			
454.90	11,628	10,083			
455.00	11,723	11,250			
455.10	11,817	12,427			
455.20	11,912	13,614			
455.30	12,006	14,810			
455.40	12,101	16,015			
455.50	12,195	17,230			
455.60	12,289	18,454			
455.70	12,384	19,688			
455.80	12,478	20,931			
455.90	12,573	22,183			
456.00	12,667	23,445			
456.10	12,762	24,717			
456.20	12,856	25,998			
456.30	12,951	27,288			
456.40	13,045	28,588			
456.50	13,140	29,897			
456.60	13,234	31,216			
456.70	13,329	32,544			
456.80	13,423	33,881			
456.90	13,518	35,229			
457.00	13,612	36,585			
457.10	13,706	37,951			
457.20	13,801	39,326			
457.30	13,895	40,711			
457.40	13,990	42,105			
457.50	14,084	43,509			
457.60	14,179	44,922			
457.70	14,273	46,345			
457.80	14,368	47,777			
457.90	14,462	49,218			
458.00	14,557	50,669			
458.10	14,651	52,130			
458.20	14,746	53,600			
458.30	14,840	55,079			
458.40	14,935	56,568			
458.50	15,029	58,066			
458.60	15,123	59,573			
458.70	15,218	61,090			
458.80	15,312	62,617			
458.90	15,407	64,153			
459.00	15,501	65,698			
459.10	15,596	67,253			
459.20	15,690	68,817			

Summary for Link H7: (new Link)

Inflow Area = 2.072 ac, 87.73% Impervious, Inflow Depth = 2.17" for 1-yr event
Inflow = 4.87 cfs @ 12.09 hrs, Volume= 0.374 af
Primary = 4.87 cfs @ 12.09 hrs, Volume= 0.374 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2C : WET 2C

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

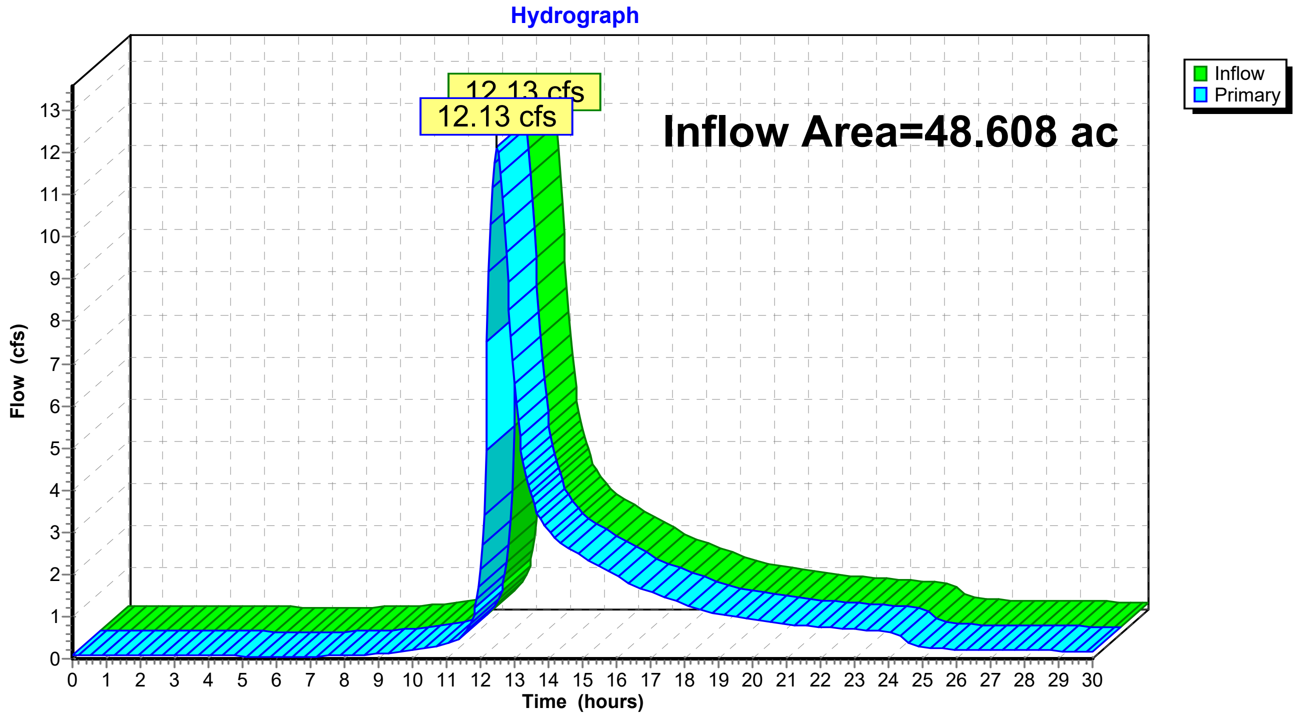


Summary for Link PR: PROPOSED

Inflow Area =	48.608 ac,	42.37% Impervious,	Inflow Depth > 0.60"	for 1-yr event	
Inflow =	12.13 cfs @	12.48 hrs,	Volume=	2.436 af	
Primary =	12.13 cfs @	12.48 hrs,	Volume=	2.436 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link PR: PROPOSED



Summary for Subcatchment PREM: LOD

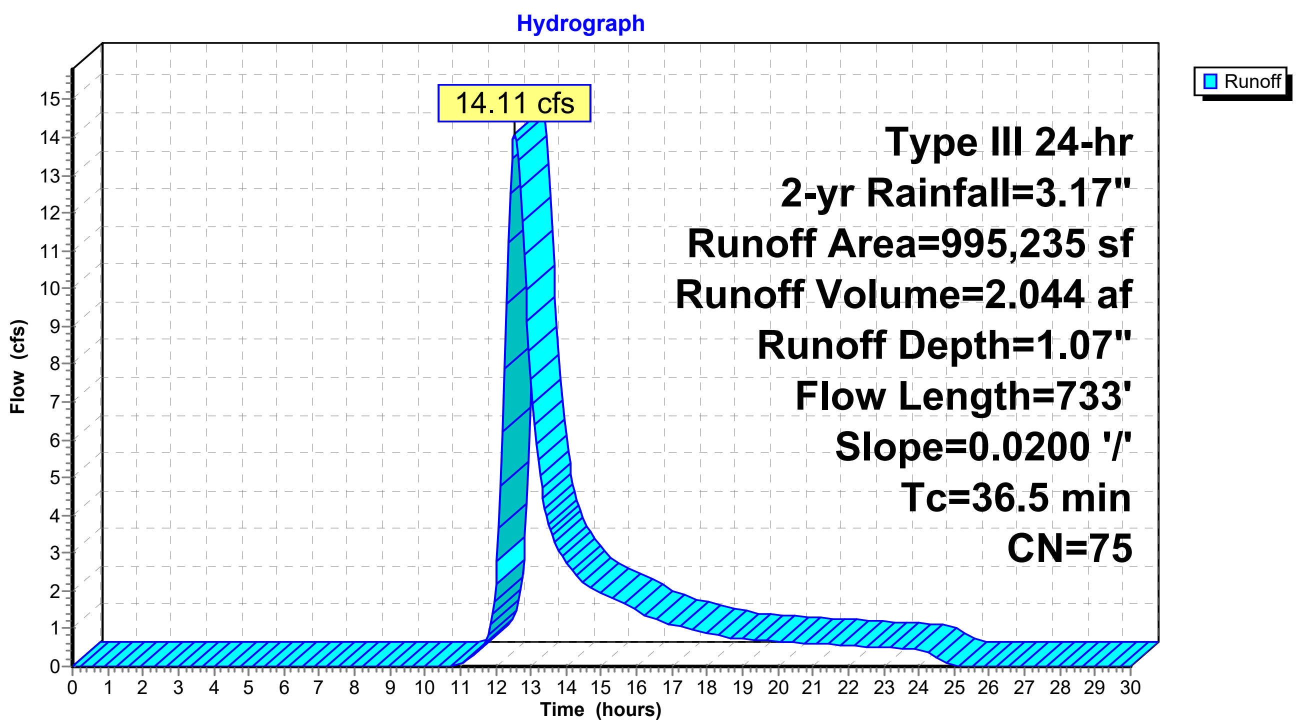
Runoff = 14.11 cfs @ 12.55 hrs, Volume= 2.044 af, Depth= 1.07"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
113,433	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
28,688	30	Meadow, non-grazed, HSG A
532,740	78	Meadow, non-grazed, HSG D
276,941	80	>75% Grass cover, Good, HSG D
995,235	75	Weighted Average
995,235		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
14.9	633	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.5	733	Total			

Subcatchment PREM: LOD



Summary for Subcatchment PW1A: PARKING

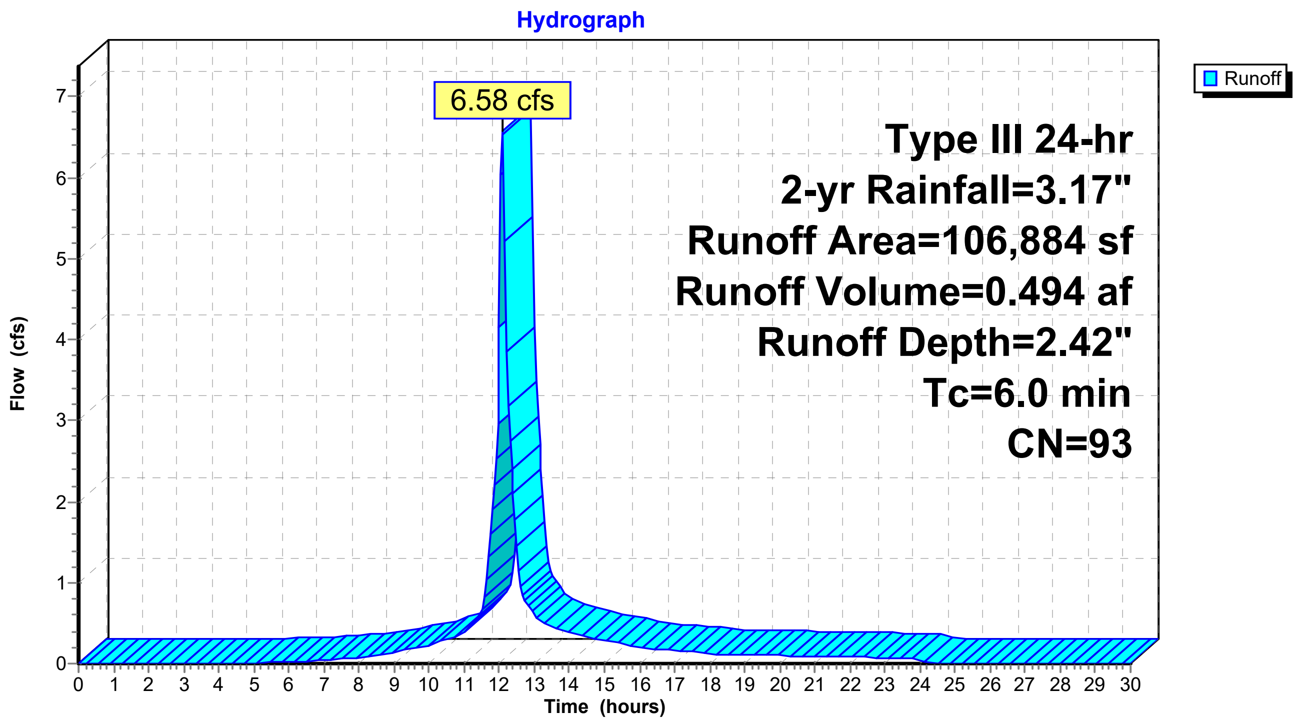
Runoff = 6.58 cfs @ 12.09 hrs, Volume= 0.494 af, Depth= 2.42"
Routed to Pond 1A-1 : INFIL 1A-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
32,522	80	>75% Grass cover, Good, HSG D
74,362	98	Paved parking, HSG D
106,884	93	Weighted Average
32,522		30.43% Pervious Area
74,362		69.57% Impervious Area

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

Subcatchment PW1A: PARKING



Summary for Subcatchment PW1BE: BLDG EAST

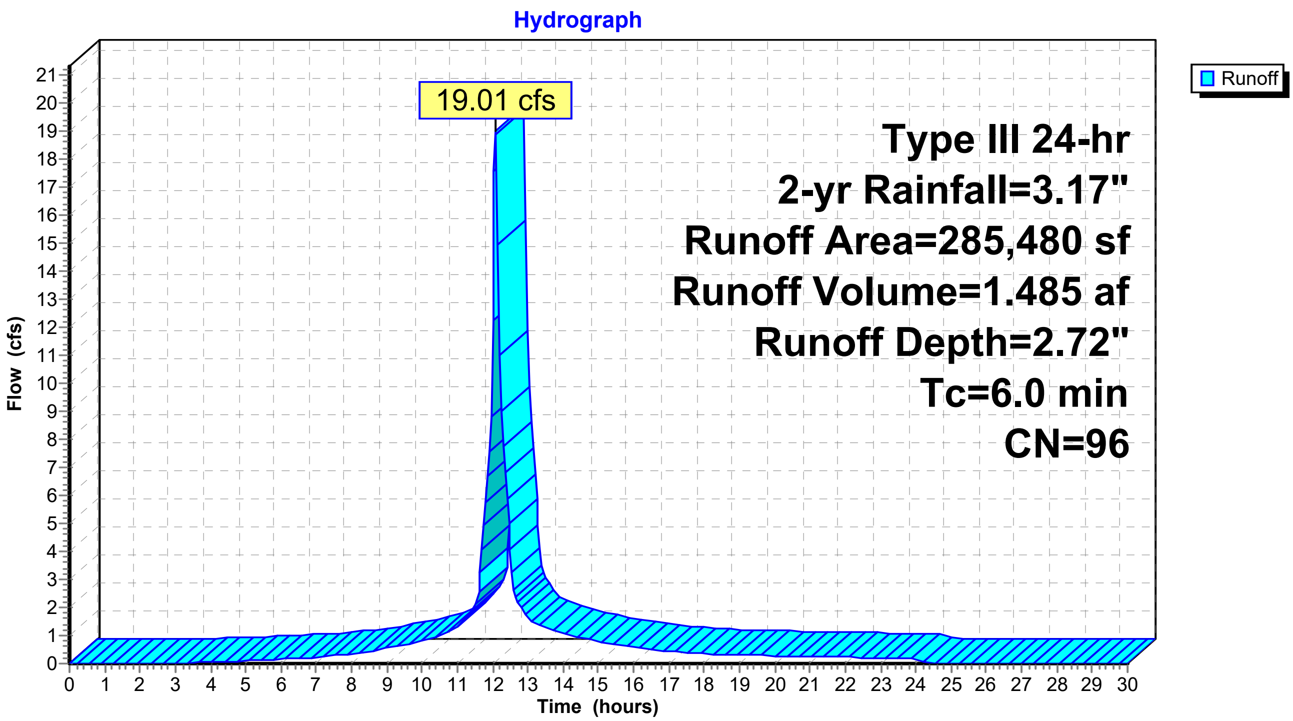
Runoff = 19.01 cfs @ 12.09 hrs, Volume= 1.485 af, Depth= 2.72"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
33,786	80	>75% Grass cover, Good, HSG D
251,694	98	Paved parking, HSG D
285,480	96	Weighted Average
33,786		11.83% Pervious Area
251,694		88.17% Impervious Area

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

Subcatchment PW1BE: BLDG EAST



Summary for Subcatchment PW1BW: BLDG WEST

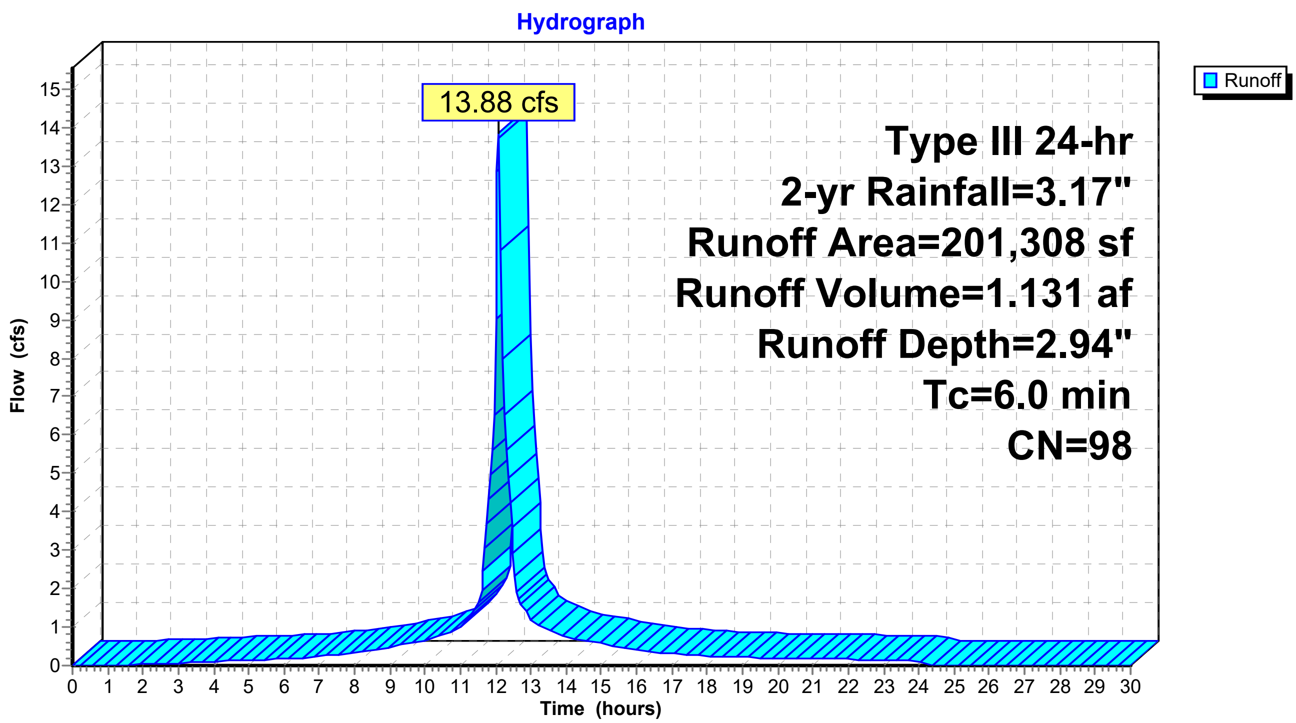
Runoff = 13.88 cfs @ 12.09 hrs, Volume= 1.131 af, Depth= 2.94"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
201,308	98	Paved parking, HSG D
201,308	98	Weighted Average
201,308		100.00% Impervious Area

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

Subcatchment PW1BW: BLDG WEST



Summary for Subcatchment PW1C:

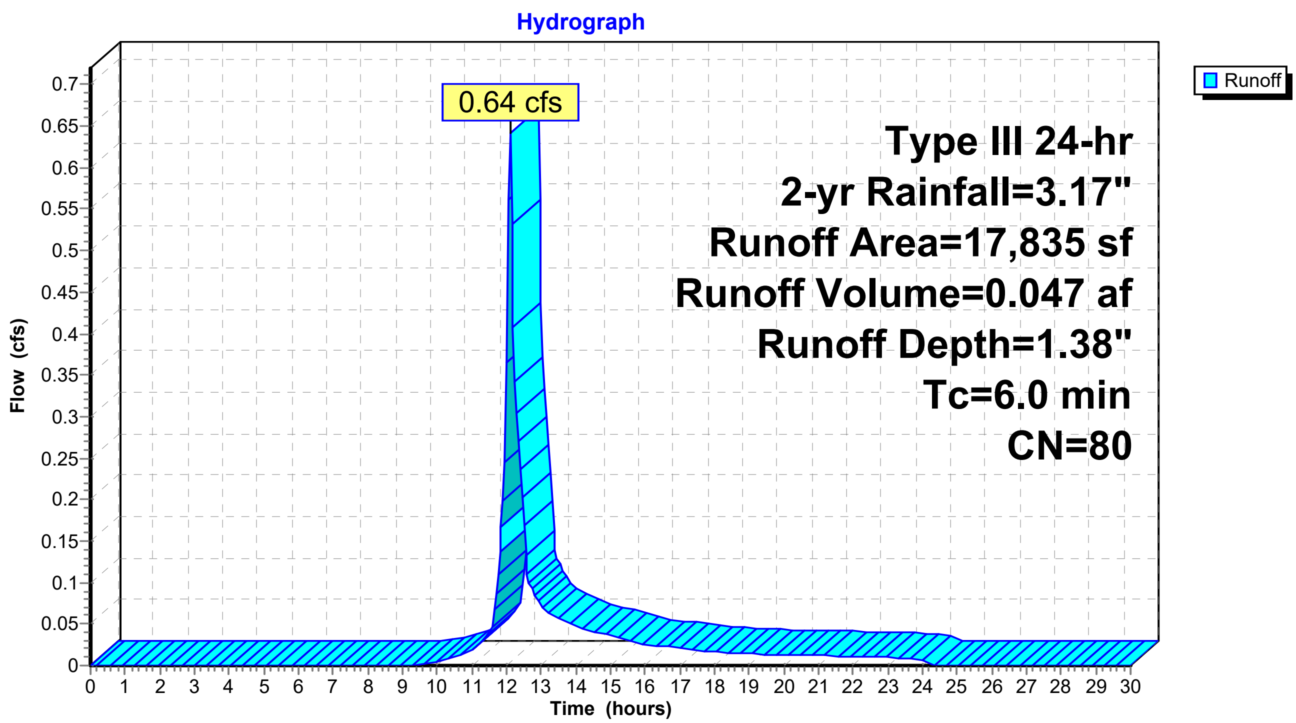
Runoff = 0.64 cfs @ 12.10 hrs, Volume= 0.047 af, Depth= 1.38"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
17,835	80	>75% Grass cover, Good, HSG D
0	98	Paved parking, HSG D
17,835	80	Weighted Average
17,835		100.00% Pervious Area

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

Subcatchment PW1C:



Summary for Subcatchment PW1D: LOAD EAST

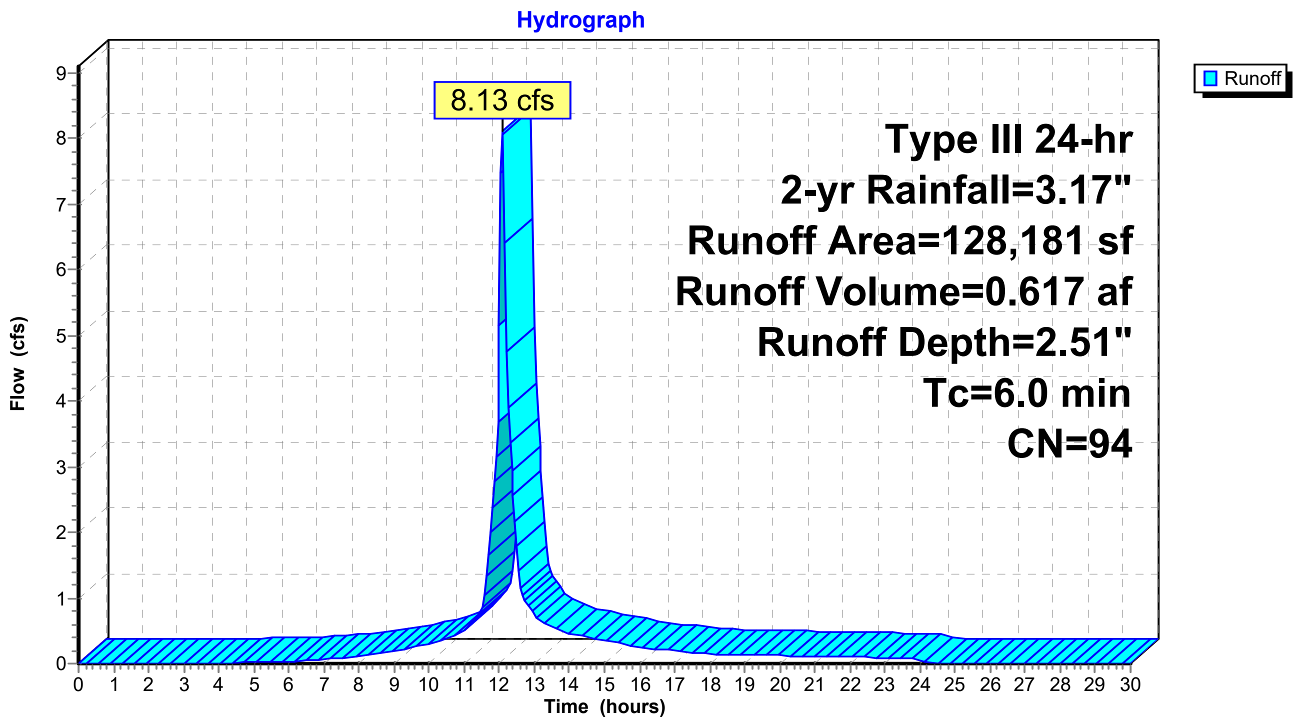
Runoff = 8.13 cfs @ 12.09 hrs, Volume= 0.617 af, Depth= 2.51"
Routed to Pond 1D : WET 1D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
28,504	80	>75% Grass cover, Good, HSG D
99,677	98	Paved parking, HSG D
128,181	94	Weighted Average
28,504		22.24% Pervious Area
99,677		77.76% Impervious Area

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

Subcatchment PW1D: LOAD EAST



Summary for Subcatchment PW1E: LOAD WEST

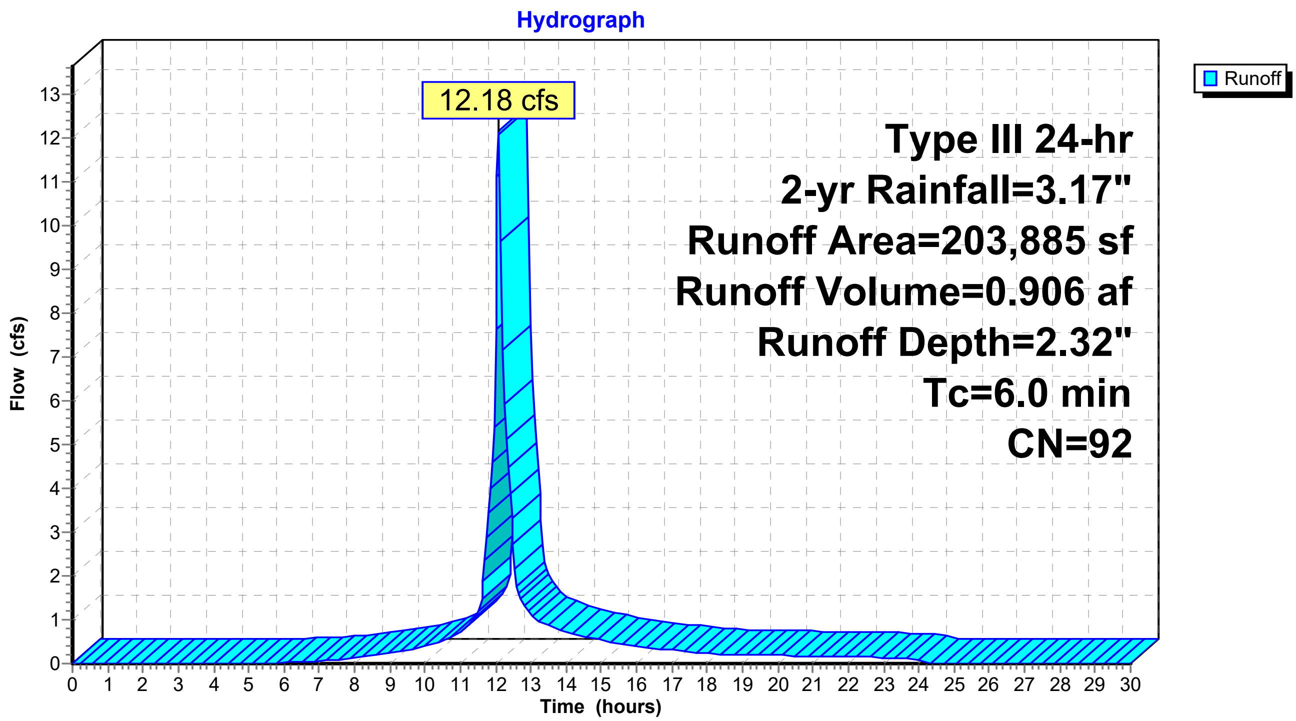
Runoff = 12.18 cfs @ 12.09 hrs, Volume= 0.906 af, Depth= 2.32"
Routed to Pond 3P : FB 1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
70,197	80	>75% Grass cover, Good, HSG D
133,688	98	Paved parking, HSG D
203,885	92	Weighted Average
70,197		34.43% Pervious Area
133,688		65.57% Impervious Area

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

Subcatchment PW1E: LOAD WEST



Summary for Subcatchment PW2A: PARKING

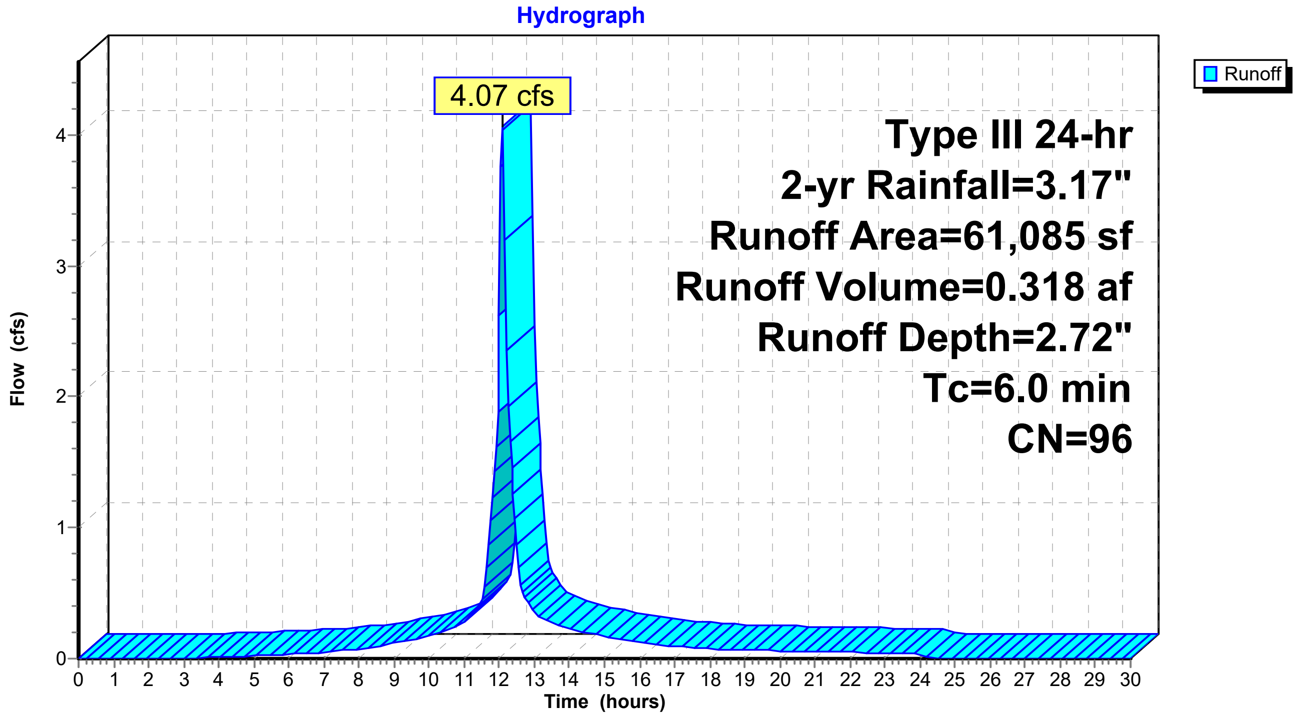
Runoff = 4.07 cfs @ 12.09 hrs, Volume= 0.318 af, Depth= 2.72"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
5,846	80	>75% Grass cover, Good, HSG D
55,239	98	Paved parking, HSG D
61,085	96	Weighted Average
5,846		9.57% Pervious Area
55,239		90.43% Impervious Area

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

Subcatchment PW2A: PARKING



Summary for Subcatchment PW2B: LOADING

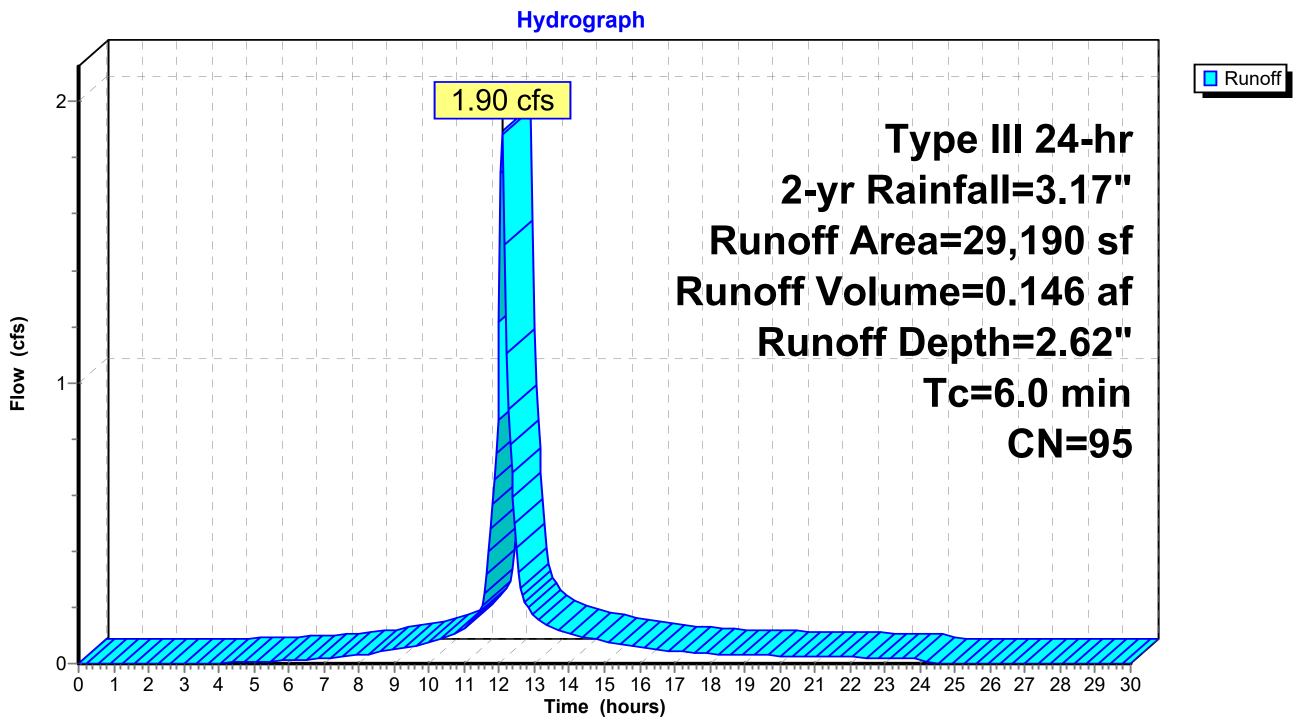
Runoff = 1.90 cfs @ 12.09 hrs, Volume= 0.146 af, Depth= 2.62"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
5,233	80	>75% Grass cover, Good, HSG D
23,957	98	Paved parking, HSG D
29,190	95	Weighted Average
5,233		17.93% Pervious Area
23,957		82.07% Impervious Area

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

Subcatchment PW2B: LOADING



Summary for Subcatchment PW2C: BACK

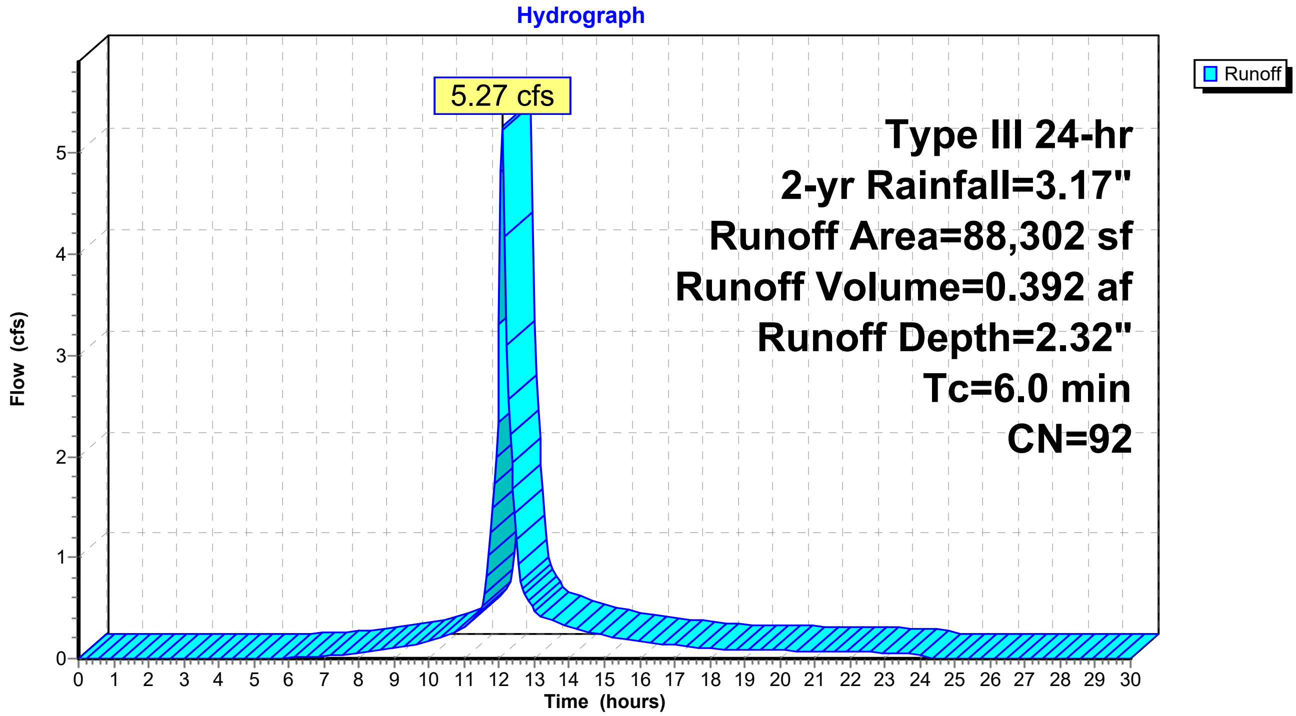
Runoff = 5.27 cfs @ 12.09 hrs, Volume= 0.392 af, Depth= 2.32"
Routed to Pond 2C : WET 2C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
31,111	80	>75% Grass cover, Good, HSG D
57,191	98	Paved parking, HSG D
88,302	92	Weighted Average
31,111		35.23% Pervious Area
57,191		64.77% Impervious Area

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

Subcatchment PW2C: BACK



Summary for Pond 1A-1: INFIL 1A-1

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 2.42" for 2-yr event
Inflow = 6.58 cfs @ 12.09 hrs, Volume= 0.494 af
Outflow = 0.53 cfs @ 13.14 hrs, Volume= 0.494 af, Atten= 92%, Lag= 63.1 min
Discarded = 0.53 cfs @ 13.14 hrs, Volume= 0.494 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1A-2 : INFIL 1A-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 476.32' @ 13.14 hrs Surf.Area= 4,592 sf Storage= 8,968 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 152.6 min (945.6 - 793.0)

Volume	Invert	Avail.Storage	Storage Description
#1	474.00'	17,580 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

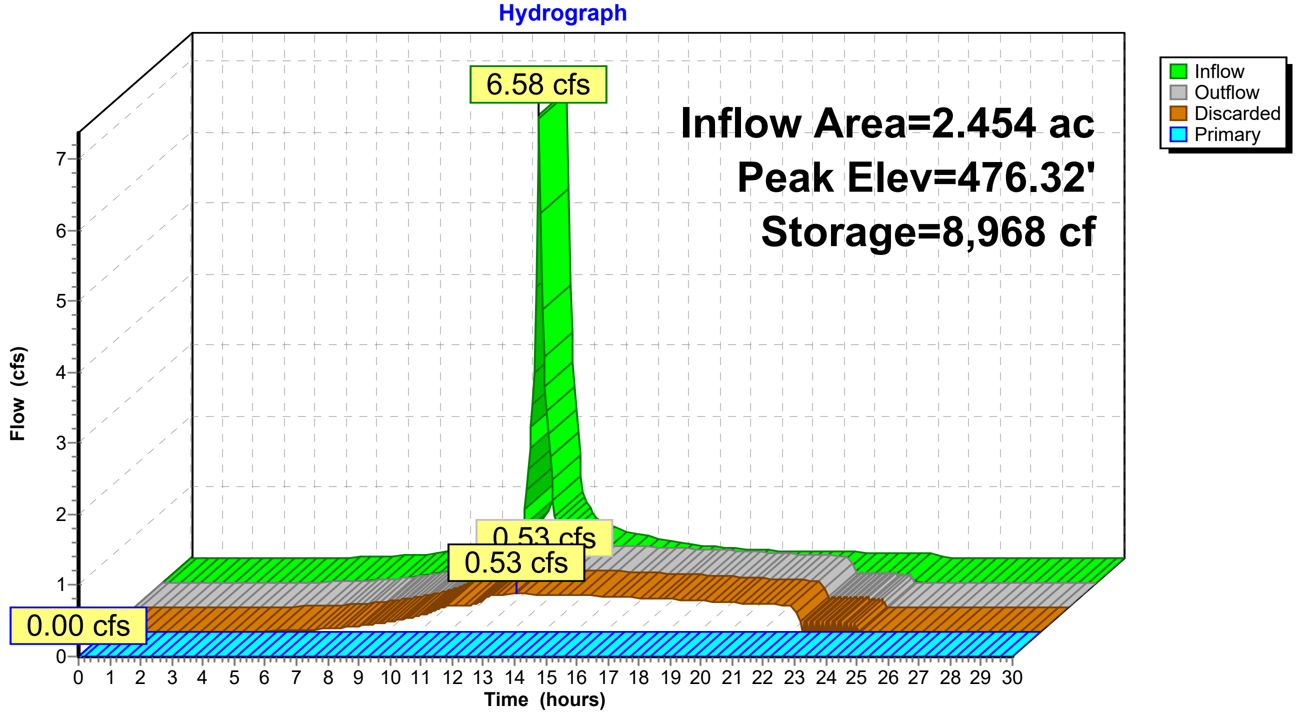
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
474.00	3,150	0	0
478.00	5,640	17,580	17,580

Device	Routing	Invert	Outlet Devices
#1	Discarded	474.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	476.50'	**20.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.53 cfs @ 13.14 hrs HW=476.32' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=474.00' TW=468.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A-1: INFIL 1A-1



Stage-Area-Storage for Pond 1A-1: INFIL 1A-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
474.00	3,150	0	476.65	4,800	10,533
474.05	3,181	158	476.70	4,831	10,774
474.10	3,212	318	476.75	4,862	11,016
474.15	3,243	480	476.80	4,893	11,260
474.20	3,274	642	476.85	4,924	11,506
474.25	3,306	807	476.90	4,955	11,753
474.30	3,337	973	476.95	4,986	12,001
474.35	3,368	1,141	477.00	5,018	12,251
474.40	3,399	1,310	477.05	5,049	12,503
474.45	3,430	1,481	477.10	5,080	12,756
474.50	3,461	1,653	477.15	5,111	13,011
474.55	3,492	1,827	477.20	5,142	13,267
474.60	3,524	2,002	477.25	5,173	13,525
474.65	3,555	2,179	477.30	5,204	13,785
474.70	3,586	2,358	477.35	5,235	14,046
474.75	3,617	2,538	477.40	5,266	14,308
474.80	3,648	2,719	477.45	5,298	14,572
474.85	3,679	2,902	477.50	5,329	14,838
474.90	3,710	3,087	477.55	5,360	15,105
474.95	3,741	3,273	477.60	5,391	15,374
475.00	3,773	3,461	477.65	5,422	15,644
475.05	3,804	3,651	477.70	5,453	15,916
475.10	3,835	3,842	477.75	5,484	16,189
475.15	3,866	4,034	477.80	5,516	16,464
475.20	3,897	4,228	477.85	5,547	16,741
475.25	3,928	4,424	477.90	5,578	17,019
475.30	3,959	4,621	477.95	5,609	17,299
475.35	3,990	4,820	478.00	**5,640**	**17,580**
475.40	4,021	5,020			
475.45	4,053	5,222			
475.50	4,084	5,425			
475.55	4,115	5,630			
475.60	4,146	5,837			
475.65	4,177	6,045			
475.70	4,208	6,255			
475.75	4,239	6,466			
475.80	4,271	6,678			
475.85	4,302	6,893			
475.90	4,333	7,109			
475.95	4,364	7,326			
476.00	4,395	7,545			
476.05	4,426	7,766			
476.10	4,457	7,988			
476.15	4,488	8,211			
476.20	4,519	8,436			
476.25	4,551	8,663			
476.30	4,582	8,892			
476.35	4,613	9,121			
476.40	4,644	9,353			
476.45	4,675	9,586			
476.50	4,706	9,820			
476.55	4,737	10,056			
476.60	4,769	10,294			

Summary for Pond 1A-2: INFIL 1A-2

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 468.00' @ 0.00 hrs Surf.Area= 928 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	468.00'	3,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

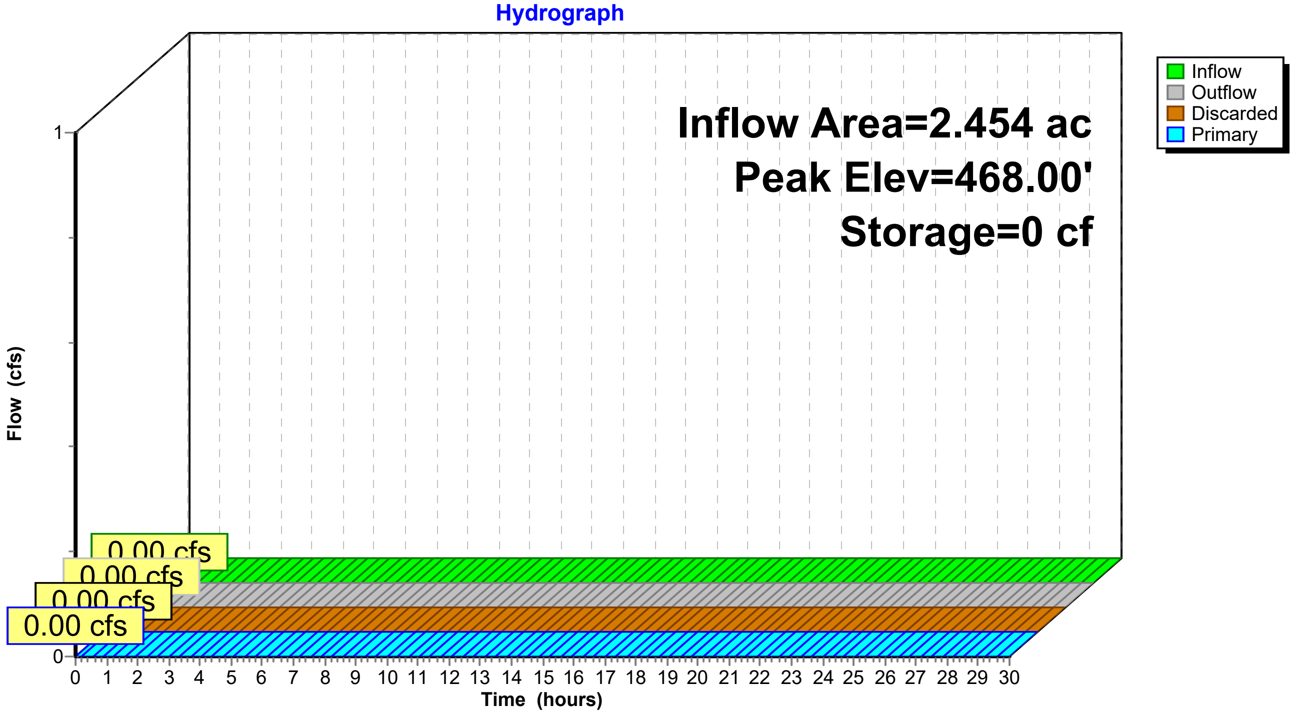
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
468.00	928	0	0
471.00	1,674	3,903	3,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	468.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Device 3	469.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	466.50'	**24.0" Round Culvert** L= 68.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 466.50' / 464.00' S= 0.0368 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=468.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.11 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=468.00' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 0.00 cfs of 10.54 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A-2: INFIL 1A-2



Stage-Area-Storage for Pond 1A-2: INFIL 1A-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
468.00	928	0
468.05	940	47
468.10	953	94
468.15	965	142
468.20	978	191
468.25	990	240
468.30	1,003	290
468.35	1,015	340
468.40	1,027	391
468.45	1,040	443
468.50	1,052	495
468.55	1,065	548
468.60	1,077	602
468.65	1,090	656
468.70	1,102	711
468.75	1,115	766
468.80	1,127	822
468.85	1,139	879
468.90	1,152	936
468.95	1,164	994
469.00	1,177	1,052
469.05	1,189	1,111
469.10	1,202	1,171
469.15	1,214	1,232
469.20	1,226	1,293
469.25	1,239	1,354
469.30	1,251	1,417
469.35	1,264	1,479
469.40	1,276	1,543
469.45	1,289	1,607
469.50	1,301	1,672
469.55	1,313	1,737
469.60	1,326	1,803
469.65	1,338	1,870
469.70	1,351	1,937
469.75	1,363	2,005
469.80	1,376	2,073
469.85	1,388	2,142
469.90	1,400	2,212
469.95	1,413	2,282
470.00	1,425	2,353
470.05	1,438	2,425
470.10	1,450	2,497
470.15	1,463	2,570
470.20	1,475	2,643
470.25	1,488	2,717
470.30	1,500	2,792
470.35	1,512	2,867
470.40	1,525	2,943
470.45	1,537	3,020
470.50	1,550	3,097
470.55	1,562	3,175
470.60	1,575	3,253
470.65	1,587	3,332
470.70	1,599	3,412
470.75	1,612	3,492
470.80	1,624	3,573
470.85	1,637	3,655
470.90	1,649	3,737
470.95	1,662	3,820
471.00	**1,674**	**3,903**

Summary for Pond 1BE: INFIL 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 1.98" for 2-yr event
Inflow = 28.05 cfs @ 12.14 hrs, Volume= 2.616 af
Outflow = 4.93 cfs @ 12.72 hrs, Volume= 2.622 af, Atten= 82%, Lag= 34.8 min
Discarded = 4.93 cfs @ 12.72 hrs, Volume= 2.622 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 456.69' @ 12.72 hrs Surf.Area= 21,304 sf Storage= 32,944 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 43.1 min (821.8 - 778.7)

Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	115,118 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

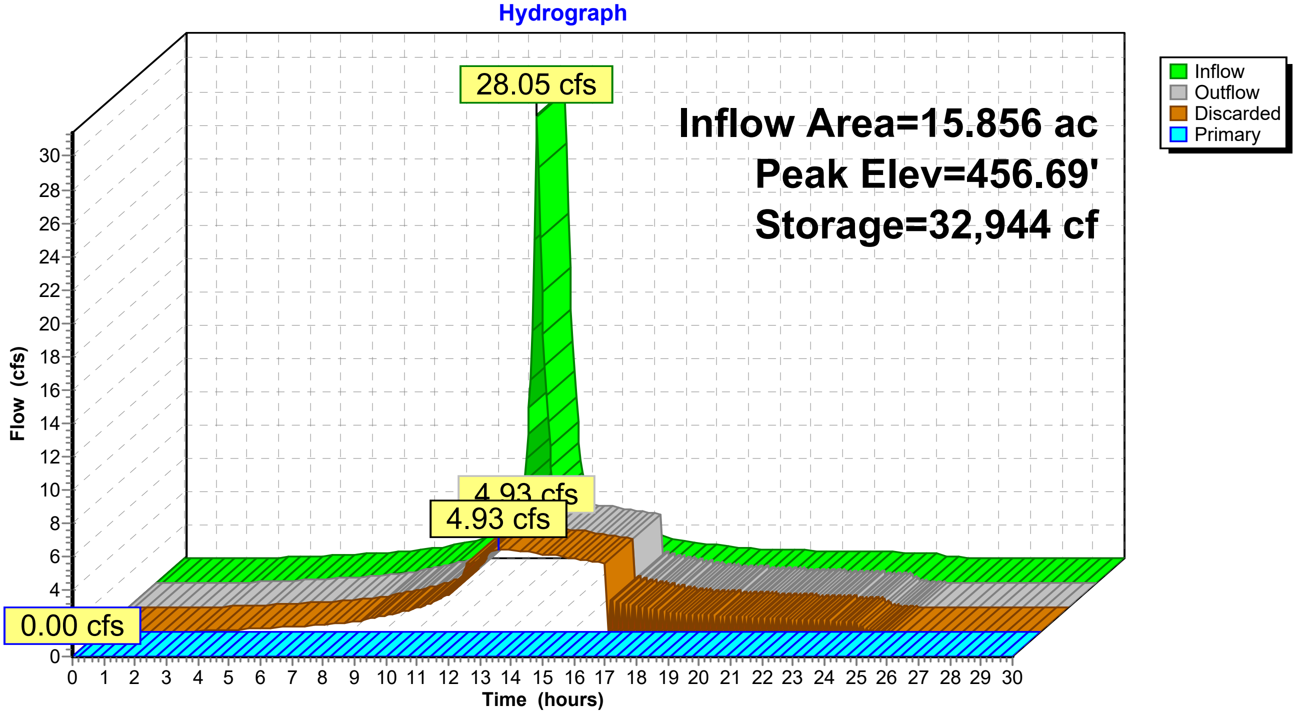
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
455.00	17,730	0	0
460.00	28,317	115,118	115,118

Device	Routing	Invert	Outlet Devices
#1	Primary	458.00'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	455.00'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=4.93 cfs @ 12.72 hrs HW=456.69' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 4.93 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=455.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1BE: INFIL 1BE



Stage-Area-Storage for Pond 1BE: INFIL 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
455.00	17,730	0	457.65	23,341	54,419
455.05	17,836	889	457.70	23,447	55,589
455.10	17,942	1,784	457.75	23,553	56,764
455.15	18,048	2,683	457.80	23,659	57,944
455.20	18,153	3,588	457.85	23,765	59,130
455.25	18,259	4,499	457.90	23,870	60,321
455.30	18,365	5,414	457.95	23,976	61,517
455.35	18,471	6,335	458.00	24,082	62,718
455.40	18,577	7,261	458.05	24,188	63,925
455.45	18,683	8,193	458.10	24,294	65,137
455.50	18,789	9,130	458.15	24,400	66,354
455.55	18,895	10,072	458.20	24,506	67,577
455.60	19,000	11,019	458.25	24,612	68,805
455.65	19,106	11,972	458.30	24,717	70,038
455.70	19,212	12,930	458.35	24,823	71,277
455.75	19,318	13,893	458.40	24,929	72,521
455.80	19,424	14,862	458.45	25,035	73,770
455.85	19,530	15,835	458.50	25,141	75,024
455.90	19,636	16,815	458.55	25,247	76,284
455.95	19,742	17,799	458.60	25,353	77,549
456.00	19,847	18,789	458.65	25,459	78,819
456.05	19,953	19,784	458.70	25,564	80,095
456.10	20,059	20,784	458.75	25,670	81,375
456.15	20,165	21,790	458.80	25,776	82,662
456.20	20,271	22,801	458.85	25,882	83,953
456.25	20,377	23,817	458.90	25,988	85,250
456.30	20,483	24,838	458.95	26,094	86,552
456.35	20,588	25,865	459.00	26,200	87,859
456.40	20,694	26,897	459.05	26,305	89,172
456.45	20,800	27,934	459.10	26,411	90,490
456.50	20,906	28,977	459.15	26,517	91,813
456.55	21,012	30,025	459.20	26,623	93,141
456.60	21,118	31,078	459.25	26,729	94,475
456.65	21,224	32,137	459.30	26,835	95,814
456.70	21,330	33,201	459.35	26,941	97,159
456.75	21,435	34,270	459.40	27,047	98,508
456.80	21,541	35,344	459.45	27,152	99,863
456.85	21,647	36,424	459.50	27,258	101,224
456.90	21,753	37,509	459.55	27,364	102,589
456.95	21,859	38,599	459.60	27,470	103,960
457.00	21,965	39,695	459.65	27,576	105,336
457.05	22,071	40,796	459.70	27,682	106,718
457.10	22,177	41,902	459.75	27,788	108,104
457.15	22,282	43,013	459.80	27,894	109,496
457.20	22,388	44,130	459.85	27,999	110,894
457.25	22,494	45,252	459.90	28,105	112,296
457.30	22,600	46,380	459.95	28,211	113,704
457.35	22,706	47,512	460.00	**28,317**	**115,118**
457.40	22,812	48,650			
457.45	22,918	49,793			
457.50	23,024	50,942			
457.55	23,129	52,096			
457.60	23,235	53,255			

Summary for Pond 1D: WET 1D

Inflow Area = 2.943 ac, 77.76% Impervious, Inflow Depth = 2.51" for 2-yr event
Inflow = 8.13 cfs @ 12.09 hrs, Volume= 0.617 af
Outflow = 0.42 cfs @ 14.34 hrs, Volume= 0.396 af, Atten= 95%, Lag= 135.0 min
Primary = 0.42 cfs @ 14.34 hrs, Volume= 0.396 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.50' Surf.Area= 14,310 sf Storage= 13,422 cf
Peak Elev= 452.53' @ 14.34 hrs Surf.Area= 16,132 sf Storage= 29,050 cf (15,627 cf above start)

Plug-Flow detention time= 1,054.8 min calculated for 0.087 af (14% of inflow)
Center-of-Mass det. time= 256.5 min (1,043.9 - 787.4)

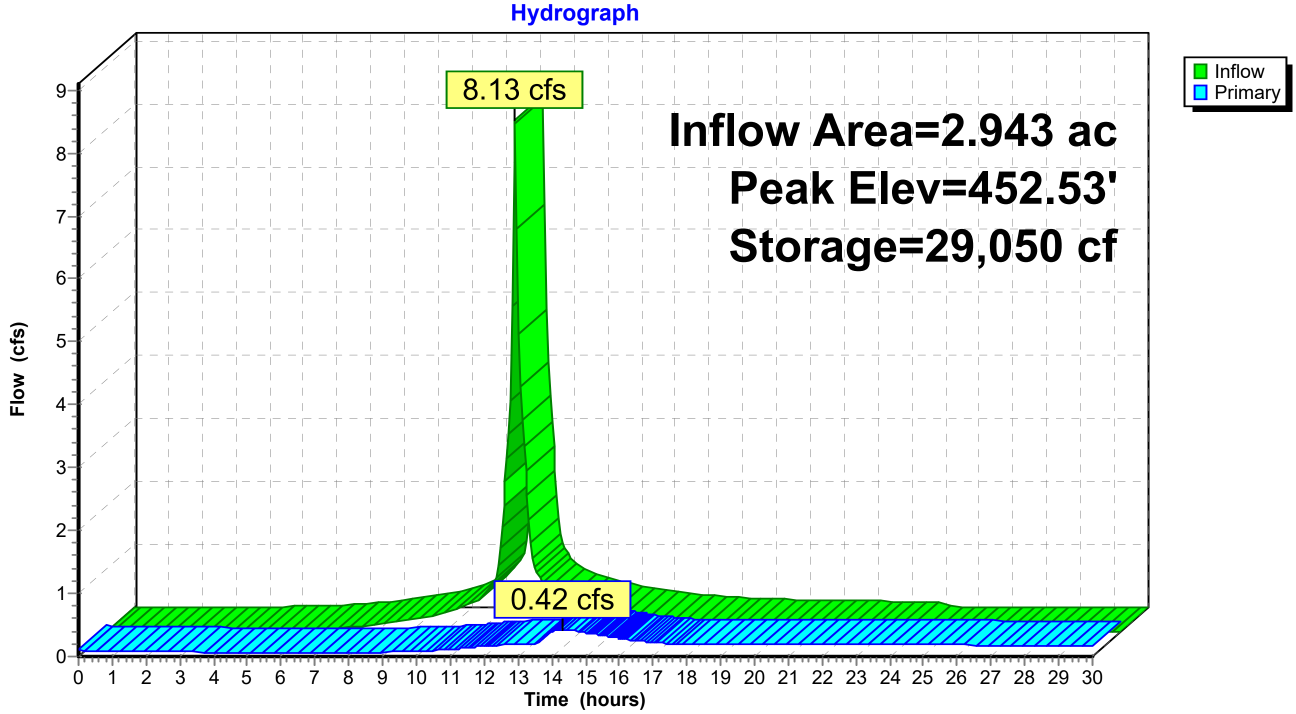
Volume	Invert	Avail.Storage	Storage Description
#1	450.50'	54,744 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.50	12,535	0	0
454.00	18,747	54,744	54,744

Device	Routing	Invert	Outlet Devices
#1	Primary	452.50'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#2	Primary	451.10'	**6.0" Round Culvert** L= 20.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.10' / 450.00' S= 0.0550 '/' Cc= 0.900 n= 0.120, Flow Area= 0.20 sf

Primary OutFlow Max=0.42 cfs @ 14.34 hrs HW=452.53' TW=0.00' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.22 cfs @ 0.42 fps)
└─**2=Culvert** (Barrel Controls 0.19 cfs @ 0.98 fps)

Pond 1D: WET 1D



Stage-Area-Storage for Pond 1D: WET 1D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.50	12,535	0
450.55	12,624	629
450.60	12,712	1,262
450.65	12,801	1,900
450.70	12,890	2,542
450.75	12,979	3,189
450.80	13,067	3,840
450.85	13,156	4,496
450.90	13,245	5,156
450.95	13,334	5,820
451.00	13,422	6,489
451.05	13,511	7,163
451.10	13,600	7,840
451.15	13,689	8,523
451.20	13,777	9,209
451.25	13,866	9,900
451.30	13,955	10,596
451.35	14,044	11,296
451.40	14,132	12,000
451.45	14,221	12,709
451.50	14,310	13,422
451.55	14,399	14,140
451.60	14,487	14,862
451.65	14,576	15,589
451.70	14,665	16,320
451.75	14,754	17,055
451.80	14,842	17,795
451.85	14,931	18,540
451.90	15,020	19,288
451.95	15,109	20,042
452.00	15,197	20,799
452.05	15,286	21,561
452.10	15,375	22,328
452.15	15,464	23,099
452.20	15,552	23,874
452.25	15,641	24,654
452.30	15,730	25,438
452.35	15,818	26,227
452.40	15,907	27,020
452.45	15,996	27,818
452.50	16,085	28,620
452.55	16,173	29,426
452.60	16,262	30,237
452.65	16,351	31,052
452.70	16,440	31,872
452.75	16,528	32,696
452.80	16,617	33,525
452.85	16,706	34,358
452.90	16,795	35,196
452.95	16,883	36,038
453.00	16,972	36,884
453.05	17,061	37,735
453.10	17,150	38,590
453.15	17,238	39,450
453.20	17,327	40,314
453.25	17,416	41,182
453.30	17,505	42,055
453.35	17,593	42,933
453.40	17,682	43,815
453.45	17,771	44,701
453.50	17,860	45,592
453.55	17,948	46,487
453.60	18,037	47,387
453.65	18,126	48,291
453.70	18,215	49,199
453.75	18,303	50,112
453.80	18,392	51,030
453.85	18,481	51,951
453.90	18,570	52,878
453.95	18,658	53,808
454.00	**18,747**	**54,744**

Summary for Pond 1E: INFIL 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 2.32" for 2-yr event
Inflow = 11.21 cfs @ 12.12 hrs, Volume= 0.906 af
Outflow = 0.99 cfs @ 13.14 hrs, Volume= 0.906 af, Atten= 91%, Lag= 61.1 min
Discarded = 0.99 cfs @ 13.14 hrs, Volume= 0.906 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 4P : FB 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 461.43' @ 13.14 hrs Surf.Area= 10,655 sf Storage= 13,732 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 129.5 min (946.4 - 816.8)

Volume	Invert	Avail.Storage	Storage Description
#1	460.00'	61,063 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

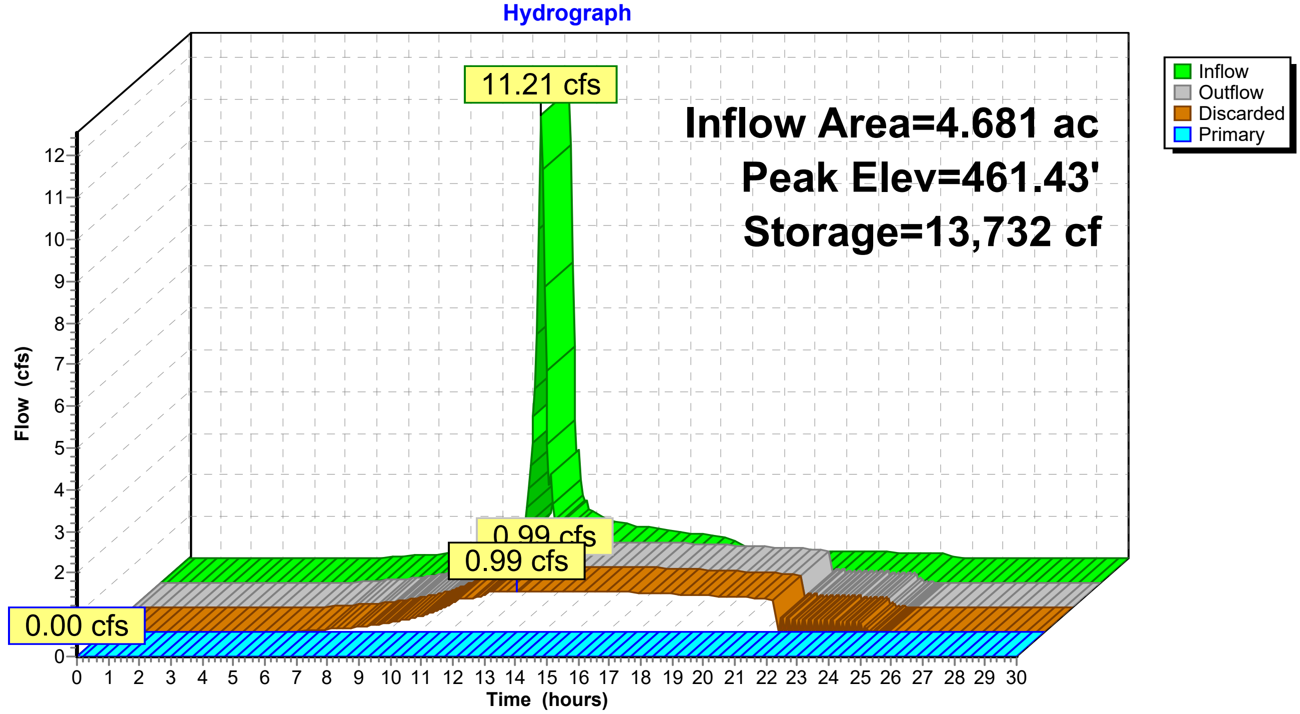
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
460.00	8,583	0	0
465.00	15,842	61,063	61,063

Device	Routing	Invert	Outlet Devices
#1	Discarded	460.00'	**4.000 in/hr EXFIL over Surface area**
#2	Primary	462.00'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.99 cfs @ 13.14 hrs HW=461.43' (Free Discharge)
└─**1=EXFIL** (Exfiltration Controls 0.99 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=460.00' TW=457.50' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1E: INFIL 1E



Stage-Area-Storage for Pond 1E: INFIL 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
460.00	8,583	0	462.65	12,430	27,843
460.05	8,656	431	462.70	12,503	28,466
460.10	8,728	866	462.75	12,575	29,093
460.15	8,801	1,304	462.80	12,648	29,723
460.20	8,873	1,746	462.85	12,721	30,358
460.25	8,946	2,191	462.90	12,793	30,996
460.30	9,019	2,640	462.95	12,866	31,637
460.35	9,091	3,093	463.00	12,938	32,282
460.40	9,164	3,549	463.05	13,011	32,931
460.45	9,236	4,009	463.10	13,084	33,583
460.50	9,309	4,473	463.15	13,156	34,239
460.55	9,381	4,940	463.20	13,229	34,899
460.60	9,454	5,411	463.25	13,301	35,562
460.65	9,527	5,886	463.30	13,374	36,229
460.70	9,599	6,364	463.35	13,447	36,899
460.75	9,672	6,846	463.40	13,519	37,574
460.80	9,744	7,331	463.45	13,592	38,251
460.85	9,817	7,820	463.50	13,664	38,933
460.90	9,890	8,313	463.55	13,737	39,618
460.95	9,962	8,809	463.60	13,809	40,306
461.00	10,035	9,309	463.65	13,882	40,999
461.05	10,107	9,812	463.70	13,955	41,695
461.10	10,180	10,320	463.75	14,027	42,394
461.15	10,253	10,830	463.80	14,100	43,097
461.20	10,325	11,345	463.85	14,172	43,804
461.25	10,398	11,863	463.90	14,245	44,515
461.30	10,470	12,385	463.95	14,318	45,229
461.35	10,543	12,910	464.00	14,390	45,946
461.40	10,616	13,439	464.05	14,463	46,668
461.45	10,688	13,972	464.10	14,535	47,393
461.50	10,761	14,508	464.15	14,608	48,121
461.55	10,833	15,048	464.20	14,681	48,853
461.60	10,906	15,591	464.25	14,753	49,589
461.65	10,978	16,138	464.30	14,826	50,329
461.70	11,051	16,689	464.35	14,898	51,072
461.75	11,124	17,243	464.40	14,971	51,819
461.80	11,196	17,801	464.45	15,044	52,569
461.85	11,269	18,363	464.50	15,116	53,323
461.90	11,341	18,928	464.55	15,189	54,081
461.95	11,414	19,497	464.60	15,261	54,842
462.00	11,487	20,070	464.65	15,334	55,607
462.05	11,559	20,646	464.70	15,406	56,375
462.10	11,632	21,226	464.75	15,479	57,147
462.15	11,704	21,809	464.80	15,552	57,923
462.20	11,777	22,396	464.85	15,624	58,703
462.25	11,850	22,987	464.90	15,697	59,486
462.30	11,922	23,581	464.95	15,769	60,272
462.35	11,995	24,179	465.00	**15,842**	**61,063**
462.40	12,067	24,780			
462.45	12,140	25,386			
462.50	12,213	25,994			
462.55	12,285	26,607			
462.60	12,358	27,223			

Summary for Pond 2C: WET 2C

Inflow Area = 4.100 ac, 76.37% Impervious, Inflow Depth = 2.51" for 2-yr event
Inflow = 11.24 cfs @ 12.09 hrs, Volume= 0.856 af
Outflow = 7.49 cfs @ 12.19 hrs, Volume= 0.843 af, Atten= 33%, Lag= 6.0 min
Primary = 7.49 cfs @ 12.19 hrs, Volume= 0.843 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.30' Surf.Area= 7,226 sf Storage= 8,306 cf
Peak Elev= 452.76' @ 12.19 hrs Surf.Area= 9,107 sf Storage= 20,240 cf (11,934 cf above start)

Plug-Flow detention time= 256.6 min calculated for 0.653 af (76% of inflow)
Center-of-Mass det. time= 112.5 min (898.9 - 786.4)

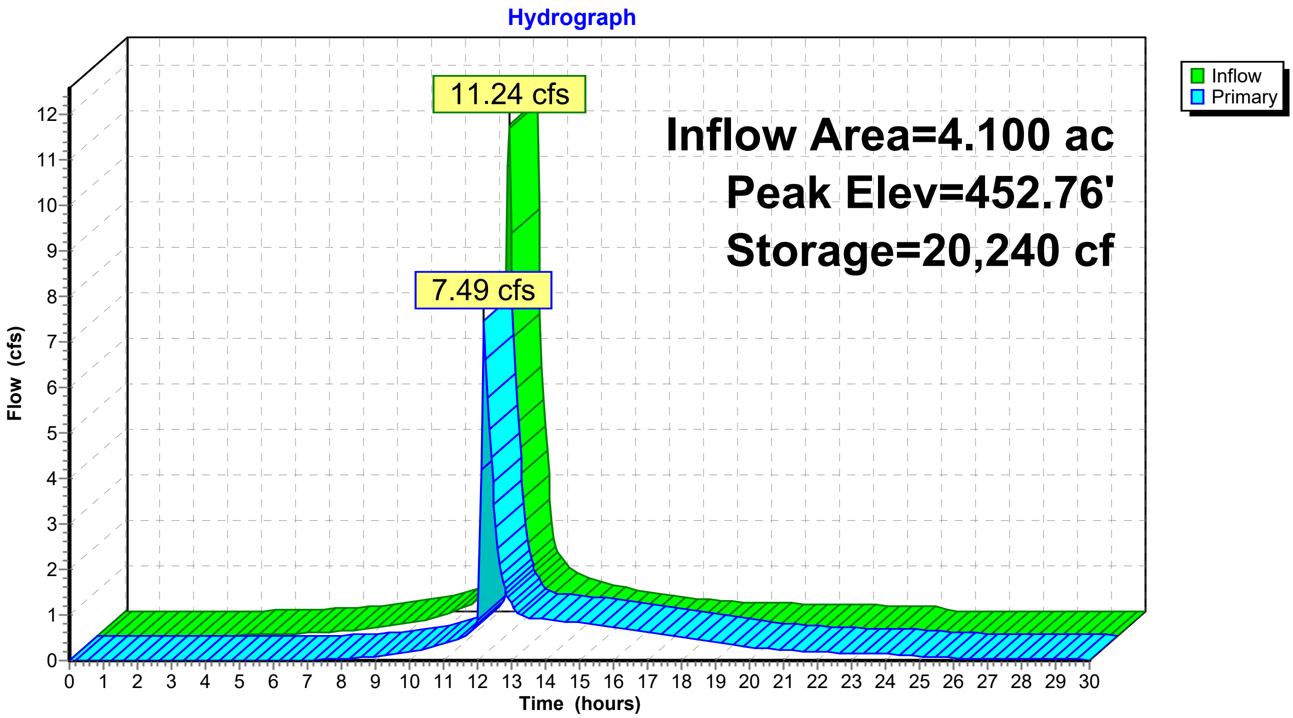
Volume	Invert	Avail.Storage	Storage Description
#1	450.00'	43,659 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.00	5,553	0	0
453.00	9,414	22,451	22,451
455.00	11,794	21,208	43,659

Device	Routing	Invert	Outlet Devices
#1	Device 3	452.50'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Device 3	451.30'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	449.50'	**18.0" Round Culvert** L= 25.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 449.50' / 449.25' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=7.39 cfs @ 12.19 hrs HW=452.76' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 7.39 cfs of 13.48 cfs potential flow)
  ├─**1=Broad-Crested Rectangular Weir** (Weir Controls 6.35 cfs @ 1.23 fps)
  └─**2=Orifice/Grate** (Orifice Controls 1.04 cfs @ 5.29 fps)

Pond 2C: WET 2C



Stage-Area-Storage for Pond 2C: WET 2C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.00	5,553	0
450.05	5,617	279
450.10	5,682	562
450.15	5,746	847
450.20	5,810	1,136
450.25	5,875	1,428
450.30	5,939	1,724
450.35	6,003	2,022
450.40	6,068	2,324
450.45	6,132	2,629
450.50	6,197	2,937
450.55	6,261	3,249
450.60	6,325	3,563
450.65	6,390	3,881
450.70	6,454	4,202
450.75	6,518	4,527
450.80	6,583	4,854
450.85	6,647	5,185
450.90	6,711	5,519
450.95	6,776	5,856
451.00	6,840	6,197
451.05	6,904	6,540
451.10	6,969	6,887
451.15	7,033	7,237
451.20	7,097	7,590
451.25	7,162	7,947
451.30	7,226	8,306
451.35	7,290	8,669
451.40	7,355	9,035
451.45	7,419	9,405
451.50	7,484	9,777
451.55	7,548	10,153
451.60	7,612	10,532
451.65	7,677	10,914
451.70	7,741	11,300
451.75	7,805	11,688
451.80	7,870	12,080
451.85	7,934	12,475
451.90	7,998	12,874
451.95	8,063	13,275
452.00	8,127	13,680
452.05	8,191	14,088
452.10	8,256	14,499
452.15	8,320	14,914
452.20	8,384	15,331
452.25	8,449	15,752
452.30	8,513	16,176
452.35	8,577	16,603
452.40	8,642	17,034
452.45	8,706	17,467
452.50	8,771	17,904
452.55	8,835	18,345
452.60	8,899	18,788
452.65	8,964	19,234
452.70	9,028	19,684
452.75	9,092	20,137
452.80	9,157	20,593
452.85	9,221	21,053
452.90	9,285	21,516
452.95	9,350	21,981
453.00	9,414	22,451
453.05	9,474	22,923
453.10	9,533	23,398
453.15	9,592	23,876
453.20	9,652	24,357
453.25	9,712	24,841
453.30	9,771	25,328
453.35	9,831	25,818
453.40	9,890	26,311
453.45	9,949	26,807
453.50	10,009	27,306
453.55	10,069	27,808
453.60	10,128	28,313
453.65	10,187	28,821
453.70	10,247	29,332
453.75	10,307	29,846
453.80	10,366	30,363
453.85	10,426	30,882
453.90	10,485	31,405
453.95	10,544	31,931
454.00	10,604	32,460
454.05	10,664	32,991
454.10	10,723	33,526
454.15	10,782	34,063
454.20	10,842	34,604
454.25	10,902	35,148
454.30	10,961	35,694
454.35	11,021	36,244
454.40	11,080	36,796
454.45	11,139	37,352
454.50	11,199	37,910
454.55	11,259	38,472
454.60	11,318	39,036
454.65	11,377	39,603
454.70	11,437	40,174
454.75	11,497	40,747
454.80	11,556	41,324
454.85	11,616	41,903
454.90	11,675	42,485
454.95	11,734	43,070
455.00	**11,794**	**43,659**

Summary for Pond 3P: FB 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 2.32" for 2-yr event
Inflow = 12.18 cfs @ 12.09 hrs, Volume= 0.906 af
Outflow = 11.21 cfs @ 12.12 hrs, Volume= 0.906 af, Atten= 8%, Lag= 2.1 min
Primary = 11.21 cfs @ 12.12 hrs, Volume= 0.906 af
Routed to Pond 1E : INFIL 1E

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 6,027 sf Storage= 16,913 cf
Peak Elev= 461.43' @ 13.19 hrs Surf.Area= 6,617 sf Storage= 19,617 cf (2,704 cf above start)

Plug-Flow detention time= 224.3 min calculated for 0.517 af (57% of inflow)
Center-of-Mass det. time= 18.7 min (816.8 - 798.1)

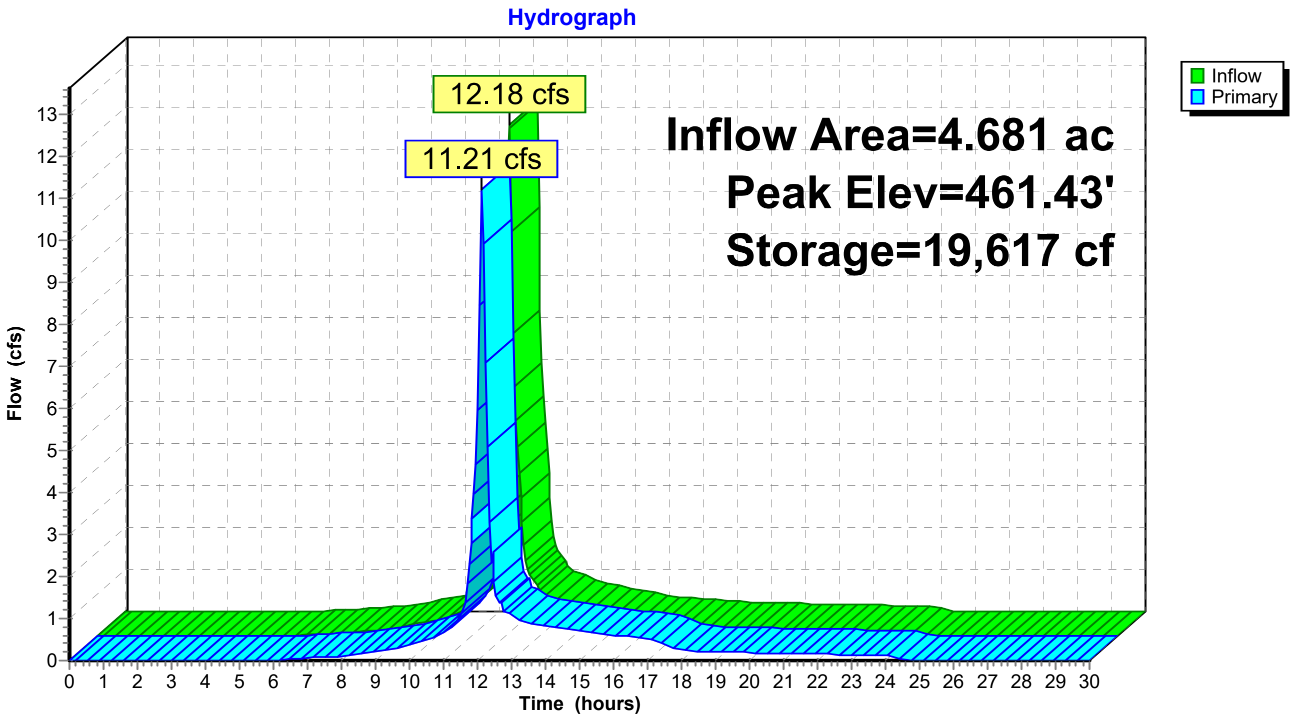
Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	52,051 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
456.00	1,140	0	0
460.00	4,648	11,576	11,576
465.00	11,542	40,475	52,051

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.90 cfs @ 12.12 hrs HW=461.34' TW=460.77' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 10.90 cfs @ 1.58 fps)

Pond 3P: FB 1E


Hydrograph
12.18 cfs
11.21 cfs
Inflow Area=4.681 ac
Peak Elev=461.43'
Storage=19,617 cf
Inflow
Primary
Flow (cfs)
Time (hours)

Stage-Area-Storage for Pond 3P: FB 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
456.00	1,140	0	461.30	6,440	18,783
456.10	1,228	118	461.40	6,578	19,434
456.20	1,315	246	461.50	6,716	20,099
456.30	1,403	381	461.60	6,854	20,778
456.40	1,491	526	461.70	6,992	21,470
456.50	1,579	680	461.80	7,130	22,176
456.60	1,666	842	461.90	7,268	22,896
456.70	1,754	1,013	462.00	7,406	23,630
456.80	1,842	1,193	462.10	7,543	24,377
456.90	1,929	1,381	462.20	7,681	25,138
457.00	2,017	1,579	462.30	7,819	25,913
457.10	2,105	1,785	462.40	7,957	26,702
457.20	2,192	1,999	462.50	8,095	27,505
457.30	2,280	2,223	462.60	8,233	28,321
457.40	2,368	2,455	462.70	8,371	29,151
457.50	2,456	2,697	462.80	8,509	29,995
457.60	2,543	2,947	462.90	8,647	30,853
457.70	2,631	3,205	463.00	8,784	31,725
457.80	2,719	3,473	463.10	8,922	32,610
457.90	2,806	3,749	463.20	9,060	33,509
458.00	2,894	4,034	463.30	9,198	34,422
458.10	2,982	4,328	463.40	9,336	35,349
458.20	3,069	4,630	463.50	9,474	36,289
458.30	3,157	4,942	463.60	9,612	37,243
458.40	3,245	5,262	463.70	9,750	38,211
458.50	3,333	5,591	463.80	9,887	39,193
458.60	3,420	5,928	463.90	10,025	40,189
458.70	3,508	6,275	464.00	10,163	41,198
458.80	3,596	6,630	464.10	10,301	42,222
458.90	3,683	6,994	464.20	10,439	43,259
459.00	3,771	7,367	464.30	10,577	44,309
459.10	3,859	7,748	464.40	10,715	45,374
459.20	3,946	8,138	464.50	10,853	46,452
459.30	4,034	8,537	464.60	10,990	47,545
459.40	4,122	8,945	464.70	11,128	48,650
459.50	4,210	9,362	464.80	11,266	49,770
459.60	4,297	9,787	464.90	11,404	50,904
459.70	4,385	10,221	465.00	**11,542**	**52,051**
459.80	4,473	10,664			
459.90	4,560	11,116			
460.00	4,648	11,576			
460.10	4,786	12,048			
460.20	4,924	12,533			
460.30	5,062	13,032			
460.40	5,200	13,546			
460.50	5,337	14,072			
460.60	5,475	14,613			
460.70	5,613	15,167			
460.80	5,751	15,736			
460.90	5,889	16,318			
461.00	6,027	16,913			
461.10	6,165	17,523			
461.20	6,303	18,146			

Summary for Pond 4P: FB 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 1.98" for 2-yr event
Inflow = 32.90 cfs @ 12.09 hrs, Volume= 2.617 af
Outflow = 28.05 cfs @ 12.14 hrs, Volume= 2.616 af, Atten= 15%, Lag= 3.2 min
Primary = 28.05 cfs @ 12.14 hrs, Volume= 2.616 af
Routed to Pond 1BE : INFIL 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 457.50' Surf.Area= 14,084 sf Storage= 43,509 cf
Peak Elev= 458.15' @ 12.14 hrs Surf.Area= 14,697 sf Storage= 52,842 cf (9,333 cf above start)

Plug-Flow detention time= 204.5 min calculated for 1.615 af (62% of inflow)
Center-of-Mass det. time= 12.0 min (778.7 - 766.7)

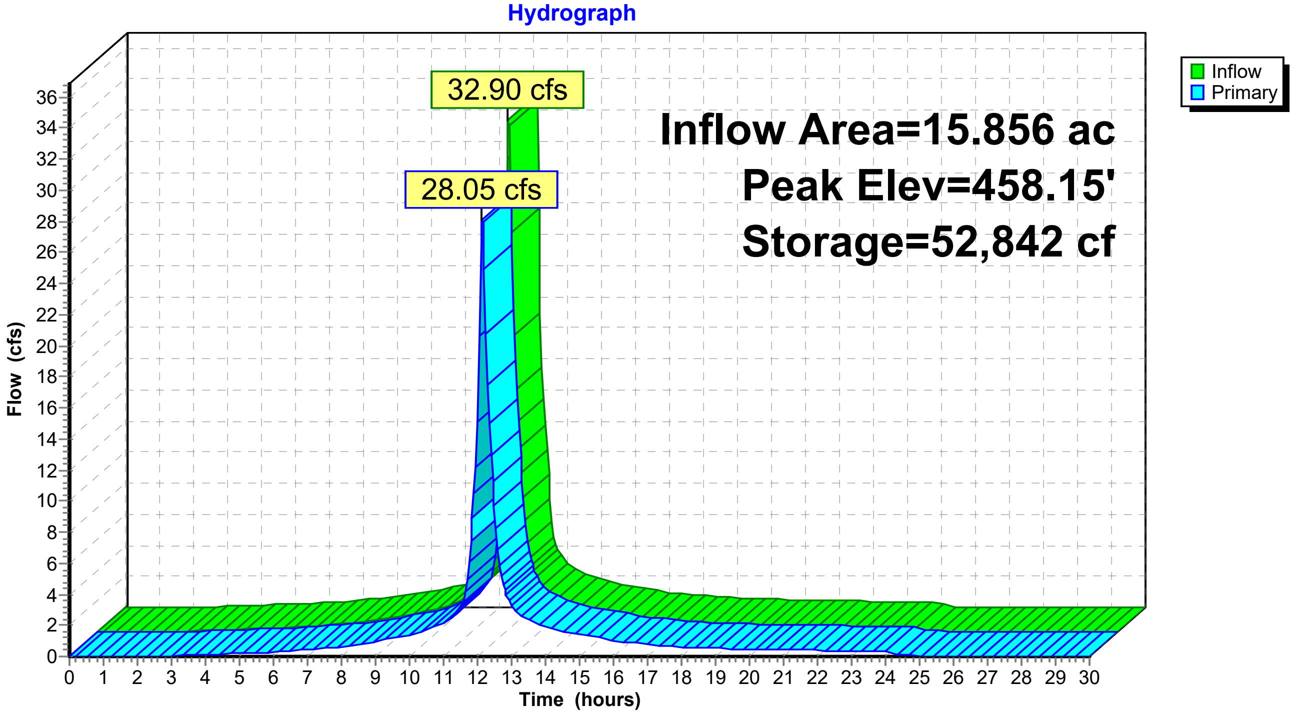
Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	81,672 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
454.00	10,778	0	0
460.00	16,446	81,672	81,672

Device	Routing	Invert	Outlet Devices
#1	Primary	457.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=27.71 cfs @ 12.14 hrs HW=458.14' TW=455.80' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 27.71 cfs @ 2.15 fps)

Pond 4P: FB 1BE



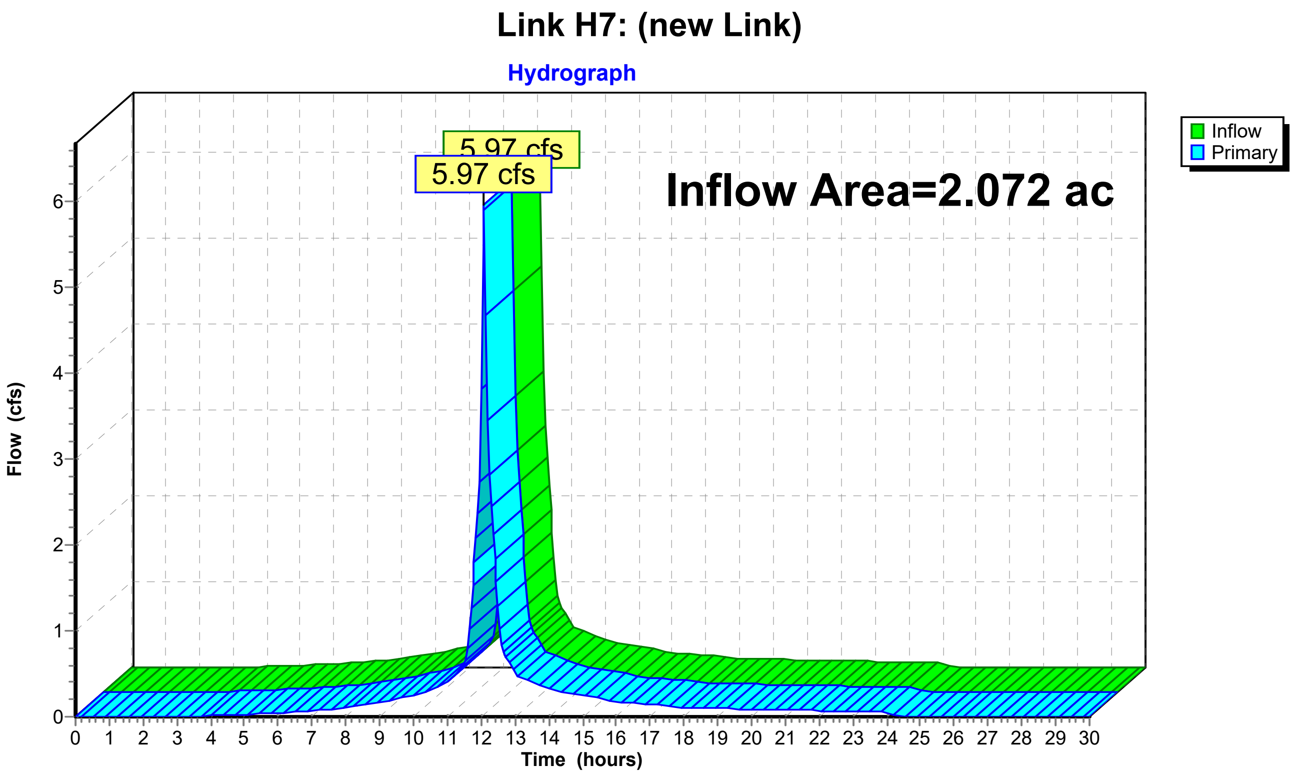
Stage-Area-Storage for Pond 4P: FB 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
454.00	10,778	0	459.30	15,785	70,391
454.10	10,872	1,083	459.40	15,879	71,974
454.20	10,967	2,174	459.50	15,974	73,567
454.30	11,061	3,276	459.60	16,068	75,169
454.40	11,156	4,387	459.70	16,163	76,781
454.50	11,250	5,507	459.80	16,257	78,402
454.60	11,345	6,637	459.90	16,352	80,032
454.70	11,439	7,776	460.00	**16,446**	**81,672**
454.80	11,534	8,925			
454.90	11,628	10,083			
455.00	11,723	11,250			
455.10	11,817	12,427			
455.20	11,912	13,614			
455.30	12,006	14,810			
455.40	12,101	16,015			
455.50	12,195	17,230			
455.60	12,289	18,454			
455.70	12,384	19,688			
455.80	12,478	20,931			
455.90	12,573	22,183			
456.00	12,667	23,445			
456.10	12,762	24,717			
456.20	12,856	25,998			
456.30	12,951	27,288			
456.40	13,045	28,588			
456.50	13,140	29,897			
456.60	13,234	31,216			
456.70	13,329	32,544			
456.80	13,423	33,881			
456.90	13,518	35,229			
457.00	13,612	36,585			
457.10	13,706	37,951			
457.20	13,801	39,326			
457.30	13,895	40,711			
457.40	13,990	42,105			
457.50	14,084	43,509			
457.60	14,179	44,922			
457.70	14,273	46,345			
457.80	14,368	47,777			
457.90	14,462	49,218			
458.00	14,557	50,669			
458.10	14,651	52,130			
458.20	14,746	53,600			
458.30	14,840	55,079			
458.40	14,935	56,568			
458.50	15,029	58,066			
458.60	15,123	59,573			
458.70	15,218	61,090			
458.80	15,312	62,617			
458.90	15,407	64,153			
459.00	15,501	65,698			
459.10	15,596	67,253			
459.20	15,690	68,817			

Summary for Link H7: (new Link)

Inflow Area = 2.072 ac, 87.73% Impervious, Inflow Depth = 2.69" for 2-yr event
Inflow = 5.97 cfs @ 12.09 hrs, Volume= 0.464 af
Primary = 5.97 cfs @ 12.09 hrs, Volume= 0.464 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2C : WET 2C

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

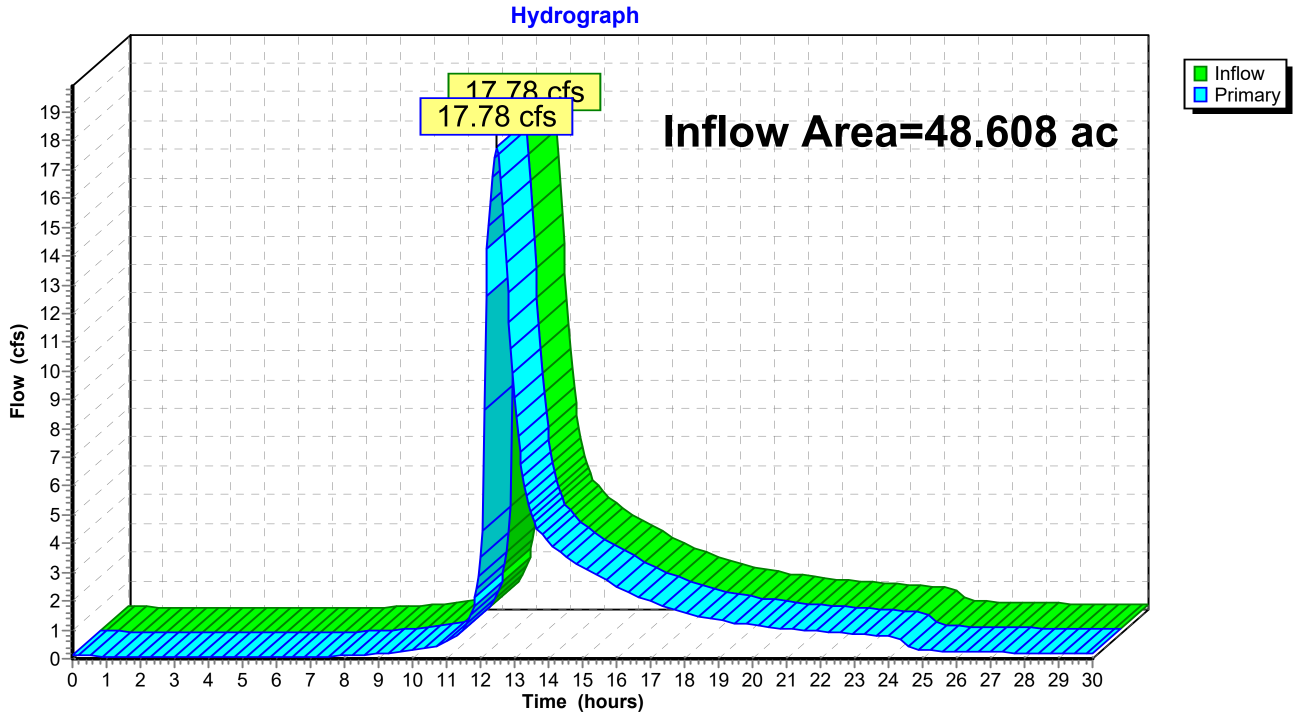


Summary for Link PR: PROPOSED

Inflow Area =	48.608 ac, 42.37% Impervious,	Inflow Depth > 0.82"	for 2-yr event
Inflow =	17.78 cfs @ 12.47 hrs,	Volume= 3.330 af	
Primary =	17.78 cfs @ 12.47 hrs,	Volume= 3.330 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link PR: PROPOSED



Summary for Subcatchment PREM: LOD

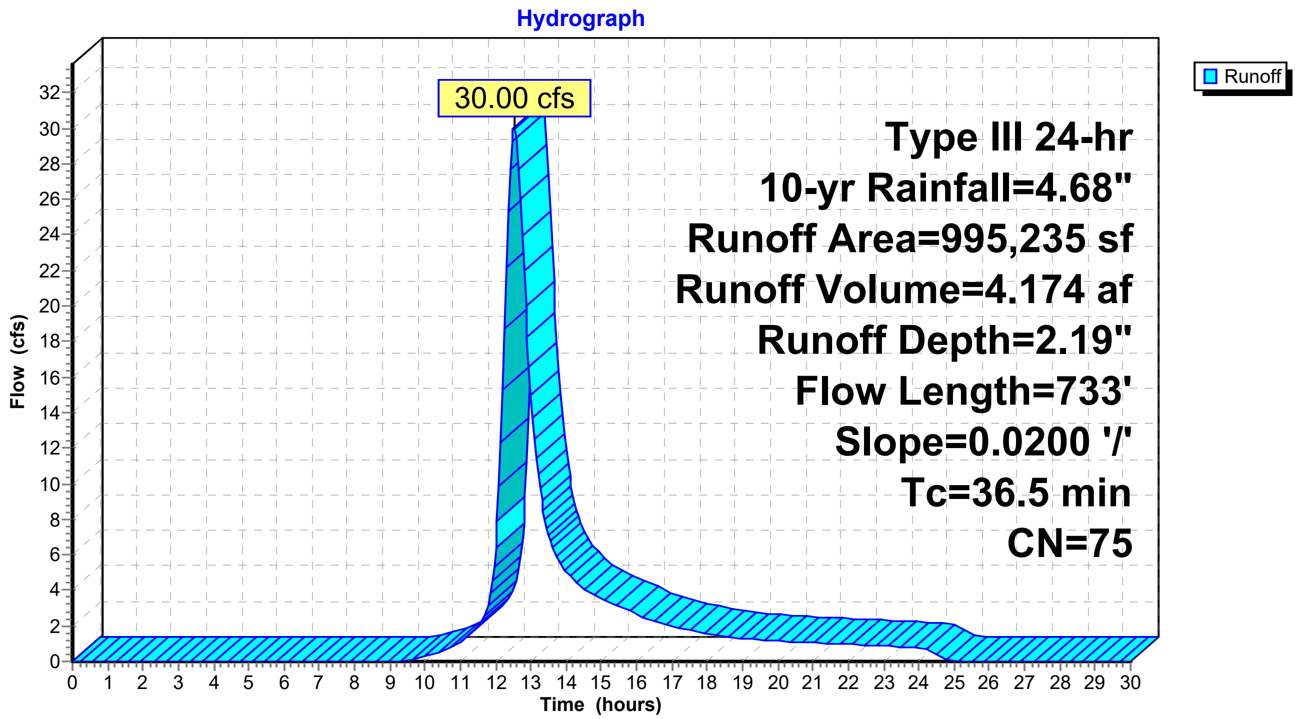
Runoff = 30.00 cfs @ 12.52 hrs, Volume= 4.174 af, Depth= 2.19"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
113,433	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
28,688	30	Meadow, non-grazed, HSG A
532,740	78	Meadow, non-grazed, HSG D
276,941	80	>75% Grass cover, Good, HSG D
995,235	75	Weighted Average
995,235		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
14.9	633	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.5	733	Total			

Subcatchment PREM: LOD



Summary for Subcatchment PW1A: PARKING

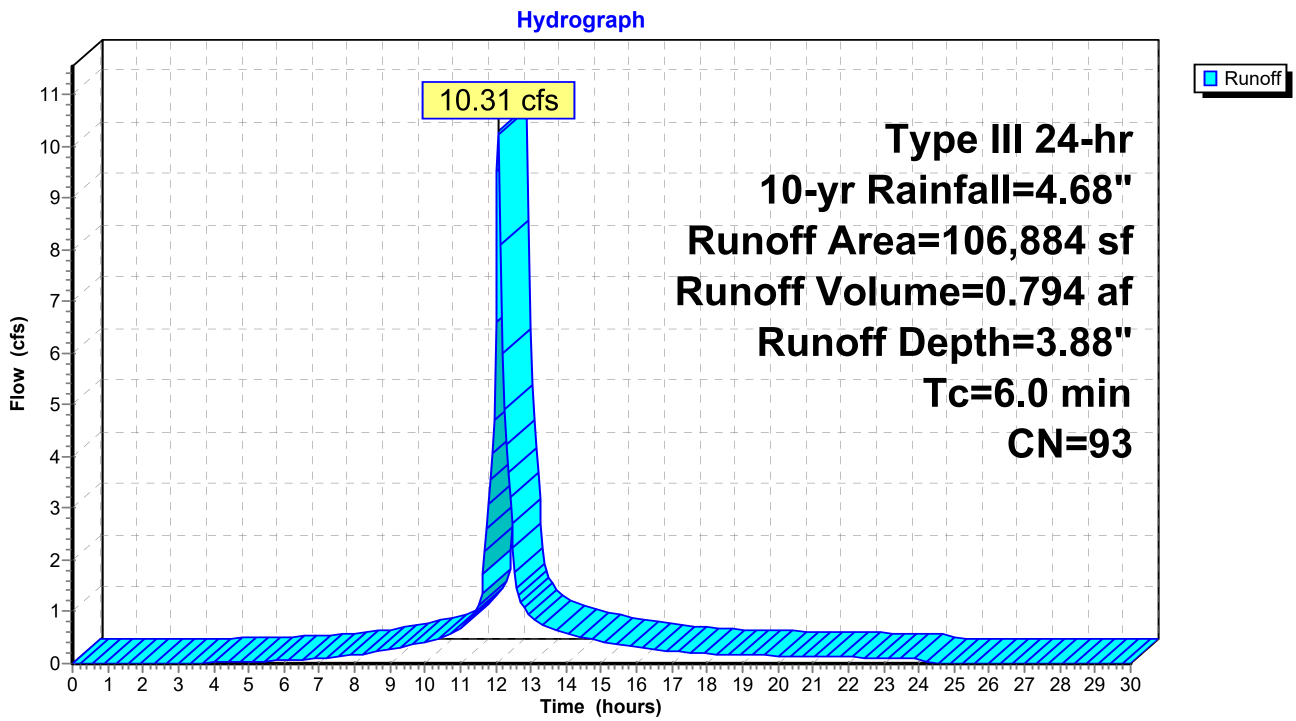
Runoff = 10.31 cfs @ 12.09 hrs, Volume= 0.794 af, Depth= 3.88"
Routed to Pond 1A-1 : INFIL 1A-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
32,522	80	>75% Grass cover, Good, HSG D
74,362	98	Paved parking, HSG D
106,884	93	Weighted Average
32,522		30.43% Pervious Area
74,362		69.57% Impervious Area

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

Subcatchment PW1A: PARKING



Summary for Subcatchment PW1BE: BLDG EAST

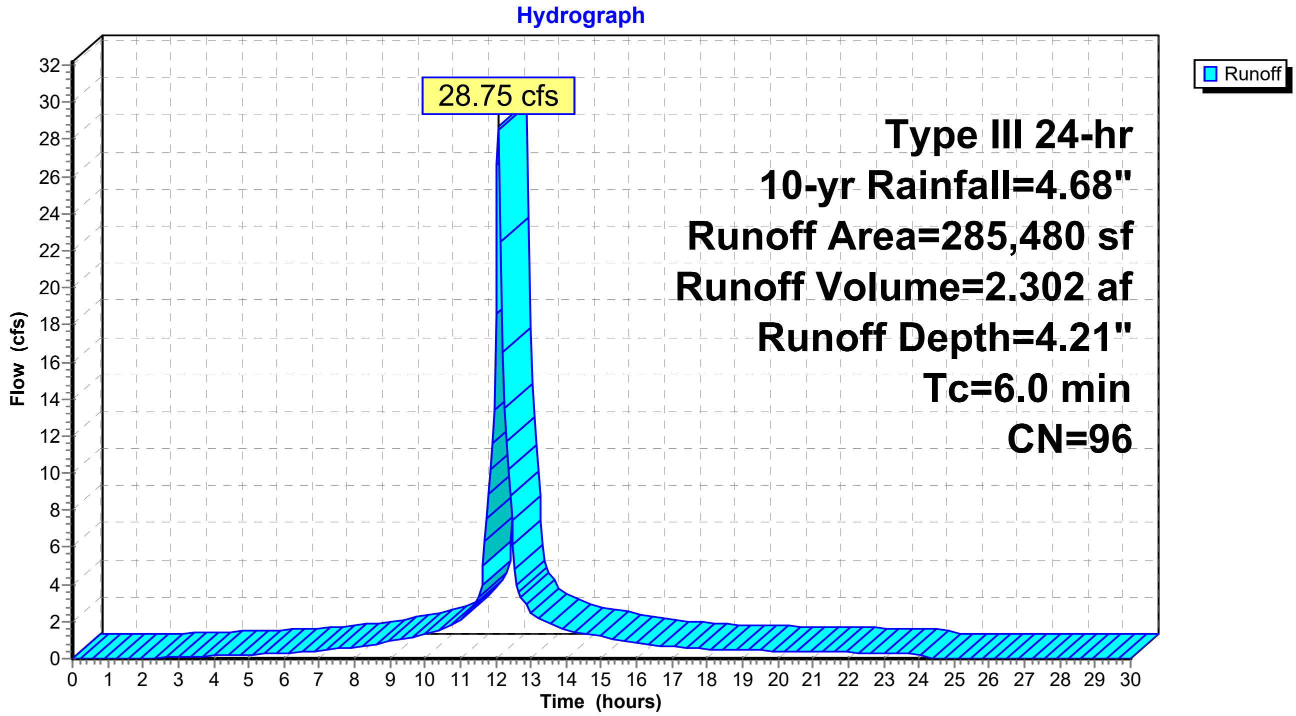
Runoff = 28.75 cfs @ 12.09 hrs, Volume= 2.302 af, Depth= 4.21"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
33,786	80	>75% Grass cover, Good, HSG D
251,694	98	Paved parking, HSG D
285,480	96	Weighted Average
33,786		11.83% Pervious Area
251,694		88.17% Impervious Area

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

Subcatchment PW1BE: BLDG EAST



Summary for Subcatchment PW1BW: BLDG WEST

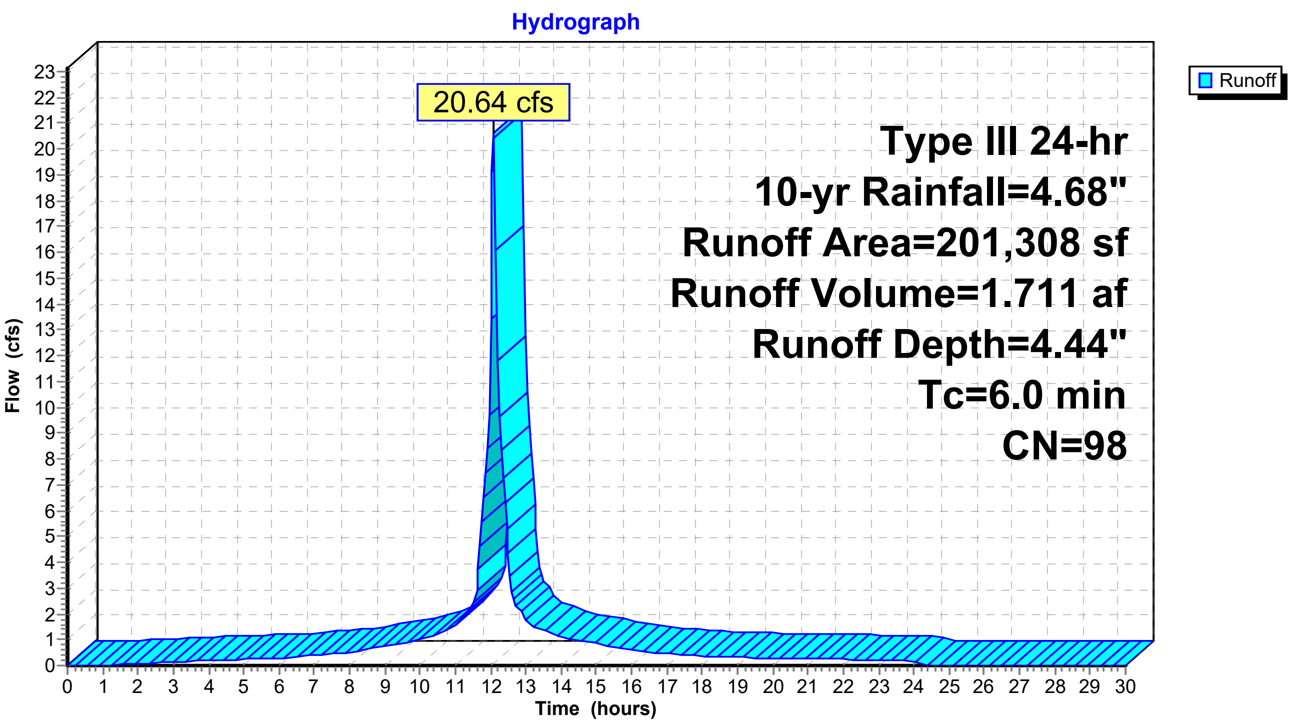
Runoff = 20.64 cfs @ 12.09 hrs, Volume= 1.711 af, Depth= 4.44"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
201,308	98	Paved parking, HSG D
201,308	98	Weighted Average
201,308		100.00% Impervious Area

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

Subcatchment PW1BW: BLDG WEST



Summary for Subcatchment PW1C:

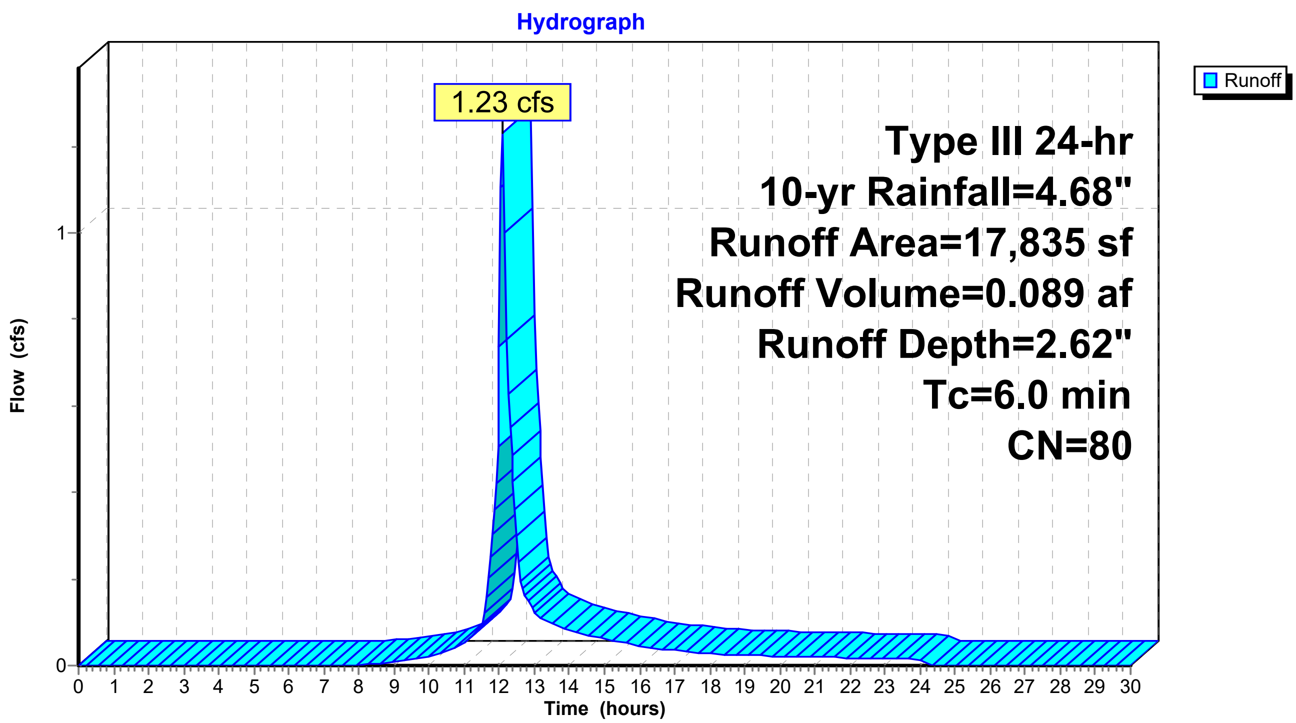
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 2.62"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
17,835	80	>75% Grass cover, Good, HSG D
0	98	Paved parking, HSG D
17,835	80	Weighted Average
17,835		100.00% Pervious Area

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

Subcatchment PW1C:



Summary for Subcatchment PW1D: LOAD EAST

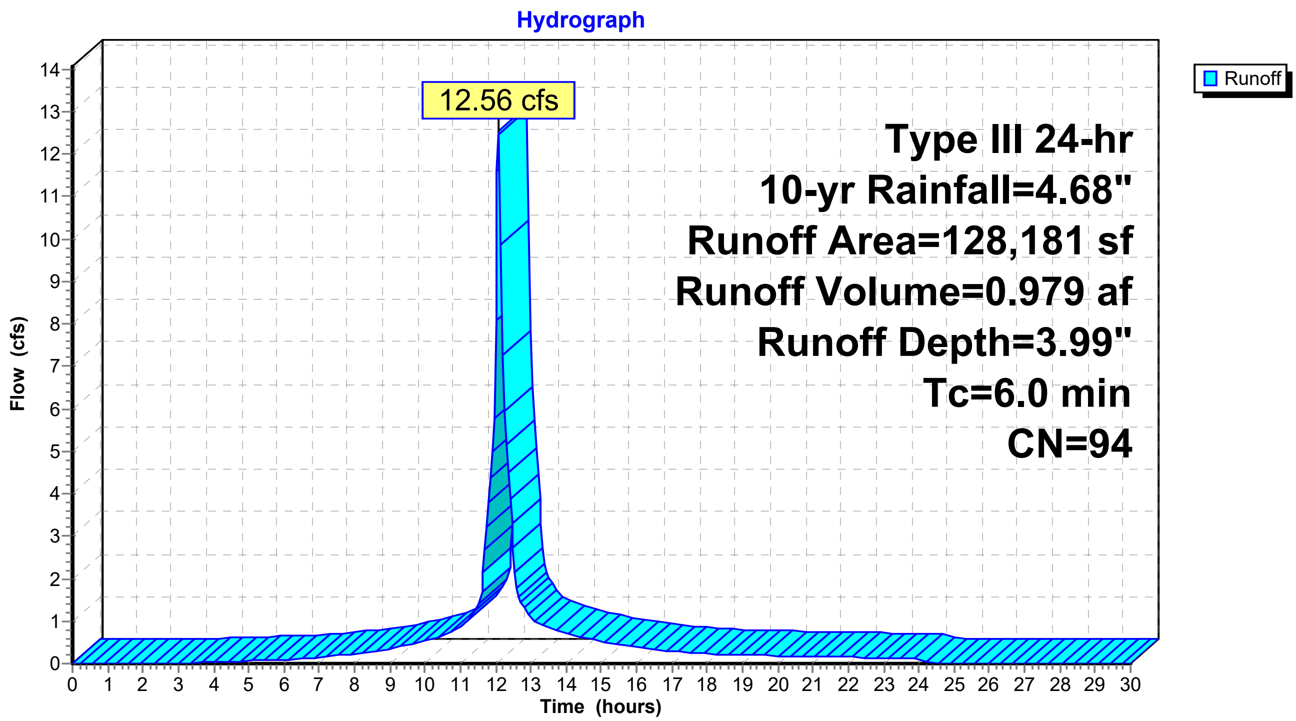
Runoff = 12.56 cfs @ 12.09 hrs, Volume= 0.979 af, Depth= 3.99"
Routed to Pond 1D : WET 1D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
28,504	80	>75% Grass cover, Good, HSG D
99,677	98	Paved parking, HSG D
128,181	94	Weighted Average
28,504		22.24% Pervious Area
99,677		77.76% Impervious Area

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

Subcatchment PW1D: LOAD EAST



Summary for Subcatchment PW1E: LOAD WEST

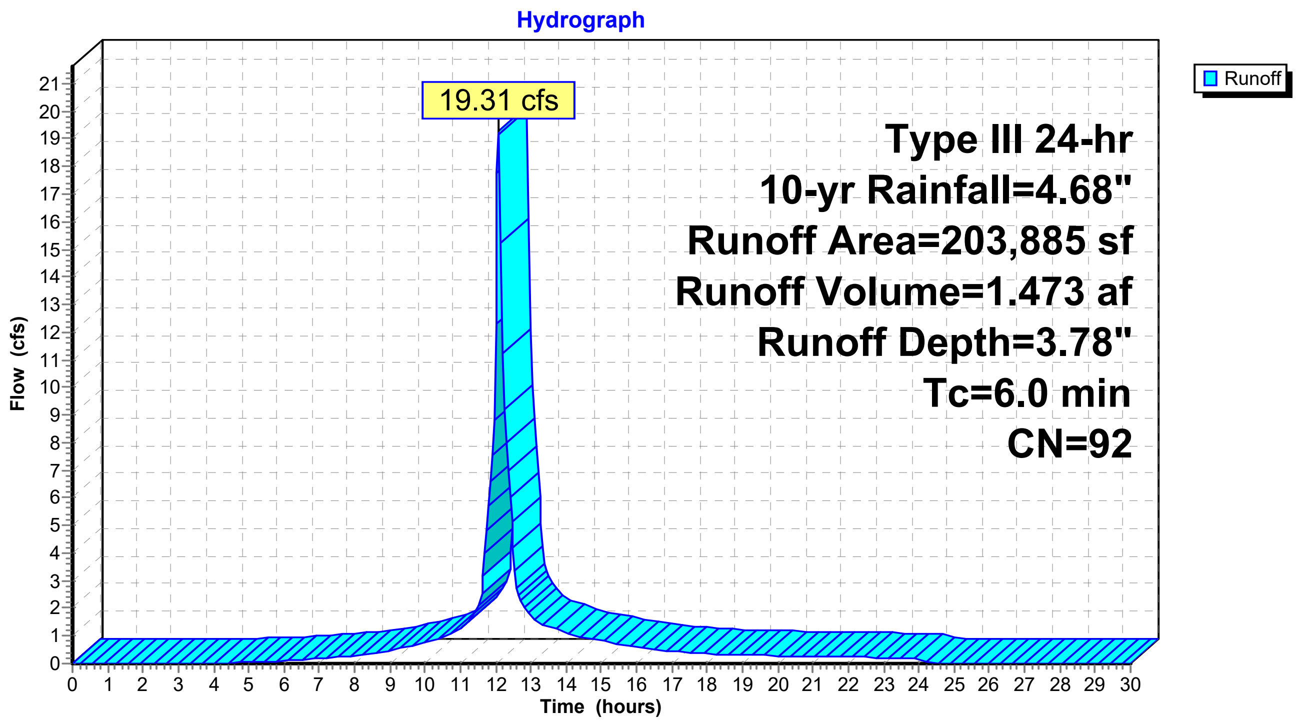
Runoff = 19.31 cfs @ 12.09 hrs, Volume= 1.473 af, Depth= 3.78"
Routed to Pond 3P : FB 1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
70,197	80	>75% Grass cover, Good, HSG D
133,688	98	Paved parking, HSG D
203,885	92	Weighted Average
70,197		34.43% Pervious Area
133,688		65.57% Impervious Area

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

Subcatchment PW1E: LOAD WEST



Summary for Subcatchment PW2A: PARKING

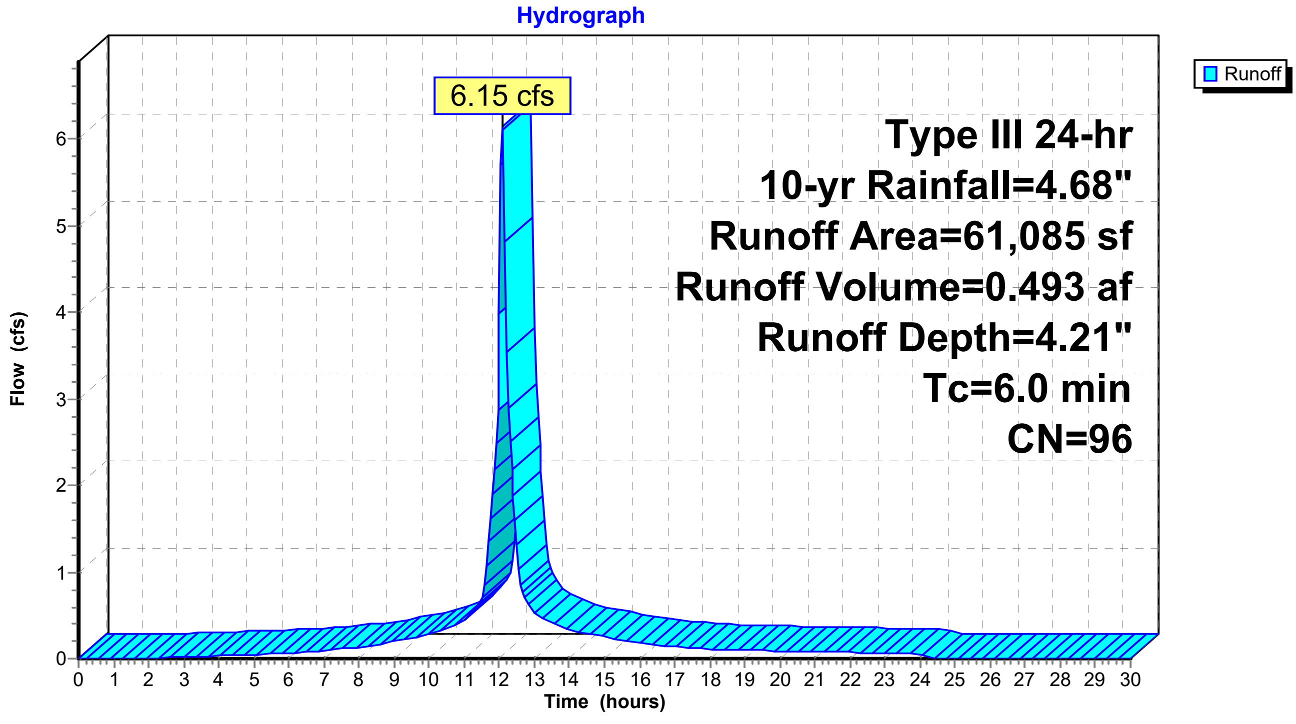
Runoff = 6.15 cfs @ 12.09 hrs, Volume= 0.493 af, Depth= 4.21"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
5,846	80	>75% Grass cover, Good, HSG D
55,239	98	Paved parking, HSG D
61,085	96	Weighted Average
5,846		9.57% Pervious Area
55,239		90.43% Impervious Area

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

Subcatchment PW2A: PARKING



Summary for Subcatchment PW2B: LOADING

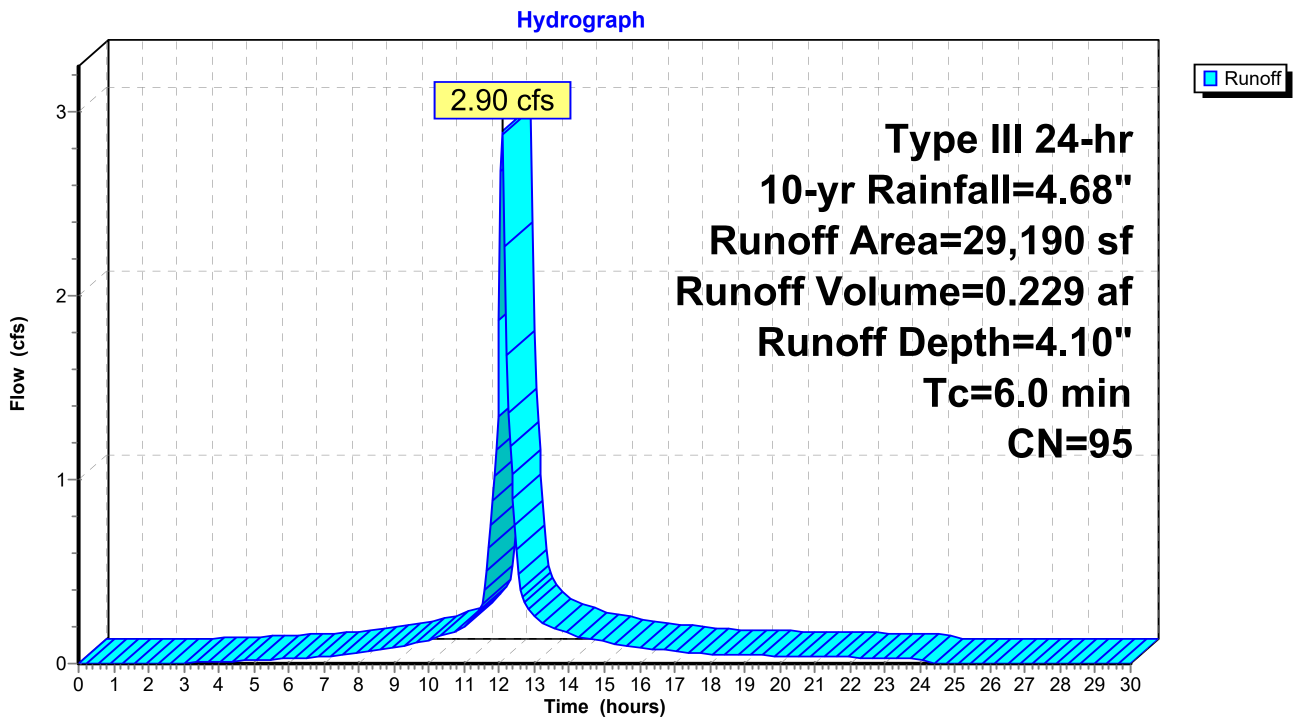
Runoff = 2.90 cfs @ 12.09 hrs, Volume= 0.229 af, Depth= 4.10"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
5,233	80	>75% Grass cover, Good, HSG D
23,957	98	Paved parking, HSG D
29,190	95	Weighted Average
5,233		17.93% Pervious Area
23,957		82.07% Impervious Area

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

Subcatchment PW2B: LOADING



Summary for Subcatchment PW2C: BACK

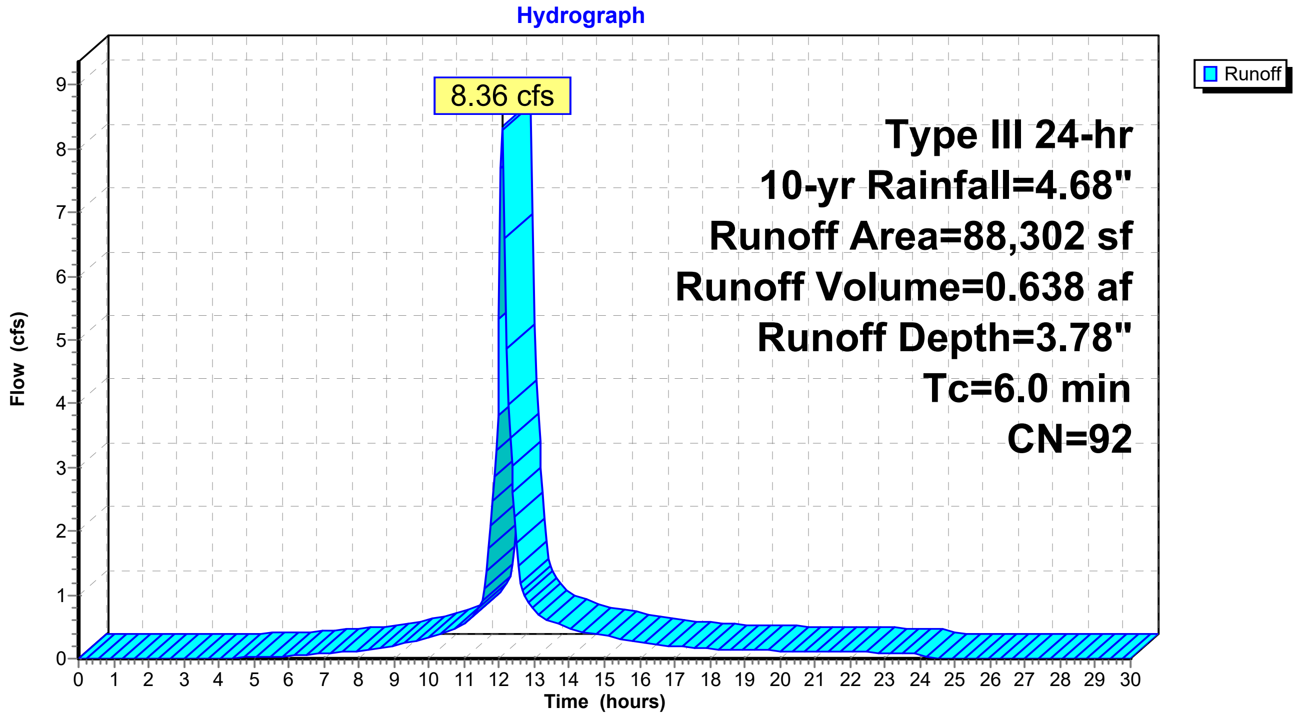
Runoff = 8.36 cfs @ 12.09 hrs, Volume= 0.638 af, Depth= 3.78"
Routed to Pond 2C : WET 2C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.68"

Area (sf)	CN	Description
31,111	80	>75% Grass cover, Good, HSG D
57,191	98	Paved parking, HSG D
88,302	92	Weighted Average
31,111		35.23% Pervious Area
57,191		64.77% Impervious Area

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

Subcatchment PW2C: BACK



Summary for Pond 1A-1: INFIL 1A-1

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 3.88" for 10-yr event
Inflow = 10.31 cfs @ 12.09 hrs, Volume= 0.794 af
Outflow = 5.92 cfs @ 12.22 hrs, Volume= 0.794 af, Atten= 43%, Lag= 8.2 min
Discarded = 0.56 cfs @ 12.20 hrs, Volume= 0.631 af
Primary = 5.35 cfs @ 12.22 hrs, Volume= 0.163 af
Routed to Pond 1A-2 : INFIL 1A-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 476.72' @ 12.20 hrs Surf.Area= 4,841 sf Storage= 10,851 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 139.0 min (919.3 - 780.3)

Volume	Invert	Avail.Storage	Storage Description
#1	474.00'	17,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

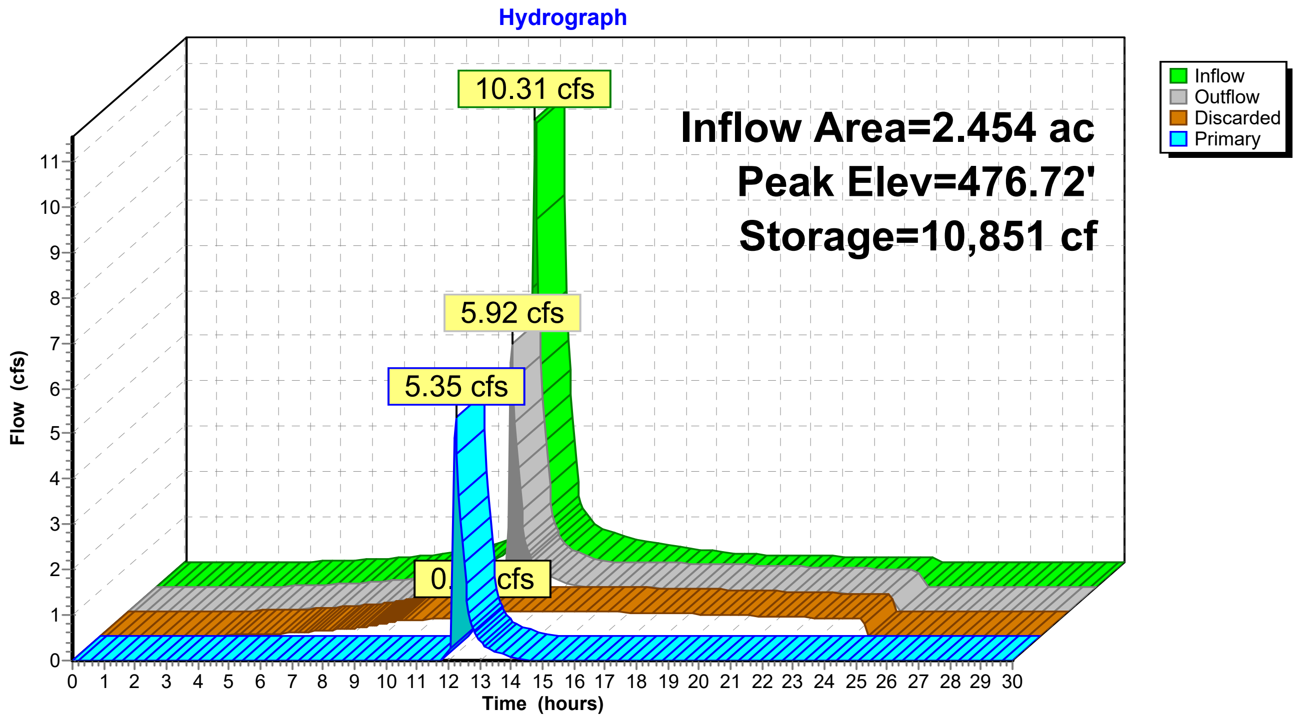
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
474.00	3,150	0	0
478.00	5,640	17,580	17,580

Device	Routing	Invert	Outlet Devices
#1	Discarded	474.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	476.50'	**20.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.56 cfs @ 12.20 hrs HW=476.72' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.56 cfs)

Primary OutFlow Max=4.90 cfs @ 12.22 hrs HW=476.72' TW=469.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 4.90 cfs @ 1.14 fps)

Pond 1A-1: INFIL 1A-1



Stage-Area-Storage for Pond 1A-1: INFIL 1A-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
474.00	3,150	0	476.65	4,800	10,533
474.05	3,181	158	476.70	4,831	10,774
474.10	3,212	318	476.75	4,862	11,016
474.15	3,243	480	476.80	4,893	11,260
474.20	3,274	642	476.85	4,924	11,506
474.25	3,306	807	476.90	4,955	11,753
474.30	3,337	973	476.95	4,986	12,001
474.35	3,368	1,141	477.00	5,018	12,251
474.40	3,399	1,310	477.05	5,049	12,503
474.45	3,430	1,481	477.10	5,080	12,756
474.50	3,461	1,653	477.15	5,111	13,011
474.55	3,492	1,827	477.20	5,142	13,267
474.60	3,524	2,002	477.25	5,173	13,525
474.65	3,555	2,179	477.30	5,204	13,785
474.70	3,586	2,358	477.35	5,235	14,046
474.75	3,617	2,538	477.40	5,266	14,308
474.80	3,648	2,719	477.45	5,298	14,572
474.85	3,679	2,902	477.50	5,329	14,838
474.90	3,710	3,087	477.55	5,360	15,105
474.95	3,741	3,273	477.60	5,391	15,374
475.00	3,773	3,461	477.65	5,422	15,644
475.05	3,804	3,651	477.70	5,453	15,916
475.10	3,835	3,842	477.75	5,484	16,189
475.15	3,866	4,034	477.80	5,516	16,464
475.20	3,897	4,228	477.85	5,547	16,741
475.25	3,928	4,424	477.90	5,578	17,019
475.30	3,959	4,621	477.95	5,609	17,299
475.35	3,990	4,820	478.00	**5,640**	**17,580**
475.40	4,021	5,020			
475.45	4,053	5,222			
475.50	4,084	5,425			
475.55	4,115	5,630			
475.60	4,146	5,837			
475.65	4,177	6,045			
475.70	4,208	6,255			
475.75	4,239	6,466			
475.80	4,271	6,678			
475.85	4,302	6,893			
475.90	4,333	7,109			
475.95	4,364	7,326			
476.00	4,395	7,545			
476.05	4,426	7,766			
476.10	4,457	7,988			
476.15	4,488	8,211			
476.20	4,519	8,436			
476.25	4,551	8,663			
476.30	4,582	8,892			
476.35	4,613	9,121			
476.40	4,644	9,353			
476.45	4,675	9,586			
476.50	4,706	9,820			
476.55	4,737	10,056			
476.60	4,769	10,294			

Summary for Pond 1A-2: INFIL 1A-2

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 0.80" for 10-yr event
Inflow = 5.35 cfs @ 12.22 hrs, Volume= 0.163 af
Outflow = 4.53 cfs @ 12.32 hrs, Volume= 0.163 af, Atten= 15%, Lag= 5.8 min
Discarded = 0.16 cfs @ 12.30 hrs, Volume= 0.062 af
Primary = 4.38 cfs @ 12.32 hrs, Volume= 0.101 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 469.70' @ 12.30 hrs Surf.Area= 1,351 sf Storage= 1,936 cf

Plug-Flow detention time= 50.1 min calculated for 0.163 af (100% of inflow)
Center-of-Mass det. time= 50.5 min (801.6 - 751.1)

Volume	Invert	Avail.Storage	Storage Description
#1	468.00'	3,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

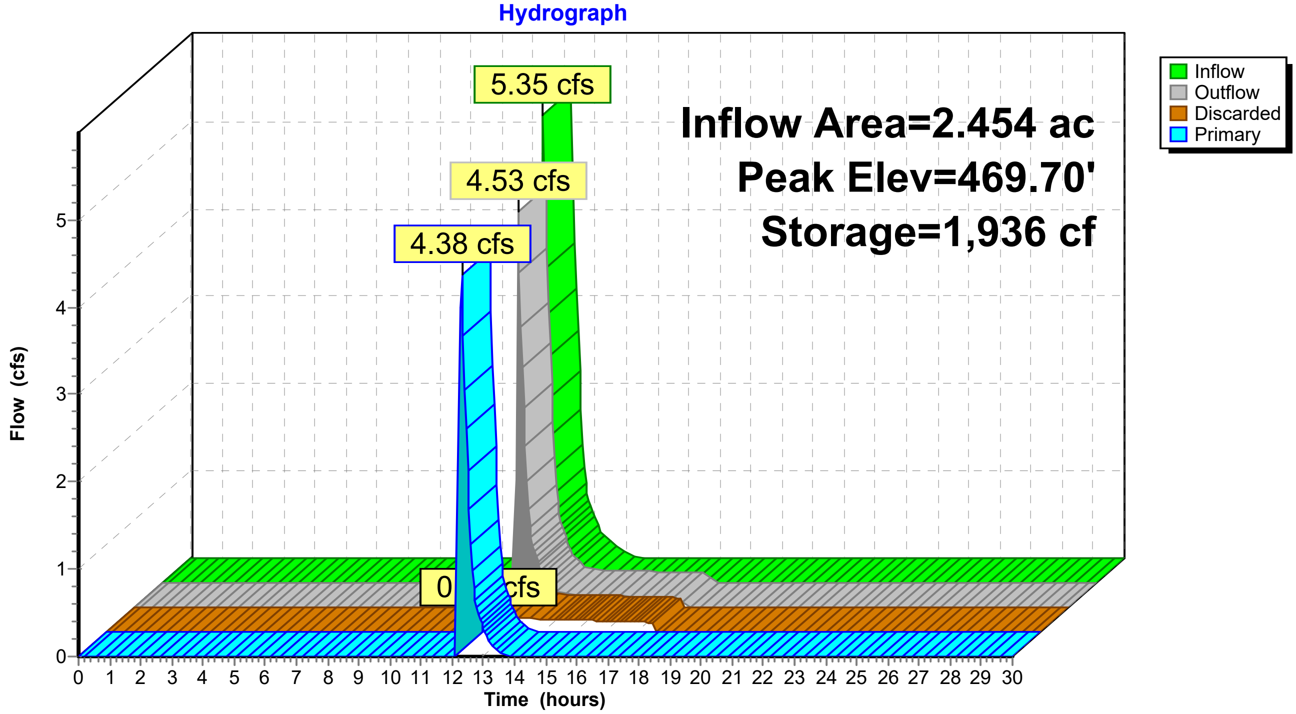
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
468.00	928	0	0
471.00	1,674	3,903	3,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	468.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Device 3	469.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	466.50'	**24.0" Round Culvert** L= 68.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 466.50' / 464.00' S= 0.0368 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=0.16 cfs @ 12.30 hrs HW=469.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=3.85 cfs @ 12.32 hrs HW=469.69' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 3.85 cfs of 22.41 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 3.85 cfs @ 1.24 fps)

Pond 1A-2: INFIL 1A-2



Stage-Area-Storage for Pond 1A-2: INFIL 1A-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
468.00	928	0
468.05	940	47
468.10	953	94
468.15	965	142
468.20	978	191
468.25	990	240
468.30	1,003	290
468.35	1,015	340
468.40	1,027	391
468.45	1,040	443
468.50	1,052	495
468.55	1,065	548
468.60	1,077	602
468.65	1,090	656
468.70	1,102	711
468.75	1,115	766
468.80	1,127	822
468.85	1,139	879
468.90	1,152	936
468.95	1,164	994
469.00	1,177	1,052
469.05	1,189	1,111
469.10	1,202	1,171
469.15	1,214	1,232
469.20	1,226	1,293
469.25	1,239	1,354
469.30	1,251	1,417
469.35	1,264	1,479
469.40	1,276	1,543
469.45	1,289	1,607
469.50	1,301	1,672
469.55	1,313	1,737
469.60	1,326	1,803
469.65	1,338	1,870
469.70	1,351	1,937
469.75	1,363	2,005
469.80	1,376	2,073
469.85	1,388	2,142
469.90	1,400	2,212
469.95	1,413	2,282
470.00	1,425	2,353
470.05	1,438	2,425
470.10	1,450	2,497
470.15	1,463	2,570
470.20	1,475	2,643
470.25	1,488	2,717
470.30	1,500	2,792
470.35	1,512	2,867
470.40	1,525	2,943
470.45	1,537	3,020
470.50	1,550	3,097
470.55	1,562	3,175
470.60	1,575	3,253
470.65	1,587	3,332
470.70	1,599	3,412
470.75	1,612	3,492
470.80	1,624	3,573
470.85	1,637	3,655
470.90	1,649	3,737
470.95	1,662	3,820
471.00	**1,674**	**3,903**

Summary for Pond 1BE: INFIL 1BE

Inflow Area =	15.856 ac, 84.94% Impervious,	Inflow Depth = 3.11"	for 10-yr event
Inflow =	42.87 cfs @ 12.14 hrs,	Volume=	4.103 af
Outflow =	5.49 cfs @ 12.97 hrs,	Volume=	4.106 af, Atten= 87%, Lag= 50.1 min
Discarded =	5.49 cfs @ 12.97 hrs,	Volume=	4.106 af
Primary =	0.00 cfs @ 0.00 hrs,	Volume=	0.000 af

Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 457.82' @ 12.97 hrs Surf.Area= 23,704 sf Storage= 58,446 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 81.5 min (851.2 - 769.7)

Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	115,118 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

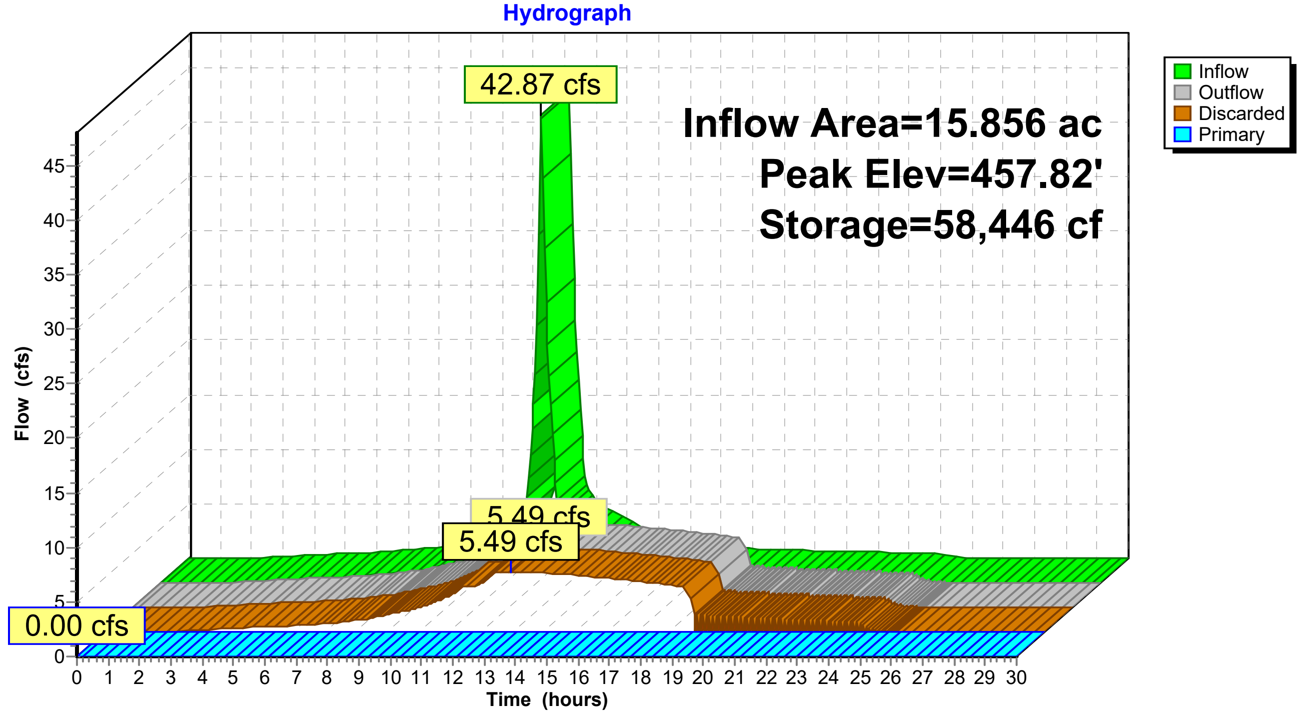
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
455.00	17,730	0	0
460.00	28,317	115,118	115,118

Device	Routing	Invert	Outlet Devices
#1	Primary	458.00'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	455.00'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=5.49 cfs @ 12.97 hrs HW=457.82' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 5.49 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=455.00' TW=0.00' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1BE: INFIL 1BE



Stage-Area-Storage for Pond 1BE: INFIL 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
455.00	17,730	0	457.65	23,341	54,419
455.05	17,836	889	457.70	23,447	55,589
455.10	17,942	1,784	457.75	23,553	56,764
455.15	18,048	2,683	457.80	23,659	57,944
455.20	18,153	3,588	457.85	23,765	59,130
455.25	18,259	4,499	457.90	23,870	60,321
455.30	18,365	5,414	457.95	23,976	61,517
455.35	18,471	6,335	458.00	24,082	62,718
455.40	18,577	7,261	458.05	24,188	63,925
455.45	18,683	8,193	458.10	24,294	65,137
455.50	18,789	9,130	458.15	24,400	66,354
455.55	18,895	10,072	458.20	24,506	67,577
455.60	19,000	11,019	458.25	24,612	68,805
455.65	19,106	11,972	458.30	24,717	70,038
455.70	19,212	12,930	458.35	24,823	71,277
455.75	19,318	13,893	458.40	24,929	72,521
455.80	19,424	14,862	458.45	25,035	73,770
455.85	19,530	15,835	458.50	25,141	75,024
455.90	19,636	16,815	458.55	25,247	76,284
455.95	19,742	17,799	458.60	25,353	77,549
456.00	19,847	18,789	458.65	25,459	78,819
456.05	19,953	19,784	458.70	25,564	80,095
456.10	20,059	20,784	458.75	25,670	81,375
456.15	20,165	21,790	458.80	25,776	82,662
456.20	20,271	22,801	458.85	25,882	83,953
456.25	20,377	23,817	458.90	25,988	85,250
456.30	20,483	24,838	458.95	26,094	86,552
456.35	20,588	25,865	459.00	26,200	87,859
456.40	20,694	26,897	459.05	26,305	89,172
456.45	20,800	27,934	459.10	26,411	90,490
456.50	20,906	28,977	459.15	26,517	91,813
456.55	21,012	30,025	459.20	26,623	93,141
456.60	21,118	31,078	459.25	26,729	94,475
456.65	21,224	32,137	459.30	26,835	95,814
456.70	21,330	33,201	459.35	26,941	97,159
456.75	21,435	34,270	459.40	27,047	98,508
456.80	21,541	35,344	459.45	27,152	99,863
456.85	21,647	36,424	459.50	27,258	101,224
456.90	21,753	37,509	459.55	27,364	102,589
456.95	21,859	38,599	459.60	27,470	103,960
457.00	21,965	39,695	459.65	27,576	105,336
457.05	22,071	40,796	459.70	27,682	106,718
457.10	22,177	41,902	459.75	27,788	108,104
457.15	22,282	43,013	459.80	27,894	109,496
457.20	22,388	44,130	459.85	27,999	110,894
457.25	22,494	45,252	459.90	28,105	112,296
457.30	22,600	46,380	459.95	28,211	113,704
457.35	22,706	47,512	460.00	**28,317**	**115,118**
457.40	22,812	48,650			
457.45	22,918	49,793			
457.50	23,024	50,942			
457.55	23,129	52,096			
457.60	23,235	53,255			

Summary for Pond 1D: WET 1D

Inflow Area = 2.943 ac, 77.76% Impervious, Inflow Depth = 3.99" for 10-yr event
Inflow = 12.56 cfs @ 12.09 hrs, Volume= 0.979 af
Outflow = 4.67 cfs @ 12.34 hrs, Volume= 0.734 af, Atten= 63%, Lag= 15.2 min
Primary = 4.67 cfs @ 12.34 hrs, Volume= 0.734 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.50' Surf.Area= 14,310 sf Storage= 13,422 cf
Peak Elev= 452.70' @ 12.34 hrs Surf.Area= 16,433 sf Storage= 31,811 cf (18,389 cf above start)

Plug-Flow detention time= 483.3 min calculated for 0.426 af (43% of inflow)
Center-of-Mass det. time= 151.5 min (926.9 - 775.4)

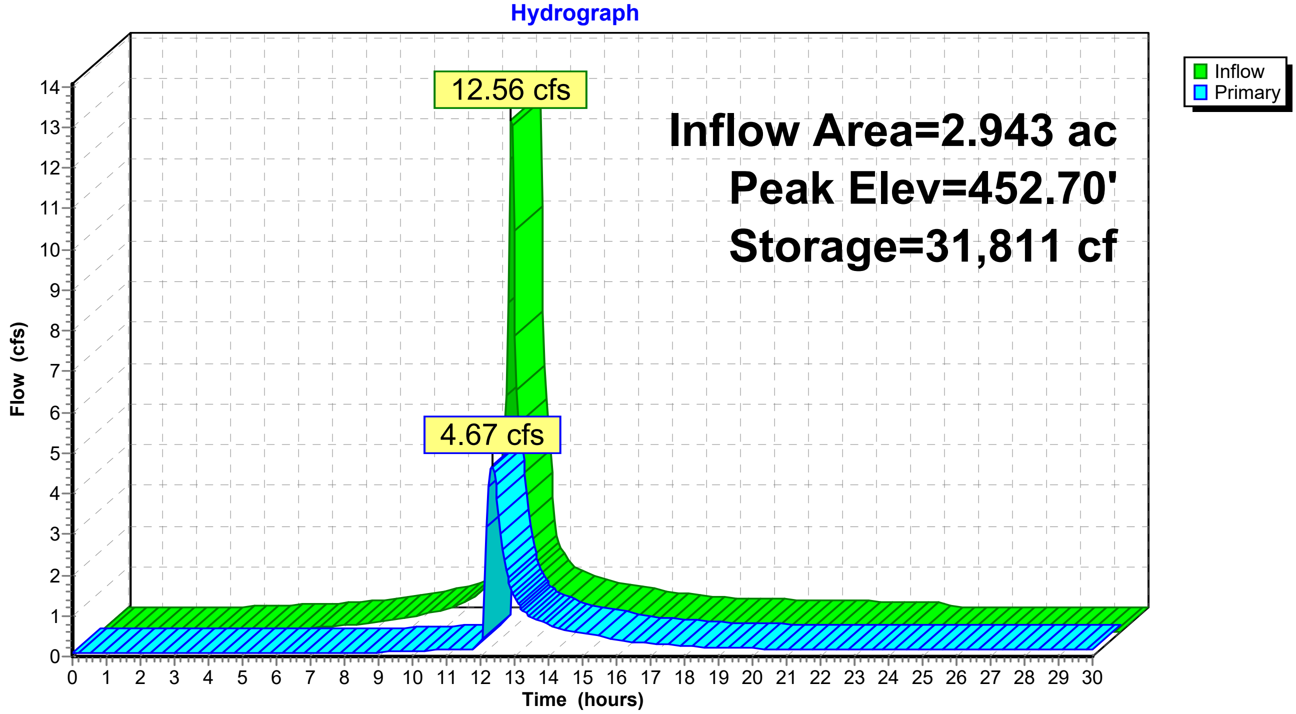
Volume	Invert	Avail.Storage	Storage Description
#1	450.50'	54,744 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.50	12,535	0	0
454.00	18,747	54,744	54,744

Device	Routing	Invert	Outlet Devices
#1	Primary	452.50'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#2	Primary	451.10'	**6.0" Round Culvert** L= 20.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.10' / 450.00' S= 0.0550 '/' Cc= 0.900 n= 0.120, Flow Area= 0.20 sf

Primary OutFlow Max=4.65 cfs @ 12.34 hrs HW=452.70' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 4.45 cfs @ 1.14 fps)
2=Culvert (Barrel Controls 0.20 cfs @ 1.02 fps)

Pond 1D: WET 1D



Stage-Area-Storage for Pond 1D: WET 1D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.50	12,535	0
450.55	12,624	629
450.60	12,712	1,262
450.65	12,801	1,900
450.70	12,890	2,542
450.75	12,979	3,189
450.80	13,067	3,840
450.85	13,156	4,496
450.90	13,245	5,156
450.95	13,334	5,820
451.00	13,422	6,489
451.05	13,511	7,163
451.10	13,600	7,840
451.15	13,689	8,523
451.20	13,777	9,209
451.25	13,866	9,900
451.30	13,955	10,596
451.35	14,044	11,296
451.40	14,132	12,000
451.45	14,221	12,709
451.50	14,310	13,422
451.55	14,399	14,140
451.60	14,487	14,862
451.65	14,576	15,589
451.70	14,665	16,320
451.75	14,754	17,055
451.80	14,842	17,795
451.85	14,931	18,540
451.90	15,020	19,288
451.95	15,109	20,042
452.00	15,197	20,799
452.05	15,286	21,561
452.10	15,375	22,328
452.15	15,464	23,099
452.20	15,552	23,874
452.25	15,641	24,654
452.30	15,730	25,438
452.35	15,818	26,227
452.40	15,907	27,020
452.45	15,996	27,818
452.50	16,085	28,620
452.55	16,173	29,426
452.60	16,262	30,237
452.65	16,351	31,052
452.70	16,440	31,872
452.75	16,528	32,696
452.80	16,617	33,525
452.85	16,706	34,358
452.90	16,795	35,196
452.95	16,883	36,038
453.00	16,972	36,884
453.05	17,061	37,735
453.10	17,150	38,590
453.15	17,238	39,450
453.20	17,327	40,314
453.25	17,416	41,182
453.30	17,505	42,055
453.35	17,593	42,933
453.40	17,682	43,815
453.45	17,771	44,701
453.50	17,860	45,592
453.55	17,948	46,487
453.60	18,037	47,387
453.65	18,126	48,291
453.70	18,215	49,199
453.75	18,303	50,112
453.80	18,392	51,030
453.85	18,481	51,951
453.90	18,570	52,878
453.95	18,658	53,808
454.00	**18,747**	**54,744**

Summary for Pond 1E: INFIL 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 3.78" for 10-yr event
Inflow = 17.47 cfs @ 12.10 hrs, Volume= 1.473 af
Outflow = 2.19 cfs @ 12.75 hrs, Volume= 1.474 af, Atten= 87%, Lag= 38.9 min
Discarded = 1.07 cfs @ 12.75 hrs, Volume= 1.384 af
Primary = 1.12 cfs @ 12.75 hrs, Volume= 0.090 af
Routed to Pond 4P : FB 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 462.08' @ 12.75 hrs Surf.Area= 11,597 sf Storage= 20,945 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 181.9 min (1,013.7 - 831.8)

Volume	Invert	Avail.Storage	Storage Description
#1	460.00'	61,063 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

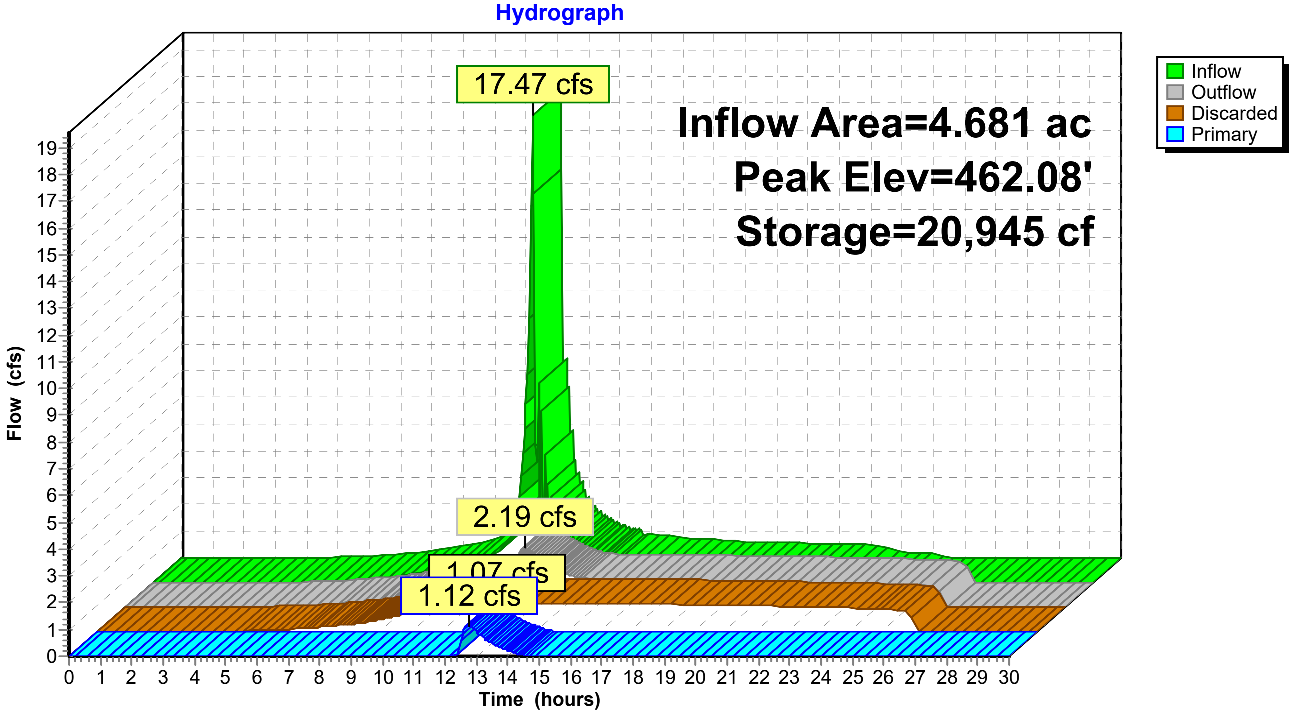
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
460.00	8,583	0	0
465.00	15,842	61,063	61,063

Device	Routing	Invert	Outlet Devices
#1	Discarded	460.00'	**4.000 in/hr EXFIL over Surface area**
#2	Primary	462.00'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.07 cfs @ 12.75 hrs HW=462.08' (Free Discharge)
└─**1=EXFIL** (Exfiltration Controls 1.07 cfs)

Primary OutFlow Max=1.12 cfs @ 12.75 hrs HW=462.08' TW=457.85' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.12 cfs @ 0.74 fps)

Pond 1E: INFIL 1E



Stage-Area-Storage for Pond 1E: INFIL 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
460.00	8,583	0	462.65	12,430	27,843
460.05	8,656	431	462.70	12,503	28,466
460.10	8,728	866	462.75	12,575	29,093
460.15	8,801	1,304	462.80	12,648	29,723
460.20	8,873	1,746	462.85	12,721	30,358
460.25	8,946	2,191	462.90	12,793	30,996
460.30	9,019	2,640	462.95	12,866	31,637
460.35	9,091	3,093	463.00	12,938	32,282
460.40	9,164	3,549	463.05	13,011	32,931
460.45	9,236	4,009	463.10	13,084	33,583
460.50	9,309	4,473	463.15	13,156	34,239
460.55	9,381	4,940	463.20	13,229	34,899
460.60	9,454	5,411	463.25	13,301	35,562
460.65	9,527	5,886	463.30	13,374	36,229
460.70	9,599	6,364	463.35	13,447	36,899
460.75	9,672	6,846	463.40	13,519	37,574
460.80	9,744	7,331	463.45	13,592	38,251
460.85	9,817	7,820	463.50	13,664	38,933
460.90	9,890	8,313	463.55	13,737	39,618
460.95	9,962	8,809	463.60	13,809	40,306
461.00	10,035	9,309	463.65	13,882	40,999
461.05	10,107	9,812	463.70	13,955	41,695
461.10	10,180	10,320	463.75	14,027	42,394
461.15	10,253	10,830	463.80	14,100	43,097
461.20	10,325	11,345	463.85	14,172	43,804
461.25	10,398	11,863	463.90	14,245	44,515
461.30	10,470	12,385	463.95	14,318	45,229
461.35	10,543	12,910	464.00	14,390	45,946
461.40	10,616	13,439	464.05	14,463	46,668
461.45	10,688	13,972	464.10	14,535	47,393
461.50	10,761	14,508	464.15	14,608	48,121
461.55	10,833	15,048	464.20	14,681	48,853
461.60	10,906	15,591	464.25	14,753	49,589
461.65	10,978	16,138	464.30	14,826	50,329
461.70	11,051	16,689	464.35	14,898	51,072
461.75	11,124	17,243	464.40	14,971	51,819
461.80	11,196	17,801	464.45	15,044	52,569
461.85	11,269	18,363	464.50	15,116	53,323
461.90	11,341	18,928	464.55	15,189	54,081
461.95	11,414	19,497	464.60	15,261	54,842
462.00	11,487	20,070	464.65	15,334	55,607
462.05	11,559	20,646	464.70	15,406	56,375
462.10	11,632	21,226	464.75	15,479	57,147
462.15	11,704	21,809	464.80	15,552	57,923
462.20	11,777	22,396	464.85	15,624	58,703
462.25	11,850	22,987	464.90	15,697	59,486
462.30	11,922	23,581	464.95	15,769	60,272
462.35	11,995	24,179	465.00	**15,842**	**61,063**
462.40	12,067	24,780			
462.45	12,140	25,386			
462.50	12,213	25,994			
462.55	12,285	26,607			
462.60	12,358	27,223			

Summary for Pond 2C: WET 2C

Inflow Area = 4.100 ac, 76.37% Impervious, Inflow Depth = 3.98" for 10-yr event
Inflow = 17.42 cfs @ 12.09 hrs, Volume= 1.360 af
Outflow = 13.99 cfs @ 12.15 hrs, Volume= 1.346 af, Atten= 20%, Lag= 3.5 min
Primary = 13.99 cfs @ 12.15 hrs, Volume= 1.346 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.30' Surf.Area= 7,226 sf Storage= 8,306 cf
Peak Elev= 452.95' @ 12.15 hrs Surf.Area= 9,356 sf Storage= 22,026 cf (13,719 cf above start)

Plug-Flow detention time= 194.7 min calculated for 1.153 af (85% of inflow)
Center-of-Mass det. time= 92.2 min (867.0 - 774.8)

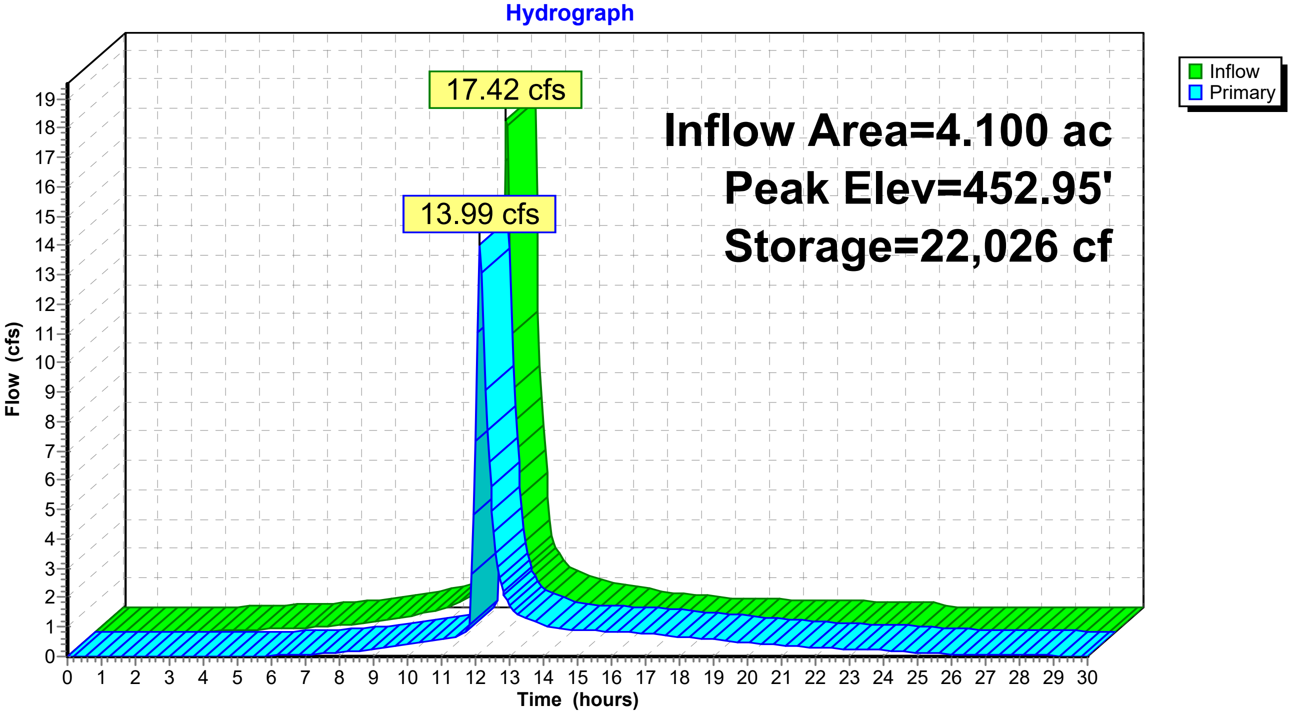
Volume	Invert	Avail.Storage	Storage Description
#1	450.00'	43,659 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.00	5,553	0	0
453.00	9,414	22,451	22,451
455.00	11,794	21,208	43,659

Device	Routing	Invert	Outlet Devices
#1	Device 3	452.50'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Device 3	451.30'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	449.50'	**18.0" Round Culvert** L= 25.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 449.50' / 449.25' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=13.99 cfs @ 12.15 hrs HW=452.95' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 13.99 cfs @ 7.92 fps)
  ├─**1=Broad-Crested Rectangular Weir** (Passes < 15.57 cfs potential flow)
  └─**2=Orifice/Grate** (Passes < 1.12 cfs potential flow)

Pond 2C: WET 2C



Stage-Area-Storage for Pond 2C: WET 2C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.00	5,553	0
450.05	5,617	279
450.10	5,682	562
450.15	5,746	847
450.20	5,810	1,136
450.25	5,875	1,428
450.30	5,939	1,724
450.35	6,003	2,022
450.40	6,068	2,324
450.45	6,132	2,629
450.50	6,197	2,937
450.55	6,261	3,249
450.60	6,325	3,563
450.65	6,390	3,881
450.70	6,454	4,202
450.75	6,518	4,527
450.80	6,583	4,854
450.85	6,647	5,185
450.90	6,711	5,519
450.95	6,776	5,856
451.00	6,840	6,197
451.05	6,904	6,540
451.10	6,969	6,887
451.15	7,033	7,237
451.20	7,097	7,590
451.25	7,162	7,947
451.30	7,226	8,306
451.35	7,290	8,669
451.40	7,355	9,035
451.45	7,419	9,405
451.50	7,484	9,777
451.55	7,548	10,153
451.60	7,612	10,532
451.65	7,677	10,914
451.70	7,741	11,300
451.75	7,805	11,688
451.80	7,870	12,080
451.85	7,934	12,475
451.90	7,998	12,874
451.95	8,063	13,275
452.00	8,127	13,680
452.05	8,191	14,088
452.10	8,256	14,499
452.15	8,320	14,914
452.20	8,384	15,331
452.25	8,449	15,752
452.30	8,513	16,176
452.35	8,577	16,603
452.40	8,642	17,034
452.45	8,706	17,467
452.50	8,771	17,904
452.55	8,835	18,345
452.60	8,899	18,788
452.65	8,964	19,234
452.70	9,028	19,684
452.75	9,092	20,137
452.80	9,157	20,593
452.85	9,221	21,053
452.90	9,285	21,516
452.95	9,350	21,981
453.00	9,414	22,451
453.05	9,474	22,923
453.10	9,533	23,398
453.15	9,592	23,876
453.20	9,652	24,357
453.25	9,712	24,841
453.30	9,771	25,328
453.35	9,831	25,818
453.40	9,890	26,311
453.45	9,949	26,807
453.50	10,009	27,306
453.55	10,069	27,808
453.60	10,128	28,313
453.65	10,187	28,821
453.70	10,247	29,332
453.75	10,307	29,846
453.80	10,366	30,363
453.85	10,426	30,882
453.90	10,485	31,405
453.95	10,544	31,931
454.00	10,604	32,460
454.05	10,664	32,991
454.10	10,723	33,526
454.15	10,782	34,063
454.20	10,842	34,604
454.25	10,902	35,148
454.30	10,961	35,694
454.35	11,021	36,244
454.40	11,080	36,796
454.45	11,139	37,352
454.50	11,199	37,910
454.55	11,259	38,472
454.60	11,318	39,036
454.65	11,377	39,603
454.70	11,437	40,174
454.75	11,497	40,747
454.80	11,556	41,324
454.85	11,616	41,903
454.90	11,675	42,485
454.95	11,734	43,070
455.00	**11,794**	**43,659**

Summary for Pond 3P: FB 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 3.78" for 10-yr event
Inflow = 19.31 cfs @ 12.09 hrs, Volume= 1.473 af
Outflow = 17.47 cfs @ 12.10 hrs, Volume= 1.473 af, Atten= 10%, Lag= 0.8 min
Primary = 17.47 cfs @ 12.10 hrs, Volume= 1.473 af
Routed to Pond 1E : INFIL 1E

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 6,027 sf Storage= 16,913 cf
Peak Elev= 462.08' @ 12.80 hrs Surf.Area= 7,511 sf Storage= 24,198 cf (7,284 cf above start)

Plug-Flow detention time= 205.5 min calculated for 1.083 af (74% of inflow)
Center-of-Mass det. time= 46.9 min (831.8 - 784.8)

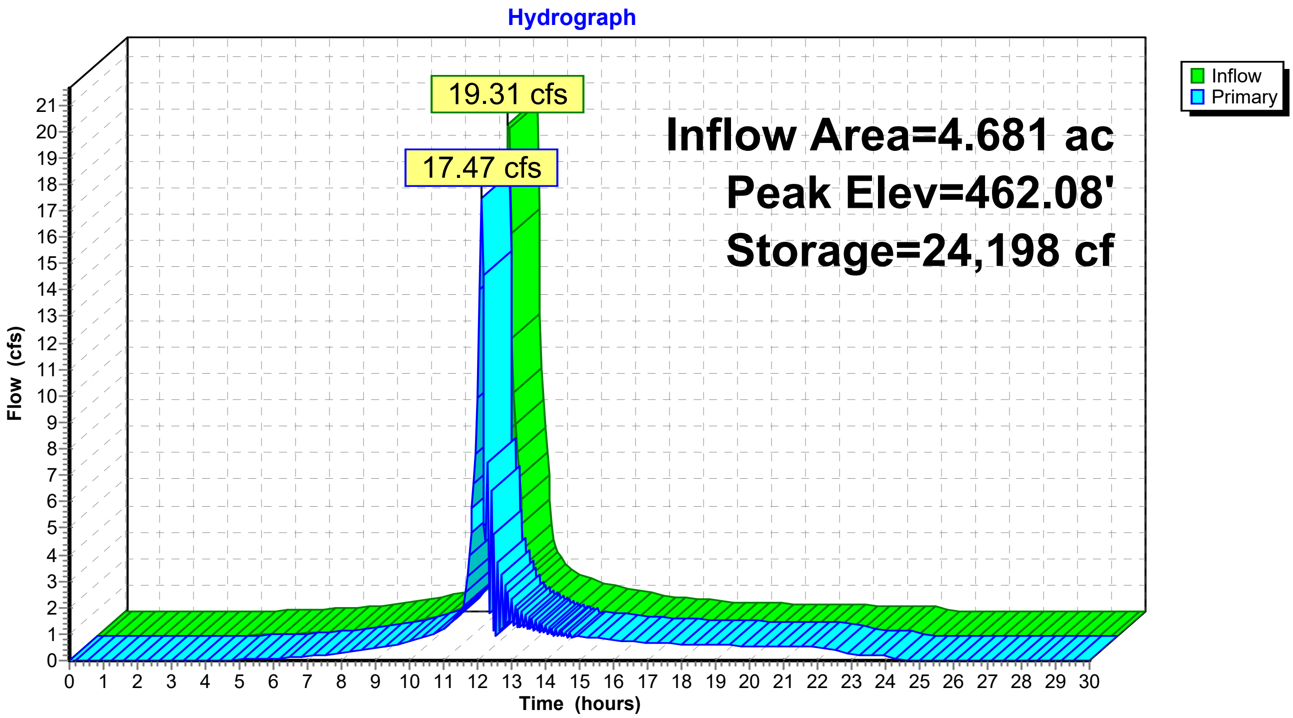
Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	52,051 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
456.00	1,140	0	0
460.00	4,648	11,576	11,576
465.00	11,542	40,475	52,051

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=12.35 cfs @ 12.10 hrs HW=461.48' TW=461.35' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 12.35 cfs @ 1.28 fps)

Pond 3P: FB 1E


Hydrograph
19.31 cfs
17.47 cfs
Inflow Area=4.681 ac
Peak Elev=462.08'
Storage=24,198 cf
Inflow
Primary
Flow (cfs)
Time (hours)
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Stage-Area-Storage for Pond 3P: FB 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
456.00	1,140	0	461.30	6,440	18,783
456.10	1,228	118	461.40	6,578	19,434
456.20	1,315	246	461.50	6,716	20,099
456.30	1,403	381	461.60	6,854	20,778
456.40	1,491	526	461.70	6,992	21,470
456.50	1,579	680	461.80	7,130	22,176
456.60	1,666	842	461.90	7,268	22,896
456.70	1,754	1,013	462.00	7,406	23,630
456.80	1,842	1,193	462.10	7,543	24,377
456.90	1,929	1,381	462.20	7,681	25,138
457.00	2,017	1,579	462.30	7,819	25,913
457.10	2,105	1,785	462.40	7,957	26,702
457.20	2,192	1,999	462.50	8,095	27,505
457.30	2,280	2,223	462.60	8,233	28,321
457.40	2,368	2,455	462.70	8,371	29,151
457.50	2,456	2,697	462.80	8,509	29,995
457.60	2,543	2,947	462.90	8,647	30,853
457.70	2,631	3,205	463.00	8,784	31,725
457.80	2,719	3,473	463.10	8,922	32,610
457.90	2,806	3,749	463.20	9,060	33,509
458.00	2,894	4,034	463.30	9,198	34,422
458.10	2,982	4,328	463.40	9,336	35,349
458.20	3,069	4,630	463.50	9,474	36,289
458.30	3,157	4,942	463.60	9,612	37,243
458.40	3,245	5,262	463.70	9,750	38,211
458.50	3,333	5,591	463.80	9,887	39,193
458.60	3,420	5,928	463.90	10,025	40,189
458.70	3,508	6,275	464.00	10,163	41,198
458.80	3,596	6,630	464.10	10,301	42,222
458.90	3,683	6,994	464.20	10,439	43,259
459.00	3,771	7,367	464.30	10,577	44,309
459.10	3,859	7,748	464.40	10,715	45,374
459.20	3,946	8,138	464.50	10,853	46,452
459.30	4,034	8,537	464.60	10,990	47,545
459.40	4,122	8,945	464.70	11,128	48,650
459.50	4,210	9,362	464.80	11,266	49,770
459.60	4,297	9,787	464.90	11,404	50,904
459.70	4,385	10,221	465.00	**11,542**	**52,051**
459.80	4,473	10,664			
459.90	4,560	11,116			
460.00	4,648	11,576			
460.10	4,786	12,048			
460.20	4,924	12,533			
460.30	5,062	13,032			
460.40	5,200	13,546			
460.50	5,337	14,072			
460.60	5,475	14,613			
460.70	5,613	15,167			
460.80	5,751	15,736			
460.90	5,889	16,318			
461.00	6,027	16,913			
461.10	6,165	17,523			
461.20	6,303	18,146			

Summary for Pond 4P: FB 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 3.11" for 10-yr event
Inflow = 49.40 cfs @ 12.09 hrs, Volume= 4.104 af
Outflow = 42.87 cfs @ 12.14 hrs, Volume= 4.103 af, Atten= 13%, Lag= 3.0 min
Primary = 42.87 cfs @ 12.14 hrs, Volume= 4.103 af
Routed to Pond 1BE : INFIL 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 457.50' Surf.Area= 14,084 sf Storage= 43,509 cf
Peak Elev= 458.37' @ 12.14 hrs Surf.Area= 14,907 sf Storage= 56,139 cf (12,630 cf above start)

Plug-Flow detention time= 161.7 min calculated for 3.105 af (76% of inflow)
Center-of-Mass det. time= 11.4 min (769.7 - 758.3)

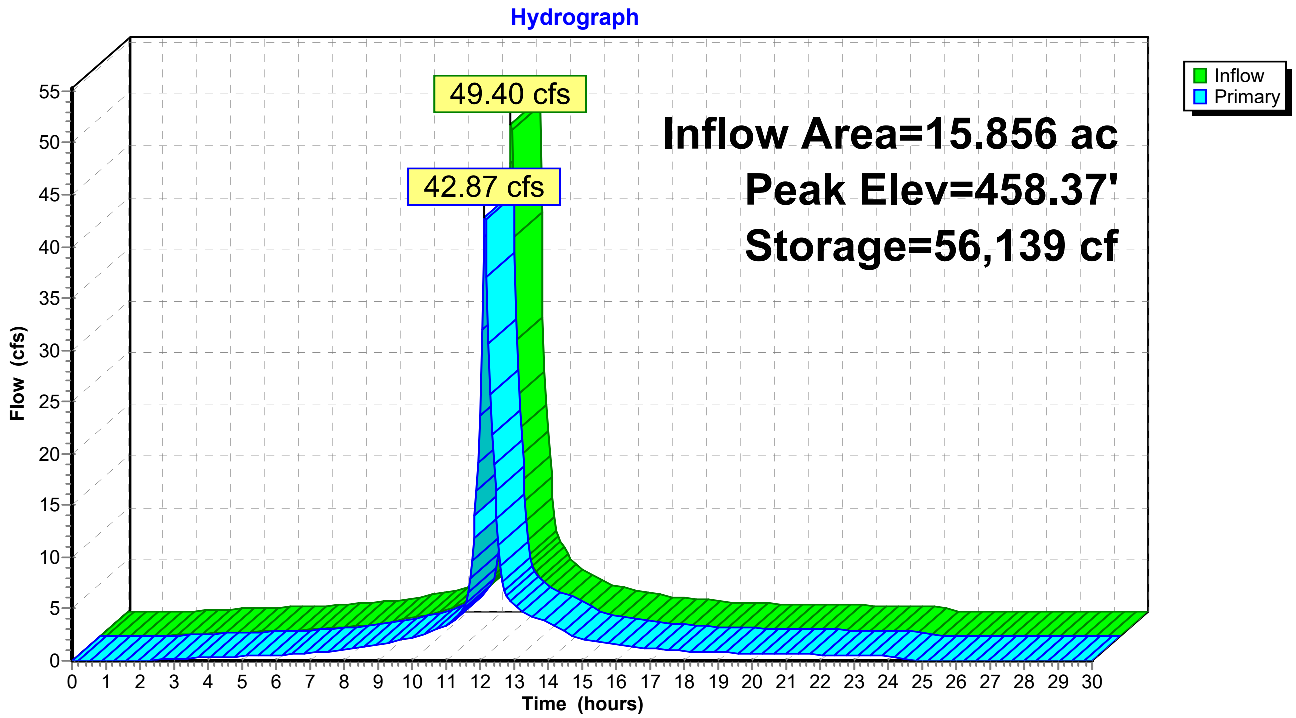
Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	81,672 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
454.00	10,778	0	0
460.00	16,446	81,672	81,672

Device	Routing	Invert	Outlet Devices
#1	Primary	457.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=42.17 cfs @ 12.14 hrs HW=458.36' TW=456.43' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 42.17 cfs @ 2.45 fps)

Pond 4P: FB 1BE



Stage-Area-Storage for Pond 4P: FB 1BE

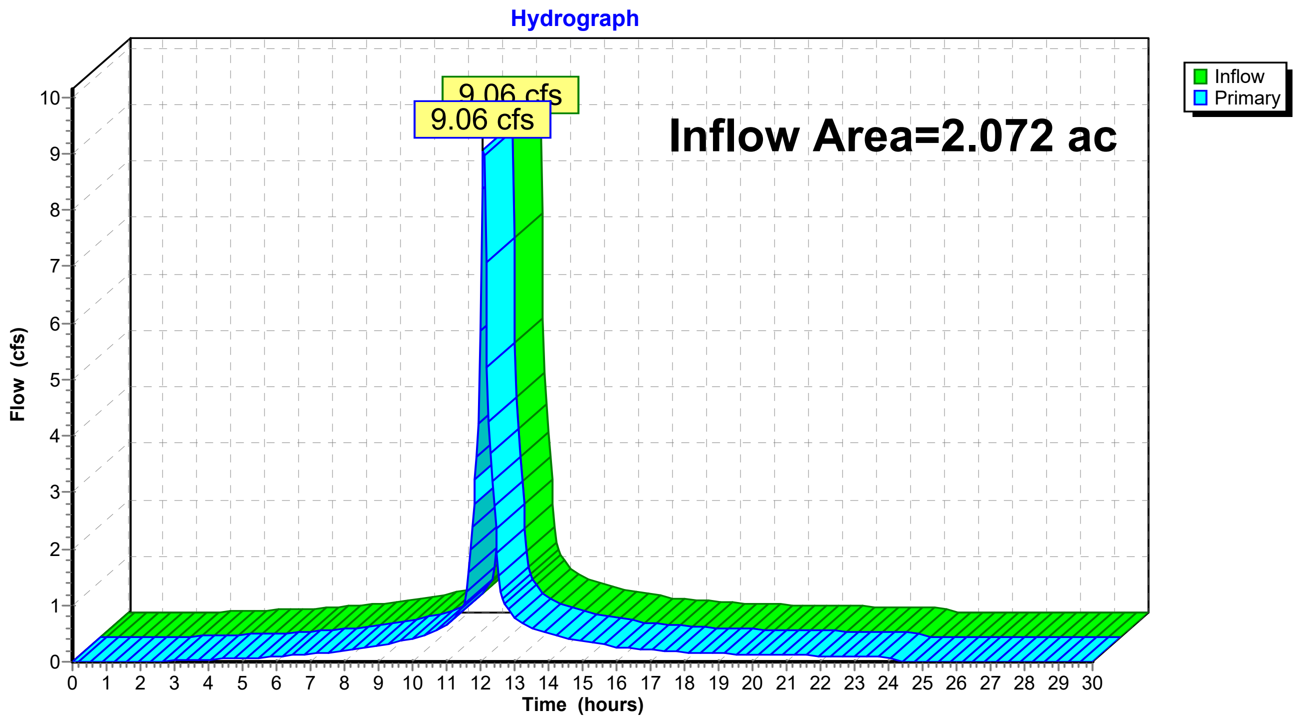
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
454.00	10,778	0	459.30	15,785	70,391
454.10	10,872	1,083	459.40	15,879	71,974
454.20	10,967	2,174	459.50	15,974	73,567
454.30	11,061	3,276	459.60	16,068	75,169
454.40	11,156	4,387	459.70	16,163	76,781
454.50	11,250	5,507	459.80	16,257	78,402
454.60	11,345	6,637	459.90	16,352	80,032
454.70	11,439	7,776	460.00	**16,446**	**81,672**
454.80	11,534	8,925			
454.90	11,628	10,083			
455.00	11,723	11,250			
455.10	11,817	12,427			
455.20	11,912	13,614			
455.30	12,006	14,810			
455.40	12,101	16,015			
455.50	12,195	17,230			
455.60	12,289	18,454			
455.70	12,384	19,688			
455.80	12,478	20,931			
455.90	12,573	22,183			
456.00	12,667	23,445			
456.10	12,762	24,717			
456.20	12,856	25,998			
456.30	12,951	27,288			
456.40	13,045	28,588			
456.50	13,140	29,897			
456.60	13,234	31,216			
456.70	13,329	32,544			
456.80	13,423	33,881			
456.90	13,518	35,229			
457.00	13,612	36,585			
457.10	13,706	37,951			
457.20	13,801	39,326			
457.30	13,895	40,711			
457.40	13,990	42,105			
457.50	14,084	43,509			
457.60	14,179	44,922			
457.70	14,273	46,345			
457.80	14,368	47,777			
457.90	14,462	49,218			
458.00	14,557	50,669			
458.10	14,651	52,130			
458.20	14,746	53,600			
458.30	14,840	55,079			
458.40	14,935	56,568			
458.50	15,029	58,066			
458.60	15,123	59,573			
458.70	15,218	61,090			
458.80	15,312	62,617			
458.90	15,407	64,153			
459.00	15,501	65,698			
459.10	15,596	67,253			
459.20	15,690	68,817			

Summary for Link H7: (new Link)

Inflow Area = 2.072 ac, 87.73% Impervious, Inflow Depth = 4.18" for 10-yr event
Inflow = 9.06 cfs @ 12.09 hrs, Volume= 0.722 af
Primary = 9.06 cfs @ 12.09 hrs, Volume= 0.722 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2C : WET 2C

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link H7: (new Link)

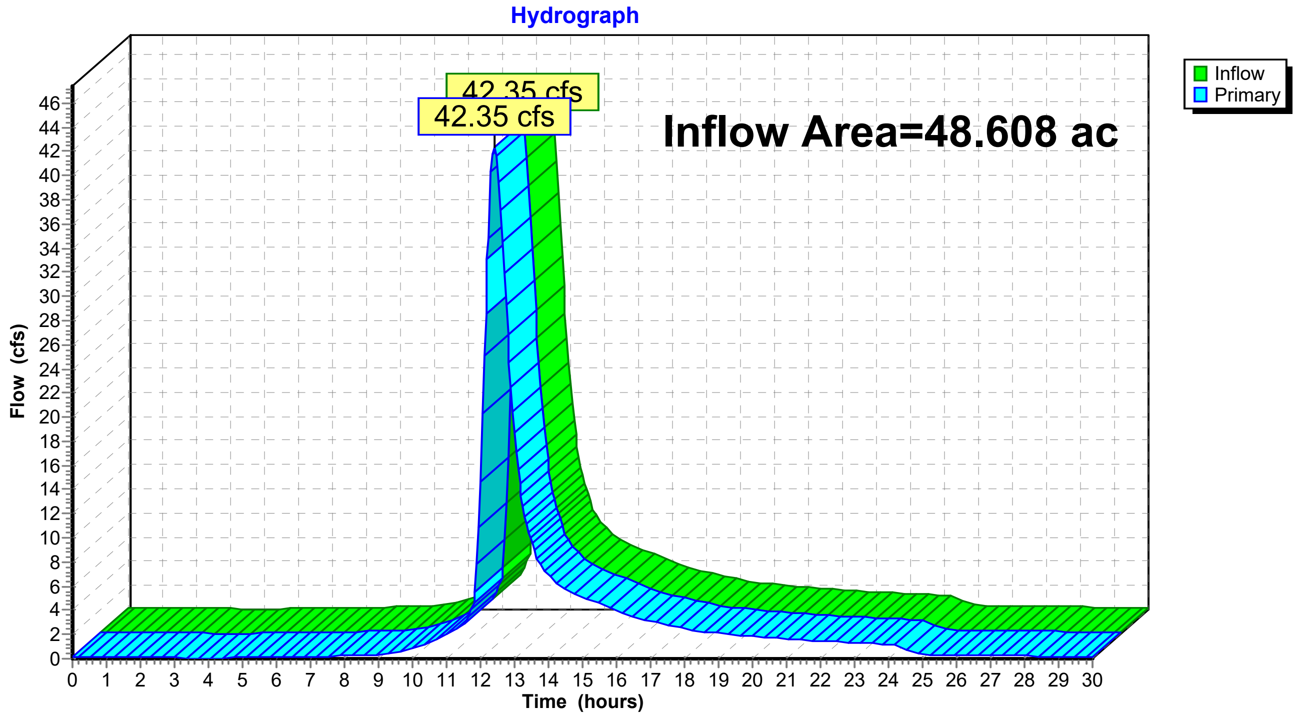


Summary for Link PR: PROPOSED

Inflow Area = 48.608 ac, 42.37% Impervious, Inflow Depth > 1.59" for 10-yr event
Inflow = 42.35 cfs @ 12.42 hrs, Volume= 6.444 af
Primary = 42.35 cfs @ 12.42 hrs, Volume= 6.444 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link PR: PROPOSED



Summary for Subcatchment PREM: LOD

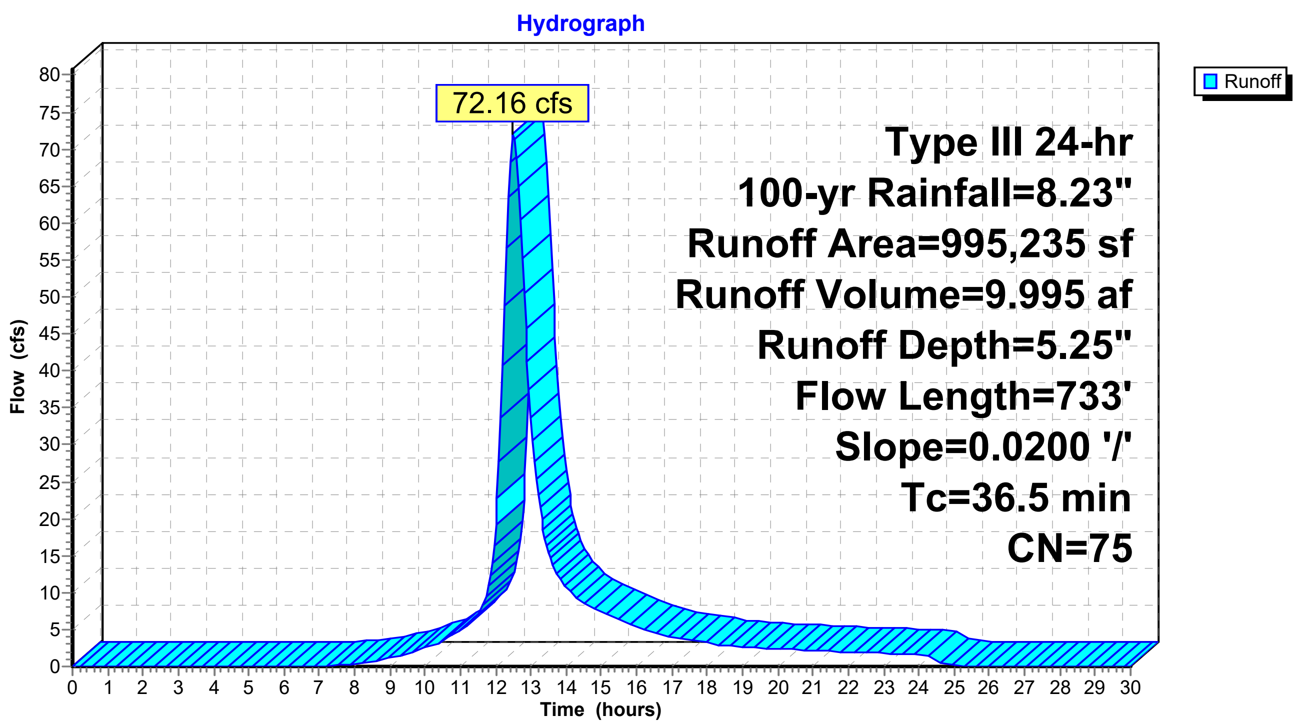
Runoff = 72.16 cfs @ 12.50 hrs, Volume= 9.995 af, Depth= 5.25"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
113,433	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
28,688	30	Meadow, non-grazed, HSG A
532,740	78	Meadow, non-grazed, HSG D
276,941	80	>75% Grass cover, Good, HSG D
995,235	75	Weighted Average
995,235		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
14.9	633	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.5	733	Total			

Subcatchment PREM: LOD



Summary for Subcatchment PW1A: PARKING

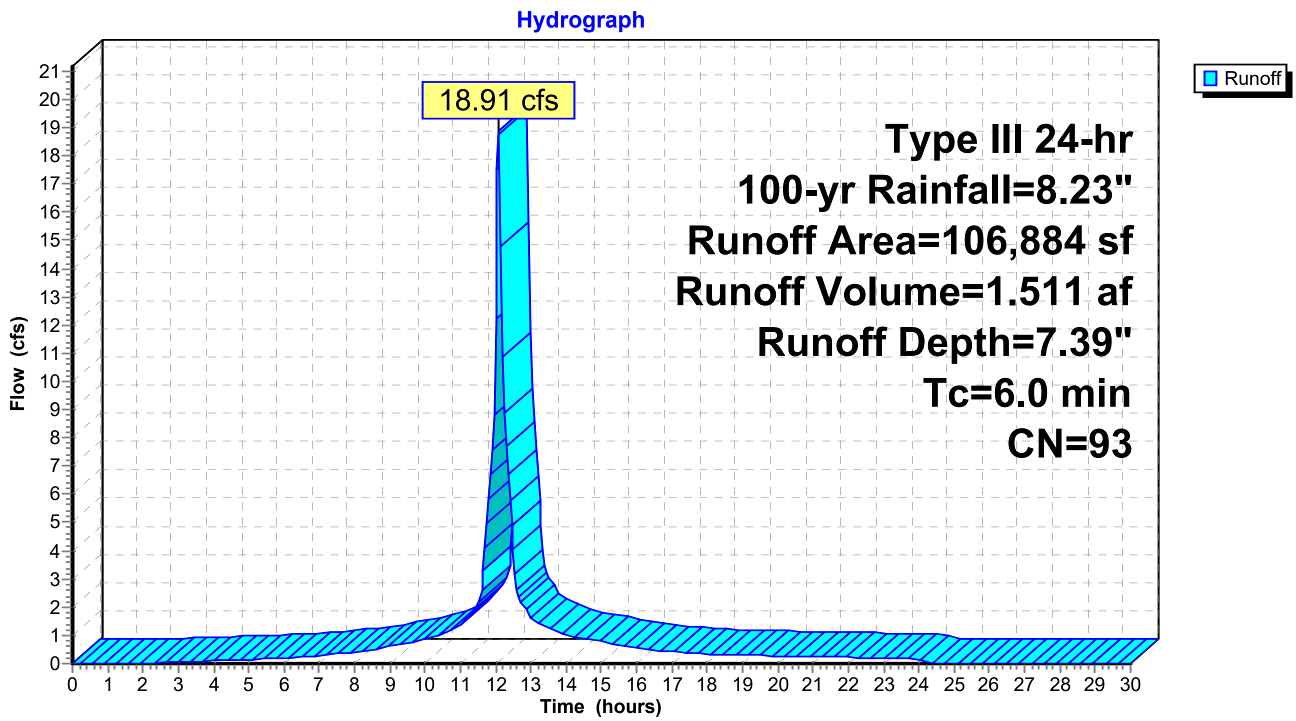
Runoff = 18.91 cfs @ 12.09 hrs, Volume= 1.511 af, Depth= 7.39"
Routed to Pond 1A-1 : INFIL 1A-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
32,522	80	>75% Grass cover, Good, HSG D
74,362	98	Paved parking, HSG D
106,884	93	Weighted Average
32,522		30.43% Pervious Area
74,362		69.57% Impervious Area

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

Subcatchment PW1A: PARKING



Summary for Subcatchment PW1BE: BLDG EAST

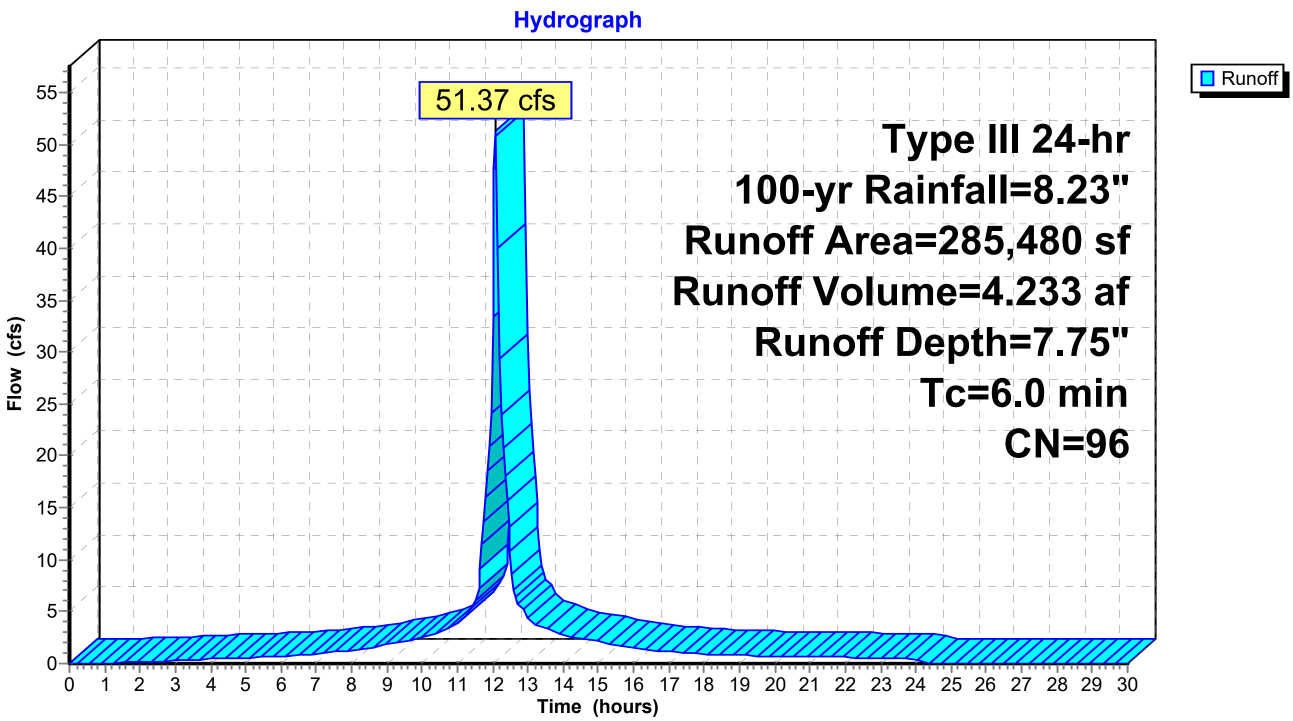
Runoff = 51.37 cfs @ 12.09 hrs, Volume= 4.233 af, Depth= 7.75"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
33,786	80	>75% Grass cover, Good, HSG D
251,694	98	Paved parking, HSG D
285,480	96	Weighted Average
33,786		11.83% Pervious Area
251,694		88.17% Impervious Area

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

Subcatchment PW1BE: BLDG EAST



Summary for Subcatchment PW1BW: BLDG WEST

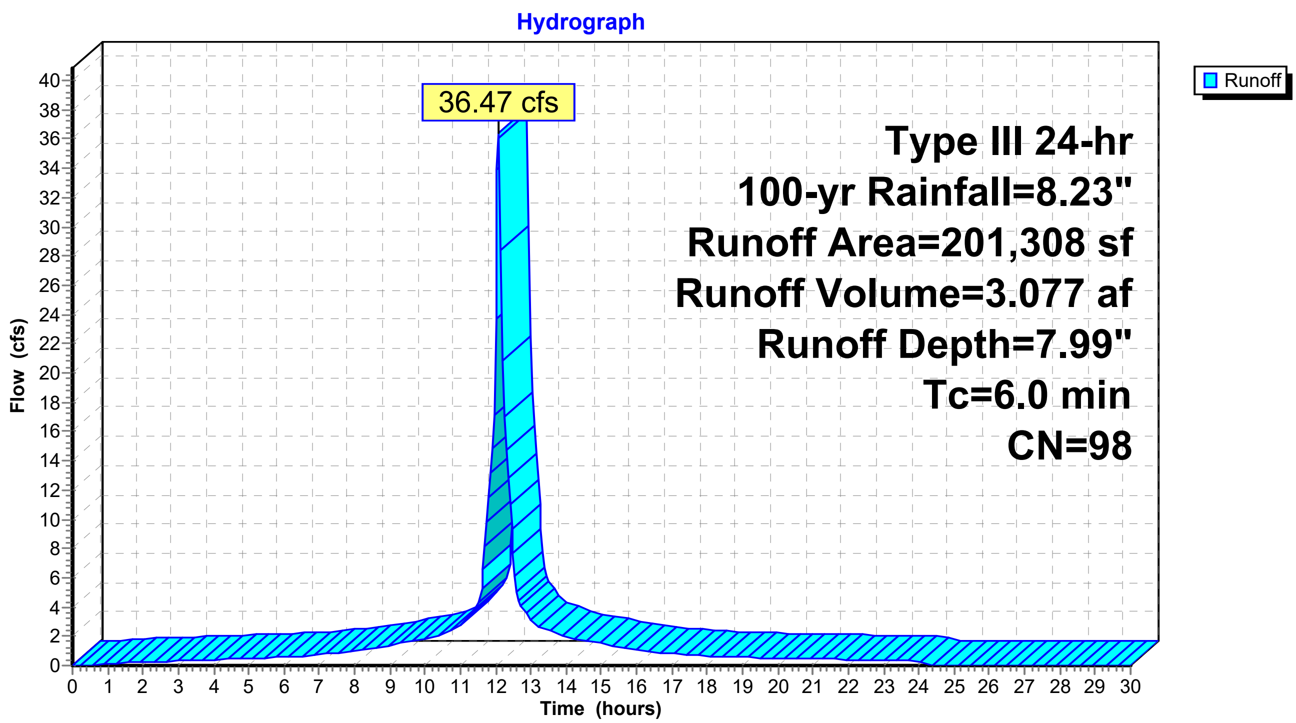
Runoff = 36.47 cfs @ 12.09 hrs, Volume= 3.077 af, Depth= 7.99"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
201,308	98	Paved parking, HSG D
201,308	98	Weighted Average
201,308		100.00% Impervious Area

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

Subcatchment PW1BW: BLDG WEST



Summary for Subcatchment PW1C:

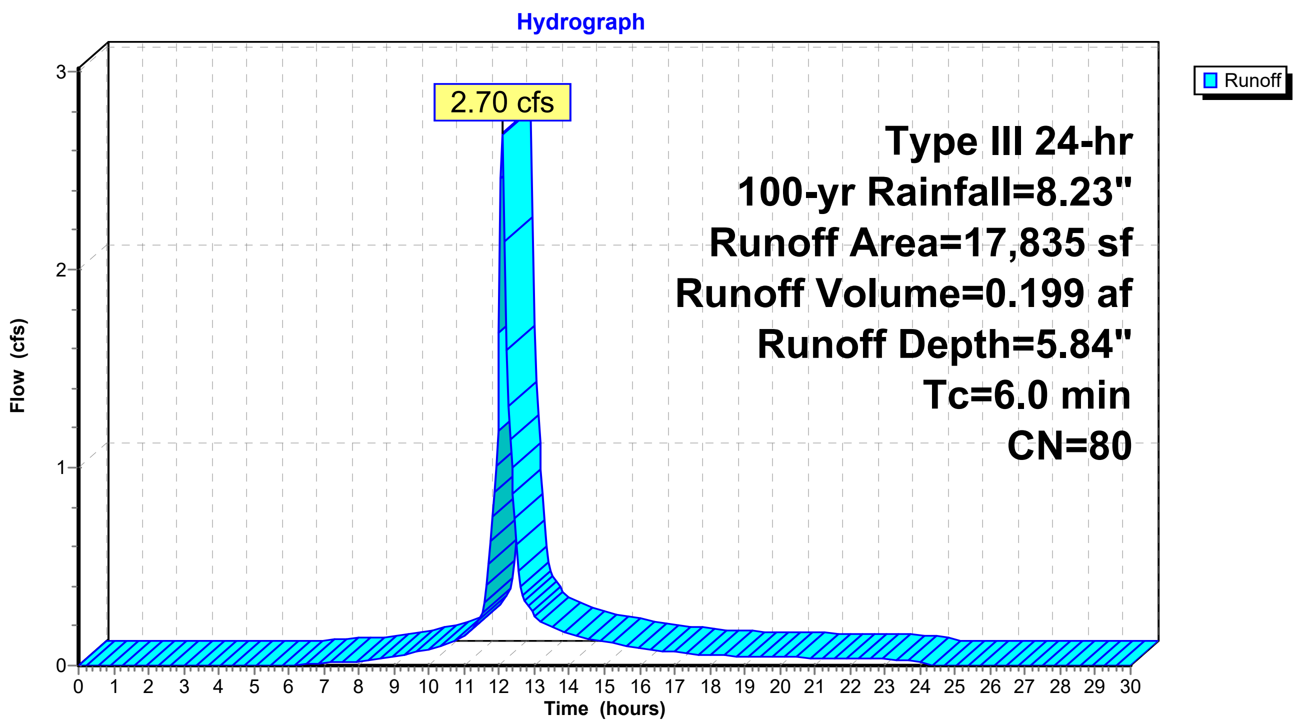
Runoff = 2.70 cfs @ 12.09 hrs, Volume= 0.199 af, Depth= 5.84"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
17,835	80	>75% Grass cover, Good, HSG D
0	98	Paved parking, HSG D
17,835	80	Weighted Average
17,835		100.00% Pervious Area

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

Subcatchment PW1C:



Summary for Subcatchment PW1D: LOAD EAST

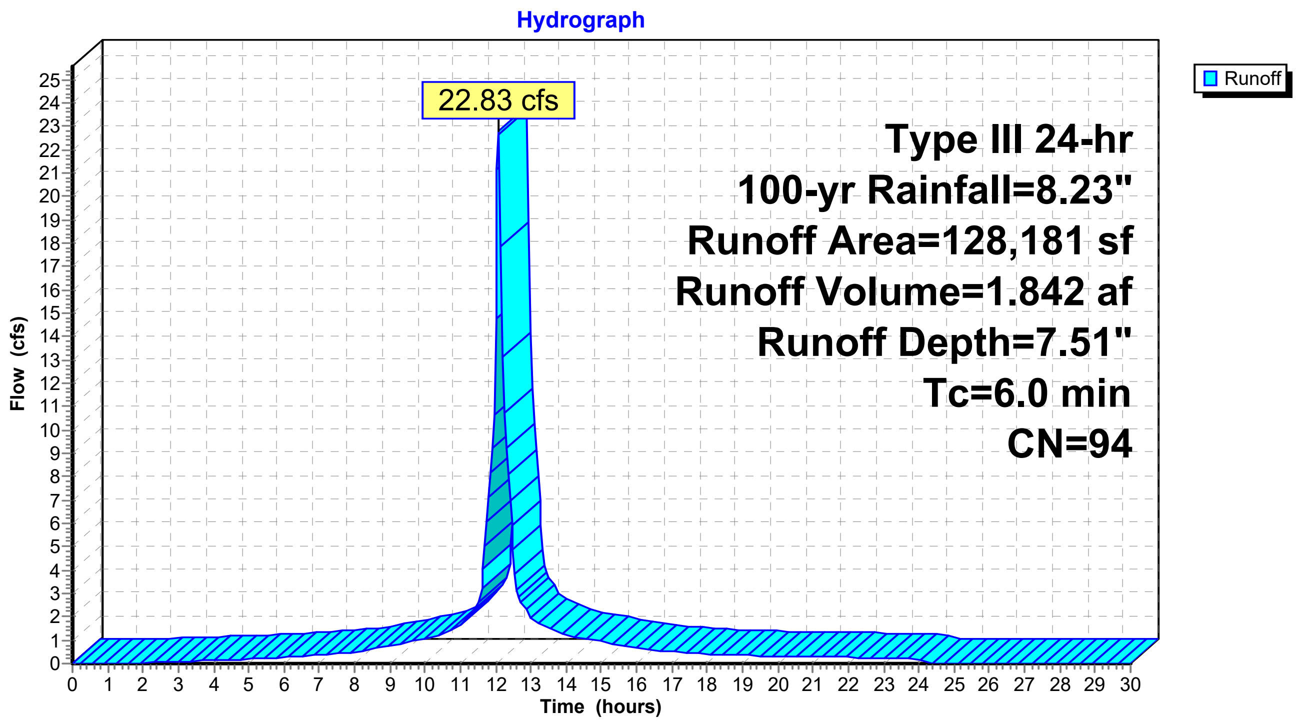
Runoff = 22.83 cfs @ 12.09 hrs, Volume= 1.842 af, Depth= 7.51"
Routed to Pond 1D : WET 1D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
28,504	80	>75% Grass cover, Good, HSG D
99,677	98	Paved parking, HSG D
128,181	94	Weighted Average
28,504		22.24% Pervious Area
99,677		77.76% Impervious Area

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

Subcatchment PW1D: LOAD EAST



Summary for Subcatchment PW1E: LOAD WEST

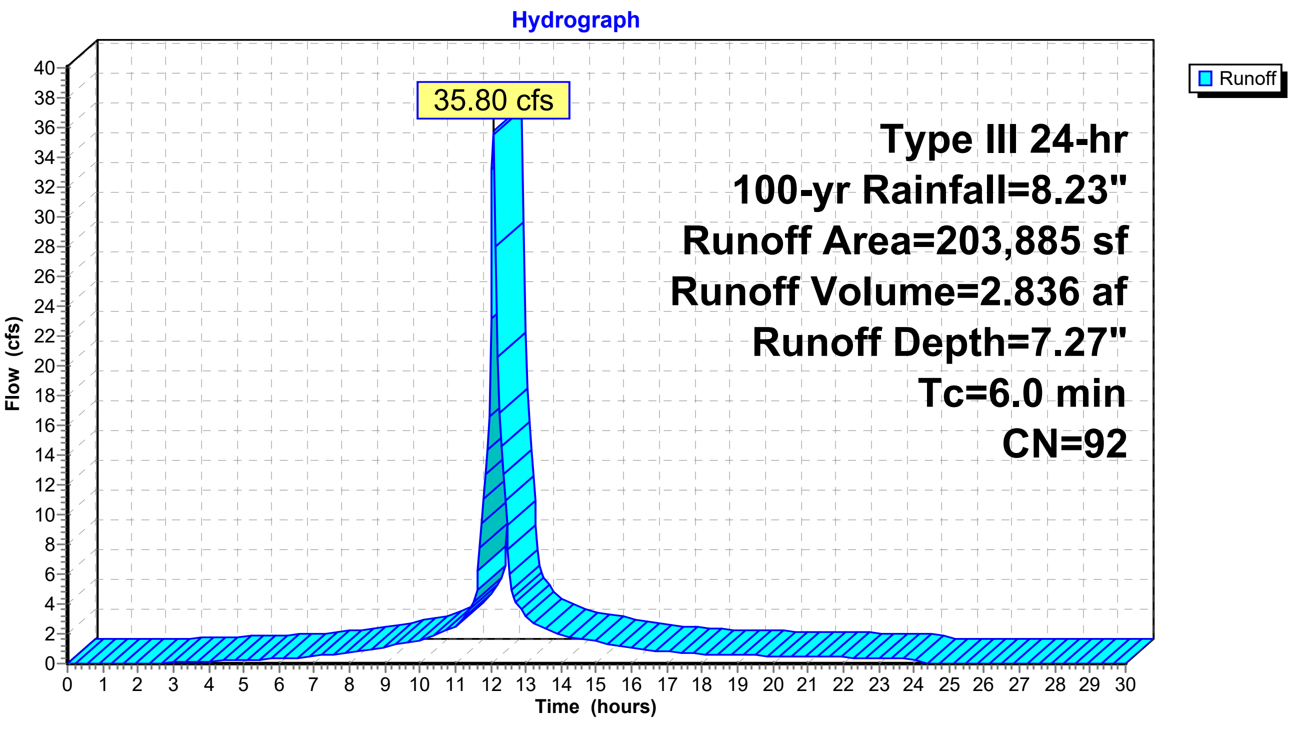
Runoff = 35.80 cfs @ 12.09 hrs, Volume= 2.836 af, Depth= 7.27"
Routed to Pond 3P : FB 1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
70,197	80	>75% Grass cover, Good, HSG D
133,688	98	Paved parking, HSG D
203,885	92	Weighted Average
70,197		34.43% Pervious Area
133,688		65.57% Impervious Area

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

Subcatchment PW1E: LOAD WEST



Summary for Subcatchment PW2A: PARKING

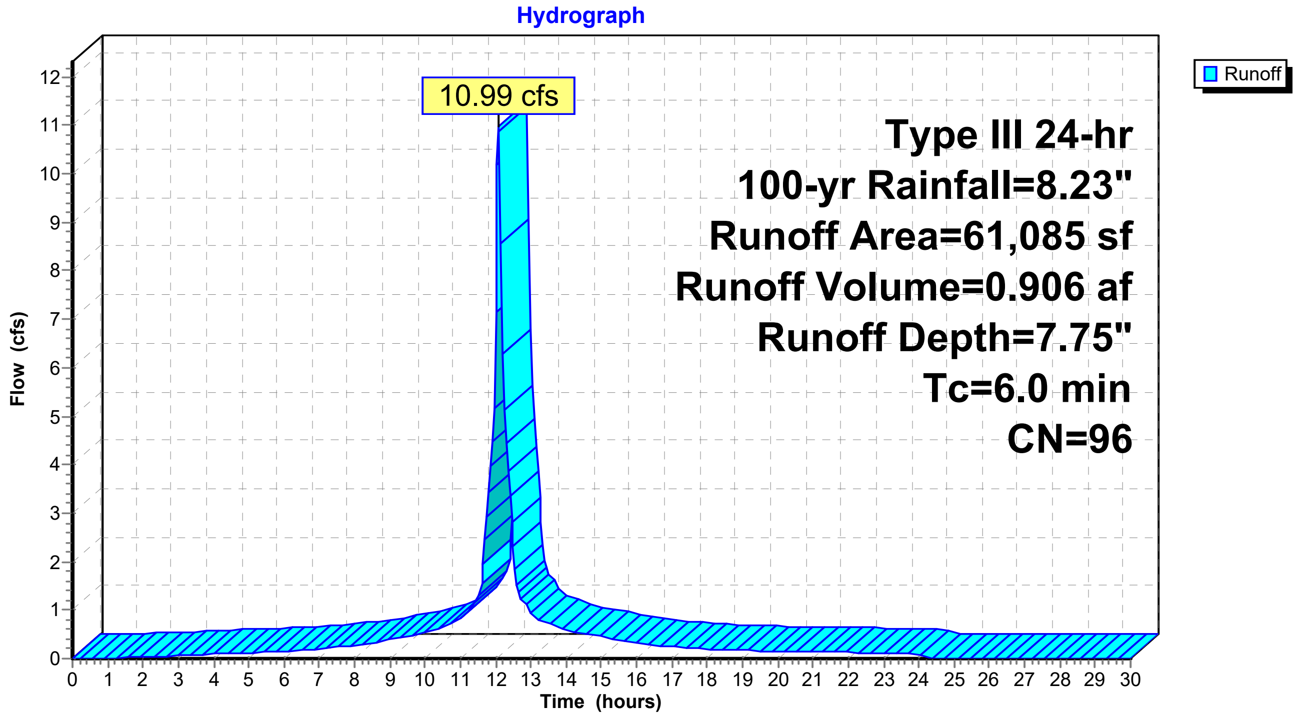
Runoff = 10.99 cfs @ 12.09 hrs, Volume= 0.906 af, Depth= 7.75"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
5,846	80	>75% Grass cover, Good, HSG D
55,239	98	Paved parking, HSG D
61,085	96	Weighted Average
5,846		9.57% Pervious Area
55,239		90.43% Impervious Area

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

Subcatchment PW2A: PARKING



Summary for Subcatchment PW2B: LOADING

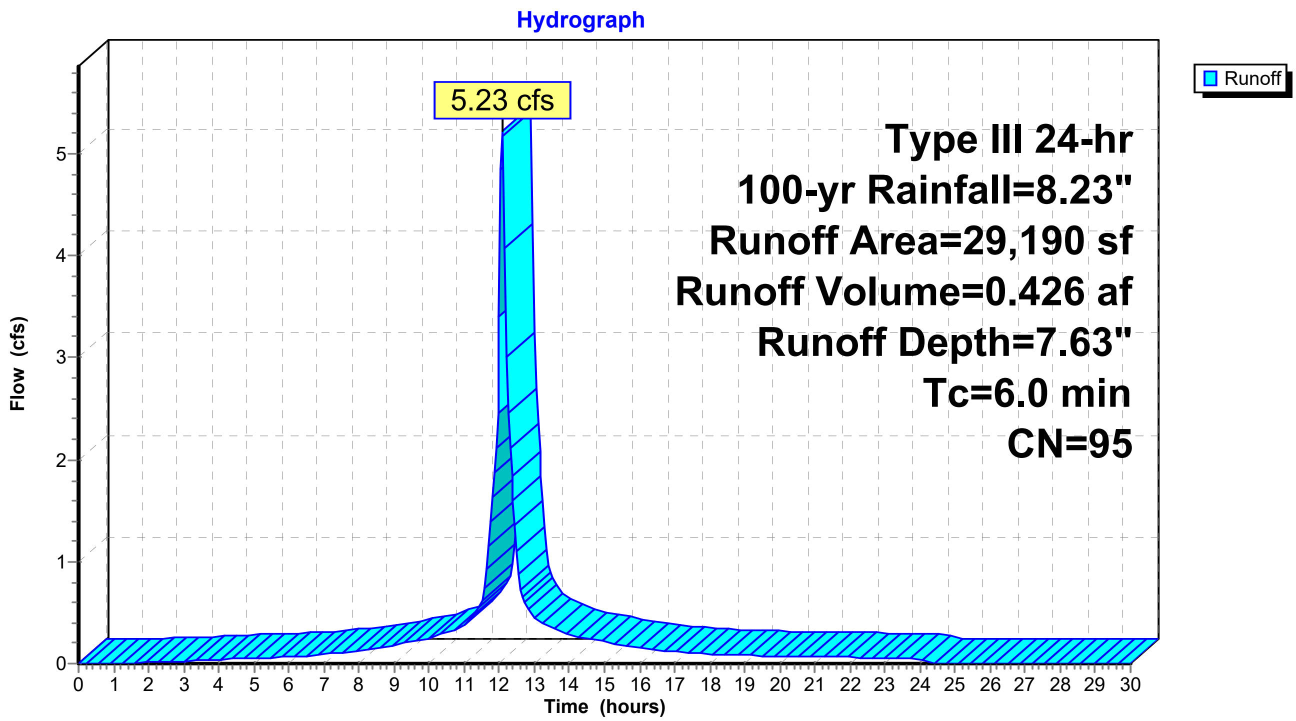
Runoff = 5.23 cfs @ 12.09 hrs, Volume= 0.426 af, Depth= 7.63"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
5,233	80	>75% Grass cover, Good, HSG D
23,957	98	Paved parking, HSG D
29,190	95	Weighted Average
5,233		17.93% Pervious Area
23,957		82.07% Impervious Area

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

Subcatchment PW2B: LOADING



Summary for Subcatchment PW2C: BACK

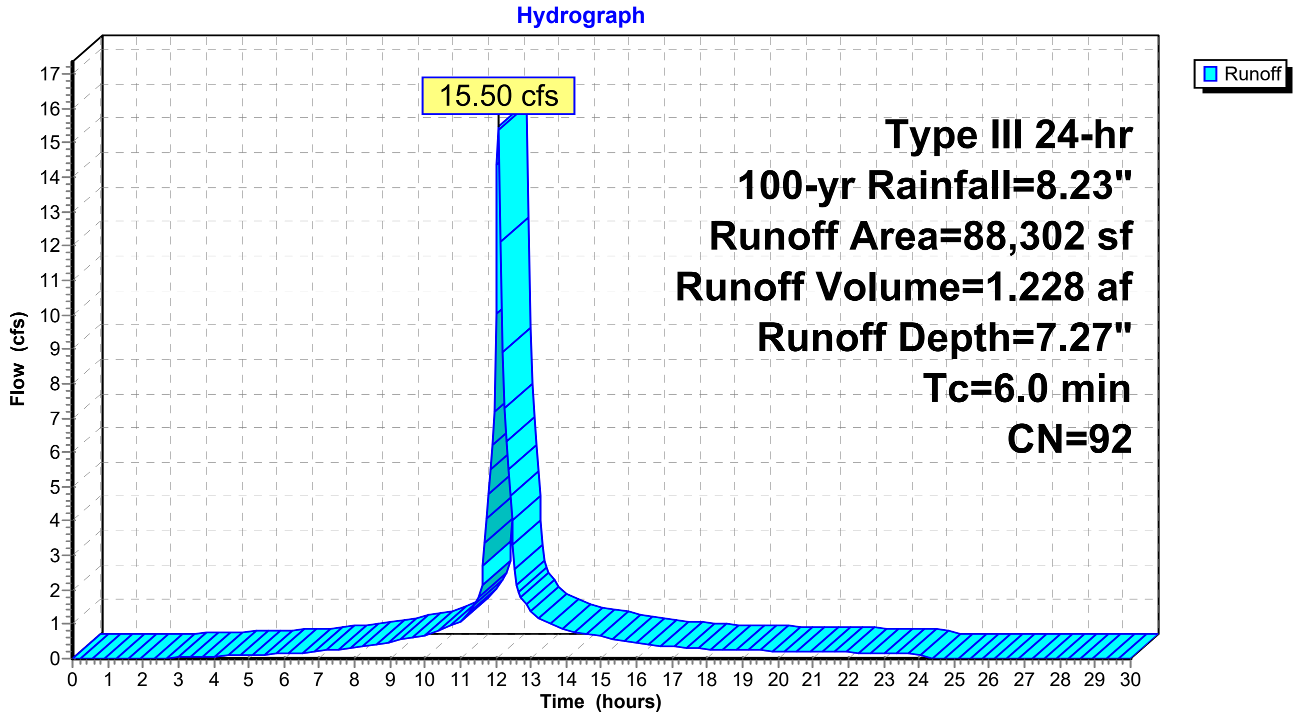
Runoff = 15.50 cfs @ 12.09 hrs, Volume= 1.228 af, Depth= 7.27"
Routed to Pond 2C : WET 2C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.23"

Area (sf)	CN	Description
31,111	80	>75% Grass cover, Good, HSG D
57,191	98	Paved parking, HSG D
88,302	92	Weighted Average
31,111		35.23% Pervious Area
57,191		64.77% Impervious Area

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

Subcatchment PW2C: BACK



Summary for Pond 1A-1: INFIL 1A-1

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 7.39" for 100-yr event
Inflow = 18.91 cfs @ 12.09 hrs, Volume= 1.511 af
Outflow = 18.23 cfs @ 12.11 hrs, Volume= 1.511 af, Atten= 4%, Lag= 1.4 min
Discarded = 0.58 cfs @ 12.11 hrs, Volume= 0.820 af
Primary = 17.65 cfs @ 12.11 hrs, Volume= 0.691 af
Routed to Pond 1A-2 : INFIL 1A-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 476.98' @ 12.11 hrs Surf.Area= 5,008 sf Storage= 12,171 cf

Plug-Flow detention time= 104.6 min calculated for 1.509 af (100% of inflow)
Center-of-Mass det. time= 104.7 min (869.4 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1	474.00'	17,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

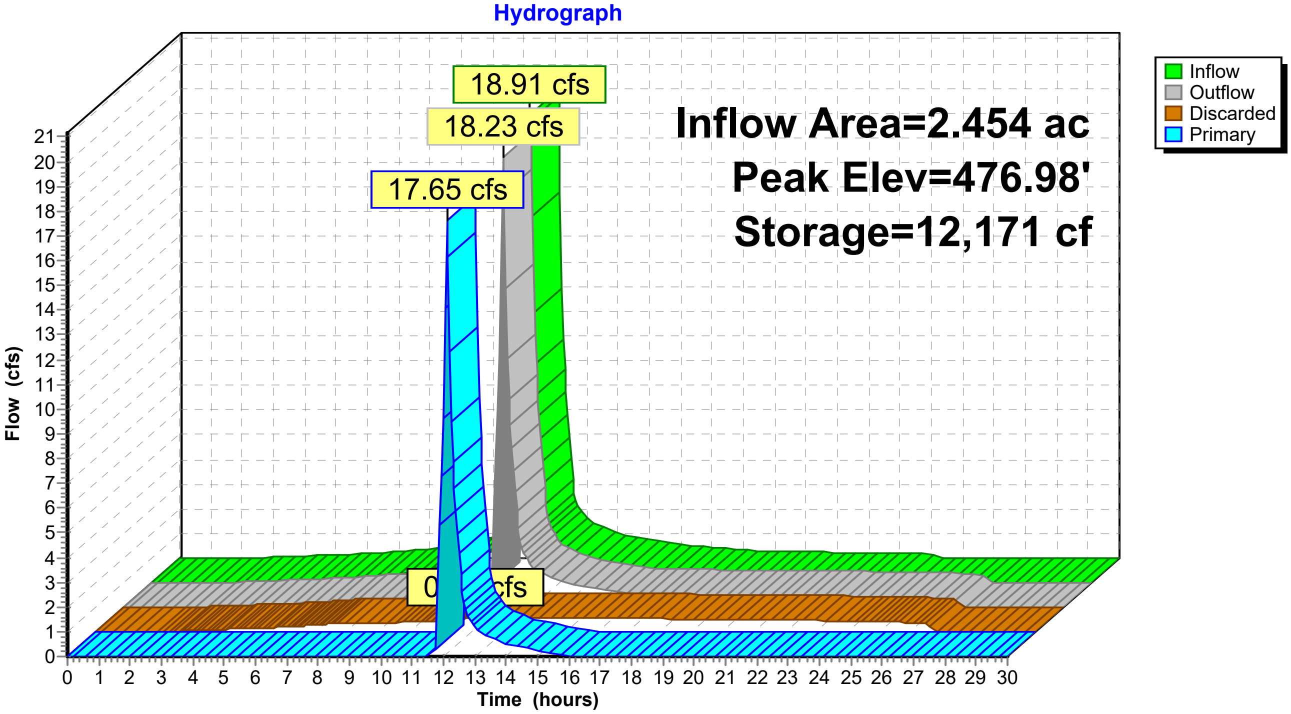
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
474.00	3,150	0	0
478.00	5,640	17,580	17,580

Device	Routing	Invert	Outlet Devices
#1	Discarded	474.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	476.50'	**20.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.58 cfs @ 12.11 hrs HW=476.98' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=17.24 cfs @ 12.11 hrs HW=476.98' TW=470.01' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 17.24 cfs @ 1.81 fps)

Pond 1A-1: INFIL 1A-1



Stage-Area-Storage for Pond 1A-1: INFIL 1A-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
474.00	3,150	0	476.65	4,800	10,533
474.05	3,181	158	476.70	4,831	10,774
474.10	3,212	318	476.75	4,862	11,016
474.15	3,243	480	476.80	4,893	11,260
474.20	3,274	642	476.85	4,924	11,506
474.25	3,306	807	476.90	4,955	11,753
474.30	3,337	973	476.95	4,986	12,001
474.35	3,368	1,141	477.00	5,018	12,251
474.40	3,399	1,310	477.05	5,049	12,503
474.45	3,430	1,481	477.10	5,080	12,756
474.50	3,461	1,653	477.15	5,111	13,011
474.55	3,492	1,827	477.20	5,142	13,267
474.60	3,524	2,002	477.25	5,173	13,525
474.65	3,555	2,179	477.30	5,204	13,785
474.70	3,586	2,358	477.35	5,235	14,046
474.75	3,617	2,538	477.40	5,266	14,308
474.80	3,648	2,719	477.45	5,298	14,572
474.85	3,679	2,902	477.50	5,329	14,838
474.90	3,710	3,087	477.55	5,360	15,105
474.95	3,741	3,273	477.60	5,391	15,374
475.00	3,773	3,461	477.65	5,422	15,644
475.05	3,804	3,651	477.70	5,453	15,916
475.10	3,835	3,842	477.75	5,484	16,189
475.15	3,866	4,034	477.80	5,516	16,464
475.20	3,897	4,228	477.85	5,547	16,741
475.25	3,928	4,424	477.90	5,578	17,019
475.30	3,959	4,621	477.95	5,609	17,299
475.35	3,990	4,820	478.00	**5,640**	**17,580**
475.40	4,021	5,020			
475.45	4,053	5,222			
475.50	4,084	5,425			
475.55	4,115	5,630			
475.60	4,146	5,837			
475.65	4,177	6,045			
475.70	4,208	6,255			
475.75	4,239	6,466			
475.80	4,271	6,678			
475.85	4,302	6,893			
475.90	4,333	7,109			
475.95	4,364	7,326			
476.00	4,395	7,545			
476.05	4,426	7,766			
476.10	4,457	7,988			
476.15	4,488	8,211			
476.20	4,519	8,436			
476.25	4,551	8,663			
476.30	4,582	8,892			
476.35	4,613	9,121			
476.40	4,644	9,353			
476.45	4,675	9,586			
476.50	4,706	9,820			
476.55	4,737	10,056			
476.60	4,769	10,294			

Summary for Pond 1A-2: INFIL 1A-2

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 3.38" for 100-yr event
Inflow = 17.65 cfs @ 12.11 hrs, Volume= 0.691 af
Outflow = 18.05 cfs @ 12.11 hrs, Volume= 0.691 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.17 cfs @ 12.12 hrs, Volume= 0.089 af
Primary = 17.88 cfs @ 12.11 hrs, Volume= 0.603 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 470.02' @ 12.12 hrs Surf.Area= 1,430 sf Storage= 2,378 cf

Plug-Flow detention time= 19.4 min calculated for 0.690 af (100% of inflow)
Center-of-Mass det. time= 19.7 min (769.7 - 750.0)

Volume	Invert	Avail.Storage	Storage Description
#1	468.00'	3,903 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

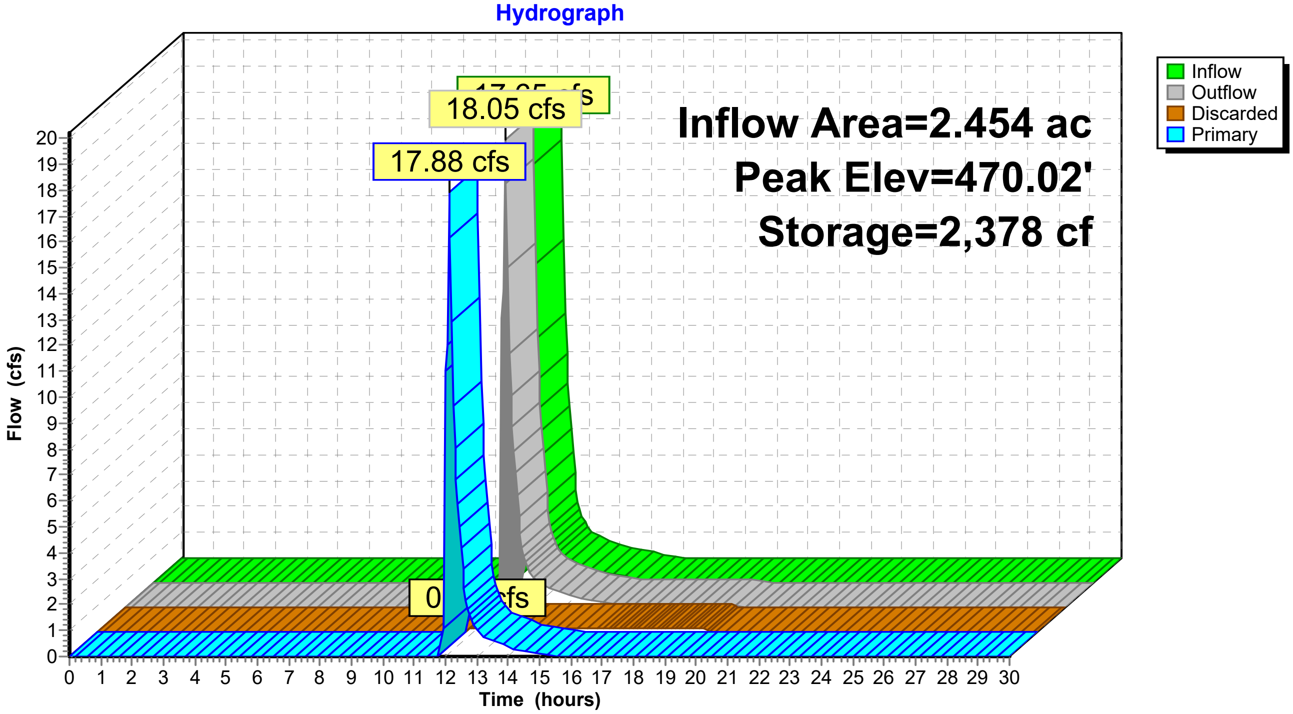
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
468.00	928	0	0
471.00	1,674	3,903	3,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	468.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Device 3	469.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	466.50'	**24.0" Round Culvert** L= 68.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 466.50' / 464.00' S= 0.0368 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=0.17 cfs @ 12.12 hrs HW=470.00' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=17.15 cfs @ 12.11 hrs HW=470.00' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 17.15 cfs of 23.93 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 17.15 cfs @ 2.13 fps)

Pond 1A-2: INFIL 1A-2



Stage-Area-Storage for Pond 1A-2: INFIL 1A-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
468.00	928	0	470.65	1,587	3,332
468.05	940	47	470.70	1,599	3,412
468.10	953	94	470.75	1,612	3,492
468.15	965	142	470.80	1,624	3,573
468.20	978	191	470.85	1,637	3,655
468.25	990	240	470.90	1,649	3,737
468.30	1,003	290	470.95	1,662	3,820
468.35	1,015	340	471.00	**1,674**	**3,903**
468.40	1,027	391			
468.45	1,040	443			
468.50	1,052	495			
468.55	1,065	548			
468.60	1,077	602			
468.65	1,090	656			
468.70	1,102	711			
468.75	1,115	766			
468.80	1,127	822			
468.85	1,139	879			
468.90	1,152	936			
468.95	1,164	994			
469.00	1,177	1,052			
469.05	1,189	1,111			
469.10	1,202	1,171			
469.15	1,214	1,232			
469.20	1,226	1,293			
469.25	1,239	1,354			
469.30	1,251	1,417			
469.35	1,264	1,479			
469.40	1,276	1,543			
469.45	1,289	1,607			
469.50	1,301	1,672			
469.55	1,313	1,737			
469.60	1,326	1,803			
469.65	1,338	1,870			
469.70	1,351	1,937			
469.75	1,363	2,005			
469.80	1,376	2,073			
469.85	1,388	2,142			
469.90	1,400	2,212			
469.95	1,413	2,282			
470.00	1,425	2,353			
470.05	1,438	2,425			
470.10	1,450	2,497			
470.15	1,463	2,570			
470.20	1,475	2,643			
470.25	1,488	2,717			
470.30	1,500	2,792			
470.35	1,512	2,867			
470.40	1,525	2,943			
470.45	1,537	3,020			
470.50	1,550	3,097			
470.55	1,562	3,175			
470.60	1,575	3,253			

Summary for Pond 1BE: INFIL 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 6.35" for 100-yr event
Inflow = 91.79 cfs @ 12.13 hrs, Volume= 8.392 af
Outflow = 51.05 cfs @ 12.29 hrs, Volume= 8.395 af, Atten= 44%, Lag= 9.4 min
Discarded = 6.01 cfs @ 12.29 hrs, Volume= 5.946 af
Primary = 45.04 cfs @ 12.29 hrs, Volume= 2.448 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 458.90' @ 12.29 hrs Surf.Area= 25,983 sf Storage= 85,189 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 71.6 min (833.1 - 761.4)

Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	115,118 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

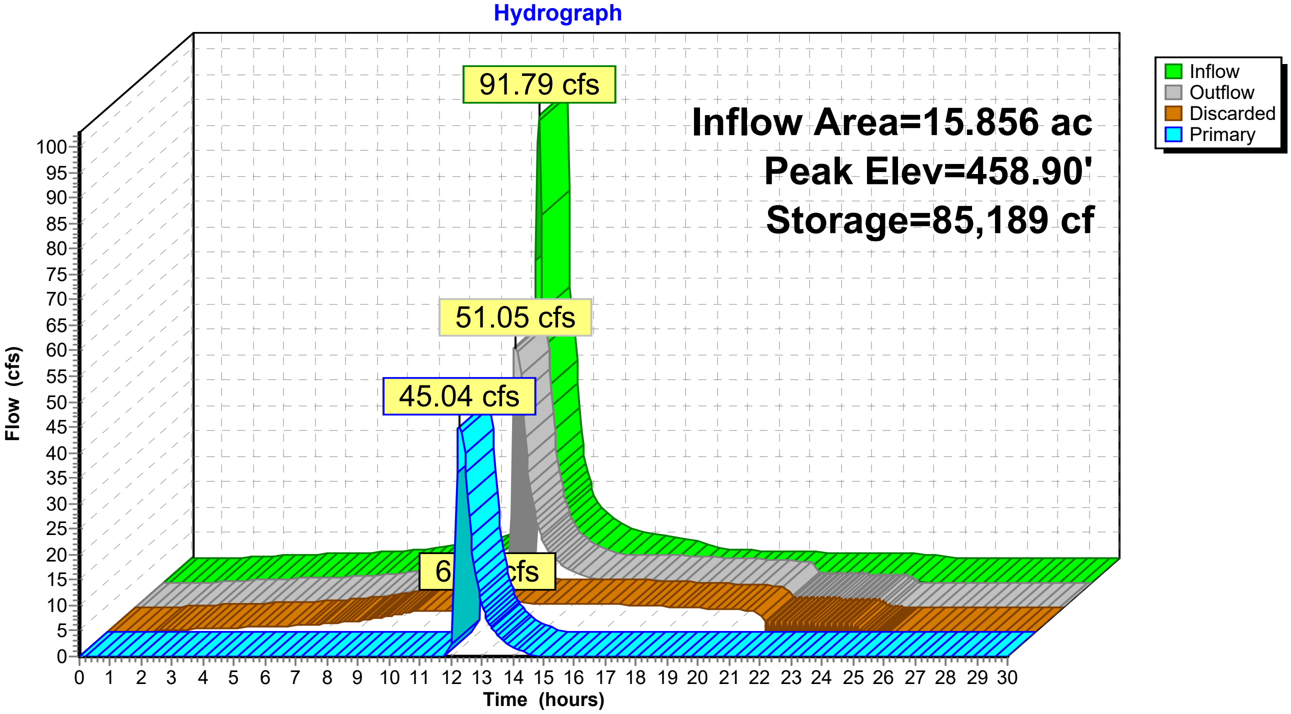
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
455.00	17,730	0	0
460.00	28,317	115,118	115,118

Device	Routing	Invert	Outlet Devices
#1	Primary	458.00'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	455.00'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=6.01 cfs @ 12.29 hrs HW=458.90' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 6.01 cfs)

Primary OutFlow Max=44.97 cfs @ 12.29 hrs HW=458.90' TW=0.00' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 44.97 cfs @ 3.13 fps)

Pond 1BE: INFIL 1BE



Stage-Area-Storage for Pond 1BE: INFIL 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
455.00	17,730	0	457.65	23,341	54,419
455.05	17,836	889	457.70	23,447	55,589
455.10	17,942	1,784	457.75	23,553	56,764
455.15	18,048	2,683	457.80	23,659	57,944
455.20	18,153	3,588	457.85	23,765	59,130
455.25	18,259	4,499	457.90	23,870	60,321
455.30	18,365	5,414	457.95	23,976	61,517
455.35	18,471	6,335	458.00	24,082	62,718
455.40	18,577	7,261	458.05	24,188	63,925
455.45	18,683	8,193	458.10	24,294	65,137
455.50	18,789	9,130	458.15	24,400	66,354
455.55	18,895	10,072	458.20	24,506	67,577
455.60	19,000	11,019	458.25	24,612	68,805
455.65	19,106	11,972	458.30	24,717	70,038
455.70	19,212	12,930	458.35	24,823	71,277
455.75	19,318	13,893	458.40	24,929	72,521
455.80	19,424	14,862	458.45	25,035	73,770
455.85	19,530	15,835	458.50	25,141	75,024
455.90	19,636	16,815	458.55	25,247	76,284
455.95	19,742	17,799	458.60	25,353	77,549
456.00	19,847	18,789	458.65	25,459	78,819
456.05	19,953	19,784	458.70	25,564	80,095
456.10	20,059	20,784	458.75	25,670	81,375
456.15	20,165	21,790	458.80	25,776	82,662
456.20	20,271	22,801	458.85	25,882	83,953
456.25	20,377	23,817	458.90	25,988	85,250
456.30	20,483	24,838	458.95	26,094	86,552
456.35	20,588	25,865	459.00	26,200	87,859
456.40	20,694	26,897	459.05	26,305	89,172
456.45	20,800	27,934	459.10	26,411	90,490
456.50	20,906	28,977	459.15	26,517	91,813
456.55	21,012	30,025	459.20	26,623	93,141
456.60	21,118	31,078	459.25	26,729	94,475
456.65	21,224	32,137	459.30	26,835	95,814
456.70	21,330	33,201	459.35	26,941	97,159
456.75	21,435	34,270	459.40	27,047	98,508
456.80	21,541	35,344	459.45	27,152	99,863
456.85	21,647	36,424	459.50	27,258	101,224
456.90	21,753	37,509	459.55	27,364	102,589
456.95	21,859	38,599	459.60	27,470	103,960
457.00	21,965	39,695	459.65	27,576	105,336
457.05	22,071	40,796	459.70	27,682	106,718
457.10	22,177	41,902	459.75	27,788	108,104
457.15	22,282	43,013	459.80	27,894	109,496
457.20	22,388	44,130	459.85	27,999	110,894
457.25	22,494	45,252	459.90	28,105	112,296
457.30	22,600	46,380	459.95	28,211	113,704
457.35	22,706	47,512	460.00	**28,317**	**115,118**
457.40	22,812	48,650			
457.45	22,918	49,793			
457.50	23,024	50,942			
457.55	23,129	52,096			
457.60	23,235	53,255			

Summary for Pond 1D: WET 1D

Inflow Area = 2.943 ac, 77.76% Impervious, Inflow Depth = 7.51" for 100-yr event
Inflow = 22.83 cfs @ 12.09 hrs, Volume= 1.842 af
Outflow = 18.43 cfs @ 12.15 hrs, Volume= 1.581 af, Atten= 19%, Lag= 3.9 min
Primary = 18.43 cfs @ 12.15 hrs, Volume= 1.581 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.50' Surf.Area= 14,310 sf Storage= 13,422 cf
Peak Elev= 452.99' @ 12.15 hrs Surf.Area= 16,954 sf Storage= 36,712 cf (23,290 cf above start)

Plug-Flow detention time= 246.3 min calculated for 1.271 af (69% of inflow)
Center-of-Mass det. time= 92.3 min (853.0 - 760.7)

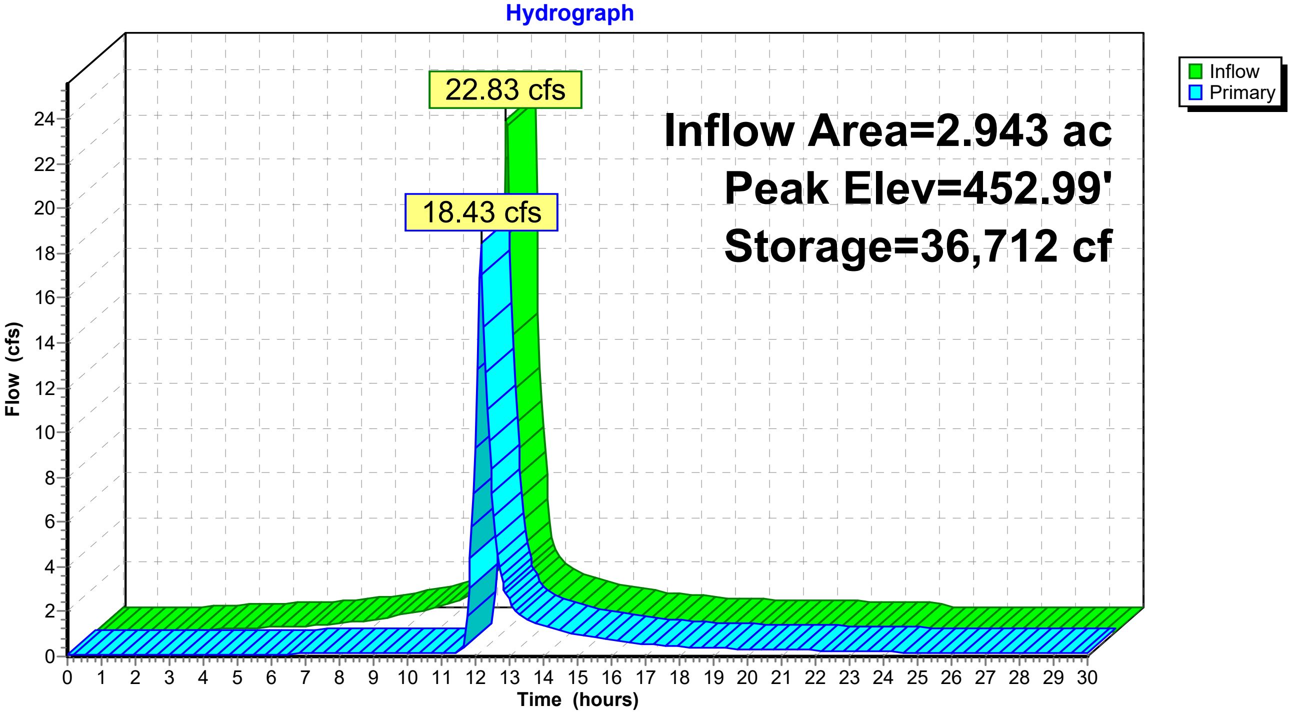
Volume	Invert	Avail.Storage	Storage Description
#1	450.50'	54,744 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.50	12,535	0	0
454.00	18,747	54,744	54,744

Device	Routing	Invert	Outlet Devices
#1	Primary	452.50'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#2	Primary	451.10'	**6.0" Round Culvert** L= 20.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.10' / 450.00' S= 0.0550 '/' Cc= 0.900 n= 0.120, Flow Area= 0.20 sf

Primary OutFlow Max=18.38 cfs @ 12.15 hrs HW=452.99' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 18.17 cfs @ 1.86 fps)
2=Culvert (Barrel Controls 0.21 cfs @ 1.08 fps)

Pond 1D: WET 1D



Stage-Area-Storage for Pond 1D: WET 1D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.50	12,535	0
450.55	12,624	629
450.60	12,712	1,262
450.65	12,801	1,900
450.70	12,890	2,542
450.75	12,979	3,189
450.80	13,067	3,840
450.85	13,156	4,496
450.90	13,245	5,156
450.95	13,334	5,820
451.00	13,422	6,489
451.05	13,511	7,163
451.10	13,600	7,840
451.15	13,689	8,523
451.20	13,777	9,209
451.25	13,866	9,900
451.30	13,955	10,596
451.35	14,044	11,296
451.40	14,132	12,000
451.45	14,221	12,709
451.50	14,310	13,422
451.55	14,399	14,140
451.60	14,487	14,862
451.65	14,576	15,589
451.70	14,665	16,320
451.75	14,754	17,055
451.80	14,842	17,795
451.85	14,931	18,540
451.90	15,020	19,288
451.95	15,109	20,042
452.00	15,197	20,799
452.05	15,286	21,561
452.10	15,375	22,328
452.15	15,464	23,099
452.20	15,552	23,874
452.25	15,641	24,654
452.30	15,730	25,438
452.35	15,818	26,227
452.40	15,907	27,020
452.45	15,996	27,818
452.50	16,085	28,620
452.55	16,173	29,426
452.60	16,262	30,237
452.65	16,351	31,052
452.70	16,440	31,872
452.75	16,528	32,696
452.80	16,617	33,525
452.85	16,706	34,358
452.90	16,795	35,196
452.95	16,883	36,038
453.00	16,972	36,884
453.05	17,061	37,735
453.10	17,150	38,590
453.15	17,238	39,450
453.20	17,327	40,314
453.25	17,416	41,182
453.30	17,505	42,055
453.35	17,593	42,933
453.40	17,682	43,815
453.45	17,771	44,701
453.50	17,860	45,592
453.55	17,948	46,487
453.60	18,037	47,387
453.65	18,126	48,291
453.70	18,215	49,199
453.75	18,303	50,112
453.80	18,392	51,030
453.85	18,481	51,951
453.90	18,570	52,878
453.95	18,658	53,808
454.00	**18,747**	**54,744**

Summary for Pond 1E: INFIL 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 7.27" for 100-yr event
Inflow = 27.31 cfs @ 12.10 hrs, Volume= 2.836 af
Outflow = 22.59 cfs @ 12.17 hrs, Volume= 2.836 af, Atten= 17%, Lag= 4.3 min
Discarded = 1.14 cfs @ 12.17 hrs, Volume= 1.754 af
Primary = 21.45 cfs @ 12.17 hrs, Volume= 1.082 af
Routed to Pond 4P : FB 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 462.54' @ 12.17 hrs Surf.Area= 12,272 sf Storage= 26,492 cf

Plug-Flow detention time= 127.8 min calculated for 2.832 af (100% of inflow)
Center-of-Mass det. time= 127.9 min (931.9 - 804.0)

Volume	Invert	Avail.Storage	Storage Description
#1	460.00'	61,063 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

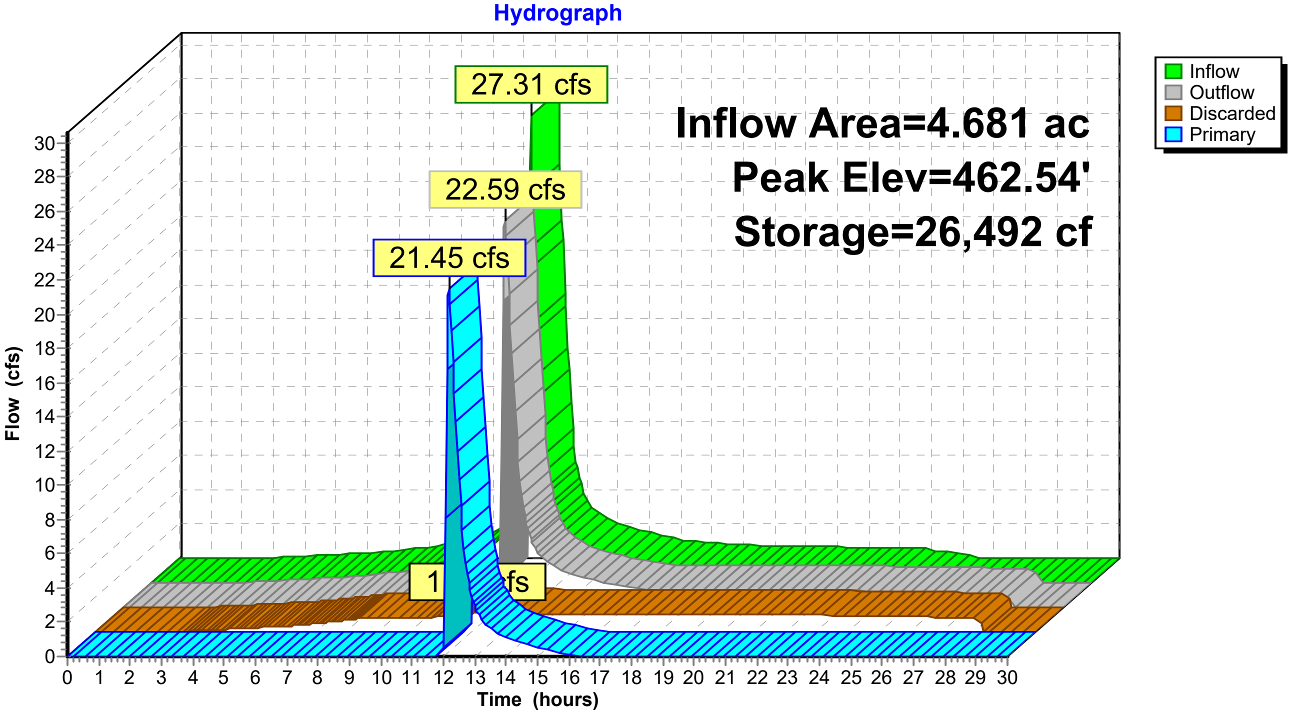
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
460.00	8,583	0	0
465.00	15,842	61,063	61,063

Device	Routing	Invert	Outlet Devices
#1	Discarded	460.00'	**4.000 in/hr EXFIL over Surface area**
#2	Primary	462.00'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.13 cfs @ 12.17 hrs HW=462.53' (Free Discharge)
└─**1=EXFIL** (Exfiltration Controls 1.13 cfs)

Primary OutFlow Max=20.88 cfs @ 12.17 hrs HW=462.53' TW=458.98' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 20.88 cfs @ 1.97 fps)

Pond 1E: INFIL 1E



Stage-Area-Storage for Pond 1E: INFIL 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
460.00	8,583	0	462.65	12,430	27,843
460.05	8,656	431	462.70	12,503	28,466
460.10	8,728	866	462.75	12,575	29,093
460.15	8,801	1,304	462.80	12,648	29,723
460.20	8,873	1,746	462.85	12,721	30,358
460.25	8,946	2,191	462.90	12,793	30,996
460.30	9,019	2,640	462.95	12,866	31,637
460.35	9,091	3,093	463.00	12,938	32,282
460.40	9,164	3,549	463.05	13,011	32,931
460.45	9,236	4,009	463.10	13,084	33,583
460.50	9,309	4,473	463.15	13,156	34,239
460.55	9,381	4,940	463.20	13,229	34,899
460.60	9,454	5,411	463.25	13,301	35,562
460.65	9,527	5,886	463.30	13,374	36,229
460.70	9,599	6,364	463.35	13,447	36,899
460.75	9,672	6,846	463.40	13,519	37,574
460.80	9,744	7,331	463.45	13,592	38,251
460.85	9,817	7,820	463.50	13,664	38,933
460.90	9,890	8,313	463.55	13,737	39,618
460.95	9,962	8,809	463.60	13,809	40,306
461.00	10,035	9,309	463.65	13,882	40,999
461.05	10,107	9,812	463.70	13,955	41,695
461.10	10,180	10,320	463.75	14,027	42,394
461.15	10,253	10,830	463.80	14,100	43,097
461.20	10,325	11,345	463.85	14,172	43,804
461.25	10,398	11,863	463.90	14,245	44,515
461.30	10,470	12,385	463.95	14,318	45,229
461.35	10,543	12,910	464.00	14,390	45,946
461.40	10,616	13,439	464.05	14,463	46,668
461.45	10,688	13,972	464.10	14,535	47,393
461.50	10,761	14,508	464.15	14,608	48,121
461.55	10,833	15,048	464.20	14,681	48,853
461.60	10,906	15,591	464.25	14,753	49,589
461.65	10,978	16,138	464.30	14,826	50,329
461.70	11,051	16,689	464.35	14,898	51,072
461.75	11,124	17,243	464.40	14,971	51,819
461.80	11,196	17,801	464.45	15,044	52,569
461.85	11,269	18,363	464.50	15,116	53,323
461.90	11,341	18,928	464.55	15,189	54,081
461.95	11,414	19,497	464.60	15,261	54,842
462.00	11,487	20,070	464.65	15,334	55,607
462.05	11,559	20,646	464.70	15,406	56,375
462.10	11,632	21,226	464.75	15,479	57,147
462.15	11,704	21,809	464.80	15,552	57,923
462.20	11,777	22,396	464.85	15,624	58,703
462.25	11,850	22,987	464.90	15,697	59,486
462.30	11,922	23,581	464.95	15,769	60,272
462.35	11,995	24,179	465.00	**15,842**	**61,063**
462.40	12,067	24,780			
462.45	12,140	25,386			
462.50	12,213	25,994			
462.55	12,285	26,607			
462.60	12,358	27,223			

Summary for Pond 2C: WET 2C

Inflow Area = 4.100 ac, 76.37% Impervious, Inflow Depth = 7.49" for 100-yr event
Inflow = 31.72 cfs @ 12.09 hrs, Volume= 2.560 af
Outflow = 16.00 cfs @ 12.24 hrs, Volume= 2.544 af, Atten= 50%, Lag= 8.9 min
Primary = 16.00 cfs @ 12.24 hrs, Volume= 2.544 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.30' Surf.Area= 7,226 sf Storage= 8,306 cf
Peak Elev= 453.79' @ 12.24 hrs Surf.Area= 10,350 sf Storage= 30,226 cf (21,919 cf above start)

Plug-Flow detention time= 141.0 min calculated for 2.349 af (92% of inflow)
Center-of-Mass det. time= 72.2 min (832.7 - 760.5)

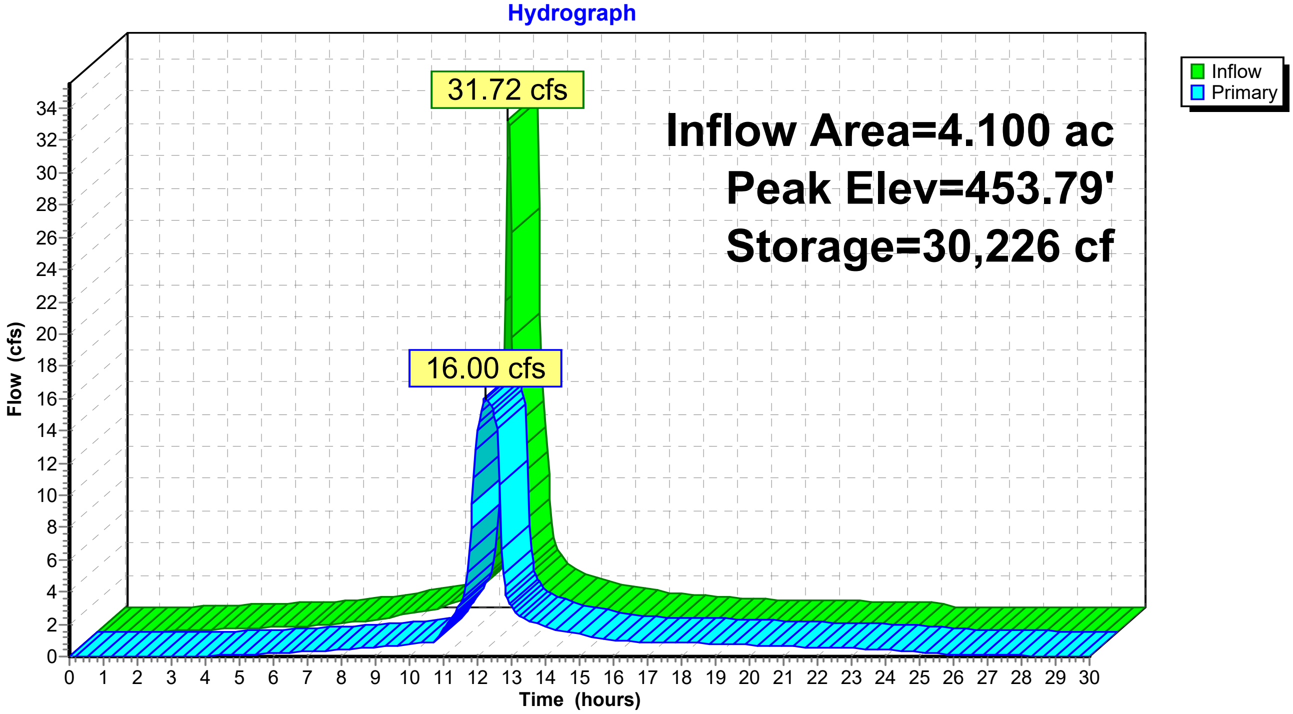
Volume	Invert	Avail.Storage	Storage Description
#1	450.00'	43,659 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.00	5,553	0	0
453.00	9,414	22,451	22,451
455.00	11,794	21,208	43,659

Device	Routing	Invert	Outlet Devices
#1	Device 3	452.50'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Device 3	451.30'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	449.50'	**18.0" Round Culvert** L= 25.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 449.50' / 449.25' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=15.99 cfs @ 12.24 hrs HW=453.78' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Inlet Controls 15.99 cfs @ 9.05 fps)
  ├─**1=Broad-Crested Rectangular Weir** (Passes < 77.28 cfs potential flow)
  └─**2=Orifice/Grate** (Passes < 1.41 cfs potential flow)

Pond 2C: WET 2C



Stage-Area-Storage for Pond 2C: WET 2C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.00	5,553	0	452.65	8,964	19,234
450.05	5,617	279	452.70	9,028	19,684
450.10	5,682	562	452.75	9,092	20,137
450.15	5,746	847	452.80	9,157	20,593
450.20	5,810	1,136	452.85	9,221	21,053
450.25	5,875	1,428	452.90	9,285	21,516
450.30	5,939	1,724	452.95	9,350	21,981
450.35	6,003	2,022	453.00	9,414	22,451
450.40	6,068	2,324	453.05	9,474	22,923
450.45	6,132	2,629	453.10	9,533	23,398
450.50	6,197	2,937	453.15	9,592	23,876
450.55	6,261	3,249	453.20	9,652	24,357
450.60	6,325	3,563	453.25	9,712	24,841
450.65	6,390	3,881	453.30	9,771	25,328
450.70	6,454	4,202	453.35	9,831	25,818
450.75	6,518	4,527	453.40	9,890	26,311
450.80	6,583	4,854	453.45	9,949	26,807
450.85	6,647	5,185	453.50	10,009	27,306
450.90	6,711	5,519	453.55	10,069	27,808
450.95	6,776	5,856	453.60	10,128	28,313
451.00	6,840	6,197	453.65	10,187	28,821
451.05	6,904	6,540	453.70	10,247	29,332
451.10	6,969	6,887	453.75	10,307	29,846
451.15	7,033	7,237	453.80	10,366	30,363
451.20	7,097	7,590	453.85	10,426	30,882
451.25	7,162	7,947	453.90	10,485	31,405
451.30	7,226	8,306	453.95	10,544	31,931
451.35	7,290	8,669	454.00	10,604	32,460
451.40	7,355	9,035	454.05	10,664	32,991
451.45	7,419	9,405	454.10	10,723	33,526
451.50	7,484	9,777	454.15	10,782	34,063
451.55	7,548	10,153	454.20	10,842	34,604
451.60	7,612	10,532	454.25	10,902	35,148
451.65	7,677	10,914	454.30	10,961	35,694
451.70	7,741	11,300	454.35	11,021	36,244
451.75	7,805	11,688	454.40	11,080	36,796
451.80	7,870	12,080	454.45	11,139	37,352
451.85	7,934	12,475	454.50	11,199	37,910
451.90	7,998	12,874	454.55	11,259	38,472
451.95	8,063	13,275	454.60	11,318	39,036
452.00	8,127	13,680	454.65	11,377	39,603
452.05	8,191	14,088	454.70	11,437	40,174
452.10	8,256	14,499	454.75	11,497	40,747
452.15	8,320	14,914	454.80	11,556	41,324
452.20	8,384	15,331	454.85	11,616	41,903
452.25	8,449	15,752	454.90	11,675	42,485
452.30	8,513	16,176	454.95	11,734	43,070
452.35	8,577	16,603	455.00	**11,794**	**43,659**
452.40	8,642	17,034			
452.45	8,706	17,467			
452.50	8,771	17,904			
452.55	8,835	18,345			
452.60	8,899	18,788			

Summary for Pond 3P: FB 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 7.27" for 100-yr event
Inflow = 35.80 cfs @ 12.09 hrs, Volume= 2.836 af
Outflow = 27.31 cfs @ 12.10 hrs, Volume= 2.836 af, Atten= 24%, Lag= 0.7 min
Primary = 27.31 cfs @ 12.10 hrs, Volume= 2.836 af
Routed to Pond 1E : INFIL 1E

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 6,027 sf Storage= 16,913 cf
Peak Elev= 462.55' @ 12.22 hrs Surf.Area= 8,169 sf Storage= 27,942 cf (11,029 cf above start)

Plug-Flow detention time= 142.6 min calculated for 2.444 af (86% of inflow)
Center-of-Mass det. time= 35.7 min (804.0 - 768.3)

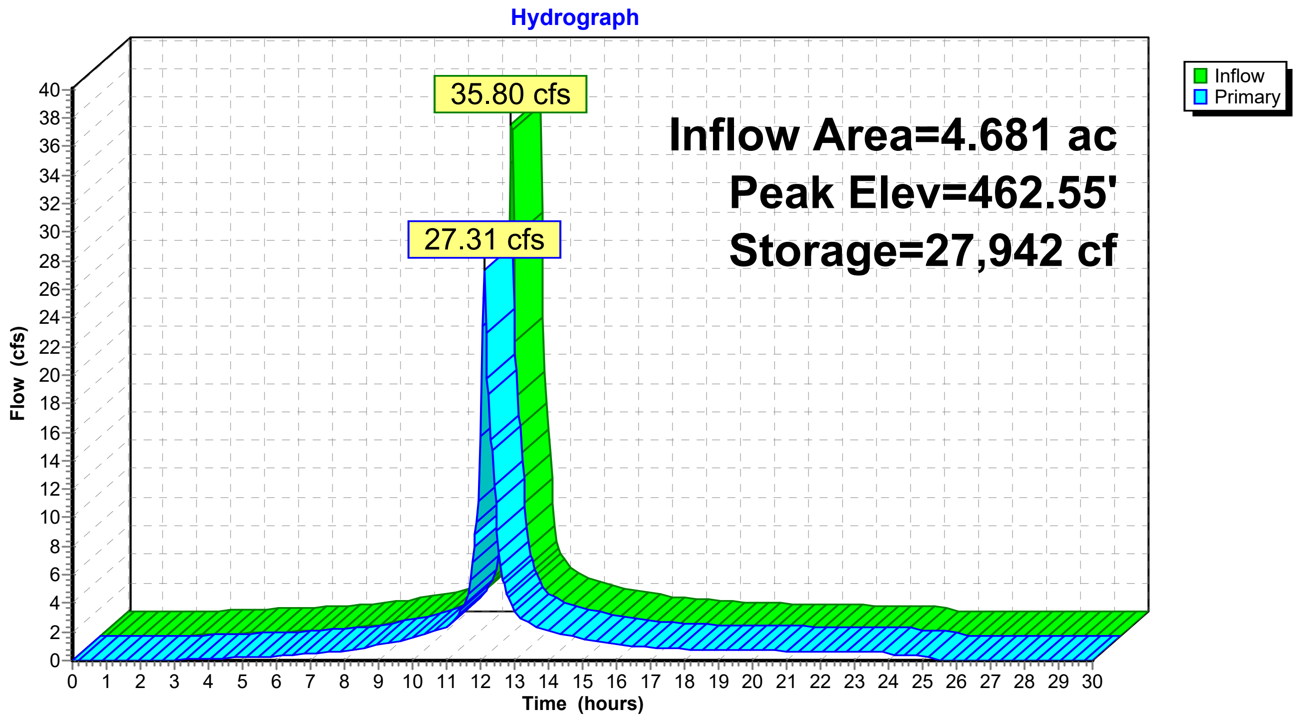
Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	52,051 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
456.00	1,140	0	0
460.00	4,648	11,576	11,576
465.00	11,542	40,475	52,051

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 12.10 hrs HW=462.33' TW=462.45' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: FB 1E


Hydrograph
35.80 cfs
27.31 cfs
Inflow Area=4.681 ac
Peak Elev=462.55'
Storage=27,942 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Stage-Area-Storage for Pond 3P: FB 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
456.00	1,140	0	461.30	6,440	18,783
456.10	1,228	118	461.40	6,578	19,434
456.20	1,315	246	461.50	6,716	20,099
456.30	1,403	381	461.60	6,854	20,778
456.40	1,491	526	461.70	6,992	21,470
456.50	1,579	680	461.80	7,130	22,176
456.60	1,666	842	461.90	7,268	22,896
456.70	1,754	1,013	462.00	7,406	23,630
456.80	1,842	1,193	462.10	7,543	24,377
456.90	1,929	1,381	462.20	7,681	25,138
457.00	2,017	1,579	462.30	7,819	25,913
457.10	2,105	1,785	462.40	7,957	26,702
457.20	2,192	1,999	462.50	8,095	27,505
457.30	2,280	2,223	462.60	8,233	28,321
457.40	2,368	2,455	462.70	8,371	29,151
457.50	2,456	2,697	462.80	8,509	29,995
457.60	2,543	2,947	462.90	8,647	30,853
457.70	2,631	3,205	463.00	8,784	31,725
457.80	2,719	3,473	463.10	8,922	32,610
457.90	2,806	3,749	463.20	9,060	33,509
458.00	2,894	4,034	463.30	9,198	34,422
458.10	2,982	4,328	463.40	9,336	35,349
458.20	3,069	4,630	463.50	9,474	36,289
458.30	3,157	4,942	463.60	9,612	37,243
458.40	3,245	5,262	463.70	9,750	38,211
458.50	3,333	5,591	463.80	9,887	39,193
458.60	3,420	5,928	463.90	10,025	40,189
458.70	3,508	6,275	464.00	10,163	41,198
458.80	3,596	6,630	464.10	10,301	42,222
458.90	3,683	6,994	464.20	10,439	43,259
459.00	3,771	7,367	464.30	10,577	44,309
459.10	3,859	7,748	464.40	10,715	45,374
459.20	3,946	8,138	464.50	10,853	46,452
459.30	4,034	8,537	464.60	10,990	47,545
459.40	4,122	8,945	464.70	11,128	48,650
459.50	4,210	9,362	464.80	11,266	49,770
459.60	4,297	9,787	464.90	11,404	50,904
459.70	4,385	10,221	465.00	**11,542**	**52,051**
459.80	4,473	10,664			
459.90	4,560	11,116			
460.00	4,648	11,576			
460.10	4,786	12,048			
460.20	4,924	12,533			
460.30	5,062	13,032			
460.40	5,200	13,546			
460.50	5,337	14,072			
460.60	5,475	14,613			
460.70	5,613	15,167			
460.80	5,751	15,736			
460.90	5,889	16,318			
461.00	6,027	16,913			
461.10	6,165	17,523			
461.20	6,303	18,146			

Summary for Pond 4P: FB 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 6.35" for 100-yr event
Inflow = 103.76 cfs @ 12.10 hrs, Volume= 8.392 af
Outflow = 91.79 cfs @ 12.13 hrs, Volume= 8.392 af, Atten= 12%, Lag= 2.1 min
Primary = 91.79 cfs @ 12.13 hrs, Volume= 8.392 af
Routed to Pond 1BE : INFIL 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 457.50' Surf.Area= 14,084 sf Storage= 43,509 cf
Peak Elev= 459.06' @ 12.33 hrs Surf.Area= 15,560 sf Storage= 66,658 cf (23,149 cf above start)

Plug-Flow detention time= 108.2 min calculated for 7.381 af (88% of inflow)
Center-of-Mass det. time= 12.1 min (761.4 - 749.3)

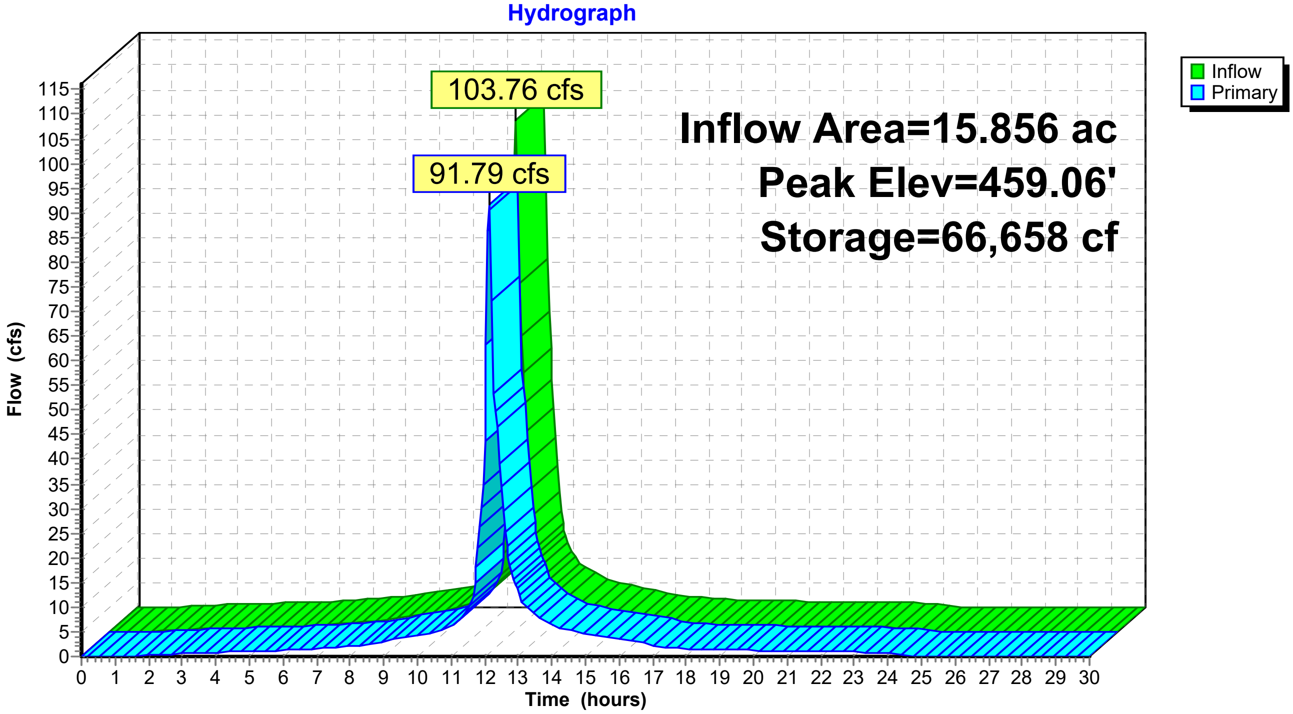
Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	81,672 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
454.00	10,778	0	0
460.00	16,446	81,672	81,672

Device	Routing	Invert	Outlet Devices
#1	Primary	457.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=77.48 cfs @ 12.13 hrs HW=458.95' TW=458.24' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 77.48 cfs @ 2.67 fps)

Pond 4P: FB 1BE



Stage-Area-Storage for Pond 4P: FB 1BE

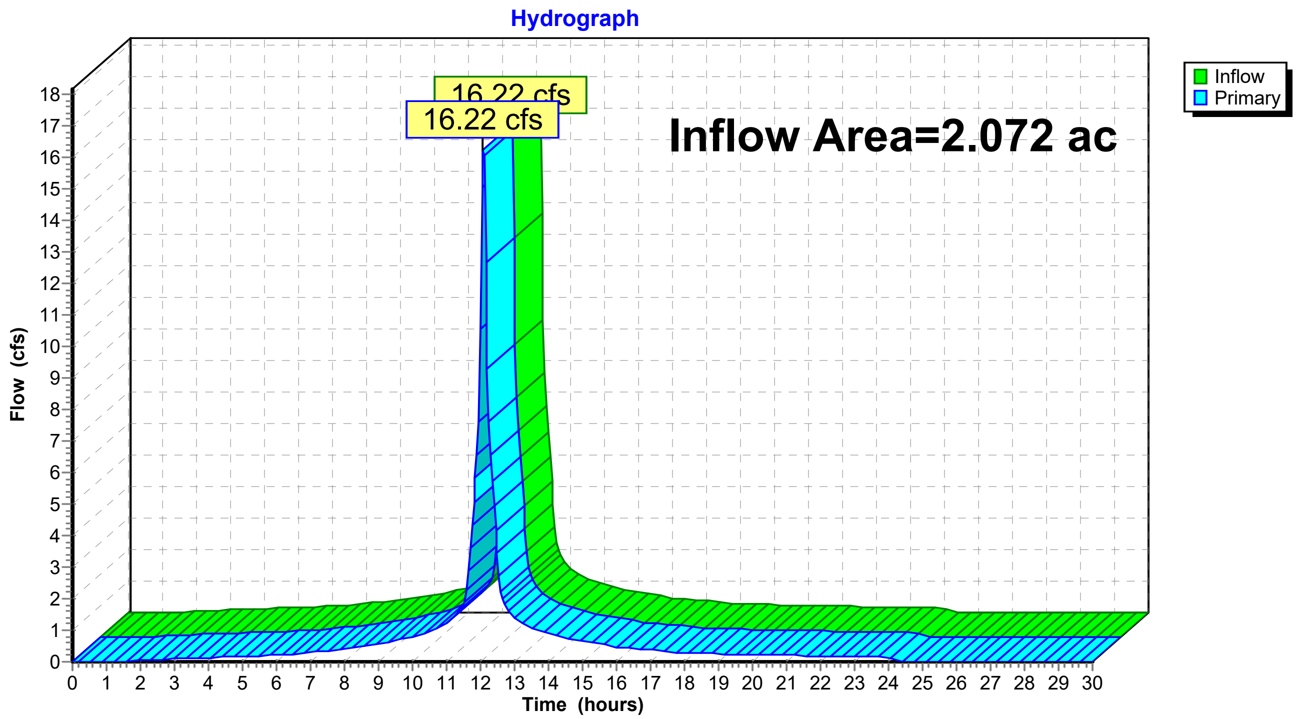
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
454.00	10,778	0
454.10	10,872	1,083
454.20	10,967	2,174
454.30	11,061	3,276
454.40	11,156	4,387
454.50	11,250	5,507
454.60	11,345	6,637
454.70	11,439	7,776
454.80	11,534	8,925
454.90	11,628	10,083
455.00	11,723	11,250
455.10	11,817	12,427
455.20	11,912	13,614
455.30	12,006	14,810
455.40	12,101	16,015
455.50	12,195	17,230
455.60	12,289	18,454
455.70	12,384	19,688
455.80	12,478	20,931
455.90	12,573	22,183
456.00	12,667	23,445
456.10	12,762	24,717
456.20	12,856	25,998
456.30	12,951	27,288
456.40	13,045	28,588
456.50	13,140	29,897
456.60	13,234	31,216
456.70	13,329	32,544
456.80	13,423	33,881
456.90	13,518	35,229
457.00	13,612	36,585
457.10	13,706	37,951
457.20	13,801	39,326
457.30	13,895	40,711
457.40	13,990	42,105
457.50	14,084	43,509
457.60	14,179	44,922
457.70	14,273	46,345
457.80	14,368	47,777
457.90	14,462	49,218
458.00	14,557	50,669
458.10	14,651	52,130
458.20	14,746	53,600
458.30	14,840	55,079
458.40	14,935	56,568
458.50	15,029	58,066
458.60	15,123	59,573
458.70	15,218	61,090
458.80	15,312	62,617
458.90	15,407	64,153
459.00	15,501	65,698
459.10	15,596	67,253
459.20	15,690	68,817
459.30	15,785	70,391
459.40	15,879	71,974
459.50	15,974	73,567
459.60	16,068	75,169
459.70	16,163	76,781
459.80	16,257	78,402
459.90	16,352	80,032
460.00	**16,446**	**81,672**

Summary for Link H7: (new Link)

Inflow Area = 2.072 ac, 87.73% Impervious, Inflow Depth = 7.71" for 100-yr event
Inflow = 16.22 cfs @ 12.09 hrs, Volume= 1.332 af
Primary = 16.22 cfs @ 12.09 hrs, Volume= 1.332 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2C : WET 2C

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link H7: (new Link)

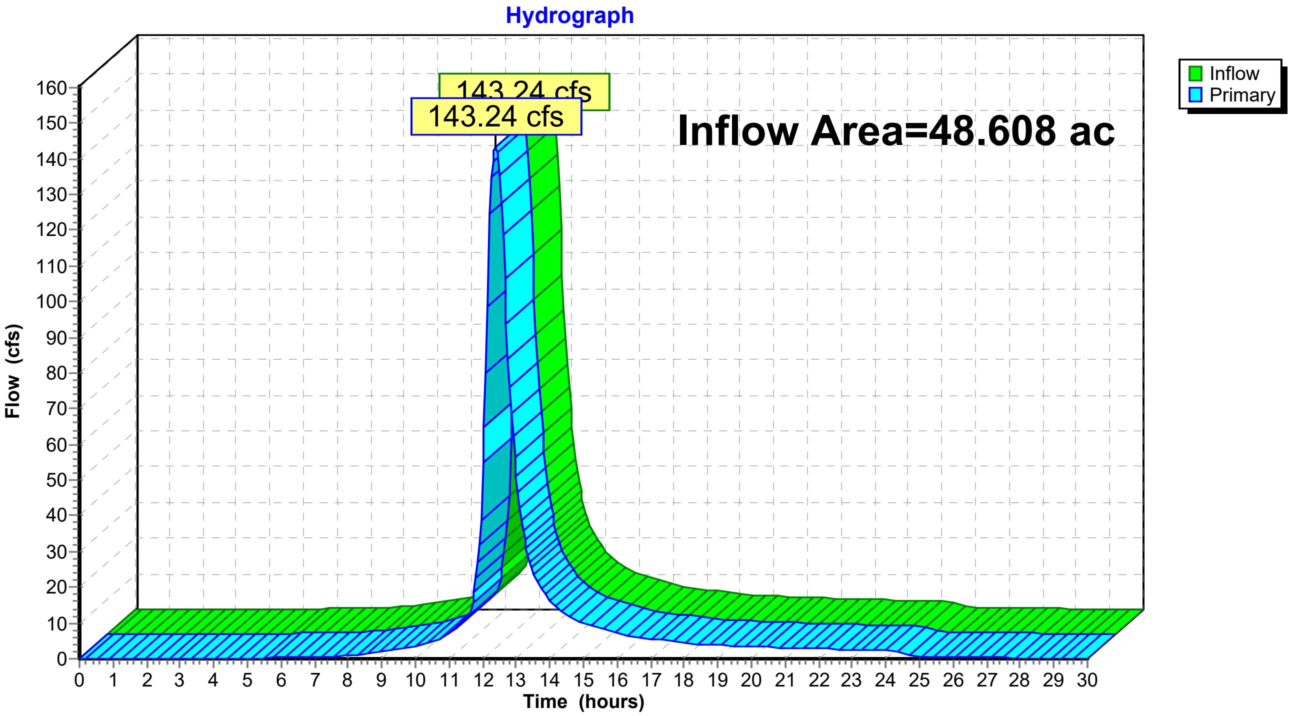


Summary for Link PR: PROPOSED

Inflow Area = 48.608 ac, 42.37% Impervious, Inflow Depth > 4.29" for 100-yr event
Inflow = 143.24 cfs @ 12.39 hrs, Volume= 17.370 af
Primary = 143.24 cfs @ 12.39 hrs, Volume= 17.370 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link PR: PROPOSED



Summary for Subcatchment PREM: LOD

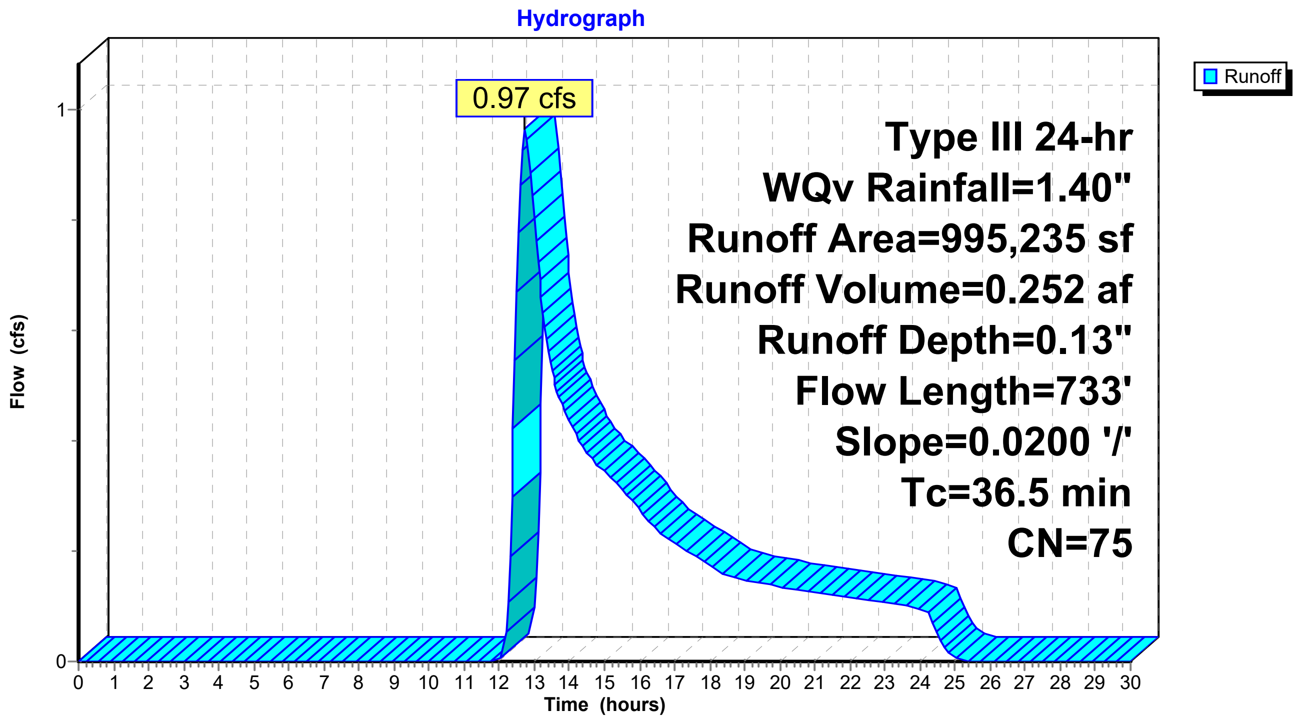
Runoff = 0.97 cfs @ 12.74 hrs, Volume= 0.252 af, Depth= 0.13"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
113,433	79	Woods, Fair, HSG D
43,433	36	Woods, Fair, HSG A
28,688	30	Meadow, non-grazed, HSG A
532,740	78	Meadow, non-grazed, HSG D
276,941	80	>75% Grass cover, Good, HSG D
995,235	75	Weighted Average
995,235		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.17"
14.9	633	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.5	733	Total			

Subcatchment PREM: LOD



Summary for Subcatchment PW1A: PARKING

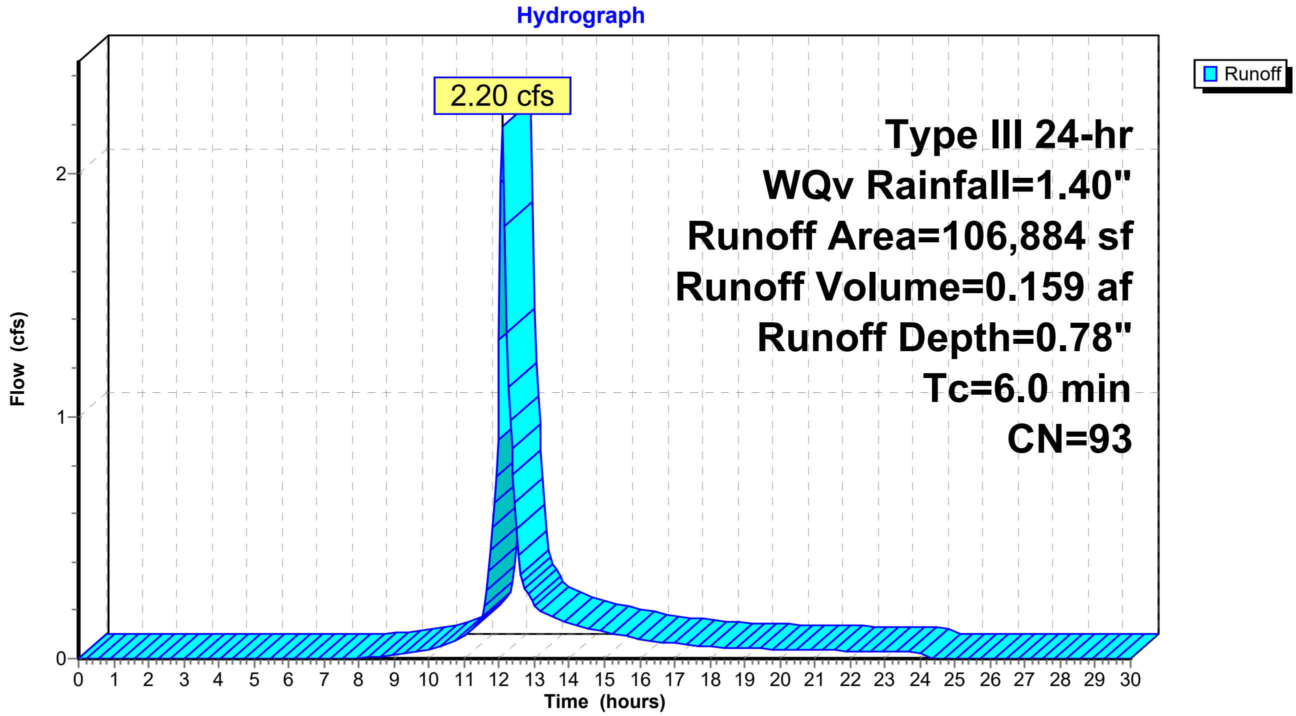
Runoff = 2.20 cfs @ 12.09 hrs, Volume= 0.159 af, Depth= 0.78"
Routed to Pond 1A-1 : INFIL 1A-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
32,522	80	>75% Grass cover, Good, HSG D
74,362	98	Paved parking, HSG D
106,884	93	Weighted Average
32,522		30.43% Pervious Area
74,362		69.57% Impervious Area

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

Subcatchment PW1A: PARKING



Summary for Subcatchment PW1BE: BLDG EAST

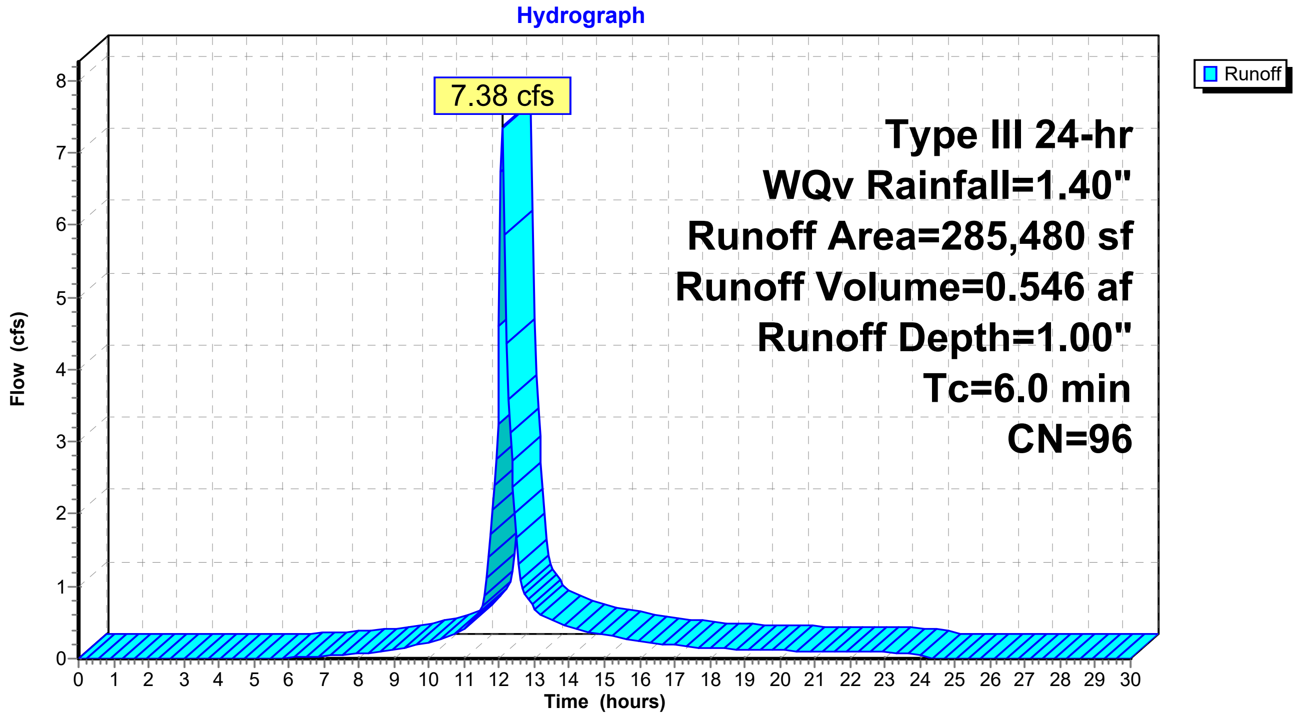
Runoff = 7.38 cfs @ 12.09 hrs, Volume= 0.546 af, Depth= 1.00"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
33,786	80	>75% Grass cover, Good, HSG D
251,694	98	Paved parking, HSG D
285,480	96	Weighted Average
33,786		11.83% Pervious Area
251,694		88.17% Impervious Area

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

Subcatchment PW1BE: BLDG EAST



Summary for Subcatchment PW1BW: BLDG WEST

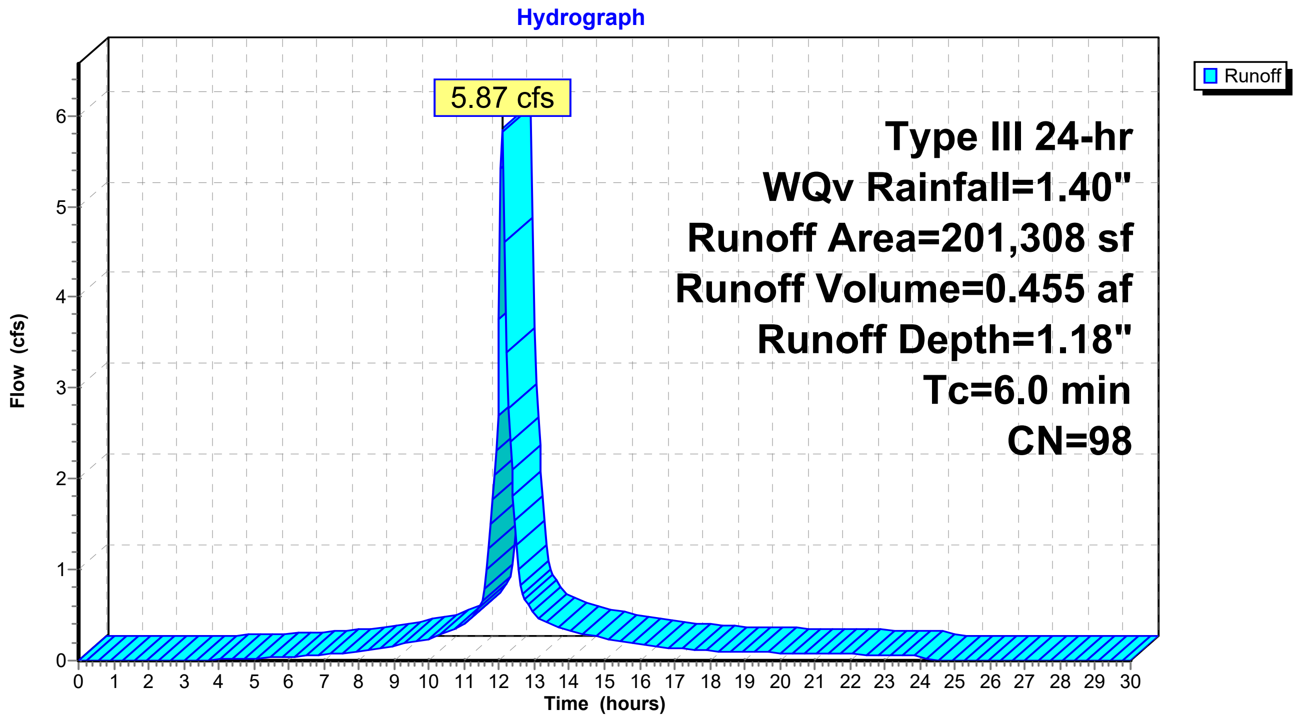
Runoff = 5.87 cfs @ 12.09 hrs, Volume= 0.455 af, Depth= 1.18"
Routed to Pond 4P : FB 1BE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
201,308	98	Paved parking, HSG D
201,308	98	Weighted Average
201,308		100.00% Impervious Area

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

Subcatchment PW1BW: BLDG WEST



Summary for Subcatchment PW1C:

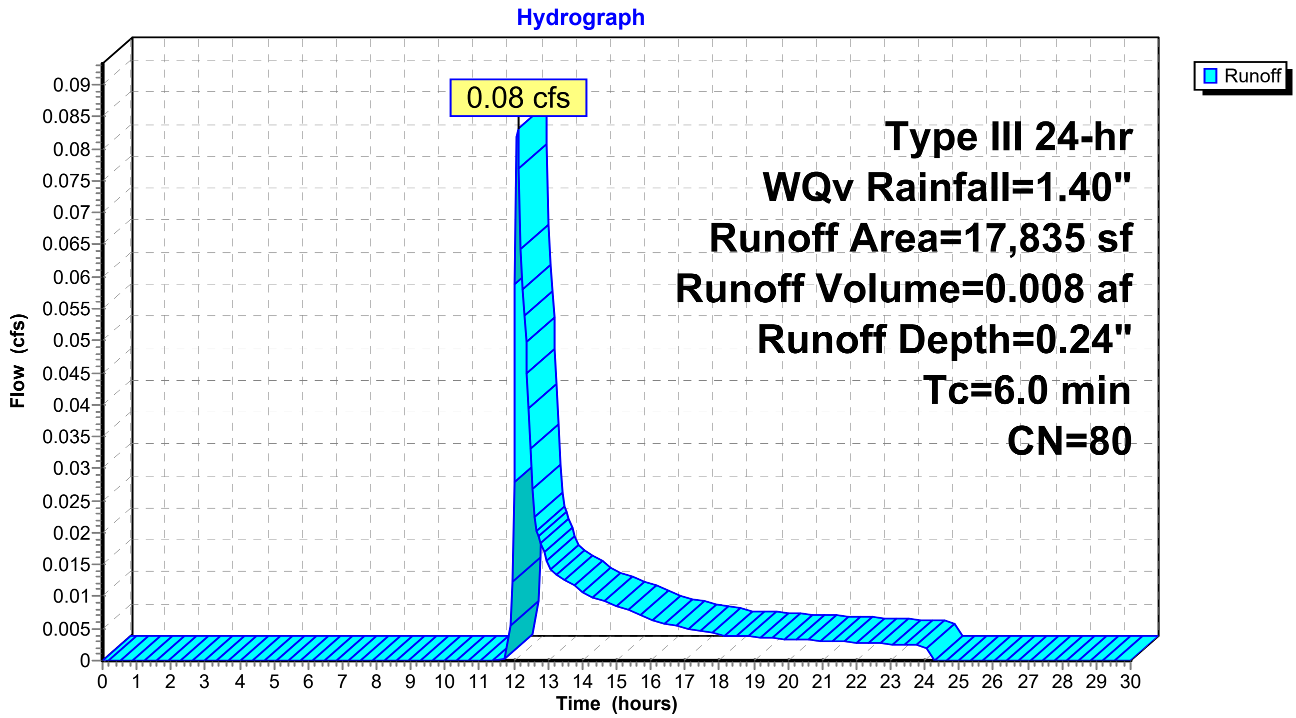
Runoff = 0.08 cfs @ 12.12 hrs, Volume= 0.008 af, Depth= 0.24"
Routed to Link PR : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
17,835	80	>75% Grass cover, Good, HSG D
0	98	Paved parking, HSG D
17,835	80	Weighted Average
17,835		100.00% Pervious Area

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

Subcatchment PW1C:



Summary for Subcatchment PW1D: LOAD EAST

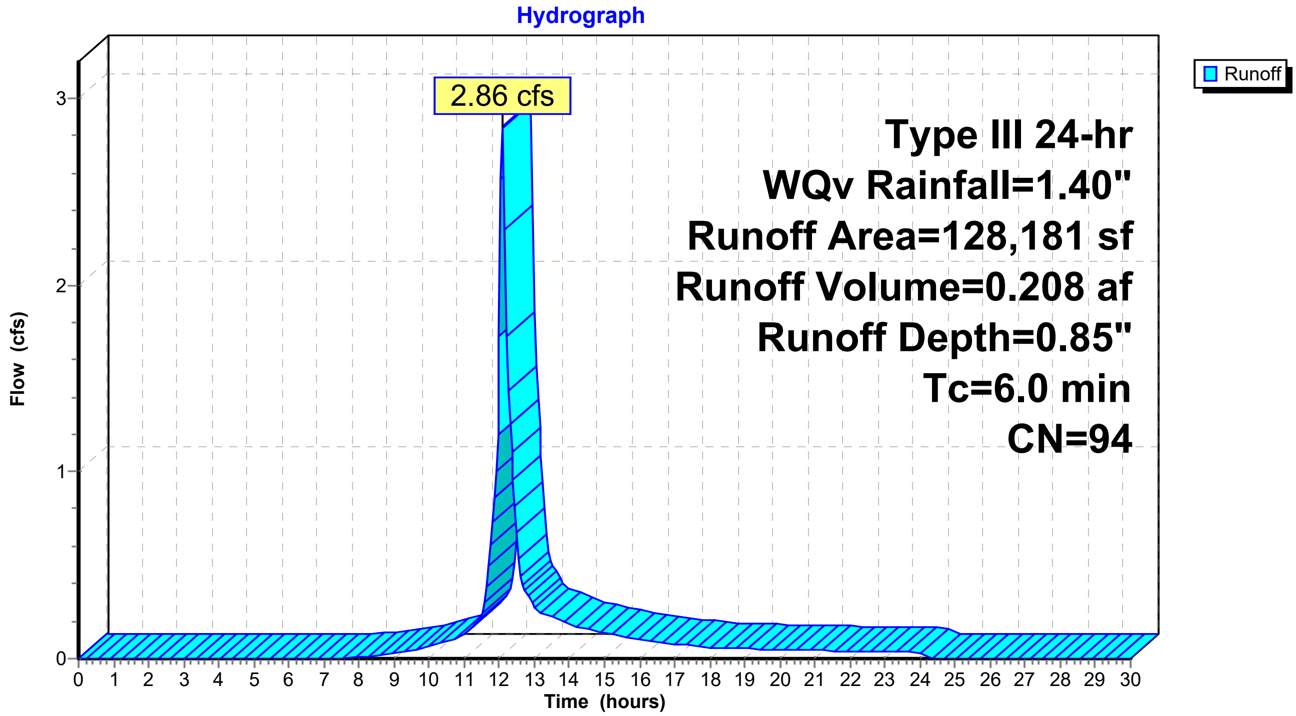
Runoff = 2.86 cfs @ 12.09 hrs, Volume= 0.208 af, Depth= 0.85"
Routed to Pond 1D : WET 1D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
28,504	80	>75% Grass cover, Good, HSG D
99,677	98	Paved parking, HSG D
128,181	94	Weighted Average
28,504		22.24% Pervious Area
99,677		77.76% Impervious Area

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

Subcatchment PW1D: LOAD EAST



Summary for Subcatchment PW1E: LOAD WEST

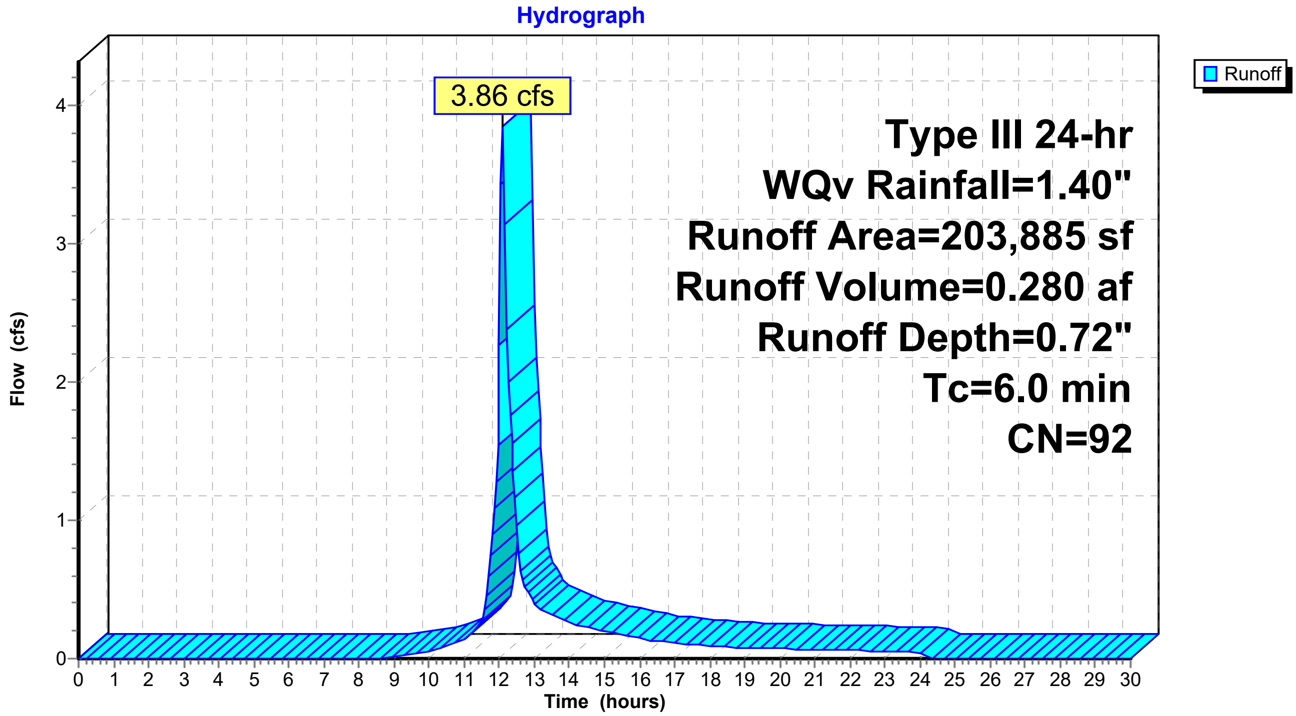
Runoff = 3.86 cfs @ 12.09 hrs, Volume= 0.280 af, Depth= 0.72"
Routed to Pond 3P : FB 1E

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
70,197	80	>75% Grass cover, Good, HSG D
133,688	98	Paved parking, HSG D
203,885	92	Weighted Average
70,197		34.43% Pervious Area
133,688		65.57% Impervious Area

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

Subcatchment PW1E: LOAD WEST



Summary for Subcatchment PW2A: PARKING

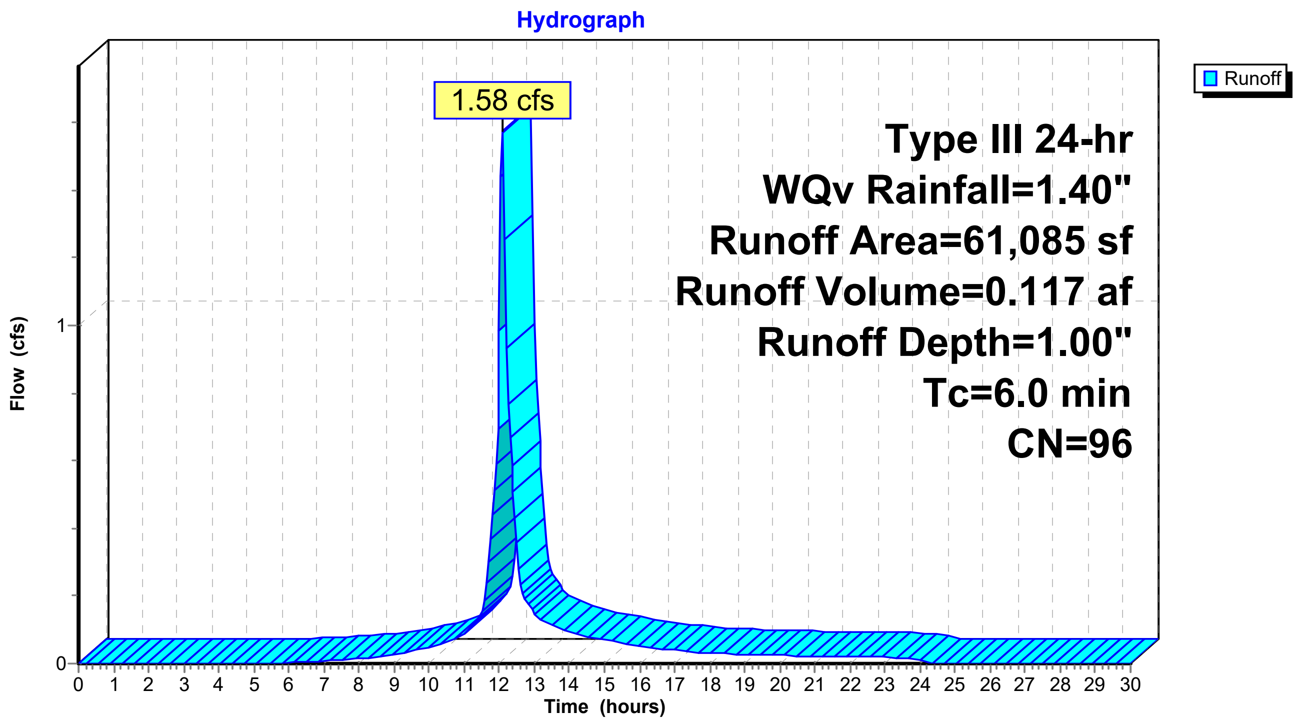
Runoff = 1.58 cfs @ 12.09 hrs, Volume= 0.117 af, Depth= 1.00"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
5,846	80	>75% Grass cover, Good, HSG D
55,239	98	Paved parking, HSG D
61,085	96	Weighted Average
5,846		9.57% Pervious Area
55,239		90.43% Impervious Area

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

Subcatchment PW2A: PARKING



Summary for Subcatchment PW2B: LOADING

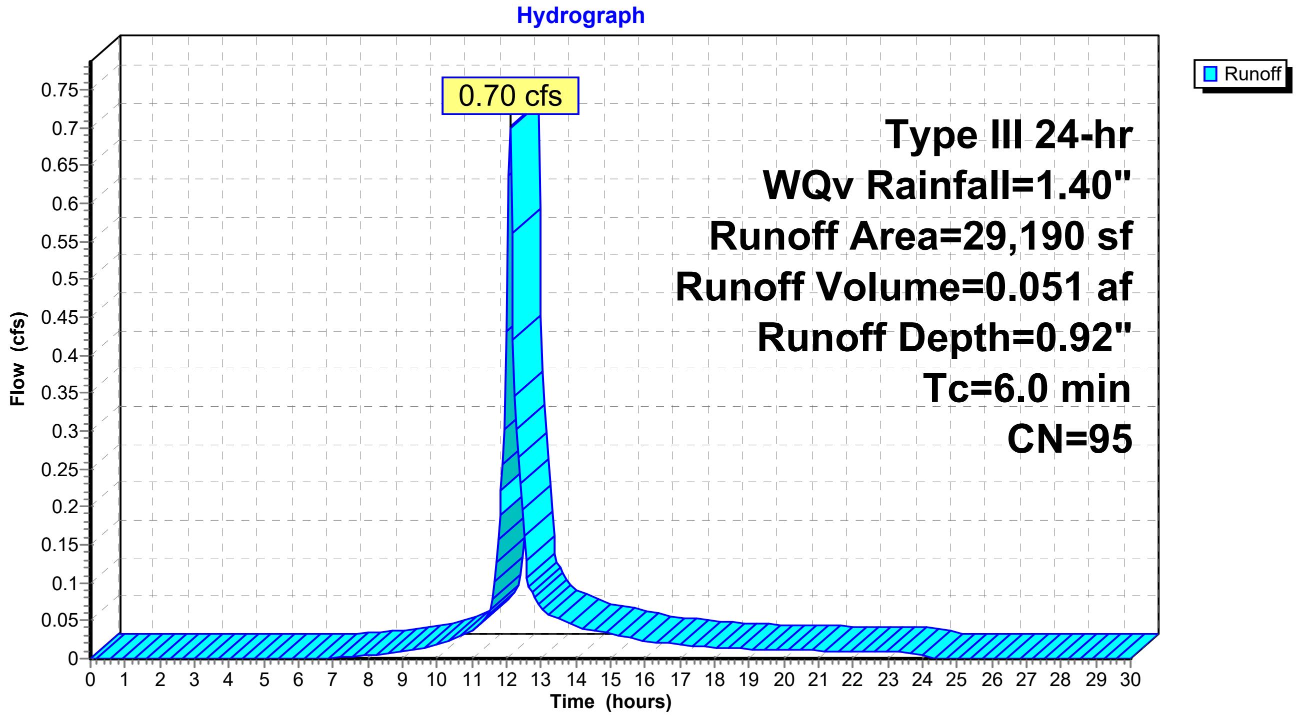
Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 0.92"
Routed to Link H7 : (new Link)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
5,233	80	>75% Grass cover, Good, HSG D
23,957	98	Paved parking, HSG D
29,190	95	Weighted Average
5,233		17.93% Pervious Area
23,957		82.07% Impervious Area

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

Subcatchment PW2B: LOADING



Summary for Subcatchment PW2C: BACK

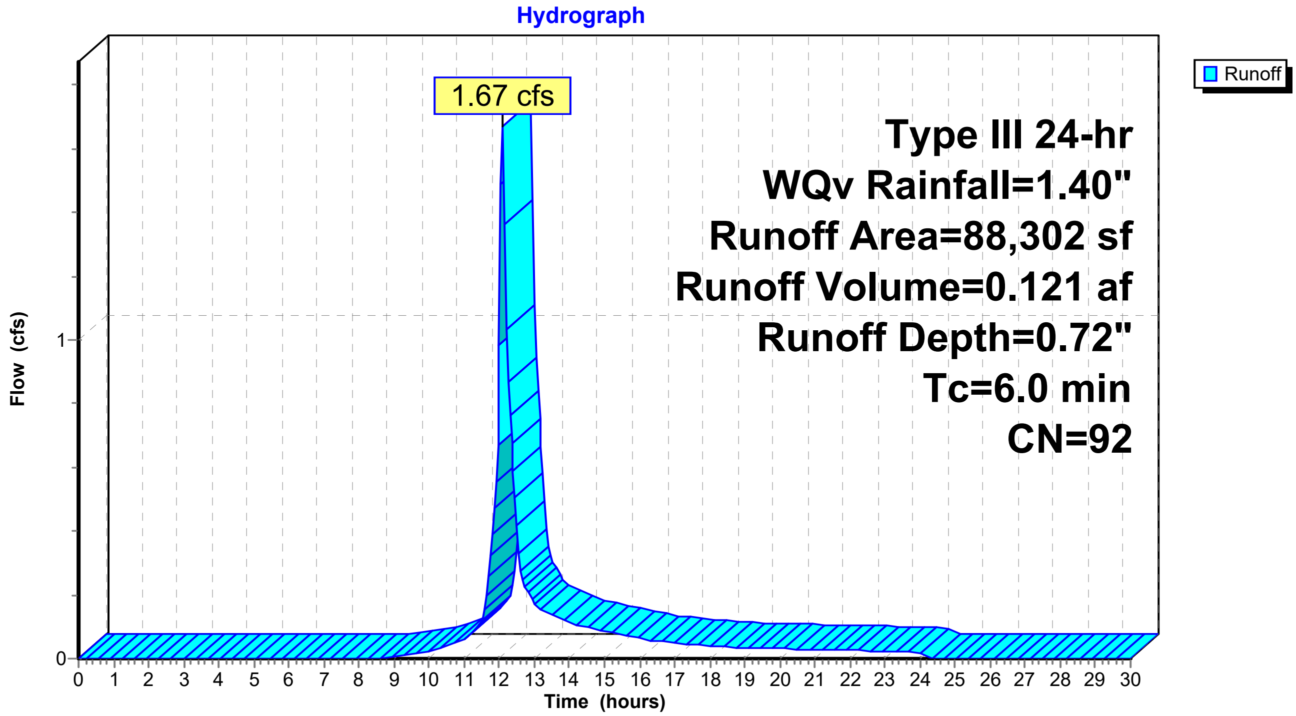
Runoff = 1.67 cfs @ 12.09 hrs, Volume= 0.121 af, Depth= 0.72"
Routed to Pond 2C : WET 2C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (sf)	CN	Description
31,111	80	>75% Grass cover, Good, HSG D
57,191	98	Paved parking, HSG D
88,302	92	Weighted Average
31,111		35.23% Pervious Area
57,191		64.77% Impervious Area

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

Subcatchment PW2C: BACK



Summary for Pond 1A-1: INFIL 1A-1

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 0.78" for WQv event
Inflow = 2.20 cfs @ 12.09 hrs, Volume= 0.159 af
Outflow = 0.41 cfs @ 12.56 hrs, Volume= 0.160 af, Atten= 82%, Lag= 28.3 min
Discarded = 0.41 cfs @ 12.56 hrs, Volume= 0.160 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1A-2 : INFIL 1A-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 474.58' @ 12.56 hrs Surf.Area= 3,508 sf Storage= 1,916 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 30.5 min (855.5 - 825.0)

Volume	Invert	Avail.Storage	Storage Description
#1	474.00'	17,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

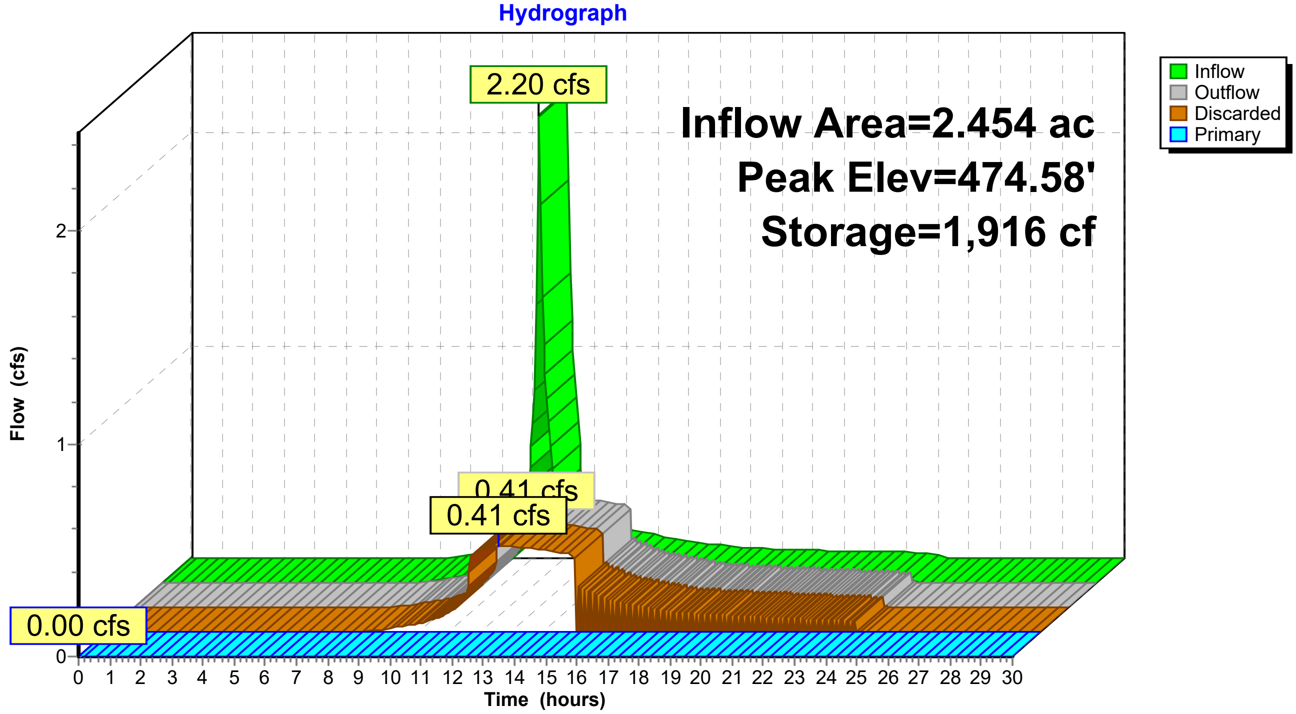
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
474.00	3,150	0	0
478.00	5,640	17,580	17,580

Device	Routing	Invert	Outlet Devices
#1	Discarded	474.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Primary	476.50'	**20.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.41 cfs @ 12.56 hrs HW=474.57' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=474.00' TW=468.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A-1: INFIL 1A-1



Stage-Area-Storage for Pond 1A-1: INFIL 1A-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
474.00	3,150	0
474.05	3,181	158
474.10	3,212	318
474.15	3,243	480
474.20	3,274	642
474.25	3,306	807
474.30	3,337	973
474.35	3,368	1,141
474.40	3,399	1,310
474.45	3,430	1,481
474.50	3,461	1,653
474.55	3,492	1,827
474.60	3,524	2,002
474.65	3,555	2,179
474.70	3,586	2,358
474.75	3,617	2,538
474.80	3,648	2,719
474.85	3,679	2,902
474.90	3,710	3,087
474.95	3,741	3,273
475.00	3,773	3,461
475.05	3,804	3,651
475.10	3,835	3,842
475.15	3,866	4,034
475.20	3,897	4,228
475.25	3,928	4,424
475.30	3,959	4,621
475.35	3,990	4,820
475.40	4,021	5,020
475.45	4,053	5,222
475.50	4,084	5,425
475.55	4,115	5,630
475.60	4,146	5,837
475.65	4,177	6,045
475.70	4,208	6,255
475.75	4,239	6,466
475.80	4,271	6,678
475.85	4,302	6,893
475.90	4,333	7,109
475.95	4,364	7,326
476.00	4,395	7,545
476.05	4,426	7,766
476.10	4,457	7,988
476.15	4,488	8,211
476.20	4,519	8,436
476.25	4,551	8,663
476.30	4,582	8,892
476.35	4,613	9,121
476.40	4,644	9,353
476.45	4,675	9,586
476.50	4,706	9,820
476.55	4,737	10,056
476.60	4,769	10,294
476.65	4,800	10,533
476.70	4,831	10,774
476.75	4,862	11,016
476.80	4,893	11,260
476.85	4,924	11,506
476.90	4,955	11,753
476.95	4,986	12,001
477.00	5,018	12,251
477.05	5,049	12,503
477.10	5,080	12,756
477.15	5,111	13,011
477.20	5,142	13,267
477.25	5,173	13,525
477.30	5,204	13,785
477.35	5,235	14,046
477.40	5,266	14,308
477.45	5,298	14,572
477.50	5,329	14,838
477.55	5,360	15,105
477.60	5,391	15,374
477.65	5,422	15,644
477.70	5,453	15,916
477.75	5,484	16,189
477.80	5,516	16,464
477.85	5,547	16,741
477.90	5,578	17,019
477.95	5,609	17,299
478.00	**5,640**	**17,580**

Summary for Pond 1A-2: INFIL 1A-2

Inflow Area = 2.454 ac, 69.57% Impervious, Inflow Depth = 0.00" for WQv event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 468.00' @ 0.00 hrs Surf.Area= 928 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	468.00'	3,903 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

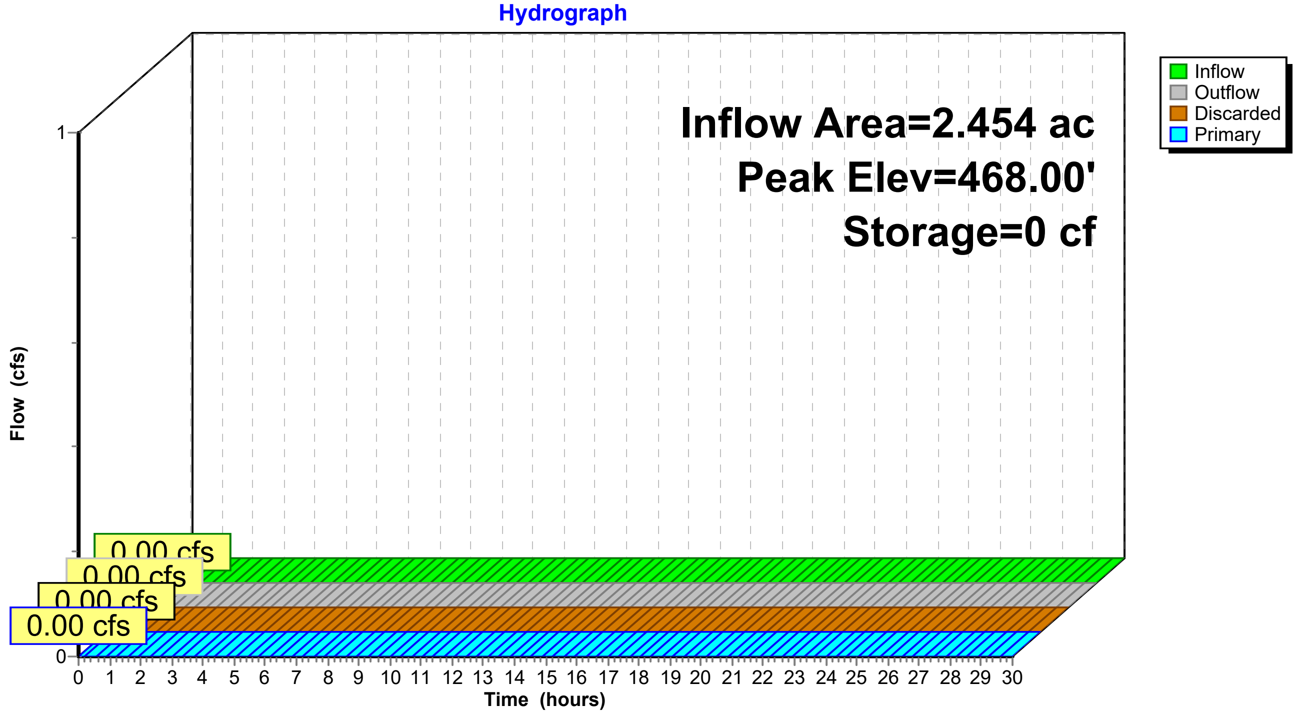
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
468.00	928	0	0
471.00	1,674	3,903	3,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	468.00'	**5.000 in/hr Exfiltration over Surface area**
#2	Device 3	469.50'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	466.50'	**24.0" Round Culvert** L= 68.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 466.50' / 464.00' S= 0.0368 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=468.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.11 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=468.00' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 0.00 cfs of 10.54 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A-2: INFIL 1A-2



Stage-Area-Storage for Pond 1A-2: INFIL 1A-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
468.00	928	0
468.05	940	47
468.10	953	94
468.15	965	142
468.20	978	191
468.25	990	240
468.30	1,003	290
468.35	1,015	340
468.40	1,027	391
468.45	1,040	443
468.50	1,052	495
468.55	1,065	548
468.60	1,077	602
468.65	1,090	656
468.70	1,102	711
468.75	1,115	766
468.80	1,127	822
468.85	1,139	879
468.90	1,152	936
468.95	1,164	994
469.00	1,177	1,052
469.05	1,189	1,111
469.10	1,202	1,171
469.15	1,214	1,232
469.20	1,226	1,293
469.25	1,239	1,354
469.30	1,251	1,417
469.35	1,264	1,479
469.40	1,276	1,543
469.45	1,289	1,607
469.50	1,301	1,672
469.55	1,313	1,737
469.60	1,326	1,803
469.65	1,338	1,870
469.70	1,351	1,937
469.75	1,363	2,005
469.80	1,376	2,073
469.85	1,388	2,142
469.90	1,400	2,212
469.95	1,413	2,282
470.00	1,425	2,353
470.05	1,438	2,425
470.10	1,450	2,497
470.15	1,463	2,570
470.20	1,475	2,643
470.25	1,488	2,717
470.30	1,500	2,792
470.35	1,512	2,867
470.40	1,525	2,943
470.45	1,537	3,020
470.50	1,550	3,097
470.55	1,562	3,175
470.60	1,575	3,253
470.65	1,587	3,332
470.70	1,599	3,412
470.75	1,612	3,492
470.80	1,624	3,573
470.85	1,637	3,655
470.90	1,649	3,737
470.95	1,662	3,820
471.00	**1,674**	**3,903**

Summary for Pond 1BE: INFIL 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 0.76" for WQv event
Inflow = 10.61 cfs @ 12.15 hrs, Volume= 1.001 af
Outflow = 4.27 cfs @ 12.51 hrs, Volume= 1.004 af, Atten= 60%, Lag= 21.2 min
Discarded = 4.27 cfs @ 12.51 hrs, Volume= 1.004 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 455.34' @ 12.51 hrs Surf.Area= 18,458 sf Storage= 6,221 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 7.1 min (813.4 - 806.3)

Volume	Invert	Avail.Storage	Storage Description
#1	455.00'	115,118 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

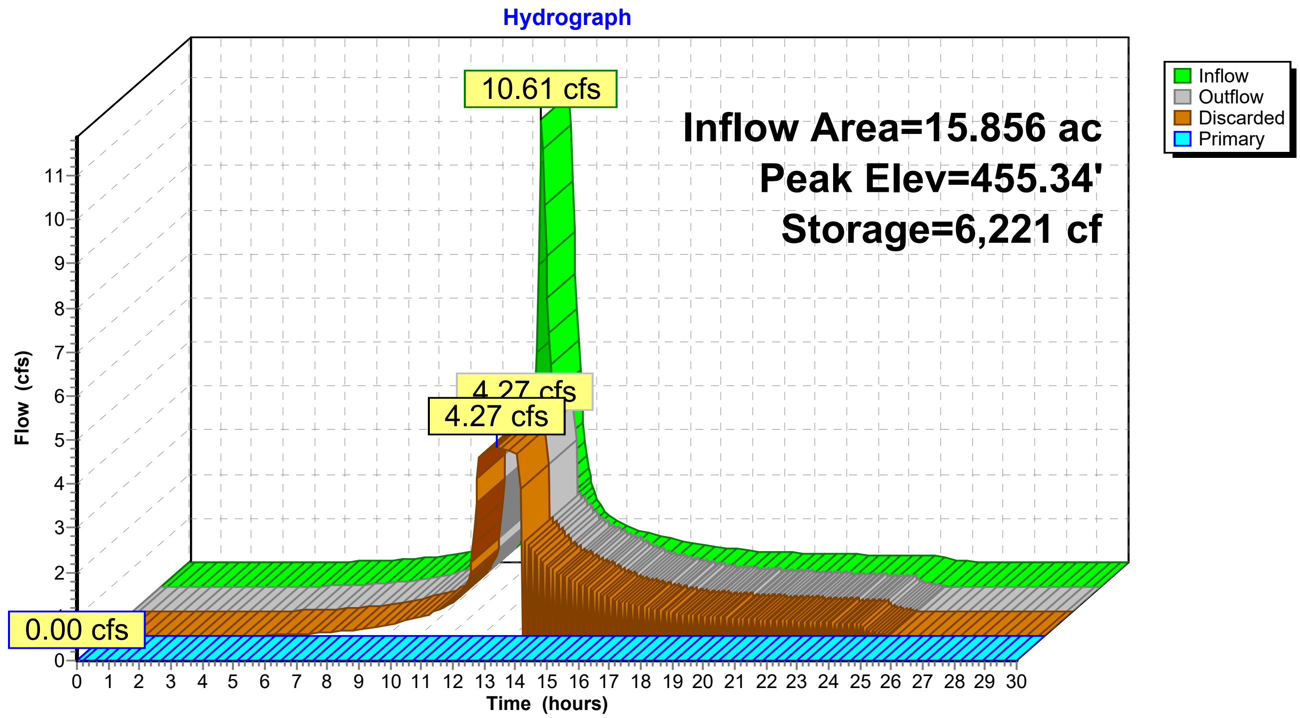
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
455.00	17,730	0	0
460.00	28,317	115,118	115,118

Device	Routing	Invert	Outlet Devices
#1	Primary	458.00'	**16.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	455.00'	**10.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=4.27 cfs @ 12.51 hrs HW=455.34' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 4.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=455.00' TW=0.00' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1BE: INFIL 1BE



Stage-Area-Storage for Pond 1BE: INFIL 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
455.00	17,730	0	457.65	23,341	54,419
455.05	17,836	889	457.70	23,447	55,589
455.10	17,942	1,784	457.75	23,553	56,764
455.15	18,048	2,683	457.80	23,659	57,944
455.20	18,153	3,588	457.85	23,765	59,130
455.25	18,259	4,499	457.90	23,870	60,321
455.30	18,365	5,414	457.95	23,976	61,517
455.35	18,471	6,335	458.00	24,082	62,718
455.40	18,577	7,261	458.05	24,188	63,925
455.45	18,683	8,193	458.10	24,294	65,137
455.50	18,789	9,130	458.15	24,400	66,354
455.55	18,895	10,072	458.20	24,506	67,577
455.60	19,000	11,019	458.25	24,612	68,805
455.65	19,106	11,972	458.30	24,717	70,038
455.70	19,212	12,930	458.35	24,823	71,277
455.75	19,318	13,893	458.40	24,929	72,521
455.80	19,424	14,862	458.45	25,035	73,770
455.85	19,530	15,835	458.50	25,141	75,024
455.90	19,636	16,815	458.55	25,247	76,284
455.95	19,742	17,799	458.60	25,353	77,549
456.00	19,847	18,789	458.65	25,459	78,819
456.05	19,953	19,784	458.70	25,564	80,095
456.10	20,059	20,784	458.75	25,670	81,375
456.15	20,165	21,790	458.80	25,776	82,662
456.20	20,271	22,801	458.85	25,882	83,953
456.25	20,377	23,817	458.90	25,988	85,250
456.30	20,483	24,838	458.95	26,094	86,552
456.35	20,588	25,865	459.00	26,200	87,859
456.40	20,694	26,897	459.05	26,305	89,172
456.45	20,800	27,934	459.10	26,411	90,490
456.50	20,906	28,977	459.15	26,517	91,813
456.55	21,012	30,025	459.20	26,623	93,141
456.60	21,118	31,078	459.25	26,729	94,475
456.65	21,224	32,137	459.30	26,835	95,814
456.70	21,330	33,201	459.35	26,941	97,159
456.75	21,435	34,270	459.40	27,047	98,508
456.80	21,541	35,344	459.45	27,152	99,863
456.85	21,647	36,424	459.50	27,258	101,224
456.90	21,753	37,509	459.55	27,364	102,589
456.95	21,859	38,599	459.60	27,470	103,960
457.00	21,965	39,695	459.65	27,576	105,336
457.05	22,071	40,796	459.70	27,682	106,718
457.10	22,177	41,902	459.75	27,788	108,104
457.15	22,282	43,013	459.80	27,894	109,496
457.20	22,388	44,130	459.85	27,999	110,894
457.25	22,494	45,252	459.90	28,105	112,296
457.30	22,600	46,380	459.95	28,211	113,704
457.35	22,706	47,512	460.00	**28,317**	**115,118**
457.40	22,812	48,650			
457.45	22,918	49,793			
457.50	23,024	50,942			
457.55	23,129	52,096			
457.60	23,235	53,255			

Summary for Pond 1D: WET 1D

Inflow Area = 2.943 ac, 77.76% Impervious, Inflow Depth = 0.85" for WQv event
Inflow = 2.86 cfs @ 12.09 hrs, Volume= 0.208 af
Outflow = 0.16 cfs @ 14.44 hrs, Volume= 0.242 af, Atten= 94%, Lag= 141.1 min
Primary = 0.16 cfs @ 14.44 hrs, Volume= 0.242 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.50' Surf.Area= 14,310 sf Storage= 13,422 cf
Peak Elev= 451.69' @ 14.44 hrs Surf.Area= 14,651 sf Storage= 16,202 cf (2,780 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 140.4 min (958.3 - 817.9)

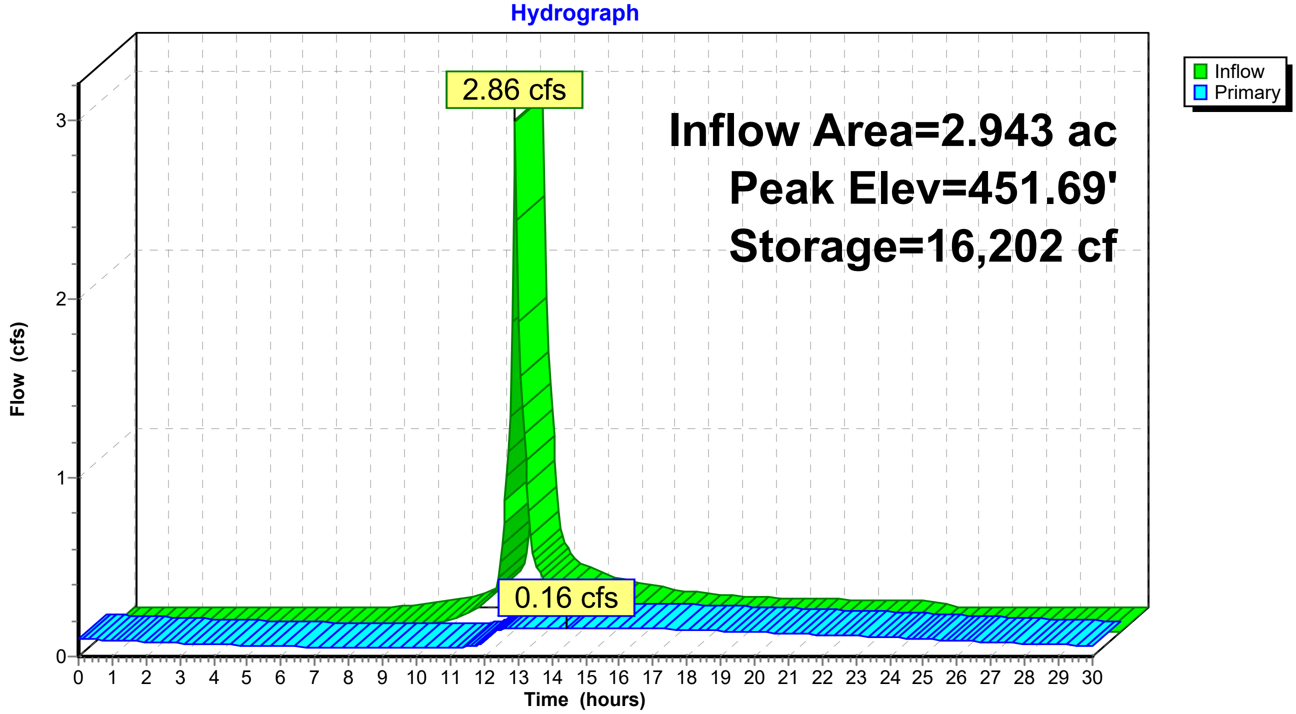
Volume	Invert	Avail.Storage	Storage Description
#1	450.50'	54,744 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.50	12,535	0	0
454.00	18,747	54,744	54,744

Device	Routing	Invert	Outlet Devices
#1	Primary	452.50'	**20.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#2	Primary	451.10'	**6.0" Round Culvert** L= 20.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.10' / 450.00' S= 0.0550 '/' Cc= 0.900 n= 0.120, Flow Area= 0.20 sf

Primary OutFlow Max=0.16 cfs @ 14.44 hrs HW=451.69' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Culvert (Barrel Controls 0.16 cfs @ 0.87 fps)

Pond 1D: WET 1D



Stage-Area-Storage for Pond 1D: WET 1D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.50	12,535	0	453.15	17,238	39,450
450.55	12,624	629	453.20	17,327	40,314
450.60	12,712	1,262	453.25	17,416	41,182
450.65	12,801	1,900	453.30	17,505	42,055
450.70	12,890	2,542	453.35	17,593	42,933
450.75	12,979	3,189	453.40	17,682	43,815
450.80	13,067	3,840	453.45	17,771	44,701
450.85	13,156	4,496	453.50	17,860	45,592
450.90	13,245	5,156	453.55	17,948	46,487
450.95	13,334	5,820	453.60	18,037	47,387
451.00	13,422	6,489	453.65	18,126	48,291
451.05	13,511	7,163	453.70	18,215	49,199
451.10	13,600	7,840	453.75	18,303	50,112
451.15	13,689	8,523	453.80	18,392	51,030
451.20	13,777	9,209	453.85	18,481	51,951
451.25	13,866	9,900	453.90	18,570	52,878
451.30	13,955	10,596	453.95	18,658	53,808
451.35	14,044	11,296	454.00	**18,747**	**54,744**
451.40	14,132	12,000			
451.45	14,221	12,709			
451.50	14,310	13,422			
451.55	14,399	14,140			
451.60	14,487	14,862			
451.65	14,576	15,589			
451.70	14,665	16,320			
451.75	14,754	17,055			
451.80	14,842	17,795			
451.85	14,931	18,540			
451.90	15,020	19,288			
451.95	15,109	20,042			
452.00	15,197	20,799			
452.05	15,286	21,561			
452.10	15,375	22,328			
452.15	15,464	23,099			
452.20	15,552	23,874			
452.25	15,641	24,654			
452.30	15,730	25,438			
452.35	15,818	26,227			
452.40	15,907	27,020			
452.45	15,996	27,818			
452.50	16,085	28,620			
452.55	16,173	29,426			
452.60	16,262	30,237			
452.65	16,351	31,052			
452.70	16,440	31,872			
452.75	16,528	32,696			
452.80	16,617	33,525			
452.85	16,706	34,358			
452.90	16,795	35,196			
452.95	16,883	36,038			
453.00	16,972	36,884			
453.05	17,061	37,735			
453.10	17,150	38,590			

Summary for Pond 1E: INFIL 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 0.72" for WQv event
Inflow = 3.35 cfs @ 12.15 hrs, Volume= 0.280 af
Outflow = 0.84 cfs @ 12.62 hrs, Volume= 0.281 af, Atten= 75%, Lag= 28.4 min
Discarded = 0.84 cfs @ 12.62 hrs, Volume= 0.281 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 4P : FB 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 460.32' @ 12.62 hrs Surf.Area= 9,054 sf Storage= 2,862 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 20.5 min (861.9 - 841.4)

Volume	Invert	Avail.Storage	Storage Description
#1	460.00'	61,063 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

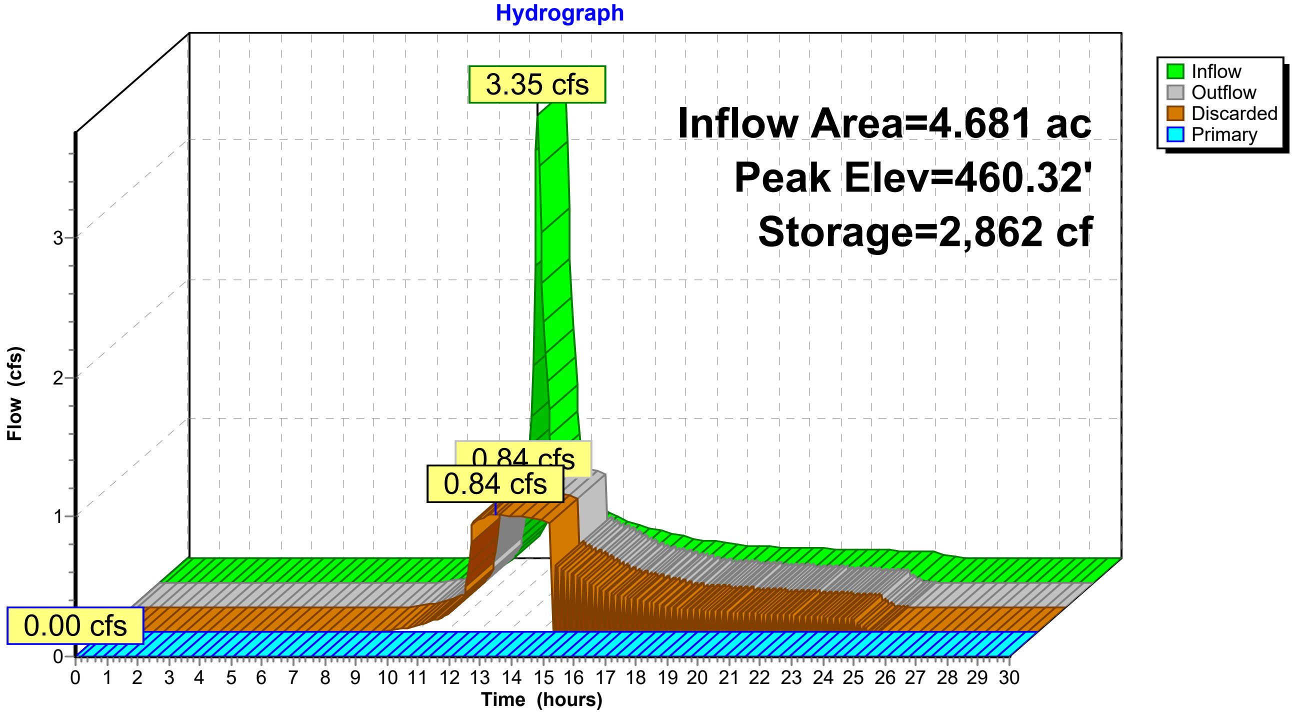
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
460.00	8,583	0	0
465.00	15,842	61,063	61,063

Device	Routing	Invert	Outlet Devices
#1	Discarded	460.00'	**4.000 in/hr EXFIL over Surface area**
#2	Primary	462.00'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.84 cfs @ 12.62 hrs HW=460.32' (Free Discharge)
└─**1=EXFIL** (Exfiltration Controls 0.84 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=460.00' TW=457.50' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1E: INFIL 1E



Stage-Area-Storage for Pond 1E: INFIL 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
460.00	8,583	0
460.05	8,656	431
460.10	8,728	866
460.15	8,801	1,304
460.20	8,873	1,746
460.25	8,946	2,191
460.30	9,019	2,640
460.35	9,091	3,093
460.40	9,164	3,549
460.45	9,236	4,009
460.50	9,309	4,473
460.55	9,381	4,940
460.60	9,454	5,411
460.65	9,527	5,886
460.70	9,599	6,364
460.75	9,672	6,846
460.80	9,744	7,331
460.85	9,817	7,820
460.90	9,890	8,313
460.95	9,962	8,809
461.00	10,035	9,309
461.05	10,107	9,812
461.10	10,180	10,320
461.15	10,253	10,830
461.20	10,325	11,345
461.25	10,398	11,863
461.30	10,470	12,385
461.35	10,543	12,910
461.40	10,616	13,439
461.45	10,688	13,972
461.50	10,761	14,508
461.55	10,833	15,048
461.60	10,906	15,591
461.65	10,978	16,138
461.70	11,051	16,689
461.75	11,124	17,243
461.80	11,196	17,801
461.85	11,269	18,363
461.90	11,341	18,928
461.95	11,414	19,497
462.00	11,487	20,070
462.05	11,559	20,646
462.10	11,632	21,226
462.15	11,704	21,809
462.20	11,777	22,396
462.25	11,850	22,987
462.30	11,922	23,581
462.35	11,995	24,179
462.40	12,067	24,780
462.45	12,140	25,386
462.50	12,213	25,994
462.55	12,285	26,607
462.60	12,358	27,223
462.65	12,430	27,843
462.70	12,503	28,466
462.75	12,575	29,093
462.80	12,648	29,723
462.85	12,721	30,358
462.90	12,793	30,996
462.95	12,866	31,637
463.00	12,938	32,282
463.05	13,011	32,931
463.10	13,084	33,583
463.15	13,156	34,239
463.20	13,229	34,899
463.25	13,301	35,562
463.30	13,374	36,229
463.35	13,447	36,899
463.40	13,519	37,574
463.45	13,592	38,251
463.50	13,664	38,933
463.55	13,737	39,618
463.60	13,809	40,306
463.65	13,882	40,999
463.70	13,955	41,695
463.75	14,027	42,394
463.80	14,100	43,097
463.85	14,172	43,804
463.90	14,245	44,515
463.95	14,318	45,229
464.00	14,390	45,946
464.05	14,463	46,668
464.10	14,535	47,393
464.15	14,608	48,121
464.20	14,681	48,853
464.25	14,753	49,589
464.30	14,826	50,329
464.35	14,898	51,072
464.40	14,971	51,819
464.45	15,044	52,569
464.50	15,116	53,323
464.55	15,189	54,081
464.60	15,261	54,842
464.65	15,334	55,607
464.70	15,406	56,375
464.75	15,479	57,147
464.80	15,552	57,923
464.85	15,624	58,703
464.90	15,697	59,486
464.95	15,769	60,272
465.00	**15,842**	**61,063**

Summary for Pond 2C: WET 2C

Inflow Area = 4.100 ac, 76.37% Impervious, Inflow Depth = 0.85" for WQv event
Inflow = 3.95 cfs @ 12.09 hrs, Volume= 0.289 af
Outflow = 0.66 cfs @ 12.58 hrs, Volume= 0.279 af, Atten= 83%, Lag= 29.5 min
Primary = 0.66 cfs @ 12.58 hrs, Volume= 0.279 af
Routed to Link PR : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 451.30' Surf.Area= 7,226 sf Storage= 8,306 cf
Peak Elev= 452.04' @ 12.58 hrs Surf.Area= 8,175 sf Storage= 13,981 cf (5,675 cf above start)

Plug-Flow detention time= 546.6 min calculated for 0.088 af (30% of inflow)
Center-of-Mass det. time= 139.6 min (955.0 - 815.4)

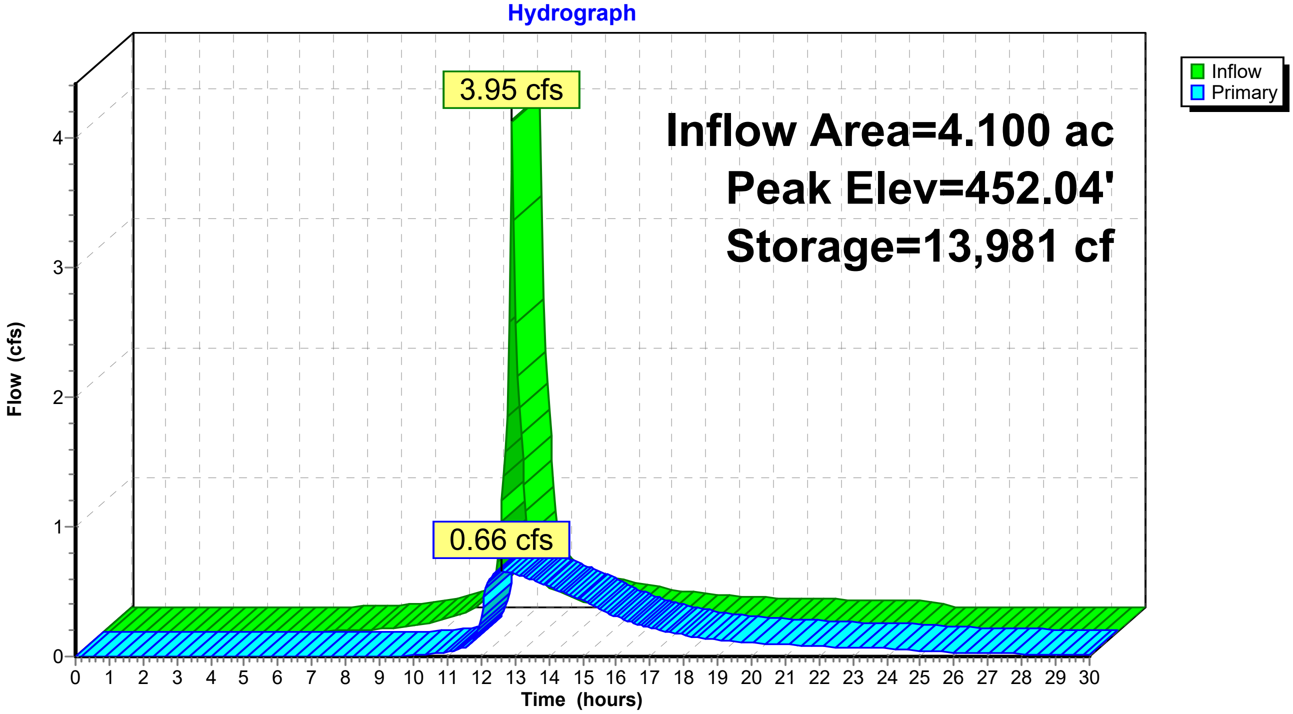
Volume	Invert	Avail.Storage	Storage Description
#1	450.00'	43,659 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
450.00	5,553	0	0
453.00	9,414	22,451	22,451
455.00	11,794	21,208	43,659

Device	Routing	Invert	Outlet Devices
#1	Device 3	452.50'	**20.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Device 3	451.30'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	449.50'	**18.0" Round Culvert** L= 25.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 449.50' / 449.25' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=0.66 cfs @ 12.58 hrs HW=452.04' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 0.66 cfs of 11.37 cfs potential flow)
  ├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**2=Orifice/Grate** (Orifice Controls 0.66 cfs @ 3.36 fps)

Pond 2C: WET 2C



Stage-Area-Storage for Pond 2C: WET 2C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
450.00	5,553	0	452.65	8,964	19,234
450.05	5,617	279	452.70	9,028	19,684
450.10	5,682	562	452.75	9,092	20,137
450.15	5,746	847	452.80	9,157	20,593
450.20	5,810	1,136	452.85	9,221	21,053
450.25	5,875	1,428	452.90	9,285	21,516
450.30	5,939	1,724	452.95	9,350	21,981
450.35	6,003	2,022	453.00	9,414	22,451
450.40	6,068	2,324	453.05	9,474	22,923
450.45	6,132	2,629	453.10	9,533	23,398
450.50	6,197	2,937	453.15	9,592	23,876
450.55	6,261	3,249	453.20	9,652	24,357
450.60	6,325	3,563	453.25	9,712	24,841
450.65	6,390	3,881	453.30	9,771	25,328
450.70	6,454	4,202	453.35	9,831	25,818
450.75	6,518	4,527	453.40	9,890	26,311
450.80	6,583	4,854	453.45	9,949	26,807
450.85	6,647	5,185	453.50	10,009	27,306
450.90	6,711	5,519	453.55	10,069	27,808
450.95	6,776	5,856	453.60	10,128	28,313
451.00	6,840	6,197	453.65	10,187	28,821
451.05	6,904	6,540	453.70	10,247	29,332
451.10	6,969	6,887	453.75	10,307	29,846
451.15	7,033	7,237	453.80	10,366	30,363
451.20	7,097	7,590	453.85	10,426	30,882
451.25	7,162	7,947	453.90	10,485	31,405
451.30	7,226	8,306	453.95	10,544	31,931
451.35	7,290	8,669	454.00	10,604	32,460
451.40	7,355	9,035	454.05	10,664	32,991
451.45	7,419	9,405	454.10	10,723	33,526
451.50	7,484	9,777	454.15	10,782	34,063
451.55	7,548	10,153	454.20	10,842	34,604
451.60	7,612	10,532	454.25	10,902	35,148
451.65	7,677	10,914	454.30	10,961	35,694
451.70	7,741	11,300	454.35	11,021	36,244
451.75	7,805	11,688	454.40	11,080	36,796
451.80	7,870	12,080	454.45	11,139	37,352
451.85	7,934	12,475	454.50	11,199	37,910
451.90	7,998	12,874	454.55	11,259	38,472
451.95	8,063	13,275	454.60	11,318	39,036
452.00	8,127	13,680	454.65	11,377	39,603
452.05	8,191	14,088	454.70	11,437	40,174
452.10	8,256	14,499	454.75	11,497	40,747
452.15	8,320	14,914	454.80	11,556	41,324
452.20	8,384	15,331	454.85	11,616	41,903
452.25	8,449	15,752	454.90	11,675	42,485
452.30	8,513	16,176	454.95	11,734	43,070
452.35	8,577	16,603	455.00	**11,794**	**43,659**
452.40	8,642	17,034			
452.45	8,706	17,467			
452.50	8,771	17,904			
452.55	8,835	18,345			
452.60	8,899	18,788			

Summary for Pond 3P: FB 1E

Inflow Area = 4.681 ac, 65.57% Impervious, Inflow Depth = 0.72" for WQv event
Inflow = 3.86 cfs @ 12.09 hrs, Volume= 0.280 af
Outflow = 3.35 cfs @ 12.15 hrs, Volume= 0.280 af, Atten= 13%, Lag= 3.1 min
Primary = 3.35 cfs @ 12.15 hrs, Volume= 0.280 af
Routed to Pond 1E : INFIL 1E

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 6,027 sf Storage= 16,913 cf
Peak Elev= 461.16' @ 12.15 hrs Surf.Area= 6,244 sf Storage= 17,879 cf (966 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 9.9 min (841.4 - 831.5)

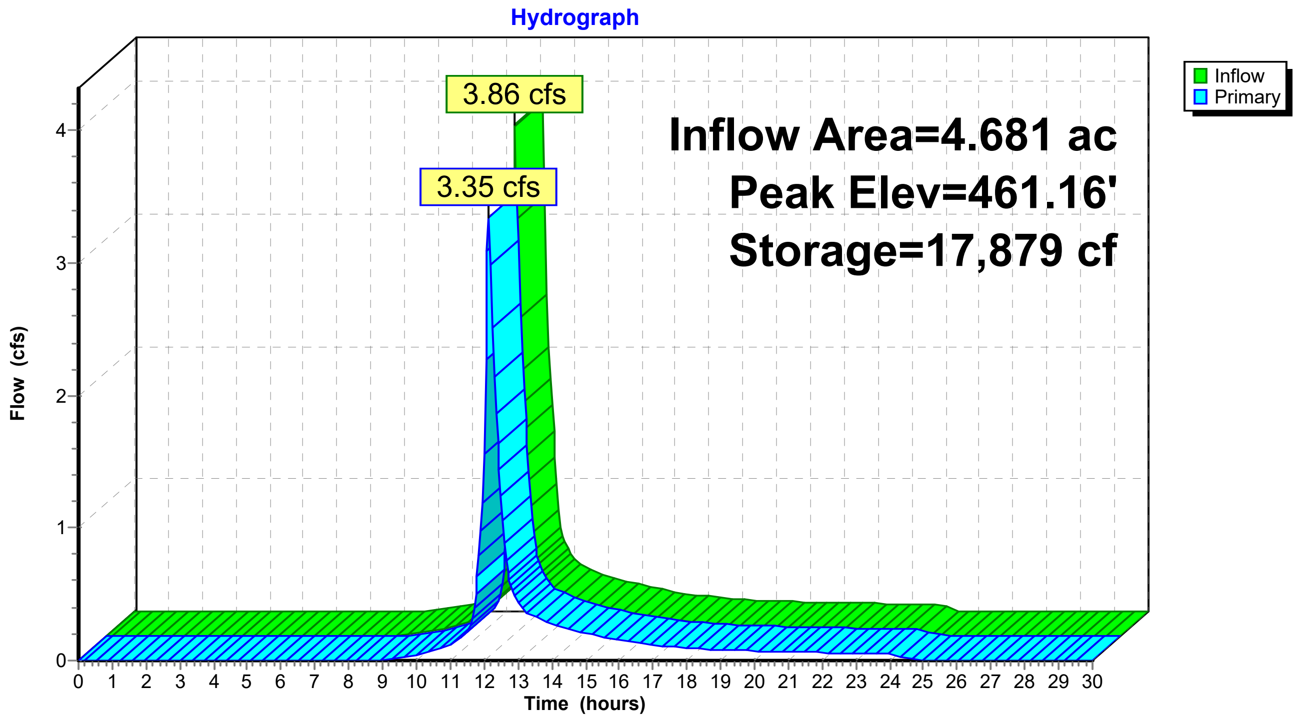
Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	52,051 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
456.00	1,140	0	0
460.00	4,648	11,576	11,576
465.00	11,542	40,475	52,051

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.32 cfs @ 12.15 hrs HW=461.16' TW=460.13' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 3.32 cfs @ 1.06 fps)

Pond 3P: FB 1E


Hydrograph
3.86 cfs
3.35 cfs
Inflow Area=4.681 ac
Peak Elev=461.16'
Storage=17,879 cf
Inflow
Primary
Flow (cfs)
Time (hours)

Stage-Area-Storage for Pond 3P: FB 1E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
456.00	1,140	0	461.30	6,440	18,783
456.10	1,228	118	461.40	6,578	19,434
456.20	1,315	246	461.50	6,716	20,099
456.30	1,403	381	461.60	6,854	20,778
456.40	1,491	526	461.70	6,992	21,470
456.50	1,579	680	461.80	7,130	22,176
456.60	1,666	842	461.90	7,268	22,896
456.70	1,754	1,013	462.00	7,406	23,630
456.80	1,842	1,193	462.10	7,543	24,377
456.90	1,929	1,381	462.20	7,681	25,138
457.00	2,017	1,579	462.30	7,819	25,913
457.10	2,105	1,785	462.40	7,957	26,702
457.20	2,192	1,999	462.50	8,095	27,505
457.30	2,280	2,223	462.60	8,233	28,321
457.40	2,368	2,455	462.70	8,371	29,151
457.50	2,456	2,697	462.80	8,509	29,995
457.60	2,543	2,947	462.90	8,647	30,853
457.70	2,631	3,205	463.00	8,784	31,725
457.80	2,719	3,473	463.10	8,922	32,610
457.90	2,806	3,749	463.20	9,060	33,509
458.00	2,894	4,034	463.30	9,198	34,422
458.10	2,982	4,328	463.40	9,336	35,349
458.20	3,069	4,630	463.50	9,474	36,289
458.30	3,157	4,942	463.60	9,612	37,243
458.40	3,245	5,262	463.70	9,750	38,211
458.50	3,333	5,591	463.80	9,887	39,193
458.60	3,420	5,928	463.90	10,025	40,189
458.70	3,508	6,275	464.00	10,163	41,198
458.80	3,596	6,630	464.10	10,301	42,222
458.90	3,683	6,994	464.20	10,439	43,259
459.00	3,771	7,367	464.30	10,577	44,309
459.10	3,859	7,748	464.40	10,715	45,374
459.20	3,946	8,138	464.50	10,853	46,452
459.30	4,034	8,537	464.60	10,990	47,545
459.40	4,122	8,945	464.70	11,128	48,650
459.50	4,210	9,362	464.80	11,266	49,770
459.60	4,297	9,787	464.90	11,404	50,904
459.70	4,385	10,221	465.00	**11,542**	**52,051**
459.80	4,473	10,664			
459.90	4,560	11,116			
460.00	4,648	11,576			
460.10	4,786	12,048			
460.20	4,924	12,533			
460.30	5,062	13,032			
460.40	5,200	13,546			
460.50	5,337	14,072			
460.60	5,475	14,613			
460.70	5,613	15,167			
460.80	5,751	15,736			
460.90	5,889	16,318			
461.00	6,027	16,913			
461.10	6,165	17,523			
461.20	6,303	18,146			

Summary for Pond 4P: FB 1BE

Inflow Area = 15.856 ac, 84.94% Impervious, Inflow Depth = 0.76" for WQv event
Inflow = 13.24 cfs @ 12.09 hrs, Volume= 1.001 af
Outflow = 10.61 cfs @ 12.15 hrs, Volume= 1.001 af, Atten= 20%, Lag= 4.0 min
Primary = 10.61 cfs @ 12.15 hrs, Volume= 1.001 af
Routed to Pond 1BE : INFIL 1BE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 457.50' Surf.Area= 14,084 sf Storage= 43,509 cf
Peak Elev= 457.84' @ 12.15 hrs Surf.Area= 14,404 sf Storage= 48,329 cf (4,820 cf above start)

Plug-Flow detention time= 1,278.7 min calculated for 0.002 af (0% of inflow)
Center-of-Mass det. time= 16.0 min (806.3 - 790.3)

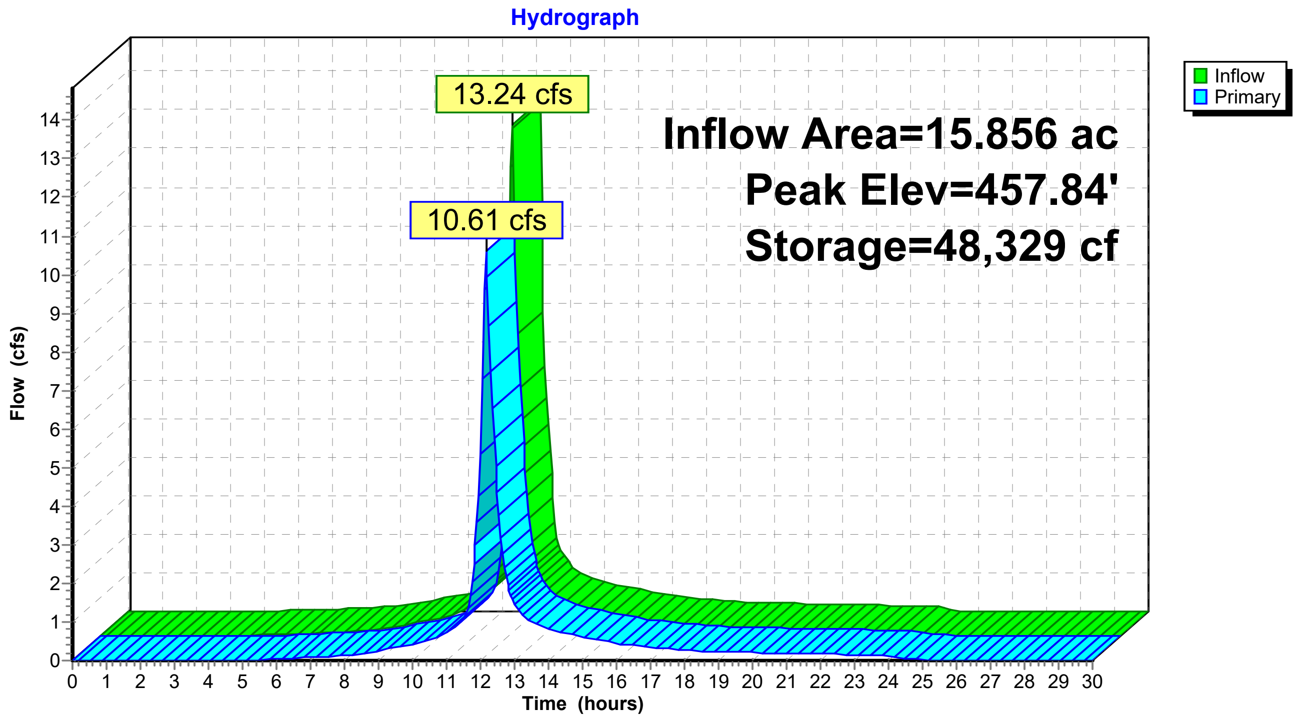
Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	81,672 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
454.00	10,778	0	0
460.00	16,446	81,672	81,672

Device	Routing	Invert	Outlet Devices
#1	Primary	457.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.53 cfs @ 12.15 hrs HW=457.84' TW=455.14' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 10.53 cfs @ 1.56 fps)

Pond 4P: FB 1BE



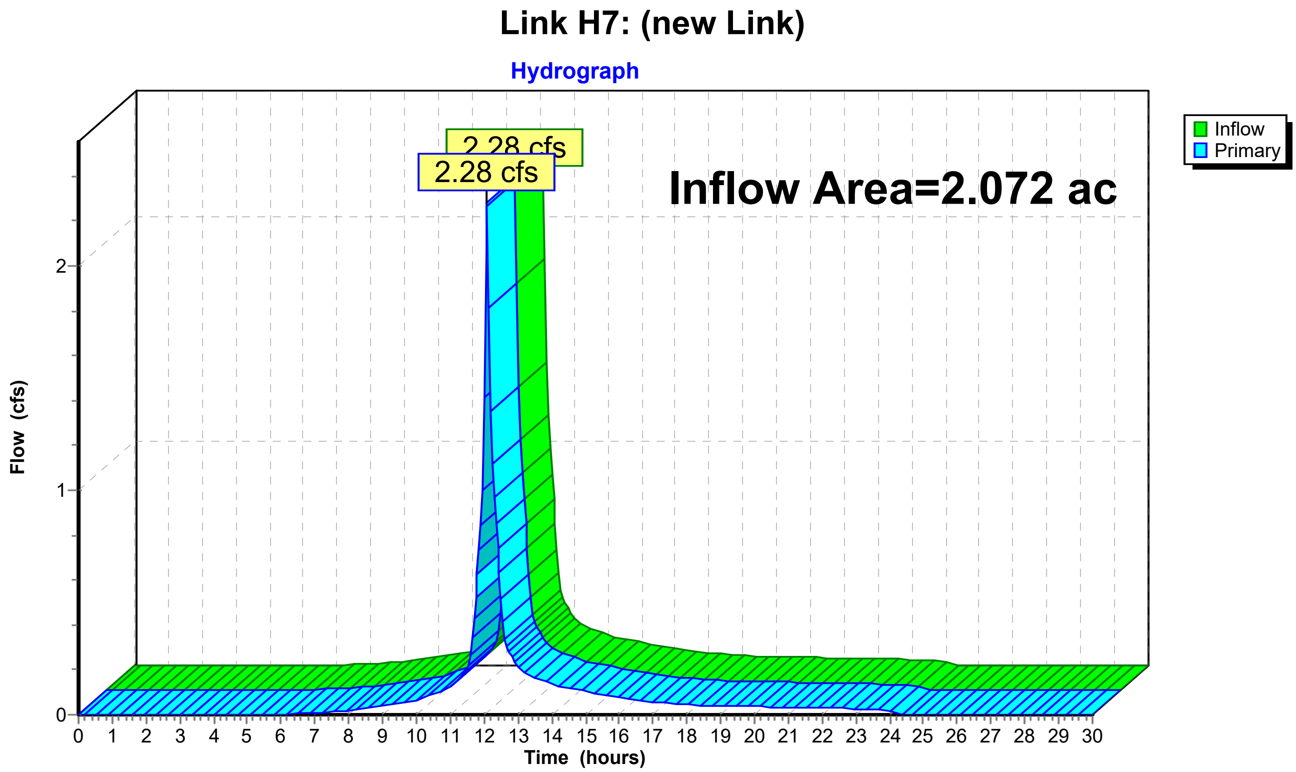
Stage-Area-Storage for Pond 4P: FB 1BE

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
454.00	10,778	0
454.10	10,872	1,083
454.20	10,967	2,174
454.30	11,061	3,276
454.40	11,156	4,387
454.50	11,250	5,507
454.60	11,345	6,637
454.70	11,439	7,776
454.80	11,534	8,925
454.90	11,628	10,083
455.00	11,723	11,250
455.10	11,817	12,427
455.20	11,912	13,614
455.30	12,006	14,810
455.40	12,101	16,015
455.50	12,195	17,230
455.60	12,289	18,454
455.70	12,384	19,688
455.80	12,478	20,931
455.90	12,573	22,183
456.00	12,667	23,445
456.10	12,762	24,717
456.20	12,856	25,998
456.30	12,951	27,288
456.40	13,045	28,588
456.50	13,140	29,897
456.60	13,234	31,216
456.70	13,329	32,544
456.80	13,423	33,881
456.90	13,518	35,229
457.00	13,612	36,585
457.10	13,706	37,951
457.20	13,801	39,326
457.30	13,895	40,711
457.40	13,990	42,105
457.50	14,084	43,509
457.60	14,179	44,922
457.70	14,273	46,345
457.80	14,368	47,777
457.90	14,462	49,218
458.00	14,557	50,669
458.10	14,651	52,130
458.20	14,746	53,600
458.30	14,840	55,079
458.40	14,935	56,568
458.50	15,029	58,066
458.60	15,123	59,573
458.70	15,218	61,090
458.80	15,312	62,617
458.90	15,407	64,153
459.00	15,501	65,698
459.10	15,596	67,253
459.20	15,690	68,817
459.30	15,785	70,391
459.40	15,879	71,974
459.50	15,974	73,567
459.60	16,068	75,169
459.70	16,163	76,781
459.80	16,257	78,402
459.90	16,352	80,032
460.00	**16,446**	**81,672**

Summary for Link H7: (new Link)

Inflow Area = 2.072 ac, 87.73% Impervious, Inflow Depth = 0.97" for WQv event
Inflow = 2.28 cfs @ 12.09 hrs, Volume= 0.168 af
Primary = 2.28 cfs @ 12.09 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2C : WET 2C

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

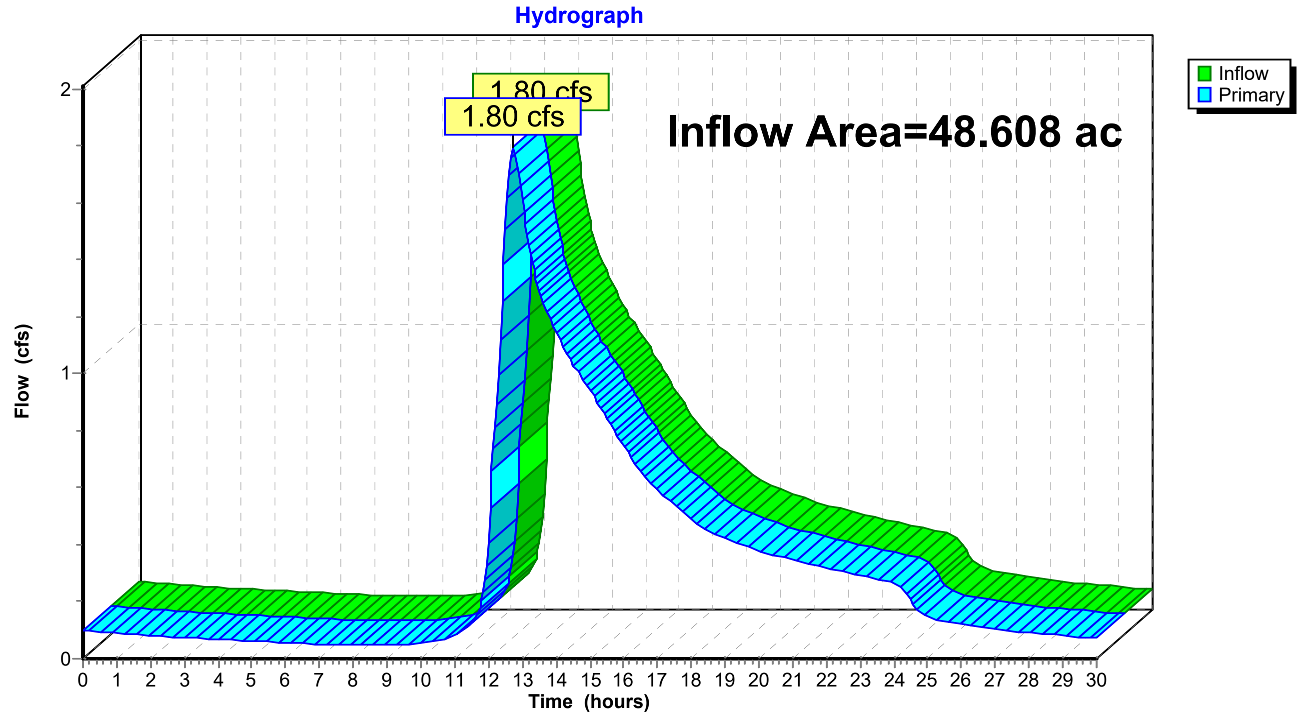


Summary for Link PR: PROPOSED

Inflow Area = 48.608 ac, 42.37% Impervious, Inflow Depth > 0.19" for WQv event
Inflow = 1.80 cfs @ 12.73 hrs, Volume= 0.781 af
Primary = 1.80 cfs @ 12.73 hrs, Volume= 0.781 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link PR: PROPOSED



Appendix 3 | NYSDEC Green Infrastructure Worksheets

Version 1.6
Last Updated: 03/28/2014

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?... No

Design Point:	1	
P=	1.40	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft ^{3})*	Description		
1	2.45	1.71	70%	0.68	8,430	INFIL 1A-1 [PW1A]		
2	0.00	0.00				INFIL-1A-2 [PW1A]		
3	11.18	10.40	93%	0.89	50,405	INFIL 1BE [1BE & 1BW]		
4	2.94	2.29	78%	0.75	11,221	WET 1D [PW 1D]		
5	4.68	3.07	66%	0.64	15,231	INFIL 1E [PW 1E]		
6	4.10	3.13	76%	0.74	15,363	WET 2C [PW2A, PW2B, PW2C]		
7								
8								
9								
10								
Subtotal (1-30)	25.35	20.60	81%	0.78	**100,650**	**Subtotal 1**		
Total	25.35	20.60	81%	0.78	**100,650**	**Initial WQv**	**2.31**	**af**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft ^{3})*		
"<<Initial WQv"	25.35	20.60	81%	0.78	100,650		
Subtract Area	0.00	0.00					
WQv adjusted after Area Reductions	**25.35**	**20.60**	81%	0.78	100,650		
Disconnection of Rooftops		0.00					
Adjusted WQv after Area Reduction and Rooftop Disconnect	25.35	20.60	81%	0.78	**100,650**	**2.31**	**af**
WQv reduced by Area Reduction techniques					0	**0.00**	**af**

Infiltration Basin Worksheet

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	2.45	1.71	0.70	0.68	8430.02	1.40	INFIL 1A-1 [PW1A]
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	70%	0.68	8,430	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	
Pretreatment Techniques to Prevent Clogging							
Infiltration Rate			5.00	*in/hour*	*Okay*		
Pretreatment Sizing			100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*		
Pretreatment Required Volume			8,430	*ft^3*			
Pretreatment Provided			9,000	*ft^3*			
Pretreatment Techniques utilized			*Other*				*CDS-4*
Size An Infiltration Basin							
Design Volume	8,430	*ft^3*	WQv				
Basal Area Required	3,372	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*				
Basal Area Provided	3,150	*ft^2*	*Error, too small*				
Design Depth	2.50	*ft*					
Volume Provided	7,875	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*				
Determine Runoff Reduction							
RRv	**7,088**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***				
Volume Treated	1,343	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*				
Sizing √	Error		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*				

Infiltration Basin Worksheet

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
2	0.00	0.00				1.40	INFIL-1A-2 [PW1A]
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00				<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					1,343	ft^3	

Pretreatment Techniques to Prevent Clogging

Infiltration Rate	5.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume		ft^3	
Pretreatment Provided	9,000	ft^3	*Inadequate Pretreatment Provided*
Pretreatment Techniques utilized	*Other*		

Size An Infiltration Basin

Design Volume	1,343	ft^3	WQv
Basal Area Required	895	ft^2	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	928	ft^2	
Design Depth	1.50	*ft*	
Volume Provided	1,392	ft^3	*Storage Volume provided in infiltration basin area (not including pretreatment.*

Determine Runoff Reduction

RRv	**1,253**	ft^3	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated		ft^3	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Infiltration Basin Worksheet

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	11.18	10.40	0.93	0.89	50404.59	1.40	INFIL 1BE [1BE & 1BW]
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	93%	0.89	50,405	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	
Drainage Area exceeds the maximum allowable unless soil infiltration rate exceeds 5 in/hr							
Pretreatment Techniques to Prevent Clogging							
Infiltration Rate			10.00	*in/hour*	*Okay*		
Pretreatment Sizing			100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*		
Pretreatment Required Volume			50,405	*ft^3*			
Pretreatment Provided			55,000	*ft^3*			
Pretreatment Techniques utilized			*Sedimentation Basin*				
Size An Infiltration Basin							
Design Volume	50,405	*ft^3*	WQv				
Basal Area Required	16,802	*ft^2*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*				
Basal Area Provided	17,730	*ft^2*					
Design Depth	3.00	*ft*					
Volume Provided	53,190	*ft^3*	*Storage Volume provided in infiltration basin area (not including pretreatment.*				
Determine Runoff Reduction							
RRv	**47,871**	***ft^3***	***90% of the storage provided in the basin or WQv whichever is smaller***				
Volume Treated	2,534	*ft^3*	*This is the portion of the WQv that is not reduced/infiltrated*				
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*				

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice

Infiltration Basin Worksheet

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious %	Rv	WQv *(ft ^{3})*	Precipitation *(in)*	Description
5	4.68	3.07	0.66	0.64	15230.75	1.40	INFIL 1E [PW 1E]
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	66%	0.64	15,231	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft ^{3}*	

Pretreatment Techniques to Prevent Clogging			
Infiltration Rate	4.00	*in/hour*	*Okay*
Pretreatment Sizing	100	*% WQv*	*25% minimum;* *50% if >2 in/hr* *100% if >5in/hour*
Pretreatment Required Volume	15,231	*ft ^{3}*	
Pretreatment Provided	16,913	*ft ^{3}*	
Pretreatment Techniques utilized	*Sedimentation Basin*		

Size An Infiltration Basin			
Design Volume	15,231	*ft ^{3}*	WQv
Basal Area Required	7,615	*ft ^{2}*	*Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.*
Basal Area Provided	8,583	*ft ^{2}*	
Design Depth	2.00	*ft*	
Volume Provided	17,166	*ft ^{3}*	*Storage Volume provided in infiltration basin area (not including pretreatment.*
Determine Runoff Reduction			
RRv	**15,231**	***ft ^{3}***	***90% of the storage provided in the basin or WQv whichever is smaller***
Volume Treated	0	*ft ^{3}*	*This is the portion of the WQv that is not reduced/infiltrated*
Sizing √	OK		*The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.*

Total RRV 71,442.05

Total Area 18.31

Infiltration Basin Worksheet

Total Impervious Area	15.18
Total Volume Treated	3,876.12
Rooftop Disconnect Impervious Area Total	0.00

Appendix 4 | SPDES GP-0-20-001

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP- 0-20-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70

of the Environmental Conservation Law

Effective Date: January 29, 2020

Expiration Date: January 28, 2025

John J. Ferguson

Chief Permit Administrator

1-23-20

Authorized Signature

Date

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

PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System ("NPDES")* permit or by a state permit program. New York administers the approved State Pollutant Discharge Elimination System (SPDES) program with permits issued in accordance with the New York State Environmental Conservation Law (ECL) Article 17, Titles 7, 8 and Article 70.

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a *point source* and therefore, pursuant to ECL section 17-0505 and 17-0701, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. The *owner or operator* cannot wait until there is an actual *discharge* from the *construction site* to obtain permit coverage.

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

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

Table of Contents

Part 1. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

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

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

B. Effluent Limitations Applicable to Discharges from Construction Activities

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

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

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

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

(i) *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharges*;

(ii) Control stormwater *discharge*s, including both peak flowrates and total stormwater volume, to *minimize* channel and *streambank* erosion and scour in the immediate vicinity of the *discharge* points;

(iii) *Minimize* the amount of soil exposed during *construction activity*;

(iv) *Minimize* the disturbance of *steep slopes*;

(v) *Minimize* sediment *discharge*s from the site;

(vi) Provide and maintain *natural buffer*s around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharge*s, unless *infeasible*;

(vii) *Minimize* soil compaction. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted;

(viii) Unless *infeasible*, preserve a sufficient amount of topsoil to complete soil restoration and establish a uniform, dense vegetative cover; and

(ix) *Minimize* dust. On areas of exposed soil, *minimize* dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged from the site.

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

c. **Dewatering**. *Discharge*s from *dewatering* activities, including *discharge*s from *dewatering* of trenches and excavations, must be managed by appropriate control measures.

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

(i) *Minimize* the *discharge* of *pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. This applies to washing operations that use clean water only. Soaps, detergents and solvents cannot be used;

(ii) *Minimize* the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, hazardous and toxic waste, and other materials present on the site to precipitation and to stormwater. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a *discharge* of *pollutants*, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use) ; and

(iii) Prevent the *discharge* of *pollutants* from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Prohibited *Discharges*.** The following *discharge*s are prohibited:

(i) Wastewater from washout of concrete;

(ii) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;

(iii) Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance;

(iv) Soaps or solvents used in vehicle and equipment washing; and

(v) Toxic or hazardous substances from a spill or other release.

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

C. Post-construction Stormwater Management Practice Requirements

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

2. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must design the practices to meet the applicable *sizing criteria* in Part I.C.2.a., b., c. or d. of this permit.

a. Sizing Criteria for New Development

(i) Runoff Reduction Volume ("RRv"): Reduce the total Water Quality Volume ("WQv") by application of RR techniques and standard SMPs with RRv capacity. The total WQv shall be calculated in accordance with the criteria in Section 4.2 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: Construction activities that cannot meet the criteria in Part I.C.2.a.(i) of this permit due to site limitations shall direct runoff from all newly constructed impervious areas to a RR technique or standard SMP with RRv capacity unless infeasible. The specific site limitations that prevent the reduction of 100% of the WQv shall be documented in the SWPPP.

For each impervious area that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered infeasible.

In no case shall the runoff reduction achieved from the newly constructed impervious areas be less than the Minimum RRv as calculated using the criteria in Section 4.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume ("Cpv"): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site discharges directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria ("Qp"): Requires storage to attenuate the post-development 10-year, 24-hour peak discharge rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria ("Qf"): Requires storage to attenuate the post-development 100-year, 24-hour peak discharge rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

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

(i) Runoff Reduction Volume (RRv): Reduce the total Water Quality Volume (WQv) by application of RR techniques and standard SMPs with RRv capacity. The total WQv is the runoff volume from the 1-year, 24 hour design storm over the post-developed watershed and shall be calculated in accordance with the criteria in Section 10.3 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.b.(i) of this permit due to *site limitations* shall direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv shall be documented in the SWPPP. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible.*

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

(iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site *discharge*s directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

c. Sizing Criteria for Redevelopment Activity

(i) Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.

(1) Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the Design Manual must be applied to all newly created pervious areas, or

(2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or

(3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or

(4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

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

(ii) Channel Protection Volume (Cpv): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

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

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

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

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

D. Maintaining Water Quality

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

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

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

If there is evidence indicating that despite compliance with the terms and conditions of this general permit it is demonstrated that the stormwater *discharge*s authorized by this permit are causing or contributing to a violation of *water quality standards*, or if the Department determines that a modification of the permit is necessary to prevent a violation of *water quality standards*, the authorized *discharge*s will no longer be eligible for coverage under this permit. The Department may require the *owner or operator* to obtain an individual SPDES permit to continue discharging.

E. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph F. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater *discharge*s; including stormwater runoff, snowmelt runoff, and surface runoff and drainage, from *construction activities*.

3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater discharges are authorized by this permit: those listed in 6 NYCRR 750-1.2(a)(29)(vi), with the following exception: "Discharges from firefighting activities are authorized only when the firefighting activities are emergencies/unplanned"; waters to which other components have not been added that are used to control dust in accordance with the SWPPP; and uncontaminated *discharge*s from *construction site* de-watering operations. All non-stormwater discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.

4. The *owner or operator* must maintain permit eligibility to *discharge* under this permit. Any *discharges* that are not compliant with the eligibility conditions of this permit are not authorized by the permit and the *owner or operator* must either apply for a separate permit to cover those ineligible *discharges* or take steps necessary to make the *discharge* eligible for coverage.

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

All of the following are **<u>not</u>** authorized by this permit:

1. *Discharge*s after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharge*s that are mixed with sources of non-stormwater other than those expressly authorized under subsection E.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII.K. of this permit;

4. *Construction activities* or *discharges* from *construction activities* that may adversely affect an *endangered or threatened species* unless the *owner or*

operator has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.D.2 of this permit;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects:

    a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

    b. Which are undertaken on land with no existing *impervious cover*; and

    c. Which disturb one (1) or more acres of land designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

7. *Construction activities* for linear transportation projects and linear utility projects:

    a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

    b. Which are undertaken on land with no existing *impervious cover*; and

    c. Which disturb two (2) or more acres of land designated on the current USDA Soil Survey as Soil Slope Phase "D" (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.D.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:

    a. Documentation that the *construction activity* is not within an archeologically sensitive area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the *construction site* within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the *construction site* within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant.

        - 1-5 acres of disturbance - 20 feet
        - 5-20 acres of disturbance - 50 feet
        - 20+ acres of disturbance - 100 feet, or

    b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
        (i) the State Environmental Quality Review (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or
        (ii) documentation from OPRHP that the *construction activity* will result in No Impact; or
        (iii) documentation from OPRHP providing a determination of No Adverse Impact; or
        (iv) a Letter of Resolution signed by the owner/operator, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA); or

    c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:

(i) No Affect
(ii) No Adverse Affect
(iii) Executed Memorandum of Agreement, or

d. Documentation that:

(i) SHPA Section 14.09 has been completed by NYS DEC or another state agency.

9. *Discharge*s from *construction activities* that are subject to an existing SPDES individual or general permit where a SPDES permit for *construction activity* has been terminated or denied; or where the *owner or operator* has failed to renew an expired individual permit.

Part II. PERMIT COVERAGE

A. How to Obtain Coverage

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a regulated, traditional land use control MS4 must first prepare a SWPPP in accordance with all applicable requirements of this permit and then submit a completed Notice of Intent (NOI) to the Department to be authorized to discharge under this permit.

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

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

B. Notice of Intent (NOI) Submittal

1. Prior to December 21, 2020, an owner or operator shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (http://www.dec.ny.gov/). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address:

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

2. Beginning December 21, 2020 and in accordance with EPA's 2015 NPDES Electronic Reporting Rule (40 CFR Part 127), the *owner or operator* must submit the NOI electronically using the *Department's* online NOI.

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

C. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:

   a. project review pursuant to the State Environmental Quality Review Act ("SEQRA") have been satisfied, when SEQRA is applicable. See the Department's website (http://www.dec.ny.gov/) for more information,

   b. where required, all necessary Department permits subject to the *Uniform Procedures Act ("UPA")* (see 6 NYCRR Part 621), or the equivalent from another New York State agency, have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

c. the final SWPPP has been prepared, and

d. a complete NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.C.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

   a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:

      (i) Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.; or

      (ii) Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for *construction activities* with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C., the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, or;

      (iii) Ten (10) business days from the date the Department receives a complete paper version of the NOI for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

   (i) Five (5) business days from the date the Department receives both a complete electronic version of the NOI (eNOI) and signed "*MS4* SWPPP Acceptance" form, or

   (ii) Ten (10) business days from the date the Department receives both a complete paper version of the NOI and signed "MS4 SWPPP Acceptance" form.

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

D. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination ("NOT") has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4. of this permit.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-20-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, responsible contractor's or subcontractor's certification statement (see Part III.A.6.), and all documentation necessary to demonstrate eligibility with this permit at the *construction site* until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land* *use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

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

b. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.

c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

d. The *owner or operator* shall install any additional site-specific practices needed to protect water quality.

e. The *owner or operator* shall include the requirements above in their SWPPP.

4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements or consistent with Part VII.K..

5. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

6. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the

regulated, traditional land use control MS4 in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *regulated, traditional land use control MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *regulated, traditional land use control MS4* prior to commencing construction of the post-construction stormwater management practice.

E. Permit Coverage for Discharges Authorized Under GP-0-15-002

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-15-002), an *owner or operator* of *a construction activity* with coverage under GP-0-15-002, as of the effective date of GP- 0-20-001, shall be authorized to *discharge* in accordance with GP- 0-20-001, unless otherwise notified by the Department.

   An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-20-001.

F. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. For *construction activities* subject to the requirements of a *regulated, traditional land use control MS4,* the original *owner or operator* must also notify the MS4, in writing, of the change in ownership at least 30 calendar days prior to the change in ownership.

2. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.B.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

3. Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or*

operator was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. A SWPPP shall be prepared and implemented by the *owner or operator* of each *construction activity* covered by this permit. The SWPPP must document the selection, design, installation, implementation and maintenance of the control measures and practices that will be used to meet the effluent limitations in Part I.B. of this permit and where applicable, the post-construction stormwater management practice requirements in Part I.C. of this permit. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*. A copy of the completed, final NOI shall be included in the SWPPP.

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the *pollutants* in stormwater *discharges* and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP, including construction drawings:

    a. whenever the current provisions prove to be ineffective in minimizing *pollutants* in stormwater *discharges* from the site;

b. whenever there is a change in design, construction, or operation at the *construction site* that has or could have an effect on the *discharge* of *pollutants*;

c. to address issues or deficiencies identified during an inspection by the *qualified inspector,* the Department or other regulatory authority; and

d. to document the final construction conditions.

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

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

   The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

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

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

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

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

   a. Background information about the scope of the project, including the location, type and size of project

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); floodplain/floodway boundaries; wetlands and drainage patterns that could be affected by the *construction activity*; existing and final contours ; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater *discharge*(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of *construction activities*, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each *construction activity* that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a *pollutant* source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the *construction site*; and

l. Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

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

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

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

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project. Include the dimensions, material specifications and installation details for each post-construction stormwater management practice;

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. A Stormwater Modeling and Analysis Report that includes:
   (i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points;

   (ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;

   (iii) Results of stormwater modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre and post-development runoff rates and volumes for the different storm events;

   (iv) Summary table, with supporting calculations, which demonstrates that each post-construction stormwater management practice has been designed in conformance with the *sizing criteria* included in the Design Manual;

   (v) Identification of any *sizing criteria* that is not required based on the requirements included in Part I.C. of this permit; and

   (vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the Design Manual. Include the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the Design Manual;

d. Soil testing results and locations (test pits, borings);

e. Infiltration test results, when required; and

f. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the applicable *sizing criteria* in Part I.C.2. b., c. or d. of this permit and the *performance criteria,* Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.f. above.

C. Required SWPPP Components by Project Type

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

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices (including pollution prevention measures) and all post-construction stormwater management practices identified in the SWPPP are inspected and maintained in accordance with Part IV.B. and C. of this permit.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York or protect the public health and safety and/or the environment.

B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity* identified in Tables 1 and 2 of Appendix B shall have a *trained contractor* inspect the erosion and sediment control practices and pollution prevention measures being implemented within the active work area daily to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, the contractor shall

begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *trained contractor* can stop conducting the maintenance inspections. The *trained contractor* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. of this permit as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *trained contractor* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

C. Qualified Inspector Inspection Requirements

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

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

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

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, <u>with the exception of</u>:

    a. the construction of a single family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;

b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;

c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

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

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.D.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed; and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.B.1 of this permit.

e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site*, and all points of *discharge* from the *construction site*.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

a. Date and time of inspection;

b. Name and title of person(s) performing inspection;

c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

d. A description of the condition of the runoff at all points of *discharge* from the *construction site*. This shall include identification of any *discharges* of sediment from the *construction site*. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site* which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

f. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance;

g. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

h. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection;

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s);

k. Identification and status of all corrective actions that were required by previous inspection; and

l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.D.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

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

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All *construction activity* identified in the SWPPP has been completed; <u>and</u> all areas of disturbance have achieved *final stabilization*; <u>and</u> all temporary, structural erosion and sediment control measures have been removed; <u>and</u> all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.F. of this permit.

d. The *owner or operator* obtains coverage under an alternative SPDES general permit or an individual SPDES permit.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *regulated, traditional land use control MS4* sign the "MS4 Acceptance" statement on the NOT in accordance with the requirements in Part VII.H. of this permit. The *regulated, traditional land use control MS4* official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The *regulated, traditional land use control MS4* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector*'s final site inspection certification(s) required in Part V.A.3. of this permit.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has a mechanism in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the *owner or operator's* deed of record,

d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university, hospital), government agency or authority, or public utility; the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION RECORDS

A. Record Retention

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

B. Addresses

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

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water

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

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

B. Continuation of the Expired General Permit

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

C. Enforcement

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

D. Need to Halt or Reduce Activity Not a Defense

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

E. Duty to Mitigate

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

F. Duty to Provide Information

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

G. Other Information

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

H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:

    a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

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

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

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

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

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

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

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

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

c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

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

I. Property Rights

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

J. Severability

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

K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any owner or operator authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall

include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the owner or operator to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from owner or operator receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

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

L. Proper Operation and Maintenance

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

M. Inspection and Entry

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

1. Enter upon the owner’s or operator's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.

4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

N. Permit Actions

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

O. Definitions

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

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with construction activity covered by this permit, the owner or operator of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Any Department initiated permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports

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

R. Other Permits

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

APPENDIX A – Acronyms and Definitions

Acronyms

APO – Agency Preservation Officer
BMP – Best Management Practice
CPESC – Certified Professional in Erosion and Sediment Control
Cpv – Channel Protection Volume
CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq)
DOW – Division of Water
EAF – Environmental Assessment Form
ECL - Environmental Conservation Law
EPA – U. S. Environmental Protection Agency
HSG – Hydrologic Soil Group
MS4 – Municipal Separate Storm Sewer System
NOI – Notice of Intent
NOT – Notice of Termination
NPDES – National Pollutant Discharge Elimination System
OPRHP – Office of Parks, Recreation and Historic Places
Qf – Extreme Flood
Qp – Overbank Flood
RRv – Runoff Reduction Volume
RWE – Regional Water Engineer
SEQR – State Environmental Quality Review
SEQRA - State Environmental Quality Review Act
SHPA – State Historic Preservation Act
SPDES – State Pollutant Discharge Elimination System
SWPPP – Stormwater Pollution Prevention Plan
TMDL – Total Maximum Daily Load
UPA – Uniform Procedures Act
USDA – United States Department of Agriculture
WQv – Water Quality Volume

Definitions

All definitions in this section are solely for the purposes of this permit.

Agricultural Building – a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products; excluding any structure designed, constructed or used, in whole or in part, for human habitation, as a place of employment where agricultural products are processed, treated or packaged, or as a place used by the public.

Agricultural Property –means the land for construction of a barn, *agricultural building*, silo, stockyard, pen or other structural practices identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" prepared by the Department in cooperation with agencies of New York Nonpoint Source Coordinating Committee (dated June 2007).

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

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

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

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

Construction Site – means the land area where *construction activity(ies)* will occur. See definition for "*Commence (Commencement of) Construction Activities"* and "*Larger Common Plan of Development or Sale" also.*

Dewatering – means the act of draining rainwater and/or groundwater from building foundations, vaults or excavations/trenches.

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

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

Embankment –means an earthen or rock slope that supports a road/highway.

Endangered or Threatened Species – see 6 NYCRR Part 182 of the Department's rules and regulations for definition of terms and requirements.

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

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

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

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

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

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

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

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

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

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

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

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

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

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

Natural Buffer –means an undisturbed area with natural cover running along a surface water (e.g. wetland, stream, river, lake, etc.).

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

New York State Erosion and Sediment Control Certificate Program – a certificate program that establishes and maintains a process to identify and recognize individuals who are capable of developing, designing, inspecting and maintaining erosion and sediment control plans on projects that disturb soils in New York State. The certificate program is administered by the New York State Conservation District Employees Association.

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

Nonpoint Source - means any source of water pollution or pollutants which is not a discrete conveyance or *point source* permitted pursuant to Title 7 or 8 of Article 17 of the Environmental Conservation Law (see ECL Section 17-1403).

Overbank –means flow events that exceed the capacity of the stream channel and spill out into the adjacent floodplain.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the *construction activity* is occurring; an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications; and/or an entity that has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

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

Point Source - means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or landfill leachate collection system from which *pollutants* are or may be discharged.

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

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

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

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

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

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

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

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is authorized to discharge under New York State DEC's

SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s) or the City of New York's Individual SPDES Permit for their Municipal Separate Storm Sewer Systems (NY-0287890).

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

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

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

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

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

Steep Slope – means land area designated on the current United States Department of Agriculture (“USDA”) Soil Survey as Soil Slope Phase “D”, (provided the map unit name is inclusive of slopes greater than 25%) , or Soil Slope Phase E or F, (regardless of the map unit name), or a combination of the three designations.

Streambank – as used in this permit, means the terrain alongside the bed of a creek or stream. The bank consists of the sides of the channel, between which the flow is confined.

Stormwater Pollution Prevention Plan (SWPPP) – means a project specific report, including construction drawings, that among other things: describes the construction activity(ies), identifies the potential sources of pollution at the *construction site*; describes and shows the stormwater controls that will be used to control the pollutants (i.e. erosion and sediment controls; for many projects, includes post-construction stormwater management controls); and identifies procedures the *owner or operator* will implement to comply with the terms and conditions of the permit. See Part III of the permit for a complete description of the information that must be included in the SWPPP.

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

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

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

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

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

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

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

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

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

APPENDIX B – Required SWPPP Components by Project Type

Table 1
Construction Activities that Require the Preparation of a SWPPP That Only Includes Erosion and Sediment Controls

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres: • Single family home not located in one of the watersheds listed in Appendix C or not *directly discharging* to one of the 303(d) segments listed in Appendix E • Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E • Construction of a barn or other *agricultural building*, silo, stock yard or pen.
The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land: All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.
The following construction activities that involve soil disturbances of one (1) or more acres of land: • Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains • Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects • Pond construction • Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover • Cross-country ski trails and walking/hiking trails • Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development; • Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path or walking path. • Slope stabilization projects • Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics

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

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

- Spoil areas that will be covered with vegetation
- Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that *alter hydrology from pre to post development* conditions,
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* <u>and</u> do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established, and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of greater than five acres and construction activities that include the construction or reconstruction of impervious area
- Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete

Table 2

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

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

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family home that disturbs five (5) or more acres of land
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Breweries, cideries, and wineries, including establishments constructed on agricultural land
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other *agricultural building* (e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional development; includes hospitals, prisons, schools and colleges
- Industrial facilities; includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's, water treatment plants, and water storage tanks
- Office complexes
- Playgrounds that include the construction or reconstruction of impervious area
- Sports complexes
- Racetracks; includes racetracks with earthen (dirt) surface
- Road construction or reconstruction, including roads constructed as part of the construction activities listed in Table 1

Table 2 (Continued)

Construction Activities that Require the Preparation of a SWPPP That Includes Post-construction Stormwater Management Practices

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

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- All other construction activities that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C – Watersheds Requiring Enhanced Phosphorus Removal

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

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

Figure 1 - New York City Watershed East of the Hudson

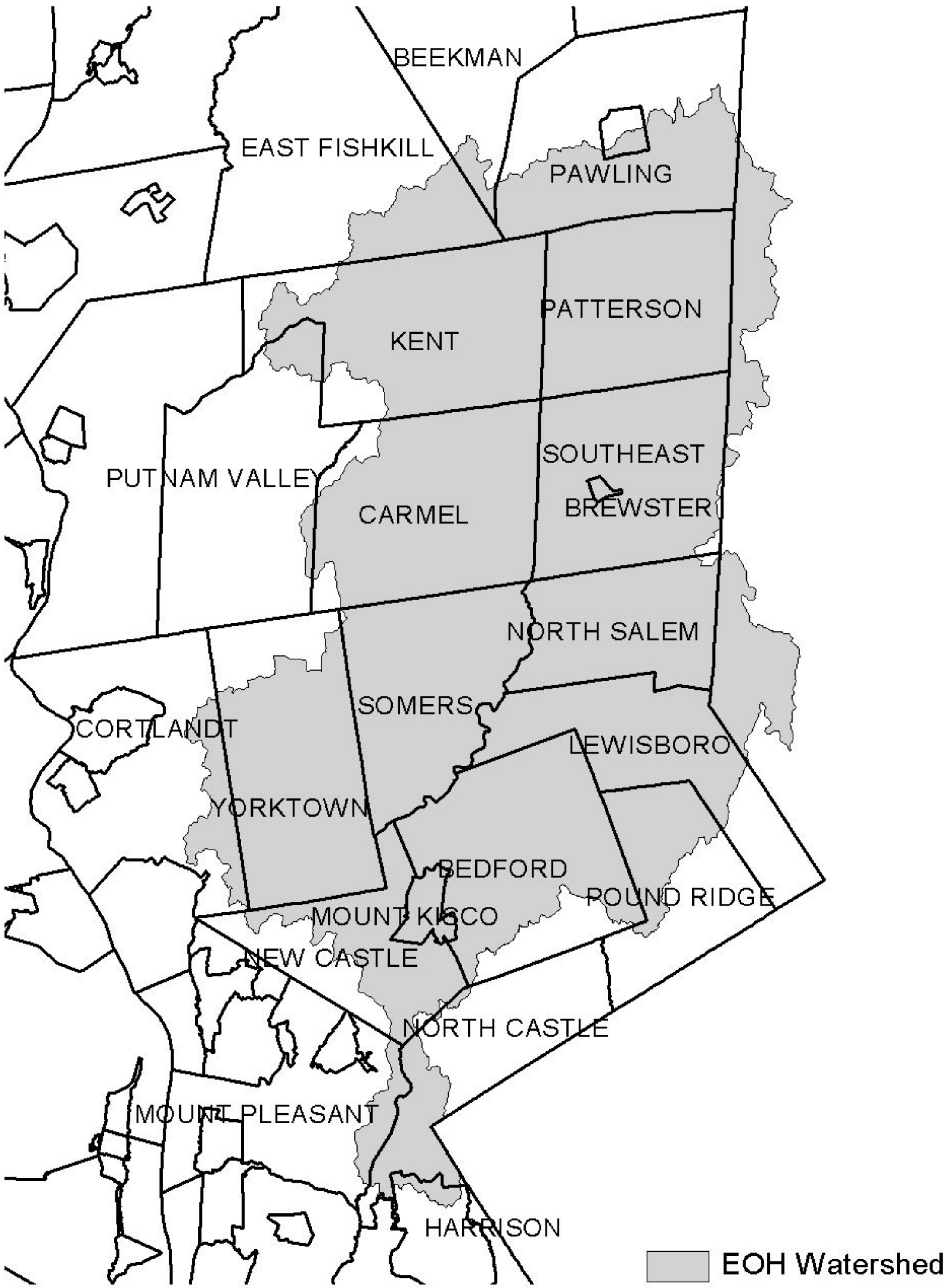
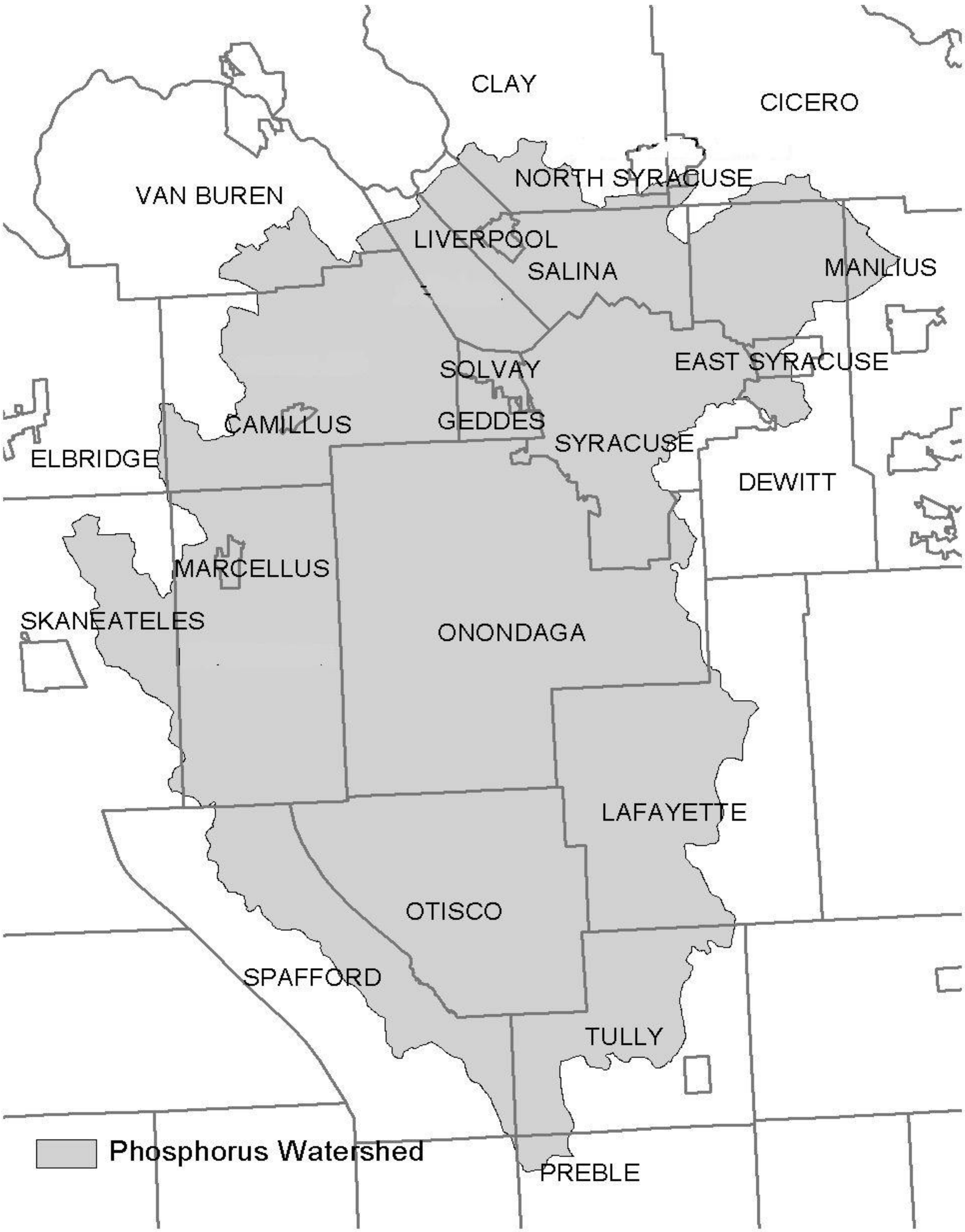


Figure 2 - Onondaga Lake Watershed



<u>Figure 3 - Greenwood Lake Watershed</u>

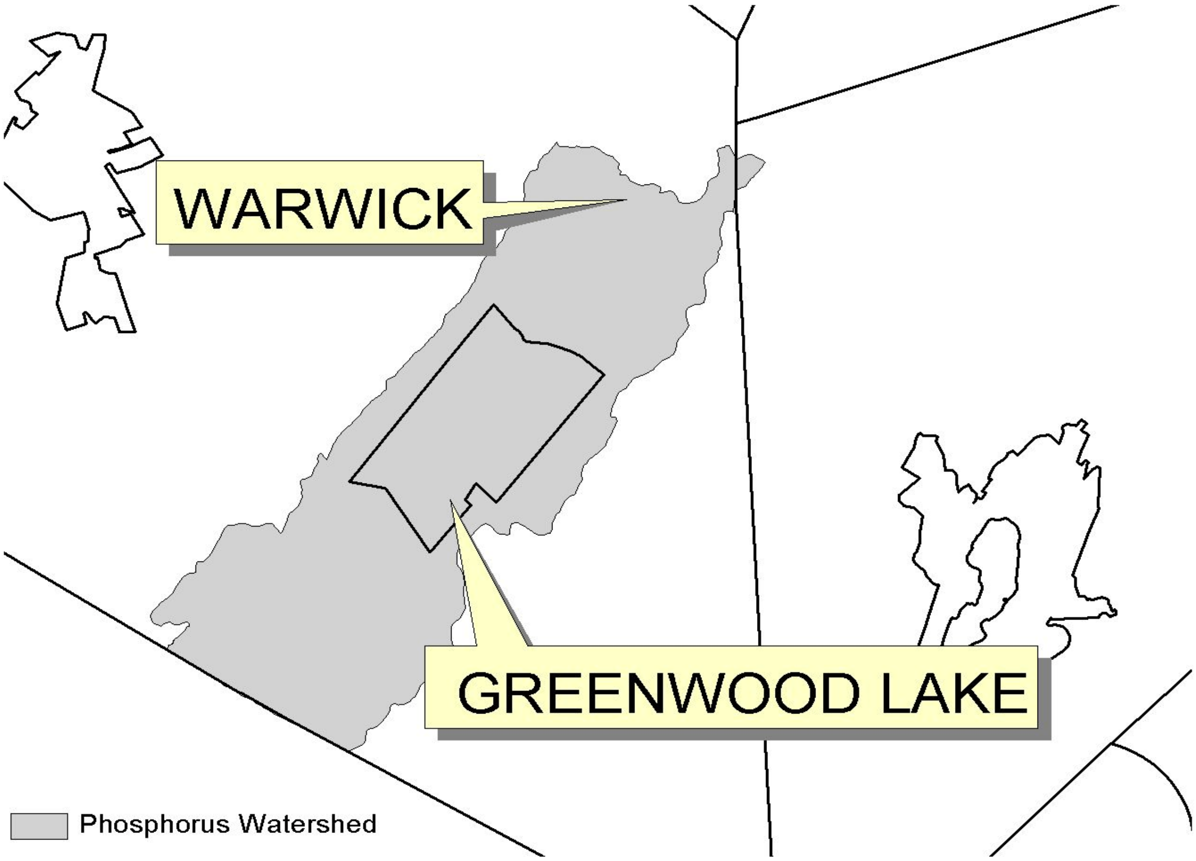


Figure 4 - Oscawana Lake Watershed

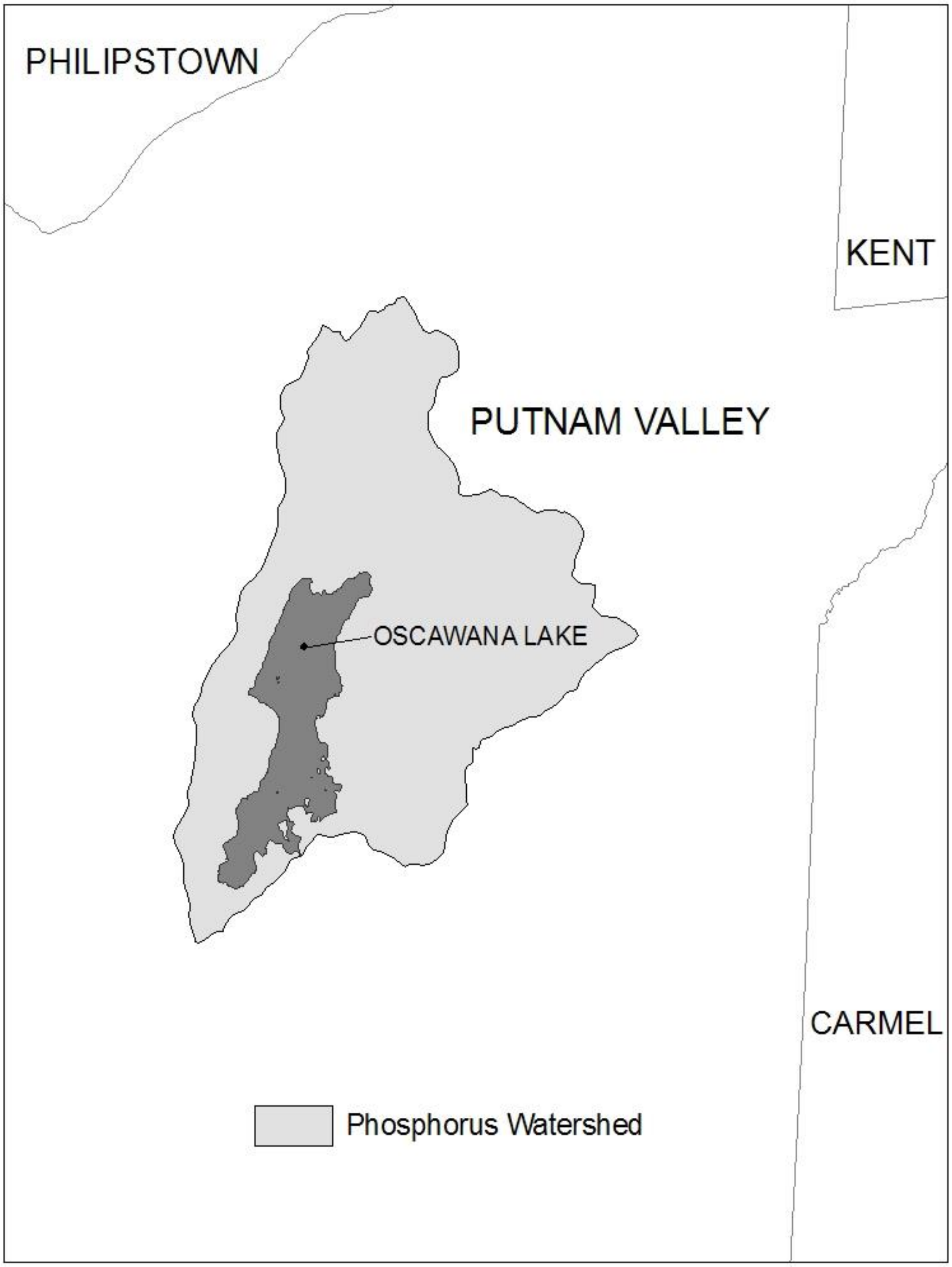
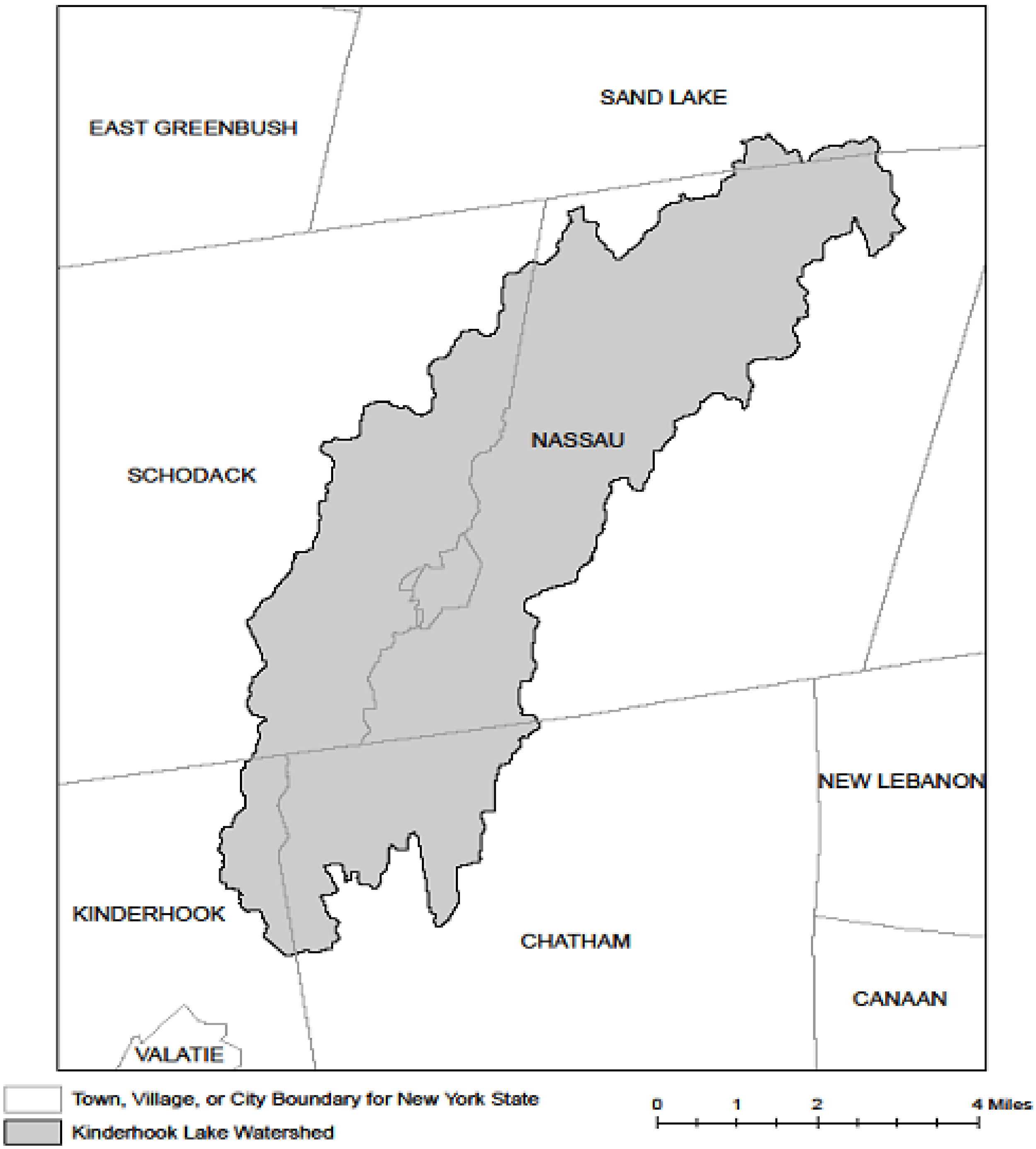


Figure 5 - Kinderhook Lake Watershed



APPENDIX D – Watersheds with Lower Disturbance Threshold

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

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

APPENDIX E – 303(d) Segments Impaired by Construction Related Pollutant(s)

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). The list was developed using ”The Final New York State 2016 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy” dated November 2016. *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual (“Design Manual”), dated January 2015.

COUNTY	WATERBODY	POLLUTANT
Albany	Ann Lee (Shakers) Pond, Stump Pond	Nutrients
Albany	Basic Creek Reservoir	Nutrients
Allegany	Amity Lake, Saunders Pond	Nutrients
Bronx	Long Island Sound, Bronx	Nutrients
Bronx	Van Cortlandt Lake	Nutrients
Broome	Fly Pond, Deer Lake, Sky Lake	Nutrients
Broome	Minor Tribs to Lower Susquehanna (north)	Nutrients
Broome	Whitney Point Lake/Reservoir	Nutrients
Cattaraugus	Allegheny River/Reservoir	Nutrients
Cattaraugus	Beaver (Alma) Lake	Nutrients
Cattaraugus	Case Lake	Nutrients
Cattaraugus	Linlyco/Club Pond	Nutrients
Cayuga	Duck Lake	Nutrients
Cayuga	Little Sodus Bay	Nutrients
Chautauqua	Bear Lake	Nutrients
Chautauqua	Chadakoin River and tribs	Nutrients
Chautauqua	Chautauqua Lake, North	Nutrients
Chautauqua	Chautauqua Lake, South	Nutrients
Chautauqua	Findley Lake	Nutrients
Chautauqua	Hulburt/Clymer Pond	Nutrients
Clinton	Great Chazy River, Lower, Main Stem	Silt/Sediment
Clinton	Lake Champlain, Main Lake, Middle	Nutrients
Clinton	Lake Champlain, Main Lake, North	Nutrients
Columbia	Kinderhook Lake	Nutrients
Columbia	Robinson Pond	Nutrients
Cortland	Dean Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Dutchess	Fall Kill and tribs	Nutrients
Dutchess	Hillside Lake	Nutrients
Dutchess	Wappingers Lake	Nutrients
Dutchess	Wappingers Lake	Silt/Sediment
Erie	Beeman Creek and tribs	Nutrients
Erie	Ellicott Creek, Lower, and tribs	Silt/Sediment
Erie	Ellicott Creek, Lower, and tribs	Nutrients
Erie	Green Lake	Nutrients
Erie	Little Sister Creek, Lower, and tribs	Nutrients
Erie	Murder Creek, Lower, and tribs	Nutrients
Erie	Rush Creek and tribs	Nutrients
Erie	Scajaquada Creek, Lower, and tribs	Nutrients
Erie	Scajaquada Creek, Middle, and tribs	Nutrients
Erie	Scajaquada Creek, Upper, and tribs	Nutrients
Erie	South Branch Smoke Cr, Lower, and tribs	Silt/Sediment
Erie	South Branch Smoke Cr, Lower, and tribs	Nutrients
Essex	Lake Champlain, Main Lake, South	Nutrients
Essex	Lake Champlain, South Lake	Nutrients
Essex	Willsboro Bay	Nutrients
Genesee	Bigelow Creek and tribs	Nutrients
Genesee	Black Creek, Middle, and minor tribs	Nutrients
Genesee	Black Creek, Upper, and minor tribs	Nutrients
Genesee	Bowen Brook and tribs	Nutrients
Genesee	LeRoy Reservoir	Nutrients
Genesee	Oak Orchard Cr, Upper, and tribs	Nutrients
Genesee	Tonawanda Creek, Middle, Main Stem	Nutrients
Greene	Schoharie Reservoir	Silt/Sediment
Greene	Sleepy Hollow Lake	Silt/Sediment
Herkimer	Steele Creek tribs	Silt/Sediment
Herkimer	Steele Creek tribs	Nutrients
Jefferson	Moon Lake	Nutrients
Kings	Hendrix Creek	Nutrients
Kings	Prospect Park Lake	Nutrients
Lewis	Mill Creek/South Branch, and tribs	Nutrients
Livingston	Christie Creek and tribs	Nutrients
Livingston	Conesus Lake	Nutrients
Livingston	Mill Creek and minor tribs	Silt/Sediment
Monroe	Black Creek, Lower, and minor tribs	Nutrients
Monroe	Buck Pond	Nutrients
Monroe	Cranberry Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Monroe	Lake Ontario Shoreline, Western	Nutrients
Monroe	Long Pond	Nutrients
Monroe	Mill Creek and tribs	Nutrients
Monroe	Mill Creek/Blue Pond Outlet and tribs	Nutrients
Monroe	Minor Tribs to Irondequoit Bay	Nutrients
Monroe	Rochester Embayment - East	Nutrients
Monroe	Rochester Embayment - West	Nutrients
Monroe	Shipbuilders Creek and tribs	Nutrients
Monroe	Thomas Creek/White Brook and tribs	Nutrients
Nassau	Beaver Lake	Nutrients
Nassau	Camaans Pond	Nutrients
Nassau	East Meadow Brook, Upper, and tribs	Silt/Sediment
Nassau	East Rockaway Channel	Nutrients
Nassau	Grant Park Pond	Nutrients
Nassau	Hempstead Bay	Nutrients
Nassau	Hempstead Lake	Nutrients
Nassau	Hewlett Bay	Nutrients
Nassau	Hog Island Channel	Nutrients
Nassau	Long Island Sound, Nassau County Waters	Nutrients
Nassau	Massapequa Creek and tribs	Nutrients
Nassau	Milburn/Parsonage Creeks, Upp, and tribs	Nutrients
Nassau	Reynolds Channel, west	Nutrients
Nassau	Tidal Tribs to Hempstead Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Silt/Sediment
Nassau	Tribs to Smith/Halls Ponds	Nutrients
Nassau	Woodmere Channel	Nutrients
New York	Harlem Meer	Nutrients
New York	The Lake in Central Park	Nutrients
Niagara	Bergholtz Creek and tribs	Nutrients
Niagara	Hyde Park Lake	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Oneida	Ballou, Nail Creeks and tribs	Nutrients
Onondaga	Harbor Brook, Lower, and tribs	Nutrients
Onondaga	Ley Creek and tribs	Nutrients
Onondaga	Minor Tribs to Onondaga Lake	Nutrients
Onondaga	Ninemile Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Middle, and tribs	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Onondaga	Onondaga Lake, northern end	Nutrients
Onondaga	Onondaga Lake, southern end	Nutrients
Ontario	Great Brook and minor tribs	Silt/Sediment
Ontario	Great Brook and minor tribs	Nutrients
Ontario	Hemlock Lake Outlet and minor tribs	Nutrients
Ontario	Honeoye Lake	Nutrients
Orange	Greenwood Lake	Nutrients
Orange	Monhagen Brook and tribs	Nutrients
Orange	Orange Lake	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Oswego	Lake Neatahwanta	Nutrients
Oswego	Pleasant Lake	Nutrients
Putnam	Bog Brook Reservoir	Nutrients
Putnam	Boyd Corners Reservoir	Nutrients
Putnam	Croton Falls Reservoir	Nutrients
Putnam	Diverting Reservoir	Nutrients
Putnam	East Branch Reservoir	Nutrients
Putnam	Lake Carmel	Nutrients
Putnam	Middle Branch Reservoir	Nutrients
Putnam	Oscawana Lake	Nutrients
Putnam	Palmer Lake	Nutrients
Putnam	West Branch Reservoir	Nutrients
Queens	Bergen Basin	Nutrients
Queens	Flushing Creek/Bay	Nutrients
Queens	Jamaica Bay, Eastern, and tribs (Queens)	Nutrients
Queens	Kissena Lake	Nutrients
Queens	Meadow Lake	Nutrients
Queens	Willow Lake	Nutrients
Rensselaer	Nassau Lake	Nutrients
Rensselaer	Snyders Lake	Nutrients
Richmond	Grasmere Lake/Bradys Pond	Nutrients
Rockland	Congers Lake, Swartout Lake	Nutrients
Rockland	Rockland Lake	Nutrients
Saratoga	Ballston Lake	Nutrients
Saratoga	Dwaas Kill and tribs	Silt/Sediment
Saratoga	Dwaas Kill and tribs	Nutrients
Saratoga	Lake Lonely	Nutrients
Saratoga	Round Lake	Nutrients
Saratoga	Tribs to Lake Lonely	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Schenectady	Collins Lake	Nutrients
Schenectady	Duane Lake	Nutrients
Schenectady	Mariaville Lake	Nutrients
Schoharie	Engleville Pond	Nutrients
Schoharie	Summit Lake	Nutrients
Seneca	Reeder Creek and tribs	Nutrients
St.Lawrence	Black Lake Outlet/Black Lake	Nutrients
St.Lawrence	Fish Creek and minor tribs	Nutrients
Steuben	Smith Pond	Nutrients
Suffolk	Agawam Lake	Nutrients
Suffolk	Big/Little Fresh Ponds	Nutrients
Suffolk	Canaan Lake	Silt/Sediment
Suffolk	Canaan Lake	Nutrients
Suffolk	Flanders Bay, West/Lower Sawmill Creek	Nutrients
Suffolk	Fresh Pond	Nutrients
Suffolk	Great South Bay, East	Nutrients
Suffolk	Great South Bay, Middle	Nutrients
Suffolk	Great South Bay, West	Nutrients
Suffolk	Lake Ronkonkoma	Nutrients
Suffolk	Long Island Sound, Suffolk County, West	Nutrients
Suffolk	Mattituck (Marratooka) Pond	Nutrients
Suffolk	Meetinghouse/Terrys Creeks and tribs	Nutrients
Suffolk	Mill and Seven Ponds	Nutrients
Suffolk	Millers Pond	Nutrients
Suffolk	Moriches Bay, East	Nutrients
Suffolk	Moriches Bay, West	Nutrients
Suffolk	Peconic River, Lower, and tidal tribs	Nutrients
Suffolk	Quantuck Bay	Nutrients
Suffolk	Shinnecock Bay and Inlet	Nutrients
Suffolk	Tidal tribs to West Moriches Bay	Nutrients
Sullivan	Bodine, Montgomery Lakes	Nutrients
Sullivan	Davies Lake	Nutrients
Sullivan	Evens Lake	Nutrients
Sullivan	Pleasure Lake	Nutrients
Tompkins	Cayuga Lake, Southern End	Nutrients
Tompkins	Cayuga Lake, Southern End	Silt/Sediment
Tompkins	Owasco Inlet, Upper, and tribs	Nutrients
Ulster	Ashokan Reservoir	Silt/Sediment
Ulster	Esopus Creek, Upper, and minor tribs	Silt/Sediment
Warren	Hague Brook and tribs	Silt/Sediment

303(d) Segments Impaired by Construction Related Pollutant(s)

Warren	Huddle/Finkle Brooks and tribs	Silt/Sediment
Warren	Indian Brook and tribs	Silt/Sediment
Warren	Lake George	Silt/Sediment
Warren	Tribs to L.George, Village of L George	Silt/Sediment
Washington	Cossayuna Lake	Nutrients
Washington	Lake Champlain, South Bay	Nutrients
Washington	Tribs to L.George, East Shore	Silt/Sediment
Washington	Wood Cr/Champlain Canal and minor tribs	Nutrients
Wayne	Port Bay	Nutrients
Westchester	Amawalk Reservoir	Nutrients
Westchester	Blind Brook, Upper, and tribs	Silt/Sediment
Westchester	Cross River Reservoir	Nutrients
Westchester	Lake Katonah	Nutrients
Westchester	Lake Lincolndale	Nutrients
Westchester	Lake Meahagh	Nutrients
Westchester	Lake Mohegan	Nutrients
Westchester	Lake Shenorock	Nutrients
Westchester	Long Island Sound, Westchester (East)	Nutrients
Westchester	Mamaroneck River, Lower	Silt/Sediment
Westchester	Mamaroneck River, Upper, and minor tribs	Silt/Sediment
Westchester	Muscoot/Upper New Croton Reservoir	Nutrients
Westchester	New Croton Reservoir	Nutrients
Westchester	Peach Lake	Nutrients
Westchester	Reservoir No.1 (Lake Isle)	Nutrients
Westchester	Saw Mill River, Lower, and tribs	Nutrients
Westchester	Saw Mill River, Middle, and tribs	Nutrients
Westchester	Sheldrake River and tribs	Silt/Sediment
Westchester	Sheldrake River and tribs	Nutrients
Westchester	Silver Lake	Nutrients
Westchester	Teatown Lake	Nutrients
Westchester	Titicus Reservoir	Nutrients
Westchester	Truesdale Lake	Nutrients
Westchester	Wallace Pond	Nutrients
Wyoming	Java Lake	Nutrients
Wyoming	Silver Lake	Nutrients

APPENDIX F – List of NYS DEC Regional Offices

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

Appendix 5 | Draft Notice of Intent (N.O.I.)

NOI for coverage under Stormwater General Permit for Construction Activity

version 1.35

(Submission #: HPR-5AVG-SN77Q, version 1)

Details

Submission Alias	Dolsontown East
Originally Started By	Cory Robinson
Alternate Identifier	DOLSONTOWN EAST
Submission ID	HPR-5AVG-SN77Q
Submission Reason	New
Status	Draft

Form Input

Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)
DOLSONTOWN ROAD EAST LLC

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
NEUMAN

Owner/Operator Contact Person First Name
ISAAC

Owner/Operator Mailing Address
1 International Boulevard, Suite 410

City
MAHWAH

State
NJ

Zip
07430

Phone
8452024900

Email
isaac@rdmgp.com

Federal Tax ID
NONE PROVIDED

Project Location

Project/Site Name
DOLSONTOWN EAST

Street Address (Not P.O. Box)
79 DOLSONTOWN RD

Side of Street
North

City/Town/Village (THAT ISSUES BUILDING PERMIT)
TOWN OF WAWAYANDA

State
NY

Zip
10973

DEC Region
3

County
ORANGE

Name of Nearest Cross Street
CASKEY LN

Distance to Nearest Cross Street (Feet)
700

Project In Relation to Cross Street
East

Tax Map Numbers Section-Block-Parcel
1-1-52.1 & 4.2, 6-1-3.2

Tax Map Numbers
NONE PROVIDED

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
41.42424518366621,-74.41736820160523

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
Pasture/Open Land

Post-Development Future Land Use
Commercial

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)
48.6

Total Area to be Disturbed (acres)
29.5

Existing Impervious Area to be Disturbed (acres)
0

Future Impervious Area Within Disturbed Area (acres)
20.6

5. Do you plan to disturb more than 5 acres of soil at any one time?
Yes

---

6. Indicate the percentage (%) of each Hydrologic Soil Group(HSG) at the site.

A (%)
9

B (%)
0

C (%)
0

D (%)
91

7. Is this a phased project?
Yes

8. Enter the planned start and end dates of the disturbance activities.

Start Date
07/01/2023

End Date
12/31/2025

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.
on site wetland

9a. Type of waterbody identified in question 9?
Wetland/State Jurisdiction On Site (Answer 9b)

Other Waterbody Type Off Site Description
NONE PROVIDED

9b. If "wetland" was selected in 9A, how was the wetland identified?
Delineated by Consultant

10. Has the surface waterbody(ies in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001?
Yes

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 D (provided the map unit name is inclusive of slopes greater than 25%), 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)?
No

16. What is the name of the municipality/entity that owns the separate storm sewer system?
NONE PROVIDED

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
Colliers Engineering & Design CT, PC

Contact Name (Last, Space, First)
Cory Robinson

Mailing Address
555 Hudson Valley Ave

City
New Windsor

State
NY

Zip
12553

Phone
845-564-4495

Email
cory.robinson@collierseng.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
Check Dams
Construction Road Stabilization
Dust Control
Sediment Basin
Sediment Traps
Silt Fence
Stabilized Construction Entrance
Storm Drain Inlet Protection
Temporary Swale

Biotechnical
Brush Matting

Vegetative Measures
Brush Matting
Mulching
Seeding
Temporary Swale
Topsoiling

Permanent Structural
Retaining Wall
Rock Outlet Protection
Diversion

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.
NONE PROVIDED

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)
2.31

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)
1.64

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)
0.456

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)
2.31

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).
3.95

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)
NONE PROVIDED

CPv Provided (acre-feet)
NONE PROVIDED

36a. The need to provide channel protection has been waived because:
Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

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)
65.9

Post-Development (CFS)
42.35

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)
161.57

Post-Development (CFS)
143.24

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
Dolsontown Road East LLC

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.
-The development proposed to stay away from the existing wetlands on-site, limiting the areas where storm water mitigation practices could be proposed.
-Shallow groundwater or unfavorable infiltration rates exist in some of the lower areas of the site limited available area for infiltration practices.

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)
15.18

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)
5.42

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

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?
Yes - Please attach the MS4 Acceptance form below

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?
No

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

Appendix 6 | Draft Notice of Termination (N.O.T.)

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

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

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information

1. Owner/Operator Name: Dolsontown Road East LLC

2. Street Address: 1 International Boulevard, Suite 410

3. City/State/Zip: Mahwah, NJ 07430

4. Contact Person: Isaac Neuman | 4a.Telephone: 845-202-4900

4b. Contact Person E-Mail: isaac@rdmgp.com

II. Project Site Information

5. Project/Site Name: Dolsontown East

6. Street Address: 79 Dolsontown Road

7. City/Zip: Wawayanda NY, 10973

8. County: Orange

III. Reason for Termination

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

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

9c. □ Other (Explain on Page 2)

IV. Final Site Information:

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

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

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

____

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

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

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

□ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

□ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

□ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

□ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

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

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? □ yes □ no

(If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation:

(Use this section to answer questions 9c. and 10b., if applicable)

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

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

Printed Name:	
Title/Position:	
Signature:	Date:

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

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

Signature:	Date:

VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):
I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.
Printed Name:
Title/Position:

Signature:	Date:

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

Signature:	Date:

(NYS DEC Notice of Termination - January 2015)

Appendix 7 | Draft MS4 Acceptance Form

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

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Dolsontown Road East LLC
2. Contact Person:	Isaac Neuman
3. Street Address:	1 International Boulevard, Suite 410
4. City/State/Zip:	Mahwah, NJ 07430
II. Project Site Information	
5. Project/Site Name:	Dolsontown East
6. Street Address:	79 Dolsontown Road
7. City/State/Zip:	Town of Wawayanda, NY, 10973
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information	
8. SWPPP Reviewed by:	
9. Title/Position:	
10. Date Final SWPPP Reviewed and Accepted:	
IV. Regulated MS4 Information	
11. Name of MS4:	Town of Wawaynda
12. MS4 SPDES Permit Identification Number: NYR20A 279	
13. Contact Person:	Charles White
14. Street Address:	80 Ridgebury Hill Road
15. City/State/Zip:	Slate Hill, NY 10973
16. Telephone Number:	845 355 5700

MS4 SWPPP Acceptance Form - continued

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

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

Printed Name:

Title/Position:

Signature:

Date:

VI. Additional Information

Appendix 8 | NRCS Hydrologic Soil Mapping

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Orange County, New York

April 1, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

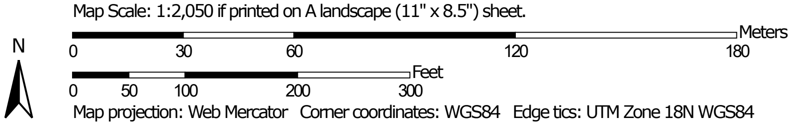
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:2,050 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Orange County, New York
Survey Area Data: Version 21, 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: Data not available.

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
ErB	Erie gravelly silt loam, 3 to 8 percent slopes	6.1	46.4%
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	0.7	5.2%
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes	6.4	48.4%
Totals for Area of Interest		**13.2**	**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.

Orange County, New York

ErB—Erie gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9vv9
Elevation: 100 to 1,390 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Erie and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Erie

Setting

Landform: Till plains, drumlinoid ridges, hills
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived from siltstone, sandstone, shale, and limestone

Typical profile

H1 - 0 to 9 inches: gravelly silt loam
H2 - 9 to 18 inches: channery silt loam
H3 - 18 to 54 inches: channery silt loam
H4 - 54 to 70 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 10 to 21 inches to fragipan
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Bath

Percent of map unit: 5 percent

Hydric soil rating: No

Mardin

Percent of map unit: 5 percent
Hydric soil rating: No

Alden

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Wurtsboro

Percent of map unit: 5 percent
Hydric soil rating: No

MdB—Mardin gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v30j
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Mardin

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Volusia

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Bath

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Mountaintop, interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

MdC—Mardin gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v30l
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Mardin

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Volusia

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Lordstown

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank, side slope, nose slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bath

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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Appendix 9 | Construction Site Log Book

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION SITE LOG BOOK

Table of Contents

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

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name ____

Permit No. ______________________ **Date of Authorization** ____________

Name of Operator ____

Prime Contractor ____

a. Preamble to Site Assessment and Inspections

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

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

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

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

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

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

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

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

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

b. Operators Certification

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

Name (please print): ______________________________

Title ______________________________ **Date:** ______________

Address: ______________________________

Phone: ______________ **Email:** ______________________________

Signature: ______________________________

c. Qualified Professional's Credentials & Certification

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

Name (please print): ______________________________

Title ______________________________ **Date:** ______________

Address: ______________________________

Phone: ______________ **Email:** ______________________________

Signature: ______________________________

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

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

Yes No NA

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

2. Resource Protection

Yes No NA

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

3. Surface Water Protection

Yes No NA

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

4. Stabilized Construction Entrance

Yes No NA

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

5. Perimeter Sediment Controls

Yes No NA

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

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

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

II. CONSTRUCTION DURATION INSPECTIONS

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

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

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

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

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

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

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

SITE PLAN/SKETCH

______________________________ ______________________________

Inspector (print name) **Date of Inspection**

______________________________ ______________________________

Qualified Professional (print name) **Qualified Professional Signature**

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

Maintaining Water Quality

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

Housekeeping

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

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

Runoff Control Practices

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

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

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

Runoff Control Practices (continued)

4. Stone Check Dam

Yes No NA

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

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

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

Yes No NA

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

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

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

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

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

Sediment accumulation is ___% of design capacity.

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

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

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

Modification & Reason:

Appendix 10 | NYSDEC Construction Stormwater Inspection Manual

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Construction Stormwater Inspection Manual

Primarily for Government Inspectors Evaluating Compliance with Construction Stormwater Control Requirements

New York State
Department of Environmental Conservation

TABLE OF CONTENTS

Version 1.05 (8/27/07)

ATTACHMENTS

1.0 INTRODUCTION AND PURPOSE

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

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

1.1 Compliance Inspections

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

Compliance inspectors will focus on determining whether:

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

1.1.1 Comprehensive Inspection

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

Comprehensive inspections should be conducted according to a neutral or random inspection scheme, or in accordance with established priorities.   A neutral monitoring scheme provides some objective basis for scheduling inspections and sampling visits by establishing a system (whether complex factor-based, alphabetic, or geographic) for setting prioritiesto ensure that a particular facility is not unfairly selected for inspection or sampling. The selection of which facility to inspect must be made without bias to ensure that the regulatory oversight authority, if challenged for being arbitrary and capricious manner, can reasonably defend itself.

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

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

1.1.2 Reconnaissance Inspection

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

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

1.2 Self-inspections

For some projects, the site owner/operator is required by their State Pollutant Discharge Elimination System (SPDES) Permit and/or local requirements to have a qualified professional[1] perform a "self-inspection" at the site. In self-inspections, the qualified professional determines whether the site is being managed in accordance with the SWPPP, and whether the SWPPP's recommended erosion and sediment controls are effective. If activities are not in accordance with the SWPPP, or if the SWPPP erosion and sediment controls are not effective, the qualified professional inspecting the site recommends corrections to the owner/operator.

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

2.0 PRE-INSPECTION ACTIVITIES

2.1 Regulatory Oversight Authorities

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

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

2.1.1 Communication

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

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

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

2.1.2 Documentation

Data Review
The inspector should review any available information such as:

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

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

Inspection Form

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

Credentials

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

2.1.3 Equipment

Personal Protective Equipment

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

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

- Hard hat (Class G, Type1 or better)
- Safety toe shoes
- Reflective vest
- Hearing protection (to achieve 85 dBA - 8 hr TWA)
- Safety glasses with side shields

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

Monitoring Equipment

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

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

2.2 Permittee's Self-inspection

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

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

3.0 ON-SITE INSPECTION PROCESS

3.1 Compliance Inspections

3.1.1 Professionalism

Don't Pretend to Possess Knowledge

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

Don't Recommend Solutions

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

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

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

3.1.2 Safety

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

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

Some general protections for construction sites are:

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

3.1.3 Legal access

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.1.6 Walk the Site

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

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

3.1.7 Taking Photographs

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

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

3.1.8 Exit Interview

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

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

3.2 Non-permitted Site Inspections

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

3.3 Self-inspections

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

It is <u>not</u> the role of the self-inspector to report directly to regulatory authorities.

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

3.3.1 Purpose

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

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

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

3.3.2 Pre-construction Conference

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

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

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

3.3.3 Inspection Preparation

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

3.3.4 Self-inspection Components

<u>Inspect installation, performance and maintenance of all E&SC practices</u>

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

<u>Identify site deficiencies and corrective measures</u>

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

4.0 POST-INSPECTION ACTIVITIES

4.1 Regulatory Oversight Authorities

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

4.1.1 Written Notification

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

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

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

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

4.1.2 Inspection Tracking

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

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

4.2 Permittee's Self-inspections

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

4.2.1 Written Records

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

4.2.2 Stormwater Pollution Prevention Plan Revisions

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

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

ATTACHMENT 1

Construction Stormwater Compliance Inspection Report

Project Name and Location:	Date:	Page 1 of 2
	Permit # (if any): **NYR**	
Municipality: County:	Entry Time:	Exit Time:
On-site Representative(s) and contact information:	Weather Conditions:	
Name and Address of SPDES Permittee/Title/Phone/Fax Numbers: Contacted: Yes ☐ No ☐		

INSPECTION CHECKLIST

SPDES Authority

	Yes	No	N/A		Law, rule or permit citation
1.	☐	☐	☐	Is a copy of the NOI posted at the construction site for public viewing?	
2.	☐	☐	☐	Is an up-to-date copy of the signed SWPPP retained at the construction site?	
3.	☐	☐	☐	Is a copy of the SPDES General Permit retained at the construction site?	

SWPPP Content

	Yes	No	N/A		Law, rule or permit citation
4.	☐	☐	☐	Does the SWPPP describe and identify the erosion & sediment control measures to be employed?	
5.	☐	☐	☐	Does the SWPPP provide a maintenance schedule for the erosion & sediment control measures?	
6.	☐	☐	☐	Does the SWPPP describe and identify the post-construction SW control measures to be employed?	
7.	☐	☐	☐	Does the SWPPP identify the contractor(s) and subcontractor(s) responsible for each measure?	
8.	☐	☐	☐	Does the SWPPP include all the necessary 'CONTRACTOR CERTIFICATION' statements?	
9.	☐	☐	☐	Is the SWPPP signed/certified by the permittee?	

Recordkeeping

	Yes	No	N/A		Law, rule or permit citation
10.	☐	☐	☐	Are inspections performed as required by the permit (every 7 days and after ½" rain event)?	
11.	☐	☐	☐	Are the site inspections performed by a qualified professional?	
12.	☐	☐	☐	Are all required reports properly signed/certified?	
13.	☐	☐	☐	Does the SWPPP include copies of the monthly/quarterly written summaries of compliance status?	

Visual Observations

	Yes	No	N/A		Law, rule or permit citation
14.	☐	☐	☐	Are all erosion and sediment control measures installed/constructed?	
15.	☐	☐	☐	Are all erosion and sediment control measures maintained properly?	
16.	☐	☐	☐	Have all disturbances of 5 acres or more been approved prior to the disturbance?	
17.	☐	☐	☐	Are stabilization measures initiated in inactive areas?	
18.	☐	☐	☐	Are permanent stormwater control measures implemented?	
19.	☐	☐	☐	Was there a discharge into the receiving water on the day of inspection?	
20.	☐	☐	☐	Are receiving waters free of there evidence of turbidity, sedimentation, or oil ? (If no , complete Page 2)	

Overall Inspection Rating: ❑ Satisfactory ❑ Marginal ❑ Unsatisfactory	
Name/Agency of Lead Inspector:	**Signature of Lead Inspector:**
Names/Agencies of Other Inspectors:	

Water Quality Observations

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

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

Describe any other water quality standards or permit violations ______________________________

Additional Comments:______________________________

☐ Photographs attached

ATTACHMENT 2

**** NOTICE ****

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

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

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

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

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

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

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

ATTACHMENT 3

<< Date >>

Mr. John Smith
123 Main Street
Ferracane, NY 12345

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

Dear Mr. Smith:

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

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

SPDES Authority

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

SWPPP Content

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

- In accordance with Part V.H.2. of the general permit, SWPPP's must be certified by the permittee. Your SWPPP was not certified by you. **Your failure to certify your SWPPP is a**

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

Recordkeeping

- In accordance with Parts III.D.3.a. and III.D.3.b. of the general permit, permittees must have a qualified professional conduct site inspections within 24 hours of the end of 0.5" or greater rain events and at least once per week. A review of your records revealed that your "self-inspections" are only being conducted about two or three times per month. **Your failure to have a qualified professional conduct inspections at the required frequency is a violation of Part III.D.3.b. of the general permit.** Please immediately direct your qualified professional to conduct your site inspections at the required frequency.

- Although the frequency of self-inspections does not meet rquirements, the quality of them is very good. Your qualified professional has accurately noted the same SWPPP deficiencies and necessary maintenance activities that I also observed, and prepared thorough sketches on the self-inspection site maps.

- In accordance with Part V.H.2. of the general permit, the permittee must certify all reports required by the permit. A review of your records showed that your self-inspection reports were not certified. **Your failure to certify your self-inspection reports is a violation of Part V.H.2. of the general permit.** Please sign and certify any and all existing and future self-inspection reports.

Visual Observations

- In accordance with Parts III.A.2. and III.A.3. of the general permit, all erosion and sediment controls (E&SC) measures must be installed (as detailed in the SWPPP) prior to the initiation of construction. During the inspection, I noted all of your E&SC measures have been correctly installed at the right times and locations.

- In accordance with Part V.L. of the general permit, all of the E&SC measures at your site must be maintained properly. While on site I observed that, among other things, the section of silt fence in place parallel to County Route 1 is in various stages of disrepair. **The failure of your contractor to adequately maintain the E&SC measures currently in place at your site is a violation of Part V.L of the general permit.** Please direct your contractor to repair this silt fence immediately and to diligently maintain all of the other required E&SC measures as they are brought to his attention by your qualified professional.

- This inspection was conducted during a rain event which resulted in a stormwater discharge to the municipal separate storm sewer system (MS4) being operated by the Eaton County Department of Public Works. Your discharge was visibly turbid whereas upstream water MS4 was clear. As a result, the discharge from the MS4 outfall into Karimipour Creek was causing slight turbidity. Please be advised that the narrative water quality standard for turbidity in Karimipour Creek is “no increase that will cause a substantial visible contrast to natural conditions.” I attribute the lack of maintenance of your E&SC measures to be the primary cause of the turbid discharge. Please be reminded that the general permit does not authorize you cause or contribute to a condition in contravention of any water quality standards.

If you have any questions or comments, please feel free to contact me at (999) 456-5432.

Sincerely,

Hector D. Inspector, CPESC
Environmental Program Specialist 2

HDI:ms
Attachment

cc w/att.: Chester Checkdam, (T) Gasper Code Enforcement Officer
Samuel Siltfence, Acme Excavating Co., Inc.

Appendix 11 | Contractor Certification Form

CONTRACTOR'S CERTIFICATION
Pursuant to
NYS DEC GENERAL PERMIT GP-0-20-001

Pursuant to the SPDES General Permit for Stormwater Discharges from Construction Activity (Permit GP-0-20-001) Part III.a.6, all contractors and subcontractors implementing all, or a portion of the Stormwater Pollution Prevention Plan (SWPPP) shall sign a copy of the following certification statement before undertaking any construction activity at the site identification in the SWPPP:

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

___________________________	____________________________	_____________
Signature	Print Name	Date

Contracting Firm Information:

Contracting Firm Name:

Address:

Telephone Number:

Address of Site: ____

Name of trained individual responsible for SWPPP implementation, and who shall be on site on a daily basis when soil disturbance activities are being performed:

Name: ____________________________ Title: _____________________________

Appendix 12 | NYSDEC Deep-Ripping & Decompaction Manual

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

Deep-Ripping and Decompaction

April 2008

New York State
Department of Environmental Conservation

Document Prepared by:

John E. Lacey,
Land Resource Consultant and Environmental Compliance Monitor
(Formerly with the Division of Agricultural Protection and Development Services,
NYS Dept. of Agriculture & Markets)

Alternative Stormwater Management
Deep-Ripping and Decompaction

Description

The two-phase practice of 1) “Deep Ripping;” and 2) “Decompaction” (deep subsoiling), of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression; i.e.: soil compaction or the substantial increase in the bulk density of the soil material.

Deep Ripping and Decompaction are key factors which help in restoring soil pore space and permeability for water infiltration. Conversely, the physical actions of cut-and-fill work, land grading, the ongoing movement of construction equipment and the transport of building materials throughout a site alter the architecture and structure of the soil, resulting in: the mixing of layers (horizons) of soil materials, compression of those materials and diminished soil porosity which, if left unchecked, severely impairs the soil’s water holding capacity and vertical drainage (rainfall infiltration), from the surface downward.

In a humid climate region, compaction damage on a site is virtually guaranteed over the duration of a project. Soil in very moist to wet condition when compacted, will have severely reduced permeability. Figure 1 displays the early stage of the deep-ripping phase (Note that all topsoil was stripped prior to construction access, and it remains stockpiled until the next phase – decompaction – is complete). A heavy-duty tractor is pulling a three-shank ripper on the first of several series of incrementally deepening passes through the construction access corridor's densely compressed subsoil material. Figure 2 illustrates the approximate volumetric composition of a loam surface soil when conditions are good for plant growth, with adequate natural pore space for fluctuating moisture conditions.

Fig. 1. A typical deep ripping phase of this practice, during the first in a series of progressively deeper “rips” through severely compressed subsoil.

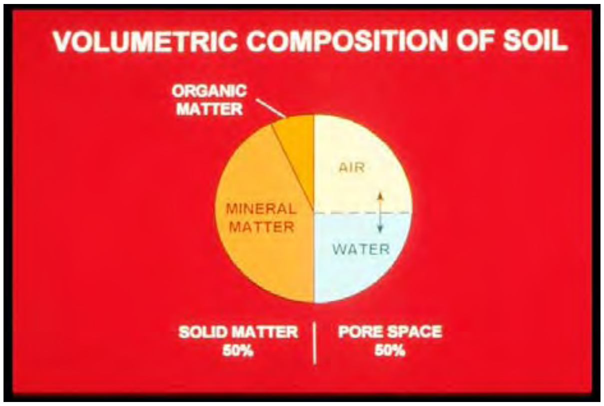

Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

Recommended Application of Practice

The objective of Deep Ripping and Decompaction is to effectively fracture (vertically and laterallly) through the thickness of the physically compressed subsoil material (see Figure 3), restoring soil porosity and permeability and aiding infiltration to help reduce runoff. Together with topsoil stripping, the "two-phase" practice of Deep Ripping and Decompaction first became established as a "best management practice" through ongoing success on commercial farmlands affected by heavy utility construction right-of-way projects (transmission pipelines and large power lines).

Fig. 3. Construction site with significant compaction of the deep basal till subsoil extends 24 inches below this exposed cut-and-fill work surface.

Soil permeability, soil drainage and cropland productivity were restored. For broader construction application, the two-phase practice of Deep Ripping and Decompaction is best adapted to areas impacted with significant soil compaction, on contiguous open portions of large construction sites and inside long, open construction corridors used as temporary access over the duration of construction. Each mitigation area should have minimal above-and-below-ground obstructions for the easy avoidance and maneuvering of a large tractor and ripping/decompacting implements. Conversely, the complete two-phase practice is not recommended in congested or obstructed areas due to the limitations on tractor and implement movement.

Benefits

Aggressive "deep ripping" through the compressed thickness of exposed subsoil before the replacement/respreading of the topsoil layer, followed by "decompaction," i.e.: "sub-soiling," through the restored topsoil layer down into the subsoil, offers the following benefits:

- Increases the project (larger size) area's direct surface infiltration of rainfall by providing the open site's mitigated soil condition and lowers the demand on concentrated runoff control structures

- Enhances direct groundwater recharge through greater dispersion across and through a broader surface than afforded by some runoff-control structural measures

- Decreases runoff volume generated and provides hydrologic source control

- May be planned for application in feasible open locations either alone or in conjunction with plans for structural practices (e.g., subsurface drain line or infiltration basin) serving the same or contiguous areas

- Promotes successful long-term revegetation by restoring soil permeability, drainage and water holding capacity for healthy (rather than restricted) root-system development of trees, shrubs and deep rooted ground cover, minimizing plant drowning during wet periods and burnout during dry periods.

Feasibility / Limitations

The effectiveness of Deep Ripping and Decompaction is governed mostly by site factors such as: the original (undisturbed) soil's hydrologic characteristics; the general slope; local weather/timing (soil moisture) for implementation; the space-related freedom of equipment/implement maneuverability (noted above in **Recommended Application of Practice**), and by the proper selection and operation of tractor and implements (explained below in **Design Guidance**). The more notable site-related factors include:

Soil

In the undisturbed condition, each identified soil type comprising a site is grouped into one of four categories of soil hydrology, Hydrologic Soil Group A, B, C or D, determined primarily by a range of characteristics including soil texture, drainage capability when thoroughly wet, and depth to water table. The natural rates of infiltration and transmission of soil-water through the undisturbed soil layers for Group A is "high" with a low runoff potential while soils in Group B are moderate in infiltration and the transmission of soil-water with a moderate runoff potential, depending somewhat on slope. Soils in Group C have slow rates of infiltration and transmission of soil-water and a moderately high runoff potential influenced by soil texture and slope; while soils in Group D have exceptionally slow rates of infiltration and transmission of soil-water, and high runoff potential.

In Figure 4, the profile displays the undisturbed horizons of a soil in Hydrologic Soil Group C and the naturally slow rate of infiltration through the subsoil. The slow rate of infiltration begins immediately below the topsoil horizon (30 cm), due to the limited amount of macro pores, e.g.: natural subsoil fractures, worm holes and root channels. Infiltration after the construction-induced mixing and compression of such subsoil material is virtually absent; but can be restored back to this natural level with the two-phase practice of deep ripping and decompaction, followed by the permanent establishment of an appropriate, deep taproot

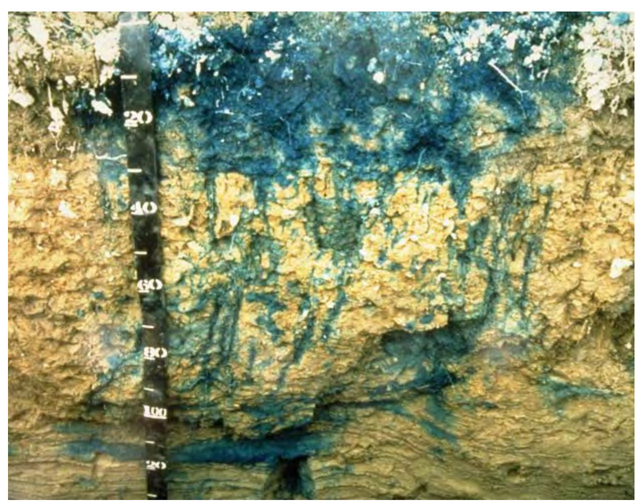

Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

lawn/ground cover to help maintain the restored subsoil structure. Infiltration after construction-induced mixing and compression of such subsoil material can be notably rehabilitated with the Deep Ripping and Decompaction practice, which prepares the site for the appropriate long-term lawn/ground cover mix including deep taproot plants such as clover, fescue or trefoil, etc. needed for all rehabilitated soils.

Generally, soils in Hydrologic Soil Groups A and B, which respectively may include deep, well-drained, sandy-gravelly materials or deep, moderately well-drained basal till materials, are among the easier ones to restore permeability and infiltration, by deep ripping and decompaction. Among the many different soils in Hydrologic Soil Group C are those unique glacial tills having a natural fragipan zone, beginning about 12 to 18 inches (30 – 45cm), below surface. Although soils in Hydrologic Soil Group C do require a somewhat more carefully applied level of the Deep Ripping and Decompaction practice, it can greatly benefit such affected areas by reducing the runoff and fostering infiltration to a level equal to that of pre-disturbance.

Soils in Hydrologic Soil Group D typically have a permanent high water table close to the surface, influenced by a clay or other highly impervious layer of material. In many locations with clay subsoil material, the bulk density is so naturally high that heavy trafficking has little or no added impact on infiltration; and structural runoff control practices rather than Deep Ripping and Decompaction should be considered.

The information about Hydrologic Soil Groups is merely a general guideline. Site-specific data such as limited depths of cut-and-fill grading with minimal removal or translocation of the inherent subsoil materials (as analyzed in the county soil survey) or, conversely, the excavation and translocation of deeper, unconsolidated substratum or consolidated bedrock materials (unlike the analyzed subsoil horizons' materials referred to in the county soil survey) should always be taken into account.

Sites made up with significant quantities of large rocks, or having a very shallow depth to bedrock, are not conducive to deep ripping and decompation (subsoiling); and other measures may be more practical.

Slope

The two-phase application of 1) deep ripping and 2) decompaction (deep subsoiling), is most practical on flat, gentle and moderate slopes. In some situations, such as but not limited to temporary construction access corridors, inclusion areas that are moderately steep along a project's otherwise gentle or moderate slope may also be deep ripped and decompacted. For limited instances of moderate steepness on other projects, however, the post-construction land use and the relative alignment of the potential ripping and decompaction work in relation to the lay of the slope should be reviewed for safety and practicality. In broad construction areas predominated by moderately steep or steep slopes, the practice is generally not used.

Local Weather/Timing/Soil Moisture

Effective fracturing of compressed subsoil material from the exposed work surface, laterally and vertically down through the affected zone is achieved only when the soil material is moderately dry to moderately moist. Neither one of the two-phases, deep ripping nor decompaction (deep subsoiling), can be effectively conducted when the soil material (subsoil or replaced topsoil) is in either a "plastic" or "liquid" state of soil consistency. Pulling the respective implements legs through the soil when it is overly moist only results in the "slicing and smearing" of the material or added "squeezing and compression" instead of the necessary fracturing. Ample drying time is needed for a "rippable" soil condition not merely in the material close to the surface, but throughout the material located down to the bottom of the physically compressed zone of the subsoil.

The "poor man's Atterberg field test" for soil plasticity is a simple "hand-roll" method used for quick, on-site determination of whether or not the moisture level of the affected soil material is low enough for: effective deep ripping of subsoil; respreading of topsoil in a friable state; and final decompaction (deep subsoiling). Using a sample of soil material obtained from the planned bottom depth of ripping, e.g.: 20 - 24 inches below exposed subsoil surface, the sample is hand rolled between the palms down to a 1/8-inch diameter thread. (Use the same test for stored topsoil material before respreading on the site.) If the respective soil sample crumbles apart in segments no greater than 3/8 of an inch long, by the time it is rolled down to 1/8 inch diameter, it is low enough in moisture for deep ripping (or topsoil replacement), and decompaction. Conversely, as shown in Figure 5, if the rolled sample stretches out in increments greater than 3/8 of an inch long before crumbling, it is in a "plastic" state of soil consistency and is too wet for subsoil ripping (as well as topsoil replacement) and final decompaction.

Fig. 5. Augered from a depth of 19 inches below the surface of the replaced topsoil, this subsoil sample was hand rolled to a 1/8-inch diameter. The test shows the soil at this site stretches out too far without crumbling; it indicates the material is in a plastic state of consistence, too wet for final decompaction (deep subsoiling) at this time.

Design Guidance

Beyond the above-noted site factors, a vital requirement for the effective Deep Ripping and Decompaction (deep subsoiling), is implementing the practice in its distinct, two-phase process:

1) Deep rip the affected thickness of exposed subsoil material (see Figure 10 and 11), aggressively fracturing it before the protected topsoil is reapplied on the site (see Figure 12); and

2) Decompact (deep subsoil), simultaneously through the restored topsoil layer and the upper half of the affected subsoil (Figure 13). The second phase, "decompaction," mitigates the partial recompaction which occurs during the heavy process of topsoil spreading/grading. Prior to deep ripping and decompacting the site, all construction activity, including construction equipment and material storage, site cleanup and trafficking (Figure 14), should be finished; and the site closed off to further disturbance. Likewise, once the practice is underway and the area's soil permeability and

rainfall infiltration are being restored, a policy limiting all further traffic to permanent travel lanes is maintained.

The other critical elements, outlined below, are: using the proper implements (deep, heavy-duty rippers and subsoilers), and ample pulling-power equipment (tractors); and conducting the practice at the appropriate speed, depth and pattern(s) of movement.

Note that an appropriate plan for the separate practice of establishing a healthy perennial ground cover, with deep rooting to help maintain the restored soil structure, should be developed in advance. This may require the assistance of an agronomist or landscape horticulturist.

Implements

Avoid the use of all undersize implements. The small-to-medium, light-duty tool will, at best, only "scarify" the uppermost surface portion of the mass of compacted subsoil material. The term "chisel plow" is commonly but incorrectly applied to a broad range of implements. While a few may be adapted for the moderate subsoiling of non-impacted soils, the majority are less durable and used for only lighter land-fitting (see Figure 6).

Fig. 6. A light duty chisel implement, not adequate for either the deep ripping or decompaction (deep subsoiling) phase.

Fig. 7. One of several variations of an agricultural ripper. This unit has long, rugged shanks mounted on a steel V-frame for deep, aggressive fracturing through Phase 1.

Use a "heavy duty" agricultural-grade, deep ripper (see Figures 7,9,10 and 11) for the first phase: the lateral and vertical fracturing of the mass of exposed and compressed subsoil, down and through, to the bottom of impact, prior to the replacement of the topsoil layer. (Any oversize rocks which are uplifted to the subsoil surface during the deep ripping phase are picked and removed.) Like the heavy-duty class of implement for the first phase, the decompaction (deep subsoiling) of Phase 2 is conducted with the heavy-duty version of the deep subsoiler. More preferable is the angled-leg variety of deep subsoiler (shown in Figures 8 and 13). It minimizes the inversion of the subsoil and topsoil layers while laterally and vertically fracturing the upper half of the previously ripped subsoil layer and all of the topsoil layer by delivering a momentary, wave-like "lifting and shattering" action up through the soil layers as it is pulled.

Pulling-Power of Equipment

Use the following rule of thumb for tractor horsepower (hp) whenever deep ripping and decompacting a significantly impacted site: For both types of implement, have at least 40 hp of tractor pull available for each mounted shank/ leg.

Using the examples of a 3-shank and a 5-shank implement, the respective tractors should have 120 and 200 hp available for fracturing down to the final depth of 20-to-24 inches per phase. Final depth for the deep ripping in Phase 1 is achieved incrementally by a progressive series of passes (see Depth and Patterns of Movement, below); while for Phase 2, the full operating depth of the deep subsoiler is applied from the beginning.

The operating speed for pulling both types of implement should not exceed 2 to 3 mph. At this slow and managed rate of operating speed, maximum functional performance is sustained by the tractor and the implement performing the soil fracturing. Referring to Figure 8, the implement is the 6-leg version of the deep angled-leg subsoiler. Its two outside legs are "chained up" so that only four legs will be engaged (at the maximum depth), requiring no less than 160 hp, (rather than 240 hp) of pull. The 4-wheel drive, articulated-frame tractor in Figure 8 is 174 hp. It will be decompacting this unobstructed, former construction access area simultaneously through 11 inches of replaced topsoil and the upper 12 inches of the previously deep-ripped subsoil. In constricted areas of Phase 1) Deep Ripping, a medium-size tractor with adequate hp, such as the one in Figure 9 pulling a 3-shank deep ripper, may be more maneuverable.

Fig. 8. A deep, angled-leg subsoiler, ideal for Phase 2 decompaction of after the topsoil layer is graded on top of the ripped subsoil.

Fig. 9. This medium tractor is pulling a 3-shank deep ripper. The severely compacted construction access corridor is narrow, and the 120 hp tractor is more maneuverable for Phase 1 deep ripping (subsoil fracturing), here.

Some industrial-grade variations of ripping implements are attached to power graders and bulldozers. Although highly durable, they are generally not recommended. Typically, the shanks or "teeth" of these rippers are too short and stout; and they are mounted too far apart to achieve the well-distributed type of lateral and vertical fracturing of the soil materials necessary to restore soil permeability and infiltration. In addition, the power graders and bulldozers, as pullers, are far less maneuverable for turns and patterns than the tractor.

Depth and Patterns of Movement

As previously noted both Phase 1 Deep Ripping through significantly compressed, exposed subsoil and Phase 2 Decompaction (deep subsoiling) through the replaced topsoil and upper subsoil need to be performed at maximum capable depth of each implement. With an implement's guide wheels attached, some have a "normal" maximum operating depth of 18 inches, while others may go deeper. In many situations, however, the tractor/implement operator must first remove the guide wheels and other non essential elements from the implement. This adapts the ripper or the deep subsoiler for skillful pulling with its frame only a few inches above surface, while the shanks or legs, fracture the soil material 20-to-24 inches deep.

There may be construction sites where the depth of the exposed subsoil's compression is moderate, e.g.: 12 inches, rather than deep. This can be verified by using a ¾ inch cone penetrometer and a shovel to test the subsoil for its level of compaction, incrementally, every three inches of increasing depth. Once the full thickness of the subsoil's compacted zone is finally "pieced" and there is a significant drop in the psi measurements of the soil penetrometer, the depth/thickness of compaction is determined. This is repeated at several representative locations of the construction site. If the thickness of the site's subsoil compaction is verified as, for example, ten inches, then the Phase 1 Deep Ripping can be correspondingly reduced to the implement's minimum operable depth of 12 inches. However, the Phase 2 simultaneous Decompation (subsoiling) of an 11 inch thick layer of replaced topsoil and the upper subsoil should run at the subsoiling implements full operating depth.

Fig. 10. An early pass with a 3-shank deep ripper penetrating only 8 inches into this worksite's severely compressed subsoil.

Fig. 11. A repeat run of the 3-shank ripper along the same patterned pass area as Fig. 9; here, incrementally reaching 18 of the needed 22 inches of subsoil fracture.

Typically, three separate series (patterns) are used for both the Phase 1 Deep Ripping and the Phase 2 Decompaction on significantly compacted sites. For Phase 1, each series begins with a moderate depth of rip and, by repeat-pass, continues until full depth is reached. Phase 2 applies the full depth of Decompation (subsoiling), from the beginning.

Every separate series (pattern) consists of parallel, forward-and-return runs, with each progressive pass of the implement's legs or shanks evenly staggered between those from the previous pass. This compensates for the shank or leg-spacing on the implement, e.g., with 24-to-30 inches between each shank or leg. The staggered return pass ensures lateral and vertical fracturing actuated every 12 to 15 inches across the densely compressed soil mass.

Large, Unobstructed Areas
For larger easy areas, use the standard patterns of movement:

- The first series (pattern) of passes is applied lengthwise, parallel with the longest spread of the site; gradually progressing across the site's width, with each successive pass.

- The second series runs obliquely, crossing the first series at an angle of about 45 degrees.

- The third series runs at right angle (or 90 degrees), to the first series to complete the fracturing and shattering on severely compacted sites, and avoid leaving large unbroken blocks of compressed soil material. (In certain instances, the third series may be optional, depending on how thoroughly the first two series loosen the material and eliminate large chunks/blocks of material as verified by tests with a ¾-inch cone penetrometer.)

Fig. 12. Moderately dry topsoil is being replaced on the affected site now that Phase 1 deep ripping of the compressed subsoil is complete.


Fig. 13. The same deep, angled-leg subsoiler shown in Fig. 7 is engaged at maximum depth for Phase 2, decompaction (deep soiling), of the replaced topsoil and the upper subsoil materials.

Corridors
In long corridors of limited width and less maneuverability than larger sites, e.g.: along compacted areas used as temporary construction access, a modified series of pattern passes are used.

- First, apply the same initial lengthwise, parallel series of passes described above.

● A second series of passes makes a broad “S” shaped pattern of rips, continually and gradually alternating the “S” curves between opposite edges inside the compacted corridor.

● The third and final series again uses the broad, alternating S pattern, but it is “flip-flopped” to continually cross the previous S pattern along the corridor’s centerline. This final series of the S pattern curves back along the edge areas skipped by the second series.

Maintenance and Cost

Once the two-phase practice of Deep Ripping and Decompation is completed, two items are essential for maintaining a site’s soil porosity and permeability for infiltration. They are: planting and maintaining the appropriate ground cover with deep roots to maintain the soil structure (see Figure 15); and keeping the site free of traffic or other weight loads.

Note that site-specific choice of an appropriate vegetative ground-cover seed mix, including the proper seeding ratio of one or more perennial species with a deep taproot system and the proper amount of lime and soil nutrients (fertilizer mix) adapted to the soil-needs, are basic to the final practice of landscaping, i.e: surface tillage, seeding/planting/fertilizing and culti-packing or mulching is applied. The "maintenance" of an effectively deep-ripped and decompacted area is generally limited to the successful perennial (long-term) landscape ground cover; as long as no weight-bearing force of soil compaction is applied.

Fig. 14. The severely compacted soil of a temporary construction yard used daily by heavy equipment for four months; shown before deep ripping, topsoil replacement, and decompaction.

Fig. 15. The same site as Fig. 14 after deep ripping of the exposed subsoil, topsoil replacement, decompaction through the topsoil and upper subsoil and final surface tillage and revegetation to maintain soil permeability and infiltration.

The Deep Ripping and Decompaction practice is, by necessity, more extensive than periodic subsoiling of farmland.The cost of deep ripping and decompacting (deep subsoiling), will vary according to the depth and severity of soil-material compression and the relative amount of tractor and implement time that is required. In some instances, depending on open maneuverability, two-to-three acres of compacted project area may be deep-ripped in one day. In other situations of more severe compaction and - or less maneuverability, as little as one acre may be fully ripped in a day. Generally, if the Phase 1) Deep Ripping is fully effective, the Phase 2) Decompaction should be completed in 2/3 to 3/4 of the time required for Phase 1.

Using the example of two acres of Phase 1) Deep Ripping in one day, at $1800 per day, the net cost is $900 per acre. If the Phase 2) Decompacting or deep subsoiling takes 3/4 the time as Phase 1, it costs $675 per acre for a combined total of $1575 per acre to complete the practice (these figures do not include the cost of the separate practice of topsoil stripping and replacement). Due to the many variables, it must be recognized that cost will be determined by the specific conditions or constraints of the site and the availability of proper equipment.

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- Examples of implements:

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- Soils data of USDA Natural Resources Conservation Service. *NRCS Web Soil Survey.* http://websoilsurvey.nrcs.usda.gov/app/ and *USDA-NRCS Official Soil Series Descriptions; View by Name.* http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi . *Last visited Jan. 08.*

- Soil penetrometer information. Access by internet searches of: *Diagnosing Soil Compaction using a Penetrometer (soil compaction tester), PSU Extension;* as well as *Dickey-john Soil Compaction Tester.* http://www.dickey-johnproducts.com/pdf/SoilCompactionTest.pdf and http://cropsoil.psu.edu/Extension/Facts/uc178pdf Last visited Sept. 07

Appendix 13 | NRCC Precipitation Tables

Extreme Precipitation Tables

Northeast Regional Climate Center

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

Smoothing	Yes
State	New York
Location	
Longitude	74.425 degrees West
Latitude	41.423 degrees North
Elevation	0 feet
Date/Time	Wed, 04 Aug 2021 09:08:26 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.50	0.62	0.82	1.02	1.26	**1yr**	0.88	1.18	1.45	1.77	2.17	2.64	3.07	**1yr**	2.33	2.95	3.38	4.08	4.71	**1yr**
2yr	0.39	0.60	0.75	0.98	1.24	1.54	**2yr**	1.07	1.43	1.76	2.15	2.62	3.17	3.63	**2yr**	2.80	3.49	4.00	4.71	5.37	**2yr**
5yr	0.46	0.71	0.89	1.19	1.53	1.92	**5yr**	1.32	1.77	2.20	2.70	3.28	3.96	4.57	**5yr**	3.50	4.40	5.01	5.80	6.57	**5yr**
10yr	0.51	0.81	1.02	1.38	1.80	2.27	**10yr**	1.55	2.08	2.62	3.21	3.89	4.68	5.45	**10yr**	4.14	5.24	5.96	6.79	7.66	**10yr**
25yr	0.60	0.95	1.21	1.67	2.23	2.85	**25yr**	1.92	2.57	3.29	4.05	4.90	5.85	6.87	**25yr**	5.18	6.61	7.49	8.38	9.40	**25yr**
50yr	0.68	1.09	1.39	1.95	2.62	3.38	**50yr**	2.26	3.01	3.91	4.81	5.81	6.94	8.20	**50yr**	6.14	7.89	8.90	9.82	10.98	**50yr**
100yr	0.77	1.24	1.60	2.27	3.09	4.01	**100yr**	2.67	3.54	4.66	5.73	6.91	8.22	9.79	**100yr**	7.28	9.42	10.59	11.52	12.82	**100yr**
200yr	0.87	1.42	1.84	2.64	3.65	4.76	**200yr**	3.15	4.17	5.54	6.82	8.22	9.75	11.70	**200yr**	8.63	11.25	12.61	13.52	14.99	**200yr**
500yr	1.04	1.71	2.24	3.25	4.55	5.97	**500yr**	3.93	5.17	6.96	8.57	10.32	12.23	14.81	**500yr**	10.82	14.24	15.90	16.72	18.44	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.44	0.54	0.73	0.89	1.11	**1yr**	0.77	1.09	1.26	1.61	1.98	2.41	2.61	**1yr**	2.14	2.51	2.86	3.36	3.93	**1yr**
2yr	0.37	0.58	0.71	0.96	1.19	1.43	**2yr**	1.03	1.40	1.62	2.07	2.56	3.09	3.52	**2yr**	2.73	3.39	3.90	4.58	5.23	**2yr**
5yr	0.42	0.65	0.81	1.11	1.41	1.66	**5yr**	1.22	1.62	1.88	2.42	3.01	3.69	4.26	**5yr**	3.27	4.10	4.70	5.40	6.16	**5yr**
10yr	0.46	0.71	0.88	1.24	1.60	1.86	**10yr**	1.38	1.82	2.10	2.66	3.38	4.23	4.92	**10yr**	3.74	4.73	5.39	6.05	6.87	**10yr**
25yr	0.53	0.80	1.00	1.42	1.87	2.13	**25yr**	1.62	2.09	2.47	3.19	3.91	5.06	5.96	**25yr**	4.48	5.73	6.49	6.93	7.93	**25yr**
50yr	0.58	0.88	1.10	1.58	2.12	2.40	**50yr**	1.83	2.35	2.77	3.61	4.38	5.82	6.90	**50yr**	5.15	6.63	7.48	7.68	8.85	**50yr**
100yr	0.64	0.97	1.21	1.75	2.40	2.69	**100yr**	2.07	2.63	3.12	4.09	4.92	6.72	8.02	**100yr**	5.95	7.71	8.62	9.08	9.84	**100yr**
200yr	0.71	1.07	1.36	1.97	2.74	3.01	**200yr**	2.37	2.94	3.51	4.66	5.53	7.77	9.32	**200yr**	6.88	8.96	9.97	10.26	10.93	**200yr**
500yr	0.83	1.23	1.58	2.30	3.27	3.50	**500yr**	2.82	3.42	4.11	5.55	6.50	9.44	11.40	**500yr**	8.36	10.96	12.11	12.05	12.57	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.55	0.68	0.91	1.12	1.35	**1yr**	0.97	1.32	1.53	1.95	2.40	2.83	3.31	**1yr**	2.50	3.18	3.65	4.37	5.11	**1yr**
2yr	0.41	0.63	0.78	1.05	1.30	1.54	**2yr**	1.12	1.51	1.76	2.23	2.78	3.29	3.75	**2yr**	2.91	3.61	4.17	4.96	5.61	**2yr**
5yr	0.50	0.77	0.95	1.31	1.66	1.98	**5yr**	1.43	1.93	2.25	2.88	3.58	4.27	4.88	**5yr**	3.78	4.69	5.32	6.20	6.95	**5yr**
10yr	0.59	0.91	1.13	1.58	2.04	2.44	**10yr**	1.76	2.39	2.74	3.54	4.38	5.22	5.99	**10yr**	4.62	5.76	6.44	7.45	8.40	**10yr**
25yr	0.75	1.14	1.41	2.02	2.66	3.25	**25yr**	2.29	3.18	3.64	4.64	5.73	6.79	7.82	**25yr**	6.01	7.52	8.31	9.50	10.69	**25yr**
50yr	0.89	1.35	1.68	2.42	3.26	3.73	**50yr**	2.81	3.64	4.46	5.68	7.00	8.27	9.57	**50yr**	7.32	9.20	10.09	11.44	12.85	**50yr**
100yr	1.06	1.60	2.01	2.90	3.98	4.54	**100yr**	3.44	4.43	5.47	6.94	8.57	10.08	11.73	**100yr**	8.92	11.28	12.23	13.99	15.46	**100yr**
200yr	1.27	1.91	2.42	3.50	4.88	5.53	**200yr**	4.21	5.40	6.72	8.50	10.49	12.29	14.38	**200yr**	10.88	13.82	14.84	16.89	18.61	**200yr**
500yr	1.61	2.40	3.08	4.48	6.37	7.16	**500yr**	5.49	7.00	8.83	11.11	13.70	15.94	18.78	**500yr**	14.11	18.06	19.15	21.67	23.82	**500yr**

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Appendix 14 | Operation and Maintenance Plan

Site Drainage

A State Pollutant Discharge Elimination System Permit (SPDES GP 0-20-001) is required from the New York State Department of Environmental Conservation (NYSDEC) and a Storm Water Pollution Prevention Plan (SWPPP) has been prepared for review/approval by the Town of New Paltz (an MS4 community). The site improvements made to the parcel are new construction and will increase the impervious area on the site. The study provides the proposed improvements and provides measures that will be used to control potential impacts due to stormwater runoff.

Constructed Stormwater Control Practices

Catch Basins:
Catch basins on-site are utilized to collect stormwater run-off and melting snow from the paved parking areas, driveway and sidewalks. These are located along the centerline of roadside swales.

Roof leaders:
Roof leaders are utilized to collect stormwater run-off from the roof and discharge it into the subsurface chamber system.

Swirl chamber units:
The swirl chamber unit a compact, below grade stormwater treatment system that provides water quality mitigation. These systems receive overland flow through grated inlets as well as piped inlets from the various catch basins and drain/yard inlets located throughout the site.

Subsurface Arch Chamber System:
A subsurface chamber system is proposed to provide water quality and quantity mitigation in keeping with the requirements in the New York State Storm Water Management Design Manual (NYSSMDM). The system also has an outlet control structure which regulates the out-flow of stormwater.

Bioretention Areas:
These are shallow stormwater depressions which capture run-off from a surrounding drainage area (six inch deep surface ponding area) and then utilize an engineered soil strata and vegetation for treatment.

Infiltration Ponds:
These are stormwater ponds designed to capture runoff and allow it to naturally infiltrate it into the soil through the bottom and sides of the basin.

See Design Plans and Details for these improvements.

Typical Maintenance for Stormwater Practices

As a consequence of its function, the stormwater conveyance system collects and transports runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and the basins on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly to avoid flooding.

Catch Basins:

Catch basins should be inspected monthly and after heavy rain fall to ensure they are functioning properly. Typical maintenance of catch basins includes removal of debris from the grate and sump. This can be done manually or using a vehicle equipped with a vacuum pump. Catch basins should be cleaned out at least one (1) time per year. A good time to clean out catch basins is in the spring to remove the build-up of leaves, sand used for traction, dirt, and other debris that accumulates during winter months.

Roof leaders:

Roof leaders, similar to the catch basins, require typical maintenance which includes removal of debris manually. Inspections of the leaders should occur monthly and after heavy rain fall to ensure they are still functioning properly. These should be cleaned out at least one (1) time per year.

Swirl Chamber Systems:

The swirl chamber systems should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly, but regular street sweeping will slow accumulation of said sediment and pollutants.

At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment wash down areas and in climates where winter sanding operations may lead to rapid accumulations of a large volume of sediment. The swirl chamber systems should be cleaned when the level of sediment has reached 75% of the capacity in the isolated sump or when significant level of hydrocarbons or trash has accumulated.

Cleaning of the swirl chamber systems should be done during dry weather conditions when no flow is entering the system. Cleanout of the swirl chamber system with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Disposal of all material removed from the swirl chamber systems should be done is accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes.

The Manufacturer's Operation and Maintenance Manual can be found in the appendix of the SWPPP. The minimum requirements to maintain intended operation are set forth by the manufacturer and should be strictly adhered to.

Subsurface Arch Chamber System:

The Subsurface Arch Chamber System should be inspected monthly (pipes, outlet control structure, etc.) and after heavy rain fall to ensure proper functionality. Refer to Appendix for Manufacturers recommended Operation & Maintenance of the Stormtech Chambers.

Bioretention Areas:

These areas should be inspected monthly and after heavy rain fall to ensure they are functioning properly. Typical maintenance of the bio-retention areas include removal of debris, weeding (especially in the first couple of years while the plants are establishing their root systems) and mulching. Any areas devoid of mulch shall be re-mulched on an annual basis. Dead or diseased plant material shall be replaced immediately.

Silt/Sediment removal from the filter bed shall be conducted when the accumulation exceeds one inch or every five to six years. If the filter bed ponds water at the surface for more than 48 hours, the top 4-6 inches (below the mulch) of material shall be removed and replaced with fresh material. Any plant material removed during clean-out shall be replaced in-kind.

See Design Plans and Details for the components of the soil mixture for the filter bed.

Stormwater Basins:

These basins should be inspected monthly (this includes the inlets pipes, rip-rap, embankments, outlet control structure, emergency spillway and fencing) and after heavy rain fall to ensure proper functionality.

Long-term Stormwater Basin maintenance requires the following:

- Mowing grass, at least twice yearly. Grass clippings and other debris must be removed from the basin area after each cutting. Removal of woody brush and trees. Reestablish good grass cover in areas where woody material has been removed.
- Leaves shall be removed as needed from the basin and outlet control structure.
- Restore and reseed eroded any areas and gullies along embankment areas. Reoccurring erosion should be inspected by a licensed professional engineer to determine probable cause and remedial action that may be necessary.
- General maintenance and repairs of the stormwater outlet and inlet structures.
- Sediment removal from forebay and micropool every five to six years or when 50% full.
- The emergency spillway must remain free of debris and maintain the design elevation in order to convey stormwater during a catastrophic storm event.
- Ensure infiltration ponds are draining after each storm event.

In general, any deficiencies identified during the regular inspections or otherwise for all the stormwater management facilities should be corrected immediately. See appendices for forms to record inspection and maintenance work for the stormwater facilities.

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StormTech®

Detention • Retention • Water Quality

An ADS company

Isolator® Row O&M Manual


SC-740


MC-3500


MC-4500

THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™

ADS®

THE ISOLATOR® ROW

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-160LP, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160LP, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

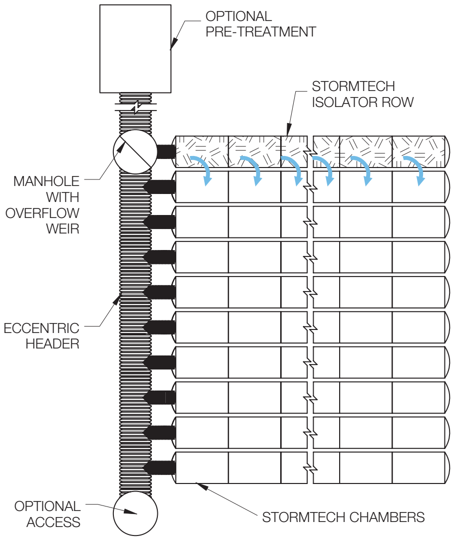
The Isolator Row is typically designed to capture the “first flush” and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

StormTech Isolator Row with Overflow Spillway (not to scale)



ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

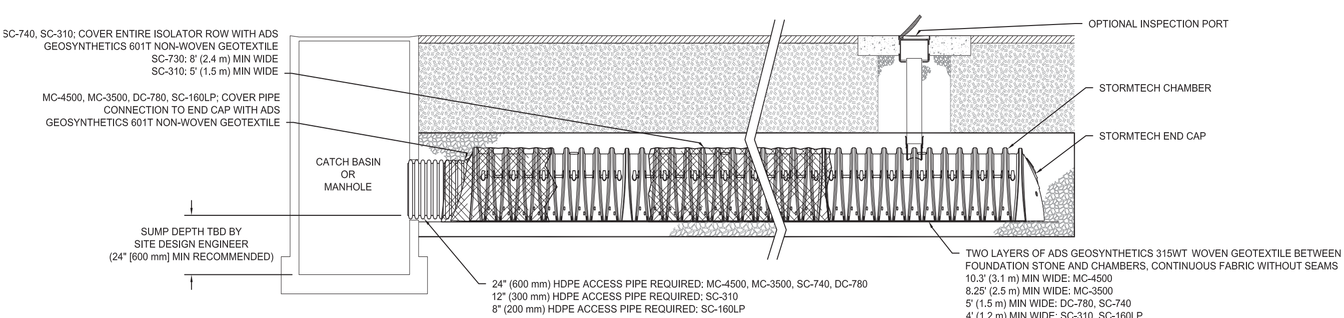
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1
Inspect Isolator Row for sediment.

A) Inspection ports (if present)
   i. Remove lid from floor box frame
   ii. Remove cap from inspection riser
   iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
   iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

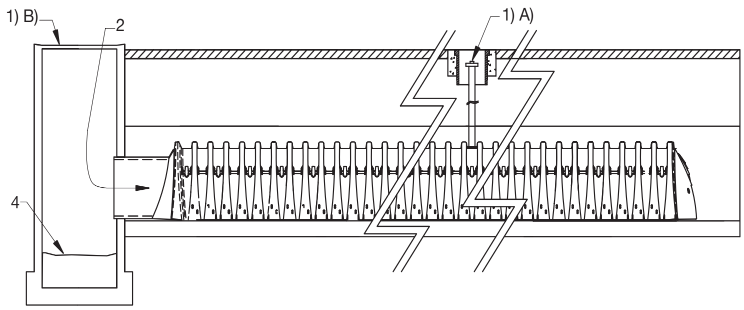
B) All Isolator Rows
   i. Remove cover from manhole at upstream end of Isolator Row
   ii. Using a flashlight, inspect down Isolator Row through outlet pipe
      1. Mirrors on poles or cameras may be used to avoid a confined space entry
      2. Follow OSHA regulations for confined space entry if entering manhole
   iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2
Clean out Isolator Row using the JetVac process.

A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

STEP 3
Replace all caps, lids and covers, record observations and actions.

STEP 4
Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings: Fixed point to chamber bottom (1)	Stadia Rod Readings: Fixed point to top of sediment (2)	Sediment Depth (1)–(2)	Observations/Actions	Inspector
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

StormTech
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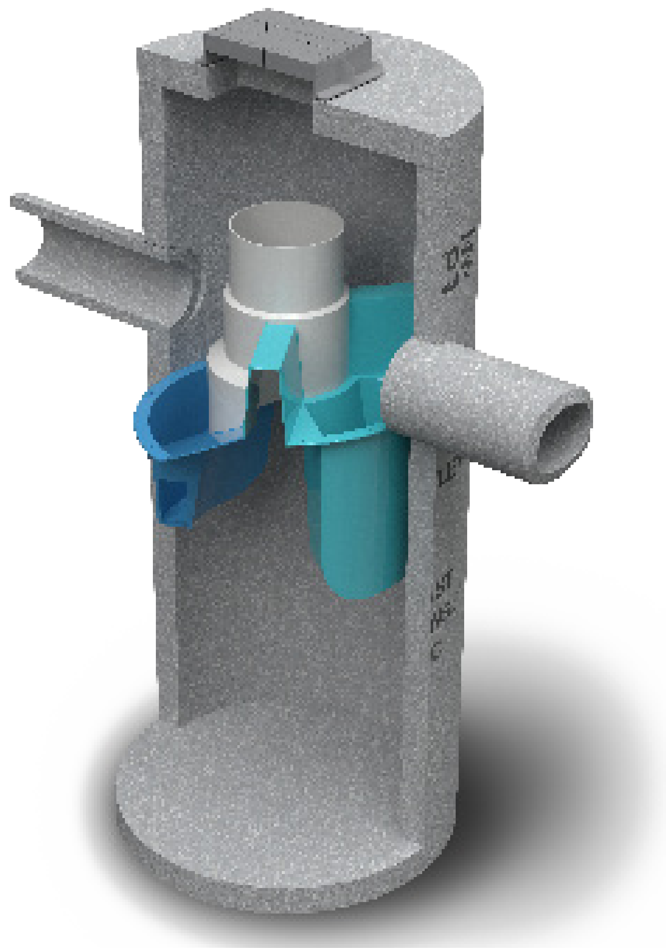
A division of ADS

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com



Operation and Maintenance Manual

First Defense® High Capacity and First Defense® Optimum

Vortex Separator for Stormwater Treatment

Table of Contents

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

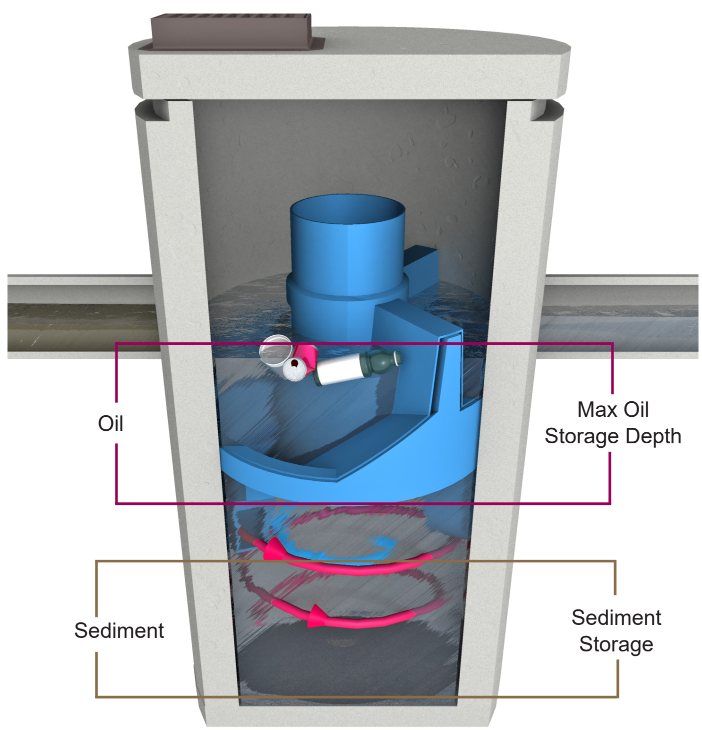


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

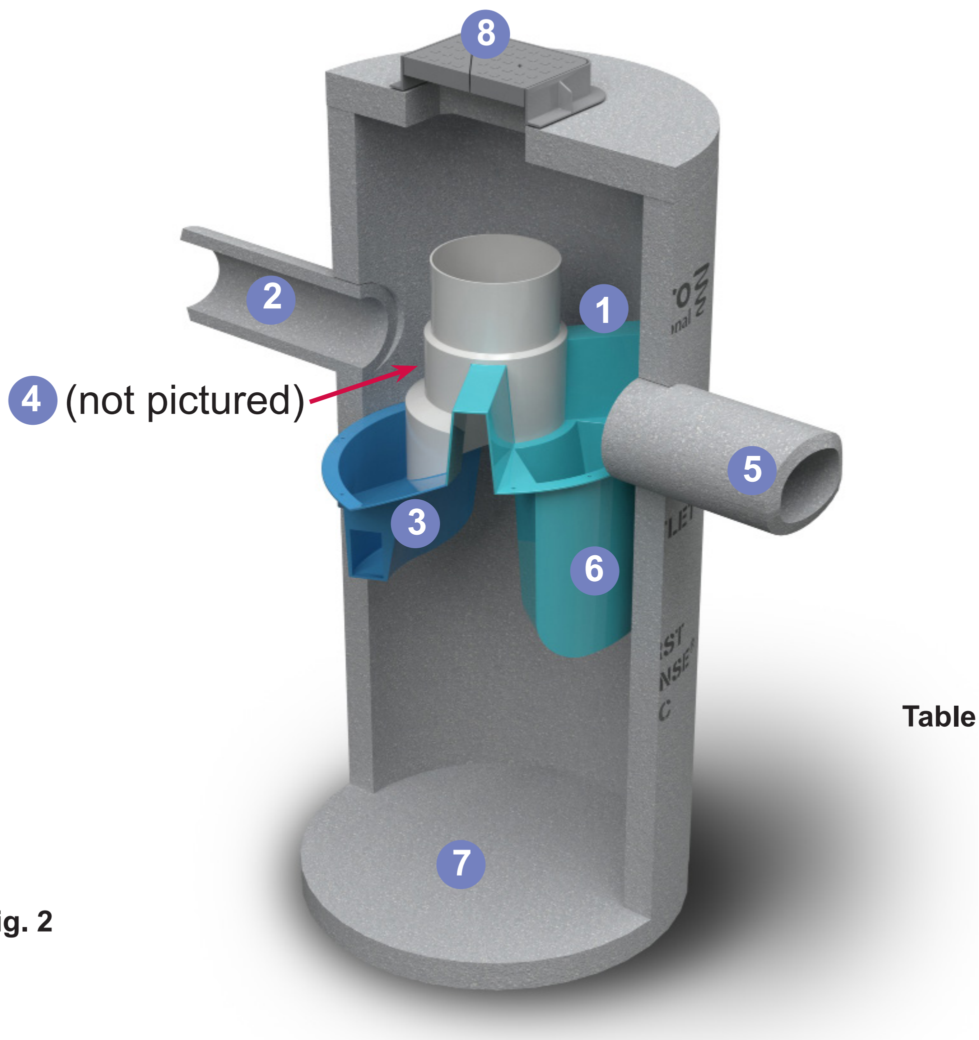


Fig. 2

Table 1

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
7 / 2.1
8 / 2.4
10 / 3.0

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

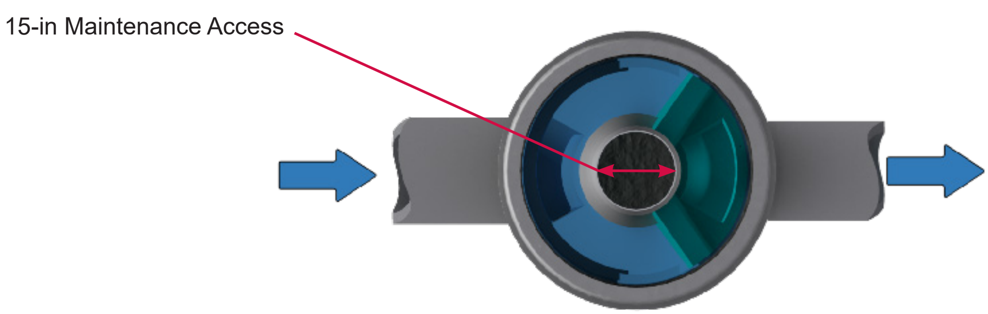


Fig.3 The central opening to the sump of the First Defense®is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Fig.4 Floatables are removed with a vactor hose

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Recommended Equipment

- Safety Equipment (traffic cones, etc)

- Crow bar or other tool to remove grate or lid

- Pole with skimmer or net (if only floatables are being removed)

- Sediment probe (such as a Sludge Judge®)

- Vactor truck (flexible hose recommended)

- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose or with the skimmer or net

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [7-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Hydro International

Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

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Engineering
& Design

Appendix 15 | ADS Stormtech Subsurface Chamber Information

First Defense® High Capacity

A Simple Solution for your Trickiest Sites

Product Profile

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (**Table 1**, next page).

Applications

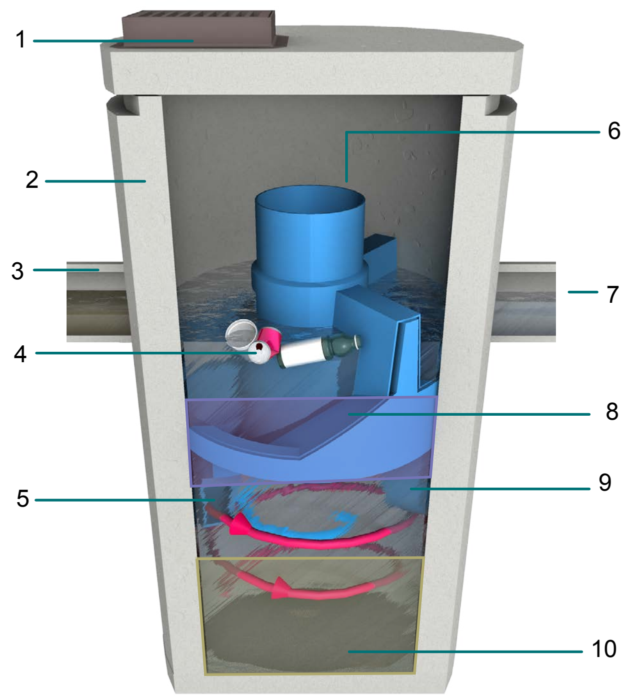
- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 450% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

Verified by NJCAT and NJDEP

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



Components

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

How it Works

The First Defense® High Capacity has internal components designed to remove and retain gross debris, total suspended solids (TSS) and hydrocarbons (**Fig.1**).

Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

First Defense® High Capacity

Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.

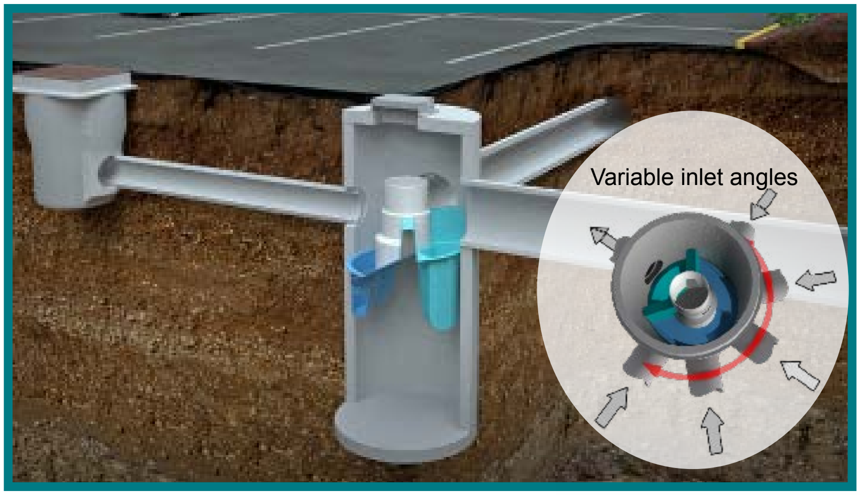


Fig 2. Works with multiple inlet pipes and grates

Free *Stormwater Separator Sizing Calculator* for Engineers

This simple online tool will recommend the best separatror, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.

Inspection and Maintenance

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Call **1 (800) 848-2706** to schedule an inspection and cleanout or learn more at **hydro-int.com/service**

Fig 3. Maintenance is done with a vactor truck

Table 1. First Defense® High Capacity Design Criteria.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates			Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	106µm	230µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	0.3 / 8.77	0.53 / 15.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	0.7 / 20	1.2 / 34	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	1.3 / 37.9	2.2 / 62.2	20 / 566	24 / 609	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	2.2 / 63	3.8 / 108	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	5.1 / 144	8.6 / 243	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 4, 2016

Lisa Lemont, CPSWQ
Business Development Manager
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Lab Certification
First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International

TSS Removal Rate 50%

Dear Ms. Lemont:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested an MTD Laboratory Certification for the First Defense® HC Stormwater Treatment Device.

The projects falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated February 2016) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the First Defense® HC Stormwater Treatment Device by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The First Defense® HC Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This First Defense® HC Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using the First Defense® HC Stormwater Treatment Device shall incorporate, at a minimum, the maintenance requirements noted in the attached document. However, it is recommended to review the maintenance website at http://www.hydro-int.com/UserFiles/downloads/FD_O%2BM_F1512.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the First Defense® HC Stormwater Treatment Device:

   Example: A 0.25 acre impervious site is to be treated to 50% TSS removal using a First Defense® HC Stormwater Treatment Device. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (curve number for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the First Defense® HC Model 4-ft with a MTFR of 1.5 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

   The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2 of the NJCAT Verification Report.

Table 1 First Defense® HC Models

First Defense® Model	Manhole Diameter (ft)	Maximum Treatment Flowrate, MTFR (cfs)
4-ft	4-ft	1.50
6-ft	6-ft	3.38
8-ft	8-ft	6.00

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnanao of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan
C: Chron File
Richard Magee, NJCAT
Vince Mazzei, DLUR
Ravi Patraju, NJDEP
Gabriel Mahon, BNPC
Titus Magnanao, BNPC

PART 1 - GENERAL

1.01 SCOPE

A. Work described in this section includes furnishing all labor, equipment, materials, tools and incidentals required for a complete and operable installation of the First Defense® stormwater treatment system as shown on the drawings and specified herein.

B. The manufacturer shall design and supply the equipment listed herein and the Contractor shall install the equipment in accordance with the manufacturer's Handling, Storage, and Installation Instructions.

1.02 GENERAL REQUIREMENTS

A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff. The system shall be self-activating with no mechanical parts or external power requirements.

B. Upon request, independently certified performance data and references shall be made available to the Engineer of Record for use in determining that the treatment system meets the design criteria and performance requirements stated herein.

1.03 SUBMITTALS

A. Submittals shall be provided and shall include the following:

   i. Site plan showing location and orientation of proposed pipe sizes, connections and excavation limits.

   ii. Product installation drawings showing plan and elevation views with water elevations for the flow conditions specified herein.

   iii. Performance data as required in Part 2.

   iv. Inspection and maintenance procedures.

1.04 QUALITY ASSURANCE

A. The treatment system shall be manufactured under the direction of an ISO 9001 Certified Company.

B. Inspection

   The treatment system shall be subject to inspection by the Engineer of Record or the owner's representative at either the place of manufacture or the project site. Any and all observed defects shall be repaired to the satisfaction of the owner or owner's representative or replacement shall be made available.

C. Warranty

The manufacturer shall guarantee the treatment system free from defects in materials and workmanship for a period of two years following installation. If during the warranty period defects in materials or workmanship are noted, then the manufacturer shall be promptly notified. The decision to repair or replace affected units shall be made at the discretion of the manufacturer.

D. Patent Indemnity

Upon request, the manufacturer shall warrant that the treatment system does not infringe upon or violate any patent, copyright, trade secret or any other proprietary right of any third party and shall indemnify the Owner against any loss, cost, expense or liability arising out of such claim whether or not such claim is successful.

E. Certificate of Compliance

Upon request, the manufacturer shall provide a “Letter of Certification” to certify that the treatment system adheres to the specifications required herein and complies with the project’s stormwater management permit.

1.05 MANUFACTURER

A. The treatment system shall be supplied by a manufacturer regularly engaged in such work who has furnished similar installations that have been in successful and continuous operation for a minimum period of five years. The manufacturer shall be a Stormwater Equipment Manufacturer Association (SWEMA) member.

B. The treatment system shall be certified by an acceptable State agency, such as a State Department of Environmental Protection (DEP) or industry verification or assessment agency (e.g.: ETV, NJCAT, NETE, MaSTEP).

PART 2 – STORMWATER HVS

2.01 General

A. The treatment system shall use a tangential inlet chute to establish rotational flow within a cylindrical vortex chamber and be able to treat the Water Quality Flow Rate stated herein without re-suspending and releasing captured pollutants. The treatment system shall not release captured floating pollutants during surcharge conditions.

B. The treatment system shall not exceed the pressure drop (headloss) for the design flow rates specified herein as determined by ASTM C1745 / C1745M – 11.

C. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.

D. The storage capacities for pollutants that settle (sediment) and float (oil) shall not be less than the volumes listed in Table 1. The treatment system shall operate as intended and perform as specified herein as pollutants accumulate. The accumulation of pollutants that settle shall not reduce the volume required in the treatment system for separation and for preventing re-suspension and washout, or reduce the floatables storage volume capacity.

E. Minimum 24-inch frame and cover shall provide access to the sediment storage volumes from the surface for inspection and maintenance. Removal of pollutants from the treatment system shall be possible without requiring confined space entry.

2.02 Performance

A. Performance of the treatment system shall be based on independent full-scale laboratory testing and shall adhere to the Performance Specifications listed in Table 1. The laboratory testing used as the basis of product performance shall be undertaken in accordance with testing protocols approved or endorsed by SWEMA or acceptable State agency, such as a State Department of Environmental Protection (DEP) or recognized verification agency (e.g.: ETV, NJCAT, NETE, MaSTEP).

B. Performance of the treatment system shall be based on treating the Water Quality Flow rate (WQF) without internally bypassing and without re-suspension and washout of captured pollutants (scour). The Maximum Treatment Flow Rate(s) (MTFR-106 and/or MTFR-230) shall be greater than or equal to the WQF. The treatment system shall remove greater than or equal to 90% of TSS based on the Target Particle Size (TPS) of 106 microns and/or 80% of TSS based on the TPS of 230 microns at MTFR-106 and MTFR-230, respectively.

C. The treatment system shall convey the Peak On-line Flow Rates listed in Table 1 without causing upstream surcharge conditions. Full-scale independent laboratory scour testing shall demonstrate effluent control of less than or equal to 5 mg/L for all flows up to 200% of MTFR-106.

D. The treatment system shall be capable of capturing and retaining fine silt and sand size particles. Analysis of captured sediment from full-scale field installations shall demonstrate particle sizes predominately in the 20-micron range.

Table 1.

First Defense® Model	Diameter	Maximum Treatment Flow Rates (MTFR)		Peak Online Flow Rate	Maximum Pipe Diameter	Oil Storage Capacity	Minimum Sediment Storage Capacity	Min. Cover (F/G to Invert)	Min. Depth
		106µm	230µm						
	(ft/m)	(cfs/ L/s)	(cfs/ L/s)	(cfs /L/s)	(in/mm)	(gal/L)	(yd^3/m^3)	(ft/m)	(ft/m)
FD-4	4/1.2	0.7/20	1.2/34	6.0/170	18/450	180/681	1.3/ 1.0	3.1/1.1	5.47/1.7
FD-4HC				18.0/510	24/600			2.3-3.9/0.7-1.2	
FD-6	6/1.8	2.2/63	3.8/108	18.0/510	24/600	420/1,590	3.3/ 2.5	4.0 / 1.2	6.52/2.0
FD-6HC				32/906	30/750			3.0-5.1/0.9-1.6	

PART 3 – EQUIPMENT

A. The treatment system shall be manufactured with materials typically used in stormwater drainage systems that have a minimum life expectancy of 30 years.

(i) Materials of construction shall be cross-linked polyethylene (XLPE) and/or Type 304 stainless steel or carbon steel powder coated in accordance with ASTM 775/ ASTM A775M. All components shall be designed to withstand normal loadings associated with fabrication, shipping, site installation, and normal operation of the equipment.

(ii) Precast shall be manufactured with concrete that has attained a compressive strength of 4,000 psi after 28 days. The structure shall be reinforced to withstand an HS20-44 loading. Shiplap joints shall be sealed with butyl rubber mastic sealant conforming to ASTM C990. Slab tops shall be suitably reinforced and provided with manhole openings and covers as required. The cast iron manhole frames and covers shall be sized as per the manufacturer's drawings and shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The masonry fixing bolts shall be Type 304 stainless steel.

(iii) All piping connections and ancillary items not listed herein shall be provided by the Contractor.

PART 4 - EQUIPMENT DELIVERY

A. The treatment components of the treatment system shall be delivered within six weeks of date of approved technical submittal.

B. The components of the treatment system shall be preassembled and delivered to the site fully fabricated and ready for the final assembly.

C. Off-loading, storage, and installation shall be by the Contractor.

D. The Contractor shall inspect and provide signed acceptance of equipment prior to unloading, or notify the manufacturer of any damage to equipment to effect proper remedial action. Failure to notify the manufacturer of damage to equipment prior to unloading will void all warranties pertaining to subject equipment.

PART 5 - EQUIPMENT INSTALLATION

A. The system shall be installed in strict accordance with the site plans, and the manufacturer's general arrangement drawings and Handling, Storage and Installation Instructions. The Contractor shall be responsible for installing the equipment and all necessary site connections.

B. The Manufacturer shall be notified immediately of any equipment which is damaged during unloading, storage, or installation. The damaged equipment shall be repaired or replaced at the discretion of the manufacturer and entirely at the Contractor's expense.

C. The precast concrete structure shall be set on a granular or compacted sand sub-base in accordance with local requirements for standard manhole installation. In no instances shall the compacted sub-base material have a thickness of less than 12 inches.

D. The precast concrete structure shall be set level and plumb to within 0.5%.

E. Non-shrink grout or hydraulic cement conforming to ASTM C 595 shall be used to provide a water tight seal in the lift holes, any drain holes and around the concrete knock-outs for the inlet and outlet pipes.

F. The Contractor shall, at the discretion of the owner or owner's representative, test the concrete structure for water tightness before backfilling.

Appendix 16a | Geotechnical Investigation Report (by others)

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, N.Y. 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group 1 International Plaza, Suite 410 Mahwah, NJ 07430	PROJECT: PROJ. No.: DATE:	79 Dolsontown Road Town of Wawayanda, N.Y. 21402 December 4, 2021

GEOTECHNICAL INVESTIGATION REPORT

Table of Contents

1. PROJECT DESCRIPTION

This geotechnical investigation report was prepared for use in the design and construction of two warehouse buildings on an undeveloped lot. The larger western building will have a footprint of approximately 461,000 square feet (10.6 acres,) and overall dimensions of 535 by 881 feet, with a small section set back at the south end of the west wall. The smaller eastern warehouse has proposed dimensions of 200 by 306 feet, with a 61,000 square foot footprint (1.4 acres.) The west building site is an east-facing hillside, with elevations ranging from 454 to 467 feet above sea level along the east side of the proposed building, and 493 to 507 feet along the west side, for a total elevation change of 53 feet across the building. Existing slopes in the building area range from five to ten percent, with a typical slope of eight percent. The proposed east building site is on a northwest-facing slope which begins to bottom out along the north side of the building, where existing elevations range from about 450 to 452 feet. The existing high point is at about 467 feet elevation, on the east end of the south side of the proposed building, approximately at the top of the slope. The existing hill slopes at about ten to twelve percent in most of the building area, and at about two to three percent on the north side. Both building sites slope toward a wetland area which is centered on a stream flowing northeast to southwest, dividing the site; no wetland crossing or wetland buffer encroachment is indicated on the drawings.

The proposed building elevations were not provided. At the smaller east building, the anticipated floor elevation is approximately 460 to 465 feet, to meet the short entrance ramp from Dolsontown Road, thus most of the slab would be supported by fill with a thickness of up to ten to fifteen feet. A stormwater detention pond is indicated near the existing low point, with a wide roadway between the pond and the building; constructing the road slightly higher than existing grade and using high exposed foundation walls in this area appears to be the most practical layout; a full or partial basement could also be provided as an alternative to supporting part of the slab on deep fill.

The elevations are more challenging in the large building area. The truck entrance ramp near the proposed southeast corner joins Dolsontown Road at about 463 feet elevation, while the ramp to the employee/personal vehicle lot, near the southwest corner, joins the road at about 503 feet. A floor elevation of about 480 to 485 feet appears to be appropriate, and should result in a roughly balanced cut and fill; the existing elevation at the center of the proposed building is 481 feet. The proposed building will be within fifty feet of the property line at one point near the middle of the west side, and road construction will be within twenty-five feet of the line at that location, where the existing elevations are 500 to 505 feet. The building wall could be built as a retaining wall in this area, backfilled to a height of fifteen to twenty-five feet to support the road, or a retaining wall and/or rock cut could be provided along the setback line to allow the road to run between the cut and the building. Proposed stormwater ponds and semi-trailer parking lots on the east and the north side of the proposed large building also present challenges with existing slopes and the need to avoid disturbance of the wetland buffer area. An overhead electric transmission line crosses the back of the property, but is avoided by the proposed construction.

The USDA Soil Survey indicates that the native topsoil type in the large warehouse area is Mardin gravelly silt loam, which typically forms over deep deposits of glacial till composed of silty clay with some sand and little gravel, sometimes with abundant cobbles and boulders. In the smaller east warehouse area, the indicated topsoil type is Hoosic gravelly sandy loam, which typically forms over deposits of glacial outwash composed of gravelly sand with trace to little silt. Wayland soils, which form over silty to clayey floodplain deposits, are indicated in the center wetland area.

In the proposed west building area, the soils encountered in the borings were generally consistent with the Soil Survey data, consisting of glacial till composed mostly of sandy silt, sandy silty clay and gravelly silty sand. Bedrock was indicated at relatively shallow depth on the higher side of the building area. Wet conditions were frequently encountered. Boulders were encountered occasionally in these borings.

In the proposed smaller east building, the Soil Survey indicated that gravelly, sandy soils should be expected, however the soils were generally finer-grained, consisting mostly of silt, silty clay and fine sand. Wet soils were present, but were at least a few feet deep and will probably not significantly affect construction. One boulder was encountered in the borings in this area.

The proposed project areas have been cultivated, but no significant prior development of the site is believed to have occurred. The local bedrock is thinly-layered gray siltstone, sandstone and shale of the Ordovician-age Austin Glen Formation.

PHOTO 1. View facing northeast, from the shoulder of Dolsontown Road. The drill rig is working near the front right (southeast) corner of the proposed west warehouse. All photos were taken on November 10, 2021.

PHOTO 2. View from the west warehouse area, facing southeast across the center wetland and stream, with the east warehouse area in the distant background.

2. SOIL INVESTIGATION AND TEST RESULTS

Twelve soil borings were drilled on November 9, 10 and 11, 2021. Borings B1 through B8 were drilled in the larger west building area, and borings B9 through B12 were drilled in the east building area. Borings were drilled by the hollow-stem auger method, using a track-mounted drill rig. Drilling was performed by General Borings, Inc. of Prospect, Connecticut. The subsurface investigation was supervised and witnessed by Wyeth Patton, under the direction of Kevin Patton, P.E.

Soil sampling and testing were performed by the Standard Penetration Test (SPT,) using a Safety Hammer on a cable with a free-spooling drum, in accordance with ASTM D1586 (Standard Method for Penetration Test and Split-Barrel Sampling of Soils.) The SPT provides the Blow Count "N" Value, equal to the number of blows of the 140-pound steel hammer that were required to drive the 2-inch outside diameter split-spoon sampling tube into the soil, over a twelve-inch increment. Soil samples are also recovered by this method, and additional tests were performed in the field and lab, as noted on the soil boring log, using a hand penetrometer to test bearing capacity and a Torvane gauge to test shear strength and cohesion. Laboratory testing was performed on representative soil samples, for moisture content, particle size distribution and Atterberg Limits. USCS classifications of the soil, per ASTM D2487 and D2488, are provided on the logs and on the subsurface profile drawing.

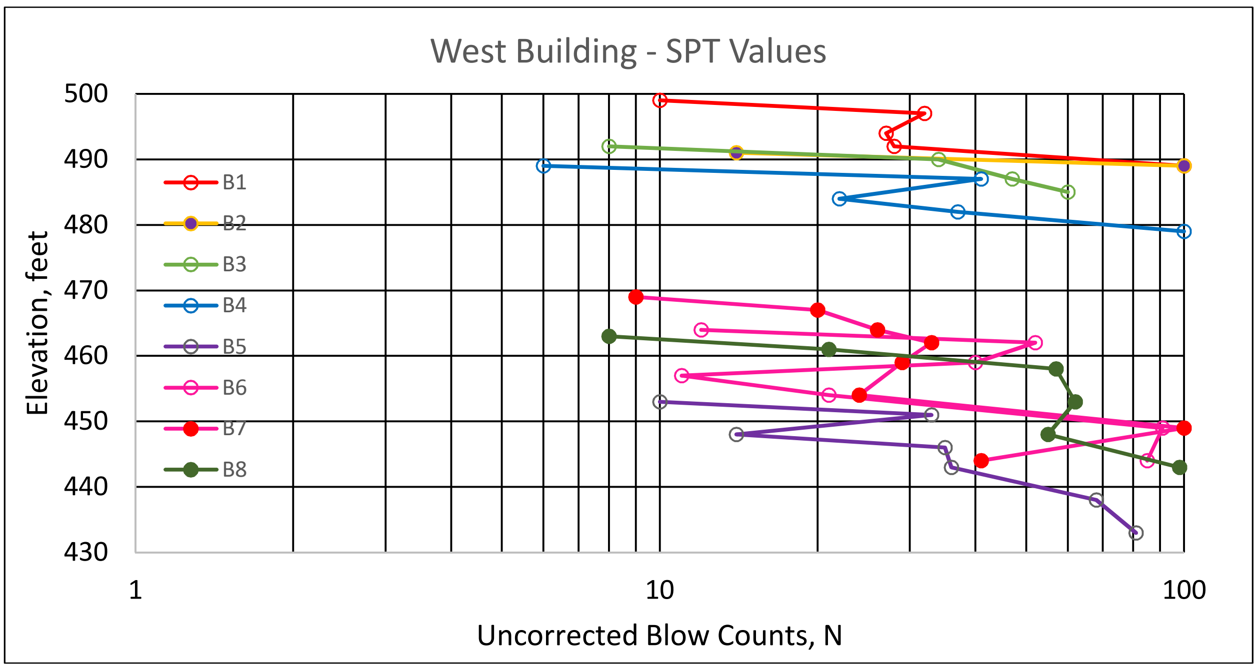
Shallow bedrock was indicated in the west part of the west building, with auger refusal typically occurring at about ten feet depth. Coring was not performed to verify that refusal was on bedrock, as the site conditions were only suitable for the track-mounted drill rig, and water could not be brought to the rig for coring. The appearance of the samples, including the presence of angular fragments of the local bedrock, the consistent depth to refusal, and the grinding of the auger on the bottom of the hole all provided positive indications that bedrock is present at this depth, however some additional exploration should be performed in this area prior to construction to verify the depth to rock.

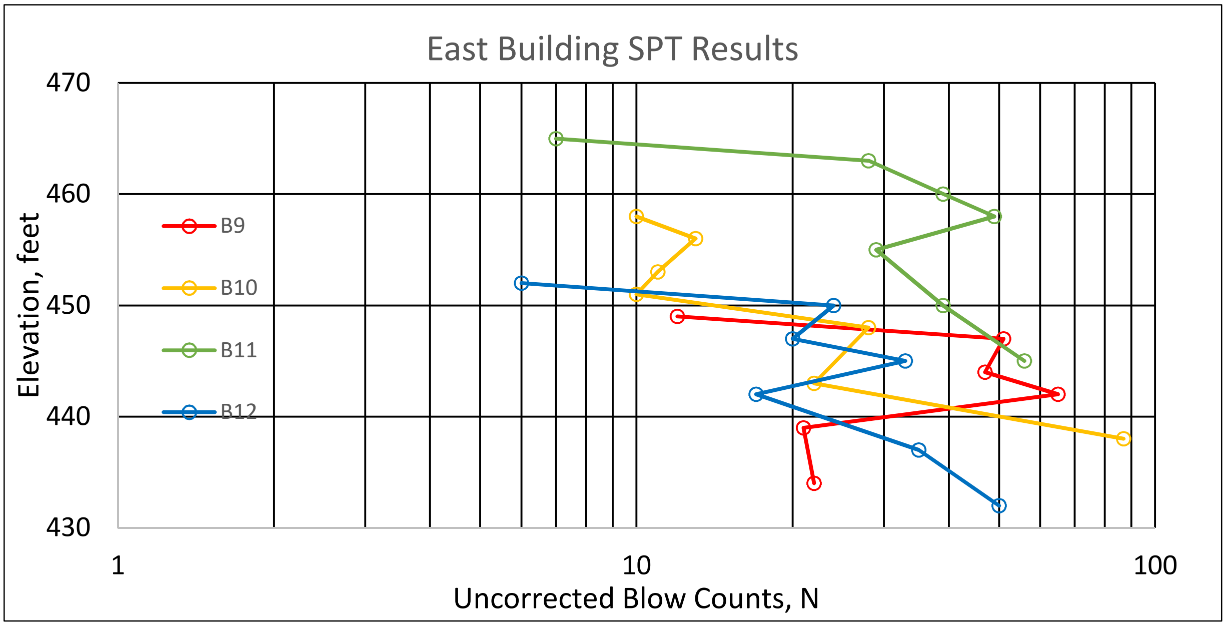
PHOTO 3. View facing west across the south end of the west warehouse area. Dolsontown Road runs left to right in the background.

2.1. Soil Boring Blow Count and Laboratory Data

Field Blow Count Values, N – West Building								
	B1	B2	B3	B4	B5	B6	B7	B8
Elev.:	500	492	493	490	454	465	470	464
Depth, ft.: 1	10	14	8	6	10	12	9	8
3	32	66/11″	34	41	33	52	20	21
6	27		47	22	14	40	26	57
8	28		60	37	35	11	33	
11	50/3″			50/6″	36	21	29	62
16					68	91	24	55
21					81	85	50/3″	98
26							41	
Auger Refusal, ft	11	5	10	11.5	--	--	--	--

Field Blow Count Values, N – East Building				
	B9	B10	B11	B12
Elev.:	450	459	466	453
Depth, ft.: 1	12	10	7	6
3	51	13	28	24
6	47	11	39	20
8	65	10	49	33
11	21	28	29	17
16	22	22	39	35
21		87	56	50





Natural Moisture Content, Percent								
Depth, feet	B1	B4	B5	B6	B7	B9	B10	B12
3	7.8	9.1	17.9	9.3		17.6	8.4	22.5
6	14.4	15.1	17.2		16.2	21.0		24.8
8	9.8		17.9	12.0	13.4	22.9		25.1
11			17.3		13.5	17.2	7.2	23.8
15						25.2		
16			13.4	8.4	11.5	19.6	15.9	
21			11.3	9.0				11.8
26					8.9		9.9	

SOIL TEXTURE				
Particle Size Analysis				
Sample		B4-S4	B10-S3	B10-S4
Depth		8 feet	6 feet	9 feet
Type		Sandy Silty Clay	Poorly-graded Sand with Silt	Silt
USCS Class		CL-ML	SP-SM	ML
Sieve Size	mm	Percent Passing by Weight		
¾"	19.0	100	100	
#4	4.75	89	100	
#10	2.00	82	99	
#40	0.425	73	75	100
#200	0.075	59	13	+/-100
Hydrometer	0.050	54	9	
	0.005	22	3	
	0.002	11	2	
Atterberg Limits				
Liquid Limit		21	None	None
Plastic Limit		15	None	23
Plasticity Index		6	Non-Plastic	Non-Plastic

The Standard Penetration Test results (blow counts) from the higher west side of the west building indicated firm to stiff soils at the surface, over about six to eight feet of very stiff to hard soil, with refusal on apparent bedrock at about ten to eleven feet depth, except in boring B2, where refusal was at five feet. On the east side of the west building, in what will be a fill area, the borings indicated loose to firm conditions to about two feet depth, over a few feet of medium-dense to dense soil, changing mostly to very dense soil below depths of about ten to fifteen feet.

In the east building area, the soils were mostly silty or sandy, loose at the surface, then mostly medium-dense, with some dense to very dense layers. In boring B10 the soils were loose to medium-dense to about eight feet depth, before changing to medium-dense. Boring B9 had very dense/hard silt and clay to about nine feet depth, over medium-dense silt.

Moisture contents of the samples mostly indicated moist to very moist conditions in densely-consolidated soil. Test results were generally higher in the finer-grained soils. The moisture content test results ranged from 7.2 percent to 25.2 percent water, by weight; test results greater than forty percent would be of concern.

The particle size analyses and Atterberg Limits tests represent typical native soils in the project area; other significantly different soil types were also encountered in the borings. Due to the sampling method, the analyses exclude particles that are medium gravel-size or larger. Occasional cobbles and few boulders are present in the soil but are not represented by the tests. Sample B4-S4 consisted of approximately 59 percent silt and clay, thirty percent sand and eleven percent gravel. Sample B10-S3 was composed of 87 percent fine-graded sand with thirteen percent fines, mostly silt. Sample B10-S4 was silt, and had nearly one hundred percent passing the #200 sieve; it had a Plastic Limit, indicating that it was cohesive, but did not have a Liquid Limit, and thus classifies as 'Non-Plastic.'

PHOTO 4. View facing northwest, across the north part of the proposed west warehouse, with the hilltop to the left and high-voltage transmission lines in the background.

2.2. Subsurface Profile and Summary of Soil Conditions

Subsurface conditions encountered in the borings are described in the boring logs and are summarized in the drawing attached to this report.

In the west building area, bedrock at shallow depth was indicated on the high side of the building. Refusal on probable bedrock occurred at elevations of 478 to 489 feet in borings B1 through B4, which were drilled about 70 to 160 feet east from the proposed west wall; if the depth to rock remains consistent, the profile along the west building wall will consist of approximately ten feet of soil over a fifteen-foot rock cut, with the bottom of the excavation at elevation 480. Drilling of additional borings and/or the excavation of exploratory test pits is recommended in the west part of the building area, to better establish the depth to bedrock, prior to planning the excavation. On the east side of the building, approximately twenty to thirty feet of fill will be required to reach the estimated 485-foot slab elevation. Borings B5 through B8 on this side of the building area indicated that the soils are suitable to support a deep fill, after removing the loose soil from the surface. Some groundwater seepage should be expected from the cut areas, both in soil and in rock.

In the east building area, borings B11 and B12 indicated mostly silt and silt with clay layers in the east part of the building. Boring B10, at the southwest corner, encountered mostly sand and fine sand, becoming gravelly at greater depth, and boring B9, at the northwest corner, encountered a thick zone of hard clay over silt. Most of the building pad will be a fill with an estimated maximum height of fifteen feet, and the subgrade soils are suitable to support the fill pad and building loads. The silt in this building area is much more sensitive to disturbance by vehicle traffic and by wind or water erosion than the silt in the west building area. Groundwater was indicated below elevations of 441 to 459 feet in the borings, and is not expected to significantly affect the construction, however some perched water or persistent seepage may be encountered.

3. EVALUATION

3.1. Subgrade Preparation

The conditions encountered in the investigation were evaluated for their impacts on construction methods, structural-geotechnical design, and long-term performance. The evaluation indicates that the subgrade throughout the proposed building areas is suitable to support the buildings and the fills that will be required for their construction, and that the native subgrade is suitable to support shallow spread footing foundations and slabs-on-grade, subject to performing the required subgrade preparation operations as described below.

Remove all existing topsoil, soft subsoil, stumps and large roots from the subgrade surface, in all building areas and building pad fill areas. Clear and grub the fill area at least one foot beyond the building footprint per foot of proposed fill height. Excavate to at least twelve inches below the original natural grade, and to the top of stiff, unyielding soil. The borings indicated that 24 to 30 inches of unsuitable material is typically present at the surface in both building areas. Use excavation methods that minimize disturbance of the final subgrade surface. Compact the surface to consolidate any soil that was loosened during excavation. Remove any pockets or small zones of unsuitable materials that are encountered, and replace them with controlled compacted fill. Contact the Engineer prior to performing any significant extra excavation. Where stumps or boulders are removed, or where other over-excavation work is performed to prepare subgrade areas, the sides of the excavation shall be trimmed back to stable soil as each lift is placed; as the backfill is compacted, extra care shall be taken to ensure thorough compaction where the edges of each lift meet the sides of the excavation. Where deficient soil is removed from below footing locations, the remediated area shall extend at least one foot out from the footing per foot of depth (1 to 1 splay.)

Where ripping or hammering of jointed or weathered rock is required, remove the rock to an approximately level and uniform elevation, with a slope of ten percent or less in areas below footings. Sound rock should be removed by blasting, except where the volume of rock is small. If the rock subgrade surface is significantly loosened, such as after excavation by ripping, level and seat the surface by tracking back-and-forth over it with a bulldozer or excavator, or spade it with the excavator bucket in tight areas, then compact the surface with several passes of a vibratory trench roller or a single-drum soil roller. A layer up to four inches thick of Structural Fill or ¾-inch to 1½-inchcrushed stone may be placed over the rock surface to facilitate compaction. Remove loose rock from vertical steps in the foundation.

Footings may bear directly on the prepared subgrade, or on controlled compacted fill placed over the subgrade. Footing bearing surfaces shall be free from frost, mud and loose soil or standing water, when concrete is placed. Where fine-grained native soil is present at the bearing elevation, a layer up to four inches thick of Structural Fill may be placed in the footing bottom to protect the soil surface, after properly preparing the surface to a level and stable condition. This layer shall be thoroughly compacted with a vibratory plate tamper or roller, and its surface shall not extend above the design bearing elevation.

If sound rock is encountered above the design bearing elevation, footings may bear on the rock, subject to approval by the Designer of Record; all footings shall bear at least twelve inches below finished grade. If the footing depth is reduced, pinning to rock may be required if the footing will be subjected to significant uplift or lateral forces. Rock surfaces should be thoroughly moistened prior to placing concrete.

3.2. Excavation

The native soils may be excavated using conventional heavy equipment, such as tracked excavators and bulldozers. Scraper pans may also be used; moderate interference from boulders should be expected. Rollers, wheel loaders and other heavy equipment should be sized appropriately for the subgrade conditions. Traffic from dump trucks and similar heavy vehicles should be minimized on the exposed surface of the subgrade and on compacted fine-grained fills.

Occasional small boulders are expected to be present in the soil, but some large boulders could also be present. Significant rock excavation is expected to be required in the west part of the west building area. Where the rock has been exposed to prolonged weathering, ripping to a depth of a few feet should be practical, using a large excavator or bulldozer with a ripper tooth. Hammering with a hydraulic hoe-ram will likely be required for the removal of fresh rock. Blasting is recommended for the removal of any significant quantities of fresh rock. Blasting should be planned to thoroughly fracture the bedrock to at least two feet below the proposed footing bearing elevations, to provide uniform bearing conditions and to allow fine-grading to be performed. Refer to the Subgrade Preparation section of this report for additional requirements.

The investigation indicates that the soils which will be encountered in the building excavations will vary significantly by location, and will include OSHA Type A soils, requiring a minimum slope of 0.75-to-1 in shallow excavations, with benching permitted, OSHA Type B soils, requiring a minimum slope of 1-to-1 in shallow excavations, with benching also permitted, and OSHA Type C soils, requiring a minimum slope of 1.5 horizontal to one vertical in shallow excavations, with benching not permitted. Soil types for excavation requirements must be confirmed during construction.

Shoring of excavations should not be required, as there appears to be sufficient distance from the property line to the estimated limits of the foundation work area to allow the use of conventional excavation slopes. The design of any required shoring or other support-of-excavation is the responsibility of the Contractor and is not included in this report.

Groundwater seepage rates in the building excavations are expected to be slow, but will likely be persistent, particularly in the west building area. Occasional zones of concentrated seepage may be encountered, with seepage particularly likely to occur near the bottom of the frost zone, at the soil-bedrock interface, and from the bottom of finer-grained soil layers. There may also be some initial short-term drainage of greater volume from zones of perched water from granular soils, including from low-plasticity silt layers. When wet, silty soils are encountered, they should be allowed to drain prior to final trimming of the cut, to avoid slumping or running. Groundwater seepage and stormwater should be removed promptly from the excavations, and the groundwater elevation should be maintained at least one foot below the bottoms of excavations in foundation construction areas. When dewatering excavations, the water level should be drawn down at a controlled rate to minimize sloughing, allowing the water to drain from the soil in the sides of the excavation.

3.3. Fill Materials and CLSM

Soils excavated from the site are expected to be mostly of fair to poor quality for re-use as fill and backfill for foundations, slabs and pavement areas. The available on-site borrow soil is expected to consist mostly of silt and silty clay, sometimes in a wet condition. These soils can be used as fill, but are moisture-sensitive and are typically difficult to work with, especially when the weather is other than warm and dry. Boulders and large cobbles must be removed from the borrow fill. Large clumps of clayey soil must be broken up.

Rock excavated from the site is expected to be of good quality for use as fill, and would be advantageous is used in the mass fill areas of the proposed building pads, particularly if used as a base layer and near the top of the fill. The rock is expected to be medium-hard, and crushed material made from fresh rock may be acceptable for use as road subbase (“Item 4,” NYSDOT Item 733-04.) For placement in mass fills, the maximum size of the rock particles shall be less than two-thirds the thickness of the lift being placed, and the rock fill shall consist of a well-graded mix of sizes from coarse to fine.

If imported fill is used below foundations and slabs, it shall consist of granular material, i.e. imported Structural Fill, which shall be good-quality bank-run sand and gravel or crushed stone, and should comply with the gradation limits below. Structural Fill may also be used as foundation backfill. Structural Fill HD (Heavy Duty) should be used in areas to be protected from heavy construction traffic and where subgrade stabilization and/or enhanced drainage is needed.

Sieve size		Structural Fill	Structural Fill HD
Inch	mm	Percent Passing by Weight	
4”	100	100	100
1½”	37.5	50-100	50-95
#4	4.75	20-70	20-50
#40	0.425	5-40	5-25
#200	0.075	0-20	0-10

All fill materials shall consist of sound, durable particles, shall be free from frost or snow, garbage, construction debris or other deleterious material, and shall be substantially free from organic matter and roots. Recycled crushed concrete and masonry from a registered source may be acceptable for some applications, subject to approval by the Designer of Record. Fill shall not be placed over frozen or unstable soil, unless approved by the Engineer.

CLSM (Controlled Low-Strength Material, aka flowable fill or k-crete,) may be used under footings and foundations when specifically approved by the Engineer, and may also be used to backfill trenches or other excavations, typically where rapid fill placement is required, fill areas are narrow, or the use of conventional compaction methods is not practical. For support of footings, a CLSM mix consisting of sand, cement and water, with a 56-day compressive strength of 75 to 200 psi, is appropriate. CLSM may produce high fluid pressures during placement, and caution must be used for placements against foundation walls, near unbraced cuts, etc. Pipes or tanks can also float if not properly restrained during placement. CLSM should not be placed against unprotected aluminum; CLSM containing flyash should not be used in contact with cast iron or ductile iron. Hardened CLSM masses may also adversely affect groundwater flow, possibly causing erosion under or along the CLSM, particularly in sloping trenches.

Other Fill Materials:

- Crushed stone base course for slabs-on-grade should consist of ASTM C33 #56 or #57 stone (⅜- to ¾-inch size,) or as required by the slab system design.
- Crushed stone or gravel for footing drains should consist of ASTM C33 #5, #56 or #57 stone (¾-inch or ⅜-¾-inch size.)
- Well-graded granular subbase material (NYSDOT Item 733-04 'Item 4' or similar) should be used under sidewalks and exterior slabs.

3.4. Fill Placement and Compaction

Soil surfaces, including fill materials, shall be prepared to a stiff and essentially unyielding condition prior to placing each lift of fill. Perform compaction using small to mid-size equipment, such as vibratory trench rollers or single-drum soil rollers with a nominal size of three to seven tons, when compacting fill over wet and/or fine-grained subgrade soils or over previous lifts of fine-grained fill. In areas with limited access, vibratory plate tampers or jumping-jack tampers may be used. Heavier compaction equipment may be used over deep granular fill and rock fill. Backfilling of foundation excavations should be completed prior to erection of building framing. Do not allow water to accumulate in footing excavations prior to backfilling. Protect the compacted fill, as well as the prepared subgrade surfaces, from rutting by dump trucks, concrete mixers and other vehicles with high contact pressure. Traffic from these vehicles is acceptable when the soil surface is hard and stable.

Soil fill shall be placed in controlled lifts, with each lift compacted to the required density at a moisture content close to optimum moisture, as determined by ASTM D1557. When the moisture content of the fill is within two percent of optimum, it may be placed in lifts with compacted thicknesses of up to twelve inches. If the moisture content is two to three percent from optimum, reduce the maximum thickness to ten inches, and if it is more than three percent from optimum, discontinue compaction. Use a reduced lift thickness if required to attain the specified percent compaction and when using small compaction equipment. If the fill is too dry, mix in water as the fill is spread; surface watering is typically ineffective.

Rock fill may be placed in lifts with compacted thicknesses of up to eighteen inches. Maintain a well-graded condition when placing the fill, and dig out and amend any boulder pockets prior to compaction. Compact each lift with at least six passes of a vibratory sheep's-foot or smooth-drum roller with a nominal size of seven tons or greater, and until the lift is fully seated and compacted. Ideally, the rock fill should be compacted in a wet condition, but it may also be compacted when moist or dry, using the same procedures.

Where fill will be placed against slopes, bench the fill into the slope to create a stair-step interface, for improved stability and groundwater control. Lightly scarify the surface of the existing soil prior to placing the fill, and key the fill into the subgrade at the toe of the slope. When the fill is more than five feet high against a slope of twenty percent or more, the key should be at least two feet deep and ten feet wide.

If the native silt and clay soil is used for thick building pad fills, careful preparation, placement and compaction methods must be employed, and the fill section must be properly designed.

- Prepare the fill by drying it to a somewhat crumbly consistency, then thoroughly break up the soil clods so that they are no larger than two-thirds of the lift thickness (e.g. smaller than eight inches for a twelve-inch thick lift.)
- Mix and spread the fill so that the larger clods are well-mixed with finer pulverized soil; remove boulders during preparation and placement. Condition the fill if needed to the reach the proper compaction moisture content, mixing the fill so that the moisture is uniform throughout the lift thickness.
- Re-work any 'clod clusters,' where the fill is lacking in fines, to a well-graded condition, by mixing and/or by adding finer fill material.
- Compact the clay fill with a mid-size single-drum vibratory roller, or with a dual-drum trench roller where access is limited; a heavy roller will tend to produce rutting, and a light roller will not adequately compact the soil. A roller with a sheep's-foot or tamping foot drum is preferred, both because it tends to knead and compact the soil clods, and because the compacted surface promotes the dispersed vertical drainage of water infiltration, versus the surface produced by a smooth-drum roller, which promotes lateral seepage movement, potentially causing local saturation and the creation of soft spots.
- Drainage must be provided at the bottom of any significant fill sections, to minimize water accumulation in the base of the silt and clay, which can cause softening and settlement. A layer of granular fill, such as crushed rock or 'Structural Fill,' at least one foot thick, is typically sufficient, provided the granular layer is free to drain laterally and/or vertically. Where vertical drainage into a clay subgrade is to be provided, trim the clay subgrade carefully to a suitable surface without disturbance, and do not compact the clay prior to placing the granular fill; this will promote infiltration, but the rate may still be slow.
- The top of the fill must also be provided with proper drainage, particularly below parking lots, lawns, and in other areas of surface water infiltration. The final lift of fine-grained fill should be at least two feet below the proposed top-of-pavement elevation in paved areas, to provide sufficient depth for drainage and for protection of the silt and clay subgrade during construction and paving. In landscaped areas, the top of the clay fill should also be at least two feet deep, to allow for a sufficient thickness of fill with a suitable moisture capacity to support vegetation.
- The top of the silt and clay fill must be carefully graded to avoid low spots, where surface water infiltration can accumulate; it should be pitched gently toward underdrains or other outlets, and not made perfectly level.
- Installation of a layer of geotextile between the top of the fine-grained fill and the pavement subbase and landscaping fill is recommended. The geotextile will promote retention or surface infiltration in the pavement base and drainage layers and in the landscaping, and will reduce concentrated infiltration into the fine-grained fill.
- Surface water infiltration in the near-surface fill materials and in the underlying clay fill will tend to seek curbs, utility trenches and similar discontinuities, and subsurface drainage should be provided from these features; where water concentration along utilities needs to be minimized, use well-graded bedding material.
- Embankment slopes constructed with fine-grained fill should be built slightly wide, then trimmed back, to allow thorough compaction near the edge. The fill placed in the outer zone (six feet wide, or one third of the fill height above, whichever is greater) should be compacted at a moisture content no more than one percent above optimum, leaving the soil clods slightly crumbly and creating some initial lateral permeability.

- The surface of the embankment should be scarified prior to placing topsoil, and small benches or one- to two-foot wide steps should be provided at frequent intervals to protect against sliding of the topsoil. The topsoil should be erosion-resistant and should be placed at the minimum required thickness.

Pipe bedding in utility trenches may act as groundwater flow routes during or after construction. Use well-graded bedding, or interrupt coarse granular bedding with occasional zones of compatible lower-permeability soil to control minor seepage. Avoid the use of excessively coarse pipe bedding material that can allow fines to wash in from the surrounding soil. Contact the Engineer if excessive groundwater is encountered.

Open-graded stone base course material for slabs-on-grade should be graded level and seated with one or more compaction passes, to help resist displacement during slab area preparation and concrete placement.

3.5. Compaction Requirements

Compact each lift of fill supporting slabs or foundations with at least six one-way compaction passes, even if the required compaction percentage is obtained with fewer passes. Each compaction pass shall be made at a slow walking speed (less than four feet per second,) with the equipment passing completely over all areas of the fill. Fill materials shall be compacted to at least the following percentage of the ASTM D1557 maximum dry density. For coarse-graded fill materials with more than thirty percent retained on the ¾-inch sieve, the ASTM D4253 Maximum Index Density test may be substituted for the D1557 test.

Minimum Percent Compaction	
Location	Minimum Percent
Below footings, foundations and slabs	95
Exterior Foundation Backfill in Landscaped Areas	90

3.6. Testing

The prepared subgrade shall be inspected to verify that it has been prepared in conformance with the requirements of this report, prior to placing fill. Compaction testing is required by Code for each lift of fill supporting foundations, and testing shall be performed while the work is in progress. Recommended test procedures and frequencies are provided below.

PROOF-ROLLING: Proof-rolling of the prepared subgrade soil is not required, but may be performed to determine the limits of a soft area. Use an appropriately–sized vehicle, to avoid damaging wet and/or fine-grained, but otherwise acceptable soils. Observe the effects of the moving vehicle, and if the soil exhibits excessive deflection, rutting or cracking, then additional excavation or drying of the subgrade may be required.

BEARING CAPACITY: The prepared subgrade surface shall be free from loose material and shall be in a dense and unyielding condition; if this condition is not encountered at the design bearing elevation, testing shall be performed with a Static Cone Penetrometer or equivalent device, and the design bearing capacity shall be obtained within 3 inches of the surface in footing excavations. The soil throughout the foundation area shall be probed thoroughly to check for soft spots. If the bearing capacity tests are acceptable, the soil is undisturbed, is free from organics and is densely-consolidated, and if the observed yielding conditions are not due to the presence of loose or deficient soils, the subgrade may be accepted. Testing is not required where the subgrade consists of bedrock or fractured rock, but these areas shall be visually inspected.

COMPACTION TESTING: Compaction tests of soil fill and backfill supporting foundations or slabs-on-grade should be performed in at least three representative locations for each lift, and in at least one location per 5000 square feet. Compaction tests should be performed with a nuclear moisture-density gauge, per ASTM Test Method D6938, unless otherwise approved. Required percent compaction values are provided above. Rock fills shall be visually inspected during placement and compaction to verify that each lift is placed at the specified thickness, is free from open-graded areas, is compacted with at least the minimum specified number of passes with acceptable equipment, and is in a hard, densely-consolidated and stable condition at the completion of compaction.

CLSM: When flowable fill is used to support footings or foundations, at least one set of three 6x12-inch test cylinders shall be cast from each day's placement, per ASTM D4832. Test the cylinders for unit weight and for compliance with the specified strength requirements. Cast additional cylinders if early tests are needed.

3.7. Geosynthetic Materials

Geosynthetic materials are expected be used for reinforcement and drainage applications at the site on an as-needed basis, or where required by Code, such as for footing drains.

Geosynthetic materials shall be installed over a smooth and evenly shaped subgrade, to avoid 'tenting' of the material over voids or high points. The geosynthetic shall be installed substantially free from wrinkles, and fill material shall be placed and spread in a manner which pushes the wrinkles out but which does not otherwise displace the geosynthetic material. Vehicles shall not drive on the exposed geosynthetics. The following material types are recommended, with typical examples of suitable products.

Drainage Separation: For footing drains and similar applications, a woven drainage geotextile with at least 4% open area, with an apparent opening size of 0.21mm (#70) or smaller, should be installed between the native soils and open-graded drainage zones. A suitable product is Carthage Mills "Carthage 6%." Non-woven geotextiles are not recommended for use in this application, due to the presence of fine particles in the native soil that will tend to clog the fabric.

Subgrade Reinforcement: Typically, a woven reinforcing geotextile such as TenCate Mirafi 600X should be used where needed to improve the stability of soft subgrade soils. Geogrids may be used instead of woven geotextiles, especially if free drainage is desired. A minimum of twelve inches of granular fill cover is typically required to mobilize the strength of the reinforcing geosynthetic.

Subgrade Separation: Where fines from the subgrade may infiltrate into an overlying granular layer, and strengthening of the subgrade and free vertical drainage are not required, a non-woven geotextile such as Mirafi S600 or 160N should be used.

Infiltration Barrier: Woven Reinforcement geotextile will act as an effective infiltration barrier when installed in a continuous horizontal layer. Non-woven Separation geotextile will also work as a barrier, when the overlying material in contact with it contains at least three percent silt and clay (passing the #200 sieve.) While these fabrics will not completely stop water movement, they will significantly reduce it, which may be advantageous or disadvantageous, depending on the installation location and goals.

4. DESIGN VALUES AND RECOMMENDATIONS

4.1. Bearing Capacity and Soil Pressure

Soil engineering properties for design are summarized in the tables below. The values assume that the building will be supported by a conventional spread footing foundation with slab-on-grade floor, as described in the previous sections, and will be provided with proper drainage.

East and West Buildings, Allowable Bearing Capacity on Soil, q_a	
Footings bearing at least 42 inches below finished grade, with a minimum width of 24 inches	3500 psf
Footings bearing at least 24 inches below finished grade, with a minimum width of 52 inches	3500 psf
Footings bearing at least 24 inches below finished grade, with a minimum width of 24 inches	3000 psf
Minor Footings bearing at least 12 inches below finished grade, with a minimum width of 12 inches	1500 psf
Allowable bearing values between 3000psf and 3500 psf may be interpolated for footings bearing at 24 inches depth, based on footing width.	

West Building, Allowable Bearing Capacity on Rock, q_a	
Footings bearing at least 12 inches below finished grade, with a minimum width of 12 inches, on intact, weathered and/or fractured bedrock.	4000 psf

Soil Properties	Native Soils
Soil Moist Density, γ, lbs/cu ft	130
Effective Internal Angle of Friction, $\emptyset$	32°
Coefficient of Friction (vs. concrete)	0.35
Coefficient of Active Earth Pressure, k_a	0.31
Coefficient of Passive Earth Pressure, k_p	3.25
Coefficient of At-Rest Earth Pressure, k_o	0.47
Lateral Bearing Capacity (psf per ft below grade)	210
Modulus of Subgrade Reaction, k, psi per inch	200

Rock Properties	Intact Bedrock
Rock Moist Density, γ, lbs/cu ft	165
Coefficient of Friction (vs. concrete)	0.70

Footings on soil or on weathered rock, and subject to frost, shall bear at least 42 inches below finished grade, or shall be otherwise protected from frost. Footings on intact bedrock or on fractured bedrock shall bear at least twelve inches below finished grade. Bearing elevations of footings shall be established such that a line drawn between the bottoms of two adjacent footings is not steeper than 30 degrees between the closest points on the footings. (Slope of 1 vertical to 1.75 horizontal.)

Up to one inch of settlement and ¾-inch of differential settlement should be anticipated for the new foundations bearing on native soil, due to normal elastic compression of the soils below the footings, however the actual expected settlement is expected to be one quarter inch or less in the densely-consolidated soils at this site. If minor fill is placed below footings, an additional quarter inch of settlement should be expected for per five feet of fill thickness.

In the deep fill areas of the building pads, some settlement of the mass fill and deflection of the subgrade soil below the pad will be added to the normal footing settlement. Settlement of the subgrade soil is expected to be nearly completed by the time the pad is completed, but some post-construction settlement of the fill should be expected. If the site borrow soil is used as fill and is carefully placed and compacted as recommended in this report, one inch of total settlement should be expected in the thickest section of the fill. This magnitude of settlement can be reduced by using well-graded granular fill materials for all or part of the building pad fill.

4.2. Control of Groundwater and Soil Gases

Minor groundwater seepage should be expected in foundation areas during and after construction. Conventional damp-proofing, including placement of slabs-on-grade over a vapor barrier and an open-graded stone base course, are appropriate to control water seepage. The walls of the west building might be partially backfilled; thorough damp-proofing, with the walls backfilled with well-graded granular fill, to convey groundwater seepage to footing drains in this area, should be sufficient to control groundwater seepage from the native soils or bedrock. Vertical drainage panels or a zone of sand or gravel outside the walls are not necessary for seepage control, but this additional drainage is recommended due to its low cost, to protect against unexpected seepage or future changed conditions. Stormwater infiltration from the parking areas should be diverted away from the building. Most building areas will not extend below grade, and footing drains are not required in those areas, however they may be beneficial for water control during construction, and are also recommended in areas where the foundation bears on substantially intact bedrock, where water trapped along the foundation could cause pavement distress near the building.

Soil gases that could normally be expected to impact the structure are water vapor and radon. Thorough foundation damp-proofing, as noted above, placement of dense concrete in slabs-on-grade, (low water-to-cementitious ratio, thoroughly consolidated,) and sealing of all wall-to-slab joints, concrete cracks, pipe penetrations, drainage sumps, etc. are usually effective in controlling transmission of these gases to interior spaces. If an open-graded base course is used under the slab, a passive vapor mitigation system can be included, using small-diameter PVC pipes. The potential for these gases to adversely impact the use of the building is estimated to be low, if the above recommended practices are used, and normal interior ventilation is provided.

4.3. Seismic and Expansive Properties

Seismic Design Values: The Seismic Site Class and Seismic Design Category for the proposed construction were determined per section 1613 of the New York State Building Code and ASCE 7-16. Seismic values for the site were obtained from the current database maintained by the Applied Technology Council, Redwood City, Cal., and are consistent with the published maps in the Building Code. Values were as follow.

Occupancy Category		I/II/III	
Seismic Site Class		West Building: C – Very Dense Soil and Soft Rock	
IBC Seismic Design Category		**SDC - B**	
Maximum Acceleration		0.2 sec S_S 1.0 sec S_1	0.212 g 0.054 g
Maximum Spectral Response Acceleration		0.2 sec S_{MS} 1.0 sec S_{M1}	0.275 g 0.082 g
5% Damped Spectral Response		0.2 sec S_{DS} 1.0 sec S_{D1}	0.184 g 0.054 g

Occupancy Category		I/II/III	
Seismic Site Class		East Building: D – Stiff Soil	
IBC Seismic Design Category		**SDC - B**	
Maximum Acceleration		0.2 sec S_S 1.0 sec S_1	0.212 g 0.054 g
Maximum Spectral Response Acceleration		0.2 sec S_{MS} 1.0 sec S_{M1}	0.339 g 0.131 g
5% Damped Spectral Response		0.2 sec S_{DS} 1.0 sec S_{D1}	0.226 g 0.087 g

The seismic design values are based on the "risk adjusted maximum probable earthquake." These are not the maximum values that *could* occur, they are values that are not likely to be exceeded during the service life of a typical structure.

Liquefaction Potential: The soils encountered in the investigation have low liquefaction susceptibility. Some poorly-graded sand was encountered in the proposed east building area; it has a potentially-liquefiable texture, but was sufficiently dense to resist shifting or settling during the design seismic event. No special mitigation measures are required.

Expansive Soils and Frost Heave: The soils encountered in the investigation have a very low potential for expansion due to shrinking and swelling resulting from moisture changes. This behavior is typically associated with high-plasticity silt and clay soils. Physical testing and qualitative examination indicate that the soil properties do not meet the criteria for potentially expansive soils as defined in section 1803.5.3 of the Code. No mitigation measures are required. The on-site soils are moderately to highly susceptible to frost heave. Frost heave can be minimized by providing good drainage and by thoroughly compacting the soil. Well-graded granular fill should be used in areas where frost heave could result in damage.

5. NOTES AND LIMITATIONS

Please see the attached pages for additional information. Subsurface conditions encountered during construction shall be compared to the soil boring logs and this report; any significant variations from anticipated conditions must be evaluated for their effect on the design. This report summarizes the results of a limited investigation and does not purport to predict every variation in subsurface conditions. Elevations, slopes, contours, project layout and similar or related data provided in this report were interpreted from the drawings, from field data or from other information which was provided, unless otherwise noted.

This geotechnical investigation was conducted to evaluate the engineering properties of the soils at the site, to aid in the design of the proposed work. The investigation did not include evaluation of the potential effects of the proposed construction on other properties, nor did it include inspection of, or sampling for, items of environmental concern such as the presence of soil contaminants or of regulated wetlands, and did not include review of local zoning regulations, codes, floodplain boundaries or similar matters, unless specifically referenced in the report. This investigation was conducted solely for the use of the Client, the Client's Project Designers and Agents and the Authorities Having Jurisdiction; this report should not be used by others, nor for any use other than its stated purpose, without contacting the Engineer. Any such use is solely at the user's risk.

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Prepared by Kevin L. Patton, P.E.

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, N.Y. 12550
845 275-7732 PATTONGEOTECH.COM

Soil Technical Notes:
Soil Classifications, Descriptions and Properties

The USCS (Unified Soil Classification System) was used to classify the soils in this report. The USCS is described in ASTM D2487 (laboratory test method) and D2488 (visual-manual method.) The USCS classification gives a 'Group Symbol' and 'Group Name' based on particle size distribution (gradation,) clay properties (Atterberg Limits) and basic composition (mineral or organic.)

USCS Soil Classes

Soils with less than 5% passing the #200 sieve:
GW, GP, SW, SP – Well-graded gravel, Poorly-graded gravel, Well-graded sand, Poorly-graded sand.
Soils with 12% to 50% passing the #200 sieve:
GC, GM, GC-GM, SC, SM, SC-SM – Clayey gravel, Silty gravel, Silty clayey gravel, Clayey sand, Silty sand, Silty clayey sand.
Soils with 5% to 12% passing the #200 sieve use a dual symbol, such as SW-SC (Clayey well-graded sand.)
Soils with more than 50% passing the #200 sieve:
CL-ML, ML, CL, MH, CH, OL, OH – Silty clay, Silt, Lean clay, Elastic silt, Fat clay, Organic silt, Organic clay.
Highly organic soils:
PT – Peat.
The soil group name is modified with the term 'with sand' or 'with gravel' added if the soil contains more than 15% of these materials; clays and silts with 30% or more plus-#200 material are described as 'sandy' or 'gravelly' (whichever is predominate.) Examples – GM, Silty gravel with sand; CL, Gravelly lean clay.

Particle size

>12" (300mm)	Boulders
12" to 3" (300-75mm)	Cobbles
3" to #4 (75-4.75mm)	Gravel
#4 to #200 (4.75-0.075mm)	Sand
<#200 (0.075mm)	Silt & Clay

Organic Soils

Highly organic soils such as peat are visually classified. Partly organic soils, with a mix of organic and mineral matter, are classified visually and by Atterberg Limits tests.

Moisture Content

Moisture is visually estimated and samples are usually tested. Soil moisture capacity varies with texture and compaction.

Typical examples:
GW, moist at 3%, saturated at 9%
SP, moist at 6%, saturated at 20%.
CL, moist at 12%, saturated at 33%.

Fine- and Coarse-grained Soils

The USCS classification applies to the material smaller than the 3-inch sieve.

'Fine-Grained Soils' (silts and clays) have more than 50% passing the #200 sieve and are classified by their Atterberg Limits.

'Coarse-Grained Soils' (sands and gravels) have less than 50% passing the #200 sieve. When more than 50% of the plus-200 material is retained on the #4 sieve the general soil type is gravel, and if more than 50% is finer than the #4 sieve, it is sand.

Clean coarse-grained soils are classified as well-graded (Classes GW, SW) or poorly-graded (GP, SP.) Well-graded soils have a wider range of sizes and are typically more stable. Poorly-graded soils are usually more permeable.

Atterberg Limits

Test is performed on the clay, silt and fine sand fraction of the soil:
Liquid Limit (LL) – moisture content (%) at which soil becomes very soft.
Plastic Limit (PL) – moisture content at which soil crumbles.
Plasticity Index (PI) = LL minus PL

Higher PI values may indicate reduced permeability and increased drying shrinkage.

LL > 50 indicates soil with a higher potential to shrink and swell due to changing moisture content.

Silts have lower PI values, and behave like very fine sand; most silts also contain some clay. Behavior of clays is partly controlled by electrochemical forces and varies among the several clay minerals.

Color

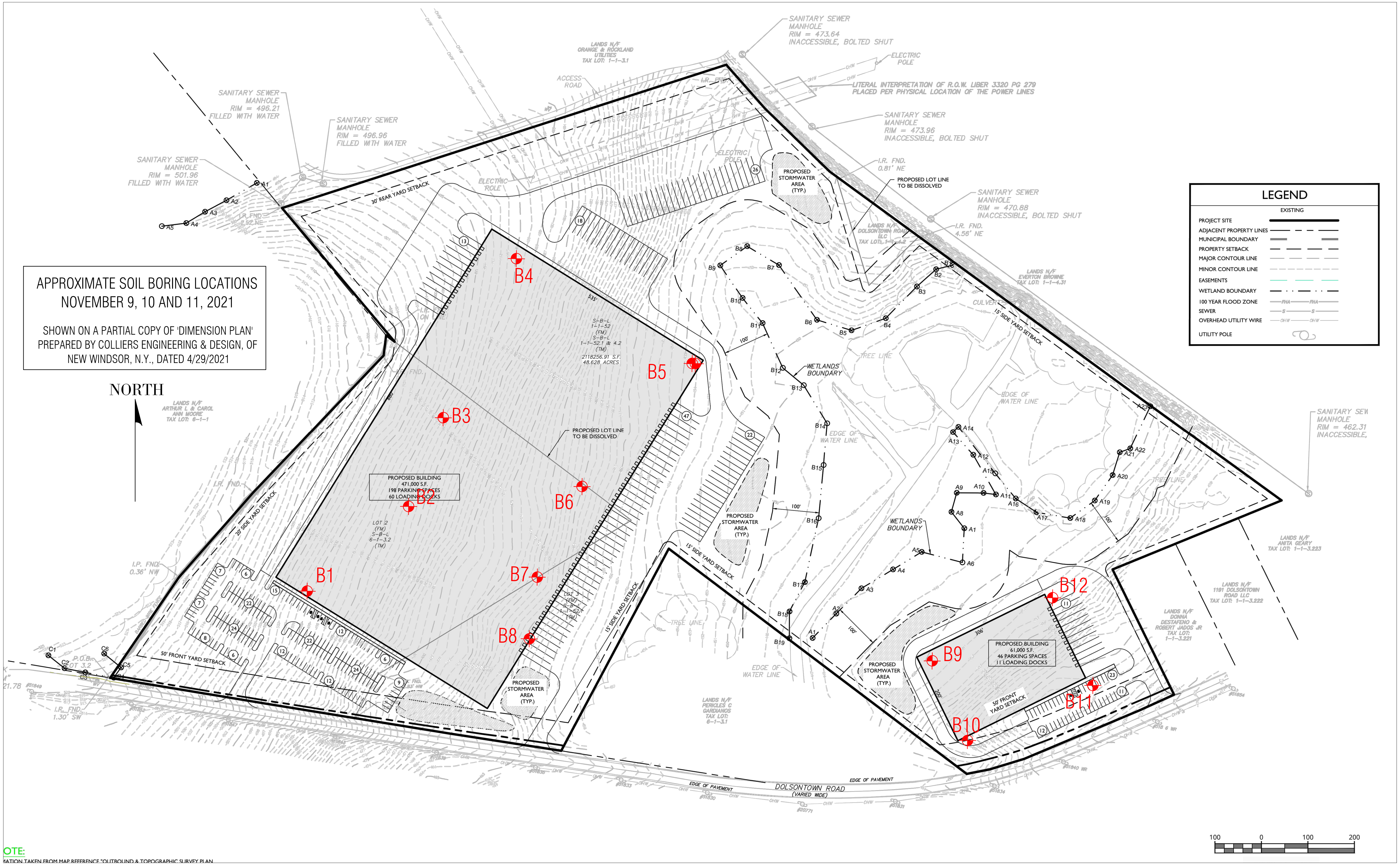
Soil color sometimes indicates groundwater conditions, with subdued colors below the water table and mottled (mixed) colors in the zone of seasonal water table fluctuation. Color changes tend to be more prominent in fine-grained soils.

Relative Quantities

Estimated percentages in descriptions:
<5% - Trace
5-10% - Traces
10-25% - Little
25-35% - Some
'And' - Approx. equal amounts
'Few' - <10% (cobbles and boulders)

USDA Soil Classification

USDA classifications are based on the relative amounts of sand, silt and clay in the soil fraction passing the #10 (2mm) sieve. 'Gravelly' indicates more than 15% of #10 to 3" size. 'Channery' indicates 15 to 35% thin flat pieces up to 6" long.



KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732
PATTONGEOTECH.COM

79 DOLSONTOWN

TOWN OF WAWAYANDA, ORANGE COUNTY, N.Y.

SOIL BORING LOCATIONS

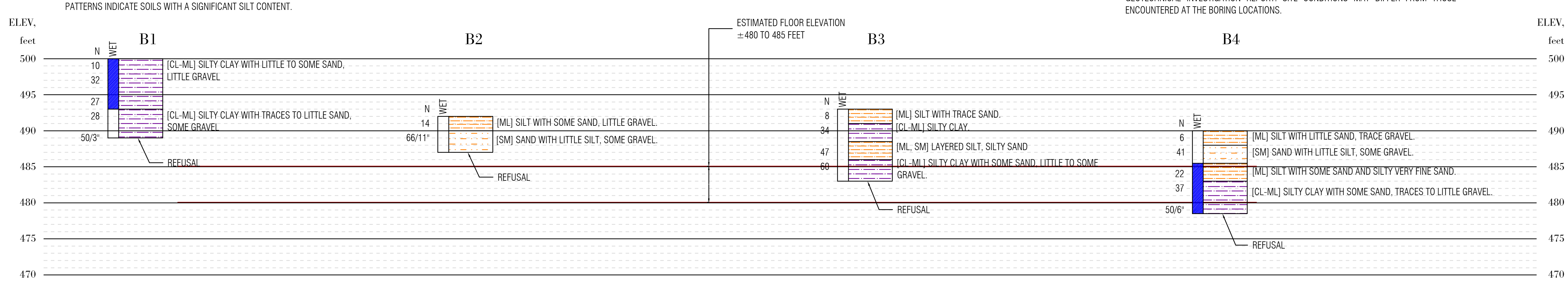
REV.	DATE	BY
0	12/4/2021	KLP

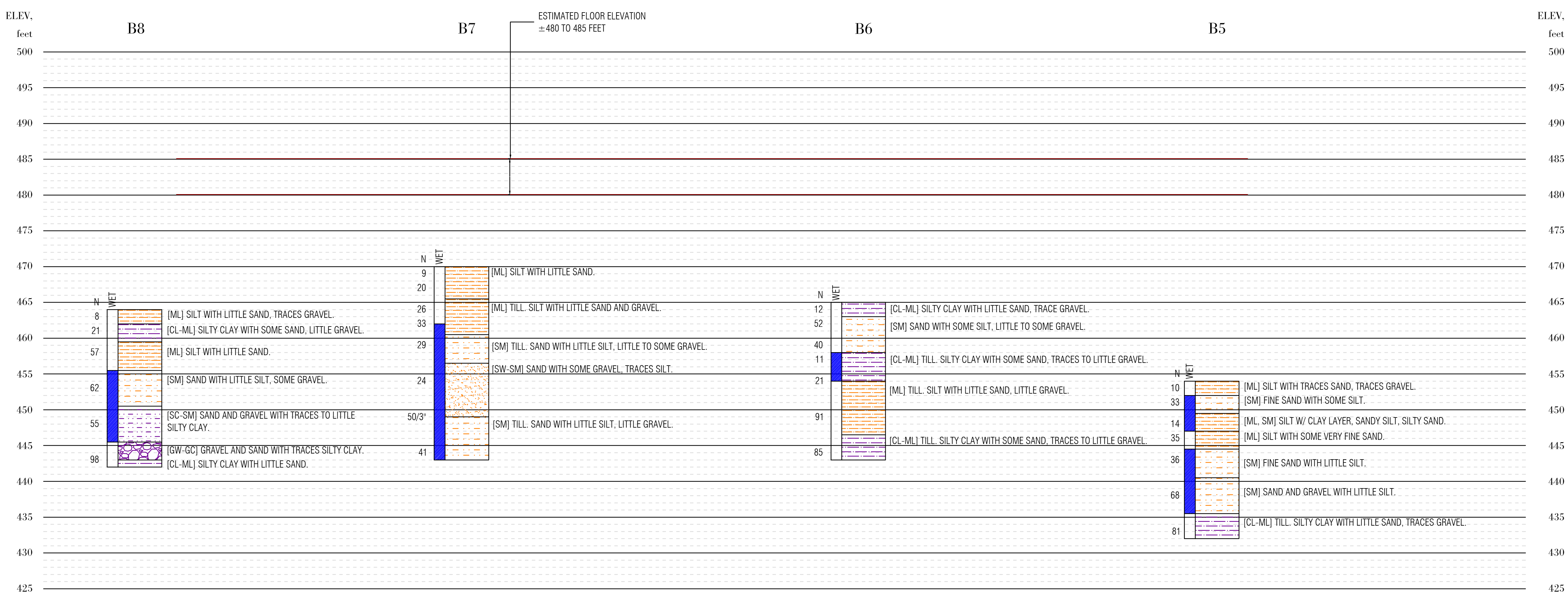
GENERALIZED SUBSURFACE PROFILE
PROPOSED WEST BUILDING

NO HORIZONTAL SCALE.
USCS SOIL CLASSIFICATIONS ARE IN BRACKETS.

IN GENERAL, RED PATTERNS INDICATE RELATIVELY CLEAN SANDY OR GRAVELLY SOILS, PURPLE PATTERNS INDICATE SOILS WITH SIGNIFICANT CLAY CONTENT AND ORANGE PATTERNS INDICATE SOILS WITH A SIGNIFICANT SILT CONTENT.

THESE SECTIONS ARE GENERALIZED REPRESENTATIONS OF THE SUBSURFACE PROFILE, BASED ON THE SUBSURFACE EXPLORATION DATA, OBSERVATIONS, RESEARCH, AND OTHER RELEVANT INFORMATION. THE SOILS INFORMATION PRESENTED HEREIN SHOULD BE INTERPRETED IN CONJUNCTION WITH THE INFORMATION FROM THE BORING LOGS AND THE GEOTECHNICAL INVESTIGATION REPORT. SITE CONDITIONS MAY DIFFER FROM THOSE ENCOUNTERED AT THE BORING LOCATIONS.





KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732
PATTONGEOTECH.COM

79 DOLSONTOWN
TOWN OF WAWAYANDA, ORANGE COUNTY, N.Y.
SUBSURFACE PROFILE - WEST BUILDING

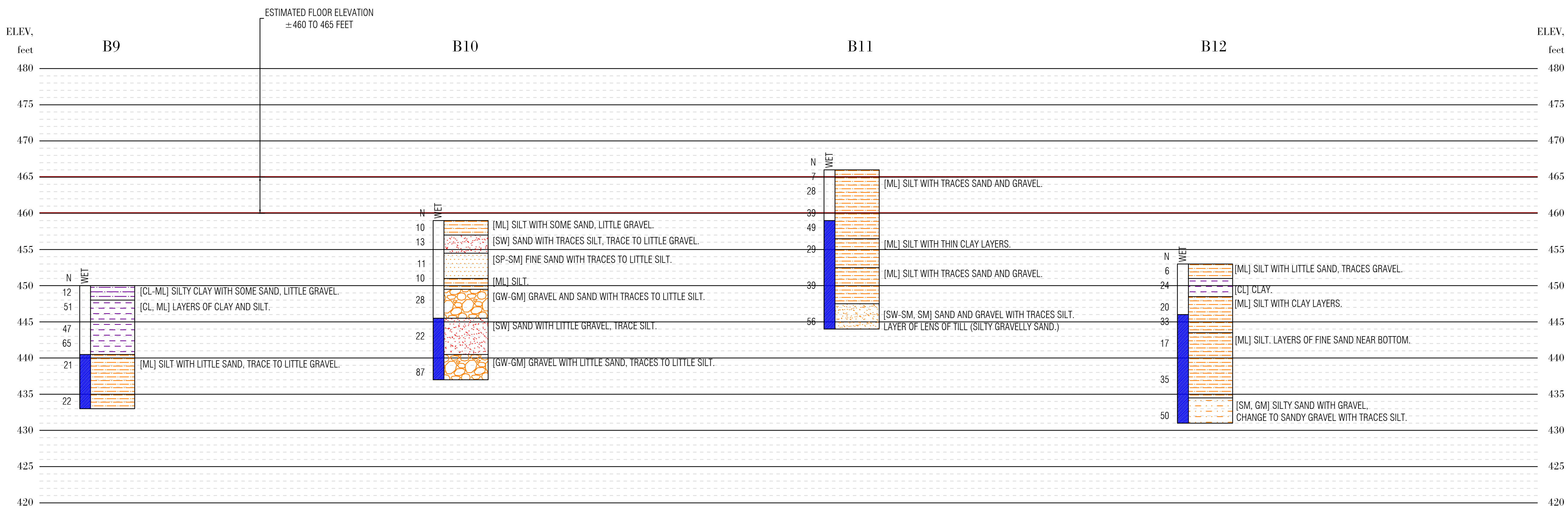
REV.	DATE	BY
0	12/4/2021	KLP

GENERALIZED SUBSURFACE PROFILE
PROPOSED EAST BUILDING

NO HORIZONTAL SCALE.
USCS SOIL CLASSIFICATIONS ARE IN BRACKETS.

IN GENERAL, RED PATTERNS INDICATE RELATIVELY CLEAN SANDY OR GRAVELLY SOILS, PURPLE PATTERNS INDICATE SOILS WITH SIGNIFICANT CLAY CONTENT AND ORANGE PATTERNS INDICATE SOILS WITH A SIGNIFICANT SILT CONTENT.

THESE SECTIONS ARE GENERALIZED REPRESENTATIONS OF THE SUBSURFACE PROFILE, BASED ON THE SUBSURFACE EXPLORATION DATA, OBSERVATIONS, RESEARCH, AND OTHER RELEVANT INFORMATION. THE SOILS INFORMATION PRESENTED HEREIN SHOULD BE INTERPRETED IN CONJUNCTION WITH THE INFORMATION FROM THE BORING LOGS AND THE GEOTECHNICAL INVESTIGATION REPORT. SITE CONDITIONS MAY DIFFER FROM THOSE ENCOUNTERED AT THE BORING LOCATIONS.



KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732
PATTONGEOTECH.COM

79 DOLSONTOWN

TOWN OF WAWAYANDA, ORANGE COUNTY, N.Y.

SUBSURFACE PROFILE - WEST BUILDING

REV.	DATE	BY
0	12/4/2021	KLP

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/9/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, SW Corner	BORING NO.	B-1
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	500		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	10	CL-ML	2	**4**	**6**	12	Wet	Silty clay with some sand, little gravel.	
										Olive brown	
2-4	**2**	SS	14	CL-ML	7	**19**	**13**	50/5	Wet	Same.	
										Brown.	
5											
5-7	**3**	SS	8	CL-ML	23	**18**	**9**	15	Wet	Silty clay with little to some sand, little gravel	
										Brown	
7-9	**4**	SS	24	CL-ML	15	**11**	**17**	14	Moist/	Silty clay with traces to little sand, some gravel	
									Very Moist	Brown	
10											
10-12	**5**	SS	0	-	50/3				-	No Recovery	
										Refusal at 11 feet	
15											
20											
25											
30											
35											
40											
45											

COMMENTS:				
DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/9/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, SW Part	**BORING NO.**	**B-2**
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	492		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	10	ML	3	**9**	**5**	9	Moist	Silt with some sand, little gravel.	
										Cobble fragment. Brown, trace red	PEN = 6 ksf
2-4	**2**	SS	12	SM	12	**16**	**50/5**		Moist	Sand (Fmc) with little silt, some gravel	
										Brown	
5											
										Refusal at 5 feet	
10											
15											
20											
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/9/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, West Middle	BORING NO.	B-3
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	493		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	14	ML	2	**4**	**4**	7	Moist/	Silt with trace sand	PEN 4.1 ksf
									Very moist	Fine mottling, light brown and greyish brown	
2-4	**2**	SS	12	CL-ML	9	**14**	**20**	24	Moist	Silty clay.	PEN 21 ksf
										Mottled brown, light brown. Vertical grey seam	
5											
5-7	**3**	SS	20	ML,	9	**18**	**29**	25	Moist/	Layered Silt, Silty Sand. Little gravel. Shale	PEN 8 ksf
				SM					Very moist	fragments. Brown.	
7-9	**4**	SS	8	CL-ML	35	**38**	**22**	21	Very moist	Silty clay with some sand, little to some gravel.	PEN 6 ksf
										Shale fragments. Brown.	
10											
										Refusal at 10 feet	
15											
20											
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/9/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, East of NW Corner	BORING NO.	B-4
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	490		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	8	ML	3	**4**	**2**	2	Wet	Silt with little sand, trace gravel, plant fibers.	
										Silt layer. Yellowish brown, faintly mottled.	pen 2.5 ksf
2-4	**2**	SS	10	SM	4	**19**	**22**	21	Moist	Sand with little silt, some gravel	
										Mottled brown with traces light brown	
5											
5-7	**3**	SS	12	ML	6	**8**	**14**	15	Wet	Silt with some sand, to Silty very fine sand.	PEN 3.8 ksf
										Traces to little gravel. Mottled brown.	
7-9	**4**	SS	16	CL-ML	10	**15**	**22**	20	Wet	Silty clay with some sand, traces to little	
										gravel. Light brown	
10											
10-12	**5**	SS	1	CL-ML	22	**50/6**			Wet	Rock fragments. Some clayey silt.	
										Brown. Small Sample.	
										Refusal at 11.5 feet	
15											
20											
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group	
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda	
NEWBURGH, NY 12550	DATE:	11/9/2021	Project No.: 21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Cloudy, 35-65F	

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, NE Corner	BORING NO.	B-5
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	454		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	11	ML	3	**4**	**6**	25	Moist	Silt with traces sand, traces gravel	
										Brown. Faint mottling.	
2-4	**2**	SS	16	SM	18	**18**	**15**	19	Wet	Fine sand with some silt	PEN 5.5 ksf
										Brown	
5											
5-7	**3**	SS		ML	6	**7**	**7**	8	Wet	Silt with soft clay layer, to Sandy silt to Silty	PEN 6 ksf (in silt
				SM						sand w/ traces to little gravel. Brown w/grey.	with traces sand.)
7-9	**4**	SS	20	ML	8	**15**	**20**	24	Moist	Silt with some very fine sand.	
										Dark brown	
10											
10-12	**5**	SS	14	SM	7	**12**	**14**	22	Wet	Fine sand with little silt	
										Dark brown	
15											
15-17	**6**	SS	8	SM	19	**46**	**22**	28	Wet	Sand and gravel with little silt	
										Dark brown	
20											Boulder at 19 feet
20-22	**7**	SS	12	CL-ML	20	**33**	**48**	54	Very Moist	Till. Silty clay with little sand, traces gravel.	
										Grey	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/10/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Sunny, 35-60F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, Middle of East Side	BORING NO.	B-6
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	465		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	12	CL-ML	4	**5**	**7**	12	Very Moist	Silty clay with little sand, trace fine gravel	
										Mottled brown and dark brown	PEN 3.7 ksf
2-4	**2**	SS	10	SM	27	**22**	**30**	33	Moist	Sand (Fmc) with some silt, some gravel	
										Brown	
5											
5-7	**3**	SS	2	SM	9	**20**	**20**	12	Moist	Till. Sand with some silt, little gravel, with	
										shale fragments. Brown	
7-9	**4**	SS	12	CL-ML	10	**6**	**5**	5	Wet	Till. Silty clay with some sand, traces to little	PEN 2.3 ksf
										gravel. Brown	
10											
10-12	**5**	SS	0	-	8	**11**	**10**	15	-	No Recovery	
15											
15-17	**6**	SS	10	ML	37	**35**	**56**	41	Moist	Till- Silt with little sand, little gravel, shale	PEN 24 ksf
										fragments. Grey	
20											
20-22	**7**	SS	14	CL-ML	16	**38**	**47**	42	Moist	Till- Silty clay with some sand, traces to little	PEN 22 ksf
										gravel. Grey	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/10/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Sunny, 35-60F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, East Side South	BORING NO.	B-7
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	470		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	5	ML	2	**4**	**5**	10	Moist	Silt with little sand, traces plant fibers	
										Brown	
2-4	**2**	SS	2	ML	11	**11**	**9**	9	Moist	Silt with little sand, trace plant fiber.	
										Brown. Small Sample	
5											
5-7	**3**	SS	20	ML	5	**12**	**14**	16	Moist	Till- Silt with trace fine gravel	
										Mottled brown with orange and grey	
7-9	**4**	SS	24	ML	12	**15**	**18**	21	Moist	Till. Silt with little fine gravel to Silt with	PEN 8 ksf
									Wet	some sand and gravel. Brown.	
10											
10-12	**5**	SS	10	SM	38	**16**	**13**	17	Wet	Till- Sand with little silt, little to some gravel.	
										Brown	
15											
15-17	**6**	SS	10	SW-SM	17	**15**	**9**	13	Wet	Sand (fmC) with some gravel, traces silt.	
										Shale fragments. Brown.	
											Hard drilling from
											17 to 20 feet.
20											
20-22	**7**	SS	0	-	50/3				-	No Recovery	
25											
25-27	**8**	SS	12	SM	30	**20**	**21**	23	Wet	Till. Sand with little silt, little gravel.	
										Grey	
										Stopped in soil.	
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
PATTONGEOTECH.COM 845 275-7732

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda		
DATE:	11/10/2021	Project No.:	21402
WEATHER:	Sunny, 35-60F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, North of SE Corner	**BORING NO.**	**B-8**
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	464		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	12	ML	3	**3**	**5**	6	Moist	Silt with little sand, traces fine gravel	
										Light brown, mottling	
2-4	**2**	SS	8	CL-ML	10	**10**	**11**	12	Moist	Silty clay with some sand, little gravel	PEN 5.5 ksf
										Brown, faint mottling	
5											Boulder at 5 feet
5-7	**3**	SS	1	ML	12	**29**	**28**	50/2	Moist	Silt with little sand, cobble fragments	
										Brown. Small Sample	
10											
10-12	**4**	SS	10	SM	18	**29**	**33**	29	Wet	Sand (fmC) with little silt, some gravel and	
										rock fragments. Brown.	
15											
15-17	**5**	SS	8	SC-SM	55	**25**	**30**	27	Wet	Sand (Cmf) and gravel with traces to little	
										silty clay. Shale fragments. Brown.	
											Boulder at
											18 to 20 feet
20											
20-22	**6**	SS	6	GW-GC	14	**48**	**50/6**		Very Moist	Gray gravel and Cmf sand with traces silty	
				CL-ML						clay, change to Brown silty clay with little	
										sand.	
25											
										Stopped in soil.	
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, NW Corner	BORING NO.	B-9
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	450		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	SAMPLE Type	SAMPLE Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	12	CL-ML	2	**5**	**7**	12	Moist/	Silty clay with some sand, little fine gravel.	
									Very moist	Light brown, mottled	
2-4	**2**	SS	12	ML,	11	**22**	**29**	32	Moist	Silt with few clay layers	Silt: PEN 15 ksf
				CL						Mottled light brown and pale grey	Clay: PEN 7.5 ksf,
5											TOR 1600/400 psf
5-7	**3**	SS	14	CL,	12	**24**	**23**	28	Moist	Clay with layers of silt	Clay: PEN 7 ksf,
				ML						Light brown. Faintly mottled.	TOR 1440/300 psf
7-9	**4**	SS	18	CL	28	**31**	**34**	34	Very moist	Clay with silt layers	PEN 3.7 ksf
										Light brown and grey	
10											
10-12	**5**	SS	16	ML	8	**11**	**10**	14	Wet	Silt with little sand, little fine gravel	PEN 5.5 ksf
										Dark grey	
15											
15-17	**6**	SS		ML	3	**7**	**15**	22	Wet	Silt, layered gray. Change to Brown silt and	PEN 3.0 ksf
										very fine sand layered with Gray silty fine	
										sand.	
20											
										Stopped at 20 feet in soil.	
										Augered to 20 feet, could not sample due	
										to soil clogging bottom of auger.	
25											
										Stopped in soil.	
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group	
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda	
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.: 21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F	

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, SW Corner	**BORING NO. B-10**
DRILLER AND HELPER:	Tom McGovern, Tommy			
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	459	
INSPECTOR:	Wyeth Patton	WATER DEPTH:		

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	6	ML	2	**6**	**4**	4	Very Moist	Silt with some sand, little fine gravel. Trace organics. Yellowish brown	
2-4	**2**	SS	8	SW	1	**5**	**8**	11	Moist	Sand with traces silt, traces to little gravel Brown	
5											
5-7	**3**	SS	10	SP-SM	5	**6**	**5**	6	Moist	Sand (FM) with traces to little silt. Brown	
7-9	**4**	SS	12	SP-SM	5	**6**	**4**	5	Moist	Very fine sand with traces to little silt. Brown.	
				ML					Very Moist	Change to Silt, faintly layered. Yellowish brown.	PEN 1.8 ksf (silt.)
10											
10-12	**5**	SS	8	GW-GM	2	**9**	**19**	21	Moist	Gravel and sand with traces to little silt. Brown	
15											
15-17	**6**	SS	12	SW	4	**6**	**16**	26	Wet	Sand (FMc) with little gravel, trace silt. Brown	Boulder at 18 to 20 feet
20											
20-22	**7**	SS	8	GW-GM	28	**33**	**54**	40	Wet	Rock fragments, gravel, with little sand, traces to little silt. Brown and dark grey Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, NE Corner	BORING NO.	B-11
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	466		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	SAMPLE Type	SAMPLE Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	16	ML	2	**3**	**4**	7	Very Moist	Silt with traces sand, trace gravel	PEN 2.8 ksf
										Light Brown	
2-4	**2**	SS	18	ML	9	**12**	**16**	18	Moist	Silt.	PEN 10 ksf
										Light Brown, faintly mottled.	
5											
5-7	**3**	SS	18	ML	10	**18**	**21**	26	Moist	Silt, trace gravel	PEN 9 ksf
										Light brown, trace pale brown	
7-9	**4**	SS	20	ML	27	**26**	**23**	29	Wet	Silt. Iron oxide deposit in vertical seam.	PEN 4.2 ksf
										Light brown, trace grey	TOR 600/140 psf
10											
10-12	**5**	SS	24	ML	8	**12**	**17**	17	Wet	Silt with trace thin clay layers. Thin layer of sand	PEN 3.3 ksf
										Light brown. Thin layer of black	
15											
15-17	**6**	SS	24	ML	9	**20**	**19**	19	Very Moist	Silt, trace fine gravel	PEN 6.5 ksf
									/Wet	Brown	
20											
20-22	**7**	SS	16	SW-SM	30	**27**	**29**	26	Wet	Sand and gravel with traces silt, with layer of Till	
				SM						(silty gravelly sand.) Brown.	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, SE Corner	BORING NO. B-12
DRILLER AND HELPER:	Tom McGovern, Tommy			
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	453	
INSPECTOR:	Wyeth Patton	WATER DEPTH:		

Feet	SAMPLE #	SAMPLE Type	SAMPLE Rec.	USCS SOIL CLASS	SPT 0-6	SPT 6-12	SPT 12-18	SPT 18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	10	ML	2	**3**	**3**	7	Very moist	Silt with little sand, traces gravel.	
										Brown, light brown.	
2-4	**2**	SS	16	CL	7	**13**	**11**	15	Moist	Clay.	
										Light brown, grey. Faint mottling	
5											
5-7	**3**	SS	20	ML	5	**8**	**12**	14	Very moist	Silt, layer of soft grey clay	
										Light brown	
7-9	**4**	SS	20	ML	16	**16**	**17**	17	Wet	Silt with trace very thin clay layers.	
										Brown, change to grey.	
10											
10-12	**5**	SS	18	ML	4	**10**	**7**	8	Wet	Silt.	
										Grey.	
15											
15-17	**6**	SS	16	ML	6	**14**	**21**	24	Wet	Silt, layered with very fine sand.	
										Brown.	
20											
20-22	**7**	SS	16	SM, GM	45	**30**	**20**	25	Wet	Till - Silty sand with gravel, change to Gravel with some sand, traces silt. Brown.	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD: HSA - Hollow-Stem Auger MR - Mud-Rotary MEASUREMENTS IN FEET AND INCHES

SAMPLE/TEST TYPE SS - SPLIT SPOON C - CORE T - UNDISTURBED TUBE AUG - AUGER CUTTINGS PEN - HAND PENETROMETER TOR - TORVANE V - VANE SHEAR

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown Road, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9-11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

MOISTURE CONTENT OF SOIL

TEST METHOD: ASTM D2216

SAMPLE NO.	DEPTH,FT.	% MOISTURE
B1 S2	3	7.8
B1 S3	6	14.4
B1 S4	8	9.8
B4 S2	3	9.1
B4 S3	6	15.1
B5 S2	3	17.9
B5 S3	6	17.2
B5 S4	8	17.9
B5 S5	11	17.3
B5 S6	16	13.4
B5 S7	21	11.3
B6 S2	3	9.3
B6 S4	8	12.0
B6 S6	16	8.4
B6 S7	21	9.0
B7 S3	6	16.2
B7 S4	8	13.4
B7 S5	11	13.5
B7 S6	16	11.5
B7 S8	26	8.9

Moisture content is expressed as a percent of the dry mass of the soil.

Reviewed by: *Kevin Patton*

Form NMC

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown Road, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9-11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

MOISTURE CONTENT OF SOIL

TEST METHOD: ASTM D2216

SAMPLE NO.	DEPTH,FT.	% MOISTURE
B9 S2	3	17.6
B9 S3	6	21.0
B9 S4	8	22.9
B9 S5	11	17.2
B9 S6	15	25.2
B9 S6	16	19.6
B10 S2	3	8.4
B10 S5	11	7.2
B10 S6	16	15.9
B10 S7	26	9.9
B12 S2	3	22.5
B12 S3	6	24.8
B12 S4	8	25.1
B12 S5	11	23.8
B12 S7	21	11.8

Moisture content is expressed as a percent of the dry mass of the soil.

Reviewed by: *Kevin Patton*

Form NMC

KEVIN L. PATTON, P.E.

36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

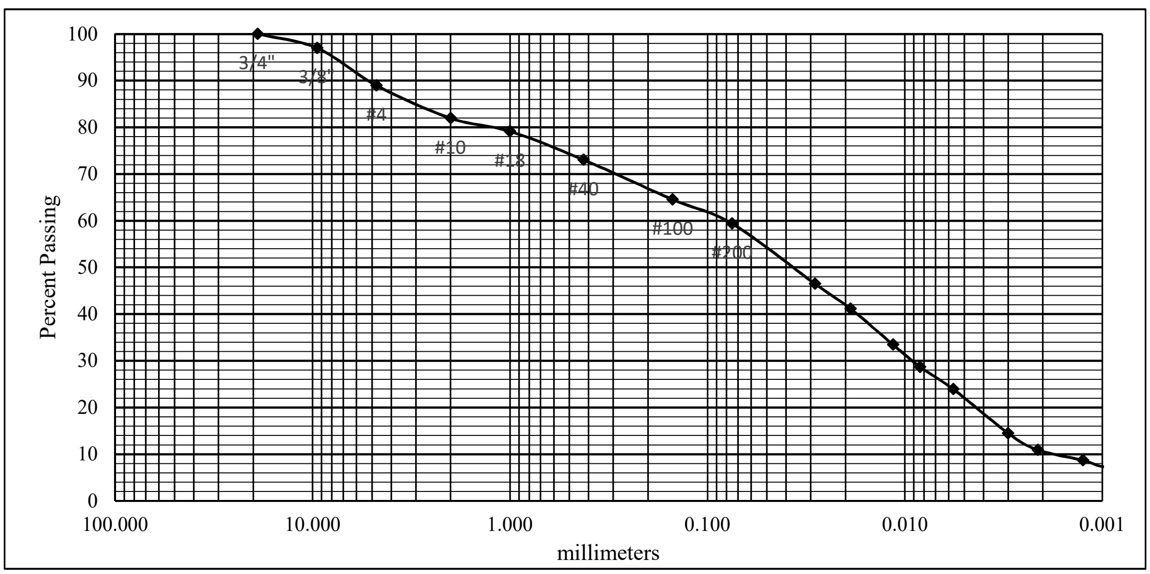
CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

SIEVE-AND-HYDROMETER ANALYSIS TEST REPORT

TEST METHOD(s): ASTM D422, AASHTO T88

Sample Location	B4-S4
Depth	8 feet

Sieve Size		Percent Retained	Percent Passing	Specification
3/4"	19.0	0	100	
3/8"	9.5	3	97	
#4	4.75	8	89	
#10	2.00	7	82	
#18	1.00	3	79	
#40	0.425	6	73	
#100	0.150	8	65	
#200	0.075	6	59	
Hydrometer Analysis	0.050	5	54	
	0.020	12	42	
	0.010	11	31	
	0.005	9	22	
	0.002	11	11	
	0.001	4	7	



USDA Particle Size Classification:	
Gravel, 3" to 2.00mm	18
Sand, 2.00 to 0.050mm:	28
Silt, 0.050 to 0.002mm:	43
Clay, <0.002mm	11
Total	100

USDA Textural Class: Gravelly Silt Loam

USCS Classification (ASTM D2487/D2488):
CL-ML, Sandy Silty Clay

Atterberg Limits were determined by: Test

Reviewed by: *Kevin Patton*

Form HYD

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

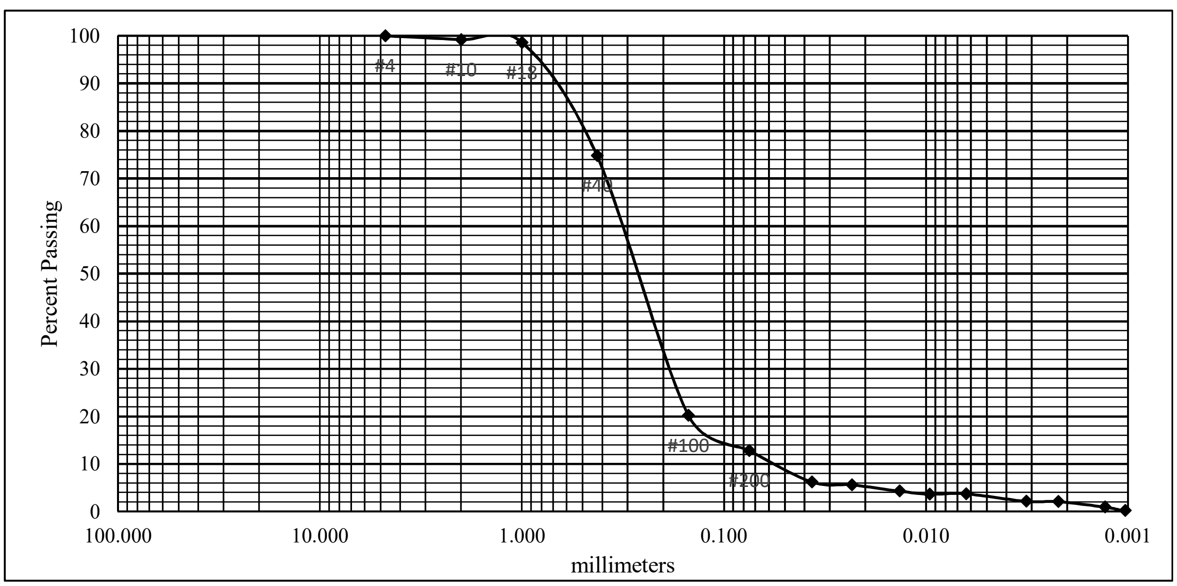
CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

SIEVE-AND-HYDROMETER ANALYSIS TEST REPORT

TEST METHOD(s): ASTM D422, AASHTO T88

Sample Location	B10-S3
Depth	6 feet

Sieve Size		Percent Retained	Percent Passing	Specification
inches	mm			
#4	4.75	0	100	
#10	2.00	1	99	
#18	1.00	0	99	
#40	0.425	24	75	
#100	0.150	55	20	
#200	0.075	7	13	
Hydrometer Analysis	0.050	4	9	
	0.020	4	5	
	0.010	1	4	
	0.005	1	3	
	0.002	1	2	
	0.001	2	0	



USDA Particle Size Classification:		**USDA Textural Class:** Sand
Gravel, 3" to 2.00mm	1	
Sand, 2.00 to 0.050mm:	90	**USCS Classification (ASTM D2487/D2488):**
Silt, 0.050 to 0.002mm:	7	SM, Silty Sand*
Clay, <0.002mm	2	*Nearly classifies as SP-SM, Poorly-Graded Sand with Silt
Total	100	Atterberg Limits were determined by: Estimated (ASTM D2488)

Reviewed by: *Kevin Patton*

Form HYD

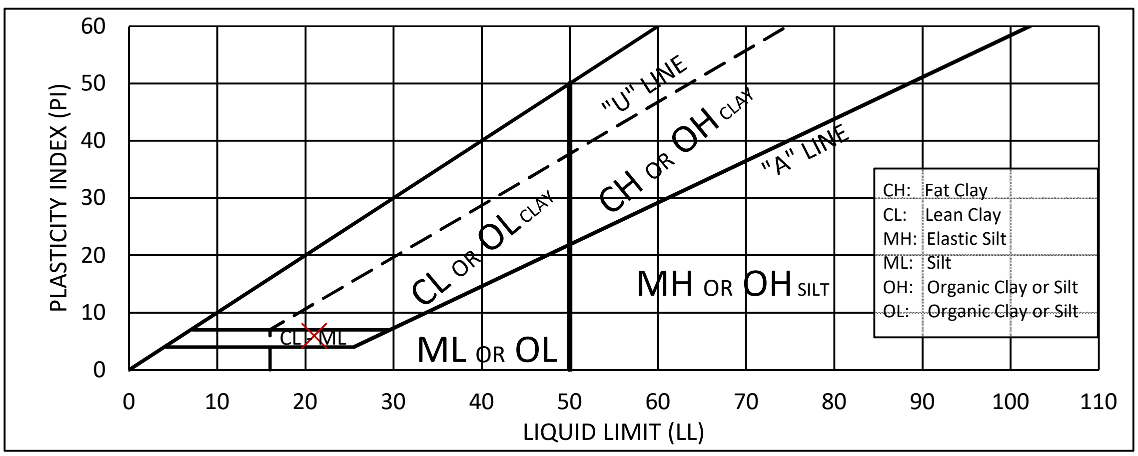
KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

ATTERBERG LIMITS TEST

TEST METHODS: ASTM D4318/ AASHTO T89, T90

Sample Location	B4-S4
Depth	8 feet
Percent Passing #40	73
Liquid Limit (LL)	**21**
Plastic Limit (PL)	**15**
Plasticity Index (PI)	**6**
USCS Class of -#40	CL-ML, Silty Clay



LL, PL and PI values are percent moisture of the soil by dry mass.

Test is performed on the 'matrix' fraction of the soil, finer than the #40 (0.425mm) sieve.

The Liquid Limit is the moisture content at which the matrix fraction of the soil changes from a stiff to a flowing consistency. The plastic limit is the moisture content at which it changes from cohesive to crumbly. The Plasticity Index is the Liquid Limit minus the Plastic Limit.

Reviewed by: *Kevin Patton*

Form ABL

KEVIN L. PATTON, P.E.

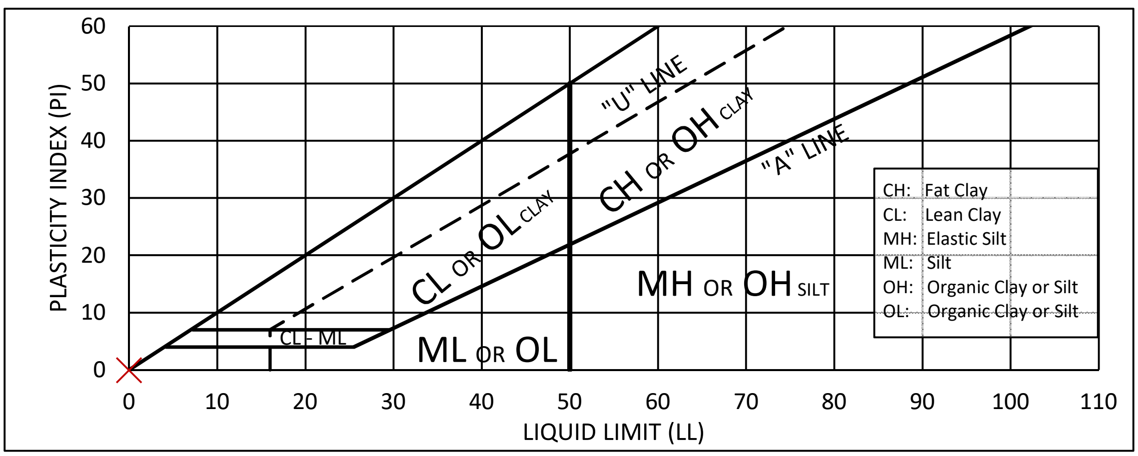
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

ATTERBERG LIMITS TEST

TEST METHODS: ASTM D4318/ AASHTO T89, T90

Sample Location	B10-S4
Depth	9 feet
Percent Passing #40	100
Liquid Limit (LL)	**None**
Plastic Limit (PL)	**23**
Plasticity Index (PI)	**Non-plastic**
USCS Class of -#40	ML, Silt



LL, PL and PI values are percent moisture of the soil by dry mass.

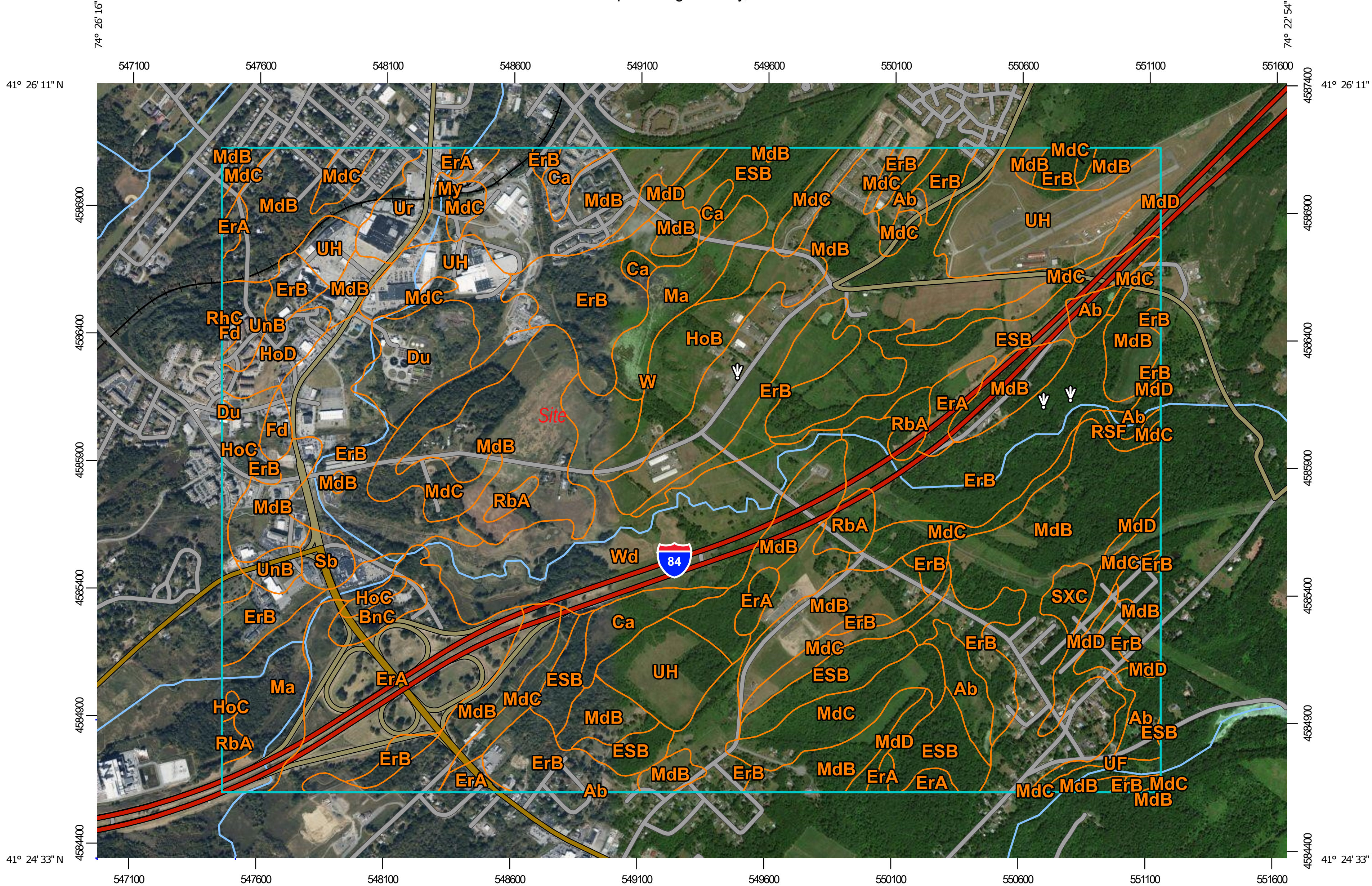
Test is performed on the 'matrix' fraction of the soil, finer than the #40 (0.425mm) sieve.

The Liquid Limit is the moisture content at which the matrix fraction of the soil changes from a stiff to a flowing consistency. The plastic limit is the moisture content at which it changes from cohesive to crumbly. The Plasticity Index is the Liquid Limit minus the Plastic Limit.

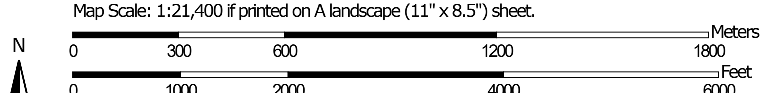
Reviewed by: *Kevin Patton*

Form ABL

Soil Map—Orange County, New York



Map Scale: 1:21,400 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Orange County, New York
Survey Area Data: Version 21, 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: Oct 7, 2013—Oct 5, 2019

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
Ab	Alden silt loam	42.6	1.8%
BnC	Bath-Nassau channery silt loams, 8 to 15 percent slopes	10.1	0.4%
Ca	Canandaigua silt loam	33.1	1.4%
Du	Dumps	36.8	1.6%
ErA	Erie gravelly silt loam, 0 to 3 percent slopes	136.6	5.9%
ErB	Erie gravelly silt loam, 3 to 8 percent slopes	396.1	17.1%
ESB	Erie extremely stony soils, gently sloping	143.9	6.2%
Fd	Fredon loam	7.9	0.3%
HoB	Hoosic gravelly sandy loam, 3 to 8 percent slopes	47.8	2.1%
HoC	Hoosic gravelly sandy loam, 8 to 15 percent slopes	24.9	1.1%
HoD	Hoosic gravelly sandy loam, 15 to 25 percent slopes	17.3	0.7%
Ma	Madalin silt loam	79.1	3.4%
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	718.8	31.0%
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes	192.7	8.3%
MdD	Mardin gravelly silt loam, 15 to 25 percent slopes	37.5	1.6%
My	Middlebury silt loam	9.2	0.4%
RbA	Rhinebeck silt loam, 0 to 3 percent slopes	25.6	1.1%
RhC	Riverhead sandy loam, 8 to 15 percent slopes	0.1	0.0%
RSF	Rock outcrop-Nassau complex, very steep	4.2	0.2%
Sb	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	9.5	0.4%
SXC	Swartswood and Mardin soils, sloping, very stony	9.3	0.4%
UF	Udifluvents-Fluvaquents complex, frequently flooded	6.9	0.3%
UH	Udorthents, smoothed	142.2	6.1%
UnB	Unadilla silt loam, 0 to 8 percent slopes	19.4	0.8%
Ur	Urban land	20.4	0.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
W	Water	0.5	0.0%
Wd	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	144.0	6.2%
Totals for Area of Interest		**2,316.7**	**100.0%**

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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

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

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

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

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
ErB—Erie gravelly silt loam, 3 to 8 percent slopes														
Erie	80	D	0-9	Gravelly silt loam	GM, ML, SM	A-2, A-4	0- 0- 0	0- 2- 5	65-85-90	50-75-75	35-65-70	20-60-65	30-35-40	5-8 -10
			9-18	Channery fine sandy loam, channery silt loam, channery loam	CL-ML, CL, GC, SC	A-1, A-2, A-4	0- 0- 2	0- 2- 10	65-85-90	50-75-75	35-65-70	20-55-65	15-20-25	5-8 -10
			18-54	Channery silt loam, channery silty clay loam, very channery loam	CL, GC, SC	A-2, A-4, A-6	0- 2- 5	0- 2- 20	50-80-85	35-70-70	25-65-70	20-55-65	25-30-35	10-13-15
			54-70	Channery silt loam, channery silty clay loam, very channery loam	CL, GC, SC	A-2, A-6	0- 2- 5	0- 2- 25	50-80-85	35-70-70	25-65-70	20-55-65	25-30-35	10-13-15

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
HoB—Hoosic gravelly sandy loam, 3 to 8 percent slopes														
Hoosic	80	A	0-6	Gravelly sandy loam	GM, ML, SM	A-1, A-2, A-4, A-5	0- 0- 0	0- 5- 10	50-70-90	35-60-75	15-40-65	10-20-50	30-38-45	2-6 -10
			6-28	Gravelly sandy loam, very gravelly sandy loam, gravelly loam	SC-SM, SP-SM, GM, SM	A-1, A-2, A-4	0- 0- 0	0- 7- 10	50-65-90	35-50-75	15-30-65	10-15-50	20-25-30	2-5 -8
			28-60	Very gravelly sand, very gravelly loamy sand, extremely gravelly loamy sand	GM, GP, GW, SM	A-1	0- 0- 0	0- 8- 15	40-50-75	30-35-50	15-20-30	0- 2- 15	—	NP
Ma—Madalin silt loam														
Madalin	80	C/D	0-10	Silt loam	MH, ML	A-6, A-7	0- 0- 0	0- 0- 0	95-100-100	95-100-100	80-95-100	65-80-95	35-50-65	10-18-25
			10-38	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	95-100-100	95-100-100	80-95-100	65-85-95	38-52-65	20-28-35
			38-60	Stratified silty clay, clay	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	95-100-100	95-100-100	80-95-100	65-85-95	35-48-60	15-25-35

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
MdB—Mardin gravelly silt loam, 3 to 8 percent slopes														
Mardin	85	D	0-8	Silt loam, gravelly silt loam, channery silt loam, channery loam	GC-GM, MH, ML	A-2-4, A-4, A-7-5	0- 0- 3	0- 4- 19	43-70-90	41-68-90	33-62-89	28-54-82	27-35-56	6-9 -16
			8-15	Flaggy silt loam, channery loam, silt loam, loam, channery silt loam, gravelly silt loam, gravelly loam	GC-GM, CL	A-2-4, A-4, A-6	0- 0- 3	0- 4- 18	44-71-91	41-69-90	34-61-88	28-54-81	22-27-38	6-9 -15
			15-20	Channery loam, silt loam, loam, channery silt loam, gravelly silt loam, gravelly loam	CL-ML, CL, GM	A-2-4, A-4, A-6	0- 0- 3	0- 4- 18	46-72-91	43-71-91	34-63-88	26-51-77	17-23-32	2-7 -12
			20-72	Very flaggy silt loam, very flaggy loam, very channery loam, very channery silt loam, channery loam, channery silt loam, gravelly loam, gravelly silt loam	CL, GM	A-1-b, A-6	0- 3- 17	3- 6- 40	33-74-82	30-73-81	23-63-80	18-55-73	16-28-35	2-12-17

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
Wd—Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded														
Wayland	60	B/D	0-9	Mucky silt loam, silt loam, silty clay loam	MH, ML, OH	A-4, A-7-5	0- 0- 0	0- 0- 0	94-100-100	89-100-100	79-99-100	74-94-100	31-51-72	7-14-21
			9-21	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	83-99-100	77-93-100	27-39-58	9-15-24
			21-28	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	82-99-100	75-91-100	26-36-54	9-14-24
			28-47	Silt loam, silty clay loam	CH, CL	A-6, A-7-6	0- 0- 0	0- 0- 0	96-100-100	91-100-100	84-99-100	77-91-100	29-37-50	12-17-24
			47-54	Silt loam, silty clay loam, fine sandy loam, gravelly loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	45-99-100	38-88-100	16-36-51	2-17-28

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
			54-60	Silt loam, silty clay loam, gravelly loam, fine sandy loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	46-99-100	39-88-100	16-36-51	2-17-28
Wayland, very poorly drained	30	B/D	0-9	Silt loam, mucky silt loam, silty clay loam	OH, OL	A-5, A-7-5	0- 0- 0	0- 0- 0	93-100-100	87-100-100	77-99-100	73-94-100	44-63-82	7-14-21
			9-21	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	83-99-100	77-93-100	27-39-58	9-15-24
			21-28	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	82-99-100	75-91-100	26-36-54	9-14-24
			28-47	Silt loam, silty clay loam	CH, CL	A-6, A-7-6	0- 0- 0	0- 0- 0	96-100-100	91-100-100	84-99-100	77-91-100	29-37-50	12-17-24
			47-54	Silt loam, silty clay loam, fine sandy loam, gravelly loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	45-99-100	38-88-100	16-36-51	2-17-28
			54-60	Silt loam, silty clay loam, fine sandy loam, gravelly loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	46-99-100	39-88-100	16-36-51	2-17-28

Data Source Information

Soil Survey Area: Orange County, New York
Survey Area Data: Version 22, Aug 29, 2021

Appendix 16b | Stormwater Infiltration Testing Report (by others)

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, N.Y. 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group 1 International Plaza, Suite 410 Mahwah, NJ 07430	PROJECT: PROJ. No.: DATE:	79 Dolsontown Road Town of Wawayanda, N.Y. 21402 May 5, 2022

Stormwater Infiltration Testing Report

The proposed stormwater detention pond areas were investigated and standpipe infiltration tests were performed per NYSDEC Stormwater Design Manual Appendix D. In each area one or more test pits were excavated by a tracked excavator, to inspect, log and sample the soils to a depth of four feet below the proposed infiltration test(s.) A standpipe piezometer was installed in each of these test pits for measurement of the groundwater depth; the piezometers consisted of 1.25-inch diameter PVC pipe with a three-foot long 0.010-inch slotted well-screen at the bottom, loosely backfilled and sealed at the surface with compacted soil. The infiltration tests were performed using four-inch diameter PVC standpipes; these were installed in hand-excavated holes, with bentonite clay chips placed in the bottom few inches of the annular space between the pipe and the hole, to minimize leakage. For the tests at depths greater than two feet below grade the excavator removed the soil to about eighteen inches above the test depth, and the rest of the of the hole was hand-excavated. The excavator was at CAT 308E furnished and operated by Boyce Excavating of Slate Hill, N.Y. and the inspection and testing were performed by Wyeth Patton and Warren Patton, under my direction. The test pits with standpipes were numbered TP1 through TP13; the infiltration test locations were numbered P1 through P28, not all of which were tested. The groundwater at the time of inspection is believed to have been at or very close to its seasonal high elevation.

Previous to the stormwater testing, soil borings were drilled in the two proposed building areas, as discussed in my Geotechnical Investigation Report for 79 Dolsontown Road, dated December 4, 2021. As noted in that report, shallow bedrock was indicated in the area of borings B1 through B4, on the high side of the west building; during the stormwater investigation two test pits (TP14 and TP15) were excavated near the proposed west building wall, between borings B3 and B4, confirming the presence of bedrock at about eight to eleven feet depth. Test pit logs are attached. The borings indicated mostly silty and clayey soils on the site, except at boring B10, near the southeast corner of the east building, where some sandy and gravelly soils were encountered. Wet soils were encountered at varying depths when the borings were drilled in November 2021, with shallow, deep and/or perched water tables in many of the borings. The majority of the soils were wet or very moist, sometimes interlayered with moist soils. If one area could be considered 'dry,' it was the south-center part of the west building (borings B2, B7 and B8,) where boring B2 (upper slope) encountered only moist soils, with refusal on apparent bedrock at five feet depth, with B7 and B8 on the lower edge of the building area encountering moist soils to about eight feet depth, over wet soils.

The soils encountered in the stormwater investigation were generally consistent with those found in the soil borings for the buildings, as were the groundwater conditions. The soils were predominately fine-grained and were mostly wet, but with highly variable depths to groundwater. Details of each test are provided on the attached reports and are summarized in the tables provided in my attached report dated April 15, 2022 (revised 5/5/2022.) The observed and measured conditions in each of the proposed areas were as follow.

West Building, South End
Test Pit TP1. Infiltration Test P1.
Results were favorable. Groundwater was at 9.4 feet depth and the infiltration rate at four feet depth was 21 inches per hour.

West Building, East Side near SE Corner
Test Pit TP2. Infiltration Test P2.
Results were unfavorable. Groundwater was at 1.2 feet depth. The infiltration rate at two feet depth was 13.5 inches per hour.

West Building, East Side, East from North Part of Building
Test Pits TP3, TP4. Infiltration Tests P3, P4, P5.
Results were unfavorable. Groundwater was at 0 to 0.2 feet depth. No infiltration tests were performed because of the shallow water condition.

West Building, North from North End of Building
Test Pits TP5, TP6, TP7. Infiltration Tests P6 through P13.
Results were mixed, but groundwater was too shallow for a practice at two feet depth. Groundwater was at 1.7, 3.0 and 4.6 feet depth in the three piezometers, becoming shallower toward the lower, downhill end. Infiltration tests were performed at two feet depth at the four southern locations, P6 through P9; three had good infiltration rates, at 3.6, 4.6 and 6.1 inches per hour, but the rate at P9 was 0.25 inch per hour. The remaining infiltration tests in this area (P10 through P13) were not performed because of the shallow groundwater condition.

West Building, North from North End of Building, Expansion area to the Northeast
Test Pits TP8, TP9. Infiltration Tests P14 through P21.
Results were favorable. Groundwater was at 7.1 and 9.4 feet depth. The measured infiltration rates at two feet depth (tests P14 through P17) were 20.9, 21.8, 13.3 and 0.6 inches per hour, averaging 14.1 inches per hour. The measured rates at four feet depth (tests P18 through P21) were 9.8, 2.3, 21.4 and 2.1 inches per hour, averaging 8.9 inches per hour.

East Building, South End
Test Pit TP10. Infiltration Tests P22, P23, P24.
Results were unfavorable. Groundwater was at 0.4 feet depth. Infiltration tests were performed at twelve inches depth and showed favorable rates of 3.9 to 19.2 inches per hour, averaging 10.1 inches per hour.

East Building, North End West
Test Pit TP11. Infiltration Tests P25, P26.
Results were favorable. Groundwater was at 8.1 feet depth. The measured infiltration rate at 24 inches depth was more than 24 inches per hour at both test locations.

East Building, North End East
Test Pits TP12, TP13. Infiltration Tests P27, P28.
Results were mixed. Groundwater was at 8.0 to 8.7 feet depth. The measured infiltration rate at 24 inches depth (P27) was 5.1 inches per hour, but it was zero when tested at 48 inches depth at location P28.

Summary

The overall test results are summarized in the tables below. At the west building, the south end and north expansion areas had groundwater levels and infiltration rates which were favorable for the use of infiltration practices. At the east building favorable results were obtained for the two north areas, although some clayey slow- or no-perc soils were encountered in one of the test pits in the east area.

West Building					
	South End	E Side, SE	E Side, North	North End	North Expansion
Groundwater Deep	Yes	No	No	No	Yes
Infiltration >0.5″/hour	Yes	Yes	No test	Mixed	Yes
Coarse-grained Soils	No	No	Mixed	Mixed	Yes

East Building			
	South End	North End West	North End East
Groundwater Deep	No	Yes	Yes
Infiltration >0.5″/hour	Yes	Yes	Mixed
Coarse-grained Soils	No	Yes	Mixed

In the tables above, groundwater was considered to be 'deep' if it was at least three feet below the proposed infiltration test elevation, the minimum separation distance typically required for these practices (four feet in sole-source aquifer areas.) An infiltration rate of at least one half inch per hour is required for most practices. The soil classification of 'coarse-grained' applied to the soils in the test pit at and below the proposed infiltration test depth, and is based on the USCS classification of coarse-grained soils as those with less than fifty percent passing the #200 (0.075um) sieve. Soils used for infiltration practices should not contain more than twenty percent clay or forty percent silt and clay; the 'coarse grained' soils in the table above are expected to meet these criteria.

Please see the attached reports for additional information.

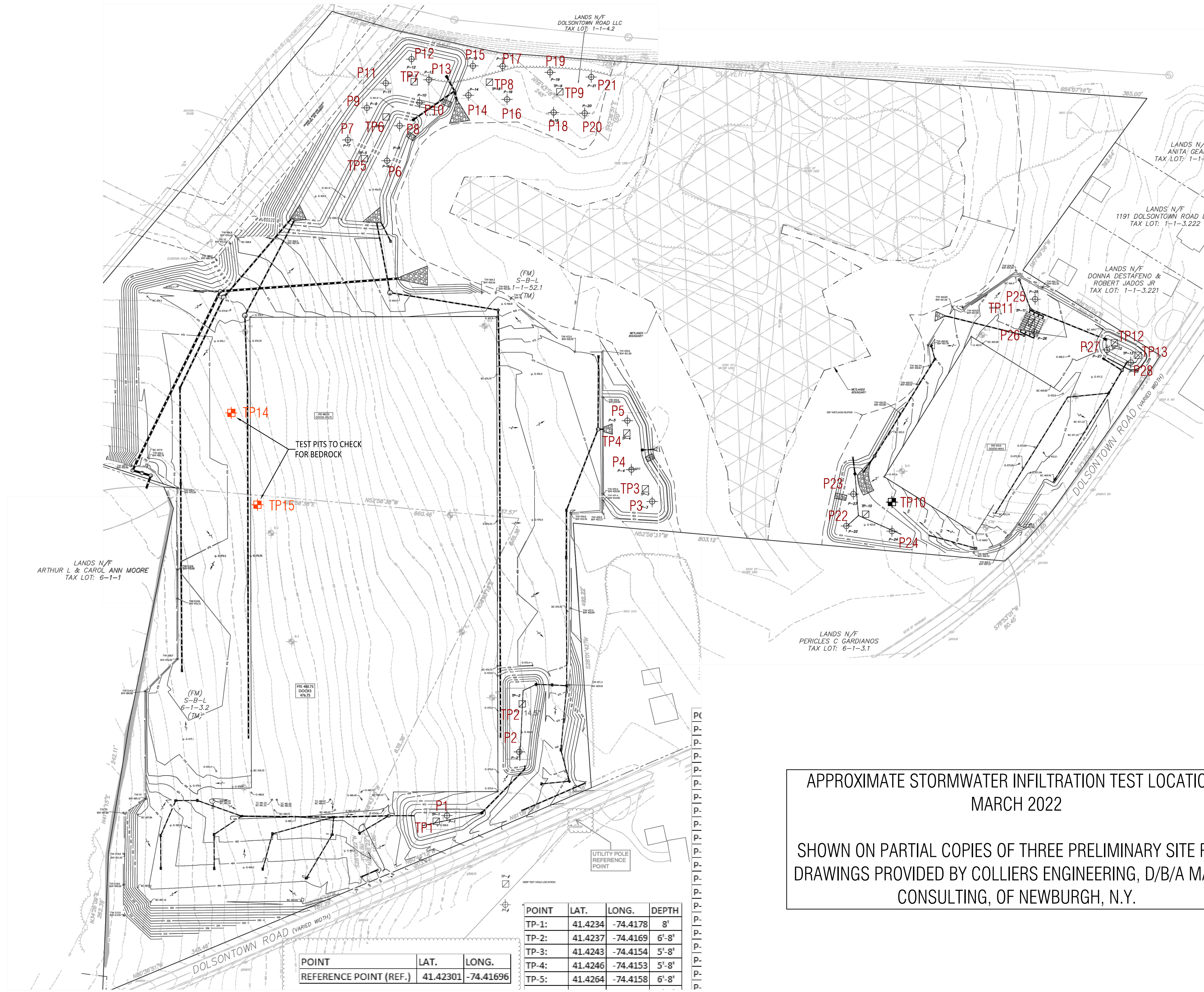
Prepared by

LICENSED PROFESSIONAL ENGINEER
KEVIN L. PATTON
072197
STATE OF NEW YORK

May 5, 2022

Kevin L. Patton, P.E.

Attachments:
Site Plan with Test Locations
Summary of Test Results, 4-5-22, Rev. 5-5-22
Inspection and Test Reports for Infiltration Tests
Test Pit Logs – TP14 and TP15 (Upper West Building Area)



POINT	LAT.	LONG.
REFERENCE POINT (REF.)	41.42301	-74.41696

POINT	LAT.	LONG.	DEPTH
TP-1:	41.4234	-74.4178	8'
TP-2:	41.4237	-74.4169	6'-8'
TP-3:	41.4243	-74.4154	5'-8'
TP-4:	41.4246	-74.4153	5'-8'
TP-5:	41.4264	-74.4158	6'-8'

APPROXIMATE STORMWATER INFILTRATION TEST LOCATIONS
MARCH 2022

SHOWN ON PARTIAL COPIES OF THREE PRELIMINARY SITE PLAN DRAWINGS PROVIDED BY COLLIERS ENGINEERING, D/B/A MASER CONSULTING, OF NEWBURGH, N.Y.

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732
PATTONGEOTECH.COM

DOLSONTOWN EAST

TOWN OF WAWAYANDA, ORANGE COUNTY, N.Y.

STORMWATER INFILTRATION TEST LOCATIONS

REV.	DATE	BY
1	5/5/2022	KLP
0	4/15/2022	KLP

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.
Report Date:	April 15, 2022, Rev. 1 May 5, 2022*

*Data added for test P25, corrected for P26.

SUMMARY OF STORMWATER INFILTRATION TESTS

Test Method: New York State Stormwater Management Design Manual, Appendix D.

Tests performed March 2022. Locations are shown on the attached drawing.

West Building, South End

Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP1	475	9.4	465.6	-	-	-
P1	473.5	-	-	48	469.5	21

West Building, East Side near SE Corner

Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP2	460.5	**1.2**	459.3	-	-	-
P2	462.5	-	-	24	460.5	13.5

West Building, East Side, East from North Part

Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP3	450.5	0.0	450.5	-	-	-
P3	450.5	-	-	12	449.5	No Test
P4	450.5	-	-	12	449.5	No Test
TP4	450.5	0.2	450.3	-	-	-
P5	450.5	-	-	12	449.5	No Test

West Building, North from North End						
Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP5	461	4.6	456.4	-	-	-
P6	458	-	-	24	456	6.1
P7	462.5	-	-	24	460.5	4.6
TP6	458	3.0	455	-	-	-
P8	457.5	-	-	24	455.5	3.6
P9	459.5	-	-	24	457.5	0.25
TP7	457	1.7	455.3	-	-	-
P10	456.5	-	-	24	454.5	No Test
P11	458.5	-	-	24	456.5	No Test
P12	457	-	-	24	455	No Test
P13	456	-	-	24	454	No Test

West Building, North from North End - NE Extension						
Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP8	458.5	7.1	451.4	-	-	-
P14	456	-	-	24	454	20.9
P15	457	-	-	24	455	21.8
P16	458.5	-	-	24	456.5	13.3
P17	459	-	-	24	457	0.6
TP9	461	9.4	451.6	-	-	-
P18	460	-	-	48	456	9.8
P19	461.5	-	-	48	457.5	2.3
P20	460	-	-	48	456	21.4
P21	461.5	-	-	48	457.5	2.1

East Building, South End						
Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP10	450	**0.4**	449.6	-	-	-
P22	449	-	-	12	448	7.3
P23	449	-	-	12	448	3.9
P24	450.5	-	-	12	449.5	19.2

East Building, North End West						
Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP11	460	8.1	451.9	-	-	-
P25	460.5	8.1	452.4	24	458.5	>24
P26	461	-	-	24	459	<24

East Building, North End East						
Test No.	±Elev.	Water Depth	Water Elev±	Test Depth, in.	Test Elev±	Perc Rate, inch/hr
TP12	467.5	8.0	459.5	-	-	-
TP13	470	8.7	461.3	-	-	-
P27	467	-	-	24	465	5.1
P28	470	-	-	48	466	0.0

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36 PATTON ROAD
NEWBURGH, NY 12550
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CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 16, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P1/ TP1		
Location:	West Building, South End		
Approximate Surface Elevation:	473.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	48"	Gravel in Bottom:	No
Water Depth in Piezometer:	9.4 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	26	21	21	21	**21**

SOIL PROFILE - TP1

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Moist	Topsoil- Dark brown silt, roots
12-30"	CL-ML	Very Moist	Light brown mottled clayey silt
30-84"	ML	Very Moist	Lightly mottled brown silt with little sand, trace gravel. Dense.
84-108"	ML	Very Moist	Same, with pockets of sandy silt
108-120"	CL-ML	Wet	Dark brown clayey silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
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CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 18, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P2 / TP2		
Location:	West Building, East Side near SE Corner		
Approximate Surface Elevation:	462.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	1.2 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	22	17.5	18.25	12.5	**13.5**

SOIL PROFILE - TP2

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Moist	Topsoil- dark brown silt
12-17"	ML	VM-Wet	Dark brown mottled silt with traces sand. Soft
17-96"	CL-ML	Wet	Mottled grey and brown silty clay with some sand, little gravel.
			Water seeping at 24-48"

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36 PATTON ROAD
NEWBURGH, NY 12550
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CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 14, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P3/ TP3		
Location:	West Building, East Side, East from North Part of Bldg.		
Approximate Surface Elevation:	450.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	12"	Gravel in Bottom:	No
Water Depth in Piezometer:	0	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour					**No Test**

SOIL PROFILE TP3

Depth	**USCS Class**	**Moisture**	**Description**
0-16"	CL-ML	Very Moist	Topsoil. Brown silty clay.
0-36"	CL-ML	Very Moist	Mottled pale grey and orange silty clay with little fine sand, trace cobbles. Very Stiff.
36-84"	SM	VM-Wet	Bluish grey sand with some silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
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CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 14, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility			
Test Number:	P4/ TP3			
Location:	West Building, East Side, East from North Part of Bldg.			
Approximate Surface Elevation:	450.5	Test Pipe Diameter:	4 inches	
Test Depth below Grade:	12"	Gravel in Bottom:	No	
Water Depth in Piezometer:	0	after	7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour					**No Test**

SOIL PROFILE TP3

Depth	**USCS Class**	**Moisture**	**Description**
0-16"	CL-ML	Very Moist	Topsoil. Brown silty clay.
0-36"	CL-ML	Very Moist	Mottled pale grey and orange silty clay with little fine sand, trace cobbles. Very Stiff.
36-84"	SM	VM-Wet	Bluish grey sand with some silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 14, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P5/ TP4		
Location:	West Building, East Side, East from North Part of Bldg.		
Approximate Surface Elevation:	450.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	12"	Gravel in Bottom:	No
Water Depth in Piezometer:	0.2 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour					**No Test**

SOIL PROFILE TP4

Depth	**USCS Class**	**Moisture**	**Description**
0-14"	CL-ML	Moist-VM	Dark bluish grey clayey silt
14-80"	CL	Moist-VM	Mottled brown and grey clay with traces fine sand. Very Stiff.
80-90"	ML	Moist-VM	Mottled dark grey and olive brown silt with trace fine sand. Very Stiff. Low Cohesion

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
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PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 21, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P6 / TP5		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	458	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	4.6 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	6	6.375	6.5	5.375	**6.1**

SOIL PROFILE TP5

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Very Moist	Dark brown topsoil- silt with trace to little sand
24-36"	SC-SM	Wet	Mottled brown and orangeish brown sand with some silty clay, traces to little gravel
36-96"	SM	Wet	Brown sand with some gravel, little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 21, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P7 / TP5		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	462.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	4.6 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	10.5	6.75	12.75	13.5	**4.6**

SOIL PROFILE

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Very Moist	Dark brown topsoil- silt with trace to little sand
24-36"	SC-SM	Wet	Mottled brown and orangeish brown sand with some silty clay, traces to little gravel
36-96"	SM	Wet	Brown sand with some gravel, little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

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DATE TESTED:	March 21, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P8 / TP6		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	457.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	3.0 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	4	5	2.5	3	**3.6**

SOIL PROFILE TP6

Depth	**USCS Class**	**Moisture**	**Description**
0-24"	CL-ML	Wet	Silty clay with some sand, trace gravel. Sticky granular texture
24-48"	ML	Wet	Mottled brown and pale brown silt with little sand. Slightly loose to medium dense
48-96"	SM	Wet	Yellowish brown sand with some gravel, little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

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DATE TESTED:	March 21, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P9 / TP6		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	459.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	3.0 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	0	0	0.5	0.5	**0.25**

SOIL PROFILE TP6

Depth	**USCS Class**	**Moisture**	**Description**
0-24"	CL-ML	Wet	Silty clay with some sand, trace gravel. Sticky granular texture
24-48"	ML	Wet	Mottled brown and pale brown silt with little sand. Slightly loose to medium dense
48-96"	SM	Wet	Yellowish brown sand with some gravel, little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

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DATE TESTED:	March 15, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P10 / TP7		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	456.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	1.7 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour					**No Test**

SOIL PROFILE TP7

Depth	**USCS Class**	**Moisture**	**Description**
0-7"	ML	Very moist	Topsoil- Dark brown silt
7-48"	CL-ML	VM-Wet	Brown silty clay, some cobbles (10-15%). Mottled light and dark brown. Boulders up to 24" diameter.
48-72"	CL-ML	VM-Wet	Dark brown silty clay
72"	SP, CL	VM-Wet	Thin layer of dark grey fine sand over olive grey clay

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

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DATE TESTED:	March 15, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P11 / TP7		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	458.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	1.7 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour					**No Test**

SOIL PROFILE TP7

Depth	**USCS Class**	**Moisture**	**Description**
0-7"	ML	Very moist	Topsoil- Dark brown silt
7-48"	CL-ML	VM-Wet	Brown silty clay, some cobbles (10-15%). Mottled light and dark brown. Boulders up to 24" diameter.
48-72"	CL-ML	VM-Wet	Dark brown silty clay
72"	SP, CL	VM-Wet	Thin layer of dark grey fine sand over olive grey clay

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

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DATE TESTED:	March 15, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P12 / TP7		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	457	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	1.7 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	Test Result
Inches per Hour					**No Test**

SOIL PROFILE TP7

Depth	USCS Class	Moisture	Description
0-7"	ML	Very moist	Topsoil- Dark brown silt
7-48"	CL-ML	VM-Wet	Brown silty clay, some cobbles (10-15%). Mottled light and dark brown. Boulders up to 24" diameter.
48-72"	CL-ML	VM-Wet	Dark brown silty clay
72"	SP, CL	VM-Wet	Thin layer of dark grey fine sand over olive grey clay

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 15, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P13 / TP7		
Location:	West Building, North from North End of Bldg.		
Approximate Surface Elevation:	456	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	1.7 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	Test Result
Inches per Hour					**No Test**

SOIL PROFILE TP7

Depth	USCS Class	Moisture	Description
0-7"	ML	Very moist	Topsoil- Dark brown silt
7-48"	CL-ML	VM-Wet	Brown silty clay, some cobbles (10-15%). Mottled light and dark brown. Boulders up to 24" diameter.
48-72"	CL-ML	VM-Wet	Dark brown silty clay
72"	SP, CL	VM-Wet	Thin layer of dark grey fine sand over olive grey clay

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36 PATTON ROAD
NEWBURGH, NY 12550
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CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 22, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P14/ TP8		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	456	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	7.1 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	22	20.75	20.5	20.25	**20.9**

SOIL PROFILE TP8

Depth	**USCS Class**	**Moisture**	**Description**
0-8"	ML	VM-Wet	Topsoil. Dark brown silt with some gravel and cobbles
8-20"	CL	VM-Wet	Brown clay, some mottling
20-60"	SM	Wet	Brown sand with little gravel, traces to little silt. Silt coatings on particles
60"-72"	SM	Wet	Darker brown silty sand, cobbles up to 12" diameter

KEVIN L. PATTON, P.E.

36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 22, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P15 / TP8		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	457	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	7.1 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	23	22	21	18.5	**21.8**

SOIL PROFILE TP8

Depth	**USCS Class**	**Moisture**	**Description**
0-8"	ML	VM-Wet	Topsoil. Dark brown silt with some gravel and cobbles
8-20"	CL	VM-Wet	Brown clay, some mottling
20-60"	SM	Wet	Brown sand with little gravel, traces to little silt. Silt coatings on particles
60"-72"	SM	Wet	Darker brown silty sand, cobbles up to 12" diameter

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36 PATTON ROAD

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PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 22, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P16 / TP8		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	458.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	7.1 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	16	9	13	12	**13.3**

SOIL PROFILE TP8

Depth	**USCS Class**	**Moisture**	**Description**
0-8"	ML	VM-Wet	Topsoil. Dark brown silt with some gravel and cobbles
8-20"	CL	VM-Wet	Brown clay, some mottling
20-60"	SM	Wet	Brown sand with little gravel, traces to little silt. Silt coatings on particles
60"-72"	SM	Wet	Darker brown silty sand, cobbles up to 12" diameter

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 21, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P17 / TP8		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	459	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	7.1 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	1	0.75	0.25	0.5	**0.6**

SOIL PROFILE TP8

Depth	**USCS Class**	**Moisture**	**Description**
0-8"	ML	VM-Wet	Topsoil. Dark brown silt with some gravel and cobbles
8-20"	CL	VM-Wet	Brown clay, some mottling
20-60"	SM	Wet	Brown sand with little gravel, traces to little silt. Silt coatings on particles
60"-72"	SM	Wet	Darker brown silty sand, cobbles up to 12" diameter

KEVIN L. PATTON, P.E.

36 PATTON ROAD

NEWBURGH, NY 12550

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PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 16, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P18 / TP9		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	460	Test Pipe Diameter:	4 inches
Test Depth below Grade:	48"	Gravel in Bottom:	No
Water Depth in Piezometer:	9.4 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	11	9	9	11.5	**9.8**

SOIL PROFILE TP9

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Very Moist	Topsoil. Brown silt with little sand.
12-48"	SC-SM	Very Moist	Brown sand (Fmc) with some silty clay, traces gravel, trace small roots
48-96"	SM	Wet	Sand with little silt, little gravel, some cobbles, few boulders.
96"	SM	Wet	Dark brown sand with traces to little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 16, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P19 / TP9		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	461.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	48"	Gravel in Bottom:	No
Water Depth in Piezometer:	9.4 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	1	2.5	3	2.75	**2.3**

SOIL PROFILE TP9

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Very Moist	Topsoil. Brown silt with little sand.
12-48"	SC-SM	Very Moist	Brown sand (Fmc) with some silty clay, traces gravel, trace small roots
48-96"	SM	Wet	Sand with little silt, little gravel, some cobbles, few boulders.
96"	SM	Wet	Dark brown sand with traces to little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 16, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P20 / TP9		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	460	Test Pipe Diameter:	4 inches
Test Depth below Grade:	48"	Gravel in Bottom:	No
Water Depth in Piezometer:	9.4 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	22	22	20.5	21	**21.4**

SOIL PROFILE TP9

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Very Moist	Topsoil. Brown silt with little sand.
12-48"	SC-SM	Very Moist	Brown sand (Fmc) with some silty clay, traces gravel, trace small roots
48-96"	SM	Wet	Sand with little silt, little gravel, some cobbles, few boulders.
96"	SM	Wet	Dark brown sand with traces to little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 18, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P21 / TP9		
Location:	West Building, Northeast Extension of North Area		
Approximate Surface Elevation:	461.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	48"	Gravel in Bottom:	No
Water Depth in Piezometer:	9.4 ft	after 6	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	2	1.5	2	3	**2.1**

SOIL PROFILE TP9

Depth	**USCS Class**	**Moisture**	**Description**
0-12"	ML	Very Moist	Topsoil. Brown silt with little sand.
12-48"	SC-SM	Very Moist	Brown sand (Fmc) with some silty clay, traces gravel, trace small roots
48-96"	SM	Wet	Sand with little silt, little gravel, some cobbles, few boulders.
96"	SM	Wet	Dark brown sand with traces to little silt

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 18, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P22 / TP10		
Location:	East Building, South End		
Approximate Surface Elevation:	449	Test Pipe Diameter:	4 inches
Test Depth below Grade:	12"	Gravel in Bottom:	No
Water Depth in Piezometer:	0.4 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	6.5	8	7	7.5	**7.3**

SOIL PROFILE TP10

Depth	**USCS Class**	**Moisture**	**Description**
0-9"	ML	Moist	Topsoil. Soil with little sand.
9-19"	CL-ML	Moist	Light brown silty clay. Mottled grey
19-48"	CL-ML	Wet	Mottled olive brown and olive grey silty clay with little sand, trace gravel. Soft.
48-96"	CL	Wet	Mottled brown and grey clay. Very stiff.

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 23, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P23 / TP10		
Location:	East Building, South End		
Approximate Surface Elevation:	449	Test Pipe Diameter:	4 inches
Test Depth below Grade:	12"	Gravel in Bottom:	No
Water Depth in Piezometer:	0.4 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	3.75	3.5	3.75	4.75	**3.9**

SOIL PROFILE TP10

Depth	**USCS Class**	**Moisture**	**Description**
0-9"	ML	Moist	Topsoil. Soil with little sand.
9-19"	CL-ML	Moist	Light brown silty clay. Mottled grey
19-48"	CL-ML	Wet	Mottled olive brown and olive grey silty clay with little sand, trace gravel. Soft.
48-96"	CL	Wet	Mottled brown and grey clay. Very stiff.

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 18, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P24 / TP10		
Location:	East Building, South End		
Approximate Surface Elevation:	450.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	12"	Gravel in Bottom:	No
Water Depth in Piezometer:	0.4 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	21	21.5	16	18.25	**19.2**

SOIL PROFILE TP10

Depth	**USCS Class**	**Moisture**	**Description**
0-9"	ML	Moist	Topsoil. Soil with little sand.
9-19"	CL-ML	Moist	Light brown silty clay. Mottled grey
19-48"	CL-ML	Wet	Mottled olive brown and olive grey silty clay with little sand, trace gravel. Soft.
48-96"	CL	Wet	Mottled brown and grey clay. Very stiff.

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 18, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P25 / TP11		
Location:	East Building, South End		
Approximate Surface Elevation:	460.5	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	8.1 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	24	24	24	24	**>24**

SOIL PROFILE TP11

Depth	**USCS Class**	**Moisture**	**Description**
0-6"	ML	Moist	Topsoil. Brown silt with little sand.
6"-96"	SM	VM-Wet	Brown sand and gravel with little silt, some cobbles (15%)

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y.	PROJ. No.	21402
DATE TESTED:	March 18, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P26 / TP11		
Location:	East Building, North End West		
Approximate Surface Elevation:	461	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	8.1 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	24	24	24	24	**>24**

SOIL PROFILE TP11

Depth	**USCS Class**	**Moisture**	**Description**
0-6"	ML	Moist	Topsoil. Brown silt with little sand.
6"-96"	SM	VM-Wet	Brown sand and gravel with little silt, some cobbles (15%)

KEVIN L. PATTON, P.E.

36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 18, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P27 / TP12		
Location:	East Building, North End East		
Approximate Surface Elevation:	467	Test Pipe Diameter:	4 inches
Test Depth below Grade:	24"	Gravel in Bottom:	No
Water Depth in Piezometer:	8.0 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	4.5	4.75	5.5	5.5	**5.1**

SOIL PROFILE TP12

Depth	**USCS Class**	**Moisture**	**Description**
0-14"	ML	Moist	Topsoil. Brown silt with some sand.
14-48"	ML	Moist	Faintly mottled brown silt.
48-72"	ML	Moist	Mottled brown and grey silt with traces to little sand. Dense to very dense.
72-96"	SM	Moist	Dark brown fine sand with traces silt, cobbles up to 12" diameter.
96"	-	-	Scraping at bottom of test pit (on large boulder?)

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	Dolsontown East, Town of Wawayanda, N.Y. PROJ. No. 21402		
DATE TESTED:	March 16, 2022	TESTED BY:	Warren Patton, Wyeth Patton

REPORT OF STORMWATER INFILTRATION TEST
Test Method: New York State Stormwater Management Design Manual, Appendix D.

Testing Phase:	Initial Feasibility		
Test Number:	P28 / TP13		
Location:	East Building, North End East		
Approximate Surface Elevation:	470	Test Pipe Diameter:	4 inches
Test Depth below Grade:	48"	Gravel in Bottom:	No
Water Depth in Piezometer:	8.7 ft	after 7	days

TEST DATA	Trial 1	Trial 2	Trial 3	Trial 4	**Test Result**
Inches per Hour	0	0	0	0	**0**

SOIL PROFILE TP13

Depth	**USCS Class**	**Moisture**	**Description**
0-6"	CL-ML	Very moist	Topsoil- Dark brown silty clay with some sand
6-16"	CL-ML	VM-Wet	Brown mottled silty clay with some sand, little gravel
16-26"	CL-ML	VM-Wet	Brown silty clay with some sand, little gravel
26-72"	CL-ML	Wet	Mottled grey, brown and orange-brown clay. Stiff to very stiff. Boulders below 5 ft depth.
72-96"	SM	Wet	Darker brown fine sand, little gravel, little silt

KEVIN L. PATTON, P.E. 36 PATTON ROAD NEWBURGH, NY 12550 PATTONGEOTECH.COM 845 275-7732	CLIENT:	RDM Group		
	PROJECT:	Dolsontown East		
	DATE:	3/15/2022	Project No.:	21402
	WEATHER:	Partly cloudy, 55F		

TEST PIT LOG

EXCAVATING COMPANY:	Boyce Excavating	LOCATION:	West Building, ±215ft S from NW corner	**TEST PIT NUMBER**	**TP14**
OPERATOR:					
EQUIPMENT:	Caterpillar 308E	ELEVATION:	495 ft±		
INSPECTOR:	Warren Patton, Wyeth Patton	WATER DEPTH:			

Depth	USCS Class	Description	Notes
0-10"	ML	Topsoil - dark brown silt with roots. Very moist.	
10"-16"	ML	Mottled brown sandy silt. Moist.	
16"-5 ft	SM	Dark brown coarse-graded sand with little silt. Moist, becoming very moist.	
5-7 ft	CL	Dark grey clay, boulders. Very moist.	
7-8 ft	SM	Dark brown silty fine sand, cobbles, scraping at 8ft. Wet.	
8 ft	Rock	Probable bedrock. Water seeping in rapidly at bottom of soils.	

SCP: Static Cone Penetrometer. Values are indicated allowable bearing capacity in kips per square foot (thousands of pounds per square foot.)

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	Dolsontown East		
NEWBURGH, NY 12550	DATE:	3/15/2022	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 55F		

TEST PIT LOG

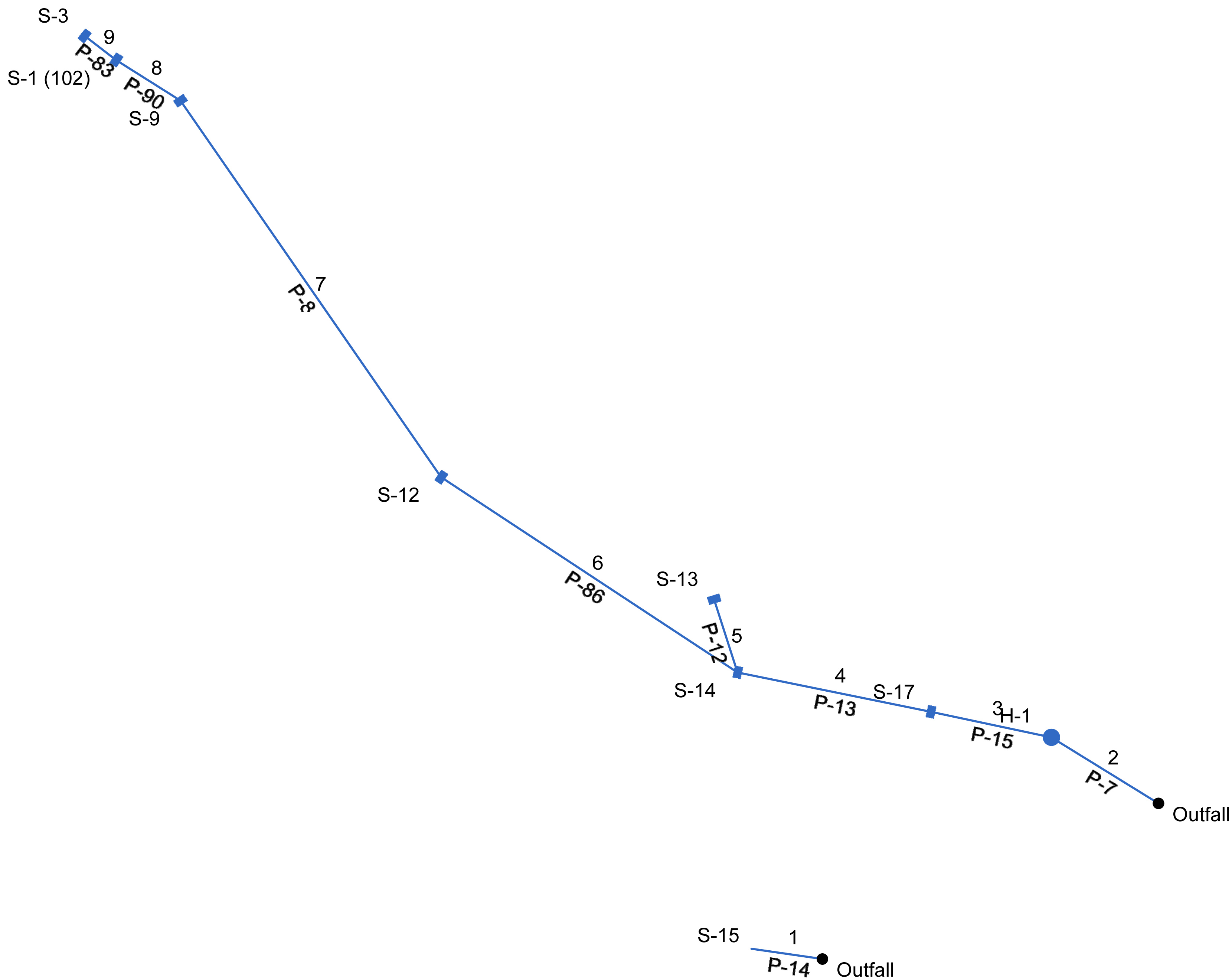
EXCAVATING COMPANY:	Boyce Excavating	LOCATION:	West Building, ±430ft S from NW corner	TEST PIT NUMBER	TP15
OPERATOR:					
EQUIPMENT:	Caterpillar 308E	ELEVATION:	495 ft±		
INSPECTOR:	Warren Patton, Wyeth Patton	WATER DEPTH:			

Depth	USCS Class	Description	Notes
0-3 ft	ML	Brown silt. Very moist.	
3-5 ft	SM	Dark brown sand with little silt. Moist.	
5-11 ft	CL-ML	Brown silty clay with little sand. Very moist.	
11 ft	Rock	Refusal, scraping on probable bedrock. Hard.	

SCP: Static Cone Penetrometer. Values are indicated allowable bearing capacity in kips per square foot (thousands of pounds per square foot.)

Appendix 17 | Hydraflow Storm Sewers Pipe Sizing Report

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



Project File: MAS_220801_West Parking Lot.stm	Number of lines: 9	Date: 2/6/2023

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	P-14	0.53	15	Cir	24	478.28	478.40	0.500	479.78*	479.78*	0.00	479.78	End	Manhole
2	P-7	12.91	24	Cir	41	467.23	468.06	1.996	470.55*	470.67*	0.10	470.77	End	Manhole
3	P-15	12.47	24	Cir	41	468.16	471.88	9.180	470.78	473.15	n/a	473.15 j	2	Combination
4	P-13	11.25	18	Cir	65	471.98	472.30	0.500	473.48*	474.11*	0.91	475.03	3	Combination
5	P-12	3.49	18	Cir	25	475.22	475.35	0.500	475.92	476.06	n/a	476.06	4	Combination
6	P-86	6.87	18	Cir	117	475.45	476.04	0.500	476.52	477.10	0.26	477.36	4	Combination
7	P-8	5.21	15	Cir	151	476.39	477.14	0.500	477.49	478.24	0.22	478.46	6	Combination
8	P-90	4.68	12	Cir	25	477.24	477.37	0.500	478.46*	478.83*	0.28	479.10	7	Combination
9	P-83	3.55	12	Cir	13	477.47	477.53	0.500	479.34*	479.45*	0.32	479.77	8	Combination

Project File: MAS_220801_West Parking Lot.stm	Number of lines: 9	Run Date: 2/6/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

MC Report

Line No.	Line ID	Inlet ID	Drng Area (ac)	Runoff Coeff (C)	Tc (min)	i Sys (in/hr)	Q Capt (cfs)	Total Runoff (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Type	n-val Pipe	Line Size (in)	Line Slope (%)	Line Length (ft)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	Gnd/Rim El Dn (ft)	HGL Up (ft)
1	P-14	S-15	0.67	0.10	6.0	7.94	....	0.53	4.95	0.43	Cir	0.012	15	0.50	24	478.40	478.28	481.41	480.94	479.78
2	P-7	H-1	0.12	0.58	7.7	7.49	....	12.91	34.62	4.11	Cir	0.012	24	2.00	41	468.06	467.23	480.54	469.10	470.67
3	P-15	S-17	0.21	0.82	7.5	7.55	1.37	12.47	74.24	4.95	Cir	0.012	24	9.18	41	471.88	468.16	481.17	480.54	473.15 j
4	P-13	S-14	0.17	0.90	7.3	7.60	1.22	11.25	8.04	6.36	Cir	0.012	18	0.50	65	472.30	471.98	480.85	481.17	474.11
5	P-12	S-13	0.53	0.83	6.0	7.94	3.49	3.49	8.04	4.31	Cir	0.012	18	0.50	25	475.35	475.22	485.10	480.85	476.06
6	P-86	S-12	0.26	0.88	6.7	7.74	1.82	6.87	8.04	5.12	Cir	0.012	18	0.50	117	476.04	475.45	481.91	480.85	477.10
7	P-8	S-9	0.09	0.76	6.1	7.91	0.54	5.21	4.95	4.55	Cir	0.012	15	0.50	151	477.14	476.39	482.80	481.91	478.24
8	P-90	S-1 (102)	0.16	0.90	6.0	7.93	1.14	4.68	2.73	5.96	Cir	0.012	12	0.50	25	477.37	477.24	479.97	482.80	478.83
9	P-83	S-3	0.48	0.93	6.0	7.94	3.55	3.55	2.73	4.52	Cir	0.012	12	0.50	13	477.53	477.47	480.19	479.97	479.45

Project File: MAS_220801_West Parking Lot.stm	Number of lines: 9	Date: 2/6/2023

NOTES: Intensity = 102.61 / (Inlet time + 16.50) ^ 0.82 -- Return period = 25 Yrs. ; ** Critical depth

MC Report

HGL Dn (ft)	Cover Up (ft)	Cover Dn (ft)
479.78	1.76	1.41
470.55	10.48	-0.13
470.78	7.29	10.38
473.48	7.05	7.69
475.92	8.25	4.13
476.52	4.37	3.90
477.49	4.41	4.27
478.46	1.60	4.56
479.34	1.66	1.50

Project File: MAS_220801_West Parking Lot.stm	Number of lines: 9	Date: 2/6/2023

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow n-Value	Sheet Flow flow Length (ft)	Sheet Flow 2-yr 24h P (in)	Sheet Flow Land Slope (%)	Sheet Flow Travel Time (min)	Shallow Concentrated Flow flow Length (ft)	Shallow Concentrated Flow Water Slope (%)	Shallow Concentrated Flow Surf Descr	Shallow Concentrated Flow Ave Vel (ft/s)	Shallow Concentrated Flow Travel Time (min)	Channel Flow X-sec Area (sqft)	Channel Flow Wetted Perim (ft)	Channel Flow Chan Slope (%)	Channel Flow n-Value	Channel Flow Vel	Channel Flow flow Length (ft)	Channel Flow Travel Time (min)	Total Travel Time (min)
1	P-14	User																		6.00
2	P-7	User																		6.00
3	P-15	User																		6.00
4	P-13	User																		6.00
5	P-12	User																		6.00
6	P-86	User																		6.00
7	P-8	User																		6.00
8	P-90	User																		6.00
9	P-83	User																		6.00

Project File: MAS_220801_West Parking Lot.stm | Min. Tc used for intensity calculations = 6 min | Number of lines: 9 | Date: 2/6/2023

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	15	0.53	478.28	479.78	1.25	1.23	0.43	0.00	479.78	0.006	24	478.40	479.78	1.25	1.23	0.43	0.00	479.78	0.006	0.006	0.001	1.00	0.00
2	24	12.91	467.23	470.55	2.00	3.14	4.11	0.26	470.81	0.278	41	468.06	470.67	2.00	3.14	4.11	0.26	470.93	0.278	0.278	0.115	0.39	0.10
3	24	12.47	468.16	470.78	2.00	2.10	3.97	0.25	471.03	0.259	41	471.88	473.15 j	1.27**	2.10	5.94	0.55	473.70	0.486	0.373	n/a	0.50	0.27
4	18	11.25	471.98	473.48	1.50*	1.77	6.36	0.63	474.11	0.978	65	472.30	474.11	1.50	1.77	6.36	0.63	474.74	0.977	0.977	0.634	1.45	0.91
5	18	3.49	475.22	475.92	0.69*	0.80	4.39	0.28	476.19	0.000	25	475.35	476.06	0.71**	0.83	4.22	0.28	476.34	0.000	0.000	n/a	1.00	n/a
6	18	6.87	475.45	476.52	1.07*	1.34	5.11	0.41	476.93	0.500	117	476.04	477.10	1.07	1.34	5.12	0.41	477.51	0.501	0.500	0.585	0.64	0.26
7	15	5.21	476.39	477.49	1.10	1.15	4.55	0.32	477.81	0.498	151	477.14	478.24	1.10	1.14	4.56	0.32	478.57	0.500	0.499	0.753	0.67	0.22
8	12	4.68	477.24	478.46	1.00	0.79	5.96	0.55	479.01	1.474	25	477.37	478.83	1.00	0.79	5.96	0.55	479.38	1.473	1.473	0.370	0.50	0.28
9	12	3.55	477.47	479.34	1.00	0.79	4.52	0.32	479.66	0.845	13	477.53	479.45	1.00	0.79	4.52	0.32	479.77	0.845	0.845	0.110	1.00	0.32

Project File: MAS_220801_West Parking Lot.stm	Number of lines: 9	Run Date: 2/6/2023

Notes: * Normal depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

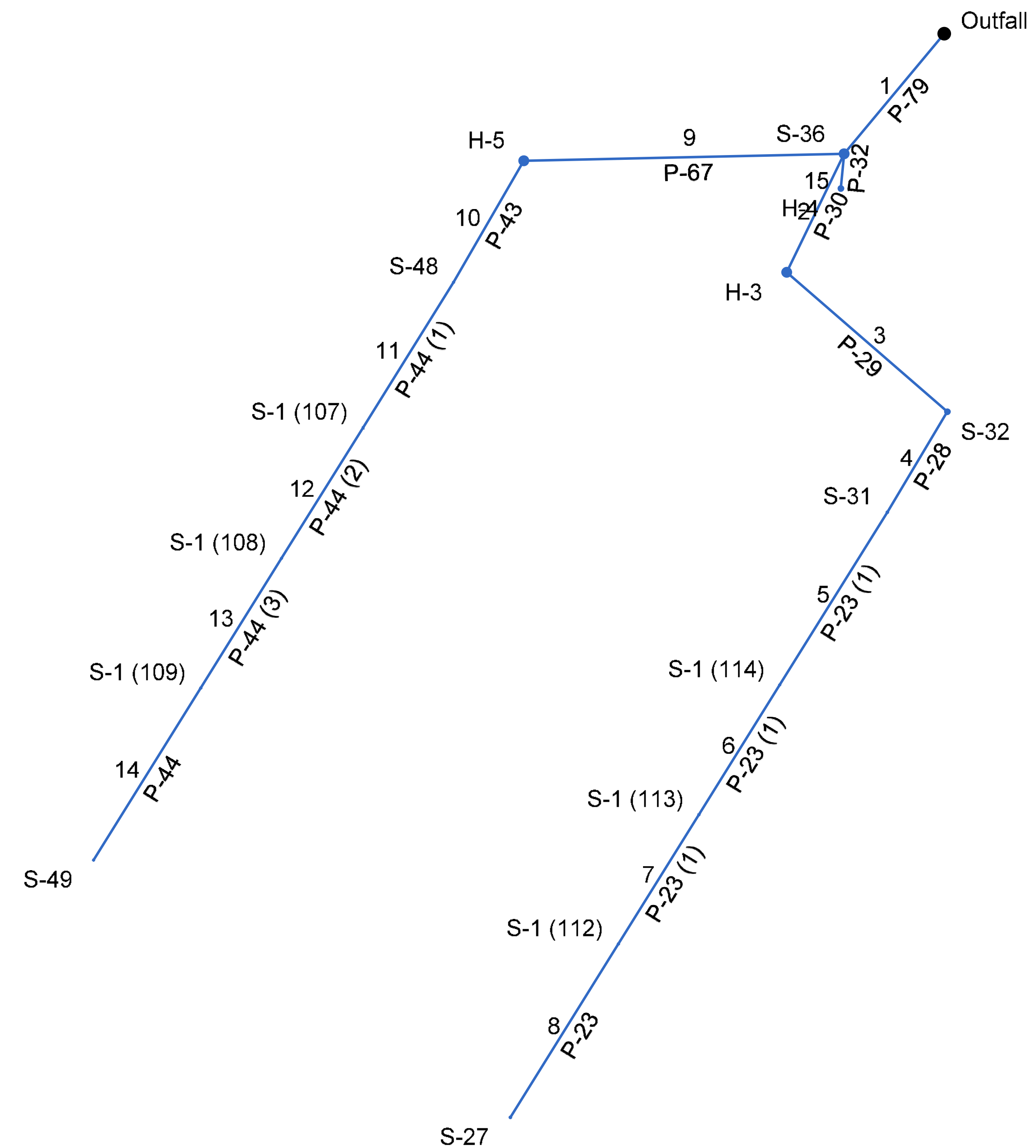
Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

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



Project File: MAS_220802_West Roof.stm	Number of lines: 15	Date: 2/6/2023

MC Report

Line No.	Line ID	Inlet ID	Drng Area (ac)	Runoff Coeff (C)	Tc (min)	i Sys (in/hr)	Q Capt (cfs)	Total Runoff (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Type	n-val Pipe	Line Size (in)	Line Slope (%)	Line Length (ft)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	Gnd/Rim El Dn (ft)	HGL Up (ft)	
1	P-79	S-36	0.00	0.90	10.5	6.11	....	50.95	51.09	8.38	Cir	0.012	36	0.50	149	456.42	455.67	462.46	455.81	458.93	
2	P-30	H-3	0.00	0.90	9.9	6.30	....	26.20	51.09	3.71	Cir	0.012	36	0.50	126	457.15	456.52	465.53	462.46	460.69	
3	P-29	S-32	0.77	0.90	8.9	6.63	....	27.56	128.37	5.29	Cir	0.012	36	3.16	203	463.55	457.15	468.26	465.53	465.25 j	
4	P-28	S-31	0.77	0.90	8.5	6.79	5.53	23.51	117.06	6.17	Cir	0.012	30	6.94	112	471.32	463.55	476.09	468.26	472.97 j	
5	P-23 (1)	S-1 (114)	0.77	0.90	7.7	7.14	5.53	19.80	31.42	5.42	Cir	0.012	30	0.50	194	472.29	471.32	476.65	476.09	473.80 j	
6	P-23 (1)	S-1 (113)	0.77	0.90	7.1	7.38	5.53	15.35	17.33	5.67	Cir	0.012	24	0.50	146	473.02	472.29	476.65	476.65	474.51	
7	P-23 (1)	S-1 (112)	0.77	0.90	6.7	7.59	5.53	10.52	8.04	5.95	Cir	0.012	18	0.50	145	473.75	473.02	476.72	476.65	476.08	
8	P-23	S-27	0.77	0.90	6.0	7.98	5.53	5.53	9.04	5.01	Cir	0.012	15	1.67	195	477.00	473.75	480.01	476.72	477.96 j	
9	P-67	H-5	0.77	0.90	8.9	6.65	....	27.65	86.29	6.73	Cir	0.012	30	3.77	305	469.58	458.08	474.58	462.46	471.37 j	
10	P-43	S-48	0.77	0.90	8.4	6.84	5.53	23.70	31.42	5.97	Cir	0.012	30	0.50	134	470.25	469.58	476.70	474.58	471.91	
11	P-44 (1)	S-1 (107)	0.77	0.90	7.7	7.14	5.53	19.80	31.42	5.41	Cir	0.012	30	0.50	163	471.07	470.25	476.65	476.70	472.58 j	
12	P-44 (2)	S-1 (108)	0.77	0.90	7.1	7.38	5.53	15.35	17.33	5.67	Cir	0.012	24	0.50	147	471.81	471.07	476.65	476.65	473.29	
13	P-44 (3)	S-1 (109)	0.77	0.90	6.7	7.59	5.53	10.52	8.05	5.96	Cir	0.012	18	0.50	146	472.54	471.81	476.69	476.65	474.87	
14	P-44	S-49	0.77	0.90	6.0	7.98	5.53	5.53	4.95	4.51	Cir	0.012	15	0.50	194	473.75	472.79	476.71	476.69	476.59	
15	P-32	H-4	0.25	0.10	6.0	7.98	0.20	0.20	2.73	0.25	Cir	0.012	12	0.50	33	458.58	458.42	463.29	462.46	460.74	

Project File: MAS_220802_West Roof.stm | Number of lines: 15 | Date: 2/6/2023

NOTES: Intensity = 39.57 / (Inlet time + 3.70) ^ 0.70 -- Return period = 25 Yrs. ; ** Critical depth

MC Report

HGL Dn (ft)	Cover Up (ft)	Cover Dn (ft)
457.99	3.04	-2.86
460.52	5.38	2.94
460.90	1.71	5.39
465.58	2.27	2.21
473.44	1.86	2.27
474.06	1.63	2.36
474.83	1.47	2.13
476.59	1.76	1.72
460.24	2.50	1.88
471.85	3.95	2.50
472.39	3.08	3.95
472.84	2.84	3.58
473.62	2.65	3.34
475.38	1.71	2.65
460.74	3.71	3.04

Project File: MAS_220802_West Roof.stm	Number of lines: 15	Date: 2/6/2023

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow n-Value	Sheet Flow flow Length (ft)	Sheet Flow 2-yr 24h P (in)	Sheet Flow Land Slope (%)	Sheet Flow Travel Time (min)	Shallow Concentrated Flow flow Length (ft)	Shallow Concentrated Flow Water Slope (%)	Shallow Concentrated Flow Surf Descr	Shallow Concentrated Flow Ave Vel (ft/s)	Shallow Concentrated Flow Travel Time (min)	Channel Flow X-sec Area (sqft)	Channel Flow Wetted Perim (ft)	Channel Flow Chan Slope (%)	Channel Flow n-Value	Channel Flow Vel	Channel Flow flow Length (ft)	Channel Flow Travel Time (min)	Total Travel Time (min)
1	P-79	User																		0.00
2	P-30	User																		0.00
3	P-29	User																		6.00
4	P-28	User																		6.00
5	P-23 (1)	User																		6.00
6	P-23 (1)	User																		6.00
7	P-23 (1)	User																		6.00
8	P-23	User																		6.00
9	P-67	User																		6.00
10	P-43	User																		6.00
11	P-44 (1)	User																		6.00
12	P-44 (2)	User																		6.00
13	P-44 (3)	User																		6.00
14	P-44	User																		6.00
15	P-32	User																		6.00

Project File: MAS_220802_West Roof.stm	Min. Tc used for intensity calculations = 6 min	Number of lines: 15	Date: 2/6/2023

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	36	50.95	455.67	457.99	2.32	5.87	8.69	1.17	459.16	0.558	149	456.42	458.93	2.51	6.32	8.07	1.01	459.94	0.480	0.519	0.775	0.79	0.80
2	36	26.20	456.52	460.52	3.00	7.07	3.71	0.21	460.74	0.132	126	457.15	460.69	3.00	7.07	3.71	0.21	460.90	0.132	0.132	0.165	0.97	0.21
3	36	27.56	457.15	460.90	3.00	4.12	3.90	0.24	461.13	0.146	203	463.55	465.25 j	1.70**	4.12	6.69	0.70	465.94	0.388	0.267	n/a	0.99	0.69
4	30	23.51	463.55	465.58	2.03	3.44	5.50	0.73	466.31	0.000	112	471.32	472.97 j	1.65**	3.44	6.84	0.73	473.70	0.000	0.000	n/a	0.50	0.36
5	30	19.80	471.32	473.44	2.12	3.10	4.45	0.64	474.08	0.000	194	472.29	473.80 j	1.51**	3.10	6.40	0.64	474.43	0.000	0.000	n/a	0.50	n/a
6	24	15.35	472.29	474.06	1.77	2.94	5.21	0.42	474.49	0.350	146	473.02	474.51	1.49	2.50	6.13	0.58	475.09	0.482	0.416	0.608	0.50	0.29
7	18	10.52	473.02	474.83	1.50	1.77	5.95	0.55	475.38	0.855	145	473.75	476.08	1.50	1.77	5.95	0.55	476.63	0.855	0.855	1.243	0.50	0.28
8	15	5.53	473.75	476.59	1.25	1.00	4.51	0.32	476.90	0.626	195	477.00	477.96 j	0.95**	1.00	5.51	0.47	478.43	0.726	0.676	n/a	1.00	0.47
9	30	27.65	458.08	460.24	2.17	3.76	6.12	0.84	461.08	0.000	305	469.58	471.37 j	1.79**	3.76	7.35	0.84	472.21	0.000	0.000	n/a	0.88	n/a
10	30	23.70	469.58	471.85	2.27	3.45	5.07	0.73	472.58	0.000	134	470.25	471.91	1.66**	3.45	6.87	0.73	472.64	0.000	0.000	n/a	0.50	0.37
11	30	19.80	470.25	472.39	2.14	3.10	4.43	0.64	473.02	0.000	163	471.07	472.58 j	1.51**	3.10	6.39	0.64	473.21	0.000	0.000	n/a	0.50	n/a
12	24	15.35	471.07	472.84	1.77	2.94	5.21	0.42	473.27	0.351	147	471.81	473.29	1.49	2.50	6.13	0.58	473.88	0.482	0.416	0.613	0.50	0.29
13	18	10.52	471.81	473.62	1.50	1.77	5.96	0.55	474.17	0.856	146	472.54	474.87	1.50	1.77	5.96	0.55	475.42	0.856	0.856	1.250	0.50	0.28
14	15	5.53	472.79	475.38	1.25	1.23	4.51	0.32	475.70	0.626	194	473.75	476.59	1.25	1.23	4.51	0.32	476.91	0.625	0.626	1.211	1.00	0.32
15	12	0.20	458.42	460.74	1.00	0.79	0.25	0.00	460.74	0.003	33	458.58	460.74	1.00	0.79	0.25	0.00	460.74	0.003	0.003	0.001	1.00	0.00

Project File: MAS_220802_West Roof.stm	Number of lines: 15	Run Date: 2/6/2023

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

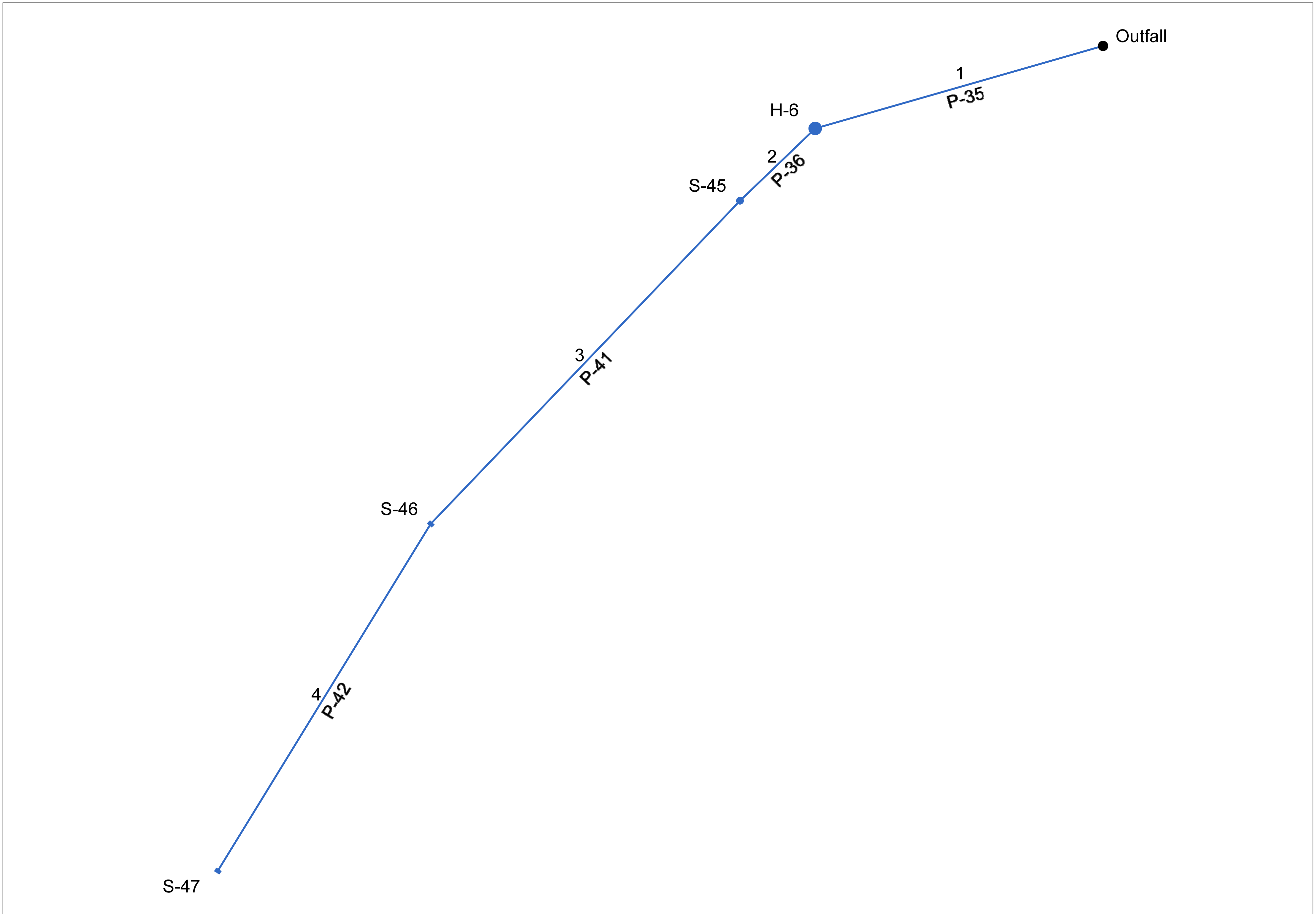
Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

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



Project File: MAS_220802_West TS 1.stm	Number of lines: 4	Date: 2/6/2023

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	P-35	28.36	24	Cir	208	456.00	460.16	2.003	457.83	461.99	0.71	461.99	End	Manhole
2	P-36	21.28	24	Cir	72	465.58	468.90	4.587	466.46	470.55	n/a	470.55	1	Grate
3	P-41	18.91	24	Cir	311	469.00	470.55	0.500	471.00*	472.85*	0.28	473.13	2	Combination
4	P-42	9.01	18	Cir	283	470.65	472.07	0.500	473.29*	475.06*	0.40	475.47	3	Combination

Project File: MAS_220802_West TS 1.stm	Number of lines: 4	Run Date: 2/6/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown).

MC Report

Line No.	Line ID	Inlet ID	Drng Area (ac)	Runoff Coeff (C)	Tc (min)	i Sys (in/hr)	Q Capt (cfs)	Total Runoff (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Type	n-val Pipe	Line Size (in)	Line Slope (%)	Line Length (ft)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	Gnd/Rim El Dn (ft)	HGL Up (ft)
1	P-35	H-6	1.68	0.62	8.0	6.99	....	28.36	34.68	9.41	Cir	0.012	24	2.00	208	460.16	456.00	476.22	458.16	461.99
2	P-36	S-45	0.76	0.63	7.8	7.07	3.86	21.28	52.48	11.75	Cir	0.012	24	4.59	72	468.90	465.58	476.07	476.22	470.55
3	P-41	S-46	2.79	0.50	6.9	7.49	11.15	18.91	17.33	6.02	Cir	0.012	24	0.50	311	470.55	469.00	474.15	476.07	472.85
4	P-42	S-47	1.80	0.63	6.0	7.98	9.01	9.01	8.04	5.10	Cir	0.012	18	0.50	283	472.07	470.65	475.24	474.15	475.06

Project File: MAS_220802_West TS 1.stm	Number of lines: 4	Date: 2/6/2023

NOTES: Intensity = 39.57 / (Inlet time + 3.70) ^ 0.70 -- Return period = 25 Yrs. ; ** Critical depth

MC Report

HGL Dn (ft)	Cover Up (ft)	Cover Dn (ft)
457.83	14.06	0.15
466.46	5.17	8.64
471.00	1.60	5.07
473.29	1.68	2.00

Project File: MAS_220802_West TS 1.stm | Number of lines: 4 | Date: 2/6/2023

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow n-Value	Sheet Flow flow Length (ft)	Sheet Flow 2-yr 24h P (in)	Sheet Flow Land Slope (%)	Sheet Flow Travel Time (min)	Shallow Concentrated Flow flow Length (ft)	Shallow Concentrated Flow Water Slope (%)	Shallow Concentrated Flow Surf Descr	Shallow Concentrated Flow Ave Vel (ft/s)	Shallow Concentrated Flow Travel Time (min)	Channel Flow X-sec Area (sqft)	Channel Flow Wetted Perim (ft)	Channel Flow Chan Slope (%)	Channel Flow n-Value	Channel Flow Vel	Channel Flow flow Length (ft)	Channel Flow Travel Time (min)	Total Travel Time (min)
1	P-35	User																		6.00
2	P-36	User																		6.00
3	P-41	User																		6.00
4	P-42	User																		6.00

Project File: MAS_220802_West TS 1.stm | Min. Tc used for intensity calculations = 6 min | Number of lines: 4 | Date: 2/6/2023

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	24	28.36	456.00	457.83	1.83	3.01	9.41	1.37	459.20	0.000	208	460.16	461.99	1.83**	3.02	9.40	1.37	463.36	0.000	0.000	n/a	0.52	0.71
2	24	21.28	465.58	466.46	0.89*	1.35	15.82	0.92	467.38	0.000	72	468.90	470.55	1.65**	2.77	7.67	0.92	471.47	0.000	0.000	n/a	0.50	n/a
3	24	18.91	469.00	471.00	2.00*	3.14	6.02	0.56	471.56	0.596	311	470.55	472.85	2.00	3.14	6.02	0.56	473.41	0.595	0.596	1.850	0.50	0.28
4	18	9.01	470.65	473.29	1.50	1.77	5.10	0.40	473.69	0.627	283	472.07	475.06	1.50	1.77	5.10	0.40	475.47	0.627	0.627	1.774	1.00	0.40

Project File: MAS_220802_West TS 1.stm | Number of lines: 4 | Run Date: 2/6/2023

Notes: * Normal depth assumed; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

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Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

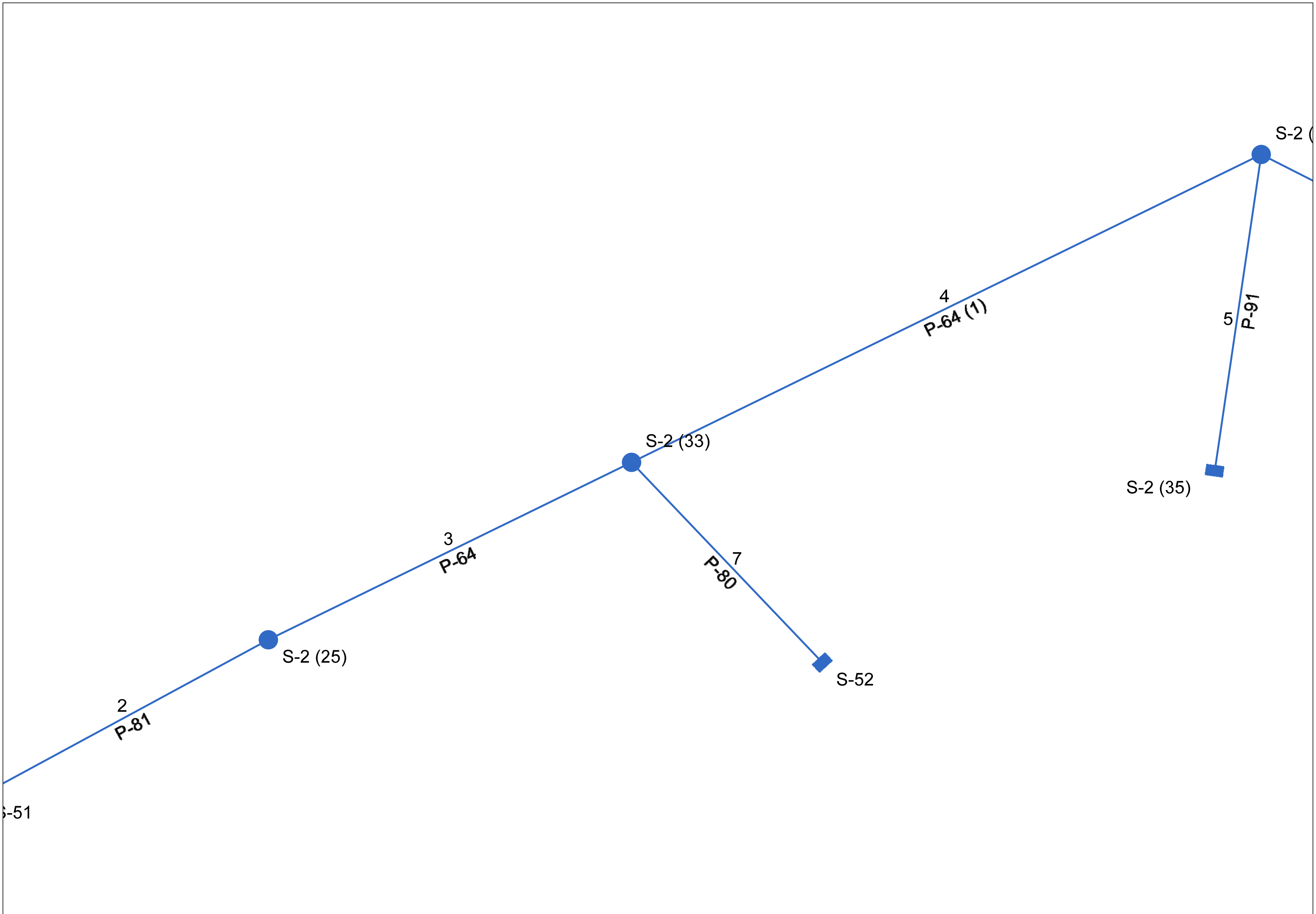
Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

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



Project File: MAS_220804_East Parking Run.stm	Number of lines: 7	Date: 2/6/2023

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	P-45	6.57	12	Cir	91	457.20	464.10	7.565	458.19	465.07	n/a	465.07 j	End	Combination
2	P-81	5.80	12	Cir	75	464.10	466.14	2.730	465.33	467.09	n/a	467.09 j	1	Manhole
3	P-64	1.83	12	Cir	93	466.14	466.61	0.500	467.89*	468.10*	0.08	468.18	2	Manhole
4	P-64 (1)	1.37	12	Cir	160	466.61	467.41	0.500	468.22	468.41	0.05	468.45	3	Manhole
5	P-91	0.61	12	Cir	73	468.03	468.40	0.500	468.49	468.72	0.12	468.72	4	Combination
6	P-46	0.91	12	Cir	78	467.41	467.80	0.500	468.48	468.52	0.03	468.55	4	Combination
7	P-80	0.69	12	Cir	63	467.99	468.30	0.500	468.33	468.65	n/a	468.65	3	Combination

Project File: MAS_220804_East Parking Run.stm | Number of lines: 7 | Run Date: 2/6/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

MC Report

Line No.	Line ID	Inlet ID	Drng Area (ac)	Runoff Coeff (C)	Tc (min)	i Sys (in/hr)	Q Capt (cfs)	Total Runoff (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Type	n-val Pipe	Line Size (in)	Line Slope (%)	Line Length (ft)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	Gnd/Rim El Dn (ft)	HGL Up (ft)
1	P-45	S-51	0.18	0.71	9.7	6.34	0.00	6.57	10.61	8.41	Cir	0.012	12	7.56	91	464.10	457.20	466.81	459.87	465.07 j
2	P-81	S-2 (25)	0.70	0.90	9.6	6.40	....	5.80	6.37	7.46	Cir	0.012	12	2.73	75	466.14	464.10	472.28	466.81	467.09 j
3	P-64	S-2 (33)	0.00	0.00	9.0	6.61	....	1.83	2.73	2.33	Cir	0.012	12	0.50	93	466.61	466.14	473.02	472.28	468.10
4	P-64 (1)	S-2 (26)	0.00	0.00	7.6	7.19	....	1.37	2.73	1.74	Cir	0.012	12	0.50	160	467.41	466.61	472.00	473.02	468.41
5	P-91	S-2 (35)	0.10	0.77	6.0	7.98	0.61	0.61	2.73	2.25	Cir	0.012	12	0.50	73	468.40	468.03	471.10	472.00	468.72
6	P-46	S-53	0.18	0.63	6.0	7.98	0.91	0.91	2.73	1.33	Cir	0.012	12	0.50	78	467.80	467.41	470.57	472.00	468.52
7	P-80	S-52	0.11	0.79	6.0	7.98	0.69	0.69	2.73	2.88	Cir	0.012	12	0.50	63	468.30	467.99	471.06	473.02	468.65

Project File: MAS_220804_East Parking Run.stm | Number of lines: 7 | Date: 2/6/2023

NOTES: Intensity = 39.57 / (Inlet time + 3.70) ^ 0.70 -- Return period = 25 Yrs. ; ** Critical depth

MC Report

HGL Dn (ft)	Cover Up (ft)	Cover Dn (ft)
458.19	1.71	1.67
465.33	5.14	1.71
467.89	5.41	5.14
468.22	3.59	5.41
468.49	1.70	2.97
468.48	1.77	3.59
468.33	1.76	4.03

Project File: MAS_220804_East Parking Run.stm	Number of lines: 7	Date: 2/6/2023

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line	Line ID	Tc	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total
No.		Method	n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	Travel Time (min)
1	P-45	User																		0.00
2	P-81	User																		6.00
3	P-64	User																		0.00
4	P-64 (1)	User																		0.00
5	P-91	User																		6.00
6	P-46	User																		6.00
7	P-80	User																		6.00

Project File: MAS_220804_East Parking Run.stm | Min. Tc used for intensity calculations = 6 min | Number of lines: 7 | Date: 2/6/2023

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	12	6.57	457.20	458.19	0.99	0.78	8.38	1.11	459.30	0.000	91	464.10	465.07 j	0.97**	0.78	8.44	1.11	466.18	0.000	0.000	n/a	1.46	1.62
2	12	5.80	464.10	465.33	1.00	0.77	7.39	0.85	466.18	2.264	75	466.14	467.09 j	0.95**	0.77	7.53	0.88	467.98	1.959	2.111	n/a	0.15	0.13
3	12	1.83	466.14	467.89	1.00	0.79	2.33	0.08	467.98	0.226	93	466.61	468.10	1.00	0.79	2.33	0.08	468.18	0.226	0.226	0.209	0.96	0.08
4	12	1.37	466.61	468.22	1.00	0.79	1.74	0.05	468.27	0.126	160	467.41	468.41	1.00	0.79	1.74	0.05	468.45	0.121	0.124	0.198	1.00	0.05
5	12	0.61	468.03	468.49	0.46	0.22	1.73	0.12	468.61	0.000	73	468.40	468.72	0.33**	0.22	2.77	0.12	468.84	0.000	0.000	n/a	1.00	0.12
6	12	0.91	467.41	468.48	1.00	0.79	1.15	0.02	468.50	0.055	78	467.80	468.52	0.72	0.60	1.50	0.03	468.55	0.074	0.064	0.050	1.00	0.03
7	12	0.69	467.99	468.33	0.34*	0.24	2.90	0.13	468.46	0.000	63	468.30	468.65	0.35**	0.24	2.86	0.13	468.78	0.000	0.000	n/a	1.00	n/a

Project File: MAS_220804_East Parking Run.stm	Number of lines: 7	Run Date: 2/6/2023

Notes: * Normal depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

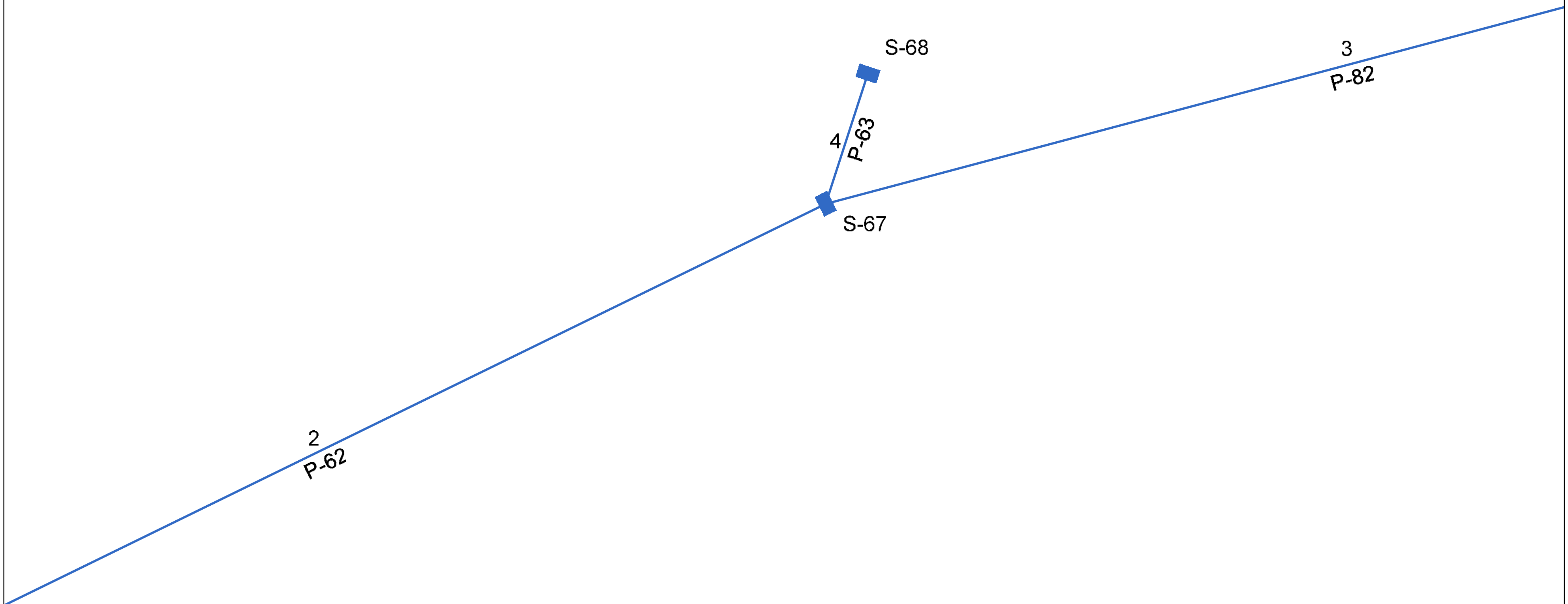
Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

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



Project File: MAS_220804_East TS.stm	Number of lines: 4	Date: 2/6/2023

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	P-61	12.67	15	Cir	30	450.54	452.80	7.446	451.63	454.03	n/a	454.03	End	Manhole
2	P-62	10.97	15	Cir	211	452.80	458.90	2.889	454.46	460.11	n/a	460.11 j	1	Combination
3	P-82	5.72	15	Cir	200	459.50	462.40	1.450	461.04	463.37	n/a	463.37 j	2	Manhole
4	P-63	0.77	12	Cir	26	458.90	459.42	2.017	461.37*	461.38*	0.01	461.39	2	Combination

Project File: MAS_220804_East TS.stm | Number of lines: 4 | Run Date: 2/6/2023

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

MC Report

Line No.	Line ID	Inlet ID	Drng Area (ac)	Runoff Coeff (C)	Tc (min)	i Sys (in/hr)	Q Capt (cfs)	Total Runoff (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Type	n-val Pipe	Line Size (in)	Line Slope (%)	Line Length (ft)	Invert Up (ft)	Invert Dn (ft)	Gnd/Rim El Up (ft)	Gnd/Rim El Dn (ft)	HGL Up (ft)
1	P-61	H-7	0.39	0.70	7.1	7.39	....	12.67	19.09	10.77	Cir	0.012	15	7.45	30	452.80	450.54	455.75	451.83	454.03
2	P-62	S-67	0.70	0.90	6.7	7.59	5.05	10.97	11.89	9.00	Cir	0.012	15	2.89	211	458.90	452.80	462.50	455.75	460.11 j
3	P-82	S-2 (34)	0.73	0.98	6.0	7.98	....	5.72	8.42	5.14	Cir	0.012	15	1.45	200	462.40	459.50	465.36	462.50	463.37 j
4	P-63	S-68	0.15	0.63	6.0	7.98	0.77	0.77	5.48	0.97	Cir	0.012	12	2.02	26	459.42	458.90	462.34	462.50	461.38

Project File: MAS_220804_East TS.stm | Number of lines: 4 | Date: 2/6/2023

NOTES: Intensity = 39.57 / (Inlet time + 3.70) ^ 0.70 -- Return period = 25 Yrs. ; ** Critical depth

MC Report

HGL Dn (ft)	Cover Up (ft)	Cover Dn (ft)
451.63	1.70	0.04
454.46	2.34	1.71
461.04	1.71	1.75
461.37	1.92	2.59

Project File: MAS_220804_East TS.stm	Number of lines: 4	Date: 2/6/2023

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line	Line ID	Tc	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total
No.		Method	n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	Travel Time (min)
1	P-61	User																		6.00
2	P-62	User																		6.00
3	P-82	User																		6.00
4	P-63	User																		6.00

Project File: MAS_220804_East TS.stm	Min. Tc used for intensity calculations = 6 min	Number of lines: 4	Date: 2/6/2023

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
(1)	(in) (2)	(cfs) (3)	(ft) (4)	(ft) (5)	(ft) (6)	(sqft) (7)	(ft/s) (8)	(ft) (9)	(ft) (10)	(%) (11)	(ft) (12)	(ft) (13)	(ft) (14)	(ft) (15)	(sqft) (16)	(ft/s) (17)	(ft) (18)	(ft) (19)	(%) (20)	(%) (21)	(ft) (22)	(K) (23)	(ft) (24)
1	15	12.67	450.54	451.63	1.09	1.14	11.16	1.67	453.30	0.000	30	452.80	454.03	1.22**	1.22	10.38	1.67	455.70	0.000	0.000	n/a	0.15	n/a
2	15	10.97	452.80	454.46	1.25	1.21	8.94	1.24	455.70	2.460	211	458.90	460.11 j	1.20**	1.21	9.05	1.27	461.38	2.146	2.303	n/a	1.14	1.45
3	15	5.72	459.50	461.04	1.25	1.02	4.66	0.34	461.38	0.669	200	462.40	463.37 j	0.97**	1.02	5.61	0.49	463.86	0.749	0.709	n/a	1.00	n/a
4	12	0.77	458.90	461.37	1.00	0.79	0.97	0.01	461.38	0.039	26	459.42	461.38	1.00	0.79	0.97	0.01	461.39	0.039	0.039	0.010	1.00	0.01

Project File: MAS_220804_East TS.stm	Number of lines: 4	Run Date: 2/6/2023

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

Appendix 18 | Erosion and Sediment Control Plan and Details

Colliers Engineering & Design

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Section 4

AR - NY SHPO Archaeological Report

DIGITAL ARCHIVE DOCUMENTATION

ID # 1892

NY SHPO SHELVING REFERENCE

County ORANGE

Report Number 691

PR Number 00PR2461

ELECTRONIC VERSION ☐

STATUS Scan Off-Site

Page Count

Report Title

PHASE 1 ARCHAEOLOGICAL SURVEY OF THE PROPOSED WAWAYANDA ENERGY CENTER PROJECT, TOWN OF WAWAYANDA, ORANGE COUNTY, NEW YORK

Report Type IA/B

Author TRC

Month 6

Year 2001

Date

Survey Sponsor SEQRA (FED/STATE/SEQRA/CEQRA/CLG SUBGRANT/OTHE

Survey Acreage (IB ONLY) 35

Survey Square Footage

Underwater Survey Area - Acres

Stripped Area - SqFt (II and III ONLY)

Surface Exam Area(Acres)

MULTIPLE COUNTIES CROSS REFERENCE:

County 1		Report 1		County 3		Report 3	
County 2		Report 2		County 4		Report 4	

MINOR CIVIL DIVISION

County	Town 1	Town 2	Town 3	Town 4
ORANGE	/T/ WAWAYWANDA			

REVIEW

Number of Archaeological Sites Identified 0

Number of Architectural Sites Identified

Log Month	Log Year	Log Date	Date Reviewed
			9/17/2001

UNIQUE SITE NUMBER(S) REPORTED : IA, IB, II AND III SURVEY

Site 1 #	Site Type 1	Quad 1	Site 8 #	Site Type 8	Quad 8
Site 2 #	Site Type 2	Quad 2	Site 9 #	Site Type 9	Quad 9
Site 3 #	Site Type 3	Quad 3	Site 10 #	Site Type 10	Quad 10
Site 4 #	Site Type 4	Quad 4	Site 11 #	Site Type 11	Quad 11
Site 5 #	Site Type 5	Quad 5	Site 12 #	Site Type 12	Quad 12
Site 6 #	Site Type 6	Quad 6	Site 13 #	Site Type 13	Quad 13
Site 7 #	Site Type 7	Quad 7	Site 14 #	Site Type 14	Quad 14

DIGITAL FILE NAME **BOX** **LOCATION** **BAR CODE**

623 - WRONG #
ORANGE
NEW # 691

ID 1892

TRC
Customer-Focused Solutions

Phase I Archaeological Survey of the Proposed Wawayanda Energy Center Project, Town of Wawayanda, Orange County, New York

04/1280
* 00PR6461

TRC

Phase I Archaeological Survey of the Proposed Wawayanda Energy Center Project, Town of Wawayanda, Orange County, New York

Prepared by

Richard D. Holmes

Timothy Marshall

Nathan Morphew

Toni R. Goar

Gwyneth Duncan

Deann Muller

Presented by

TRC

Boot Mills South

Foot of John Street

Lowell, Massachusetts 01852

Presented to

Calpine Energy Corporation

Principal Investigators

Richard D. Holmes, Ph.D., R.P.A.

Nathan Morphew, M.A.

OPRHP Project Review Number 00PR2461

TRC Project Number 29156-0040

June 2001

Abstract

TRC conducted a Phase I archaeological survey for the proposed Wawayanda Energy Center project in Wawayanda, Orange County, New York. TRC of Lowell, Massachusetts conducted this survey for the Calpine Energy Corporation. The project area consists of a Northern Portion, a Southern Portion, and a Water Line Route; these portions were subdivided into survey units.

The first session of fieldwork was conducted from October 16–20, 2000, on a parcel of approximately 25 acres in the Northern Portion of the project area. During the first session, a total of 467 shovel test pits was excavated at 15 m (50 foot) intervals, except for delineated wetlands, areas covered by water during fieldwork, on steep slopes, or in areas of evident ground disturbance (e.g., deep tractor scars, animal burrows, or push piles).

Subsequent to the first session of fieldwork, an additional parcel was added to the Northern Portion, the Southern Portion was included in the project, and a Water Line Route was defined. Fieldwork in these additional areas was conducted from June 11–17, 2001. An additional 96 shovel test pits were excavated in the Northern Portion, 135 shovel test pits in the Southern Portion, and 25 shovel test pits along the Water Line Route. Part of the Southern Portion could not be subjected to subsurface investigation since it was planted with corn; this area will not be disturbed, according to project plans, and will have electric transmission wires span the area between transmission towers. An area that is densely wooded was examined with four shovel test probes.

The intervals between shovel test pits were somewhat closer than 15 m (50 feet) in areas with the highest archaeological potential (i.e., on a ridge top with an eastern exposure). Soils uniformly exhibited a plow zone (typically 10YR 4/1 dark gray) that was generally silty soil with a high organic content over a B horizon (typically 10YR 6/2 light brownish-gray silt loam or a 10YR 5/8 yellowish brown silt loam). In flat areas, on the bottom of slopes, and near wetlands, soils exhibited illuviation and mottling.

One chert flake was found in a shovel test pit behind the house in the Northern Portion; four other units were excavated at a 1 m interval around it, but these pits contained no artifacts or features. No subsurface features were found in any shovel test pit. A single piece of ironstone ceramic had been found on the surface during the pedestrian inspection, and several historic ceramics from the nineteenth and twentieth centuries were recovered from shovel test pits.

An earthen ramp with unmortared boulders on the sides leads from the project area to the old railroad grade, providing access to the tracks or to the land beyond; the railroad grade has been impacted by construction of an outfall pipe. Stone fences line parts of the property boundary. An 1875 map indicates that this was open land, and was apparently a pasture or a meadow. No archaeological or historical data suggest that the property is eligible for the National or State Registers of Historic Places. No additional archaeological research is recommended. The standing farmhouse and barns should be evaluated for architectural significance.

Management Summary

This report documents a Phase I archaeological survey conducted by TRC for the Calpine Energy Corporation. The New York State Office of Parks, Recreation and Historic Preservation assigned Project Review Number 00PR2461 to this project.

The Public Service Law of New York requires the Siting Board to issue a Certificate for a proposed project only if it finds that the project "minimizes adverse environmental impacts, considering...the interest of the state with respect to...preservation of historic sites" [PSL § 1678.2(c)(i)]. Furthermore, the Siting Board regulations explicitly require applicants to list local cultural resources, specifically the "identified historic, community, and archaeological resources listed, or eligible to be listed, in the National or State Registers of Historic Places" [16 NYCRR 1001.3(b)1(iv)].

Consultation was undertaken with the New York State Office of Parks, Recreation and Historic Preservation, whose commissioner acts as the State Historic Preservation Officer under the National Historic Preservation Act of 1966, as amended (16 USC 470 et seq.). In a letter dated July 7, 2000, the New York State Office of Parks, Recreation and Historic Preservation requested a complete Phase I archaeological survey.

TRC requested Kim Croshier of Hartgen Archaeological Associates, Inc., to conduct a site files search in the records of the New York State Office of Parks, Recreation and Historic Preservation's Field Services Bureau at Peebles Island State Park. This information is incorporated into the present report. Nathan Morphew, staff archaeologist of TRC, performed a pedestrian inspection on July 26, 2000. The results of the pedestrian inspection are as follows:

> *There are no recorded archaeological sites within the proposed project area. Several archaeological sites, however, are nearby. Most of the recorded sites were discovered as the result of surface collections made after fields had been plowed. The majority of sites are surface scatters of artifacts.*
>
> *Four properties within 5 miles of the project area are listed on the National Register of Historic Places. These are the Hillside Cemetery (ca. 1861), the Oliver Avenue Bridge (1895), the Webb Horton House (ca. 1902), and the First (or Primitive) Baptist Church of Bloomfield (1792). At the 5-mile boundary is the Dutchess Quarry Cave site. Other properties have been listed on the State Register of Historic Places or determined eligible for the National Register of Historic Places; these are discussed in the present report.*
>
> *TRC conducted a pedestrian inspection over all of the project area, except for delineated wetlands. The project area had been planted recently, and surface visibility was about 80 percent. A systematic walkover was performed. One artifact, an ironstone plate fragment was found. No features were observed.*

In a letter dating September 21, 2000, TRC informed the New York State Office of Parks, Recreation and Historic Preservation that it had undertaken a comprehensive site file search on this project and that it would conduct subsurface investigations.

Fieldwork for the survey was performed during the week of October 16–20, 2000. Before subsurface investigations began, the field crew performed a walkover. The surface was covered with vegetation. Currently, the land is a meadow with delineated wetlands, a pond, places that were wet during fieldwork, some steep and moderately steep slopes, and areas of disturbance (e.g., animal burrows, and two-track roads). Areas with the greatest archaeological potential on the basis of topographic features included the northeastern end of a ridge on the western side of the property, the relatively level southeastern-facing top of the ridge, and a knoll at the northern end of the property. Flat areas, places near the bottom of a slope, and land adjacent to delineated wetlands had accumulated water from rain during and prior to fieldwork.

Shovel test pits were excavated at 15 m (approximately 50 foot) intervals along transects 15 m (approximately 50 feet) apart across all of the project area, except for delineated wetlands, areas that were covered with water at the time of fieldwork, on steep slopes, or in areas of evident ground disturbance. The STPs were 0.3–0.5 m in diameter and hand excavated in 0.1 m levels. All soil was screened through ¼-inch mesh. Stratigraphic information was recorded, and a typical soil profile was described with a Munsell Color Chart. A typical soil profile revealed a plow zone (typically 10YR 4/1 dark gray) of generally silty soils with high organic content for approximately 0.20+ m over a B horizon (typically 10YR 6/2 light brownish gray) silt loams. Soils were hard packed or stony below 0.35–0.40+ m.

During the first field session, 467 shovel test pits were excavated in the Northern Portion. An additional 96 shovel test pits were excavated in the Northern Portion, 135 shovel test pits in the Southern Portion, and 25 shovel test pits along the Water Line Route during the second field session (June 11-17, 2001). A single chert flake was the only prehistoric artifact found. Historic artifacts (excluding recent trash) included nineteenth and twentieth century ceramics. No subsurface features were found.

An earthen ramp with sides held by unmortared boulders and cobbles is at the northern edge of the property and leads to the old railroad grade. This ramp was used for access to the railroad and the land beyond it. The railroad grade has been impacted by construction of an outfall pipe. No artifacts or features were found on or near the ramp. Stone fences are along portions of the northern and western boundaries of the property.

Richard D. Holmes investigated the historic maps and other materials in the history room of the Thrall Public Library in Middletown, New York. The project area was used as farmland from the late nineteenth century to the present. A map from 1875 indicates that this was a rural area at that time, although the railroad grade already existed adjacent to the project area. Land in the project area was cultivated as recently as this year.

TRC found no cultural material suggesting that the project area contains archaeological sites eligible for inclusion in the National or State Registers of Historic Places. No further archaeological research is recommended. The standing farmhouse and barns should be evaluated for architectural and historical significance.

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1.0 Introduction

This report documents the Phase I archaeological survey of the proposed Wawayanda Energy Center Project in the Town of Wawayanda, Orange County, New York. TRC of Lowell, Massachusetts conducted this survey for the Calpine Energy Corporation (Calpine). Site file data were acquired by a comprehensive site files search performed by Kim Croshier of Hartgen Archaeological Associates, Inc. The New York State Office of Parks, Recreation and Historic Preservation (OPRHP) assigned Project Review Number 00PR2461 to this project.

1.1 Project Location and Description

The project area is in the Town of Wawayanda, Orange County, New York (Figure 1.1). It is approximately 96 km (60 miles) north-northwest of New York City. Middletown, the nearest city, and Wallkill are to the north. Goshen is to the east, Warwick is to the south, and Greenville and Minisink are to the west.

The project area is depicted on the 1969/1976 Middletown, New York, United States Geological Survey (USGS) 7.5' quadrangle (Figure 1.2). Dolsontown Road bisects the project area; across this road are farms and residences. Several parcels north of Dolsontown Road have been excluded from the property that contains the project area. To the west are other residences and an electrical substation. The unused railroad grade of the Erie and Lackawanna Railroad, which has been subsequently used for a sewer outfall route, forms the eastern boundary. Subsequent to the first session of fieldwork, additional parcels were added.

For this report, the project area is divided into a Northern Portion, a Southern Portion, and a Water Line Route (Figure 1.3). These sub-areas are further divided into survey units based on topography. Subdivisions, called survey units, are discussed further below. Elevations range from approximately 400–500 feet above mean sea level.

Historically and currently the land is agricultural. This year, the ground had been plowed and cultivated as a meadow. It appears that this area was primarily used for dairy purposes for many years. Deciduous forest with a dense understory lines the boundary on the west, north, and parts of the east. Numerous whitetail deer and Canada geese were observed during Phase IB fieldwork in October 2000 and June 2001.

1.1.1 The Northern Portion

The Northern Portion consists of a ridge with an eastern and northeastern aspect (designated the Ridge Unit), a slope, relatively flat areas that include delineated wetlands (designated the South Field, North Field, and Flat Units), and a small knoll (the Knoll Unit). Additions to the Northern Portion included the East of House Unit, Backyard Unit, and West Wedge Unit. TRC excavated an additional transect of shovel test pits (STPs) in the Flat Unit, which had been very wet during the first fieldwork session. Figures 1.4 through 1.9 illustrate the Northern Portion. Figure 1.9 illustrates the farmhouse added to this project area.

Wetlands occupy much of the level ground in the eastern half of the property; they include a small stream and a tributary drainage, a pond, and areas with typical wetland vegetation. During the first fieldwork session, much of the soil near the wetlands was saturated and temporarily covered with water. Some of the slope to the east of the Ridge Unit is steep. There is some evidence of ground disturbance by farm equipment, including tractor scars and a two-track road at the northern boundary nearest the electrical substation; a portion of the Ridge Unit was disturbed by the presence of a utility pole carrying a transmission line from the electrical substation. Animal burrows were found in several parts of the Northern Portion. Beyond the trees bordering the Northern Portion's northern boundary is an old railroad bed (Figure 1.10); an earthen ramp leads from the Northern Portion to the railroad bed (Figure 1.11).

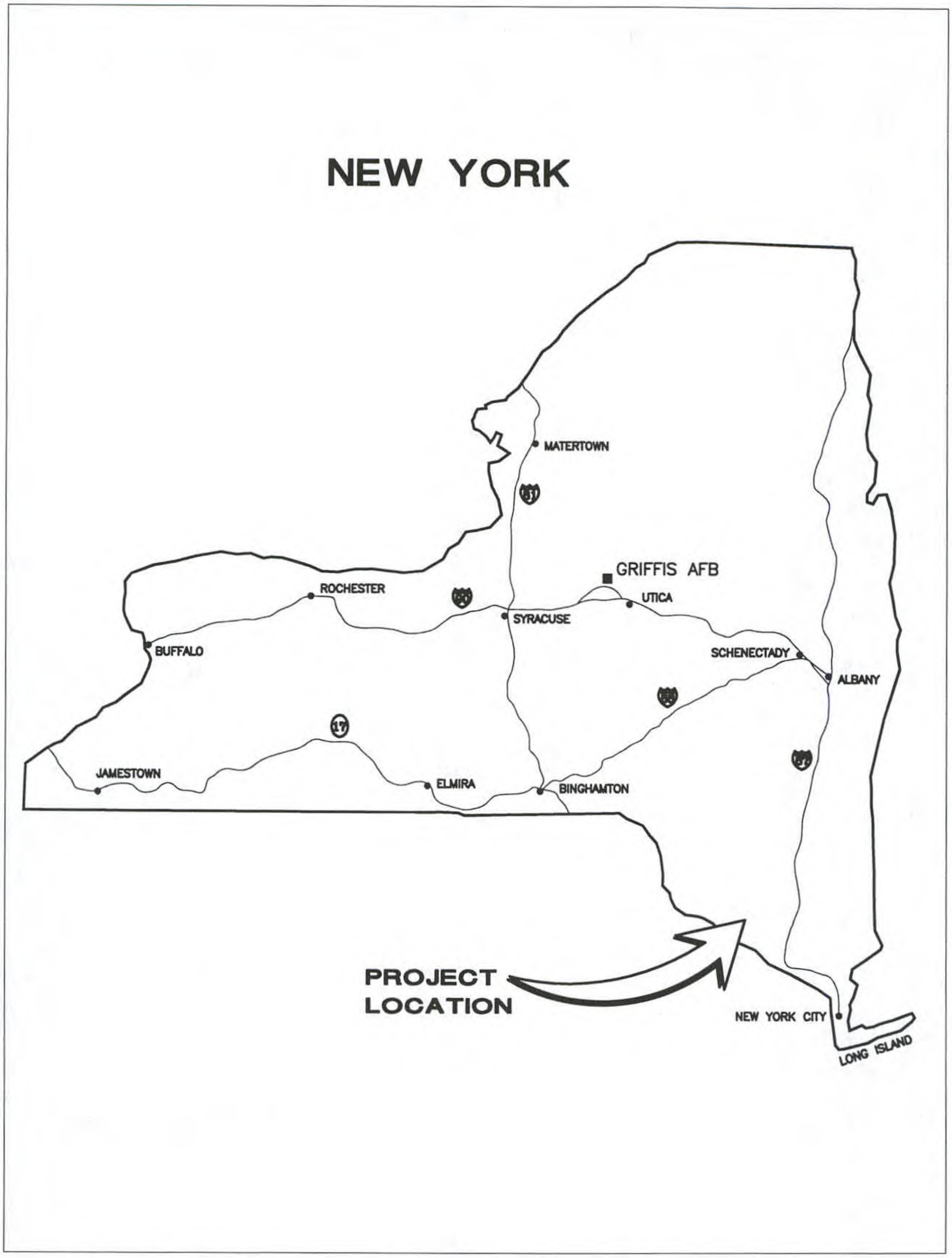

Figure 1.1 Location of Project.

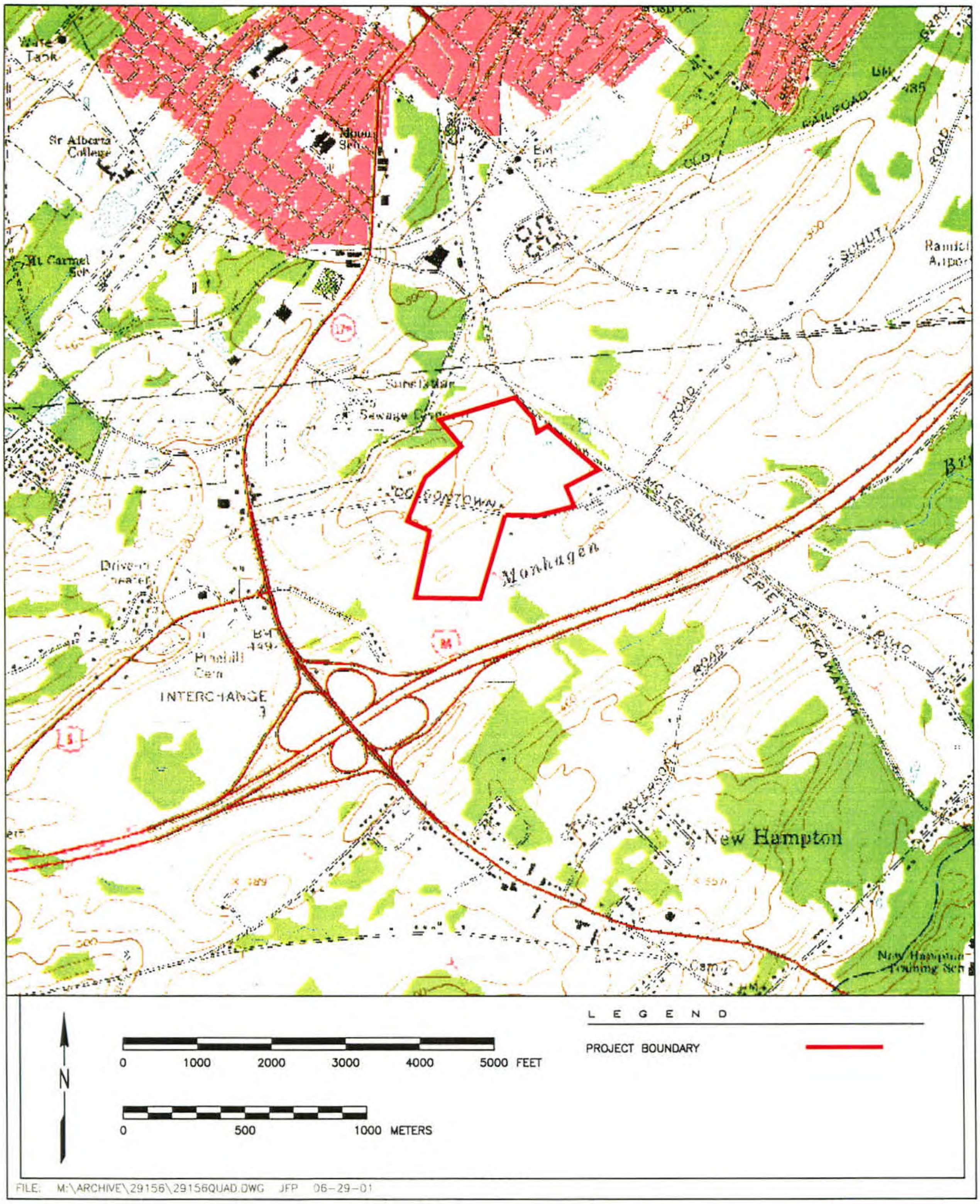

Figure 1.2 **Project Area. Based on Middletown, New York (1969, Photoinspected 1976), Quadrangle USGS 7.5' Series (1:24,000 Scale).**

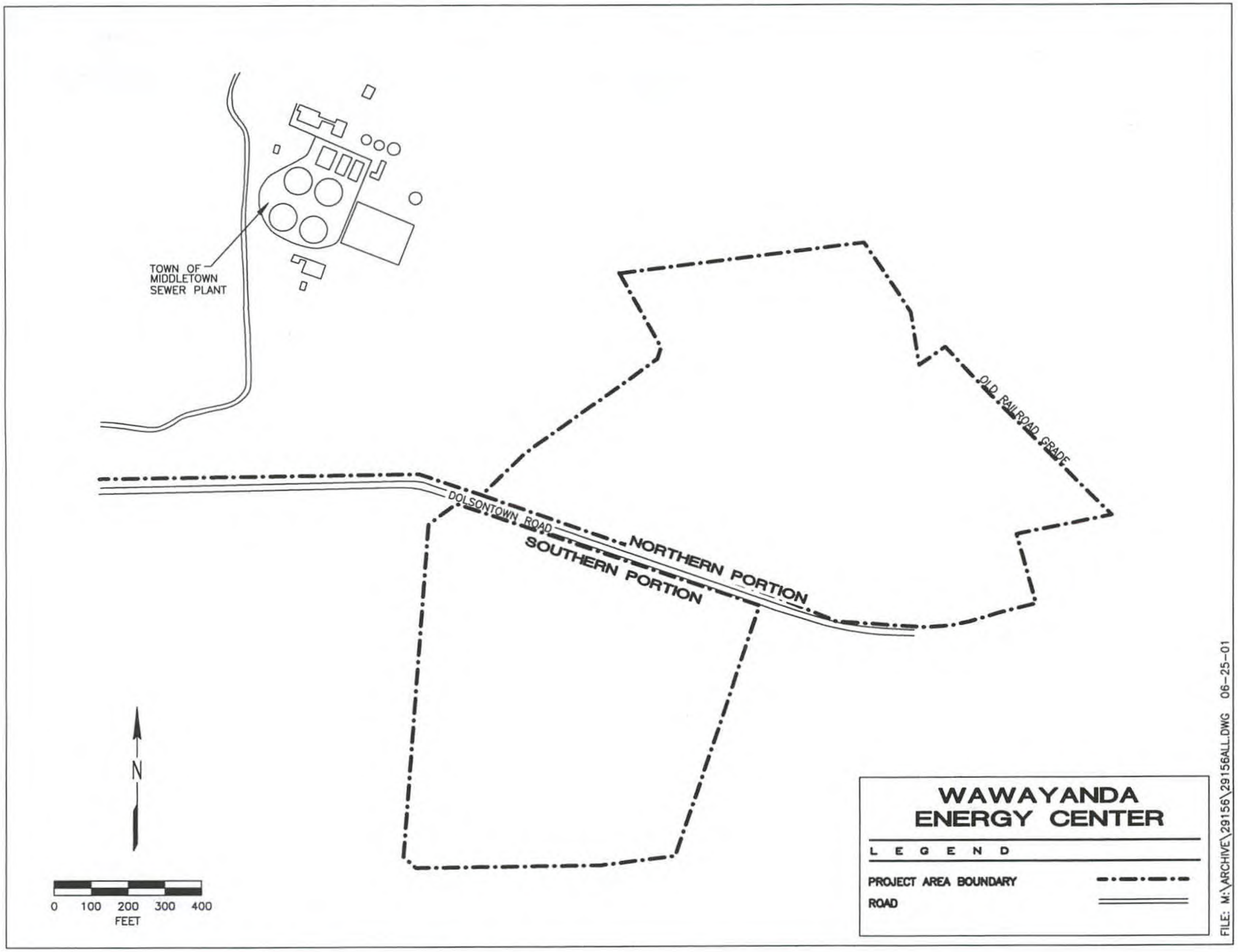

Figure 1.3 Map Showing the Northern Portion, Southern Portion, and Water Line Route.

Figure 1.4 Northern Portion (western half) Looking Northeast from Dolsontown Road (Ridge Unit is in Foreground).

Figure 1.5 Northern Portion (eastern half) Looking Northeast from Dolsontown Road (Knoll Unit, North Field Unit and South Field Unit are in Background).

Figure 1.6 Work at Ridge Unit, Looking East (Flat Unit at Bottom of this Slope Farmhouse and Barn are in Background).

Figure 1.7 Vegetation at Edge of Knoll Unit.

Figure 1.8 Northern Portion Looking South from North Field Unit at Farmhouse and Barn (Note Barns on Both Sides of Dolsontown Road).

Figure 1.9 Farmhouse and Barn Looking North.

Figure 1.10   Railroad Bed Adjacent to Project Area, Looking East.

Figure 1.11   Earthen Ramp to Old Railroad Bed, Looking North.

1.1.2 The Southern Portion

The Southern Portion is south of Dolsontown Road (Figure 1.12), which consists of a slope that is the continuation of the Northern Portion ridge; in this report, the top of this slope is designated the Crest Unit. Parts of this slope are steep, particularly at the southern. A relatively flat area on this slope was designated the Gap Unit, and it was investigated by excavating STPs. The knoll to the west of the barn standing in the Southern Portion was called the Barn Knoll Unit. South of the barn is another area that was investigated, and it was designated the Behind the Barn Unit. A small area of heavily wooded land is at the northwestern corner of the Southern Portion. It is also thickly covered with poison ivy. A field borders the delineated wetlands in the southern part of the Southern Portion; during the second session of fieldwork, this field was planted with corn (Figure 1.13). Current plans for the property propose that the cornfield be spanned by electric transmission wires suspended from transmission towers and the proposed project will not impact the field itself.

Figure 1.12 Southern Portion Looking East from Crest Unit (Note Barn South of Dolsontown Road).

1.1.3 Water Line Route

The Water Line Route includes three parts: (1) the area within the Northern Portion, (2) the line within a utility right-of-way that connects the Northern Portion to the existing Town of Middletown Sewer Plant (Figure 1.14), and (3) the area within the Town of Middletown Sewer Plant (Figure 1.15). TRC surveyed the Water Line Route up to 15 m (50 feet) from each side of the proposed line. Within the Northern Portion, the majority of the route had already been adequately investigated during the first fieldwork session through the excavation of STPs along transects. During the second session, STPs were excavated parallel to the house, adjacent to a small wetland area. STPs were also excavated in the right-of-way between the Northern Portion and the Town of Middletown Sewer Plant and the sewer plant itself.

Figure 1.13 Southern Portion Crest Unit Looking South (Wooded Area in Middle Ground; Planted Field in Background).

Figure 1.14 Water Line Route Right-of-Way Looking West.

Figure 1.15 Water Line Route Sewer Plant Looking East.

1.2 Background of the Project

Calpine proposes to build a 540 MW (nominal, unfired) natural gas-fired, combined-cycle power plant. It will supply electricity to the regional grid as an exempt wholesale generator as defined by federal regulations. This will be a merchant facility, developed, constructed, and operated by Calpine using private funding sources. Additional property will be used for parking, staging areas, and connections.

TRC was asked to conduct cultural resource investigations as part of the permitting process under Article X of the Public Service Law of New York State. Research for Phase IA and Phase IB surveys were conducted and are reported together in the present document.

1.3 Goals of the Project

The New York Archaeological Council (1994) states that:

> The primary goals of Phase I Cultural Resource Investigations are to identify archaeologically sensitive areas, cultural/sacred areas, and standing structures that are at least 50 years old, that may be affected by a proposed project and to locate all prehistoric and historic cultural/archaeological resources that may exist within the proposed project area.

The current project consisted of a Phase IA reconnaissance survey (involving a pedestrian inspection of the entire property when it had been plowed, a site files and literature search, and a review of historical maps) and a Phase IB field investigation (involving systematic subsurface investigation using manually excavated STPs).

Specific goals of this project were to (1) locate and identify cultural resources within the project area and (2) make recommendations on (a) their potential eligibility for the National and State Registers of Historic Places and (b) the need for further research.

1.4 Legal Authorities

This project has been conducted to provide the Siting Board with information needed to determine that the proposed construction project "minimizes adverse environmental impacts, considering...the interest of the state with respect to...preservation of historic sites" [PSL §168.2(c)(i)]. Furthermore, the Siting Board regulations require applicants for a Certificate to list local cultural resources, specifically the "identified historic, community and archaeological resources listed, or eligible to be listed, in the National or State Registers of Historic Places" [16 NYCRR 1001.3(b)1(iv)]. The OPRHP is reviewing this project under the State Environmental Quality Review Act (SEQRA), 6 NYCRR Part 617 of the New York State Environmental Conservation Law.

1.5 Personnel

Richard D. Holmes, Ph.D., R.P.A., and Nathan Morphew, M.A., were co-Principal Investigators (co-PIs) for this project. Both of these TRC employees are qualified as archaeologists under the Secretary of the Interior's Professional Qualifications Standards, as amended and annotated (36 CFR 61). For the first fieldwork session, Toni R. Goar, who has archaeological field experience in the Northeast, directed fieldwork and assisted in report preparation. Gwyneth Duncan also assisted in reporting. Field crew members were Juan Arias, Bruce Boeke, and Michael Okies. For the second fieldwork session, Timothy Marshall, M.A., was the Crew Chief. Field crew members were Juan Arias, Lance Lundquist, Deann Muller, and Michael Okies. Richard D. Holmes was present at both sessions. Jewell Paschke produced graphics. Technical editing was completed by Jodi Chapman and Constance Upton. Jodi Chapman, Karen Laney, and Tracy Suzuki formatted the report. Pamela Chan and Stefan Solzhenitsyn of TRC's Lowell office managed the project.

1.6 Structure of the Report

This report presents information on the environmental background, a brief culture history of the region, a summary of previous research and recorded sites, methods employed, research results, recommendations and conclusions, and references cited. Appendix A presents field data by excavation unit.

2.0 Environmental Background

The project area is located in a rural region experiencing construction and growth. Farms and rural residences are in the immediate vicinity, as are some businesses. Areas of wetlands and deciduous forest remain between open fields and meadows. An electrical substation is to the west. Further west, Dolsontown Road meets State Highway 17M; the area at this intersection is a local commercial center.

2.1 Physiography and Hydrology

There are three physiographic provinces in Orange County: the Hudson Lowland Section, the New England (Upland) Province, and in the western part of the county is a small portion of the Glaciated Allegheny Plateau. The relative proximity of the project area to all three physiographic provinces probably made this area attractive for prehistoric use and settlement.

The Town of Wawayanda is in the western portion of Orange County. The region is characterized by rolling terrain. To the southeast, there is a range of hills nearly parallel to the Wallkill River, as well as highlands in the northwest. Wawayanda is drained by the Wallkill River to the east and southeast and by Rutger's Creek to the south and southwest. Delineated wetlands, including a small pond at the eastern end, are located on the project area. Monhagen Brook, which flows into the Wallkill River, is to the south of the project area.

2.2 Geology and Soils

Bedrock is more than 30 m (approximately 100 feet) below ground surface (bgs). Soils in the project area were derived from glacial till, glacial outwash deposits, and alluvial deposits. The eastern portion of the project area consists of soils deposited in periglacial lakes. Beneath the soil are laminated lacustrine silts and clays with a thickness of 91 m (approximately 300 feet). Soils have been surveyed by the Soil Conservation Service (SCS, now the Natural Resource Conservation Service) (SCS 1981).

One soil type in the project area is Mardin soil. This is a gravelly silt loam that is deep and has a dense frangipan. Permeability is moderate at the surface and in the upper part of the soil, but it is slow in the frangipan and substratum. The water table in this soil is perched above the frangipan in the early spring and during wet periods. Seasonal wetness and slow permeability in the frangipan limit the uses of Mardin soil.

Also present in the project area are Wayland and Erie silt loams and Hoosic gravelly sandy loam. Most of the eastern portion consists of the Wayland silt loam, which is a deep, poorly drained soil. Wayland soil is commonly subject to flooding in the spring and the water table is at or near the surface for prolonged periods, unless the soil is drained. A drainage ditch in the eastern portion of the project area is a tributary of Monhagen Brook. Delineated wetlands in the project area are Wayland soils. Hoosic soil is a deep, well-drained soil with a high content of sand and gravel.

The Town of Middletown sewer plant and the adjacent land is mostly fill material. This fill contains recent trash and debris.

Most of the project area has been plowed for agricultural purposes. A plow zone was anticipated in almost all of the project area, except for delineated wetlands. Slopes on the ridge at the western end of the project area and at the base of the slope contain colluvial deposits. Evidence of ground disturbance includes tractor scars, animal burrows, and some push piles. The area at the base of the ridge slope and the ground near the delineated wetlands were very wet during fieldwork, with some areas under a shallow layer of water.

2.3 Flora and Fauna

Grasses cover the surface of the project area, except for the delineated wetlands, which contain typical wetland vegetation. The margins of the property contain either brushy vegetation or are at the edge of a deciduous forest. Canada geese and whitetail deer were observed in the project area during fieldwork. Animal burrows are in several areas.

3.0 Cultural History

3.1 Prehistoric Background

3.1.1 Paleoindian Period (10,500–6000 BC)

Current archaeological consensus suggests that southern New York was first occupied during the Early Paleoindian period (10,500–9000 BC) (Funk 1978; Ritchie 1980). To date, the earliest accepted items of material culture in the region represent Clovis-like lithic assemblages found in open-air sites located on hills and rises (Funk 1978). Early occupations occurred in a tundra or park-tundra like environment created by the retreating Wisconsin glacial ice sheet. Site distribution data are limited but suggest the presence of larger multi-seasonal, multi-purpose habitation sites (Funk 1978; Ritchie 1980). Data from early Paleoindian sites in the region suggest that Clovis peoples were primarily big game hunters who exploited caribou (genius *Rangifer*), mastodon, moose-elk, and other large Pleistocene fauna when available, and small game and edible plants at other times (Ritchie 1956). Late Paleoindian period (9000–8000 BC) occupations, defined by Plano-like projectile points, are rare in eastern New York. This may reflect changing climatic conditions, as the tundra environments of the earlier period were replaced by coniferous forests with low carrying capacities for game species (Ritchie 1980).

3.1.2 Archaic Period (8000–1000 BC)

Archaic-period occupation in the northeastern United States can be divided into the Early (8000–6000 BC), Middle (6000–4000 BC) and Late (4000–1400 BC) periods. Early and Middle Archaic-period occupations are rare in the eastern New York study area and occupation of this region by Archaic peoples may have coincided with the northward advancement of deciduous forests during the Hypsithermal climatic interval of 8000–5000 BC (Ritchie 1980).

Late Archaic sites are much more common in the eastern New York region. Deciduous forests would have been present in this region for over a thousand years and Late Archaic occupations appear well adapted to this environment. At the Late Archaic River and Bent sites, approximately 40 percent of the total artifact assemblages were composed of lithic projectile points and atlatl weights, indicating the continued emphasis of hunting; however, the presence of burned-rock roasting pits containing carbonized acorn cotyledons and notched pebble net sinkers also attests to the significance of wild plant and riverine resources (Ritchie 1980).

Late Archaic period occupations continue to be located near large river drainages and lakes. Sites during this period appear as either large multipurpose settlements containing abundant sheet midden or small, specialized camps that lack such debris. Site structural, floral, faunal, and artifactual data from such sites attest to a seasonally contingent resource extraction strategy whereby large riverine central-base settlements were occupied by macro-bands throughout the spring and summer, and small camps were either winter-fall micro-band camps or specialized resource extractive locations.

Ritchie (1980) defined a so-called Transitional stage up to the use of ceramics for the Middle Atlantic region. In New York, this pre-adaptation, known as the Susquehanna tradition, appears to be confined to river drainages in the central part of the state. This transition is defined by the appearance of soapstone bowls and crude ceramics with steatite temper on several archaic period sites. The Transitional stage appears to reflect a change in technology and cooking practices rather than any dietary or economic shift.

3.1.3 Woodland Period (1000 BC–AD 1600)

The Early Woodland period (1000 BC–300 BC) is defined by the introduction of ceramics on a scale larger than the tentative applications found at the end of the Transitional stage. Early Woodland occupations, such as those of the Meadowood phase, continued to be located on rivers and lakes near propitious fishing grounds. Thick and coarse tempered gray to black or bluff colored wares, such as Vinette 1, were employed instead of steatite and/or wooden vessels for cooking. The presence of copper beads and implements and marine shell beads suggests ties to the Great Lakes and Atlantic coast regions, while numerous stone gorgets and tubular ceramic pipes indicate a heightened emphasis on status and ritual. Mortuary ceremonialism becomes much more formalized during this period and burials are often cremated, placed in pits with a variety of grave offerings, and covered with red ochre.

The Middle Woodland period (300 BC–AD 1000) is characterized by a continued riverine focus and an increase in trade contacts and ceremonialism as documented by the Adena related materials associated with the Middlesex phase in eastern New York (Ritchie 1980).

During the Late Woodland period (AD 1000–1600) the region was occupied by the Delawares. These Algonkian speakers were not related to the Owasco people of upper New York State, who may be ancestral to the Iroquois. Linguistic differences distinguished the aboriginal inhabitants of the region from New England and Long Island. Subsistence was based on hunting, fishing, and cultivation of maize, beans, and squash.

3.2 Historic Background

Sustained European-Native American contact in southern New York State dates to 1609, when Henry Hudson sailed up the Hudson River. The Dutch West India Company directed the first permanent and lasting European settlement of what became New York State. Orange County, which included Rockland County until 1798, was established in 1683. Most of the early settlement by Dutch, English, and French Huguenot people was in the southeastern part of the county, now within Rockland County.

Settlement in the vicinity of Wawayanda possibly occurred prior to 1700. In 1738, the population for Minisink was listed as 339, estimated to have been about 60 families. A blockhouse was built as protection against the Indians in 1756, and general settlement of Wawayanda is dated sometime during the revolution or at its close. In 1779, a clash with Indians at Minisink left many houses burned and some of the settlers killed (Ruttenber and Clark 1980).

The area was primarily agricultural. Some regional centers for commerce were established, but no large cities developed. Transportation corridors used roads, canals, and then railroads.

The town of Wawayanda was formed from part of the Town of Minisink on November 15, 1849. By 1880, principal villages in Wawayanda were: New Hampton, Denton, Ridgebury, Slate Hill, Centerville, Millsburg, and Gardnerville. In the eighteenth and nineteenth centuries, farming was the primary means of business. Various villages within the town of Wawayanda contained grist, cider, and feed mills, a woolen factory, blacksmith shops, a wagon shop, general merchandise stores, a shoe shop, a saloon, and a distillery. In 1880, the village of Wawayanda was listed as a milk station on the New Jersey Midland Railroad (Ruttenber and Clark 1980).

The project area has been used for agricultural purposes for many years. An Orange County Atlas from 1875 includes a map of Wawayanda that shows the land as open and probably used as a pasture or a meadow (Figure 3.1). Nearby structures are rural residences and some recent commercial buildings.

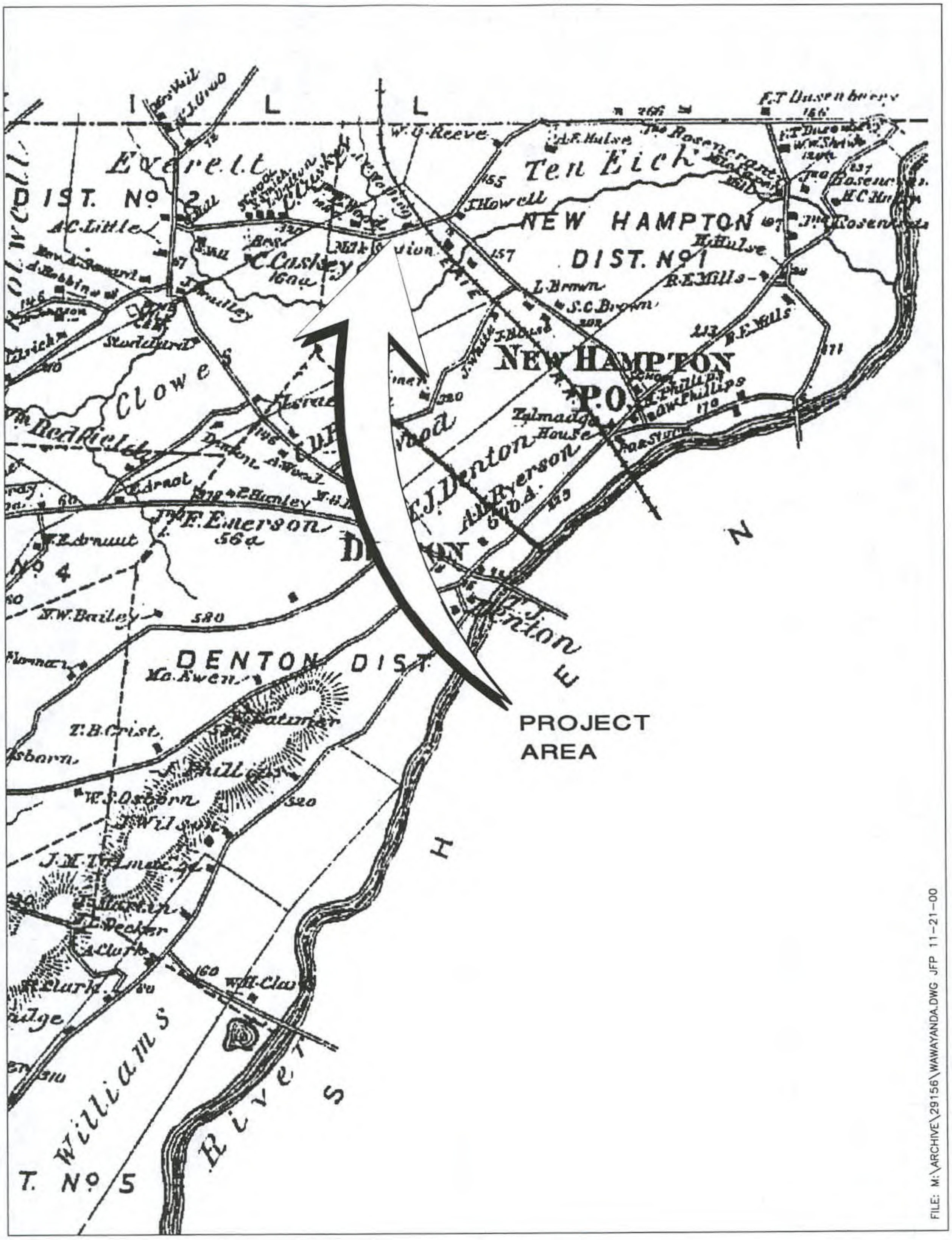

Figure 3.1 Project Area Depicted on Orange County Map (1875).

4.0 Previous Research

4.1 Archaeological Surveys or Excavations

A Phase IB survey was conducted along the route of a sewer outfall pipe along the railroad right-of-way, bordering the present project area on the north (Landscape Studies, Inc. 1983). No cultural material was found in the railroad corridor, which was subsequently disturbed by construction. An earthen ramp—a feature discussed in the present report—provides access to this railroad grade.

A cultural resources survey report was prepared for the New York State Department of Transportation for a proposed reconstruction of a bridge on Dolsontown Road where it crosses Conrail railroad tracks (Stevens 1982). This project was to the east of the present project area. No cultural materials were found, although the report noted historic map information suggesting nineteenth century houses and farms nearby.

Hartgen Archaeological Associates, Inc. (1989) conducted a survey for the Marcy-South 345 kV Transmission Line. This survey recorded site A07119.00083, the Simon site (23-131-13), discussed below. The site contained lithics, including a transitional Late Archaic/Early Woodland projectile point and projectile point base.

Other surveys include one for the proposed Orange Recycling and Ethanol Production Facility, immediately to the northwest of the project area (BTK Associates, Inc. 1998). No historic resources were identified by map research; no cultural resources were reported.

A survey was conducted for the Sunrise Office Building (Gimigliano 1987). No further research was recommended.

A Phase IB survey and supplementary survey were conducted for the Wallkill Pipeline Project (Oberon and Emery 1994a and 1994b; reports filed together as Report #150). Isolated occurrences of prehistoric material were within 1.6 km (1 mile) of the present project area.

Roberta Wingerson and Stuart Fiedel of Cultural Resource Surveys, Inc. conducted surface inspections and subsurface investigations for Cloverleaf Park. A form filed with the OPRHP indicates that no cultural material was found.

Hartgen Archaeological Associates, Inc. (1989) conducted a survey for Hampton Village. No sites were reported.

A survey was conducted at the Kosuga-Uhlig Property (Lenik et al. 1990; Report #111). Historic features from the late nineteenth and early twentieth centuries were found, as were three prehistoric sites. Two prehistoric sites had been recorded previously (A07119.0082 and A07119.0008 [discussed below]). Generally, no further research was recommended.

4.2 Recorded Archaeological Sites

No archaeological sites have been recorded in the project area. Within 1.6 km (1 mile) of the project area are several sites recorded in the OPRHP site files, including: A07119.0008, A07119.0015, A07119.0016, A07119.0017, A07119.0018, A07119.0021, and A07119.0083. Most of these sites were recorded by the Orange County Chapter of the New York State Archaeological Association, but there is minimal information on the nature of the finds and the cultural affiliation. Site A07119.0008 was revisited by a later survey (Lenik et al. 1990); a chert flake and a chert core were recovered from a STP.

Hartgen Archaeological Associates, Inc., recorded A07119.00083. It is also known as the Simon site (23-131-13). This site contained a transitional Late Archaic/Early Woodland projectile point and projectile point base, a bifacially worked chert blade, a roughly flaked bifacial tool, chert cores, chert flakes, and a water-worn block flake scraper. This site was found during a survey of the Marcy-South 345 kV Transmission Line near Dolsontown Road (Hartgen Archaeological Associates, Inc. 1985). Although this site is relatively close to the project area, it is in an environmental setting very different from the present project area.

There are several archaeological sites within 8 km (5 miles) of the project area. Those on the National or State Registers are discussed in general below.

Two New York State Museum (NYSM) site numbers are listed within 1.6 km (1 mile) of the project area. They are NYSM 6169, a cemetery, and NYSM 6170, a site whose location is the only information on file.

4.3 National and State Register Properties

Properties currently listed on the National Register of Historic Places (NRHP) within 8 km (5 miles) of the project area include:

The Oliver Avenue Bridge, Middletown. The bridge, constructed in 1895, served the Middletown to Goshen Trolley Line. It was an excellent example of a high Pratt truss bridge and one of only two surviving bridges in New York built by the Havana Bridge Works. The bridge was listed on the NRHP in July 1984. The bridge was unsafe and recently dismantled.

Hillside Cemetery, Middletown. This is located at the end of Mulberry Street and was listed on the NRHP in September 1994. Calvert Vaux, co-designer of Central Park in New York, designed the cemetery, which was constructed in 1861.

The Webb Horton House, Middletown. It was built between 1902 and 1906. The forty-room mansion was the home of Webb Horton, a tanner from Warren, Pennsylvania, and his family. Family members owned the house until Christine Morrison donated it for use by Orange County Community College (OCCC). The mansion currently houses OCCC's administrative offices and is named Morrison Hall. The house was listed in April 1990.

The First Baptist Church of Bloomfield, also called the Primitive Church of Bloomfield was listed on the NRHP in November 1976. The church was built in 1792. It is located on the north side of US 6 near the intersection of NY 284 in Wawayanda (Slate Hill).

District School No. 9, "Old Stone Schoolhouse," on NY 17A in Goshen. It was listed in September 1988.

U.S. Post Office, Goshen. This is on Grand Street and was listed in May 1989 as part of the nomination for U.S. Post Offices in New York State.

1841 Goshen Courthouse, Goshen. This building is at 101 Main Street, and it was listed in March 1975.

Church Park Historic District, Goshen. Part of this district is within an 8 km (5 mile) radius of the project area.

Dutchess Quarry Cave Site, location restricted. This is a Paleoindian site.

Several properties within 8 km (5 miles) of the project area have been evaluated as eligible for the NRHP but are not listed in the NRHP. They include:

- The Middletown Psychiatric Historic District, Middletown
- The Mid-Hudson Psychiatric Center Historic District, Wawayanda (New Hampton)
- 94 Maples Road, Wallkill
- 105 Maples Road, Wallkill
- 220 Maples Road, Wallkill
- Holmes Bookstaver House, Crotty Road, Wallkill
- Frank Post House, Crotty Road, Wallkill
- Joseph Slaughter/Alanson Slaughter House, Goshen Turnpike, Wallkill
- 11 Webster Avenue, Village of Goshen
- Bennett House, 29 Cart Lane, Village of Goshen
- County Trust Bank, West Main Street, Village of Goshen
- Gavin Building, Greenwich Avenue, Village of Goshen
- Goshen Town Hall, 15 Webster Avenue, Village of Goshen
- Johnic Pharmacy, 62 West Main Street, Village of Goshen
- Norstar Bank, 54 West Main Street, Village of Goshen
- Houston House, NY 17A, Goshen
- Sanford House, 4 West Street, Village of Goshen
- Saver House, 9 New Street, Goshen
- John Wells Homestead, 6 ½ Station Road, Goshen
- Site 23-15-16-4, location restricted
- Site ORGO-08F, location restricted
- Gilman Site, location restricted

A review of the State Register of Historic Places (SRHP) indicates that there are properties listed in the SRHP as well as those evaluated as eligible for the NRHP but not listed on the NRHP. Among them is the Middletown Psychiatric Historic District, on the western edge of Middletown. Another is the Mid-Hudson Psychiatric Center Historic District, on US 6 and NY 17M in Wawayanda (New Hampton).

4.4 Potentially Relevant Historic Contexts and Anticipated Resources

Historic contexts that may be relevant to the project area include prehistoric land use of the Wallkill drainage, historic occupation and agriculture in Wawayanda, and construction and use of railroads in Orange County. Resources that may be present include prehistoric remains, farm machinery and equipment, and material related to the adjacent railroad grade. There are no surface indications or map evidence that structures were located here; it is not likely that many architectural fragments will be present.

5.0 Research Methods

5.1 Background Research

Background research consisted of a site files and literature search at the Field Services Bureau of the OPRHP at Peebles Island State Park. Kim Croshier of Hartgen Archaeological Associates, Inc. performed this search. Information reviewed by the co-PIs included site forms and portions of previous research reports.

Additional information was acquired at the Thrall Public Library in Middletown and from previous research conducted for the Preliminary Statement submitted as part of the permitting process under Article X of the New York State Public Service Law.

5.2 Fieldwork

Fieldwork consisted of a 100 percent pedestrian survey over the project area, except for delineated wetlands. A systematic walkover was performed at 15 m (approximately 50 foot) intervals.

The field crew also examined the ground surface prior to excavation of STPs—each 0.3–0.5 in diameter—were excavated along transects that were 15 m (50 feet) apart, at intervals of 15 m (50 feet). Soil was manually excavated in 0.1 m levels and screened through ¼-inch mesh; a trowel had to be used to work the soil through the screen, which was mostly heavy and wet. All of the project area was subjected to subsurface investigation, except for delineated wetlands, slopes, and areas of either obvious surface disturbance or which were covered with water during fieldwork. Soil stratigraphy was recorded.

6.0 Research Results

6.1 Pedestrian Inspection

TRC conducted a pedestrian inspection over all of the project area, except for delineated wetlands. Surface visibility was about 80 percent during the first session, but less than 50 percent during the second. A systematic walkover was performed. One artifact, an ironstone plate fragment was found. No features were observed, except for an earthen ramp that leads up to the railroad from the Northern Portion (Figure 1.11). Stone fences are present along portions of the project area boundary.

6.2 Northern Portion

Parts of the Northern Portion were very wet during the first fieldwork session. Many areas that had been very wet were dry during the June 2001 session; only the last day was rainy. A total of 563 STPs was excavated in the Northern Portion. STP locations are indicated in Figure 6.1, and STPs are listed in Appendix A.

Soils uniformly exhibited a plow zone (typically 10YR 4/1 dark gray) from 0 to about 0.2 m bgs; the plow zone soil was silty with generally high organic content. The plow zone lies over a B horizon (typically 10YR 6/2 light brownish gray silt loam) from 0.2 m or more bgs to depths of 0.35–0.4 m bgs. Soil became hard packed or stony at about this level. Soils in flat areas, on the bottom of slopes, and near wetlands exhibited illuviation and mottling in the B horizon.

In the South Field Unit, bordering Dolsontown Road, 122 STPs were excavated. None of these STPs contained artifacts or subsurface features. Soils all had a plow zone. The northern edge of the unit was wet and borders a delineated wetland; land to the east, which is adjacent to private houses, contained areas of brushy vegetation and some wet areas.

Along the Ridge Unit, 232 STPs were excavated. Along transect K, STPs were excavated at a closer interval than elsewhere in the project area, approximately 10 m (33 feet); this was done to investigate the ridge top that, in the opinion of the co-PIs, had the greatest potential for subsurface remains. Elsewhere in this unit, several STPs were not excavated at the appropriate interval along transects because of a steep slope. No artifacts or features were found in any STP.

In the Knoll Unit, 24 STPs were excavated. Soils were similar to other portions of the project area. Being on higher ground than the surrounding land, this unit appeared to the co-PIs to have a greater potential for containing prehistoric remains than lower and wetter units, such as the North Field and Flat Units. No artifacts or features, however, were found here.

The North Field Unit is bordered by two delineated wetlands, the bottom of a slope, and a low-lying flat area. Soil here was darker than the typical soil profile in the project area. The typical soil profile in this unit had a plow zone of 10YR 3/1 very dark gray silty soil over a B horizon of 10YR 6/2 light brownish gray silt loam. A total of 48 STPs was excavated. No artifacts or features were found.

In the Flat Unit, 68 STPs were excavated. Transect B, along the base of the slope, contained rocky and mottled soil. The rockiness may be the result of materials being transported down the slope, or this may be the remnants of an old farm road that was stabilized by rocks and fill material. Near the edge of the no-build area (i.e., the building setback along the abutter's property line), soils in transects E, F, and G were notably mottled, suggesting occasional flooding. Several tractor scars were also observed in the vicinity. No artifacts or features were found.

In the Backyard Unit, 16 STPS were excavated. Soils were similar to other portions of the project area. Some of the STPs contained historic artifacts, fragments of ceramics, glass, coal clinkers, etc. A possible prehistoric artifact necessitated digging four STPs 1 m away from the positive STP. Only historic artifacts contemporary to the house were encountered.

In the East of House Unit, 30 STPS were excavated. Soils were similar to other portions of the project area. In the initial STPs of transect B a dark compact, organic soil was found (5Y 3/1-5Y 2.5/1, very dark gray to black). This may be the remains of a buried wetland. Historic artifacts such as coal slag, brick, and corroded iron were found within the first 20 cm of the plow zone during shovel testing.

In the West Wedge Unit, 23 STPs were excavated. Soils were similar to other portions of the project area. STPs along the end of the C transect encountered a tan clay soil (10YR 5/8 yellow-brown clay) rather than the normal gray soil. The final STP in transect F contained many heavy cobbles. Historic artifacts were encountered in greater numbers than in any other area. These included many sherds of different types of ceramics, some small pieces of brick, shell, glass, and coal slag. All historic artifacts were found within the plow zone, typically within the first 20 cm (0.20 m) and decreasing in frequency toward the lower levels. The low-density distribution of historic artifacts recovered is consistent with household and farming debris typical of plowed fields near farmsteads.

An earthen ramp was observed at the northeastern edge of the project area (Figure 1.11). This ramp has sides held up by boulders that are unmortared. Access to and across the railroad grade is provided by the ramp. Stone fences are standing at the eastern end of the property. No evidence of structures was found in the project area other than the house and barn in the parcel added to this project.

6.3 Southern Portion

In the Southern Portion, the ground slopes towards the south. The southern half and central part of the portion contains extensive wetlands. The mid-west portion of the parcel has been plowed and was recently planted with corn. A barn complex occupies the northeastern portion of the parcel.

Soils uniformly exhibited a plow zone (typically 10YR 4/1 dark gray) from 0 to about 0.2 m bgs; the plow zone soil is silty with generally high organic content. The plow zone lies over a B horizon (typically 10YR 5/8 gray silt loam) from 0.2 m or more bgs to depths of 0.35–0.4 m bgs. Soil became hard packed or stony at about this level. Soils in relatively level areas, on the bottom of slopes, and near wetlands exhibited illuviation and mottling in the B horizon.

A total of 135 STPs was excavated in the Southern Portion. STP locations are indicated in Figure 6.2, and STPs are listed in Appendix A. They were distributed among the survey units as follows:

The Crest Unit is at the highest point in the Southern Portion of the project area. A total of 40 STPs was dug. Soils were similar to other portions of the project area. Only modern trash was encountered during the excavation.

The Gap Unit is at a slight leveling of the terrain before it dips to the south band of wetlands. Ten STPs were excavated. Soils were similar to that found in STPs elsewhere in the project area. One nail was encountered in the units.

The area south of the barn complex (Behind Barn Unit) slopes gently towards the wetland area. A total of 51 STPs were excavated. Soils were similar to other portions of the project area. Historic artifacts were encountered in this unit. One piece of clear glass and one piece of coal clink were found in the first 0.10 m of the plow zone.

The Below the Knoll Unit sloped gently down from the highway towards the wetland and the barn complex. In this survey unit, 34 STPs were excavated. Soils were similar to other portions of the project area. Two STPs (Q4 and S2) were terminated due to cobbles or wet soil. One STP (Q3) contained an unusual B horizon, which was dry, containing loose sand, and the usual mix of gravels and cobbles. One sherd of historic earthenware ceramic was found in the upper 0.20 m of the plow zone.

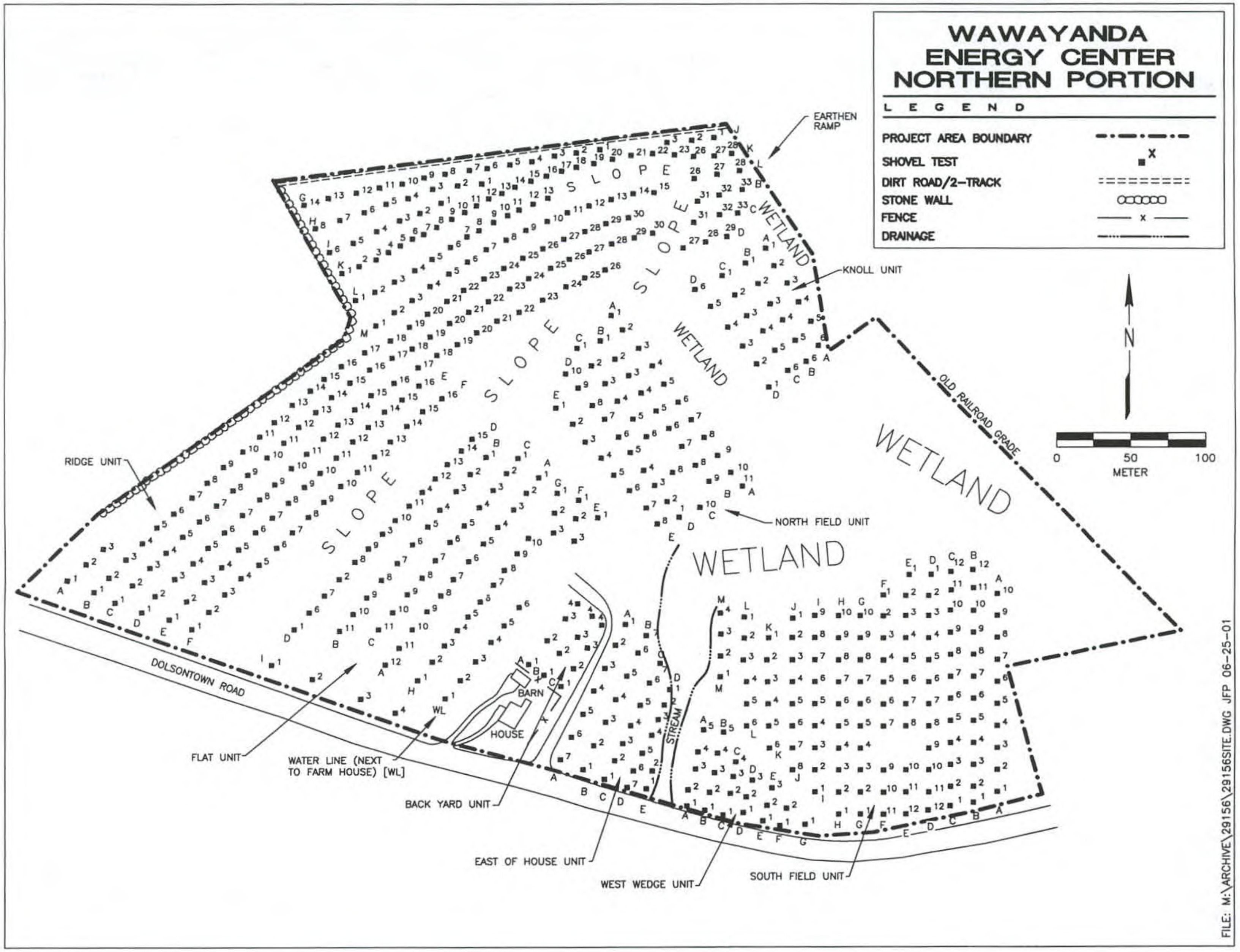

Figure 6.1 Shovel Test Pit Locations (Northern Portion).

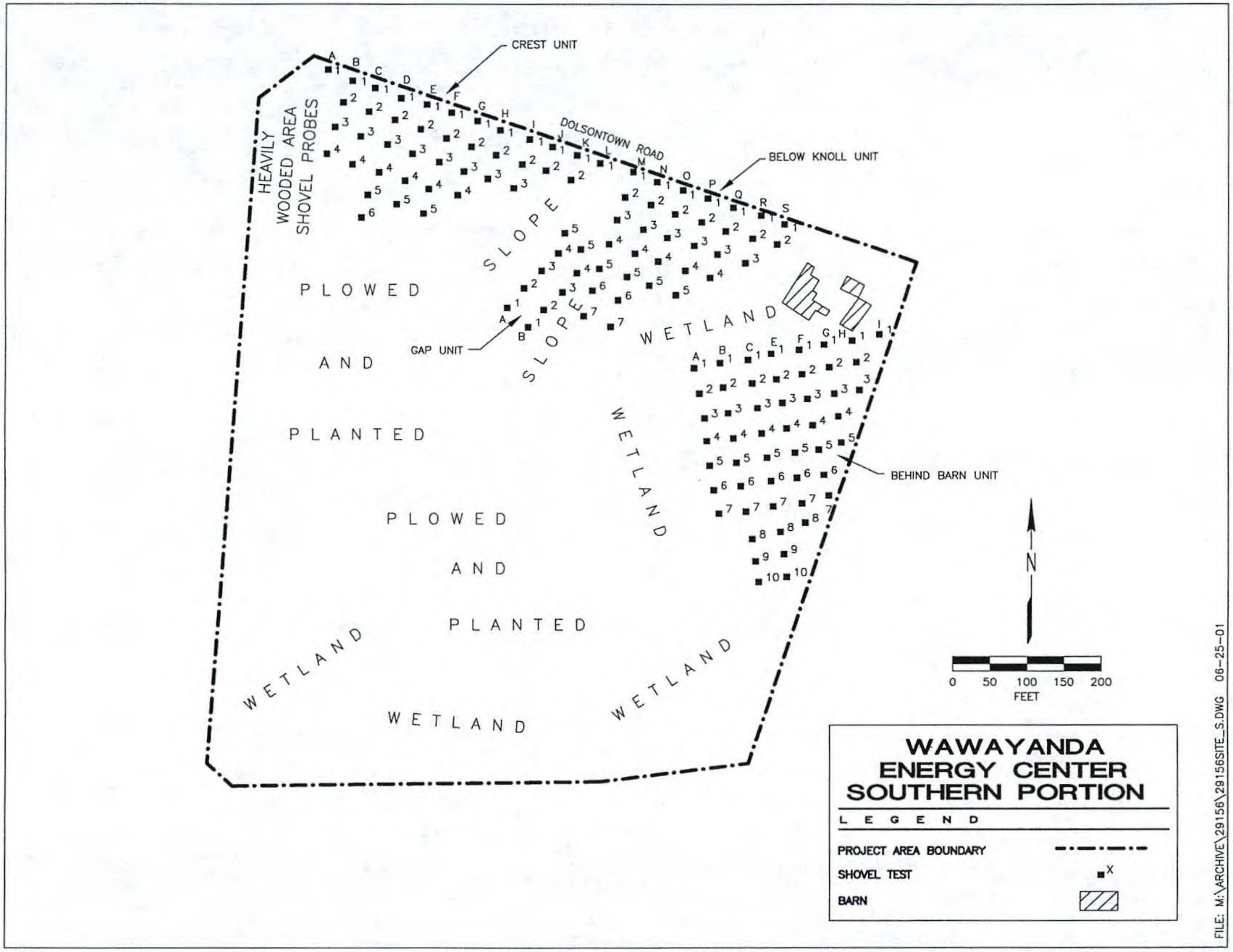

Figure 6.2 **Shovel Test Pit Locations (Southern Portion).**

6.4 Water Line Route

The Water Line Route runs from the Northern Portion's boundary towards the sewer plant. Transects of STPs excavated in the Northern Portion have adequately examined this route and 15 m (50 feet) of each side of the route. Aside from where the route crosses the Northern Portion, three sections of the route have been singled out for further research. A total of 25 STPs (listed in Appendix A) was excavated in these sections, which are: (1) the area near the farmhouse, (2) the area adjacent to the northern boundary of the Northern Portion, and (3) the Town of Middletown Sewer Plant.

Six STPs were excavated in the area near the farmhouse (Figure 6.1). The line itself is routed through small wetlands near the house and into an area containing large rocks and farm equipment. Soils were similar to other portions of the project area. Historic artifacts were encountered during the excavation.

After the water line emerges from the edge of the Northern Portion, it follows a slope and turns northwest towards the plant. Once past this slope the line encounters wetlands and part of an eroding two-track road (Figure 6.3 and Figure 1.14). Fifteen STPs were excavated in this survey. The survey is down slope from the North Parcel. Soils were similar to other portions of the project area, but contained modern trash remnants.

The line then enters the sewer plant ground and four STPs were excavated in the town of Middleton Sewer Plant (Figure 6.4 and Figure 1.15). The Plant Supervisor noted that sludge ponds had been in the area since the 1920s but recently the sludge was removed and fill put down. STPs confirmed this. An extremely compact yellow, 10YR 5/8, clay was encountered containing gravels and cobbles, along with very modern trash.

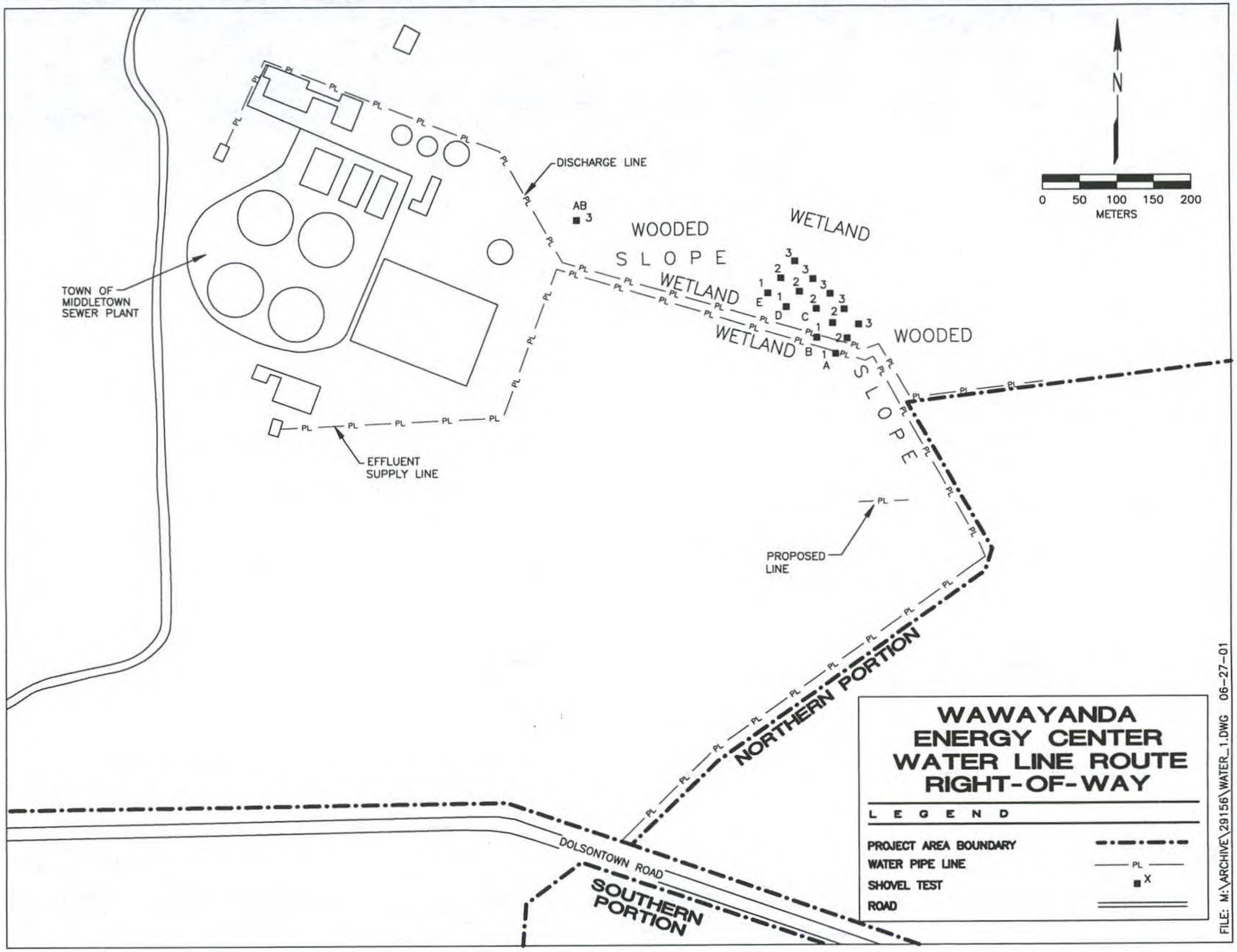

Figure 6.3 Wawayanda Energy Center Water Line Route Right-of-Way.

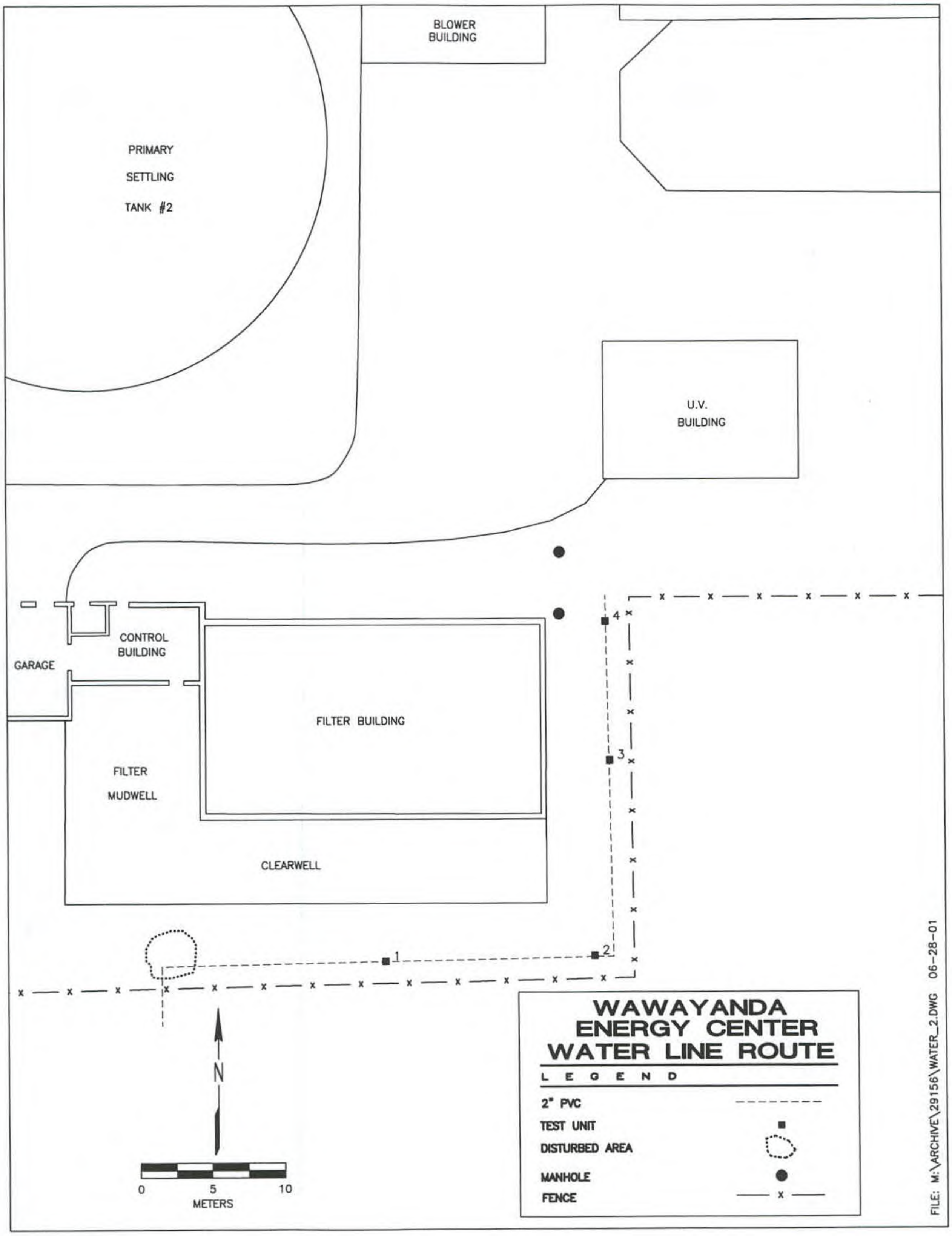

Figure 6.4 Wawayanda Energy Center Water Line Route

7.0 Conclusions and Recommendations

No previously recorded sites are in the project area. One fragment of ironstone ceramic was found during the pedestrian inspection. A single chert flake was found in the backyard of the house in the Northern Portion; no prehistoric materials were found in the four additional STPs excavated within 1 m of this positive STP. The nature and low-density distribution of historic materials such as ceramics, brick, coal slag, glass, and iron nails is consistent with use of the land for farming and pasture and does not suggest any research potential for the project area. No subsurface features were found in any of the STPs excavated. An earthen ramp is located near the former railroad grade, and stone fences are present on the parts of the project area boundaries.

The project area was used for agricultural purposes throughout its history, and no structures are known to have been located there. Soils are heavy and wet, and a plow zone is present throughout the project area. Wetlands and poorly drained areas, slopes, areas of either animal or mechanical disturbances are present. No archaeological sites were found, and no further archaeological research is recommended for this project area.

The standing farmhouse and barns should be evaluated by an architectural historian for NRHP eligibility.

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Appendix A

Excavation Units and Soil Data

Completed between October 16th and 20th, 2000:

Project: Wawayanda
Transect: A
Survey Unit: South Field
Date: 10/17/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	PZ, 10YR 4/1, dark brown	
	20-35	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-20	B horizon, 10YR 6/2, light brownish gray silt loam	
	20-35	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-22	B horizon, 10YR 6/2, light brownish gray silt loam	
	22-40	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-25	PZ, 10YR 4/1, dark brown	
	25-35	Burrow	
5	0-25	PZ, 10YR 4/1, dark brown/stony	
6	0-30	PZ, 10YR 4/1, dark brown/very stony	
7	0-25	PZ, 10YR 4/1, dark brown/very stony	
8	0-8	PZ, 10YR 4/1, dark brown	Brick flecks/fragments and coal clinker
	8-19	PZ, 10YR4/1, dark brown	
	19-32	Hard packed	
9		PZ, 10YR 4/1, dark brown and B horizon, 10YR 6/2, light brownish gray silt loam/mottled	In 2-track road
10	0-35	PZ, 10YR 4/1, dark brown and B horizon, 10YR 6/2, dark brownish gray silt loam/mottled	
	35-40	light gray silty sand	Next to wetland

Project: Wawayanda
Transect: B
Survey Unit: South Field
Date: 10/17/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-15	PZ, 10YR 4/1, dark brown	
	15-42	B horizon, 10YR 6/2, light brownish gray silt loam/gravels	
2	0-20	PZ, 10YR 4/1, dark brown	
	20-35	B horizon, 10YR 6/2, light brownish gray silt loam/gravels	
3	0-23	PZ, 10YR 4/1, dark brown	
	23-27	B horizon, 10YR 6/2, light brownish gray silt loam/gravels	
4	0-23	PZ, 10YR 4/1, dark brown	
	23-43	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-13	PZ, 10YR 4/1, dark brown	
	13-28	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-25	PZ, 10YR 4/1, dark brown	
	25-48	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-13	PZ, 10YR 4/1, dark brown	
	13-28	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-15	PZ, 10YR 4/1, dark brown	Brick at 13 cm
	15-38	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-23	PZ, 10YR 4/1, dark brown	1 brick 0-23
	23-43	B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-15	PZ, 10YR 4/1, dark brown	
	15-30	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-15	PZ, 10YR 4/1, dark brown	
	15-30	B horizon, 10YR 6/2, light brownish gray silt loam	
12	0-15	PZ, 10YR 4/1, dark brown	
	15-35	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: C
Survey Unit: South Field
Date: 10/17/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-10	PZ, 10YR 4/1, dark brown	
	10-40	B horizon, 10YR 4/1, light brownish gray silt loam	
2	0-16	PZ, 10YR 4/1, dark brown	
	16-35	B horizon, 10YR 4/1, light brownish gray silt loam	
3	0-28	PZ, 10YR 4/1, dark brown	
	28-40	B horizon, 10YR 4/1, light brownish gray silt loam	
4	0-19	PZ, 10YR 4/1, dark brown	
	19-22	20 tan rocks	
5	0-20	PZ, 10YR 4/1, dark brown	
	20-40	Large gravels	
6	0-30	PZ, 10YR 4/1, dark brown	
	18-30	Gravels	
7	0-12	PZ, 10YR 4/1, dark brown	
	12-30	B horizon, 10YR 4/1, light brownish gray silt loam	
8	0-12	PZ, 10YR 4/1, dark brown	
	12-40	B horizon, 10YR 4/1, light brownish gray silt loam	
9	0-17	PZ, 10YR 4/1, dark brown	
	17-30	B horizon, 10YR 4/1, light brownish gray silt loam	
10	0-21	PZ, 10YR 4/1, dark brown	
	21-35	B horizon, 10YR 4/1, light brownish gray silt loam	
11	0-13	PZ, 10YR 4/1, dark brown	
	13-30	B horizon, 10YR 4/1, light brownish gray silt loam	
12	0-16	PZ, 10YR 4/1, dark brown	
	16-35	B horizon, 10YR 4/1, light brownish gray silt loam	

Project: Wawayanda
Transect: D
Survey Unit: South Field
Date: 10/17/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-16	PZ, 10YR 4/1, dark gray/clay	
	16-30	Clay	
2	1-18	PZ, 10YR 4/1, dark gray/clay	
	18-30	Clay	
3	0-20	PZ, 10YR 4/1, dark gray /clay	
	20-30	Clay	
4	0-20	PZ, 10YR 4/1, dark gray	
	20-32	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-18	PZ, 10YR 4/1, dark gray	
	18-35	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-23	PZ, 10YR 4/1, dark gray	
	23-35	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-18	PZ, 10YR 4/1, dark gray	
	18-32	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-50	Large gravels throughout, PZ undistinguishable, 10+ cm rock	
9	0-20	PZ, 10YR 4/1, dark gray/stopped due to large rocks	
10	0-17	PZ, 10YR 4/1, dark gray	
	17-35	Gravels throughout	
11	0-25	PZ, 10YR 4/1, dark gray	
	25-35	Gravels throughout	
12	0-15	PZ, 10YR 4/1, dark gray	
	15-30	Gravels	

Project: Wawayanda
Transect: E
Survey Unit: South Field
Date: 10/17/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	Wet PZ, 10YR 4/1 dark gray	Ruts
2	0-27	PZ, 10YR 4/1 dark gray	
	27-35	B horizon, 10YR 6/2 light brownish gray silt loam	Iron mottling
3	0-20	PZ, 10YR 4/1 dark gray	
	20-35	B horizon, 10YR 6/2 light brownish gray silt loam	
4	0-35	PZ, 10YR 4/1 dark gray/mottled with B horizon, 10YR 6/2 light brownish gray silt loam	
	35-40	B horizon, 10YR 6/2 light brownish gray silt loam	
5	0-35	PZ, 10YR 4/1 dark gray/mottled soil	
	35-40	PZ, 10YR 4/1 dark gray/mottled with B horizon, 10YR 6/2 light brownish gray silt loam	
6	0-27	PZ, 10YR 4/1 dark gray	
	27-40	B horizon, 10YR 6/2 light brownish gray silt loam	Drier than PZ, 10YR 4/1 dark gray
7	0-18	PZ, 10YR 4/1 dark gray	
	18-31		Strat 2/hard packed like at rd top
8	0-19	PZ, 10YR 4/1 dark gray	At bottom of steeper slope near D8
	19-32	B horizon, 10YR 6/2 light brownish gray silt loam/hard packed	
9		Not completed, rocky	Slope
	0-20	PZ, 10YR 4/1 dark gray	
	20-30	B horizon, 10YR 6/2 light brownish gray silt loam	
	30-45	Silty mixed sod, burrow	
11	0-19	PZ, 10YR 4/1 dark gray	
	19-33	Mottled, mini hill near road	
	33-50	Strat 4, next to road	
12	0-20	PZ, 10YR 4/1 dark gray	
	20-50	B horizon, 10YR 6/2 light brownish gray silt loam	

Project: Wawayanda
Transect: F
Survey Unit: South Field
Date: 10/17/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-17	PZ, 10YR 4/1, dark gray	Brick fragments in soil
2	0-21	PZ, 10YR 4/1, dark gray	
	21-52	Disturbed mottled, burrow	
3	0-16	PZ, 10YR 4/1, dark gray	
	16-27	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-12	PZ, 10YR 4/1, dark gray	
	12-28	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-16	PZ, 10YR 4/1, dark gray	
	16-28	Mottled soil	
	28-45	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-12	PZ, 10YR 4/1, dark gray	
	12-32	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-16	PZ, 10YR 4/1, dark gray	
	16-32	B horizon, 10YR 6/2, light brownish gray silt loam	
8		Not done	Slope
9	0-12	PZ, 10YR 4/1, dark gray/gravels	
	12-30	Gravels and B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-10	PZ, 10YR 4/1, dark gray	
	10-25	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-17	PZ, 10YR 4/1, dark gray	
	17-42	Gravels and B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: G
Survey Unit: South Field
Date: 10/17/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-16	PZ, 10YR 4/1, dark brown	
	16-35	Burrow	
2	0-17	PZ, 10YR 4/1, dark brown	
	17-40	Gravels	
3	0-14	PZ, 10YR 4/1, dark brown	
	14-30	Gravels	
4	0-40	Undistinguishable gravels	
5	0-17	PZ, 10YR 4/1, dark brown	
	17-30	B horizon, 10YR 6.2, light brownish gray silt loam	
6	0-17	PZ, 10YR 4/1, dark brown	
	17-35	Clay	
7	0-19	PZ, 10YR 4/1, dark brown	
	19-30	Clay	
8	0-32	PZ, 10YR 4/1, dark brown	
	32-40	Clay	
9	0-20	PZ, 10YR 4/1, dark brown	
	20-42	Darker soil in B horizon, organic material	
10	0-10	PZ, 10YR 4/1, dark brown	
	10-30	Clay	

Project: Wawayanda
Transect: H
Survey Unit: South Field
Date: 10/17/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-50	PZ, 10YR 4/1,next to road, bottom of hill	
2	0-20	Hard packed rocky soil	
3	0-30	Hard packed rocky soil	
4	0-35	Hard packed rocky soil	
5	0-20	PZ, 10YR 4/1, dark brown, bottom of hill	
	20-35	Mottled soil with inclusions and iron striations	
6	0-18	PZ, 10YR 4/1, dark brown	
	18-40	Mottled soil with inclusions and iron striations	
7	0-30	PZ, 10YR 4/1, dark brown	
	30-45	Mottled soil with inclusions and iron striations	
8	0-20	PZ, 10YR 4/1, dark brown	
	20-30	Mottled soil with inclusions and iron striations	
9	0-20	PZ, 10YR 4/1, dark brown	
	20-35	Mottled soil with inclusions and iron striations	
10	0-15	PZ, 10YR 4/1, dark brown, very rocky, on hill	

Project: Wawayanda
Transect: I
Survey Unit: South Field
Date: 10/17/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-15	PZ, 10YR 4/1, dark brown/gravels	
	15-30	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-23	PZ, 10YR 4/1, dark brown/gravels, big root	
3	0-12	PZ, 10YR 4/1, dark brown/glacial till	
	12-30	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-22	PZ, 10YR 4/1, dark brown	
	22-40	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-11	PZ, 10YR 4/1, dark brown	
	11-25	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-11	PZ, 10YR 4/1, dark brown	
	11-40	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-15	PZ, 10YR 4/1, dark brown	
	15-52	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-13	PZ, 10YR 4/1, dark brown	
	13-30	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-8	PZ, 10YR 4/1, dark brown	
	8-28	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: J
Survey Unit: South Field
Date: 10/17/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-8	PZ, 10YR 4/1, dark brown	
	8-22	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-8	PZ, 10YR 4/1, dark brown	
	8-25	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-14	PZ, 10YR 4/1, dark brown	
	14-33	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-9	PZ, 10YR 4/1, dark brown	
	9-26	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-7	PZ, 10YR 4/1, dark brown	
	7-22	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-11	PZ, 10YR 4/1, dark brown/gravels	
	11-25	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-12	PZ, 10YR 4/1, dark brown	Soil sample
	12-35	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-22	PZ, 10YR 4/1, dark brown	
	22-35	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: K
Survey Unit: South Field
Date: 10/17/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	No PZ	
	very wet	Mottled soil with inclusions	
2	0-20	PZ, 10YR 4/1, dark brown/mottled soil with inclusions	Very hard packed
3	0-20	PZ, 10YR 4/1,dark brown/mottled soil with inclusions	
	20-30	Mottled soil with inclusions	
4	0-30	PZ, 10YR 4/1, dark brown/mottled soil with inclusions	
	30-40	Mottled soil with inclusions	
5	0-15	PZ, 10YR 4/1, dark brown	
	15-18	Very rocky	
6	0-18	PZ, 10YR 4/1, dark brown	
	18-30	B horizon, 10YR 6/2, light brownish gray silt loam	Last in transect, too close to road for next

Project: Wawayanda
Transect: L
Survey Unit: South Field
Date: 10/17/00
Recorder: JA/MO

Shovel Test #	Depth	Soil Type(s) and Munsell Colors	Notes
1	0-30	Clay and mottled soil	
2	0-12	PZ, 10YR 4/1, dark brown	
	12-25	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-25	Mottled gravels, undistinguishable	
4	0-25	PZ, 10YR 4/1, dark brown/mottled soil	
	25-30	Clay	
5	0-23	PZ, 10YR 4/1, dark brown/charcoal pieces	
	23-30	Clay	
6	0-16	PZ, 10YR 4/1, dark brown	
	16-27	Large rocks and gravels	

Project: Wawayanda
Transect: M
Survey Unit: South Field
Date: 10/17/00
Recorder: JA/MO/BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-40	Mottled soil	Next to road and bridge by wetland flat area
2	0-11	PZ, 10YR 4/1, dark brown	
	11-27	Clay/wetland strat	
3	0-16	PZ, 10YR 4/1, dark brown	
	16-30	Silt loam	
4	0-25	Mottled, undistinguishable	

Project: Wawayanda
Transect: A
Survey Unit: Ridge
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	not dry	Disturbed by mechanical tracks	
2	0-18	PZ, 10YR 4/1, dark gray	
	18-35	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-29	PZ, 10YR 4/1, dark gray/mixed	In 2-track road

Project: Wawayanda
Transect: B
Survey Unit: Ridge
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-28	Disturbed, large rocks near surface	
2	0-18	PZ, 10YR 4/1, dark gray	
	18-30	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-19	PZ, 10YR 4/1, dark gray	
	19-30	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-16	PZ, 10YR 4/1, dark gray	
	16-30	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-19	PZ, 10YR 4/1, dark gray	
	19-31	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-20	PZ, 10YR 4/1, dark gray	
	20-32	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-19	PZ, 10YR 4/1, dark gray	
	19-35	B horizon, 10YR 6/2, light brownish gray silt loam, cobbles	
8	0-21	PZ, 10YR 4/1, dark gray	
	21-38	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-19	PZ, 10YR 4/1, dark gray	
	19-32	B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-21	PZ, 10YR 4/1, dark gray	
	21-32	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-18	PZ, 10YR 4/1, dark gray	
	18-34	B horizon, 10YR 6/2, light brownish gray silt loam	
12	0-18	PZ, 10YR 4/1, dark gray	
	18-35	B horizon, 10YR 6/2, light brownish gray silt loam	
13	0-23	PZ, 10YR 4/1, dark gray	
	23-35	B horizon, 10YR 6/2, light brownish gray silt loam, high gravel content	
14	0-17	PZ, 10YR 4/1, dark gray	
	17-30	B horizon, 10YR 6/2, light brownish gray silt loam, high gravel content	
15	0-14	PZ, 10YR 4/1, dark gray	
	14-25	B horizon, 10YR 6/2, light brownish gray silt loam, cobbles	
16	0-13	PZ, 10YR 4/1, dark gray	
	13-26	B horizon, 10YR 6/2, light brownish gray silt loam	
17	0-22	Mottled, high gravel content	

Transect B, Ridge Unit (Continued)

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
18	0-20	PZ, 10YR 4/1, dark gray	
	20-35	B horizon, 10YR 6/2, light brownish gray silt loam	
19	0-18	PZ, 10YR 4/1, dark gray	
	18-35	B horizon, 10YR 6/2, light brownish gray silt loam	
20	0-22	PZ, 10YR 4/1, dark gray	
	22-40	B horizon, 10YR 6/2, light brownish gray silt loam	
21	0-17	PZ, 10YR 4/1, dark gray	
	17-35	B horizon, 10YR 6/2, light brownish gray silt loam	
22	0-23	PZ, 10YR 4/1, dark gray	
	23-30	B horizon, 10YR 6/2, light brownish gray silt loam	
23	0-17	PZ, 10YR 4/1, dark gray	
	17-30	B horizon, 10YR 6/2, light brownish gray silt loam	
24	0-26	Mottled soil	
	26-35	B horizon, 10YR 6/2, light brownish gray silt loam	
25		Not done	Power lines
26		Not done	Power lines
27	0-20	PZ, 10YR 4/1, dark gray	
	20-30	B horizon, 10YR 6/2, light brownish gray silt loam	
28	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam, high gravel content	
29	0-16	PZ, 10YR 4/1, dark gray	
	16-23	B horizon, 10YR 6/2, light brownish gray silt loam	
30	0-24	PZ, 10YR 4/1, dark gray	
	24-35	B horizon, 10YR 6/2, light brownish gray silt loam, high gravel content	
31	0-25	PZ, 10YR 4/1, dark gray	
	25-40	B horizon, 10YR 6/2, light brownish gray silt loam	
32	0-25	PZ, 10YR 4/1, dark gray	
	25-38	B horizon, 10YR 6/2, light brownish gray silt loam	
33	0-20	PZ, 10YR 4/1, dark gray	
	20-35	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: C
Survey Unit: Ridge
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	PZ, 10YR 4/1, dark gray	
	20-32	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-23	PZ, 10YR 4/1, dark gray	
	23-32	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-27	PZ, 10YR 4/1, dark gray	
	27-30	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-22	PZ, 10YR 4/1, dark gray	
	22-33	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-22	PZ, 10YR 4/1, dark gray	
	22-34	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-20	PZ, 10YR 4/1, dark gray	
	20-30	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-24	PZ, 10YR 4/1, dark gray	
	24-35	B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-27	PZ, 10YR 4/1, dark gray	
	27-35	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-24	PZ, 10YR 4/1, dark gray	
	24-35	B horizon, 10YR 6/2, light brownish gray silt loam	
12	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
13	0-22	PZ, 10YR 4/1, dark gray	
	22-32	B horizon, 10YR 6/2, light brownish gray silt loam	
14	0-25	PZ, 10YR 4/1, dark gray	
	25-35	B horizon, 10YR 6/2, light brownish gray silt loam	
15	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
16	0-22	PZ, 10YR 4/1, dark gray	
	22-32	B horizon, 10YR 6/2, light brownish gray silt loam	
17	0-21	PZ, 10YR 4/1, dark gray	
	21-31	B horizon, 10YR 6/2, light brownish gray silt loam	
18	0-20	PZ, 10YR 4/1, dark gray	
	20-27	B horizon, 10YR 6/2, light brownish gray silt loam	
19	0-23	PZ, 10YR 4/1, dark gray	
	23-33	B horizon, 10YR 6/2, light brownish gray silt loam	
20	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
21	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
22	0-25	PZ, 10YR 4/1, dark gray	
	25-33	B horizon, 10YR 6/2, light brownish gray silt loam	
23	0-20	PZ, 10YR 4/1, dark gray	
	20-27	B horizon, 10YR 6/2, light brownish gray silt loam	
24	0-20	PZ, 10YR 4/1, dark gray	
	20-30	B horizon, 10YR 6/2, light brownish gray silt loam	
25	0-22	PZ, 10YR 4/1, dark gray	
	22-28	B horizon, 10YR 6/2, light brownish gray silt loam	

C, Ridge Unit (Continued)

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
26	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
27	0-20	PZ, 10YR 4/1, dark gray	
	20-27	B horizon, 10YR 6/2, light brownish gray silt loam	
28		Disturbed soil, not completed	Power lines
29		Disturbed soil, not completed	Power lines
30	0-23	PZ, 10YR 4/1, dark gray	
	23-34	B horizon, 10YR 6/2, light brownish gray silt loam	
31	0-19	PZ, 10YR 4/1, dark gray	
	19-32	B horizon, 10YR 6/2, light brownish gray silt loam	
32	0-20	PZ, 10YR 4/1, dark gray	
	20-24	B horizon, 10YR 6/2, light brownish gray silt loam	
33	0-25	PZ, 10YR 4/1, dark gray	
	25-35	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: D
Survey Unit: Ridge
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-18	PZ, 10YR 4/1, dark gray	
	18-31	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-18	PZ, 10YR 4/1, dark gray	
	18-35	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-24	PZ, 10YR 4/1, dark gray	
	24-33	B horizon, 10YR 6/2, light brownish gray silt loam	Rocks at bottom, on slope
4	0-20	PZ, 10YR 4/1, dark gray	Rock on bottom
5	0-40	PZ, 10YR 4/1, dark gray	
	40+ rock	B horizon, 10YR 6/2, light brownish gray silt loam	Rock on bottom
6	0-27	PZ, 10YR 4/1, dark gray/mixed, no strat change, stony	
7	0-35	PZ, 10YR 4/1, dark gray/no strat change, stony	
8	0-42	PZ, 10YR 4/1, dark gray, no strat change, stony, slope	
9	0-35	PZ, 10YR 4/1, dark gray, no strat change, stony, slope	
10	0-25	PZ, 10YR 4/1, dark gray, no strat change, very stony	
11	0-25	PZ, 10YR 4/1, dark gray, no strat change, stony	
12	0-35	PZ, 10YR 4/1, dark gray, no strat change, stony	
13	0-25	PZ, 10YR 4/1, dark gray, no strat change, stony	
14	0-25	PZ, 10YR 4/1, dark gray	
	25-40	B horizon, 10YR 6/2, light brownish gray silt loam	
15	0-33	PZ, 10YR 4/1, dark gray	
	33-37	B horizon, 10YR 6/2, light brownish gray silt loam	
16	0-30	Mixed PZ, 10YR 4/1, dark gray/B horizon, 10YR 6/2, light brownish gray silt loam	
	30-40	Mottled soil, stony at bottom	
17	0-28	PZ, 10YR 4/1, dark gray	
	28-32	B horizon, 10YR 6/2, light brownish gray silt loam/very stony	

D, Ridge Unit (Continued).

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
18	0-42	PZ, 10YR 4/1, dark gray	
	42-45	B horizon, 10YR 6/2, light brownish gray silt loam	
19	0-32	PZ, 10YR 4/1, dark gray/very stony, no change	
20	0-30	PZ, 10YR 4/1, dark gray/very stony, no change	
21	0-20	PZ, 10YR 4/1, dark gray	
	20-27	B horizon, 10YR 6/2, light brownish gray silt loam, very stony	
22	0-10	PZ, 10YR 4/1, dark gray/broken cobbles, very rocky	
23	0-35	PZ, 10YR 4/1, dark gray/mottled at bottom	
24	0-37	PZ, 10YR 4/1, dark gray/mottled at bottom	
25	0-35	PZ, 10YR 4/1, dark gray /mottled, stony	
26	0-25	PZ, 10YR 4/1, dark gray /mottled, stony	
27	0-30	PZ, 10YR 4/1, dark gray/B horizon, 10YR 6/2, light brownish gray silt loam, 2 mixed, more clay	
28	0-30	PZ, 10YR 4/1, dark gray/B horizon, 10YR 6/2, light brownish gray silt loam, mixed, more clay	
29	0-30	PZ, 10YR 4/1, dark gray/B horizon, 10YR 6/2, light brownish gray silt loam, mixed, more clay	

Project: Wawayanda
Transect: E
Survey Unit: Ridge
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-19	PZ, 10YR 4/1, dark gray	
	19-32	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-26	PZ, 10YR 4/1, dark gray/large rocks encountered	
4	0-17	PZ, 10YR 4/1, dark gray	
	17-30	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-24	PZ, 10YR 4/1, dark gray	
	24-37	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-23	PZ, 10YR 4/1, dark gray	
	23-30	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-20	PZ, 10YR 4/1, dark gray	
	20-33	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-30	Mottled soil throughout STP	
9	0-25	PZ, 10YR 4/1, dark gray	
	25-35	B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-15	PZ, 10YR 4/1, dark gray	
	15-30	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
12	0-17	PZ, 10YR 4/1, dark gray	
	17-30	B horizon, 10YR 6/2, light brownish gray silt loam	
13	0-25	PZ, 10YR 4/1, dark gray	
	25-32	B horizon, 10YR 6/2, light brownish gray silt loam	
14	0-25	PZ, 10YR 4/1, dark gray	
	25-35	B horizon, 10YR 6/2, light brownish gray silt loam	
15	0-23	PZ, 10YR 4/1, dark gray	
	23-30	B horizon, 10YR 6/2, light brownish gray silt loam	
16	0-18	PZ, 10YR 4/1, dark gray	
	18-30	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: F
Survey Unit: Ridge
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-22	PZ, 10YR 4/1, dark gray	
	22-28	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-22	PZ, 10YR 4/1, dark gray	
	22-32	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-25	PZ, 10YR 4/1, dark gray	
	25-33	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-23	PZ, 10YR 4/1, dark gray	
	23-30	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-23	PZ, 10YR 4/1, dark gray	
	23-33	B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
12	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
13	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
14	0-20	PZ, 10YR 4/1, dark gray	
	20-27	B horizon, 10YR 6/2, light brownish gray silt loam	
15	0-13	PZ, 10YR 4/1, dark gray	
	13-22	B horizon, 10YR 6/2, light brownish gray silt loam	
16	0-22	PZ, 10YR 4/1, dark gray	
	22-27	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: G
Survey Unit: Ridge
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	PZ, 10YR 4/1, dark gray, rocky	
2	0-27	PZ, 10YR 4/1, dark gray, mottled with B horizon, 10YR 6/2, light brownish gray silt loam, rocky	
3	0-10	PZ, 10YR 4/1, dark gray, very rocky in area	
4	0-27	PZ, 10YR 4/1, dark gray/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
5	0-30	PZ, 10YR 4/1, dark gray/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
6	0-25	PZ, 10YR 4/1, dark gray/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
7	0-32	PZ, 10YR 4/1, dark gray, mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
8	0-30	PZ, 10YR 4/1, dark gray, mottled with B horizon, 10YR 6/2, light brownish gray silt loam, rocky	
9	0-27	PZ, 10YR 4/1/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
10	0-31	PZ, 10YR 4/1, dark gray, mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
11	0-28	PZ, 10YR 4/1, dark gray/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
12	0-25	PZ, 10YR 4/1, dark gray/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
13	0-25	PZ, 10YR 4/1, dark gray/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	
14	0-15	PZ, 10YR 4/1, dark gray/mottled with B horizon, 10YR 6/2, light brownish gray silt loam, very rocky	

Project: Wawayanda
Transect: H
Survey Unit: Ridge
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	PZ, 10YR 4/1, dark gray	
	20-30	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-20	PZ, 10YR 4/1, dark gray	
	20-32	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-12	PZ, 10YR 4/1, dark gray	
	12-22	B horizon, 10YR 6/2, light brownish gray silt loam, very compact	
4	0-17	PZ, 10YR 4/1, dark gray	
	17-32	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-21	PZ, 10YR 4/1, dark gray	
	21-30	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-24	PZ, 10YR 4/1, dark gray	
	24-30	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-23	PZ, 10YR 4/1, dark gray	
	23-34	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-20	PZ, 10YR 4/1, dark gray	
	20-31	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: I
Survey Unit: Ridge
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-27	PZ, 10YR 4/1, dark gray	
	27-35	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-22	PZ, 10YR 4/1, dark gray	
	22-30	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: J
Survey Unit: Ridge
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-35	PZ, 10YR 4/1, dark gray and B horizon, 10YR 6/2, light brownish gray silt loam, mottled	
2	0-24	PZ, 10YR 4/1, dark gray and B horizon, 10YR 6/2, light brownish gray silt loam, mottled, very rocky	
3	0-15	PZ, 10YR 4/1, dark gray and B horizon, 10YR 6/2, light brownish gray silt loam, mottled, very rocky	PZ and strat 2 mottled, very rocky, in 2-track

Project: Wawayanda
Transect: K
Survey Unit: Ridge
Date: 10/19/00
Recorder: RGH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	PZ, 10YR 4/1, dark gray, very rocky	
2	0-33	PZ, 10YR 4/1, dark gray, very rocky	
3	0-30	PZ, 10YR 4/1, dark gray, very rocky	
4	0-36	PZ, 10YR 4/1, dark gray, very rocky	
5	0-30	PZ, 10YR 4/1, dark gray, very rocky, especially at bottom	
6	0-28	PZ, 10YR 4/1, dark gray, very rocky	
7	0-30	PZ, 10YR 4/1, dark gray, very rocky	
8	0-28	PZ, 10YR 4/1, dark gray, very rocky	
9	0-30	PZ, 10YR 4/1, dark gray, very rocky	
10	0-30	PZ, 10YR 4/1, dark gray, mottled soil	
11	0-29	PZ, 10YR 4/1, dark gray, mottled soil	
12	0-27	PZ, 10YR 4/1, dark gray, mottled soil	
13	0-30	PZ, 10YR 4/1, dark gray, mottled soil	
14	0-20	PZ, 10YR 4/1, dark gray, mottled soil	
15	0-25	PZ, 10YR 4/1, dark gray, mottled soil	
16	0-26	PZ, 10YR 4/1, dark gray, mottled soil	
17	0-35	PZ, 10YR 4/1, dark gray, mottled soil	
18	0-30	PZ, 10YR 4/1, dark gray, mottled soil	
19	0-37	PZ, 10YR 4/1, dark gray, mottled soil	
20	0-32	PZ, 10YR 4/1, dark gray, mottled soil	
21	0-28	PZ, 10YR 4/1, dark gray, mottled soil	
22	0-30	PZ, 10YR 4/1, dark gray, mottled soil	
23	0-30	PZ, 10YR 4/1, dark gray, mottled soil	
24		Not done	Slope
25		Not done	Slope
26	0-32	PZ, 10YR 4/1, dark gray, mottled soil	
27	0-31	PZ, 10YR 4/1, dark gray, mottled soil	
28	0-33	PZ, 10YR 4/1, dark gray, mottled soil	

Project: Wawayanda
Transect: L
Survey Unit: Ridge
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-15	PZ, 10YR 4/1, dark gray	
	15-20	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-25	PZ, 10YR 4/1, dark gray	
	25-33	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-25	PZ, 10YR 4/1, dark gray	
	25-33	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-23	PZ, 10YR 4/1, dark gray	
	23-30	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-24	PZ, 10YR 4/1, dark gray	
	24-30	B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-30	PZ, 10YR 4/1, dark gray	
	30-36	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-30	PZ, 10YR 4/1, dark gray	
	30-60	B horizon, 10YR 6/2, light brownish gray silt loam	
12	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
13	0-25	PZ, 10YR 4/1, dark gray	
	25-32	B horizon, 10YR 6/2, light brownish gray silt loam	
14		Not done	Slope
15		Not done	Slope
16		Not done	Slope
17		Not done	Slope
18		Not done	Slope
19		Not done	Slope
20		Not done	Slope
21		Not done	Slope
22		Not done	Slope
23		Not done	Slope
24		Not done	Slope
25		Not done	Slope
26	0-35	PZ, 10YR 4/1, dark gray	
	35-40	B horizon, 10YR 6/2, light brownish gray silt loam	
27	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
28	0-22	PZ, 10YR 4/1, dark gray	
	22-28	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: M
Survey Unit: Ridge
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-15	PZ, 10YR 4/1, dark gray	
	15-25	B horizon, 10YR 6/2, light brownish gray silt loam, cobbles	
2	0-23	PZ, 10YR 4/1, dark gray	
	23-35	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-40	Mottled soil throughout STP	
4	0-35	PZ, 10YR 4/1, dark gray	
	35-40	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-30	PZ, 10YR 4/1, dark gray/cobbles	
6	0-40	PZ, 10YR 4/1, dark gray/cobbles	
7	0-20	PZ, 10YR 4/1, dark gray/cobbles	
8	0-30	PZ, 10YR 4/1, dark gray/cobbles	
9	6-16	PZ, 10YR 4/1, dark gray	
	16-31	B horizon, 10YR 6/2, light brownish gray silt loam, cobbles	
10	0-25	PZ, 10YR 4/1, dark gray/large cobbles	
11	0-35	PZ, 10YR 4/1, dark gray (burrow 2 m north)	
	35-40	B horizon, 10YR 6/2, light brownish gray silt loam, cobbles	
12	0-25	PZ, 10YR 4/1, dark gray/large cobbles	
13	0-36	Mottled soil	
14	0-23	PZ, 10YR 4/1, dark gray	
	23-36	B horizon, 10YR 6/2, light brownish gray silt loam, cobbles	
15	0-23	PZ, 10YR 4/1, dark gray	
	23-37	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: A
Survey Unit: Knoll
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-23	PZ, 10YR 4/1, dark gray	
	23-37	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-24	PZ, 10YR 4/1, dark gray	
	24-32	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-18	PZ, 10YR 4/1, dark gray	
	18-30	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-30	PZ, 10YR 4/1, dark gray	
	30-34	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-28	PZ, 10YR 4/1, dark gray	
	28-32	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-40	PZ, 10YR 4/1, dark gray, gravels	

Project: Wawayanda
Transect: B
Survey Unit: Knoll
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	PZ, 10YR 4/1, dark gray	
	20-28	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-30	PZ, 10YR 4/1, dark gray	
	30-40	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-22	PZ, 10YR 4/1, dark gray	
	22-27	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-24	PZ, 10YR 4/1, dark gray	
	24-30	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-24	PZ, 10YR 4/1, dark gray	
	24-30	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: C
Survey Unit: Knoll
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1		Not completed	Slope
2	0-15	PZ, 10YR 4/1, dark gray	
	15-30	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-28	PZ, 10YR 4/1, dark gray	
	28-39	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-35	Mottled soil throughout STP	
5	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: D
Survey Unit: Knoll
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-25	PZ, 10YR 4/1, dark gray/mottled	
	25-35	B horizon, 10YR 6/2, light brownish gray silt loam, rocky	
2	0-25	PZ, 10YR 4/1, dark gray/mottled	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam, rocky	
3	0-30	PZ, 10YR 4/1, dark gray/mottled	
	30-39	B horizon, 10YR 6/2, light brownish gray silt loam, rocky	
4	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, dark brownish gray silt loam	
6	0-30	PZ, 10YR 4/1, dark gray/mottled	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam, rocky	

Project: Wawayanda
Transect: A
Survey Unit: North Field
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-40	PZ, 10YR 3/1, very dark gray	
	40+	B horizon, 10YR 6/2, light brownish gray silt loam	Rock below B horizon
2	0-10	PZ, 10YR 3/1, very dark gray	
	10-1`22	B horizon, 10YR 6/2, light brownish gray silt loam Silt loam	
3	0-22	PZ, 10YR 3/1, very dark gray	
	22-28	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-35	PZ, 10YR 3/1, very dark gray	
	35-40	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-20	PZ, 10YR 3/1, very dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-30	PZ, 10YR 3/1, very dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-20	PZ, 10YR 3/1, very dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-25	PZ, 10YR 3/1, very dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
9		Soil saturated, not completed	
10	0-35	PZ, 10YR 3/1, very dark gray	
	35-40	B horizon, 10YR 6/2, light brownish gray silt loam	
11	0-25	PZ, 10YR 3/1, very dark gray	
	25-32	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: B
Survey Unit: North Field
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-19	PZ, 10YR 3/1, very dark gray	
	19-45	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-22	PZ, 10YR 3/1, very dark gray	
	22-33	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-25	PZ, 10YR 3/1, very dark gray	
	25-35	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-20	PZ, 10YR 3/1, very dark gray	
	20-30	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-25	PZ, 10YR 3/1, very dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-25	PZ, 10YR 3/1, very dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-40	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-23	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-13	PZ, 10YR 3/1, very dark gray	
	13-30	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: C
Survey Unit: North Field
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-35	PZ, 10YR 3/1, very dark gray, very organic, rocks at bottom	
2	0-35	PZ, 10YR 3/1, very dark gray, with mottled soil inclusions	
3	0-30	PZ, 10YR 3/1, very dark gray	
	30-35	Mottled soil throughout STP	
4	0-30	Mottled soil throughout STP	
5	0-32	Mottled soil throughout STP	
6	0-30	Mottled soil throughout STP	
7		Not done	Standing water
8	0-30	Mottled soil throughout STP	
9		Not done	Standing water
10	0-30	Mottled soil throughout STP	

Project: Wawayanda
Transect: D
Survey Unit: North Field
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	Soil saturated	
2	0-35	PZ, 10YR 3/1, very dark gray	
	35-40	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-40	Disturbed soil	Animal burrow
4	0-22	PZ, 10YR 3/1, very dark gray	
	22-28	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-20	PZ, 10YR 3/1, very dark gray	
	20-25	B horizon, 10YR 6/2, light brownish gray silt loam	
6	0-25	PZ, 10YR 3/1, very dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-25	PZ, 10YR 3/1, very dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-25	PZ, 10YR 3/1, very dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
9	0-10	PZ, 10YR 3/1, very dark gray	
	10-15	B horizon, 10YR 6/2, light brownish gray silt loam	
10	0-22	PZ, 10YR 3/1, very dark gray	
	22-28	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: E
Survey Unit: North Field
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-27	PZ, 10YR 4/1, dark brown	
	27-35	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-30	PZ, 10YR 4/1, dark brown	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-12	PZ, 10YR 4/1, dark brown	
	12-30	B horizon, 10YR 6/2, light brownish gray silt loam	
4	0-23	PZ, 10YR 4/1, dark brown	
	23-32	B horizon, 10YR 6/2, light brownish gray silt loam	
5	0-25	PZ, 10YR 4/1, dark brown, cobbles	
6	0-23	PZ, 10YR 4/1, dark brown	
	23-32	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-26	PZ, 10YR 4/1, dark brown	
	26-30	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-26	PZ, 10YR 4/1, dark brown	
	26-35	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: A
Survey Unit: Flat
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2, light brownish gray silt loam	
2	0-20	PZ, 10YR 4/1, dark gray	
	20-32	B horizon, 10YR 6/2, light brownish gray silt loam	
3	0-32	PZ, 10YR 4/1, dark gray	
	32-40	B horizon, 10YR 6/2, light brownish gray silt loam	
4		Disturbed, not completed	
5	0-35	B horizon, 10YR 6/2, light brownish gray silt loam,	
6	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2, light brownish gray silt loam	
7	0-20	PZ, 10YR 4/1, dark gray	
	20-28	B horizon, 10YR 6/2, light brownish gray silt loam	
8	0-30	PZ, 10YR 4/1, dark gray/cobble	
9		> 12% slope, not completed	
10	0-25	PZ, 10YR 4/1, dark gray	
	25-35	B horizon, 10YR 6/2, light brownish gray silt loam	
11		Large rock near surface	
12	0-28	PZ, 10YR 4/1, dark gray	
	28-35	B horizon, 10YR 6/2, light brownish gray silt loam	

Project: Wawayanda
Transect: B
Survey Unit: Flat
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-25	Mottled soil	Area at base of slope may have been modified for a farm road at one time.
2	0-5	Rocky	
3	0-37	Rocky	
4	0-5	Rocky	
5	0-20	Rocky	
6	0-27	Rocky	
7	0-20	Rocky	
8	0-20	Rocky	
9	0-25	Rocky	
10	0-30	Rocky	
11	0-28	Rocky	

Project: Wawayanda
Transect: C
Survey Unit: Flat
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2 light brownish gray silt loam	
2	0-10	Disturbed soil	
	10-30	Rocky	
3	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2 light brownish gray silt loam	
4	0-30	PZ, 10YR 4/1, dark gray	
	30-38	B horizon, 10YR 6/2 light brownish gray silt loam	
5	0-27	PZ, 10YR 4/1, dark gray	
	27-33	B horizon, 10YR 6/2 light brownish gray silt loam	
6	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2 light brownish gray silt loam	
7	0-30	PZ, 10YR 4/1, dark gray	
	30-37	B horizon, 10YR 6/2 light brownish gray silt loam	
8	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2 light brownish gray silt loam	
9	0-30	PZ, 10YR 4/1, dark gray	
	30-35	B horizon, 10YR 6/2 light brownish gray silt loam	
10	0-25	PZ, 10YR 4/1, dark gray	
	25-30	B horizon, 10YR 6/2 light brownish gray silt loam	
11	0-20	PZ, 10YR 4/1, dark gray	
	20-25	B horizon, 10YR 6/2 light brownish gray silt loam	

Project: Wawayanda
Transect: E
Survey Unit: Flat
Date: 10/19/00
Recorder: JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-35	PZ, 10YR 4/1, dark gray, mottled soil	

Project: Wawayanda
Transect: F
Survey Unit: Flat
Date: 10/19/00
Recorder: BB/NM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-40	Mottled soil	
2	0-37	Mottled soil	
3	0-32	Mottled soil, rocky on bottom	

Project: Wawayanda
Transect: G
Survey Unit: Flat
Date: 10/19/00
Recorder: RDH/TRG

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	Mottled soil, rocky	
2	0-25	Mottled soil, rocky	
3	0-30	Mottled soil, rocky	

Completed between June 10th and 17th, 2001:

Project: Wawayanda
Transect: A
Survey Unit: Backyard
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-28	10YR 4/1, dark gray, gravels and cobbles	
	28-37	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray, gravels and cobbles	
	20-40	10YR 5/8, yellow/brow clay	
3	0-30	10YR 4/1, dark gray, gravels	
	30-45	10YR 5/8, yellow/brown clay, gravels	
4	0-15	10YR 4/1, dark gray, gravels	
	15-26	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: B
Survey Unit: Backyard
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-34	10YR 4/1, dark gray	Several pieces of clear, modern glass, 3 rusted iron nails, several ceramic sherds, some slag, coal slag
	34-50	10YR 5/8, yellow/brown clay	
2	0-30	10YR 4/1, dark gray	Ceramic glass
	32-40	10YR 5/8, yellow/brown clay, consolidated tan silt	
3	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
4	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay, light brown silt	

Project: Wawayanda
Transect: C
Survey Unit: Backyard
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-17	10YR 4/1, dark gray, gravels and cobbles	
	17-30	10YR 5/8, yellow/brown clay	
2	0-25	10YR 4/1, dark gray, gravels	
	25-34	10YR 5/8, yellow/brown clay	
3	0-30	10YR 4/1, dark gray, gravels	
	30-40	10YR 5/8, yellow/brown clay	
4	0-36	10YR 4/1, dark gray with coal and bricks	Lithic debitage, earthenware
	36-60	10YR 5/8, yellow/brown clay, cobbles, gravels	
4-1	0-36	10YR 4/1, dark gray	Collected cream container fragment at 0.12, 10 small coat bits, 3 clear glass not collected-coal in walls to 30
	36-45	10YR 5/8, yellow/brown clay	
4-2	0-37	10YR 4/1, dark gray, few gravels	
	37-48	10YR 5/8, yellow/brown clay	Coal clink, brick distributed throughout, ceramics
4-3	0-40	10YR 4/1, dark gray, few gravels	
	40-50	10YR 5/8, yellow/brown clay	
4-4	0-40	10YR 4/1, dark gray, few gravels	Coal clink, ceramics, milk glass, brick bits distributed throughout
	40-50	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: D
Survey Unit: Flat
Date: 6/17/01
Recorder: DM/LL/MO/JA/TM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-35	10YR 4/1, dark gray, gravels	
	35-50	10YR 5/8, yellow/brown clay, few gravels	
2	0-42	10YR 4/1, dark gray, gravels	
	42-55	10YR 5/8, yellow/brow clay	
3	0-40	10YR 4/1, dark gray, gravels and cobbles	
	40-55	10YR 5/8, yellow/brown clay	
4	0-20	10YR 4/1, dark gray, gravels	
	20-35	10YR 5/8, yellow/brown clay	
5	0-50	10YR 4/1, dark gray, many gravels and cobbles	
			Test unit terminated due to shale bedrock
6	0-27	10YR 4/1, dark gray, gravels	
	27-35	10YR 5/8, yellow/brown clay	
7	0-54	10YR 4/1, dark gray, cobbles and gravels	
	54-60	10YR 5/8, yellow/brown clay	
8	0-28	10YR 4/1, dark gray, cobbles and gravels	
	28-42	10YR 5/8, yellow/brown clay	
9	0-15	10YR 4/1, dark gray, cobbles and gravels	
	15-29	10YR 5/8, yellow/brown clay	
10	0-18	10YR 4/1, dark gray, gravels	
	18-30	10YR 5/8, yellow/brown clay	
11	0-38	10YR 4/1, dark gray	
			Terminated due to large cobbles at 38 cm
12	0-23	10YR 4/1, dark gray, gravels and cobbles	
	23-37	10YR 5/8, yellow/brown clay	
13	0-30	10YR 4/1, dark gray, gravels	
	30-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: H
Survey Unit: Flat
Date: 6/17/01
Recorder: DM/LL/MO/JA/TM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	
2	0-25	10YR 4/1, dark gray, cobbles of shale	
	25-35	10YR 5/8, yellow/brown clay, no cobble	
3	0-30	10YR 4/1, dark gray	
	30-50	10YR 5/8, yellow/brown clay	Sterile hard packed clay
4	0-30	10YR 4/1, dark gray, many cobbles	
	30-40	10YR 5/8, yellow/brown clay, some cobbles	
5	0-20	10YR 4/1, dark gray	Brick, some coal slag
	20-50	10YR 5/8, yellow/brown clay	
6	0-35	10YR 4/1, dark gray, cobbles, brick fragments	Many small pieces of coal
	36-40	10YR 5/8, yellow/brown clay, few cobbles	
7	0-20	10YR 4/1, dark gray	Compacted HB/clay
	20-50	10YR 5/8, yellow/brown clay	
8	10-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	37-45, large cobbles, couldn't go deeper
9	0-20	10YR 4/1, dark gray	
	20-50	10YR 5/8, yellow/brown clay	
10	0-30	10YR 4/1, dark gray, many cobbles	
	30-45	10YR 5/8, yellow/brown clay, semi-compact	

Project: Wawayanda
Transect: I
Survey Unit: Flat
Date: 6/17/01
Recorder: DM/LL/MO/JA/TM

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-10	10YR 4/1, dark gray	Plastic cup
	20-35	10YR 5/8, yellow/brown clay	
2	0-28	10YR 4/1, dark gray, few gravels	In the field notes this unit had no letter designation
	28-40	10YR 5/8, yellow/brown clay, few gravels	
3	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
4	0-40	10YR 4/1, dark gray, very gravelly	
		10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: A
Section Unit: East of House
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
			Terminated due to large cobbles
2	0-25	10YR 4/1, dark gray, cobbles and gravels	
	25-35	10YR 5/8, yellow/brow clay	
3	0-20	10YR 4/1, dark gray	
			Terminated due to large cobbles
4	0-30	10YR 4/1, dark gray, gravels and cobbles	
	30-40	10YR 5/8, yellow/brown clay, and blue gray	
5	0-33	10YR 4/1, dark gray, large cobbles	
	33-45	10YR 5/8, yellow/brown clay	
6	0-30	10YR 4/1, dark gray, large cobbles	
	30-37	10YR 5/8, gray clay	
7	0-30	10YR 4/1, dark gray	2 pieces historic ceramic, 1 piece gray chert
	30-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: B
Section Unit: East of House
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	10-20	10YR 4/1, dark gray	1 piece corroded iron, 1 piece of coal slag
	20-50	10YR 5/8, yellow/brown clay	Silty clay with organic content
2	0-25	10YR 4/1, dark gray	
	25-50	10YR 5/8, yellow/brown clay	Dark gray, compact
3	0-30	10YR 4/1, dark gray	1 piece brick
	30-40	10YR 5/8, yellow/brown clay	
4	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
5	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
6	0-30	10YR 4/1, dark gray	Piece of gray chert, 15 mm
	30-40	10YR 5/8, yellow/brown clay	
7	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: C
Section Unit: East of House
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-31	10YR 4/1, dark gray, gravels	
	31-40	10YR 5/8, yellow/brown clay with cobbles	
2	0-21	10YR 4/1, dark gray, gravels	
	21-30	10YR 5/8, yellow/brown clay	
3	0-22	10YR 4/1, dark gray, gravels and cobbles	
	22-36	10YR 5/8, yellow/brown clay	
4	0-23	10YR 4/1, dark gray, gravels	
	23-34	10YR 5/8, yellow/brown clay	
5	0-35	10YR 4/1, dark gray with gravels	
	35-45	10YR 5/8, yellow/brown clay	
6	0-20	10YR 4/1, dark gray, gravels	Lithic debitage
	20-30	10YR 5/8, yellow/brown clay	
7	0-20	10YR 4/1, dark gray, gravels	
	20-40	Mix between 10YR 5/8 and 10YR 4/1, gravels	

Project: Wawayanda
Transect: D
Section Unit: East of House
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray, gravels	
			Terminated due to large cobbles
2	0-30	10YR 5/8, yellow/brown clay with gravels	
3	0-26	Mix of 10YR 4/1 and 10YR 5/8, gravels	
	26-32	10YR 5/8, yellow/brown clay	
4	0-32	10YR 4/1, dark gray, gravels	
	32-43	10YR 5/8, yellow/brown clay	
5	0-24	10YR 4/1, dark gray, gravels	
	24-35	10YR 5/8, yellow/brown clay	
6	0-26	10YR 4/1, dark gray, gravels	
	26-40	10YR 5/8, yellow/brown clay	
7	0-39	10YR 4/1, dark gray	
	39-50	10YR 5/8, yellow/brown clay, gravels	

Project: Wawayanda
Transect: E
Section Unit: East of House
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-32	10YR 4/1, dark gray, gravels	
	32-45	10YR 5/8, yellow/brown clay	
2	0-23	10YR 4/1, dark gray	
	23-32	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: A
Section Unit: West Wedge
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	5 pieces brick ceramic/porcelain
	20-50	10YR 5/8, yellow/brown clay	Small piece ceramic
2	0-30	10YR 4/1, dark gray	2 pieces red brick
	30-40	10YR 5/8, yellow/brown clay	
3	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	
4	0-20	10YR 4/1, dark gray, very rocky with many small pebbles	
	20-35	10YR 5/8, yellow/brown clay	
5	0-20	10YR 4/1, dark gray	
	20-35	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: B
Section Unit: West Wedge
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-40	10YR 4/1, dark gray, cobbles	
	40-60	10YR 5/8, yellow/brown clay, cobbles	
2	0-28	10YR 4/1, dark gray, gravels	
	28-40	10YR 5/8, yellow/brow clay	
3	0-25	10YR 4/1, dark gray	
	25-50	10YR 5/8, yellow/brown clay	
4	0-28	10YR 4/1, dark gray	
	28-40	10YR 5/8, yellow/brown clay	
5	0-20	10YR 4/1, dark gray	
	20-50	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: C
Section Unit: West Wedge
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-40	10YR 4/1, dark gray	1 piece red brick, 1 historic sherd, 1 flake large # of diff. sherds, shell, window and bottle glass
	40-50	10YR 5/8, yellow/brown clay, extremely rocky with large pebbles and cobbles	
2	0-30	10YR 4/1, dark gray	1 sherd
	30-50	10YR 5/8, yellow/brown clay	Ceramic (2 pieces)
3	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
4	0-30	10YR 4/1, dark gray	Large chunks broken brick (red), 1 at 7cm in size
	30-40	10YR 5/8, yellow/brown clay, compacted tan silt	

Project: Wawayanda
Transect: D
Section Unit: West Wedge
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-29	10YR 4/1, dark gray	
	29-40	10YR 5/8, yellow/brown clay	
2	0-45	10YR 4/1, dark gray, many gravels	
			Terminated due to large cobbles
3	0-25	10YR 4/1, dark gray	
	25-48	10YR 4/1 and 10YR 5/8 mix	

Project: Wawayanda
Transect: E
Section Unit: West Wedge
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-46	10YR 4/1, dark gray, gravels	
			Terminated due to large cobbles
2	0-37	10YR 4/1, dark gray, cobbles	
	37-50	10YR 5/8, yellow/brown clay	
3	0-28	10YR 4/1, dark gray	
	28-35	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: F
Section Unit: West Wedge
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	10YR 4/1, dark gray, heavy cobbles	Couldn't get shovel through
2	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: G
Section Unit: West Wedge
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-35	10YR 4/1, dark gray	
	35-45	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: A
Survey Unit: Gap
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-15	10YR 4/1, very gravelly	
	15-25	10YR 5/8, yellow/brown clay, very gravelly	
2	0-31	10YR 4/1, dark gray, few gravels	
	31-40	10YR 5/8, yellow/brow clay, few gravels	
3	0-20	10YR 4/1, dark gray, few gravels	
	20-30	10YR 5/8, yellow/brown clay, few gravels	
4	0-28	10YR 4/1, dark gray, few gravels	
	28-34	10YR 5/8, yellow/brown clay, few gravels	
5	0-28	10YR 4/1, dark gray, few gravels	
	28-33	10YR 5/8, yellow/brown clay, rocks	

Project: Wawayanda
Transect: B
Survey Unit: Gap
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
2	0-30	10YR 4/1, dark gray	Unit located on slight slope
	30-40	10YR 5/8, yellow/brown clay	
3	0-40	10YR 4/1, dark gray	
	40-50	10YR 5/8, yellow/brown clay	
4	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
5	0-18	10YR 4/1, dark gray, few gravels	
	18-30	10YR 5/8, yellow/brown clay, rocks	

Project: Wawayanda
Transect: A
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-29	10YR 4/1, dark gray, loamy gravels	
	29-37	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray, loamy gravels	
	20-30	10YR 5/8, yellow/brow clay	
3	0-28	10YR 4/1, dark gray, loam	
	28-35	10YR 5/8, yellow/brown clay	
4	0-24	10YR 4/1, dark gray, loam	
	24-35	10YR 5/8, yellow/brown clay	
5	0-21	10YR 4/1, dark gray, loam	
	21-32	10YR 5/8, yellow/brown clay	
6	0-24	10YR 4/1, dark gray, loam	
	24-37	10YR 5/8, yellow/brown clay	
7	0-26	10YR 4/1, dark gray, loam	
	26-35	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: B
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
	20-32	10YR 5/8, yellow/brown clay	
2	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
3	0-30	10YR 4/1, dark gray	1 piece of clear glass
	30-40	10YR 5/8, yellow/brown clay, huge cobble, 15 cm 1x15 deep x 8 cm w	
4	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	
5	0-30	10YR 4/1, dark gray	
	30-40	10YR 4/6, dark yellowish brown silty sand	
6	0-40	10YR 4/1, dark gray	
	40-55	10YR 5/8, yellow/brown clay	
7	0-30	10YR 4/1, dark gray	
	30-45	10YR 5/8, yellow/brown clay	
8	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
9	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
10	0-30	10YR 4/1, dark gray	
	30-40	10YR 4/6, dark yellowing brown silty sand	

Project: Wawayanda
Transect: C
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-45	10YR 4/1, dark gray, many gravels and cobbles	
2	0-32	10YR 4/1, dark gray, many gravels and cobbles	
			Test unit terminated due to large cobbles
3	0-30	10YR 4/1, dark gray, gravels	
	30-45	10YR 5/8, yellow/brown clay	
4	0-33	10YR 4/1, dark gray with gravels	
	33-47	10YR 5/8, yellow/brown clay	
5	0-46	10YR 4/1, dark gray, with gravels	
	46-50	10YR 5/8, yellow/brown clay	
6	0-25	10YR 4/1, dark gray, gravelly	
	25-55	10YR 5/8, yellow/brown, no inclusions	
7	0-30	10YR 4/1, dark gray	
	30-50	10YR 5/8, yellow/brown clay, gravels	
8	.0-30	10YR 4/1, dark gray, with gravels	
	30-40	10YR 5/8, yellow/brown clay	
9	0-32	10YR 4/1, dark gray, with gravels	
	32-42	10YR 5/8, yellow/brown clay	
10	0-30	10YR 4/1, dark gray, with gravels	
	30-43	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: E
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
2	0-30	10YR 4/1, dark gray	
	30-45	10YR 5/8, yellow/brown clay	
3	0-30	10YR 4/1, dark gray	
	30-45	10YR 5/8, yellow/brown clay	
4	0-30	10YR 4/1, dark gray, gravelly soil	
	30-35	10YR 5/8, yellow/brown clay	
5	0-20	10YR 4/1, dark gray	
	20-35	10YR 5/8, yellow/brown clay, sandy soil	
6	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
7	0-50	10YR 4/1, dark gray, dry, gravelly increasing into lower levels	
8	0-40	10YR 4/1, dark gray	
	40-50	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: F
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-18	10YR 4/1, dark gray, with gravels	
	18-30	10YR 4/6, yellowish silty sand	
2	0-28	10YR 4/1, dark gray, with gravels, rocks	
	28-35	10YR 4/6, yellowish silty sand	
3	0-26	10YR 4/1, dark gray, with gravels	
	26-35	10YR 5/8, yellow/brown clay	
4	0-15	10YR 4/1, dark gray, very gravelly	
	15-25	10YR 5/8, yellow/brown clay	
5	0-21	10YR 4/1, dark gray, very gravelly	
	21-30	10YR 5/8, yellow/brown clay	
6	0-40	10YR 4/1, dark gray, very gravelly, rocks	
	40-45	10YR 5/8, yellow/brown clay	
7	0-32	10YR 4/1, dark gray, very gravelly	
	32-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: G
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
	20-35	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
3	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
4	0-30	10YR 4/1, dark gray	1 piece coal clink
	30-40	10YR 5/8, yellow/brown clay	
5	0-20	10YR 4/1, dark gray	
	20-35	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: H
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-27	10YR 4/1, dark gray, gravelly	
	28-36	10YR 5/8, yellow/brown clay, few gravels	
2	0-20	10YR 4/1, dark gray, gravelly	
	20-28	10YR 5/8, yellow/brown clay, few gravels	
3	0-32	10YR 4/1, dark gray, few gravels	
	32-38	10YR 5/8, yellow/brown clay, few gravels	

Project: Wawayanda
Transect: I
Survey Unit: Behind Barn
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray, few gravels	
	20-30	10YR 5/8, yellow/brown clay, no gravels	

Project: Wawayanda
Transect: A
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-18	10YR 4/1, dark gray, gravels	
	18-30	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: B
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-25	10YR 4/1, dark gray, loamy gravels	
	25-35	10YR 5/8, yellow/brown clay, gravels	
2	0-24	10YR 4/1, dark gray, loamy gravels	
	24-35	10YR 5/8, yellow/brow clay, gravels	
3	0-23	10YR 4/1, dark gray, loamy gravels	
	23-30	10YR 5/8, yellow/brown clay, gravels	
4	0-24	10YR 4/1, dark gray, gravels	
	24-34	10YR 5/8, yellow/brown clay, gravels	

Project: Wawayanda
Transect: C
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay, gravelly	
2	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay, gravelly	
3	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay, hard packed, tan eolian silt	
4	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: D
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-24	10YR 4/1, dark gray, gravels	
	24-31	10YR 5/8, yellow/brown clay	
2	0-30	10YR 4/1, dark gray, loamy gravels	
	30-42	10YR 5/8, yellow/brown clay	
3	0-25	10YR 4/1, dark gray, loamy gravels	
	25-35	10YR 5/8, yellow/brown clay	
4	0-21	10YR 4/1, dark gray, gravels	Lithic debitage
	21-32	10YR 5/8, yellow/brown clay	
5	0-17	10YR 4/1, dark gray, loamy gravels	
	17-27	10YR 5/8, yellow/brown clay, cobbles	
6	0-18	10YR 4/1, dark gray	
	18-33	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: E
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
3	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
4	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
5	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: F
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-19	10YR 4/1, dark gray, loamy gravel	
	19-30	10YR 5/8, yellow/brown clay cobbles	
2	0-25	10YR 4/1, dark gray, gravel	
	25-35	10YR 5/8, yellow/brown clay, gravel	
3	0-18	10YR 4/1, dark gray, gravel	
	18-30	10YR 5/8, yellow/brown clay	
4	0-38	10YR 4/1, dark gray, gravels	
	38-45	10YR 5/8, yellow/brown clay, gravels	
5	0-26	10YR 4/1, dark gray, loamy gravels	
	26-40	10YR 5/8, yellow/brown clay, gravels	

Project: Wawayanda
Transect: G
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	Wrappers, modern trash
	20-30	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
3	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
4	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: H
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray, gravels and cobbles	
	20-30	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray, gravels and cobbles	
	20-30	10YR 5/8, yellow/brown clay	
3	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: I
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
2	0-18	10YR 4/1, dark gray	
	18-28	10YR 5/8, yellow/brown clay, gravels	
3	0-20	10YR 4/1, dark gray, gravels	
	20-32	10YR 5/8, yellow/brown clay, gravels	

Project: Wawayanda
Transect: J
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-20	10YR 4/1, dark gray	Modern brown glass
	20-40	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray	
	20-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: K
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-22	10YR 4/1, dark gray, gravels	
	22-32	10YR 5/8, yellow/brown clay, gravels	
2	0-21	10YR 4/1, dark gray, loamy gravels	
	21-30	10YR 5/8, yellow/brown clay, cobbles and gravels	

Project: Wawayanda
Transect: L
Survey Unit: Crest
Date: 6/17/01
Recorder: DM/LL/JA/MO

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-22	10YR 4/1, dark gray, gravels	
	22-34	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: M
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	10YR 4/1, dark gray loam	
	30-40	10YR 5/8, yellow/brown clay	
2	0-30	10YR 4/1, dark gray loam	
	30-50	10YR 5/8, yellow/brown clay	
3	0-30	10YR 4/1, dark gray loam	
	30-40	10YR 5/8, yellow/brown clay	
4	0-40	10YR 4/1, dark gray loam	
	40-50	10YR 5/8, yellow/brown clay	Bottom: dense gravel, little dirt with large cobbles
5	0-30	10YR 4/1, dark gray loam	
	30-40	10YR 5/8, yellow/brown clay	
6	0-40	10YR 4/1, dark gray loam	
	40-50	10YR 5/8, yellow/brown clay	
7	0-30	10YR 4/1, dark gray loam	
	30-50	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: N
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-25	10YR 4/1, dark gray, gravels	
	25-35	10YR 5/8, yellow/brown clay	
2	0-27	10YR 4/1, dark gray, gravels	
	27-35	10YR 5/8, yellow/brown clay	
3	0-40	10YR 4/1, dark gray loam, gravels	
	40-48	10YR 5/8, yellow/brown clay	
4	0-62	10YR 4/1, dark gray loam compact with gravels	
5	0-46	10YR 4/1, dark gray loam, gravels	
	46-52	10YR 5/8, yellow/brown clay, gravels	
6	0-37	10YR 4/1, dark gray loam compact with gravels	
	37-42	10YR 5/8, yellow/brown clay, compact	
7	0-30	10YR 4/1, dark gray loam compact with gravels	
	30-37	10YR 5/8, yellow/brown clay, compact	

Project: Wawayanda
Transect: O
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-26	10YR 4/1, dark gray loam, gravels	
	26-33	10YR 5/8, yellow/brown clay	
2	0-40	10YR 4/1, dark gray loam, gravels	
	40-45	10YR 5/8, yellow/brown clay, gravels	
3	0-28	10YR 4/1, dark gray loam compact with gravels	
	28-36	10YR 5/8, yellow/brown clay, gravels	
4	0-40	10YR 4/1, dark gray loam compact with gravels	
			Test terminated due to large cobbles at 40 cm
5	0-31	10YR 4/1, dark gray loam compact with gravels	
	31-40	10YR 5/8, yellow/brown clay, cobbles and gravels	

Project: Wawayanda
Transect: P
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-37	10YR 4/1, dark gray	
	37-46	10YR 5/8, yellow/brown clay	
2	0-60	10YR 4/1, dark gray loam, gravels	
3	0-23	10YR 4/1, dark gray loam, many gravels	
	23-35	10YR 5/8, yellow/brown clay, many gravels	
4	0-30	10YR 4/1, dark gray loam, many gravels	
	30-36	10YR 5/8, yellow/brown clay, many gravels	
5	0-31	10YR 4/1, dark gray loam compact with gravels	
	31-42	10YR 5/8, yellow/brown clay, many gravels	

Project: Wawayanda
Transect: Q
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-40	10YR 4/1, dark gray loam	
	40-45	10YR 5/8, yellow/brown clay	
2	0-40	10YR 4/1, dark gray loam	
	40-45	10YR 5/8, yellow/brown clay	
3	0-30	10YR 4/1, dark gray loam	
	30-40	10YR 5/8, yellow/brown clay, very dry, loose and sandy, very gravelly with small pebbles	
4	0-50	10YR 4/1, dark gray loam	
	50-60	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: R
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-60	10YR 4/1, dark gray loam compact with gravels and cobbles	
2	0-25	10YR 4/1, dark gray loam, many gravels	
	25-35	10YR 5/8, yellow/brown clay, many gravels	
3	0-30	10YR 4/1, dark gray loam, gravels	
	30-40	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: S
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	10YR 4/1, dark gray loam	
	30-40	10YR 5/8, yellow/brown clay	
2			Test terminated, wetlands

Project: Wawayanda
Transect: Z
Survey Unit: Below the Knoll
Date: 6/17/01
Recorder: DM/LL/MO/JA

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	10YR 4/1, dark gray	
	30-45	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Survey Unit: Water Line (next to farmhouse)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-21	10YR 4/1, dark gray, no gravels	
	21-33	10YR 5/8, yellow/brown clay, no gravels	
2	0-30	10YR 4/1, dark gray	
	30-40	10YR 5/8, yellow/brown clay	
3	0-22	10YR 4/1, dark gray, no gravels	
	22-30	10YR 5/8, yellow/brow clay, no gravels	
4	0-20	10YR 4/1, dark gray	2 ceramics
	20-35	10YR 5/8, yellow/brown clay	
5	0-21	10YR 4/1, dark gray, no gravels	
	21-30	10YR 5/8, yellow/brow clay, no gravels	
6	0-20	10YR 4/1, dark gray, no gravels	
	21-30	10YR 5/8, yellow/brow clay, no gravels	

Project: Wawayanda
Transect: A
Survey Unit: Water Line (in right-of-way)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1			Test terminated, wetlands
2	0-20	10YR 4/1, dark gray	
	20-30	10YR 5/8, yellow/brown clay	
3	0-12	10YR 4/1, dark gray, gravelly	
	12-20	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: B
Survey Unit: Water Line (in right-of-way)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1			Test terminated, wetlands
2	0-20	10YR 4/1, dark gray	Modern trash, bottle caps, pull tab soda cans, some glass
	20-30	10YR 5/8, yellow/brown clay	
3	0-13	10YR 4/1, dark gray	
	13-22	10YR 5/8, yellow/brown clay	

Project: Wawayanda
Transect: C
Survey Unit: Water Line (in right-of-way)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
2	0-20	10YR 4/1, dark gray	Trash compacted through entire unit for 20 cm, pull tabs, plastic wrappers, containers, glass
	20-30	10YR 5/8, yellow/brown clay	
3			In thicket, test terminated

Project: Wawayanda
Transect: D
Survey Unit: Water Line (in right-of-way)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-10	10YR 4/1, dark gray	Both levels very gravelly
	10-18	10YR 5/8, yellow/brown clay	
2	0-20	10YR 4/1, dark gray	25 cm of modern trash-plastic, glass, metal bits
	20-35	10YR 5/8, yellow/brown clay	
3			Test terminated, in thicket

Project: Wawayanda
Transect: E
Survey Unit: Water Line (in right-of-way)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1			Test terminated, in thicket
2	0-12	10YR 4/1, dark gray, gravelly	
	12-20	10YR 5/8, yellow/brown clay, gravelly	
3			Test terminated, in wetland

Project: Wawayanda
Transect: A-B
Survey Unit: Water Line (in right-of-way)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
3	0-16	10YR 4/1, dark gray, large asphalt chunks	
	16-23	10YR 5/8, yellow/brown clay, gravelly	

Project: Wawayanda
Survey Unit: Water Line (Sewer Plant)
Date: 6/17/01
Recorder: MO/JA/DM/LL

Shovel Test #	Depth (cm)	Soil Type(s) and Munsell Colors	Notes
1	0-30	10YR 5/8, yellow/brown clay	Clay is dry and extremely compact with large cobbles and concrete fragments, galvanized wire also.
2	0-30	10YR 5/8 yellow/brown clay, clay is dry and very compact, several large cobbles	scattered brick, glass, modern plastic, with many pieces of Styrofoam distributed throughout.
3	0-35	10YR5/8 yellow/brown clay, extremely compact with many gravels	Glass, plastic, panty hose, brick found in test unit.
4	0-33	10YR5/8 yellow/brown clay	Milk glass, large piece yellow foam in test unit bottom. Extremely compact with many gravels.

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4221-A Balloon Park Road NE
Albuquerque, New Mexico 87109
505-761-0099

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Customer-Focused Solutions

Section 5

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, N.Y. 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group 1 International Plaza, Suite 410 Mahwah, NJ 07430	PROJECT: PROJ. No.: DATE:	79 Dolsontown Road Town of Wawayanda, N.Y. 21402 December 4, 2021

GEOTECHNICAL INVESTIGATION REPORT

Table of Contents

1. PROJECT DESCRIPTION

This geotechnical investigation report was prepared for use in the design and construction of two warehouse buildings on an undeveloped lot. The larger western building will have a footprint of approximately 461,000 square feet (10.6 acres,) and overall dimensions of 535 by 881 feet, with a small section set back at the south end of the west wall. The smaller eastern warehouse has proposed dimensions of 200 by 306 feet, with a 61,000 square foot footprint (1.4 acres.) The west building site is an east-facing hillside, with elevations ranging from 454 to 467 feet above sea level along the east side of the proposed building, and 493 to 507 feet along the west side, for a total elevation change of 53 feet across the building. Existing slopes in the building area range from five to ten percent, with a typical slope of eight percent. The proposed east building site is on a northwest-facing slope which begins to bottom out along the north side of the building, where existing elevations range from about 450 to 452 feet. The existing high point is at about 467 feet elevation, on the east end of the south side of the proposed building, approximately at the top of the slope. The existing hill slopes at about ten to twelve percent in most of the building area, and at about two to three percent on the north side. Both building sites slope toward a wetland area which is centered on a stream flowing northeast to southwest, dividing the site; no wetland crossing or wetland buffer encroachment is indicated on the drawings.

The proposed building elevations were not provided. At the smaller east building, the anticipated floor elevation is approximately 460 to 465 feet, to meet the short entrance ramp from Dolsontown Road, thus most of the slab would be supported by fill with a thickness of up to ten to fifteen feet. A stormwater detention pond is indicated near the existing low point, with a wide roadway between the pond and the building; constructing the road slightly higher than existing grade and using high exposed foundation walls in this area appears to be the most practical layout; a full or partial basement could also be provided as an alternative to supporting part of the slab on deep fill.

The elevations are more challenging in the large building area. The truck entrance ramp near the proposed southeast corner joins Dolsontown Road at about 463 feet elevation, while the ramp to the employee/personal vehicle lot, near the southwest corner, joins the road at about 503 feet. A floor elevation of about 480 to 485 feet appears to be appropriate, and should result in a roughly balanced cut and fill; the existing elevation at the center of the proposed building is 481 feet. The proposed building will be within fifty feet of the property line at one point near the middle of the west side, and road construction will be within twenty-five feet of the line at that location, where the existing elevations are 500 to 505 feet. The building wall could be built as a retaining wall in this area, backfilled to a height of fifteen to twenty-five feet to support the road, or a retaining wall and/or rock cut could be provided along the setback line to allow the road to run between the cut and the building. Proposed stormwater ponds and semi-trailer parking lots on the east and the north side of the proposed large building also present challenges with existing slopes and the need to avoid disturbance of the wetland buffer area. An overhead electric transmission line crosses the back of the property, but is avoided by the proposed construction.

The USDA Soil Survey indicates that the native topsoil type in the large warehouse area is Mardin gravelly silt loam, which typically forms over deep deposits of glacial till composed of silty clay with some sand and little gravel, sometimes with abundant cobbles and boulders. In the smaller east warehouse area, the indicated topsoil type is Hoosic gravelly sandy loam, which typically forms over deposits of glacial outwash composed of gravelly sand with trace to little silt. Wayland soils, which form over silty to clayey floodplain deposits, are indicated in the center wetland area.

In the proposed west building area, the soils encountered in the borings were generally consistent with the Soil Survey data, consisting of glacial till composed mostly of sandy silt, sandy silty clay and gravelly silty sand. Bedrock was indicated at relatively shallow depth on the higher side of the building area. Wet conditions were frequently encountered. Boulders were encountered occasionally in these borings.

In the proposed smaller east building, the Soil Survey indicated that gravelly, sandy soils should be expected, however the soils were generally finer-grained, consisting mostly of silt, silty clay and fine sand. Wet soils were present, but were at least a few feet deep and will probably not significantly affect construction. One boulder was encountered in the borings in this area.

The proposed project areas have been cultivated, but no significant prior development of the site is believed to have occurred. The local bedrock is thinly-layered gray siltstone, sandstone and shale of the Ordovician-age Austin Glen Formation.

PHOTO 1. View facing northeast, from the shoulder of Dolsontown Road. The drill rig is working near the front right (southeast) corner of the proposed west warehouse. All photos were taken on November 10, 2021.

PHOTO 2. View from the west warehouse area, facing southeast across the center wetland and stream, with the east warehouse area in the distant background.

2. SOIL INVESTIGATION AND TEST RESULTS

Twelve soil borings were drilled on November 9, 10 and 11, 2021. Borings B1 through B8 were drilled in the larger west building area, and borings B9 through B12 were drilled in the east building area. Borings were drilled by the hollow-stem auger method, using a track-mounted drill rig. Drilling was performed by General Borings, Inc. of Prospect, Connecticut. The subsurface investigation was supervised and witnessed by Wyeth Patton, under the direction of Kevin Patton, P.E.

Soil sampling and testing were performed by the Standard Penetration Test (SPT,) using a Safety Hammer on a cable with a free-spooling drum, in accordance with ASTM D1586 (Standard Method for Penetration Test and Split-Barrel Sampling of Soils.) The SPT provides the Blow Count "N" Value, equal to the number of blows of the 140-pound steel hammer that were required to drive the 2-inch outside diameter split-spoon sampling tube into the soil, over a twelve-inch increment. Soil samples are also recovered by this method, and additional tests were performed in the field and lab, as noted on the soil boring log, using a hand penetrometer to test bearing capacity and a Torvane gauge to test shear strength and cohesion. Laboratory testing was performed on representative soil samples, for moisture content, particle size distribution and Atterberg Limits. USCS classifications of the soil, per ASTM D2487 and D2488, are provided on the logs and on the subsurface profile drawing.

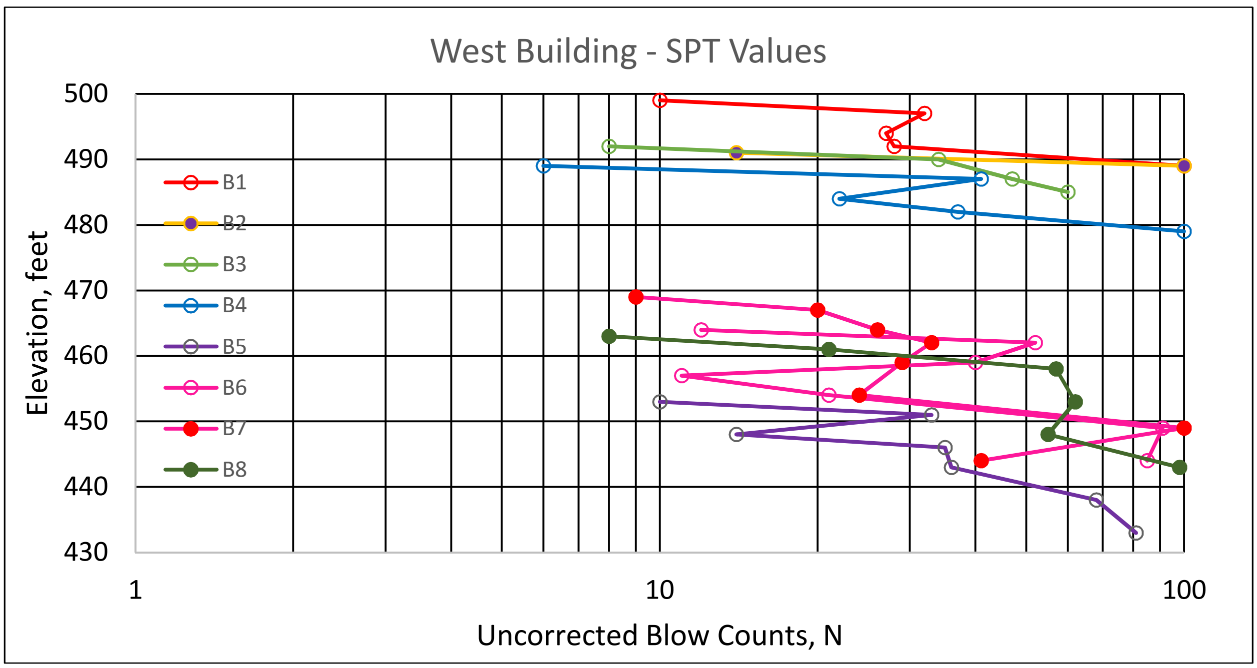
Shallow bedrock was indicated in the west part of the west building, with auger refusal typically occurring at about ten feet depth. Coring was not performed to verify that refusal was on bedrock, as the site conditions were only suitable for the track-mounted drill rig, and water could not be brought to the rig for coring. The appearance of the samples, including the presence of angular fragments of the local bedrock, the consistent depth to refusal, and the grinding of the auger on the bottom of the hole all provided positive indications that bedrock is present at this depth, however some additional exploration should be performed in this area prior to construction to verify the depth to rock.

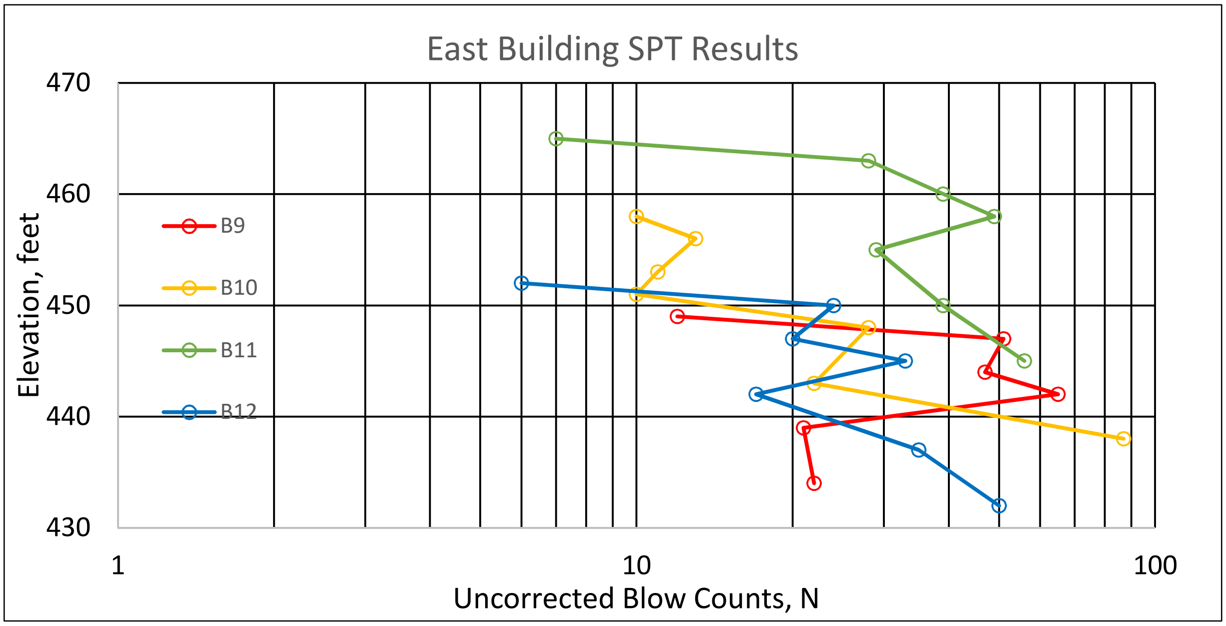
PHOTO 3. View facing west across the south end of the west warehouse area. Dolsontown Road runs left to right in the background.

2.1. Soil Boring Blow Count and Laboratory Data

Field Blow Count Values, N – West Building								
	B1	B2	B3	B4	B5	B6	B7	B8
Elev.:	500	492	493	490	454	465	470	464
Depth, ft.: 1	10	14	8	6	10	12	9	8
3	32	66/11″	34	41	33	52	20	21
6	27		47	22	14	40	26	57
8	28		60	37	35	11	33	
11	50/3″			50/6″	36	21	29	62
16					68	91	24	55
21					81	85	50/3″	98
26							41	
Auger Refusal, ft	11	5	10	11.5	--	--	--	--

Field Blow Count Values, N – East Building				
	B9	B10	B11	B12
Elev.:	450	459	466	453
Depth, ft.: 1	12	10	7	6
3	51	13	28	24
6	47	11	39	20
8	65	10	49	33
11	21	28	29	17
16	22	22	39	35
21		87	56	50





Natural Moisture Content, Percent								
Depth, feet	B1	B4	B5	B6	B7	B9	B10	B12
3	7.8	9.1	17.9	9.3		17.6	8.4	22.5
6	14.4	15.1	17.2		16.2	21.0		24.8
8	9.8		17.9	12.0	13.4	22.9		25.1
11			17.3		13.5	17.2	7.2	23.8
15						25.2		
16			13.4	8.4	11.5	19.6	15.9	
21			11.3	9.0				11.8
26					8.9		9.9	

SOIL TEXTURE				
Particle Size Analysis				
Sample		B4-S4	B10-S3	B10-S4
Depth		8 feet	6 feet	9 feet
Type		Sandy Silty Clay	Poorly-graded Sand with Silt	Silt
USCS Class		CL-ML	SP-SM	ML
Sieve Size	mm	Percent Passing by Weight		
¾″	19.0	100	100	
#4	4.75	89	100	
#10	2.00	82	99	
#40	0.425	73	75	100
#200	0.075	59	13	+/-100
Hydrometer	0.050	54	9	
	0.005	22	3	
	0.002	11	2	
Atterberg Limits				
Liquid Limit		21	None	None
Plastic Limit		15	None	23
Plasticity Index		6	Non-Plastic	Non-Plastic

The Standard Penetration Test results (blow counts) from the higher west side of the west building indicated firm to stiff soils at the surface, over about six to eight feet of very stiff to hard soil, with refusal on apparent bedrock at about ten to eleven feet depth, except in boring B2, where refusal was at five feet. On the east side of the west building, in what will be a fill area, the borings indicated loose to firm conditions to about two feet depth, over a few feet of medium-dense to dense soil, changing mostly to very dense soil below depths of about ten to fifteen feet.

In the east building area, the soils were mostly silty or sandy, loose at the surface, then mostly medium-dense, with some dense to very dense layers. In boring B10 the soils were loose to medium-dense to about eight feet depth, before changing to medium-dense. Boring B9 had very dense/hard silt and clay to about nine feet depth, over medium-dense silt.

Moisture contents of the samples mostly indicated moist to very moist conditions in densely-consolidated soil. Test results were generally higher in the finer-grained soils. The moisture content test results ranged from 7.2 percent to 25.2 percent water, by weight; test results greater than forty percent would be of concern.

The particle size analyses and Atterberg Limits tests represent typical native soils in the project area; other significantly different soil types were also encountered in the borings. Due to the sampling method, the analyses exclude particles that are medium gravel-size or larger. Occasional cobbles and few boulders are present in the soil but are not represented by the tests. Sample B4-S4 consisted of approximately 59 percent silt and clay, thirty percent sand and eleven percent gravel. Sample B10-S3 was composed of 87 percent fine-graded sand with thirteen percent fines, mostly silt. Sample B10-S4 was silt, and had nearly one hundred percent passing the #200 sieve; it had a Plastic Limit, indicating that it was cohesive, but did not have a Liquid Limit, and thus classifies as 'Non-Plastic.'

PHOTO 4. View facing northwest, across the north part of the proposed west warehouse, with the hilltop to the left and high-voltage transmission lines in the background.

2.2. Subsurface Profile and Summary of Soil Conditions

Subsurface conditions encountered in the borings are described in the boring logs and are summarized in the drawing attached to this report.

In the west building area, bedrock at shallow depth was indicated on the high side of the building. Refusal on probable bedrock occurred at elevations of 478 to 489 feet in borings B1 through B4, which were drilled about 70 to 160 feet east from the proposed west wall; if the depth to rock remains consistent, the profile along the west building wall will consist of approximately ten feet of soil over a fifteen-foot rock cut, with the bottom of the excavation at elevation 480. Drilling of additional borings and/or the excavation of exploratory test pits is recommended in the west part of the building area, to better establish the depth to bedrock, prior to planning the excavation. On the east side of the building, approximately twenty to thirty feet of fill will be required to reach the estimated 485-foot slab elevation. Borings B5 through B8 on this side of the building area indicated that the soils are suitable to support a deep fill, after removing the loose soil from the surface. Some groundwater seepage should be expected from the cut areas, both in soil and in rock.

In the east building area, borings B11 and B12 indicated mostly silt and silt with clay layers in the east part of the building. Boring B10, at the southwest corner, encountered mostly sand and fine sand, becoming gravelly at greater depth, and boring B9, at the northwest corner, encountered a thick zone of hard clay over silt. Most of the building pad will be a fill with an estimated maximum height of fifteen feet, and the subgrade soils are suitable to support the fill pad and building loads. The silt in this building area is much more sensitive to disturbance by vehicle traffic and by wind or water erosion than the silt in the west building area. Groundwater was indicated below elevations of 441 to 459 feet in the borings, and is not expected to significantly affect the construction, however some perched water or persistent seepage may be encountered.

3. EVALUATION

3.1. Subgrade Preparation

The conditions encountered in the investigation were evaluated for their impacts on construction methods, structural-geotechnical design, and long-term performance. The evaluation indicates that the subgrade throughout the proposed building areas is suitable to support the buildings and the fills that will be required for their construction, and that the native subgrade is suitable to support shallow spread footing foundations and slabs-on-grade, subject to performing the required subgrade preparation operations as described below.

Remove all existing topsoil, soft subsoil, stumps and large roots from the subgrade surface, in all building areas and building pad fill areas. Clear and grub the fill area at least one foot beyond the building footprint per foot of proposed fill height. Excavate to at least twelve inches below the original natural grade, and to the top of stiff, unyielding soil. The borings indicated that 24 to 30 inches of unsuitable material is typically present at the surface in both building areas. Use excavation methods that minimize disturbance of the final subgrade surface. Compact the surface to consolidate any soil that was loosened during excavation. Remove any pockets or small zones of unsuitable materials that are encountered, and replace them with controlled compacted fill. Contact the Engineer prior to performing any significant extra excavation. Where stumps or boulders are removed, or where other over-excavation work is performed to prepare subgrade areas, the sides of the excavation shall be trimmed back to stable soil as each lift is placed; as the backfill is compacted, extra care shall be taken to ensure thorough compaction where the edges of each lift meet the sides of the excavation. Where deficient soil is removed from below footing locations, the remediated area shall extend at least one foot out from the footing per foot of depth (1 to 1 splay.)

Where ripping or hammering of jointed or weathered rock is required, remove the rock to an approximately level and uniform elevation, with a slope of ten percent or less in areas below footings. Sound rock should be removed by blasting, except where the volume of rock is small. If the rock subgrade surface is significantly loosened, such as after excavation by ripping, level and seat the surface by tracking back-and-forth over it with a bulldozer or excavator, or spade it with the excavator bucket in tight areas, then compact the surface with several passes of a vibratory trench roller or a single-drum soil roller. A layer up to four inches thick of Structural Fill or ¾-inch to 1½-inchcrushed stone may be placed over the rock surface to facilitate compaction. Remove loose rock from vertical steps in the foundation.

Footings may bear directly on the prepared subgrade, or on controlled compacted fill placed over the subgrade. Footing bearing surfaces shall be free from frost, mud and loose soil or standing water, when concrete is placed. Where fine-grained native soil is present at the bearing elevation, a layer up to four inches thick of Structural Fill may be placed in the footing bottom to protect the soil surface, after properly preparing the surface to a level and stable condition. This layer shall be thoroughly compacted with a vibratory plate tamper or roller, and its surface shall not extend above the design bearing elevation.

If sound rock is encountered above the design bearing elevation, footings may bear on the rock, subject to approval by the Designer of Record; all footings shall bear at least twelve inches below finished grade. If the footing depth is reduced, pinning to rock may be required if the footing will be subjected to significant uplift or lateral forces. Rock surfaces should be thoroughly moistened prior to placing concrete.

3.2. Excavation

The native soils may be excavated using conventional heavy equipment, such as tracked excavators and bulldozers. Scraper pans may also be used; moderate interference from boulders should be expected. Rollers, wheel loaders and other heavy equipment should be sized appropriately for the subgrade conditions. Traffic from dump trucks and similar heavy vehicles should be minimized on the exposed surface of the subgrade and on compacted fine-grained fills.

Occasional small boulders are expected to be present in the soil, but some large boulders could also be present. Significant rock excavation is expected to be required in the west part of the west building area. Where the rock has been exposed to prolonged weathering, ripping to a depth of a few feet should be practical, using a large excavator or bulldozer with a ripper tooth. Hammering with a hydraulic hoe-ram will likely be required for the removal of fresh rock. Blasting is recommended for the removal of any significant quantities of fresh rock. Blasting should be planned to thoroughly fracture the bedrock to at least two feet below the proposed footing bearing elevations, to provide uniform bearing conditions and to allow fine-grading to be performed. Refer to the Subgrade Preparation section of this report for additional requirements.

The investigation indicates that the soils which will be encountered in the building excavations will vary significantly by location, and will include OSHA Type A soils, requiring a minimum slope of 0.75-to-1 in shallow excavations, with benching permitted, OSHA Type B soils, requiring a minimum slope of 1-to-1 in shallow excavations, with benching also permitted, and OSHA Type C soils, requiring a minimum slope of 1.5 horizontal to one vertical in shallow excavations, with benching not permitted. Soil types for excavation requirements must be confirmed during construction.

Shoring of excavations should not be required, as there appears to be sufficient distance from the property line to the estimated limits of the foundation work area to allow the use of conventional excavation slopes. The design of any required shoring or other support-of-excavation is the responsibility of the Contractor and is not included in this report.

Groundwater seepage rates in the building excavations are expected to be slow, but will likely be persistent, particularly in the west building area. Occasional zones of concentrated seepage may be encountered, with seepage particularly likely to occur near the bottom of the frost zone, at the soil-bedrock interface, and from the bottom of finer-grained soil layers. There may also be some initial short-term drainage of greater volume from zones of perched water from granular soils, including from low-plasticity silt layers. When wet, silty soils are encountered, they should be allowed to drain prior to final trimming of the cut, to avoid slumping or running. Groundwater seepage and stormwater should be removed promptly from the excavations, and the groundwater elevation should be maintained at least one foot below the bottoms of excavations in foundation construction areas. When dewatering excavations, the water level should be drawn down at a controlled rate to minimize sloughing, allowing the water to drain from the soil in the sides of the excavation.

3.3. Fill Materials and CLSM

Soils excavated from the site are expected to be mostly of fair to poor quality for re-use as fill and backfill for foundations, slabs and pavement areas. The available on-site borrow soil is expected to consist mostly of silt and silty clay, sometimes in a wet condition. These soils can be used as fill, but are moisture-sensitive and are typically difficult to work with, especially when the weather is other than warm and dry. Boulders and large cobbles must be removed from the borrow fill. Large clumps of clayey soil must be broken up.

Rock excavated from the site is expected to be of good quality for use as fill, and would be advantageous is used in the mass fill areas of the proposed building pads, particularly if used as a base layer and near the top of the fill. The rock is expected to be medium-hard, and crushed material made from fresh rock may be acceptable for use as road subbase ("Item 4," NYSDOT Item 733-04.) For placement in mass fills, the maximum size of the rock particles shall be less than two-thirds the thickness of the lift being placed, and the rock fill shall consist of a well-graded mix of sizes from coarse to fine.

If imported fill is used below foundations and slabs, it shall consist of granular material, i.e. imported Structural Fill, which shall be good-quality bank-run sand and gravel or crushed stone, and should comply with the gradation limits below. Structural Fill may also be used as foundation backfill. Structural Fill HD (Heavy Duty) should be used in areas to be protected from heavy construction traffic and where subgrade stabilization and/or enhanced drainage is needed.

Sieve size		Structural Fill	Structural Fill HD
Inch	mm	Percent Passing by Weight	
4″	100	100	100
1½″	37.5	50-100	50-95
#4	4.75	20-70	20-50
#40	0.425	5-40	5-25
#200	0.075	0-20	0-10

All fill materials shall consist of sound, durable particles, shall be free from frost or snow, garbage, construction debris or other deleterious material, and shall be substantially free from organic matter and roots. Recycled crushed concrete and masonry from a registered source may be acceptable for some applications, subject to approval by the Designer of Record. Fill shall not be placed over frozen or unstable soil, unless approved by the Engineer.

CLSM (Controlled Low-Strength Material, aka flowable fill or k-crete,) may be used under footings and foundations when specifically approved by the Engineer, and may also be used to backfill trenches or other excavations, typically where rapid fill placement is required, fill areas are narrow, or the use of conventional compaction methods is not practical. For support of footings, a CLSM mix consisting of sand, cement and water, with a 56-day compressive strength of 75 to 200 psi, is appropriate. CLSM may produce high fluid pressures during placement, and caution must be used for placements against foundation walls, near unbraced cuts, etc. Pipes or tanks can also float if not properly restrained during placement. CLSM should not be placed against unprotected aluminum; CLSM containing flyash should not be used in contact with cast iron or ductile iron. Hardened CLSM masses may also adversely affect groundwater flow, possibly causing erosion under or along the CLSM, particularly in sloping trenches.

Other Fill Materials:

- Crushed stone base course for slabs-on-grade should consist of ASTM C33 #56 or #57 stone (⅜- to ¾-inch size,) or as required by the slab system design.
- Crushed stone or gravel for footing drains should consist of ASTM C33 #5, #56 or #57 stone (¾-inch or ⅜-¾-inch size.)
- Well-graded granular subbase material (NYSDOT Item 733-04 'Item 4' or similar) should be used under sidewalks and exterior slabs.

3.4. Fill Placement and Compaction

Soil surfaces, including fill materials, shall be prepared to a stiff and essentially unyielding condition prior to placing each lift of fill. Perform compaction using small to mid-size equipment, such as vibratory trench rollers or single-drum soil rollers with a nominal size of three to seven tons, when compacting fill over wet and/or fine-grained subgrade soils or over previous lifts of fine-grained fill. In areas with limited access, vibratory plate tampers or jumping-jack tampers may be used. Heavier compaction equipment may be used over deep granular fill and rock fill. Backfilling of foundation excavations should be completed prior to erection of building framing. Do not allow water to accumulate in footing excavations prior to backfilling. Protect the compacted fill, as well as the prepared subgrade surfaces, from rutting by dump trucks, concrete mixers and other vehicles with high contact pressure. Traffic from these vehicles is acceptable when the soil surface is hard and stable.

Soil fill shall be placed in controlled lifts, with each lift compacted to the required density at a moisture content close to optimum moisture, as determined by ASTM D1557. When the moisture content of the fill is within two percent of optimum, it may be placed in lifts with compacted thicknesses of up to twelve inches. If the moisture content is two to three percent from optimum, reduce the maximum thickness to ten inches, and if it is more than three percent from optimum, discontinue compaction. Use a reduced lift thickness if required to attain the specified percent compaction and when using small compaction equipment. If the fill is too dry, mix in water as the fill is spread; surface watering is typically ineffective.

Rock fill may be placed in lifts with compacted thicknesses of up to eighteen inches. Maintain a well-graded condition when placing the fill, and dig out and amend any boulder pockets prior to compaction. Compact each lift with at least six passes of a vibratory sheep's-foot or smooth-drum roller with a nominal size of seven tons or greater, and until the lift is fully seated and compacted. Ideally, the rock fill should be compacted in a wet condition, but it may also be compacted when moist or dry, using the same procedures.

Where fill will be placed against slopes, bench the fill into the slope to create a stair-step interface, for improved stability and groundwater control. Lightly scarify the surface of the existing soil prior to placing the fill, and key the fill into the subgrade at the toe of the slope. When the fill is more than five feet high against a slope of twenty percent or more, the key should be at least two feet deep and ten feet wide.

If the native silt and clay soil is used for thick building pad fills, careful preparation, placement and compaction methods must be employed, and the fill section must be properly designed.

- Prepare the fill by drying it to a somewhat crumbly consistency, then thoroughly break up the soil clods so that they are no larger than two-thirds of the lift thickness (e.g. smaller than eight inches for a twelve-inch thick lift.)
- Mix and spread the fill so that the larger clods are well-mixed with finer pulverized soil; remove boulders during preparation and placement. Condition the fill if needed to the reach the proper compaction moisture content, mixing the fill so that the moisture is uniform throughout the lift thickness.
- Re-work any 'clod clusters,' where the fill is lacking in fines, to a well-graded condition, by mixing and/or by adding finer fill material.
- Compact the clay fill with a mid-size single-drum vibratory roller, or with a dual-drum trench roller where access is limited; a heavy roller will tend to produce rutting, and a light roller will not adequately compact the soil. A roller with a sheep's-foot or tamping foot drum is preferred, both because it tends to knead and compact the soil clods, and because the compacted surface promotes the dispersed vertical drainage of water infiltration, versus the surface produced by a smooth-drum roller, which promotes lateral seepage movement, potentially causing local saturation and the creation of soft spots.
- Drainage must be provided at the bottom of any significant fill sections, to minimize water accumulation in the base of the silt and clay, which can cause softening and settlement. A layer of granular fill, such as crushed rock or 'Structural Fill,' at least one foot thick, is typically sufficient, provided the granular layer is free to drain laterally and/or vertically. Where vertical drainage into a clay subgrade is to be provided, trim the clay subgrade carefully to a suitable surface without disturbance, and do not compact the clay prior to placing the granular fill; this will promote infiltration, but the rate may still be slow.
- The top of the fill must also be provided with proper drainage, particularly below parking lots, lawns, and in other areas of surface water infiltration. The final lift of fine-grained fill should be at least two feet below the proposed top-of-pavement elevation in paved areas, to provide sufficient depth for drainage and for protection of the silt and clay subgrade during construction and paving. In landscaped areas, the top of the clay fill should also be at least two feet deep, to allow for a sufficient thickness of fill with a suitable moisture capacity to support vegetation.
- The top of the silt and clay fill must be carefully graded to avoid low spots, where surface water infiltration can accumulate; it should be pitched gently toward underdrains or other outlets, and not made perfectly level.
- Installation of a layer of geotextile between the top of the fine-grained fill and the pavement subbase and landscaping fill is recommended. The geotextile will promote retention or surface infiltration in the pavement base and drainage layers and in the landscaping, and will reduce concentrated infiltration into the fine-grained fill.
- Surface water infiltration in the near-surface fill materials and in the underlying clay fill will tend to seek curbs, utility trenches and similar discontinuities, and subsurface drainage should be provided from these features; where water concentration along utilities needs to be minimized, use well-graded bedding material.
- Embankment slopes constructed with fine-grained fill should be built slightly wide, then trimmed back, to allow thorough compaction near the edge. The fill placed in the outer zone (six feet wide, or one third of the fill height above, whichever is greater) should be compacted at a moisture content no more than one percent above optimum, leaving the soil clods slightly crumbly and creating some initial lateral permeability.

- The surface of the embankment should be scarified prior to placing topsoil, and small benches or one- to two-foot wide steps should be provided at frequent intervals to protect against sliding of the topsoil. The topsoil should be erosion-resistant and should be placed at the minimum required thickness.

Pipe bedding in utility trenches may act as groundwater flow routes during or after construction. Use well-graded bedding, or interrupt coarse granular bedding with occasional zones of compatible lower-permeability soil to control minor seepage. Avoid the use of excessively coarse pipe bedding material that can allow fines to wash in from the surrounding soil. Contact the Engineer if excessive groundwater is encountered.

Open-graded stone base course material for slabs-on-grade should be graded level and seated with one or more compaction passes, to help resist displacement during slab area preparation and concrete placement.

3.5. Compaction Requirements

Compact each lift of fill supporting slabs or foundations with at least six one-way compaction passes, even if the required compaction percentage is obtained with fewer passes. Each compaction pass shall be made at a slow walking speed (less than four feet per second,) with the equipment passing completely over all areas of the fill. Fill materials shall be compacted to at least the following percentage of the ASTM D1557 maximum dry density. For coarse-graded fill materials with more than thirty percent retained on the ¾-inch sieve, the ASTM D4253 Maximum Index Density test may be substituted for the D1557 test.

Minimum Percent Compaction	
Location	Minimum Percent
Below footings, foundations and slabs	95
Exterior Foundation Backfill in Landscaped Areas	90

3.6. Testing

The prepared subgrade shall be inspected to verify that it has been prepared in conformance with the requirements of this report, prior to placing fill. Compaction testing is required by Code for each lift of fill supporting foundations, and testing shall be performed while the work is in progress. Recommended test procedures and frequencies are provided below.

PROOF-ROLLING: Proof-rolling of the prepared subgrade soil is not required, but may be performed to determine the limits of a soft area. Use an appropriately–sized vehicle, to avoid damaging wet and/or fine-grained, but otherwise acceptable soils. Observe the effects of the moving vehicle, and if the soil exhibits excessive deflection, rutting or cracking, then additional excavation or drying of the subgrade may be required.

BEARING CAPACITY: The prepared subgrade surface shall be free from loose material and shall be in a dense and unyielding condition; if this condition is not encountered at the design bearing elevation, testing shall be performed with a Static Cone Penetrometer or equivalent device, and the design bearing capacity shall be obtained within 3 inches of the surface in footing excavations. The soil throughout the foundation area shall be probed thoroughly to check for soft spots. If the bearing capacity tests are acceptable, the soil is undisturbed, is free from organics and is densely-consolidated, and if the observed yielding conditions are not due to the presence of loose or deficient soils, the subgrade may be accepted. Testing is not required where the subgrade consists of bedrock or fractured rock, but these areas shall be visually inspected.

COMPACTION TESTING: Compaction tests of soil fill and backfill supporting foundations or slabs-on-grade should be performed in at least three representative locations for each lift, and in at least one location per 5000 square feet. Compaction tests should be performed with a nuclear moisture-density gauge, per ASTM Test Method D6938, unless otherwise approved. Required percent compaction values are provided above. Rock fills shall be visually inspected during placement and compaction to verify that each lift is placed at the specified thickness, is free from open-graded areas, is compacted with at least the minimum specified number of passes with acceptable equipment, and is in a hard, densely-consolidated and stable condition at the completion of compaction.

CLSM: When flowable fill is used to support footings or foundations, at least one set of three 6x12-inch test cylinders shall be cast from each day's placement, per ASTM D4832. Test the cylinders for unit weight and for compliance with the specified strength requirements. Cast additional cylinders if early tests are needed.

3.7. Geosynthetic Materials

Geosynthetic materials are expected be used for reinforcement and drainage applications at the site on an as-needed basis, or where required by Code, such as for footing drains.

Geosynthetic materials shall be installed over a smooth and evenly shaped subgrade, to avoid 'tenting' of the material over voids or high points. The geosynthetic shall be installed substantially free from wrinkles, and fill material shall be placed and spread in a manner which pushes the wrinkles out but which does not otherwise displace the geosynthetic material. Vehicles shall not drive on the exposed geosynthetics. The following material types are recommended, with typical examples of suitable products.

Drainage Separation: For footing drains and similar applications, a woven drainage geotextile with at least 4% open area, with an apparent opening size of 0.21mm (#70) or smaller, should be installed between the native soils and open-graded drainage zones. A suitable product is Carthage Mills "Carthage 6%." Non-woven geotextiles are not recommended for use in this application, due to the presence of fine particles in the native soil that will tend to clog the fabric.

Subgrade Reinforcement: Typically, a woven reinforcing geotextile such as TenCate Mirafi 600X should be used where needed to improve the stability of soft subgrade soils. Geogrids may be used instead of woven geotextiles, especially if free drainage is desired. A minimum of twelve inches of granular fill cover is typically required to mobilize the strength of the reinforcing geosynthetic.

Subgrade Separation: Where fines from the subgrade may infiltrate into an overlying granular layer, and strengthening of the subgrade and free vertical drainage are not required, a non-woven geotextile such as Mirafi S600 or 160N should be used.

Infiltration Barrier: Woven Reinforcement geotextile will act as an effective infiltration barrier when installed in a continuous horizontal layer. Non-woven Separation geotextile will also work as a barrier, when the overlying material in contact with it contains at least three percent silt and clay (passing the #200 sieve.) While these fabrics will not completely stop water movement, they will significantly reduce it, which may be advantageous or disadvantageous, depending on the installation location and goals.

4. DESIGN VALUES AND RECOMMENDATIONS

4.1. Bearing Capacity and Soil Pressure

Soil engineering properties for design are summarized in the tables below. The values assume that the building will be supported by a conventional spread footing foundation with slab-on-grade floor, as described in the previous sections, and will be provided with proper drainage.

East and West Buildings, Allowable Bearing Capacity on Soil, q_a	
Footings bearing at least 42 inches below finished grade, with a minimum width of 24 inches	3500 psf
Footings bearing at least 24 inches below finished grade, with a minimum width of 52 inches	3500 psf
Footings bearing at least 24 inches below finished grade, with a minimum width of 24 inches	3000 psf
Minor Footings bearing at least 12 inches below finished grade, with a minimum width of 12 inches	1500 psf
Allowable bearing values between 3000psf and 3500 psf may be interpolated for footings bearing at 24 inches depth, based on footing width.	

West Building, Allowable Bearing Capacity on Rock, q_a	
Footings bearing at least 12 inches below finished grade, with a minimum width of 12 inches, on intact, weathered and/or fractured bedrock.	4000 psf

Soil Properties	Native Soils
Soil Moist Density, γ, lbs/cu ft	130
Effective Internal Angle of Friction, $\emptyset$	32^o
Coefficient of Friction (vs. concrete)	0.35
Coefficient of Active Earth Pressure, k_a	0.31
Coefficient of Passive Earth Pressure, k_p	3.25
Coefficient of At-Rest Earth Pressure, k_o	0.47
Lateral Bearing Capacity (psf per ft below grade)	210
Modulus of Subgrade Reaction, k, psi per inch	200

Rock Properties	Intact Bedrock
Rock Moist Density, γ, lbs/cu ft	165
Coefficient of Friction (vs. concrete)	0.70

Footings on soil or on weathered rock, and subject to frost, shall bear at least 42 inches below finished grade, or shall be otherwise protected from frost. Footings on intact bedrock or on fractured bedrock shall bear at least twelve inches below finished grade. Bearing elevations of footings shall be established such that a line drawn between the bottoms of two adjacent footings is not steeper than 30 degrees between the closest points on the footings. (Slope of 1 vertical to 1.75 horizontal.)

Up to one inch of settlement and ¾-inch of differential settlement should be anticipated for the new foundations bearing on native soil, due to normal elastic compression of the soils below the footings, however the actual expected settlement is expected to be one quarter inch or less in the densely-consolidated soils at this site. If minor fill is placed below footings, an additional quarter inch of settlement should be expected for per five feet of fill thickness.

In the deep fill areas of the building pads, some settlement of the mass fill and deflection of the subgrade soil below the pad will be added to the normal footing settlement. Settlement of the subgrade soil is expected to be nearly completed by the time the pad is completed, but some post-construction settlement of the fill should be expected. If the site borrow soil is used as fill and is carefully placed and compacted as recommended in this report, one inch of total settlement should be expected in the thickest section of the fill. This magnitude of settlement can be reduced by using well-graded granular fill materials for all or part of the building pad fill.

4.2. Control of Groundwater and Soil Gases

Minor groundwater seepage should be expected in foundation areas during and after construction. Conventional damp-proofing, including placement of slabs-on-grade over a vapor barrier and an open-graded stone base course, are appropriate to control water seepage. The walls of the west building might be partially backfilled; thorough damp-proofing, with the walls backfilled with well-graded granular fill, to convey groundwater seepage to footing drains in this area, should be sufficient to control groundwater seepage from the native soils or bedrock. Vertical drainage panels or a zone of sand or gravel outside the walls are not necessary for seepage control, but this additional drainage is recommended due to its low cost, to protect against unexpected seepage or future changed conditions. Stormwater infiltration from the parking areas should be diverted away from the building. Most building areas will not extend below grade, and footing drains are not required in those areas, however they may be beneficial for water control during construction, and are also recommended in areas where the foundation bears on substantially intact bedrock, where water trapped along the foundation could cause pavement distress near the building.

Soil gases that could normally be expected to impact the structure are water vapor and radon. Thorough foundation damp-proofing, as noted above, placement of dense concrete in slabs-on-grade, (low water-to-cementitious ratio, thoroughly consolidated,) and sealing of all wall-to-slab joints, concrete cracks, pipe penetrations, drainage sumps, etc. are usually effective in controlling transmission of these gases to interior spaces. If an open-graded base course is used under the slab, a passive vapor mitigation system can be included, using small-diameter PVC pipes. The potential for these gases to adversely impact the use of the building is estimated to be low, if the above recommended practices are used, and normal interior ventilation is provided.

4.3. Seismic and Expansive Properties

Seismic Design Values: The Seismic Site Class and Seismic Design Category for the proposed construction were determined per section 1613 of the New York State Building Code and ASCE 7-16. Seismic values for the site were obtained from the current database maintained by the Applied Technology Council, Redwood City, Cal., and are consistent with the published maps in the Building Code. Values were as follow.

Occupancy Category	I/II/III	
Seismic Site Class	West Building: C – Very Dense Soil and Soft Rock	
IBC Seismic Design Category	**SDC - B**	
Maximum Acceleration	0.2 sec S_S 1.0 sec S_1	0.212 g 0.054 g
Maximum Spectral Response Acceleration	0.2 sec S_{MS} 1.0 sec S_{M1}	0.275 g 0.082 g
5% Damped Spectral Response	0.2 sec S_{DS} 1.0 sec S_{D1}	0.184 g 0.054 g

Occupancy Category	I/II/III	
Seismic Site Class	East Building: D – Stiff Soil	
IBC Seismic Design Category	**SDC - B**	
Maximum Acceleration	0.2 sec S_S 1.0 sec S_1	0.212 g 0.054 g
Maximum Spectral Response Acceleration	0.2 sec S_{MS} 1.0 sec S_{M1}	0.339 g 0.131 g
5% Damped Spectral Response	0.2 sec S_{DS} 1.0 sec S_{D1}	0.226 g 0.087 g

The seismic design values are based on the "risk adjusted maximum probable earthquake." These are not the maximum values that *could* occur, they are values that are not likely to be exceeded during the service life of a typical structure.

Liquefaction Potential: The soils encountered in the investigation have low liquefaction susceptibility. Some poorly-graded sand was encountered in the proposed east building area; it has a potentially-liquefiable texture, but was sufficiently dense to resist shifting or settling during the design seismic event. No special mitigation measures are required.

Expansive Soils and Frost Heave: The soils encountered in the investigation have a very low potential for expansion due to shrinking and swelling resulting from moisture changes. This behavior is typically associated with high-plasticity silt and clay soils. Physical testing and qualitative examination indicate that the soil properties do not meet the criteria for potentially expansive soils as defined in section 1803.5.3 of the Code. No mitigation measures are required. The on-site soils are moderately to highly susceptible to frost heave. Frost heave can be minimized by providing good drainage and by thoroughly compacting the soil. Well-graded granular fill should be used in areas where frost heave could result in damage.

5. NOTES AND LIMITATIONS

Please see the attached pages for additional information. Subsurface conditions encountered during construction shall be compared to the soil boring logs and this report; any significant variations from anticipated conditions must be evaluated for their effect on the design. This report summarizes the results of a limited investigation and does not purport to predict every variation in subsurface conditions. Elevations, slopes, contours, project layout and similar or related data provided in this report were interpreted from the drawings, from field data or from other information which was provided, unless otherwise noted.

This geotechnical investigation was conducted to evaluate the engineering properties of the soils at the site, to aid in the design of the proposed work. The investigation did not include evaluation of the potential effects of the proposed construction on other properties, nor did it include inspection of, or sampling for, items of environmental concern such as the presence of soil contaminants or of regulated wetlands, and did not include review of local zoning regulations, codes, floodplain boundaries or similar matters, unless specifically referenced in the report. This investigation was conducted solely for the use of the Client, the Client's Project Designers and Agents and the Authorities Having Jurisdiction; this report should not be used by others, nor for any use other than its stated purpose, without contacting the Engineer. Any such use is solely at the user's risk.

Prepared by Kevin L. Patton, P.E.

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, N.Y. 12550
845 275-7732 PATTONGEOTECH.COM

Soil Technical Notes:
Soil Classifications, Descriptions and Properties

The USCS (Unified Soil Classification System) was used to classify the soils in this report. The USCS is described in ASTM D2487 (laboratory test method) and D2488 (visual-manual method.) The USCS classification gives a 'Group Symbol' and 'Group Name' based on particle size distribution (gradation,) clay properties (Atterberg Limits) and basic composition (mineral or organic.)

USCS Soil Classes

Soils with less than 5% passing the #200 sieve:

GW, GP, SW, SP – Well-graded gravel, Poorly-graded gravel, Well-graded sand, Poorly-graded sand.

Soils with 12% to 50% passing the #200 sieve:

GC, GM, GC-GM, SC, SM, SC-SM – Clayey gravel, Silty gravel, Silty clayey gravel, Clayey sand, Silty sand, Silty clayey sand.

Soils with 5% to 12% passing the #200 sieve use a dual symbol, such as SW-SC (Clayey well-graded sand.)

Soils with more than 50% passing the #200 sieve:

CL-ML, ML, CL, MH, CH, OL, OH – Silty clay, Silt, Lean clay, Elastic silt, Fat clay, Organic silt, Organic clay.

Highly organic soils:

PT – Peat.

The soil group name is modified with the term 'with sand' or 'with gravel' added if the soil contains more than 15% of these materials; clays and silts with 30% or more plus-#200 material are described as 'sandy' or 'gravelly' (whichever is predominate.) Examples – GM, Silty gravel with sand; CL, Gravelly lean clay.

Particle size

>12" (300mm)	Boulders
12" to 3" (300-75mm)	Cobbles
3" to #4 (75-4.75mm)	Gravel
#4 to #200 (4.75-0.075mm)	Sand
<#200 (0.075mm)	Silt & Clay

Organic Soils

Highly organic soils such as peat are visually classified. Partly organic soils, with a mix of organic and mineral matter, are classified visually and by Atterberg Limits tests.

Moisture Content

Moisture is visually estimated and samples are usually tested. Soil moisture capacity varies with texture and compaction.

Typical examples:
GW, moist at 3%, saturated at 9%
SP, moist at 6%, saturated at 20%.
CL, moist at 12%, saturated at 33%.

Fine- and Coarse-grained Soils

The USCS classification applies to the material smaller than the 3-inch sieve.

'Fine-Grained Soils' (silts and clays) have more than 50% passing the #200 sieve and are classified by their Atterberg Limits.

'Coarse-Grained Soils' (sands and gravels) have less than 50% passing the #200 sieve. When more than 50% of the plus-200 material is retained on the #4 sieve the general soil type is gravel, and if more than 50% is finer than the #4 sieve, it is sand.

Clean coarse-grained soils are classified as well-graded (Classes GW, SW) or poorly-graded (GP, SP.) Well-graded soils have a wider range of sizes and are typically more stable. Poorly-graded soils are usually more permeable.

Atterberg Limits

Test is performed on the clay, silt and fine sand fraction of the soil:
Liquid Limit (LL) – moisture content (%) at which soil becomes very soft.
Plastic Limit (PL) – moisture content at which soil crumbles.
Plasticity Index (PI) = LL minus PL

Higher PI values may indicate reduced permeability and increased drying shrinkage.

LL > 50 indicates soil with a higher potential to shrink and swell due to changing moisture content.

Silts have lower PI values, and behave like very fine sand; most silts also contain some clay. Behavior of clays is partly controlled by electrochemical forces and varies among the several clay minerals.

Color

Soil color sometimes indicates groundwater conditions, with subdued colors below the water table and mottled (mixed) colors in the zone of seasonal water table fluctuation. Color changes tend to be more prominent in fine-grained soils.

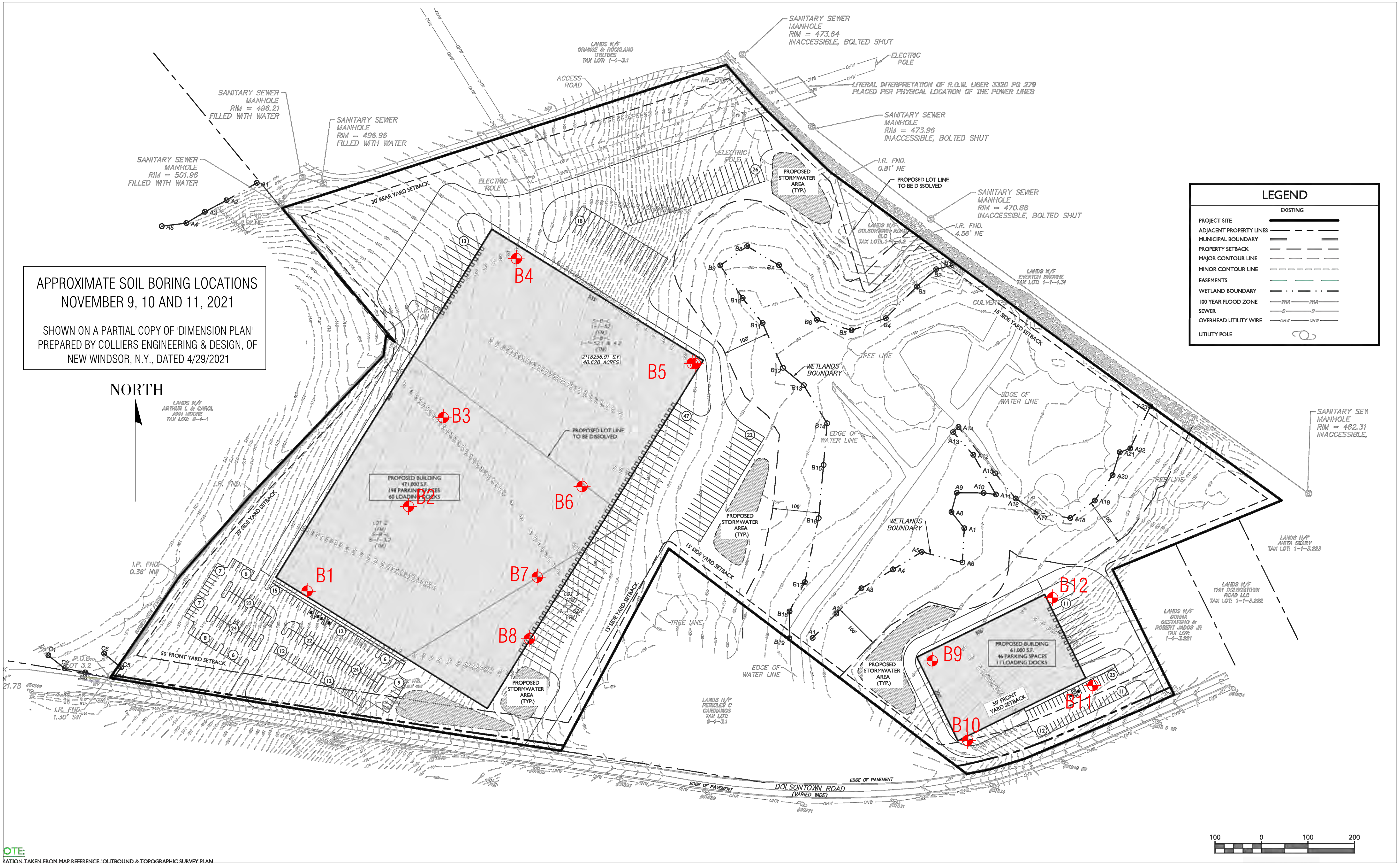
Relative Quantities

Estimated percentages in descriptions:

<5% -	Trace
5-10% -	Traces
10-25% -	Little
25-35% -	Some
'And' -	Approx. equal amounts
'Few' -	<10% (cobbles and boulders)

USDA Soil Classification

USDA classifications are based on the relative amounts of sand, silt and clay in the soil fraction passing the #10 (2mm) sieve. 'Gravelly' indicates more than 15% of #10 to 3" size. 'Channery' indicates 15 to 35% thin flat pieces up to 6" long.



KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732
PATTONGEOTECH.COM

79 DOLSONTOWN
TOWN OF WAWAYANDA, ORANGE COUNTY, N.Y.
SOIL BORING LOCATIONS

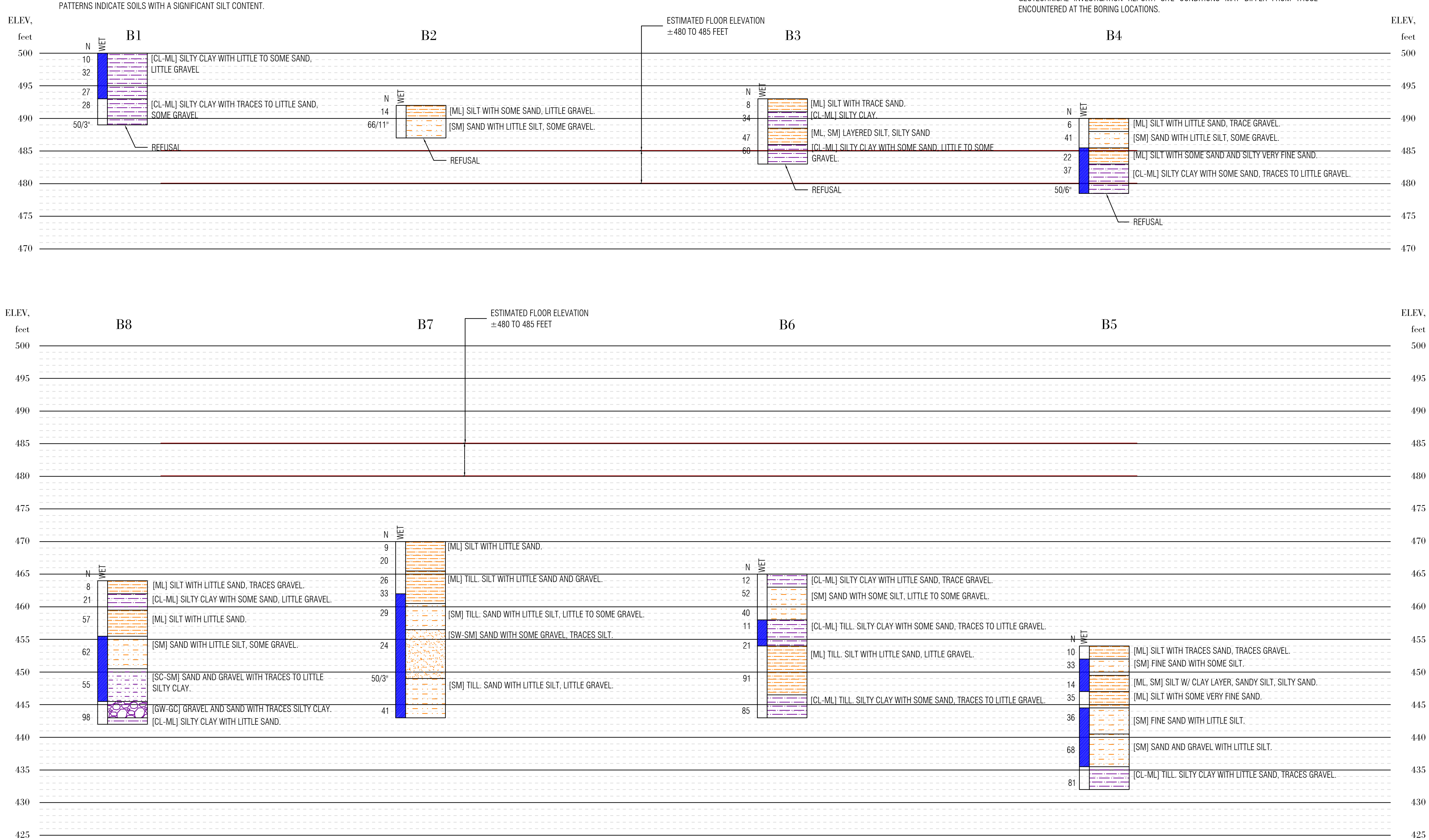
REV.	DATE	BY
0	12/4/2021	KLP

GENERALIZED SUBSURFACE PROFILE
PROPOSED WEST BUILDING

NO HORIZONTAL SCALE.
USCS SOIL CLASSIFICATIONS ARE IN BRACKETS.

IN GENERAL, RED PATTERNS INDICATE RELATIVELY CLEAN SANDY OR GRAVELLY SOILS, PURPLE PATTERNS INDICATE SOILS WITH SIGNIFICANT CLAY CONTENT AND ORANGE PATTERNS INDICATE SOILS WITH A SIGNIFICANT SILT CONTENT.

THESE SECTIONS ARE GENERALIZED REPRESENTATIONS OF THE SUBSURFACE PROFILE, BASED ON THE SUBSURFACE EXPLORATION DATA, OBSERVATIONS, RESEARCH, AND OTHER RELEVANT INFORMATION. THE SOILS INFORMATION PRESENTED HEREIN SHOULD BE INTERPRETED IN CONJUNCTION WITH THE INFORMATION FROM THE BORING LOGS AND THE GEOTECHNICAL INVESTIGATION REPORT. SITE CONDITIONS MAY DIFFER FROM THOSE ENCOUNTERED AT THE BORING LOCATIONS.



KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732
PATTONGEOTECH.COM

79 DOLSONTOWN
TOWN OF WAWAYANDA, ORANGE COUNTY, N.Y.
SUBSURFACE PROFILE - WEST BUILDING

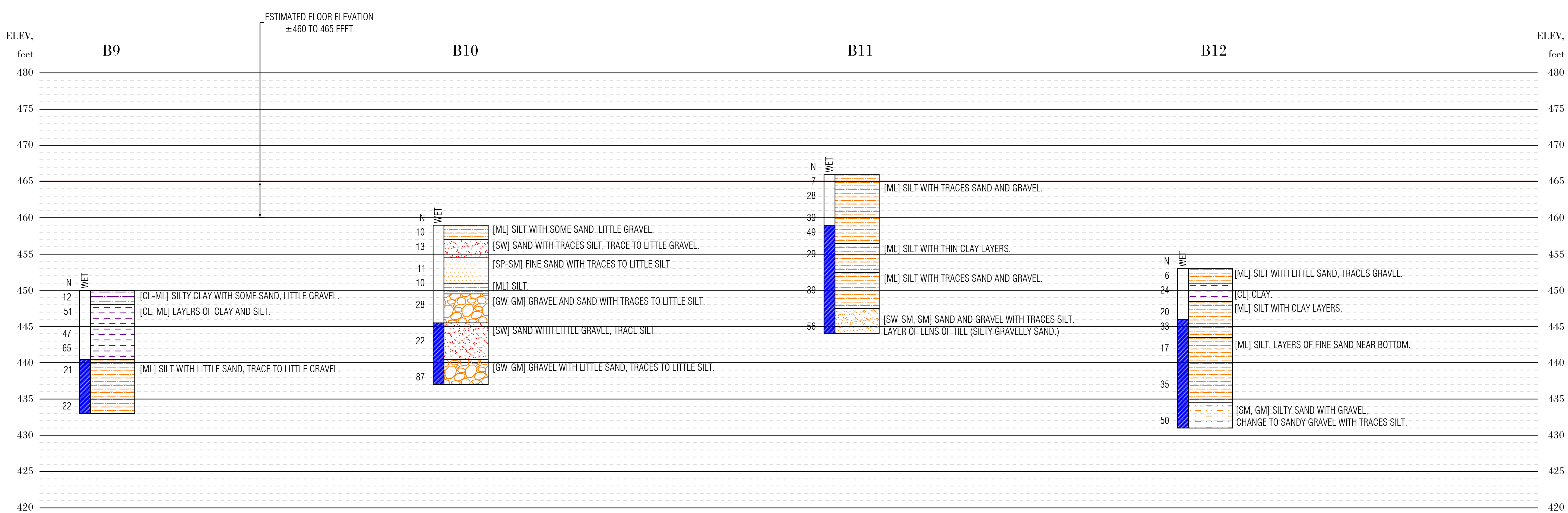
REV.	DATE	BY
0	12/4/2021	KLP

GENERALIZED SUBSURFACE PROFILE
PROPOSED EAST BUILDING

NO HORIZONTAL SCALE.
USCS SOIL CLASSIFICATIONS ARE IN BRACKETS.

IN GENERAL, RED PATTERNS INDICATE RELATIVELY CLEAN SANDY OR GRAVELLY SOILS, PURPLE PATTERNS INDICATE SOILS WITH SIGNIFICANT CLAY CONTENT AND ORANGE PATTERNS INDICATE SOILS WITH A SIGNIFICANT SILT CONTENT.

THESE SECTIONS ARE GENERALIZED REPRESENTATIONS OF THE SUBSURFACE PROFILE, BASED ON THE SUBSURFACE EXPLORATION DATA, OBSERVATIONS, RESEARCH, AND OTHER RELEVANT INFORMATION. THE SOILS INFORMATION PRESENTED HEREIN SHOULD BE INTERPRETED IN CONJUNCTION WITH THE INFORMATION FROM THE BORING LOGS AND THE GEOTECHNICAL INVESTIGATION REPORT. SITE CONDITIONS MAY DIFFER FROM THOSE ENCOUNTERED AT THE BORING LOCATIONS.



KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732
PATTONGEOTECH.COM

79 DOLSONTOWN

TOWN OF WAWAYANDA, ORANGE COUNTY, N.Y.

SUBSURFACE PROFILE - WEST BUILDING

REV.	DATE	BY
0	12/4/2021	KLP

KEVIN L. PATTON, P.E. 36 PATTON ROAD NEWBURGH, NY 12550 PATTONGEOTECH.COM 845 275-7732	CLIENT:	RDM Group		
	PROJECT:	79 Dolsontown, Town of Wawayanda		
	DATE:	11/9/2021	Project No.:	21402
	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, SW Corner	BORING NO.	B-1
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	500		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	10	CL-ML	2	**4**	**6**	12	Wet	Silty clay with some sand, little gravel.	
										Olive brown	
2-4	**2**	SS	14	CL-ML	7	**19**	**13**	50/5	Wet	Same.	
										Brown.	
5											
5-7	**3**	SS	8	CL-ML	23	**18**	**9**	15	Wet	Silty clay with little to some sand, little gravel	
										Brown	
7-9	**4**	SS	24	CL-ML	15	**11**	**17**	14	Moist/	Silty clay with traces to little sand, some gravel	
									Very Moist	Brown	
10											
10-12	**5**	SS	0	-	50/3				-	No Recovery	
										Refusal at 11 feet	
15											
20											
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/9/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, SW Part	BORING NO.	B-2
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	492		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	SAMPLE Type	SAMPLE Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	10	ML	3	**9**	**5**	9	Moist	Silt with some sand, little gravel.	
										Cobble fragment. Brown, trace red	PEN = 6 ksf
2-4	**2**	SS	12	SM	12	**16**	**50/5**		Moist	Sand (Fmc) with little silt, some gravel	
										Brown	
5											
										Refusal at 5 feet	
10											
15											
20											
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/9/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, West Middle	BORING NO.	B-3
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	493		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	14	ML	2	**4**	**4**	7	Moist/	Silt with trace sand	PEN 4.1 ksf
									Very moist	Fine mottling, light brown and greyish brown	
2-4	**2**	SS	12	CL-ML	9	**14**	**20**	24	Moist	Silty clay.	PEN 21 ksf
										Mottled brown, light brown. Vertical grey seam	
5											
5-7	**3**	SS	20	ML,	9	**18**	**29**	25	Moist/	Layered Silt, Silty Sand. Little gravel. Shale	PEN 8 ksf
				SM					Very moist	fragments. Brown.	
7-9	**4**	SS	8	CL-ML	35	**38**	**22**	21	Very moist	Silty clay with some sand, little to some gravel.	PEN 6 ksf
										Shale fragments. Brown.	
10											
										Refusal at 10 feet	
15											
20											
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
PATTONGEOTECH.COM 845 275-7732

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda		
DATE:	11/9/2021	Project No.:	21402
WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, East of NW Corner	**BORING NO.** **B-4**
DRILLER AND HELPER:	Tom McGovern, Tommy			
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	490	
INSPECTOR:	Wyeth Patton	WATER DEPTH:		

Feet	SAMPLE #	SAMPLE Type	SAMPLE Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	8	ML	3	**4**	**2**	2	Wet	Silt with little sand, trace gravel, plant fibers.	
										Silt layer. Yellowish brown, faintly mottled.	pen 2.5 ksf
2-4	**2**	SS	10	SM	4	**19**	**22**	21	Moist	Sand with little silt, some gravel	
										Mottled brown with traces light brown	
5											
5-7	**3**	SS	12	ML	6	**8**	**14**	15	Wet	Silt with some sand, to Silty very fine sand.	PEN 3.8 ksf
										Traces to little gravel. Mottled brown.	
7-9	**4**	SS	16	CL-ML	10	**15**	**22**	20	Wet	Silty clay with some sand, traces to little	
										gravel. Light brown	
10											
10-12	**5**	SS	1	CL-ML	22	**50/6**			Wet	Rock fragments. Some clayey silt.	
										Brown. Small Sample.	
										Refusal at 11.5 feet	
15											
20											
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD: HSA - Hollow-Stem Auger MR - Mud-Rotary MEASUREMENTS IN FEET AND INCHES

SAMPLE/TEST TYPE: SS - SPLIT SPOON C - CORE T - UNDISTURBED TUBE AUG - AUGER CUTTINGS
PEN - HAND PENETROMETER TOR - TORVANE V - VANE SHEAR

KEVIN L. PATTON, P.E. **36 PATTON ROAD** **NEWBURGH, NY 12550** **PATTONGEOTECH.COM 845 275-7732**	CLIENT:	RDM Group		
	PROJECT:	79 Dolsontown, Town of Wawayanda		
	DATE:	11/9/2021	Project No.:	21402
	WEATHER:	Cloudy, 35-65F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, NE Corner	**BORING NO.**	**B-5**
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	454		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	11	ML	3	**4**	**6**	25	Moist	Silt with traces sand, traces gravel	
										Brown. Faint mottling.	
2-4	**2**	SS	16	SM	18	**18**	**15**	19	Wet	Fine sand with some silt	PEN 5.5 ksf
										Brown	
5											
5-7	**3**	SS		ML	6	**7**	**7**	8	Wet	Silt with soft clay layer, to Sandy silt to Silty	PEN 6 ksf (in silt
				SM						sand w/ traces to little gravel. Brown w/grey.	with traces sand.)
7-9	**4**	SS	20	ML	8	**15**	**20**	24	Moist	Silt with some very fine sand.	
										Dark brown	
10											
10-12	**5**	SS	14	SM	7	**12**	**14**	22	Wet	Fine sand with little silt	
										Dark brown	
15											
15-17	**6**	SS	8	SM	19	**46**	**22**	28	Wet	Sand and gravel with little silt	
										Dark brown	
20											Boulder at 19 feet
20-22	**7**	SS	12	CL-ML	20	**33**	**48**	54	Very Moist	Till. Silty clay with little sand, traces gravel.	
										Grey	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
PATTONGEOTECH.COM 845 275-7732

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda		
DATE:	11/10/2021	Project No.:	21402
WEATHER:	Sunny, 35-60F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, Middle of East Side	**BORING NO.** **B-6**
DRILLER AND HELPER:	Tom McGovern, Tommy			
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	465	
INSPECTOR:	Wyeth Patton	WATER DEPTH:		

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	12	CL-ML	4	**5**	**7**	12	Very Moist	Silty clay with little sand, trace fine gravel	
										Mottled brown and dark brown	PEN 3.7 ksf
2-4	**2**	SS	10	SM	27	**22**	**30**	33	Moist	Sand (Fmc) with some silt, some gravel	
										Brown	
5											
5-7	**3**	SS	2	SM	9	**20**	**20**	12	Moist	Till. Sand with some silt, little gravel, with	
										shale fragments. Brown	
7-9	**4**	SS	12	CL-ML	10	**6**	**5**	5	Wet	Till. Silty clay with some sand, traces to little	PEN 2.3 ksf
										gravel. Brown	
10											
10-12	**5**	SS	0	-	8	**11**	**10**	15	-	No Recovery	
15											
15-17	**6**	SS	10	ML	37	**35**	**56**	41	Moist	Till- Silt with little sand, little gravel, shale	PEN 24 ksf
										fragments. Grey	
20											
20-22	**7**	SS	14	CL-ML	16	**38**	**47**	42	Moist	Till- Silty clay with some sand, traces to little	PEN 22 ksf
										gravel. Grey	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/10/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Sunny, 35-60F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, East Side South	BORING NO.	B-7
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	470		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	Type	Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	5	ML	2	**4**	**5**	10	Moist	Silt with little sand, traces plant fibers	
										Brown	
2-4	**2**	SS	2	ML	11	**11**	**9**	9	Moist	Silt with little sand, trace plant fiber.	
										Brown. Small Sample	
5											
5-7	**3**	SS	20	ML	5	**12**	**14**	16	Moist	Till- Silt with trace fine gravel	
										Mottled brown with orange and grey	
7-9	**4**	SS	24	ML	12	**15**	**18**	21	Moist	Till. Silt with little fine gravel to Silt with	PEN 8 ksf
									Wet	some sand and gravel. Brown.	
10											
10-12	**5**	SS	10	SM	38	**16**	**13**	17	Wet	Till- Sand with little silt, little to some gravel.	
										Brown	
15											
15-17	**6**	SS	10	SW-SM	17	**15**	**9**	13	Wet	Sand (fmC) with some gravel, traces silt.	
										Shale fragments. Brown.	
											Hard drilling from
											17 to 20 feet.
20											
20-22	**7**	SS	0	-	50/3				-	No Recovery	
25											
25-27	**8**	SS	12	SM	30	**20**	**21**	23	Wet	Till. Sand with little silt, little gravel.	
										Grey	
										Stopped in soil.	
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/10/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Sunny, 35-60F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	West Building, North of SE Corner	BORING NO.	B-8
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	464		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	12	ML	3	**3**	**5**	6	Moist	Silt with little sand, traces fine gravel	
										Light brown, mottling	
2-4	**2**	SS	8	CL-ML	10	**10**	**11**	12	Moist	Silty clay with some sand, little gravel	PEN 5.5 ksf
										Brown, faint mottling	
5											Boulder at 5 feet
5-7	**3**	SS	1	ML	12	**29**	**28**	50/2	Moist	Silt with little sand, cobble fragments	
										Brown. Small Sample	
10											
10-12	**4**	SS	10	SM	18	**29**	**33**	29	Wet	Sand (fmC) with little silt, some gravel and	
										rock fragments. Brown.	
15											
15-17	**5**	SS	8	SC-SM	55	**25**	**30**	27	Wet	Sand (Cmf) and gravel with traces to little	
										silty clay. Shale fragments. Brown.	
											Boulder at
											18 to 20 feet
20											
20-22	**6**	SS	6	GW-GC	14	**48**	**50/6**		Very Moist	Gray gravel and Cmf sand with traces silty	
				CL-ML						clay, change to Brown silty clay with little	
										sand.	
25											
										Stopped in soil.	
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group	
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda	
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.: 21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F	

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, NW Corner	**BORING NO.**	**B-9**
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	450		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	12	CL-ML	2	**5**	**7**	12	Moist/	Silty clay with some sand, little fine gravel.	
									Very moist	Light brown, mottled	
2-4	**2**	SS	12	ML,	11	**22**	**29**	32	Moist	Silt with few clay layers	Silt: PEN 15 ksf
				CL						Mottled light brown and pale grey	Clay: PEN 7.5 ksf,
5											TOR 1600/400 psf
5-7	**3**	SS	14	CL,	12	**24**	**23**	28	Moist	Clay with layers of silt	Clay: PEN 7 ksf,
				ML						Light brown. Faintly mottled.	TOR 1440/300 psf
7-9	**4**	SS	18	CL	28	**31**	**34**	34	Very moist	Clay with silt layers	PEN 3.7 ksf
										Light brown and grey	
10											
10-12	**5**	SS	16	ML	8	**11**	**10**	14	Wet	Silt with little sand, little fine gravel	PEN 5.5 ksf
										Dark grey	
15											
15-17	**6**	SS		ML	3	**7**	**15**	22	Wet	Silt, layered gray. Change to Brown silt and	PEN 3.0 ksf
										very fine sand layered with Gray silty fine	
										sand.	
20											
										Stopped at 20 feet in soil.	
										Augered to 20 feet, could not sample due	
										to soil clogging bottom of auger.	
25											
										Stopped in soil.	
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, SW Corner	BORING NO.	B-10
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	459		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE #	SAMPLE Type	SAMPLE Rec.	USCS SOIL CLASS	SPT TEST, BLOWS/6" 0-6	6-12	12-18	18-24	MOISTURE	DESCRIPTION	NOTES
0-2	**1**	SS	6	ML	2	**6**	**4**	4	Very Moist	Silt with some sand, little fine gravel. Trace	
										organics. Yellowish brown	
2-4	**2**	SS	8	SW	1	**5**	**8**	11	Moist	Sand with traces silt, traces to little gravel	
										Brown	
5											
5-7	**3**	SS	10	SP-SM	5	**6**	**5**	6	Moist	Sand (FM) with traces to little silt.	
										Brown	
7-9	**4**	SS	12	SP-SM	5	**6**	**4**	5	Moist	Very fine sand with traces to little silt. Brown.	
				ML					Very Moist	Change to Silt, faintly layered. Yellowish	PEN 1.8 ksf (silt.)
10										brown.	
10-12	**5**	SS	8	GW-GM	2	**9**	**19**	21	Moist	Gravel and sand with traces to little silt.	
										Brown	
15											
15-17	**6**	SS	12	SW	4	**6**	**16**	26	Wet	Sand (FMc) with little gravel, trace silt.	
										Brown	
											Boulder at
											18 to 20 feet
20											
20-22	**7**	SS	8	GW-GM	28	**33**	**54**	40	Wet	Rock fragments, gravel, with little sand,	
										traces to little silt. Brown and dark grey	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD: HSA - Hollow-Stem Auger MR - Mud-Rotary MEASUREMENTS IN FEET AND INCHES

SAMPLE/TEST TYPE: SS - SPLIT SPOON C - CORE T - UNDISTURBED TUBE AUG - AUGER CUTTINGS
PEN - HAND PENETROMETER TOR - TORVANE V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, NE Corner	BORING NO.	B-11
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	466		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.	CLASS	0-6	6-12	12-18	18-24			
0-2	**1**	SS	16	ML	2	**3**	**4**	7	Very Moist	Silt with traces sand, trace gravel	PEN 2.8 ksf
										Light Brown	
2-4	**2**	SS	18	ML	9	**12**	**16**	18	Moist	Silt.	PEN 10 ksf
										Light Brown, faintly mottled.	
5											
5-7	**3**	SS	18	ML	10	**18**	**21**	26	Moist	Silt, trace gravel	PEN 9 ksf
										Light brown, trace pale brown	
7-9	**4**	SS	20	ML	27	**26**	**23**	29	Wet	Silt. Iron oxide deposit in vertical seam.	PEN 4.2 ksf
										Light brown, trace grey	TOR 600/140 psf
10											
10-12	**5**	SS	24	ML	8	**12**	**17**	17	Wet	Silt with trace thin clay layers. Thin layer of sand	PEN 3.3 ksf
										Light brown. Thin layer of black	
15											
15-17	**6**	SS	24	ML	9	**20**	**19**	19	Very Moist	Silt, trace fine gravel	PEN 6.5 ksf
									/Wet	Brown	
20											
20-22	**7**	SS	16	SW-SM	30	**27**	**29**	26	Wet	Sand and gravel with traces silt, with layer of Till	
				SM						(silty gravelly sand.) Brown.	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.	CLIENT:	RDM Group		
36 PATTON ROAD	PROJECT:	79 Dolsontown, Town of Wawayanda		
NEWBURGH, NY 12550	DATE:	11/11/2021	Project No.:	21402
PATTONGEOTECH.COM 845 275-7732	WEATHER:	Partly cloudy, 30-55F		

SOIL BORING LOG

DRILLING COMPANY:	General Borings, Prospect, Conn.	LOCATION:	East Building, SE Corner	BORING NO.	B-12
DRILLER AND HELPER:	Tom McGovern, Tommy				
HAMMER TYPE:	Safety Hammer, Drum and cable	APPROX. ELEV.:	453		
INSPECTOR:	Wyeth Patton	WATER DEPTH:			

Feet	SAMPLE			USCS SOIL CLASS	SPT TEST, BLOWS/6"				MOISTURE	DESCRIPTION	NOTES
	#	Type	Rec.		0-6	6-12	12-18	18-24			
0-2	**1**	SS	10	ML	2	**3**	**3**	7	Very moist	Silt with little sand, traces gravel.	
										Brown, light brown.	
2-4	**2**	SS	16	CL	7	**13**	**11**	15	Moist	Clay.	
										Light brown, grey. Faint mottling	
5											
5-7	**3**	SS	20	ML	5	**8**	**12**	14	Very moist	Silt, layer of soft grey clay	
										Light brown	
7-9	**4**	SS	20	ML	16	**16**	**17**	17	Wet	Silt with trace very thin clay layers.	
										Brown, change to grey.	
10											
10-12	**5**	SS	18	ML	4	**10**	**7**	8	Wet	Silt.	
										Grey.	
15											
15-17	**6**	SS	16	ML	6	**14**	**21**	24	Wet	Silt, layered with very fine sand.	
										Brown.	
20											
20-22	**7**	SS	16	SM,	45	**30**	**20**	25	Wet	Till - Silty sand with gravel, change to Gravel	
				GM						with some sand, traces silt. Brown.	
										Stopped in soil.	
25											
30											
35											
40											
45											

COMMENTS:

DRILLING METHOD:	HSA - Hollow-Stem Auger	MR - Mud-Rotary		MEASUREMENTS IN FEET AND INCHES
SAMPLE/TEST TYPE	SS - SPLIT SPOON	C - CORE	T - UNDISTURBED TUBE	AUG - AUGER CUTTINGS
	PEN - HAND PENETROMETER		TOR - TORVANE	V - VANE SHEAR

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown Road, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9-11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

MOISTURE CONTENT OF SOIL

TEST METHOD: ASTM D2216

SAMPLE NO.	DEPTH,FT.	% MOISTURE
B1 S2	3	7.8
B1 S3	6	14.4
B1 S4	8	9.8
B4 S2	3	9.1
B4 S3	6	15.1
B5 S2	3	17.9
B5 S3	6	17.2
B5 S4	8	17.9
B5 S5	11	17.3
B5 S6	16	13.4
B5 S7	21	11.3
B6 S2	3	9.3
B6 S4	8	12.0
B6 S6	16	8.4
B6 S7	21	9.0
B7 S3	6	16.2
B7 S4	8	13.4
B7 S5	11	13.5
B7 S6	16	11.5
B7 S8	26	8.9

Moisture content is expressed as a percent of the dry mass of the soil.

Reviewed by: *Kevin Patton*

Form NMC

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown Road, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9-11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

MOISTURE CONTENT OF SOIL

TEST METHOD: ASTM D2216

SAMPLE NO.	DEPTH,FT.	% MOISTURE
B9 S2	3	17.6
B9 S3	6	21.0
B9 S4	8	22.9
B9 S5	11	17.2
B9 S6	15	25.2
B9 S6	16	19.6
B10 S2	3	8.4
B10 S5	11	7.2
B10 S6	16	15.9
B10 S7	26	9.9
B12 S2	3	22.5
B12 S3	6	24.8
B12 S4	8	25.1
B12 S5	11	23.8
B12 S7	21	11.8

Moisture content is expressed as a percent of the dry mass of the soil.

Reviewed by: *Kevin Patton*

Form NMC

KEVIN L. PATTON, P.E.

36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

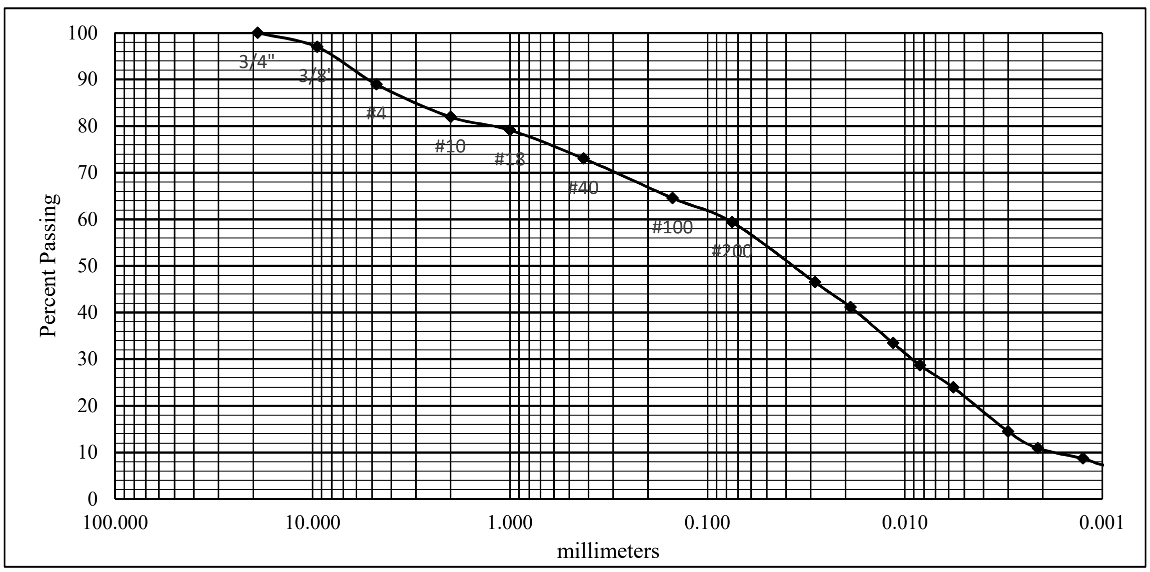
CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

SIEVE-AND-HYDROMETER ANALYSIS TEST REPORT

TEST METHOD(s): ASTM D422, AASHTO T88

Sample Location	B4-S4
Depth	8 feet

Sieve Size		Percent Retained	Percent Passing	Specification
3/4"	19.0	0	100	
3/8"	9.5	3	97	
#4	4.75	8	89	
#10	2.00	7	82	
#18	1.00	3	79	
#40	0.425	6	73	
#100	0.150	8	65	
#200	0.075	6	59	
Hydrometer Analysis	0.050	5	54	
	0.020	12	42	
	0.010	11	31	
	0.005	9	22	
	0.002	11	11	
	0.001	4	7	



USDA Particle Size Classification:	
Gravel, 3" to 2.00mm	18
Sand, 2.00 to 0.050mm:	28
Silt, 0.050 to 0.002mm:	43
Clay, <0.002mm	11
Total	100

USDA Textural Class: Gravelly Silt Loam

USCS Classification (ASTM D2487/D2488):
CL-ML, Sandy Silty Clay

Atterberg Limits were determined by: Test

Reviewed by: *Kevin Patton*

Form HYD

KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

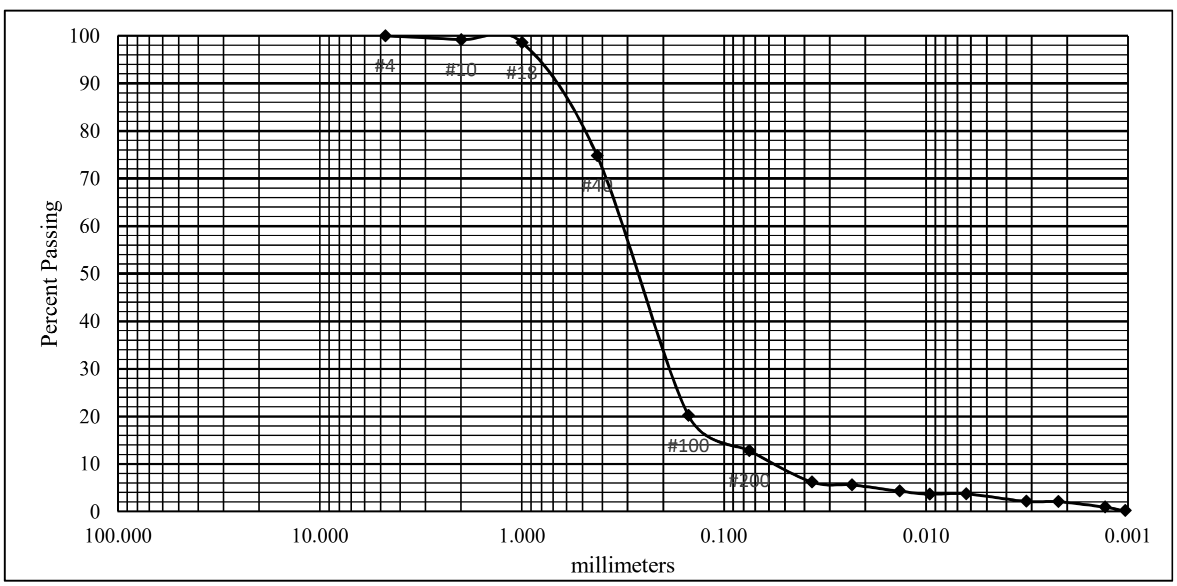
CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

SIEVE-AND-HYDROMETER ANALYSIS TEST REPORT

TEST METHOD(s): ASTM D422, AASHTO T88

Sample Location	B10-S3
Depth	6 feet

Sieve Size		Percent Retained	Percent Passing	Specification
inches	mm			
#4	4.75	0	100	
#10	2.00	1	99	
#18	1.00	0	99	
#40	0.425	24	75	
#100	0.150	55	20	
#200	0.075	7	13	
Hydrometer Analysis	0.050	4	9	
	0.020	4	5	
	0.010	1	4	
	0.005	1	3	
	0.002	1	2	
	0.001	2	0	



USDA Particle Size Classification:	
Gravel, 3" to 2.00mm	1
Sand, 2.00 to 0.050mm:	90
Silt, 0.050 to 0.002mm:	7
Clay, <0.002mm	2
Total	100

USDA Textural Class: Sand

USCS Classification (ASTM D2487/D2488):

SM, Silty Sand*

*Nearly classifies as SP-SM, Poorly-Graded Sand with Silt

Atterberg Limits were determined by: Estimated (ASTM D2488)

Reviewed by: *Kevin Patton*

Form HYD

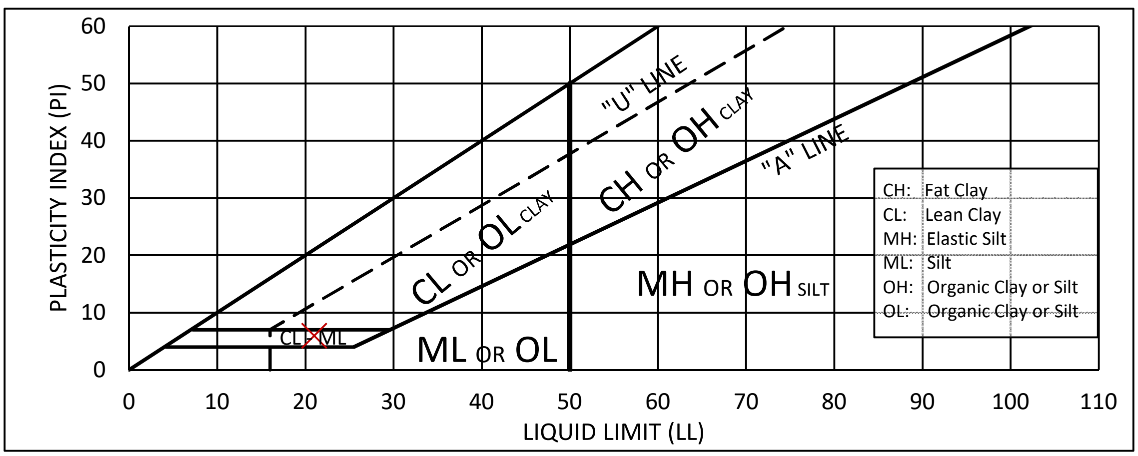
KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/9/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

ATTERBERG LIMITS TEST

TEST METHODS: ASTM D4318/ AASHTO T89, T90

Sample Location	B4-S4
Depth	8 feet
Percent Passing #40	73
Liquid Limit (LL)	**21**
Plastic Limit (PL)	**15**
Plasticity Index (PI)	**6**
USCS Class of -#40	CL-ML, Silty Clay



LL, PL and PI values are percent moisture of the soil by dry mass.

Test is performed on the 'matrix' fraction of the soil, finer than the #40 (0.425mm) sieve.

The Liquid Limit is the moisture content at which the matrix fraction of the soil changes from a stiff to a flowing consistency. The plastic limit is the moisture content at which it changes from cohesive to crumbly. The Plasticity Index is the Liquid Limit minus the Plastic Limit.

Reviewed by: *Kevin Patton*

Form ABL

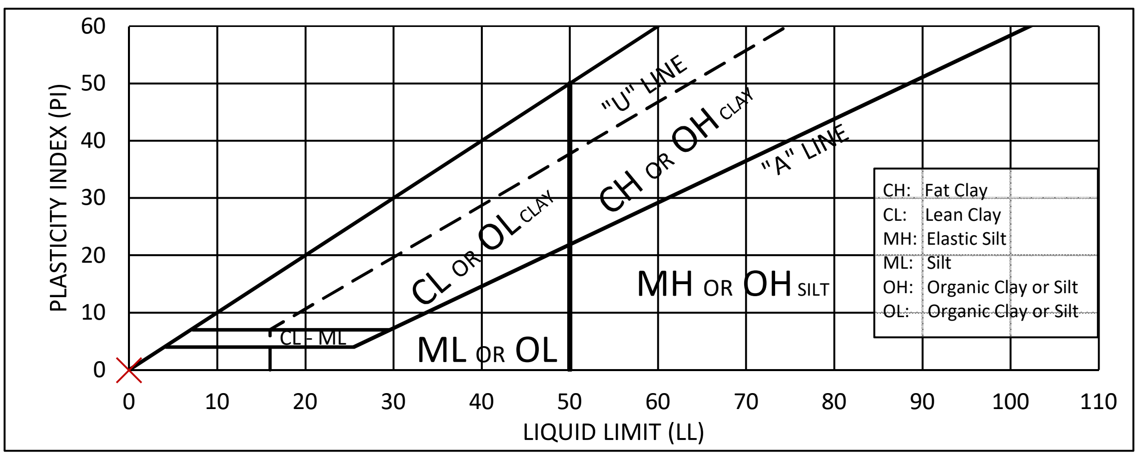
KEVIN L. PATTON, P.E.
36 PATTON ROAD
NEWBURGH, NY 12550
845 275-7732 PATTONGEOTECH.COM

CLIENT:	RDM Group		
PROJECT:	79 Dolsontown, Town of Wawayanda, N.Y.		
PROJECT No.:	21402	SAMPLE LOT No.:	211109-1
DATE SAMPLED:	11/11/2021	DATE TESTED:	11/23/2021
SAMPLED BY:	Wyeth Patton	TESTED BY:	Wyeth Patton

ATTERBERG LIMITS TEST

TEST METHODS: ASTM D4318/ AASHTO T89, T90

Sample Location	B10-S4
Depth	9 feet
Percent Passing #40	100
Liquid Limit (LL)	**None**
Plastic Limit (PL)	**23**
Plasticity Index (PI)	**Non-plastic**
USCS Class of -#40	ML, Silt



LL, PL and PI values are percent moisture of the soil by dry mass.

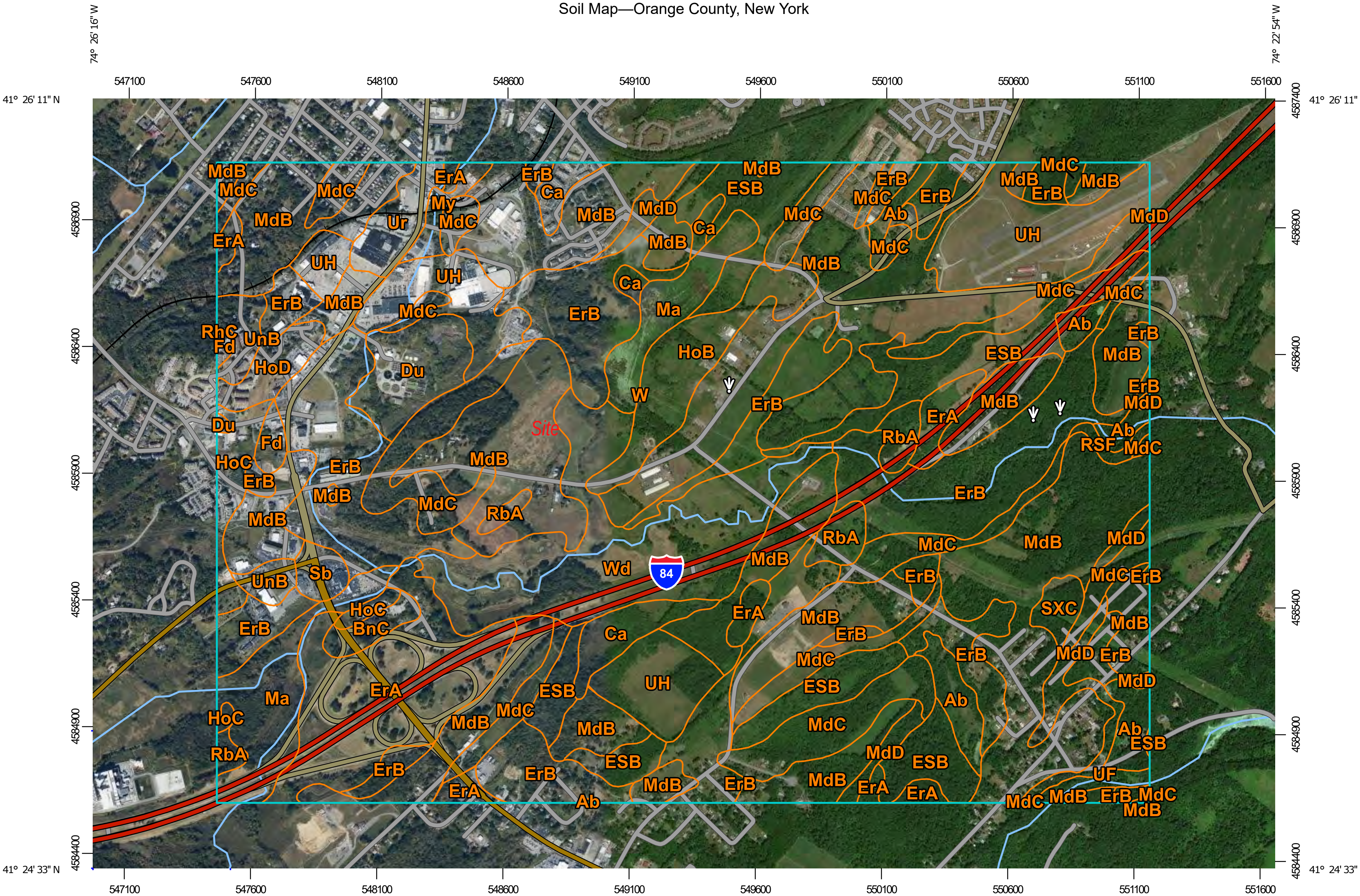
Test is performed on the 'matrix' fraction of the soil, finer than the #40 (0.425mm) sieve.

The Liquid Limit is the moisture content at which the matrix fraction of the soil changes from a stiff to a flowing consistency. The plastic limit is the moisture content at which it changes from cohesive to crumbly. The Plasticity Index is the Liquid Limit minus the Plastic Limit.

Reviewed by: *Kevin Patton*

Form ABL

Soil Map—Orange County, New York



Map Scale: 1:21,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 300, 600, 1200, 1800

Feet: 0, 1000, 2000, 4000, 6000

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

MAP LEGEND

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

Soils
Soil Map Unit Polygons
Soil Map Unit Lines
Soil Map Unit Points

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

Spoil Area
Stony Spot
Very Stony Spot
Wet Spot
Other
Special Line Features

Water Features
Streams and Canals

Transportation
Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background
Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Orange County, New York
Survey Area Data: Version 21, 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: Oct 7, 2013—Oct 5, 2019

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
Ab	Alden silt loam	42.6	1.8%
BnC	Bath-Nassau channery silt loams, 8 to 15 percent slopes	10.1	0.4%
Ca	Canandaigua silt loam	33.1	1.4%
Du	Dumps	36.8	1.6%
ErA	Erie gravelly silt loam, 0 to 3 percent slopes	136.6	5.9%
ErB	Erie gravelly silt loam, 3 to 8 percent slopes	396.1	17.1%
ESB	Erie extremely stony soils, gently sloping	143.9	6.2%
Fd	Fredon loam	7.9	0.3%
HoB	Hoosic gravelly sandy loam, 3 to 8 percent slopes	47.8	2.1%
HoC	Hoosic gravelly sandy loam, 8 to 15 percent slopes	24.9	1.1%
HoD	Hoosic gravelly sandy loam, 15 to 25 percent slopes	17.3	0.7%
Ma	Madalin silt loam	79.1	3.4%
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	718.8	31.0%
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes	192.7	8.3%
MdD	Mardin gravelly silt loam, 15 to 25 percent slopes	37.5	1.6%
My	Middlebury silt loam	9.2	0.4%
RbA	Rhinebeck silt loam, 0 to 3 percent slopes	25.6	1.1%
RhC	Riverhead sandy loam, 8 to 15 percent slopes	0.1	0.0%
RSF	Rock outcrop-Nassau complex, very steep	4.2	0.2%
Sb	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	9.5	0.4%
SXC	Swartswood and Mardin soils, sloping, very stony	9.3	0.4%
UF	Udifluvents-Fluvaquents complex, frequently flooded	6.9	0.3%
UH	Udorthents, smoothed	142.2	6.1%
UnB	Unadilla silt loam, 0 to 8 percent slopes	19.4	0.8%
Ur	Urban land	20.4	0.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
W	Water	0.5	0.0%
Wd	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	144.0	6.2%
Totals for Area of Interest		**2,316.7**	**100.0%**

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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

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

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

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

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H	L-R-H
ErB—Erie gravelly silt loam, 3 to 8 percent slopes														
Erie	80	D	0-9	Gravelly silt loam	GM, ML, SM	A-2, A-4	0- 0- 0	0- 2- 5	65-85-90	50-75-75	35-65-70	20-60-65	30-35-40	5-8 -10
			9-18	Channery fine sandy loam, channery silt loam, channery loam	CL-ML, CL, GC, SC	A-1, A-2, A-4	0- 0- 2	0- 2- 10	65-85-90	50-75-75	35-65-70	20-55-65	15-20-25	5-8 -10
			18-54	Channery silt loam, channery silty clay loam, very channery loam	CL, GC, SC	A-2, A-4, A-6	0- 2- 5	0- 2- 20	50-80-85	35-70-70	25-65-70	20-55-65	25-30-35	10-13-15
			54-70	Channery silt loam, channery silty clay loam, very channery loam	CL, GC, SC	A-2, A-6	0- 2- 5	0- 2- 25	50-80-85	35-70-70	25-65-70	20-55-65	25-30-35	10-13-15

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
HoB—Hoosic gravelly sandy loam, 3 to 8 percent slopes														
Hoosic	80	A	0-6	Gravelly sandy loam	GM, ML, SM	A-1, A-2, A-4, A-5	0- 0- 0	0- 5- 10	50-70-90	35-60-75	15-40-65	10-20-50	30-38 -45	2-6 -10
			6-28	Gravelly sandy loam, very gravelly sandy loam, gravelly loam	SC-SM, SP-SM, GM, SM	A-1, A-2, A-4	0- 0- 0	0- 7- 10	50-65-90	35-50-75	15-30-65	10-15-50	20-25 -30	2-5 -8
			28-60	Very gravelly sand, very gravelly loamy sand, extremely gravelly loamy sand	GM, GP, GW, SM	A-1	0- 0- 0	0- 8- 15	40-50-75	30-35-50	15-20-30	0- 2- 15	—	NP
Ma—Madalin silt loam														
Madalin	80	C/D	0-10	Silt loam	MH, ML	A-6, A-7	0- 0- 0	0- 0- 0	95-100-100	95-100-100	80-95-100	65-80-95	35-50 -65	10-18-25
			10-38	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	95-100-100	95-100-100	80-95-100	65-85-95	38-52 -65	20-28-35
			38-60	Stratified silty clay, clay	CH, CL	A-6, A-7	0- 0- 0	0- 0- 0	95-100-100	95-100-100	80-95-100	65-85-95	35-48 -60	15-25-35

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
MdB—Mardin gravelly silt loam, 3 to 8 percent slopes														
Mardin	85	D	0-8	Silt loam, gravelly silt loam, channery silt loam, channery loam	GC-GM, MH, ML	A-2-4, A-4, A-7-5	0- 0- 3	0- 4- 19	43-70-90	41-68-90	33-62-89	28-54-82	27-35 -56	6-9 -16
			8-15	Flaggy silt loam, channery loam, silt loam, loam, channery silt loam, gravelly silt loam, gravelly loam	GC-GM, CL	A-2-4, A-4, A-6	0- 0- 3	0- 4- 18	44-71-91	41-69-90	34-61-88	28-54-81	22-27 -38	6-9 -15
			15-20	Channery loam, silt loam, loam, channery silt loam, gravelly silt loam, gravelly loam	CL-ML, CL, GM	A-2-4, A-4, A-6	0- 0- 3	0- 4- 18	46-72-91	43-71-91	34-63-88	26-51-77	17-23 -32	2-7 -12
			20-72	Very flaggy silt loam, very flaggy loam, very channery loam, very channery silt loam, channery loam, channery silt loam, gravelly loam, gravelly silt loam	CL, GM	A-1-b, A-6	0- 3- 17	3- 6- 40	33-74-82	30-73-81	23-63-80	18-55-73	16-28 -35	2-12-17

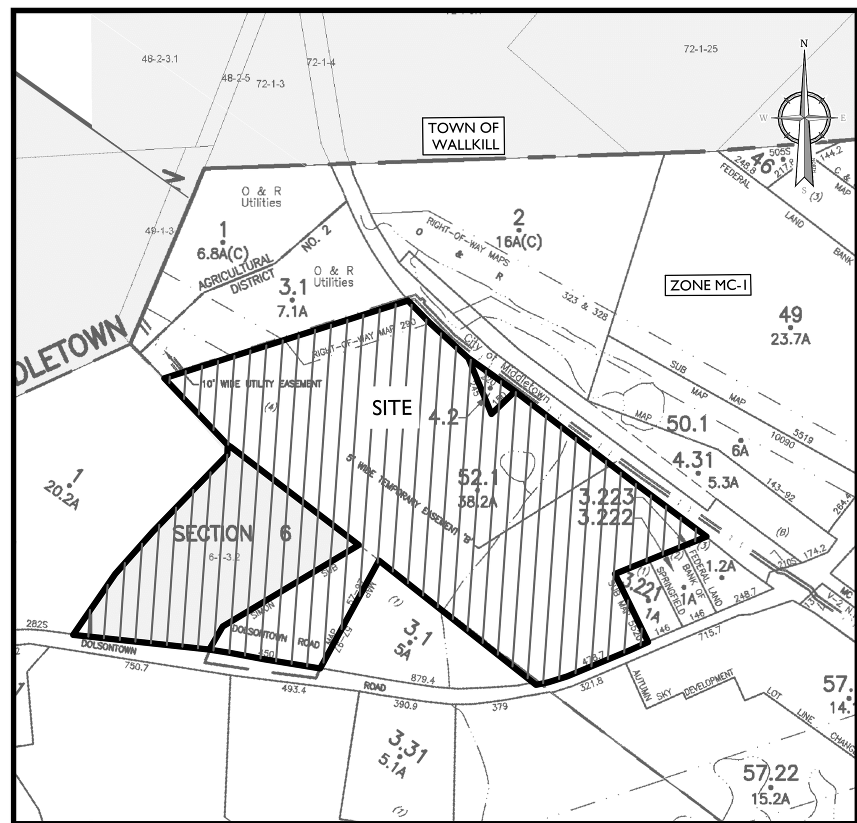
Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
Wd—Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded														
Wayland	60	B/D	0-9	Mucky silt loam, silt loam, silty clay loam	MH, ML, OH	A-4, A-7-5	0- 0- 0	0- 0- 0	94-100-100	89-100-100	79-99-100	74-94-100	31-51-72	7-14-21
			9-21	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	83-99-100	77-93-100	27-39-58	9-15-24
			21-28	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	82-99-100	75-91-100	26-36-54	9-14-24
			28-47	Silt loam, silty clay loam	CH, CL	A-6, A-7-6	0- 0- 0	0- 0- 0	96-100-100	91-100-100	84-99-100	77-91-100	29-37-50	12-17-24
			47-54	Silt loam, silty clay loam, fine sandy loam, gravelly loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	45-99-100	38-88-100	16-36-51	2-17-28

Engineering Properties–Orange County, New York														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
			54-60	Silt loam, silty clay loam, gravelly loam, fine sandy loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	46-99-100	39-88-100	16-36-51	2-17-28
Wayland, very poorly drained	30	B/D	0-9	Silt loam, mucky silt loam, silty clay loam	OH, OL	A-5, A-7-5	0- 0- 0	0- 0- 0	93-100-100	87-100-100	77-99-100	73-94-100	44-63-82	7-14-21
			9-21	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	83-99-100	77-93-100	27-39-58	9-15-24
			21-28	Silt loam, silty clay loam	CL, MH	A-6, A-7-5	0- 0- 0	0- 0- 0	95-100-100	91-100-100	82-99-100	75-91-100	26-36-54	9-14-24
			28-47	Silt loam, silty clay loam	CH, CL	A-6, A-7-6	0- 0- 0	0- 0- 0	96-100-100	91-100-100	84-99-100	77-91-100	29-37-50	12-17-24
			47-54	Silt loam, silty clay loam, fine sandy loam, gravelly loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	45-99-100	38-88-100	16-36-51	2-17-28
			54-60	Silt loam, silty clay loam, fine sandy loam, gravelly loam, clay loam	CH, CL, GM	A-4, A-6, A-7-6	0- 0- 0	0- 0- 7	58-100-100	58-100-100	46-99-100	39-88-100	16-36-51	2-17-28

Data Source Information

Soil Survey Area: Orange County, New York
Survey Area Data: Version 22, Aug 29, 2021

Section 6



TOWN OF WAWAYANDA TAX MAP

SCALE: 1" = 500'

SOURCE: ORANGE COUNTY, NY TAX MAP

PRELIMINARY SITE PLANS

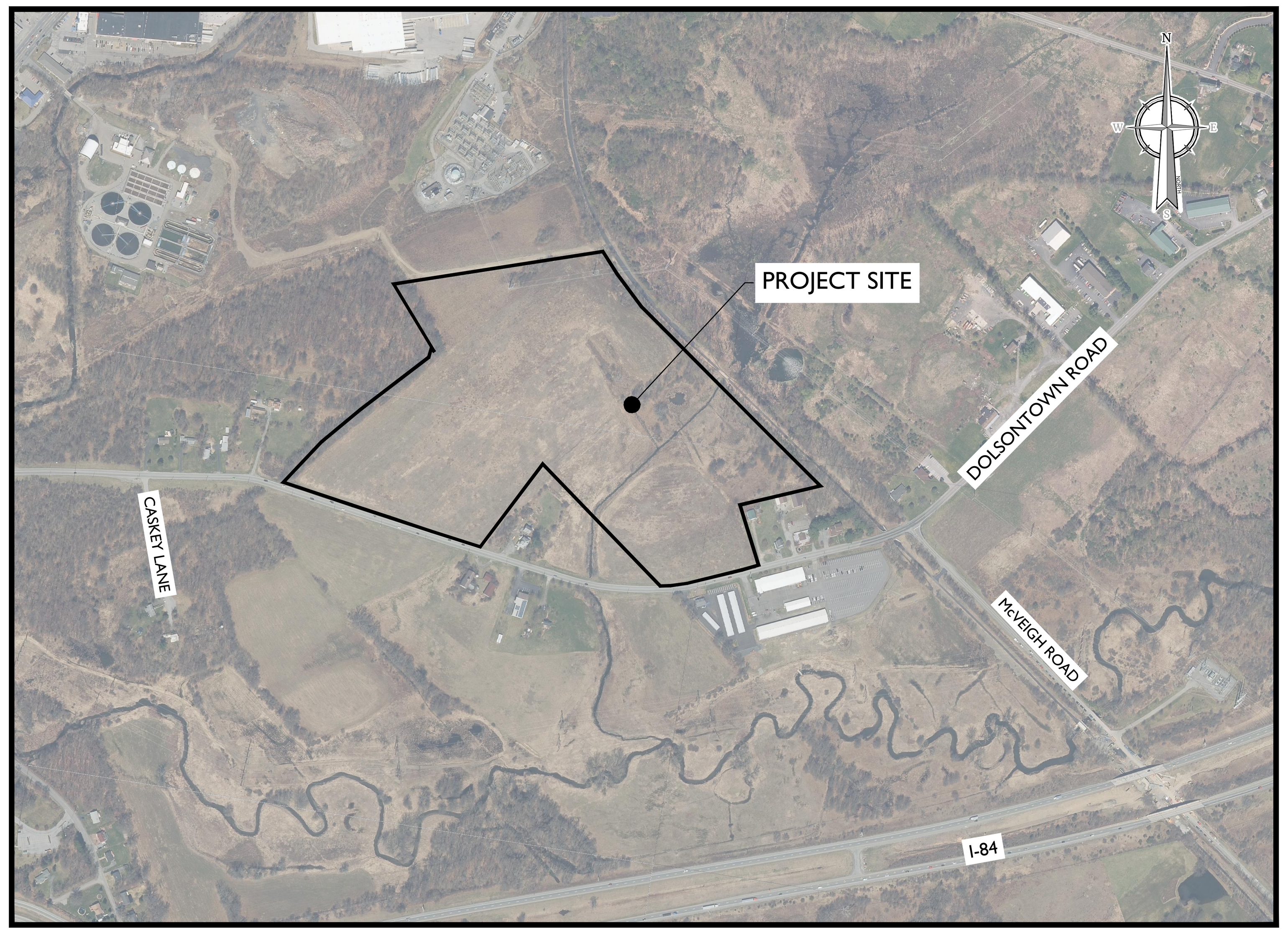
FOR

DOLSONTOWN ROAD EAST, LLC

TAX LOTS 1-1-52.1, 1-1-4.2 & 6-1-3.2

TOWN OF WAWAYANDA

ORANGE COUNTY, NEW YORK STATE



500 0 500

SCALE : 1" = 500'

SITE LOCATION MAP

SOURCE: NEW YORK STATE CLEARING HOUSE

INDEX OF SHEETS

SHT. No.	DESCRIPTION	LATEST REVISION
1	COVER SHEET	1/27/2023
2	EXISTING CONDITIONS & DEMOLITION PLAN	1/27/2023
3	OVERALL DIMENSION PLAN	1/27/2023
4-6	DIMENSION PLANS	1/27/2023
7-9	GRADING & DRAINAGE PLANS	1/27/2023
10	UTILITY PLAN	1/27/2023
11	SOIL EROSION & SEDIMENT CONTROL PLAN	1/27/2023
12	SOIL EROSION & SEDIMENT CONTROL DETAILS	1/27/2023
13-15	LANDSCAPE PLAN	1/27/2023
16-18	LIGHTING PLAN	1/27/2023
19-23	CONSTRUCTION DETAILS	1/27/2023

GENERAL INFORMATION

1. THE SUBJECT PROPERTY IS KNOWN AS TAX LOTS 1-1-52.1, 1-1-4.2 & 6-1-3.2 IN THE TOWN OF WAWAYANDA ORANGE COUNTY, NEW YORK
2. THE PROPERTY IS LOCATED IN THE MC-1 (MIXED COMMERCIAL) ZONE DISTRICT AND CONTAINS A TOTAL TRACT AREA OF 2,118,257 S.F. / 48.63 ACRES.

   OWNER: DOLSONTOWN ROAD, LLC
   100 LAMONT STREET
   ELMSFORD, NEW YORK 10523

   APPLICANT: DOLSONTOWN ROAD EAST, LLC
   1 INTERNATIONAL BOULEVARD, SUITE 410
   MAHWAH, NEW JERSEY 07430
3. BOUNDARY AND TOPOGRAPHIC INFORMATION SHOWN HEREON IS TAKEN FROM A PLAN ENTITLED "OUTBOUND & TOPOGRAPHIC SURVEY PREPARED FOR 79 DOLSONTOWN ROAD SECTION 1, BLOCK 1, LOT 52.1 & 4.2, SECTION 6, BLOCK 1, LOT 3.2" AND PREPARED BY JOHN W. McCORD, SR. DATED MARCH 23, 2021. LAST REVISED JUNE 22, 2021
4. THE HORIZONTAL DATUM IS RELATIVE TO NAD83. THE VERTICAL DATUM IS RELATIVE TO N.A.V.D. 1988.
5. THE LIMITS OF FRESHWATER WETLANDS SHOWN HEREON WERE FIELD DELINEATED BY BY ECOLOGICAL SOLUTIONS, LLC ON 03/13/2021 AND A WETLAND VALIDATION IS CURRENTLY PENDING.
6. NO 100 YEAR FLOOD PLAINS ARE KNOWN TO EXIST ON THE SITE PER THE FLOOD INSURANCE RATE MAP 36071C0266E DATED 8/3/2009 PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.
7. GEOTECHNICAL INFORMATION AND SOIL TEST PIT LOCATIONS SHOWN HEREON ARE AS PRESENTED IN A REPORT ENTITLED "GEOTECHNICAL INVESTIGATION REPORT FOR 79 DOLSONTOWN ROAD TOWN OF WAWAYANDA, N.Y.", DATED: DECEMBER 4,2021, PREPARED BY KEVIN L. PATTON, P.E..
8. THIS SET OF PLANS IS NOT DEPICTING ENVIRONMENTAL CONDITIONS OR A CERTIFICATION/WARRANTY REGARDING THE PRESENCE OR ABSENCE OF ENVIRONMENTALLY IMPACTED SITE CONDITIONS. MASER CONSULTING HAS PERFORMED NO EXPLORATORY OR TESTING SERVICES, INTERPRETATIONS, CONCLUSIONS OR OTHER SITE ENVIRONMENTAL SERVICES RELATED TO THE DETERMINATION OF THE POTENTIAL FOR CHEMICAL, TOXIC, RADIOACTIVE OR OTHER TYPE OF CONTAMINANTS AFFECTING THE PROPERTY AND THE UNDERSIGNED PROFESSIONAL IS NOT QUALIFIED TO DETERMINE THE EXISTENCE OF SAME. SHOULD ENVIRONMENTAL CONTAMINATION OR WASTE BE DISCOVERED, THE OWNER AND CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE LAWS AND REGULATIONS.
9. THIS IS A SITE DEVELOPMENT PLAN AND UNLESS SPECIFICALLY NOTED ELSEWHERE HEREON, IS NOT A SURVEY.
10. DO NOT SCALE DRAWINGS AS THEY PERTAIN TO ADJACENT AND SURROUNDING PHYSICAL CONDITIONS, BUILDINGS, STRUCTURES, ETC. THEY ARE SCHEMATIC ONLY, EXCEPT WHERE DIMENSIONS ARE SHOWN THERETO.
11. THIS SET OF PLANS HAS BEEN PREPARED FOR THE PURPOSES OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL APPROVALS REQUIRED HAVE BEEN OBTAINED, ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED AND THE DRAWINGS HAVE BEEN STAMPED "ISSUED FOR CONSTRUCTION". THIS SHALL INCLUDE APPROVAL OF ALL CATALOG CUTS, SHOP DRAWINGS AND/OR DESIGN CALCULATIONS AS REQUIRED BY THE PROJECT OWNER AND/OR MUNICIPAL ENGINEER.
12. THE CONTRACTOR IS RESPONSIBLE FOR PROJECT SAFETY, INCLUDING PROVISION OF ALL APPROPRIATE SAFETY DEVICES AND TRAINING REQUIRED.
13. PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL CALL 811 TO REQUEST A UTILITY MARKOUT.
14. INFORMATION HEREON INCORPORATES THE CONTENT IN THE FOLLOWING REPORTS:
    A. "STORMWATER POLLUTION PREVENTION PLAN (SWPPP)" PREPARED FOR DOLSONTOWN ROAD, LLC AND PREPARED BY COLLIERS ENGINEERING & DESIGN, REVISED JANUARY 2023.
    B. "STORMWATER INFILTRATION TESTING REPORT" PREPARED FOR 79 DOLSONTOWN ROAD WAWAYANDA, NY AND PREPARED BY KEVIN L. PATTON, P.E. DATED MAY 5, 2022.

SITE NOTES

1. BUILDING FOOTPRINT DIMENSIONS SHOWN HEREON ARE APPROXIMATE. FINAL BUILDING FOOTPRINT DIMENSIONS FOR EACH BUILDING SHALL BE FURNISHED ON THE INDIVIDUAL ARCHITECTURAL PLANS AT THE TIME OF APPLICATION FOR A BUILDING PERMIT. ALL STRUCTURES SHALL CONFORM TO THE APPROVED BULK ZONING REQUIREMENTS.
2. CURBS SHALL BE DEPRESSED FLUSH WITH PAVEMENT, AND HANDICAP ACCESSIBLE RAMPS INSTALLED WHERE SIDEWALKS AND CROSSWALKS INTERSECT SAME. DETECTABLE WARNINGS SHALL BE INCLUDED ON HANDICAP ACCESSIBLE RAMPS.
3. TRAFFIC SIGNAGE AND STRIPING SHALL CORRESPOND TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
4. REFUSE AND RECYCLABLES SHALL BE STORED WITHIN OUTDOOR ROLL-OFF CONTRAINERS AND PICKED UP BY PRIVATE WASTE DISPOSAL HAULER.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER DISPOSAL OF ALL WASTE MATERIALS IN ACCORDANCE WITH GOVERNING REGULATIONS AND AGENCIES.
6. THERE SHALL BE NO ON-SITE BURIAL OF CONSTRUCTION MATERIALS, TREE BRANCHES, STUMPS, OR OTHER DELETERIOUS MATERIALS.
7. MATERIALS, WORKMANSHIP, AND CONSTRUCTION FOR THE SITE IMPROVEMENTS SHOWN HEREON SHALL BE IN ACCORDANCE WITH:
   A. NEW YORK STATE DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS", 2018; AS SUPPLEMENTED.
   B. CURRENT PREVAILING MUNICIPAL, COUNTY, AND/OR STATE AGENCY SPECIFICATIONS, STANDARDS, CONDITIONS, AND REQUIREMENTS.
   C. CURRENT PREVAILING UTILITY COMPANY/AUTHORITY SPECIFICATIONS, STANDARDS, AND REQUIREMENTS.
   D. CURRENT MANUFACTURER SPECIFICATIONS, STANDARDS, AND REQUIREMENTS.

UTILITY NOTES

1. EXISTING UTILITY INFORMATION SHOWN HEREON HAS BEEN COLLECTED FROM VARIOUS SOURCES AND IS NOT GUARANTEED AS TO ACCURACY OR COMPLETENESS. THE CONTRACTOR SHALL VERIFY ALL INFORMATION TO HIS SATISFACTION PRIOR TO EXCAVATION. WHERE EXISTING UTILITIES ARE TO BE CROSSED BY PROPOSED CONSTRUCTIONS, TEST PITS SHALL BE DUG BY THE CONTRACTOR PRIOR TO CONSTRUCTION TO ASCERTAIN EXISTING INVERTS, MATERIALS, AND SIZES. TEST PIT INFORMATION SHALL BE GIVEN TO THE ENGINEER PRIOR TO CONSTRUCTION TO PERMIT ADJUSTMENTS AS REQUIRED TO AVOID CONFLICTS. THE CONTRACTOR SHALL NOTIFY THE UNDER SIGNED PROFESSIONAL IMMEDIATELY IF ANY FIELD CONDITIONS ENCOUNTERED DIFFER MATERIALLY FROM THOSE REPRESENTED HEREON. SUCH CONDITIONS COULD RENDER THE DESIGNS HEREON INAPPROPRIATE OR INEFFECTIVE.
2. UTILITY RELOCATIONS SHOWN HEREON, IF ANY, ARE FOR INFORMATIONAL PURPOSES ONLY AND MAY NOT REPRESENT ALL REQUIRED UTILITY RELOCATIONS. THE CONTRACTOR IS RESPONSIBLE FOR PERFORMING AND/OR COORDINATING ALL REQUIRED UTILITY RELOCATIONS IN COOPERATION WITH THE RESPECTIVE UTILITY COMPANY/AUTHORITIES.
3. STORM SEWERS SHALL BE CLASS III (OR HIGHER IF NOTED) REINFORCED CONCRETE PIPE (RCP) WITH "O" RING GASKETS OR INTERNALLY PRELUBRICATED GASKET (TYLOX SUPERSEAL OR EQUIVALENT, ADS N-12 HIGH DENSITY POLYETHYLENE PIPE (HDPE), AS NOTED ON THE PLAN, OR APPROVED EQUAL. PROPER PIPE COVERAGE SHALL BE MAINTAINED DURING ALL PHASES OF CONSTRUCTION. PIPE LENGTHS SHOWN HEREON ARE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
4. WATER SERVICE TO BE PROVIDED FROM THE EXISTING WATER MAIN LINE ON DOLSONTOWN ROAD, OWNED AND OPERATED BY THE TOWN OF WAWAYANDA WATER DEPARTMENT. PROPOSED WATER MAIN EXTENSIONS AND FIRE HYDRANT LOCATIONS ARE SUBJECT TO MUNICIPAL REVIEW AND APPROVAL. PIPE MATERIALS SHALL BE CEMENT LINED DUCTILE IRON PIPE CLASS 52 AS NOTED ON THE PLANS. WATER MAINS SHALL BE INSTALLED TO PROVIDE A MINIMUM 4'-6" OF COVER FROM THE TOP OF PIPE TO THE PROPOSED GRADE.
5. SANITARY SEWER SERVICE SHALL BE PROVIDED BY FORCE MAIN CONNECTION TO EXISTING SEWER MAIN ON DOLSONTOWN ROAD, OWNED AN OPERATED BY THE TOWN OF WAWAYANDA SEWER DEPARTMENT. PROPOSED SEWER MAIN EXTENSIONS AND MANHOLE LOCATIONS ARE SUBJECT TO MUNICIPAL REVIEW AND APPROVAL. PIPE MATERIALS SHALL BE PVC SDR-35, EXCEPT AS NOTED OTHERWISE ON THE PLANS. EXCEPT WHERE SHALLOWER DEPTHS ARE PERMITTED BY THE MUNICIPALITY OR UTILITY AUTHORITY, SEWER LINES, INCLUDING FORCE MAINS AND LATERALS, SHALL BE INSTALLED TO PROVIDE A MINIMUM 4 FEET OF COVER FROM THE TOP OF PIPE TO PROPOSED GRADE.
6. ALL WATER MAINS SHOULD BE SEPARATED FROM SANITARY SEWER AND INDUSTRIAL DISCHARGE LINES BY A MINIMUM HORIZONTAL DISTANCE OF 10 FEET. IF SUCH HORIZONTAL SEPARATION IS NOT POSSIBLE, THE WATER AND SEWER LINES SHALL BE IN SEPARATE TRENCHES (STEP TRENCHES ARE PROHIBITED) WITH THE TOP OF THE SEWER LINE AT LEAST 18 INCHES BELOW THE BOTTOM OF THE WATER MAIN ENCASED IN CONCRETE OR WITH SUCH SEPARATION EXPRESSLY APPROVED BY THE DEPARTMENT OF HEALTH.
7. AT THE CROSSINGS OF SEWER LINES AND WATER MAINS, THE TOP OF THE SEWER LINES SHALL BE AT LEAST 18 INCHES BELOW THE BOTTOM OF THE WATER MAIN (SEWER SERVICE LATERALS ARE NOT SUBJECT TO THIS REQUIREMENT). IF SUCH VERTICAL SEPARATION IS NOT POSSIBLE, THE WATER LINE SHALL BE ENCASED IN CONCRETE.
8. GAS, ELECTRIC, LIGHTING, CABLE TELEVISION, AND ELECTRICAL SERVICE PLANS, IF REQUIRED, SHALL BE PREPARED BY THE RESPECTIVE UTILITY COMPANIES THAT SERVICE THE AREA PRIOR TO SITE CONSTRUCTION AND SHALL BE INSTALLED PER ORDINANCE OR LOCAL UTILITY COMPANIES REQUIREMENTS.
9. TELEPHONE, ELECTRIC, AND GAS LINES WILL BE INSTALLED UNDERGROUND. CROSSINGS OF PROPOSED PAVEMENTS WILL BE INSTALLED PRIOR TO THE CONSTRUCTION OF PAVEMENT BASE COURSE.

THESE GENERAL NOTES SHALL APPLY TO ALL SHEETS IN THIS SET.

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Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
COLLIERS ENGINEERING & DESIGN CT, P.C.
N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS

FOR

DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

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SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

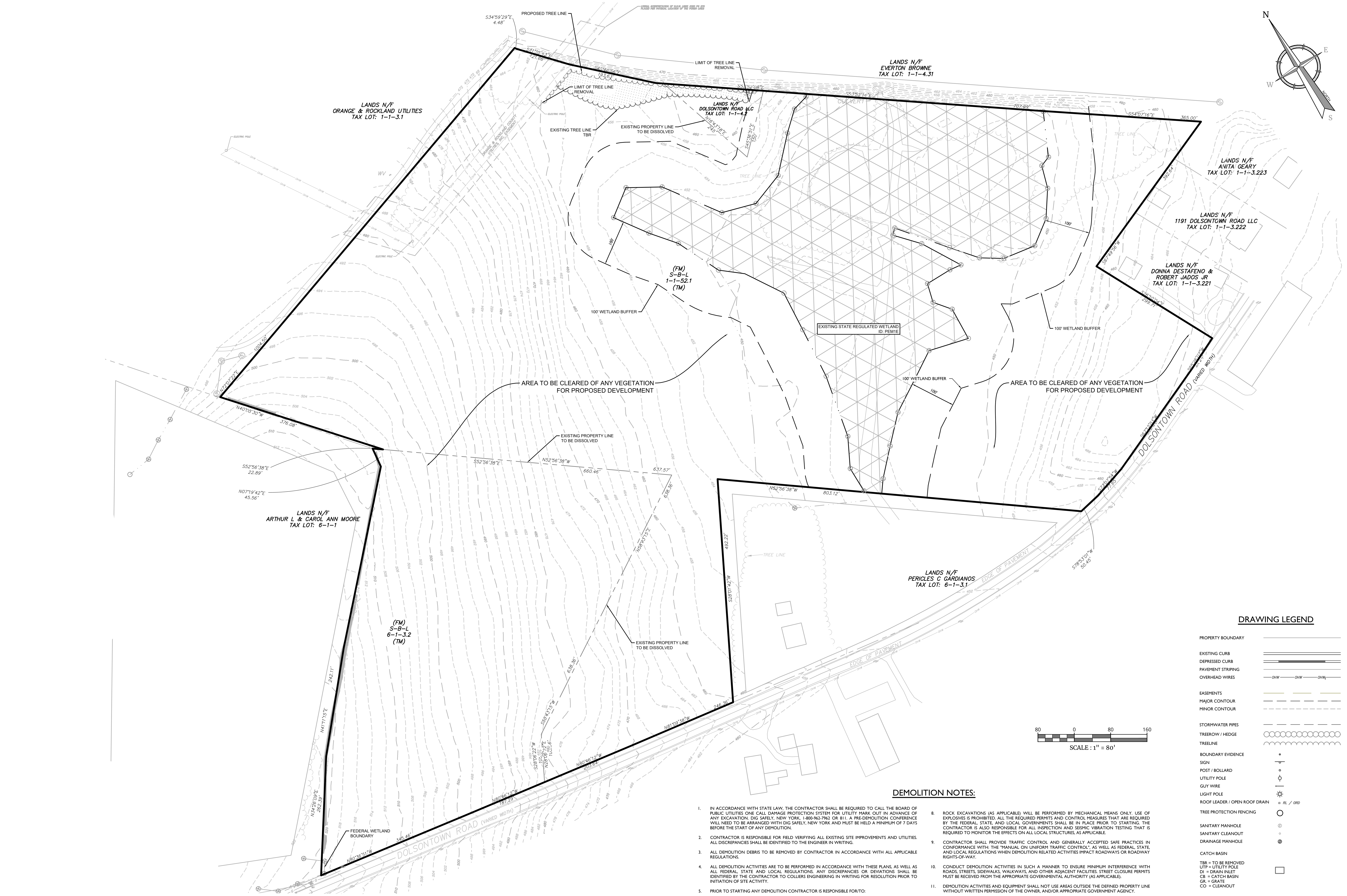
PROJECT NUMBER: 20006912B

DRAWING NAME: C-COVER

SHEET TITLE: COVER SHEET

SHEET NUMBER: 01 of 23

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



DEMOLITION NOTES:

1. IN ACCORDANCE WITH STATE LAW, THE CONTRACTOR SHALL BE REQUIRED TO CALL THE BOARD OF PUBLIC UTILITIES ONE CALL DAMAGE PROTECTION SYSTEM FOR UTILITY MARK OUT IN ADVANCE OF ANY EXCAVATION. DIG SAFELY, NEW YORK, 1-800-962-7962 OR 811. A PRE-DEMOLITION CONFERENCE WILL NEED TO BE ARRANGED WITH DIG SAFELY, NEW YORK AND MUST BE HELD A MINIMUM OF 7 DAYS BEFORE THE START OF ANY DEMOLITION.
2. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING SITE IMPROVEMENTS AND UTILITIES. ALL DISCREPANCIES SHALL BE IDENTIFIED TO THE ENGINEER IN WRITING.
3. ALL DEMOLITION DEBRIS TO BE REMOVED BY CONTRACTOR IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS.
4. ALL DEMOLITION ACTIVITIES ARE TO BE PERFORMED IN ACCORDANCE WITH THESE PLANS, AS WELL AS ALL FEDERAL, STATE AND LOCAL REGULATIONS. ANY DISCREPANCIES OR DEVIATIONS SHALL BE IDENTIFIED BY THE CONTRACTOR TO COLLIERS ENGINEERING IN WRITING FOR RESOLUTION PRIOR TO INITIATION OF SITE ACTIVITY.
5. PRIOR TO STARTING ANY DEMOLITION CONTRACTOR IS RESPONSIBLE FOR/TO:
   A. ENSURING COPIES OF ALL PERMITS AND APPROVALS MUST BE MAINTAINED ON SITE AND AVAILABLE FOR REVIEW (SEE "EROSION AND SEDIMENT CONTROL PLAN," THIS DRAWING SET).
   B. INSTALLING THE REQUIRED SOIL EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO SITE DISTURBANCE.
   C. ALL UTILITIES AND SERVICES, INCLUDING BUT NOT LIMITED TO GAS, WATER, ELECTRIC, SANITARY AND STORM SEWER, TELEPHONE, CABLE, FIBER OPTIC CABLE, ETC. WITHIN THE LIMITS OF DISTURBANCE. THE CONTRACTOR SHALL USE AND COMPLY WITH THE REQUIREMENTS OF THE APPLICABLE UTILITY NOTIFICATION SYSTEM TO LOCATE ALL THE UNDERGROUND UTILITIES.
   D. PROTECTING AND MAINTAINING IN OPERATION, ALL ACTIVE SYSTEMS THAT ARE NOT BEING REMOVED DURING ALL DEMOLITION ACTIVITIES.
   E. FAMILIARIZING THEMSELVES WITH THE APPLICABLE UTILITY SERVICE PROVIDER AND IS RESPONSIBLE FOR ALL COORDINATION REGARDING PROVIDER AND IS RESPONSIBLE FOR ALL COORDINATION REGARDING UTILITY DEMOLITION REQUIRED FOR THE PROJECT. THE CONTRACTOR SHALL PROVIDE THE OWNER WRITTEN NOTIFICATION THAT THE EXISTING UTILITIES AND SERVICES HAVE BEEN TERMINATED AND ABANDONED IN ACCORDANCE WITH JURISDICTION AND UTILITY COMPANY REQUIREMENTS.
   F. CLEAN THE EXISTING UTILITY STRUCTURES ON-SITE PRIOR TO CONSTRUCTION AND VERIFY THE INVERTS FOR CONNECTION.
6. COLLIERS ENGINEERING IS NOT RESPONSIBLE FOR JOB SITE SAFETY OR SUPERVISION. CONTRACTOR IS TO PROCEED WITH THE DEMOLITION IN A SYSTEMATIC AND SAFE MANNER, FOLLOWING ALL THE O.S.H.A. REQUIREMENTS, TO ENSURE PUBLIC AND CONTRACTOR SAFETY.
7. THE CONTRACTOR SHALL PROVIDE ALL THE "MEANS AND METHODS" NECESSARY TO PREVENT MOVEMENT, SETTLEMENT, OR COLLAPSE OF EXISTING STRUCTURES, AND ANY OTHER IMPROVEMENTS THAT ARE REMAINING ON OR OFF SITE. THE DEMOLITION CONTRACTOR IS RESPONSIBLE FOR ALL REPAIRS OF DAMAGE TO ALL ITEMS THAT ARE TO REMAIN AS A RESULT OF HIS ACTIVITIES. ALL REPAIRS SHALL USE NEW MATERIAL. THE REPAIRS SHALL RESTORE THE ITEM TO THE PRE-DEMOLITION CONDITION.
8. ROCK EXCAVATIONS (AS APPLICABLE) WILL BE PERFORMED BY MECHANICAL MEANS ONLY. USE OF EXPLOSIVES IS PROHIBITED. ALL THE REQUIRED PERMITS AND CONTROL MEASURES THAT ARE REQUIRED BY THE FEDERAL, STATE, AND LOCAL GOVERNMENTS SHALL BE IN PLACE PRIOR TO STARTING. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ALL INSPECTION AND SEISMIC VIBRATION TESTING THAT IS REQUIRED TO MONITOR THE EFFECTS ON ALL LOCAL STRUCTURES, AS APPLICABLE.
9. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL AND GENERALLY ACCEPTED SAFE PRACTICES IN CONFORMANCE WITH: THE "MANUAL ON UNIFORM TRAFFIC CONTROL", AS WELL AS FEDERAL, STATE, AND LOCAL REGULATIONS WHEN DEMOLITION RELATED ACTIVITIES IMPACT ROADWAYS OR ROADWAY RIGHTS-OF-WAY.
10. CONDUCT DEMOLITION ACTIVITIES IN SUCH A MANNER TO ENSURE MINIMUM INTERFERENCE WITH ROADS, STREETS, SIDEWALKS, WALKWAYS, AND OTHER ADJACENT FACILITIES. STREET CLOSURE PERMITS MUST BE RECEIVED FROM THE APPROPRIATE GOVERNMENTAL AUTHORITY (AS APPLICABLE).
11. DEMOLITION ACTIVITIES AND EQUIPMENT SHALL NOT USE AREAS OUTSIDE THE DEFINED PROPERTY LINE WITHOUT WRITTEN PERMISSION OF THE OWNER, AND/OR APPROPRIATE GOVERNMENT AGENCY.
12. THIS DEMOLITION PLAN IS INTENDED TO IDENTIFY THOSE EXISTING ITEMS/CONDITIONS WHICH ARE TO BE REMOVED. IT IS NOT INTENDED TO PROVIDE DIRECTION OTHER THAN THAT ALL METHODS AND MEANS ARE TO BE IN ACCORDANCE WITH STATE, FEDERAL, LOCAL, AND JURISDICTIONAL REQUIREMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL O.S.H.A. AND OTHER SAFETY PRECAUTIONS NECESSARY TO PROVIDE A SAFE WORK SITE.
13. DEBRIS SHALL NOT BE BURIED ON THE SUBJECT SITE. ALL DEMOLITION WASTES AND DEBRIS (SOLID WASTE) SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL TOWN, COUNTY, STATE, AND FEDERAL LAWS AND APPLICABLE CODES.
14. DEMOLITION SHALL NOT PROCEED UNTIL THE APPROXIMATE LOCATION OF THE EXISTING UTILITIES ARE MARKED IN THE FIELD AND ALL UTILITY CONNECTIONS ARE SUITABLY SHUT OFF AND DISCONNECTED AND PROPER DEMOLITION PERMITS ARE IN PLACE WITH THE APPROPRIATE JURISDICTION.
15. CONTRACTOR IS RESPONSIBLE TO RESTORE ALL DISTURBED SITE AREAS TO ORIGINAL CONDITION AS DIRECTED BY THE OWNER.
16. PROTECT ALL EXISTING UTILITIES TO REMAIN (INCLUDING DRAINAGE STRUCTURES, HYDRANTS, VALVES, SEWER MANHOLES, ETC.) DURING DEMOLITION. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIMSELF OR SUB-CONTRACTORS.
17. THIS SET OF PLANS IS NOT DEPICTING ENVIRONMENTAL CONDITIONS OR A CERTIFICATION/WARRANTY REGARDING THE PRESENCE OR ABSENCE OF ENVIRONMENTALLY IMPACTED SITE CONDITIONS. MASER CONSULTING HAS PERFORMED NO EXPLORATORY OR TESTING SERVICE, INTERPRETATIONS, CONCLUSIONS OR OTHER SITE ENVIRONMENTAL SERVICES RELATED TO THE DETERMINATION OF POTENTIAL FOR CHEMICAL, TOXIC, OR RADIOACTIVE OR OTHER TYPE OF CONTAMINANTS AFFECTING THE PROPERTY AND THE UNDERSIGNED PROFESSIONAL IS NOT QUALIFIED TO DETERMINE THE EXISTENCE OF SAME. SHOULD ENVIRONMENTAL CONTAMINATION OR WASTE BE DISCOVERED, THE OWNER AND CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE LAW AND REGULATIONS.

REFERENCE NOTE:

1. EXISTING SITE INFORMATION TAKEN FROM MAP REFERENCE "OUTBOUND & TOPOGRAPHIC SURVEY PLAN PREPARED FOR 79 DOLSONTOWN ROAD - SECTION 1 - BLOCK 1 - LOT 52.1 & 4.2, SECTION 6 - BLOCK 1 - LOT 3.2" PREPARED BY JOHN W. McCORD, SR. DATED 03/23/2021, LAST REVISED 06/22/2021

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PRELIMINARY SITE PLANS
FOR
DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

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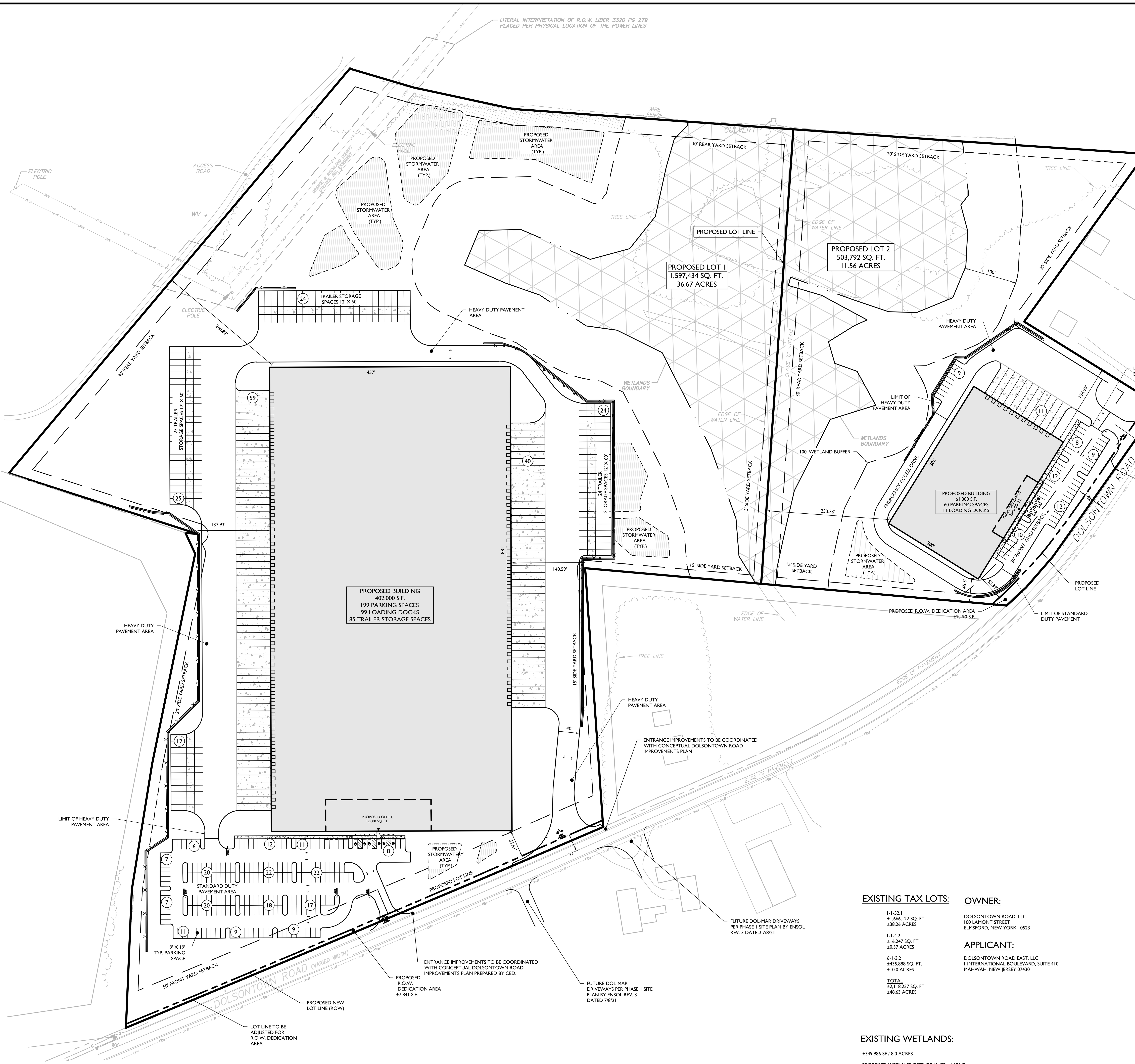
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER: 20006912B
DRAWING NAME: C-DEMO

SHEET TITLE:
EXISTING CONDITIONS & DEMOLITION PLAN

SHEET NUMBER:
02 of 23

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



LEGEND

EXISTING		PROPOSED
12+00 / 13+00	TRAVERSE LINE, CENTER LINE OR BASELINE (LABEL AS SUCH)	12+00 / 13+00
	RIGHT OF WAY LINE	
	PROPERTY LINE	
	EDGE OF PAVEMENT	
FACE / BACK	CURB	FACE / BACK
	DEPRESSED CURB	
	SIDEWALK	
X	FENCES	X
	TREELINE	
	ROADWAY SIGNS	
	WETLAND LINE	
	MUNICIPAL BOUNDARY LINE	
	STALL COUNT	10
	ADA ACCESSIBLE STALL	V
	DEPRESSED CURB AND ADA RAMP	HC
	DIRECTION OF TRAFFIC FLOW	

SCALE : 1" = 80'

80 0 80 160

PARKING REQUIREMENTS:

PROPOSED LOT 1

OFFICE USE:

1 PER 300 SF OF FLOOR AREA
12,000 SF = 40 SPACES

WAREHOUSE USE:

ITE PARKING GENERATION MANUAL:

WAREHOUSING USE - AVERAGE RATE OF 0.39 SPACES PER 1,000 S.F. GROSS FLOOR AREA
402,000 GROSS SQ. FT. / 1,000 X 0.39 = 157 SPACES

TOTAL PARKING REQUIRED = 199 SPACES
TOTAL PARKING PROVIDED = 199 SPACES (INCLUDES 6 ADA SPACES)

PROPOSED WAREHOUSE:
REQUIRED INTERIOR ISLAND SPACE (10 SQ.FT. PER PARKING SPACE) = 1,990 SQ.FT.
PROVIDED INTERIOR ISLAND SPACE = 3,849 SQ.FT.

PROPOSED LOT 2

OFFICE USE:

1 PER 300 SF OF FLOOR AREA
3,000 SF = 10 SPACES

WAREHOUSE USE:

ITE PARKING GENERATION MANUAL:

WAREHOUSING USE - AVERAGE RATE OF 0.39 SPACES PER 1,000 S.F. GROSS FLOOR AREA
61,000 GROSS SQ. FT. / 1,000 X 0.39 = 24 SPACES

TOTAL PARKING REQUIRED = 34 SPACES
TOTAL PARKING PROVIDED = 60 SPACES (INCLUDES 3 ADA SPACES)

PROPOSED WAREHOUSE:
REQUIRED INTERIOR ISLAND SPACE (10 SQ.FT. PER PARKING SPACE) = 600 SQ.FT.
PROVIDED INTERIOR ISLAND SPACE = 908 SQ.FT.

2020\20006912B\Engineering\Site Plans\C-LAYT.dwg\C-03-OVERALL LAYOUT By: MICHAEL.SABA

NOTES:

BUILDING INFORMATION SHOWN IS PRELIMINARY AND EGRESS LOCATIONS, TRASH RECEPTICALS/COMPACTORS, AND RAMP UP LOCATIONS TO BE PROVIDED PENDING ARCH DRAWINGS.

ZONING DISTRICT: MC-1 ; (MIXED COMMERCIAL)
SPECIAL USE SUBJECT TO SITE PLAN APPROVAL ; WAREHOUSE

MINIMUM	REQUIRED	PROPOSED LOT 1	PROPOSED LOT 2	REMARKS
LOT AREA	2 ACRES	36.67 ACRES (1,597,434 S.F.)	11.56 ACRES (503,792 S.F.)	OK
FRONT YARD SETBACK	50 FEET	51.61 FEET	53.39 FEET	OK
REAR YARD SETBACK	30 FEET	248.82 FEET	233.56 FEET	OK
SIDE YARD SETBACK				
ONE	15 FEET	137.93 FEET	45.5 FEET	OK
BOTH	35 FEET	278.52 FEET	200.49 FEET	OK
LOT WIDTH	100 FEET	977.48 FEET	527.47 FEET	OK
MAXIMUM				
BUILDING HEIGHT	65 FEET	<65 FEET	<65 FEET	OK
LOT COVERAGE	70%	48.4% (773,751 S.F.)	26.4.% (133,305 S.F.)	OK
BUILDING COVERAGE	50%	25.16% (402,000 S.F.)	12.1% (61,000 S.F.)	OK

EXISTING TAX LOTS:

1-1-52.1
±1,666,122 SQ. FT.
±38.26 ACRES

1-1-4.2
±16,247 SQ. FT.
±0.37 ACRES

6-1-3.2
±435,888 SQ. FT.
±10.0 ACRES

TOTAL
±2,118,257 SQ. FT
±48.63 ACRES

OWNER:

DOLSONTOWN ROAD, LLC
100 LAMONT STREET
ELMSFORD, NEW YORK 10523

APPLICANT:

DOLSONTOWN ROAD EAST, LLC
1 INTERNATIONAL BOULEVARD, SUITE 410
MAHWAH, NEW JERSEY 07430

EXISTING WETLANDS:

±349,986 SF / 8.0 ACRES

PROPOSED WETLAND DISTURBANCE = NONE

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SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER: 20006912B
DRAWING NAME: C-LAYT

SHEET TITLE:
OVERALL DIMENSION PLAN

SHEET NUMBER:
03 of 23

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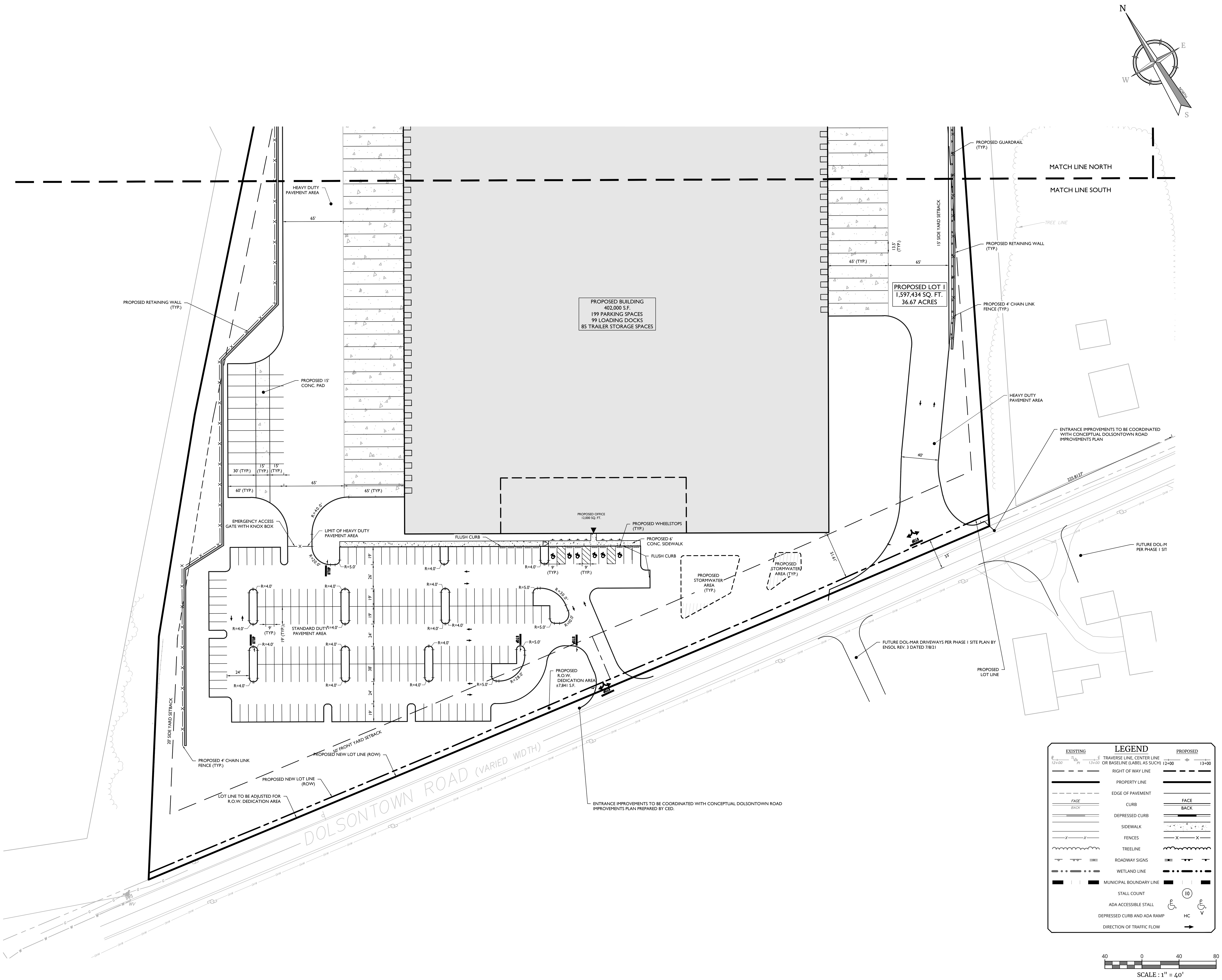

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FOR STATE SPECIFIC DIRECT PHONE NUMBERS VISIT: WWW.CALL811.COM

REV	DATE	DRAWN BY	DESCRIPTION
1	02/04/22	CDR	REVISED FOR GEIS SUBMISSION
2	01/27/23	CDR	REVISED PER PLANNING BOARD COMMENTS & STORMWATER TESTING RESULTS

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER IS A VIOLATION OF ARTICLE 145, SECTION 7209, SUB-DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
COLLIERS ENGINEERING & DESIGN CT, P.C.
N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS
FOR
DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

TOWN OF WAWAYANDA
ORANGE COUNTY
NEW YORK STATE

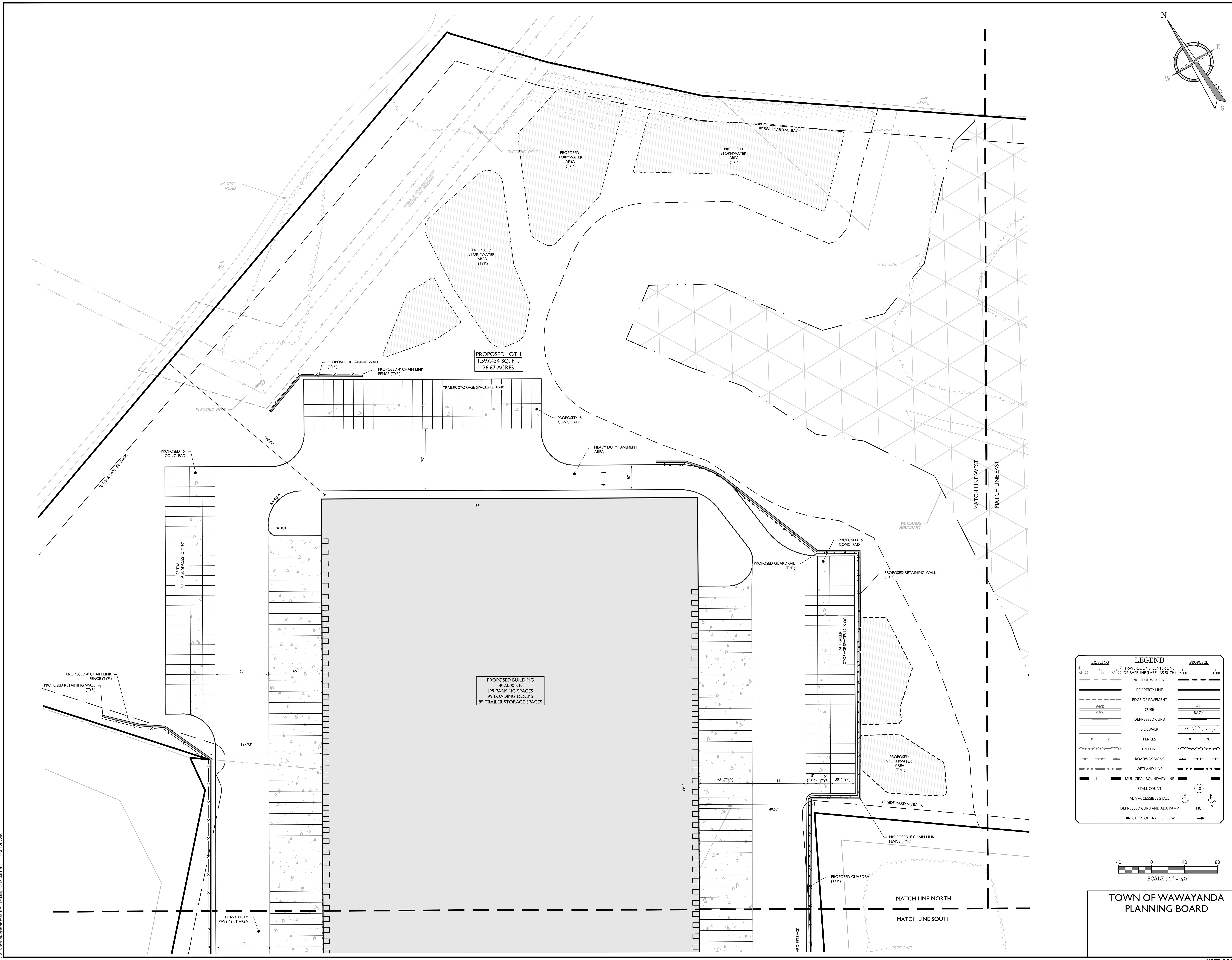
Colliers Engineering & Design
NEWBURGH
555 Hudson Valley Avenue
Suite 101
New Windsor, NY 12553
Phone: 845.564.4495
COLLIERS ENGINEERING & DESIGN CT, P.C. DOING BUSINESS AS MASER CONSULTING ENGINEERING & LAND SURVEYING

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED
PROJECT NUMBER: 20006912B	DRAWING NAME: C-LAYT		

SHEET TITLE:
DIMENSION PLAN

SHEET NUMBER:
04 of 23

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



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SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER: 20006912B
DRAWING NAME: C-LAYT

SHEET TITLE:
DIMENSION PLAN

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

LEGEND

EXISTING	LEGEND	PROPOSED
12+00 13+00	TRAVERSE LINE, CENTER LINE OR BASELINE (LABEL AS SUCH)	12+00 13+00
	RIGHT OF WAY LINE	
	PROPERTY LINE	
	EDGE OF PAVEMENT	
FACE / BACK	CURB	FACE / BACK
	DEPRESSED CURB	
	SIDEWALK	
	FENCES	
	TREELINE	
	ROADWAY SIGNS	
	WETLAND LINE	
	MUNICIPAL BOUNDARY LINE	
	STALL COUNT	
	ADA ACCESSIBLE STALL	
	DEPRESSED CURB AND ADA RAMP	HC
	DIRECTION OF TRAFFIC FLOW	

40 0 40 80

SCALE : 1" = 40'

TOWN OF WAWAYANDA
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20006912B	C-LAYT

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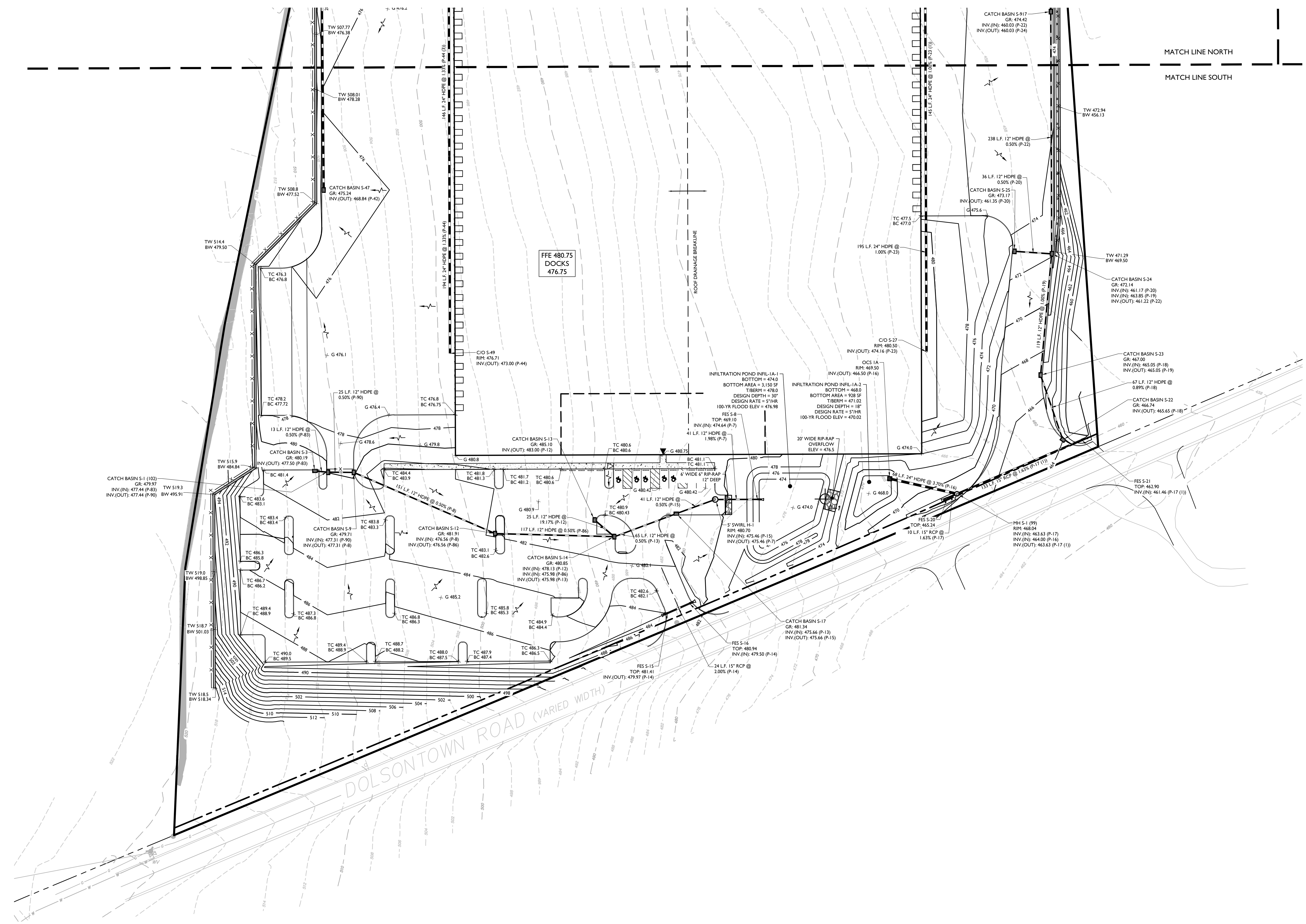

LEGEND		
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	PROPERTY LINE	
	EDGE OF PAVEMENT	
FACE BACK	CURB	FACE BACK
	DEPRESSED CURB	
	SIDEWALK	
	FENCES	
	TREELINE	
	ROADWAY SIGNS	
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	MUNICIPAL BOUNDARY LINE	
	'B' INLET	
	'E' INLET	
	STORM MANHOLE	
	SANITARY MANHOLE	
	FLARED END SECTION	
	HEADWALL	
	HYDRANT	
	POLE MOUNTED LIGHT	
75 / 74	CONTOURS	75 / 74
× G 29.0	SPOT ELEVATION	× G 29.0
	DIRECTION OF OVERLAND FLOW	
× TC 29.0	TOP OF CURB ELEVATION	× TC 29.0
× BC 29.0	BOTTOM OF CURB ELEVATION	× BC 29.0
	TOP OF DEPRESSED CURB ELEVATION	× TDC 29.0

INFILTRATION TEST RESULTS				
TEST #	ELEVATION	TEST ELEVTION	DEPTH	PERC. RATE (IN/HR)
P-1	473.5	469.5	48"	21.0
P-6	458.0	456.0	24"	6.1
P-7	462.5	460.5	24"	4.6
P-8	457.5	455.5	24"	3.6
P-9	459.5	457.5	24"	0.3
P-14	456.0	454.0	24"	20.9
P-15	457.0	455.0	24"	21.8
P-16	458.5	456.5	24"	13.3
P-17	459.0	457.0	24"	0.6
P-18	460.0	456.0	48"	9.8
P-19	461.5	457.5	48"	2.3
P-20	460.0	456.0	48"	21.4
P-21	461.5	457.5	48"	2.1

GRADING NOTES:

1. PROPOSED GRADE ELEVATIONS SHOWN AT BUILDING LINE ARE GROUND ELEVATIONS.
2. PROPOSED SPOT ELEVATIONS IN PAVEMENT AREAS ARE TOP OF FINISHED PAVEMENT.
3. PROVIDE POSITIVE DRAINAGE AWAY FROM BUILDING FOUNDATION.
4. BORING LOCATIONS REFERENCED FROM GEOTECHNICAL DATA REPORT DATE 12/04/2021

40 0 40 80

SCALE : 1" = 40'

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6-1-3.2

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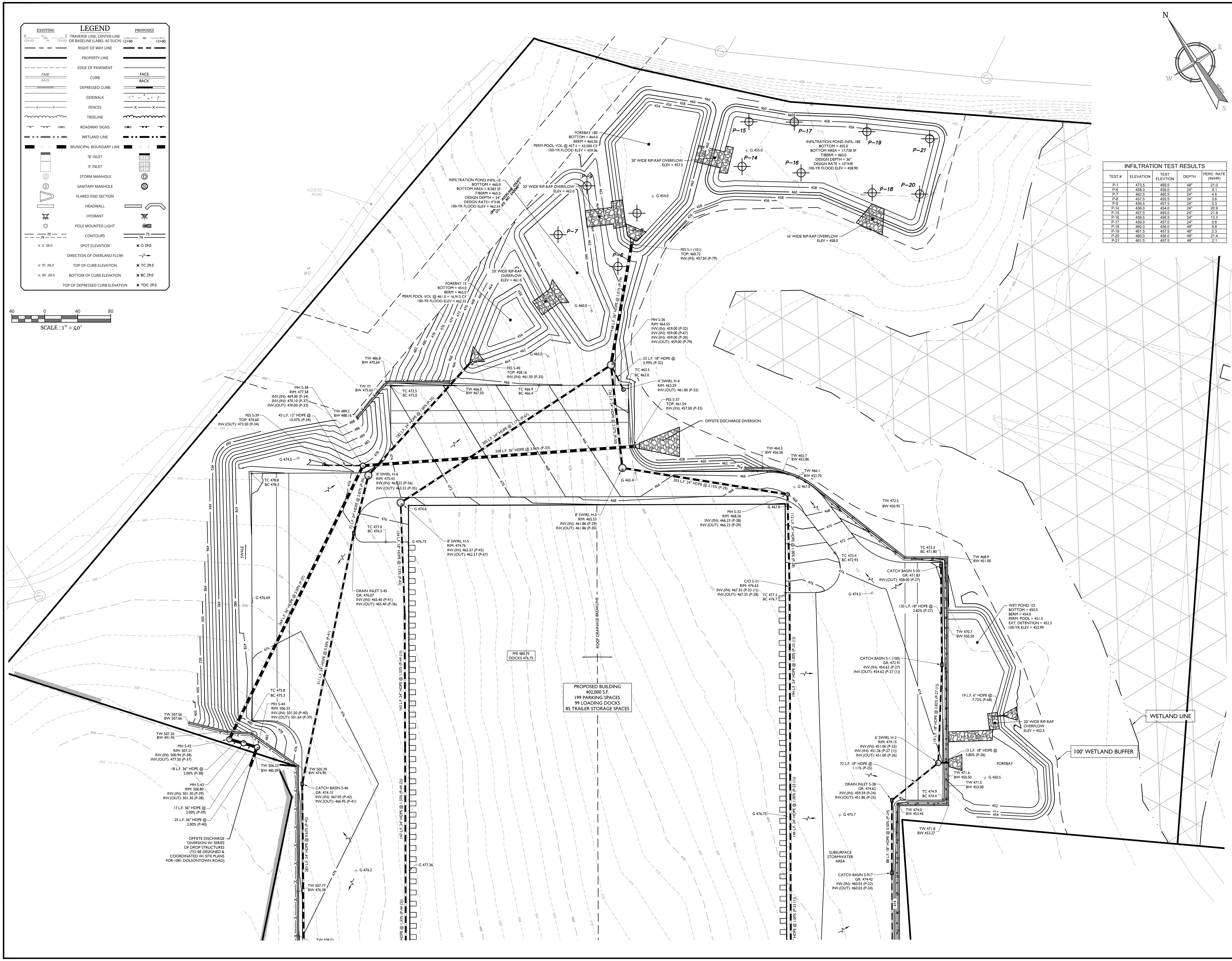
20006912B	C-GRAD		

GRADING & DRAINAGE PLAN



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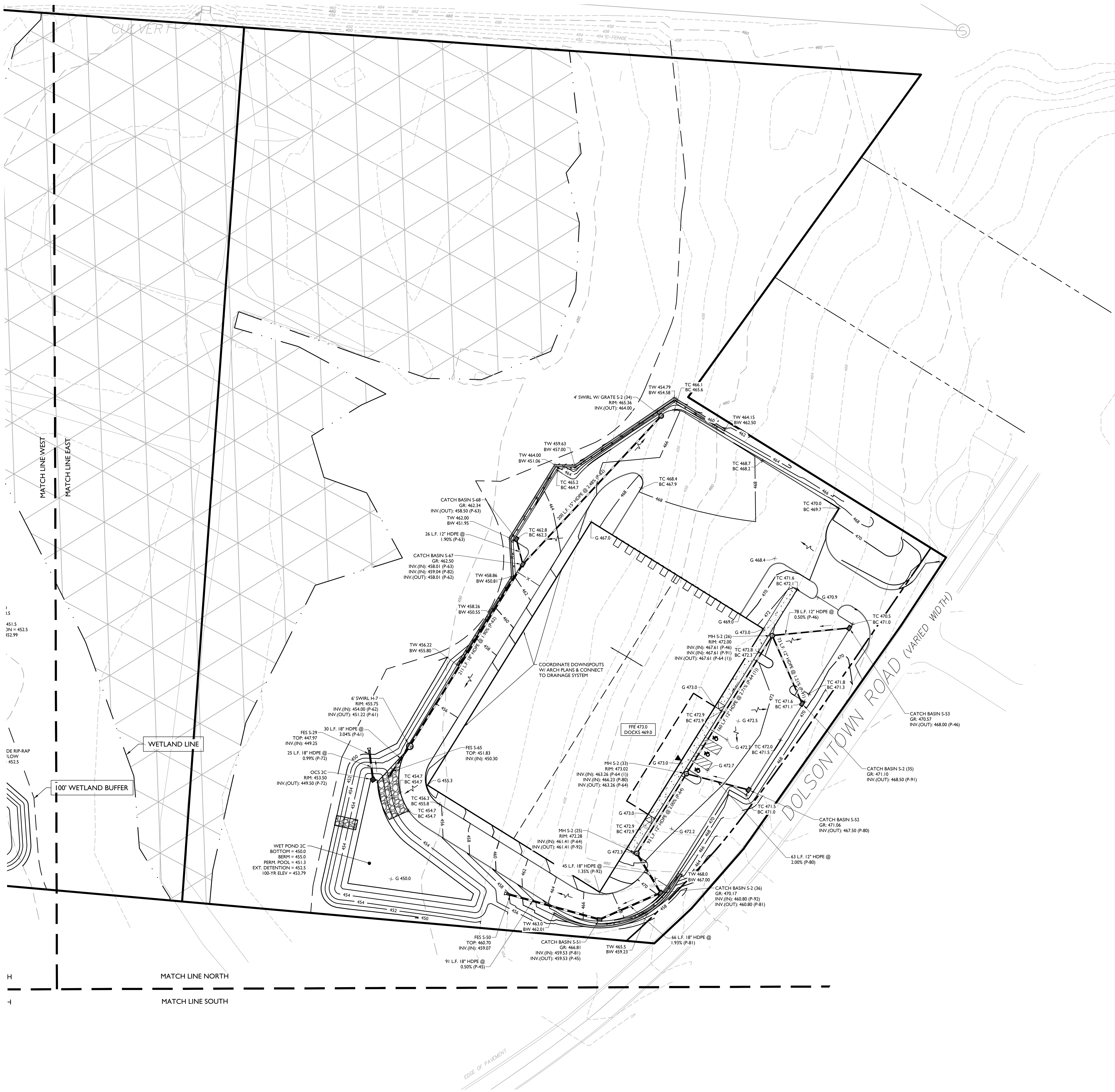

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	DIRECTION OF OVERLAND FLOW	
× TC 29.0	TOP OF CURB ELEVATION	× TC 29.0
× BC 29.0	BOTTOM OF CURB ELEVATION	× BC 29.0
	TOP OF DEPRESSED CURB ELEVATION	× TDC 29.0

40 0 40 80

SCALE : 1" = 40'

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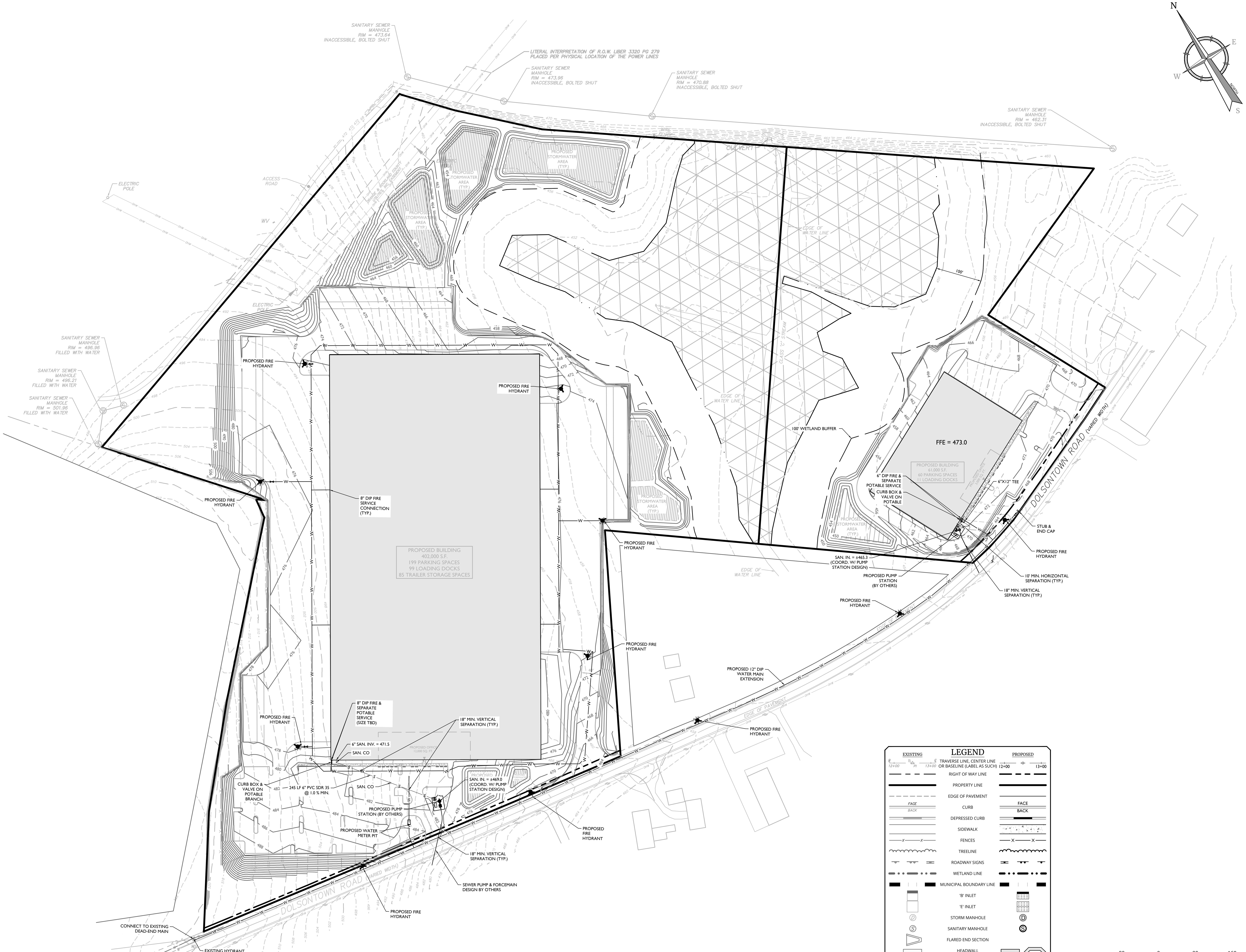

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	TOP OF DEPRESSED CURB ELEVATION	× TDC 29.0

80 0 80 160

SCALE : 1" = 80'

NOTE:

1. WATER SERVICE SIZES TO BE CONFIRMED WITH ARCHITECTURAL / MEP DESIGN
2. SANITARY SEWER DESIGN BY OTHERS

TOWN OF WAWAYANDA
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FOR
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TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

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SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED
PROJECT NUMBER: 20006912B	DRAWING NAME: C-UTIL		

SHEET TITLE:
UTILITY PLAN

SHEET NUMBER:
10 of 23

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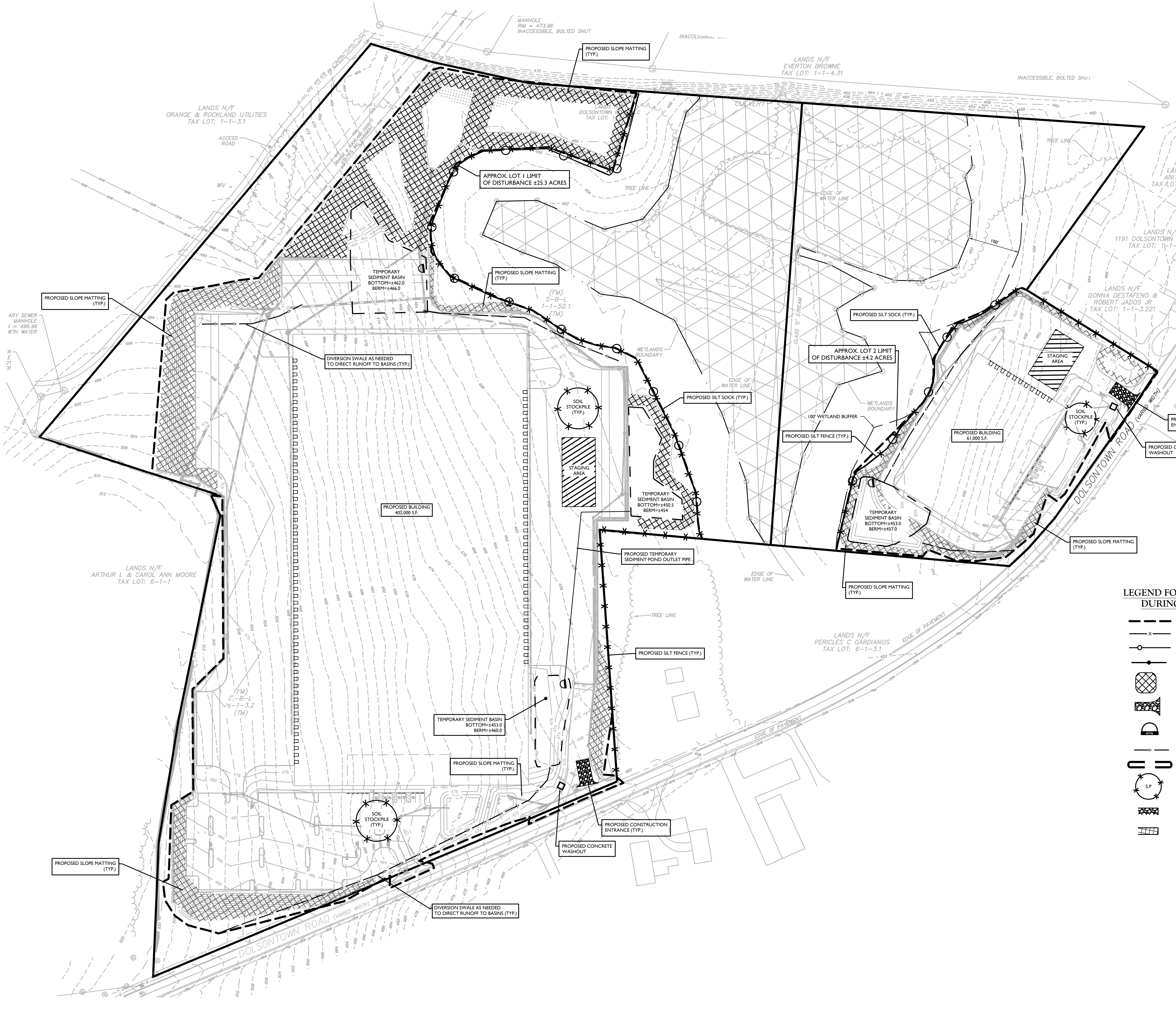

LEGEND FOR EROSION CONTROL DURING CONSTRUCTION

- CONSTRUCTION LIMIT LINE
- SILT FENCE
- SILT SOCK
- ORANGE CONSTRUCTION FENCE
- STORM INLET SEDIMENT TRAP
- STABILIZED CONSTRUCTION ENTRANCE
- SEDIMENT TRAP OUTLET
- TEMPORARY SWALE
- TEMPORARY SEDIMENT BASIN
- S.P MATERIAL STOCKPILE
- CHECK DAM
- SLOPE MATTING

GENERAL SOIL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
2. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN FOURTEEN (14) DAYS FOR DISTURBANCES LESS THAN FIVE (5) ACRES AND SEVEN (7) DAYS FOR DISTURBANCES GREATER THAN FIVE (5) ACRES, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
3. PERMANENT VEGETATION TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN FIVE (5) DAYS AFTER FINAL GRADING. MULCHING IS REQUIRED ON ALL SEEDING. WHEN HYDROSEEDING, MULCH SHALL NOT BE INCLUDED IN THE TANK WITH THE SEED.
4. ALL WORK TO BE DONE IN ACCORDANCE WITH THE 2016 NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL OR AS AMENDED.
5. A SUBBASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS TO STABILIZE STREETS, ROADS, DRIVEWAYS, AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUBBASE SHALL BE INSTALLED WITHIN FIVE (5) DAYS OF THE PRELIMINARY GRADING.
6. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE A TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
7. ANY STEEP SLOPES RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION CONTINUES (I.E. SLOPES GREATER THAN 3:1).
8. THE STANDARD FOR STABILIZED CONSTRUCTION ACCESS REQUIRES THE INSTALLATION OF A STONE PAD, AT ALL CONSTRUCTION DRIVEWAYS, IMMEDIATELY AFTER INITIAL SITE DISTURBANCE.
9. IN ACCORDANCE WITH THE STANDARD FOR MANAGEMENT OF HIGH ACID PRODUCING SOILS, ANY SOIL HAVING A PH OF 4 OR LESS OR CONTAINING IRON SULFIDES SHALL BE COVERED WITH A MINIMUM OF TWELVE (12) INCHES OF SOIL HAVING A PH OF 5 OR MORE PRIOR TO SEEDBED PREPARATION. AREAS WHERE TREES OR SHRUBS ARE TO BE PLANTED SHALL BE COVERED WITH A MINIMUM OF TWENTY-FOUR (24) INCHES OF SOIL HAVING A PH OF 5 OR MORE.
10. AT THE TIME THE SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER, SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT IT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NON-VEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION WILL HAVE TO BE EMPLOYED.
11. CONDUIT OUTLET PROTECTION MUST BE REVIEWED & SUPPLEMENTED AT ALL OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
12. UNFILTERED DEWATERING IS NOT PERMITTED. TAKE ALL NECESSARY PRECAUTIONS DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER. ANY DEWATERING METHODS USED MUST BE IN ACCORDANCE WITH STATE STANDARDS.
13. SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE WILL BE SPRINKLED UNTIL THE SURFACE IS WET, TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED IN ACCORDANCE WITH STATE STANDARDS FOR EROSION CONTROL.
14. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHT-OF-WAY WILL BE REMOVED IMMEDIATELY.
15. THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR ANY EROSION AND SEDIMENTATION THAT MAY OCCUR BELOW STORMWATER OUTFALLS OR OFFSITE AS A RESULT OF CONSTRUCTION OF THE PROJECT.
16. STOCKPILE AND STAGING LOCATIONS DETERMINED IN THE FIELD, SHALL BE PLACED WITHIN THE LIMITS OF DISTURBANCE ACCORDING TO THE CERTIFIED PLAN.
17. CONCRETE WASHOUT, DUMPSTER, & STAGING AREA LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED AT THE PRE-CONSTRUCITON MEETING. THEY SHALL BE PLACED IN THE PROXIMITY OF THE CONSTRUCTION ENTRANCE AND STAGING AREAS AND SHALL BE USED PRIOR TO EXITING THE PROJECT SITE. THE LOCATION SHALL BE IN A PRACTICAL, CLEARLY DELINEATED, AREA AND BE MAINTAINED THROUGHOUT CONSTRUCTION.
18. ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH THE NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL.
19. ALL PERMANENT SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED BY THE PROPERTY OWNER, AND SHALL BECOME THEIR RESPONSIBILITY.
20. PAVEMENT AREAS ARE TO BE KEPT CLEAN AT ALL TIMES.
21. DURING CONSTRUCTION, ANY ADDITIONAL CONTROL MEASURES AS DEEMED NECESSARY TO PREVENT EROSION OR CONTROL SEDIMENT BEYOND THOSE MEASURES SHOWN ON THE APPROVED PLAN SHALL BE INSTALLED OR EMPLOYED AT THE DIRECTION OF THE MUNICIPAL ENGINEER.
22. ALL TEMPORARY, STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES CAN BE REMOVED, WHEN ALL CONSTRUCTION ACTIVITY IDENTIFIED IN THE SWPPP HAS BEEN COMPLETED, ALL AREAS OF DISTURBANCE HAVE ACHIEVED FINAL STABILIZATION** AND ALL POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES HAVE BEEN CONSTRUCTED IN CONFORMANCE WITH THE SWPPP AND ARE OPERATIONAL.
23. BOTTOM AND BERM ELEVATIONS OF TEMPORARY SEDIMENT BASINS TO BE REVIEWED WITH THE CONTRACTOR BASED ON THEIR PROPOSED CONSTRUCTION SEQUENCE FOR THE PROJECT.
24. UPON STABILIZATION OF UPSTREAM CONTRIBUTORY AREAS, CONVERT SEDIMENT BASIN TO INFILTRATION BASIN
25. STAGING AREAS, STOCKPILE LOCATIONS, CONCRETE WASHOUT LOCATIONS, ETC SHOWN ARE SCHEMATIC AND SUBJECT TO CHANGE WITH THE APPROVAL OF THE ENGINEER.

**FINAL STABILIZATION - MEANS THAT ALL SOIL DISTURBANCE ACTIVITIES HAVE CEASED AND A UNIFORM, PERENNIAL VEGETATIVE COVER WITH A DENSITY OF EIGHTY (80) PERCENT OVER THE ENTIRE PERVIOUS SURFACE HAS BEEN ESTABLISHED; OR OTHER EQUIVALENT STABILIZATION MEASURES, SUCH AS PERMANENT LANDSCAPE MULCHES, ROCK RIP-RAP OR WASHED/CRUSHED STONE HAVE BEEN APPLIED ON ALL DISTURBED AREAS THAT ARE NOT COVERED BY PERMANENT STRUCTURES, CONCRETE OR PAVEMENT.

MAINTENANCE PLAN DURING CONSTRUCTION:

INSPECTION AND MAINTENANCE SHALL BE PERFORMED IN CONFORMANCE WITH GP-0-20-001 OR AS AMENDED. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND OPERATION FOLLOWING EVERY RUNOFF-PRODUCING RAINFALL BUT IN NO CASE LESS THAN ONCE EVERY WEEK. ANY NEEDED REPAIRS WILL BE MADE IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED AND INSTALLED FOR THE PROJECT. THE SEDIMENT TRAPS WILL BE CLEANED OUT WHEN THE LEVEL OF SEDIMENT REACHES 25% OF ITS' CAPACITY. SEDIMENT WILL BE REMOVED FROM BEHIND THE SILT FENCE WHEN IT BECOMES APPROXIMATELY 6" DEEP AT THE FENCE. THE SILT FENCE WILL BE REPAIRED AS NECESSARY TO MAINTAIN A BARRIER. ALL SEEDED AREAS WILL BE FERTILIZED, RE-SEEDED AS NECESSARY, AND MULCHED ACCORDING TO SPECIFICATIONS IN THE LANDSCAPE PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.

MAINTENANCE AGREEMENT NOTE:

THE OWNER/APPLICANT SHALL ENTER INTO AN ENFORCEABLE MAINTENANCE AGREEMENT WITH THE MUNICIPALITY (IF AN MS4. COMMUNITY) RELATED TO MAINTENANCE OF STORMWATER FACILITIES. THE OWNER/APPLICANT IS RESPONSIBLE TO PERFORM ALL REQUIRED MAINTENANCE BOTH DURING CONSTRUCTION AND LONG-TERM. THE NATURE OF THE AGREEMENT IS TO ALLOW THE MUNICIPALITY TO PERFORM MAINTENANCE AT THEIR OPTION SHOULD THE OWNER/APPLICANT FAIL TO ADEQUATELY MAINTAIN THE SYSTEM AS DETERMINED BY THE MUNICIPAL ENGINEER. MAINTENANCE OF THE STORMWATER SYSTEM SHALL BE PERFORMED IN ACCORDANCE WITH THE APPROVED SWPPP AND DETAIL SHEETS.

WETLAND BUFFER NOTE:

1. WETLAND BUFFER AREAS MUST BE SURVEYED AND DELINEATED WITH ORANGE CONSTRUCTION FENCE PRIOR TO THE START OF CONSTRUCTION.

303 (D) - SEGMENTS IMPAIRED BY CONSTRUCTION RELATED POLLUTANTS

1. FOR CONSTRUCTION SITE THAT DIRECTLY DISCHARGE TO ONE OF THE 303(D) SEGMENTS LISTED IN APPENDIX E OF THE GP-0-20-001 OR IS LOCATED IN ONE OF THE WATERSHEDS LISTED IN APPENDIX GP-0-20-001, THE QUALIFIED INSPECTOR SHALL CONDUCT AT LEAST TWO (2) SITE INSPECTIONS EVERY SEVEN (7) CALENDAR DAYS. THE TWO (2) INSPECTIONS SHALL BE SEPARATED BY A MINIMUM OF TWO (2) FULL CALENDAR DAYS.
2. FOR CONSTRUCTION SITES THAT DIRECTLY DISCHARGE TO ONE OF THE 303(D) SEGMENTS LISTED IN APPENDIX E OF THE GP-0-20-001 OR IS LOCATED IN ONE OF THE WATERSHEDS LISTED IN APPENDIX C OF THE GP-0-20-001, THE APPLICATION OF SOIL STABILIZATION MEASURES MUST BE INITIATED BY THE END OF THE NEXT BUSINESS DAY AND COMPLETED WITHIN SEVEN (7) DAYS.
3. THE PROJECT SITE DISCHARGES TO THE MONHAGEN BROOK LISTED IN APPENDIX E OF THE GP-0-20-001.

INFILTRATION AREA PROTECTION DURING CONSTRUCTION

1. THE INFILTRATION FOOTPRINT MUST BE PROTECTED FROM RUNOFF AND SURCHARGE LOADING AT ALL TIMES DURING CONSTRUCTION UNTIL IT HAS BEEN FULLY INSTALLED WITH ADEQUATE COVER. ALL UPSTREAM STRUCTURES TRIBUTARY TO THE SUBSURFACE SYSTEM MUST HAVE ADEQUATE INLET PROTECTION INSTALLED PRIOR TO THE SYSTEM BEING PLACE ON-LINE.

80 0 80 160
SCALE : 1" = 80'

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REV	DATE	DRAWN BY	DESCRIPTION
1	02/04/22	CDR	REVISED FOR GEIS SUBMISSION
2	01/27/23	CDR	REVISED PER PLANNING BOARD COMMENTS & STORMWATER TESTING RESULTS

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER IS A VIOLATION OF ARTICLE 145, SECTION 7209, SUB-DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
COLLIERS ENGINEERING & DESIGN CT, P.C.
N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS

FOR

DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

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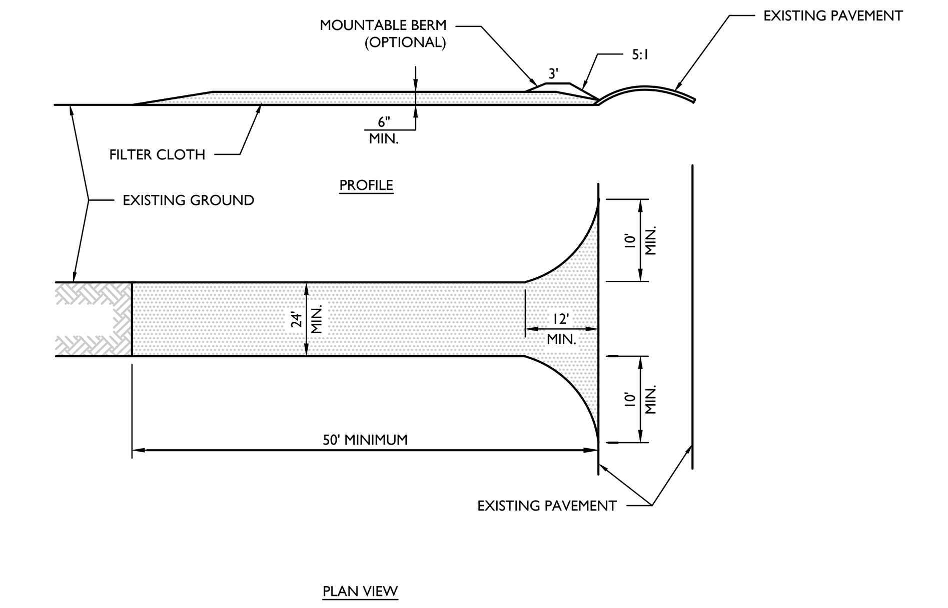
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER:	DRAWING NAME:
20006912B	C-SESC

SHEET TITLE:
SOIL EROSION & SEDIMENT CONTROL PLAN

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

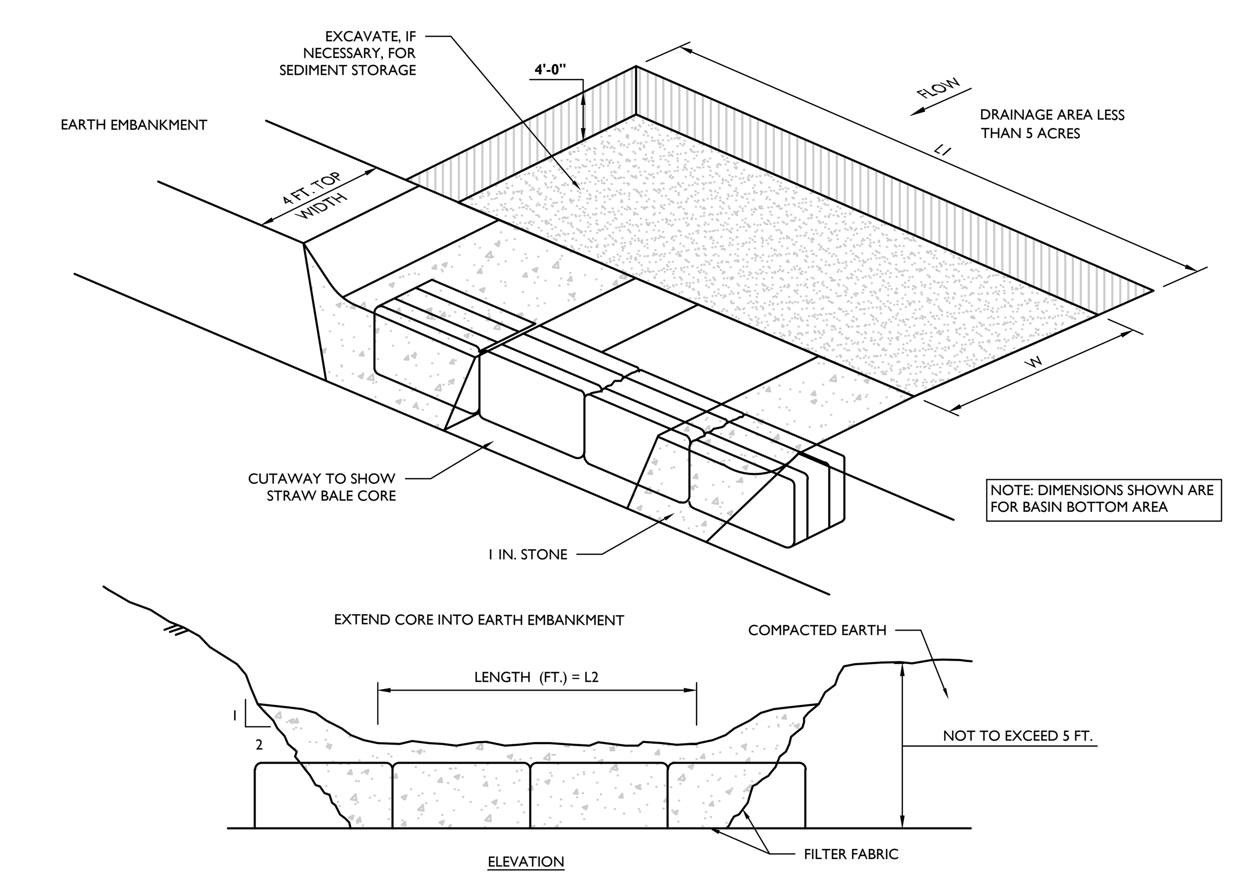


NOTES:

1. STONE SIZE - USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT. LENGTH: NOT LESS THAN 50 FEET. THICKNESS: NOT LESS THAN (6) INCHES.
2. WIDTH - 24'
3. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
4. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTING BERM WITH 5:1 SLOPES WILL BE PERMITTED.
5. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
6. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED BY THE CONTRACTOR AS REQUIRED.

STABILIZED CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1000 07/01/19



TO BE INSTALLED PRIOR TO GRADING OR FILLING IN THE DRAINAGE AREA THEY ARE TO PROTECT. TRAPS THAT ARE TO FUNCTION DURING BUILDING CONSTRUCTION MUST NOT BE LOCATED WITHIN 20 FEET OF A PROPOSED BUILDING FOUNDATION. WHILE TRAPS SHOULD BE SITED TO MAXIMIZE STORAGE BENEFIT, THEY SHOULD NOT BE LOCATED IN WETLANDS OR WETLAND BUFFER AREAS, OR IN EXISTING WATERCOURSES.

SEE EROSION AND SEDIMENT CONTROL PLAN FOR LOCATIONS.

INSTALLATION NOTES:

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED AS WELL.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER SIZED STONES, ROCKS, ORGANIC MATERIAL AND OTHER QUESTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
4. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
5. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
6. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
7. ALL CUT AND FILL SLOPES SHALL BE 1 : 2 OR FLATTER.
8. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.

SIZING CALCULATIONS

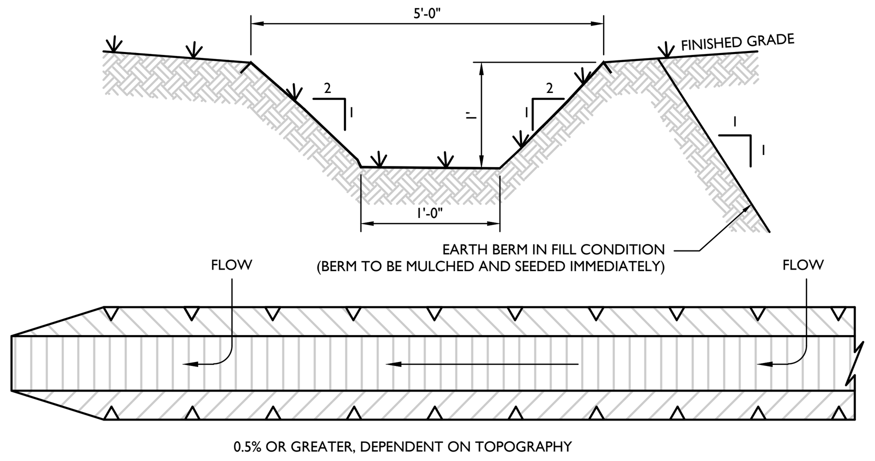
NOTE:

1. 3,600 CUBIC FEET OF STORAGE REQUIRED PER ACRE OF DISTURBANCE.

*THIS IS THE MINIMUM AMOUNT OF SEDIMENT TRAPS, ADDITIONAL MAY BE REQUIRED BASED UPON OTHER ON-SITE CONDITIONS AND CONTRACTOR SCHEDULE AND PHASING ACTIVITIES.

STONE OUTLET SEDIMENT TRAP DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1601 07/01/19



TO BE INSTALLED ABOVE DISTURBED AREAS, TO DIVERT RUNOFF OFF-SITE WITHOUT INCREASING EROSION; INTERMITTENTLY ACROSS DISTURBED AREAS, TO SHORTEN OVERLAND FLOW DISTANCES; BELOW DISTURBED AREAS, TO DIVERT SEDIMENT-LADEN WATER TO A SEDIMENT TRAPPING DEVICE; AND TO SAFELY TRANSPORT RUNOFF ALONG ROADWAYS.

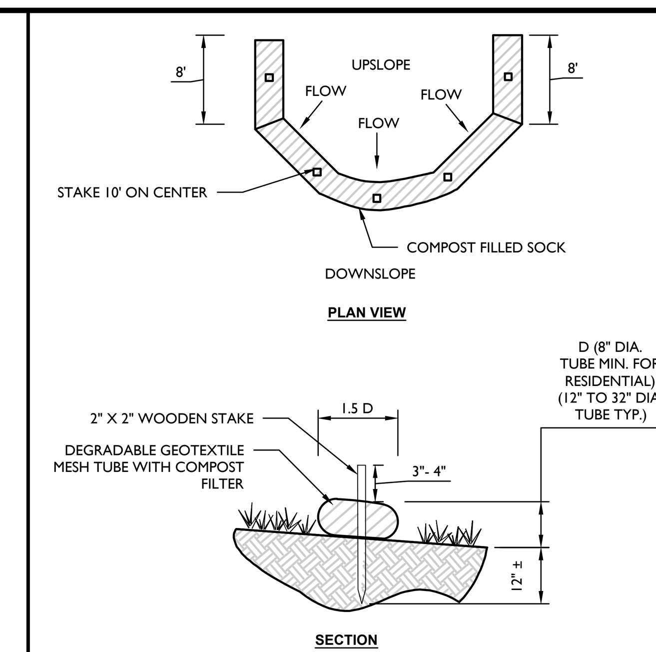
* WHERE SWALE TRAVERSES CONSTRUCTION VEHICLE PATH, DEPTH TO BE 6". SEE PLAN FOR LOCATION

INSTALLATION NOTES:

1. ALL SWALES SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED FOR CONSTRUCTION SHALL BE PLACED SO AS NOT TO INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. INSPECTION AND MAINTENANCE MUST BE PROVIDED BY THE CONTRACTOR AS REQUIRED
9. STABILIZATION SHALL BE SEED AND STRAW MULCH.

TEMPORARY SWALE & EARTH BERM DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2302 07/01/19



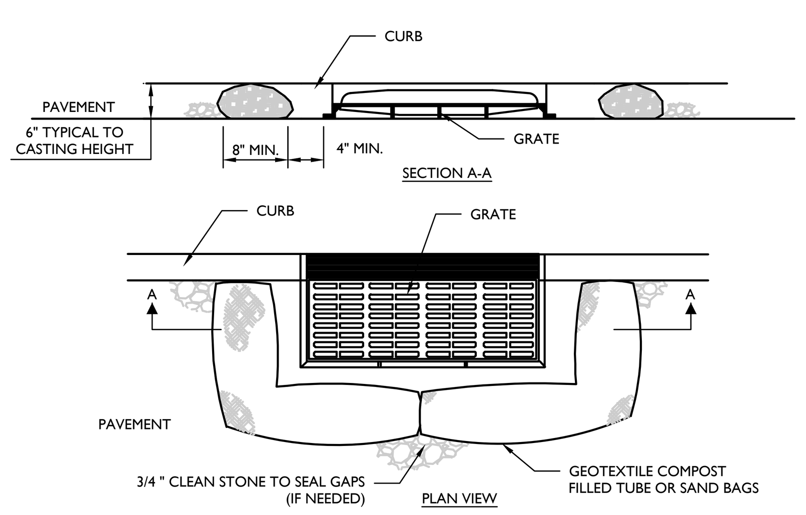
DIA. (in.)	SLOPE%						
	2	5	10	20	25	33	50
8	225*	200	100	50	20	-	-
12	250	225	125	65	50	40	25
18	275	250	150	70	55	45	30
24	350	275	200	130	100	60	35
32	450	325	275	150	120	75	50
*Length in feet							

NOTES:

1. ALL MATERIAL TO MEET **FILTREXX SILTSOX** SPECIFICATIONS OR APPROVED EQUAL.
2. COMPOST/SOIL/ROCK/SEED FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

COMPOST FILTER SOCK DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1200 05/01/17

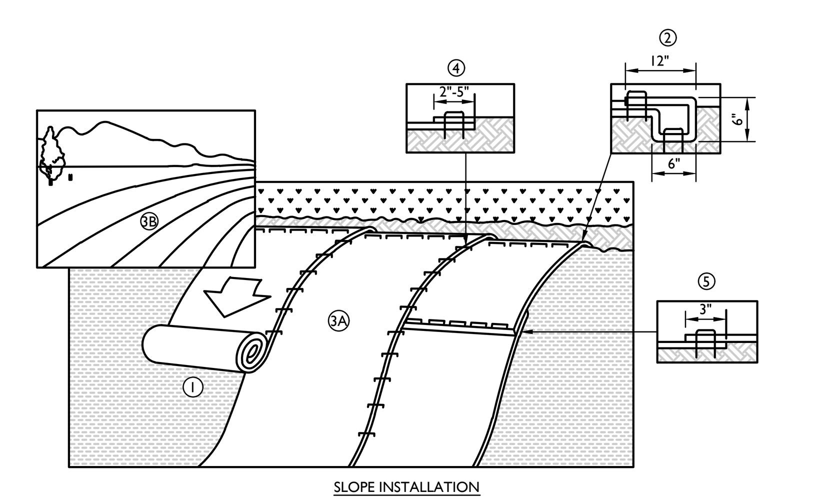


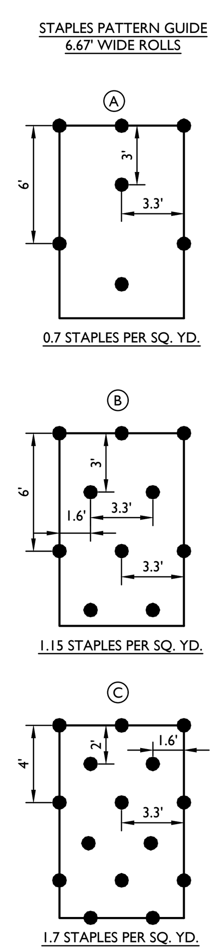
NOTES:

1. GEOTEXTILE TO BE WOVEN POLYPROPYLENE PRODUCT, OR APPROVED EQUAL.
2. FILLER CORE MAY BE SAND, COMPOST, OR PEA GRAVEL COMPLETELY CONTAINED WITHIN GEOTEXTILE. SEAMS, CLOSED BY SUITABLE MECHANICAL MEANS TO PREVENT LEAKAGE OF FILLER.
3. WHERE NO CURB IS PRESENT, BARRIER SHALL COMPLETELY ENCIRCLE THE DRAIN INLET.
4. INLET GRATE OPENING IS TO BE KEPT CLEAR OF OBSTRUCTIONS AT ALL TIMES.
5. THE PROTECTION DEVICE WILL BE DESIGNED TO CAPTURE OR FILTER RUNOFF FROM THE 1 YEAR/ 24 HOUR STORM EVENT AND SHALL SAFELY CONVEY HIGHER FLOWS DIRECTLY INTO THE STORM SEWER SYSTEM.
6. OTHER METHODS THAT ACCOMPLISH THE PURPOSE OF STORM SEWER INLET PROTECTION MAY BE USED IF APPROVED BY THE PROJECT ENGINEER.
7. INSPECTIONS SHALL BE FREQUENT. MAINTENANCE, REPAIR, AND REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED. THE BARRIER SHALL BE REMOVED WHEN THE AREA DRAINING TOWARDS THE INLET HAS REACHED FINAL STABILIZATION.

INLET PROTECTION (FILTER BARRIER) DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1500 07/01/19



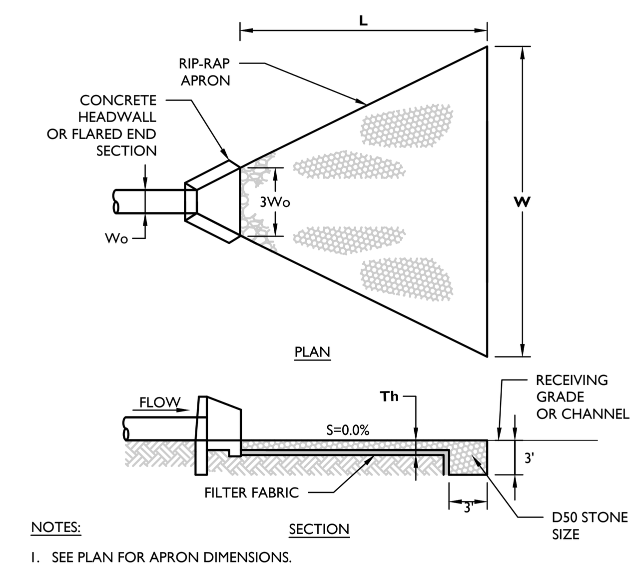


NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP'S), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
   * WHEN USING MATTING WITH SEED, DO NOT SEED THE AREA. FOLLOW MANUFACTURER'S RECOMMENDATIONS.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP'S IN A 6" DEEP x 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECP'S EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP'S WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF RECP'S BACK OVER SEED AND COMPACTED SOIL. SECURE RECP'S OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE RECP'S.
3. ROLL THE RECP'S (A.) DOWN OR (B.) HORIZONTALLY STEP BY STEP ACROSS THE SLOPE TAMPERING IT DOWN ALONG THE WAY. RECP'S SHALL UNROLL WITH APPROPRIATE SIDE TIGHTLY AGAINST THE SOIL SURFACE. RECP'S MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM, STAPLES/STAKESSHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP'S MUST BE STAKED WITH APPROXIMATELY 2" TO 5" OVERLAP DEPENDING ON RECP'S TYPE.
5. CONSECUTIVE RECP'S SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE RECP'S WIDTH.
   * IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY SECURE THE RECP'S.

EROSION MATTING (CURLEX ENFORCER I) DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2200 07/01/19

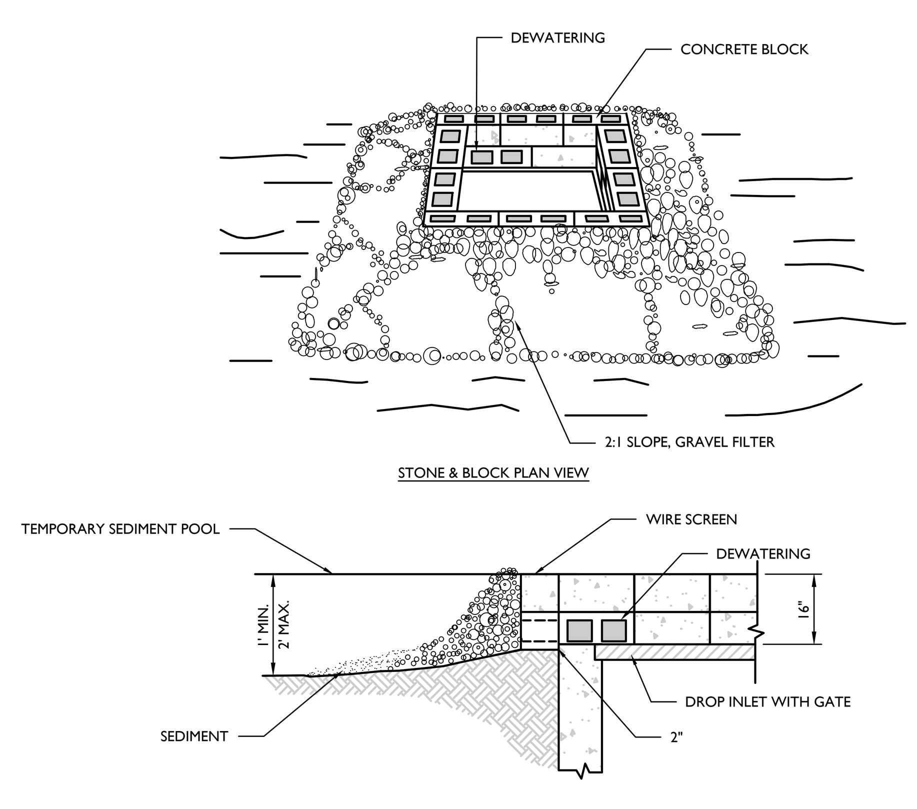


NOTES:

1. SEE PLAN FOR APRON DIMENSIONS.
2. SIDE SLOPE SHALL BE 2:1 OR FLATTER. THE BOTTOM GRADE SHALL BE LEVEL (0% SLOPE). THERE SHALL BE NO FALL AT THE END OF APRON TO THE RECEIVING SURFACE.

CONDUIT OUTLET PROTECTION DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1600 07/01/19

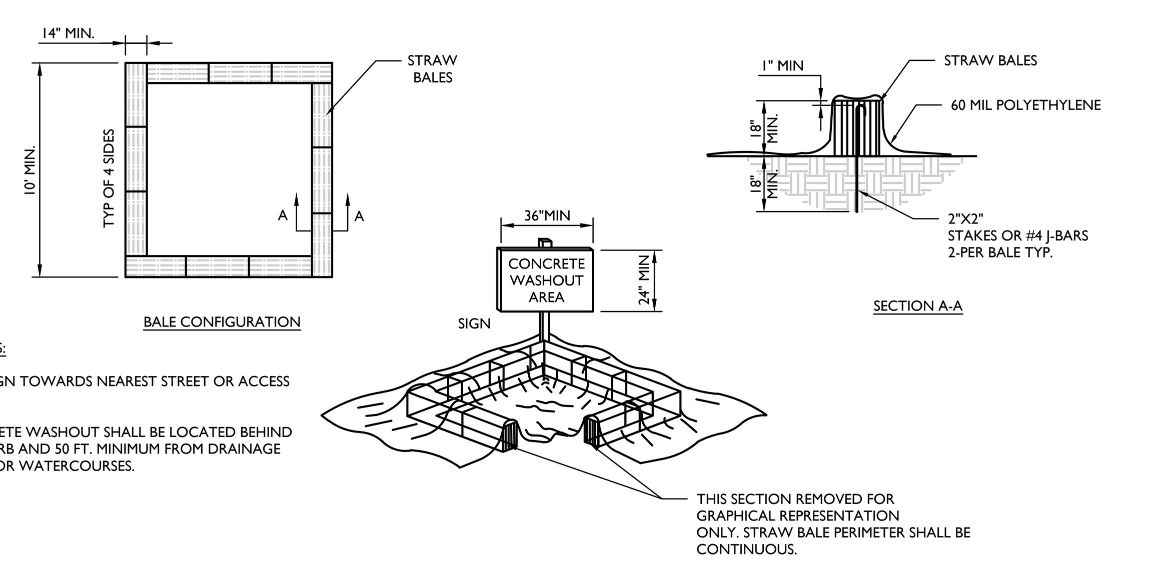


CONSTRUCTION SPECIFICATIONS

1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE FOR DEWATERING. FOUNDATION SHALL BE 2 INCHES MINIMUM BELOW REST OF INLET AND BLOCKS SHALL BE PLACED AGAINST INLET FOR SUPPORT.
2. HARDWARE CLOTH OR $\frac{1}{2}$" WIRE MESH SHALL BE PLACED OVER BLOCK OPENINGS TO SUPPORT STONE.
3. USE CLEAN STONE OR GRAVEL $\frac{1}{2}$" - $\frac{3}{4}$" IN DIAMETER PLACED 2 INCHES BELOW TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER.

STONE & BLOCK DROP INLET PROTECTION DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1501 07/01/19



DETAIL NOTES:

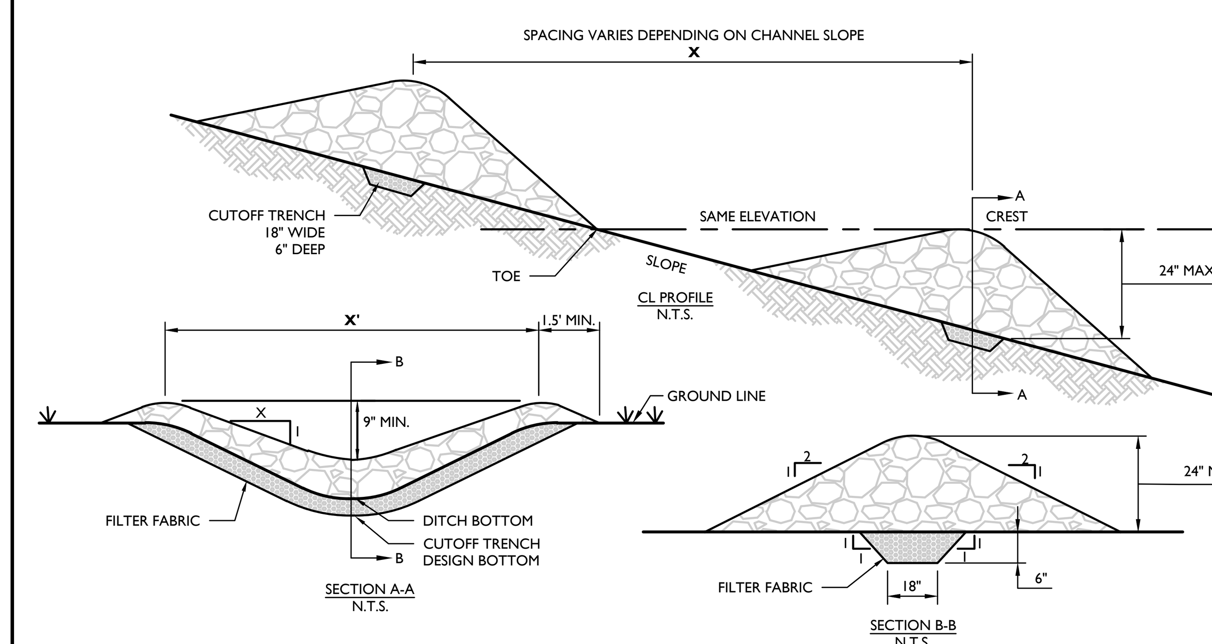
1. FACE SIGN TOWARDS NEAREST STREET OR ACCESS POINT.
2. CONCRETE WASHOUT SHALL BE LOCATED BEHIND THE CURB AND 50 FT. MINIMUM FROM DRAINAGE INLETS OR WATERCOURSES.

NOTES:

1. CONCRETE WASHOUTS ARE REQUIRED ON ALL CONSTRUCTION SITES INVOLVING CONCRETE AND STUCCO USE.
2. THE CONTRACTOR SHALL REQUIRE ALL CONCRETE DRIVERS TO UTILIZE THE CONCRETE WASHOUTS ONSITE.
3. WASHOUT FACILITIES SHALL BE LOCATED AT LEAST 50 FEET AWAY FROM STORM SEWER DRAIN INLETS, GUTTERS, OPEN DITCHES, AND WATER COURSES.
4. APPROPRIATE STONE SHOULD COVER PATHS TO CONCRETE WASHOUT.
5. THE NUMBER OF CONCRETE WASHOUTS DEPENDS ON THE EXPECTED DEMAND FOR STORAGE CAPACITY. LARGE SITES WITH EXTENSIVE CONCRETE WORK SHALL BE PLACED AT MULTIPLE LOCATIONS FOR USE BY CONCRETE TRUCK DRIVERS.
6. CONCRETE WASHOUT AREAS SHALL BE IDENTIFIED BY POSTING SIGNS ONSITE.
7. CONCRETE WASHOUTS ARE TO BE INSPECTED DAILY BY THE CONTRACTOR FOR LEAKS OR TEARS IN PLASTIC LINER.
8. REMOVE AND DISPOSE OF ALL MATERIAL WHEN THE WASHOUT HAS BEEN FILLED TO 75% CAPACITY.
9. PRIOR TO ANY RAINFALL, ALL CONCRETE WASHOUTS ARE TO BE CLEANED OUT OR COVERED.
10. ONCE THE MATERIAL HAS BEEN CLEANED OUT OF THE CONCRETE WASHOUT FACILITY, THE FACILITY MUST BE INSPECTED FOR REPAIR, RECONSTRUCTION OR REPLACEMENT. ALL PLASTIC LINING SHALL BE REMOVED AND REPLACED.
11. PRE-FABRICATED OR ONSITE FABRICATED CONCRETE WASHOUTS MAY BE USED.
12. OPTIONS FOR ONSITE CONCRETE WASHOUTS:
    A. DIG A PIT AND LINE WITH 10 MIL PLASTIC SHEETING.
    B. CREATE AN ABOVE-GROUND STRUCTURE FROM STRAW BALES OR SANDBAGS WITH 10 MIL PLASTIC LINING.

CONCRETE WASHOUT DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1700 07/01/19



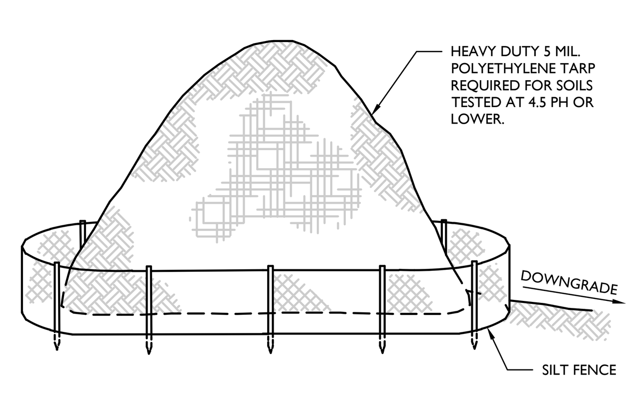
CONSTRUCTION SPECIFICATIONS

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN ON THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.

MAXIMUM DRAINAGE AREA: 2 ACRES

STONE CHECK DAM DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2301 07/01/19

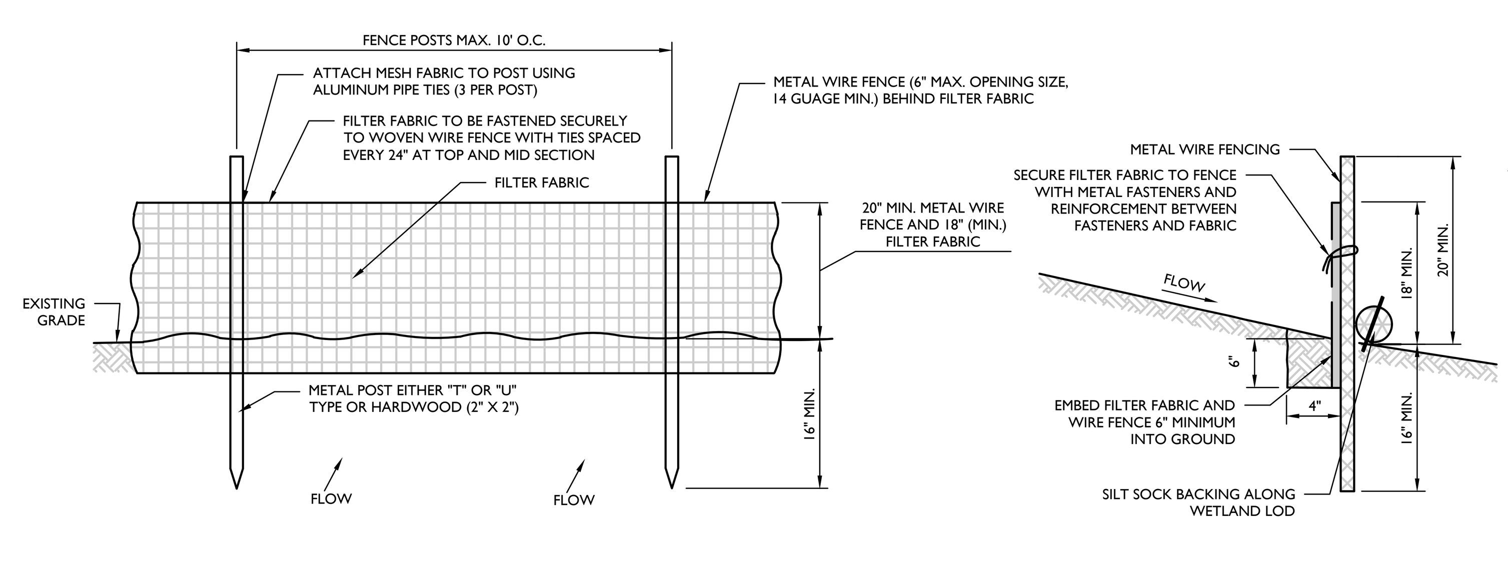


NOTES:

1. ALL STOCKPILES SHALL NOT TO BE LOCATED WITHIN 50 FEET OF A FLOODPLAIN, SLOPE, ROADWAY OR DRAINAGE FACILITY.

TOPSOIL STOCKPILE DETAIL

NOT TO SCALE MCNY-SOIL-EROS-2500 07/01/19



NOTES:

1. GEOTEXTILE TO BE FASTENED SECURELY TO FENCE POST BY USING WIRE TIES OR HOG RINGS. USE 3 FASTENERS PER POST.
2. SPLICING OF INDIVIDUAL ROLLS SHALL NOT OCCUR AT LOW POINTS.
3. ALL SILT FENCE TO BE INSPECTED AND REMEDIAL MAINTENANCE PERFORMED BY THE CONTRACTOR AS REQUIRED. MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
4. WHEN TWO SECTIONS OF FILTER FABRIC ARE JOINED, THEY SHALL BE OVER-WRAPPED BY SIX INCHES AND FOLDED.
5. FILTER FABRIC TO BE EITHER FILTER X, MIRAFI 100X, STABILINKA T14ON, OR APPROVED EQUIVALENT.
6. PREFABRICATED UNITS SHALL MEET THE MINIMUM REQUIREMENTS SHOWN.
7. IF SPACE PERMITTED, LOCATE SILT FENCE 10' AWAY FROM TOE OF SLOPE IF THE SLOPE IS STEEPER THAN 1:1.

REINFORCED SILT FENCE (WITH WIRE FENCE) DETAIL

NOT TO SCALE MCNY-SOIL-EROS-1101 07/01/19

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Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
COLLIERS ENGINEERING & DESIGN CT, P.C.
N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS
FOR
DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

TOWN OF WAWAYANDA
ORANGE COUNTY
NEW YORK STATE

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Suite 101
New Windsor, NY 12553
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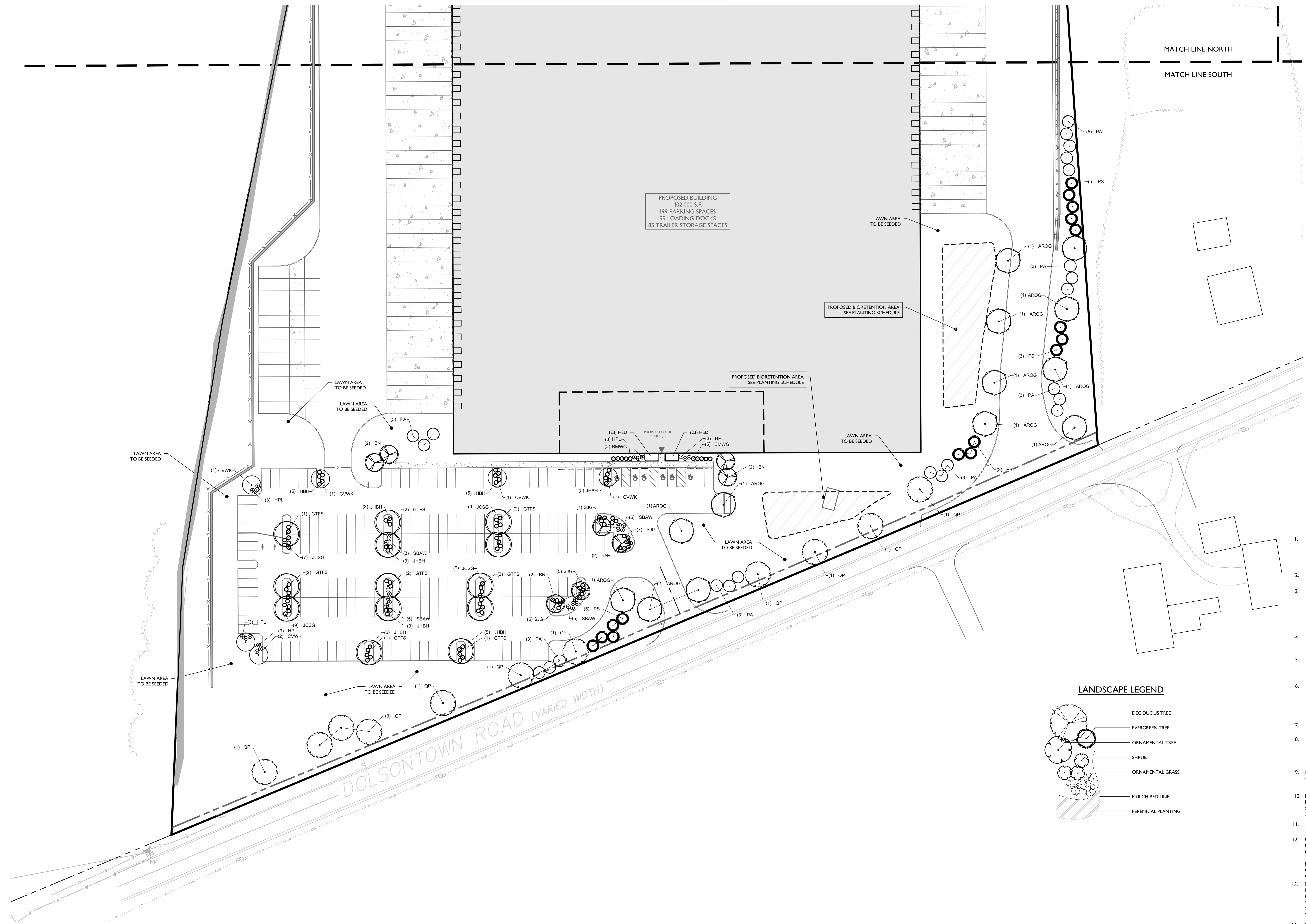
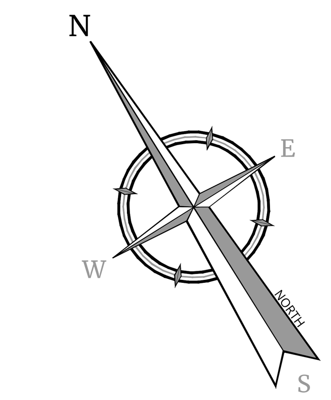
AS SHOWN	01/14/2022	SMB	JED
PROJECT NUMBER: 20006912B	DRAWING NAME: C-SESC		

SHEET TITLE:
SOIL EROSION & SEDIMENT CONTROL DETAILS

SHEET NUMBER:
12 of 23

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.





GENERAL PLANTING NOTES:

1. THIS PLAN SHALL BE USED FOR LANDSCAPE PLANTING PURPOSES ONLY. EXAMINE ALL ENGINEERING DRAWINGS AND FIELD CONDITIONS FOR SPECIFIC LOCATIONS OF UTILITIES AND STRUCTURES AND NOTIFY THE LANDSCAPE ARCHITECT OF ANY DISCREPANCIES OR LOCATION CONFLICTS PRIOR TO PLANTING INSTALLATION.
2. THE CONTRACTOR IS RESPONSIBLE TO LOCATE AND VERIFY LOCATION OF ALL UTILITIES ON SITE PRIOR TO CONSTRUCTION.
3. ALL PLANT MATERIAL SHALL CONFORM TO GUIDELINES AS SET FORTH IN THE LATEST EDITION OF THE AMERICAN ASSOCIATION OF NURSERYMEN'S STANDARD FOR NURSERY STOCK OR THE PLANT MATERIAL WILL BE UNACCEPTABLE. ALL PLANT MATERIAL SHALL BE TRUE TO SPECIES, VARIETY, SIZE AND BE CERTIFIED DISEASE AND INSECT FREE. THE OWNER AND/OR THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO APPROVE ALL PLANT MATERIAL ON SITE PRIOR TO INSTALLATION.
4. NO PLANT SUBSTITUTIONS SHALL BE PERMITTED WITH REGARD TO SIZE, SPECIES, OR VARIETY WITHOUT WRITTEN PERMISSION OF THE LANDSCAPE CONSULTANT. WRITTEN PROOF OF PLANT MATERIAL UNAVAILABILITY MUST BE DOCUMENTED.
5. THE LOCATION OF ALL PLANT MATERIAL INDICATED ON THE LANDSCAPE PLANS ARE APPROXIMATE. THE FINAL LOCATION OF ALL PLANT MATERIAL AND PLANTING BED LINES SHALL BE DETERMINED IN THE FIELD UNDER THE DIRECTION OF THE LANDSCAPE ARCHITECT.
6. ALL STREET TREES AND SHADE TREES PLANTED NEAR PEDESTRIAN OR VEHICULAR ACCESS SHOULD NOT BE BRANCHED LOWER THAN 7'-0" ABOVE GRADE. ALL PLANT MATERIAL LOCATED WITHIN SIGHT TRIANGLE EASEMENTS SHALL NOT EXCEED A MATURE HEIGHT OF 30" ABOVE THE ELEVATION OF THE ADJACENT CURB. ALL STREET TREES PLANTED IN SIGHT TRIANGLE EASEMENTS SHALL BE PRUNED TO NOT HAVE BRANCHES BELOW 10'-0".
7. THE PLANTING PLAN SHALL TAKE PRECEDENCE OVER THE PLANT SCHEDULE SHOULD ANY PLANT QUANTITY DISCREPANCIES OCCUR.
8. ALL PLANT MATERIAL SHALL BE PROPERLY INSTALLED IN CONFORMANCE WITH THE TYPICAL PLANTING DETAILS. INSTALL ALL PLANT MATERIAL ON UNDISTURBED GRADE. CUT AND REMOVE JUTE BURLAP FROM TOP ONE-THIRD OF THE ROOT BALL. WIRE BASKETS AND NOT JUTE BURLAP SHALL BE COMPLETELY REMOVED PRIOR TO BACKFILLING THE PLANT PIT.
9. BRANCHES OF DECIDUOUS TREES SHALL BE PRUNED BACK BY NO MORE THAN ONE QUARTER (1/4) TO BALANCE THE TOP GROWTH WITH ROOTS AND TO PRESERVE THEIR CHARACTER AND SHAPE. THE CENTRAL LEADER OF TREE SHALL NOT BE PRUNED.
10. PROVIDE PLANTING PITS AS INDICATED ON PLANTING DETAILS. BACKFILL PLANTING PITS WITH ONE PART EACH OF TOPSOIL, PEAT MOSS AND PARENT MATERIAL. IF WET SOIL CONDITIONS EXIST THEN PLANTING PITS SHALL BE EXCAVATED AN ADDITIONAL 12" AND FILLED WITH CRUSHED STONE OR UNTIL FREE DRAINING.
11. ALL PLANT MATERIAL SHALL BEAR THE SAME RELATION TO FINISHED GRADE AS IT BORE TO EXISTING GRADE AT NURSERY.
12. OPTIMUM PLANTING TIME:
    DECIDUOUS - APRIL 1 TO JUNE 1 & OCTOBER 15 TO NOVEMBER 30.
    CONIFEROUS - APRIL 1 TO JUNE 1 & SEPTEMBER 1 TO NOVEMBER 1.

    PLANTING OUTSIDE OF THE OPTIMUM DATES SHALL NOT BE CONDUCTED WITH OUT PRIOR APPROVAL FROM THE LANDSCAPE CONSULTANT.
13. NEWLY INSTALLED PLANT MATERIAL SHALL BE WATERED AT THE TIME OF INSTALLATION. REGULAR WATERING SHALL BE PROVIDED TO ENSURE THE ESTABLISHMENT, GROWTH AND SURVIVAL OF ALL PLANTS. WATERING AMOUNTS SHOULD BE ADJUSTED AS RAIN EVENTS OCCUR. WATERING AFTER THE INITIAL 4 WEEKS SHALL BE ADJUSTED BASED ON SEASONAL CONDITIONS. WATERING SHALL NOT TAKE PLACE DURING THE HOTTEST POINT OF THE DAY.
14. ALL PLANT MATERIAL SHALL BE GUARANTEED FOR TWO YEARS AFTER THE DATE OF FINAL ACCEPTANCE. ANY PLANT MATERIAL THAT DIES WITHIN THAT TIME PERIOD SHALL BE REMOVED, INCLUDING THE STUMP, AND REPLACED BY A TREE OF SIMILAR SIZE AND SPECIES AT NO EXPENSE TO THE OWNER.
15. THE LANDSCAPE CONTRACTOR SHALL PROVIDE A MINIMUM 4" LAYER OF TOPSOIL IN ALL LAWN AREAS AND A MINIMUM OF 12" OF TOPSOIL IN ALL PLANTING AREAS. A FULL SOIL ANALYSIS SHALL BE CONDUCTED AFTER CONSTRUCTION AND PRIOR TO PLANTING TO DETERMINE THE EXTENT OF SOIL AMENDMENT REQUIRED. SOIL PH SHOULD BE 5.5-6.5.
16. ALL DISTURBED LAWN AREAS SHALL BE STABILIZED WITH SEED AS INDICATED ON THE LANDSCAPE PLANS. TEMPORARY SEEDING SHALL BE IN ACCORDANCE WITH THE GENERAL SEEDING NOTES ON THIS SHEET. ALL DISTURBED LAWN AREAS SHALL BE TOPSOILED, LIMED, FERTILIZED AND FINE GRADED PRIOR TO LAWN INSTALLATION.
17. ALL PLANTING BEDS SHALL RECEIVE 3" OF SHREDDED HARDWOOD BARK MULCH.
18. ALL SHRUB MASSES SHALL BE PLANTED IN CONTINUOUS MULCHED BEDS.
19. ALL PLANTING DEBRIS (WIRE, TWINE, RUBBER HOSE, BACKFILL ETC.) SHALL BE REMOVED FROM THE SITE AFTER PLANTING IS COMPLETE. PROPERTY IS TO BE LEFT IN A NEAT ORDERLY CONDITION IN ACCORDANCE WITH ACCEPTED PLANTING PRACTICES.

TYPICAL BIORETENTION AREA PLANT SCHEDULE

TREES	COMMON NAME	CONT	SIZE	HEIGHT	REMARKS
Betula nigra	River Birch	CONT		6\` - 8\`	MULTISTEM / TYP. SPECIES HABIT
SHRUBS	**COMMON NAME**	**CONT**	**SIZE**	**HEIGHT**	**REMARKS**
Aronia Arbutifolira	Red Chokeberry	CONT		24"-30"	TYPICAL SPECIES HABIT
Clethra Alnifolia 'Hummingbird'	Summersweet	CONT		18"-24"	TYPICAL SPECIES HABIT
Ilex Glabra	Inkberry	CONT		18"-24"	TYPICAL SPECIES HABIT
Sambucus Canadensis	Elderberry	CONT		18"-24"	TYPICAL SPECIES HABIT
Viburnum Dentatum	Arrowwood Viburnum	CONT		18"-24"	TYPICAL SPECIES HABIT
PERENNIALS	**COMMON NAME**	**CONT**		**HEIGHT**	**REMARKS**
Aster Novae Angliae	New England Aster	1 Gal. CONT.			Clumps, 24" O.C.
Deschampsia Cespitosa	Tufted Hair Grass	#SP4 CONT.			Clumps, 12" O.C.
Echinacea Purpurea	Coneflower	1 Gal. CONT.			Clumps, 24" O.C.
Juncus Effusus	Common Rush	#SP4 CONT.			Clumps, 12" O.C.

SITE PLANTING SCHEDULE

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	SIZE	HEIGHT	REMARKS
AROG	28	Acer rubrum 'October Glory'	October Glory Red Maple	B & B	2-2 1/2"		STRAIGHT LEADER/SYM. BRANCHING
GTFS	16	Gleditsia triacanthos 'Skyline'	Skyline Honey Locust	B & B	2-2 1/2"		STRAIGHT LEADER/SYM. BRANCHING
QP	26	Quercus Palustris	Pin Oak	B & B	2-2 1/2"		STRAIGHT LEADER/SYM. BRANCHING
EVERGREEN TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**SIZE**	**HEIGHT**	**REMARKS**
PA	66	Picea abies	Norway Spruce	B & B	6-8\` Ht.		DENSE / TYP. SPECIES HABIT
PS	36	Pinus strobus	White Pine	B & B	6-8\` Ht.		DENSE / TYP. SPECIES HABIT
ORNAMENTAL TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**SIZE**	**HEIGHT**	**REMARKS**
BN	10	Betula nigra	River Birch	B & B		6\` - 7\`	MULTISTEM / TYP. SPECIES HABIT
CVWK	6	Crataegus viridis 'Winter King'	Winter King Hawthorn	B & B	1 1/2 - 1 3/4"		STRAIGHT LEADER/SYM. BRANCHING
SHRUBS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**SIZE**	**HEIGHT**	**REMARKS**
BMWG	10	Buxus microphylla japonica 'Winter Gem'	Winter Gem Japanese Boxwood	CONT	24"-30"		TYPICAL SPECIES HABIT, O.C. 4'
HPL	33	Hydrangea paniculata 'Limelight'	Limelight Panicle Hydrangea	CONT		24"-30"	TYPICAL SPECIES HABIT, O.C. 4'
IG	25	Ilex glabra \`Shamrock\`	Inkberry	CONT		24"-30"	TYPICAL SPECIES HABIT, O.C. 4'
JCSG	34	Juniperus chinensis 'Sea Green'	Sea Green Juniper	CONT		24"-30"	TYPICAL SPECIES HABIT, O.C. 4.5'
JHBH	55	Juniperus horizontalis 'Bar Harbor'	Bar Harbor Creeping Juniper	CONT	24"-30"		TYPICAL SPECIES HABIT, O.C. 4.5'
SJG	34	Spiraea japonica 'Goldmound'	Goldmound Japanese Spirea	CONT		18"-24"	TYPICAL SPECIES HABIT, O.C. 4'
SBAW	27	Spiraea x bumalda 'Anthony Waterer'	Anthony Waterer Bumald Spiraea	CONT		18"-24"	TYPICAL SPECIES HABIT, O.C. 4.5
PERENNIALS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**SIZE**	**HEIGHT**	**REMARKS**
HSD	46	HEMEROCALLIS 'STELLA DE ORO'	STELLA DE ORO DAYLILY	1 GAL.			CLUMPS, 24" O.C.

40 0 40 80

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Justin Eric Dates
NEW YORK REGISTERED LANDSCAPE ARCHITECT
LICENSE NUMBER: 001964-01
COLLIERS ENGINEERING & DESIGN CT, P.C.

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SHEET TITLE:
LANDSCAPE PLAN

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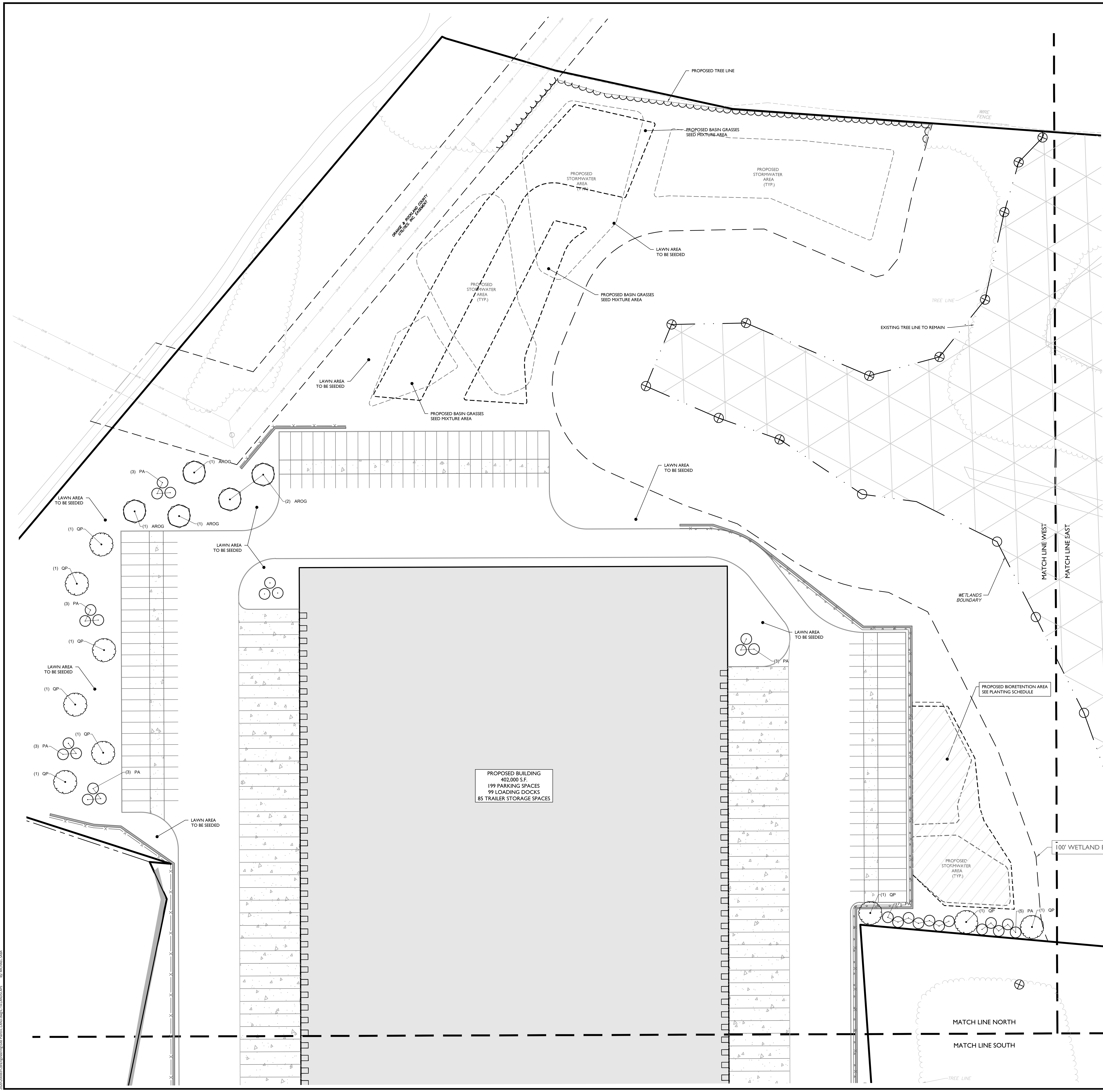


GENERAL SEEDING NOTES:

1. TEMPORARY SEEDING: REFER TO SOIL EROSION AND SEDIMENT CONTROL PLANS.
2. PERMANENT SEEDING SHALL CONSIST OF THE FOLLOWING MIXTURE OR APPROVED EQUAL - OPTIMUM SEEDING DATES ARE BETWEEN APRIL 1 AND MAY 31: AND AUGUST 16 AND OCTOBER 15.

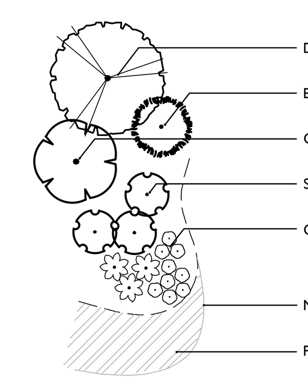
   TURF MIX (7-10 LBS./1,000 S.F. MINIMUM)
   TALL FESCUE, 'STINGRAY' (34%)
   TALL FESCUE, RAPTOR III (33%)
   HARD FESCUE, 'RIDU' (33%)

   BASIN MIX (2-3 LBS./1,000 S.F. MINIMUM)
   CREEPING RED FESCUE (30%)
   TALL FESCUE (30%)
   PERENNIAL RYE GRASS (10%)
   BIRDSFOOT TREFOIL (30%)

   SEEDING OUTSIDE OF THE OPTIMUM DATES SHALL NOT BE CONDUCTED WITH OUT PRIOR APPROVAL.
3. PERMANENT SEEDING TO BE APPLIED BY RAKING OR DRILLING INTO THE SOILS AT THE RATE GIVEN ABOVE.
4. FERTILIZER FOR THE ESTABLISHMENT OF TEMPORARY AND PERMANENT VEGETATIVE COVER SHALL BE IN COMPLIANCE WITH THE LATEST NYSDEC REGULATIONS. THIS INCLUDES, BUT LIMITED TO:
   1. NO FERTILIZER SHALL BE APPLIED BETWEEN DEC. 1 AND APRIL 1 IN ANY YEAR.
   2. SHALL NOT BE APPLIED WITHIN 20 FEET OF A WATER BODY.
   3. ONLY LAWN FERTILIZER WITH LESS THAN 0.67% BY WEIGHT PHOSPHATE CONTENT MAY BE APPLIED.

   (A SOIL TEST PRIOR TO FERTILIZER APPLICATION IS RECOMMENDED.)
5. IF SEASON PREVENTS THE ESTABLISHMENT OF TEMPORARY OR PERMANENT SEEDING, EXPOSED AREA TO BE STABILIZED WITH MULCH AS INDICATED IN NOTE 6.
6. MULCH TO CONSIST OF SMALL GRAIN STRAW OR SALT HAY ANCHORED WITH A WOOD AND FIBER MULCH BINDER OR AN APPROVED EQUAL. MULCH WILL BE SPREAD AT RATES PER NYSDEC STANDARDS AND ANCHORED WITH A MULCH ANCHORING TOOL OR LIQUID MULCH BINDER, AND SHALL BE PROVIDED ON ALL SEEDINGS. HYDROMULCH SHALL ONLY BE USED DURING OPTIMUM GROWING SEASONS.
7. AS NEEDED, WORK LIME AND FERTILIZER INTO SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLY UNIFORM, FINE SEEDBED IS PREPARED. ALL BUT CLAY OR SILTY SOILS AND COARSE SANDS SHOULD BE ROLLED TO FIRM THE SEEDBED WHEREVER FEASIBLE.
8. REMOVE FROM THE SURFACE ALL STONES TWO INCHES OR LARGER IN ANY DIMENSION. REMOVE ALL OTHER DEBRIS, SUCH AS WIRE, CABLE, TREE ROOTS, PIECES OF CONCRETE, CLODS, LUMPS, OR OTHER UNSUITABLE MATERIAL.
9. INSPECT SEEDBED JUST BEFORE SEEDING. IF TRAFFIC HAS LEFT THE SOIL COMPACTED, THE AREA MUST BE RETILLED AND FIRMED AS ABOVE.

LANDSCAPE LEGEND



DECIDUOUS TREE
EVERGREEN TREE
ORNAMENTAL TREE
SHRUB
ORNAMENTAL GRASS
MULCH BED LINE
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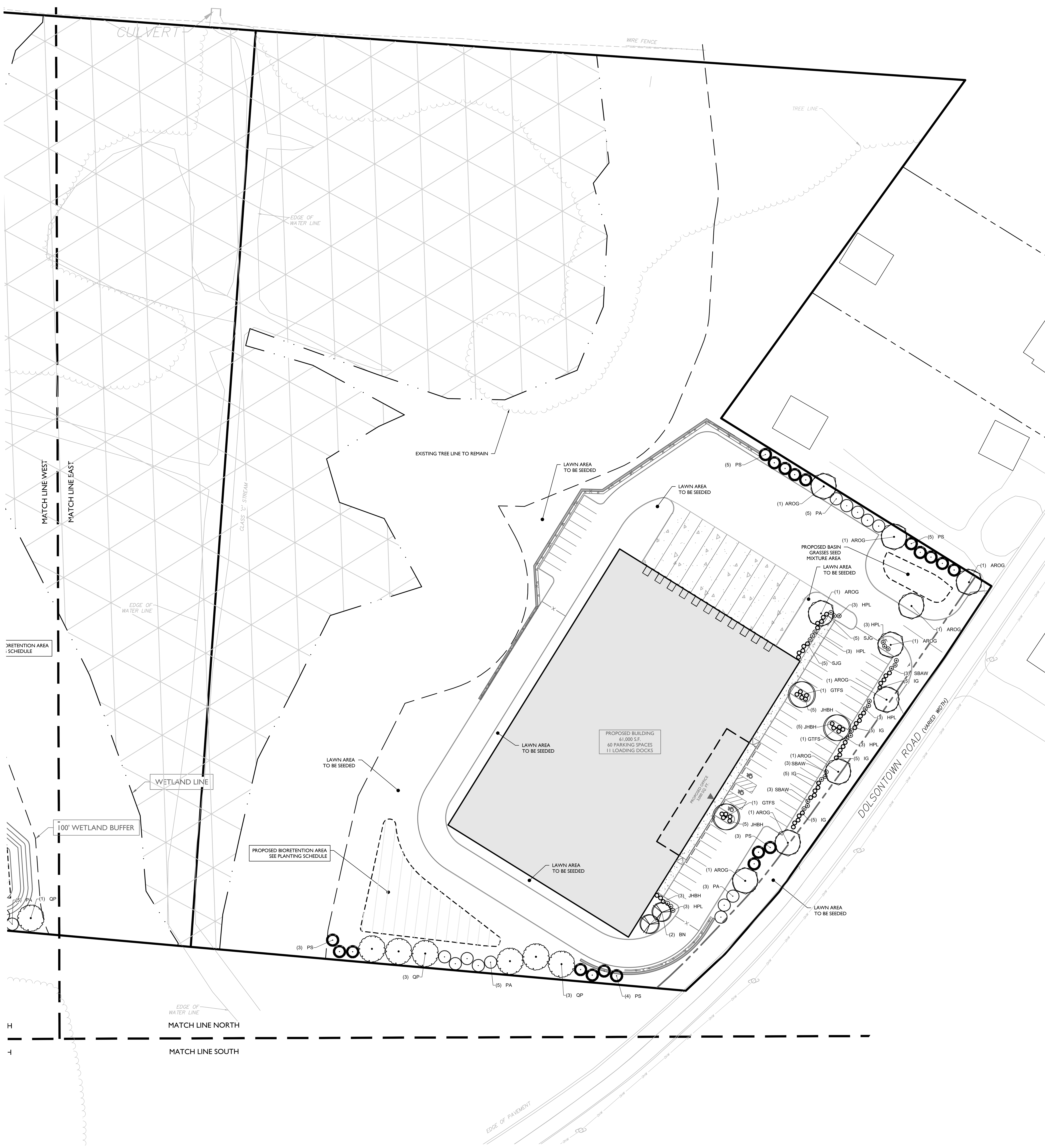

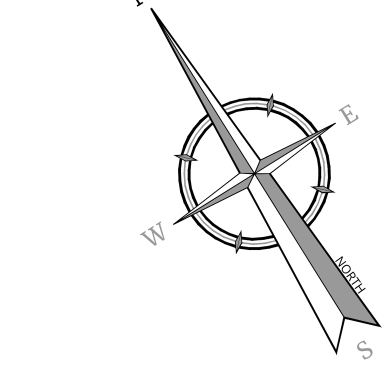

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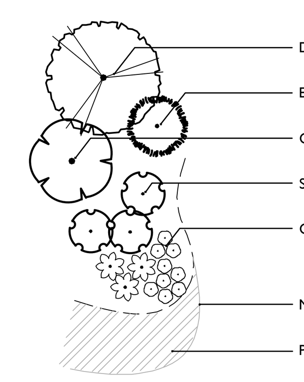

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1-1-4.2 &
6-1-3.2

TOWN OF WAWAYANDA
ORANGE COUNTY
NEW YORK STATE

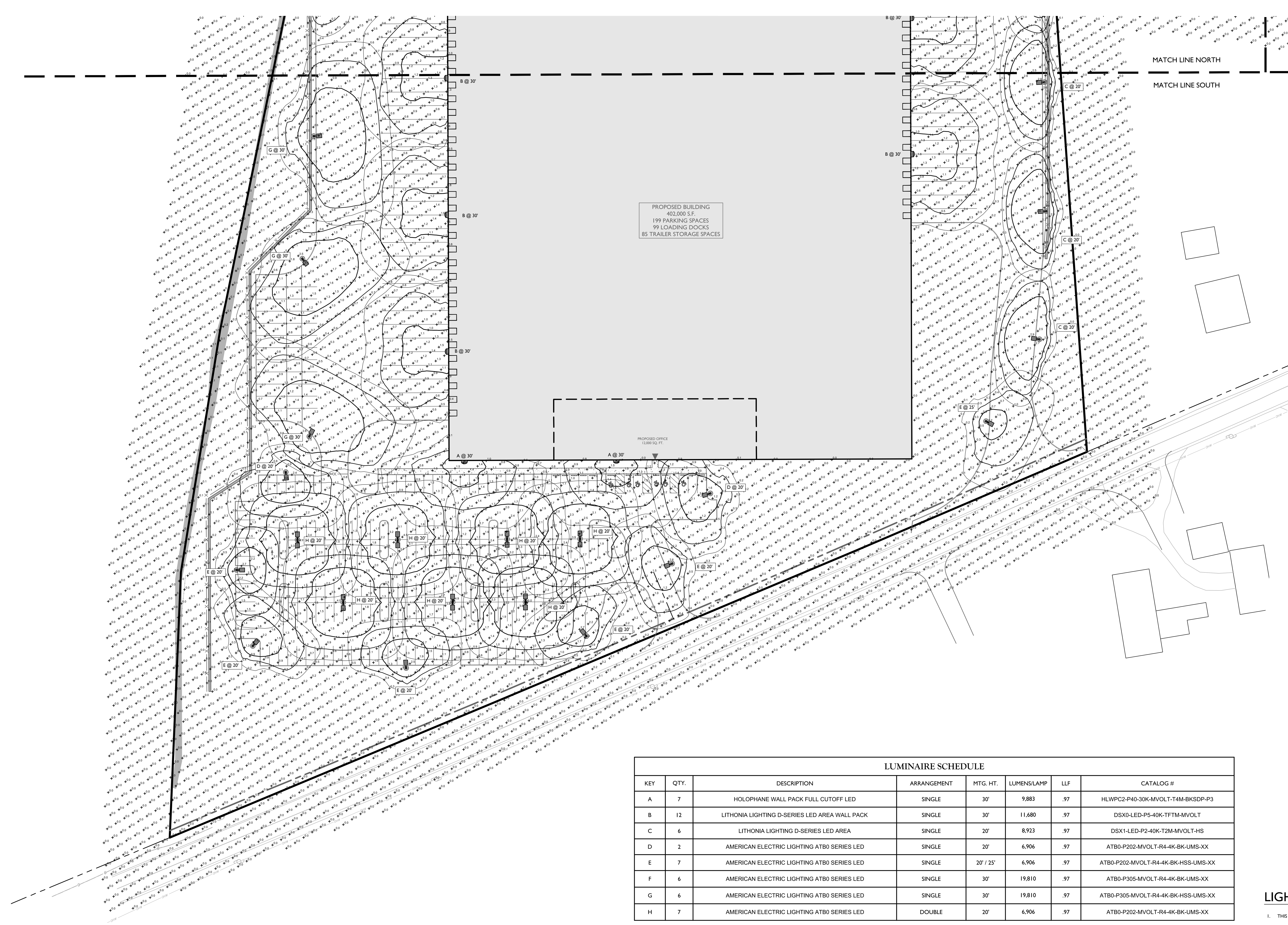
Colliers Engineering & Design
NEWBURGH
555 Hudson Valley Avenue
Suite 101
New Windsor, NY 12553
Phone: 845.564.4495
COLLIERS ENGINEERING & DESIGN CT, P.C.
DOING BUSINESS AS MASER CONSULTING
ENGINEERING & LAND SURVEYING

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER: 20006912B
DRAWING NAME: C-LAND

SHEET TITLE:
LANDSCAPE PLAN

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



LIGHTING LEGEND:

SINGLE FIXTURE POLE LIGHT

WALLPACK

0.0 LIGHT LEVEL AT GRADE (IN FOOTCANDLES)

0.25

0.5

1.0

LUMINAIRE SCHEDULE

KEY	QTY.	DESCRIPTION	ARRANGEMENT	MTG. HT.	LUMENS/LAMP	LLF	CATALOG #
A	7	HOLOPHANE WALL PACK FULL CUTOFF LED	SINGLE	30'	9,883	.97	HLWPC2-P40-30K-MVOLT-T4M-BKSDP-P3
B	12	LITHONIA LIGHTING D-SERIES LED AREA WALL PACK	SINGLE	30'	11,680	.97	DSX0-LED-P5-40K-TFTM-MVOLT
C	6	LITHONIA LIGHTING D-SERIES LED AREA	SINGLE	20'	8,923	.97	DSX1-LED-P2-40K-T2M-MVOLT-HS
D	2	AMERICAN ELECTRIC LIGHTING ATB0 SERIES LED	SINGLE	20'	6,906	.97	ATB0-P202-MVOLT-R4-4K-BK-UMS-XX
E	7	AMERICAN ELECTRIC LIGHTING ATB0 SERIES LED	SINGLE	20' / 25'	6,906	.97	ATB0-P202-MVOLT-R4-4K-BK-HSS-UMS-XX
F	6	AMERICAN ELECTRIC LIGHTING ATB0 SERIES LED	SINGLE	30'	19,810	.97	ATB0-P305-MVOLT-R4-4K-BK-UMS-XX
G	6	AMERICAN ELECTRIC LIGHTING ATB0 SERIES LED	SINGLE	30'	19,810	.97	ATB0-P305-MVOLT-R4-4K-BK-HSS-UMS-XX
H	7	AMERICAN ELECTRIC LIGHTING ATB0 SERIES LED	DOUBLE	20'	6,906	.97	ATB0-P202-MVOLT-R4-4K-BK-UMS-XX

CALCULATION SUMMARY

DESCRIPTION	CALC. TYPE	UNITS	AVG.	MAX.	MIN.	AVG. / MIN.
PAVEMENT VEHICLE PARKING AREA SUMMARY	ILLUMINANCE	FC	1.7	5.1	0.4	4.3:1
PAVEMENT TRUCK & LOADING DOCK AREA SUMMARY	ILLUMINANCE	FC	0.9	3.0	0.1	9.0:1

LIGHTING NOTES:

1. THIS PLAN IS TO BE USED FOR LIGHTING PURPOSES ONLY.
2. POLES AND FIXTURES AS SUPPLIED BY:
   POLES - HOLOPHANE
   WALL FIXTURES - HOLOPHANE & LITHONIA
   POLE FIXTURES - AMERICAN ELECTRIC LIGHTING & LITHONIA LIGHTING
3. LAMPS ARE TO BE LEDs. A LIGHT LOSS FACTOR (LLF) WAS USED AS SHOWN IN THE LUMINARIES SCHEDULE.
4. FIXTURES AND POLES ARE TO BE BLACK.
5. POLE MOUNTED FIXTURES SHALL BE PLACED A MINIMUM OF TWO (2) FEET BEHIND CURBS, EDGE OF PAVEMENT OR RETAINING WALLS IN CAR PARKING AREAS.
6. PROPOSED LIGHT FIXTURE LOCATIONS ARE CRITICAL TO PROVIDE THE LIGHTING LEVELS DEPICTED ON THIS PLAN. THE LIGHTING CONTRACTOR SHALL FIELD VERIFY FIXTURE LOCATIONS PRIOR TO INSTALLATION. IF ADJUSTMENT TO ANY LIGHT FIXTURE LOCATION IS REQUIRED DUE TO FINAL CONSTRUCTION OF UTILITIES AND SITE IMPROVEMENTS, THE LIGHTING CONTRACTOR SHALL NOTIFY THE PROJECT LANDSCAPE ARCHITECT OF ANY DISCREPANCIES PRIOR TO INSTALLATION.
7. LIGHTING SHOWN ON PLAN DEPICTS AVERAGE MAINTAINED FOOTCANDLE LEVELS AT GRADE.
8. CONTRACTOR TO PROVIDE SHOP DRAWINGS OF LIGHT FIXTURES FOR REVIEW AND APPROVAL BY THE OWNER OR PROJECT LANDSCAPE ARCHITECT.
9. ELECTRICAL PLANS FOR WIRING LAYOUT BY OTHERS.
10. POLE BASE INSTALLATION SHALL INCLUDE A SUPPLEMENTARY GROUND ROD AND WIRE LEAD TO BASE FOR POWER CONNECTION. DETAILS PER PROJECT ELECTRICAL ENGINEER.
11. ALL LIGHTING FIXTURES WILL BE DARK SKY COMPLIANT.

TOWN OF WAWAYANDA
PLANNING BOARD

0 40 80
SCALE : 1" = 40'

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REV	DATE	DRAWN BY	DESCRIPTION
1	02/04/22	CDR	REVISED FOR GEIS SUBMISSION
2	01/27/23	CDR	REVISED PER PLANNING BOARD COMMENTS & STORMWATER TESTING RESULTS.

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER IS A VIOLATION OF ARTICLE 145, SECTION 7209, SUB-DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

Justin Eric Dates
NEW YORK REGISTERED LANDSCAPE ARCHITECT
LICENSE NUMBER: 001964-01
COLLIERS ENGINEERING & DESIGN CT, P.C.

PRELIMINARY SITE PLANS
FOR
DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

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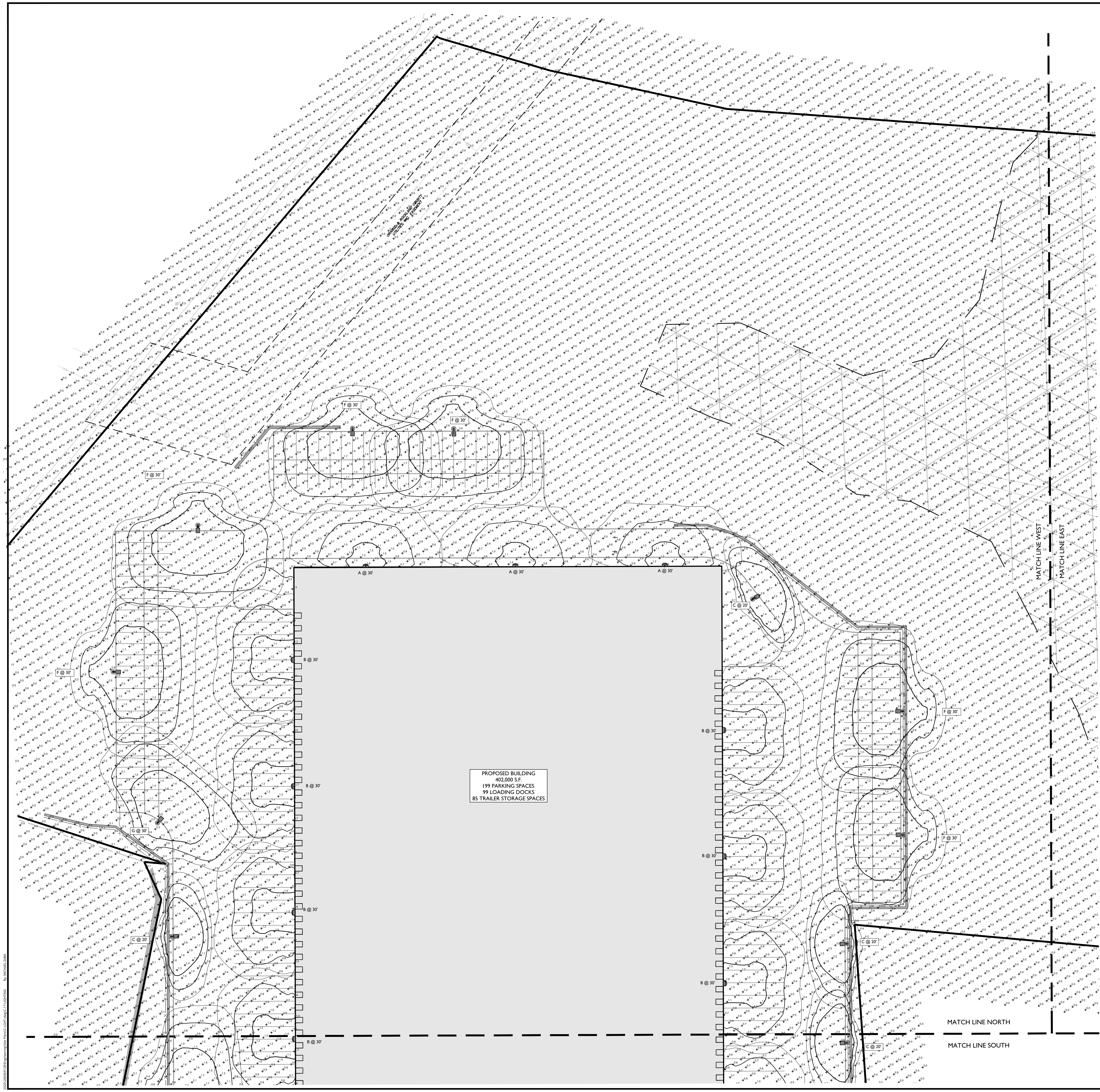
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER:	DRAWING NAME:
20006912B	C-LGHT

SHEET TITLE:
LIGHTING PLAN

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



LIGHTING LEGEND:

SINGLE FIXTURE POLE LIGHT

WALLPACK

0.0 LIGHT LEVEL AT GRADE (IN FOOTCANDLES)

0.25

0.5

1.0

40 0 40 80

SCALE : 1" = 40'

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PLANNING BOARD

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811 Know what's below. Call before you dig.

FOR STATE SPECIFIC DIRECT PHONE NUMBERS
VISIT: WWW.CALL811.COM

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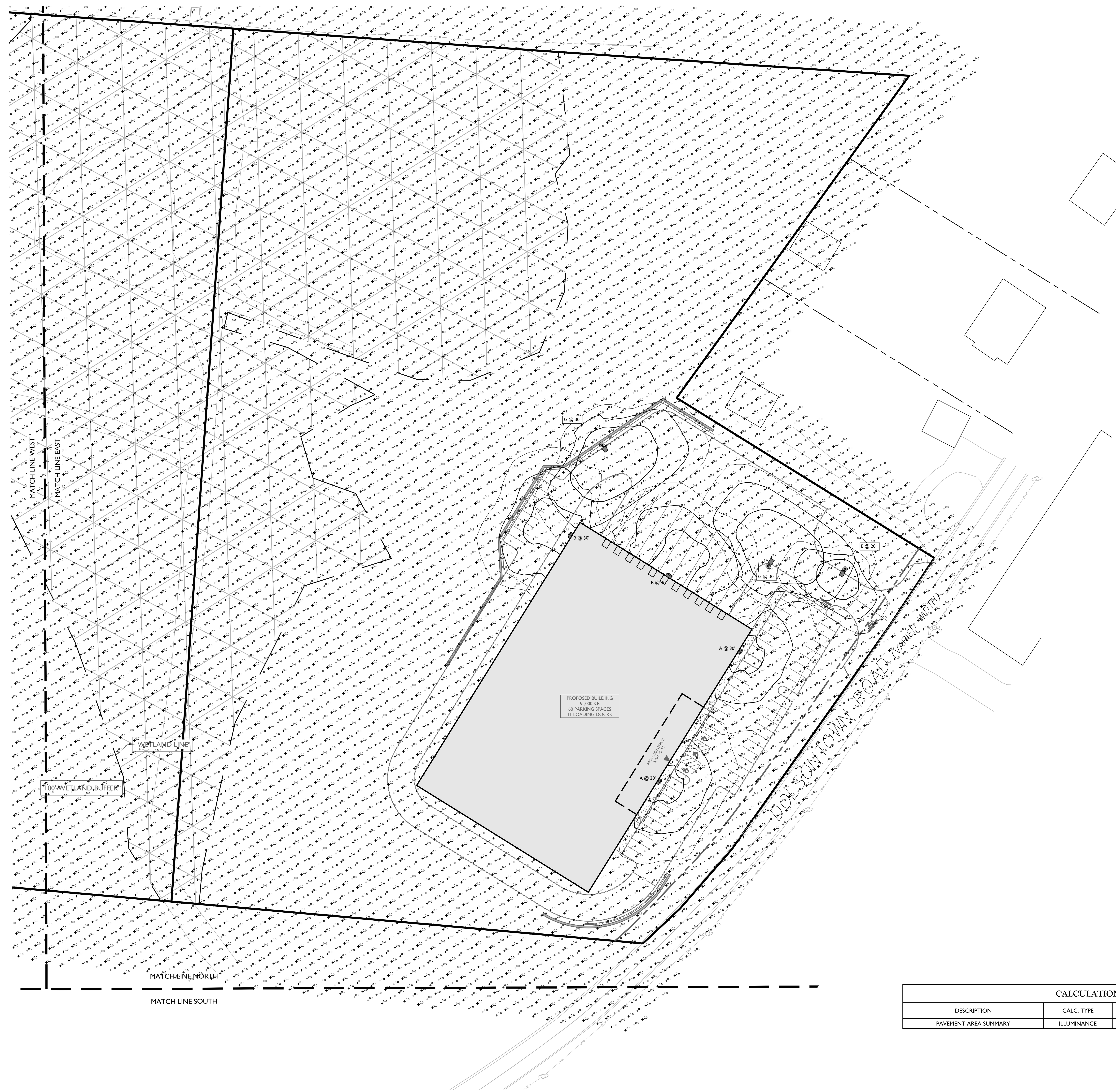

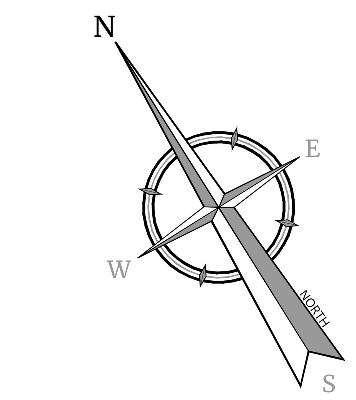

LIGHTING LEGEND:

- SINGLE FIXTURE POLE LIGHT
- WALLPACK
- 0.0 LIGHT LEVEL AT GRADE (IN FOOTCANDLES)
- 0.25
- 0.5
- 1.0

CALCULATION SUMMARY						
DESCRIPTION	CALC. TYPE	UNITS	AVG.	MAX.	MIN.	AVG. / MIN.
PAVEMENT AREA SUMMARY	ILLUMINANCE	FC	1.1	3.5	0.2	5.5:1

40 0 40 80
SCALE : 1" = 40'

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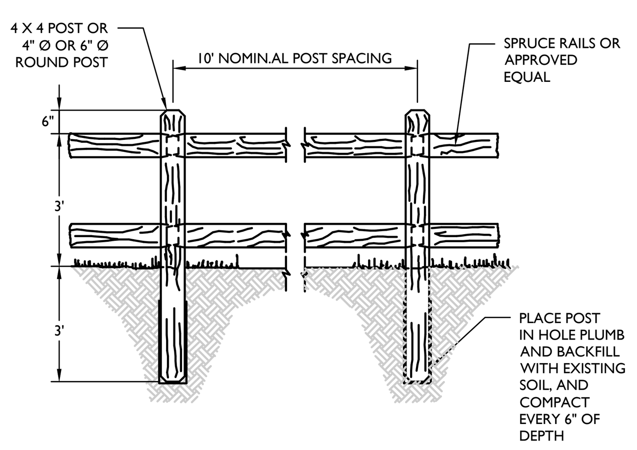
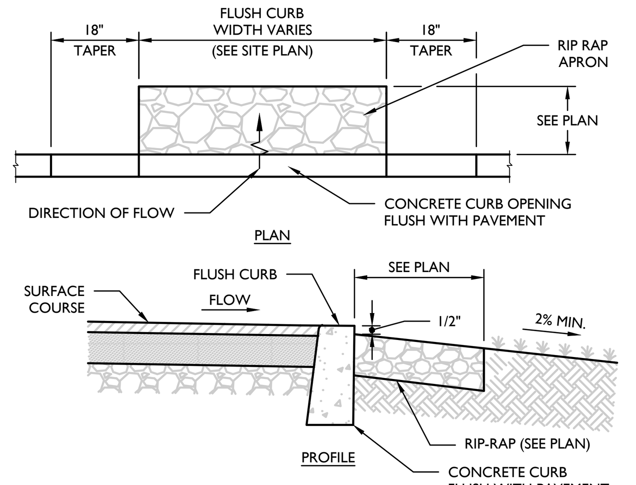


SPLIT RAIL FENCE (2 - RAIL) DETAIL

NOT TO SCALE MCCM-SITE-FNCE-1900 07/01/19

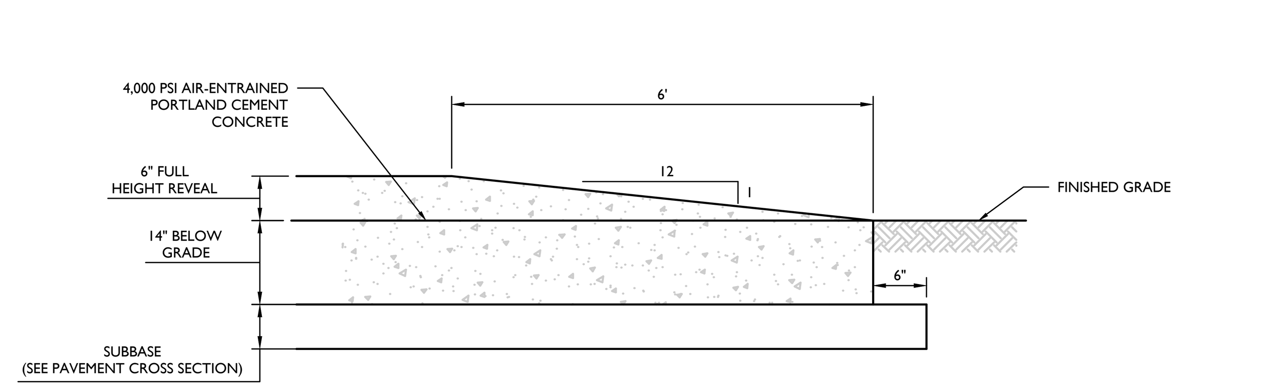


NOTES:

1. FLUSH CURB FOR OVERLAND FLOW TO BE USED AT DESIGNATED LOCATIONS ONLY AS SHOWN ON SITE PLANS.
2. CONTRACTOR SHALL ENSURE THAT THERE IS POSITIVE DRAINAGE FROM THE PAVEMENT TO THE GRASSED AREA.

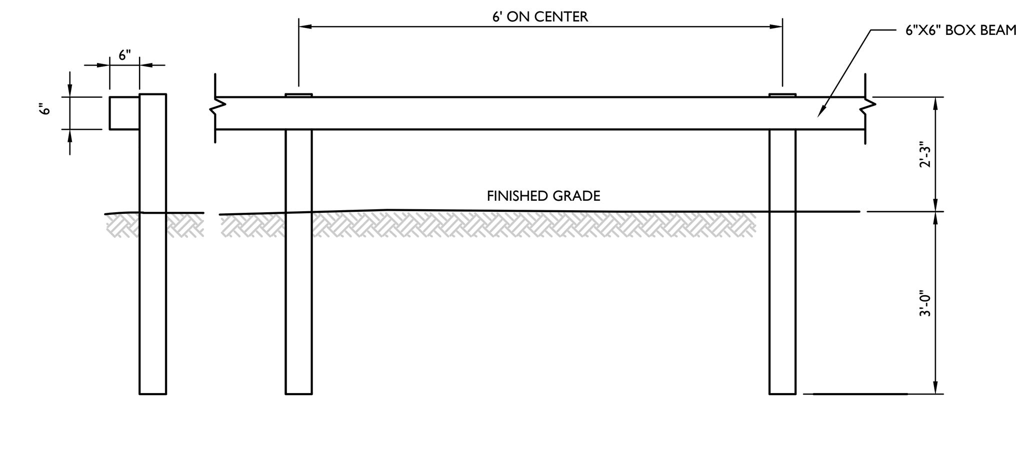
FLUSH CURB FOR DRAINAGE DETAIL

NOT TO SCALE MCNY-SITE-CURB-1400 07/01/19



TERMINAL CURB DETAIL

NOT TO SCALE MCNY-SITE-CURB-2400 07/01/19



NOTES:

1. INSTALLATION OF PROPOSED GUIDE RAIL TO BE IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATIONS.

BOX BEAM GUIDE RAIL DETAIL

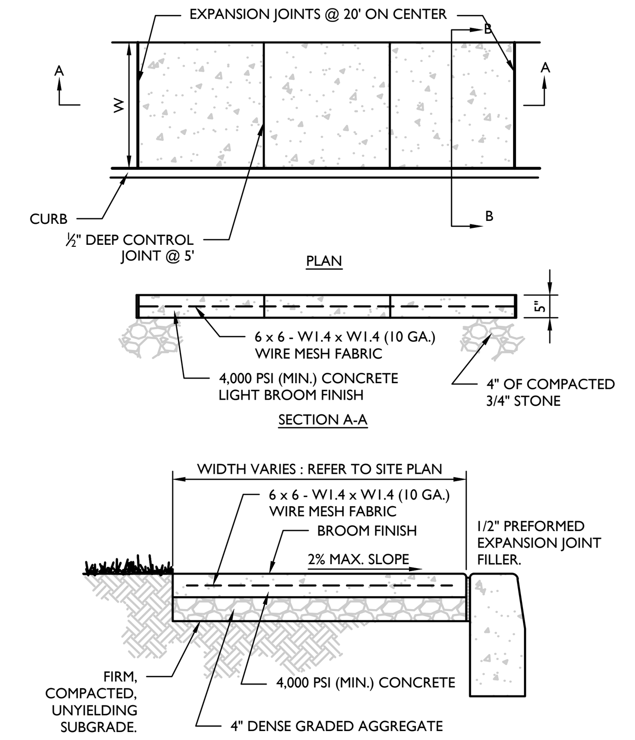
NOT TO SCALE MCCM-SITE-FNCE-2700

NOTES:

1. CONTRACTOR SHALL PREPARE SHOP DRAWINGS OF EACH CURB RAMP FOR SUBMISSION AND APPROVAL OF THE UNDERSIGNED PROFESSIONAL AND THE MUNICIPAL, COUNTY, STATE OR OTHER AGENCY'S ENGINEER HAVING JURISDICTION.
2. LANDING AREA, APPROACH SIDEWALK TRANSITIONS AND CURB RAMP SHALL BE KEPT CLEAR OF OBSTRUCTIONS.
3. CURB AT RAMP OPENING (FLUSH CURB) TO BE FLUSH WITH ROADWAY PAVEMENT.
4. CROSSWALKS AND PAVEMENT MARKINGS TO BE INSTALLED AS DENOTED ON SITE PLAN.
5. MAXIMUM RAMP SLOPE MAY BE 12H:1V UPON APPROVAL OF ENGINEER. RAMP SLOPES SHOWN ARE THE PREFERRED SLOPE. SIDE FLARE SLOPES MAY BE 10H:1V UPON APPROVAL OF THE ENGINEER.
6. MINIMUM RAMP CROSS-SLOPE SHALL BE 0.50%. THE MAXIMUM RAMP CROSS-SLOPE MAY BE 2.00% UPON APPROVAL OF THE ENGINEER. CROSS-SLOPES SHOWN IN THE DETAILS ARE THE PREFERRED SLOPES TO MAINTAIN A LEVEL OF CONSTRUCTION TOLERANCE.
7. ACCESSIBLE RAMPS SHALL BE INSTALLED PURSUANT WITH THE CURRENT UNITED STATES ACCESS BOARD ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES AND THE ADA STANDARDS FOR ACCESSIBLE DESIGN AS PUBLISHED BY THE UNITED STATES DEPARTMENT OF JUSTICE AND OTHER APPLICABLE LOCAL AND STATE STANDARDS IN EFFECT AT THE DATE OF CONSTRUCTION.
8. DEVIATIONS FROM THE CURB RAMP DETAILS REQUIRE WRITTEN APPROVAL OF THE UNDERSIGNED PROFESSIONAL AND THE MUNICIPAL, COUNTY, STATE OR OTHER AGENCY'S ENGINEER HAVING JURISDICTION.
9. THE RAMP SURFACE SHALL HAVE A NON-SLIP, HAND BROOMED FINISH.
10. CONCRETE EXPANSION JOINTS SHALL HAVE A FIRM SURFACE WITH 1/4" BEVELED CONCRETE EDGES. THE JOINT SURFACE SHALL NOT BE MORE THAN 1/4" BELOW THE ADJOINING CONCRETE SURFACE.
11. CURB RAMP MUST BE WHOLLY CONTAINED WITHIN THE CROSSWALK CROSSING.
12. THE CLEAR SPACE SHALL BE INCREASED TO 5 FEET WHERE THE TURNING SPACE IS CONSTRAINED AT THE BACK OF THE SIDEWALK.
13. THE MAXIMUM SEPARATION BETWEEN THE BACK OF CURB AND DETECTABLE WARNING SURFACE SHALL NOT EXCEED 5 FEET. THE MAXIMUM SEPARATION AREA MAY BE WITHIN THE 4' X 4' CLEAR SPACE.
14. SEE SEPARATE DETAILS FOR "DETECTABLE WARNING SURFACE" AND "CURB RAMP SECTIONS".
15. WHERE SIDE FLARES ARE NOT REQUIRED, PROVIDE AN 18" CURB TAPER TO THE FLUSH CURB.
16. ALL CURB RAMP FLUSH CURB SHALL BE MADE WITH CONCRETE CURB CRADLE, REGARDLESS OF THE CURB MATERIAL USED THROUGHOUT THE SITE.

CURB RAMP NOTES

MCNY-SITE-HADA-2500 07/01/19

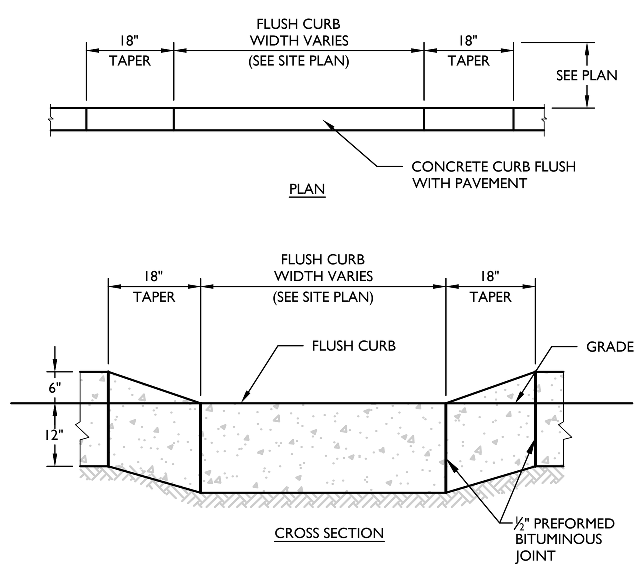


NOTES:

1. A PREFORMED, BITUMINOUS EXPANSION JOINT 1/2" THICK, 4" WIDE AND EXTENDING THE FULL WIDTH OF THE SIDEWALK (UNBROKEN) SHALL BE INSTALLED.
2. ½" DEEP CONTROL JOINTS INSTALLED AT AN INTERVAL OF EVERY 5'.
3. JOINT FILLER SHALL CONFORM TO AASHTO M-33. SURFACE OF CONCRETE SHALL BE BROOM FINISH. ROUND EDGES USING AN EDGING TOOL WITH A 1/4" RADIUS.
4. CONCRETE SIDEWALK SHALL BE CONSTRUCTED PER THE LATEST ADA REQUIREMENTS.

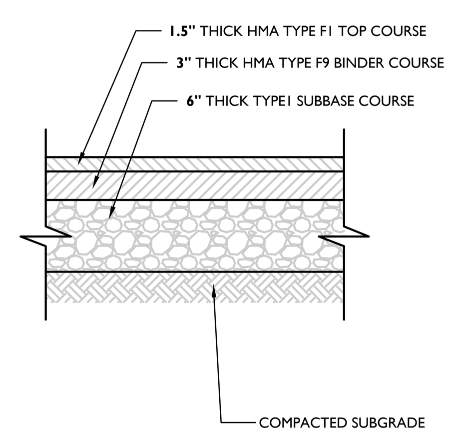
REINFORCED CONCRETE SIDEWALK (NEXT TO CURB) DETAIL

NOT TO SCALE MCNY-SITE-PVMT-1800 07/01/19



CONCRETE FLUSH CURB DETAIL

NOT TO SCALE MCNY-SITE-CURB-1300 07/01/19

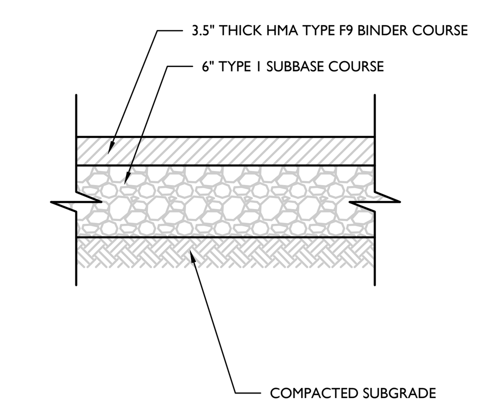


NOTES:

1. PAVEMENT TYPES TO BE IN ACCORDANCE WITH CURRENT NYSDOT STANDARDS AND SPECIFICATIONS.

STANDARD ASPHALT PAVEMENT DETAIL

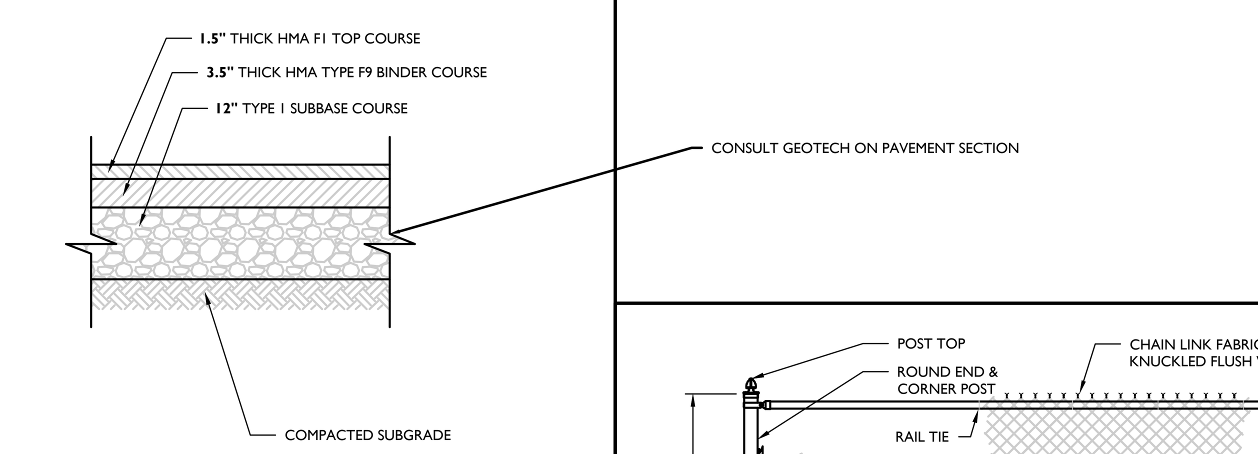
NOT TO SCALE MCNY-SITE-PVMT-1000 07/01/19



NOTES:

1. PAVEMENT TYPES TO BE IN ACCORDANCE WITH CURRENT NYSDOT STANDARDS AND SPECIFICATIONS.

EMERGENCY ACCESS PAVEMENT DETAIL

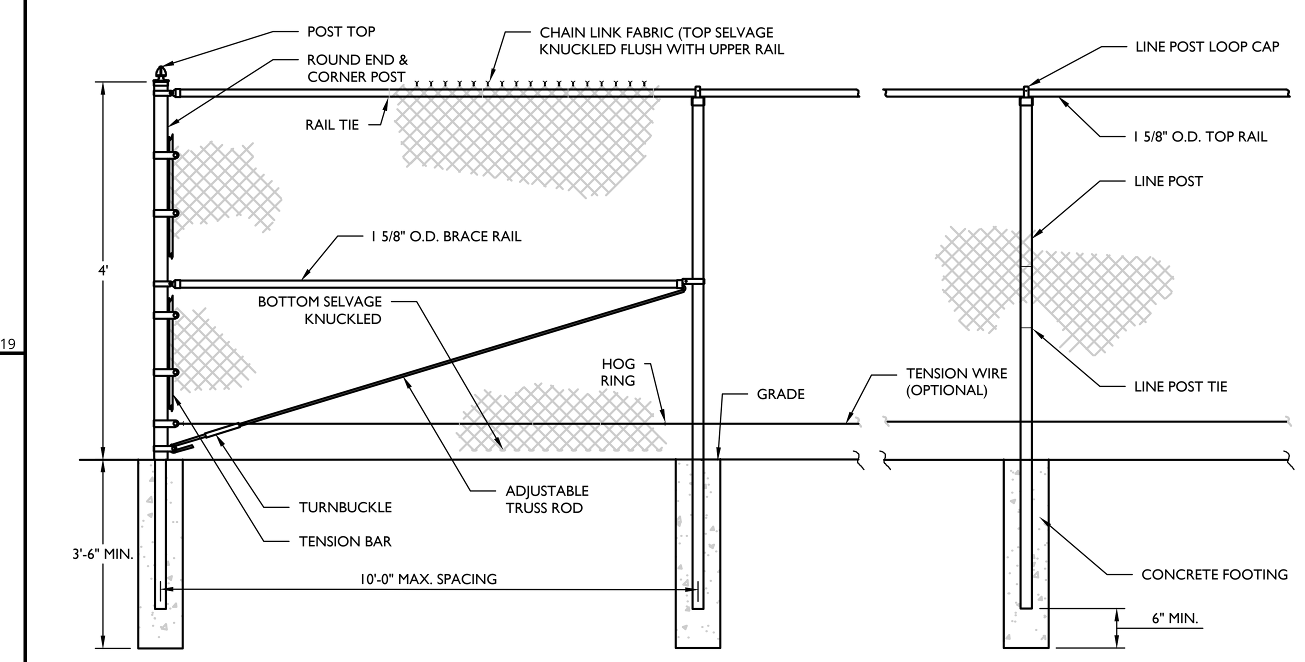


NOTES:

1. PAVEMENT TYPES TO BE IN ACCORDANCE WITH CURRENT NYSDOT STANDARDS AND SPECIFICATIONS.

HEAVY-DUTY ASPHALT PAVEMENT DETAIL

NOT TO SCALE MCNY-SITE-PVMT-1100 07/01/19

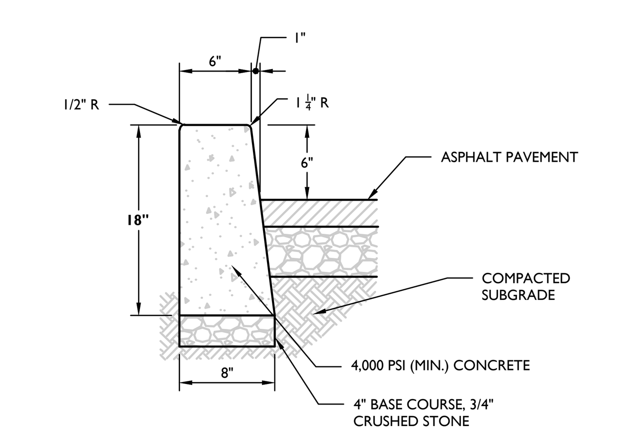


NOTES:

1. WIRE MESH SHALL BE 2" MESH 9 GAUGE GALVANIZED (ZINC) COATED STEEL CHAIN LINK FABRIC, WITH KNUCKLED SELVAGE (KK) ON BOTH TOP AND BOTTOM.
2. FENCE FRAMEWORK RAIL AND POSTS SHALL BE HOT DIP GALVANIZED STEEL PIPE, 16 GAUGE, CLASS 1 ZINC COATED PER ASTM 1043 GORUP 1A FOR SCHEDULE 40 ROUND PIPE, WITH REGULAR STEEL YIELD STRENGTH OF 30,000 PSI PER ASTM F1083.
3. BAR LENGTH AND POST HEIGHT ABOVE GRADE PER FENCE HEIGHT AND MANUFACTURER'S SPECIFICATIONS. FENCE HEIGHT AS SPECIFIED ON THE PLAN.
4. COLOR OF WIRE MESH AS SPECIFIED ON THE PLANS.
5. END AND CORNER POST TOP SHALL BE DOME SHAPE.
6. FOOTING WIDTH TO BE (4) X POST WIDTH, MINIMUM DEPTH 3'-6", 3,000 PSI (MIN.) CONCRETE.

GALVANIZED STEEL CHAIN LINK FENCE DETAIL

NOT TO SCALE 07/01/19

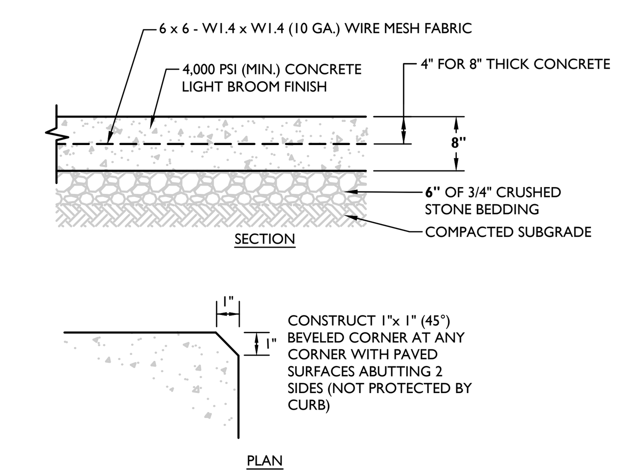


NOTES:

1. PREFORMED BITUMINOUS FIBER EXPANSION JOINTS, 1/2" THICK AT 20' MAX. INTERVALS ALONG THE CURB. PROVIDE CONTROL JOINTS @ 10 FEET MAX. BETWEEN EXPANSION JOINTS.

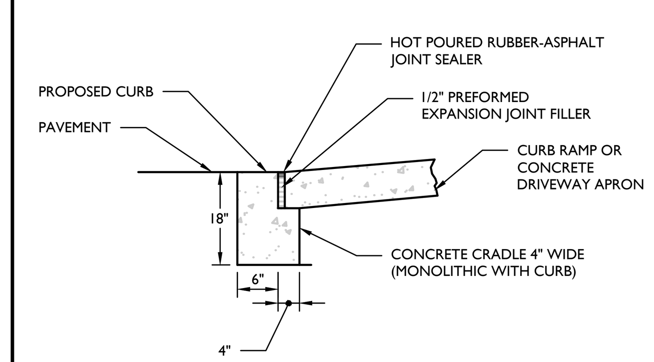
CONCRETE CURB (ASPHALT PAVEMENT) DETAIL

NOT TO SCALE MCNY-SITE-CURB-1000 07/01/19



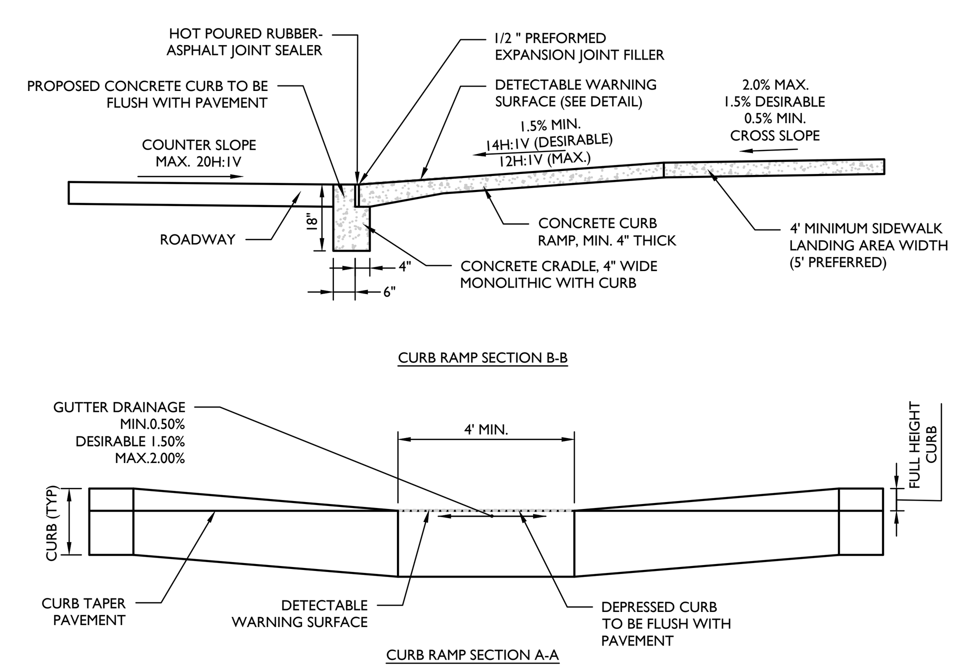
CONCRETE LOADING PAD DETAIL

NOT TO SCALE MCNY-SITE-PVMT-1600 07/01/19



DROPPED CURB AND CRADLE DETAIL

NOT TO SCALE MCNY-SITE-CURB-2000 07/01/19

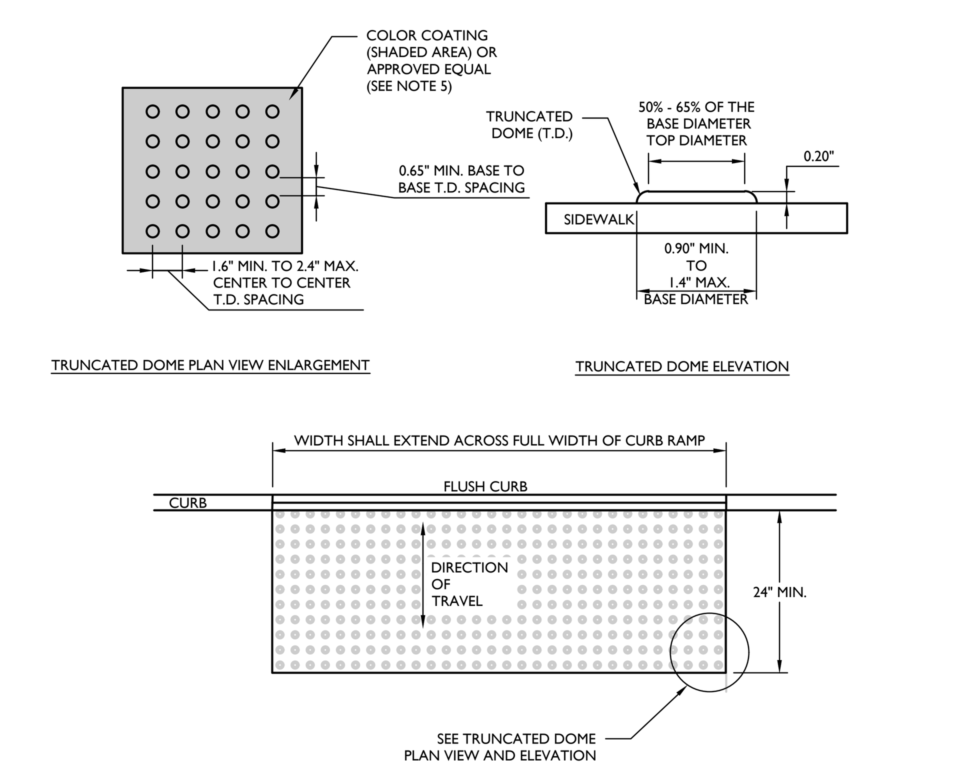


NOTES:

1. DEPRESSED CURB AT DETECTABLE WARNING SHALL BE A SMOOTH LEVEL SURFACE THAT IS FLUSH WITH THE ADJOINING PAVEMENT. NO BUMPS OR ROUGH SURFACE ARE ALLOWED. SUCH UNEVENNESS SHALL BE MILLED OR GRINDED SMOOTH.
2. POSITIVE DRAINAGE SHALL BE MAINTAINED AT RAMP. RAMP SHALL SLOPE TOWARDS PAVEMENT NO PONDING OF WATER IS PERMITTED AT CURB RAMP. PAVEMENT GRADES TO BE ADJUSTED AS NECESSARY TO PROVIDE POSITIVE GUTTER DRAINAGE.
3. CURB (DROPPED CURB) GUTTER-LINE TO BE FLUSH WITH ROADWAY PAVEMENT.
4. MAXIMUM GUTTER DRAINAGE GRADE MAY BE INCREASED TO 2.00% UPON THE WRITTEN APPROVAL OF THE UNDERSIGNED PROFESSIONAL.
5. DEVIATION FROM THIS DETAIL REQUIRES THE WRITTEN APPROVAL OF THE UNDERSIGNED PROFESSIONAL.

CURB RAMP SECTIONS DETAIL

NOT TO SCALE MCNY-SITE-HADA-2000 07/01/19

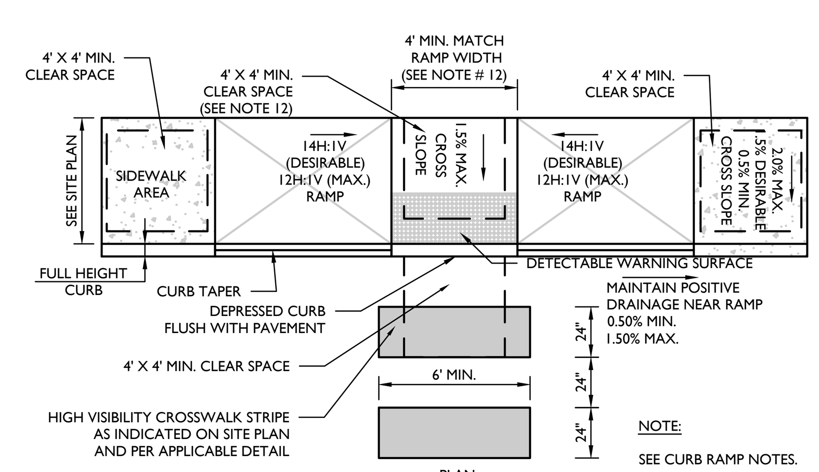


NOTES:

1. THE DETECTABLE WARNING SURFACE SHALL BE MANUFACTURED MATS THAT ARE EMBEDDED AND CAST-IN-PLACE IN THE CONCRETE.
2. IN LIEU OF A CAST IN PLACE DETECTABLE WARNING SURFACE, THE CONTRACTOR MAY UTILIZE A SURFACE APPLIED DETECTABLE WARNING SURFACE WITH PRIOR APPROVAL OF THE UNDERSIGNED ENGINEER AND PRIOR TO POURING OF THE CONCRETE RAMP.
3. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A SHOP DRAWING OF THE DETECTABLE WARNING SURFACE PRIOR TO CONSTRUCTION FOR APPROVAL.
4. THE CONTRACTOR SHALL PROVIDE A MANUFACTURER CERTIFICATION THAT THE DETECTABLE WARNING SURFACE COMPLIES WITH THE CURRENT ADA STANDARDS FOR ACCESSIBLE DESIGN AS PUBLISHED BY THE DEPARTMENT OF JUSTICE AND THE ADA STANDARDS AS SUPPORTED BY THE UNITED STATES ACCESS BOARD, AND THE STATE AND/OR LOCAL ADA STANDARDS.
5. **SAFETY RED** SHALL BE APPROVED BY THE LOCAL JURISDICTION PRIOR TO INSTALLATION. DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT. ALTERNATIVE COLOR MAY BE USED PROVIDED SUCH COLOR COMPLIES WITH CURRENT ADA STANDARDS.
6. DETECTABLE WARNINGS SHALL CONSIST OF A SURFACE OF TRUNCATED DOMES.
7. TRUNCATED DOMES IN A DETECTABLE WARNING SURFACE SHALL HAVE A BASE DIAMETER OF 0.9 INCH (23 mm) MINIMUM AND 1.4 INCHES (36 mm) MAXIMUM, A TOP DIAMETER OF 50 PERCENT OF THE BASE DIAMETER MINIMUM TO 65 PERCENT OF THE BASE DIAMETER MAXIMUM, AND A HEIGHT OF 0.2 INCH (5.1 mm).
8. TRUNCATED DOMES IN DETECTABLE WARNING SURFACE SHALL HAVE A CENTER-TO-CENTER SPACING OF 1.6 INCHES (41 mm) MINIMUM AND 2.4 INCHES (61 mm) MAXIMUM, AND A BASE-TO-BASE SPACING OF 0.65 INCH (17 mm) MINIMUM, MEASURED BETWEEN THE MOST ADJACENT DOMES ON A SQUARE GRID.
9. SOME DETECTABLE WARNING PRODUCTS REQUIRE A CONCRETE BORDER FOR PROPER INSTALLATION. WHERE REQUIRED BY THE MANUFACTURER, THE CONCRETE BORDER SHALL NOT EXCEED 2 INCHES (51 mm).
10. DETECTABLE WARNING SURFACES SHOULD NOT BE PLACED ON PAVING OR EXPANSION JOINTS AT CURB RAMPS. THE ROWS OF TRUNCATED DOMES IN DETECTABLE WARNING SURFACES SHOULD BE ALIGNED PERPENDICULAR TO THE GRADE BREAK BETWEEN THE RAMP RUN AND THE STREET SO PEDESTRIANS WHO USE WHEELCHAIRS CAN "TRACK" BETWEEN THE DOMES.
11. ON PERPENDICULAR CURB RAMPS, DETECTABLE WARNING SURFACES SHALL BE PLACED AS FOLLOWS:
    a. WHERE THE ENDS OF THE BOTTOM GRADE BREAK ARE IN FRONT OF THE BACK OF CURB, DETECTABLE WARNING SURFACES SHALL BE PLACED AT THE BACK OF CURB.
    b. WHERE THE ENDS OF THE BOTTOM GRADE BREAK ARE BEHIND THE BACK OF CURB AND THE DISTANCE FROM EITHER END OF THE BOTTOM GRADE BREAK TO THE BACK OF CURB IS 5.0 FT OR LESS, DETECTABLE WARNING SURFACES SHALL BE PLACED ON THE RAMP RUN WITHIN ONE DOME SPACING OF THE BOTTOM GRADE BREAK.
    c. WHERE THE ENDS OF THE BOTTOM GRADE BREAK ARE BEHIND THE BACK OF CURB AND THE DISTANCE FROM EITHER END OF THE BOTTOM GRADE BREAK TO THE BACK OF CURB IS MORE THAN 5.0 FT, DETECTABLE WARNING SURFACES SHALL BE PLACED ON THE LOWER LANDING AT THE BACK OF CURB.
12. ON PARALLEL CURB RAMPS, DETECTABLE WARNING SURFACES SHALL BE PLACED ON THE TURNING SPACE AT THE FLUSH TRANSITION BETWEEN THE STREET AND SIDEWALKS.
13. ON BLENDED TRANSITIONS, DETECTABLE WARNING SURFACES SHALL BE PLACED AT THE BACK OF CURB.

DETECTABLE WARNING SURFACE DETAIL

NOT TO SCALE MCNY-SITE-HADA-2100 07/01/19

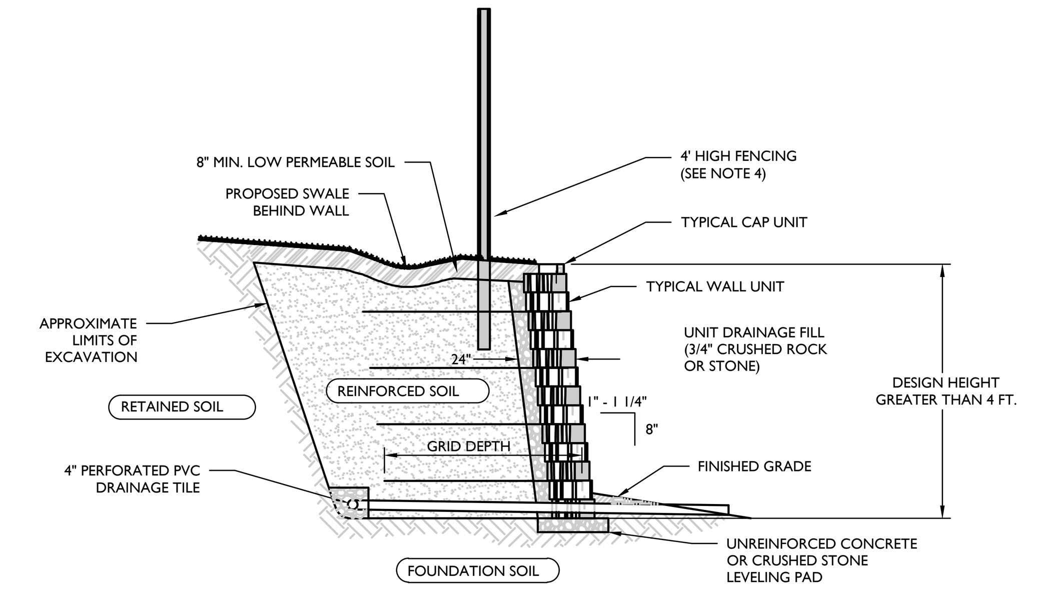


NOTE:

SEE CURB RAMP NOTES.

CURB RAMP TYPE 7 DETAIL

NOT TO SCALE MCNY-SITE-HADA-1600 07/01/19



NOTES:

1. THIS DETAIL IS A SCHEMATIC REPRESENTATION FOR MUNICIPAL AND/OR AGENCY APPROVALS AND IS NOT INTENDED TO BE USED FOR CONSTRUCTION.
2. CONTRACTOR TO PROVIDE SITE-SPECIFIC SHOP DRAWINGS AND STRUCTURAL DESIGN CALCULATIONS FOR EACH RETAINING WALL PREPARED BY A STATE LICENSED PROFESSIONAL ENGINEER FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
3. MODULAR CONCRETE BLOCK WALL TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
4. A SAFETY BARRIER (FENCING) IS REQUIRED ON ALL WALLS WHERE THE WALL HEIGHT EXCEEDS 30". PLACEMENT AND INSTALLATION METHOD OF THE PROPOSED FENCING TO BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

TYPICAL REINFORCED WALL SECTION (1" TO 1-1/4" SETBACK) DETAIL

NOT TO SCALE MCCM-SITE-WALL-1101 10/01/19

TOWN OF WAWAYANDA PLANNING BOARD

Colliers Engineering & Design

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REV	DATE	DRAWN BY	DESCRIPTION
1	02/04/22	CDR	REVISED FOR GEIS SUBMISSION
2	01/27/23	CDR	REVISED PER PLANNING BOARD COMMENTS & STORMWATER TESTING RESULTS

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER IS A VIOLATION OF ARTICLE 145, SECTION 7209, SUB-DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
COLLIERS ENGINEERING & DESIGN CT, P.C.
N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS

FOR

DOLSONTOWN ROAD EAST, LLC

TAX LOTS: 1-1-52.1, 1-1-4.2 & 6-1-3.2

TOWN OF WAWAYANDA
ORANGE COUNTY
NEW YORK STATE

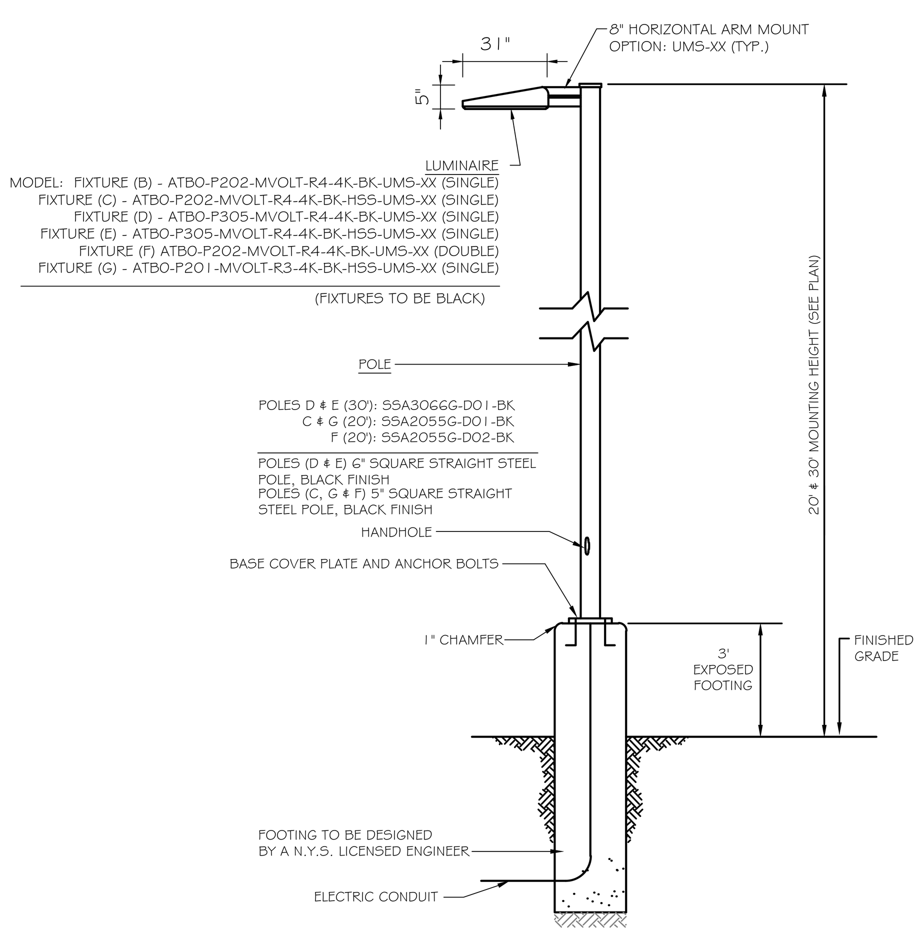
Colliers Engineering & Design
NEWBURGH
555 Hudson Valley Avenue
Suite 101
New Windsor, NY 12553
Phone: 845.564.4495
COLLIERS ENGINEERING & DESIGN CT, P.C. DOING BUSINESS AS MASER CONSULTING ENGINEERING & LAND SURVEYING

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED
PROJECT NUMBER: 20006912B	DRAWING NAME: C-DTLS		

SHEET TITLE: SITE DETAILS

SHEET NUMBER: 19 of 23

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



NOTES:

1. LUMINAIRES TO BE MANUFACTURED BY AMERICAN ELECTRIC LIGHTING AND POLES BY HOLOPHANE (MANUFACTURER TO CONFIRM POLE SIZE) OR APPROVED EQUAL.
2. CONTRACTOR TO PROVIDE SHOP DRAWINGS OF LIGHT FIXTURES FOR REVIEW AND APPROVAL BY THE OWNER OR PROJECT LANDSCAPE ARCHITECT.
3. FOOTING TO BE DESIGNED, SIGNED, AND SEALED BY A N.Y.S. LICENSED ENGINEER.
4. *VOLTAGE TO BE CONFIRMED BY ELECTRICIAN CONTRACTOR.
5. PROPOSED POLES HEIGHT TO BE MODIFIED IN FIELD TO MEET DESIGN.

POLE MOUNTED FIXTURE DETAIL

NOT TO SCALE

1. TEMPORARY SEEDING: REFER TO SOIL EROSION AND SEDIMENT CONTROL PLANS.
2. PERMANENT SEEDING SHALL CONSIST OF THE FOLLOWING MIXTURE OR APPROVED EQUAL: OPTIMUM SEEDING DATES ARE BETWEEN APRIL 1 AND MAY 31: AND AUGUST 16 AND OCTOBER 15.

   TURF MIX (7-10 LBS./1,000 S.F. MINIMUM)
   TALL FESCUE, 'STINGRAY' (34%)
   TALL FESCUE, RAPTOR III (33%)
   HARD FESCUE, 'RIDU' (33%)

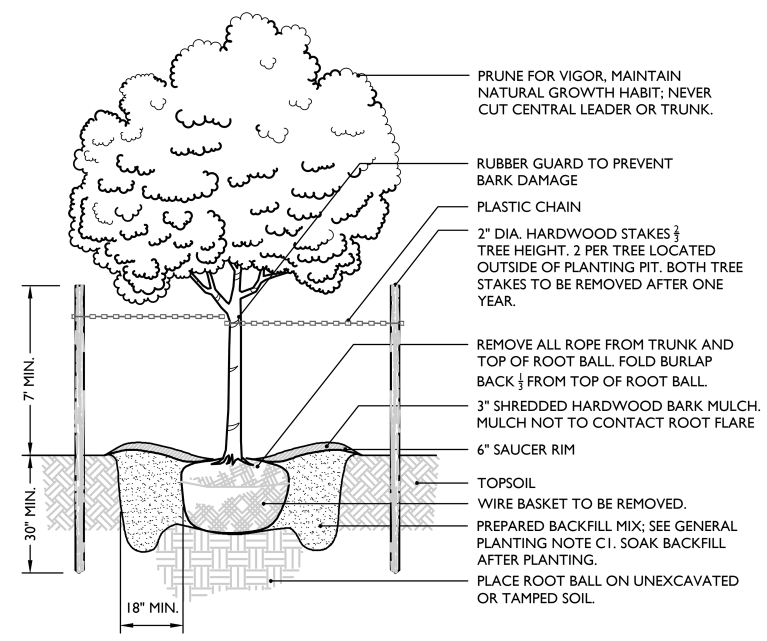
   BASIN MIX (2-3 LBS./1,000 S.F. MINIMUM)
   CREEPING RED FESCUE (30%)
   TALL FESCUE (30%)
   PERENNIAL RYE GRASS (10%)
   BIRDSFOOT TREFOIL (30%)

   SEEDING OUTSIDE OF THE OPTIMUM DATES SHALL NOT BE CONDUCTED WITH OUT PRIOR APPROVAL.
3. PERMANENT SEEDING TO BE APPLIED BY RAKING OR DRILLING INTO THE SOILS AT THE RATE GIVEN ABOVE.
4. FERTILIZER FOR THE ESTABLISHMENT OF TEMPORARY AND PERMANENT VEGETATIVE COVER SHALL BE IN COMPLIANCE WITH THE LATEST NYSDEC REGULATIONS. THIS INCLUDES, BUT LIMITED TO:
   1. NO FERTILIZER SHALL BE APPLIED BETWEEN DEC. 1 AND APRIL 1 IN ANY YEAR.
   2. SHALL NOT BE APPLIED WITHIN 20 FEET OF A WATER BODY.
   3. ONLY LAWN FERTILIZER WITH LESS THAN 0.67% BY WEIGHT PHOSPHATE CONTENT MAY BE APPLIED.
   (A SOIL TEST PRIOR TO FERTILIZER APPLICATION IS RECOMMENDED.)
5. IF SEASON PREVENTS THE ESTABLISHMENT OF TEMPORARY OR PERMANENT SEEDING, EXPOSED AREA TO BE STABILIZED WITH MULCH AS INDICATED IN NOTE 6.
6. MULCH TO CONSIST OF SMALL GRAIN STRAW OR SALT HAY ANCHORED WITH A WOOD AND FIBER MULCH BINDER OR AN APPROVED EQUAL. MULCH WILL BE SPREAD AT RATES PER NYSDEC STANDARDS AND ANCHORED WITH A MULCH ANCHORING TOOL OR LIQUID MULCH BINDER, AND SHALL BE PROVIDED ON ALL SEEDINGS. HYDROMULCH SHALL ONLY BE USED DURING OPTIMUM GROWING SEASONS.
7. AS NEEDED, WORK LIME AND FERTILIZER INTO SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT. THE FINAL HARROWING OR DISCING OPERATION SHOULD BE ON ON THE GENERAL CONTOUR. CONTINUE TILLAGE UNTIL A REASONABLY UNIFORM, FINE SEEDBED IS PREPARED. ALL BUT CLAY OR SILTY SOILS AND COARSE SANDS SHOULD BE ROLLED TO FIRM THE SEEDBED WHEREVER FEASIBLE.
8. REMOVE FROM THE SURFACE ALL STONES TWO INCHES OR LARGER IN ANY DIMENSION. REMOVE ALL OTHER DEBRIS, SUCH AS WIRE, CABLE, TREE ROOTS, PIECES OF CONCRETE, CLODS, LUMPS, OR OTHER UNSUITABLE MATERIAL.
9. INSPECT SEEDBED JUST BEFORE SEEDING. IF TRAFFIC HAS LEFT THE SOIL COMPACTED, THE AREA MUST BE RETILLED AND FIRMED AS ABOVE.

GENERAL SEEDING NOTES

1. NO SOIL OR MULCH SHALL BE PLACED AGAINST ROOT COLLAR OF PLANT. MULCH SHALL NOT TOUCH THE TREE TRUNK.
2. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.
3. WIRE BASKETS AND NON-JUTE BURLAP MUST BE ENTIRELY REMOVED FROM THE ROOT BALL. JUTE BURLAP MUST BE REMOVED FROM THE TOP 1/3 OF THE ROOT BALL.
4. DEPTH OF PLANT PIT SHALL BE INCREASED BY 12" WHEREVER POOR SOIL CONDITIONS OCCUR, WITH THE ADDITION OF LOOSE AGGREGATE.
5. CONTRACTOR SHALL PARTIALLY FILL WITH WATER A REPRESENTATIVE NUMBER OF PITS IN EACH AREA OF THE PROJECT PRIOR TO PLANTING TO DETERMINE IF THERE IS ADEQUATE PERCOLATION. IF PIT DOESN'T PERCOLATE, MEASURES MUST BE TAKEN TO ASSURE PROPER DRAINAGE BEFORE PLANTING.
6. PLANTING MUST BE GUARANTEED FOR TWO FULL GROWING SEASONS FROM THE TIME OF FINAL ACCEPTANCE BY THE LANDSCAPE CONSULTANT. CONTRACTOR SHALL REMOVE ALL WRAPPING AT THE END OF GUARANTEE PERIOD OR SOONER PER PROJECT LANDSCAPE ARCHITECT.
7. BACKFILL MIXTURE TO BE SPECIFIED BASED UPON SOIL TEST AND CULTURAL REQUIREMENTS OF PLANT.
8. PRUNE DAMAGED AND CONFLICTING BRANCHES MAINTAINING NORMAL TREE SHAPE, NEVER CUT CENTRAL TRUNK OR LEADER.

PLANT DETAIL NOTES

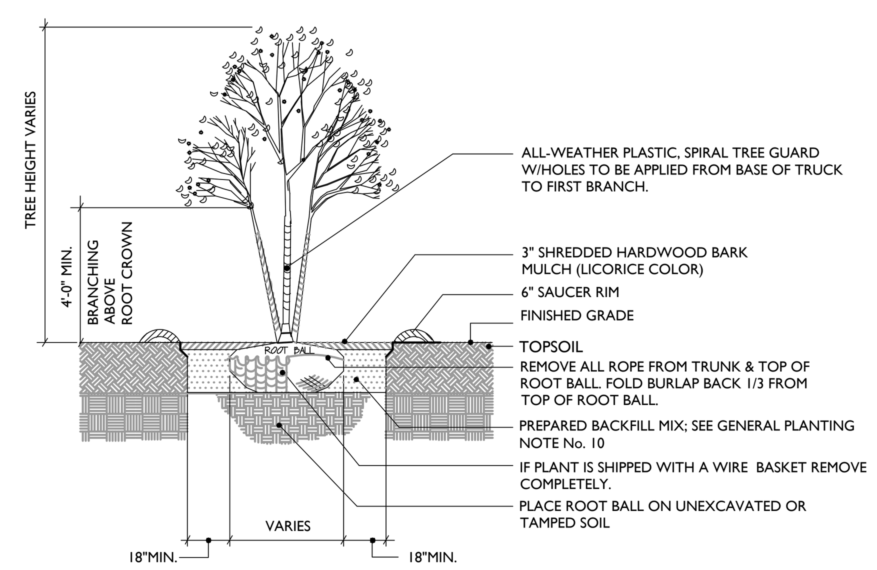


NOTES:

1. NO SOIL OR MULCH SHALL BE PLACED AGAINST ROOT COLLAR OF PLANT.
2. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.

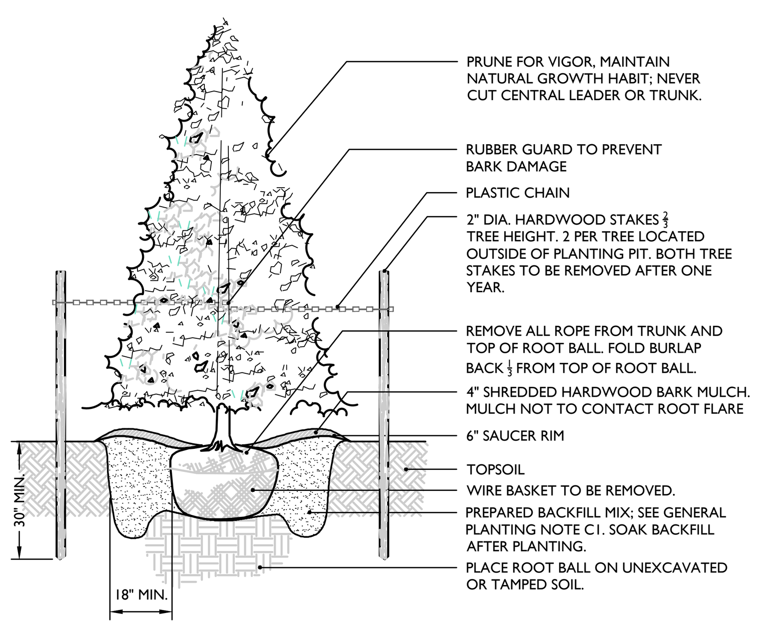
TREE PLANTING DETAIL

NOT TO SCALE 07/01/19



MULTI-STEM TREE PLANTING DETAIL

NOT TO SCALE 07/01/19

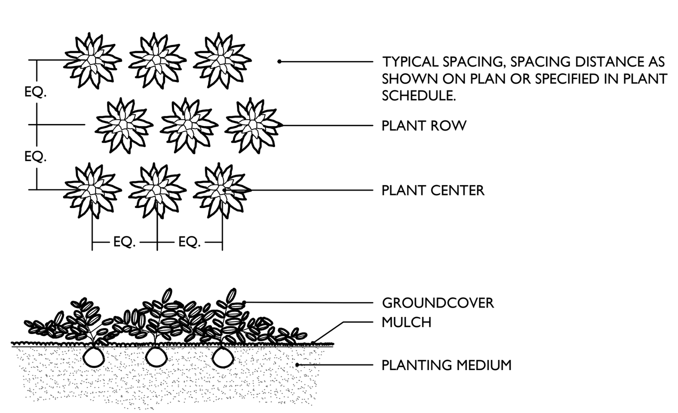


NOTES:

1. NO SOIL OR MULCH SHALL BE PLACED AGAINST ROOT COLLAR OF PLANT.
2. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.

EVERGREEN TREE PLANTING DETAIL

NOT TO SCALE 07/01/19

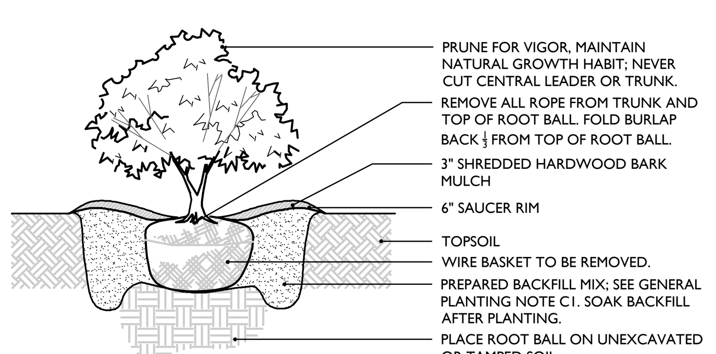


NOTES:

1. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.

PERENNIAL PLANTING DETAIL

NOT TO SCALE

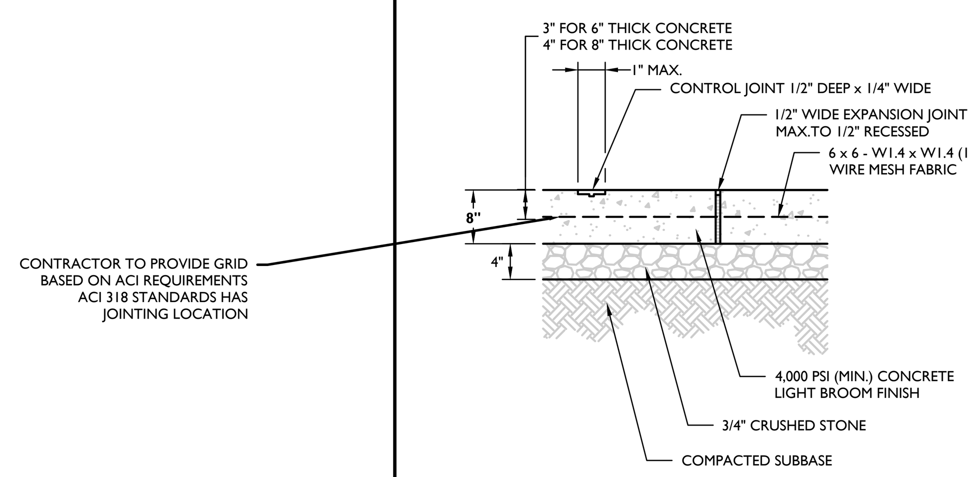


NOTES:

1. NO SOIL OR MULCH SHALL BE PLACED AGAINST ROOT COLLAR OF PLANT.
2. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.

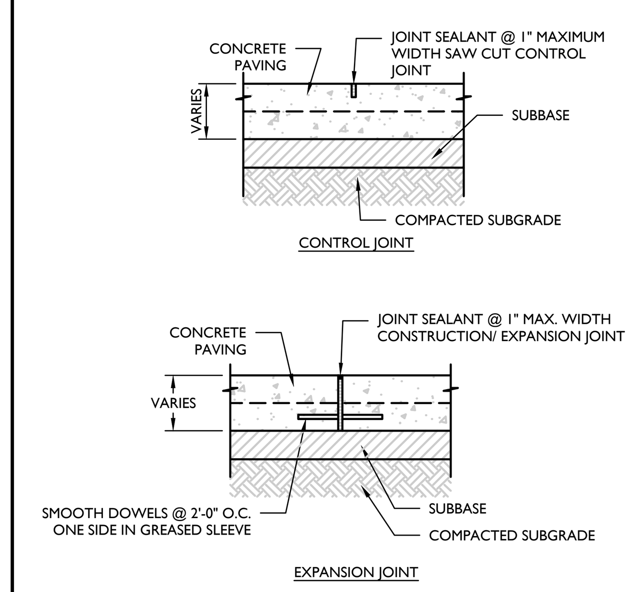
SHRUB PLANTING DETAIL

NOT TO SCALE



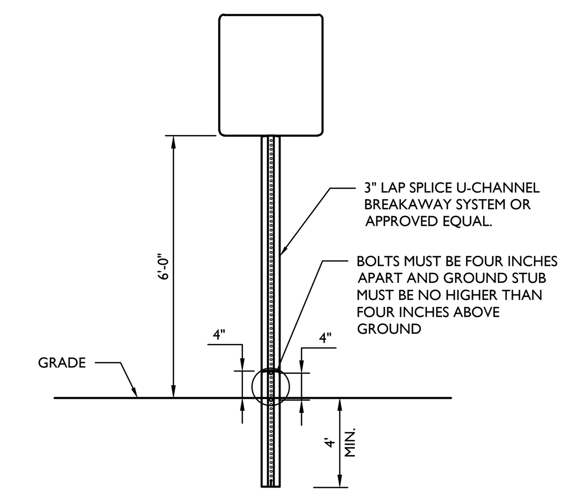
CONCRETE PAVEMENT DETAIL

NOT TO SCALE MCNY-SITE-PVMT-1500 07/01/19



CONCRETE PAVING JOINTS DETAIL

NOT TO SCALE MCNY-SITE-PVMT-1700 07/01/19

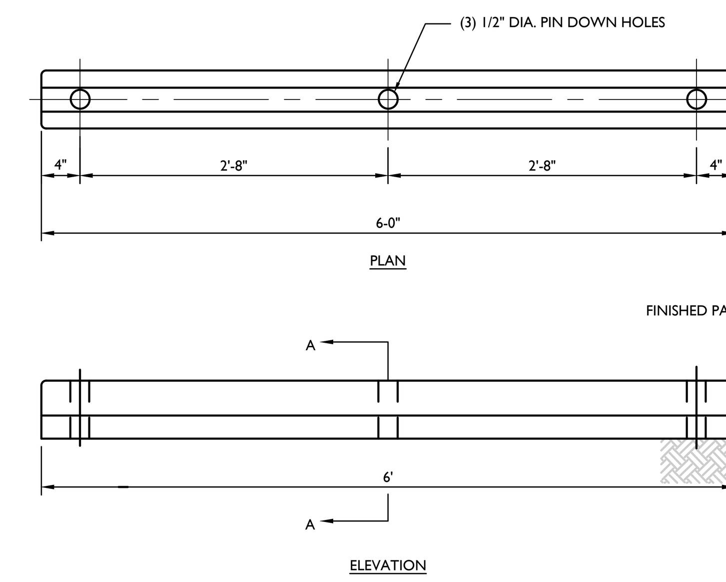


NOTE:

1. ALL SIGNS SHALL CONFORM TO THE CURRENT MANUAL ON "UNIFORM TRAFFIC CONTROL DEVICES" FOR STREETS AND HIGHWAYS AND CURRENT MUNICIPAL SPECIFICATIONS FOR COLOR, DESIGN AND EXACT WORDING.
2. ALL POSTS SHALL BE OF ADEQUATE LENGTH TO MEET THE REQUIREMENTS FOR ERECTION AS STATED IN THE CURRENT MANUAL IN "UNIFORM TRAFFIC CENTRAL DEVICES" FOR STREET & HIGHWAYS.
3. ALL POSTS SHALL BE EMBEDDED 4' MINIMUM.
4. ALL POSTS TO BE BREAKAWAY STEEL U-POSTS IN CONFORMANCE WITH CURRENT NYSDOT STANDARDS.
5. IN AREAS WITHOUT CURBING, THE OUTER EDGE OF SIGN TO BE 2'-0" MINIMUM TO 12'-0" MAXIMUM FROM EDGE OF CURB AS DIRECTED.

BREAKAWAY SIGN POST DETAIL

NOT TO SCALE MCCM-SIGN-GENL-6102 07/01/19

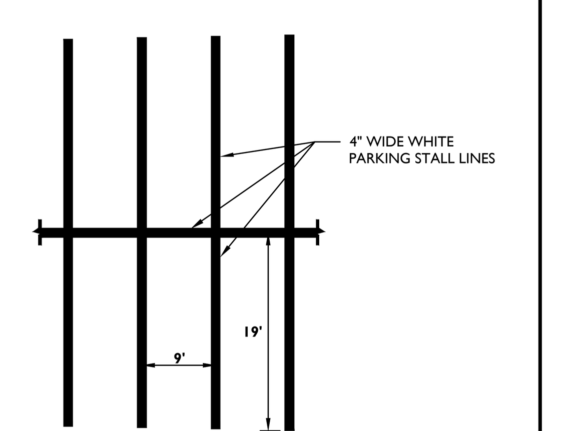


NOTES:

1. WHEELSTOP MANUFACTURED BY INNOPLAST. SHALL BE TYPE DELUXE COLOR YELLOW.
2. INSTALL IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

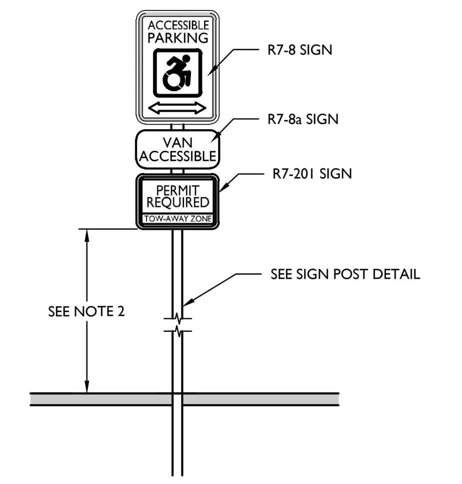
POLYMER WHEELSTOP DETAIL

NOT TO SCALE MCNY-SITE-CURB-2102 07/01/19



TYPICAL PARKING STALL STRIPING DETAIL

NOT TO SCALE MCNY-SITE-MRKG-1000 07/01/19

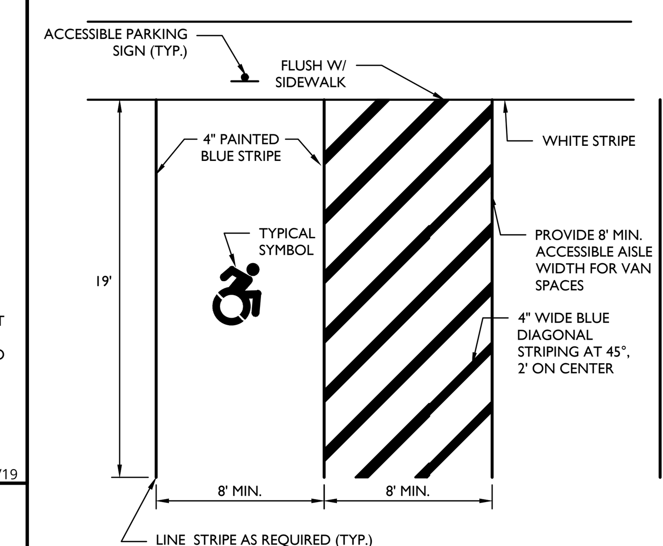


NOTES:

1. INSTALL SIGN WHERE NOTED ON PLAN.
2. THE BOTTOM OF THE LOWEST SIGN SHALL BE MOUNTED 60" ABOVE THE PARKING LOT OR SIDEWALK SURFACE WHEN THE SIGN IS PARALLEL TO THE SIDEWALK AND 72" ABOVE THE PARKING LOT OR SIDEWALK WHEN THE SIGN IS PERPENDICULAR TO THE SIDEWALK.

ACCESSIBLE PARKING SIGN DETAIL

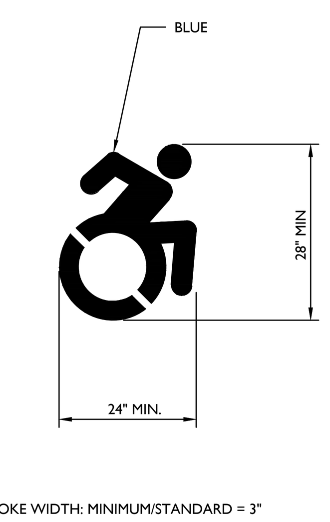
NOT TO SCALE MCNY-SITE-MRKG-2200 07/01/19



ACCESSIBLE PARKING LINE STRIPE STALL DETAIL

MOD: 11/17/20

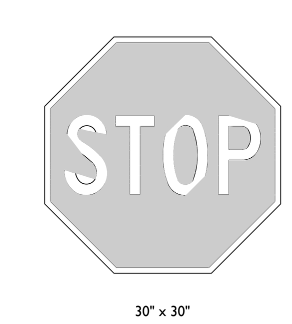
NOT TO SCALE MCNY-SITE-MRKG-1801 07/01/19



STROKE WIDTH: MINIMUM/STANDARD = 3"

ACCESSIBLE SYMBOL DETAIL

NOT TO SCALE MCNY-SITE-MRKG-2000 07/01/19

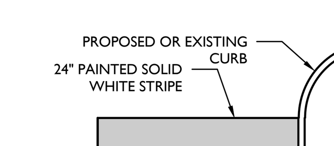


30" x 30"

COLORS:
LEGEND = WHITE (RETROREFLECTIVE)
BACKGROUND = RED (RETROREFLECTIVE)

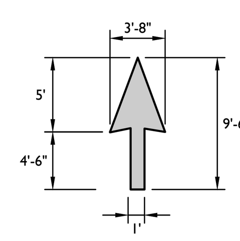
R1-1 SIGN DETAIL

NOT TO SCALE MCCM-SIGN-REGU-R1-1 12/01/20



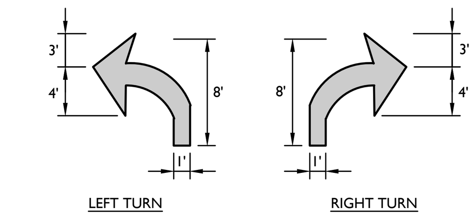
TYPICAL STOP BAR DETAIL

NOT TO SCALE MCNY-SITE-MRKG-1100 07/01/19



STRAIGHT PAVEMENT ARROW DETAIL

NOT TO SCALE MCNY-SITE-MRKG-1200 07/01/19



"LEFT OR RIGHT" PAVEMENT ARROW DETAIL

NOT TO SCALE MCNY-SITE-MRKG-1201 07/01/19

TOWN OF WAWAYANDA
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REV	DATE	DRAWN BY	DESCRIPTION
1	02/04/22	CDR	REVISED FOR GEIS SUBMISSION
2	01/27/23	CDR	REVISED PER PLANNING BOARD COMMENTS & STORMWATER TESTING RESULTS

Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
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N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS

FOR

DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

TOWN OF WAWAYANDA
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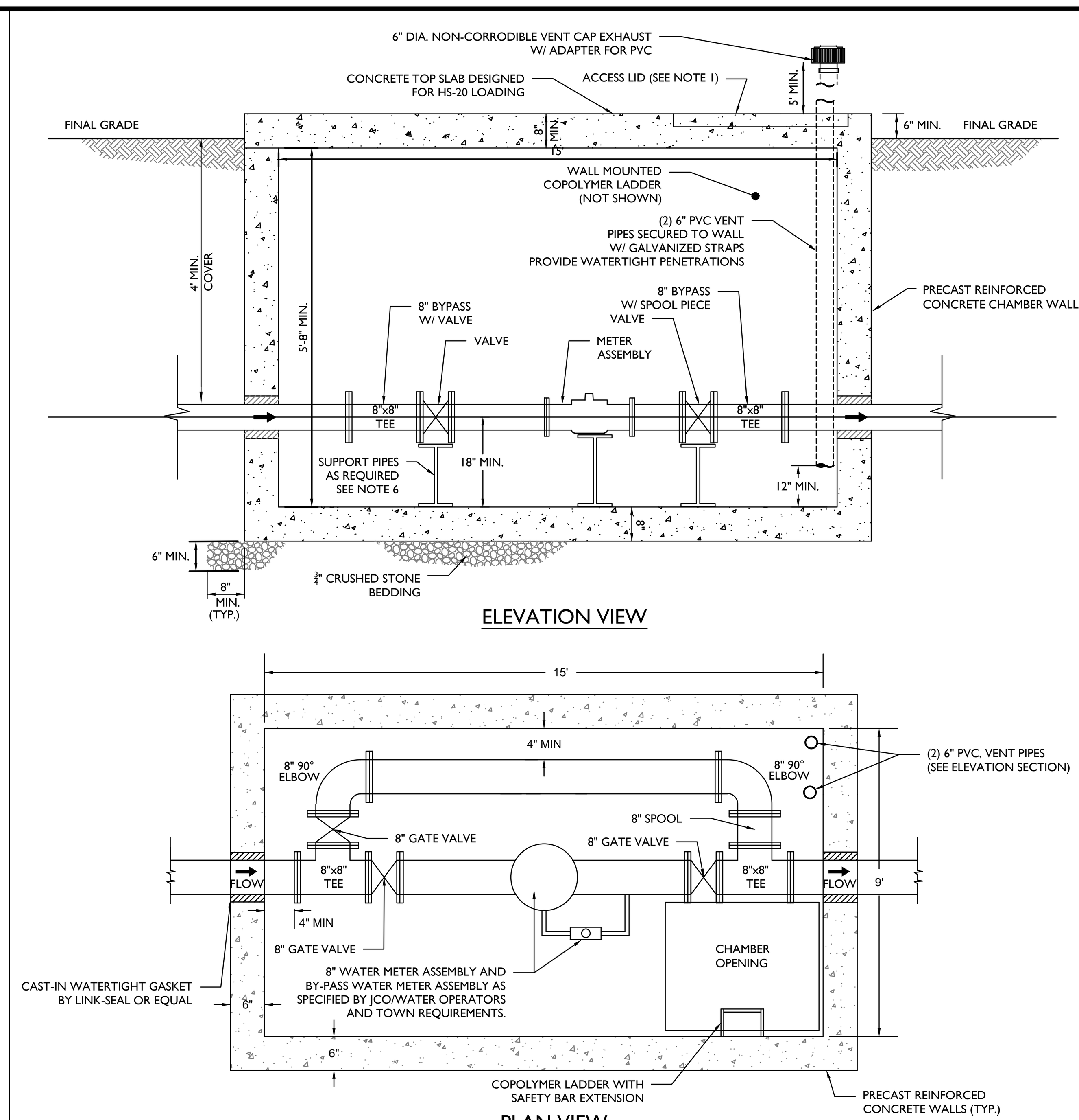
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER:	DRAWING NAME:
20006912B	C-DTLS

SHEET TITLE:
PARKING & LANDSCAPING DETAILS

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

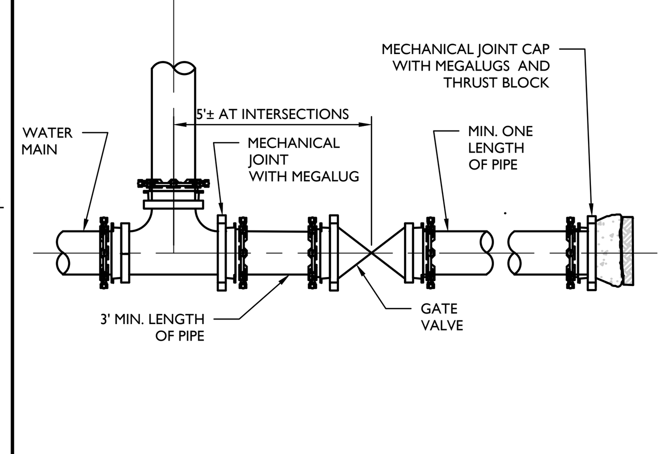


NOTES:

1. ACCESS TO CHAMBER BY 36"X30" TYPE PCM-3 FLUSH WATERTIGHT SIDEWALK DOOR AS MANUFACTURED BY BILCO, OR APPROVED EQUAL.
   - LADDER SHALL BE POLYPROPYLENE VAULT LADDER W/ SAFETY BAR EXTENSION BY LANE INTERNATIONAL, OR APPROVED EQUAL. LADDER MUST BE ANCHORED TO WALL PER MANUFACTURER SPECIFICATIONS.
   - ENTIRE CHAMBER INSIDE AND OUTSIDE MUST BE COMPLETELY WATERPROOFED.
   - GRADE AROUND CHAMBER MUST BE PITCHED TO DRAIN WATER AWAY FROM CHAMBER TOP.
   - "LADDER-UP" SAFETY POST BY BILCO OR APPROVED EQUAL SHALL BE PROVIDED.
   - ACCESS TO HAVE LOCKABLE DOOR.
2. ALL CHAMBER AND PIPING CONSTRUCTION SUBJECT TO WATER DEPARTMENT APPROVAL PRIOR TO SERVICE CONNECTION.
3. ALL 3" AND LARGER CONNECTIONS WITHIN THE METER CHAMBER SHALL BE FLANGED TYPE CONNECTIONS, UNLESS OTHERWISE NOTED.
4. ALL CONNECTIONS OUTSIDE THE METER CHAMBER SHALL BE AS SPECIFIED FOR BURIED WATER LINES.
5. ALL GATE VALVES TO OPEN LEFT (COUNTERCLOCKWISE).
6. PIPE/EQUIPMENT SYSTEM TO BE ADEQUATELY SUPPORTED WITHIN THE CHAMBER TO THE SATISFACTION OF THE MUNICIPALITY.
7. MINIMUM STRENGTH 4,000 PSI CONCRETE WITH ADEQUATE STEEL REINFORCEMENT TO WITHSTAND H20 HIGHWAY LOAD AND SOIL LOADS.
8. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR PRECAST AND ALL APPURTENANCES FOR REVIEW AND APPROVAL. TO COORDINATE WITH WATER DEPARTMENT PRIOR TO FABRICATION.
9. PROPER SIGNAGE SHALL BE DISPLAYED TO INDICATE THAT THIS VAULT IS A CONFINED SPACE AND ALL APPLICABLE ENTRY RULES APPLY.
10. WATER METER AND READING EQUIPMENT AS SPECIFIED BY JCO/WATER OPERATORS AND TOWN REQUIREMENTS.
11. BACKFLOW PREVENTION DEVICES TO BE INSTALLED INSIDE OF THE PROPOSED BUILDINGS (DESIGN BY OTHERS).

WATER METER PIT DETAIL

NOT TO SCALE MCNY-UTIL-WATR-1100 MOD: 07/29/20 07/01/19



WATER MAIN STUB FOR FUTURE CONNECTION DETAIL

NOT TO SCALE MCNY-UTIL-WATR-1800 07/01/19

NUMBER AND SIZE OF RODS REQUIRED AND PIPE LENGTH IN FEET TO BE RESTRAINED									
PIPE SIZE IN INCHES	90° TEE OR DEAD END PLUG			45° BEND			22½° BEND		
	No.	SIZE	L*	No.	SIZE	L*	No.	SIZE	L*
4	2	¾"	30'	2	¾"	10'	2	¾"	5'
6	2	¾"	40'	2	¾"	10'	2	¾"	5'
8	4 or 2	¾" or ⅞"	50'	2	¾"	15'	2	¾"	5'
10	4 or 2	¾" or 1"	60'	2	¾"	20'	2	¾"	5'
12	4	⅞"	70'	2	¾"	20'	2	¾"	5'
14	4	1"	80'	2	¾"	25'	2	¾"	5'
16	4	1"	80'	2	¾"	25'	2	¾"	5'

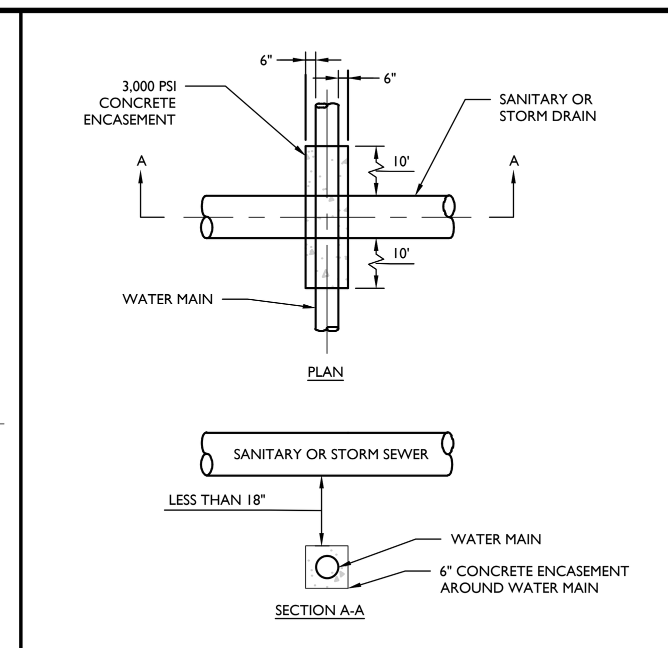
L* = LENGTH OF PIPE TO BE RESTRAINED IS FOR EACH SIDE OF BEND

NOTES:

1. USE OF MECHANICAL JOINT RETAINER GLANDS SHALL PROVIDE A THRUST RESTRAINT SYSTEM EQUIVALENT TO THAT LISTED IN THE TABLE FOR CLAMPS AND RODS.
2. LENGTHS ARE BASED ON THE FOLLOWING CRITERIA: 150 PSI MAXIMUM PRESSURE AND 3'-6" 0F COVER, THEREFORE THE CALCULATION IS CONSERVATIVE FOR THE PROPOSED MIN. 4'-6" COVER. TABLE IS FOR USE WITH CAST IRON PIPE OR DUCTILE IRON PIPE ONLY. IF TEST CONDITIONS ARE MORE SEVERE OR LARGER PIPES ARE PROPOSED, THEN SPECIAL COMPUTATIONS MUST BE PROVIDED BY LICENSED PROFESSIONAL ENGINEER.

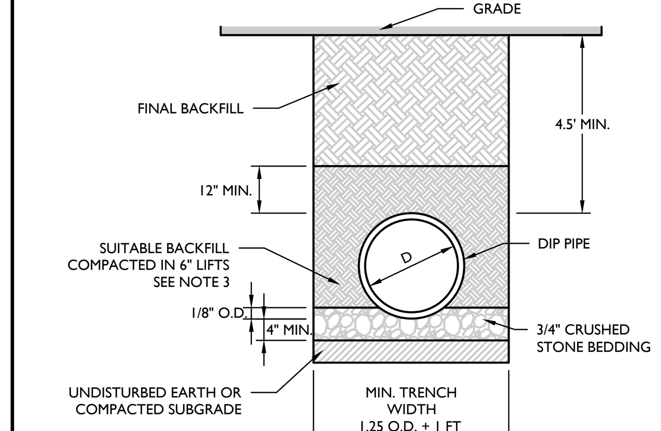
JOINT RESTRAINT SCHEDULE DETAIL

NOT TO SCALE JOINT RESTR 07/01/19



WATER MAIN ENCASEMENT DETAIL

NOT TO SCALE ENCASE 07/01/19

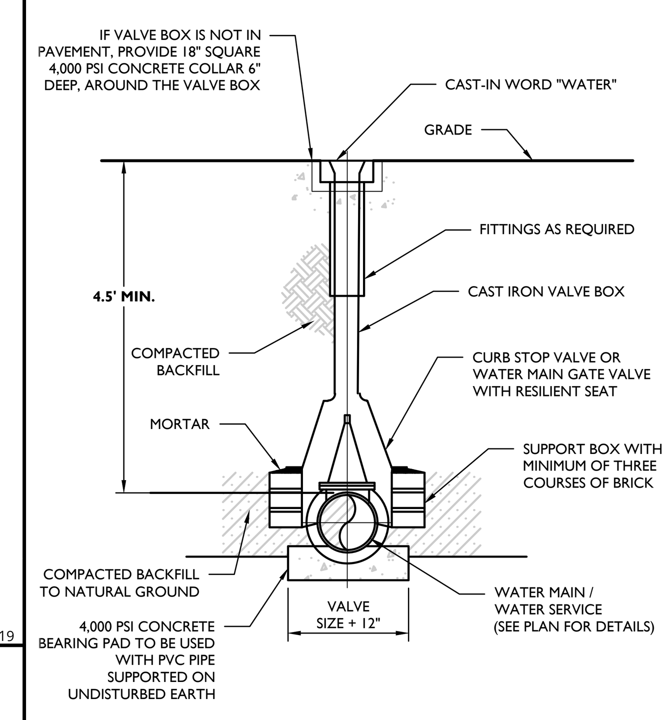


NOTES:

1. ALL PIPE SYSTEMS AND BACKFILL SHALL BE INSTALLED IN ACCORDANCE WITH ANSI/AWWA C600.
2. WATER MAIN PIPE SHALL BE CEMENT LINED DUCTILE IRON PIPE (DIP) PRESSURE CLASS 150, THICKNESS CLASS 52 WITH ASPHALTIC EPOXY TYPE COATING, INSTALLED W/ THREE (3) BRONZE WEDGES PER JOINT FOR CONDUCTIVITY.
3. SUITABLE BACKFILL MATERIAL SHALL BE SAND, WELL GRADED GRAVEL < 2", OR 3/4" CRUSHED STONE.
4. SUITABLE FINAL BACKFILL MATERIAL SHALL BE SITE SOILS, CLEAN FILL, 3/4" CRUSHED STONE, OR ITEM 4 STONE - COMPACTED IN MAX. 9" LIFTS.
5. STONES LARGER THAN 2" FOUND IN THE TRENCH SHALL BE REMOVED FOR A DEPTH OF AT LEAST 4" BELOW THE PIPE.
6. FOR INSTALLATION IN PAVEMENT, REFER TO THE APPLICABLE PAVEMENT DETAIL TO ESTABLISH FINAL GRADE. BACKFILL REQUIREMENTS BEYOND THE DEPTH OF THE PAVEMENT DETAIL SHALL BE IN ACCORDANCE WITH THIS DETAIL.
7. MAXIMUM ALLOWABLE DEFLECTION AT PIPE JOINTS SHALL BE LIMITED TO 80% OF THE VALUES PUBLISHED IN AWWA C600, LATEST REVISION.

DIP WATER PIPE BEDDING DETAIL

NOT TO SCALE DIP PIPE BED 07/01/19

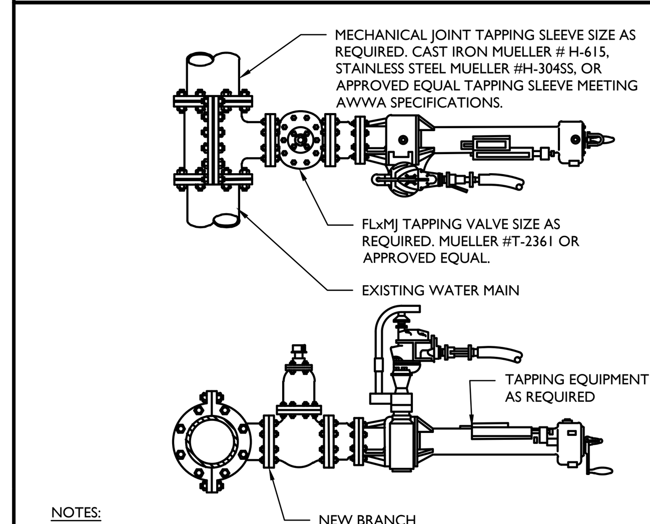


NOTES:

1. VALVE BOX SHOULD HAVE EXTENSION IF WATER MAIN OR SERVICE IS PLACED DEEPER THAN 5 FEET.
2. VALVE BOX SHALL BE MUELLER SLIP/EXTENSION TYPE WITH ARCH PATTERN BASE, OR APPROVED EQUAL.
3. VALVES TO BE RESILIENT-SEATED GATE VALVES CONFORMING TO THE LATEST EDITION OF AWWA C509 STANDARD SPECIFICATIONS, MODEL MUELLER #2360 OR APPROVED EQUAL.

WATER VALVE BOX DETAIL

NOT TO SCALE VALVE 07/01/19

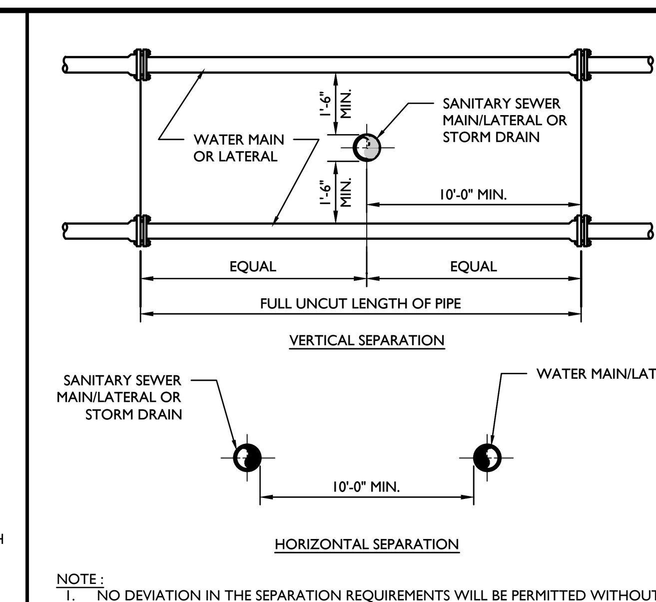


NOTES:

1. WET TAP VALVE CAN BE INSTALLED IN EITHER VERTICAL OR HORIZONTAL POSITION.
2. CONTRACTOR SHALL VERIFY DEPTH OF BURY, MATERIAL, DIAMETER (O.D.) AND OPERATING PRESSURE OF EXISTING WATER MAIN PRIOR TO ORDERING OF WET TAP UNIT.

WET TAP DETAIL

NOT TO SCALE WET TAPO 07/01/19



NOTE:

1. NO DEVIATION IN THE SEPARATION REQUIREMENTS WILL BE PERMITTED WITHOUT THE EXPRESS APPROVAL OF THE ENGINEER.

SANITARY/STORM SEWER-WATER MAIN SEPARATION DETAIL

NOT TO SCALE SEPARATION 07/01/19

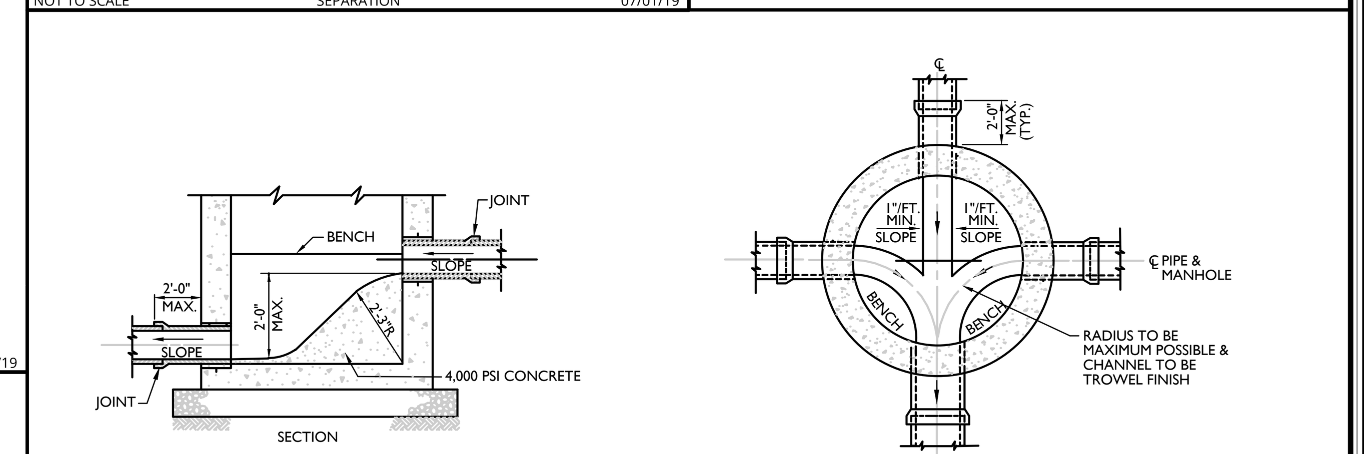
LIST OF STANDARD WATER SUPPLY MATERIALS

MCNY-UTIL-WATR-2500 MOD: 04/23/21 07/01/19

ANY EXCEPTIONS TO THE MATERIALS LISTED BELOW SHALL BE APPROVED IN WRITING BY THE ENGINEER.

HYDRANTS	MUELLER SUPER CENTURION 250 #A-421, 2 HOSE NOZZLES AND 1 PUMPER NOZZLE
VALVES	MUELLER TYPE A-2630 RESILIENT WEDGE GATE VALVES, NRS-AWWA C509
VALVE BOXES	CAST IRON, SLIP/EXTENSION TYPE, ARCH PATTER BASE, AND AT LEAST 5 ¼" IN DIAMETER
PIPE	CLASS 52 DUCTILE IRON PIPE CEMENT LINED & SEALED W/ MECHANICAL OR PUSH-ON JOINT CONNECTIONS
TAPPING SLEEVE	MUELLER #H-615, DUCTILE IRON CLASS 250 OR MUELLER #H-304SS STAINLESS STEEL
TAPPING VALVE	MUELLER #T-2361 CLASS 250
MECHANICAL JOINT RESTRAINTS	EBAA's IRON MEGALUG SERIES 1100
FITTINGS	DUCTILE IRON MECHANICAL JOINT FITTINGS

NOTE:
ALL UTILITY WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CURRENT STANDARDS AND DETAILS OF THE MUNICIPALITY.

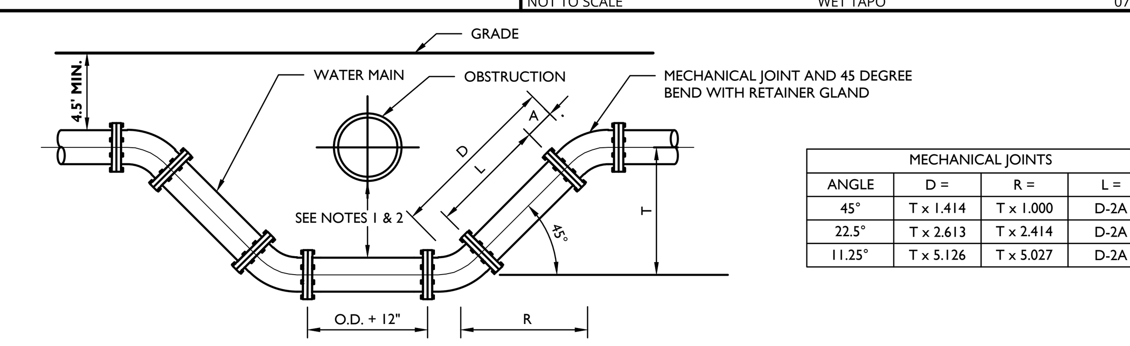


NOTE:

1. MANHOLE CHUTE IS TO BE USED WHERE DIFFERENCE IN INVERT ELEVATIONS BETWEEN INCOMING PIPE AND OUTGOING PIPE IS LESS THAN 2'-0".
2. IF THE DIFFERENCE 2'-0" OR GREATER, THEN EXTERNAL DROP CONNECTION SHALL BE MADE. CHANNELING SHALL BE AS SHOWN ABOVE.

MANHOLE CHUTE DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-3000 07/01/19



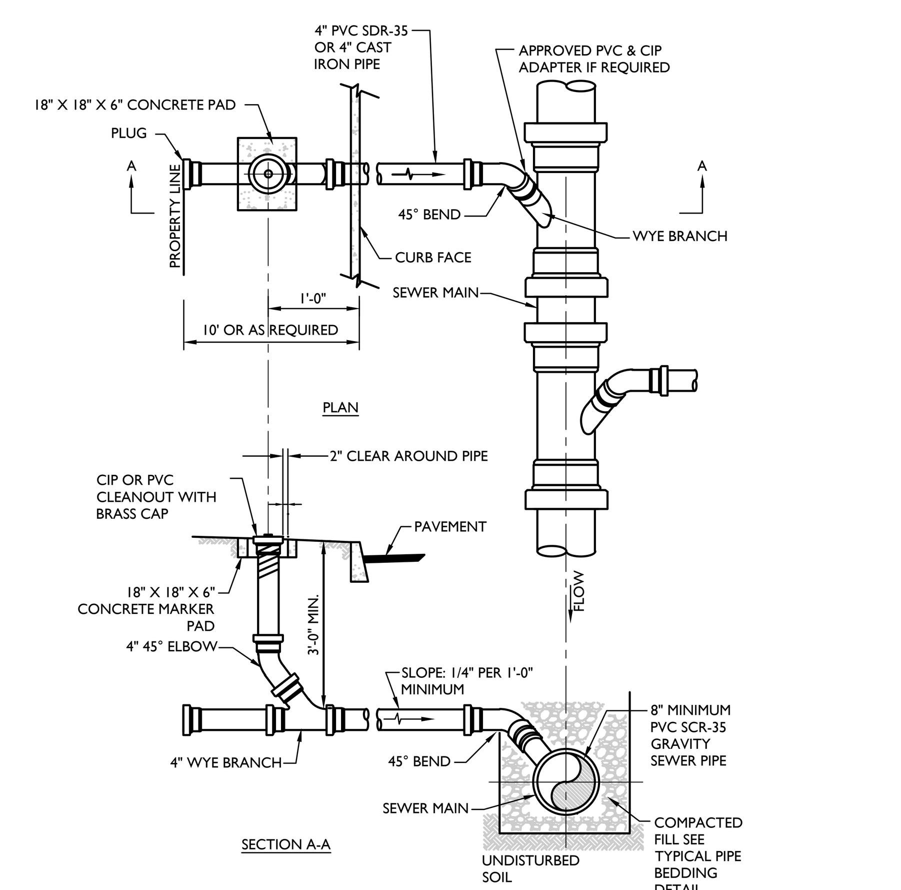
MECHANICAL JOINTS			
ANGLE	D =	R =	L =
45°	T x 1.414	T x 1.000	D-2A
22.5°	T x 2.613	T x 2.414	D-2A
11.25°	T x 5.126	T x 5.027	D-2A

NOTES:

1. WATER MAIN MAY CROSS ABOVE OBSTRUCTION IF **4.5'** MINIMUM COVER IS MAINTAINED ABOVE THE WATER MAIN AND FINISH GRADE.
2. MINIMUM VERTICAL SEPARATION BETWEEN SANITARY OR STORM SEWER TO WATER MAIN SHALL BE 18" IF THE HORIZONTAL SEPARATION IS LESS THAN 10'. BETWEEN WATER MAIN AND OTHER UTILITIES, THE MINIMUM VERTICAL SEPARATION SHALL BE 12".
3. WATER MAIN SHALL BE SIZE AND MATERIAL SPECIFIED ON THE PLAN, WITH MECHANICAL JOINT OR PUSH-ON AND ALL FITTINGS BE CAST IRON MECHANICAL JOINT.
4. OFFSETS MAY BE SUBSTITUTED FOR A "T" OF UP TO 24" IF APPROVED BY THE ENGINEER.
5. THRUST RESTRAINT SHALL BE PROVIDED AT ALL BENDS OR OTHER POINTS OF PIPE DIRECTION CHANGE.

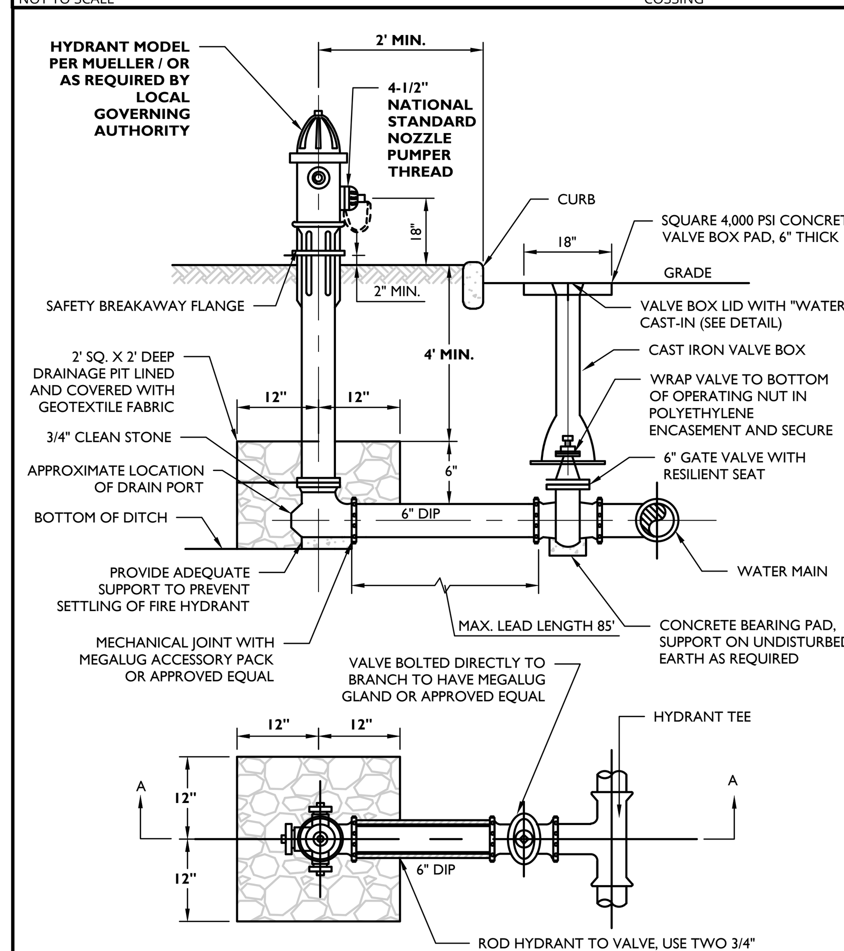
WATER CROSSING UNDER UTILITY DETAIL

NOT TO SCALE COSSING 07/01/19



SANITARY SEWER LATERAL & CLEANOUT DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-1601 07/01/19



NOTES:

1. HYDRANT SHALL BE **MUELLER SUPER CENTURION 250 #A-421** TRAFFIC MODEL DESIGN WITH THE FOLLOWING SPECIFICATION.
   A. SAFETY COUPLED STANDPIPE.
   B. 6" MECHANICAL JOINT INLET CONNECTION
   C. TWO 2-1/2" NATIONAL STANDARD THREAD HOSE NOZZLES.
   D. ONE 4-1/2" NATIONAL STANDARD THREAD STEAMER NOZZLE, FACING THE ROAD.
   E. HYDRANT OPERATORS AND HYDRANT NOZZLE CAP NUTS SHALL BE IN ACCORDANCE WITH AWWA/ANSI STANDARD C502.
   F. HYDRANT HOSE CAPS SHALL BE ATTACHED BY MEANS OF CHAINS.
   G. HYDRANT BARRELS SHALL BE PAINTED - **RED**, BONNETS - **YELLOW**, AND NOZZLE CAPS - **BLACK** TO INDICATE THE AVAILABLE FIRE FLOW OR AS IN ACCORDANCE WITH THE LOCAL REQUIREMENTS.
   H. HYDRANTS SHALL OPEN COUNTER-CLOCKWISE.
2. STANDPIPE (BREAK-AWAY) COUPLING SHALL NOT EXCEED A MAXIMUM OF 5 INCHES FROM THE TOP OF THE CURB TO THE BOTTOM OF COUPLING.
3. THE DRAIN VALVE SHALL BE CLEAR OF ANY OBSTRUCTIONS, AND 3/4" CLEAN GRAVEL BE PLACED FROM THE BOTTOM OF THE HYDRANT TO A POINT 6" ABOVE THE HYDRANT LATERAL PIPE. HYDRANT DRAINS SHALL NOT BE CONNECTED TO OR LOCATED WITHIN 10' OF ANY SANITARY SEWERS OR STORM DRAINS. IF HYDRANT DRAIN IS LOCATED WITHIN 2 FEET OF HIGH GROUNDWATER, DRAIN SHALL BE PLUGGED. IF PLUGGED, PROPER SIGNAGE MUST BE INSTALLED TO INDICATE THAT THE BARRELS MUST BE PUMPED DRY AFTER EACH USE.
4. BACKFILL MATERIAL SHALL BE IN ACCORDANCE WITH THE LOCAL JURISDICTION.
5. GATE VALVE SHALL BE **6" U.S. PIPE METROSEAL 250 R/S** (RESILIENT SEALED) MECHANICAL JOINT END (RIGHT HAND) OR APPROVED EQUAL.
6. WATER LATERAL SHALL BE 6" DUCTILE IRON CEMENT LINED CLASS 52 PIPE.
7. TIE ROD SHALL BE 3/4" DIAMETER TIE ROD WITH EYE BOLTS - TWO REQUIRED (SIDE VIEW SHOWN). RESTRAIN ALL JOINTS ON HYDRANT TEE, VALVE, AND HYDRANT LEAD.
8. HYDRANT TEE SHALL BE U.S. PIPE CATALOG #U-592 TRIM-TYTE DUCTILE IRON, MECHANICAL JOINT OR AN APPROVED EQUAL SUBSTITUTE.

FIRE HYDRANT (VALVE IN PAVEMENT) DETAIL

NOT TO SCALE HYDRANT 07/01/19

WATER NOTES:

1. ALL METHODS, MATERIALS, FITTINGS, DEVICES, DIMENSIONAL REQUIREMENTS AND PROCEDURES NECESSARY TO COMPLETE THE WORK SHOWN HEREON SHALL MEET THE APPROPRIATE CURRENT AWWA SPECIFICATIONS IN EFFECT AS WELL AS ALL REQUIREMENTS DEEMED APPLICABLE BY THE MUNICIPALITY OR ANY OTHER GOVERNMENTAL BODY HAVING JURISDICTION OVER SAID WORK.
2. ALL WATER MAIN PIPE SHALL BE AWWA C151/A21.51-02 THICKNESS CLASS FIFTY-TWO (52) CEMENT LINED DUCTILE IRON PUSH-ON (RUBBER GASKET) TYPE; AND INSTALLED WITH THREE (3) BRONZE WEDGES PER JOINT. JOINT INSTALLATION SHALL BE "TYPE 2" AS PRESCRIBED IN THE LATEST REVISION OF AWWA C600. MECHANICAL JOINTS SHALL HAVE RETAINER GLANDS.
3. ALL PIPE FITTINGS SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE AWWA SPECIFICATION C153/A21.53-00.
4. ALL GATE VALVES SHALL BE "MUELLER" OR APPROVED EQUAL, RESILIANT-SEATED GATE VALVES WITH MECHANICAL JOINT CONNECTIONS. OPENING SHALL BE LEFT (CCW) AND OPERATION SHALL BE BY 2" SQUARE WRENCH NUT. MINIMUM WORKING PRESSURE SHALL BE 250 PSI. GATE VALVES ARE TO BE IN ACCORDANCE WITH LATEST REVISION OF AWWA SPECIFICATION C509.
5. ALL VALVE BOXES SHALL BE EXTENSION TYPE BY MUELLER SET ON BRICKS AND POSITIONED PERPENDICULAR TO THE PIPE AND ON COMPACTED BACKFILL.
6. ALL CHANGES IN PIPE LINE DIRECTION, BOTH HORIZONTAL AND VERTICAL SHALL BE TIE-RODDED AND MECHANICALLY RESTRAINED AS DIRECTED BY THE ENGINEER.
7. FLUSH OUT ALL WATER MAINS AND APPURTENANCES AS DIRECTED BY THE MUNICIPALITY UNTIL THE WATER RUNS CLEAN AND FREE OF RUST AND DIRT. PRESSURIZE ALL LINES AND APPURTENANCES FOR FORTY-EIGHT (48) HOURS, OR AS DIRECTED BY THE MUNICIPALITY, TO REVEAL ANY LEAKS OR BROKEN PIPE. THIS SHALL ALL BE DONE EITHER AS A TOTAL PROJECT OR BETWEEN VALVED SECTIONS AS DIRECTED BY THE TOWN. IF PRESSURE TESTING REVEALS ANY LEAKS OR DIFFICULTIES THE CONTRACTOR SHALL PROMPTLY UNCOVER THE LEAK OR BROKEN PIPE AND IMMEDIATELY REPAIR AND RETEST SAME. THIS SHALL BE REPEATED AS MANY TIMES AS MAY BE REQUIRED TO DEMONSTRATE A TIGHT LINE TO THE SATISFACTION OF THE TOWN & PROJECT ENGINEER. THE NEW WATER MAIN AND APPURTENANCES SHALL BE PRESSURE TESTED IN ACCORDANCE WITH THE LATEST REVISION OF AWWA C-600. RESULTS OF TESTS ARE TO BE SUBMITTED AND ACCEPTED BY THE MUNICIPALITY & PROJECT ENGINEER.
8. THE MUNICIPAL ENGINEER MUST BE NOTIFIED FORTY-EIGHT (48) HOURS PRIOR TO PRESSURE TESTING.
9. ALL WATER LINES AND APPURTENANCES SHALL BE DISINFECTED TO THE SATISFACTION OF THE MUNICIPALITY, PROJECT ENGINEER, AND IN ACCORDANCE WITH THE STANDARDS OF THE DEPT. OF HEALTH. THIS SHALL ALSO BE DONE IN ACCORDANCE WITH THE LATEST REVISION OF AWWA C651. A MINIMUM OF TWO (2) BACTERIAL TESTS TAKEN TWENTY-FOUR (24) HOURS APART ARE REQUIRED. RESULTS OF TESTS ARE TO BE SUBMITTED AND ACCEPTED BY THE MUNICIPALITY & PROJECT ENGINEER. DISINFECTION PROCEDURE, FEED LOCATIONS, AND SAMPLE LOCATIONS MUST BE REVIEWED AND APPROVED BY THE MUNICIPALITY & PROJECT ENGINEER PRIOR TO TESTING.
   AS PER AWWA C651, LATEST REVISION, WATER MAIN DISINFECTION PROCEDURE SHALL, GENERALLY, BE AS FOLLOWS:
   A. INSPECTING MATERIALS TO BE USED TO ENSURE THEIR INTEGRITY.
   B. PREVENTING CONTAMINATING MATERIALS FROM ENTERING THE WATER MAIN DURING STORAGE, CONSTRUCTION, OR REPAIR AND NOTING POTENTIAL CONTAMINATION AT THE CONSTRUCTION SITE.
   C. REMOVING, BY FLUSHING OR OTHER MEANS, THOSE MATERIALS THAT MAY HAVE ENTERED THE WATER MAIN.
   D. CHLORINATING ANY RESIDUAL CONTAMINATION THAT MAY REMAIN, AND FLUSHING THE CHLORINATED WATER FROM THE MAIN.
   E. PROTECTING THE EXISTING DISTRIBUTION SYSTEM FROM BACKFLOW CAUSED BY HYDROSTATIC PRESSURE TEST AND DISINFECTION PROCEDURES.
   F. DOCUMENTING THAT AN ADEQUATE LEVEL OF CHLORINE CONTACTED EACH PIPE TO PROVIDE DISINFECTION.
   G. DETERMINING THE BACTERIOLOGICAL QUALITY BY LABORATORY TEST AFTER DISINFECTION.
   H. FINAL CONNECTION OF THE APPROVED NEW WATER SERVICE TO THE ACTIVE DISTRIBUTION SYSTEM.

   THE CONTINUOUS-FEED METHOD SHALL BE IMPLEMENTED FOR CHLORINATION, AS DESCRIBED IN AWWA C651, LATEST REVISION. AFTER CHLORINATION, THE CONTRACTOR SHALL FLUSH THE MAINS AS PER FINAL FLUSHING REQUIREMENTS OF AWWA C651, LATEST REVISION. WHEN CUTTING INTO OR REPAIRING AN EXISTING MAIN, DISINFECTION PROCEDURES SHALL BE OBSERVED AS DETAILED IN DISINFECTION PROCEDURES WHEN CUTTING INTO OR REPAIRING EXISTING MAINS OF AWWA C651, LATEST REVISION. THE TABLET METHOD FOR INTRODUCING CHLORINE TO THE SYSTEM SHALL NOT BE PERMITTED.

   VERIFICATION SHALL BE ACCOMPLISHED VIA BACTERIOLOGICAL TESTS. AFTER FINAL FLUSHING AND BEFORE THE NEW WATER MAIN IS CONNECTED TO THE DISTRIBUTION SYSTEM, TWO CONSECUTIVE SETS OF ACCEPTABLE SAMPLES, TAKEN AT LEAST 24 HR APART, SHALL BE COLLECTED FROM THE NEW MAIN. AT LEAST ONE SET OF SAMPLES SHALL BE COLLECTED FROM EVERY 1,200 FT OF THE NEW WATER MAIN, PLUS ONE SET FROM THE END OF THE LINE AND AT LEAST ONE SET FROM EACH BRANCH. SAMPLES SHALL BE TESTED FOR BACTERIOLOGICAL (CHEMICAL AND PHYSICAL) QUALITY IN ACCORDANCE WITH STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, AND SHALL SHOW THE ABSENCE OF COLIFORM ORGANISMS AND THE PRESENCE OF A CHLORINE RESIDUAL. SAMPLES FOR BACTERIOLOGICAL ANALYSIS SHALL BE COLLECTED IN STERILE BOTTLES TREATED WITH SODIUM THIOSULFATE, AS REQUIRED BY STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER. NO HOSE OR FIRE HYDRANT SHALL BE USED IN THE COLLECTION OF SAMPLES. THERE SHOULD BE NO WATER IN THE TRENCH UP TO THE CONNECTION FOR SAMPLING. THE SAMPLING PIPE MUST BE DEDICATED AND CLEAN AND DISINFECTED AND FLUSHED PRIOR TO SAMPLING. A CORPORATION COCK MAY BE INSTALLED IN THE MAIN WITH A COPPER-TUBE GOOSENECK ASSEMBLY. AFTER SAMPLES HAVE BEEN COLLECTED, THE GOOSENECK ASSEMBLY MAY BE REMOVED AND RETAINED FOR FUTURE USE. IF SAMPLES RESULTS FROM THE LAB INDICATE A MEASURED HPC GREATER THAN 500 COLONY-FORMING UNITS (CFU) PER ML, FLUSHING SHOULD BE RESUMED AND ANOTHER COLIFORM AND HPC SET OF SAMPLES SHOULD BE TAKEN UNTIL NO COLIFORMS ARE PRESENT AND THE HPC IS LESS THAN 500 CFU/ML THE RECORD OF COMPLIANCE SHALL BE THE BACTERIOLOGICAL TEST RESULTS CERTIFYING THAT THE WATER SAMPLED FROM THE NEW WATER MAIN IS FREE OF COLIFORM BACTERIA CONTAMINATION AND IS EQUAL TO OR BETTER THAN THE BACTERIOLOGIC WATER QUALITY IN THE DISTRIBUTION SYSTEM.

   ALL OTHER REQUIREMENTS OF AWWA C651, LATEST REVISION, SHALL BE OBSERVED.
10. WATER SERVICE CROSSING SEWER OR STORM SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18" BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF THE SEWER OR STORM. THIS SHALL BE THE CASE WHERE THE WATER MAIN IS EITHER ABOVE OR BELOW THE SEWER. AT CROSSINGS, ONE FULL LENGTH OF WATER PIPE SHALL BE LOCATED SO BOTH JOINTS WILL BE AS FAR FROM THE SEWER OR STORM AS POSSIBLE. SPECIAL STRUCTURAL SUPPORT FOR THE WATER AND SEWER MAY BE REQUIRED.
11. WATER SERVICE SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED SEWER MAIN OR SERVICE.
12. WATER TIGHT PLUGS ARE TO BE INSTALLED IN THE ENDS OF PIPES WHEN WORK IS NOT IN PROGRESS.
13. LEAKAGE AND HYDROSTATIC PRESSURE TESTING SHALL BE PERFORMED AT 1.5 TIMES THE WORKING PRESSURE OR 150 PSI, WHICHEVER IS GREATER.
14. THE MAXIMUM DEFLECTION ALLOWED ALLOWED AT PIPE JOINTS SHALL BE LIMITED TO 80% OF THAT ALLOWED BY AWWA OR IN ACCORDANCE WITH THE MUNICIPALITY. FOR AWWA ALLOWABLE JOINT DEFLECTIONS SEE LATEST REVISION OF AWWA SPECIFICATION C600.
15. CONSTRUCTION MUST CONFORM TO ALL ORDINANCES.
16. CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF EXISTING WATER AND OTHER UTILITIES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
17. CONTRACTOR TO CALL UNDERGROUND MARK-OUT PRIOR TO COMMENCEMENT OF CONSTRUCTION AT 1-800-962-7962 FOR COMPLETE UTILITIES MARK-OUT.
18. CONTRACTOR TO CONTACT WATER DEPARTMENT AT LEAST 2 DAYS PRIOR TO CONSTRUCTION.
19. ALL IMPROVEMENTS SHALL BE INSPECTED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK AND CERTIFICATION SHALL BE PROVIDED TO THE MUNICIPALITY THAT THE SUBJECT IMPROVEMENTS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE APPROVED PLANS.
20. CONTRACTOR TO NOTIFY ENGINEER OF ANY DEVIATION FROM THE HORIZONTAL OR VERTICAL ALIGNMENTS WITH REGARDS TO EXISTING UTILITIES.
21. A CERTIFIED AS BUILT MAP OF THE WATER SYSTEM IMPROVEMENTS SHALL BE PROVIDED TO THE MUNICIPALITY'S WATER DEPARTMENT BY A LICENSED DESIGN PROFESSIONAL.

TOWN OF WAWAYANDA PLANNING BOARD

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REV	DATE	DRAWN BY	DESCRIPTION
1	02/04/22	CDR	REVISED FOR GEIS SUBMISSION
2	01/12/23	CDR	REVISED PER PLANNING BOARD COMMENTS & STORMWATER TESTING RESULTS

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER IS A VIOLATION OF ARTICLE 145, SECTION 7209, SUB-DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
COLLIERS ENGINEERING & DESIGN CT, P.C.
N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS FOR DOLSONTOWN ROAD EAST, LLC

TAX LOTS: 1-1-52.1, 1-1-4.2 & 6-1-3.2

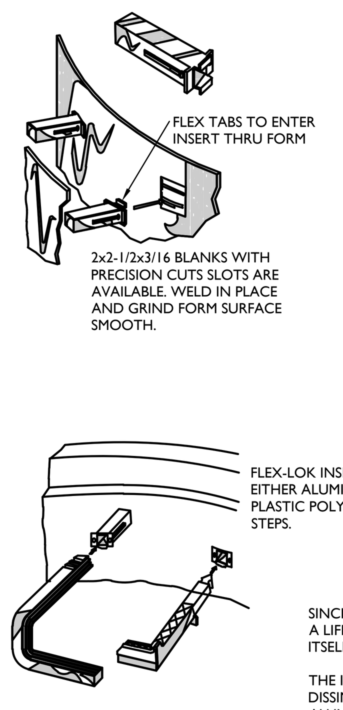
TOWN OF WAWAYANDA ORANGE COUNTY NEW YORK STATE

Colliers Engineering & Design
NEWBURGH
555 Hudson Valley Avenue Suite 101 New Windsor, NY 12553
Phone: 845.564.4495
COLLIERS ENGINEERING & DESIGN CT, P.C. DOING BUSINESS AS MASER CONSULTING ENGINEERING & LAND SURVEYING

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	01/14/2022	SMB	JED
PROJECT NUMBER:	DRAWING NAME:		
20006912B	C-DTLS		

SHEET TITLE: WATER & PARKING DETAILS

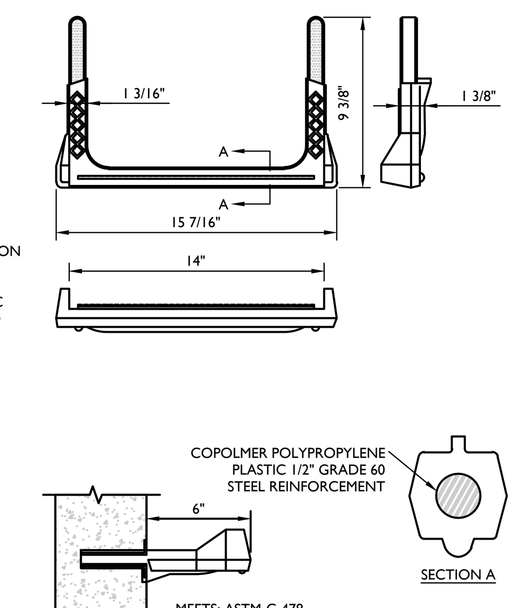
NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.



A POLYPROPYLENE INSERT FOR THE PURPOSE OF SECURING STEPS IN THE WALL OF A PRECAST CONCRETE MANHOLE OR OTHER CONCRETE STUCTURE.

PLACEMENT OF THE INSERT IS DONE AT THE TIME OF MANUFACTURE, THEREBY ASSURING THE WALL TO REMAIN WATERTIGHT, AND AT THE SAME TIME GUARANTEEING POSITIVE ALIGNMENT AND PROJECTION OF THE STEPS.

INSTALLATION OF EITHER THE ALUMINUM OR PLASTIC POLYPROPYLENE STEP INTO THE INSERT IS RAPID AND SIMPLE, AS THE STEP IS PRESSED OR DRIVEN INTO AN INTERFERENCE FIT IN THE INSERT CAVITY.



SINCE THE INSERT IS MADE OF POLYPROPYLENE, IT HAS A LIFE EXPECTANCY WHICH EXCEEDS THE CONCRETE ITSELF, AND HAS EXCELLENT CHEMICAL RESISTANCE.

THE INSERT ALSO SERVES AS A PROTECTIVE SHIELD AGAINST DISSIMILIAR MATERIAL REACTIONS, SUCH AS ELECTROLYSIS OF ALUMINUM AND CONCRETE.

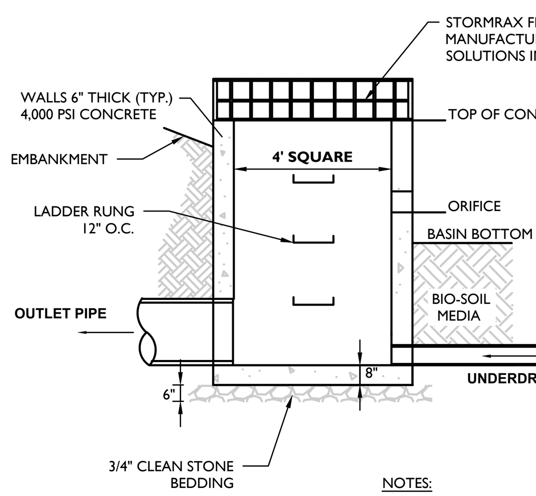
THE INSERT MEETS REQUIREMENTS OF A.S.T.M. C-478 SECTION 12 AND PERFORMANCE TEST PROCEDURES OF A.S.T.M. C-497.

NOTES:

1. STEP INSERTS TO BE AS MANUFACTURED BY A-LOK PRODUCTS OR APPROVED EQUAL.

LADDER RUNG (COPOLYMER) DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-1500 07/01/19



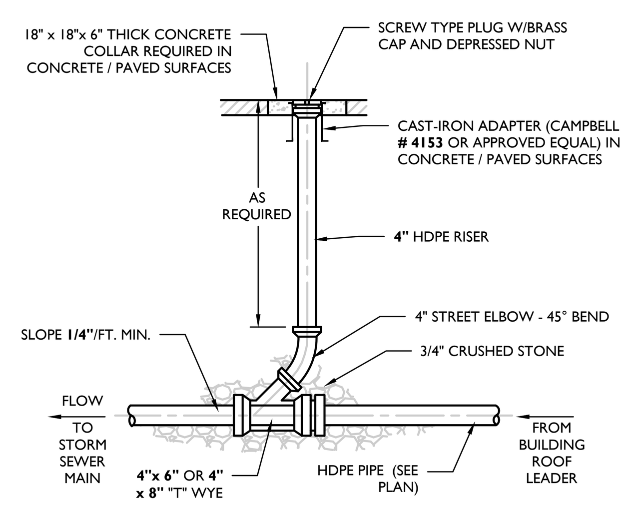
STRUCTURE	TOP OF CONC.	ORIFICE	OUTLET DIA.	OUTLET INV.	UNDERDRAIN INV.@ STRUCTURE
OCS-1A	469.5	N/A	18"	464.5	464.5
OCS-1BE	459.0	N/A	24"	456.34	N/A
OCS-1C	468.5	N/A	12"	461.5	461.5
OCS-1E	458.2	N/A	24"	456.0	N/A
OCS-2A	469.0	N/A	18"	466.0	N/A
OCS-2C	453.5	N/A	18"	449.5	449.5
OCS-1D	453.0	6" DIA. INV = 451.0	12"	451.0	N/A

NOTES:

1. CONTRACTOR TO SUBMIT SHOP DRAWING FOR REVIEW AND APPROVAL.
2. ALL CONCRETE TO BE 4,000 PSI (MIN.)

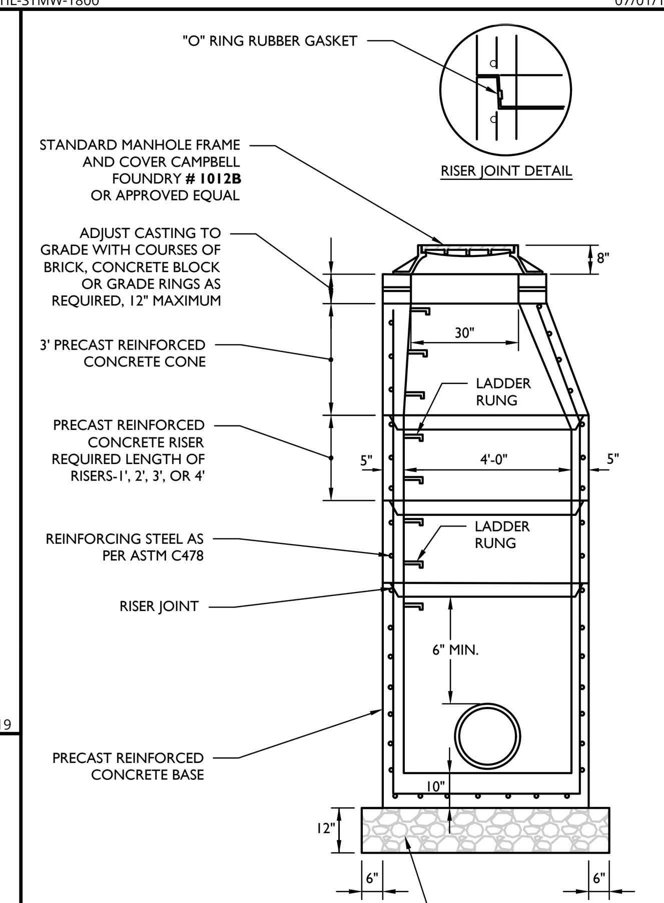
TYPICAL BIORETENTION POND OUTLET STRUCTURE DETAIL

NOT TO SCALE MCNY-UTIL-STMW-1800 07/01/19



ROOF LEADER CLEANOUT DETAIL

NOT TO SCALE MCNY-UTIL-STRM-1900 07/01/19



NOTE:

1. IN ACID SOILS, TWO COATS OF BITUMASTIC WATER PROOFING SHALL BE APPLIED PER MANUFACTURER'S SPECIFICATION.
2. ALL CONCRETE TO BE 4,000 PSI.

PRECAST CONCRETE STORM MANHOLE 4' DIA. DETAIL

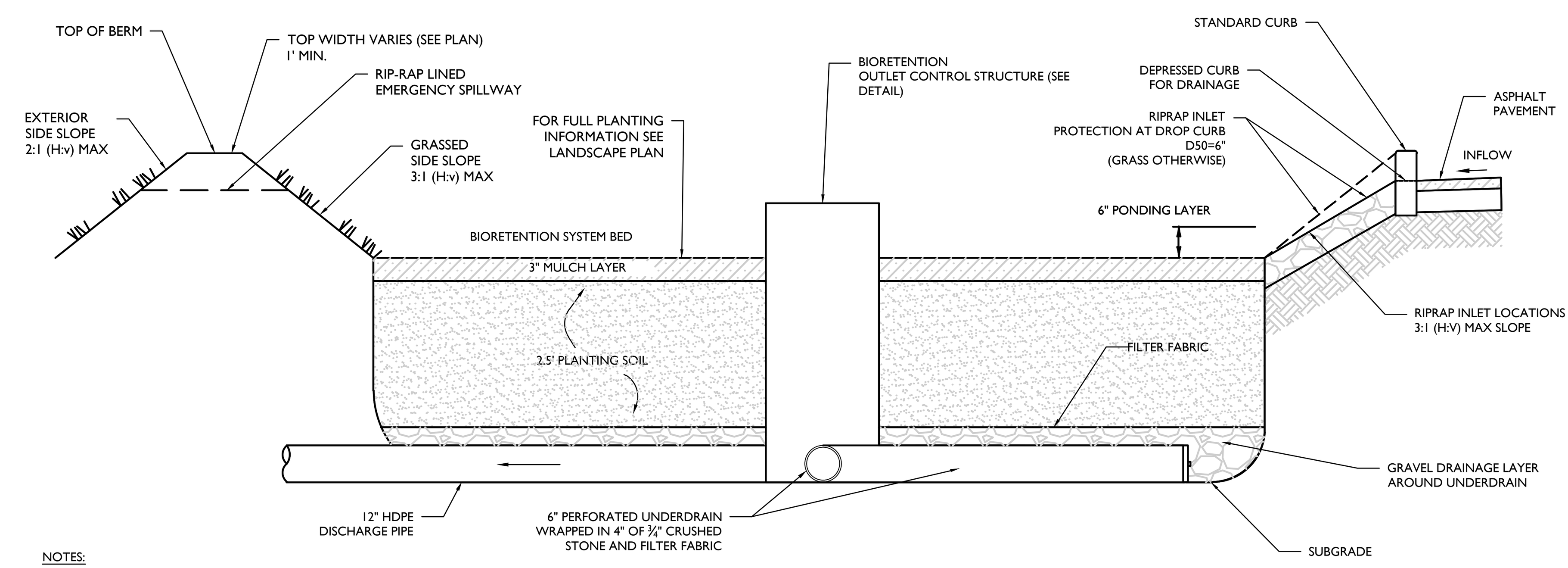
NOT TO SCALE MCNY-UTIL-STRM-1600 07/01/19

BIORETENTION ELEVATIONS					
SYSTEM	OUTLET NAME	OUTLET SIZE	BED ELEVATION	TOP OF BERM ELEVATION	EMERGENCY SPILLWAY EL.
BIO-1A	OCS 1A	4'X4'	468.0	471.02	469.5
BIO-1BE	OCS 1BE	4'X4'	456.0	461.0	464.0
BIO-1C	OCS 1C	4'X4'	464.0	470.0	469.5
INFIL-1D	OCS 1D	4'X4'	450.0	454.0	455.0
INFIL-1E	OCS 1E	4'X4'	456.0	461.0	464.0

PLANTING SOIL NOTE:

THE PLANTING SOIL SHOULD BE A SANDY LOAM, LOAMY SAND, LOAM (USDA), OR A LOAM/SAND MIX (SHOULD CONTAIN A MINIMUM 35 TO 60% SAND, BY VOLUME). THE CLAY CONTENT FOR THESE SOILS SHOULD BE LESS THAN 25% BY VOLUME. SOILS SHOULD FALL WITHIN THE SM, OR ML CLASSIFICATIONS OD THE UNIFIED SOIL CLASSIFICATION SYSTEM (USCS). A PERMEABILITY OF AT LEAST 1.0 FEET PER DAY (0.5"/HR) IS REQUIRED (A CONSERVATIVE VALUE OF 0.5 FEET PER DAY IS USED FOR DESIGN). THE SOIL SHOULD BE FREE OF STONES, STUMPS, ROOTS, OR OTHER WOODY MATERIAL OVER 1" IN DIAMETER, AND BRUSH OR SEED FROM NOXIOUS WEEDS. PLACEMENT OF THE PLANTING SOIL SHOULD BE IN LIFTS OF 12" TO 18", LOOSELY COMPACTED (TAMPED LIGHTLY WITH A DOZER OR BACKHOE BUCKET). THE SPECIFIC CHARACTERISTICS ARE AS FOLLOWS:

PARAMETER	VALUE
PH RANGE	5.2 TO 7.00
ORGANIC MATTER	1.5 TO 4.0%
MAGNESIUM	35 LBS. PER ACRE, MINIMUM
PHOSPHORUS (P_2O_5)	75 LBS. PER ACRE, MINIMUM
POTASSIUM (K_2O)	85 LBS. PER ACRE, MINIMUM
SOLUBLE SALTS	500 ppm
CLAY	10 TO 25%
SILT	30 TO 55%
SAND	35 TO 60%

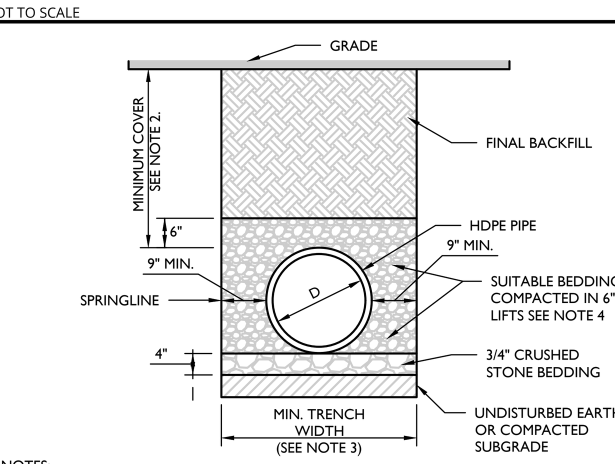


NOTES:

1. SEE PLAN FOR DROP CURB LOCATIONS AND BIORETENTION AREA CONFIGURATION.
2. PLANTING SOIL TO BE IN ACCORDANCE WITH NEW YORK STATE STANDARDS AND SPECIFICATIONS FOUND WITHIN THE PROJECT SWPPP. CONTRACTOR MUST PROVIDE SUBMITTAL OF PROPOSED BIORETENTION SOIL FOR REVIEW & APPROVAL BY THE ENGINEER.
3. DURING CONSTRUCTION THE CONTRACTOR SHALL MINIMIZE COMPACTION OF BOTH THE BASE OF THE BIORETENTION AREA AND THE REQUIRED BACKFILL. WHEN POSSIBLE, USE EXCAVATION HOES TO REMOVED ORIGINAL SOIL. IF BIORETENTION AREAS ARE EXCAVATED USING A LOADER, THE CONTRACTOR SHOULD USE WIDE TRACK OR MARCH TRACK EQUIPMENT, OR LIGHT EQUIPMENT WITH TURF TYPE TIRES. USE OF EQUIPMENT WITH NARROW TRACKS OR NARROW TIRES, RUBBER TIRES WITH LARGE LUGS, OR HIGH PRESSURE TIRES WILL CAUSE EXCESSIVE COMPACTION RESULTING IN REDUCED INFILTRATION RATES AND STORAGE VOLUMES AND IS NOT ACCEPTABLE. COMPACTION WILL SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE.
4. WHEN BACKFILLING THE BIORETENTION FACILITY, PLACE SOIL IN LIFTS 12" OR GREATER. DO NOT USE HEAVY EQUIPMENT WITHIN THE BIORETENTION BASIN. HEAVY EQUIPMENT CAN BE USED AROUND THE PERIMETER OF THE BASIN TO SUPPLY MATERIALS. BIORETENTION SOILS ARE TO BE GRADED BY HAND OR WITH LIGHT EQUIPMENT SUCH AS A COMPACT LOADER OR EQUIPMENT WITH MARSH TRACKS.

BIORETENTION SYSTEM CROSS SECTION DETAIL

NOT TO SCALE MCNY-UTIL-STMW-2400 07/01/19

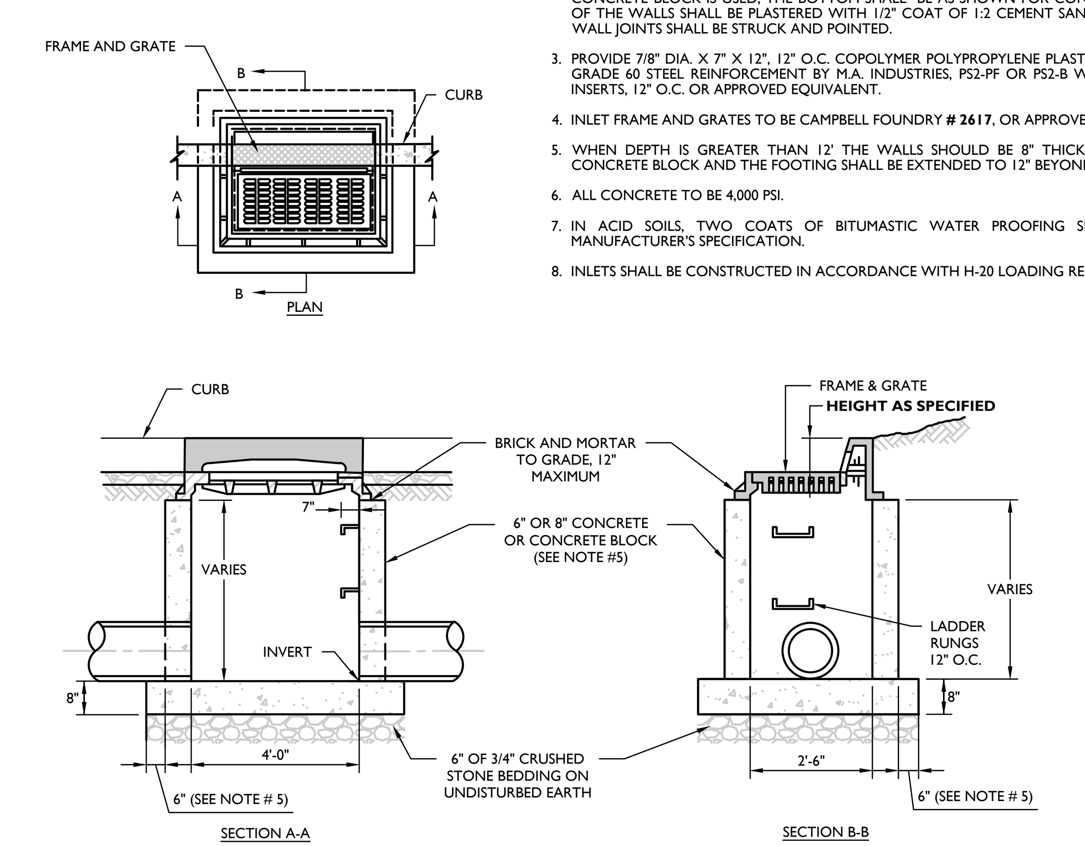


NOTES:

1. ALL PIPE SYSTEMS AND BACKFILL SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321.
2. MINIMUM COVER FOR HDPE PIPES IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR UP TO 60" DIAMETER PIPE. PIPE COVER IS MEASURED FROM TOP OF PIPE TO THE BOTTOM OF FLEXIBLE PAVEMENT, OR TO THE TOP OF RIGID PAVEMENT, OR TO THE GROUND SURFACE.
3. MINIMUM TRENCH WIDTH PER MANUFACTURER'S RECOMMENDATIONS.
4. SUITABLE BEDDING MATERIAL SHALL BE SAND, WELL GRADED GRAVEL < 2", OR 3/4" CRUSHED STONE.
5. SUITABLE FINAL BACKFILL MATERIAL SHALL BE SITE SOILS, CLEAN FILL, OR ITEM 4 STONE COMPACTED IN MAX. 9" LIFTS.
6. STONES LARGER THAN 2" FOUND IN THE TRENCH SHALL BE REMOVED FOR A DEPTH OF AT LEAST 4" BELOW THE PIPE.
7. FOR INSTALLATION IN PAVEMENT, REFER TO THE APPLICABLE PAVEMENT DETAIL TO ESTABLISH FINAL GRADE. BACKFILL REQUIREMENTS BEYOND THE DEPTH OF THE PAVEMENT DETAIL SHALL BE IN ACCORDANCE WITH THIS DETAIL.

HDPE STORM PIPE BEDDING DETAIL

NOT TO SCALE HDPE 07/01/19

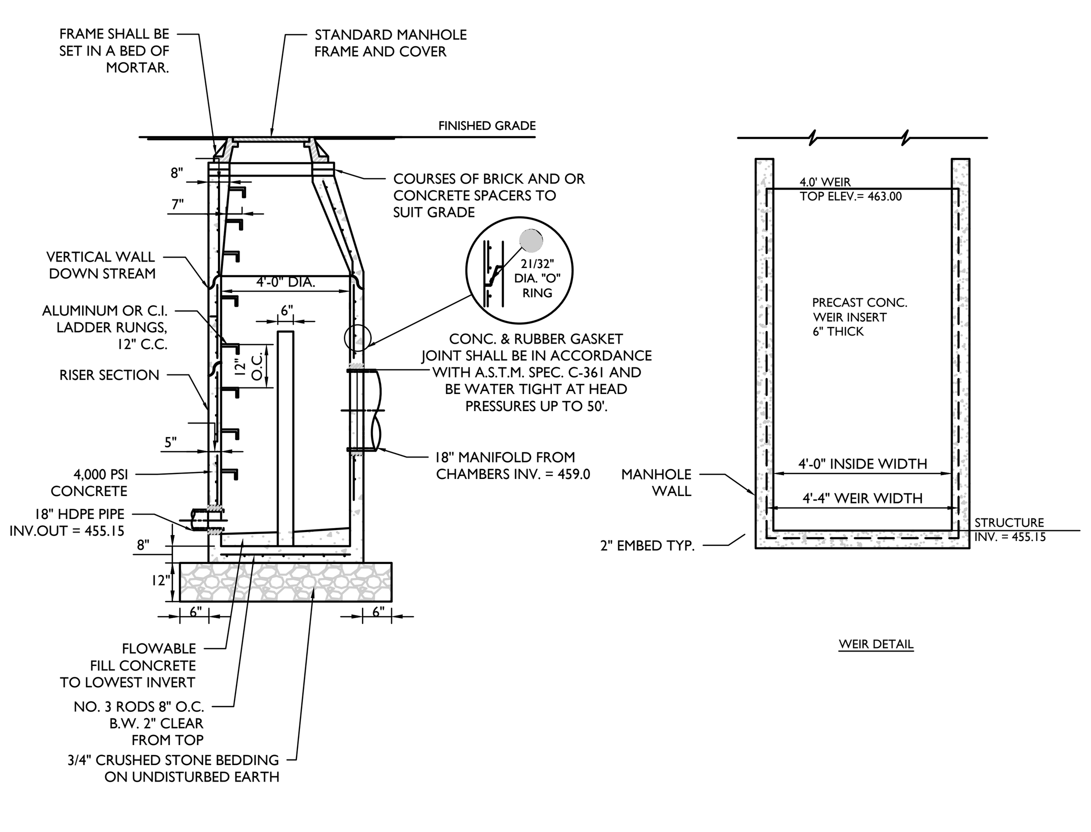


NOTES:

1. INVERTS TO BE ELIMINATED IN BOTTOM OF TERMINAL INLETS. MINIMUM DIFFERENCE IN INVERTS TO BE 0.1 FEET.
2. THIS INLET SHALL BE CONSTRUCTED OF PRECAST CONCRETE OR SOLID CONCRETE BLOCK. IF CONCRETE BLOCK IS USED, THE BOTTOM SHALL BE AS SHOWN FOR CONCRETE & THE OUTSIDE OF THE WALLS SHALL BE PLASTERED WITH 1/2" COAT OF 1:2 CEMENT SAND MORTAR. THE INSIDE WALL JOINTS SHALL BE STRUCK AND POINTED.
3. PROVIDE 7/8" DIA. X 7" X 12", 12" O.C. COPOLYMER POLYPROPYLENE PLASTIC STEPS WITH 1/2" DIA. GRADE 60 STEEL REINFORCEMENT BY M.A. INDUSTRIES, PS2-PF OR PS2-B WITH PRECAST PRESS FIT INSERTS, 12" O.C. OR APPROVED EQUIVALENT.
4. INLET FRAME AND GRATES TO BE CAMPBELL FOUNDRY **# 2617**, OR APPROVED EQUAL.
5. WHEN DEPTH IS GREATER THAN 12' THE WALLS SHOULD BE 8" THICK CONCRETE OR SOLID CONCRETE BLOCK AND THE FOOTING SHALL BE EXTENDED TO 12" BEYOND THE OUTSIDE WALLS.
6. ALL CONCRETE TO BE 4,000 PSI.
7. IN ACID SOILS, TWO COATS OF BITUMASTIC WATER PROOFING SHALL BE APPLIED PER MANUFACTURER'S SPECIFICATION.
8. INLETS SHALL BE CONSTRUCTED IN ACCORDANCE WITH H-20 LOADING REQUIREMENTS.

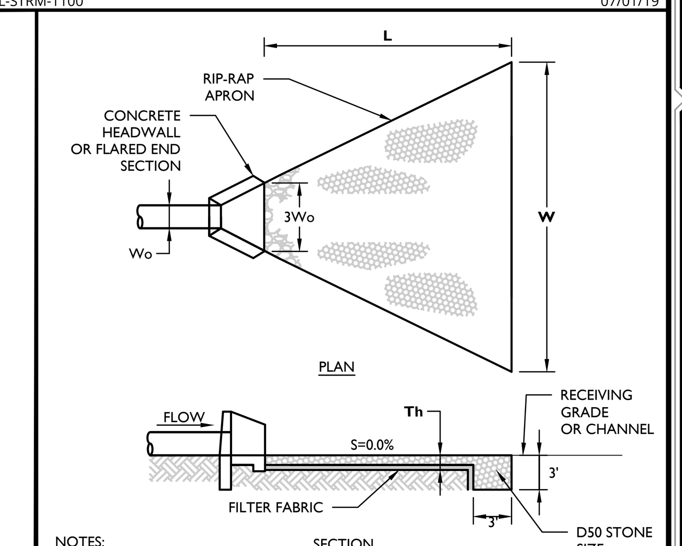
SINGLE CATCH BASIN DETAIL

NOT TO SCALE MCNY-UTIL-STRM-1100 07/01/19



MANHOLE OUTLET CONTROL STRUCTURE DETAIL (OCS-2B)

NOT TO SCALE MOD: 09/25/20 07/01/19



NOTES:

1. SEE PLAN FOR APRON DIMENSIONS.
2. SIDE SLOPE SHALL BE 2:1 OR FLATTER. THE BOTTOM GRADE SHALL BE LEVEL (0% SLOPE). THERE SHALL BE NO FALL AT THE END OF APRON TO THE RECEIVING SURFACE.

CONDUIT OUTLET PROTECTION DETAIL

NOT TO SCALE WATER MOD: 01/05/22 05/01/17

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Cory Daniel Robinson
NEW YORK LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: 103788
COLLIERS ENGINEERING & DESIGN CT, P.C.
N.Y. C.O.A #: 0017609

PRELIMINARY SITE PLANS

FOR

DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

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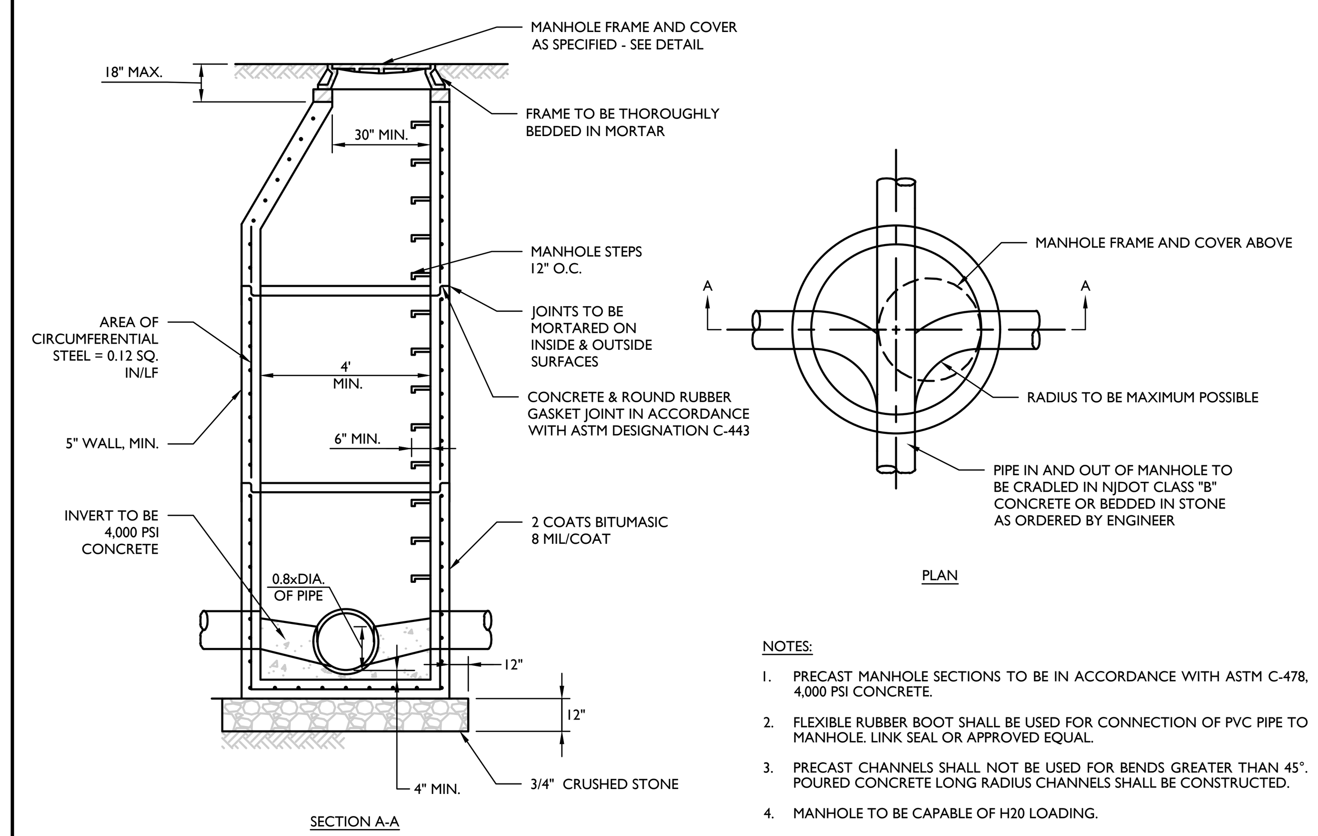
PROJECT NUMBER: 20006912B	DRAWING NAME: C-DTLS		

SHEET TITLE: STORM DETAILS

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

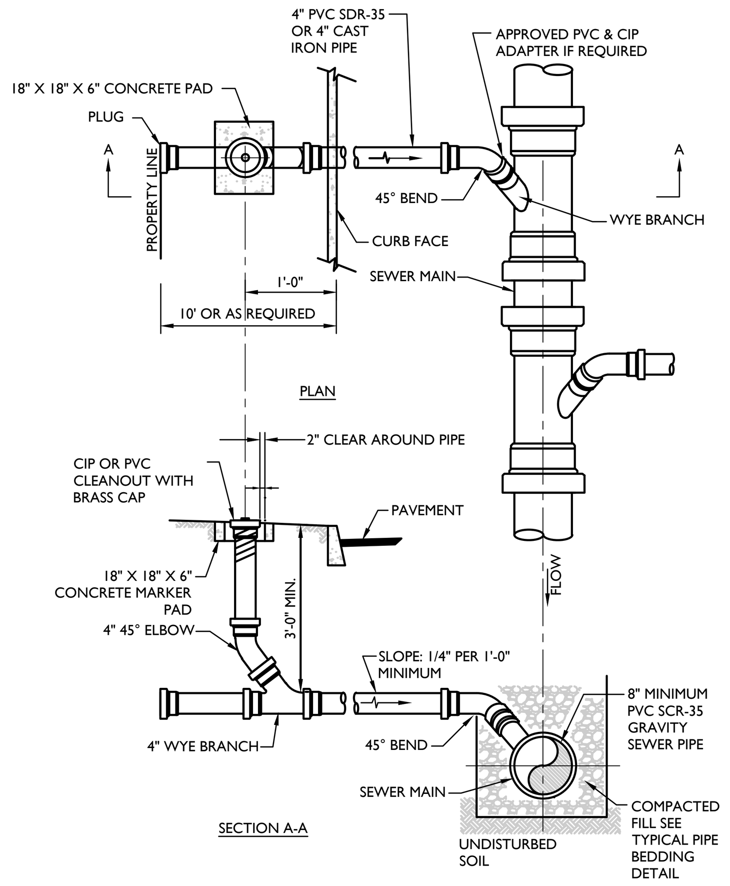


NOTES:

1. PRECAST MANHOLE SECTIONS TO BE IN ACCORDANCE WITH ASTM C-478, 4,000 PSI CONCRETE.
2. FLEXIBLE RUBBER BOOT SHALL BE USED FOR CONNECTION OF PVC PIPE TO MANHOLE. LINK SEAL OR APPROVED EQUAL.
3. PRECAST CHANNELS SHALL NOT BE USED FOR BENDS GREATER THAN 45°. POURED CONCRETE LONG RADIUS CHANNELS SHALL BE CONSTRUCTED.
4. MANHOLE TO BE CAPABLE OF H20 LOADING.

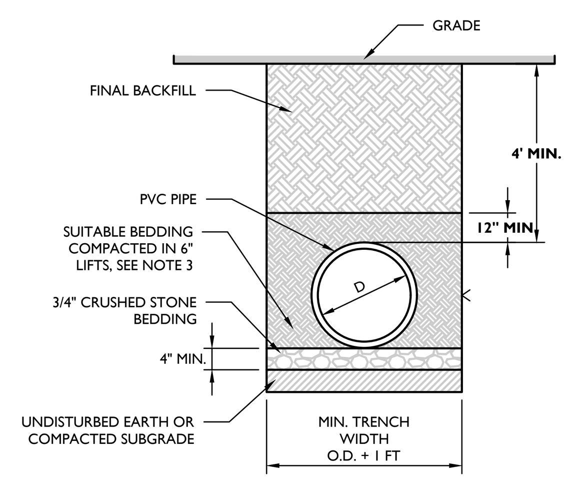
SANITARY PRECAST MANHOLE DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-1000 07/01/19



SANITARY SEWER LATERAL & CLEANOUT DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-1601 07/01/19

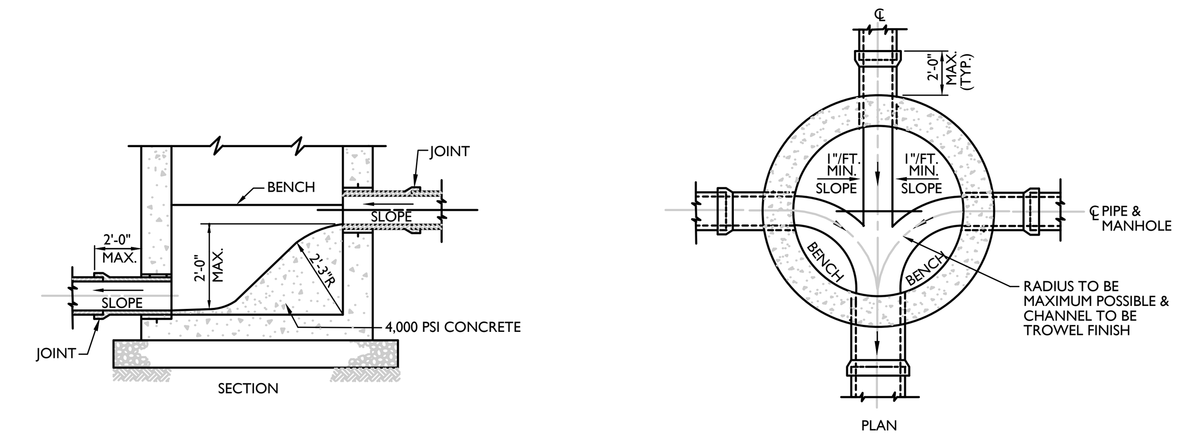


NOTES:

1. ALL PVC GRAVITY PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321.
2. GRAVITY SANITARY PIPE SHALL BE PVC SDR 35 PER ASTM D3034 OR AS REQUIRED BY THE GOVERNING AUTHORITY.
3. SUITABLE BEDDING MATERIAL SHALL BE COARSE SAND OR $\frac{3}{4}$" CRUSHED STONE.
4. SUITABLE FINAL BACKFILL MATERIAL SHALL BE SITE SOILS, CLEAN FILL, OR ITEM 4 STONE COMPACTED IN MAX. 9" LIFTS. BACKFILL MATERIAL WITHIN 2' OF THE PIPE MUST BE FREE AND CLEAR OF DEBRIS, FROZEN MATERIAL, LARGE CLODS OR STONES, ORGANIC MATTER, OR OTHER UNSUITABLE MATERIALS.
5. STONES LARGER THAN 2" FOUND IN THE TRENCH SHALL BE REMOVED FOR A DEPTH OF AT LEAST 4" BELOW THE PIPE.
6. FOR INSTALLATION IN PAVEMENT, REFER TO THE APPLICABLE PAVEMENT DETAIL TO ESTABLISH FINAL GRADE. BACKFILL REQUIREMENTS BEYOND THE DEPTH OF THE PAVEMENT DETAIL SHALL BE IN ACCORDANCE WITH THIS DETAIL.

PVC SANITARY PIPE BEDDING (GRAVITY) DETAIL

NOT TO SCALE PVC 07/01/19

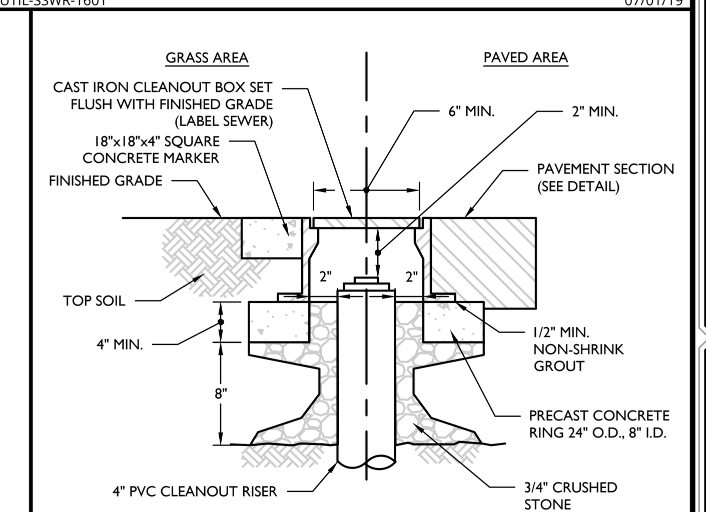


NOTE:

1. MANHOLE CHUTE IS TO BE USED WHERE DIFFERENCE IN INVERT ELEVATIONS BETWEEN INCOMING PIPE AND OUTGOING PIPE IS LESS THAN 2'-0".
2. IF THE DIFFERENCE 2'-0" OR GREATER, THEN EXTERNAL DROP CONNECTION SHALL BE MADE. CHANNELING SHALL BE AS SHOWN ABOVE.

MANHOLE CHUTE DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-3000 07/01/19

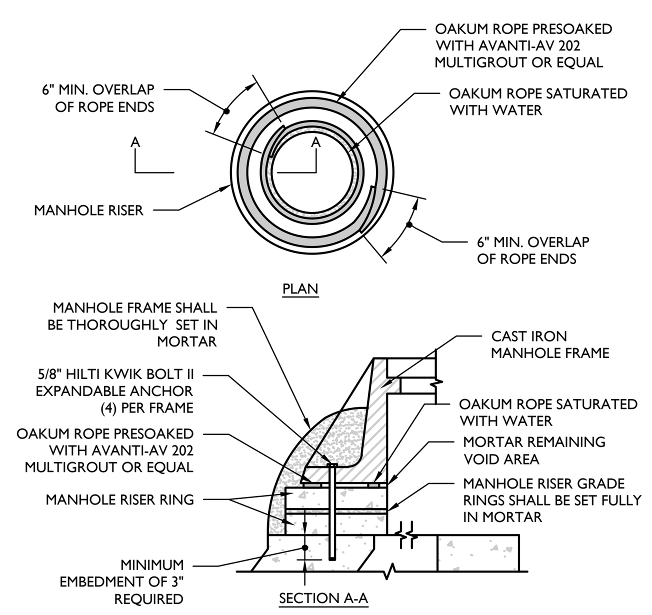


NOTES

1. ALL PVC CLEANOUTS TO HAVE CAST IRON FRAME AND COVER PROTECTION BOX. DESIGN FOR H20 LOADING.

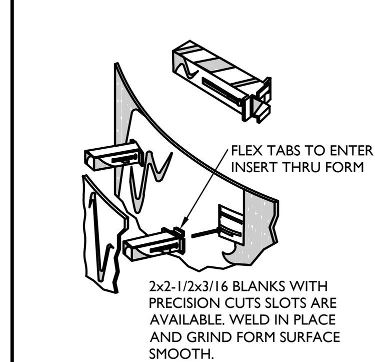
CLEANOUT PROTECTION BOX DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-1600 07/01/19



SANITARY SEWER MANHOLE FRAME INSTALLATION DETAIL

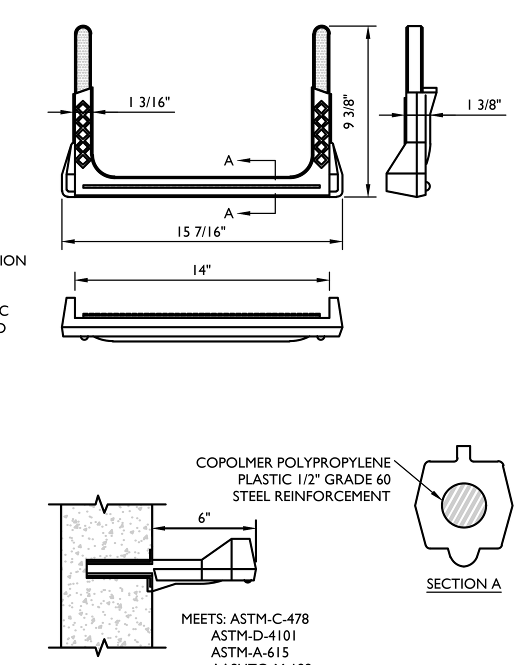
NOT TO SCALE MCNY-UTIL-SSWR-1300 07/01/19

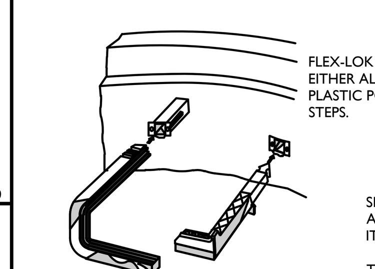


A POLYPROPYLENE INSERT FOR THE PURPOSE OF SECURING STEPS IN THE WALL OF A PRECAST CONCRETE MANHOLE OR OTHER CONCRETE STUCTURE.

PLACEMENT OF THE INSERT IS DONE AT THE TIME OF MANUFACTURE, THEREBY ASSURING THE WALL TO REMAIN WATERTIGHT, AND AT THE SAME TIME GUARANTEEING POSITIVE ALIGNMENT AND PROJECTION OF THE STEPS.

INSTALLATION OF EITHER THE ALUMINUM OR PLASTIC POLYPROPYLENE STEP INTO THE INSERT IS RAPID AND SIMPLE, AS THE STEP IS PRESSED OR DRIVEN INTO AN INTERFERENCE FIT IN THE INSERT CAVITY.





SINCE THE INSERT IS MADE OF POLYPROPYLENE, IT HAS A LIFE EXPECTANCY WHICH EXCEEDS THE CONCRETE ITSELF, AND HAS EXCELLENT CHEMICAL RESISTANCE.

THE INSERT ALSO SERVES AS A PROTECTIVE SHIELD AGAINST DISSIMILIAR MATERIAL REACTIONS, SUCH AS ELECTROLYSIS OF ALUMINUM AND CONCRETE.

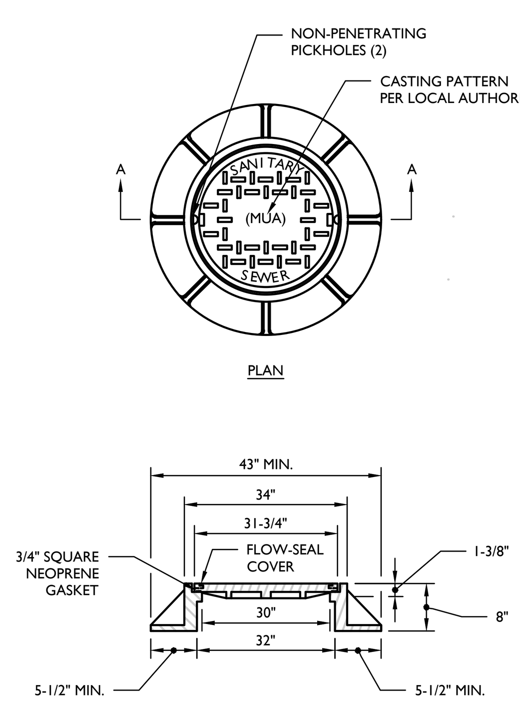
THE INSERT MEETS REQUIREMENTS OF A.S.T.M. C-478 SECTION 12 AND PERFORMANCE TEST PROCEDURES OF A.S.T.M. C-497.

NOTES:

1. STEP INSERTS TO BE AS MANUFACTURED BY A-LOK PRODUCTS OR APPROVED EQUAL.

LADDER RUNG (COPOLYMER) DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-1500 07/01/19



NOTES:

1. MANHOLE FRAME AND COVER SHALL BE CAMPBELL FOUNDRY PATTERN # **1012B** WITH FLOW-SEAL COVER OR APPROVED EQUAL OR AS OTHERWISE REQUIRED BY JURISDICTIONAL AUTHORITY.
2. MANHOLE FRAME AND COVER TO BE HEAVY DUTY, CONFORMING TO ASTM SPECIFICATION A-48 CLASS 30-B WITH SHOP COAT OF ASPHALTIC PITCH.
3. IN EASEMENTS AND REMOTE AREAS, COVER LOCKING DEVICES OF BRONZE AND KEY SHALL BE PROVIDED.
4. WATERTIGHT MANHOLE FRAME AND COVER SHALL BE PATTERN # **6548** AS MANUFACTURED BY CAMPBELL FOUNDRY COMPANY OR APPROVED EQUAL.

SANITARY MANHOLE FRAME AND COVER DETAIL

NOT TO SCALE MCNY-UTIL-SSWR-1001 07/01/19

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2	01/27/23	CDR	REVISED PER PLANNING BOARD COMMENTS & STORMWATER TESTING RESULTS.

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PRELIMINARY SITE PLANS

FOR

DOLSONTOWN ROAD EAST, LLC

TAX LOTS:
1-1-52.1,
1-1-4.2 &
6-1-3.2

TOWN OF WAWAYANDA
ORANGE COUNTY
NEW YORK STATE

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AS SHOWN	01/14/2022	SMB	JED

PROJECT NUMBER:	DRAWING NAME:
20006912B	C-DTLS

SHEET TITLE:
SEWER & LANDSCAPE DETAILS

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

Section 7

TOWN OF WAWAYANDA PLANNING BOARD

ENVIRONMENTAL ASSESSMENT FORM NARRATIVE
DOLSONTOWN ROAD EAST LLC ("Applicant")

TOWN OF WAWAYANDA, ORANGE COUNTY
MC-1 (Mixed Commercial) zoning district

TAX LOTS: 1-1-52.1, 1-1-4.2, & 6-1-3.2 (the "Site")
February 9, 2022

PROPOSED ACTION

The proposed project will consist of the construction of two warehouse/distribution facilities on three existing parcels, which will be combined via a lot line change and converted to two separate lots, 36.67 acres in size and 11.56 acres in size, respectively. The Site has frontage along Dolsontown Road to the south. The Site is proposed to host one 402,000 square foot warehouse/distribution facility with 12,000 square feet of office space and one 61,000 square foot warehouse/distribution facility with 3,000 square feet of office space. The warehouses are located on Dolsontown Road, tax lots 1-1-52.1, 1-1-4.2, and 6-1-3.2 (the "Project"). The Project is consistent with the Town of Wawayanda Comprehensive Plan and complies with Wawayanda's Zoning Law.

The Project is within the Town of Wawayanda MC-1 (Mixed Commercial) zoning district. Within the MC-1 zoning district, a "Warehouse, storage and distribution facilities" use requires a special use permit subject to site plan approval by the Planning Board. Other associated site improvements proposed for the Site include 199 vehicle parking spaces, 99 truck loading docks, and 85 trailer spaces for the first warehouse and 60 vehicle parking spaces and 11 truck loading docks for the second warehouse. The Site has three proposed driveways to Dolsontown Road that will provide vehicular and truck access to the facilities.

The warehouse facilities propose water (potable & fire protection) and sanitary sewer services to service the buildings. These services will be provided by service connections to the adjacent town mains within Dolsontown Road via anticipated pump stations. The Project is anticipated to generate a water and sewer demand of approximately 3,540 GPD.

The Site is currently undeveloped with a mixture of woodlands and wetlands. The Site contains 8 acres of federally and state regulated wetlands; however, no wetland disturbance is necessary to accommodate the project.

The Project is estimated to require approximately 25 acres of site disturbance and requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP). A SWPPP has been prepared in accordance with the Town and NYSDEC requirements to provide stormwater management/mitigation for water quantity and water quality and will be provided to the Planning Board with this submission as part of Appendix C.

SEQRA COMPLIANCE AND INVOLVED AND INTERESTED AGENCIES

The Project's potential environmental impacts must be reviewed pursuant to the State Environmental Quality Review Act and its implementing regulations in 6 NYCRR Part 617 (collectively, "SEQRA"). Pursuant to 6 NYCRR § 617.6(a)(1)(iv), "as soon as an agency receives an application for…approval of an action, it must" make a preliminary classification of the action as Type 1, Type 2 or Unlisted. This "preliminary classification will assist in determining whether a full EAF and coordinated review is necessary."

In this Project, the SEQRA "action" is the Planning Board's decision on the Applicant's applications for site plan and special use permit approvals for the Project. Because the Project entails the physical alteration of 10 acres or more for a non-residential project and is proposed to have more than 100,000 square feet of gross floor area in a town having a population of 150,000 persons or less, it is properly classified as a Type 1 action pursuant to 6 NYCRR §§ 617.4(b). As a result, a full EAF ("FEAF") and coordinated environmental review of the Project has been conducted.

Accordingly, Applicant completed Part 1 of the FEAF as required by 6 NYCRR § 617.6(a)(2) and provided it to the Planning Board in its May 12, 2021 submission. As further required by SEQRA, Applicant identified the following other agencies that may be involved or interested in the review of the Project:

- Town of Wawayanda Town Board;
- Town of Wawayanda Building Department;
- Town of Wawayanda Highway Department;
- New Hampton Fire Company;
- Orange County Department of Planning;
- Orange County Department of Health;
- NYS Department of Environmental Conservation;
- NYS Department of Parks, Recreation and Historic Preservation;
- Army Corps of Engineers;
- New York State Department of Transportation;
- Orange County Department of Public Works

At its June 9, 2021 meeting, the Planning Board declared itself "lead agency" in a coordinated SEQRA review and circulated a Notice to Designate SEQRA Lead Agency to the identified involved and interested agencies on or about June 10, 2021. No objection was received to the Planning Board serving as lead agency.

EVALUATION OF POTENTIAL ENVIRONMENTAL IMPACTS

The lead agency must consider the criteria for determining the significance of potential environmental impacts from the Project as set forth in the SEQRA regulations at 6 NYCRR § 617.7(c). To do this, the lead agency reviews all relevant information and completes Parts 2 and 3 of the FEAF to provide the basis for its SEQRA determination.

For the Project, the identification of potential impacts and assessment of potential environmental impacts based on FEAF Part 2 is discussed below. Based on the following discussion, the Project includes the potential for at least one significant adverse environmental impact. A draft Generic Environmental Impact Statement (GEIS) was prepared to assess such potential significant adverse environmental impacts.

1. Impact on Land

The Project will have minimal impacts on land. Blasting is not anticipated to be required in connection with Project construction.

Consistent with Section 5.2 "Planning for Green Infrastructure: Reduction of Impervious Cover" of the NYSDEC Stormwater Management Design Manual, the proposed site plan has been designed to include the following Green Infrastructure site planning techniques, among others: the extent of the clearing will be limited to meet the user's needs; compacted soils located in open areas without shallow utilities will be tilled in order to restore the original properties of the soil prior to seeding; roadway widths were reduced wherever possible while still maintaining the necessary access; sidewalks added where needed to adequately and safely serve the pedestrian needs of the facilities; the proposed driveways have been minimized wherever possible; building footprints have been designed to meet the end user's needs.

Existing federally and state regulated wetland areas exist on site but will not be disturbed by the Project. Additionally, erosion control measures will be implemented during construction to minimize the erosion of land. Please refer to the draft GEIS for a full discussion of the Project's potential significant adverse environmental impacts to wetlands and surface water.

Based on the foregoing, the Project is not anticipated to have any significant adverse impacts on land.

2. Impact of Geological Features

There are no unique landforms on the Site that will be impacted by the Project. The Geotechnical Report (provided to the Planning Board with this submission as part of Appendix C) documented no surface or shallow bedrock that will be affected. No geological feature registered as a National Natural Landmark is present on or next to the Site. Accordingly, the Project is not anticipated to have any significant adverse impact on geological features.

3. Impact on Surface Water

Please refer to the draft GEIS for a full discussion of the Project's potential significant adverse environmental impacts to wetlands and surface water. Based on the findings set forth in the draft GEIS, the Project is not anticipated to have any significant adverse impact on surface water.

4. Impact on Groundwater

The SWPPP provides for “good housekeeping” and material management practices to minimize the risk of spills. These practices include: keeping products in original containers unless they are not re-sealable, (retaining original labels and material safety data sheets (MSDS), storing only enough products required to do the job, storing materials in a neat, orderly manner in their appropriate containers (and if possible, under a roof or other enclosure and/or on non-porous blacktop), not mixing substances unless recommended by the manufacturer, using all of a product before disposing of the container, following manufacturer's recommendations for proper use and disposal of materials and daily inspections by the contractor’s site superintendent to ensure proper use and disposal of materials on site.

Additionally, the contractor’s Site superintendent shall serve as a spill prevention and cleanup coordinator, and the following practices, outlined in the SWPPP, shall be followed: spills, of any size, of toxic or hazardous material and/or petroleum products shall be reported to the NYSDEC and Central Hudson’s Environmental Affairs division; manufacturer’s recommended methods for spill cleanup shall be clearly posted and site personnel shall be made aware of the procedures and the locations of the information and cleanup supplies; materials and equipment necessary for spill cleanup shall be kept in the material storage area onsite (equipment and materials shall include but not be limited to brooms, dust pans, mops, rags, gloves, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose); all spills shall be cleaned up immediately after discovery and the spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance. The spill prevention plan shall be adjusted to include measures to prevent toxic or hazardous material of spills from recurring and how to clean up the spill. A description of the spill, what caused it, and the cleanup measures shall also be included.

The proposed facilities are anticipated to generate approximately 3,540 gallons per day of water and sewer usage. The facilities are proposed to have water (potable & fire protection) and sanitary sewer services through connections to the existing town mains within Dolsontown Road via anticipated pump stations. Please refer to the draft GEIS for a full discussion of the Project’s potential significant adverse environmental impacts to groundwater.

Based on the foregoing, the Project will not create any significant adverse impacts to groundwater.

5. Impact on Flooding

All storm water from the Site will be collected, managed and treated by a stormwater management system in accordance with the NYSDEC General SPDES permit for stormwater discharges and SWPPP. Furthermore, as noted on the Federal Emergency Management Administration Flood Insurance Rate Maps (“FIRM”) covering the Town of Wawayanda, the Site is located outside any designated flood hazard area in an area where there is a minimal flood hazard during 100-year and 500-year storm events. There is no known flooding on the Site.

Please refer to the draft GEIS for a full discussion of the Project’s potential significant adverse environmental impacts to flooding.

Based on the foregoing, the Project will not create any adverse impacts to flooding.

6. Impacts on Air

The Project will not result in any significant adverse impacts on air quality. The Project does not include a State regulated air emission source or involve any activity that will have more than a minimal impact on air quality.

Several energy conservation methods will be incorporated into building construction. Energy Star approved building materials will be used that help reduce the amount of heat lost during the wintertime and cool air during the summertime. Other items such as reduced flow water fixtures that limit the amount of water flowing through the tap, thereby diminishing the amount of water used throughout the day will be used. Energy efficient light bulbs will reduce the amount of energy required for building and site light while extending the "life" of the lightbulb.

Please refer to the draft GEIS for a full discussion of the Project's potential significant adverse environmental impacts on air associated with traffic.

Based on the foregoing, the Project will not create any significant adverse impacts to air quality.

7. Impact on Plants and Animals

Please refer to the draft GEIS for a full discussion of the Project's potential significant adverse environmental impacts on plants and animals.

Based on the findings set forth in the draft GEIS, the Project will not create any significant adverse impacts to plants and animals.

8. Impact on Agricultural Resources

The Project is consistent with the Town's Comprehensive Plan and the requirements of the MC-1 Zoning District. The Town's Comprehensive Plan provides that "the MC mixed commercial zone is a district intended to provide a principal area for intensive nonresidential development such as office, retail, service businesses, manufacturing and industrial uses". The Comprehensive Plan further indicates that the zone is intended to be developed with commercial enterprises and specifically excludes residential uses and observes that recently attracted uses include small contractor yards, offices, retail, large warehousing and industrial uses. The Comprehensive Plan recommends that the Town continue to allow commercial/industrial uses on a minimum 2-acre lot size. The Project is consistent with the letter and intent of the MC-1 Zone as set forth in the Town of Wawayanda Zoning Law and Comprehensive plan, as it is a permitted use on 38.26-acre and 11.56-acre lots, far greater than the minimum lot size requirement.

Based on the foregoing, no significant adverse environmental impacts to agricultural resources are anticipated from the Project.

9. Impact on Aesthetic Resources

The Project will not be visible from any officially designated federal, state, or local scenic or aesthetic resource, nor will it impact any officially designated scenic views. The Project is located in the MC-1 zone and is consistent with the Town's Comprehensive Plan. It is consistent with existing land uses in the vicinity of the Site, with the exception of certain pre-existing nonconforming residential uses which will be screened from the Project. Building height is proposed to be less than the 65 feet allowed by the Town's Zoning Code.

The landscaping plan adheres to Chapter 195-24 of the Town Code, and in accordance with Section 195-24 A. has a goal of enhancing the appearance and natural beauty of the Town and protecting property values through the preservation and planting of vegetation, screening, and landscaping material. The plan includes a variety of native deciduous and evergreen trees and shrubs, as well as non-invasive ornamental species. To further break-up the building mass along the roadway, trees are proposed near the right-of-way line.

Based on the foregoing, the Project will not result in any significant adverse impacts to aesthetic resources.

10. Impact on Historic and Archeological Resources

Please refer to the draft GEIS for a full discussion of the Project's potential significant adverse environmental impacts on historic and archaeological resources.

Based on the findings set forth in the draft GEIS, the Project will not create any significant adverse impacts on historic and archaeological resources.

11. Impact on Open Space and Recreation

The Project will not result in any loss of recreational opportunities or any reduction of an open space resource designated in a governmental open space plan. The Site is not designated open space. The Site is largely wooded and located in a zoning district intended for commercial development such as the Project. The Site is privately owned and is not used for public recreation.

Other existing recreational facilities in the vicinity of the Site includes the Orange County Heritage Trail, a 10-foot-wide trail on the right-of-way of the former Erie Railroad which originates in the Village of Harriman and terminates in the City of Middletown. The 18-mile trail is used by both pedestrians and bicyclists and winds through natural areas, historic landmarks, and communities. The trail runs parallel to NYS Route 17 and NYS Route 17M, with a short portion of the trail abutting the east side of the Project site. No development or disturbance is proposed on or near the east side of the Project site due to the presence of state regulated wetlands. Thus, users of the Heritage Trail will not be impacted by the Project in any manner.

Based on the foregoing, the Project will not have any significant adverse impact on open space and recreational resources.

12. Impact on Critical Environmental Areas

The Site is not located within a Critical Environmental Area. As summarized in the draft GEIS, stormwater will be managed, treated and discharged in accordance with the requirements set forth in the NYSDEC SPDES and the Project's SWPPP, which is designed to conform to applicable requirements in the NYSDEC general stormwater permit and the standards provided by the New York State Stormwater Management Design Manual (dated January 2015).

Based on the foregoing, the Project will not have any significant adverse impact on Critical Environmental Areas.

13. Impact on Transportation

Please refer to the draft GEIS for a full discussion of the Project's potential significant adverse environmental impacts on traffic/transportation.

Based on the findings set forth in the draft GEIS, the Project will not create any significant adverse impacts on traffic/transportation.

14. Impact on Energy

Several energy conservation methods will be incorporated into building construction. Energy Star approved building materials will be used that help reduce the amount of heat lost during the wintertime and cool air during the summertime. Other items such as reduced flow water fixtures that limit the amount of water flowing through the tap, thereby diminishing the amount of water used throughout the day will be used. Energy efficient light bulbs will reduce the amount of energy required for building and site light while extending the "life" of the lightbulb.

Based on the foregoing, the Project will not have any significant adverse impact on Energy.

15. Impact on Noise, Odor and Light

Noise

The Project Site is located in the MC-1 Zoning District. As stated above, The Project is consistent with the District Intent set forth in Attachment 8 to the Town's Zoning Law, which provides that the MC District "is intended to provide the Town with a principal area for intensive nonresidential development such as office, retail, service businesses and manufacturing". Indeed, the Project is anticipated to be less intensive than a variety of other uses that are permitted by Site Plan approval or Special Use Permit, including contractor yards, motor vehicle sales and services, high traffic retail and service businesses, industrial uses, manufacturing uses and mining operations, including major mining operations.

The Project will generate noise during its construction phase. Once constructed, the Project will produce small to moderate amounts of noise, mostly due to Site generated traffic and building

HVAC mechanical units.

There is typically a minimal amount of time that trucks will be idling and waiting to drop off or pick up a trailer. In the event that they are waiting for a period of more than five (5) minutes, they are required to turn off their engine in accordance with the New York State Heavy Duty Vehicle Idling Law (6 NYCRR Subpart 217-3).

Based on the foregoing, the Project will not have any significant adverse impacts with regard to noise.

Light

Project Site lighting will be provided for the parking lot areas surrounding the buildings and along the driveways into the Project Site. All lighting will be dark sky compliant. The exterior site lighting proposed for the Project utilizes night sky friendly fixtures which will be down directed and has been designed with fixture locations that do not present any light trespass onto neighboring properties.

The lighting will consist of energy efficient LED light fixtures. The lights will have edges that extend below the level of the fixture to reduce the potential for source glare and light spillage. The light fixtures will be mounted on poles and on the building.

Based on the foregoing, the Project will not have any significant adverse impacts with regard to light.

Odor

Regarding odor, the Project Site is not expected to produce appreciable odors. Refuse and recycling will be contained an enclosed dumpster or compactor until pickup for disposal on a regular basis by a private carting company. In addition, the Project does not include any fixed-point source of air emissions that would cause any odor.

Based on the foregoing, the Project will not have any significant adverse impacts with regard to odor.

16. Impact on Human Health

No significant impacts to human health are anticipated from the Project because all construction and operational activities will be undertaken in accordance with and in compliance with all pertinent environmental and land development regulations and related permit and approval procedures and requirements. As indicated above, water service to the facilities will be provided from an existing water main line, owned and operated by the Town of Wawayanda Water Department and sanitary sewer service will be provided from an existing sewer main on, owned and operated by the Town of Wawayanda Sewer Department. As further indicated above, spill prevention and cleanup protocols are proposed to be in place.

Based on the foregoing, the Project will not have any significant adverse impacts on human health.

17. Consistency with Community Plans

The Project is consistent with the Town of Wawayanda's Comprehensive Plan and complies with Wawayanda's Zoning Law that was enacted in furtherance of the Comprehensive Plan's goals.

Specifically, the Project is consistent with the requirements of the MC-1 Zoning District. The Town's Comprehensive Plan provides that "the MC mixed commercial zone is a district intended to provide a principal area for intensive nonresidential development such as office, retail, service businesses, manufacturing and industrial uses". The Comprehensive Plan further indicates that the zone is intended to be developed with commercial enterprises and specifically excludes residential uses and observes that recently attracted uses include small contractor yards, offices, retail, large warehousing and industrial uses. The Comprehensive Plan recommends that the Town continue to allow commercial/industrial uses on a minimum 2-acre lot size. The Project is consistent with the letter and intent of the MC-1 Zone as set forth in the Town of Wawayanda Zoning Law and Comprehensive plan, as it is a permitted use on 38.26-acre and 11.56-acre lots, far greater than the minimum lot size requirement.

The Project will increase tax revenues to the Town and other taxing jurisdictions including the local school district (without generating any school age children).

For the foregoing reasons, the Project will not have a significant adverse impact on the Town of Wawayanda's community plans.

18. Consistency with Community Character

The Project is a permitted use in accordance with the Town of Wawayanda Zoning Code and located in the MC-1 zoning district. The Project is consistent with existing land uses in the vicinity of the Site, with the exception of certain pre-existing nonconforming residential uses which will be screened from the Project.

The Project is consistent with the District Intent set forth in Attachment 8 to the Town's Zoning Law, which provides that the MC District "is intended to provide the Town with a principal area for intensive nonresidential development such as office, retail, service businesses and manufacturing". Indeed, the Project is anticipated to be less intensive than a variety of other uses that are permitted by Site Plan approval or Special Use Permit, including contractor yards, motor vehicle sales and services, high traffic retail and service businesses, industrial uses, manufacturing uses and mining operations, including major mining operations.

In addition to the above, the Project is consistent with the surrounding community character based on the Project's design incorporating measures to limit noise and to protect adjoining properties, among other such mitigation measures discussed above and in the various reports.

Accordingly, the Project will not have a significant adverse impact on the community character of the Town of Wawayanda.