DRAINAGE REPORT

For

JOHNSON DEVELOPMENT ASSOCIATES, INC.

PROPOSED

"Industrial Development"

53 Spring Street
Southington, Connecticut
Hartford County

Prepared by:

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I. EXECUTIVE SUMMARY

This report examines the changes in drainage that can be expected as the result of the proposed development at 53 Spring Street and provides calculations documenting the design of the proposed stormwater management system illustrated within the accompanying Proposed Site Plan Documents prepared by Bohler.

The stormwater management system for this site has been designed utilizing Best Management Practices (BMPs) to meet or exceed the stormwater management standards in accordance with Connecticut Department of Energy & Environmental Protection (CT DEEP) 2004 Connecticut Stormwater Quality Manual and the Southington Zoning Regulations. The proposed project will provide; pollutant reduction by providing via treatment of the water quality volume and water quality flows through primary and secondary treatment practices, conveyance protection, and peak runoff attenuation through use of stormwater ponds. The project will also provide erosion and sedimentation controls in accordance with 2002 Connecticut Guidelines for Soil Erosion and Sediment Control during the demolition and construction periods, as well as long term stabilization of the site.

A summary of the pre- and pos-development conditions peak runoff rates for the 2-, 10-, 25-, and 100-year storms can be found in **Table 1.1** below.

Table 1.1: Design Point Peak Runoff Rate Summary

Peak Flow Discharge in cubic feet per second (cfs)												
	2-year			10-year			25-year			100-year		
	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta
DP1	8.95	8.74	-0.21	27.55	26.48	-1.07	41.07	35.56	-5.51	63.39	46.20	-17.19
DP2	1.22	0.83	-0.39	5.22	2.67	-2.55	8.37	6.48	-1.89	13.72	10.53	-3.19
DP3	2.54	2.16	-0.38	10.45	10.21	-0.24	16.69	15.57	-1.12	27.37	26.64	-0.73

II. EXISTING SITE CONDITIONS

Existing Site Description

The site consists of approximately 59.5 acres of vacant land historically used as a dairy farm and cattle grazing. The site is located on the west side of Smoron Road, South of Spring Street, and north of I-84 in a commercial and residential area of Southington. The site is partially developed

with a vacant residential building, barn, and storage shed all located in the eastern portion of the property. The remainder of the site consists of overgrown fields to the south and west of the buildings with wooded areas at the western and northern edges of the subject property. The residential building is serviced by a private well, private septic system, and overhead electric. The residential building utilizes a traditional fireplace as a source of heat. Most of the site is considered FEMA flood hazard Zone X with some flood hazard Zone AE and Zone X with 0.2% annual chance (500-year) areas in the northwest portion of the site and outside the proposed development area.

On-Site Soil Information

The site includes soils classified by the Natural Resource Conservation Service (NRCS) as Hydrologic Soil Group (HSG) "B", "C" and "D". Wetlands were delineated by Soil Resource Consultants and field verified by SLR Consulting in March 2023. A geotechnical investigation was completed by Whitestone in June 2022. Refer to **Appendix B** for additional information.

Existing Collection and Conveyance

There is no existing drainage infrastructure on site.

Existing Watersheds and Design Point Information

The site is located within two Local drainage basins numbered 5200-00 and 5200-04, of which both drain to the Quinnipiac River (Q River). Most of the site is in 5200-04 which drains Northerly and westerly from a ridgeline along I-84 toward the wetlands and under Spring street to the Q River. The remainder of the site drains Northerly and Easterly from the same ridgeline to a roadside swale of Smoron Drive that has a series of culverts draining to the Q River. The site was analyzed at three (3) design points to analyze pre-development condition flow rates. DP-1 representing the area in Local Basin 5200-00 to Smoron Drive and the Q River; DP-2 representing the area in Local basin 5200-04 draining to the existing farm ponds; DP-3 representing the remainder of area in Local basin 5200-04 to the wetlands to Spring Street and the Q River. Pre-development land use coverages within the analysis area include areas of pavement, rooftop, meadow, and woods (good).

Refer to **Table 1.1,** for the calculated pre-development conditions peak rates of runoff. For additional hydrologic information and graphical representation of the existing drainage areas, refer to **Appendix C** and the Drainage Area Maps in the appendices of this report.

III. PROPOSED SITE CONDITIONS

Proposed Development Description

The proposed project consists of the construction of a new industrial use building and includes associated paved parking areas, landscaping, utilities, and stormwater management features. The site will be served by public sewer and water. The project will also provide erosion and sedimentation controls during the demolition and construction periods, as well as long term stabilization of the site. In addition, a Stormwater Operation and Maintenance (O&M) Plan, attached in **Appendix F**, has been developed which includes scheduled maintenance and periodic inspections of stormwater management structures.

Proposed Development Collection and Conveyance

The site has been designed mainly with a conventional drainage system and a dry bioswale along the access drive. Catch basins will capture and convey stormwater runoff, via an underground pipe system, to stormwater ponds. All roof runoff will be directed to stormwater ponds as well. Pretreatment of stormwater runoff will be provided by sediment forebays before entering the ponds and a proprietary treatment device near the entrance drive before discharging to the existing roadside swale at Smoron Drive.

Proposed Watersheds and Design Point Information

The project has been designed to maintain existing drainage watersheds to the greatest extent possible, with the same design points described in **Section II** above. The site was subdivided into six (6) separate sub watersheds for the post-development conditions. Post-development land use coverages within the analysis area include areas of pavement, rooftop, meadow, woods (good), and open space (good).

Refer to **Table 1.1** for the calculated post-development conditions peak rates of runoff. For additional hydrologic information and graphical representation of the proposed drainage areas, refer to **Appendix D** and the Drainage Area Maps in the appendices of this report.

IV. STORMWATER MANAGEMENT STANDARDS

In accordance with the 2004 Connecticut Stormwater Quality Manual and the Southington Zoning Regulations, the following stormwater management standards are provided.

Pollutant Reduction

The pollutant reduction criterion is designed to improve the water quality of stormwater discharges by treating a prescribed water quality volume (WQV) or associated peak flow, referred to as the water quality flow (WQF). The water quality volume (WQV) is the amount of stormwater runoff from any given storm that should be captured and treated in order to remove most stormwater pollutants on an average annual basis. The recommended WQV, which results in the capture and treatment of the entire runoff volume for 90 percent of the average annual storm events, is equivalent to the runoff associated with the first one-inch of rainfall. 80 percent TSS removal is achieved when WQV is provided in a primary stormwater treatment practice and/or when an alternate stormwater treatment practice demonstrates the ability to treat the WQV or WQF and meets the 80 percent TSS and float-ables criteria. Pollutant reduction is met by providing the WQV in the stormwater ponds and bioswale and meeting the WQF prior to discharging to the existing roadside swale at Smoron Drive. As calculated, the WQV required for this development is **51,392 cf,** whereas **54,198** is provided in our design. Refer to **Appendix E** of this report for calculations documenting required and provided water quality.

Groundwater Recharge Volume

The groundwater recharge criterion is intended to maintain pre-development annual groundwater recharge volumes by capturing and infiltrating stormwater runoff to the maximum extent practicable using infiltration measures. The groundwater recharge volume (GRV) is the post-development design recharge volume required to minimize the loss of annual pre-development groundwater recharge. The GRV is determined as a function of annual pre-development recharge for site-specific soils, average annual rainfall volume, and amount of impervious cover on a site. The GRV was calculated using the Hydrologic Soil Group approach. The GRV is provided to the maximum extent practicable due to poor hydraulic conductivity, groundwater elevations, fill conditions of the proposed development, and limiting disturbance to the wetland buffers. Refer to **Appendix E** of this report for calculations documenting GRV.

Runoff Capture Volume

The objective of the runoff capture criterion is to capture stormwater runoff to prevent the discharge of pollutants, including "unpolluted" fresh water, to sensitive coastal receiving waters and wetlands. The runoff capture criterion applies to new stormwater discharges located less than 500 feet from tidal wetlands, which are not fresh-tidal wetlands. The site is located more than 500 feet from tidal wetlands and therefore this criterion is NOT provided.

Stream Channel Protection

The stream channel protection criterion is intended to protect stream channels from erosion and associated sedimentation in downstream receiving waters and wetlands as a result of urbanization within a watershed. This criterion does not apply when (1) entire channel protection volume is recharged to ground water; (2) Site less than or equal to one acre of impervious; (3) site discharges to a large river (fourth order or greater), lake, estuary, or tidal water where the development area is less than 5 percent of the watershed area upstream of the development site unless known water quality problems exist in the receiving waters. This criterion does NOT apply as our development area discharges to the Quinnipiac River and is less than 5% of the watershed area upstream of the site. The 2-year, 24-hr rainfall event is still provided in the analysis and the post-development peak rate of stormwater runoff is reduced from the pre-development condition.

Conveyance Protection

Pipes have been designed to safely convey the 10-year storm using the Hydraflow Storm Sewers Extension for Autodesk Civil 3D. This program utilizes the rational method. Final discharge pipes were modeled with 'normal' starting tailwater conditions as determined by Manning's Equation. In situations where the pipe discharges into a stormwater basin, the tail water is set at the water surface elevation of that stormwater basin for the design storm event. In situations where the normal depth is less than the critical depth, Hydraflow Storm Sewers Extension changes the starting tailwater to critical depth (min. specific energy) of the line.

The input data for rainfalls, regarding storm conveyance, with statistical recurrence frequencies of 10-years are based on NOAA and provided in the appendices of this report. Refer to **Appendix E** for more information and pipe sizing calculations.

Peak Runoff Attenuation

The pre- and post-development runoff rates discharged from the site were computed using the HydroCAD Software Solutions LLC computer program. HydroCAD is a computer model that utilizes the methodologies set forth in the Technical Release No. 55 (TR-55) manual and Technical Release No. 20 (TR-20) computer model, originally developed by the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS). The computer program forecasts the rate of surface water runoff based upon several factors including land use, hydrologic soil type, contributing watershed area, time of concentration, rainfall data, storage volumes, exfiltration rates, and the hydraulic capacity of structures. The computer model predicts the amount of runoff as a function of time, with the ability to include the attenuation effect due to dams, lakes, large wetlands, floodplains, and stormwater management basins. Land use for the site under pre- and post-development conditions were determined from field survey, town topographic maps, and aerial imagery.

The input data for rainfalls with statistical recurrence frequencies of 2-, 10-, 25-, and 100- years are based on NOAA and are listed in table 4.1 below. Refer to **Appendix E** for more information.

Table 4.1: NOAA Rainfall Depths

Frequency	2-year	10-year	25-year	100-year
Rainfall* (inches)	3.43	5.45	6.71	8.65

*The rainfall depths were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 10, Precipitation Frequency Data Server (PFDS).

The proposed stormwater management as designed will provide a decrease in peak rates of runoff for the 2-, 10-, 25-, and 100-year design storm events in accordance with the 2004 Connecticut Stormwater Quality Manual and the Southington Zoning Regulations. The pre-development versus post-development stormwater discharge comparisons are contained in Table 1.1. Refer to **Appendix C and D** for the Existing and Proposed Hydrologic analysis.

Emergency Outlet Sizing

The emergency outlets of stormwater management facilities shall be designed to safely pass the peak discharge rate associated with the 100-year storm. The emergency outlets are sized to pass the 100-year peak runoff rate, in a controlled manner, without eroding outfalls or downstream

conveyances. The peak discharges from the basins are managed via outlet control structures that feed into respective HDPE drainage pipes and empty to a suitably designed outlet protection measure. Refer to **Appendix E** for more information.

V. SUMMARY

In summary, the proposed stormwater management system illustrated on the drawings prepared by Bohler, meets, or exceeds the standards set forth in the 2004 Connecticut Stormwater Quality Manual and the Southington Zoning Regulations. The proposed development provides pollutant reduction and reduces peak rates of stormwater runoff from the subject site when compared to pre-development conditions for the analyzed storm events. The pre-development versus post-development stormwater discharge comparisons are contained in Table 1.1 above. Supporting documentation and stormwater-related computations are contained in the appendices of this report.

APPENDIX F: STORMWATER OPERATION & MAINTENANCE PLAN

- *O & M PLAN*

APPENDIX A: PROJECT LOCATION MAPS

- *USGS MAP*
- *FEMA FIRMETTE*

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

BRISTOL QUADRANGLE
CONNECTICUT
7.5-MINUTE SERIES

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 18T
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery ... NAIP, July 2016 - September 2016
Roads ... U.S. Census Bureau, 2016
Names ... GNIS, 1979 - 2017
Hydrography ... National Hydrography Dataset, 2004 - 2017
Contours ... National Elevation Dataset, 2012
Boundaries ... Multiple sources; see metadata file 2016 - 2017
Wetlands ... FWS National Wetlands Inventory 2010

UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION
Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

QUADRANGLE LOCATION

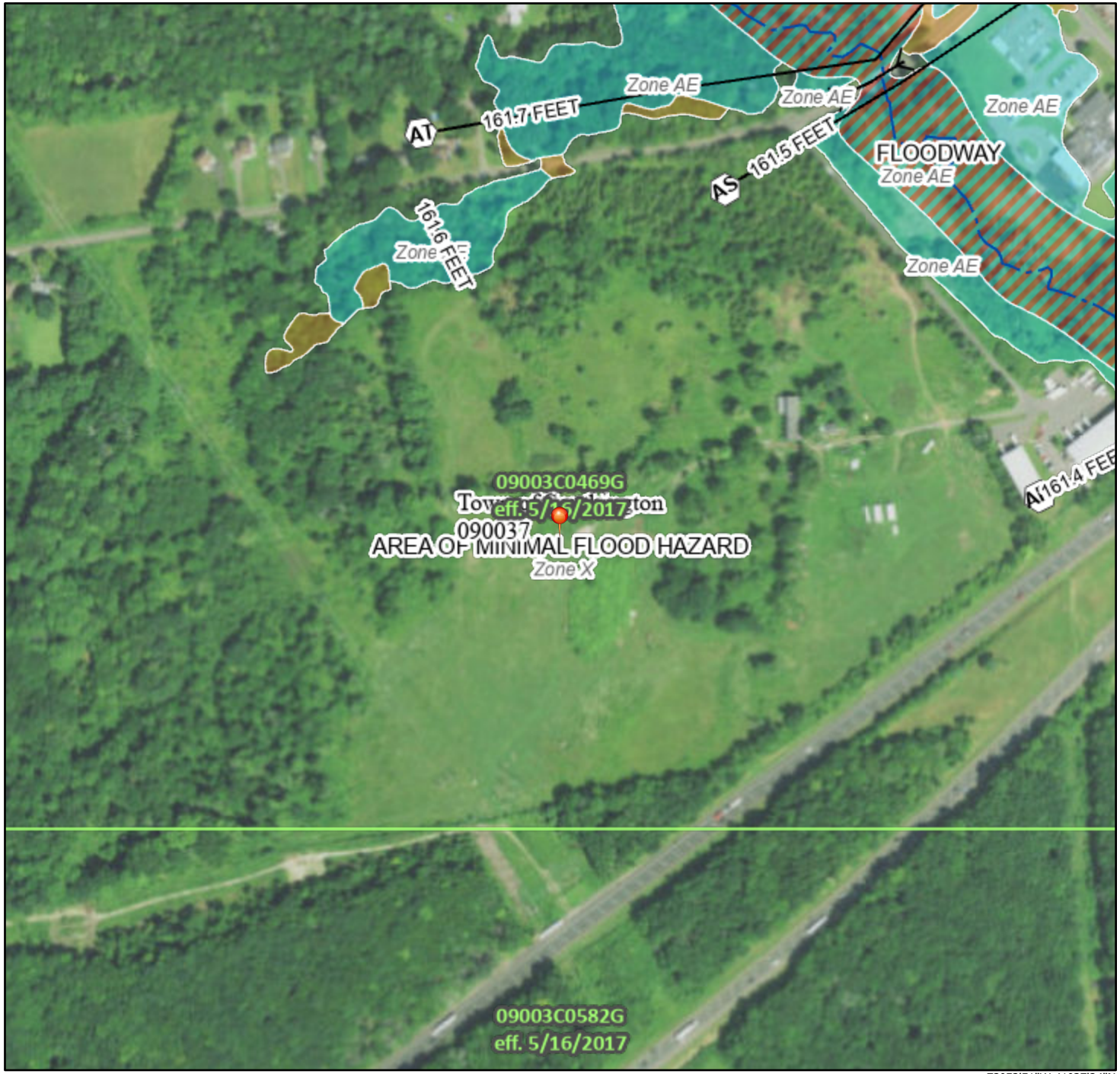
ADJOINING QUADRANGLES
1 Torrington
2 Collinsville
3 Avon
4 Thomaston
5 New Britain
6 Waterbury
7 Southington
8 Meriden

BRISTOL, CT
2021

National Flood Hazard Layer FIRMette

FEMA

72°53'29"W 41°37'51"N



72°52'51"W 41°37'24"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/24/2022 at 10:47 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX B: SOIL AND WETLAND INFORMATION

- *NCRS CUSTOM SOIL RESOURCE REPORT*
- *GEOTECHNICAL REPORT*
- *WETLAND/WATERCOURSES REPORT*

WHITESTONE
An Employee-Owned Company

16 OLD FORGE ROAD
SUITE A
ROCKY HILL, CT 06067
860.726.7889
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June 21, 2022

via email

JOHNSON DEVELOPMENT ASSOCIATES, INC.
551 West Lancaster Avenue
Suite 202
Haverford, Pennsylvania 19041

Attention: Mr. Cole Sanford
Real Estate Analyst, Industrial Division

Regarding: LIMITED GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL WAREHOUSE
53 SPRING STREET
MAP 156, LOT 6
SOUTHINGTON, HARTFORD COUNTY, CONNECTICUT
WHITESTONE PROJECT NO.: GM2219183.000

Dear Mr. Sanford:

Whitestone Associates, Inc. (Whitestone) has completed a limited geotechnical investigation at the above-referenced site. The results of the investigation and recommendations presented below are based on the soil conditions disclosed from a limited number of soil borings and test pits conducted during Whitestone's field investigation. The purpose of the investigation was to assess subsurface conditions within and adjacent to the proposed building area accessible to an all terrain vehicle mounted drill rig and tracked excavator. Recommendations for support of the proposed structure and pavement, and anticipated earthwork requirements are included herein.

1.0 PROJECT DESCRIPTION

1.1 Site Location & Existing Conditions

The subject property is located at 53 Spring Street in Southington, Hartford County, Connecticut. The site currently is developed with a residence and farm buildings. The site slopes down to the north from approximately 225 feet above North American Vertical Datum of 1988 (NAVD) to 175 feet above NAVD. Organic material and concrete and asphalt have been dumped on the site. The approximate extent of the dumping is shown on attached Figure 1 - *Test Location Plan*. Delineated wetlands are located within the proposed building footprint.

1.2 Site Geology

Based on a review of the *Surficial Materials Map of Connecticut (1992)*, the natural site soils consist of glacial till. The *Bedrock Geologic Map of Connecticut (1985)* indicates that the subject property is underlain by Upper Triassic-age (possibly Lower Jurassic at top) New Haven Arkose, consisting of arkose with minor siltstone, conglomerate, and sandstone, part of Central Lowlands; Newark Terrane - Hartford and Pomperaug Mesozoic Basins and part of Newark Supergroup (Upper Triassic and Lower Jurassic).

1.3 Proposed Construction

Based on a June 3, 2022 *Site & Grad Exhibit*, prepared by Bohler Engineering MA, LLC of West Hartford, Connecticut, the proposed development will include removal of the farm buildings and the construction of an industrial warehouse with a footprint of approximately 282,700 square feet, new pavements, and utilities. Access will be from Smoron Drive, which connects to Spring Street. The location is shown on attached Figure 1 - *Test Location Plan*.

The proposed building is anticipated to be a single-story, masonry and steel-framed structure with a ground-supported floor slab and no basement or crawl space. The finished floor elevation (FFE) will be 210 feet above NAVD with loading bays at 206 feet above NAVD. This will require up to approximately 12 feet of cut at the southern corner of the building and 14 feet of fill at the northern corner. Cuts and fill of similar magnitudes will be required for parts of the parking areas and access roads.

Three retaining walls are planned: approximately 630 feet long and up to 14 feet high at the southern corner of the site; 500 feet long and up to 12 feet high on the northeastern side; and 220 feet long and up to 10 feet high along a portion of the access road on the northern side. Stormwater management basins are planned at the northern and western corners of the site.

Detailed structural information was not available at the time of this report, however, based on experience with similar facilities, Whitestone anticipates that maximum column, wall, and floor loads will be less than about 350 kips, 4.0 kips per lineal foot, and 150 pounds per square foot, respectively.

2.0 FIELD EXPLORATION & TESTING

2.1 Field Exploration

Field exploration at the project site consisted of advancing 19 soil borings (identified as B-1 through B-19). The explorations subsequently were backfilled to the surface with excavated soils from the investigation. The locations of the explorations are shown on the accompanying *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A.

Field exploration also consisted of excavating 24 test pits (identified as TP-1 through TP-24) The test pits subsequently were backfilled to the surface with excavated soils. The locations of the test pits are shown on the accompanying *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A.

The subsurface tests were conducted in the presence of a Whitestone engineer, who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. Test locations were established in the field using phone-based GPS. These locations are presumed to be accurate to the degree implied by the method used.

Soil borings and Standard Penetration Tests (SPTs) were conducted in general accordance with ASTM International (ASTM) designation D1586. The SPT resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations. Rock was cored using a NQ2-sized diamond bit. The rock core description, recovery, RQD, and other pertinent information were recorded on the boring log and are included in Appendix A on the *Records of Subsurface Exploration*. The RQD value reflects the quality and fracture spacing of the rock and is

calculated by summing all unbroken samples that are four inches or longer divided by the total length of the run. The percentage of core recovery and RQD value provide an understanding of the physical and engineering properties of the rock.

Groundwater level observations, where encountered, were recorded during and immediately after the completion of field operations prior to backfilling the tests. Seasonal variations, temperature effects, man-made effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

2.2 Infiltration Testing

Field infiltration testing was conducted with a Guelph permeameter, which has an applicable permeability range of about 0.01 inches per hour (in/hr) to 15 in/hr. Hydraulic conductivities, k_{fs}, measured by the Guelph apparatus and tabulated below, ranged from 0.3 in/hr to 1.3 in/hr. The measured hydraulic conductivities are within the applicable range for the Guelph permeameter. No indications of seasonal high groundwater level were noted in the test pits.

SUMMARY OF INFILTRATION TESTING					
Guelph Permeameter Testing					
Location	**Ground Elevation (feet above NAVD)**	**Groundwater Depth/Elevation (fbgs/feet NAVD)**	**Test Depth/Elevation (fbgs/feet NAVD)**	**Soil Type (USCS)**	**Field Saturated Hydraulic Conductivity, k_{fs} (in/hr)**
I-1 (TP-2)	177	5.0/172	2.0/175	SM	0.7
I-2 (TP-3)	184	4.0/180	2.0/182	SM	1.3
I-3 (TP-4)	177	5.0/172	2.5/174.5	SM	0.3
I-4 (TP-8)	192	9.5/182.5	6.0/186	SM	0.3
I-5 (TP-9)	195	9.0/186	5.0/190	ML	0.3

NE: Not encountered; fbgs: feet below ground surface

Typically, a Factor of Safety (FoS) is applied to field infiltration rates to account for siltation and consolidation of the soils below systems over time. Safety factors used should consider how critical the systems are to the development, and the available storage. If the system is critical and storage is limited, a higher FoS should be applied. Infiltration rates are variable and dependent on test depth and stratification. An appropriate Factor of Safety should be selected and applied to the values above.

2.3 Laboratory Testing

Laboratory testing was conducted to determine additional, pertinent engineering characteristics of representative samples of on-site soils. Laboratory testing was conducted in general accordance with applicable ASTM standard test methods and included physical/textural testing of representative samples.

The results of the laboratory program are presented in this section in a general manner and qualitatively interpreted. The results are incorporated into the findings and recommendations discussed throughout this report. Quantitative test results are provided in Appendix B.

Physical and Textural Analysis: Five representative samples were subjected to a laboratory testing program that included moisture content determinations (ASTM D2216) and washed gradation analyses (ASTM D422) in order to conduct supplementary engineering soil classifications in general accordance with ASTM D2487. The soil strata tested were classified by the Unified Soil Classification System (USCS), provided in Appendix C. The results of the laboratory testing are summarized in the following table.

PHYSICAL/TEXTURAL ANALYSES SUMMARY					
Boring	**Sample**	**Depth (fbgs)**	**Moisture Content (%)**	**Passing No. 200 Sieve (%)**	**USCS Classification**
TP-2	S-1	3.0	10.1	28.1	SM
TP-3	S-1	3.0	13.4	24.4	SM
TP-4	S-1	4.0	11.3	32.8	SM
TP-8	S-1	3.0	27.4	94.7	ML
TP-8	S-2	6.0	9.9	25.4	SM

3.0 SUBSURFACE CONDITIONS

The subsurface soil conditions encountered within the subsurface tests conducted by Whitestone consisted of the following generalized strata in order of increasing depth. *Records of Subsurface Exploration* are provided in Appendix A.

Surface Cover Materials: The explorations, with the exception of boring B-3, encountered six inches to 16 inches of topsoil at the ground surface, underlain by six inches to 23 inches of subsoil with roots. Boring B-3 encountered six inches of gravel at the surface. Although explorations were not advanced within delineated wetlands, wetlands are expected to have some quantity of organic material.

Existing Fill (intermittent): Beneath the surface cover materials, borings B-2, B-3, and B-18 encountered existing fill, consisting of brown to black, loose to medium dense (occasionally dense), silty sand with gravel. The SPT N-values within the existing fill were variable, ranging from nine blows per foot (bpf) to 36 bpf. The existing fill extended to depths of four fbgs to seven fbgs.

In addition to the intermittent existing fill discussed above, organic material, and concrete and asphalt have been dumped within various parts of the site. Additional areas of existing fill associated with the previous farming operations should be expected between the widely spaced explorations. Buried stump pits are also common on sites of this type

Alluvial Deposit (intermittent): Beneath the surface cover materials, borings B-8, B-9, B-10, and B-13, and test pits TP-8, TP-9, TP-13, TP-17, and TP-21 encountered an alluvial deposit, consisting of brown, loose to medium dense, sandy silt (USCS: ML). The SPT N-values within the alluvial deposit were variable, ranging from six bpf to 23 bpf indicating a loose to medium dense density. The alluvial deposit extended to depths of 3.5 fbgs to seven fbgs.

Glacial Till: Beneath the surface cover materials, alluvial deposit, or existing fill, the explorations encountered glacial till, consisting of reddish-brown, medium dense to very dense, silty sand with gravel,

cobbles, boulders (USCS: SM). The SPT N-values within the glacial till were variable, ranging from 14 bpf to 98 bpf indicating a medium dense to very dense relative density. The borings B-4 through B-9 terminated in the glacial till at depths of 6.8 fbgs to 16 fbgs. Test pits TP-1, TP-2, TP-5, TP-8, TP-13, TP-15 through TP-18, TP-22, TP-23, and TP-24 terminated in the glacial till at depths of eight fbgs to 10 fbgs.

Weathered Bedrock and Bedrock: Beneath the glacial till, borings B-3, B-12, and B-13, and test pits TP-3, TP-4, TP-7, TP-9 through TP-12, TP-14, TP-19, TP-20, and TP-21 encountered up to approximately three feet of weathered bedrock. Borings B-1, B-2, B-3, B-10 through B-13, and B-16 through B-19 encountered auger refusal on more competent bedrock at depths ranging from 11 fbgs to 18 fbgs. Test pits TP-4, TP-6, TP-7, TP-12, and TP-13 encountered excavator bucket refusal on more competent bedrock at depths ranging from four fbgs to 10 fbgs. The bedrock, which was cored in borings B-14 and B-15, consists of reddish-brown to gray, slightly to highly weathered, medium grained, medium to thickly bedded, medium hard, arkose. Specific descriptions of each core run are on the boring logs. A summary of the bedrock coring is tabulated below:

BEDROCK CORING SUMMARY			
Boring	**Cored Depth (fbgs)**	**Recovery (%)**	**RQD (%)**
B-14	10 - 15	98	76
B-14	15 - 20	97	90
B-15	10 - 15	92	23
B-15	15 - 19	100	56

The RQD values ranged from 23 percent, indicating “very poor” rock quality, to 90 percent, indicating “good” rock quality. RQD values typically increase with depth.

Groundwater: Groundwater was encountered in the soil borings during the exploration at depths of five fbgs to 15 fbgs, typically around five fbgs to seven fbgs. Groundwater levels should be expected to fluctuate seasonally and following periods of precipitation.

4.0 CONCLUSIONS & RECOMMENDATIONS

Contingent upon construction phase evaluation, Whitestone’s findings indicate that the proposed building may be supported on conventional shallow foundations bearing on the inspected and approved glacial till or alluvial deposit, and/or structural fill placed on the glacial till/alluvial deposit, or to bear on crushed stone placed on the bedrock. A ground-supported floor slab may derive support from the properly inspected and approved glacial till, alluvial deposit, bedrock, or existing fill (improved by surface compaction), and/or controlled structural fill materials. Additionally, the site conditions support the use of typical pavement sections using standard Connecticut Department of Transportation (CTDOT) specified materials.

The following recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered within the limited exploration conducted. If there are any significant changes to the project characteristics or if significantly different subsurface conditions are encountered during construction, Whitestone should be consulted, such that the recommendations of this report can be reviewed.

4.1 Site Preparation & Earthwork

Surface Cover Stripping and Demolition: Prior to stripping operations, utilities should be identified and secured. Existing structures should be removed from within and at least five feet beyond the limits of the proposed building and pavement areas. Any existing structural elements, such as foundation walls, and concrete foundations, walls or slabs encountered during excavations, should be removed entirely. Topsoil, organic subsoil, vegetation, trees, shrubs, and other organic matter should also be removed from within and at least five feet beyond the limits of the proposed building footprint and other site structures, as well as any other area that will require controlled structural fill placement. Tree/shrub removal should include the removal of stumps and root material. Root structures will require removal in excess of the few inches of topsoil typically encountered at the ground surface. The demolition contractor should be required to conduct earthwork in accordance with the recommendations in this report, including backfilling any excavation, etc. with structural fill. Fill or backfill placed within the proposed building area during demolition operations should be placed as structural fill in accordance the recommendations of this report.

Excavation Difficulties: Very dense glacial till and cobbles and boulders typically encountered in glacial till, and the relatively shallow bedrock, including any weathered bedrock, will likely present excavation difficulties at marginal depths below the ground surface during proposed site excavations. Excavation difficulties will be affected by excavation size and depth. The speed and ease of excavation also will depend on the type of equipment used and the skill of the operator. Although excavation of some of the weathered bedrock close to the bedrock surface may be feasible with a large excavator, a "hoe-ram" or other mechanical device will be required to loosen up weathered and fractured rock to facilitate excavation. Blasting may be required for more competent bedrock.

Surface Preparation/Proofrolling: Prior to placing fill to raise or restore grades to the desired subgrade elevations the existing exposed soils should be compacted to a firm and unyielding surface with several passes in two perpendicular directions of a minimum 10-ton vibratory compactor. The surface should then be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify soft or loose pockets that may require removal and replacement, or further evaluation. Proofrolling should be conducted after a suitable period of dry and non-freezing weather to reduce the likelihood of degrading an otherwise stable subgrade. Should construction be started during the winter months, Whitestone should be contacted for alternate surface preparation procedures. Fill and backfill should be placed and compacted in accordance with Section 4.2.

Bedrock Foundation Subgrade Preparation: Bedrock slopes that form the subgrade for foundation support should not be steeper than 4:1 (horizontal:vertical). Bedrock steeper than 4:1 (horizontal:vertical) should be stepped. Loose bedrock should be removed from the subgrade prior to placement of crushed stone. Bedrock fractures and joints should be tight. Bedrock joints, fractures, or fissures greater than 0.5 inch in width should be filled with lean concrete. Only minus 0.375-inch crushed stone should be placed directly over the bedrock. Structural fill (sand and gravel) should not be placed directly on the bedrock surface to reduce the likelihood of migration of fines into the bedrock.

Weather Performance Criteria: The site soils are moisture sensitive. Every effort should be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be conducted during favorable weather conditions. Overexcavation of saturated soils and replacement with controlled structural fill per Section 4.2 of this report may be required prior to resuming work on disturbed subgrade soils.

Subgrade Protection and Inspection: The site soils are moisture sensitive. Every effort should therefore be made to reduce disturbance of the on-site soils by construction traffic and surface runoff.

The contractor should be responsible for protection of subgrades and minimization of exposure of the site soils to precipitation by covering stockpiles and subgrades with plastic and preventing ponding of water by sealing subgrades before precipitation events and grading the site to allow proper drainage of surface water. The services of the geotechnical engineer should be retained to observe soils conditions during construction and review the suitability of prepared foundation subgrades for support of design loads.

Groundwater Control: Groundwater was encountered during the exploration. In addition, shallower perched water may be encountered during construction above impermeable material. Construction phase dewatering will likely consist of temporarily lowering the groundwater table and removing surface water runoff, infiltrating water, or trapped water. Whitestone anticipates that such construction phase dewatering would typically include installing temporary sump pits and filtered pumps within trenches and excavations. Whitestone recommends that foundation construction occur during periods of relatively dry weather. Every effort should be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of foundation areas to precipitation.

In terms of permanent drainage, a foundation perimeter drain and slab underdrains should be provided for the portion of the proposed building footprint that is within the area of the site where finished grade is lower than existing grade. The slab underdrains should be oriented across the building (approximately northwest-southeast) with a maximum spacing of 20 feet-on-center. In addition, for the portion of the paved parking and access areas where finished grade is lower than existing grade, edge (interceptor) drains on the higher sides of the paved areas and a network of underdrains connected to the catch basins should be installed.

Proper grading and drainage should be incorporated into the site design and construction phase grading to discourage ponding of surface runoff. Every effort should be made to maintain drainage of surface run-off away from construction areas by grading. The contractor should limit exposure of excavations and prepared subgrades to rainfall. Overexcavation of wet soils and replacement with controlled structural fill per Section 4.2 of this report may be required prior to resuming work on disturbed subgrade soils.

4.2 Structural Fill & Backfill

Imported Fill Material: Only 0.375-inch minus crushed stone should be placed directly on bedrock subgrade. Elsewhere, imported material placed as structural fill or backfill to restore design grades should consist of clean, relatively well-graded sand or gravel with a maximum particle size of three inches and up to 15 percent of material finer than a #200 sieve. The material should be free of clay lumps, organics, and deleterious material. Any imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

Soil Reuse: Whitestone anticipates that only the more granular portions of the glacial till will be structurally suitable for selective reuse as fill/backfill material, provided that soil moisture contents are controlled within three percent of optimum moisture level, particles larger than three inches in diameter are either removed or crushed, and objectionable portions, such as any organics, are segregated. The glacial till has a relatively high fines content and will be difficult to place and compact, especially during cold and wet periods. Reuse of the glacial till will require moisture conditioning and/or drying to facilitate reuse, workability, and compaction in fill areas. Alternatively, the glacial till may be mixed with more granular material. Reuse of the glacial till should not be attempted during inclement weather or in damp conditions. Blast rock may be processed with on-site crushers to gradations recommended above for imported fill material. The alluvial deposit is not suitable for reuse as fill/backfill material. Reuse of the site soils will be contingent on careful review in the field by visual observation by the owner's geotechnical engineer during construction as recommended herein.

Compaction and Placement Requirements: Fill and backfill should be placed in maximum eight-inch loose lifts and compacted to 95 percent of the maximum dry density within three percent of the optimum moisture content, as determined by ASTM D1557 (Modified Proctor). Whitestone recommends using only a small hand-held vibratory compactor to compact the on-site soils within footing excavations.

4.3 Foundation Design Criteria

Foundations: Contingent upon construction phase evaluation, Whitestone preliminarily recommends supporting the proposed building on conventional shallow spread foundations designed to bear within the inspected and approved glacial till or alluvial deposit, and/or structural fill placed on the glacial till/alluvial deposit, or to bear on crushed stone placed on the bedrock, provided these materials are properly evaluated, placed, and compacted in accordance with the recommendations of this report. Foundations bearing within these materials may be designed using a maximum net allowable bearing pressure of 4,000 pounds per square foot.

Footings bearing on the glacial till should be underlain by a minimum of 12 inches of glacial till over any bedrock. Where exposed at footing subgrade level, the alluvial deposit should be overexcavated by 12 inches, geotextile separation fabric (Mirafi 140N, or similar) placed, and the underside of footing level reestablished with minus 0.75-inch crushed stone. Footings deriving support from the bedrock should be underlain by a minimum of 12 inches of minus 0.375-inch crushed stone placed over the bedrock, with the crushed stone connecting to the granular base under the interior floor slab to promote drainage. Foundations should not be supported partially on bedrock and partially on soil, because of the risk of differential settlement.

A foundation perimeter drain should be provided for the portion of the proposed building footprint that is within the area of the site where finished grade is lower than existing grade.

Foundation subgrades should be reviewed by the geotechnical engineer. Regardless of loading conditions, new foundations should be sized no less than minimum dimensions of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Footings subject to lateral loads and/or overturning should be designed so that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete. Side friction should be neglected when proportioning the footings so that lateral resistance should be provided by friction resistance at the base of the footings. An allowable coefficient of friction against sliding of 0.4 is recommended for use in the design of the foundations bearing within the existing site soils or imported structural fill soils.

Seismic Site Class: Based on a review of the subsurface conditions relevant to the *Connecticut State Building Code*, the subject site has been assigned a Site Class C. The site soils are not susceptible to earthquake induced liquefaction.

Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing soils at the footing bottoms be reviewed by a geotechnical engineer immediately prior to placing concrete for the footings. In the event that areas of unsuitable materials are encountered, additional overexcavation and replacement of the materials may be necessary to provide a suitable footing subgrade. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be eliminated if grades are restored with lean concrete.

Partial Weathered Rock/Bedrock Support: Foundations should not be supported partially on weathered rock or bedrock and partially on soil because of the risk of brittle fracture due to a hinging effect. If the proposed bearing elevations result with partial bearing on such materials, Whitestone recommends removing a minimum of six inches of the weathered rock/bedrock and restoring the bearing elevation with structural fill. Alternatively, the proposed footings may be extended deeper to bear entirely within weathered rock/bedrock.

Frost Coverage: Footings subject to frost action should be placed at least 42 inches below adjacent exterior grades, in accordance with the *Connecticut State Building Code*, to provide protection from frost penetration. Interior footings not subject to frost action may be placed at a minimum depth of 18 inches below the floor slab subgrade, but should not be placed on existing fill.

Settlement: Whitestone estimates post construction settlements of proposed foundations of less than one inch, if the recommendations outlined in this report are properly implemented. Differential settlement of spread foundations should be less than ½ inch.

4.4 Floor Slab

Following surficial compaction and proofrolling to densify any upper loose zones, Whitestone anticipates that the properly inspected and approved existing fill, glacial till, alluvial deposit, and/or compacted structural fill and/or backfill placed to raise or restore design elevations, will be suitable for support of the proposed floor slab provided these materials are properly compacted and proofrolled in accordance with the recommendations of this report during favorable weather conditions. The floor slab may also derive support from the bedrock, provided a minimum 12-inch thickness of crushed stone is placed over the bedrock subgrade.

Areas of overexcavation should be anticipated if the soil subgrades are exposed to precipitation or where deleterious materials is encountered. Areas that are, or become, softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural fill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum 12-inch layer of CTDOT *M.05.01 Processed Aggregate Base* (or approved equivalent) should be placed below the floor slab to provide a uniform granular base. However, where the floor slab derives support from the bedrock, the processed gravel should be replaced with a similar thickness of minus 0.375-inch crushed stone. Within the area of the slab where finished grade is lower than existing grade, slab underdrains should be installed below the granular base, oriented across the building (approximately northwest-southeast) with a maximum spacing of 20 feet-on-center. A moisture vapor barrier should also be installed beneath the floor slab in accordance with flooring manufacturer's recommendations.

4.5 Pavement Design

Whitestone anticipates that the properly inspected and approved glacial till, alluvial deposit, existing fill (improved by surface compaction), or bedrock, and/or compacted structural fill and/or backfill placed to raise or restore design elevations will be suitable for support of the proposed pavements, provided these materials are properly evaluated, compacted, and proofrolled in accordance with the recommendations in this report during favorable weather conditions.

A California Bearing Ratio value of 8.0 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to a prepare flexible pavement design per the AASHTO *Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20-year life. Estimated maximum pavement loads of 30,000 ESALs and 2,000,000 ESALs were used for the standard-duty and heavy-duty pavement areas, respectively. These values assume the pavements primarily will accommodate both automobile and limited heavier truck traffic, with the heavier truck traffic designated to the main drive lanes. Actual loading experienced is anticipated to be less than these values.

Pavement components should meet material specifications from CTDOT *Standard Specifications* specified below. The recommended flexible pavement sections are tabulated below:

FLEXIBLE PAVEMENT SECTION			
Layer	**Material**	**Standard-Duty Thickness (inches)**	**Heavy-Duty Thickness (inches)**
Asphalt Wearing Course	CTDOT HMA S0.375 (Superpave); PG 64S-22	1.5	1.5
Asphalt Binder Course	CTDOT HMA S0.5 (Superpave); PG 64S-22	1.5	4.0
Granular Base	CTDOT M.05.01 Processed Aggregate Base	6.0	6.0
Granular Subbase	CTDOT M.02.02 Subbase; M.02.06 Gradation A	6.0	6.0

Rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns, such as at trailer parking areas, ingress/egress locations and the trash enclosure. The recommended rigid pavement is tabulated below:

RIGID PAVEMENT SECTION		
Layer	**Material**	**Thickness (inches)**
Surface	4,000 psi Air-Entrained Concrete	6.0 [1]
Granular Base	CTDOT M.05.01 Processed Aggregate Base	6.0
Granular Subbase	CTDOT M.02.02 Subbase; M.02.06 Gradation A	6.0

[1] The outer edges of concrete pavements are susceptible to damage as trucks move from rigid pavement to adjacent flexible pavement. Therefore, the thickness at the outer two feet of the rigid concrete pavement should be 12 inches. The concrete should be reinforced with at least one layer of six-inch by six-inch W5.4/W5.4 welded wire fabric (ASTM A185).

Where finished grade is lower than existing grade, Whitestone recommends installing edge (interceptor) drains and a network of underdrains extending out from stormwater inlet structures to improve drainage within proposed pavement areas. Edge drains and underdrains typically consist of top perforated polyvinyl chloride (PVC) piping within a 12-inch by 12-inch, clean 0.75-inch crushed stone layer surrounded by a fines separation fabric. A woven fabric, such as long term, clog resistant Mirafi FW700, or approved equivalent, is recommended. Drains should be designed to pitch towards and discharge into the stormwater drainage system. The pipes should have a minimum slope of 0.5 percent.

The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local code. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, subgrade soil and supporting fill or backfill should be placed, compacted, and evaluated in accordance with the recommendations of this report. Proper drainage should be provided for the pavement structure, including appropriate grading and surface water control. In areas where finished grade is lower than existing grade, edge drains on the higher sides of the paved areas and a network of underdrains connected to the catch basins should be installed.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that CTDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. Rigid concrete pavements should be suitably air-entrained, jointed, and reinforced in general accordance with ACI 330R-08 *Guide for the Design and Construction of Concrete Parking Lots*.

4.6 Retaining Walls/Lateral Earth Pressures

Retaining walls up to approximately 14 feet in height are planned. The following parameters may be used for design of the proposed retaining walls, any below-grade walls, and other structures reliant on granular materials to provide adequate drainage. However, the parameters are not directly applicable to the design of mechanically stabilized earth (MSE) retaining walls, which require proprietary design methods for the selected earth retention system.

Retaining/below-grade walls should be capable of withstanding active and at-rest earth pressures. With an active earth pressure coefficient (K_a) of 0.33, a level backfill, and an assumed maximum backfill soil unit weight of 140 pounds per cubic foot (pcf), an equivalent fluid pressure of 46 psf per foot of wall height should be used in design of retaining/below-grade walls which are free to rotate.

Retaining/below-grade walls and wall corners that are restrained from lateral movement should be designed using at-rest earth pressures. A coefficient of at-rest earth pressure (K_o) of 0.5, for a level backfill, is recommended for retaining/below-grade walls designed to resist at-rest earth pressures, which assume no lateral movement. With an assumed maximum total unit weight of backfill of approximately 140 pcf, an equivalent fluid pressure of 70 pounds per square foot per foot of wall height should be used in design of restrained retaining/below-grade wall and wall corners. A coefficient of friction of 0.4 against sliding can be used for concrete on the existing site soils. Additional lateral earth pressures from a sloped backfill or any temporary or long-term surcharge loads also should be included in the design. Retaining wall design should include a global stability analysis.

Whitestone recommends that granular soils be used to backfill behind retaining walls. The granular backfill materials should consist of clean, relatively well graded sand or gravel.

Whitestone recommends that backfill directly behind any walls be compacted with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within a zone of influence measured at a 45-degree angle from the base of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

Positive drainage should be provided at the base of the below-grade walls. Where wall drainage is not provided, the wall should be designed to withstand full hydrostatic pressure.

Whitestone should be notified if any other retaining structures or design considerations requiring lateral earth pressure estimations are proposed. Specific recommendations for temporary retaining structures are beyond Whitestone's scope.

4.7 Excavations

The site soils encountered during this investigation typically are, at a minimum, consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA), which require a maximum unbraced excavation angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA), so that safe excavation methods and/or shoring and bracing requirements are implemented. Competent bedrock may be excavated at an angle of 1:6 (horizontal:vertical). A steeper temporary excavation angle in the bedrock may be feasible, if the exposed bedrock is reviewed by a professional engineer or geologist.

5.0 SUPPLEMENTAL POST INVESTIGATION SERVICES

Demolition and Construction Inspection and Monitoring: The owner's geotechnical engineer with specific knowledge of the site subsurface conditions and design intent should conduct inspection, testing, and consultation during demolition and construction as described in previous sections of this report. Monitoring and testing should also be conducted to confirm that the building foundations are removed and properly backfilled, any other encountered underground structures are removed and properly backfilled, the existing surface cover materials are properly removed, and suitable materials, used for controlled fill, are properly placed and compacted over suitable subgrade soils. Proofrolling of all subgrades prior to foundation, slab and pavement support should be witnessed and documented by the owner's geotechnical engineer.

6.0 CLOSING

Whitestone's Geotechnical Division appreciates the opportunity to be of service to Johnson Development Associates, Inc. Please note that Whitestone has the capability to conduct the additional geotechnical engineering services recommended herein. Please contact us with any questions regarding this report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Richard W.M. McLaren, P.E.
Senior Consultant

Ryan R. Roy, P.E.
Vice President

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Enclosures
Copy: Laurence W. Keller, P.E., Whitestone Associates, Inc.

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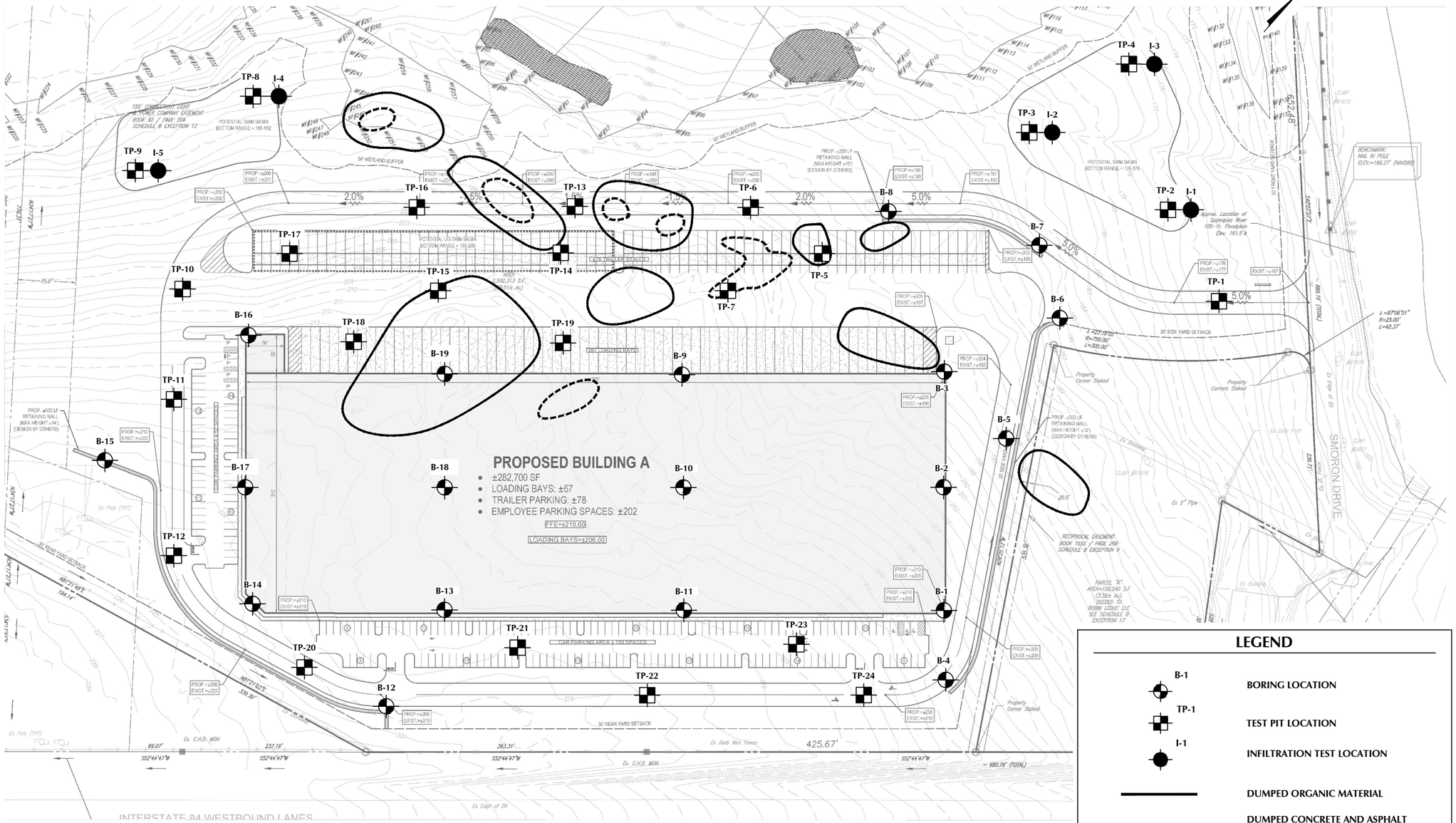
FIGURE 1
Test Location Plan



LEGEND

- B-1 — BORING LOCATION
- TP-1 — TEST PIT LOCATION
- I-1 — INFILTRATION TEST LOCATION
- DUMPED ORGANIC MATERIAL
- DUMPED CONCRETE AND ASPHALT MATERIAL
- SUBJECT PROPERTY BOUNDARY

NOTE: ALL LOCATIONS ARE APPROXIMATE.

REFERENCE

THIS PLAN IS BASED ON A 06/03/22 SITE AND GRADING EXHIBIT PREPARED BY BOHLER ENGINEERING.

WHITESTONE
An Employee-Owned Company
16 OLD FORGE ROAD, SUITE A, ROCKY HILL, CT 06067
860.726.7889 WHITESTONEASSOC.COM

DRAWING TITLE: **TEST LOCATION PLAN**

CLIENT: **JOHNSON DEVELOPMENT ASSOCIATES, INC.**

PROJECT: **PROPOSED INDUSTRIAL WAREHOUSE**
53 SPRING STREET
PARCEL ID: 156006
SOUTHINGTON, HARTFORD COUNTY, CONNECTICUT

PROJECT #: GM2219183.000	
DESIGNED BY: MR	PROJ. MGR.: RR
DATE: 6/17/22	FIGURE: 1
SCALE: 1" = 140'	

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APPENDIX A
Records of Subsurface Exploration

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RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 207.0 feet above NAVD88	**Date Started:**	6/6/2022
Termination Depth:	18.0 feet bgs	**Date Completed:**	6/6/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	HSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)			Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	8.5	198.5		
At Completion:	--	--	**At Completion:**	-- | --
24 Hours:	--	--	**24 Hours:**	-- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
0 - 2	S-1		2 - 2 - 2 - 3	16	4	0.0	TS	12" Topsoil	
							SUBSOIL	18" Subsoil, Roots	
2 - 4	S-2		6 - 10 - 8 - 8	16	18			Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0			
5 - 7	S-3		10 - 10 - 13 - 12	18	23			As Above (SM)	
7 - 9	S-4		10 - 11 - 12 - 12	18	22			As Above (SM)	
						10.0	GLACIAL TILL		
10 - 12	S-5		14 - 25 - 26 - 26	16	51			As Above, Very Dense (SM)	
						15.0			
15 - 17	S-6		41 - 50 - 48 - 52	18	98			As Above (SM)	
						20.0		Boring Log B-1 Terminated upon Auger Refusal at Depth of 18 fbgs.	
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 202.0 feet above NAVD88	**Date Started:**	6/6/2022
Termination Depth:	12.0 feet bgs	**Date Completed:**	6/6/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	HSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	6.0	196.0		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
0 - 2	S-1		1 - 2 - 2 - 3	12	4		TS	10" Topsoil	
2 - 4	S-2		4 - 7 - 16 - 11	16	23		EXISTING FILL	Brown, Very Loose to Loose, Silty Sand (FILL) Reddish-Brown to Black, Medium Dense, Silty Sand with Gravel (FILL)	
4 - 6	S-3		15 - 18 - 18 - 13	16	36	5.0		Dark Brown, Dense, Silty Sand with Gravel (FILL)	
6 - 8	S-4		15 - 20 - 19 - 18	16	39	5.5	GLACIAL TILL	Reddish-Brown, Dense, Silty Sand with Gravel (SM) As Above (SM)	
						10.0			
10 - 11.4	S-5		10 - 16 - 50/5"	8	32			As Above (SM)	
						15.0		Boring Log B-2 Terminated upon Auger Refusal at Depth of 12 fbgs.	
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 196.0 feet above NAVD88	**Date Started:**	6/6/2022
Termination Depth:	16.0 feet bgs	**Date Completed:**	6/6/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	HSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	6.0	190.0		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
							GRAVEL	6" Gravel	
0 - 2	S-1		18 - 15 - 6 - 4	3	21		EXISTING FILL	Brown to Reddish-Brown, Medium Dense, Silty Sand with Gravel (FILL)	
2 - 4	S-2		6 - 4 - 6 - 9	6	10	4.0		As Above, Loose to Medium Dense (FILL)	
						5.0			
5 - 7	S-3		10 - 60 - 23 - 12	14	83			Reddish-Brown, Very Dense, Silty Sand with Gravel (SM)	
7 - 9	S-4		10 - 14 - 16 - 13	18	30		GLACIAL TILL	As Above, Medium Dense to Dense (SM)	
						10.0			
10 - 12	S-5		8 - 9 - 13 - 11	16	22			As Above, Medium Dense (SM)	
						13.0			
							WEATHERED BEDROCK		
15 - 15.3	S-6		50/3"	2	-	15.0		Weathered Arkose Bedrock	
								Boring Log B-3 Terminated upon Auger Refusal at Depth of 16 fbgs.	
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-4

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 209.0 feet above NAVD88	**Date Started:**	6/6/2022
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/6/2022
Proposed Location:	Retaining Wall	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	--	--		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		8" Topsoil	
0 - 2	S-1		2 - 1 - 2 - 4	14	3		SUBSOIL		12" Subsoil, Roots	
2 - 4	S-2		6 - 12 - 23 - 48	16	35				Reddish-Brown, Dense, Silty Sand with Gravel (SM)	Cobbles
						5.0	GLACIAL TILL			Auger refusal @ 5 fbgs
5 - 7	S-3		13 - 18 - 17 - 20	20	35				As Above (SM)	Boring offset
7 - 9	S-4		36 - 32 - 22 - 21	16	54				As Above, Very Dense (SM)	Cobbles
									Boring Log B-4 Terminated at Depth of 9 feet below ground surface.	
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-5

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 195.0 feet above NAVD88	**Date Started:**	6/6/2022
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/6/2022
Proposed Location:	Retaining Wall	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	6.0	189.0		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
0 - 2	S-1	X	3 - 2 - 2 - 2	16	4		TS	18" Topsoil mixed with Fill	
							SUBSOIL	12" Subsoil, Roots	
2 - 4	S-2	X	4 - 8 - 11 - 14	12	19		GLACIAL TILL	Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0			
5 - 7	S-3	X	16 - 21 - 18 - 15	18	39			As Above, Dense (SM)	
7 - 9	S-4	X	18 - 16 - 15 - 16	12	31			As Above (SM)	
						10.0		Boring Log B-5 Terminated at Depth of 9 feet below ground surface.	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-6

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 186.0 feet above NAVD88	**Date Started:**	6/6/2022
Termination Depth:	8.3 feet bgs	**Date Completed:**	6/6/2022
Proposed Location:	Retaining Wall	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	1.0	185.0		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
0 - 2	S-1		1 - 2 - 2 - 3	14	4		TS	8" Topsoil	
							SUBSOIL	12" Subsoil, Roots	
2 - 4	S-2		6 - 9 - 13 - 15	18	22		GLACIAL TILL	Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0			
5 - 7	S-3		14 - 10 - 12 - 12	20	22			As Above (SM)	
7 - 8.3	S-4		12 - 20 - 50/3"	8	40			As Above, Dense (SM)	
								Boring Log B-6 Terminated at Depth of 8.3 feet below ground surface.	
						10.0			
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-7

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 186.0 feet above NAVD88	**Date Started:**	6/6/2022
Termination Depth:	6.8 feet bgs	**Date Completed:**	6/6/2022
Proposed Location:	Retaining Wall	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	1.0	185.0		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
0 - 2	S-1	X	1 - 1 - 2 - 4	18	3		TS	12" Topsoil	
							SUBSOIL	12" Subsoil, Roots	
2 - 4	S-2	X	8 - 12 - 16 - 14	18	28		GLACIAL TILL	Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0			
5 - 6.8	S-3	X	12 - 15 - 40 - 50/3"	14	55			As Above, Very Dense (SM)	Cobbles
								Boring Log B-7 Terminated at Depth of 6.8 feet below ground surface.	
						10.0			
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-8

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 193.0 feet above NAVD88	**Date Started:**	6/7/2022
Termination Depth:	7.6 feet bgs	**Date Completed:**	6/7/2022
Proposed Location:	Retaining Wall	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	2.0 | 191.0		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		8" Topsoil	
0 - 2	S-1		4 - 4 - 4 - 6	14	8		ALLUVIAL DEPOSIT		Brown, Loose, Sandy Silt (ML)	
2 - 4	S-2		2 - 2 - 4 - 10	18	6	3.5			As Above (ML)	
									Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0				
5 - 7	S-3		7 - 14 - 22 - 23	20	36		GLACIAL TILL		As Above, Dense (SM)	
7 - 7.6	S-4		43 - 50/1"	6	-				As Above (SM)	
									Boring Log B-8 Terminated at Depth of 7.6 feet below ground surface.	
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-9

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 208.0 feet above NAVD88	**Date Started:**	6/7/2022
Termination Depth:	16.0 feet bgs	**Date Completed:**	6/7/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0			
0 - 2	S-1		2 - 2 - 3 - 4	15	5		TS	12" Topsoil	
							SUBSOIL	12" Subsoil, Roots	
2 - 4	S-2		7 - 7 - 13 - 11	18	20		ALLUVIAL DEPOSIT	Brown, Medium Dense, Sandy Silt (ML)	
						5.0			
5 - 5.5	S-3		16 - 50/0"	6	-	5.5		As Above (SM)	
							GLACIAL TILL		Cobbles
8 - 10	S-4		8 - 10 - 15 - 15	22	25			Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						10.0			
10 - 12	S-5		12 - 14 - 17 - 14	16	31			As Above, Dense (SM)	
						15.0			
15 - 15.1	S-6		50/1"	1	-			As Above (SM)	Cobbles
								Boring Log B-9 Terminated at Depth of 16 feet below ground surface.	
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-10

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 209.0 feet above NAVD88	**Date Started:**	6/7/2022
Termination Depth:	14.0 feet bgs	**Date Completed:**	6/7/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	--	--		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
0 - 2	S-1	X	2 - 3 - 4 - 5	13	7		TS	9" Topsoil	
							ALLUVIAL DEPOSIT	Brown, Loose, Sandy Silt (ML)	
2 - 4	S-2	X	10 - 16 - 7 - 9	22	23			As Above, Medium Dense (ML)	
						5.0			
						5.5		As Above (ML)	
5 - 7	S-3	X	17 - 15 - 22 - 16	20	37		GLACIAL TILL	Reddish-Brown, Dense, Silty Sand with Gravel (SM)	
7 - 9	S-4	X	14 - 17 - 16 - 21	13	33			As Above (SM)	
						10.0			
10 - 10.9	S-5	X	19 - 50/5"	11	-			As Above (SM)	Cobbles
						15.0		Boring Log B-10 Terminated upon Auger Refusal at Depth of 14 fbgs.	
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-11

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 215.0 feet above NAVD88	**Date Started:**	6/7/2022
Termination Depth:	16.0 feet bgs	**Date Completed:**	6/7/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth (feet bgs) | Elevation (ft NAVD88)		Cave-In Depth (feet bgs) | Elevation (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1	X	1 - 2 - 3 - 3	12	5		TS		12" Topsoil	
							SUBSOIL		12" Subsoil, Roots	
2 - 4	S-2	X	10 - 13 - 9 - 9	14	22				Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0				
5 - 7	S-3	X	9 - 10 - 13 - 14	24	23				As Above (SM)	
7 - 9	S-4	X	13 - 15 - 15 - 17	21	30		GLACIAL TILL		As Above, Medium Dense to Dense (SM)	
						10.0				
10 - 12	S-5	X	12 - 13 - 21 - 21	23	34				As Above, Dense (SM)	
						15.0				
15 - 15.3	S-6	X	50/3"	2	-				As Above (SM)	Cobbles
									Boring Log B-11 Terminated upon Auger Refusal at Depth of 16 fbgs.	
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-12

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 220.0 feet above NAVD88	**Date Started:**	6/7/2022
Termination Depth:	16.0 feet bgs	**Date Completed:**	6/7/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		2 - 2 - 5 - 8	12	7		TS		12" Topsoil	
							SUBSOIL		18" Subsoil	
2 - 4	S-2		5 - 10 - 10 - 13	20	20				Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0				
5 - 7	S-3		16 - 20 - 19 - 31	18	39				As Above, Dense(SM)	
7 - 7.3	S-4		50/3"	3	-				As Above (SM)	Cobbles
							GLACIAL TILL			
						10.0				
10 - 11.2	S-5		21 - 24 - 50/2"	12	48				As Above (SM)	Cobbles
						14.0				
						15.0	WEATHERED BEDROCK		Weathered Arkose Bedrock	
									Boring Log B-12 Terminated upon Auger Refusal at Depth of 16 fbgs.	
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-13

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 216.0 feet above NAVD88	**Date Started:**	6/7/2022
Termination Depth:	11.0 feet bgs	**Date Completed:**	6/7/2022
Proposed Location:	Building	**Logged By:**	RK
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

	Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
During:	--	--		
At Completion:	--	--	**At Completion:**	-- / --
24 Hours:	--	--	**24 Hours:**	-- / --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
0 - 2	S-1		1 - 1 - 2 - 4	6	3		TS	12" Topsoil	
							SUBSOIL	12" Subsoil, Roots	
2 - 4	S-2		7 - 10 - 7 - 7	16	17		ALLUVIAL DEPOSIT	Brown, Medium Dense, Sandy Silt (ML)	
						5.0			
5 - 7	S-3		14 - 17 - 19 - 21	18	36		GLACIAL TILL	Reddish-Brown, Dense, Silty Sand with Gravel (SM)	
7 - 9	S-4		19 - 17 - 22 - 24	17	39			As Above (SM)	
						10.0			
10 - 10.1	S-5		50/1"	1	-		WEATHERED BEDROCK	Weathered Arkose Bedrock	
								Boring Log B-13 Terminated upon Auger Refusal at Depth of 11 fbgs.	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-14

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 222.0 feet above NAVD88	**Date Started:**	6/13/2022
Termination Depth:	20.0 feet bgs	**Date Completed:**	6/13/2022
Proposed Location:	Building	**Logged By:**	MB
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		6" Topsoil	
							SUBSOIL		6" Subsoil	
0 - 2	S-1		2 - 6 - 6 - 10	14	12				Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
2 - 4	S-2		13 - 15 - 20 - 23	16	35				As Above, Dense (SM)	
						5.0	GLACIAL TILL			
5 - 7	S-3		25 - 21 - 20 - 18	14	41				As Above (SM)	
7 - 9	S-4		19 - 31 - 46 - 35	14	77				As Above, Very Dense (SM)	
10 - 10.2	S-5		50/2"	1	-	10.0			As Above (SM)	
			2.0 mins							
			2.0 mins							
10 - 15	C-1	NQ2	2.0 mins	59" 98%	RQD 76%				Reddish-Brown, Slightly Weathered, Medium Grained, Medium to Thickly Bedded, Medium Hard, Arkose	
			2.0 mins							
			2.0 mins			15.0	BEDROCK			
			1.8 mins							
			1.5 mins							
15 - 20	C-2	NQ2	1.8 mins	58" 97%	RQD 90%				Reddish-Brown, Slightly Weathered, Medium Grained, Medium to Thickly Bedded, Medium Hard, Arkose	
			2.5 mins							
			2.5 mins			20.0				
			Time	**Rec.**	**RQD**				Boring Log B-14 Terminated at Depth of 20 feet below ground surface.	
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-15

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 222.0 feet above NAVD88	**Date Started:**	6/13/2022
Termination Depth:	19.0 feet bgs	**Date Completed:**	6/13/2022
Proposed Location:	Retaining Wall	**Logged By:**	MB
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth (feet bgs) | Elevation (ft NAVD88)		Cave-In Depth (feet bgs) | Elevation (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		6 - 4 - 6 - 4	14	10		TS		12" Topsoil	
							SUBSOIL		12" Subsoil, Roots	
2 - 4	S-2		3 - 14 - 38 - 27	12	52				Reddish-Brown, Very Dense, Silty Sand with Gravel (SM)	
						5.0				
5 - 6.8	S-3		14 - 37 - 45 - 50/4"	14	82		GLACIAL TILL		As Above (SM)	
			Time	Rec.	RQD	10.0				
10 - 15	C-1	NQ2	1.5 mins 2.3 mins 2.0 mins 1.5 mins 1.3 mins	55" 92%	RQD 23%		BEDROCK		Reddish-Brown, Medium to Highly Weathered, Medium Grained, Medium Bedded, Medium Hard, Arkose	
15 - 19	C-2	NQ2	1.8 mins 2.5 mins 1.3 mins 2.0 mins	48" 100%	RQD 56%	15.0			Reddish-Brown, Medium Weathered, Medium Grained, Medium Bedded, Medium Hard, Arkose	
						20.0			Boring Log B-15 Terminated at Depth of 19 feet below ground surface.	
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-16

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 213.0 feet above NAVD88	**Date Started:**	6/13/2022
Termination Depth:	12.0 feet bgs	**Date Completed:**	6/13/2022
Proposed Location:	Building	**Logged By:**	MB
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		2 - 2 - 3 - 3	12	5		TS		12" Topsoil	
							SUBSOIL		12" Subsoil, Roots	
2 - 4	S-2		10 - 20 - 18 - 21	12	38				Reddish-Brown, Dense, Silty Sand with Gravel (SM)	
						5.0				
5 - 7	S-3		5 - 5 - 10 - 13	20	15		GLACIAL TILL		As Above, Medium Dense (SM)	
7 - 9	S-4		24 - 17 - 16 - 31	18	33				As Above, Dense (SM)	
						10.0				
10 - 10.3	S-5		50/3"	2	-				As Above (SM)	
									Boring Log B-16 Terminated upon Auger Refusal at Depth of 12 fbgs.	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-17

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 221.0 feet above NAVD88	**Date Started:**	6/13/2022
Termination Depth:	14.0 feet bgs	**Date Completed:**	6/13/2022
Proposed Location:	Building	**Logged By:**	MB
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		1 - 2 - 2 - 3	12	4		TS		12" Topsoil	
							SUBSOIL		12" Subsoil, Roots	
2 - 4	S-2		5 - 6 - 8 - 14	12	14				Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0				
5 - 7	S-3		24 - 13 - 12 - 14	12	25				As Above (SM)	
7 - 9	S-4		20 - 32 - 23 - 17	6	55		GLACIAL TILL		As Above, Very Dense (SM)	
						10.0				
10 - 12	S-5		14 - 16 - 65 - 28	20	81				As Above (SM)	
									Boring Log B-17 Terminated upon Auger Refusal at Depth of 14 fbgs.	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-18

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 215.0 feet above NAVD88	**Date Started:**	6/13/2022
Termination Depth:	15.0 feet bgs	**Date Completed:**	6/13/2022
Proposed Location:	Building	**Logged By:**	MB
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	5.0 | 210.0		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		6" Topsoil	
0 - 2	S-1		1 - 2 - 2 - 7	12	4		SUBSOIL		18" Subsoil	
2 - 4	S-2		4 - 6 - 8 - 9	14	14		EXISTING FILL		Reddish-Brown, Medium Dense, Silty Sand with Gravel (FILL)	
						5.0				
5 - 7	S-3		5 - 3 - 6 - 8	12	9				As Above, Loose (FILL)	
						7.0				
7 - 9	S-4		6 - 8 - 10 - 11	12	18		GLACIAL TILL		Reddish-Brown, Medium Dense, Silty Sand with Gravel (SM)	
						10.0				
10 - 12	S-5		7 - 10 - 10 - 9	20	20				As Above (SM)	
						15.0				
									Boring Log B-18 Terminated upon Auger Refusal at Depth of 15 fbgs.	
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-19

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.
Surface Elevation:	± 215.0 feet above NAVD88	**Date Started:**	6/13/2022
Termination Depth:	13.0 feet bgs	**Date Completed:**	6/13/2022
Proposed Location:	Building	**Logged By:**	MB
Drill / Test Method:	SSA / SPT	**Contractor:**	MS
		Equipment:	Mobile B-53

Water Depth | Elevation (feet bgs) | (ft NAVD88)		Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	-- | --		
At Completion:	-- | --	**At Completion:**	-- | --
24 Hours:	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		6" Topsoil	
0 - 2	S-1		1 - 2 - 5 - 5	6	7		SUBSOIL		12" Subsoil	
2 - 4	S-2		15 - 23 - 18 - 14	6	41		GLACIAL TILL		Reddish-Brown, Dense, Silty Sand with Gravel (SM)	
						5.0				
5 - 7	S-3		13 - 13 - 11 - 17	12	24				As Above, Medium Dense (SM)	
7 - 9	S-4		17 - 23 - 30 - 30	16	53				As Above, Very Dense (SM)	
						10.0				
10 - 10.3	S-5		80/4"	2	-				As Above (SM)	
									Boring Log B-19 Terminated upon Auger Refusal at Depth of 13 fbgs.	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-1

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

				Water Depth (feet bgs) | Elevation (ft NAVD88)	Cave-In Depth (feet bgs) | Elevation (ft NAVD88)
Surface Elevation:	± 174.0 feet NAVD88	**Date Started:**	6/7/2022		
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022		
Location:	Access	**Logged By:**	RK	**During:** 5.0 | 169.0	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:** -- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:** -- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		16" Topsoil	
				SUBSOIL		8" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles (SM)	
			10.0			Test Pit TP-1 Terminated at Depth of 9 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-2

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 177.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)**	**Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (ft NAVD88)**
Termination Depth:	8.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	SWM Area	**Logged By:**	RK	**During:**	5.0	172.0	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	--	--	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		10" Topsoil	
				SUBSOIL		6" Subsoil, Roots	
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles (SM)	Guelph infiltration test @ 2 fbgs
3	S-1	Grab					
			5.0 ▽				
			10.0			Test Pit TP-2 Terminated at Depth of 8 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-3

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 184.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)**	**Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (ft NAVD88)**
Termination Depth:	8.5 feet bgs	**Date Completed:**	6/7/2022				
Location:	SWM Area	**Logged By:**	RK	**During:**	4.0	180.0	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	--	--	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		10" Subsoil, Roots	Guelph infiltration test @ 2 fbgs
3	S-1	Grab					
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			8.0				
				WEATHERED BEDROCK		Weathered Arkose Bedrock	
						Test Pit TP-3 Terminated at Depth of 8.5 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-4

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

					Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
Surface Elevation:	± 177.0 feet NAVD88	**Date Started:**	6/7/2022	**During:**	5.0	172.0		
Termination Depth:	7.5 feet bgs	**Date Completed:**	6/7/2022	**At Completion:**	--	--	**At Completion:**	-- / --
Location:	SWM Area	**Logged By:**	RK	**24 Hours:**	--	--		
Excavating Method:	Compact Excavator	**Contractor:**	CL					
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315					

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		10" Topsoil	
				SUBSOIL		17" Subsoil, Roots	Guelph infiltration test @ 2.5 fbgs
4	S-1	Grab		GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles (SM)	
			5.0 ▽				
			7.0	WEATHERED BEDROCK		Weathered Arkose Bedrock	
						Test Pit TP-4 Terminated upon Refusal at Depth of 7.5 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-5

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 198.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022			
Location:	Parking	**Logged By:**	RK	**During:**	5.3 | 192.7	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		10" Topsoil	
				SUBSOIL		18" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			10.0			Test Pit TP-5 Terminated at Depth of 9 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-6

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 199.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth:	4.0 feet bgs	**Date Completed:**	6/7/2022			
Location:	Roadway	**Logged By:**	RK	**During:**	-- | --	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		11" Topsoil	
				SUBSOIL		19" Subsoil, Roots	
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			5.0			Test Pit TP-6 Terminated upon Refusal at Depth of 4 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-7

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 204.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	10.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Parking	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		16" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles (SM)	
			9.5				
			10.0	Weathered Bedrock		Weathered Arkose Bedrock	
						Test Pit TP-7 Terminated upon Refusal at Depth of 10 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-8

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

				Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
Surface Elevation:	± 192.0 feet NAVD88	**Date Started:**	6/7/2022				
Termination Depth:	10.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	SWM Area	**Logged By:**	RK	**During:**	9.5 / 182.5		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- / --	**At Completion:**	-- / --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- / --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		18" Subsoil, Roots	
3	S-1	Grab		ALLUVIAL DEPOSIT		Brown, Sandy Silt (ML)	
			4.5				
			5.0				Cobble layer 4.5 to 5 fbgs
6	S-2	Grab					Guelph infiltration test @ 6 fbgs
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			10.0				
						Test Pit TP-8 Terminated at Depth of 10 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-9

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 195.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**
Termination Depth:	10.0 feet bgs	**Date Completed:**	6/7/2022			
Location:	SWM Area	**Logged By:**	RK	**During:**	9.0 | 186.0	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		10" Topsoil	
				SUBSOIL		13" Subsoil, Roots	
				ALLUVIAL DEPOSIT		Brown, Sandy Silt (ML)	Guelph infiltration test @ 5 fbgs
			5.0				
			7.0				
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			9.0				
				WEATHERED BEDROCK		Weathered Arkose Bedrock	
			10.0				
						Test Pit TP-9 Terminated at Depth of 10 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-10

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Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 207.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	8.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Roadway	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		14" Topsoil	
				SUBSOIL		18" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles (SM)	
			7.5	Weathered Bedrock		Weathered Arkose Bedrock	
			10.0			Test Pit TP-10 Terminated at Depth of 8 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-11

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 218.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**	
Termination Depth:	10.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Roadway	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		20" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles (SM)	
			9.5				
			10.0	Weathered Bedrock		Weathered Arkose Bedrock	
						Test Pit TP-11 Terminated at Depth of 10 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-12

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 224.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**	
Termination Depth:	7.5 feet bgs	**Date Completed:**	6/7/2022				
Location:	Roadway	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		10" Topsoil	
				SUBSOIL		11" Subsoil, Roots	
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	Cobble layer 2 to 3 fbgs
			5.0				
			7.0	Weathered Bedrock		Weathered Arkose Bedrock	
						Test Pit TP-12 Terminated upon Refusal at Depth of 7.5 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-13

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 201.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022			
Location:	Roadway	**Logged By:**	RK	**During:**	7.0 | 194.0	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		10" Topsoil	
				SUBSOIL		22" Subsoil, Roots	
				ALLUVIAL DEPOSIT		Brown, Sandy Silt (ML)	
			4.0				
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles (SM)	
						Test Pit TP-13 Terminated at Depth of 9 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-14

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 206.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth:	5.0 feet bgs	**Date Completed:**	6/7/2022			
Location:	Parking	**Logged By:**	RK	**During:**	-- | --	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		14" Subsoil, Roots	
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			4.0				
				WEATHERED BEDROCK		Weathered Arkose Bedrock	
			5.0				
						Test Pit TP-14 Terminated upon Refusal at Depth of 5 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-15

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 211.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022			
Location:	Parking	**Logged By:**	RK	**During:**	9.0 | 202.0	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		13" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
						Test Pit TP-15 Terminated at Depth of 9 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-16

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

				Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
Surface Elevation:	± 201.0 feet NAVD88	**Date Started:**	6/7/2022				
Termination Depth:	10.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Roadway	**Logged By:**	RK	**During:**	5.7 / 195.3		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- / --	**At Completion:**	-- / --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- / --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		18" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	Cobbles below 6 fbgs Boulders @ 7 fbgs
			10.0				
						Test Pit TP-16 Terminated at Depth of 10 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-17

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 204.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)**	**Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) / Elevation (ft NAVD88)**
Termination Depth:	10.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Parking	**Logged By:**	RK	**During:**	--	--	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	--	--	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		8" Subsoil, Roots	
				ALLUVIAL DEPOSIT		Brown, Sandy Silt (ML)	
			4.7				
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			10.0				
						Test Pit TP-17 Terminated at Depth of 10 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-18

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 215.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	10.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Loading Bays	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		9" Topsoil	
				SUBSOIL		17" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			10.0			Test Pit TP-18 Terminated at Depth of 10 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-19

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 211.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022			
Location:	Loading Bays	**Logged By:**	RK	**During:**	-- | --	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil and Compost	
				SUBSOIL		10" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	Cobbles / Boulders below 5 fbgs
			8.5	WEATHERED BEDROCK		Weathered Arkose Bedrock	
			10.0			Test Pit TP-19 Terminated at Depth of 9 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-20

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 220.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)**	**Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) / Elevation (ft NAVD88)**
Termination Depth:	7.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Roadway	**Logged By:**	RK	**During:**	6.5	213.5	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	--	--	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		14" Topsoil	
				SUBSOIL		8" Subsoil, Roots	
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			5.0				
			6.0	WEATHERED BEDROCK		Weathered Arkose Bedrock	
						Test Pit TP-20 Terminated at Depth of 7 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-21

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 218.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)**	**Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (ft NAVD88)**
Termination Depth:	7.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Parking	**Logged By:**	RK	**During:**	3.7	214.3	
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	--	--	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		11" Topsoil	
				SUBSOIL		10" Subsoil, Roots	
				ALLUVIAL DEPOSIT		Brown, Sandy Silt (ML)	
			3.5				
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			5.0				
			6.5				
				WEATHERED BEDROCK		Weathered Arkose Bedrock	
						Test Pit TP-21 Terminated at Depth of 7 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-22

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 218.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Roadway	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		9" Topsoil	
				SUBSOIL		23" Subsoil, Roots	
				GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	Cobble layer @ 3 fbgs
			5.0				
			10.0			Test Pit TP-22 Terminated at Depth of 9 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-23

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 214.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Parking	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		9" Topsoil	
				SUBSOIL		18" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel (SM)	
			10.0			Test Pit TP-23 Terminated at Depth of 9 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-24

Page 1 of 1

Project:	Proposed Industrial Warehouse	**WAI Project No.:**	GM2219183.000
Location:	53 Spring Street, Southington, Hartford County, Connecticut	**Client:**	Johnson Development Associates, Inc.

Surface Elevation:	± 214.0 feet NAVD88	**Date Started:**	6/7/2022		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**	
Termination Depth:	9.0 feet bgs	**Date Completed:**	6/7/2022				
Location:	Roadway	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	CL	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Caterpillar 315	**24 Hours:**	-- | --		

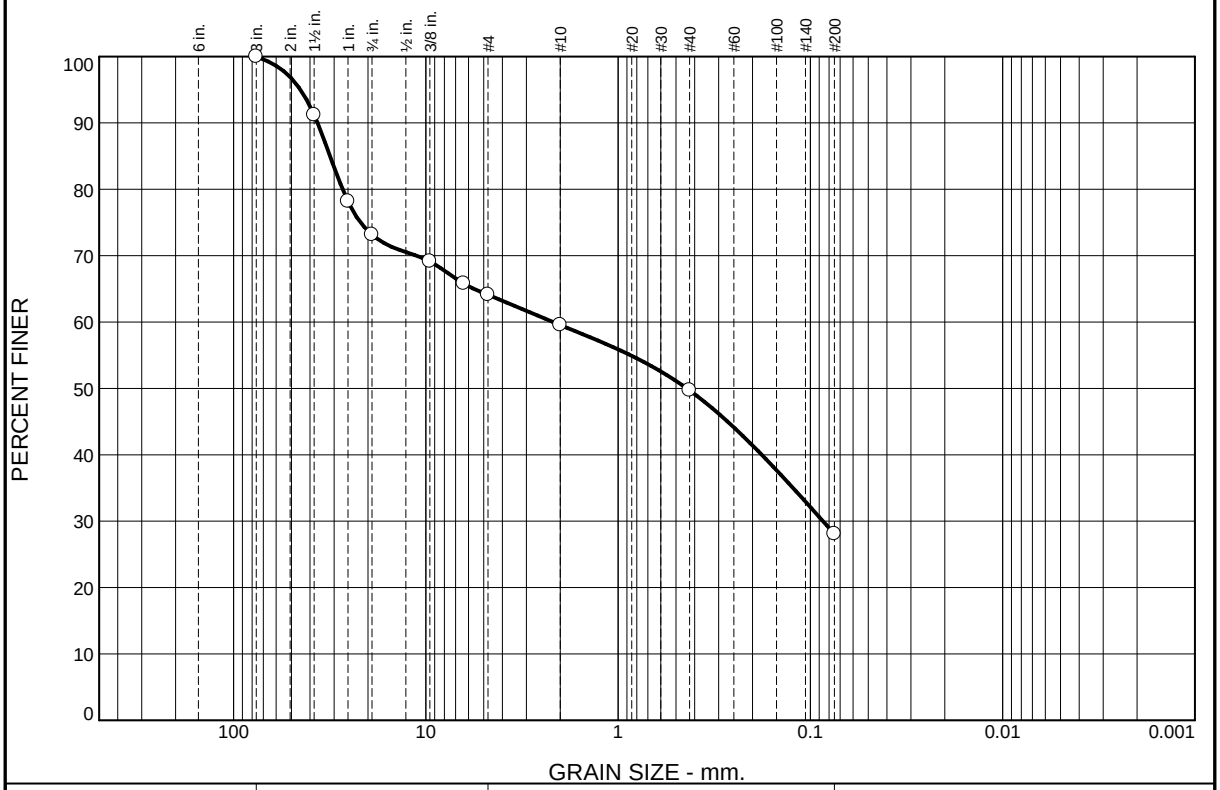
SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		12" Topsoil	
				SUBSOIL		16" Subsoil, Roots	
			5.0	GLACIAL TILL		Reddish-Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
			10.0			Test Pit TP-24 Terminated at Depth of 9 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

APPENDIX B
Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.8	9.1	4.5	9.9	21.6	28.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0	100.0	
1 1/2"	91.2		
1"	78.2		
3/4"	73.2		
3/8"	69.1		
1/4"	65.8		
#4	64.1		
#10	59.6		
#40	49.7		
#200	28.1	0.0 - 15.0	X

* Whitestone Structural Fill

Material Description

Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NP PI= NV

Coefficients

D_{90}= 36.5803 D_{85}= 31.4839 D_{60}= 2.1777
D_{50}= 0.4386 D_{30}= 0.0860 D_{15}=
D_{10}= C_u= C_c=

Classification

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

Remarks

Moisture Content = 10.1%
Gradation Unsuitable for Whitestone Structural Fill Spec

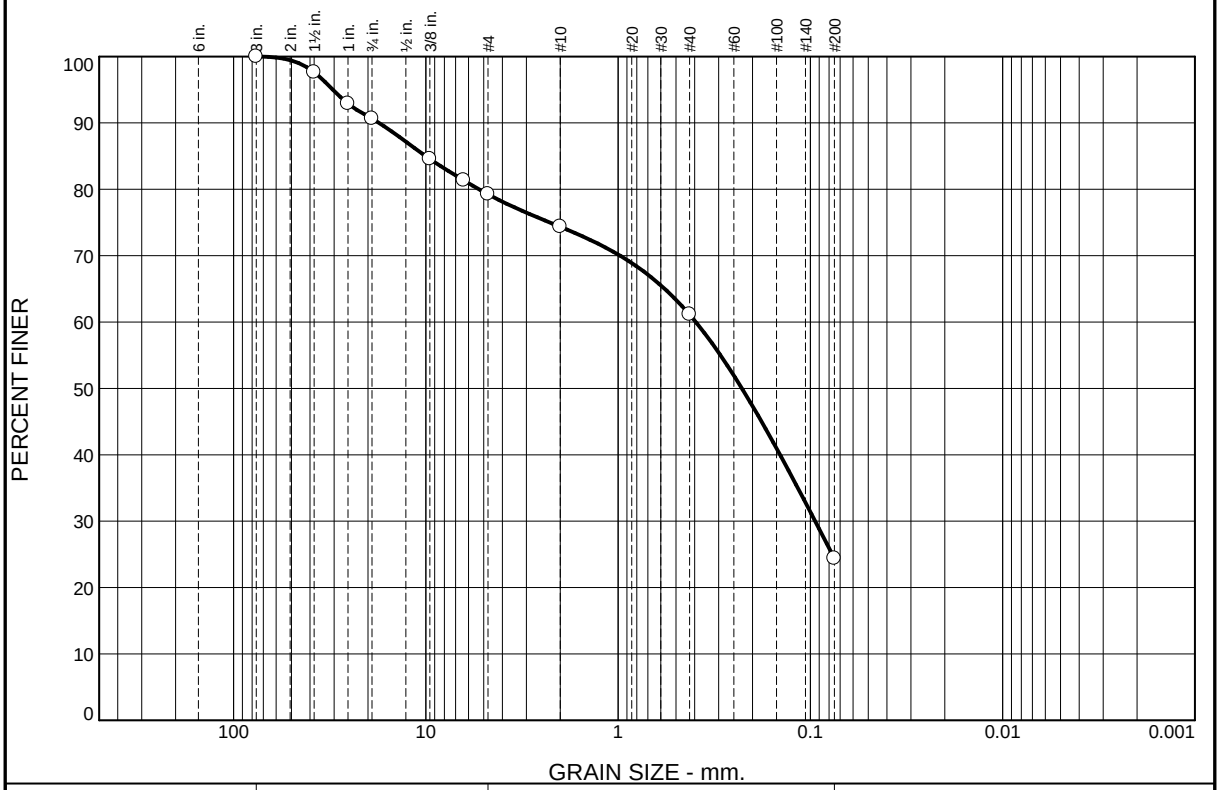
Location: Test Pit TP-2
Sample Number: S-1 **Depth:** 3' **Date:** 6/10/2022

WHITESTONE

Client: Johnson Development Associates, Inc.
Project: Proposed Industrial Warehouse
53 Spring Street, Southington, Hartford County, CT
Project No: GM2219183.000 **Figure** S-1

Tested By: JM **Checked By:** RWM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.4	11.3	4.9	13.3	36.7	24.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0	100.0	
1 1/2"	97.6		
1"	92.9		
3/4"	90.6		
3/8"	84.6		
1/4"	81.4		
#4	79.3		
#10	74.4		
#40	61.1		
#200	24.4	0.0 - 15.0	X

* Whitestone Structural Fill

Material Description

Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 17.5112 D_{85}= 10.0108 D_{60}= 0.3941
D_{50}= 0.2269 D_{30}= 0.0944 D_{15}=
D_{10}= C_u= C_c=

Classification

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

Remarks

Moisture Content = 13.4%
Gradation Unsuitable for Whitestone Structural Fill Spec

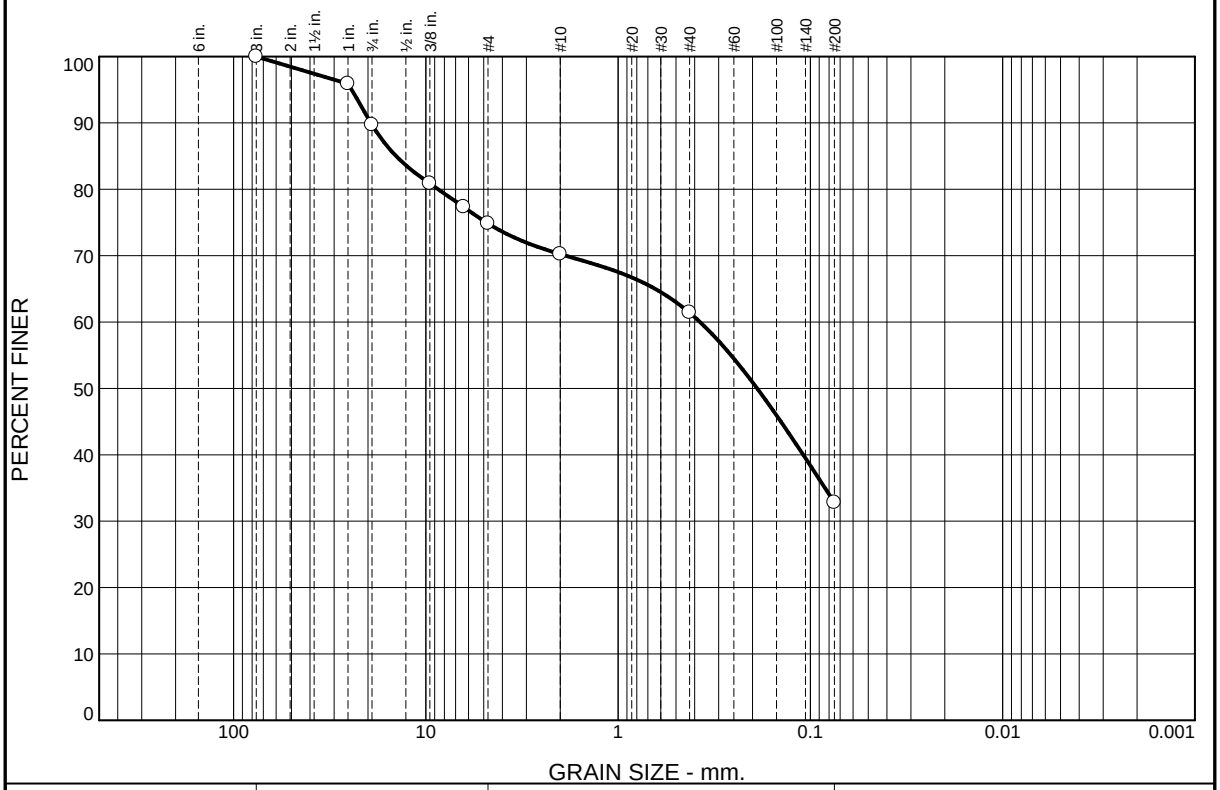
Location: Test Pit TP-3
Sample Number: S-1 **Depth:** 3' **Date:** 6/10/2022

WHITESTONE

Client: Johnson Development Associates, Inc.
Project: Proposed Industrial Warehouse
53 Spring Street, Southington, Hartford County, CT
Project No: GM2219183.000 **Figure** S-2

Tested By: JM **Checked By:** RWM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.3	14.9	4.6	8.8	28.6	32.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0	100.0	
1"	95.9		
3/4"	89.7		
3/8"	80.9		
1/4"	77.3		
#4	74.8		
#10	70.2		
#40	61.4		
#200	32.8	0.0 - 15.0	X

* Whitestone Structural Fill

Material Description

Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 19.3202 D_{85}= 14.2729 D_{60}= 0.3749
D_{50}= 0.1891 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

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

Remarks

Moisture Content = 11.3%
Gradation Unsuitable for Whitestone Structural Fill Spec

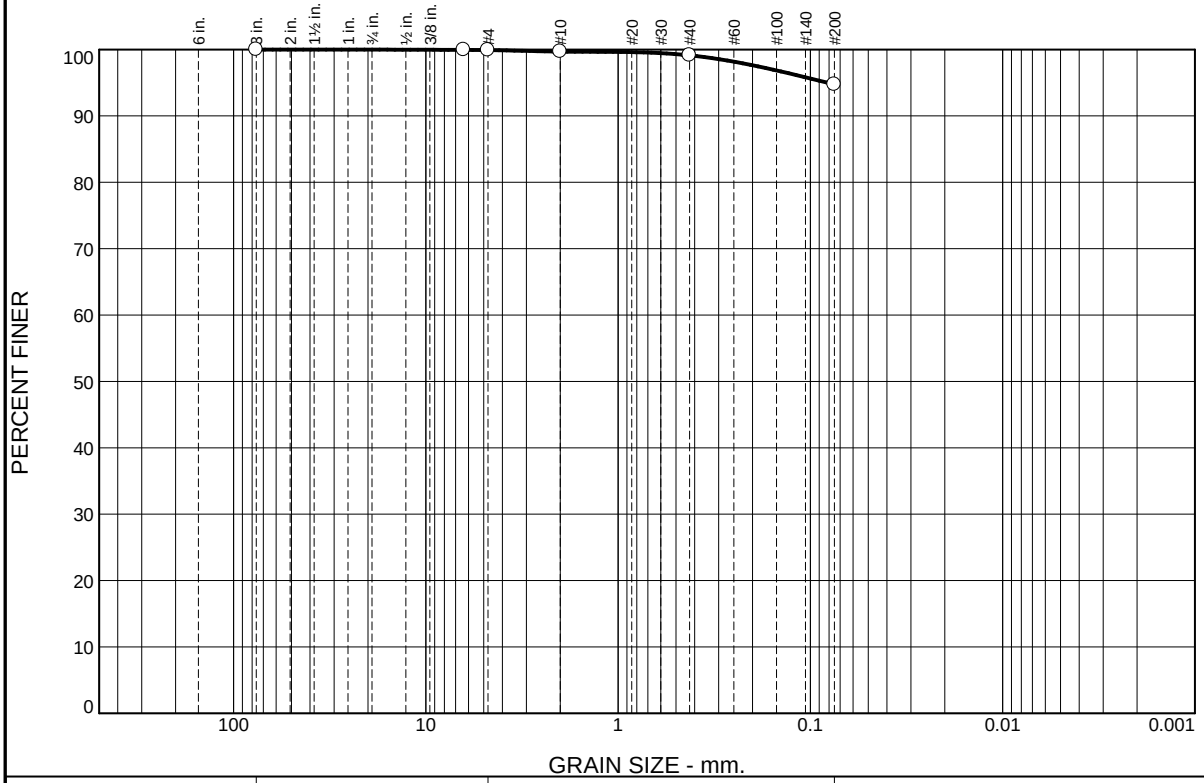
Location: Test Pit TP-4
Sample Number: S-1 **Depth:** 4' **Date:** 6/10/2022

WHITESTONE

Client: Johnson Development Associates, Inc.
Project: Proposed Industrial Warehouse
53 Spring Street, Southington, Hartford County, CT
Project No: GM2219183.000 **Figure** S-3

Tested By: JM **Checked By:** RWM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	0.6	4.4	94.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0	100.0	
1/4"	99.9		
#4	99.9		
#10	99.7		
#40	99.1		
#200	94.7	0.0 - 15.0	X

* Whitestone Structural Fill

Material Description

Silt

Atterberg Limits

PL= NP LL= NP PI= NV

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Moisture Content = 27.4%
Gradation Unsuitable for Whitestone Structural Fill Spec

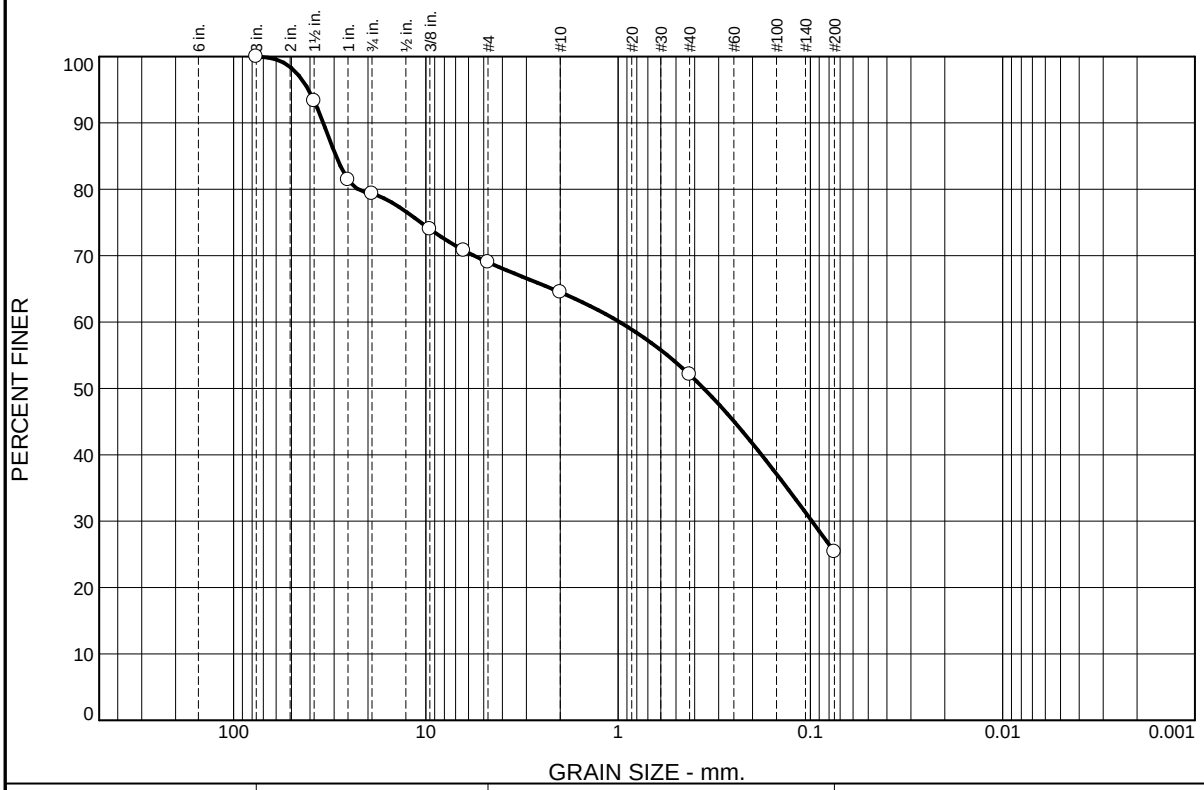
Location: Test Pit TP-8
Sample Number: S-1 **Depth:** 3' **Date:** 6/10/2022

WHITESTONE

Client: Johnson Development Associates, Inc.
Project: Proposed Industrial Warehouse
53 Spring Street, Southington, Hartford County, CT
Project No: GM2219183.000 **Figure** S-4

Tested By: JM **Checked By:** RWM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.7	10.3	4.5	12.4	26.7	25.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0	100.0	
1 1/2"	93.3		
1"	81.4		
3/4"	79.3		
3/8"	74.0		
1/4"	70.8		
#4	69.0		
#10	64.5		
#40	52.1		
#200	25.4	0.0 - 15.0	X

* Whitestone Structural Fill

Material Description

Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NP PI= NV

Coefficients

D_{90}= 34.1694 D_{85}= 29.2973 D_{60}= 0.9816
D_{50}= 0.3585 D_{30}= 0.0982 D_{15}=
D_{10}= C_u= C_c=

Classification

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

Remarks

Moisture Content = 9.9%
Gradation Unsuitable for Whitestone Structural Fill Spec

Location: Test Pit TP-8
Sample Number: S-2 **Depth:** 6' **Date:** 6/10/2022

WHITESTONE

Client: Johnson Development Associates, Inc.
Project: Proposed Industrial Warehouse
53 Spring Street, Southington, Hartford County, CT
Project No: GM2219183.000 **Figure** S-5

Tested By: JM **Checked By:** RWM

WHITESTONE

APPENDIX C
Supplemental Information (USCS, Terms & Symbols)

WHITESTONE
An Employee-Owned Company

16 Old Forge Road
Suite A
Rocky Hill, CT 06067
860.726.7889
whitestoneassoc.com

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

L:\Geotechnical Forms and References\Reports\USCSTRMSSYM CT.docx

WHITESTONE
An Employee-Owned Company

16 Old Forge Road
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Rocky Hill, CT 06067
860.726.7889
whitestoneassoc.com

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

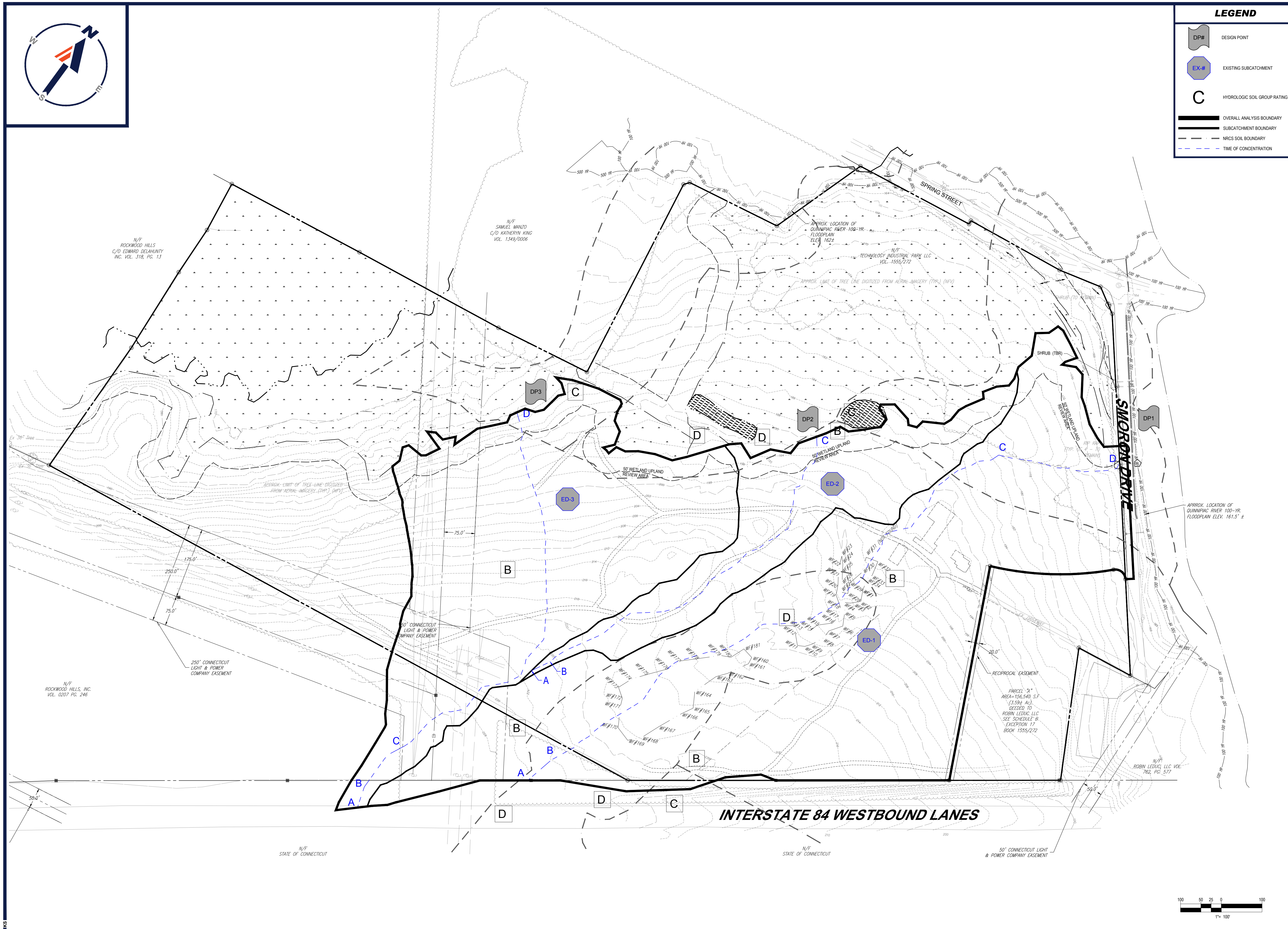
Other Office Locations:

Warren, NJ 908.668.7777 | Chalfont, PA 215.712.2700 | Southborough, MA 508.485.0755 | Wall, NJ 732.592.2101 | Philadelphia, PA 215.848.2323 | Bedford, NH 603.514.2230 | Tampa, FL 813.851.0690

Environmental & Geotechnical Engineers & Consultants

APPENDIX C: EXISTING CONDITIONS HYDROLOGIC ANALYSIS

- *EXISTING CONDITIONS DRAINAGE MAP*
- *EXISTING CONDITIONS HYDROCAD COMPUTATIONS*



LEGEND

DP#	DESIGN POINT
EX-#	EXISTING SUBCATCHMENT
C	HYDROLOGIC SOIL GROUP RATING
	OVERALL ANALYSIS BOUNDARY
	SUBCATCHMENT BOUNDARY
	NRCS SOIL BOUNDARY
	TIME OF CONCENTRATION

BOHLER//
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

811
Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

PERMIT SET

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	CTA220027.00
DRAWN BY:	VEH / KJS
CHECKED BY:	CWE
DATE:	04/17/2023
CAD I.D.:	CTA220027.00-EDAM-1A

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

JOHNSON DEVELOPMENT ASSOCIATES, INC.

PROPOSED DEVELOPMENT

MAP: 156 BLOCK: NULL LOT: 006
53 SPRING STREET,
TOWN OF SOUTHINGTON,
HARTFORD COUNTY,
CONNECTICUT

BOHLER//
65 LaSALLE ROAD, SUITE 401
WEST HARTFORD, CT 06107
Phone: (860) 333-8900
www.BohlerEngineering.com

C.W. EVANS
PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 35060
PENNSYLVANIA LICENSE No. 90701

SHEET TITLE:

EXISTING CONDITIONS DRAINAGE AREA MAP

SHEET NUMBER:

EXDAM

ORG. DATE - 04/17/2023

Cn Data				
	Cn Value			
Cover Type/Condition	HSG A	HSG B	HSG C	HSG D
Open Space (Lawns), Poor Condition	68	79	86	89
Open Space (Lawns), Fair Condition	49	69	79	84
Open Space (Lawns), Good Condition	39	61	74	80
Impervious	98	98	98	98
Impervious (Roofs)	98	98	98	98
Impervious (High Traffic Street / Highway)	98	98	98	98
Impervious (Medium Traffic Street)	98	98	98	98
Impervious (Low Traffic / Residential Street)	98	98	98	98
Impervious (Res. Driveways, Play Courts, etc.)	98	98	98	98
Impervious (High Traffic Parking Lot)	98	98	98	98
Impervious (Low Traffic Parking Lot)	98	98	98	98
Impervious (Paved; open ditches (incl. R.O.W.)	83	89	92	93
Impervious (Gravel)	76	85	89	91
Impervious (Dirt, incl. R.O.W.)	72	82	87	89
Residential (1/8 Ac or less - 65% imperv.)	77	85	90	92
Residential (1/4 Ac - 38% imperv.)	61	75	83	87
Residential (1/3 Ac - 30% imperv.)	57	72	81	86
Residential (1/2 Ac - 25% imperv.)	54	70	80	85
Residential (1 Ac - 20% imperv.)	51	68	79	84
Residential (2 Ac - 12% imperv.)	46	65	77	82
Pasture, grassland, or range, Poor Condition	68	79	86	89
Pasture, grassland, or range, Fair Condition	49	69	79	84
Pasture, grassland, or range, Good Condition	39	61	74	80
Meadow	30	58	71	78
Brush - brush-weed-grass mixture, Poor Condition)	48	67	77	83
Brush - brush-weed-grass mixture, Fair Condition)	35	56	70	77
Brush - brush-weed-grass mixture, Good Condition)	30	48	65	73
Woods - grass combo (orchard or tree farm), Poor Condition	57	73	82	86
Woods, Poor Condition	45	66	77	83
Woods, Fair Condition	36	60	73	79
Woods, Good Condition	30	55	70	77
Fallow (Bare Soil)	77	86	91	94
Fallow (Crop Residue Cover), Poor Condition	76	85	90	93
Fallow (Crop Residue Cover), Good Condition	74	83	88	90
Row Crops (Straight Row (SR)), Poor Condition	72	81	88	91
Row Crops (Straight Row (SR)), Good Condition	67	78	85	89
Row Crops (SR + CR), Poor Condition	71	80	87	90
Row Crops (SR + CR), Good Condition	64	75	82	85
Row Crops (Contoured (C)), Poor Condition	70	79	84	88
Row Crops (Contoured (C)), Good Condition	65	75	82	86
Row Crops (C + CR), Poor Condition	69	78	83	87
Row Crops (C + CR), Good Condition	64	74	81	85
Row Crops (C + T), Poor Condition	66	74	80	82
Row Crops (C + T), Good Condition	62	71	78	81

Runoff Calculations Cn Worksheet

Project: **Johnson Development**

Description: **ED-1**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Woods, Good Condition	55	0.369	20.32
	Meadow	58	9.324	540.77
	Impervious	98	0.030	2.92
	Impervious (Roofs)	98	0.170	16.71
C	Meadow	71	0.878	62.35
	Impervious	98	0.082	8.07
	Woods, Good Condition	70	1.806	126.44
D	Meadow	78	4.442	346.44
	Woods, Good Condition	77	0.381	29.33
water				
			17.483	**1153.36**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{1153.36}{17.48} = 65.97$

CN = 66

Runoff Calculations Cn Worksheet

Project: **Johnson Development**

Description: **ED-2**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Meadow	58	3.563	206.68
C	Meadow	71	0.425	30.18
	Woods, Good Condition	70	0.294	20.55
D	Meadow	78	0.081	6.34
water				
			4.364	**263.76**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{263.76}{4.36} = 60.45$

CN = 60

Runoff Calculations Cn Worksheet

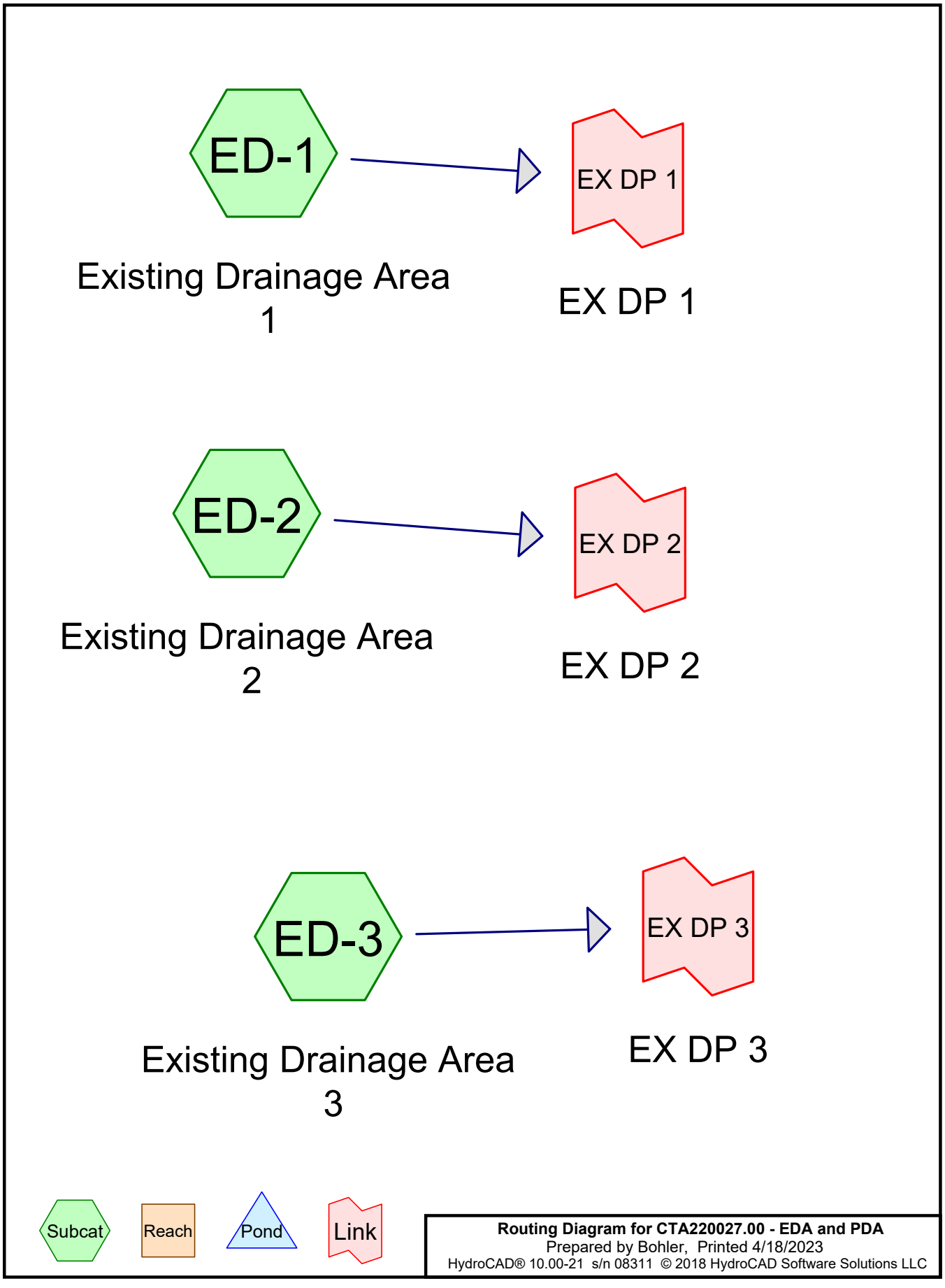
Project: **Johnson Development**

Description: **ED-3**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Woods, Good Condition	55	0.506	27.83
	Meadow	58	8.827	511.98
C	Meadow	71	0.563	39.97
D	Meadow	78	0.631	49.19
water				
			10.527	**628.97**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{628.97}{10.53} = 59.75$

CN = 60



Routing Diagram for CTA220027.00 - EDA and PDA
Prepared by Bohler, Printed 4/18/2023

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Existing Drainage Runoff Area=17.483 ac 0.00% Impervious Runoff Depth>0.76"
Flow Length=1,784' Tc=19.5 min CN=66 Runoff=8.95 cfs 1.104 af

Subcatchment ED-2: Existing Drainage Area Runoff Area=4.364 ac 0.00% Impervious Runoff Depth>0.50"
Flow Length=994' Tc=17.6 min CN=60 Runoff=1.22 cfs 0.181 af

Subcatchment ED-3: Existing Drainage Runoff Area=10.527 ac 0.00% Impervious Runoff Depth>0.50"
Flow Length=1,226' Tc=27.7 min CN=60 Runoff=2.54 cfs 0.435 af

Link EX DP 1: EX DP 1 Inflow=8.95 cfs 1.104 af
Primary=8.95 cfs 1.104 af

Link EX DP 2: EX DP 2 Inflow=1.22 cfs 0.181 af
Primary=1.22 cfs 0.181 af

Link EX DP 3: EX DP 3 Inflow=2.54 cfs 0.435 af
Primary=2.54 cfs 0.435 af

Total Runoff Area = 32.374 ac Runoff Volume = 1.721 af Average Runoff Depth = 0.64"
100.00% Pervious = 32.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-1: Existing Drainage Area 1

Runoff = 8.95 cfs @ 12.32 hrs, Volume= 1.104 af, Depth> 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (ac)	CN	Description
*	17.483	66	
	17.483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
8.6	1,441	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.6	293	0.0550	7.68	53.79	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.00' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
19.5	1,784	Total			

Summary for Subcatchment ED-2: Existing Drainage Area 2

Runoff = 1.22 cfs @ 12.34 hrs, Volume= 0.181 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (ac)	CN	Description
*	4.364	60	
	4.364		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
5.4	944	0.0330	2.92		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
17.6	994	Total			

Summary for Subcatchment ED-3: Existing Drainage Area 3

Runoff = 2.54 cfs @ 12.52 hrs, Volume= 0.435 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (ac)	CN	Description
*	10.527	60	
	10.527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
2.2	133	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
4.8	1,043	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.7	1,226	Total			

Summary for Link EX DP 1: EX DP 1

Inflow Area = 17.483 ac, 0.00% Impervious, Inflow Depth > 0.76" for 2-Yr event
Inflow = 8.95 cfs @ 12.32 hrs, Volume= 1.104 af
Primary = 8.95 cfs @ 12.32 hrs, Volume= 1.104 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link EX DP 2: EX DP 2

Inflow Area = 4.364 ac, 0.00% Impervious, Inflow Depth > 0.50" for 2-Yr event
Inflow = 1.22 cfs @ 12.34 hrs, Volume= 0.181 af
Primary = 1.22 cfs @ 12.34 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link EX DP 3: EX DP 3

Inflow Area = 10.527 ac, 0.00% Impervious, Inflow Depth > 0.50" for 2-Yr event
Inflow = 2.54 cfs @ 12.52 hrs, Volume= 0.435 af
Primary = 2.54 cfs @ 12.52 hrs, Volume= 0.435 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Existing Drainage Runoff Area=17.483 ac 0.00% Impervious Runoff Depth>2.03"
Flow Length=1,784' Tc=19.5 min CN=66 Runoff=27.55 cfs 2.959 af

Subcatchment ED-2: Existing Drainage Area Runoff Area=4.364 ac 0.00% Impervious Runoff Depth>1.56"
Flow Length=994' Tc=17.6 min CN=60 Runoff=5.22 cfs 0.569 af

Subcatchment ED-3: Existing Drainage Runoff Area=10.527 ac 0.00% Impervious Runoff Depth>1.56"
Flow Length=1,226' Tc=27.7 min CN=60 Runoff=10.45 cfs 1.368 af

Link EX DP 1: EX DP 1 Inflow=27.55 cfs 2.959 af
Primary=27.55 cfs 2.959 af

Link EX DP 2: EX DP 2 Inflow=5.22 cfs 0.569 af
Primary=5.22 cfs 0.569 af

Link EX DP 3: EX DP 3 Inflow=10.45 cfs 1.368 af
Primary=10.45 cfs 1.368 af

Total Runoff Area = 32.374 ac Runoff Volume = 4.895 af Average Runoff Depth = 1.81"
100.00% Pervious = 32.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-1: Existing Drainage Area 1

Runoff = 27.55 cfs @ 12.28 hrs, Volume= 2.959 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (ac)	CN	Description
*	17.483	66	
	17.483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
8.6	1,441	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.6	293	0.0550	7.68	53.79	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.00' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
19.5	1,784	Total			

Summary for Subcatchment ED-2: Existing Drainage Area 2

Runoff = 5.22 cfs @ 12.26 hrs, Volume= 0.569 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (ac)	CN	Description
*	4.364	60	
	4.364		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
5.4	944	0.0330	2.92		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
17.6	994	Total			

Summary for Subcatchment ED-3: Existing Drainage Area 3

Runoff = 10.45 cfs @ 12.43 hrs, Volume= 1.368 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (ac)	CN	Description
*	10.527	60	
	10.527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
2.2	133	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
4.8	1,043	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.7	1,226	Total			

Summary for Link EX DP 1: EX DP 1

Inflow Area = 17.483 ac, 0.00% Impervious, Inflow Depth > 2.03" for 10-Yr event
Inflow = 27.55 cfs @ 12.28 hrs, Volume= 2.959 af
Primary = 27.55 cfs @ 12.28 hrs, Volume= 2.959 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link EX DP 2: EX DP 2

Inflow Area = 4.364 ac, 0.00% Impervious, Inflow Depth > 1.56" for 10-Yr event
Inflow = 5.22 cfs @ 12.26 hrs, Volume= 0.569 af
Primary = 5.22 cfs @ 12.26 hrs, Volume= 0.569 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link EX DP 3: EX DP 3

Inflow Area = 10.527 ac, 0.00% Impervious, Inflow Depth > 1.56" for 10-Yr event
Inflow = 10.45 cfs @ 12.43 hrs, Volume= 1.368 af
Primary = 10.45 cfs @ 12.43 hrs, Volume= 1.368 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Existing Drainage Runoff Area=17.483 ac 0.00% Impervious Runoff Depth>2.96"
Flow Length=1,784' Tc=19.5 min CN=66 Runoff=41.07 cfs 4.320 af

Subcatchment ED-2: Existing Drainage Area Runoff Area=4.364 ac 0.00% Impervious Runoff Depth>2.39"
Flow Length=994' Tc=17.6 min CN=60 Runoff=8.37 cfs 0.869 af

Subcatchment ED-3: Existing Drainage Runoff Area=10.527 ac 0.00% Impervious Runoff Depth>2.38"
Flow Length=1,226' Tc=27.7 min CN=60 Runoff=16.69 cfs 2.091 af

Link EX DP 1: EX DP 1 Inflow=41.07 cfs 4.320 af
Primary=41.07 cfs 4.320 af

Link EX DP 2: EX DP 2 Inflow=8.37 cfs 0.869 af
Primary=8.37 cfs 0.869 af

Link EX DP 3: EX DP 3 Inflow=16.69 cfs 2.091 af
Primary=16.69 cfs 2.091 af

Total Runoff Area = 32.374 ac Runoff Volume = 7.279 af Average Runoff Depth = 2.70"
100.00% Pervious = 32.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-1: Existing Drainage Area 1

Runoff = 41.07 cfs @ 12.28 hrs, Volume= 4.320 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (ac)	CN	Description
*	17.483	66	
	17.483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
8.6	1,441	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.6	293	0.0550	7.68	53.79	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.00' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
19.5	1,784	Total			

Summary for Subcatchment ED-2: Existing Drainage Area 2

Runoff = 8.37 cfs @ 12.26 hrs, Volume= 0.869 af, Depth> 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (ac)	CN	Description
*	4.364	60	
	4.364		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
5.4	944	0.0330	2.92		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
17.6	994	Total			

Summary for Subcatchment ED-3: Existing Drainage Area 3

Runoff = 16.69 cfs @ 12.41 hrs, Volume= 2.091 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (ac)	CN	Description
*	10.527	60	
	10.527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
2.2	133	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
4.8	1,043	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.7	1,226	Total			

Summary for Link EX DP 1: EX DP 1

Inflow Area = 17.483 ac, 0.00% Impervious, Inflow Depth > 2.96" for 25-Yr event
Inflow = 41.07 cfs @ 12.28 hrs, Volume= 4.320 af
Primary = 41.07 cfs @ 12.28 hrs, Volume= 4.320 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link EX DP 2: EX DP 2

Inflow Area = 4.364 ac, 0.00% Impervious, Inflow Depth > 2.39" for 25-Yr event
Inflow = 8.37 cfs @ 12.26 hrs, Volume= 0.869 af
Primary = 8.37 cfs @ 12.26 hrs, Volume= 0.869 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link EX DP 3: EX DP 3

Inflow Area = 10.527 ac, 0.00% Impervious, Inflow Depth > 2.38" for 25-Yr event
Inflow = 16.69 cfs @ 12.41 hrs, Volume= 2.091 af
Primary = 16.69 cfs @ 12.41 hrs, Volume= 2.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Existing Drainage Runoff Area=17.483 ac 0.00% Impervious Runoff Depth>4.53"
Flow Length=1,784' Tc=19.5 min CN=66 Runoff=63.39 cfs 6.596 af

Subcatchment ED-2: Existing Drainage Area Runoff Area=4.364 ac 0.00% Impervious Runoff Depth>3.81"
Flow Length=994' Tc=17.6 min CN=60 Runoff=13.72 cfs 1.387 af

Subcatchment ED-3: Existing Drainage Runoff Area=10.527 ac 0.00% Impervious Runoff Depth>3.80"
Flow Length=1,226' Tc=27.7 min CN=60 Runoff=27.37 cfs 3.337 af

Link EX DP 1: EX DP 1 Inflow=63.39 cfs 6.596 af
Primary=63.39 cfs 6.596 af

Link EX DP 2: EX DP 2 Inflow=13.72 cfs 1.387 af
Primary=13.72 cfs 1.387 af

Link EX DP 3: EX DP 3 Inflow=27.37 cfs 3.337 af
Primary=27.37 cfs 3.337 af

Total Runoff Area = 32.374 ac Runoff Volume = 11.319 af Average Runoff Depth = 4.20"
100.00% Pervious = 32.374 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-1: Existing Drainage Area 1

Runoff = 63.39 cfs @ 12.28 hrs, Volume= 6.596 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (ac)	CN	Description
*	17.483	66	
	17.483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
8.6	1,441	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.6	293	0.0550	7.68	53.79	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.00' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
19.5	1,784	Total			

Summary for Subcatchment ED-2: Existing Drainage Area 2

Runoff = 13.72 cfs @ 12.25 hrs, Volume= 1.387 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (ac)	CN	Description
*	4.364	60	
	4.364		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
5.4	944	0.0330	2.92		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
17.6	994	Total			

Summary for Subcatchment ED-3: Existing Drainage Area 3

Runoff = 27.37 cfs @ 12.40 hrs, Volume= 3.337 af, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (ac)	CN	Description
*	10.527	60	
	10.527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
2.2	133	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
4.8	1,043	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.7	1,226	Total			

Summary for Link EX DP 1: EX DP 1

Inflow Area = 17.483 ac, 0.00% Impervious, Inflow Depth > 4.53" for 100-Yr event
Inflow = 63.39 cfs @ 12.28 hrs, Volume= 6.596 af
Primary = 63.39 cfs @ 12.28 hrs, Volume= 6.596 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link EX DP 2: EX DP 2

Inflow Area = 4.364 ac, 0.00% Impervious, Inflow Depth > 3.81" for 100-Yr event
Inflow = 13.72 cfs @ 12.25 hrs, Volume= 1.387 af
Primary = 13.72 cfs @ 12.25 hrs, Volume= 1.387 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

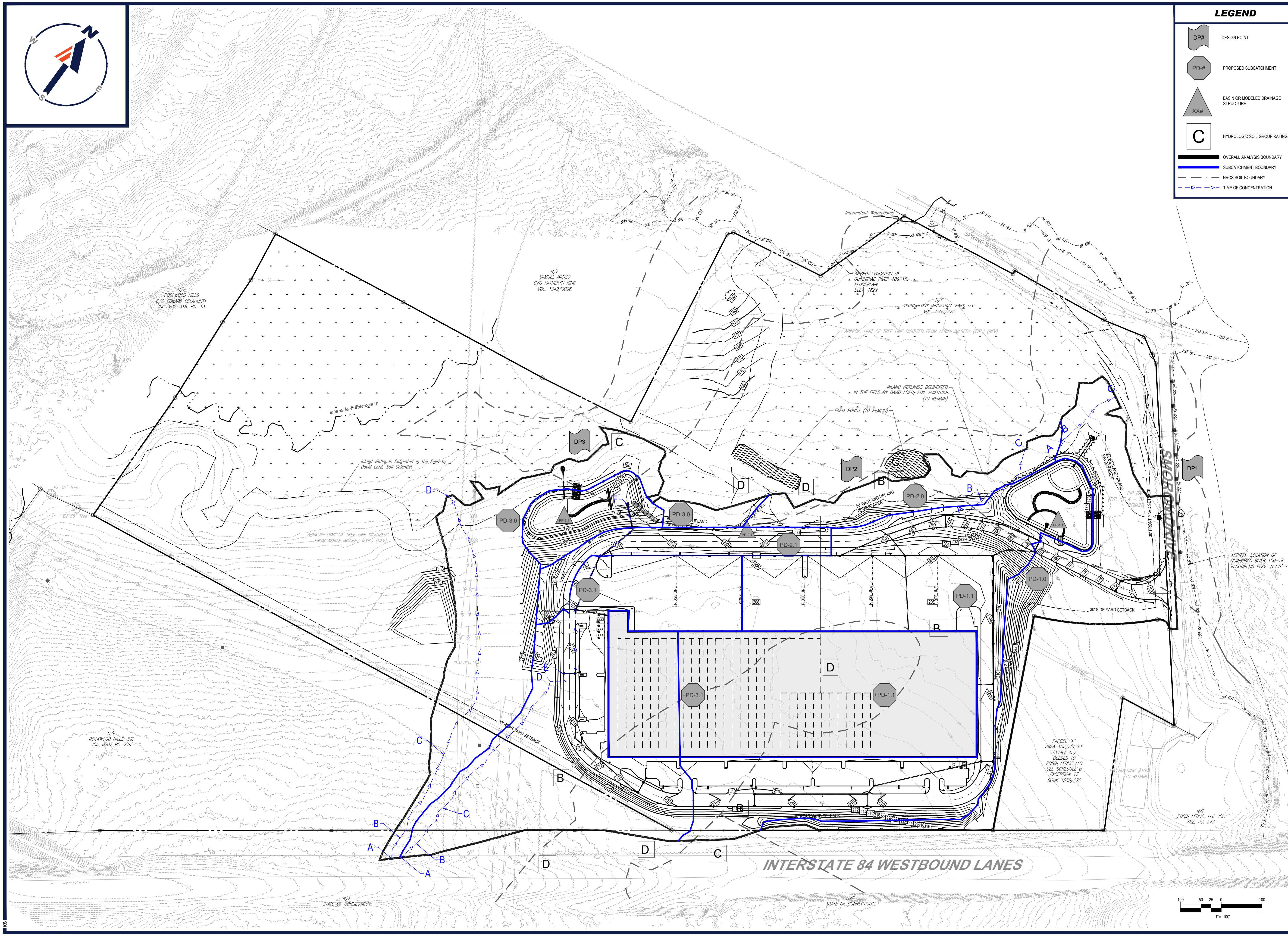
Summary for Link EX DP 3: EX DP 3

Inflow Area = 10.527 ac, 0.00% Impervious, Inflow Depth > 3.80" for 100-Yr event
Inflow = 27.37 cfs @ 12.40 hrs, Volume= 3.337 af
Primary = 27.37 cfs @ 12.40 hrs, Volume= 3.337 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

APPENDIX D: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

- *PROPOSED CONDITIONS DRAINAGE MAP*
- *PROPOSED CONDITIONS HYDROCAD CALCULATIONS*



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REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

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PROJECT No.:	CTA220027.00
DRAWN BY:	VEH / KJS
CHECKED BY:	CWE
DATE:	04/17/2023
CAD I.D.:	CTA220027.00-PDAM-1A

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

JOHNSON DEVELOPMENT ASSOCIATES, INC.

PROPOSED DEVELOPMENT

MAP: 156 BLOCK: NULL LOT: 006
53 SPRING STREET,
TOWN OF SOUTHINGTON,
HARTFORD COUNTY,
CONNECTICUT

BOHLER
65 LaSALLE ROAD, SUITE 401
WEST HARTFORD, CT 06107
Phone: (860) 333-8900
www.BohlerEngineering.com

C.W. EVANS
PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 35060
PENNSYLVANIA LICENSE No. 90701

SHEET TITLE:
PROPOSED CONDITIONS DRAINAGE AREA MAP

SHEET NUMBER:
PRDAM

ORG. DATE - 04/17/2023

Runoff Calculations Cn Worksheet

Project: **Johnson Development**

Description: **PD-1.0**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Meadow	58	1.794	104.05
	Impervious	98	0.255	24.95
	Woods, Good Condition	55	0.003	0.16
C	Meadow	71	0.414	29.41
	Impervious	98	0.159	15.56
	Woods, Good Condition	70	1.277	89.38
D				
water				
			3.901	**263.51**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{263.51}{3.90} = 67.54$

CN = 68

Runoff Calculations Cn Worksheet

Project: **Johnson Development**

Description: **PD-1.1**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Meadow	58	1.291	74.86
	Open Space (Lawns), Good Condition	61	0.502	30.63
	Impervious (Roofs)	98	2.500	244.95
	Impervious	98	4.490	439.98
C	Meadow	71	1.014	71.99
	Impervious	98	0.043	4.21
	Woods, Good Condition	70	0.016	1.13
D	Meadow	78	0.088	6.89
	Open Space (Lawns), Good Condition	80	0.078	6.21
	Impervious (Roofs)	98	2.704	265.01
	Impervious	98	0.389	38.13
	Woods, Good Condition	77	0.008	0.65
water				
			13.123	**1184.65**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{1184.65}{13.12} = 90.27$

CN = 90

Runoff Calculations Cn Worksheet

Project: **Johnson Development**

Description: **PD-2.0**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Meadow	58	0.661	38.34
C	Meadow	71	0.334	23.68
	Woods, Good Condition	70	0.229	16.04
D	Meadow	78	0.162	12.64
water				
			1.386	**90.70**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{90.70}{1.39} = 65.45$

CN = 65

Runoff Calculations Cn Worksheet

Project: **Johnson Development**

Description: **PD-2.1**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Meadow	58	0.756	43.85
	Impervious	98	0.469	45.95
C				
D	Meadow	78	0.004	0.29
water				
			1.229	**90.09**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{90.09}{1.23} = 73.33$

CN = 73

Runoff Calculations Cn Worksheet

Project: **Johnson Development**

Description: **PD-3.0**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Meadow	58	3.085	178.93
	Woods, Good Condition	55	0.373	20.54
C	Meadow	71	0.468	33.25
D	Meadow	78	0.371	28.95
water				
			4.298	**261.66**

CN (weighted) = $\frac{\text{Total (C)}}{\text{Total (B)}} = \frac{261.66}{4.30} = 60.88$

CN = 61

Runoff Calculations Cn Worksheet

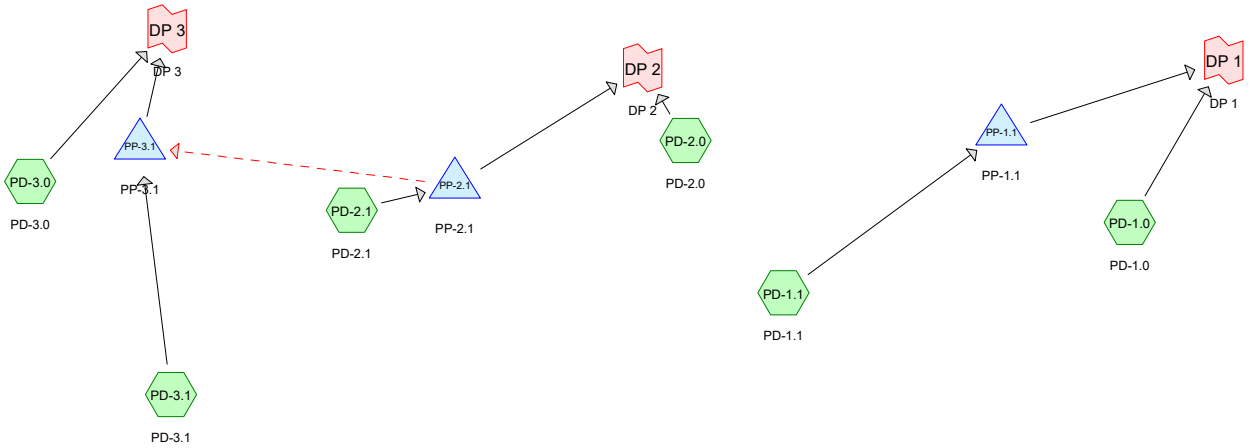
Project: **Johnson Development**

Description: **PD-3.1**

Soil Group	Land Use Description	CN (A)	% or Area (Acre) (B)	Product (A x B) (C)
A				
B	Meadow	58	2.965	171.96
	Open Space (Lawns), Good Condition	61	0.236	14.38
	Impervious (Roofs)	98	0.951	93.20
	Impervious	98	2.233	218.85
	Woods, Good Condition	55	0.227	12.50
C	Meadow	71	0.095	6.73
D	Meadow	78	0.538	41.96
	Open Space (Lawns), Good Condition	80	0.130	10.42
	Impervious (Roofs)	98	0.343	33.64
	Impervious	98	0.343	33.61
	Woods, Good Condition	77	0.375	28.91
water				
			8.437	**666.17**

$$CN\ (weighted) = \frac{Total\ (C)}{Total\ (B)} = \frac{666.17}{8.44} = 78.96$$

CN = 79



Subcat Reach Pond Link

Routing Diagram for CTA220027.00 - EDA and PDA

Prepared by {enter your company name here}, Printed 5/1/2023

Summary for Subcatchment PD-1.0: PD-1.0

Runoff = 3.12 cfs @ 12.14 hrs, Volume= 0.279 af, Depth> 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (sf)	CN	Description
*	169,938	68	
	169,938		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.7	152	0.0455	3.43		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.1	202	Total			

Summary for Subcatchment PD-1.1: PD-1.1

Runoff = 36.14 cfs @ 12.09 hrs, Volume= 2.603 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (sf)	CN	Description
*	571,628	90	
	571,628		100.00% Pervious Area

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

Summary for Subcatchment PD-2.0: PD-2.0

Runoff = 0.83 cfs @ 12.16 hrs, Volume= 0.082 af, Depth> 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (sf)	CN	Description
*	60,362	65	
	60,362		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.8	182	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
10.0	232	Total			

Summary for Subcatchment PD-2.1: PD-2.1

Runoff = 1.55 cfs @ 12.10 hrs, Volume= 0.116 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (sf)	CN	Description
*	53,519	73	
	53,519		100.00% Pervious Area

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

Summary for Subcatchment PD-3.0: PD-3.0

Runoff = 1.18 cfs @ 12.50 hrs, Volume= 0.192 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (sf)	CN	Description
*	187,213	61	
	187,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
3.8	230	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.6	676	0.0700	4.26		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.1	956	Total			

Summary for Subcatchment PD-3.1: PD-3.1

Runoff = 10.74 cfs @ 12.23 hrs, Volume= 1.059 af, Depth> 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.43"

	Area (sf)	CN	Description
*	367,507	79	
	367,507		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
1.7	106	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	410	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.1	35	0.3300	9.25		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
0.7	430	0.0400	9.83	7.72	**Pipe Channel, E-F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
16.6	1,031	Total			

Summary for Pond PP-1.1: PP-1.1

Inflow Area = 13.123 ac, 0.00% Impervious, Inflow Depth > 2.38" for 2-Yr event
Inflow = 36.14 cfs @ 12.09 hrs, Volume= 2.603 af
Outflow = 6.51 cfs @ 12.54 hrs, Volume= 2.462 af, Atten= 82%, Lag= 27.5 min
Primary = 6.51 cfs @ 12.54 hrs, Volume= 2.462 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.50' @ 12.54 hrs Surf.Area= 25,863 sf Storage= 48,012 cf

Plug-Flow detention time= 117.0 min calculated for 2.462 af (95% of inflow)
Center-of-Mass det. time= 87.5 min (891.1 - 803.6)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	175,762 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.50	22,150	0	0
176.00	23,052	11,301	11,301
178.00	26,797	49,849	61,150
180.00	30,768	57,565	118,715
181.75	34,429	57,047	175,762

Device	Routing	Invert	Outlet Devices
#1	Primary	175.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.50' / 173.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	180.50'	**20.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	178.40'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.50'	**8.0" Vert. Orifice-WQV and 2 yr control X 3.00** C= 0.600
#5	Device 1	177.70'	**2.5' long Sharp-Crested Rectangular Weir X 2.00** 2 End Contraction(s)

Primary OutFlow Max=6.51 cfs @ 12.54 hrs HW=177.50' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 6.51 cfs of 15.13 cfs potential flow)
  - **3=Riser** (Controls 0.00 cfs)
  - **4=Orifice-WQV and 2 yr control** (Orifice Controls 6.51 cfs @ 6.22 fps)
  - **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond PP-2.1: PP-2.1

Inflow Area =	1.229 ac,	0.00% Impervious,	Inflow Depth > 1.13"	for 2-Yr event
Inflow =	1.55 cfs @	12.10 hrs,	Volume=	0.116 af
Outflow =	0.18 cfs @	13.05 hrs,	Volume=	0.083 af, Atten= 88%, Lag= 57.2 min
Discarded =	0.06 cfs @	13.05 hrs,	Volume=	0.058 af
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Secondary =	0.12 cfs @	13.05 hrs,	Volume=	0.026 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 197.71' @ 13.05 hrs Surf.Area= 2,240 sf Storage= 2,212 cf

Plug-Flow detention time= 236.9 min calculated for 0.083 af (72% of inflow)
Center-of-Mass det. time= 137.3 min (997.4 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	196.00'	4,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.00	354	0	0
198.00	2,566	2,920	2,920
198.60	3,000	1,670	4,590

Device	Routing	Invert	Outlet Devices
#1	Secondary	194.80'	**12.0" Round Culvert** L= 198.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 194.80' / 193.00' S= 0.0091 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	197.50'	**6.0" Vert. Orifice** C= 0.600
#3	Device 1	198.20'	**24.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Primary	198.30'	**40.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#5	Discarded	196.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.00'

Discarded OutFlow Max=0.06 cfs @ 13.05 hrs HW=197.71' (Free Discharge)
└**5=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=196.00' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.12 cfs @ 13.05 hrs HW=197.71' TW=187.62' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.12 cfs of 4.65 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.12 cfs @ 1.54 fps)
  └**3=Riser** (Controls 0.00 cfs)

Summary for Pond PP-3.1: PP-3.1

Inflow Area = 8.437 ac, 0.00% Impervious, Inflow Depth > 1.54" for 2-Yr event
Inflow = 10.74 cfs @ 12.23 hrs, Volume= 1.085 af
Outflow = 1.14 cfs @ 14.17 hrs, Volume= 0.911 af, Atten= 89%, Lag= 116.1 min
Primary = 1.14 cfs @ 14.17 hrs, Volume= 0.911 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 187.70' @ 14.17 hrs Surf.Area= 15,558 sf Storage= 23,744 cf

Plug-Flow detention time= 260.8 min calculated for 0.911 af (84% of inflow)
Center-of-Mass det. time= 194.2 min (1,044.3 - 850.1)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	114,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
186.00	12,438	0	0
188.00	16,117	28,555	28,555
190.00	20,021	36,138	64,693
192.25	24,685	50,294	114,987

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 184.50' S= 0.0175 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	191.00'	**10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	190.80'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	186.00'	**6.0" Vert. Orifice-WQV and 2 yr control** C= 0.600
#5	Device 1	187.90'	**11.0" Vert. Orifice-10 yr control X 2.00** C= 0.600
#6	Device 1	189.70'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.14 cfs @ 14.17 hrs HW=187.70' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.14 cfs of 16.54 cfs potential flow)
  - **3=Riser** (Controls 0.00 cfs)
  - **4=Orifice-WQV and 2 yr control** (Orifice Controls 1.14 cfs @ 5.79 fps)
  - **5=Orifice-10 yr control** (Controls 0.00 cfs)
  - **6=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP 1: DP 1

Inflow Area = 17.024 ac, 0.00% Impervious, Inflow Depth > 1.93" for 2-Yr event
Inflow = 8.74 cfs @ 12.17 hrs, Volume= 2.742 af
Primary = 8.74 cfs @ 12.17 hrs, Volume= 2.742 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 2: DP 2

Inflow Area = 2.614 ac, 0.00% Impervious, Inflow Depth > 0.38" for 2-Yr event
Inflow = 0.83 cfs @ 12.16 hrs, Volume= 0.082 af
Primary = 0.83 cfs @ 12.16 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 3: DP 3

Inflow Area = 12.735 ac, 0.00% Impervious, Inflow Depth > 1.04" for 2-Yr event
Inflow = 2.16 cfs @ 12.53 hrs, Volume= 1.103 af
Primary = 2.16 cfs @ 12.53 hrs, Volume= 1.103 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment PD-1.0: PD-1.0

Runoff = 8.89 cfs @ 12.13 hrs, Volume= 0.716 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (sf)	CN	Description
*	169,938	68	
	169,938		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.7	152	0.0455	3.43		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.1	202	Total			

Summary for Subcatchment PD-1.1: PD-1.1

Runoff = 63.63 cfs @ 12.08 hrs, Volume= 4.710 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (sf)	CN	Description
*	571,628	90	
	571,628		100.00% Pervious Area

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

Summary for Subcatchment PD-2.0: PD-2.0

Runoff = 2.67 cfs @ 12.15 hrs, Volume= 0.226 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (sf)	CN	Description
*	60,362	65	
	60,362		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.8	182	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
10.0	232	Total			

Summary for Subcatchment PD-2.1: PD-2.1

Runoff = 3.79 cfs @ 12.09 hrs, Volume= 0.270 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (sf)	CN	Description
*	53,519	73	
	53,519		100.00% Pervious Area

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

Summary for Subcatchment PD-3.0: PD-3.0

Runoff = 4.56 cfs @ 12.41 hrs, Volume= 0.585 af, Depth> 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (sf)	CN	Description
*	187,213	61	
	187,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
3.8	230	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.6	676	0.0700	4.26		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.1	956	Total			

Summary for Subcatchment PD-3.1: PD-3.1

Runoff = 23.01 cfs @ 12.23 hrs, Volume= 2.237 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.45"

	Area (sf)	CN	Description
*	367,507	79	
	367,507		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
1.7	106	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	410	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.1	35	0.3300	9.25		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
0.7	430	0.0400	9.83	7.72	**Pipe Channel, E-F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
16.6	1,031	Total			

Summary for Pond PP-1.1: PP-1.1

Inflow Area = 13.123 ac, 0.00% Impervious, Inflow Depth > 4.31" for 10-Yr event
Inflow = 63.63 cfs @ 12.08 hrs, Volume= 4.710 af
Outflow = 21.53 cfs @ 12.37 hrs, Volume= 4.532 af, Atten= 66%, Lag= 16.9 min
Primary = 21.53 cfs @ 12.37 hrs, Volume= 4.532 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 178.53' @ 12.37 hrs Surf.Area= 27,840 sf Storage= 75,507 cf

Plug-Flow detention time= 102.7 min calculated for 4.532 af (96% of inflow)
Center-of-Mass det. time= 80.8 min (868.0 - 787.2)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	175,762 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.50	22,150	0	0
176.00	23,052	11,301	11,301
178.00	26,797	49,849	61,150
180.00	30,768	57,565	118,715
181.75	34,429	57,047	175,762

Device	Routing	Invert	Outlet Devices
#1	Primary	175.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.50' / 173.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	180.50'	**20.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	178.40'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.50'	**8.0" Vert. Orifice-WQV and 2 yr control X 3.00** C= 0.600
#5	Device 1	177.70'	**2.5' long Sharp-Crested Rectangular Weir X 2.00** 2 End Contraction(s)

Primary OutFlow Max=21.53 cfs @ 12.37 hrs HW=178.53' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 21.53 cfs @ 6.85 fps)
  - **3=Riser** (Passes < 2.03 cfs potential flow)
  - **4=Orifice-WQV and 2 yr control** (Passes < 8.27 cfs potential flow)
  - **5=Sharp-Crested Rectangular Weir** (Passes < 11.45 cfs potential flow)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond PP-2.1: PP-2.1

Inflow Area =	1.229 ac,	0.00% Impervious,	Inflow Depth >	2.64" for 10-Yr event
Inflow =	3.79 cfs @	12.09 hrs,	Volume=	0.270 af
Outflow =	1.94 cfs @	12.25 hrs,	Volume=	0.228 af, Atten= 49%, Lag= 9.6 min
Discarded =	0.08 cfs @	12.25 hrs,	Volume=	0.067 af
Primary =	0.29 cfs @	12.25 hrs,	Volume=	0.003 af
Secondary =	1.57 cfs @	12.25 hrs,	Volume=	0.158 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 198.32' @ 12.25 hrs Surf.Area= 2,798 sf Storage= 3,779 cf

Plug-Flow detention time= 121.7 min calculated for 0.228 af (85% of inflow)
Center-of-Mass det. time= 55.3 min (890.3 - 835.0)

Volume	Invert	Avail.Storage	Storage Description
#1	196.00'	4,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.00	354	0	0
198.00	2,566	2,920	2,920
198.60	3,000	1,670	4,590

Device	Routing	Invert	Outlet Devices
#1	Secondary	194.80'	**12.0" Round Culvert** L= 198.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 194.80' / 193.00' S= 0.0091 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	197.50'	**6.0" Vert. Orifice** C= 0.600
#3	Device 1	198.20'	**24.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Primary	198.30'	**40.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#5	Discarded	196.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.00'

Discarded OutFlow Max=0.08 cfs @ 12.25 hrs HW=198.32' (Free Discharge)
└**5=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.29 cfs @ 12.25 hrs HW=198.32' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.29 cfs @ 0.36 fps)

Secondary OutFlow Max=1.57 cfs @ 12.25 hrs HW=198.32' TW=187.99' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.57 cfs of 5.02 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.71 cfs @ 3.64 fps)
  └**3=Riser** (Weir Controls 0.86 cfs @ 1.13 fps)

Summary for Pond PP-3.1: PP-3.1

Inflow Area = 8.437 ac, 0.00% Impervious, Inflow Depth > 3.41" for 10-Yr event
Inflow = 24.55 cfs @ 12.23 hrs, Volume= 2.395 af
Outflow = 6.58 cfs @ 12.75 hrs, Volume= 2.041 af, Atten= 73%, Lag= 31.1 min
Primary = 6.58 cfs @ 12.75 hrs, Volume= 2.041 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 188.98' @ 12.75 hrs Surf.Area= 18,033 sf Storage= 45,315 cf

Plug-Flow detention time= 186.1 min calculated for 2.040 af (85% of inflow)
Center-of-Mass det. time= 124.6 min (953.4 - 828.8)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	114,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
186.00	12,438	0	0
188.00	16,117	28,555	28,555
190.00	20,021	36,138	64,693
192.25	24,685	50,294	114,987

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 184.50' S= 0.0175 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	191.00'	**10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	190.80'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	186.00'	**6.0" Vert. Orifice-WQV and 2 yr control** C= 0.600
#5	Device 1	187.90'	**11.0" Vert. Orifice-10 yr control X 2.00** C= 0.600
#6	Device 1	189.70'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.58 cfs @ 12.75 hrs HW=188.98' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 6.58 cfs of 23.83 cfs potential flow)
  - **3=Riser** (Controls 0.00 cfs)
  - **4=Orifice-WQV and 2 yr control** (Orifice Controls 1.56 cfs @ 7.96 fps)
  - **5=Orifice-10 yr control** (Orifice Controls 5.02 cfs @ 3.80 fps)
  - **6=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP 1: DP 1

Inflow Area = 17.024 ac, 0.00% Impervious, Inflow Depth > 3.70" for 10-Yr event
Inflow = 26.48 cfs @ 12.33 hrs, Volume= 5.248 af
Primary = 26.48 cfs @ 12.33 hrs, Volume= 5.248 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 2: DP 2

Inflow Area = 2.614 ac, 0.00% Impervious, Inflow Depth > 1.05" for 10-Yr event
Inflow = 2.67 cfs @ 12.15 hrs, Volume= 0.228 af
Primary = 2.67 cfs @ 12.15 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 3: DP 3

Inflow Area = 12.735 ac, 0.00% Impervious, Inflow Depth > 2.47" for 10-Yr event
Inflow = 10.21 cfs @ 12.55 hrs, Volume= 2.626 af
Primary = 10.21 cfs @ 12.55 hrs, Volume= 2.626 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment PD-1.0: PD-1.0

Runoff = 12.99 cfs @ 12.13 hrs, Volume= 1.031 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (sf)	CN	Description
*	169,938	68	
	169,938		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.7	152	0.0455	3.43		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.1	202	Total			

Summary for Subcatchment PD-1.1: PD-1.1

Runoff = 80.62 cfs @ 12.08 hrs, Volume= 6.052 af, Depth> 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (sf)	CN	Description
*	571,628	90	
	571,628		100.00% Pervious Area

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

Summary for Subcatchment PD-2.0: PD-2.0

Runoff = 4.03 cfs @ 12.14 hrs, Volume= 0.332 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (sf)	CN	Description
*	60,362	65	
	60,362		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.8	182	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
10.0	232	Total			

Summary for Subcatchment PD-2.1: PD-2.1

Runoff = 5.31 cfs @ 12.09 hrs, Volume= 0.377 af, Depth> 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (sf)	CN	Description
*	53,519	73	
	53,519		100.00% Pervious Area

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

Summary for Subcatchment PD-3.0: PD-3.0

Runoff = 7.19 cfs @ 12.40 hrs, Volume= 0.887 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (sf)	CN	Description
*	187,213	61	
	187,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
3.8	230	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.6	676	0.0700	4.26		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.1	956	Total			

Summary for Subcatchment PD-3.1: PD-3.1

Runoff = 31.01 cfs @ 12.23 hrs, Volume= 3.028 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.71"

	Area (sf)	CN	Description
*	367,507	79	
	367,507		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
1.7	106	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	410	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.1	35	0.3300	9.25		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
0.7	430	0.0400	9.83	7.72	**Pipe Channel, E-F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
16.6	1,031	Total			

Summary for Pond PP-1.1: PP-1.1

Inflow Area = 13.123 ac, 0.00% Impervious, Inflow Depth > 5.53" for 25-Yr event
Inflow = 80.62 cfs @ 12.08 hrs, Volume= 6.052 af
Outflow = 24.73 cfs @ 12.40 hrs, Volume= 5.854 af, Atten= 69%, Lag= 18.8 min
Primary = 24.73 cfs @ 12.40 hrs, Volume= 5.854 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.17' @ 12.40 hrs Surf.Area= 29,126 sf Storage= 93,950 cf

Plug-Flow detention time= 95.2 min calculated for 5.852 af (97% of inflow)
Center-of-Mass det. time= 75.8 min (856.4 - 780.6)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	175,762 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.50	22,150	0	0
176.00	23,052	11,301	11,301
178.00	26,797	49,849	61,150
180.00	30,768	57,565	118,715
181.75	34,429	57,047	175,762

Device	Routing	Invert	Outlet Devices
#1	Primary	175.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.50' / 173.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	180.50'	**20.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	178.40'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.50'	**8.0" Vert. Orifice-WQV and 2 yr control X 3.00** C= 0.600
#5	Device 1	177.70'	**2.5' long Sharp-Crested Rectangular Weir X 2.00** 2 End Contraction(s)

Primary OutFlow Max=24.73 cfs @ 12.40 hrs HW=179.17' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 24.73 cfs @ 7.87 fps)
  - **3=Riser** (Passes < 31.11 cfs potential flow)
  - **4=Orifice-WQV and 2 yr control** (Passes < 9.21 cfs potential flow)
  - **5=Sharp-Crested Rectangular Weir** (Passes < 25.78 cfs potential flow)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond PP-2.1: PP-2.1

Inflow Area =	1.229 ac,	0.00% Impervious,	Inflow Depth >	3.68" for 25-Yr event
Inflow =	5.31 cfs @	12.09 hrs, Volume=	0.377 af	
Outflow =	5.05 cfs @	12.12 hrs, Volume=	0.333 af,	Atten= 5%, Lag= 1.6 min
Discarded =	0.09 cfs @	12.12 hrs, Volume=	0.072 af	
Primary =	2.56 cfs @	12.12 hrs, Volume=	0.034 af	
Secondary =	2.40 cfs @	12.12 hrs, Volume=	0.228 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 198.39' @ 12.12 hrs Surf.Area= 2,845 sf Storage= 3,964 cf

Plug-Flow detention time= 96.3 min calculated for 0.333 af (88% of inflow)
Center-of-Mass det. time= 42.5 min (867.8 - 825.4)

Volume	Invert	Avail.Storage	Storage Description
#1	196.00'	4,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.00	354	0	0
198.00	2,566	2,920	2,920
198.60	3,000	1,670	4,590

Device	Routing	Invert	Outlet Devices
#1	Secondary	194.80'	**12.0" Round Culvert** L= 198.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 194.80' / 193.00' S= 0.0091 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	197.50'	**6.0" Vert. Orifice** C= 0.600
#3	Device 1	198.20'	**24.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Primary	198.30'	**40.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#5	Discarded	196.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.00'

Discarded OutFlow Max=0.09 cfs @ 12.12 hrs HW=198.39' (Free Discharge)
└**5=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=2.55 cfs @ 12.12 hrs HW=198.39' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 2.55 cfs @ 0.74 fps)

Secondary OutFlow Max=2.40 cfs @ 12.12 hrs HW=198.39' TW=187.92' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.40 cfs of 5.06 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.75 cfs @ 3.84 fps)
  └**3=Riser** (Weir Controls 1.65 cfs @ 1.41 fps)

Summary for Pond PP-3.1: PP-3.1

Inflow Area = 8.437 ac, 0.00% Impervious, Inflow Depth > 4.63" for 25-Yr event
Inflow = 32.92 cfs @ 12.23 hrs, Volume= 3.255 af
Outflow = 9.40 cfs @ 12.71 hrs, Volume= 2.826 af, Atten= 71%, Lag= 29.3 min
Primary = 9.40 cfs @ 12.71 hrs, Volume= 2.826 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 189.77' @ 12.71 hrs Surf.Area= 19,568 sf Storage= 60,095 cf

Plug-Flow detention time= 158.1 min calculated for 2.825 af (87% of inflow)
Center-of-Mass det. time= 101.1 min (922.6 - 821.5)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	114,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
186.00	12,438	0	0
188.00	16,117	28,555	28,555
190.00	20,021	36,138	64,693
192.25	24,685	50,294	114,987

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 184.50' S= 0.0175 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	191.00'	**10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	190.80'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	186.00'	**6.0" Vert. Orifice-WQV and 2 yr control** C= 0.600
#5	Device 1	187.90'	**11.0" Vert. Orifice-10 yr control X 2.00** C= 0.600
#6	Device 1	189.70'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=9.40 cfs @ 12.71 hrs HW=189.77' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 9.40 cfs of 27.34 cfs potential flow)
  - **3=Riser** (Controls 0.00 cfs)
  - **4=Orifice-WQV and 2 yr control** (Orifice Controls 1.77 cfs @ 9.03 fps)
  - **5=Orifice-10 yr control** (Orifice Controls 7.54 cfs @ 5.72 fps)
  - **6=Sharp-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.85 fps)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP 1: DP 1

Inflow Area = 17.024 ac, 0.00% Impervious, Inflow Depth > 4.85" for 25-Yr event
Inflow = 35.56 cfs @ 12.15 hrs, Volume= 6.885 af
Primary = 35.56 cfs @ 12.15 hrs, Volume= 6.885 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 2: DP 2

Inflow Area = 2.614 ac, 0.00% Impervious, Inflow Depth > 1.68" for 25-Yr event
Inflow = 6.48 cfs @ 12.12 hrs, Volume= 0.366 af
Primary = 6.48 cfs @ 12.12 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 3: DP 3

Inflow Area = 12.735 ac, 0.00% Impervious, Inflow Depth > 3.50" for 25-Yr event
Inflow = 15.57 cfs @ 12.47 hrs, Volume= 3.714 af
Primary = 15.57 cfs @ 12.47 hrs, Volume= 3.714 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment PD-1.0: PD-1.0

Runoff = 19.69 cfs @ 12.13 hrs, Volume= 1.553 af, Depth> 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (sf)	CN	Description
*	169,938	68	
	169,938		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.7	152	0.0455	3.43		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.1	202	Total			

Summary for Subcatchment PD-1.1: PD-1.1

Runoff = 106.55 cfs @ 12.08 hrs, Volume= 8.136 af, Depth> 7.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (sf)	CN	Description
*	571,628	90	
	571,628		100.00% Pervious Area

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

Summary for Subcatchment PD-2.0: PD-2.0

Runoff = 6.27 cfs @ 12.14 hrs, Volume= 0.510 af, Depth> 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (sf)	CN	Description
*	60,362	65	
	60,362		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
0.8	182	0.0500	3.60		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
10.0	232	Total			

Summary for Subcatchment PD-2.1: PD-2.1

Runoff = 7.74 cfs @ 12.09 hrs, Volume= 0.551 af, Depth> 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (sf)	CN	Description
*	53,519	73	
	53,519		100.00% Pervious Area

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

Summary for Subcatchment PD-3.0: PD-3.0

Runoff = 11.67 cfs @ 12.38 hrs, Volume= 1.405 af, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (sf)	CN	Description
*	187,213	61	
	187,213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.43"
3.8	230	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.6	676	0.0700	4.26		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
27.1	956	Total			

Summary for Subcatchment PD-3.1: PD-3.1

Runoff = 43.49 cfs @ 12.23 hrs, Volume= 4.287 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Yr Rainfall=8.65"

	Area (sf)	CN	Description
*	367,507	79	
	367,507		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Grass: Bermuda n= 0.410 P2= 3.43"
1.7	106	0.0410	1.01		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	410	0.0510	3.64		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.1	35	0.3300	9.25		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
0.7	430	0.0400	9.83	7.72	**Pipe Channel, E-F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
16.6	1,031	Total			

Summary for Pond PP-1.1: PP-1.1

Inflow Area = 13.123 ac, 0.00% Impervious, Inflow Depth > 7.44" for 100-Yr event
Inflow = 106.55 cfs @ 12.08 hrs, Volume= 8.136 af
Outflow = 29.31 cfs @ 12.43 hrs, Volume= 7.910 af, Atten= 72%, Lag= 20.7 min
Primary = 29.31 cfs @ 12.43 hrs, Volume= 7.910 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 180.25' @ 12.43 hrs Surf.Area= 31,301 sf Storage= 126,619 cf

Plug-Flow detention time= 90.4 min calculated for 7.910 af (97% of inflow)
Center-of-Mass det. time= 73.6 min (846.7 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	175,762 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.50	22,150	0	0
176.00	23,052	11,301	11,301
178.00	26,797	49,849	61,150
180.00	30,768	57,565	118,715
181.75	34,429	57,047	175,762

Device	Routing	Invert	Outlet Devices
#1	Primary	175.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.50' / 173.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	180.50'	**20.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	178.40'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.50'	**8.0" Vert. Orifice-WQV and 2 yr control X 3.00** C= 0.600
#5	Device 1	177.70'	**2.5' long Sharp-Crested Rectangular Weir X 2.00** 2 End Contraction(s)

Primary OutFlow Max=29.31 cfs @ 12.43 hrs HW=180.25' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 29.31 cfs @ 9.33 fps)
  - **3=Riser** (Passes < 78.69 cfs potential flow)
  - **4=Orifice-WQV and 2 yr control** (Passes < 10.60 cfs potential flow)
  - **5=Sharp-Crested Rectangular Weir** (Passes < 53.12 cfs potential flow)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond PP-2.1: PP-2.1

Inflow Area =	1.229 ac,	0.00% Impervious,	Inflow Depth > 5.38"	for 100-Yr event
Inflow =	7.74 cfs @	12.09 hrs, Volume=	0.551 af	
Outflow =	7.66 cfs @	12.10 hrs, Volume=	0.506 af, Atten= 1%, Lag= 0.7 min	
Discarded =	0.09 cfs @	12.10 hrs, Volume=	0.079 af	
Primary =	4.58 cfs @	12.10 hrs, Volume=	0.093 af	
Secondary =	2.99 cfs @	12.10 hrs, Volume=	0.334 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 198.43' @ 12.10 hrs Surf.Area= 2,875 sf Storage= 4,081 cf

Plug-Flow detention time= 76.0 min calculated for 0.505 af (92% of inflow)
Center-of-Mass det. time= 34.3 min (848.8 - 814.5)

Volume	Invert	Avail.Storage	Storage Description
#1	196.00'	4,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.00	354	0	0
198.00	2,566	2,920	2,920
198.60	3,000	1,670	4,590

Device	Routing	Invert	Outlet Devices
#1	Secondary	194.80'	**12.0" Round Culvert** L= 198.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 194.80' / 193.00' S= 0.0091 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	197.50'	**6.0" Vert. Orifice** C= 0.600
#3	Device 1	198.20'	**24.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Primary	198.30'	**40.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#5	Discarded	196.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.00'

Discarded OutFlow Max=0.09 cfs @ 12.10 hrs HW=198.43' (Free Discharge)
└**5=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=4.58 cfs @ 12.10 hrs HW=198.43' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 4.58 cfs @ 0.90 fps)

Secondary OutFlow Max=2.99 cfs @ 12.10 hrs HW=198.43' TW=188.73' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.99 cfs of 5.09 cfs potential flow)
  └**2=Orifice** (Orifice Controls 0.78 cfs @ 3.96 fps)
  └**3=Riser** (Weir Controls 2.22 cfs @ 1.56 fps)

Summary for Pond PP-3.1: PP-3.1

Inflow Area = 8.437 ac, 0.00% Impervious, Inflow Depth > 6.57" for 100-Yr event
Inflow = 45.70 cfs @ 12.22 hrs, Volume= 4.622 af
Outflow = 16.66 cfs @ 12.63 hrs, Volume= 4.098 af, Atten= 64%, Lag= 24.6 min
Primary = 16.66 cfs @ 12.63 hrs, Volume= 4.098 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 190.79' @ 12.63 hrs Surf.Area= 21,651 sf Storage= 81,072 cf

Plug-Flow detention time= 133.7 min calculated for 4.098 af (89% of inflow)
Center-of-Mass det. time= 82.2 min (895.1 - 813.0)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	114,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
186.00	12,438	0	0
188.00	16,117	28,555	28,555
190.00	20,021	36,138	64,693
192.25	24,685	50,294	114,987

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 184.50' S= 0.0175 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	191.00'	**10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	190.80'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	186.00'	**6.0" Vert. Orifice-WQV and 2 yr control** C= 0.600
#5	Device 1	187.90'	**11.0" Vert. Orifice-10 yr control X 2.00** C= 0.600
#6	Device 1	189.70'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=16.66 cfs @ 12.63 hrs HW=190.79' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 16.66 cfs of 31.32 cfs potential flow)
  - **3=Riser** (Controls 0.00 cfs)
  - **4=Orifice-WQV and 2 yr control** (Orifice Controls 2.01 cfs @ 10.25 fps)
  - **5=Orifice-10 yr control** (Orifice Controls 9.90 cfs @ 7.50 fps)
  - **6=Sharp-Crested Rectangular Weir** (Weir Controls 4.75 cfs @ 3.41 fps)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP 1: DP 1

Inflow Area = 17.024 ac, 0.00% Impervious, Inflow Depth > 6.67" for 100-Yr event
Inflow = 46.20 cfs @ 12.14 hrs, Volume= 9.464 af
Primary = 46.20 cfs @ 12.14 hrs, Volume= 9.464 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 2: DP 2

Inflow Area = 2.614 ac, 0.00% Impervious, Inflow Depth > 2.77" for 100-Yr event
Inflow = 10.53 cfs @ 12.12 hrs, Volume= 0.603 af
Primary = 10.53 cfs @ 12.12 hrs, Volume= 0.603 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP 3: DP 3

Inflow Area = 12.735 ac, 0.00% Impervious, Inflow Depth > 5.19" for 100-Yr event
Inflow = 26.64 cfs @ 12.49 hrs, Volume= 5.503 af
Primary = 26.64 cfs @ 12.49 hrs, Volume= 5.503 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond PP-1.1: PP-1.1 Peak Elev=180.25' Storage=126,619 cf Inflow=106.55 cfs 8.136 af
Outflow=29.31 cfs 7.910 af

Pond PP-2.1: PP-2.1 Peak Elev=198.43' Storage=4,081 cf Inflow=7.74 cfs 0.551 af
Discarded=0.09 cfs 0.079 af Primary=4.58 cfs 0.093 af Secondary=2.99 cfs 0.334 af Outflow=7.66 cfs 0.506 af

Pond PP-3.1: PP-3.1 Peak Elev=190.79' Storage=81,072 cf Inflow=45.70 cfs 4.622 af
Outflow=16.66 cfs 4.098 af

Summary for Pond PP-1.1: PP-1.1

Inflow Area = 13.123 ac, 0.00% Impervious, Inflow Depth > 7.44" for 100-Yr event
Inflow = 106.55 cfs @ 12.08 hrs, Volume= 8.136 af
Outflow = 29.31 cfs @ 12.43 hrs, Volume= 7.910 af, Atten= 72%, Lag= 20.7 min
Primary = 29.31 cfs @ 12.43 hrs, Volume= 7.910 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 180.25' @ 12.43 hrs Surf.Area= 31,301 sf Storage= 126,619 cf

Plug-Flow detention time= 90.4 min calculated for 7.910 af (97% of inflow)
Center-of-Mass det. time= 73.6 min (846.7 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1	175.50'	175,762 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.50	22,150	0	0
176.00	23,052	11,301	11,301
178.00	26,797	49,849	61,150
180.00	30,768	57,565	118,715
181.75	34,429	57,047	175,762

Device	Routing	Invert	Outlet Devices
#1	Primary	175.50'	**24.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.50' / 173.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	180.50'	**20.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	178.40'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.50'	**8.0" Vert. Orifice-WQV and 2 yr control X 3.00** C= 0.600
#5	Device 1	177.70'	**2.5' long Sharp-Crested Rectangular Weir X 2.00** 2 End Contraction(s)

Primary OutFlow Max=29.31 cfs @ 12.43 hrs HW=180.25' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 29.31 cfs @ 9.33 fps)
  - **3=Riser** (Passes < 78.69 cfs potential flow)
  - **4=Orifice-WQV and 2 yr control** (Passes < 10.60 cfs potential flow)
  - **5=Sharp-Crested Rectangular Weir** (Passes < 53.12 cfs potential flow)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond PP-1.1: PP-1.1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
175.50	22,150	0
175.60	22,330	2,224
175.70	22,511	4,466
175.80	22,691	6,726
175.90	22,872	9,004
176.00	23,052	11,301
176.10	23,239	13,615
176.20	23,426	15,948
176.30	23,614	18,300
176.40	23,801	20,671
176.50	23,988	23,061
176.60	24,175	25,469
176.70	24,363	27,896
176.80	24,550	30,341
176.90	24,737	32,806
177.00	24,925	35,289
177.10	25,112	37,791
177.20	25,299	40,311
177.30	25,486	42,850
177.40	25,674	45,408
177.50	25,861	47,985
177.60	26,048	50,580
177.70	26,235	53,195
177.80	26,423	55,828
177.90	26,610	58,479
178.00	26,797	61,150
178.10	26,996	63,839
178.20	27,194	66,549
178.30	27,393	69,278
178.40	27,591	72,027
178.50	27,790	74,796
178.60	27,988	77,585
178.70	28,187	80,394
178.80	28,385	83,222
178.90	28,584	86,071
179.00	28,783	88,939
179.10	28,981	91,827
179.20	29,180	94,735
179.30	29,378	97,663
179.40	29,577	100,611
179.50	29,775	103,579
179.60	29,974	106,566
179.70	30,172	109,573
179.80	30,371	112,601
179.90	30,569	115,648
180.00	30,768	118,715
180.10	30,977	121,802
180.20	31,186	124,910
180.30	31,396	128,039
180.40	31,605	131,189
180.50	31,814	134,360
180.60	32,023	137,552
180.70	32,232	140,765
180.80	32,442	143,998
180.90	32,651	147,253
181.00	32,860	150,529
181.10	33,069	153,825
181.20	33,278	157,142
181.30	33,488	160,481
181.40	33,697	163,840
181.50	33,906	167,220
181.60	34,115	170,621
181.70	**34,324**	**174,043**

Summary for Pond PP-2.1: PP-2.1

Inflow Area = 1.229 ac, 0.00% Impervious, Inflow Depth > 5.38" for 100-Yr event
Inflow = 7.74 cfs @ 12.09 hrs, Volume= 0.551 af
Outflow = 7.66 cfs @ 12.10 hrs, Volume= 0.506 af, Atten= 1%, Lag= 0.7 min
Discarded = 0.09 cfs @ 12.10 hrs, Volume= 0.079 af
Primary = 4.58 cfs @ 12.10 hrs, Volume= 0.093 af
Secondary = 2.99 cfs @ 12.10 hrs, Volume= 0.334 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 198.43' @ 12.10 hrs Surf.Area= 2,875 sf Storage= 4,081 cf

Plug-Flow detention time= 76.0 min calculated for 0.505 af (92% of inflow)
Center-of-Mass det. time= 34.3 min (848.8 - 814.5)

Volume	Invert	Avail.Storage	Storage Description
#1	196.00'	4,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
196.00	354	0	0
198.00	2,566	2,920	2,920
198.60	3,000	1,670	4,590

Device	Routing	Invert	Outlet Devices
#1	Secondary	194.80'	**12.0" Round Culvert** L= 198.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 194.80' / 193.00' S= 0.0091 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	197.50'	**6.0" Vert. Orifice** C= 0.600
#3	Device 1	198.20'	**24.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Primary	198.30'	**40.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#5	Discarded	196.00'	**1.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 192.00'

Discarded OutFlow Max=0.09 cfs @ 12.10 hrs HW=198.43' (Free Discharge)
└**5=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=4.58 cfs @ 12.10 hrs HW=198.43' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 4.58 cfs @ 0.90 fps)

Secondary OutFlow Max=2.99 cfs @ 12.10 hrs HW=198.43' TW=188.73' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.99 cfs of 5.09 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.78 cfs @ 3.96 fps)
  └**3=Riser** (Weir Controls 2.22 cfs @ 1.56 fps)

Stage-Area-Storage for Pond PP-2.1: PP-2.1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
196.00	354	0
196.05	409	19
196.10	465	41
196.15	520	66
196.20	575	93
196.25	631	123
196.30	686	156
196.35	741	192
196.40	796	230
196.45	852	271
196.50	907	315
196.55	962	362
196.60	1,018	411
196.65	1,073	464
196.70	1,128	519
196.75	1,184	577
196.80	1,239	637
196.85	1,294	700
196.90	1,349	767
196.95	1,405	835
197.00	1,460	907
197.05	1,515	981
197.10	1,571	1,059
197.15	1,626	1,138
197.20	1,681	1,221
197.25	1,737	1,307
197.30	1,792	1,395
197.35	1,847	1,486
197.40	1,902	1,579
197.45	1,958	1,676
197.50	2,013	1,775
197.55	2,068	1,877
197.60	2,124	1,982
197.65	2,179	2,090
197.70	2,234	2,200
197.75	2,290	2,313
197.80	2,345	2,429
197.85	2,400	2,548
197.90	2,455	2,669
197.95	2,511	2,793
198.00	2,566	2,920
198.05	2,602	3,049
198.10	2,638	3,180
198.15	2,675	3,313
198.20	2,711	3,448
198.25	2,747	3,584
198.30	2,783	3,722
198.35	2,819	3,862
198.40	2,855	4,004
198.45	2,891	4,148
198.50	2,928	4,293
198.55	2,964	4,441
198.60	**3,000**	**4,590**

Summary for Pond PP-3.1: PP-3.1

Inflow Area = 8.437 ac, 0.00% Impervious, Inflow Depth > 6.57" for 100-Yr event
Inflow = 45.70 cfs @ 12.22 hrs, Volume= 4.622 af
Outflow = 16.66 cfs @ 12.63 hrs, Volume= 4.098 af, Atten= 64%, Lag= 24.6 min
Primary = 16.66 cfs @ 12.63 hrs, Volume= 4.098 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 190.79' @ 12.63 hrs Surf.Area= 21,651 sf Storage= 81,072 cf

Plug-Flow detention time= 133.7 min calculated for 4.098 af (89% of inflow)
Center-of-Mass det. time= 82.2 min (895.1 - 813.0)

Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	114,987 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
186.00	12,438	0	0
188.00	16,117	28,555	28,555
190.00	20,021	36,138	64,693
192.25	24,685	50,294	114,987

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" Round Culvert** L= 57.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 184.50' S= 0.0175 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	191.00'	**10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#3	Device 1	190.80'	**36.0" x 48.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Device 1	186.00'	**6.0" Vert. Orifice-WQV and 2 yr control** C= 0.600
#5	Device 1	187.90'	**11.0" Vert. Orifice-10 yr control X 2.00** C= 0.600
#6	Device 1	189.70'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=16.66 cfs @ 12.63 hrs HW=190.79' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 16.66 cfs of 31.32 cfs potential flow)
  - **3=Riser** (Controls 0.00 cfs)
  - **4=Orifice-WQV and 2 yr control** (Orifice Controls 2.01 cfs @ 10.25 fps)
  - **5=Orifice-10 yr control** (Orifice Controls 9.90 cfs @ 7.50 fps)
  - **6=Sharp-Crested Rectangular Weir** (Weir Controls 4.75 cfs @ 3.41 fps)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond PP-3.1: PP-3.1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
186.00	12,438	0
186.10	12,622	1,253
186.20	12,806	2,524
186.30	12,990	3,814
186.40	13,174	5,122
186.50	13,358	6,449
186.60	13,542	7,794
186.70	13,726	9,157
186.80	13,910	10,539
186.90	14,094	11,939
187.00	14,278	13,358
187.10	14,461	14,795
187.20	14,645	16,250
187.30	14,829	17,724
187.40	15,013	19,216
187.50	15,197	20,726
187.60	15,381	22,255
187.70	15,565	23,803
187.80	15,749	25,368
187.90	15,933	26,952
188.00	16,117	28,555
188.10	16,312	30,176
188.20	16,507	31,817
188.30	16,703	33,478
188.40	16,898	35,158
188.50	17,093	36,858
188.60	17,288	38,577
188.70	17,483	40,315
188.80	17,679	42,073
188.90	17,874	43,851
189.00	18,069	45,648
189.10	18,264	47,465
189.20	18,459	49,301
189.30	18,655	51,157
189.40	18,850	53,032
189.50	19,045	54,927
189.60	19,240	56,841
189.70	19,435	58,775
189.80	19,631	60,728
189.90	19,826	62,701
190.00	20,021	64,693
190.10	20,228	66,705
190.20	20,436	68,739
190.30	20,643	70,793
190.40	20,850	72,867
190.50	21,057	74,963
190.60	21,265	77,079
190.70	21,472	79,216
190.80	21,679	81,373
190.90	21,887	83,551
191.00	22,094	85,750
191.10	22,301	87,970
191.20	22,508	90,211
191.30	22,716	92,472
191.40	22,923	94,754
191.50	23,130	97,057
191.60	23,338	99,380
191.70	23,545	101,724
191.80	23,752	104,089
191.90	23,959	106,474
192.00	24,167	108,881
192.10	24,374	111,308
192.20	**24,581**	**113,756**

APPENDIX E: STORMWATER CALCULATIONS

- *NOAA RAINFALL DATA*
- *POLLUTANT REDUCTION*
- *CONVEYANCE PROTECTION CALCULATIONS*

NOAA Atlas 14, Volume 10, Version 3
Location name: Southington, Connecticut, USA*
Latitude: 41.6271°, Longitude: -72.8862°
Elevation: 194.53 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.345 (0.267-0.441)	0.416 (0.322-0.532)	0.532 (0.410-0.683)	0.627 (0.481-0.810)	0.759 (0.564-1.03)	0.859 (0.626-1.19)	0.962 (0.681-1.39)	1.08 (0.724-1.59)	1.24 (0.802-1.90)	1.37 (0.865-2.15)
10-min	0.489 (0.379-0.624)	0.589 (0.456-0.753)	0.753 (0.581-0.965)	0.888 (0.682-1.15)	1.08 (0.799-1.46)	1.22 (0.886-1.68)	1.36 (0.964-1.96)	1.53 (1.02-2.26)	1.75 (1.14-2.70)	1.94 (1.23-3.04)
15-min	0.575 (0.446-0.735)	0.693 (0.537-0.886)	0.886 (0.683-1.14)	1.05 (0.802-1.35)	1.26 (0.940-1.71)	1.43 (1.04-1.98)	1.60 (1.14-2.31)	1.79 (1.21-2.66)	2.06 (1.34-3.17)	2.28 (1.44-3.58)
30-min	0.785 (0.609-1.00)	0.944 (0.731-1.21)	1.20 (0.928-1.54)	1.42 (1.09-1.83)	1.71 (1.27-2.32)	1.94 (1.41-2.68)	2.17 (1.54-3.13)	2.43 (1.63-3.59)	2.79 (1.81-4.29)	3.09 (1.95-4.85)
60-min	0.995 (0.771-1.27)	1.19 (0.925-1.53)	1.52 (1.17-1.95)	1.79 (1.37-2.31)	2.16 (1.61-2.93)	2.44 (1.78-3.39)	2.74 (1.94-3.94)	3.06 (2.06-4.53)	3.52 (2.28-5.42)	3.90 (2.47-6.13)
2-hr	1.30 (1.01-1.65)	1.55 (1.21-1.97)	1.96 (1.52-2.51)	2.31 (1.78-2.96)	2.78 (2.08-3.74)	3.13 (2.30-4.32)	3.50 (2.50-5.03)	3.93 (2.65-5.78)	4.54 (2.95-6.95)	5.05 (3.20-7.89)
3-hr	1.51 (1.18-1.90)	1.80 (1.41-2.28)	2.28 (1.77-2.89)	2.68 (2.07-3.42)	3.22 (2.42-4.33)	3.63 (2.67-5.00)	4.07 (2.91-5.84)	4.57 (3.09-6.71)	5.31 (3.46-8.10)	5.93 (3.77-9.24)
6-hr	1.91 (1.50-2.40)	2.29 (1.80-2.89)	2.93 (2.29-3.70)	3.46 (2.69-4.39)	4.18 (3.16-5.60)	4.72 (3.50-6.48)	5.30 (3.83-7.61)	5.99 (4.07-8.76)	7.03 (4.59-10.7)	7.91 (5.04-12.3)
12-hr	2.35 (1.86-2.93)	2.87 (2.27-3.59)	3.72 (2.93-4.67)	4.43 (3.47-5.59)	5.40 (4.11-7.21)	6.12 (4.57-8.38)	6.90 (5.03-9.90)	7.86 (5.35-11.4)	9.32 (6.10-14.1)	10.6 (6.77-16.3)
24-hr	2.75 (2.19-3.41)	3.43 (2.72-4.26)	4.53 (3.59-5.65)	5.45 (4.29-6.84)	6.71 (5.14-8.93)	7.63 (5.74-10.4)	8.65 (6.37-12.5)	9.95 (6.79-14.4)	12.0 (7.88-18.1)	13.8 (8.87-21.2)
2-day	3.09 (2.47-3.81)	3.92 (3.13-4.84)	5.28 (4.21-6.54)	6.41 (5.07-7.99)	7.96 (6.15-10.6)	9.09 (6.90-12.4)	10.4 (7.72-15.0)	12.0 (8.24-17.4)	14.8 (9.75-22.2)	17.3 (11.1-26.5)
3-day	3.35 (2.69-4.12)	4.27 (3.43-5.25)	5.77 (4.61-7.12)	7.01 (5.57-8.72)	8.73 (6.76-11.6)	9.97 (7.60-13.6)	11.4 (8.51-16.4)	13.3 (9.09-19.1)	16.4 (10.8-24.5)	19.2 (12.4-29.3)
4-day	3.60 (2.90-4.41)	4.58 (3.68-5.61)	6.17 (4.95-7.60)	7.50 (5.97-9.30)	9.32 (7.24-12.3)	10.6 (8.13-14.5)	12.1 (9.10-17.5)	14.1 (9.72-20.3)	17.5 (11.5-26.1)	20.5 (13.2-31.1)
7-day	4.29 (3.47-5.23)	5.38 (4.35-6.57)	7.17 (5.77-8.78)	8.65 (6.92-10.7)	10.7 (8.32-14.0)	12.2 (9.31-16.5)	13.8 (10.4-19.7)	16.0 (11.0-22.9)	19.6 (13.0-29.1)	22.8 (14.7-34.5)
10-day	4.99 (4.05-6.06)	6.14 (4.98-7.47)	8.02 (6.48-9.79)	9.58 (7.69-11.8)	11.7 (9.14-15.3)	13.3 (10.2-17.9)	15.0 (11.2-21.3)	17.3 (11.9-24.6)	20.9 (13.9-30.9)	24.0 (15.6-36.3)
20-day	7.19 (5.87-8.68)	8.40 (6.85-10.2)	10.4 (8.44-12.6)	12.0 (9.71-14.7)	14.3 (11.2-18.4)	16.0 (12.2-21.1)	17.8 (13.2-24.6)	19.9 (13.9-28.2)	23.2 (15.5-34.1)	26.0 (16.9-39.1)
30-day	9.04 (7.40-10.9)	10.3 (8.40-12.4)	12.3 (10.0-14.9)	14.0 (11.3-17.0)	16.3 (12.7-20.8)	18.0 (13.8-23.6)	19.8 (14.7-27.1)	21.9 (15.3-30.8)	24.9 (16.6-36.4)	27.3 (17.8-40.9)
45-day	11.3 (9.30-13.5)	12.6 (10.3-15.1)	14.7 (12.0-17.7)	16.4 (13.3-19.9)	18.8 (14.7-23.8)	20.6 (15.7-26.7)	22.4 (16.5-30.2)	24.4 (17.1-34.1)	26.9 (18.1-39.3)	29.0 (18.9-43.3)
60-day	13.2 (10.9-15.8)	14.5 (11.9-17.3)	16.7 (13.7-20.0)	18.4 (15.0-22.3)	20.9 (16.4-26.3)	22.8 (17.4-29.4)	24.7 (18.1-32.9)	26.5 (18.6-36.9)	28.8 (19.4-41.9)	30.5 (19.9-45.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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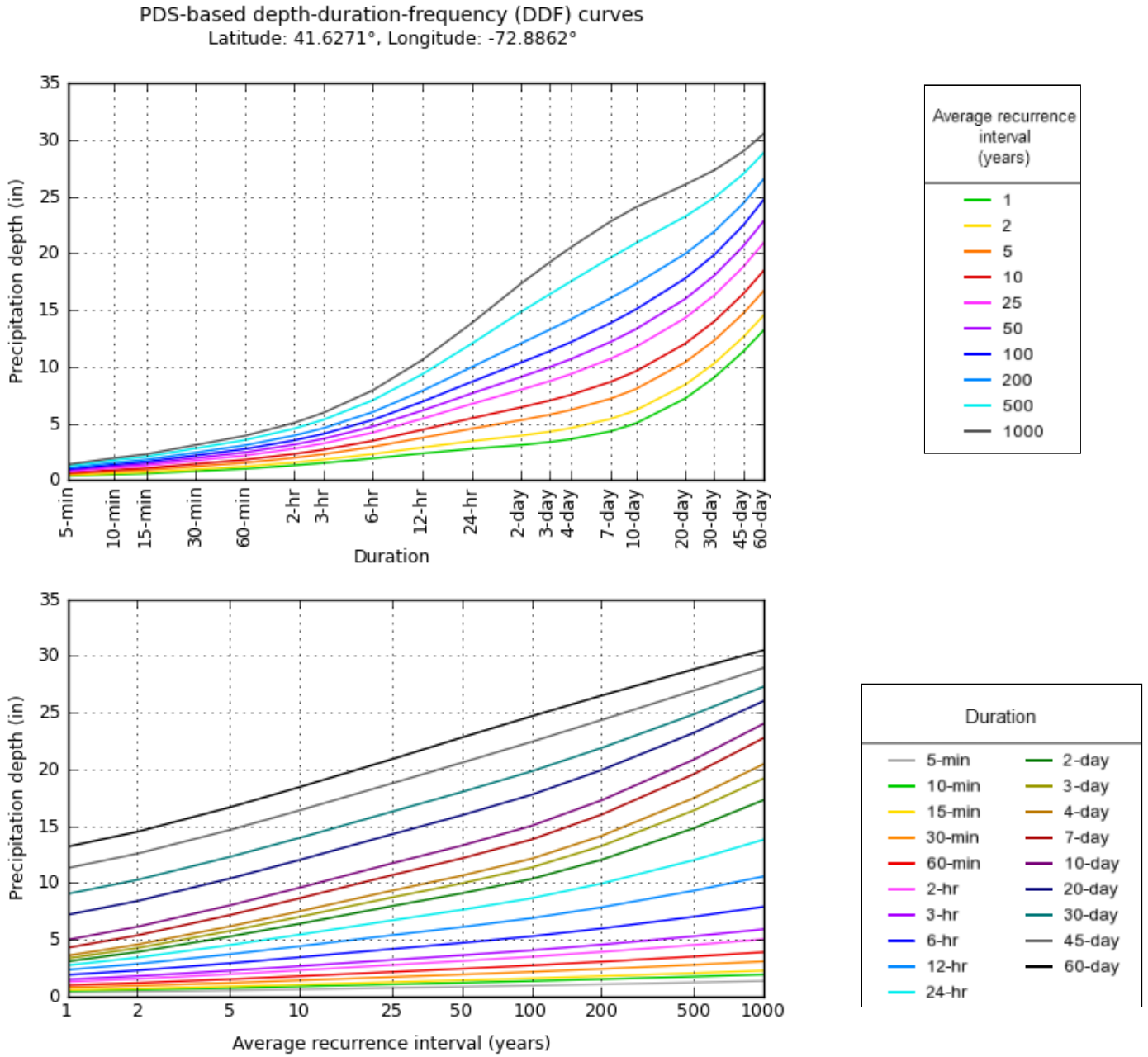
PF graphical



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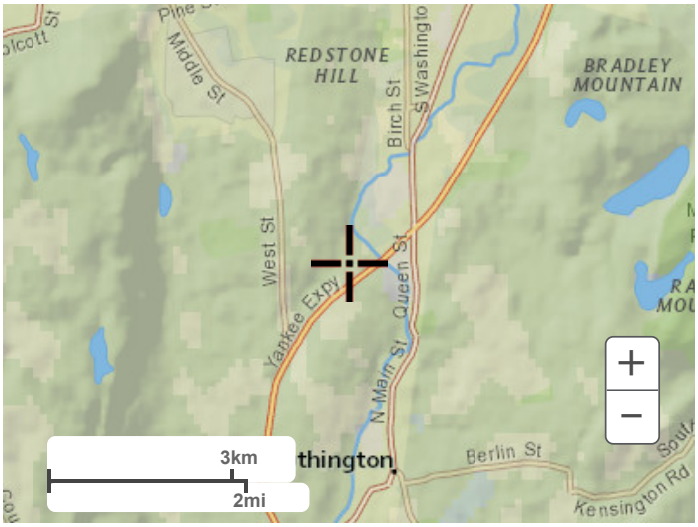
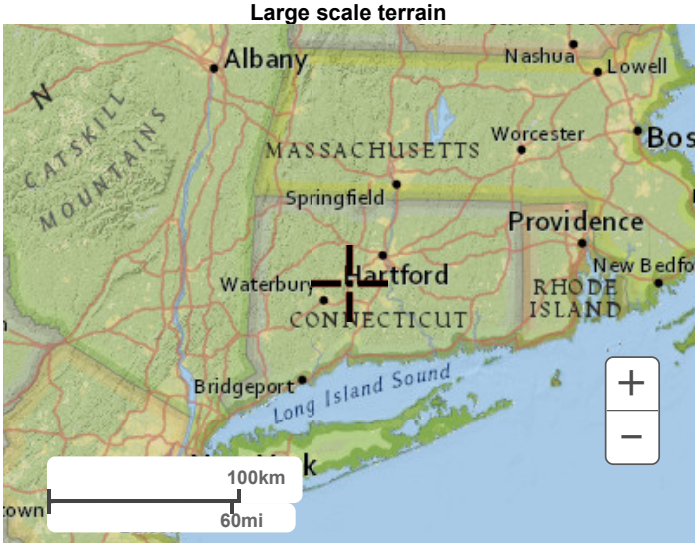
Maps & aerials

Small scale terrain



Large scale terrain



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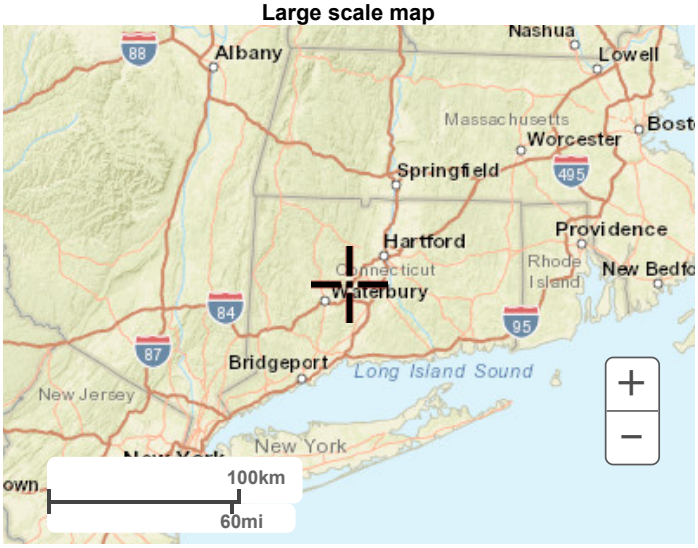

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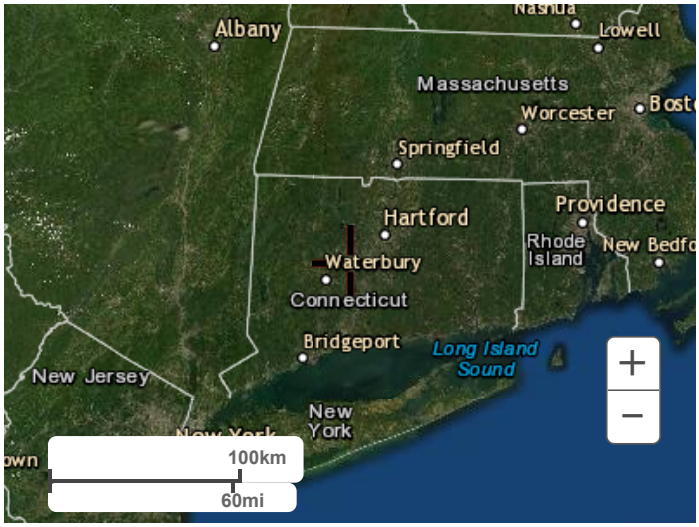

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Disclaimer

NOAA Atlas 14, Volume 10, Version 3
Location name: Southington, Connecticut, USA*
Latitude: 41.6271°, Longitude: -72.8862°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.14** (3.20-5.29)	**4.99** (3.86-6.38)	**6.38** (4.92-8.20)	**7.52** (5.77-9.72)	**9.11** (6.77-12.3)	**10.3** (7.51-14.3)	**11.5** (8.17-16.6)	**12.9** (8.69-19.1)	**14.8** (9.62-22.8)	**16.4** (10.4-25.8)
10-min	**2.93** (2.27-3.74)	**3.53** (2.74-4.52)	**4.52** (3.49-5.79)	**5.33** (4.09-6.88)	**6.45** (4.79-8.73)	**7.30** (5.32-10.1)	**8.18** (5.78-11.8)	**9.15** (6.15-13.5)	**10.5** (6.82-16.2)	**11.6** (7.36-18.3)
15-min	**2.30** (1.78-2.94)	**2.77** (2.15-3.54)	**3.54** (2.73-4.55)	**4.18** (3.21-5.40)	**5.06** (3.76-6.85)	**5.72** (4.17-7.93)	**6.42** (4.54-9.23)	**7.18** (4.83-10.6)	**8.25** (5.34-12.7)	**9.11** (5.77-14.3)
30-min	**1.57** (1.22-2.01)	**1.89** (1.46-2.41)	**2.41** (1.86-3.09)	**2.84** (2.18-3.66)	**3.43** (2.55-4.64)	**3.87** (2.82-5.37)	**4.34** (3.07-6.25)	**4.85** (3.27-7.19)	**5.58** (3.62-8.59)	**6.18** (3.91-9.71)
60-min	**0.995** (0.771-1.27)	**1.19** (0.925-1.53)	**1.52** (1.17-1.95)	**1.79** (1.37-2.31)	**2.16** (1.61-2.93)	**2.44** (1.78-3.39)	**2.74** (1.94-3.94)	**3.06** (2.06-4.53)	**3.52** (2.28-5.42)	**3.90** (2.47-6.13)
2-hr	**0.650** (0.506-0.824)	**0.776** (0.604-0.986)	**0.982** (0.762-1.25)	**1.15** (0.890-1.48)	**1.39** (1.04-1.87)	**1.56** (1.15-2.16)	**1.75** (1.25-2.52)	**1.96** (1.33-2.89)	**2.27** (1.48-3.47)	**2.52** (1.60-3.95)
3-hr	**0.501** (0.392-0.634)	**0.599** (0.468-0.758)	**0.759** (0.591-0.964)	**0.891** (0.690-1.14)	**1.07** (0.806-1.44)	**1.21** (0.890-1.67)	**1.35** (0.970-1.95)	**1.52** (1.03-2.24)	**1.77** (1.15-2.70)	**1.97** (1.25-3.08)
6-hr	**0.318** (0.250-0.400)	**0.383** (0.301-0.482)	**0.489** (0.383-0.618)	**0.577** (0.449-0.734)	**0.698** (0.528-0.935)	**0.788** (0.584-1.08)	**0.885** (0.639-1.27)	**1.00** (0.679-1.46)	**1.17** (0.766-1.78)	**1.32** (0.842-2.05)
12-hr	**0.195** (0.154-0.243)	**0.238** (0.188-0.298)	**0.309** (0.243-0.388)	**0.368** (0.288-0.464)	**0.448** (0.341-0.598)	**0.508** (0.379-0.696)	**0.573** (0.417-0.822)	**0.652** (0.444-0.949)	**0.774** (0.507-1.17)	**0.878** (0.562-1.36)
24-hr	**0.115** (0.091-0.142)	**0.143** (0.113-0.177)	**0.189** (0.150-0.235)	**0.227** (0.179-0.285)	**0.279** (0.214-0.372)	**0.318** (0.239-0.435)	**0.361** (0.265-0.519)	**0.415** (0.283-0.601)	**0.501** (0.329-0.753)	**0.576** (0.370-0.885)
2-day	**0.064** (0.051-0.079)	**0.082** (0.065-0.101)	**0.110** (0.088-0.136)	**0.133** (0.106-0.166)	**0.166** (0.128-0.220)	**0.189** (0.144-0.259)	**0.216** (0.161-0.312)	**0.251** (0.172-0.362)	**0.309** (0.203-0.463)	**0.361** (0.232-0.551)
3-day	**0.047** (0.037-0.057)	**0.059** (0.048-0.073)	**0.080** (0.064-0.099)	**0.097** (0.077-0.121)	**0.121** (0.094-0.161)	**0.138** (0.106-0.189)	**0.158** (0.118-0.228)	**0.184** (0.126-0.265)	**0.228** (0.150-0.340)	**0.267** (0.172-0.407)
4-day	**0.037** (0.030-0.046)	**0.048** (0.038-0.058)	**0.064** (0.052-0.079)	**0.078** (0.062-0.097)	**0.097** (0.075-0.128)	**0.111** (0.085-0.151)	**0.126** (0.095-0.182)	**0.147** (0.101-0.211)	**0.182** (0.120-0.271)	**0.213** (0.138-0.324)
7-day	**0.026** (0.021-0.031)	**0.032** (0.026-0.039)	**0.043** (0.034-0.052)	**0.051** (0.041-0.063)	**0.064** (0.050-0.084)	**0.072** (0.055-0.098)	**0.082** (0.062-0.117)	**0.095** (0.066-0.136)	**0.117** (0.077-0.173)	**0.136** (0.088-0.205)
10-day	**0.021** (0.017-0.025)	**0.026** (0.021-0.031)	**0.033** (0.027-0.041)	**0.040** (0.032-0.049)	**0.049** (0.038-0.064)	**0.055** (0.042-0.074)	**0.063** (0.047-0.089)	**0.072** (0.050-0.102)	**0.087** (0.058-0.129)	**0.100** (0.065-0.151)
20-day	**0.015** (0.012-0.018)	**0.018** (0.014-0.021)	**0.022** (0.018-0.026)	**0.025** (0.020-0.031)	**0.030** (0.023-0.038)	**0.033** (0.025-0.044)	**0.037** (0.028-0.051)	**0.042** (0.029-0.059)	**0.048** (0.032-0.071)	**0.054** (0.035-0.082)
30-day	**0.013** (0.010-0.015)	**0.014** (0.012-0.017)	**0.017** (0.014-0.021)	**0.019** (0.016-0.024)	**0.023** (0.018-0.029)	**0.025** (0.019-0.033)	**0.028** (0.020-0.038)	**0.030** (0.021-0.043)	**0.035** (0.023-0.050)	**0.038** (0.025-0.057)
45-day	**0.010** (0.009-0.013)	**0.012** (0.010-0.014)	**0.014** (0.011-0.016)	**0.015** (0.012-0.018)	**0.017** (0.014-0.022)	**0.019** (0.015-0.025)	**0.021** (0.015-0.028)	**0.023** (0.016-0.032)	**0.025** (0.017-0.036)	**0.027** (0.018-0.040)
60-day	**0.009** (0.008-0.011)	**0.010** (0.008-0.012)	**0.012** (0.009-0.014)	**0.013** (0.010-0.015)	**0.015** (0.011-0.018)	**0.016** (0.012-0.020)	**0.017** (0.013-0.023)	**0.018** (0.013-0.026)	**0.020** (0.013-0.029)	**0.021** (0.014-0.032)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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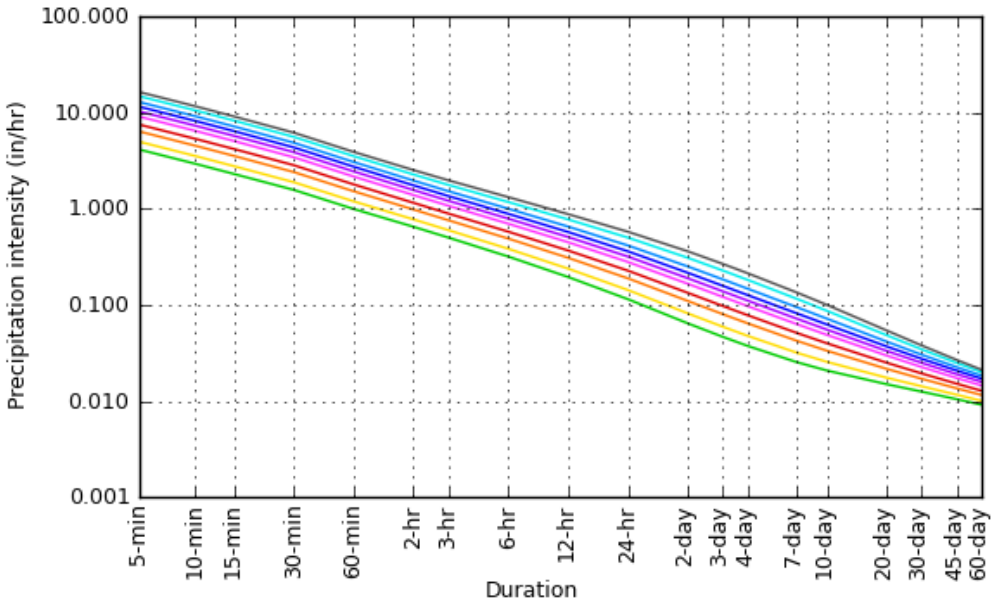
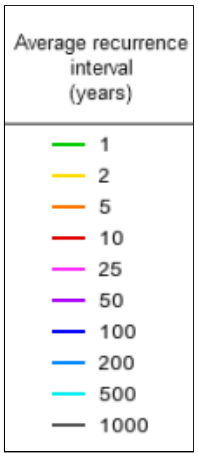
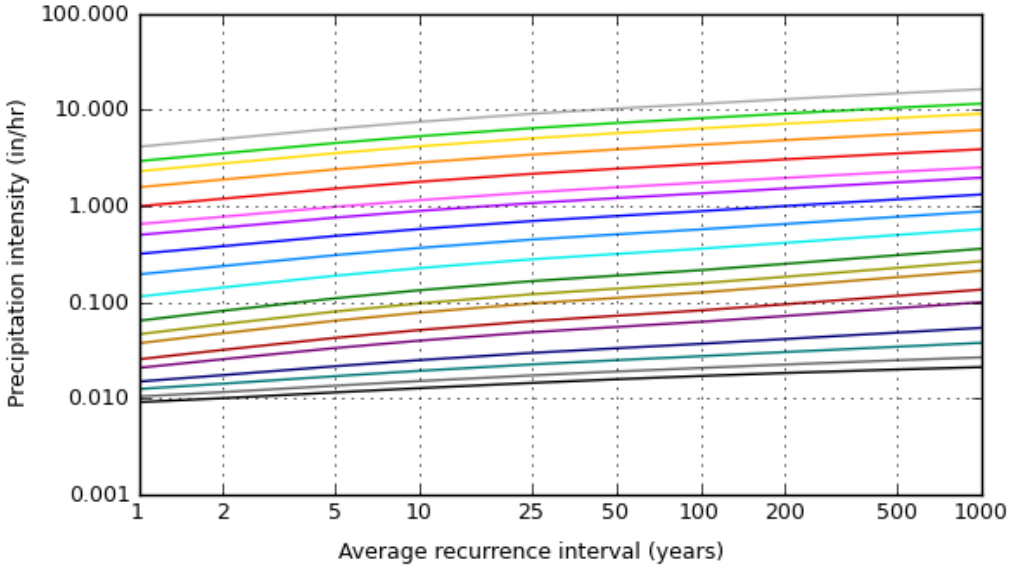
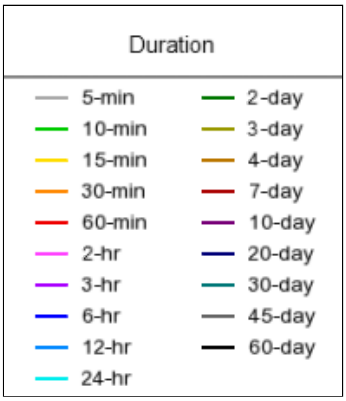
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 41.6271°, Longitude: -72.8862°









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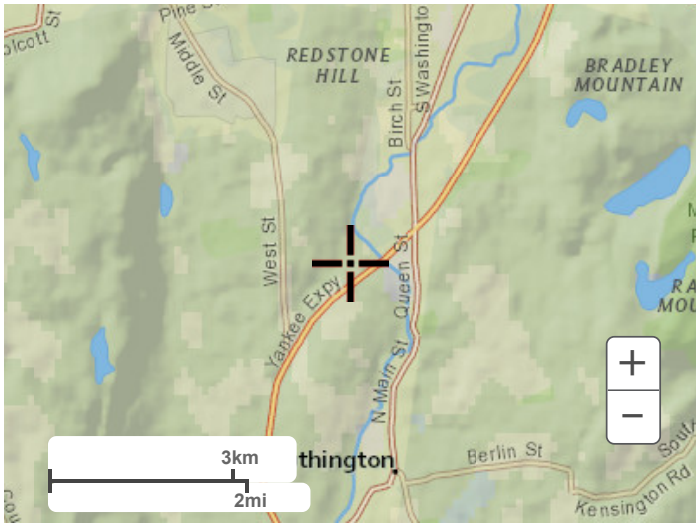
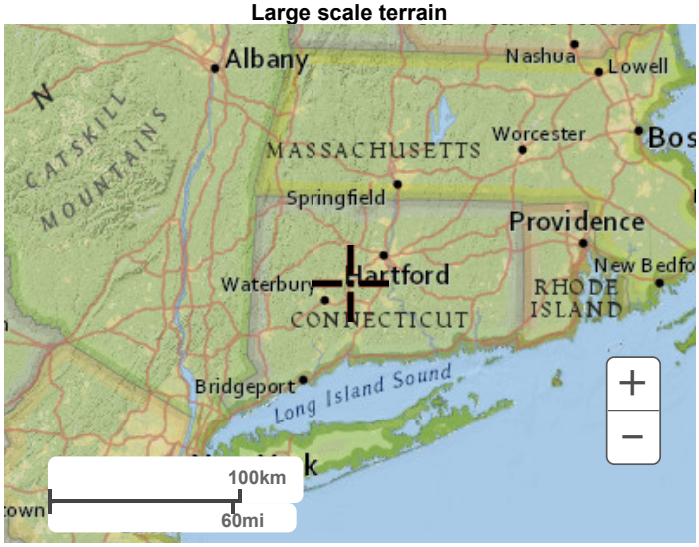
Maps & aerials

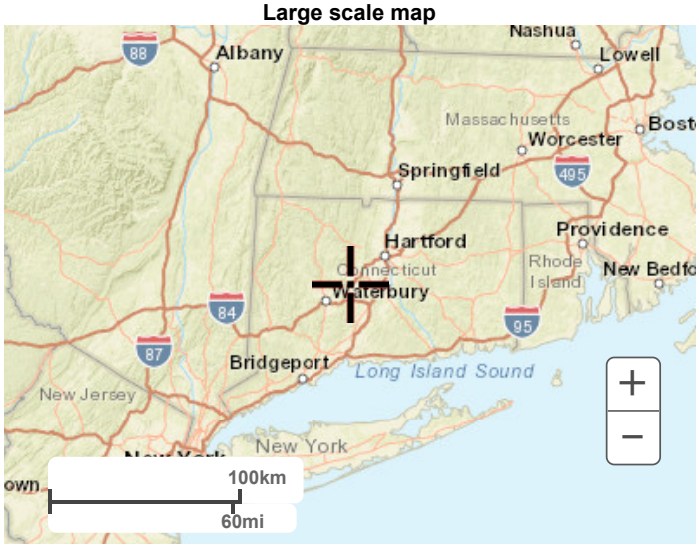
Small scale terrain



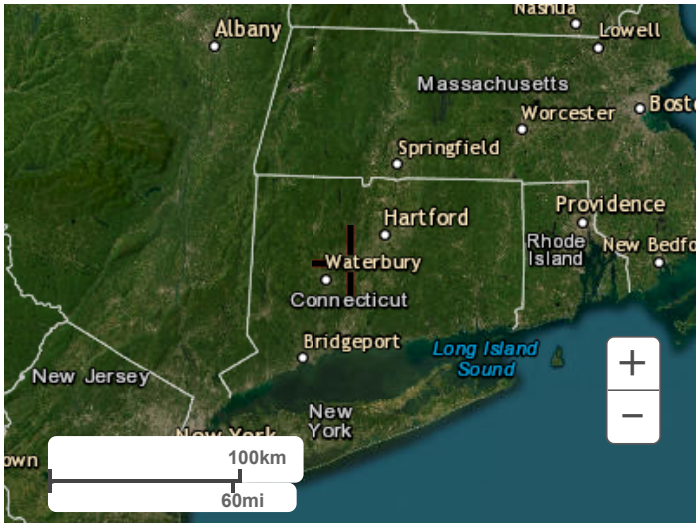
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Johnson Southington
53 Spring Street
Southington, CT
Bohler Job Number: CTA220027.00
April 13, 2023

Groundwater Recharge Volume Calculations

Required Recharge Volume - A Soils (0.40 in.)	
Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Percent impervious area	0.000
Recharge Volume Required (cf)	**0**
Required Recharge Volume - B Soils (0.25 in.)	
Area (ac)	22.790
Proposed Site Impervious Area (ac)	10.900
Percent impervious area	0.478
Recharge Volume Required (cf)	**9,892**
Required Recharge Volume - C Soils (0.10 in.)	
Area (ac)	3.820
Proposed Site Impervious Area (ac)	0.200
Percent impervious area	0.052
Recharge Volume Required (cf)	**73**
Required Recharge Volume - D Soils (0.0 in.-waived)	
Total Recharge Volume Required (cf)	**9,964**
Provided Recharge Volume*	
PP-2.1	1,775
Total Recharge Volume Provided (cf)	**1,775**

*Volume provided below lowest outlet in cubic feet (cf)

Johnson Southington
53 Spring Street
Southington, CT
Bohler Job Number: CTA220027.00
April 13, 2023

Water Quality Calculations - Water Quality Volume

From CT 2004 Stormwater Quality Manual:

$$WQV = \frac{(1")(R)(A)}{12}$$

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

WQV = water quality volume (ac-ft)
R = volumetric runoff coefficient
I = percent impervious cover
A = site area in acres

Watershed Area	Structure	Total Area		Impervious Area		Impervious Cover	Volumetric Runoff Coefficient	Water Quality Volume (WQV)		Pretreatment Volume Required[1]	Pretreatment Volume Provided	WQV provided	Notes
ID	ID	ac	ft^2	ac	ft^2	%	R	acre-feet	ft^3	ft^3	ft^3	ft^3	
PD-1.1	PP-1.1	13.123	571,628	10.125	441,060	77.16	0.744	0.814	35,461	3,546	3,810	35,870	-Pretreatment via Forebay -Micropool volume=8,060 cf -WQV @ elev 176.5
PD-2.1	PP-2.1	1.229	53,519	0.469	20,425	38.16	0.393	0.040	1,755	439	439	1,775	-Pretreatment via check dams in bioswale -OCS Low orifice @ 197.5
PD-3.1	PP-3.1	8.437	367,507	3.870	168,594	45.88	0.463	0.325	14,176	1,418	4,688	16,553	-Pretreatment via Forebay -Micropool volume=3,430 cf -WQV @ elev 186.6
TOTALS			992,654		630,079	63.47%			51,392			54,198	

1- 10% of WQV for Stormwater ponds, 25% for infiltration practice

Johnson Southington
53 Spring Street
Southington, CT
Bohler Job Number: CTA220027.00
April 13, 2023

Water Quality Calculations - Water Quality Flow

From CT 2004 Stormwater Quality Manual:

$$WQF = (q_u)(A)(Q)$$

$$Q = \frac{[WQV(acre-feet) \times [12(inches/foot)]]}{DrainageArea(acres)}$$

$$CN = \frac{1000}{[10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{\frac{1}{2}}]}$$

WQF = water quality flow (cfs)
q_u = unit peak discharge,
A = Area (sq. miles)
Q = runoff depth (in watershed inches)
CN = Runoff Curve Number
P = design preciptation, inches, (1" for water quality storm)
T_c = time of concentration
I_a = Initial abstraction, inches, from Table 4-1, Chapter 4, TR-55

$$WQV = \frac{(1")(R)(A)}{12}$$

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

WQV = water quality volume (ac-ft)
R = volumetric runoff coefficient
I = percent impervious cover
A = site area in acres

Watershed Area	Structure ID	Proprietary Structure	Total Area			Imp Area		Imp Cover	R	WQV	Q	P	CN	T_c		I_a	I_a/P	q_u [1]	WQF Req.	WQF Provided
			ft^2	ac	mi^2	ft^2	ac	%	-	acre-feet	in	in	-	mins	hours	in	-	$cfs/mi^2/in$	cfs	cfs
PD-1.1 to FES 150	HDS 150	CDS 2015-4	61,500	1.412	0.0022	10,000	0.230	16.26	0.196	0.023	0.20	1.00	86	6.0	0.1	0.326	0.326	650	**0.28**	**1.40**

1- From Exhibit 4-III: Unit peak discharge (q_u) for SCS type III rainfall distribution, Urban Hydrology for Small Watersheds (TR-55), USDS< SCS, June 1986.

2. Compute the time of concentration (t_c) based on the methods described in Chapter 3 of TR-55. A minimum value of 0.167 hours (10 minutes) should be used. For sheet flow, the flow path should not be longer than 300 feet.

3. Using the computed CN, t_c, and drainage area (A) in acres, compute the peak discharge for the water quality storm (i.e., the water quality flow [WQF]), based on the procedures described in Chapter 4 of TR-55.

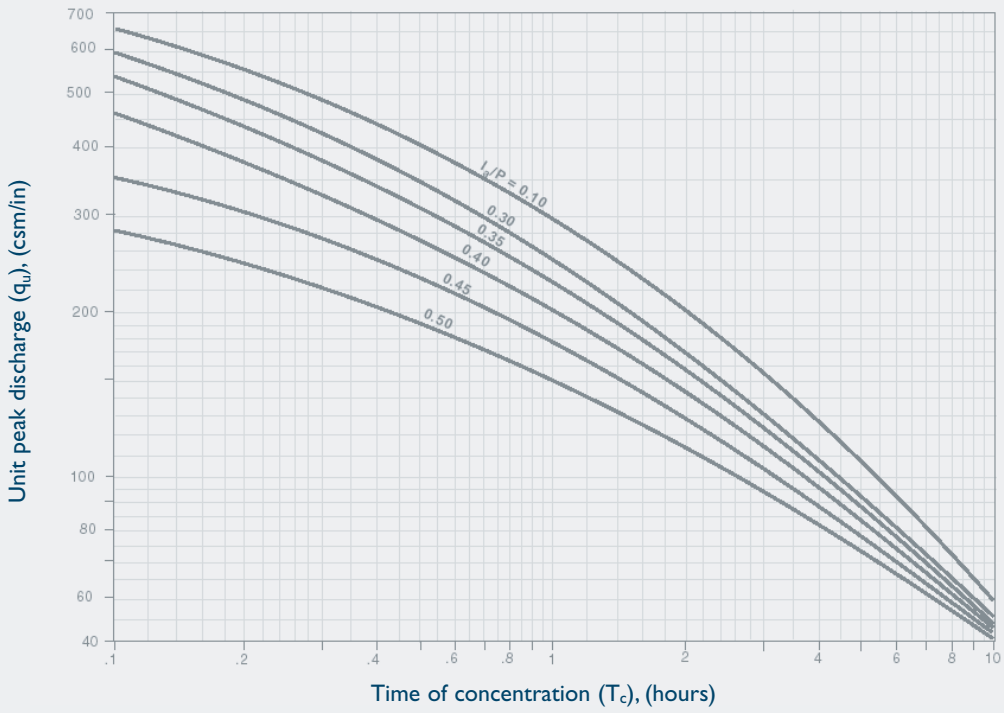
   ❍ *Read initial abstraction (I_a) from Table 4-1 in Chapter 4 of TR-55 (reproduced below); compute I_a/P*

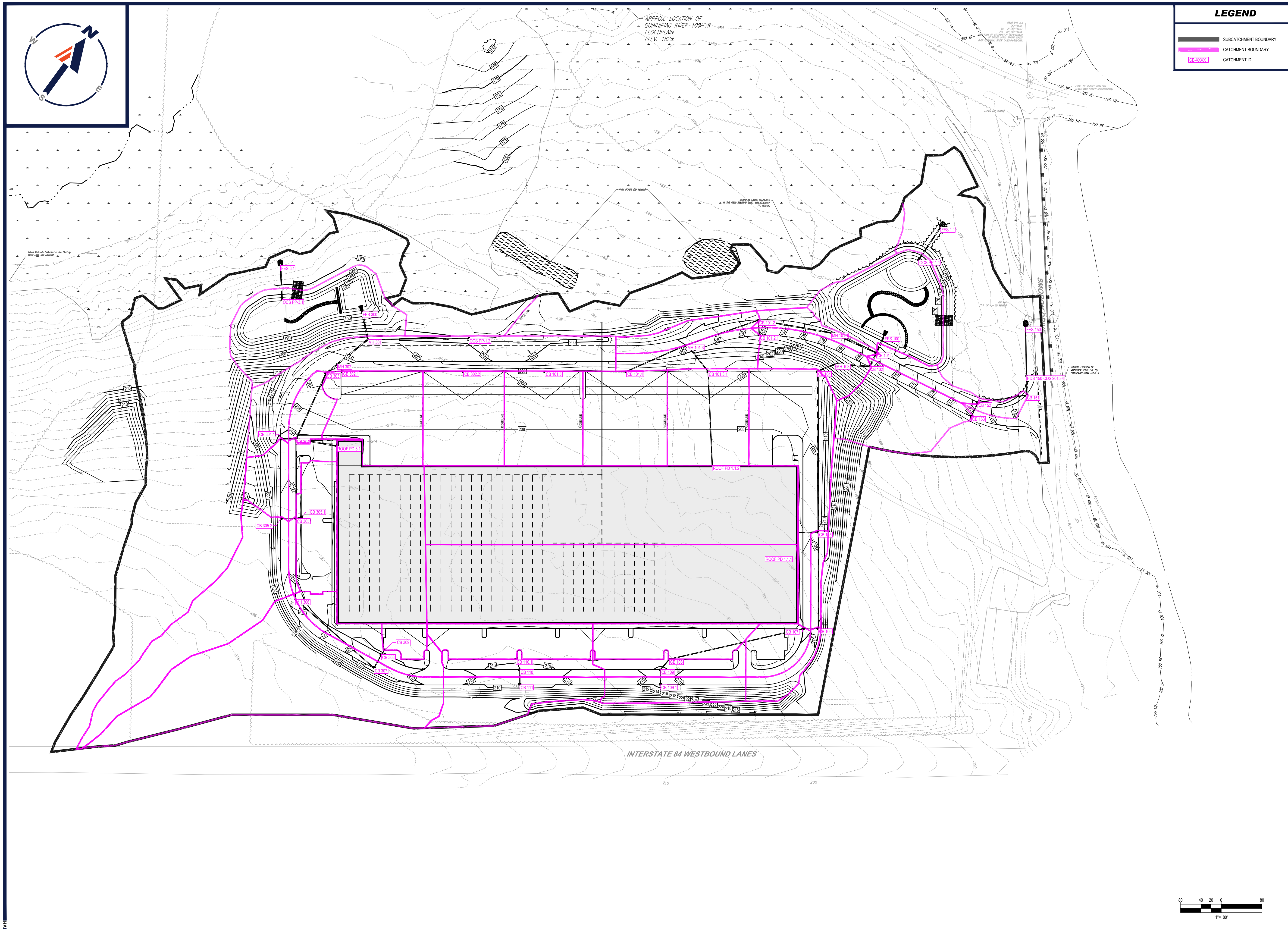
Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)	Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	55	1.636	70	0.857	85	0.353
41	2.878	56	1.571	71	0.817	86	0.326
42	2.762	57	1.509	72	0.778	87	0.299
43	2.651	58	1.448	73	0.740	88	0.273
44	2.545	59	1.390	74	0.703	89	0.247
45	2.444	60	1.333	75	0.667	90	0.222
46	2.348	61	1.279	76	0.632	91	0.198
47	2.255	62	1.226	77	0.597	92	0.174
48	2.167	63	1.175	78	0.564	93	0.151
49	2.082	64	1.125	79	0.532	94	0.128
50	2.000	65	1.077	80	0.500	95	0.105
51	1.922	66	1.030	81	0.469	96	0.083
52	1.846	67	0.985	82	0.439	97	0.062
53	1.774	68	0.941	83	0.410	98	0.041
54	1.704	69	0.899	84	0.381		

   ❍ *Read the unit peak discharge (q_u) from Exhibit 4-III in Chapter 4 of TR-55 (reproduced below) for appropriate t_c*

Exhibit 4-111 Unit peak discharge (q_u) for NRCS (SCS) type III rainfall distribution





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PROJECT No.:	CTA220027.00
DRAWN BY:	VEH / KJS
CHECKED BY:	CWE
DATE:	04/17/2023
CAD I.D.:	CTA220027.00-DRNE-0A

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

JOHNSON DEVELOPMENT ASSOCIATES, INC.

PROPOSED DEVELOPMENT

MAP: 156 BLOCK: NULL LOT: 006
53 SPRING STREET,
TOWN OF SOUTHINGTON,
HARTFORD COUNTY,
CONNECTICUT

BOHLER
65 LaSALLE ROAD, SUITE 401
WEST HARTFORD, CT 06107
Phone: (860) 333-8900
www.BohlerEngineering.com

C.W. EVANS
PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 35060
PENNSYLVANIA LICENSE No. 90701

SHEET TITLE:

PROPOSED CATCHMENT AREAS

SHEET NUMBER:
PDA-C

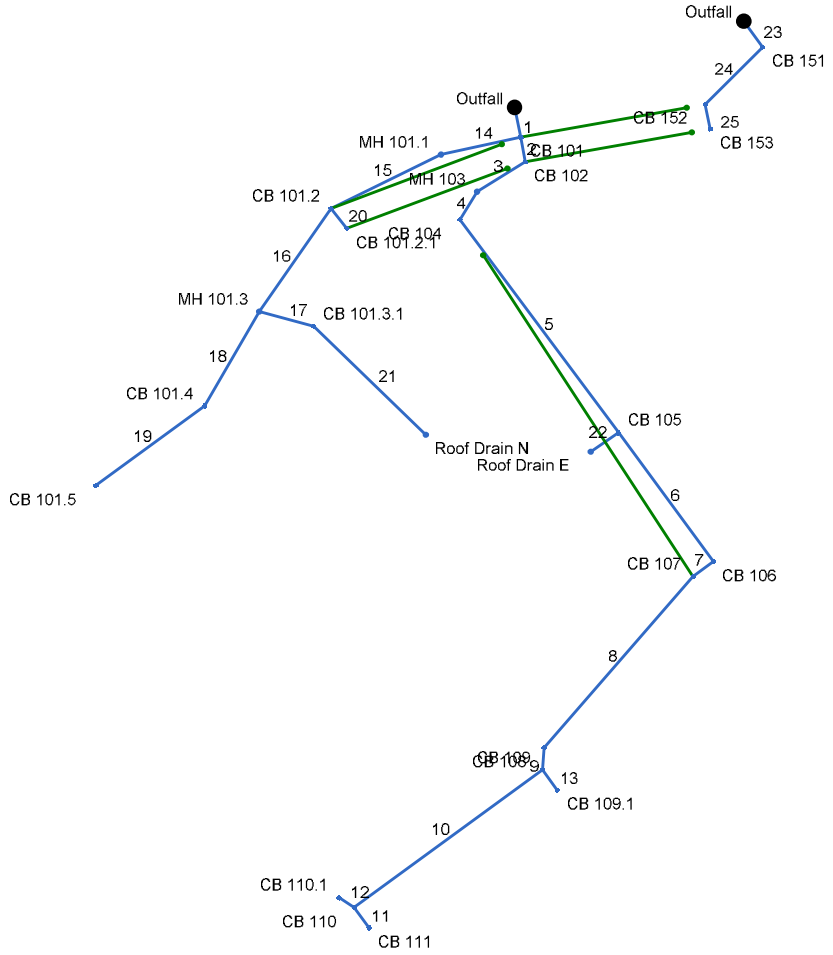
ORG. DATE - 04/17/2023

Johnson Southington
53 Spring Street
Southington, CT
Bohler Job Number: CTA220027.00
April 13, 2023

Proposed Rational Method Runoff Coefficients Summary

	Land Use							
	Woods (sf)	Grassed (sf)	Impervious (sf)	Other (sf)				
Rational Runoff Coefficient	0.15	0.3	0.9	0	Total Drainage Area (sf)	Total Drainage Area (A, ac)	Composite Runoff Coefficient	Time of Conc. (tc, min)
Structure ID								
System 100								
CB 101	0	3,397	3,740	0	7,137	0.16	0.61	6
CB 102	0	13,521	3,619	0	17,140	0.39	0.43	6
MH 103	-	-	-	-	-	-	-	-
CB 104	0	15,080	28,967	0	44,047	1.01	0.69	6
CB 105	0	1,722	2,935	0	4,657	0.11	0.68	6
CB 106	0	3,755	3,016	0	6,771	0.16	0.57	6
CB 107	0	3,553	7,264	0	10,817	0.25	0.70	6
CB 108	0	3,361	17,225	0	20,586	0.47	0.80	6
CB 109	0	5,684	5,251	0	10,935	0.25	0.59	6
CB 110	0	6,085	5,115	0	11,200	0.26	0.57	6
CB 111	989	17,226	4,903	0	23,118	0.53	0.42	6
CB 110.1	0	3,370	18,045	0	21,415	0.49	0.81	6
CB 109.1	0	9,650	4,294	0	13,944	0.32	0.48	6
MH 101.1	-	-	-	-	-	-	-	-
CB 101.2	0	5,889	4,357	0	10,246	0.24	0.56	6
MH 101.3	-	-	-	-	-	-	-	-
CB 101.3.1	0	716	29,685	0	30,401	0.70	0.89	6
CB 101.4	0	369	30,464	0	30,833	0.71	0.89	6
CB 101.5	0	296	28,244	0	28,540	0.66	0.89	6
CB 101.2.1	0	10,314	4,366	0	14,680	0.34	0.48	6
Roof Drain N-PD 1.1.2	0	0	113,483	0	113,483	2.61	0.90	6
Roof Drain E-PD 1.1.1	0	0	113,168	0	113,168	2.60	0.90	6
CB 151	0	1,150	2,115	0	3,265	0.07	0.69	6
CB 152	0	3,861	3,354	0	7,215	0.17	0.58	6
CB 153	0	27,085	3,380	0	30,465	0.70	0.37	6
System 300								
MH 301	-	-	-	-	-	-	-	-
MH 302	-	-	-	-	-	-	-	-
CB 303	0	644	7,842	0	8,486	0.19	0.85	6
CB 304	0	1,403	4,978	0	6,381	0.15	0.77	6
CB 305	0	0	2,148	0	2,148	0.05	0.90	6
CB 305.2	5,911	35,620	7,892	0	49,423	1.13	0.38	6
CB 305.1	0	4,371	15,452	0	19,823	0.46	0.77	6
CB 304.1	0	8,042	2,380	0	10,422	0.24	0.44	6
MH 306	-	-	-	-	-	-	-	-
CB 307	29,438	53,564	5,657	0	88,659	2.04	0.29	6
CB 308	0	8,220	6,816	0	15,036	0.35	0.57	6
CB 309	0	1,128	4,263	0	5,391	0.12	0.77	6
CB 302.1	0	3,073	28,032	0	31,105	0.71	0.84	6
CB 302.2	0	0	29,680	0	29,680	0.68	0.90	6
Roof Drain PP-3.1	0	0	56,377	0	56,377	1.29	0.90	6

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



Project File: CTA220027.00 - Series 100.stm	Number of lines: 25	Date: 4/18/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	36	78	Comb	0.00	0.16	0.61	6.0	176.00	2.22	176.80	30	Cir	0.012	1.50	182.52	FES 100-CB 101
2	1	30	2	Comb	0.00	0.39	0.43	6.0	176.80	0.67	177.00	30	Cir	0.012	1.41	182.52	CB 101-CB 102
3	2	67	68	MH	0.00	0.00	0.00	0.0	177.00	9.70	183.50	30	Cir	0.012	0.50	193.99	CB 102-MH 103
4	3	39	-27	Comb	0.00	1.01	0.69	6.0	183.50	9.76	187.30	30	Cir	0.012	1.41	204.32	MH 103-CB 104
5	4	315	-68	Comb	0.00	0.11	0.69	6.0	198.90	0.52	200.53	30	Cir	0.012	1.50	207.58	CB 104-CB 105
6	5	190	0	Comb	0.00	0.16	0.57	6.0	200.53	0.60	201.67	18	Cir	0.012	1.50	209.64	CB 105-CB 106
7	6	30	90	Comb	0.00	0.25	0.70	6.0	201.67	0.60	201.85	18	Cir	0.012	0.50	209.64	CB 106-CB 107
8	7	269	-13	Comb	0.00	0.47	0.80	6.0	201.85	0.60	203.47	18	Cir	0.012	0.97	210.03	CB 107-CB 108
9	8	26	-36	Comb	0.00	0.25	0.59	6.0	203.47	0.61	203.63	18	Cir	0.012	1.57	209.40	CB 108-CB 109
10	9	276	49	Comb	0.00	0.26	0.57	6.0	203.63	0.60	205.28	18	Cir	0.012	2.13	208.83	CB 109-CB 110
11	10	30	-90	Comb	0.00	0.53	0.42	6.0	205.28	0.73	205.50	15	Cir	0.012	1.00	208.83	CB 110-CB 111
12	10	21	69	Comb	0.00	0.49	0.81	6.0	205.28	5.62	206.48	12	Cir	0.012	1.00	210.03	CB 110-CB 110.1
13	9	30	-41	Comb	0.00	0.32	0.48	6.0	203.63	7.23	205.80	15	Cir	0.012	1.00	209.40	CB 109-CB 109.1
14	1	97	89	MH	0.00	0.00	0.00	0.0	176.86	4.14	180.87	24	Cir	0.012	0.28	187.34	CB 101-MH 101.1
15	14	145	-14	Comb	0.00	0.24	0.56	6.0	180.87	4.15	186.89	24	Cir	0.012	1.50	194.32	MH 101.1-CB 101.2
16	15	149	-29	MH	0.00	0.00	0.00	0.0	186.89	6.12	196.00	18	Cir	0.012	1.00	199.95	CB 101.2-MH 101.3
17	16	67	-110	Comb	0.00	0.70	0.89	6.0	196.00	7.07	200.72	18	Cir	0.012	0.81	205.00	MH 101.3-CB 101.3.
18	16	129	-5	Comb	0.00	0.71	0.89	6.0	196.00	1.16	197.50	18	Cir	0.012	0.69	205.00	MH 101.3-CB 101.4
19	18	160	24	Comb	0.00	0.66	0.89	6.0	200.50	0.59	201.45	15	Cir	0.012	1.00	205.00	CB 101.4-CB 101.5
20	15	30	-102	Comb	0.00	0.34	0.48	6.0	190.50	1.00	190.80	15	Cir	0.012	1.00	194.32	CB 101.2-CB 101.2.
21	17	185	29	MH	0.00	2.61	0.90	6.0	200.72	2.28	204.94	18	Cir	0.012	1.00	209.00	CB 101.3.1-Roof dr
22	5	40	92	MH	0.00	2.60	0.90	6.0	200.53	9.15	204.19	18	Cir	0.012	1.00	209.00	CB 105-Roof drain
23	End	38	54	Comb	0.00	0.07	0.69	6.0	161.00	6.54	163.50	15	Cir	0.012	1.49	167.10	FES 150-CB 151

Project File: CTA220027.00 - Series 100.stm

Number of lines: 25

Date: 4/18/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	23	96	81	Comb	0.00	0.17	0.58	6.0	163.50	4.05	167.40	15	Cir	0.012	1.30	171.41	CB 151-CB 152
25	24	30	-57	Comb	0.00	0.70	0.37	6.0	167.40	1.67	167.90	15	Cir	0.012	1.00	171.41	CB 152-CB 153

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	36	0.16	12.26	0.61	0.10	9.58	6.0	10.8	5.2	50.03	66.19	10.39	30	2.22	176.00	176.80	178.51	179.10	177.13	182.52	FES 100-CB 101
2	1	30	0.39	6.84	0.43	0.17	4.99	6.0	10.7	5.2	26.18	36.28	6.35	30	0.67	176.80	177.00	179.10	178.74	182.52	182.52	CB 101-CB 102
3	2	67	0.00	6.45	0.00	0.00	4.82	0.0	10.5	5.3	25.50	138.4	7.03	30	9.70	177.00	183.50	178.74	185.22	182.52	193.99	CB 102-MH 103
4	3	39	1.01	6.45	0.69	0.70	4.82	6.0	10.4	5.3	25.62	138.8	7.11	30	9.76	183.50	187.30	185.22	189.02	193.99	204.32	MH 103-CB 104
5	4	315	0.11	5.44	0.69	0.08	4.13	6.0	9.7	5.5	22.80	31.96	6.91	30	0.52	198.90	200.53	200.46	202.15	204.32	207.58	CB 104-CB 105
6	5	190	0.16	2.73	0.57	0.09	1.71	6.0	9.1	5.7	9.75	8.81	5.52	18	0.60	200.53	201.67	202.15	203.55	207.58	209.64	CB 105-CB 106
7	6	30	0.25	2.57	0.70	0.18	1.62	6.0	9.0	5.7	9.28	8.81	5.25	18	0.60	201.67	201.85	204.26	204.46	209.64	209.64	CB 106-CB 107
8	7	269	0.47	2.32	0.80	0.38	1.44	6.0	8.1	6.0	8.73	8.82	4.94	18	0.60	201.85	203.47	204.67	206.26	209.64	210.03	CB 107-CB 108
9	8	26	0.25	1.85	0.59	0.15	1.07	6.0	8.0	6.1	6.50	8.86	3.68	18	0.61	203.47	203.63	206.63	206.71	210.03	209.40	CB 108-CB 109
10	9	276	0.26	1.28	0.57	0.15	0.77	6.0	6.4	6.7	5.18	8.79	2.93	18	0.60	203.63	205.28	207.04	207.62	209.40	208.83	CB 109-CB 110
11	10	30	0.53	0.53	0.42	0.22	0.22	6.0	6.0	6.9	1.54	5.99	1.26	15	0.73	205.28	205.50	207.90	207.91	208.83	208.83	CB 110-CB 111
12	10	21	0.49	0.49	0.81	0.40	0.40	6.0	6.0	6.9	2.75	9.14	3.51	12	5.62	205.28	206.48	207.90	208.01	208.83	210.03	CB 110-CB 110.1
13	9	30	0.32	0.32	0.48	0.15	0.15	6.0	6.0	6.9	1.07	18.81	0.87	15	7.23	203.63	205.80	207.04	207.05	209.40	209.40	CB 109-CB 109.1
14	1	97	0.00	5.26	0.00	0.00	4.49	0.0	7.4	6.3	28.33	49.89	9.21	24	4.14	176.86	180.87	179.10	182.70	182.52	187.34	CB 101-MH 101.1
15	14	145	0.24	5.26	0.56	0.13	4.49	6.0	7.1	6.4	28.80	49.90	9.53	24	4.15	180.87	186.89	182.70	188.73	187.34	194.32	MH 101.1-CB 101
16	15	149	0.00	4.68	0.00	0.00	4.19	0.0	7.0	6.5	27.18	28.14	15.39	18	6.12	186.89	196.00	188.73	197.49	194.32	199.95	CB 101.2-MH 101
17	16	67	0.70	3.31	0.89	0.62	2.97	6.0	6.3	6.8	20.13	30.25	11.43	18	7.07	196.00	200.72	197.49	202.19	199.95	205.00	MH 101.3-CB 101
18	16	129	0.71	1.37	0.89	0.63	1.22	6.0	6.6	6.7	8.13	12.25	5.22	18	1.16	196.00	197.50	197.49	198.60	199.95	205.00	MH 101.3-CB 101
19	18	160	0.66	0.66	0.89	0.59	0.59	6.0	6.0	6.9	4.07	5.39	4.81	15	0.59	200.50	201.45	201.31	202.27	205.00	205.00	CB 101.4-CB 101.
20	15	30	0.34	0.34	0.48	0.16	0.16	6.0	6.0	6.9	1.13	7.00	3.66	15	1.00	190.50	190.80	190.84	191.22	194.32	194.32	CB 101.2-CB 101.
21	17	185	2.61	2.61	0.90	2.35	2.35	6.0	6.0	6.9	16.29	17.18	9.33	18	2.28	200.72	204.94	202.19	206.37	205.00	209.00	CB 101.3.1-Roof
22	5	40	2.60	2.60	0.90	2.34	2.34	6.0	6.0	6.9	16.23	34.41	9.27	18	9.15	200.53	204.19	202.15	205.62	207.58	209.00	CB 105-Roof drai

Project File: CTA220027.00 - Series 100.stm | Number of lines: 25 | Run Date: 4/18/2023

NOTES:Intensity = 37.23 / (Inlet time + 4.00) ^ 0.73; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	End	38	0.07	0.94	0.69	0.05	0.41	6.0	6.6	6.7	2.70	17.90	7.28	15	6.54	161.00	163.50	161.33	164.16	167.96	167.10	FES 150-CB 151
24	23	96	0.17	0.87	0.58	0.10	0.36	6.0	6.2	6.9	2.45	14.08	3.86	15	4.05	163.50	167.40	164.16	168.03	167.10	171.41	CB 151-CB 152
25	24	30	0.70	0.70	0.37	0.26	0.26	6.0	6.0	6.9	1.80	9.03	3.26	15	1.67	167.40	167.90	168.03	168.43	171.41	171.41	CB 152-CB 153

Project File: CTA220027.00 - Series 100.stm

Number of lines: 25

Run Date: 4/18/2023

NOTES:Intensity = 37.23 / (Inlet time + 4.00) ^ 0.73; Return period =Yrs. 10 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CB 101	0.68	0.39	0.60	0.46	Comb	4.0	2.73	0.00	2.31	1.35	0.050	2.53	0.020	0.020	0.013	0.10	5.06	0.07	3.70	0.0	24
2	CB 102	1.16	0.50	0.84	0.83	Comb	4.0	2.73	0.00	2.31	1.35	0.050	2.53	0.020	0.020	0.013	0.12	5.98	0.09	4.60	0.0	25
3	MH 103	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	CB 104	4.83	0.90	5.74	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.40	20.14	0.40	20.14	0.0	Off
5	CB 105	0.53	0.24	0.45	0.32	Comb	4.0	2.73	0.00	2.31	1.35	0.011	2.53	0.020	0.020	0.013	0.12	5.95	0.09	4.28	0.0	4
6	CB 106	0.63	0.00	0.39	0.24	Comb	4.0	2.73	0.00	2.31	1.35	0.011	2.53	0.020	0.020	0.013	0.11	5.52	0.08	3.87	0.0	5
7	CB 107	1.21	0.00	0.63	0.58	Comb	4.0	2.73	0.00	2.31	1.35	0.011	2.53	0.020	0.020	0.013	0.14	7.05	0.11	5.35	0.0	4
8	CB 108	2.61	0.00	2.61	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.25	12.37	0.25	12.37	0.0	Off
9	CB 109	1.02	0.00	1.02	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.18	9.07	0.18	9.07	0.0	Off
10	CB 110	1.03	0.00	1.03	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.18	9.09	0.18	9.09	0.0	Off
11	CB 111	1.54	0.00	1.54	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.23	11.56	0.23	11.56	0.0	Off
12	CB 110.1	2.75	0.00	2.75	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.33	16.45	0.33	16.45	0.0	Off
13	CB 109.1	1.07	0.00	1.07	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.19	9.29	0.19	9.29	0.0	Off
14	MH 101.1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
15	CB 101.2	0.93	0.00	0.54	0.39	Comb	4.0	2.73	0.00	2.31	1.35	0.050	2.53	0.020	0.020	0.013	0.10	4.81	0.07	3.47	0.0	1
16	MH 101.3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	CB 101.3.1	4.32	0.00	4.32	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.34	16.87	0.34	16.87	0.0	Off
18	CB 101.4	4.38	0.00	4.38	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.34	17.02	0.34	17.02	0.0	Off
19	CB 101.5	4.07	0.00	4.07	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.33	16.26	0.33	16.26	0.0	Off
20	CB 101.2.1	1.13	0.00	0.63	0.50	Comb	4.0	2.73	0.00	2.31	1.35	0.050	2.53	0.020	0.020	0.013	0.10	5.17	0.08	3.81	0.0	2
21	Roof Drain N	16.29	0.00	0.00	16.29	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
22	Roof Drain E	16.23	0.00	0.00	16.23	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
23	CB 151	0.34	0.00	0.24	0.09	Comb	4.0	2.73	0.00	2.31	1.35	0.050	2.53	0.020	0.020	0.013	0.07	3.28	0.04	2.02	0.0	Off

Project File: CTA220027.00 - Series 100.stm | Number of lines: 25 | Run Date: 4/18/2023

NOTES: Inlet N-Values = 0.016; Intensity = 37.23 / (Inlet time + 4.00) ^ 0.73; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	CB 152	0.68	0.46	0.64	0.51	Comb	4.0	2.73	0.00	2.31	1.35	0.050	2.53	0.020	0.020	0.013	0.10	5.20	0.08	3.84	0.0	Off
25	CB 153	1.80	0.83	1.12	1.50	Comb	4.0	2.73	0.00	2.31	1.35	0.030	2.53	0.020	0.020	0.013	0.16	7.80	0.13	6.32	0.0	Off

Project File: CTA220027.00 - Series 100.stm | Number of lines: 25 | Run Date: 4/18/2023

NOTES: Inlet N-Values = 0.016; Intensity = 37.23 / (Inlet time + 4.00) ^ 0.73; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

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	30	50.03	176.00	178.51	2.50	4.72	10.19	1.62	180.13	1.269	36	176.80	179.10	2.30**	4.72	10.59	1.74	180.84	1.101	1.185	n/a	1.50	n/a
2	30	26.18	176.80	179.10	2.30	3.65	5.54	0.80	179.90	0.000	30	177.00	178.74	1.74**	3.65	7.16	0.80	179.54	0.000	0.000	n/a	1.41	n/a
3	30	25.50	177.00	178.74	1.74	3.60	6.98	0.78	179.52	0.000	67	183.50	185.22 j	1.72**	3.60	7.08	0.78	186.00	0.000	0.000	n/a	0.50	n/a
4	30	25.62	183.50	185.22	1.72	3.60	7.12	0.78	186.00	0.000	39	187.30	189.02	1.72**	3.61	7.10	0.78	189.81	0.000	0.000	n/a	1.41	1.10
5	30	22.80	198.90	200.46	1.56*	3.22	7.07	0.71	201.17	0.000	315	200.53	202.15	1.62**	3.37	6.76	0.71	202.86	0.000	0.000	n/a	1.50	n/a
6	18	9.75	200.53	202.15	1.50	1.77	5.52	0.47	202.63	0.735	190	201.67	203.55	1.50	1.77	5.52	0.47	204.02	0.735	0.735	1.396	1.50	0.71
7	18	9.28	201.67	204.26	1.50	1.77	5.25	0.43	204.69	0.666	30	201.85	204.46	1.50	1.77	5.25	0.43	204.89	0.666	0.666	0.200	0.50	0.21
8	18	8.73	201.85	204.67	1.50	1.77	4.94	0.38	205.05	0.589	269	203.47	206.26	1.50	1.77	4.94	0.38	206.64	0.589	0.589	1.585	0.97	0.37
9	18	6.50	203.47	206.63	1.50	1.77	3.68	0.21	206.84	0.327	26	203.63	206.71	1.50	1.77	3.68	0.21	206.92	0.327	0.327	0.086	1.57	0.33
10	18	5.18	203.63	207.04	1.50	1.77	2.93	0.13	207.18	0.207	276	205.28	207.62	1.50	1.77	2.93	0.13	207.75	0.207	0.207	0.572	2.13	0.28
11	15	1.54	205.28	207.90	1.25	1.23	1.26	0.02	207.92	0.049	30	205.50	207.91	1.25	1.23	1.26	0.02	207.94	0.049	0.049	0.015	1.00	0.02
12	12	2.75	205.28	207.90	1.00	0.79	3.51	0.19	208.09	0.510	21	206.48	208.01	1.00	0.79	3.51	0.19	208.20	0.509	0.509	0.109	1.00	0.19
13	15	1.07	203.63	207.04	1.25	1.23	0.87	0.01	207.06	0.023	30	205.80	207.05	1.25	1.23	0.87	0.01	207.06	0.023	0.023	0.007	1.00	0.01
14	24	28.33	176.86	179.10	2.00	3.02	9.02	1.26	180.36	1.338	97	180.87	182.70 j	1.83**	3.02	9.39	1.37	184.07	1.163	1.250	n/a	0.28	n/a
15	24	28.80	180.87	182.70	1.83	3.02	9.55	1.41	184.11	0.000	145	186.89	188.73	1.84**	3.03	9.52	1.41	190.14	0.000	0.000	n/a	1.50	2.11
16	18	27.18	186.89	188.73	1.50	1.77	15.38	3.68	192.41	5.711	149	196.00	197.49 j	1.49**	1.77	15.39	3.68	201.18	5.338	5.525	n/a	1.00	3.68
17	18	20.13	196.00	197.49	1.49	1.76	11.40	2.04	199.53	0.000	67	200.72	202.19 j	1.47**	1.76	11.45	2.04	204.23	0.000	0.000	n/a	0.81	n/a
18	18	8.13	196.00	197.49	1.49	1.39	4.61	0.53	198.02	0.000	129	197.50	198.60 j	1.10**	1.39	5.83	0.53	199.13	0.000	0.000	n/a	0.69	0.37
19	15	4.07	200.50	201.31	0.81*	0.84	4.83	0.36	201.67	0.000	160	201.45	202.27	0.82**	0.85	4.80	0.36	202.62	0.000	0.000	n/a	1.00	n/a
20	15	1.13	190.50	190.84	0.34*	0.27	4.19	0.15	190.99	0.000	30	190.80	191.22	0.42**	0.36	3.14	0.15	191.37	0.000	0.000	n/a	1.00	0.15
21	18	16.29	200.72	202.19	1.47	1.74	9.27	1.37	203.56	0.000	185	204.94	206.37 j	1.43**	1.74	9.38	1.37	207.74	0.000	0.000	n/a	1.00	1.37
22	18	16.23	200.53	202.15	1.50	1.74	9.19	1.31	203.47	2.037	40	204.19	205.62 j	1.43**	1.74	9.35	1.36	206.98	1.765	1.901	n/a	1.00	1.36

Project File: CTA220027.00 - Series 100.stm | Number of lines: 25 | Run Date: 4/18/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

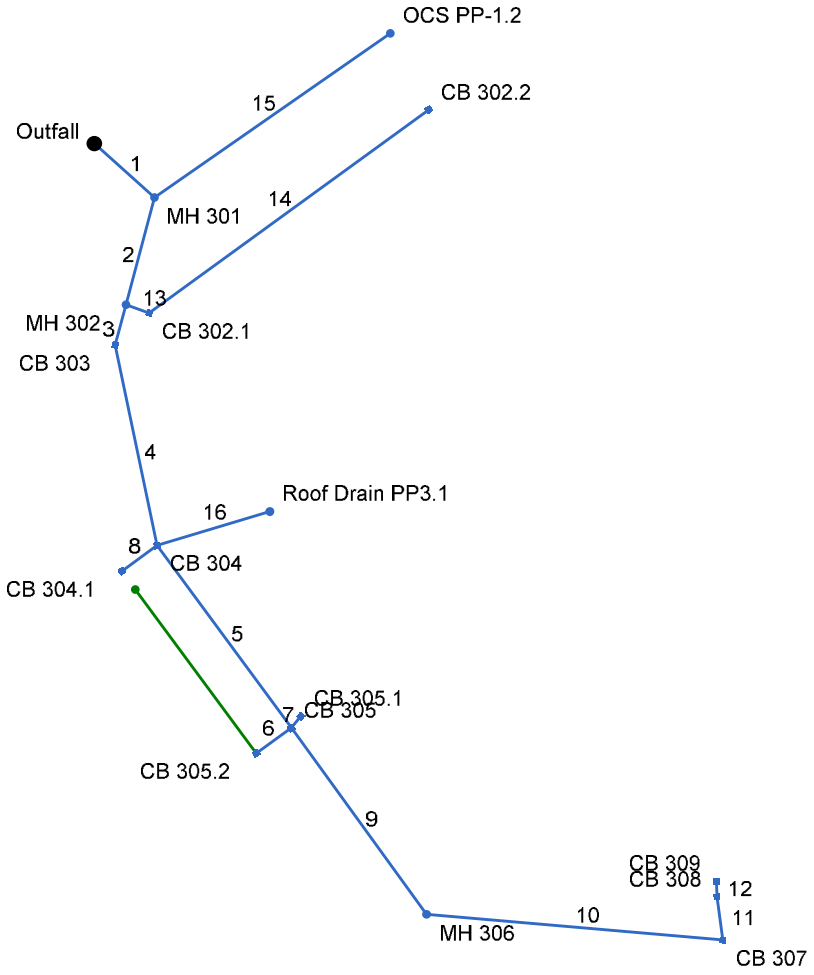
Hydraulic Grade Line Computations

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)
23	15	2.70	161.00	161.33	0.33	0.26	10.44	0.26	161.59	0.000	38	163.50	164.16	0.66**	0.66	4.12	0.26	164.42	0.000	0.000	n/a	1.49	n/a
24	15	2.45	163.50	164.16	0.66	0.62	3.74	0.25	164.41	0.000	96	167.40	168.03 j	0.63**	0.62	3.99	0.25	168.27	0.000	0.000	n/a	1.30	n/a
25	15	1.80	167.40	168.03	0.63	0.50	2.92	0.20	168.23	0.000	30	167.90	168.43 j	0.53**	0.50	3.61	0.20	168.63	0.000	0.000	n/a	1.00	n/a

Project File: CTA220027.00 - Series 100.stm | Number of lines: 25 | Run Date: 4/18/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

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



Project File: CTA220027.00 - Series 300.stm	Number of lines: 16	Date: 4/17/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	56	42	MH	0.00	0.00	0.00	0.0	186.00	2.70	187.50	30	Cir	0.012	0.98	200.93	FES 300-MH 301
2	1	77	63	MH	0.00	0.00	0.00	0.0	195.00	3.00	197.30	30	Cir	0.012	1.00	204.50	MH 301-MH 302
3	2	29	0	Comb	0.00	0.19	0.85	6.0	197.36	3.06	198.24	24	Cir	0.012	0.76	204.64	MH 302-CB 303
4	3	141	-27	Comb	0.00	0.15	0.77	6.0	198.24	3.08	202.60	24	Cir	0.012	1.50	210.27	CB 303-CB 304
5	4	156	-24	Comb	0.00	0.05	0.90	6.0	202.60	0.50	203.38	24	Cir	0.012	2.25	212.54	CB 304-CB 305
6	5	30	90	Comb	0.00	1.13	0.38	6.0	208.50	1.67	209.00	15	Cir	0.012	1.00	212.54	CB 305-CB 305.2
7	5	10	-105	Comb	0.00	0.46	0.77	6.0	206.50	4.83	207.00	15	Cir	0.012	1.00	210.73	CB 305-CB 305.1
8	4	30	66	Comb	0.00	0.24	0.44	6.0	206.50	0.73	206.72	15	Cir	0.012	1.00	210.27	CB 304-CB 304.1
9	5	159	0	MH	0.00	0.00	0.00	0.0	203.38	0.50	204.17	18	Cir	0.012	0.79	214.33	CB 305-MH 306
10	9	204	-49	Comb	0.00	2.04	0.29	6.0	204.17	0.50	205.19	15	Cir	0.012	1.50	208.89	MH 306-CB 307
11	10	30	-103	Comb	0.00	0.35	0.57	6.0	205.19	0.50	205.34	15	Cir	0.012	0.50	208.89	CB 307-CB 308
12	11	11	5	Comb	0.00	0.12	0.77	6.0	205.34	19.70	207.45	12	Cir	0.012	1.00	211.00	CB 308-CB 309
13	2	17	-85	Comb	0.00	0.71	0.84	6.0	199.50	2.94	200.00	18	Cir	0.012	1.28	204.77	MH 302-CB 302.1
14	13	238	-56	Comb	0.00	0.68	0.90	6.0	200.00	0.63	201.50	15	Cir	0.012	1.00	205.00	CB 302.1-CB 302.2
15	1	198	-77	MH	1.57	0.00	0.00	0.0	193.00	0.91	194.80	12	Cir	0.012	1.00	198.20	MH 301-OCS PP1.2
16	4	81	-95	MH	0.00	1.29	0.90	6.0	202.60	7.16	208.40	24	Cir	0.012	1.00	209.00	CB 304-Roof Drain

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Number of lines: 16

Date: 4/17/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	56	0.00	7.41	0.00	0.00	4.46	0.0	8.8	5.8	27.48	72.96	6.46	30	2.70	186.00	187.50	188.89	189.29	188.67	200.93	FES 300-MH 301
2	1	77	0.00	7.41	0.00	0.00	4.46	0.0	8.6	5.8	26.09	76.95	10.66	30	3.00	195.00	197.30	196.00	199.04	200.93	204.50	MH 301-MH 302
3	2	29	0.19	6.02	0.85	0.16	3.26	6.0	8.6	5.9	19.10	42.85	7.00	24	3.06	197.36	198.24	199.04	199.81	204.50	204.64	MH 302-CB 303
4	3	141	0.15	5.83	0.77	0.12	3.09	6.0	8.2	6.0	18.52	43.02	7.05	24	3.08	198.24	202.60	199.81	204.15	204.64	210.27	CB 303-CB 304
5	4	156	0.05	4.15	0.90	0.05	1.71	6.0	7.7	6.2	10.59	17.31	4.82	24	0.50	202.60	203.38	204.15	204.54	210.27	212.54	CB 304-CB 305
6	5	30	1.13	1.13	0.38	0.43	0.43	6.0	6.0	6.9	2.98	9.03	5.43	15	1.67	208.50	209.00	208.99	209.69	212.54	212.54	CB 305-CB 305.2
7	5	10	0.46	0.46	0.77	0.35	0.35	6.0	6.0	6.9	2.46	15.38	6.58	15	4.83	206.50	207.00	206.84	207.63	212.54	210.73	CB 305-CB 305.1
8	4	30	0.24	0.24	0.44	0.11	0.11	6.0	6.0	6.9	0.73	5.99	3.04	15	0.73	206.50	206.72	206.80	207.05	210.27	210.27	CB 304-CB 304.1
9	5	159	0.00	2.51	0.00	0.00	0.88	0.0	7.1	6.4	5.68	8.02	4.43	18	0.50	203.38	204.17	204.54	205.09	212.54	214.33	CB 305-MH 306
10	9	204	2.04	2.51	0.29	0.59	0.88	6.0	6.4	6.7	5.95	4.94	4.85	15	0.50	204.17	205.19	205.42	206.90	214.33	208.89	MH 306-CB 307
11	10	30	0.35	0.47	0.57	0.20	0.29	6.0	6.1	6.9	2.01	4.95	1.64	15	0.50	205.19	205.34	207.45	207.48	208.89	208.89	CB 307-CB 308
12	11	11	0.12	0.12	0.77	0.09	0.09	6.0	6.0	6.9	0.64	17.12	1.81	12	19.70	205.34	207.45	207.50	207.78	208.89	211.00	CB 308-CB 309
13	2	17	0.71	1.39	0.84	0.60	1.21	6.0	6.9	6.5	7.86	19.52	8.09	18	2.94	199.50	200.00	200.16	201.09	204.50	204.77	MH 302-CB 302.1
14	13	238	0.68	0.68	0.90	0.61	0.61	6.0	6.0	6.9	4.25	5.55	4.32	15	0.63	200.00	201.50	201.09	202.33	204.77	205.00	CB 302.1-CB 302.
15	1	198	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.57	3.68	4.10	12	0.91	193.00	194.80	193.46	195.33	200.93	198.20	MH 301-OCS PP1
16	4	81	1.29	1.29	0.90	1.16	1.16	6.0	6.0	6.9	8.05	65.57	4.08	24	7.16	202.60	208.40	204.15	209.41	210.27	209.00	CB 304-Roof Drai

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Number of lines: 16

Run Date: 4/17/2023

NOTES:Intensity = 37.23 / (Inlet time + 4.00) ^ 0.73; Return period =Yrs. 10 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	MH 301	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	MH 302	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	CB 303	1.12	0.37	0.76	0.73	Comb	4.0	2.73	0.00	2.31	1.35	0.038	2.53	0.020	0.020	0.013	0.12	6.04	0.09	4.63	0.0	Off
4	CB 304	0.80	0.09	0.52	0.37	Comb	4.0	2.73	0.00	2.31	1.35	0.038	2.53	0.020	0.020	0.013	0.10	4.98	0.07	3.60	0.0	3
5	CB 305	0.31	0.00	0.22	0.09	Comb	4.0	2.73	0.00	2.31	1.35	0.011	2.53	0.020	0.020	0.013	0.08	4.24	0.05	2.65	0.0	4
6	CB 305.2	2.98	0.00	1.20	1.78	Comb	4.0	2.73	0.00	2.31	1.35	0.011	2.53	0.020	0.020	0.013	0.20	9.87	0.16	8.14	0.0	8
7	CB 305.1	2.46	0.00	2.46	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.24	11.94	0.24	11.94	0.0	Off
8	CB 304.1	0.73	1.78	1.10	1.41	Comb	4.0	2.73	0.00	2.31	1.35	0.038	2.53	0.020	0.020	0.013	0.15	7.34	0.12	5.91	0.0	Off
9	MH 306	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	CB 307	4.10	0.00	4.10	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.33	16.33	0.33	16.33	0.0	Off
11	CB 308	1.38	0.00	1.38	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.22	10.83	0.22	10.83	0.0	Off
12	CB 309	0.64	0.00	0.64	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.14	6.95	0.14	6.95	0.0	Off
13	CB 302.1	4.14	0.00	4.14	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.33	16.42	0.33	16.42	0.0	Off
14	CB 302.2	4.25	0.00	4.25	0.00	Comb	4.0	5.46	6.24	4.62	1.35	Sag	2.53	0.020	0.020	0.000	0.33	16.68	0.33	16.68	0.0	Off
15	OCS PP-1.2	1.57*	0.00	0.00	1.57	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
16	Roof Drain PP3.1	8.05	0.00	0.00	8.05	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off

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NOTES: Inlet N-Values = 0.016; Intensity = 37.23 / (Inlet time + 4.00) ^ 0.73; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

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	30	27.48	186.00	188.89	2.50	3.75	5.60	0.49	189.38	0.383	56	187.50	189.29 j	1.79**	3.75	7.32	0.83	190.12	0.518	0.450	n/a	0.98	n/a
2	30	26.09	195.00	196.00	1.00*	1.84	14.16	0.80	196.80	0.000	77	197.30	199.04	1.74**	3.65	7.15	0.80	199.84	0.000	0.000	n/a	1.00	n/a
3	24	19.10	197.36	199.04	1.68	2.65	6.78	0.81	199.85	0.000	29	198.24	199.81 j	1.57**	2.65	7.22	0.81	200.62	0.000	0.000	n/a	0.76	n/a
4	24	18.52	198.24	199.81	1.57	2.61	6.99	0.78	200.59	0.000	141	202.60	204.15 j	1.55**	2.61	7.10	0.78	204.93	0.000	0.000	n/a	1.50	1.17
5	24	10.59	202.60	204.15	1.55	1.90	4.06	0.48	204.63	0.000	156	203.38	204.54 j	1.16**	1.90	5.58	0.48	205.03	0.000	0.000	n/a	2.25	1.09
6	15	2.98	208.50	208.99	0.49*	0.45	6.60	0.28	209.28	0.000	30	209.00	209.69	0.69**	0.70	4.26	0.28	209.98	0.000	0.000	n/a	1.00	n/a
7	15	2.46	206.50	206.84	0.34*	0.27	9.18	0.25	207.09	0.000	10	207.00	207.63	0.63**	0.62	3.99	0.25	207.87	0.000	0.000	n/a	1.00	n/a
8	15	0.73	206.50	206.80	0.30*	0.22	3.31	0.12	206.91	0.000	30	206.72	207.05	0.33**	0.26	2.77	0.12	207.17	0.000	0.000	n/a	1.00	n/a
9	18	5.68	203.38	204.54	1.16	1.13	3.86	0.23	204.78	0.277	159	204.17	205.09 j	0.92**	1.13	5.01	0.39	205.48	0.519	0.398	n/a	0.79	0.31
10	15	5.95	204.17	205.42	1.25*	1.23	4.85	0.37	205.79	0.725	204	205.19	206.90	1.25	1.23	4.85	0.37	207.27	0.724	0.725	1.482	1.50	0.55
11	15	2.01	205.19	207.45	1.25	1.23	1.64	0.04	207.49	0.083	30	205.34	207.48	1.25	1.23	1.64	0.04	207.52	0.083	0.083	0.025	0.50	0.02
12	12	0.64	205.34	207.50	1.00	0.23	0.82	0.01	207.51	0.028	11	207.45	207.78	0.33**	0.23	2.80	0.12	207.91	0.482	0.255	n/a	1.00	n/a
13	18	7.86	199.50	200.16	0.66*	0.75	10.44	0.51	200.68	0.000	17	200.00	201.09	1.09**	1.37	5.74	0.51	201.60	0.000	0.000	n/a	1.28	n/a
14	15	4.25	200.00	201.09	1.09	0.87	3.75	0.37	201.46	0.000	238	201.50	202.33 j	0.83**	0.87	4.88	0.37	202.70	0.000	0.000	n/a	1.00	0.37
15	12	1.57	193.00	193.46	0.46*	0.35	4.50	0.21	193.67	0.000	198	194.80	195.33	0.53**	0.42	3.70	0.21	195.54	0.000	0.000	n/a	1.00	n/a
16	24	8.05	202.60	204.15	1.55	1.59	3.09	0.40	204.55	0.000	81	208.40	209.41 j	1.01**	1.59	5.06	0.40	209.81	0.000	0.000	n/a	1.00	n/a

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Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Johnson Southington
53 Spring Street
Southington, CT
Bohler Job Number: CTA220027.00
April 13, 2023

Rip Rap Sizing Calculations

Design Period Storms: 25 year, except 100 year out of detention basins

Rip Rap Apron Sizing Calculations

Location	Pipe Size (in.)	Pipe Size (ft.)	Q (cfs)	TW (ft.)	V (fps)	W1 (ft.)	La (ft.)	W2 (ft.)	W3 (ft.)	Apron Type	Rip Rap Type
FES 150	15	1.3	3.29	0.36	7.76	3.75	10	11	NA	A	Modified

Based ConnDOT Drainage Manual - Type A, B, and C Riprap Aprons

Outlet Velocity (fps)
0-8 - Modified
8-10 - Intermediate

Scour Hole Sizing Calculations

Location	Pipe Size/ Span (in)	Pipe Size/ Span (ft)	Q (cfs)	TW (ft.)	Scour Hole Type	D_{50} (ft)	F (ft)	C (ft)	B (ft)	Rip Rap Type
FES 100	30	2.5	62.95	3.14	Type 1	0.29	1.25	15	13	Modified
FES 300	30	2.5	33.40	3.66	Type 1	0.11	1.25	15	13	Modified
FES 1.1	24	2.0	29.18	1.18	Type 1	0.38	1.00	12	10	Modified
FES 3.1	24	2.0	16.01	0.99	Type 1	0.20	1.00	12	10	Modified

Based on ConnDOT Drainage Manual - Type 1 and 2 Scour Holes

D_{50} < 0.42 ft - Modified
0.42 ft < D_{50} < 0.67 ft - Intermediate
0.67 ft < D_{50} < 1.25 ft - Standard

Riprap Type D_{50} (inches)
Modified - 5
Intermediate - 8

APPENDIX F: STORMWATER OPERATION & MAINTENANCE PLAN

- *O & M PLAN*

STORMWATER OPERATION AND MAINTENANCE PLAN

Johnson Development Associates
53 Spring Street
Southington, CT

RESPONSIBLE PARTY DURING CONSTRUCTION:

Contractor - TBD

RESPONSIBLE PARTY POST CONSTRUCTION:

Owner - TBD

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, and the CT General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, if applicable. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Contact information of the OWNER and CONTRACTOR shall be listed in the Stormwater Pollution Control Plan (SWPCP) for this site. The SWPCP also includes information regarding construction period allowable and illicit discharges, housekeeping and emergency response procedures. Upon proper notice to the property owner, the Town or its authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. Parking lots: Sweep at least 2 times per year and on a more frequent basis depending on sanding operations. Swept areas shall include all parking, drive aisles, and access aisles. All resulting sweepings shall be collected and properly disposed of offsite in accordance with local, state, federal, and other applicable requirements.

2. Roadways: Sweep at least 2 times per year and on a more frequent basis depending on sanding operations. All resulting sweepings shall be collected and properly disposed of off site in accordance with local, state, federal, and other applicable requirements.

3. Catch basins, yard drains, trench drains, manholes and piping: Inspect 2 times per year and at the end of foliage and snow-removal seasons. These features shall be cleaned 2 times per year. or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the catch basin or underground system. Accumulated sediment and hydrocarbons present must be removed and properly disposed of off-site in accordance with local, state, federal, and other applicable requirements.

4. Riprap apron / Scour Hole: Riprap and scour holes should be checked at least annually and after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for displaced stones, slumping, and erosion at edges, especially downstream or downslope. If the riprap is damaged, it should be repaired before further damage can take place. Note and repair any erosion, stone displacement or low spots in the areas. Woody vegetation should be removed from the riprap annually.

5. Water Quality Unit (Proprietary Separator): Follow manufacturer's recommendations (attached).

6. Water Quality Swale: Inspect swales for the first few months after construction and at least twice a year thereafter to make sure vegetation is adequate and slopes are not eroding. Check for rilling and gullying. Repair eroded areas and revegetate. Mow dry swales as needed. Do not cut the grass shorter than three to four inches, and do not let the grass height exceed six inches. Regular maintenance includes mowing, fertilizing, liming, watering, pruning, weeding, and pest control as necessary. Remove sediment and debris manually at least once a year. Re-seed as necessary. Any sediment removed shall be disposed of in accordance with local, state, federal, and other applicable requirements.

7. Infiltration Basin: Preventative maintenance after every major storm event during the first three (3) months of operation and at least twice per year thereafter. Inspect structure and pretreatment BMP to ensure proper operation after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for the first three months. Mow the buffer area, side slopes and basin bottom if grassed floor, rake if stone or sand bottom, remove trash and debris, remove grass clippings and accumulated organic matter. Any sediment removed shall be disposed of in accordance with local, state, federal, and other applicable requirements.

8. Forebays: The sediment forebay areas shall be inspected for the first few months after construction to ensure they are operating as intended and that all components are stable and in working order. Inspections shall be by qualified personnel. All vegetation (i.e. tree saplings) will be removed from embankments and the forebay bottom. The inlet to the forebay shall be inspected for erosion and sedimentation, and riprap shall be promptly repaired as needed. Sediment forebays shall be inspected quarterly and sediment removed when sediment depth reaches half the height of the stone weir and at a minimum every 5 years. After sediment is removed, replace any vegetation damaged during the clean out by either reseeding or re-sodding. Any sediment removed shall be disposed of in accordance with local, state, federal, and other applicable requirements.

9. Stormwater Ponds:
    a. Annually: Inspect for damage; note signs of hydrocarbon build-up (and remove if detected); Monitor for sediment accumulation in the facility beyond the forebay; Examine to ensure that inlet and outlet devices are free of debris and operational.
    b. Repair undercut or eroded areas as needed.
    c. Monthly: Clean and remove debris from inlet and outlet structures. Mow side slopes. High grass along pond edge will discourage waterfowl from taking up residence and serve to filter pollutants.
    d. 10 year: Remove sediment when the pool volume has become reduced significantly, or when significant algal growth is observed.

All components of the stormwater system will be accessible by the owner or their assignee.

STORMWATER MANAGEMENT SYSTEM

POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

Johnson Development Associates
53 Spring Street
Southington, CT

RESPONSIBLE PARTY:

Owner - TBD

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Catch Basins:	
Discharge Points/ Flared End Sections / Rip Rap:	
Stormwater Basin:	
Water Quality Units:	
Other:	

Note Recommended Actions to be taken on the Following (sediment and/or debris removal, repairs, etc.):
Catch Basins:
Discharge Points / Flared End Sections / Rip Rap:
Stormwater Basin:
Water Quality Units:
Other:
Comments:

STORMWATER INSPECTION AND MAINTENANCE LOG FORM

Johnson Development Associates
53 Spring Street
Southington, CT

Stormwater Management Practice	Responsible Party	Date	Maintenance Activity Performed

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

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CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.