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Project:

River Crossing Apartments

Location:
Gateway Drive
City of Watertown, WI

STORM WATER MANAGEMENT PLAN

Preparer:



Project Number: 491163
Last Revised: September 8th, 2026

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1.0 INTRODUCTION

The River Crossing multi-family development is located along the east side of Gateway Drive, south of Air Park Drive and part of the SE1/4 and NW1/4 of Section 16, T8N, R15E in the City of Watertown, Jefferson County, Wisconsin. The 24.35 acre study area includes the proposed multifamily development and the existing development on the adjacent Pro-Health Care property. A site location map is included in **Appendix 1**.

The closest water body is an unnamed tributary to the Rock River.

Storm water management is required by the Wisconsin Department of Natural Resources (DNR) through Chapter NR 151 Runoff Management and the City of Watertown ordinance Chapter 20.16. The development is required to implement the following controls:

Runoff Rate Control: In the City of Watertown, runoff rate control or detention is required whenever the development occurring is subject to storm water management. Per Chapter 20.16, requires the installation of stormwater detention and retention facilities which shall be designed so that the post-development runoff shall not exceed predevelopment rates for the 2-yr, 10-yr and 100-yr storm events.
The maximum runoff curve numbers for existing meadow with C soils is 71, and the maximum existing runoff curve number for forest with C soils is 70. Peak discharges are calculated using TR-55 runoff curve number methodology, Atlas 14 precipitation depths, and the appropriate NRCS Wisconsin MSE3 precipitation distribution".

- **Sediment Control**: BMPs shall be designed, installed and maintained to reduce the total suspended solids carried in runoff from the post-construction site by 80% for new development or to the maximum extent practicable as provided in subd. 2. The design shall be based on an average annual rainfall, as compared to no runoff management controls.

- **Infiltration**: Per the geotechnical report, the site is exempt from the infiltration requirements base on WDNR Technical standard 1002, Site evaluation for stormwater infiltration.

Planning Goals
The stormwater planning goals include:

- Minimize sediment and other pollutants from leaving the site during and after construction; and
- Maintain pre-development peak flows to avoid off-site channel erosion during post-development stormwater conveyance events.

Design Summary
To accomplish the above goals, a storm sewer system is proposed throughout the site to convey runoff to wet detention ponds. The Stormwater BMPs will by design:

- Reduce post-construction total suspended solids by not less than 80%
- Maintain pre-development peak flow rates for the 2, 10 and 100-year/24-hour design storm events.

2.0 HYDROLOGIC CALCULATIONS

HydroCAD version 10.20-9a has been used to analyze storm water hydrologic characteristics for the site. HydroCAD uses the TR-55 methodology for determining peak discharge runoff rates. Curve numbers for the existing ground cover were selected by soil type using the values specified in the City of Watertown and NR-151 requirements. The Web Soil Survey and the Geotechnical Report for the study area are included in **Appendix 2**. Storm water modeling was conducted using the 1-year, 2-year, 10-year and 100-year storm events using the MSE3 rainfall distribution. Rainfall depths and intensity were developed for the site, based on NOAA Atlas 14, Volume 8, Version 2.

Table 1: Design Rainfall Values

Storm Recurrence Interval	24-hour Rainfall Depth
1-year	2.42 inches
2-year	2.74 inches
10-year	3.85inches
100-year	6.18 inches

3.0 PRE-DEVELOPED CONDITIONS

The drainage study areas were determined using 1-foot topographic mapping generated from topographic field survey data developed for the project. The existing drainage areas are broken out into separate sub-areas to match the proposed sub-areas. Drainage area maps are included in **Appendix 3**.
A stormwater management plan was previously prepared for a portion of this area in connection with the construction of ProHealth Care in early 2000's. Thr runoff from approximately 2.45 acres of the ProHealth Care property crosses the River Crossing development and drains to an existing dry stormwater pond constructed to reduce peak discharge rates. The pond discharges to adjacent wetlands. Of the River Crossing Property, approximately 3.55 acres drains west towards Gateway Drive, while the remaining 18.35 acres drains east towards the wetlands. Existing land cover consists of lawn, row crops, meadow, driveways, and buildings.
Existing conditions were modeled using current drainage patterns and impervious areas. The existing dry stormwater pond is not included in the predevelopment calculations.

The following table presents the results of the hydrological analysis for existing conditions:

Table 2: Hydrologic Analysis of Pre-Developed Conditions

	Area (Ac)	Runoff Curve Number	Time of Conc. (min.)	Peak Flow Rate (cfs)			
				1-year	2-year	10-year	100-year
Existing Basin (E1)	3.55	75	6	3.81	5.13	10.30	22.57
Existing Basin (E2)	20.80	74	12.7	14.74	20.36	42.81	97.37
Total	24.35			16.93	23.37	48.95	111.21

Detailed hydrologic calculations for the study area are included in **Appendix 4**.

4.0 POST-DEVELOPMENT CONDITIONS

Post-development conditions encompass 24.35-acres including a portion of the existing ProHealth Care parcel, the proposed multifamily development with buildings, roads and parking, and toe stormwater ponds. The two stormwater ponds function as a single system through an equalizer pipe that connects them.

The area of post-development drainage basins match those of the existing conditions.

Proposed drainage Basin P1 flows offsite to the Gateway Drive with no stormwater controls, the area flowing to Gateway Drive is being reduced from 3.55 acres to 2.45 acres. Proposed drainage Basin P3 flows to the wetlands with no stormwater controls. Proposed drainage Basin P2 flows to a wet stormwater pond for peak flow control and water quality.

The following table summarizes the results of the analysis of proposed conditions:

Table 3: Hydrologic Analysis of Post-Developed Conditions

	Area (Ac)	Runoff Curve Number	Time of Conc. (min.)	Peak Flow Rate (cfs)			
				1-year	2-year	10-year	100-year
Proposed Basin (P1)	2.45	82	6	1.29	5.39	9.43	18.36
Proposed Basin (P2)	20.36	90	14.2	37.72	44.95	70.30	123.34
Proposed Basin (P3)	1.54	83	6	2.86	3.57	6.14	11.78
Total Proposed (w/o detention)	24.35	---	---	41.16	49.25	77.74	138.01
Detention Features				**1-year**	**2-year**	**10-year**	**100-year**
Proposed Pond	Peak Inflow (cfs)			37.72	44.95	70.30	123.34
	Peak Outflow (cfs)			1.11	2.24	8.45	16.52
	High Water Level			821.16	821.29	821.75	82.91
Total Proposed (with detention)				7.25	9.08	15.75	34.57

Detailed hydrologic calculations for the study area are included in **Appendix 4**.

5.0 ALLOWABLE PEAK RUNOFF RATES

Hydrologic analysis included in this report was performed using the HydroCAD hydrologic simulation computer model, version 10.20-9a by HydroCAD Software Solutions LLC. The discharges were generated using the SCS Dimensionless Unit Hydrograph Method for a 24-hour duration storm. Model parameters include drainage area, SCS runoff curve number, time of concentration and 24-hour precipitation with MSE3 NRCS rainfall distribution curve. A time of concentration path was determined and the time calculated for the pre-development areas and a 6-minute minimum time of concentration and lag method is used for a portion of the post-development areas. The following table summarizes the results of the analysis.

Table 4: Comparison of Pre- and Post-Development Flows

	1-year	2-year	10-year	100-year
Total Site Discharge (cfs)	**Pre-development Flows**			
	16.93	23.37	48.95	111.21
	Post-Development Flows			
	7.25	9.08	15.75	34.57

6.0 STORM WATER QUALITY CONTROL

The post-development site will utilize the wet ponds to achieve post-construction storm water quality control in accordance with the State of Wisconsin requirements for suspended solids removal.

The requirement is 80% removal of the Total Suspended Solids (TSS) as compared to no controls. Water quality analysis included in this report was performed using the Source Loading and Management Model (WINSLAMM) computer model, version 10.5.0. WINSLAMM was adopted and calibrated by the Wisconsin Department of Natural Resources to better understand the relationships between sources of urban runoff pollutants and runoff quality. The water quality modeling results for the study area are as follows:

Table 5: Water Quality Modeling Results (TSS)

Site	No Controls (lbs)	With Controls (lbs)	% Reduction
Post-development Site	6444	665.3	89.83

Table 6: Water Quality Modeling Results (phosphouus)

Site	No Controls (lbs)	With Controls (lbs)	% Reduction
Post-development Site	25.43	8.049	68.35

Detailed computations are provided in **Appendix 5**.

The wet ponds exceed 80% TSS reduction and provide 38.35% Phosphorus reduction.

7.0 INFILTRATION

The proposed development is exempt from infiltration requirements. Infiltration testing was done per WDNR standard 1002, design infiltration rates of 0.03 and 0.50 inches per hour were observed.

8.0 STORMWATER MANAGEMENT MAINTENANCE PLAN

The stormwater management maintenance provisions and maintenance checklist are detailed in **Appendix 7.**

Appendix 1

Location Map

City of Watertown



Municipal Boundary

Parcels Boundaries

Common Areas

Addresses

Street Labels

THE CITY OF WATERTOWN
Opportunity runs through it.

N

City of Watertown Geographic Information System

Scale: 1:6,479
SCALE BAR = 1"

Printed on: August 31, 2026
Author:

DISCLAIMER: This map is not a substitute for an actual field survey or onsite investigation.
The accuracy of this map is limited to the quality of the records from which it was assembled.
Other inherent inaccuracies occur during the compilation process.
City of Watertown makes no warranty whatsoever concerning this information.

Appendix 2

Web Soil Survey and

Geotechnical Report

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,900 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7021A	Palms muck, 0 to 2 percent slopes	5.3	8.0%
7263A	Keowns silt loam, 0 to 2 percent slopes	14.7	21.9%
7328C2	Rotamer loam, 6 to 12 percent slopes, eroded	5.8	8.6%
7346B	Hebron loam, 1 to 6 percent slopes	0.6	0.9%
7361B	Kidder loam, 2 to 6 percent slopes	7.3	10.8%
7366A	Aztalan fine sandy loam, 0 to 3 percent slopes	0.6	0.9%
7766B	Lamartine silt loam, 2 to 6 percent slopes	9.8	14.6%
7845B	Theresa silt loam, 2 to 6 percent slopes	22.4	33.4%
W	Water	0.5	0.7%
Totals for Area of Interest		**67.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the

scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jefferson County, Wisconsin

7021A—Palms muck, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2szdc
Landscape: Drumlin fields
Elevation: 780 to 1,240 feet
Mean annual precipitation: 31 to 35 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 124 to 178 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Palms, muck, and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Palms, Muck

Setting

Landscape: Drumlin fields
Landform: Interdrumlins
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over loamy drift

Typical profile

Oap - 0 to 13 inches: muck
Oa - 13 to 30 inches: muck
2Cg - 30 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 1.98 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 15.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F095XB001WI - Mucky Swamp
Forage suitability group: Not suited, flooded or organics (G095BY010WI)
Other vegetative classification: Not suited, flooded or organics (G095BY010WI)
Hydric soil rating: Yes

Minor Components

Houghton, muck

Percent of map unit: 8 percent
Landscape: Outwash plains
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F095XB001WI - Mucky Swamp
Other vegetative classification: Not suited, flooded or organics (G095BY010WI)
Hydric soil rating: Yes

Adrian

Percent of map unit: 5 percent
Landscape: Drumlin fields
Landform: Interdrumlins
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F095XB001WI - Mucky Swamp
Hydric soil rating: Yes

7263A—Keowns silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tjz0
Landscape: Lake plains
Elevation: 580 to 1,050 feet
Mean annual precipitation: 29 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 124 to 190 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Keowns and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Keowns

Setting

Landscape: Lake plains
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
Eg - 9 to 16 inches: silt loam
Bg - 16 to 32 inches: silt loam
Cg - 32 to 79 inches: stratified silt loam to very fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Forage suitability group: High AWC, high water table (G095BY007WI)
Other vegetative classification: High AWC, high water table (G095BY007WI)
Hydric soil rating: Yes

Minor Components

Palms, muck

Percent of map unit: 10 percent
Landscape: Lake plains
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F095XB001WI - Mucky Swamp
Hydric soil rating: Yes

7328C2—Rotamer loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2wpxv
Landscape: Till plains
Elevation: 790 to 1,070 feet
Mean annual precipitation: 33 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 150 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rotamer, eroded, and similar soils: 93 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rotamer, Eroded

Setting

Landscape: Till plains
Landform: Drumlins, Moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous sandy and loamy till

Typical profile

Ap - 0 to 8 inches: loam
Bt - 8 to 13 inches: sandy clay loam
C - 13 to 79 inches: gravelly sandy loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F095XB007WI - Loamy Upland with Carbonates
Forage suitability group: Mod AWC, adequately drained (G095BY005WI)
Other vegetative classification: Mod AWC, adequately drained (G095BY005WI)
Hydric soil rating: No

Minor Components

Kidder, eroded

Percent of map unit: 4 percent
Landscape: Till plains
Landform: Drumlins, Moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F095XB010WI - Loamy and Clayey Upland
Other vegetative classification: Mod AWC, adequately drained (G095BY005WI)
Hydric soil rating: No

Lapeer

Percent of map unit: 2 percent
Landscape: Till plains
Landform: Drumlins, Moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F095XB007WI - Loamy Upland with Carbonates
Hydric soil rating: No

Lamartine

Percent of map unit: 1 percent
Landscape: Till plains
Landform: Drumlins, Moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Hydric soil rating: No

7346B—Hebron loam, 1 to 6 percent slopes

Map Unit Setting

National map unit symbol: g6zp
Landscape: Lake plains
Elevation: 780 to 1,060 feet
Mean annual precipitation: 28 to 35 inches
Mean annual air temperature: 36 to 57 degrees F
Frost-free period: 135 to 170 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Hebron and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hebron

Setting

Landscape: Lake plains
Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy outwash over silty and clayey lacustrine deposits

Typical profile

Ap,E - 0 to 12 inches: loam

Bt - 12 to 34 inches: sandy clay loam
2Bt - 34 to 40 inches: silty clay loam
2C - 40 to 60 inches: silty clay loam

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F095XB010WI - Loamy and Clayey Upland
Forage suitability group: High AWC, adequately drained (G095BY008WI)
Other vegetative classification: High AWC, adequately drained (G095BY008WI)
Hydric soil rating: No

Minor Components

Matherton

Percent of map unit: 4 percent
Landscape: Lake plains
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Hydric soil rating: No

Aztalan

Percent of map unit: 4 percent
Landscape: Lake plains
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Hydric soil rating: No

Sebewa

Percent of map unit: 2 percent
Landscape: Lake plains
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Hydric soil rating: Yes

7361B—Kidder loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2tjy9
Landscape: Drumlin fields
Elevation: 790 to 1,180 feet
Mean annual precipitation: 31 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 127 to 181 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Kidder and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kidder

Setting

Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy till

Typical profile

Ap - 0 to 11 inches: loam
Bt - 11 to 31 inches: sandy clay loam
C - 31 to 79 inches: gravelly sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F095XB010WI - Loamy and Clayey Upland

Forage suitability group: Mod AWC, adequately drained (G095BY005WI)
Other vegetative classification: Mod AWC, adequately drained (G095BY005WI)
Hydric soil rating: No

Minor Components

Mchenry
Percent of map unit: 3 percent
Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F095XB010WI - Loamy and Clayey Upland
Hydric soil rating: No

Rotamer
Percent of map unit: 2 percent
Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F095XB007WI - Loamy Upland with Carbonates
Hydric soil rating: No

7366A—Aztalan fine sandy loam, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: 2wspn
Landscape: Basins
Elevation: 770 to 870 feet
Mean annual precipitation: 33 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 136 to 172 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Aztalan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aztalan

Setting
Landscape: Basins
Landform: Glacial lakes (relict)
Landform position (three-dimensional): Talf
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Loamy outwash over stratified silty and clayey lacustrine deposits

Typical profile

Ap - 0 to 14 inches: fine sandy loam
Bt - 14 to 25 inches: loam
2Cg - 25 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Forage suitability group: Mod AWC, high water table (G095BY004WI)
Other vegetative classification: Mod AWC, high water table (G095BY004WI)
Hydric soil rating: No

Minor Components

Sebewa, clayey substratum

Percent of map unit: 10 percent
Landscape: Drumlin fields
Landform: Interdrumlins
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Hydric soil rating: Yes

7766B—Lamartine silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2tjw4
Landscape: Drumlin fields
Elevation: 590 to 1,240 feet
Mean annual precipitation: 28 to 36 inches
Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 135 to 194 days
Farmland classification: Prime farmland if drained

Map Unit Composition

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

Description of Lamartine

Setting

Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess over loamy till

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 20 inches: silty clay loam
2Bt2 - 20 to 28 inches: clay loam
2C - 28 to 79 inches: gravelly sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B/D
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Forage suitability group: High AWC, high water table (G095BY007WI)
Other vegetative classification: High AWC, high water table (G095BY007WI)
Hydric soil rating: No

Minor Components

Theresa

Percent of map unit: 9 percent
Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear

Across-slope shape: Linear
Ecological site: F095XB007WI - Loamy Upland with Carbonates
Hydric soil rating: No

Pella

Percent of map unit: 6 percent
Landscape: Drumlin fields
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Hydric soil rating: Yes

7845B—Theresa silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2szd9
Landscape: Drumlin fields
Elevation: 700 to 1,240 feet
Mean annual precipitation: 31 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Theresa

Setting

Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy till and/or calcareous, dense loamy till

Typical profile

Ap - 0 to 8 inches: silt loam
BE - 8 to 14 inches: silt loam
Bt1 - 14 to 18 inches: silty clay loam
2Bt2 - 18 to 34 inches: clay loam
2Cd - 34 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: 32 to 35 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 60 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F095XB007WI - Loamy Upland with Carbonates
Forage suitability group: Mod AWC, adequately drained with limitations (G095BY006WI)
Other vegetative classification: Mod AWC, adequately drained with limitations (G095BY006WI)
Hydric soil rating: No

Minor Components

Hochheim

Percent of map unit: 10 percent
Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F095XB006WI - Shallow Upland
Hydric soil rating: No

Lamartine

Percent of map unit: 5 percent
Landscape: Drumlin fields
Landform: Drumlins
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: g718

Elevation: 660 to 980 feet
Mean annual precipitation: 30 to 34 inches
Mean annual air temperature: 39 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Watertown Apartments

Geotechnical Engineering Report

June 12, 2026 | Terracon Project No. 58265062

Watertown, Wisconsin

Prepared for:

Payne & Dolan Incorporated
PO Box 781
Waukesha, WI 53187



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June 12, 2026

Payne & Dolan Incorporated
PO Box 781
Waukesha, WI 53187

Attn: Mr. Nick Olson
P: (262) 804-7414
E: nickolson@walbecgroup.com

Re: Geotechnical Engineering Report
Watertown Apartments
1911 Gateway Drive
Watertown, Wisconsin
Terracon Project No. 58265062

Dear Mr. Olson:

We have completed the scope of Geotechnical Engineering services for the referenced project in general accordance with the Task Order dated April 8, 2026. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations pavement and floor slab for the proposed project.

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

Sincerely,

Terracon

Abdelhady Deif, E.I.T.
Field Engineer

Paul J. Koszarek, P.E., C.S.T.
Senior Principal

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Attachments

Exploration and Testing Procedures
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Supporting Information

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

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services for the construction of a new Apartments Complex in Watertown, Wisconsin. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Demolition considerations
- Foundation design and construction
- Floor slab design and construction
- Seismic considerations per IBC
- Frost considerations
- Design and construction of pavements
- Design and construction of stormwater management

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the **Site Location** and **Exploration Plan**, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs in the **Exploration Results** section.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was received from Nick Olson, dated February 17, 2026. The request included a preliminary site plan showing the proposed building and driveway locations. A follow-up phone call was conducted on February 25, 2026. Updated site plan with boring locations was provided on March 2, 2026.
Project Description	Based on the site plan the project will include the construction of 24 buildings. Building height information indicates that the structures will be two- or three-story above grade. Basements are not planned. Additional site work will include the construction of two stormwater ponds along the east side of the site.
Finished Floor Elevation (FFE)	Not provided, but we anticipate that the finished floor elevations of the building will be within 2 feet of existing grade.
Maximum Loads	We were not provided the maximum column, wall, and slab loads. We will use the following assumed loads in estimating settlement based on our experience with similar projects. ■ Columns: 75 to 150 kips ■ Walls: 2 to 6 kips per linear foot (klf) Slabs: 125 pounds per square foot (psf)
Grading/Slopes	Not provided but anticipated to be on the order of approximately 2 feet of cut and/or fill to be required to develop final grades, excluding remedial grading requirements and excavations for stormwater ponds.
Below-Grade Structures	None anticipated
Free-Standing Retaining Walls	None anticipated

Item	Description
Pavements	Paved site roads, driveways and parking lots will be constructed on the parcel. A preferred pavement surfacing has not been identified to us as part of the preliminary information. Asphalt surfacing is common in the area for projects of this nature and is the assumed preference. Unless information is provided prior to the report, we assume that the traffic classification will consist of: ■ Class I: Parking stalls for autos and pickup trucks ■ Class II: Traffic consisting of home delivery trucks, trash pickup The pavement design period is 20 years.
Building Code	2021 IBC.

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at 1911 Gateway Drive in Watertown, Wisconsin. Latitude/Longitude (approximate) 43.1617, -88.7273 See **Site Location**
Existing Improvements	The site is mostly undeveloped consisting of a farm field, with an existing structure located along the west side that is planned to be demolished for this project.
Existing Topography	Based on grading plan provided, the site elevations vary from 819 feet to 841 feet. The site gently slopes downward towards the northeast direction.
Current Ground Cover	Grass, trees and other vegetation

Geotechnical Characterization

The following table describes the locations where the borings were performed and the termination depths:

Number of Borings	Approximate Boring Depth [1]	Location
10 (B-1 through B-10)	(13.3-20)[2]	Buildings Area
3 (SW-1 to SW-3)	(11-15)[2]	Stormwater Pond Areas

1. Feet below existing ground surface.
2. Some borings encountered refusals on unknown material (bedrock or cobbles/boulders) at depths shallower than the planned boring depth.

Subsurface Profile

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

Model Layer	Layer Name	General Description
1	**Topsoil**	12 to 30 inches thick.
2	**Native Cohesive Soil**	Tan and gray lean clay with traces of sand and gravel was encountered. The lean clay was soft to hard in consistency with obtained hand penetrometer values ranging from 1.00 to over 4.5 tons per square foot (tsf). The clay exhibited increase in strength with depth. Moisture contents ranged from 8% to 26%.
3	**Native Non-Cohesive Soils**	Silt, clayey sand, and silty sand were encountered in a loose to very dense condition, with N-values ranging from 4 to 62 bpf, including refusal at 50 blows for 0.5 inches of penetration. Moisture contents ranged from about 7% to 13%.

Auger and split spoon refusals varied from 11.0 feet to 18.0 feet below ground surface. The refusal materials are not known because rock coring or test pits were not

performed. The following table lists the borings where auger refusal was observed and the corresponding depths and elevation of refusal:

Boring Number	Depth below Ground Surface where Refusal was Observed (feet)	Refusal Elevation (feet)
B-1	13.7	807.4
B-2	16.8	804.7
B-4	13.3	813.8
B-5	16	809.8
B-7	18	814.0
SW-1	11	807.9
SW-2	14.3	810.8

Based on the State of Wisconsin Depth to bedrock maps, the depth to bedrock in the vicinity of this site is 20 to 43 feet. Therefore, it is possible that the auger refusals represent competent bedrock; however, rock cores were not completed as part of our scope so this could not be verified.

The geotechnical characterization forms the basis of our geotechnical evaluation of site preparation, foundation options and pavement options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Subsurface Water Conditions

The boreholes were observed during drilling and after completion for the presence and level of groundwater. Free water was observed at depths ranging from 5.0 to 13.0 feet below existing ground surface during drilling, and from 2.5 to 14.5 feet below existing ground surface at completion of drilling operations, or during the short period after removal of the augers and before backfilling.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of

groundwater level fluctuations should be considered when developing the design and construction plans for the project

Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

The main concern on this site would be the observed presence of groundwater within 5 feet of the current ground surface. We did not observe water at this level in all of our borings; however, it would appear that the water was observed to be close to the ground surface in the lower elevations of the site (B-1, B-2, SW-1, SW-2 and SW-3). In these areas, dewatering will likely be required in order to lower the groundwater levels to at least 2 feet below the lowest planned elevation of excavation. In the pond areas, dewatering will be required to lower the levels to 2 feet below the bottom of liner elevation and then remain in place until the liners are constructed and pond is filled to avoid the liner from failing due to uneven hydrostatic pressures.

If finished floor elevations are lowered to elevations that are within 2 feet of the observed water levels, then underslab drainage systems may be required. It is recommended to attempt to raise grade in the areas were water levels were observed to be within 5 feet of existing grade to prevent excessive dewatering and hydrostatic pressure mitigation.

The **Shallow Foundations** section addresses foundation support of structures. Structures may be supported on shallow foundations bearing on suitable native soils or newly compacted engineered fill. The shallow foundations may be proportioned using a net allowable bearing pressure of 2,500 psf, assuming finished floor elevations will be within 2 feet of existing grade. We do not recommend that the very loose sand or medium stiff clay soils layer be used for support of the new foundations. Overexcavation and replacement with compacted construction fill or lean concrete backfill may be considered.

If near surface soils are observed to be unstable during construction, they should be moisture conditioned and recompacted. Terracon should be retained during construction to discuss stabilization if unstable conditions are encountered. See **Subgrade Stabilization** for further recommendations.

Based on subsurface conditions encountered at the boring locations, it is anticipated that approximately 12 to 30 inches of topsoil will need to be removed from the site. The near-surface clay soils observed in the borings exhibited elevated moisture contents,

typically near or exceeding 20 percent. As a result, these soils are expected to be unstable in their current condition.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

Earthwork

The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, pavements, floor slabs, and utility trenches.

Demolition

It is anticipated that the existing building on the west side of the site will be demolished in advance of earthwork activities. Removal of any foundations, floor slabs, and utilities should be conducted. The sidewalls of the former basement should be sloped back at a minimum 1H:1V slope to allow for proper benching in of the sidewalls with new structural fill.

Site Preparation

Prior to placing structural fill, topsoil, vegetation, and other unsuitable or soft material for an area extending at least 10 feet beyond the edges of the proposed structures' footprint and pavements should be removed. Following site stripping, and prior to placing new structural fill, the exposed soils should be observed and tested by Terracon. A Terracon representative should observe proof compaction of the exposed soils. For granular soils, proofcompaction can be accomplished using a vibratory steel drum roller with a minimum drum weight of 10 tons.

For clay soils, a full loaded dump truck weighing about 25 tons should be used for a proofroll. The proofcompaction/proofrolling should be performed under the direction of the Geotechnical Engineer. Areas that display excessive deflection (pumping) or rutting, more than 1", during proofcompaction or proofroll operations should be improved by scarification and recompaction or undercut and replacement with new structural fill.

After an acceptable subgrade condition is achieved, the placement and compaction of new fills may begin, as appropriate. The placement and compaction of all base course and fill soils should be monitored by a representative of the geotechnical engineer. Fill

and base course placement should be done in accordance with the State of Wisconsin's Standard Specifications for Highway and Structure Construction.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas.

Reuse of On-Site Soil: Excavated on-site soil may be selectively reused as structural of general fill. The onsite soils are cohesive and will be sensitive to moisture conditions (particularly during seasonally wet periods) and may not be suitable for reuse when above optimum moisture content.

Material property requirements for on-site soil for use as general fill and structural fill are noted in the table below:

Property	General Fill	Structural Fill
Composition	Free of deleterious material	Free of deleterious material
Maximum particle size	6 inches (or 2/3 of the lift thickness)	3 inches
Fines content	Not limited	Not limited
Plasticity	Not limited	Maximum liquid limit of 45 with a plasticity index of 20 or less.
GeoModel Layer Expected to be Suitable[1]	2, 3	2, 3

1. Based on subsurface exploration. Actual material suitability should be determined in the field at time of construction.

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

Soil Type [1, 2]	USCS Classification	Acceptable Locations for Placement
Cohesive	CL [3], CL/ML [3] (LL ≤ 45 and PI ≤ 20)	Not native to the site, not recommended to be imported as structural fill

Soil Type [1, 2]	USCS Classification	Acceptable Locations for Placement
Granular	GW, GP, GM, GC SW, SP, SM, SC 5% to 15% passing #200 sieve	Mass grading and backfill for utilities and foundations. Can also be used below/adjacent to floor slabs and pavement
Granular	Crushed limestone meeting WisDOT Section 305 for 1¼ dense graded base	Undercut areas below foundations. Aggregate base below slabs and pavements. Can also be used for utility and structural backfill

1. Structural fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to Terracon for evaluation prior to use on this site.
2. Any organic materials, rock fragments larger than 3 inches, and other unsuitable materials should be removed prior to use as structural fill.
3. Highly susceptible to frost; unstable when wet, are commonly used for pavement support with the knowledge that additional maintenance and/or shorter pavement life are likely.

Fill Placement and Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Description
Maximum Fill Lift Thickness	■ 9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used ■ 4 inches in loose thickness when hand-guided equipment (i.e., a jumping jack or plate compactor) is used
Minimum Compaction Requirements [1, 2, 3]	■ Structural Fills: 95% of the maximum dry density as obtained by the modified Proctor (ASTM D1557) ■ General Fills: 90% of the maximum dry density as obtained by the modified Proctor (ASTM D1557)
Moisture Content Range [1]	■ within 2% below to 3% above the modified Proctor optimum moisture content at the time of placement and compaction ■ granular materials should be compacted within workable moisture levels

Item	Description

1. We recommend that structural fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. If the granular material is coarse sand, crushed limestone, or gravel, is of a uniform size, or has a low fines content, compaction should be observed to ensure that each lift is placed in the recommended thickness and compacted using proper equipment. The clean granular soils should be compacted to at least 65% of relative density until they are not observed to yield.
3. Specifically, moisture levels should be maintained to achieved compaction without bulking during placement or pumping when proofrolled.

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with structural fill or bedding material in accordance with the specifications for the utility be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1.5 horizontal:1 vertical projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

For low permeability subgrades, utility trenches are a common source of water infiltration and migration. Utility trenches penetrating beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the building. The trench should provide an effective trench plug that extends at least 5 feet from the face of the building exterior. The plug material should consist of cementitious flowable fill or low permeability clay. The trench plug material should be placed to surround the utility line. If used, the clay trench plug material

should be placed and compacted to comply with the water content and compaction recommendations for structural fill stated previously in this report.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Terracon should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation, proofrolling, placement and compaction of controlled compacted fills, backfilling of excavations into the completed subgrade, and just prior to construction of building floor slabs.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, as well as other applicable codes, and in accordance with any applicable local, state, and federal safety regulations. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed those specified by these safety regulations.

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

Construction Observation and Testing

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should be contacted to discuss mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the structures areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 100 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for newly constructed shallow foundations. We do not recommend that the existing fill soils be used for support of foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing pressure [1, 2]	2,500 psf
Required Bearing Stratum [3]	Native clay soils with unconfined strength ≥ 1.25 tsf, or structural fill or lean concrete extending to suitable native soils, sandy soils with a minimum SPT N value of 8 blows per foot or structural fill or lean concrete extending to suitable native soils.
Minimum Foundation Dimensions	Columns: 30 inches Strip Footings: 18 inches
Minimum Embedment below Finished Grade [4]	Exterior footings for unheated buildings: 60 inches Exterior footings for heated buildings: 48 inches Interior footings in heated buildings: 18 inches *If construction occurs during winter months, the depth of interior footings should be at 48 inches in order to minimize the need for winter protection of the foundation bearing soils. The bearing soils will still require protection until they are poured and backfilled.
Estimated Total Settlement from Structural Loads [2]	Less than about 1 inch
Estimated Differential Settlement from Structural Loads[5]	Approximately ½ inch

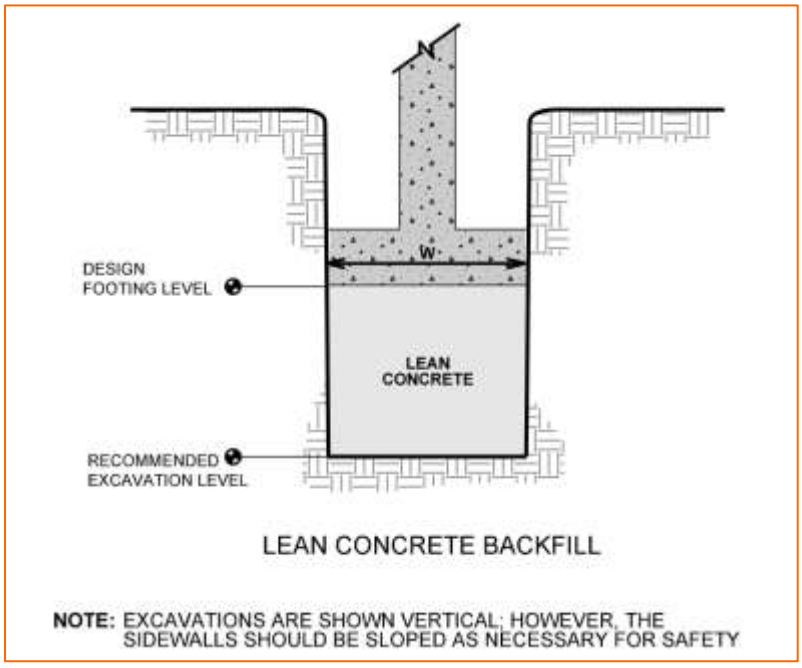
1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the **Earthwork**.
4. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
5. Differential settlements are measured over a span of 50 feet.

Foundation Construction Considerations

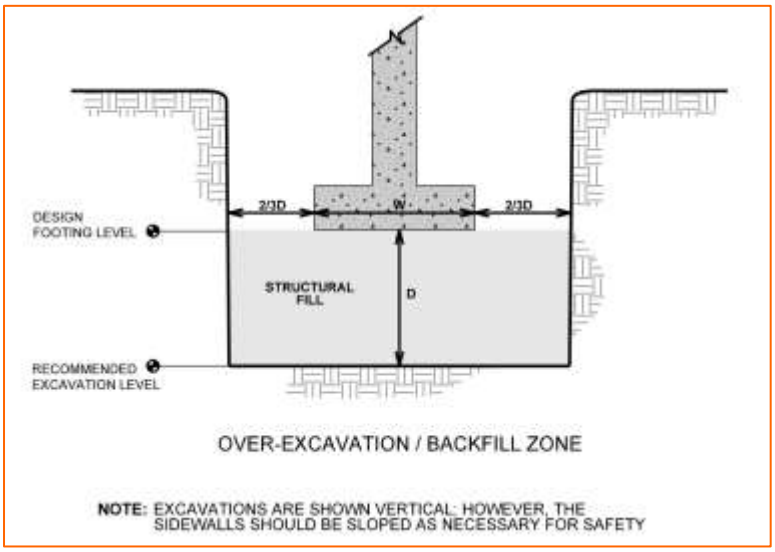
As noted in **Earthwork**, the foundation excavations should be evaluated under the direction of the Geotechnical Engineer. Based on the conditions observed in the borings, foundation may bear on the native sandy soils at the site. Due to the granular nature of the soils, they will become loosened through the excavation process. Prior to observation and testing of the bearing soils, they should be redensified using a ho-pac or diesel plate compactor.

As noted in **Earthwork**, the foundation excavations should be evaluated under the direction of the Geotechnical Engineer. Due to the granular nature of the soils, they will become loosened through the excavation process. Prior to observation and testing of the bearing soils, they should be redensified using a ho-pac or diesel plate compactor. If unsuitable material is encountered at the planned bearing level, the material should be overexcavated and replaced. Illustrations of overexcavation and backfill can be found below. All foundation excavations should be free of water and soft/loose soil, prior to placing concrete/structural fill should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level, or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



Over-excavation for structural fill placement below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the **Earthwork** section.



Floor Slabs

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support [1]	Suitable existing fill that has prepared in accordance with the **Earthwork** section and tested/approved by Terracon or newly placed structural fill
Granular Leveling Course	A minimum 4 inches of well-graded crushed stone meeting WisDOT Section 310 for an open graded base course material compacted to non-yielding condition
Modulus of Subgrade Reaction	125 pounds per square inch per inch (psi/in) for a soil subgrade prepared as recommended in this report Note: a value of 125 pci can be used at the top of the compacted granular leveling course

Item	Description
1.	Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

Terracon should review the condition of the floor slab subgrades immediately prior to placement of the granular leveling course and construction of the slabs. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas containing backfilled trenches. Areas where unsuitable conditions are located should be repaired by removing and replacing the affected material with properly

Seismic Considerations

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7-16 and the International Building Code (IBC). During this geotechnical field investigation, soil borings were completed at the site to a maximum depth of about 20 feet. The soil conditions below this depth are anticipated to be similar to those encountered in the upper 20 feet based on our experience with the geology in the vicinity of the project site. Based on the soil conditions encountered and our experience with the geology in the vicinity of the project site, **Seismic Site Classification D** can be used for the design of the proposed structures. Additional deeper borings and/or a site-specific seismic evaluation using geophysical methods would be required to further define the seismic site class.

Frost Considerations

The soils on this site are frost susceptible, and water present or migrating beneath structures in non-climate-controlled areas can affect the performance of the slabs on-grade, and pavements. Exterior slabs should be anticipated to heave during winter months. If frost action needs to be eliminated in critical areas, we recommend the use of non-frost susceptible (NFS) fill or structural slabs (for instance, structural stoops in front of building doors). Placement of NFS material in large areas may not be feasible; however, the following recommendations are provided to help reduce potential frost heave:

- Provide surface drainage away from the building and slabs.
- Install drains around the perimeter of the building, below exterior slabs and pavements, and connect them to the storm drainage system.
- Provide underdrains within NFS backfill to prevent the accumulation of water from surface infiltration
- Grade subgrades, so groundwater potentially perched in overlying more permeable subgrades and/or engineered-fills, slope toward a site drainage system.
- Place NFS fill as backfill beneath slabs and pavements critical to the project.
- Place a 3 horizontal to 1 vertical (3H:1V) transition zone between NFS fill and other soils.
- Place NFS materials in critical sidewalk areas.

As an alternative to extending NFS fill to the full frost depth, consideration can be made to placing extruded polystyrene or cellular concrete under a buffer of at least 2 feet of

NFS material. Footings for heated structures should be 48 inches below perimeter grade and 60 inches below perimeter grade for unheated structures.

Pavements

General Pavement Comments

Estimates of minimum pavement thicknesses are provided for the traffic conditions. Site preparation is a critical aspect of pavement performance. The minimum pavement thicknesses are based on the subgrade being prepared as recommended in the **Earthwork** section.

There is often a time lapse between the end of grading operations and the commencement of paving. Subgrades prepared early in the construction process can become disturbed by construction traffic. Non-uniform subgrades often result in poor pavement performance and local failures relatively soon after pavements are constructed. Depending on the paving equipment used by the contractor, measures may be required to improve subgrade strength to greater depths for support of heavily loaded trucks. Improvements should be made as recommended in **Earthwork**.

Before paving, and were recommended by Terracon, pavement subgrades should be proofrolled in the presence of a Terracon representative. Proofrolling can be accomplished using a loaded tandem-axle dump truck with a gross weight of at least 25 tons, or similarly loaded equipment.

Designs for new pavement sections for this project have been based on the procedures outlined in the 1993 Guideline for Design of Pavement Structures by the American Association of State Highway and Transportation Officials (AASHTO-1993). Pavement design methods are intended to provide structural sections with adequate thickness over a particular subgrade such that wheel loads are reduced to a level the subgrade can support.

Pavement Section Thicknesses

All pavements should be designed for the types and volumes of traffic, subgrade, and drainage conditions that are anticipated. Terracon was not provided with anticipated traffic loading information; therefore, the traffic usage and loading should be provided to Terracon so that the thickness recommendations provided below can be verified prior to using them for final design.

The minimum thicknesses provided are based on 18-kip Equivalent Single Axle Load Applications ($ESAL_{18}$) over a 20-year design life, which are provided in the table below.

Traffic patterns and anticipated loading conditions are as follows:

Design Traffic		
Pavement Type	**Location**	**Flexible Design ESAL's Values**
Standard Duty	Passenger car parking areas	30,000
Heavy Duty	Passenger car drive areas	60,000

The following pavement design parameters were used in our evaluation of estimating minimum pavement sections for the project.

Pavement Design Input		
Input Parameter	**Asphalt**	**Concrete**
Reliability	85%	85%
Initial Serviceability	4.2	4.5
Terminal Serviceability	2.0	2.0
Standard Deviation	0.45	0.35
Load Transfer	---	3.6
Drainage	1.0	1.0

Based upon the estimated design parameters listed above, we have developed recommended minimum pavement sections for Asphaltic Concrete (AC) and Portland Cement Concrete (PCC) pavements, where the subgrade appears firm under proofrolling at the time of construction. The recommended minimum pavement sections are provided in the following table. Greater pavement and/or base course thicknesses may be required for greater expected traffic loads and volumes, or if poorer subgrade conditions are encountered.

The following table provides our estimated minimum thickness of AC pavements.

Asphaltic Concrete (AC) Design

Layer	Thickness (inches)	
	Standard Duty Pavement	**Heavy Duty Pavement**
AC Surface [1]	1.5	2
AC Binder [2]	2	2

Asphaltic Concrete (AC) Design

Layer	Thickness (inches)	
	Standard Duty Pavement	Heavy Duty Pavement
Aggregate Base [3]	8	9

1. Surface course, WisDOT Specifications for No. 5 (9.5 mm) Hot Mix Asphalt (HMA)
2. Binder course, WisDOT Specifications for No. 4 (12.5 mm) HMA
3. The base course aggregate beneath the new pavement should conform to the 1-1/4-inch Dense Graded Base listed in Section 305 of the WisDOT Standard Specifications (current edition)

The following table provides our estimated minimum thickness of PCC pavements.

Portland Cement Concrete (PCC) Design

Layer	Thickness (inches)	Thickness (inches)	
	Standard Duty Pavement	Heavy Duty Pavement [3]	Dumpster Pad [3]
PCC [1]	5	6	7
Aggregate Base [2]	6	6	6

1. Portland cement concrete pavements are recommended for roadways and areas subjected to repeated truck traffic, truck turning areas, and trash container pads. Trash container pads should be large enough to support the container and the tipping axle of the trash collection vehicle.
2. The base course aggregate beneath the new pavement should conform to the 1-1/4-inch Dense Graded Base listed in Section 305 of the WisDOT Standard Specifications (current edition).
3. PCC should be considered for areas of anticipated heavy traffic, fire trucks, delivery trucks, or concentrated loads (e.g., dumpster pads), and areas with repeated turning or maneuvering of heavy vehicles.

Pavement Drainage

The pavement sections provided above are based on no significant increase in the subgrade moisture contents. Paved areas should be sloped to provide rapid drainage of surface water and to drain water away from the pavement edges. Water should not be allowed to accumulate on or adjacent to the pavement, since this could saturate and soften the subgrade soils and subsequently accelerate pavement deterioration. Periodic maintenance of the pavements will be required. Cracks should be sealed, and areas exhibiting distress should be repaired promptly to help prevent further deterioration. Even with periodic maintenance, some movement and related cracking may still occur, and repairs may be required.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.

Stormwater Management

It is our understanding that ponds is planned along the east portion of the site. The bottom of the pond is unknown to us. The seasonal high groundwater level for the area of the pond where the borings were conducted was observed at elevation 813 to 814 feet.

Stormwater management facilities are governed by the Wisconsin Department of Natural Resources Conservation Practice Standard 1002 (Site Evaluation for Storm Water Infiltration). Based on the textural classification consisting of a design infiltration rate of 0.04 to 0.5 inches per hour (in/hr) were assigned to the soils observed within the borings per Table 2 of WDNR Standard 1002.

Based on the soils and the observation of the seasonal high groundwater level at 813 to 814, there isn't at least 5 feet of infiltratable soils above the SHGWL and thus this site would be exempt from infiltration.

Wet detention ponds should incorporate a liner system in accordance with the WDNR Technical Standard 1001. Liner systems constructed of soil should have a minimum thickness of two feet. The level of liner system (A, B, or C) is dependent on the potential for groundwater pollution and should be selected by the designer and owner based on the operational characteristics of the facility. The on-site lean clays should be suitable for use as a clay liner. Soil fill materials used for liner construction should be processed placed in horizontal lifts of 9 inches or less in loose thickness. Each lift should be compacted to at least 95% of the maximum dry density as obtained by the standard Proctor (ASTM D698) or 92% of the maximum dry density as obtained by the Modified Proctor (ASTM D1557), or the minimum degree required to achieve the specified maximum permeability recommended below. The liner material should be uniformly moisture conditioned at the time of compaction within 0 to +4% of the optimum moisture content as determined by the standard Proctor test. The pond side slopes should be no steeper than 3H:1V.

The completed earthen liner should be protected from desiccation and cracking prior to filling the pond. If the liner becomes dry, desiccated, or cracked prior to filling or during the life of the pond, the clay liner should be scarified, moisture conditioned, and recompacted. Additionally, the normal pool elevation within the pond should be maintained at or above the seasonal high groundwater level to avoid the possibility of the clay liner failing due to hydrostatic pressures.

The material characteristics and permeability criteria for the liner system should be selected in accordance with Appendix D of Technical Standard 1001 based on the liner level which is required for the facility. We recommend that onsite soils or imported materials are tested to confirm they will meet the requirements defined in the Technical Standard.

Due to the presence of water close the ground surface in the pond borings, dewatering may be required in order to lower the groundwater table to 2 feet below the lowest planned excavation level and allow for proper compaction of the liner materials.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the

Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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

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

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth [1]	Location
10 (B-1 through B-10)	(13.3-20)[2]	Buildings Area
3 (SW-1 to SW-3)	(11-15)[2]	Stormwater Pond Areas

1. Feet below existing ground surface.
2. Some borings encountered refusals on unknown material at depths shallower than planned.

Boring Layout and Elevations: Terracon personnel laid out the borings based on the planned structure locations and the locations of existing utilities which are present at the site. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±20 feet) and using existing site features.

Subsurface Exploration Procedures: The borings were advanced their full depth using continuous flight hollow stem augers. Four samples were obtained in the upper 10 feet of each boring, and at 5-foot intervals thereafter to termination depths. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. Soil samples in stormwater area were collected at 2.5-foot intervals to the termination depth The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples were placed in appropriate containers, taken to our laboratory for testing, and classified by the project engineer. In addition, we observed and recorded subsurface water levels during drilling and after boring completion. The borings were backfilled with bentonite chips and auger cuttings after drilling.

Our exploration team prepared field boring logs as part of standard drilling operations. These logs include sampling depths, penetration distances, and other relevant sampling information, visual classifications of materials encountered during drilling, and our interpretation of subsurface conditions between samples. Report logs were prepared from the field logs and incorporated the project engineer's interpretation of the field logs and include modifications based on observations and laboratory tests of the samples in our laboratory.

Laboratory Testing

The samples were tested in the laboratory to measure their natural water content which are provided on the boring logs in **Exploration Results**. Laboratory testing to determine the organic content of samples from borings B-5 and SW-1 was also performed. The samples were also classified in the laboratory based on visual observation, texture, and plasticity. The soil descriptions presented on the boring logs are in accordance with the General Notes and Unified Soil Classification System (USCS) included in **Supporting Information**. The estimated USCS group symbols for native soil samples are shown on the boring logs, and a brief description of the USCS is included in **Supporting Information**. The soils in the pond area were classified using the USDA Classification System.

Attachment

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location

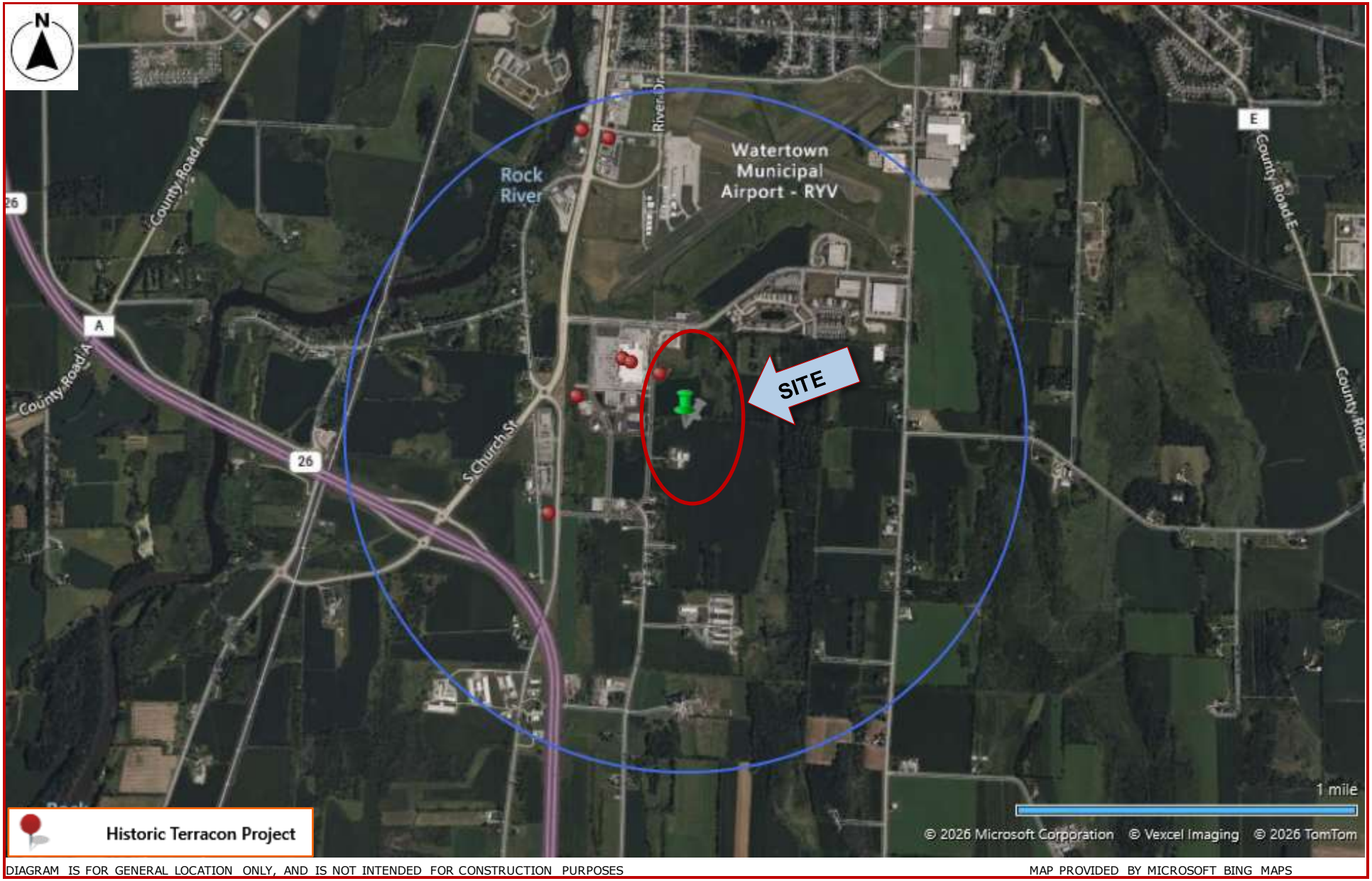


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

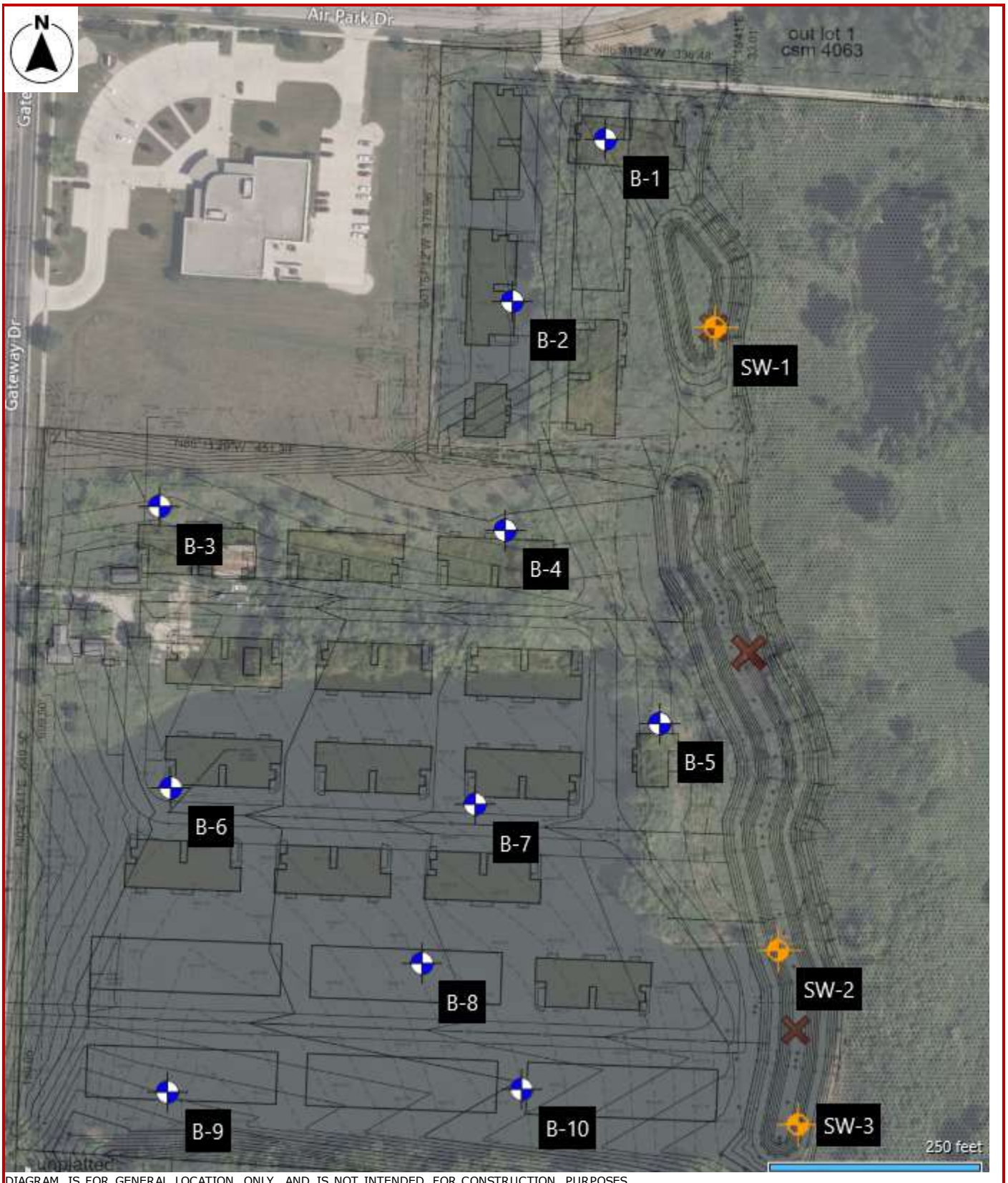


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Exploration and Laboratory Results

Contents:

Untitled Fence Diagram
Boring Logs.
Stormwater Forms

Note: All attachments are one page unless noted above.

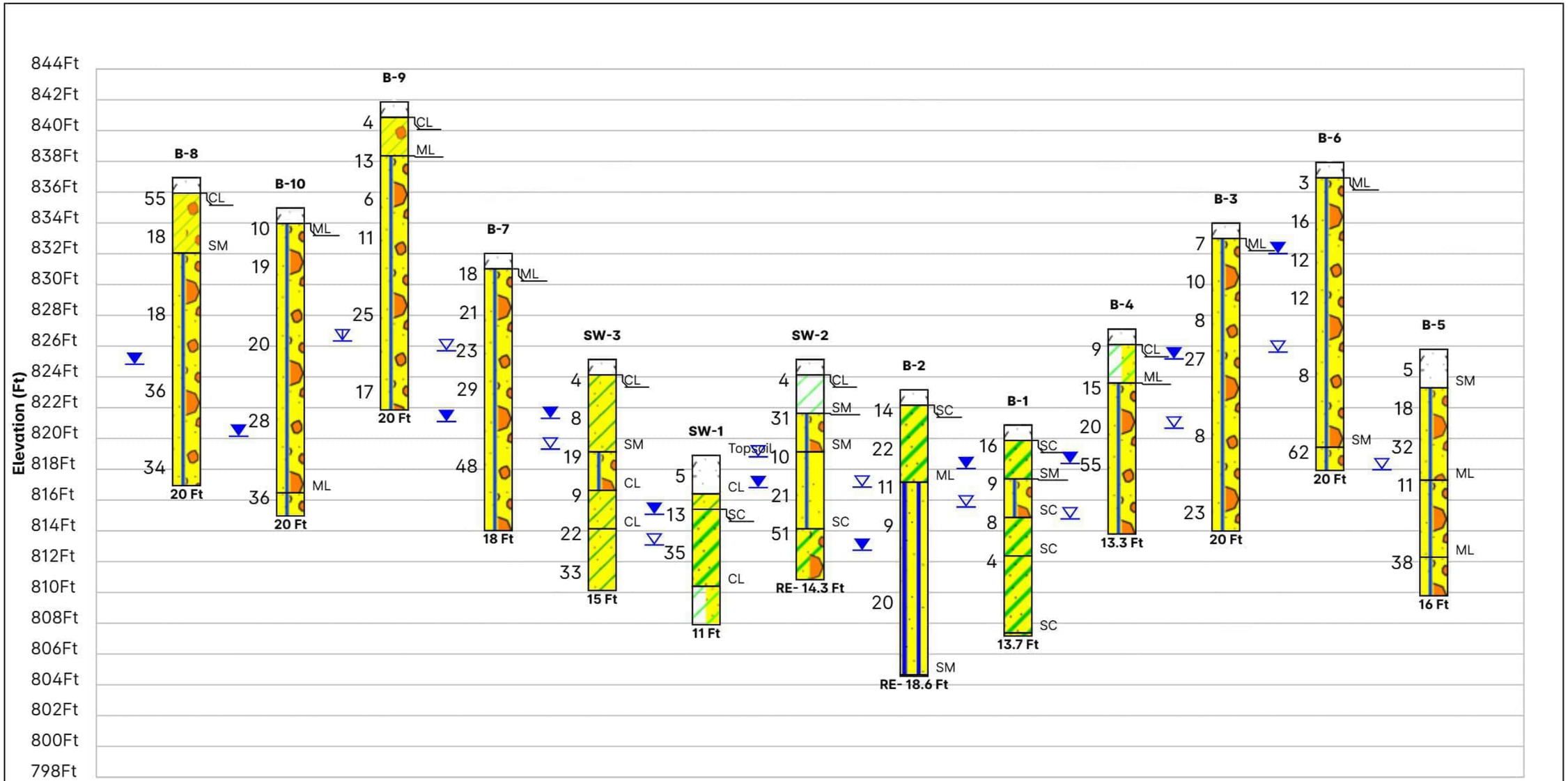
Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No: 58265062

Subsurface Profile

Terracon
4900 S Pennsylvania Ave, Ste 100
Cudahy, WI 53110-1347

◄ X

X ►



Notes	Water Level Observations	Explanation
See Exploration Plan for orientation of soil profile. See General Notes in Supporting Information for symbols and soil classifications. Soils profile provided for illustration purposes only. Soils between borings may differ AR - Auger Refusal BT - Boring Termination	Water Level Reading at time of drilling. Water Level Reading after drilling.	B-01 — Borehole Number Sampling (See General Notes) — Borehole Lithology AR / BT — Borehole Termination Type

Material Legend

	Sandy Lean Clay with Gravel	Silty Sand with Gravel	Sandy Silt with Gravel	Sandy Lean Clay	Topsoil	
Clayey Sand	Lean Clay with Sand	Lean Clay	Silty Sand	Clayey Sand with Gravel	Sandy Silt	

CPT Soil Classification Graphic Color Code

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1632° Longitude: -88.7263°

BORING LOG NO. B-1

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
821(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Water Content (%)
1			**TOPSOIL,** (12" thick)		821.0					
		1.0			820.0					
3			**CLAYEY SAND (SC),** trace gravel, fine grained sand, gray mottled brown, moist, medium dense, rust mottling				16	▼	2-7-9 N = 16	12
		3.5			817.5					
			SILTY SAND WITH GRAVEL (SM), fine to coarse grained sand, brown, moist, loose, possible cobble	5			1	▽	1-2-7 N = 9	-
		6.0			815.0					
			CLAYEY SAND (SC), trace gravel, fine grained sand, brown, wet, loose				14		6-5-3 N = 8	10
		8.5			812.5					
			CLAYEY SAND (SC), trace gravel, fine grained sand, gray, wet, loose	10			10		1-2-2 N = 4	9
		13.5			807.5					
			CLAYEY SAND WITH GRAVEL (SC), fine grained sand, tan, moist, very dense				0.5		50/2"	7
			Boring Auger Refusal at 13.7 Ft							

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
Finishing Comments: Refusal due to possible bedrock or cobbles/boulders

Water Level Observations
▽ 5 Ft. While drilling
▼ 2.5 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/24/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1627° Longitude: -88.7268°

BORING LOG NO. B-2

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
823(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Water Content (%)
1		1.0	**TOPSOIL,** (12" thick)		823.0 822.0					
3		6.0	**CLAYEY SAND (SC),** trace gravel, fine grained sand, tan, moist, medium dense	5	817.0		18	▽	2-4-10 N = 14	12
							5		14-13-9 N = 22	9
			SANDY SILT (ML), trace gravel, tan, wet, stiff to very stiff				18		2-5-6 N = 11	10
				10			18	▼	8-5-4 N = 9	10
				15			1		6-9-11 N = 20	-
		18.5	**SILTY SAND WITH GRAVEL (SM),** light gray, wet, very dense, possible cobble		804.5		1		50/1.5"	
			Boring Refusal at 18.6 Ft							

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
Finishing Comments: Refusal due to possible bedrock or cobbles/boulders

Water Level Observations
▽ 6 Ft. While drilling
▼ 10.1 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/23/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.162° Longitude: -88.7283°

BORING LOG NO. B-3

4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
834(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Water Content (%)
1		1.0	**TOPSOIL,** (12" thick)		834.0 833.0					
3			**SANDY SILT WITH GRAVEL (ML),** tan, moist to wet, medium stiff to very stiff	5			18		2-2-5 N = 7	11
							18		4-4-6 N = 10	10
							18		2-2-6 N = 8	11
				10			1		36-17-10 N = 27	
				15			16		2-4-4 N = 8	12
							18		4-9-14 N = 23	9
			Boring Terminate at 20 Ft							

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.

Water Level Observations
13 Ft. While drilling
8.5 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/23/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1619° Longitude: -88.7268°

BORING LOG NO. B-4

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
827(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Hand Penetrometer (tsf)	Water Content (%)
1			**TOPSOIL,** (12" thick)		827.0						
		1.0			826.0						
2			**SANDY LEAN CLAY (CL),** trace gravel, tan, stiff, trace roots				10		2-3-6 N = 9	1.0	11
		3.5			823.5						
3			**SANDY SILT WITH GRAVEL (ML),** tan, moist to wet, very stiff to hard, trace cobbles	5			16		10-8-7 N = 15		9
							14		15-10-10 N = 20		8
							3		11-23-32 N = 55		11
				10							
			Boring Auger Refusal at 13.3 Ft								

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
Finishing Comments: Refusal due to possible bedrock or cobbles/boulders

Water Level Observations
12 Ft. While drilling
8.4 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/23/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1613° Longitude: -88.7261°

BORING LOG NO. B-5

4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
826(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Water Content (%)	Organic Content (%)
1			**TOPSOIL,** (30" thick)		826.0						
						X	6		1-2-3 N = 5	36	7
		2.5			823.5						
3			**SILTY SAND WITH GRAVEL (SM),** fine, medium and coarse grained sand, brown, moist to wet, medium dense to dense								
						X	12		4-6-12 N = 18	11	
				5							
						X	12	▽	10-16-16 N = 32	7	
		8.5			817.5						
			SANDY SILT WITH GRAVEL (ML), tan, moist to wet, stiff			X	16		3-5-6 N = 11	9	
				10							
		13.5			812.5						
			SANDY SILT WITH GRAVEL (ML), gray, moist, very stiff, trace clay			X	18		14-16-22 N = 38	7	
				15							
			Boring Auger Refusal at 16 Ft								

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
Finishing Comments: Refusal due to possible bedrock or cobbles/boulders

Water Level Observations
Groundwater not encountered upon completion
▽ 7.5 Ft. While drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/23/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1611° Longitude: -88.7283°

BORING LOG NO. B-6

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
838(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Water Content (%)
1			**TOPSOIL,** (12" thick)		838.0					
		1.0			837.0					
3			**SANDY SILT WITH GRAVEL (ML),** tan, moist to wet, soft to stiff, trace clay				18		1-1-2 N = 3	13
							6		5-8-8 N = 16	12
				5				▼		
							12		3-5-7 N = 12	10
							15		5-7-5 N = 12	8
				10				▽		
							22		1-2-6 N = 8	12
				15						
		18.5			819.5					
			SILTY SAND WITH GRAVEL (SM), fine grained sand, tan, moist to wet, very dense, possible cobbles and boulders				20		15-27-35 N = 62	9
			Boring Terminate at 20 Ft							

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.

Water Level Observations
▽ 12 Ft. While drilling
▼ 5.6 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/22/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1611° Longitude: -88.7269°

BORING LOG NO. B-7

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
832(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Water Content (%)
1		1.0	**TOPSOIL,** (12" thick)		832.0 831.0					
3			**SANDY SILT WITH GRAVEL (ML),** tan, moist to wet, very stiff to hard	5			18	▽	2-8-10 N = 18	8
							20		7-9-12 N = 21	9
				10			18		3-5-18 N = 23	9
							20	▼	7-14-15 N = 29	7
				15			19		10-18-30 N = 48	8
			Boring Auger Refusal at 18 Ft							

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
Finishing Comments: Refusal due to possible bedrock or cobbles/boulders

Water Level Observations
▽ 6 Ft. While drilling
▼ 10.6 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/23/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1605° Longitude: -88.7272°

BORING LOG NO. B-8

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
837(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Hand Penetrometer (tsf)	Water Content (%)
1			**TOPSOIL,** (12" thick)		837.0						
		1.0			836.0						
2			**SANDY LEAN CLAY WITH GRAVEL (CL),** dark brown to brown, hard, possible cobbles and boulders				10		4-20-35 N = 55	dist.	21
							6		7-10-8 N = 18		
		5.0			832.0						
3			**SILTY SAND WITH GRAVEL (SM),** tan, moist, medium dense to very dense, possible cobbles and boulders	5							
							6		6-50/2.5''		9
							18		5-8-10 N = 18		9
				10				▼			
							16		13-16-20 N = 36		10
				15							
							22		8-16-18 N = 34		8
			Boring Terminate at 20 Ft								

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
General Comments: Auger refusal at 6.5-feet offset 5-feet west

Water Level Observations
Groundwater not encountered while drilling
▼ 11.8 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/22/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1601° Longitude: -88.7283°

BORING LOG NO. B-9

4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
842(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Hand Penetrometer (tsf)	Water Content (%)
1			**TOPSOIL,** (12" thick)		842.0						
		1.0			841.0						
2			**SANDY LEAN CLAY WITH GRAVEL (CL),** tan, medium stiff, trace silt				18		1-2-2 N = 4	dist.	26
		3.5			838.5						
3			**SANDY SILT WITH GRAVEL (ML),** tan, moist to wet, medium stiff to very stiff	5			12		2-4-9 N = 13		11
							20		3-2-4 N = 6		10
				10			18		3-4-7 N = 11		12
				15			16	▽	6-10-15 N = 25		9
							10		5-7-10 N = 17		9
			Boring Terminate at 20 Ft								

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.

Water Level Observations
Groundwater not encountered while drilling
▽ 15.2 Ft. After completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/22/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1601° Longitude: -88.7267°

BORING LOG NO. B-10

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
835(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Water Content (%)
1			**TOPSOIL,** (12" thick)		835.0					
		1.0			834.0					
3			**SANDY SILT WITH GRAVEL (ML),** tan, moist to wet, stiff to hard, possible cobbles and boulders				10		2-3-7 N = 10	11
				5			14		4-12-7 N = 19	8
							8		8-50/4"	8
							13		7-9-11 N = 20	8
				10						
							18	▼	5-10-18 N = 28	8
				15						
		18.5			816.5					
			SANDY SILT WITH GRAVEL (ML), gray, moist, hard				22		12-18-18 N = 36	7
			Boring Terminate at 20 Ft							

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.

Water Level Observations
Groundwater not encountered while drilling
▼ 14.5 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/22/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1626° Longitude: -88.7259°

BORING LOG NO. SW-1

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
819(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Hand Penetrometer (tsf)	Water Content (%)	Organic Content (%)
			TOPSOIL, (30" thick)		819.0							
1							5		1-1-4 N = 5	dist.	27	3.2
		2.5			816.5							
3			**CLAYEY SAND (SC),** trace gravel, gray and rusty brown, moist, medium dense to very dense									
							10		4-6-7 N = 13		9	
				5								
							14		12-15-20 N = 35		7	
		8.5			810.5							
			CLAYEY SAND (SC), trace gravel, gray, wet, very dense, trace rock				8		4-50/5''		11	
				10			0		50/0.5''			
			Boring Auger Refusal at 11 Ft									

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
Finishing Comments: Refusal due to possible bedrock or cobbles/boulders

Water Level Observations
▽ 5.5 Ft. While drilling
▼ 3.5 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/24/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.1606° Longitude: -88.7256°

BORING LOG NO. SW-2

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
825(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Hand Penetrometer (tsf)	Water Content (%)
1			**TOPSOIL,** (12" thick)		825.0						
		1.0			824.0						
2			**LEAN CLAY (CL),** trace sand, trace gravel, rusty brown mottled gray, stiff				10		2-2-2 N = 4	1.5	20
		3.5			821.5						
3			**SILTY SAND WITH GRAVEL (SM),** trace clay, gray, moist, dense				18		9-16-15 N = 31		7
				5							
		6.0			819.0						
			SILTY SAND (SM), trace gravel, trace clay, brown with rust mottling, medium dense, very moist				18		3-4-6 N = 10		9
							18		5-8-13 N = 21		8
				10							
		11.0			814.0						
			CLAYEY SAND WITH GRAVEL (SC), brownish gray, moist, very dense				18		20-27-24 N = 51		7
							8		14-50/3''		6
			Boring Refusal at 14.3 Ft								

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.
Finishing Comments: Refusal due to possible bedrock or cobbles/boulders

Water Level Observations
▽ 6 Ft. While drilling
▼ 8 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/23/2026

Watertown Apartments
1911 Gateway Drive, Watertown, WI, 53094-8727,USA
Terracon Project No. 58265062

Latitude: 43.16° Longitude: -88.7255°

BORING LOG NO. SW-3

Terracon
4900 S Pennsylvania Ave,
Ste 100 Cudahy, WI 53110-1347

Surface Elevation:
825(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Recovery (In.)	Water Level Observations	Field Test Results	Hand Penetrometer (tsf)	Water Content (%)
1		1.0	**TOPSOIL,** (12" thick)		825.0 824.0						
2			**SANDY LEAN CLAY (CL),** trace gravel, rusty brown mottled gray, stiff				10		1-2-2 N = 4	dist.	22
								▼			
							12		3-2-6 N = 8	1.25	11
		6.0		5				▽			
3			**SILTY SAND WITH GRAVEL (SM),** brown, medium dense, very moist		819.0		8		6-12-7 N = 19		9
		8.5			816.5						
2			**SANDY LEAN CLAY (CL),** trace gravel, grayish brown, stiff	10			18		2-4-5 N = 9	1.0	10
		11.0			814.0						
			SANDY LEAN CLAY (CL), trace gravel, gray, hard				18		7-8-14 N = 22	4.5+	8
							18		7-9-24 N = 33	dist.	11
			Boring Terminate at 15 Ft								

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevation interpreted from the topographic plan.

Water Level Observations
▽ 5.5 Ft. While drilling
▼ 3.5 Ft. At completion of drilling

Abandonment Method
Boring backfilled with soil cuttings and bentonite chips upon completion.

Equipment
Subcontractor-7822DT
Geoprobe

Hammer Type
Automatic

Driller
Chris

Logged By
Madie

Start Date
04/23/2026

Wisconsin Department of Safety and Professional Services
Division of Industry Services
4822 Madison Yards Way
PO Box 7302
Madison, WI 53707

Phone: 608-266-2112
Web: http://dsps.wi.gov
Email: dsps@wisconsin.gov

Program: Plumbing
Web: https://dsps.wi.gov/Pages/Programs/Plumbing

Soil and Site Evaluation – Stormwater Infiltration

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but is not limited to: vertical and horizontal reference point (BM); direction and percent of slope; scale or dimensions; north arrow; and BM referenced to nearest road.

PLEASE PRINT ALL INFORMATION

COUNTY: Jefferson County

PARCEL ID: 291-0815-1624-003

PROPERTY OWNER: 1911 WATERTOWN PROPCO LLC

PROPERTY OWNER'S MAILING ADDRESS: 220 N GREEN ST STE 610

CITY, STATE, ZIP CODE / PHONE: CHICAGO, IL 60607

PROPERTY LOCATION

Govt. Lot ____, ____ ¼, ____ ¼, S ____, T ____N, R ____ W

Lot #, Block #, Subd. Name or CSM #: _____

Municipality: _____

☑ City ☐ Village ☐ Town

Nearest Road: Gateway Dr

Drainage area_____ ☐sq. ft. ☐acres

Test site suitable for (check all that apply):

☐Site not suitable ☐Bioretention

☐Reuse ☐Subsurface Dispersal System

☐Irrigation ☐Other _____

HYDRAULIC APPLICATION TEST METHOD

☐ Morphological Evaluation

☐ Double Ring Infiltrometer

☐ Other: (specify)

_____

SOIL MOISTURE

Date of soil borings: 04/23/2026

USDA-NRCS WETS VALUE:

☐ Dry = 1

☑ Normal = 2

☐ Wet = 3

SW-3 #OBS. ☐ Pit ☑ Boring Ground Surface Elevation 825 ft. Elevation of Limiting Factor 814 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App. Rate Inches/Hr.
1	12			Topsoil						
2	72	10 YR 5/2	C2D 10 YR 5/6	SC	3 Vco Abk	Fi	Ab	5	55	0.04
3	102	10 YR 5/4	None	XGRSL	0 Sg	L	Ab	30	40	0.50
4	132	10 YR 5/3	None	GRSC	3 Vco Abk	Fr	Ab	15	60	0.04
5	180	10 YR 5/2	None	SC	3 Vco Abk	Fi	Ab	10	70	0.04

Comments:

SW-2 ____ #OBS. ☐ Pit ☑ Boring Ground Surface Elevation 825 ft. Elevation of Limiting Factor 814 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App. Rate Inches/Hr.
1	12			Topsoil						
2	42	10 YR 5/4	M2D 10 YR 5/1, C2D 10 YR 5/6	C	3 Vco Abk	Fi	Ab	5	90	0.07
3	72	10 YR 5/4	None	GSL	0 Sg	L	Ab	15	35	0.50
4	132	10 YR 5/4	F2D 7.5 YR 5/6	SCL	3 Vco Abk	Fr	Ab	8	50	0.11
5	172	10 YR 5/2	None	GSCL	3 Vco Abk	Fr	Ab	15	45	0.11

Comments:

SW-1 ____ #OBS. ☐ Pit ☑ Boring Ground Surface Elevation 819 ft. Elevation of Limiting Factor 813 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App. Rate Inches/Hr.
1	12			Topsoil						
2	72	10 YR 6/2	C2D 10 YR 6/6	SC	3 Vco Abk	Fr	Ab	5	80	0.04
3	102	10 YR 5/3	None	SCL	3 Vco Abk	Fi	Ab	5	50	0.11
4	180	10 YR 5/6	C2D 5 YR 4/6	SC	3 Vco Abk	Fr	Ab	10	60	0.04

Comments:

____ #OBS. ☐ Pit ☐ Boring Ground Surface Elevation _____ ft. Elevation of Limiting Factor _____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App. Rate Inches/Hr.

Comments:

____ #OBS. ☐ Pit ☐ Boring Ground Surface Elevation _____ ft. Elevation of Limiting Factor _____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App. Rate Inches/Hr.

Comments:

____ #OBS. ☐ Pit ☐ Boring Ground Surface Elevation _____ ft. Elevation of Limiting Factor _____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App. Rate Inches/Hr.

Comments:

Overall Site Comments:

Paul J Koszarek, P.E., C.S.T. — Name (Please Print)

Signature

1263130 — Credential Number

4900 S Pennsylvania Ave Suite 100, Cudahy, WI 53110 — Address

05/14/2026 — Date Evaluation Conducted

262-332-3399 — Phone Number

Supporting Information

Contents:

General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.

General Notes

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING


Auger


Split Spoon


Shelby Tube


Macro Core


Ring Sampler


Rock Core


Grab Sample


No Recovery

WATER LEVEL


Water Initially Encountered


Water Level After a Specified Period of Time


Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Subsurface water level variations will occur over time. In low permeability soils, accurate determination of subsurface water levels is not possible with short term water level observations.

FIELD TESTS

(HP)	**Hand Penetrometer**
(T)	**Torvane**
(b/f)	**Standard Penetration Test (blows per foot)**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**
(DCP)	**Dynamic Cone Penetrometer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS

(More than 50% retained on No. 200 sieve)
Density determined by Standard Penetration Resistance

Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 – 3
Loose	4 – 9
Medium Dense	10 – 29
Dense	30 – 50
Very Dense	> 50

CONSISTENCY OF FINE-GRAINED SOILS

(50% or more passing the No. 200 sieve)
Consistency determined by laboratory shear strength testing, field visual-manual procedures, or standard penetration resistance

Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, tsf	Standard Penetration or N-Value Blows/Ft.
Very Soft	Less than 0.25	0 – 1
Soft	0.25 to 0.50	2 – 4
Medium Stiff	0.50 to 1.00	4 – 8
Stiff	1.00 to 2.00	8 – 15
Very Stiff	2.00 to 4.00	15 – 30
Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive term(s) of other constituents	Percent (%) of dry weight
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major component of sample	Particle size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive term(s) of other constituents	Percent (%) of dry weight
Trace	< 5
With	5 – 12
Modifier	> 12

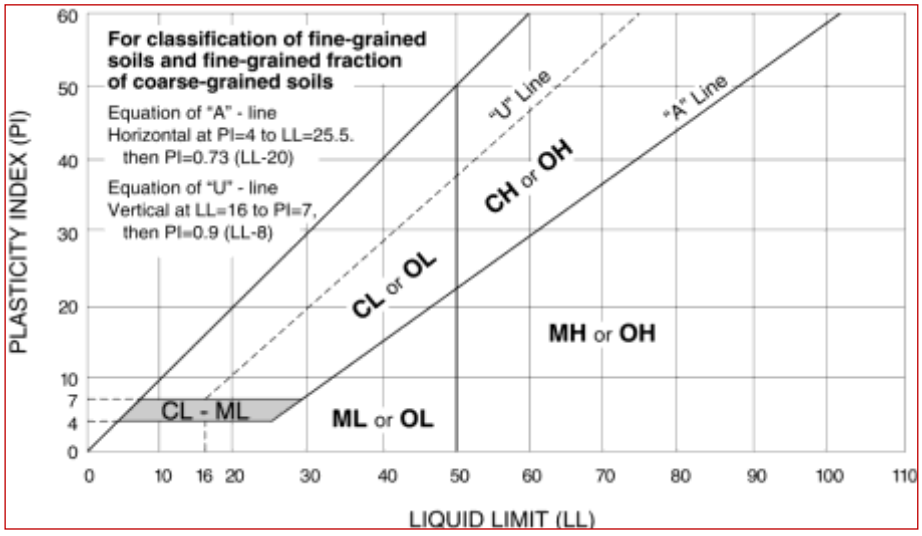
PLASTICITY DESCRIPTION

Term	Plasticity Index
Non plastic	0
Low	1 – 10
Medium	11 – 30
High	> 30

Unified Soil Classification System

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

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Appendix 3

Drainage Area Maps

PRELIMINARY
NOT FOR
CONSTRUCTION

SCALE IN FEET
0 50' 100'

7328C

7845B

7766B

7263A

7021A

EXISTING E1
BUILDING/DRIVEWAYS - 0.14 AC
ROW CROPS - 2.27 AC
LAWN - 1.14 AC
TOTAL - 3.55 AC
COMPOSITE CN = XX

EXISTING E1
BUILDING/DRIVEWAYS - 0.95 AC
LAWN - 3.60 AC
ROW CROPS - 9.79 AC
MEADOW - 6.46 AC
TOTAL - 20.80 AC
COMPOSITE CN = X

EXISTING
PRO-HEALTHCARE
BUILDING

EXISTING
PRO-HEALTHCARE
PARKING

conc

Time of Conc Path = 4.2 Min

Time of Conc Path = 12.7 Min

777' @ 2.7%

100' @ 2.6%

STM INLET
GRATE - 822.91
12"W - 819.71
12"N - 819.83

STM INLET
GRATE - 822.26
12"S - 820.26

STM INLET
GRATE - 825.88
12"W - 821.78

STM INLET
GRATE - 821.26
12"N - 817.56

SAN MH
RIM - 822.87
8"N - 807.17
8"SW - 807.17

EXISTING "DRY" STORMWATER POND
TO BE REMOVED

WETLANDS

DIGGERS HOTLINE
Toll Free (800) 242-8511
Milwaukee Area (414) 259-1181
Hearing Impaired TDD (800) 542-2289
www.DiggersHotline.com

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Payne+Dolan
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(920) 757-7559

PROJECT
RIVER CROSSING
GATEWAY DRIVE
CITY OF WATERTOWN, WI

CLIENT
NATIONAL MANAGEMENT.LLC
333 BISHOPS WAY, SUITE 141
BROOKFIELD, WI 53005

Seal

SHEET TITLE
EXISTING HYDROLOGY

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Drawing Scale:	1"=50'
Drawn:	SPK 09/01/2026
Checked:	HAM 01/09/2026
P&D Project No:	419163
Sheet No.	HY1

PRELIMINARY
NOT FOR
CONSTRUCTION

SCALE IN FEET
0 50' 100'

PROPOSED P1
BUILDINGS - 0.32 AC
DRIVEWAY/CONCRETE - 0.10 AC
LANDSCAPE - 2.03 AC
TOTAL - 2.45 AC
COMPOSITE CN = 82

7328C

PROPOSED P2
BUILDINGS - 4.24 AC
DRIVEWAY/CONCRETE - 5.87AC
LANDSCAPE - 8.65 AC
POND - 1.60 AC
TOTAL - 20.36 AC
COMPOSITE CN = XX

7845B

PROPOSED P3
BUILDINGS - 0.12 AC
DRIVEWAY/CONCRETE - 0.17 AC
LANDSCAPE - 1.25 AC
TOTAL - 1.54 AC
COMPOSITE CN = XX

7766B

7265HA

7021A

EXISTING
PRO-HEALTHCARE
BUILDING

EXISTING
PRO-HEALTHCARE
PARKING

8-UNIT
12-UNIT
15-UNIT
18-UNIT

conc

Time of Conc Path = 15.5 Min

SAN MH
RIM=832.87
8"N-807.12
8"SW-807.17

12"N-817.

POND OUTLET STRUCTURE

POND OVERFLOW WIER

WETLANDS

EQUILIZER PIPE

DIGGERS HOTLINE
Toll Free (800) 242-8511
Milwaukee Area (414) 259-1181
Hearing Impaired TDD (800) 542-2289
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GATEWAY DRIVE
CITY OF WATERTOWN, WI

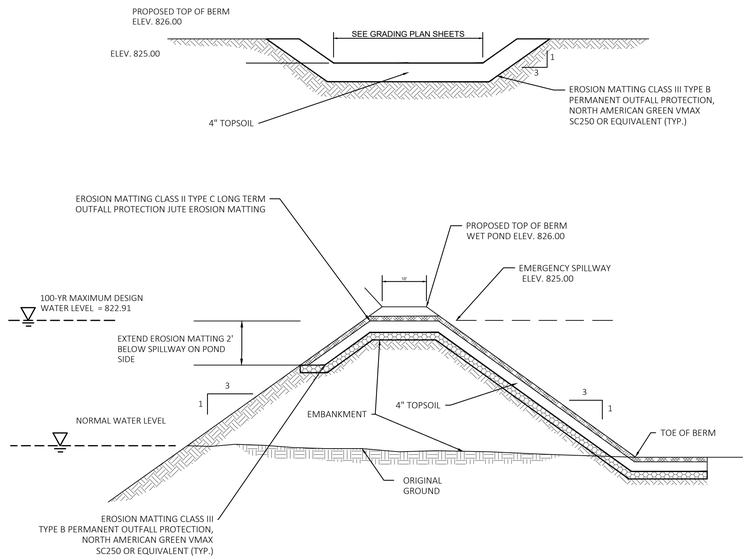
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SHEET TITLE
PROPOSED HYDROLOGY

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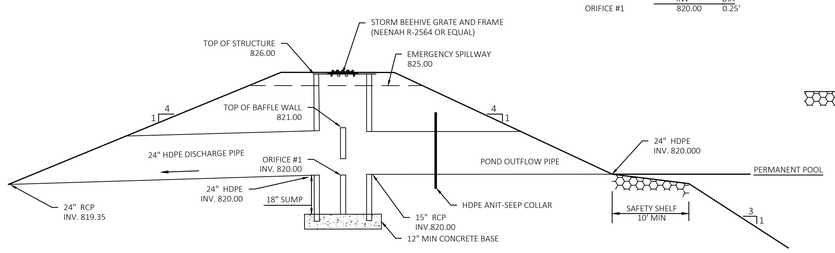
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Drawn:	SPK 09/01/2026
Checked:	HAM 01/09/2026
P&D Project No:	419163
Sheet No.	HY2



PROPOSED EMERGENCY SPILLWAYS

N.T.S.

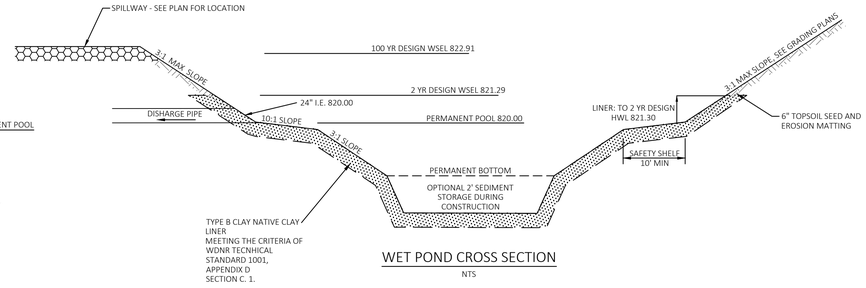
WET POND #1	DIA	INV	SLOPE
DISCHARGE PIPE	24"	798.00	1.00%
	RIM		
OUTLET STRUCTURE	826.00		
	ELEV		
TOP OF BAFFLE WALL	821.00		
	INV	DIA	
ORIFICE #1	820.00	0.25'	



WET POND PRECAST OUTLET STRUCTURE

NTS

WET POND #1 DATA	ELEV
TOP OF BERM	826.00
SPILLWAY	825.00
100-YR WSEL	822.91
2-YR WSEL	821.29
PERMANENT POOL	820.00
PERMANENT BOTTOM	815.00



WET POND CROSS SECTION

NTS

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DIGGERS HOTLINE

Toll Free (800) 242-8511
Milwaukee Area (414) 259-1181
Hearing Impaired TDD (800) 542-2289
www.DiggersHotline.com

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RIVER CROSSING
CITY OF WATERTOWN, WI

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BROOKFIELD, WI 53005

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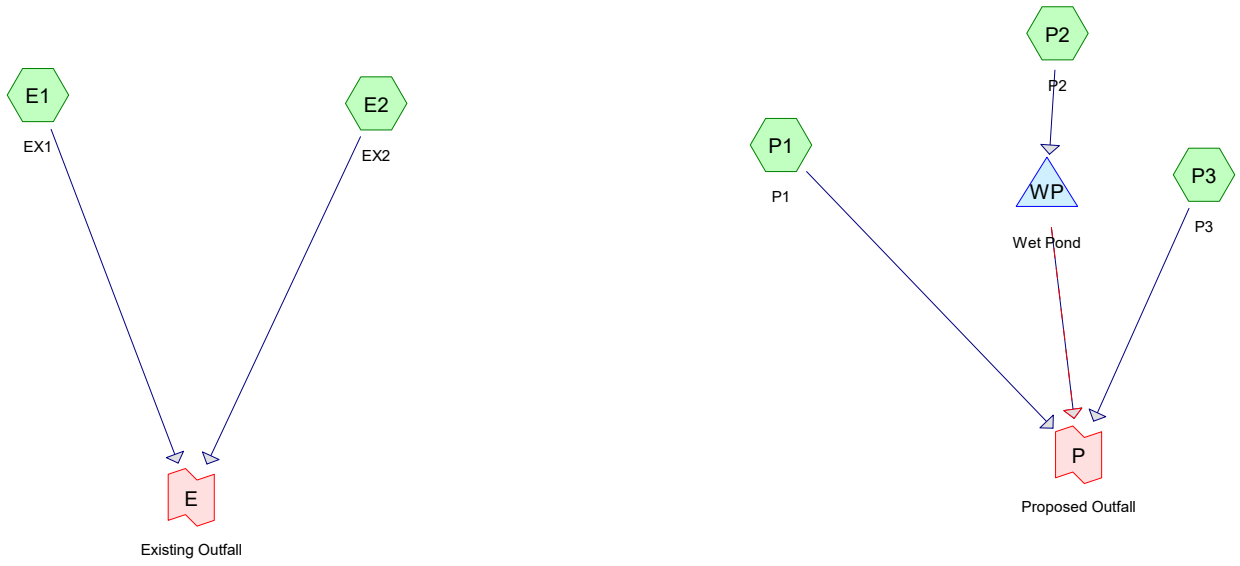
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Drawn:	XXX 08/17/2026
Checked:	XXX XX/XX/XXXX
P&D Project No:	#491163
Sheet No.	**C8.4**

Appendix 4

HydroCAD Model Results



Subcat Reach Pond Link

Routing Diagram for River Crossing
Prepared by Payne & Dolan, Printed 8/31/2026
HydroCAD® 10.20-9a s/n 08699 © 2026 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-year	MSE 24-hr	3	Default	24.00	1	2.42	2
2	2-year	MSE 24-hr	3	Default	24.00	1	2.74	2
3	10-year	MSE 24-hr	3	Default	24.00	1	3.85	2
4	100-year	MSE 24-hr	3	Default	24.00	1	6.18	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.670	79	50-75% Grass cover, Fair, HSG C (E1, E2, P1, P2, P3)
0.140	98	Building/driveways (E1)
4.560	98	Buildings (P1, P2)
0.950	98	Buildings and Driveways (E2)
0.120	98	Builkdings (P3)
5.870	98	Drives/Concrete (P2)
0.100	98	Driveway/sidewalks (P1)
18.520	71	Meadow, non-grazed, HSG C (E1, E2)
0.170	98	Parking/Drives (P3)
1.600	98	Pond (P2)
48.700	**81**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: EX1 Runoff Area=3.550 ac 3.94% Impervious Runoff Depth=0.60"
Tc=6.0 min CN=75 Runoff=3.81 cfs 0.179 af

Subcatchment E2: EX2 Runoff Area=20.800 ac 4.57% Impervious Runoff Depth=0.56"
Flow Length=871' Tc=12.7 min CN=74 Runoff=14.74 cfs 0.977 af

Subcatchment P1: P1 Runoff Area=2.450 ac 17.14% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=82 Runoff=4.29 cfs 0.192 af

Subcatchment P2: P2 Runoff Area=20.360 ac 57.51% Impervious Runoff Depth=1.46"
Flow Length=710' Slope=0.0120 '/' Tc=15.5 min CN=90 Runoff=37.72 cfs 2.477 af

Subcatchment P3: P3 Runoff Area=1.540 ac 18.83% Impervious Runoff Depth=1.00"
Tc=6.0 min CN=83 Runoff=2.86 cfs 0.128 af

Pond WP: Wet Pond Peak Elev=821.16' Storage=277,869 cf Inflow=37.72 cfs 2.477 af
Primary=1.11 cfs 1.532 af Secondary=0.00 cfs 0.000 af Outflow=1.11 cfs 1.532 af

Link E: Existing Outfall Inflow=16.93 cfs 1.156 af
Primary=16.93 cfs 1.156 af

Link P: Proposed Outfall Inflow=7.25 cfs 1.851 af
Primary=7.25 cfs 1.851 af

Total Runoff Area = 48.700 ac Runoff Volume = 3.952 af Average Runoff Depth = 0.97"
72.26% Pervious = 35.190 ac 27.74% Impervious = 13.510 ac

Summary for Subcatchment E1: EX1

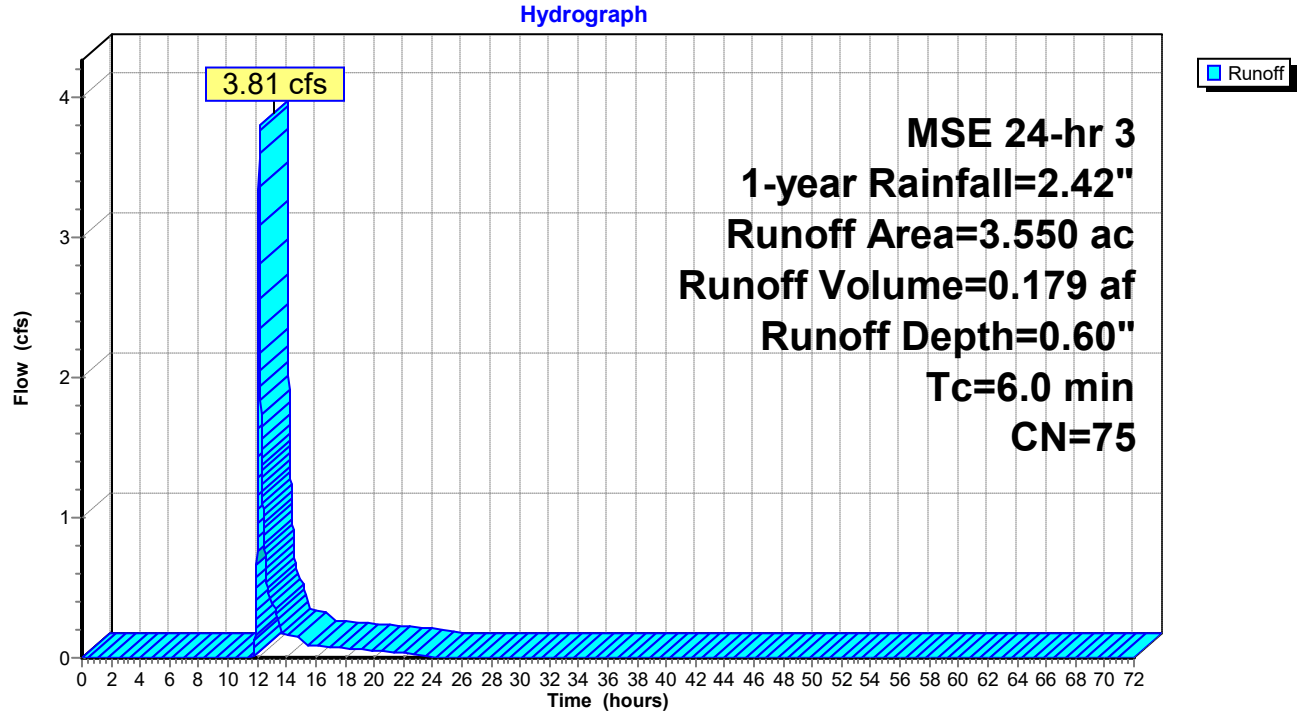
Runoff = 3.81 cfs @ 12.14 hrs, Volume= 0.179 af, Depth= 0.60"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-year Rainfall=2.42"

	Area (ac)	CN	Description
*	0.140	98	Building/driveways
	2.270	71	Meadow, non-grazed, HSG C
	1.140	79	50-75% Grass cover, Fair, HSG C
	3.550	75	Weighted Average
	3.410		96.06% Pervious Area
	0.140		3.94% Impervious Area

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

Subcatchment E1: EX1



Summary for Subcatchment E2: EX2

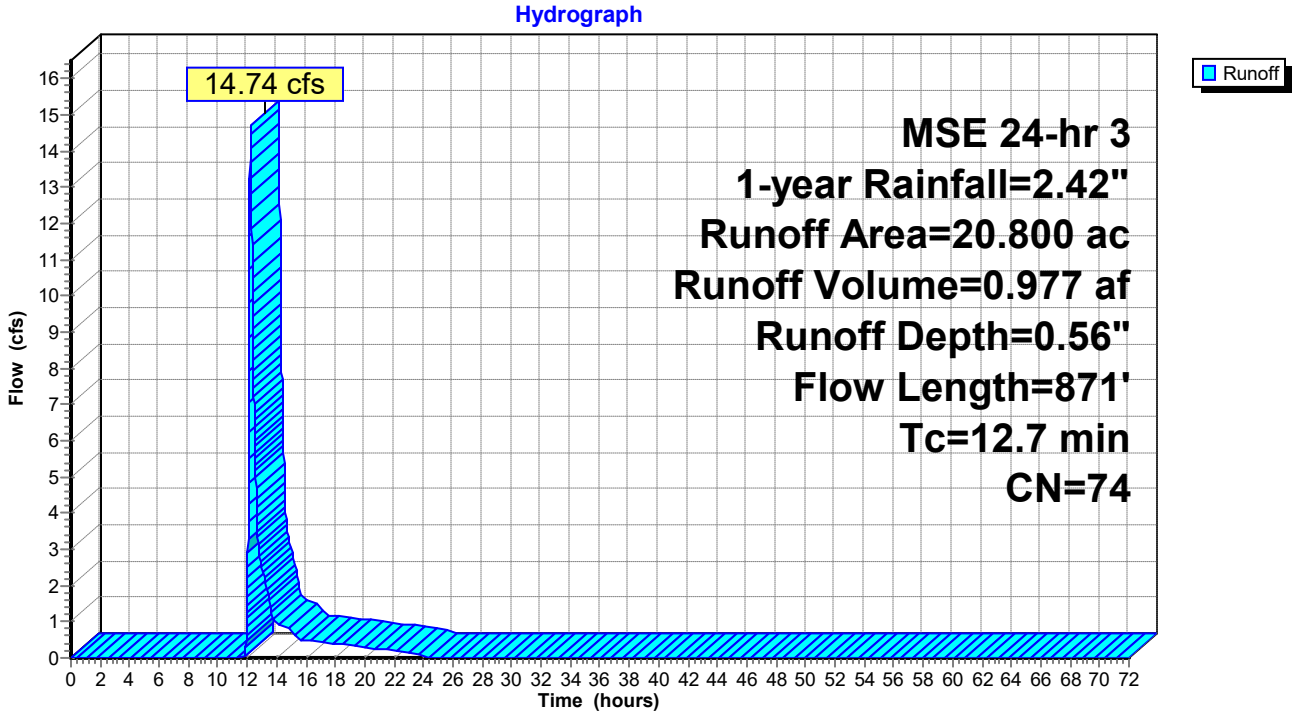
Runoff = 14.74 cfs @ 12.23 hrs, Volume= 0.977 af, Depth= 0.56"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-year Rainfall=2.42"

	Area (ac)	CN	Description
*	0.950	98	Buildings and Driveways
	3.600	79	50-75% Grass cover, Fair, HSG C
	16.250	71	Meadow, non-grazed, HSG C
	20.800	74	Weighted Average
	19.850		95.43% Pervious Area
	0.950		4.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0260	0.42		**Sheet Flow,** Fallow n= 0.050 P2= 2.74"
8.7	771	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.7	871	Total			

Subcatchment E2: EX2



Summary for Subcatchment P1: P1

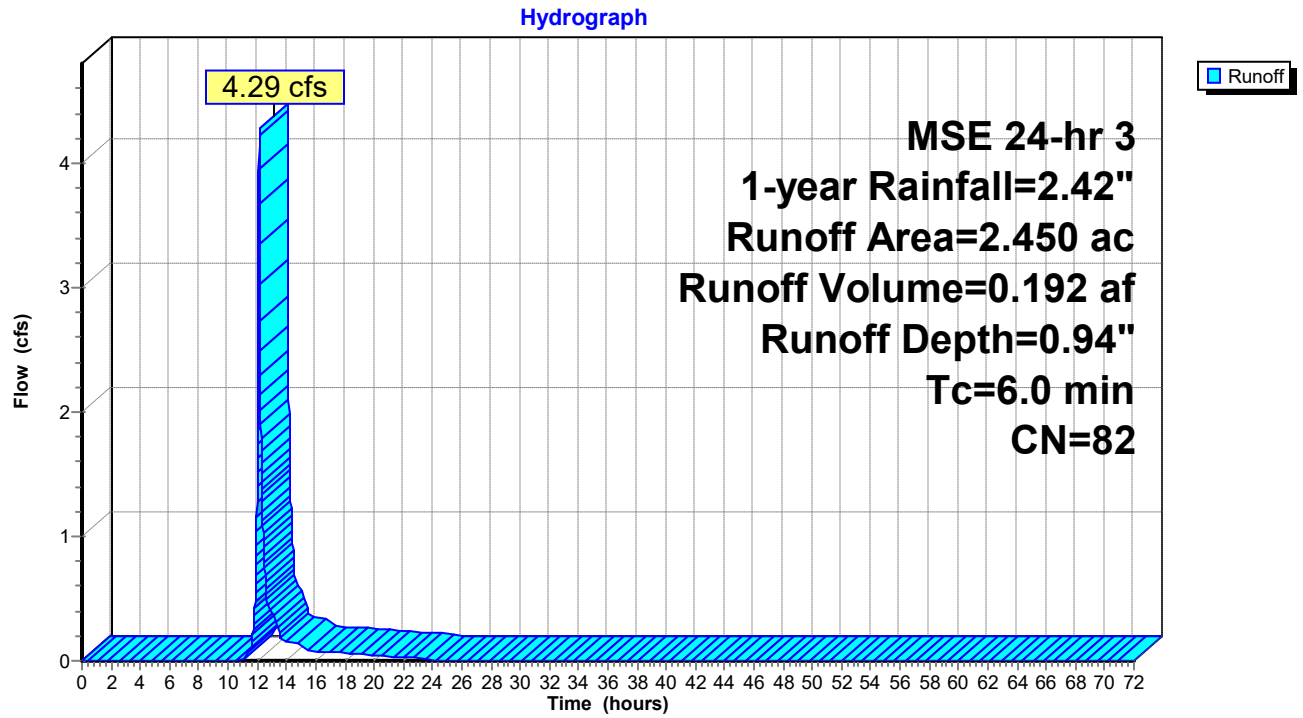
Runoff = 4.29 cfs @ 12.14 hrs, Volume= 0.192 af, Depth= 0.94"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-year Rainfall=2.42"

	Area (ac)	CN	Description
*	0.100	98	Driveway/sidewalks
*	0.320	98	Buildings
	2.030	79	50-75% Grass cover, Fair, HSG C
	2.450	82	Weighted Average
	2.030		82.86% Pervious Area
	0.420		17.14% Impervious Area

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

Subcatchment P1: P1



Summary for Subcatchment P2: P2

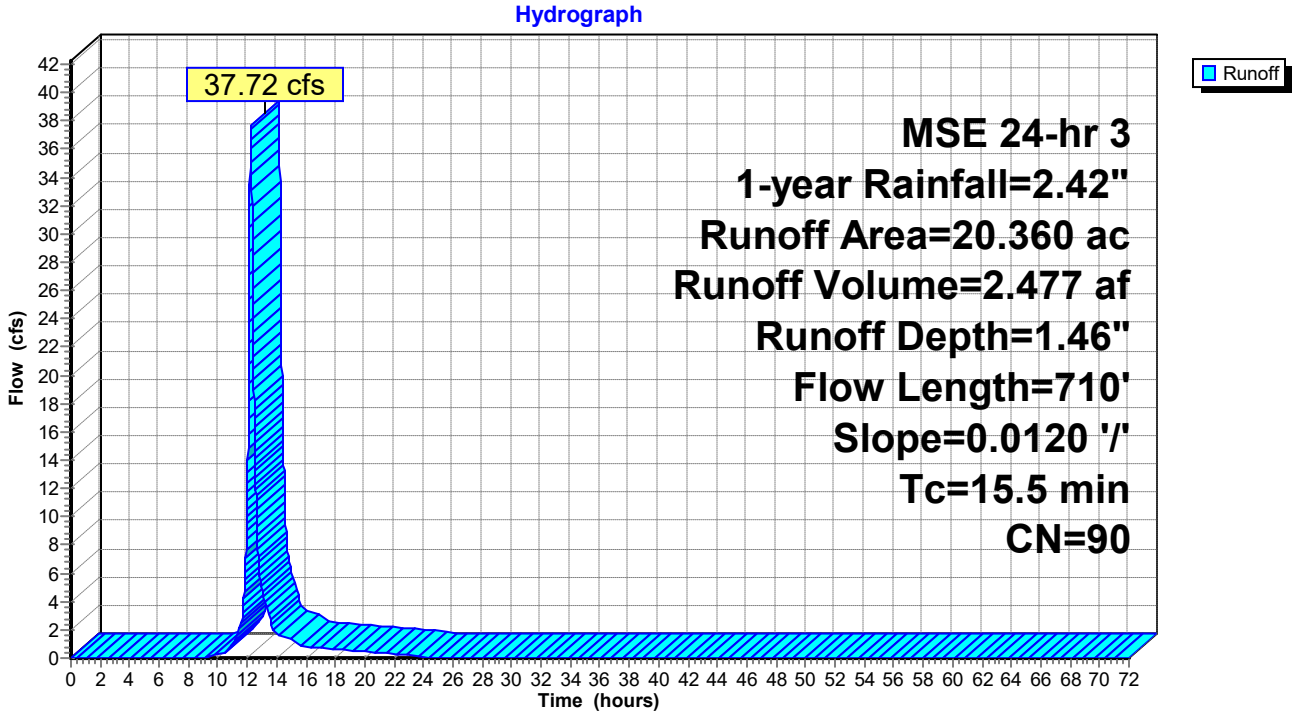
Runoff = 37.72 cfs @ 12.24 hrs, Volume= 2.477 af, Depth= 1.46"
Routed to Pond WP : Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-year Rainfall=2.42"

	Area (ac)	CN	Description
*	4.240	98	Buildings
*	5.870	98	Drives/Concrete
	8.650	79	50-75% Grass cover, Fair, HSG C
*	1.600	98	Pond
	20.360	90	Weighted Average
	8.650		42.49% Pervious Area
	11.710		57.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	710	0.0120	0.76		**Lag/CN Method,**

Subcatchment P2: P2



Summary for Subcatchment P3: P3

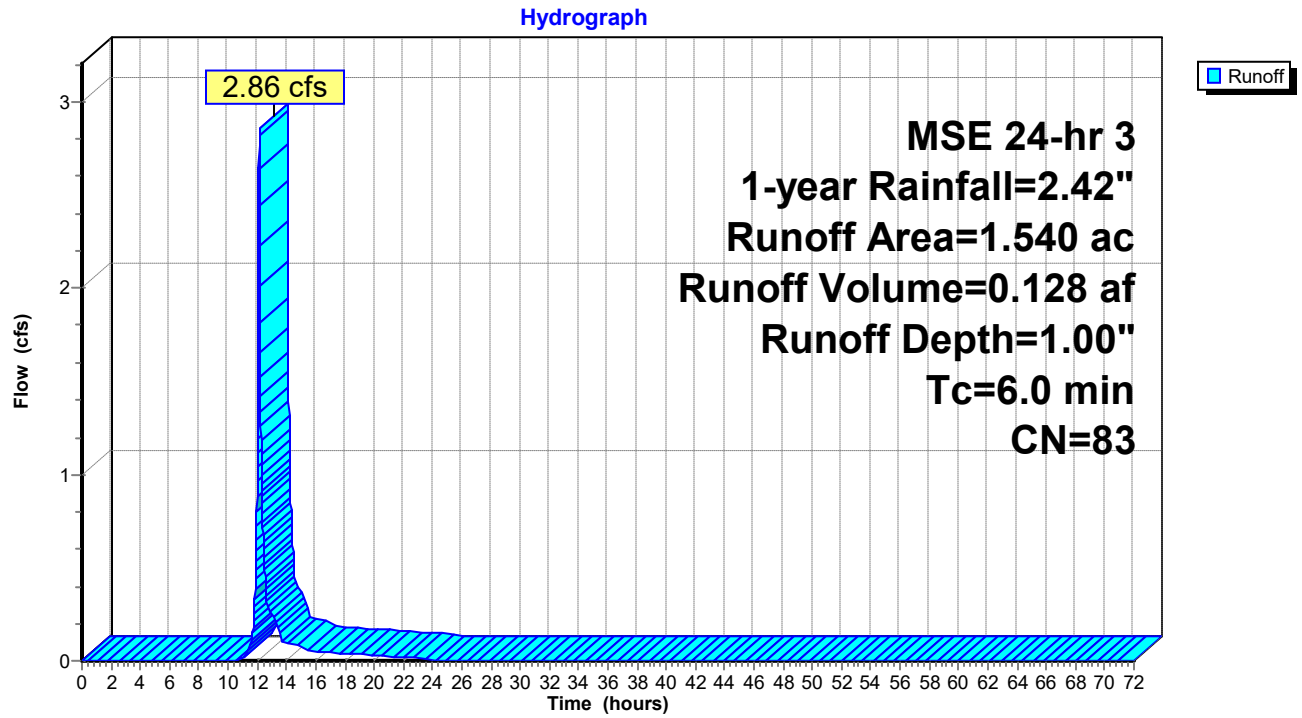
Runoff = 2.86 cfs @ 12.14 hrs, Volume= 0.128 af, Depth= 1.00"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-year Rainfall=2.42"

	Area (ac)	CN	Description
*	0.120	98	Builkdings
*	0.170	98	Parking/Drives
	1.250	79	50-75% Grass cover, Fair, HSG C
	1.540	83	Weighted Average
	1.250		81.17% Pervious Area
	0.290		18.83% Impervious Area

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

Subcatchment P3: P3



Summary for Pond WP: Wet Pond

Inflow Area = 20.360 ac, 57.51% Impervious, Inflow Depth = 1.46" for 1-year event
Inflow = 37.72 cfs @ 12.24 hrs, Volume= 2.477 af
Outflow = 1.11 cfs @ 15.23 hrs, Volume= 1.532 af, Atten= 97%, Lag= 179.5 min
Primary = 1.11 cfs @ 15.23 hrs, Volume= 1.532 af
Routed to Link P : Proposed Outfall
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link P : Proposed Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 820.00' Surf.Area= 68,008 sf Storage= 194,045 cf
Peak Elev= 821.16' @ 15.23 hrs Surf.Area= 75,999 sf Storage= 277,869 cf (83,824 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1,137.9 min (1,943.7 - 805.8)

Volume	Invert	Avail.Storage	Storage Description
#1	815.00'	730,078 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

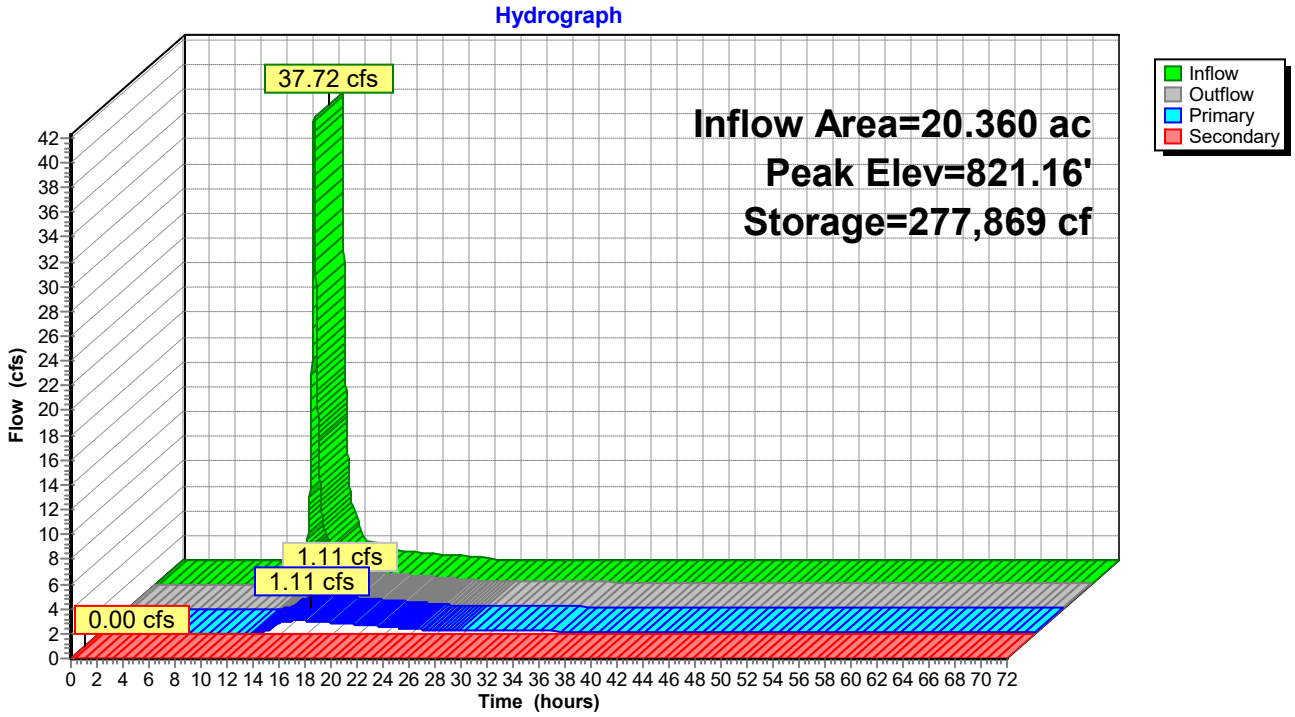
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
815.00	22,094	0	0
819.00	46,341	136,870	136,870
820.00	68,008	57,175	194,045
821.00	74,853	71,431	265,475
822.00	81,829	78,341	343,816
823.00	88,933	85,381	429,197
824.00	96,180	92,557	521,754
825.00	103,545	99,863	621,616
826.00	113,378	108,462	730,078

Device	Routing	Invert	Outlet Devices
#1	Primary	820.00'	**24.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 820.00' / 819.35' S= 0.0120 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Secondary	825.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Device 1	820.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	821.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.11 cfs @ 15.23 hrs HW=821.16' (Free Discharge)
└**1=Culvert** (Passes 1.11 cfs of 5.50 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 0.24 cfs @ 4.91 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.86 cfs @ 1.33 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=820.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond WP: Wet Pond

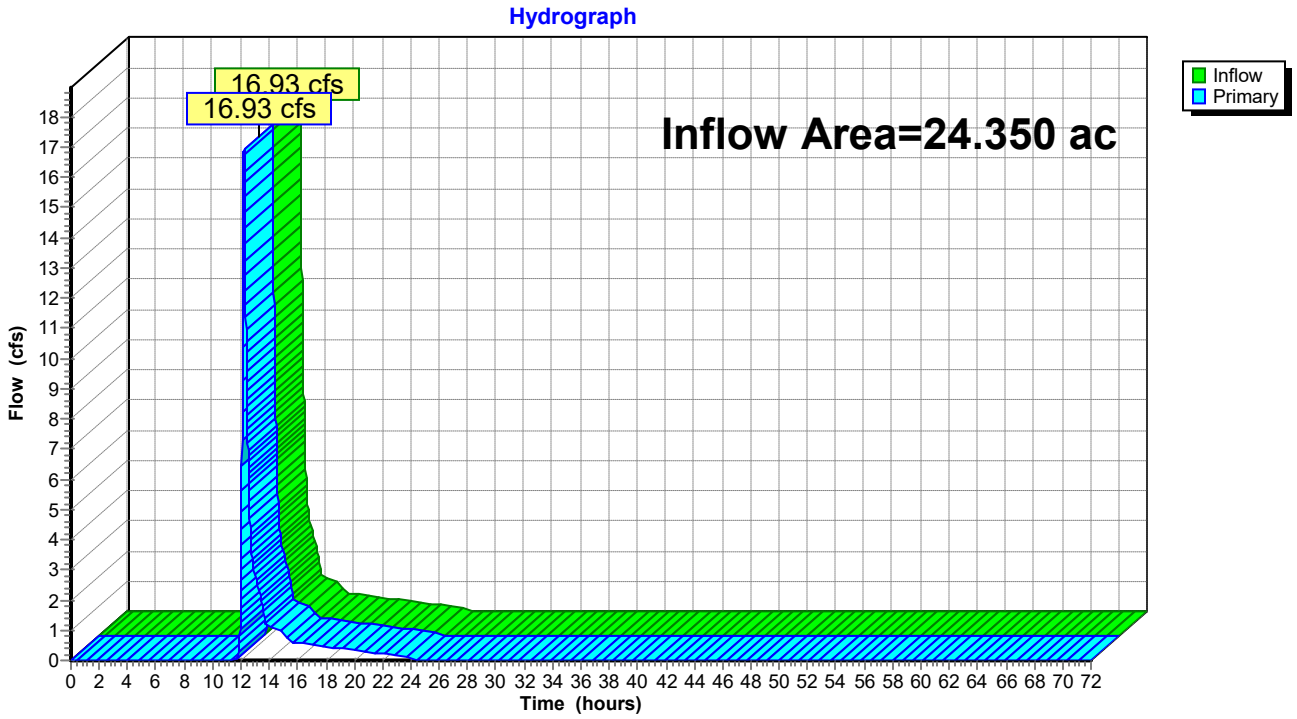


Summary for Link E: Existing Outfall

Inflow Area = 24.350 ac, 4.48% Impervious, Inflow Depth = 0.57" for 1-year event
Inflow = 16.93 cfs @ 12.21 hrs, Volume= 1.156 af
Primary = 16.93 cfs @ 12.21 hrs, Volume= 1.156 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E: Existing Outfall

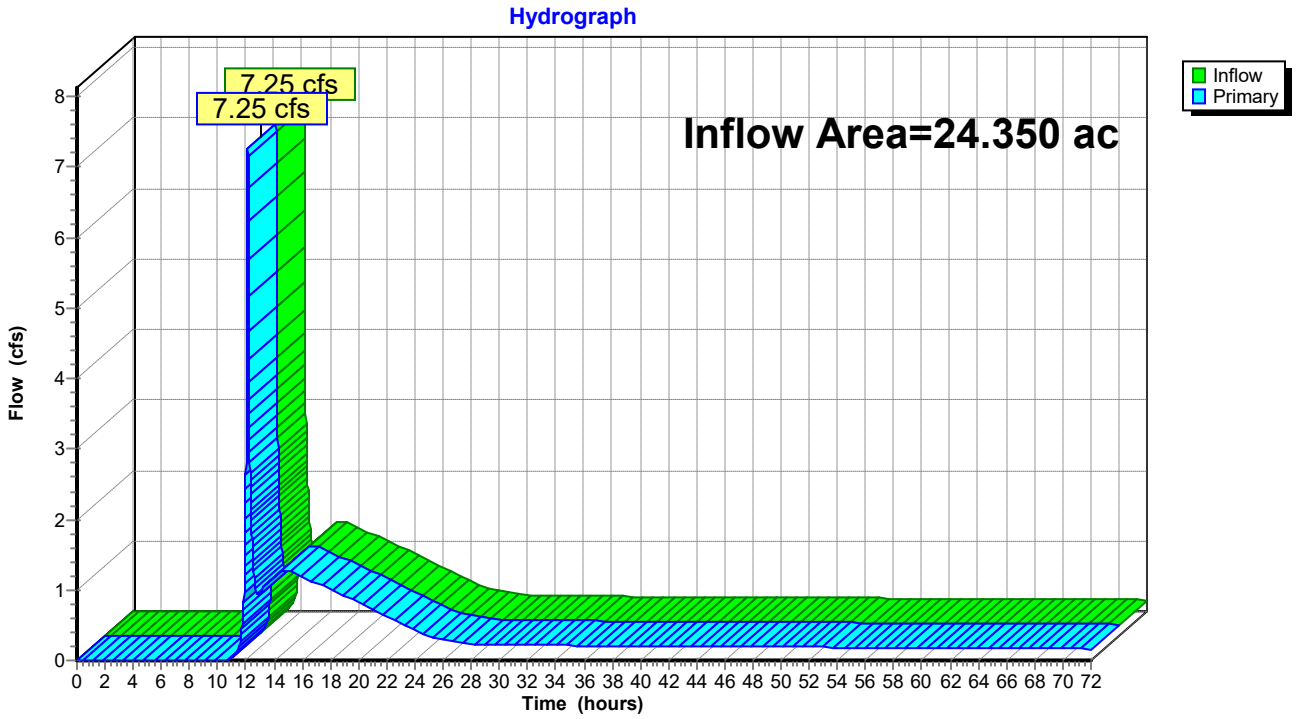


Summary for Link P: Proposed Outfall

Inflow Area = 24.350 ac, 51.01% Impervious, Inflow Depth > 0.91" for 1-year event
Inflow = 7.25 cfs @ 12.14 hrs, Volume= 1.851 af
Primary = 7.25 cfs @ 12.14 hrs, Volume= 1.851 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P: Proposed Outfall



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: EX1 Runoff Area=3.550 ac 3.94% Impervious Runoff Depth=0.80"
Tc=6.0 min CN=75 Runoff=5.13 cfs 0.235 af

Subcatchment E2: EX2 Runoff Area=20.800 ac 4.57% Impervious Runoff Depth=0.75"
Flow Length=871' Tc=12.7 min CN=74 Runoff=20.36 cfs 1.296 af

Subcatchment P1: P1 Runoff Area=2.450 ac 17.14% Impervious Runoff Depth=1.18"
Tc=6.0 min CN=82 Runoff=5.39 cfs 0.240 af

Subcatchment P2: P2 Runoff Area=20.360 ac 57.51% Impervious Runoff Depth=1.75"
Flow Length=710' Slope=0.0120 '/' Tc=15.5 min CN=90 Runoff=44.95 cfs 2.964 af

Subcatchment P3: P3 Runoff Area=1.540 ac 18.83% Impervious Runoff Depth=1.24"
Tc=6.0 min CN=83 Runoff=3.57 cfs 0.159 af

Pond WP: Wet Pond Peak Elev=821.29' Storage=287,155 cf Inflow=44.95 cfs 2.964 af
Primary=2.24 cfs 2.010 af Secondary=0.00 cfs 0.000 af Outflow=2.24 cfs 2.010 af

Link E: Existing Outfall Inflow=23.37 cfs 1.531 af
Primary=23.37 cfs 1.531 af

Link P: Proposed Outfall Inflow=9.08 cfs 2.410 af
Primary=9.08 cfs 2.410 af

Total Runoff Area = 48.700 ac Runoff Volume = 4.895 af Average Runoff Depth = 1.21"
72.26% Pervious = 35.190 ac 27.74% Impervious = 13.510 ac

Summary for Subcatchment E1: EX1

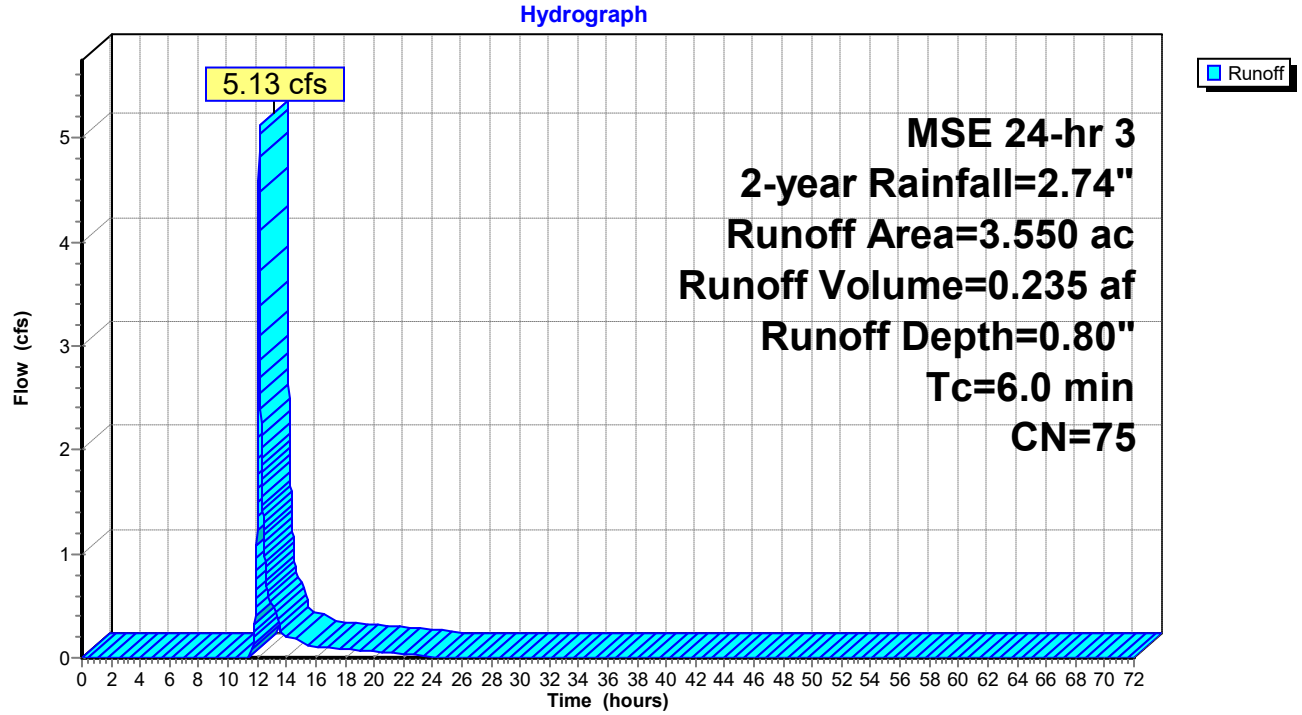
Runoff = 5.13 cfs @ 12.14 hrs, Volume= 0.235 af, Depth= 0.80"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.74"

	Area (ac)	CN	Description
*	0.140	98	Building/driveways
	2.270	71	Meadow, non-grazed, HSG C
	1.140	79	50-75% Grass cover, Fair, HSG C
	3.550	75	Weighted Average
	3.410		96.06% Pervious Area
	0.140		3.94% Impervious Area

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

Subcatchment E1: EX1



Summary for Subcatchment E2: EX2

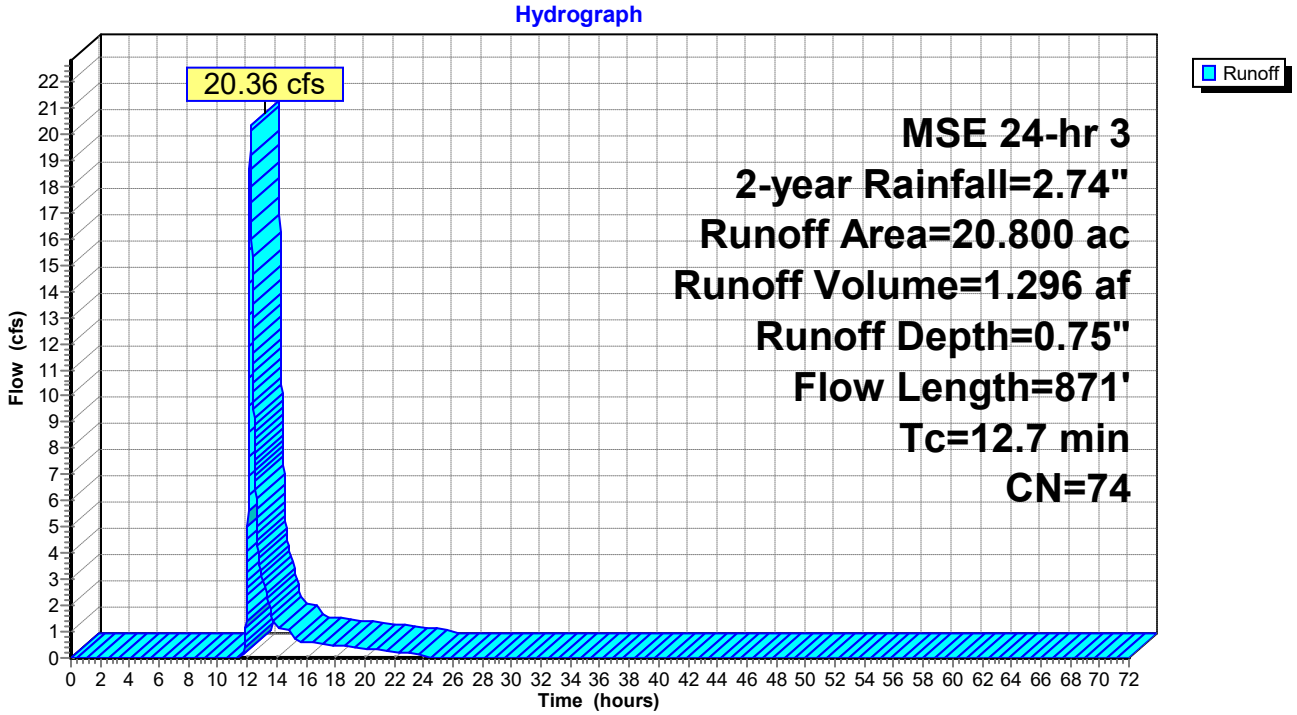
Runoff = 20.36 cfs @ 12.22 hrs, Volume= 1.296 af, Depth= 0.75"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.74"

	Area (ac)	CN	Description
*	0.950	98	Buildings and Driveways
	3.600	79	50-75% Grass cover, Fair, HSG C
	16.250	71	Meadow, non-grazed, HSG C
	20.800	74	Weighted Average
	19.850		95.43% Pervious Area
	0.950		4.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0260	0.42		**Sheet Flow,** Fallow n= 0.050 P2= 2.74"
8.7	771	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.7	871	Total			

Subcatchment E2: EX2



Summary for Subcatchment P1: P1

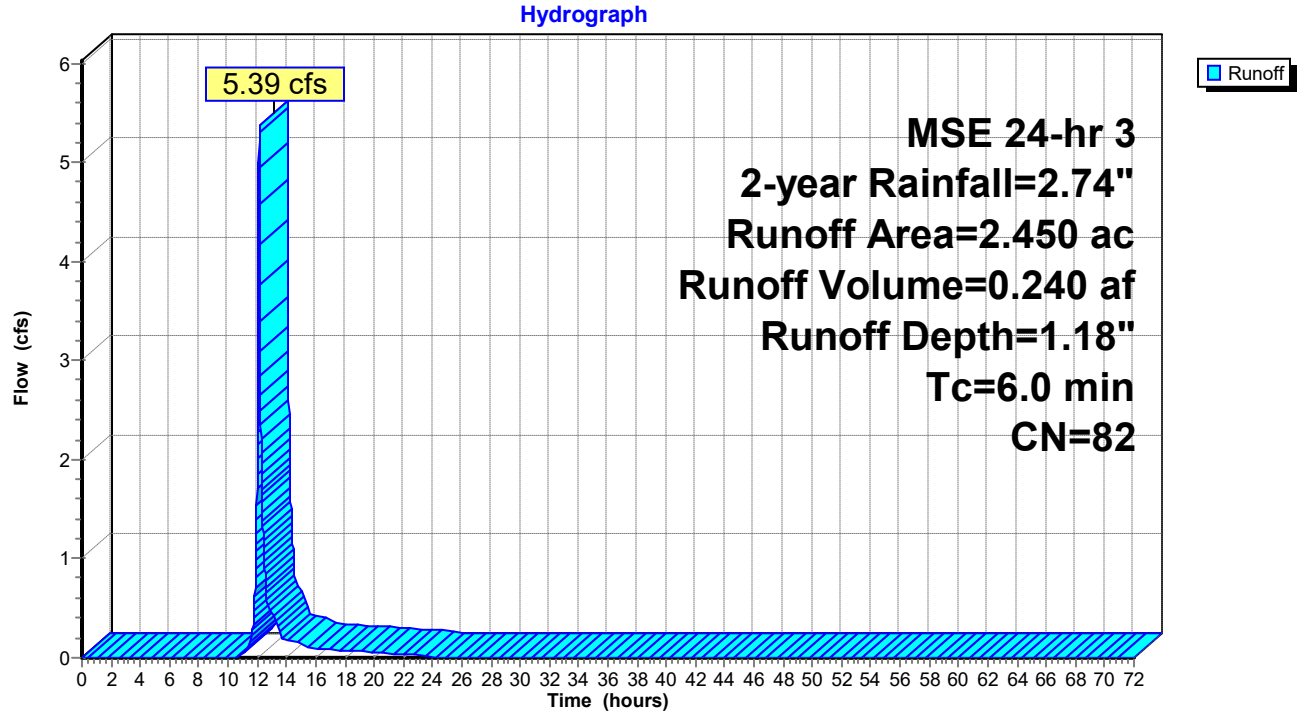
Runoff = 5.39 cfs @ 12.14 hrs, Volume= 0.240 af, Depth= 1.18"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.74"

	Area (ac)	CN	Description
*	0.100	98	Driveway/sidewalks
*	0.320	98	Buildings
	2.030	79	50-75% Grass cover, Fair, HSG C
	2.450	82	Weighted Average
	2.030		82.86% Pervious Area
	0.420		17.14% Impervious Area

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

Subcatchment P1: P1



Summary for Subcatchment P2: P2

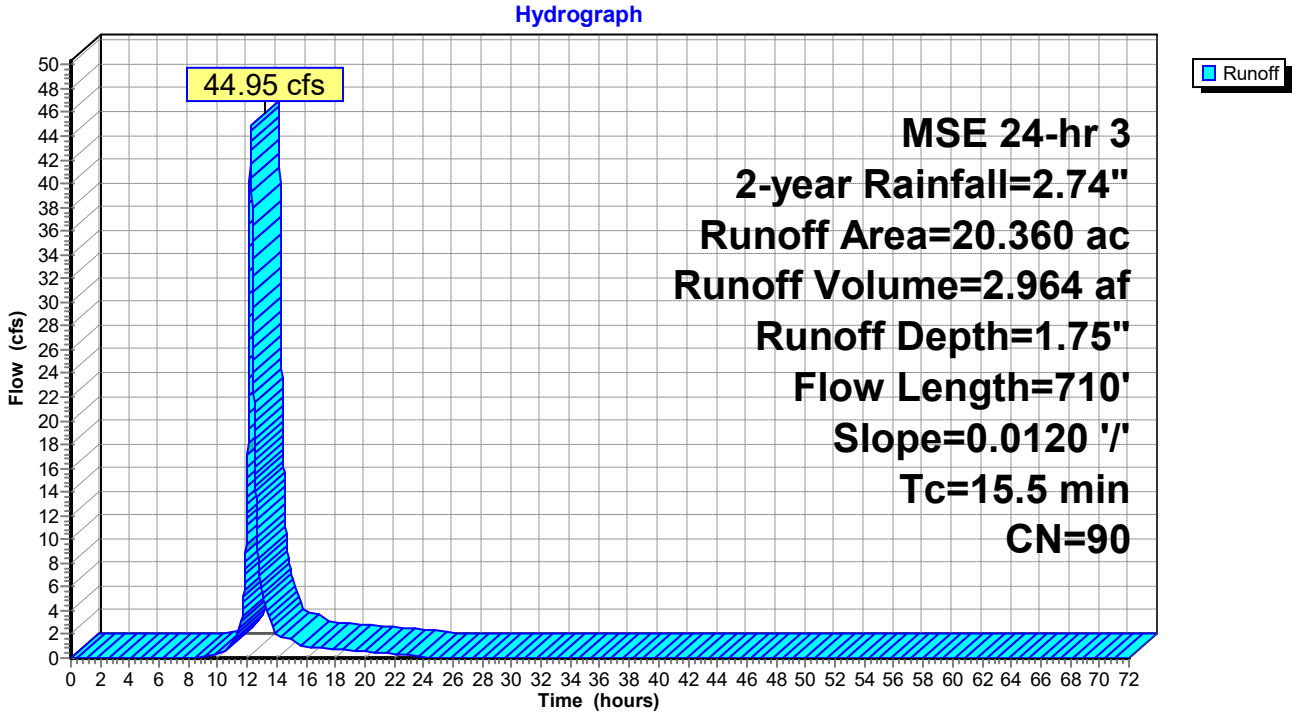
Runoff = 44.95 cfs @ 12.24 hrs, Volume= 2.964 af, Depth= 1.75"
Routed to Pond WP : Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.74"

	Area (ac)	CN	Description
*	4.240	98	Buildings
*	5.870	98	Drives/Concrete
	8.650	79	50-75% Grass cover, Fair, HSG C
*	1.600	98	Pond
	20.360	90	Weighted Average
	8.650		42.49% Pervious Area
	11.710		57.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	710	0.0120	0.76		**Lag/CN Method,**

Subcatchment P2: P2



Summary for Subcatchment P3: P3

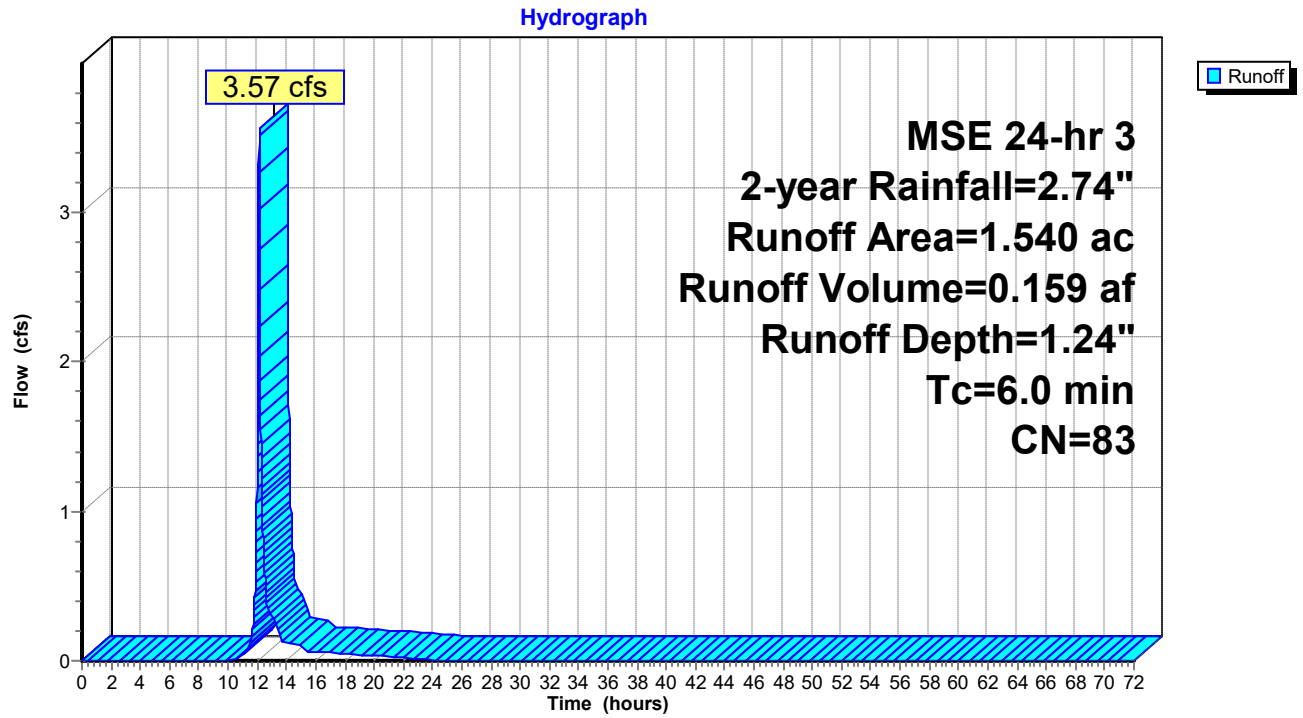
Runoff = 3.57 cfs @ 12.14 hrs, Volume= 0.159 af, Depth= 1.24"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.74"

	Area (ac)	CN	Description
*	0.120	98	Builkdings
*	0.170	98	Parking/Drives
	1.250	79	50-75% Grass cover, Fair, HSG C
	1.540	83	Weighted Average
	1.250		81.17% Pervious Area
	0.290		18.83% Impervious Area

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

Subcatchment P3: P3



Summary for Pond WP: Wet Pond

Inflow Area = 20.360 ac, 57.51% Impervious, Inflow Depth = 1.75" for 2-year event
Inflow = 44.95 cfs @ 12.24 hrs, Volume= 2.964 af
Outflow = 2.24 cfs @ 13.78 hrs, Volume= 2.010 af, Atten= 95%, Lag= 92.5 min
Primary = 2.24 cfs @ 13.78 hrs, Volume= 2.010 af
Routed to Link P : Proposed Outfall
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link P : Proposed Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 820.00' Surf.Area= 68,008 sf Storage= 194,045 cf
Peak Elev= 821.29' @ 13.78 hrs Surf.Area= 76,847 sf Storage= 287,155 cf (93,111 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 909.5 min (1,711.7 - 802.2)

Volume	Invert	Avail.Storage	Storage Description
#1	815.00'	730,078 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

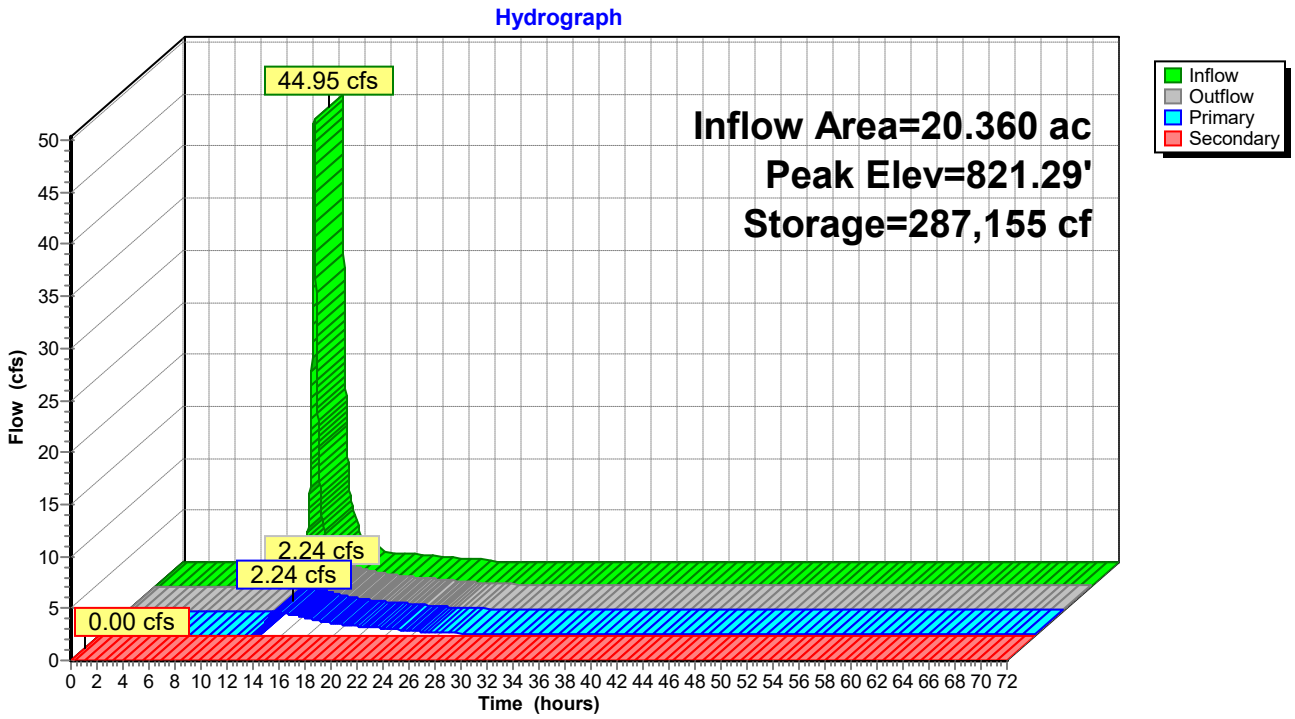
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
815.00	22,094	0	0
819.00	46,341	136,870	136,870
820.00	68,008	57,175	194,045
821.00	74,853	71,431	265,475
822.00	81,829	78,341	343,816
823.00	88,933	85,381	429,197
824.00	96,180	92,557	521,754
825.00	103,545	99,863	621,616
826.00	113,378	108,462	730,078

Device	Routing	Invert	Outlet Devices
#1	Primary	820.00'	**24.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 820.00' / 819.35' S= 0.0120 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Secondary	825.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Device 1	820.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	821.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.22 cfs @ 13.78 hrs HW=821.29' (Free Discharge)
└**1=Culvert** (Passes 2.22 cfs of 6.51 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 0.25 cfs @ 5.19 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 1.97 cfs @ 1.75 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=820.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond WP: Wet Pond

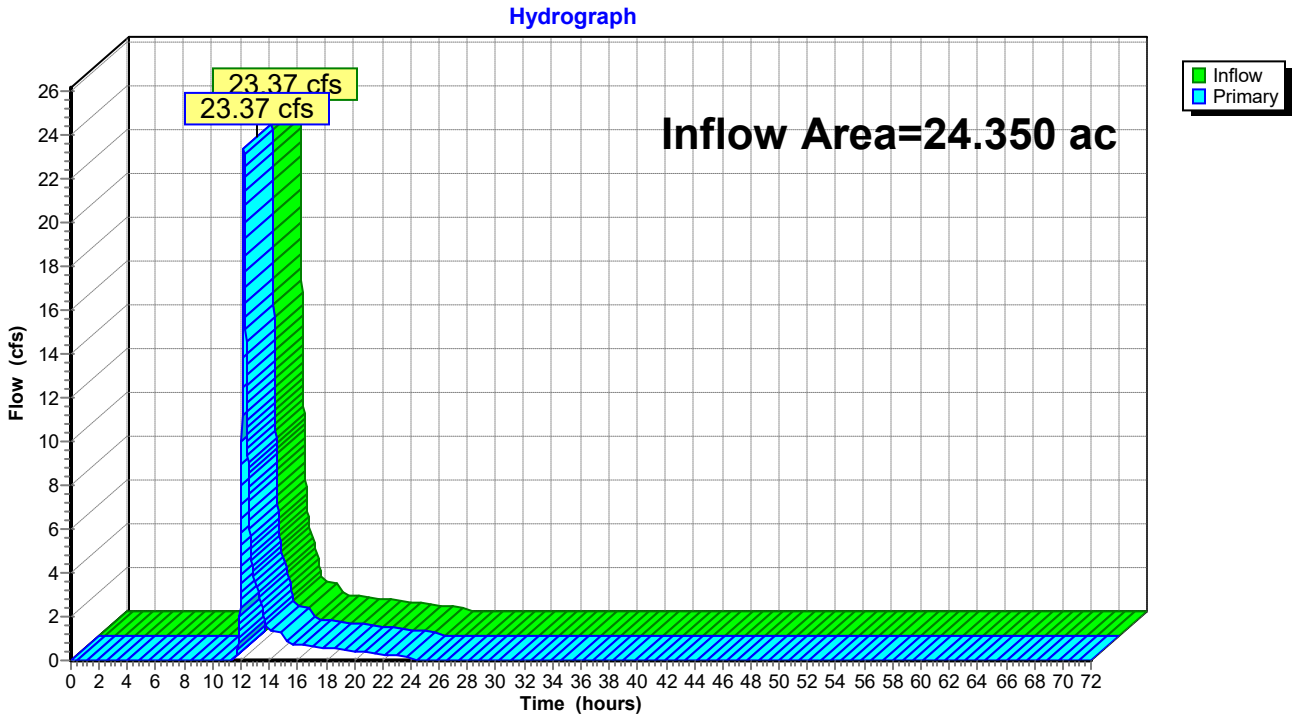


Summary for Link E: Existing Outfall

Inflow Area = 24.350 ac, 4.48% Impervious, Inflow Depth = 0.75" for 2-year event
Inflow = 23.37 cfs @ 12.21 hrs, Volume= 1.531 af
Primary = 23.37 cfs @ 12.21 hrs, Volume= 1.531 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E: Existing Outfall

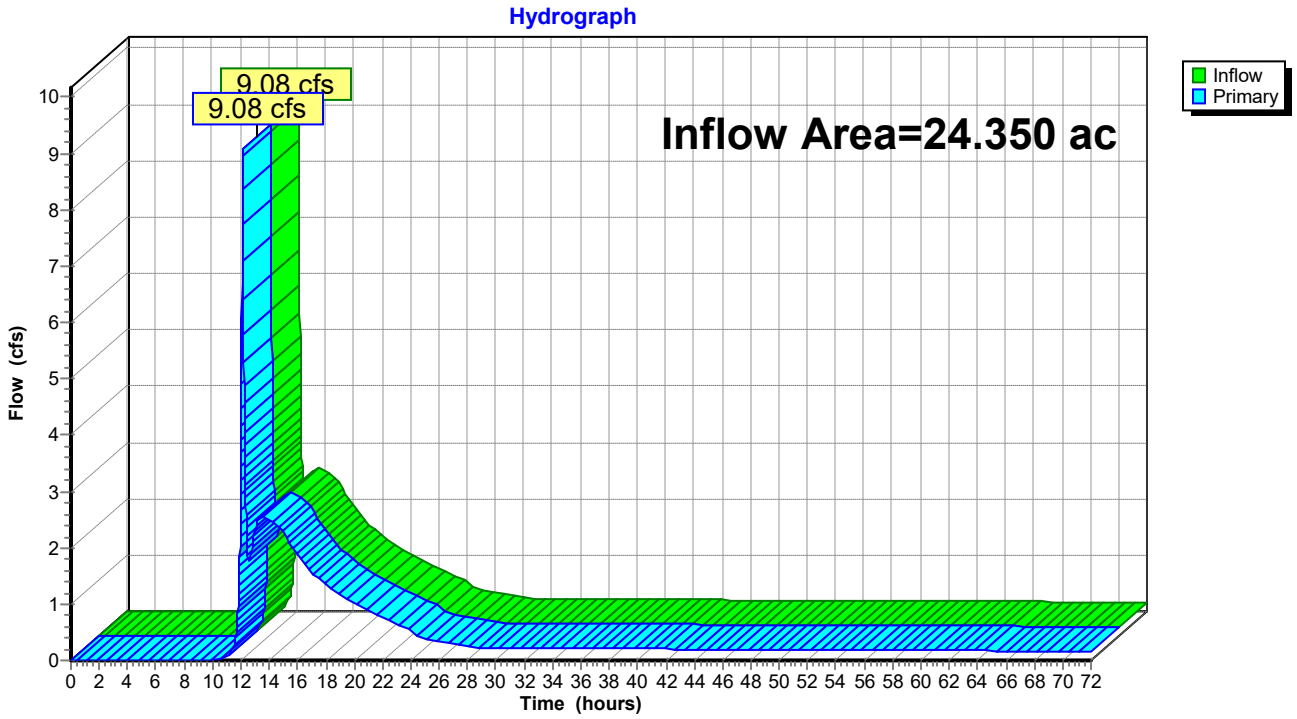


Summary for Link P: Proposed Outfall

Inflow Area = 24.350 ac, 51.01% Impervious, Inflow Depth > 1.19" for 2-year event
Inflow = 9.08 cfs @ 12.14 hrs, Volume= 2.410 af
Primary = 9.08 cfs @ 12.14 hrs, Volume= 2.410 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P: Proposed Outfall



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: EX1 Runoff Area=3.550 ac 3.94% Impervious Runoff Depth=1.56"
Tc=6.0 min CN=75 Runoff=10.30 cfs 0.460 af

Subcatchment E2: EX2 Runoff Area=20.800 ac 4.57% Impervious Runoff Depth=1.49"
Flow Length=871' Tc=12.7 min CN=74 Runoff=42.81 cfs 2.578 af

Subcatchment P1: P1 Runoff Area=2.450 ac 17.14% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=82 Runoff=9.43 cfs 0.424 af

Subcatchment P2: P2 Runoff Area=20.360 ac 57.51% Impervious Runoff Depth=2.78"
Flow Length=710' Slope=0.0120 '/' Tc=15.5 min CN=90 Runoff=70.30 cfs 4.712 af

Subcatchment P3: P3 Runoff Area=1.540 ac 18.83% Impervious Runoff Depth=2.16"
Tc=6.0 min CN=83 Runoff=6.14 cfs 0.277 af

Pond WP: Wet Pond Peak Elev=821.75' Storage=323,368 cf Inflow=70.30 cfs 4.712 af
Primary=8.45 cfs 3.743 af Secondary=0.00 cfs 0.000 af Outflow=8.45 cfs 3.743 af

Link E: Existing Outfall Inflow=48.95 cfs 3.038 af
Primary=48.95 cfs 3.038 af

Link P: Proposed Outfall Inflow=15.75 cfs 4.444 af
Primary=15.75 cfs 4.444 af

Total Runoff Area = 48.700 ac Runoff Volume = 8.450 af Average Runoff Depth = 2.08"
72.26% Pervious = 35.190 ac 27.74% Impervious = 13.510 ac

Summary for Subcatchment E1: EX1

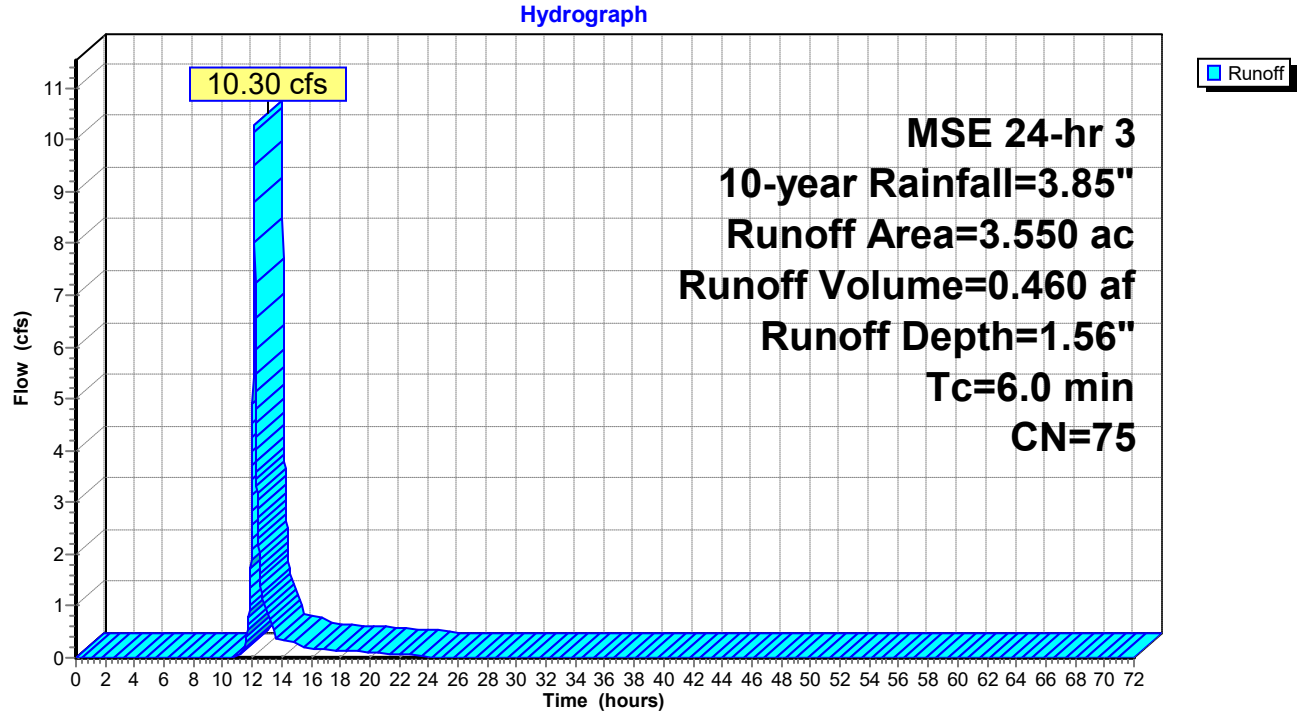
Runoff = 10.30 cfs @ 12.14 hrs, Volume= 0.460 af, Depth= 1.56"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=3.85"

	Area (ac)	CN	Description
*	0.140	98	Building/driveways
	2.270	71	Meadow, non-grazed, HSG C
	1.140	79	50-75% Grass cover, Fair, HSG C
	3.550	75	Weighted Average
	3.410		96.06% Pervious Area
	0.140		3.94% Impervious Area

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

Subcatchment E1: EX1



Summary for Subcatchment E2: EX2

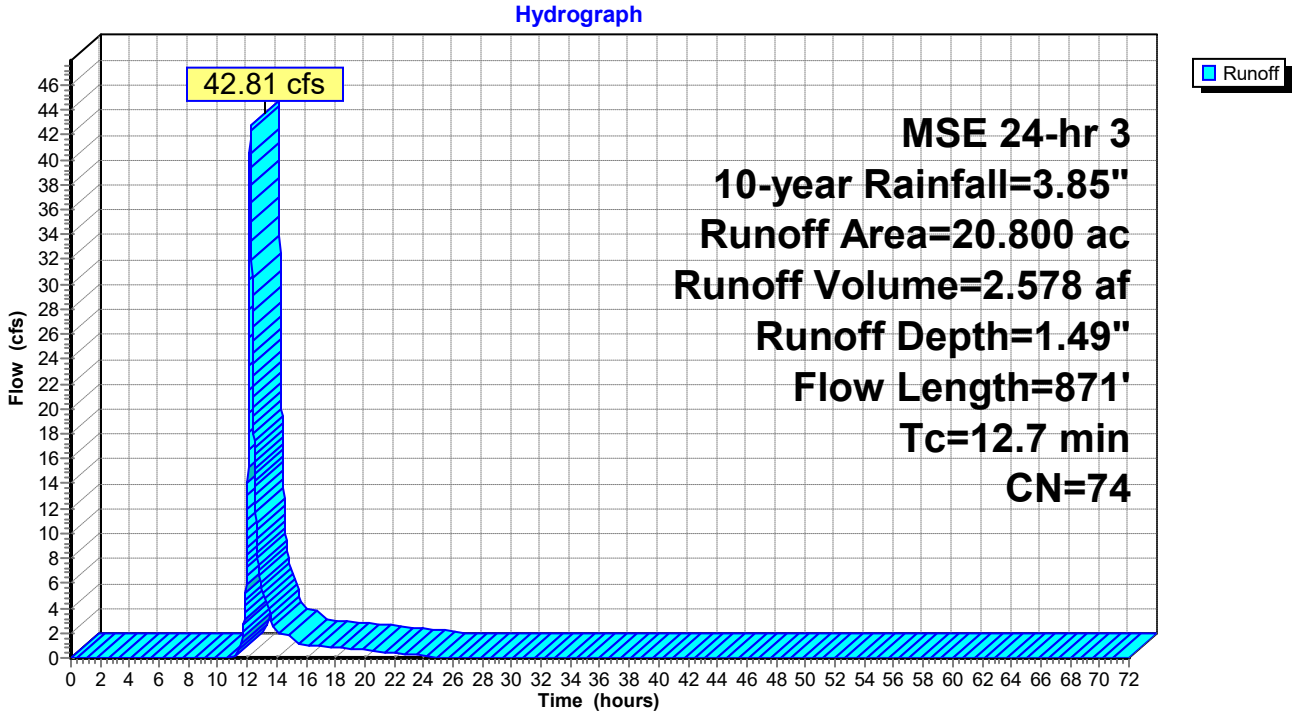
Runoff = 42.81 cfs @ 12.21 hrs, Volume= 2.578 af, Depth= 1.49"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=3.85"

	Area (ac)	CN	Description
*	0.950	98	Buildings and Driveways
	3.600	79	50-75% Grass cover, Fair, HSG C
	16.250	71	Meadow, non-grazed, HSG C
	20.800	74	Weighted Average
	19.850		95.43% Pervious Area
	0.950		4.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0260	0.42		**Sheet Flow,** Fallow n= 0.050 P2= 2.74"
8.7	771	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.7	871	Total			

Subcatchment E2: EX2



Summary for Subcatchment P1: P1

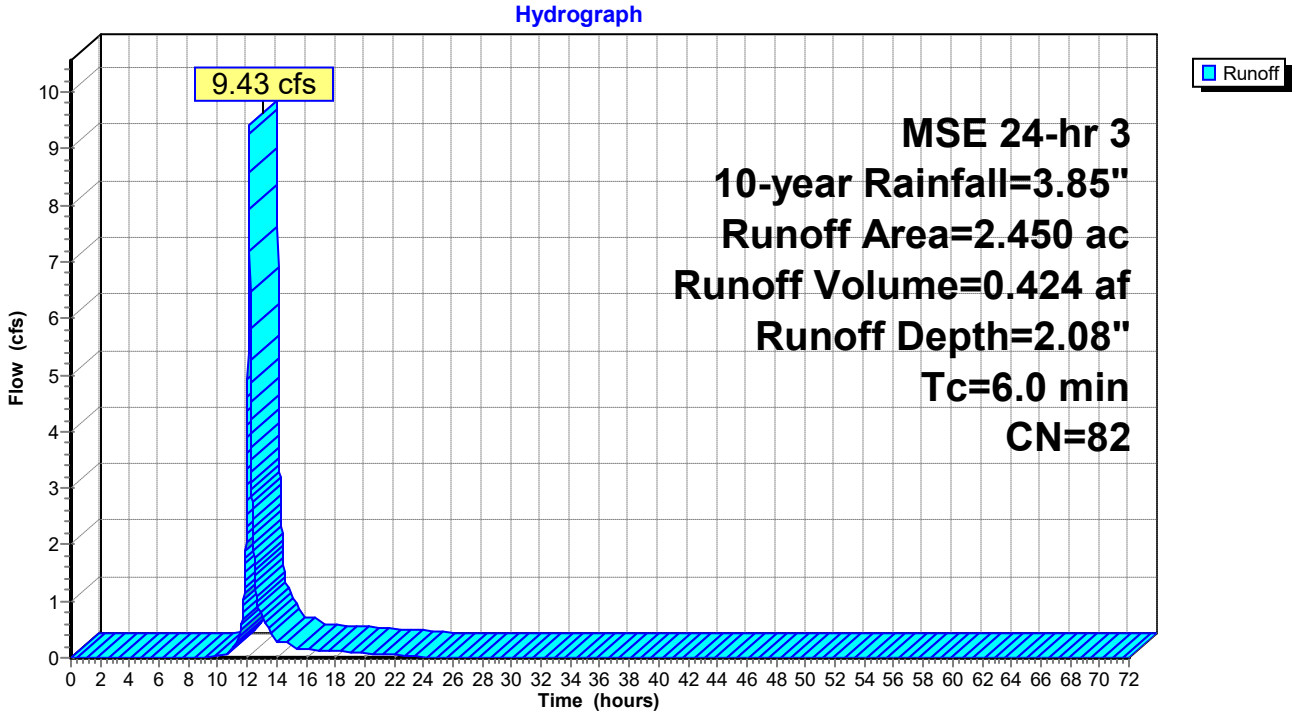
Runoff = 9.43 cfs @ 12.13 hrs, Volume= 0.424 af, Depth= 2.08"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=3.85"

	Area (ac)	CN	Description
*	0.100	98	Driveway/sidewalks
*	0.320	98	Buildings
	2.030	79	50-75% Grass cover, Fair, HSG C
	2.450	82	Weighted Average
	2.030		82.86% Pervious Area
	0.420		17.14% Impervious Area

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

Subcatchment P1: P1



Summary for Subcatchment P2: P2

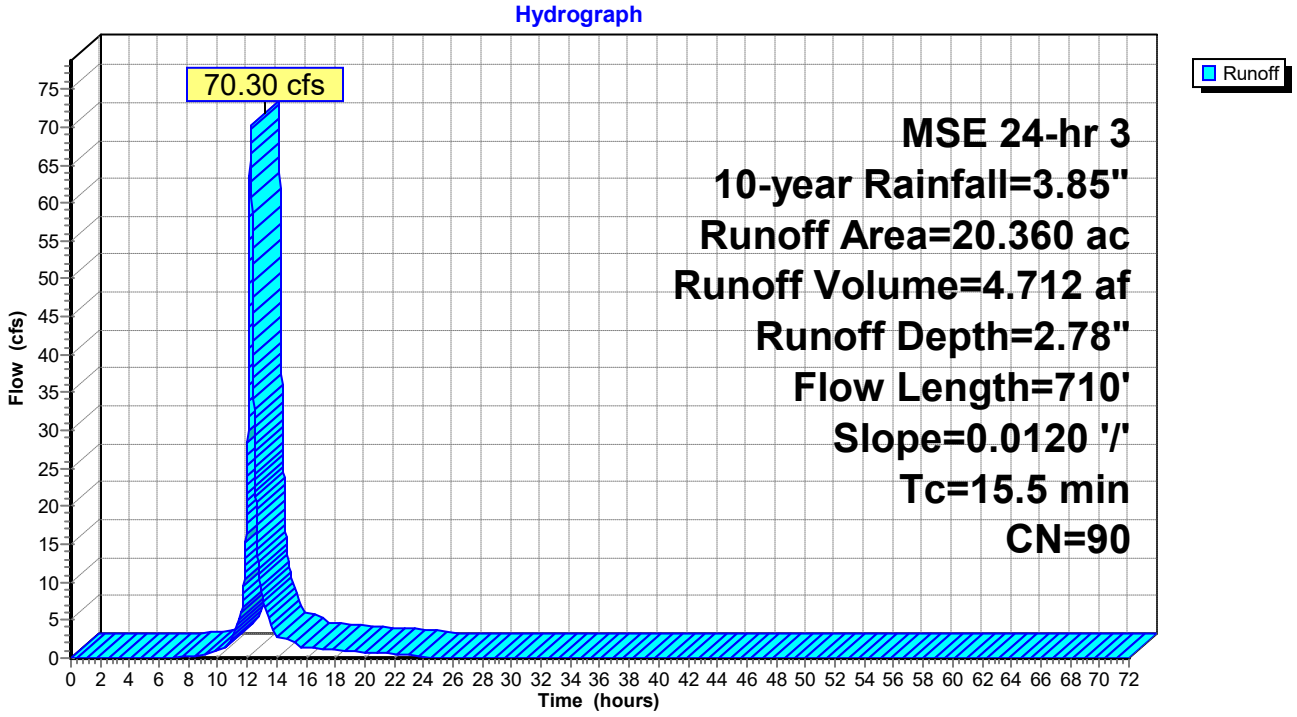
Runoff = 70.30 cfs @ 12.24 hrs, Volume= 4.712 af, Depth= 2.78"
Routed to Pond WP : Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=3.85"

	Area (ac)	CN	Description
*	4.240	98	Buildings
*	5.870	98	Drives/Concrete
	8.650	79	50-75% Grass cover, Fair, HSG C
*	1.600	98	Pond
	20.360	90	Weighted Average
	8.650		42.49% Pervious Area
	11.710		57.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	710	0.0120	0.76		**Lag/CN Method,**

Subcatchment P2: P2



Summary for Subcatchment P3: P3

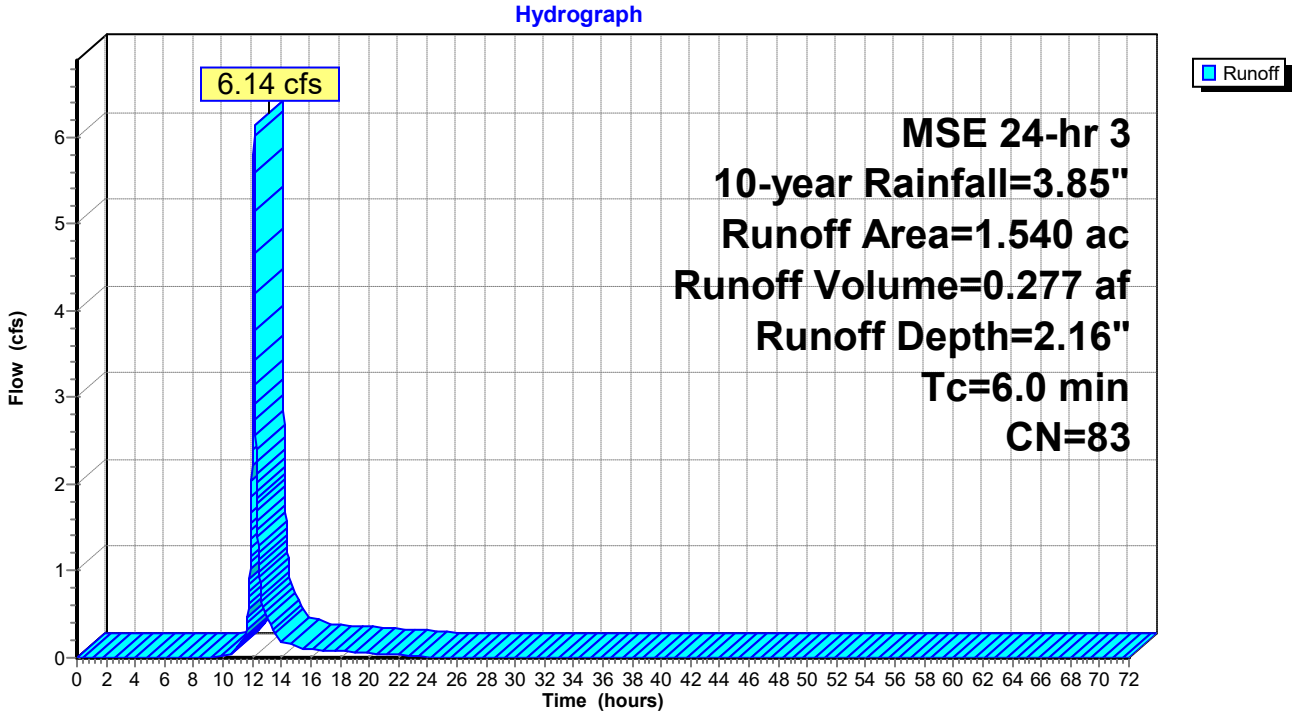
Runoff = 6.14 cfs @ 12.13 hrs, Volume= 0.277 af, Depth= 2.16"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=3.85"

	Area (ac)	CN	Description
*	0.120	98	Builkdings
*	0.170	98	Parking/Drives
	1.250	79	50-75% Grass cover, Fair, HSG C
	1.540	83	Weighted Average
	1.250		81.17% Pervious Area
	0.290		18.83% Impervious Area

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

Subcatchment P3: P3



Summary for Pond WP: Wet Pond

Inflow Area = 20.360 ac, 57.51% Impervious, Inflow Depth = 2.78" for 10-year event
Inflow = 70.30 cfs @ 12.24 hrs, Volume= 4.712 af
Outflow = 8.45 cfs @ 12.97 hrs, Volume= 3.743 af, Atten= 88%, Lag= 43.8 min
Primary = 8.45 cfs @ 12.97 hrs, Volume= 3.743 af
Routed to Link P : Proposed Outfall
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link P : Proposed Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 820.00' Surf.Area= 68,008 sf Storage= 194,045 cf
Peak Elev= 821.75' @ 12.97 hrs Surf.Area= 80,067 sf Storage= 323,368 cf (129,324 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 548.9 min (1,341.8 - 792.9)

Volume	Invert	Avail.Storage	Storage Description
#1	815.00'	730,078 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

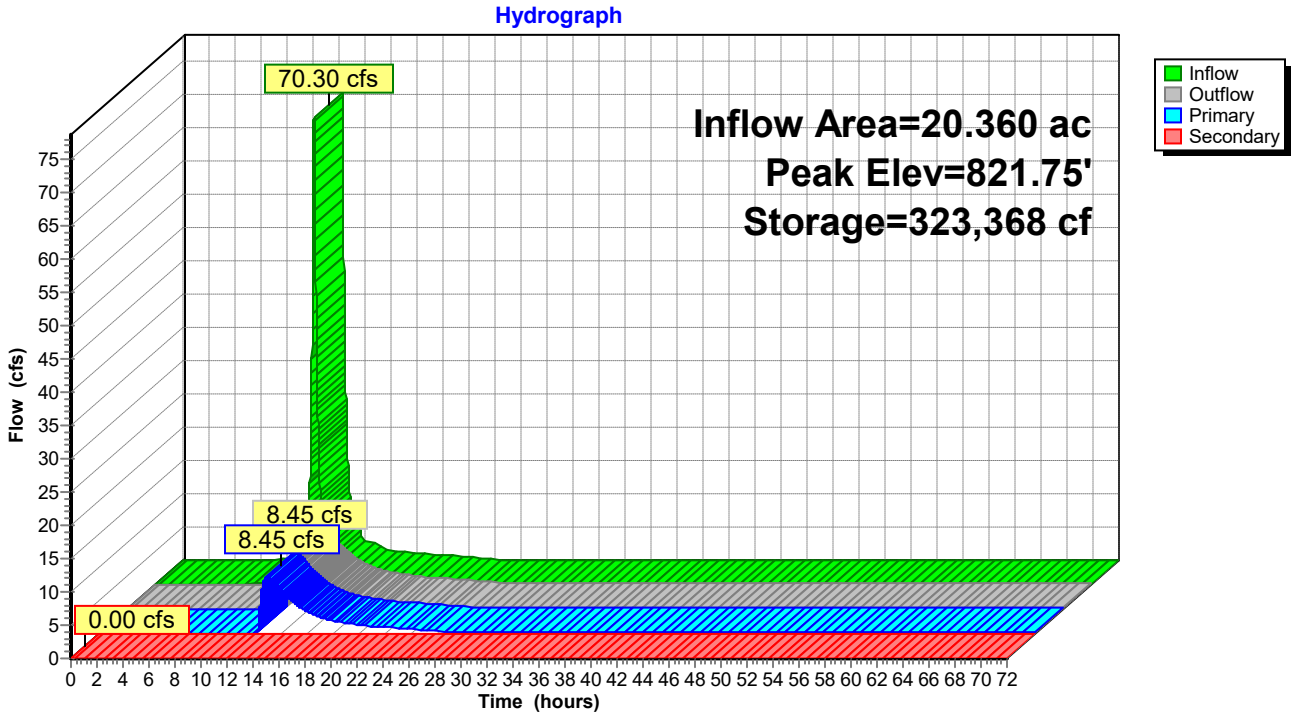
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
815.00	22,094	0	0
819.00	46,341	136,870	136,870
820.00	68,008	57,175	194,045
821.00	74,853	71,431	265,475
822.00	81,829	78,341	343,816
823.00	88,933	85,381	429,197
824.00	96,180	92,557	521,754
825.00	103,545	99,863	621,616
826.00	113,378	108,462	730,078

Device	Routing	Invert	Outlet Devices
#1	Primary	820.00'	**24.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 820.00' / 819.35' S= 0.0120 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Secondary	825.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Device 1	820.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	821.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=8.44 cfs @ 12.97 hrs HW=821.75' (Free Discharge)
└**1=Culvert** (Passes 8.44 cfs of 10.34 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 0.30 cfs @ 6.13 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 8.14 cfs @ 2.83 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=820.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond WP: Wet Pond

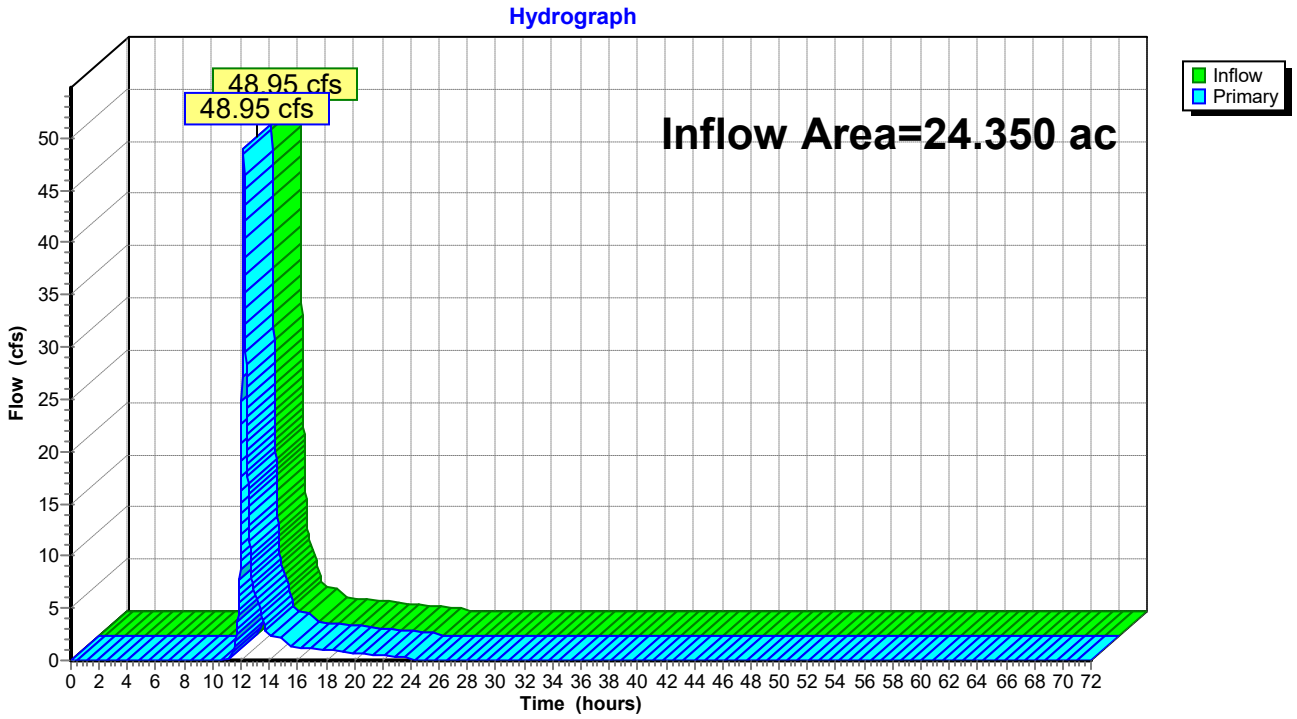


Summary for Link E: Existing Outfall

Inflow Area = 24.350 ac, 4.48% Impervious, Inflow Depth = 1.50" for 10-year event
Inflow = 48.95 cfs @ 12.20 hrs, Volume= 3.038 af
Primary = 48.95 cfs @ 12.20 hrs, Volume= 3.038 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E: Existing Outfall

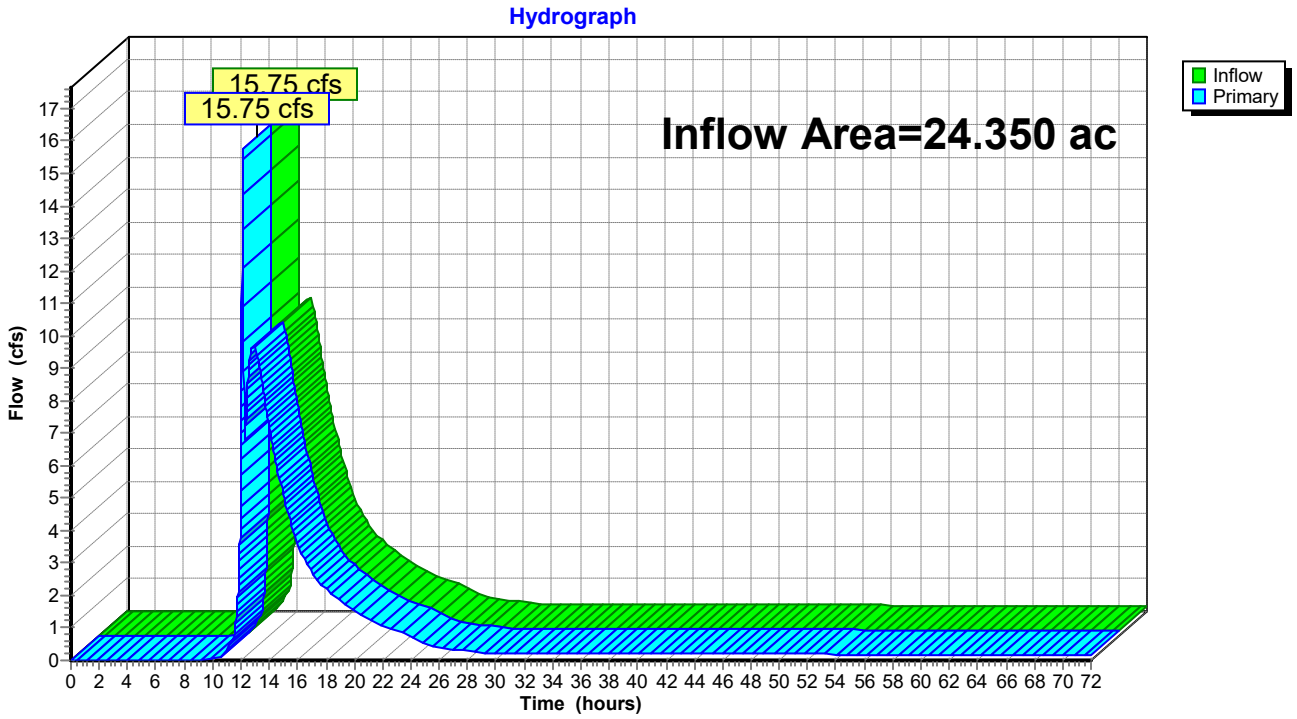


Summary for Link P: Proposed Outfall

Inflow Area = 24.350 ac, 51.01% Impervious, Inflow Depth > 2.19" for 10-year event
Inflow = 15.75 cfs @ 12.13 hrs, Volume= 4.444 af
Primary = 15.75 cfs @ 12.13 hrs, Volume= 4.444 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P: Proposed Outfall



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: EX1 Runoff Area=3.550 ac 3.94% Impervious Runoff Depth=3.44"
Tc=6.0 min CN=75 Runoff=22.57 cfs 1.016 af

Subcatchment E2: EX2 Runoff Area=20.800 ac 4.57% Impervious Runoff Depth=3.34"
Flow Length=871' Tc=12.7 min CN=74 Runoff=97.37 cfs 5.784 af

Subcatchment P1: P1 Runoff Area=2.450 ac 17.14% Impervious Runoff Depth=4.15"
Tc=6.0 min CN=82 Runoff=18.36 cfs 0.848 af

Subcatchment P2: P2 Runoff Area=20.360 ac 57.51% Impervious Runoff Depth=5.02"
Flow Length=710' Slope=0.0120 '/' Tc=15.5 min CN=90 Runoff=123.34 cfs 8.519 af

Subcatchment P3: P3 Runoff Area=1.540 ac 18.83% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=83 Runoff=11.78 cfs 0.547 af

Pond WP: Wet Pond Peak Elev=822.91' Storage=421,590 cf Inflow=123.34 cfs 8.519 af
Primary=16.52 cfs 7.533 af Secondary=0.00 cfs 0.000 af Outflow=16.52 cfs 7.533 af

Link E: Existing Outfall Inflow=111.21 cfs 6.800 af
Primary=111.21 cfs 6.800 af

Link P: Proposed Outfall Inflow=34.57 cfs 8.928 af
Primary=34.57 cfs 8.928 af

Total Runoff Area = 48.700 ac Runoff Volume = 16.714 af Average Runoff Depth = 4.12"
72.26% Pervious = 35.190 ac 27.74% Impervious = 13.510 ac

Summary for Subcatchment E1: EX1

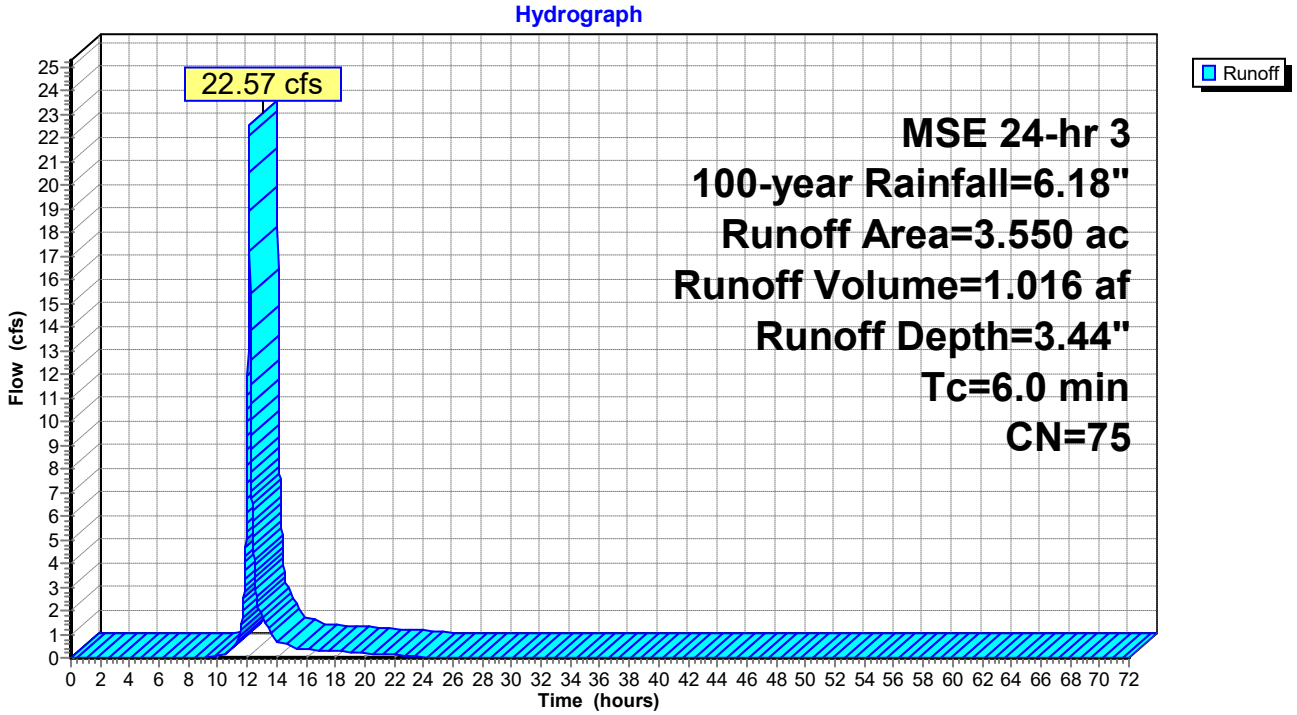
Runoff = 22.57 cfs @ 12.13 hrs, Volume= 1.016 af, Depth= 3.44"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.140	98	Building/driveways
	2.270	71	Meadow, non-grazed, HSG C
	1.140	79	50-75% Grass cover, Fair, HSG C
	3.550	75	Weighted Average
	3.410		96.06% Pervious Area
	0.140		3.94% Impervious Area

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

Subcatchment E1: EX1



Summary for Subcatchment E2: EX2

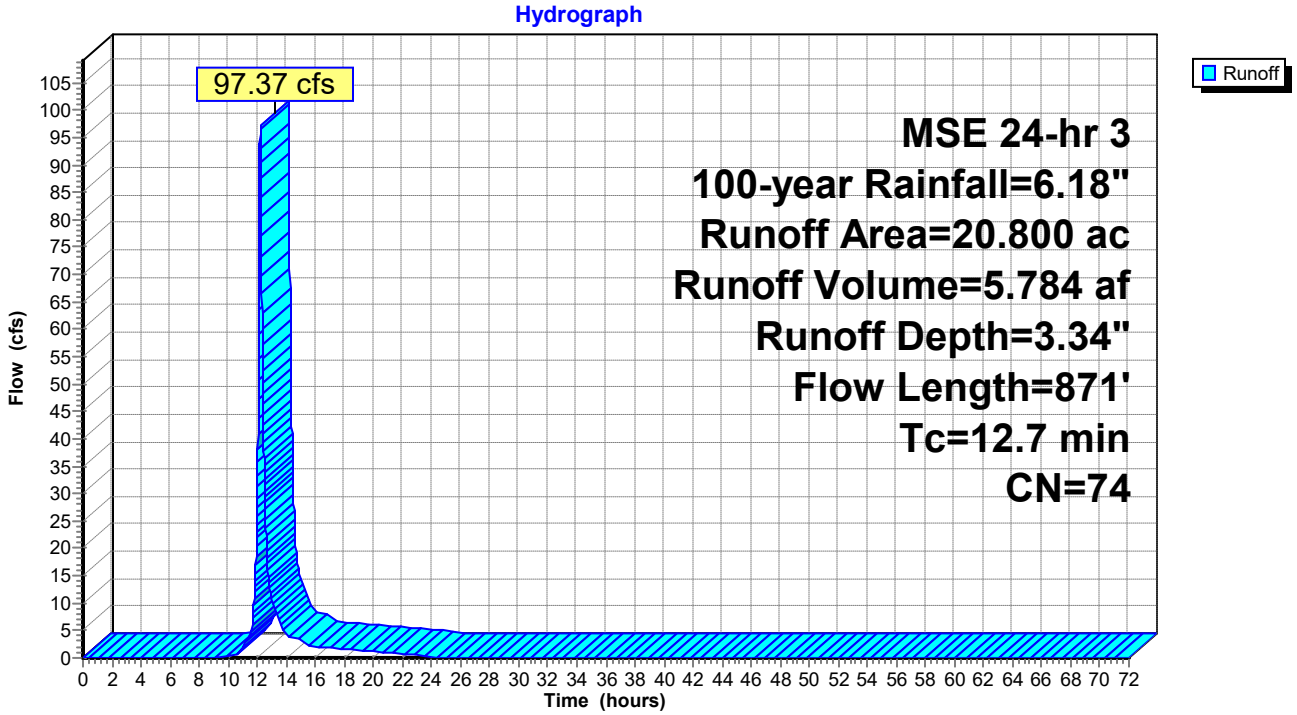
Runoff = 97.37 cfs @ 12.21 hrs, Volume= 5.784 af, Depth= 3.34"
Routed to Link E : Existing Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.950	98	Buildings and Driveways
	3.600	79	50-75% Grass cover, Fair, HSG C
	16.250	71	Meadow, non-grazed, HSG C
	20.800	74	Weighted Average
	19.850		95.43% Pervious Area
	0.950		4.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0260	0.42		**Sheet Flow,** Fallow n= 0.050 P2= 2.74"
8.7	771	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.7	871	Total			

Subcatchment E2: EX2



Summary for Subcatchment P1: P1

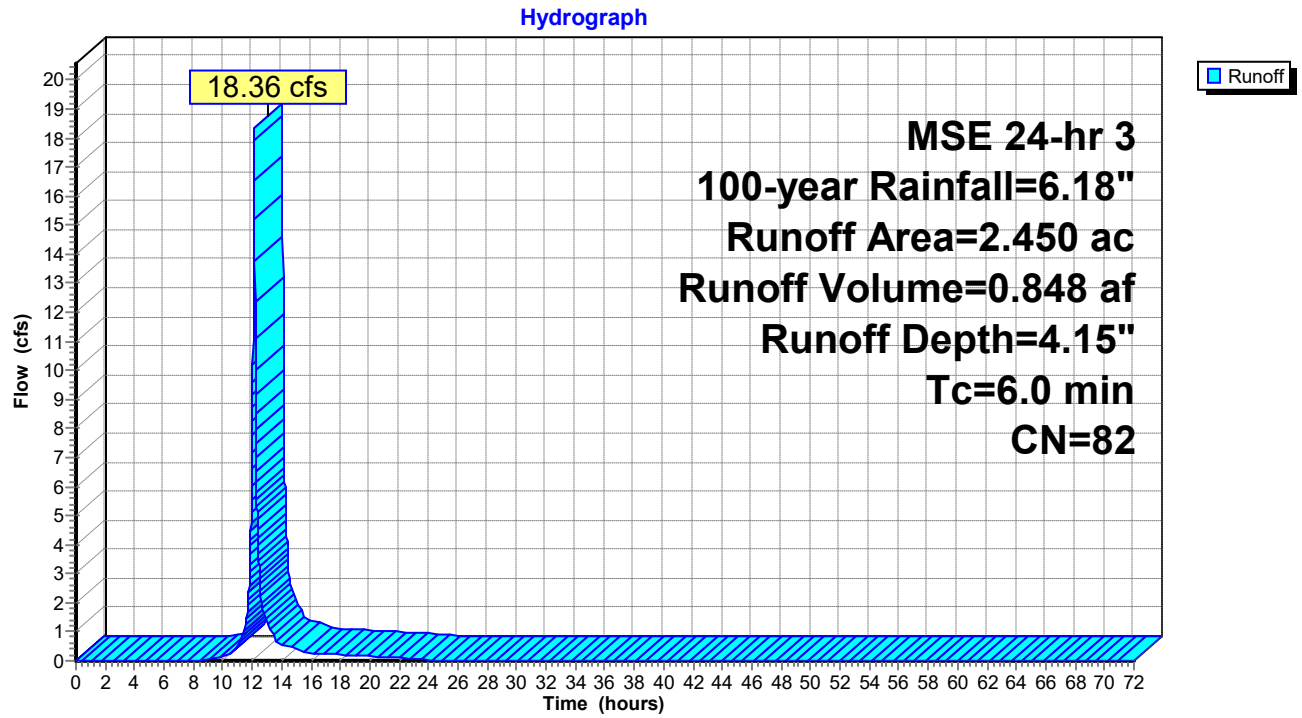
Runoff = 18.36 cfs @ 12.13 hrs, Volume= 0.848 af, Depth= 4.15"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.100	98	Driveway/sidewalks
*	0.320	98	Buildings
	2.030	79	50-75% Grass cover, Fair, HSG C
	2.450	82	Weighted Average
	2.030		82.86% Pervious Area
	0.420		17.14% Impervious Area

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

Subcatchment P1: P1



Summary for Subcatchment P2: P2

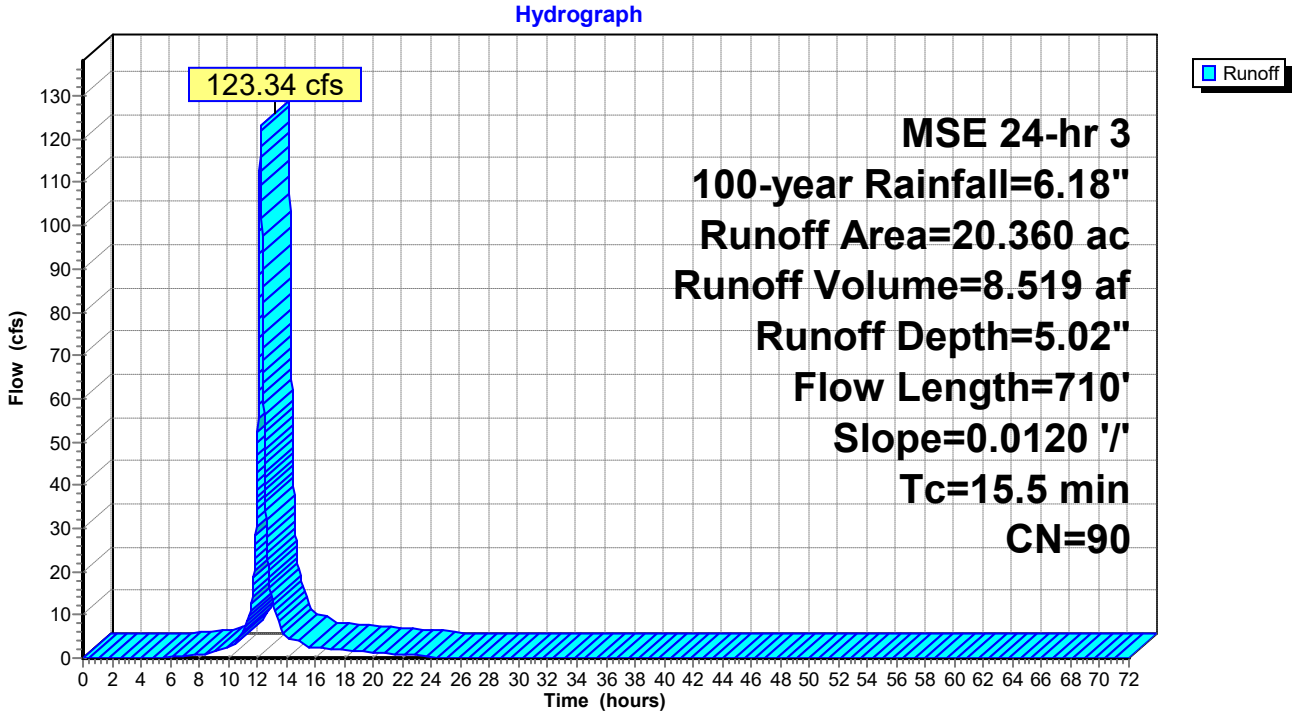
Runoff = 123.34 cfs @ 12.23 hrs, Volume= 8.519 af, Depth= 5.02"
Routed to Pond WP : Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=6.18"

	Area (ac)	CN	Description
*	4.240	98	Buildings
*	5.870	98	Drives/Concrete
	8.650	79	50-75% Grass cover, Fair, HSG C
*	1.600	98	Pond
	20.360	90	Weighted Average
	8.650		42.49% Pervious Area
	11.710		57.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	710	0.0120	0.76		**Lag/CN Method,**

Subcatchment P2: P2



Summary for Subcatchment P3: P3

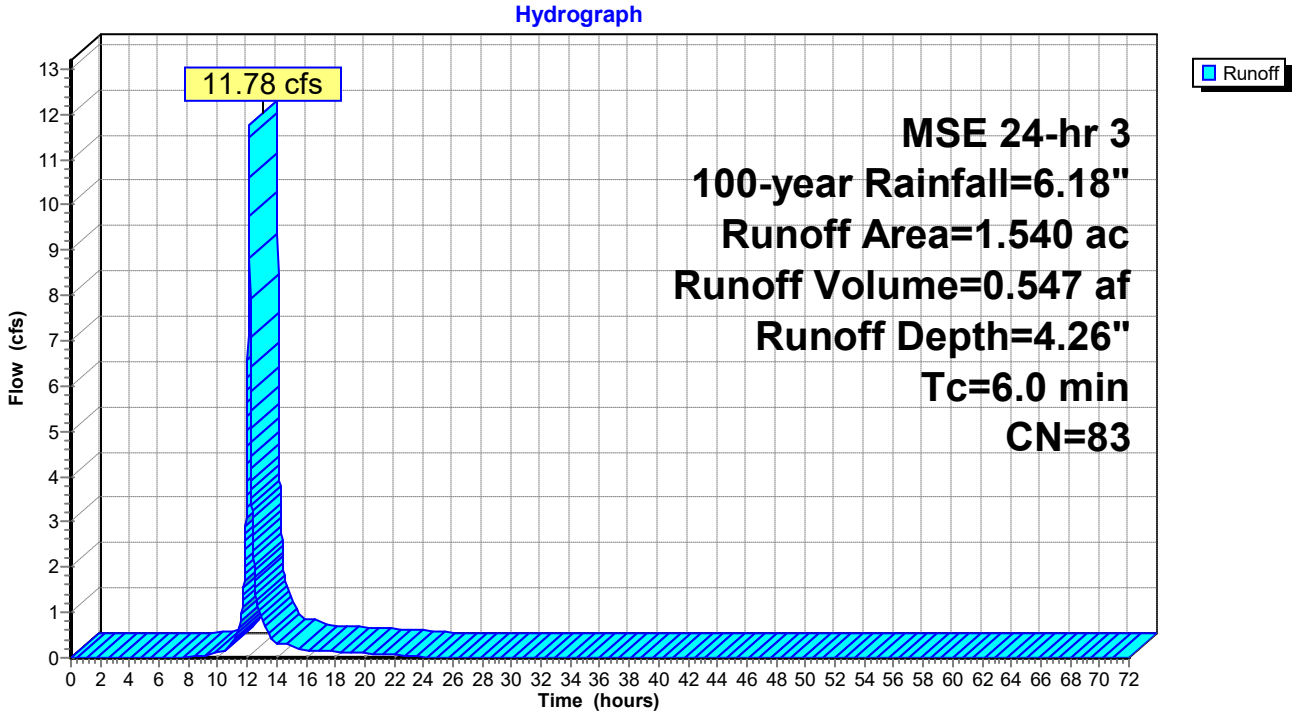
Runoff = 11.78 cfs @ 12.13 hrs, Volume= 0.547 af, Depth= 4.26"
Routed to Link P : Proposed Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.120	98	Builkdings
*	0.170	98	Parking/Drives
	1.250	79	50-75% Grass cover, Fair, HSG C
	1.540	83	Weighted Average
	1.250		81.17% Pervious Area
	0.290		18.83% Impervious Area

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

Subcatchment P3: P3



Summary for Pond WP: Wet Pond

Inflow Area = 20.360 ac, 57.51% Impervious, Inflow Depth = 5.02" for 100-year event
Inflow = 123.34 cfs @ 12.23 hrs, Volume= 8.519 af
Outflow = 16.52 cfs @ 12.85 hrs, Volume= 7.533 af, Atten= 87%, Lag= 37.1 min
Primary = 16.52 cfs @ 12.85 hrs, Volume= 7.533 af
Routed to Link P : Proposed Outfall
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link P : Proposed Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 820.00' Surf.Area= 68,008 sf Storage= 194,045 cf
Peak Elev= 822.91' @ 12.85 hrs Surf.Area= 88,323 sf Storage= 421,590 cf (227,546 cf above start)

Plug-Flow detention time= 878.1 min calculated for 3.079 af (36% of inflow)
Center-of-Mass det. time= 350.6 min (1,131.9 - 781.3)

Volume	Invert	Avail.Storage	Storage Description
#1	815.00'	730,078 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

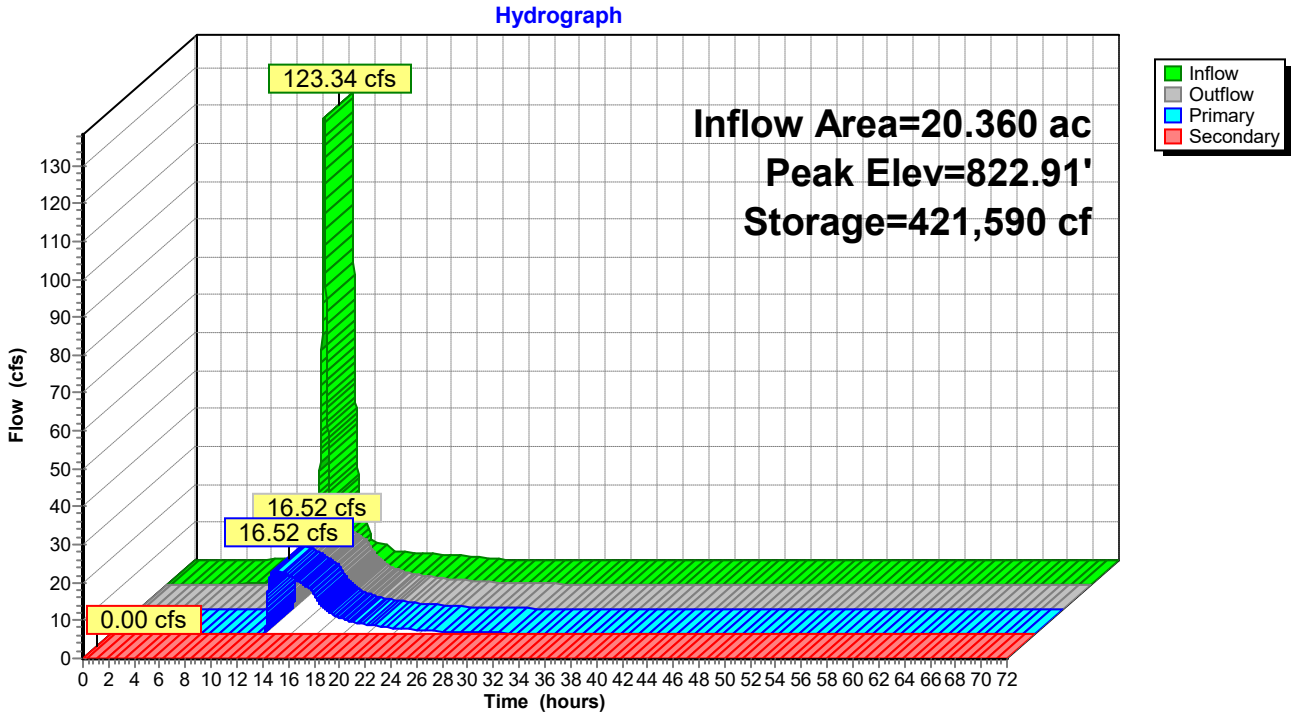
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
815.00	22,094	0	0
819.00	46,341	136,870	136,870
820.00	68,008	57,175	194,045
821.00	74,853	71,431	265,475
822.00	81,829	78,341	343,816
823.00	88,933	85,381	429,197
824.00	96,180	92,557	521,754
825.00	103,545	99,863	621,616
826.00	113,378	108,462	730,078

Device	Routing	Invert	Outlet Devices
#1	Primary	820.00'	**24.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 820.00' / 819.35' S= 0.0120 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Secondary	825.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Device 1	820.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	821.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=16.52 cfs @ 12.85 hrs HW=822.91' (Free Discharge)
└**1=Culvert** (Inlet Controls 16.52 cfs @ 5.26 fps)
└**3=Orifice/Grate** (Passes < 0.39 cfs potential flow)
└**4=Sharp-Crested Rectangular Weir** (Passes < 31.32 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=820.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond WP: Wet Pond

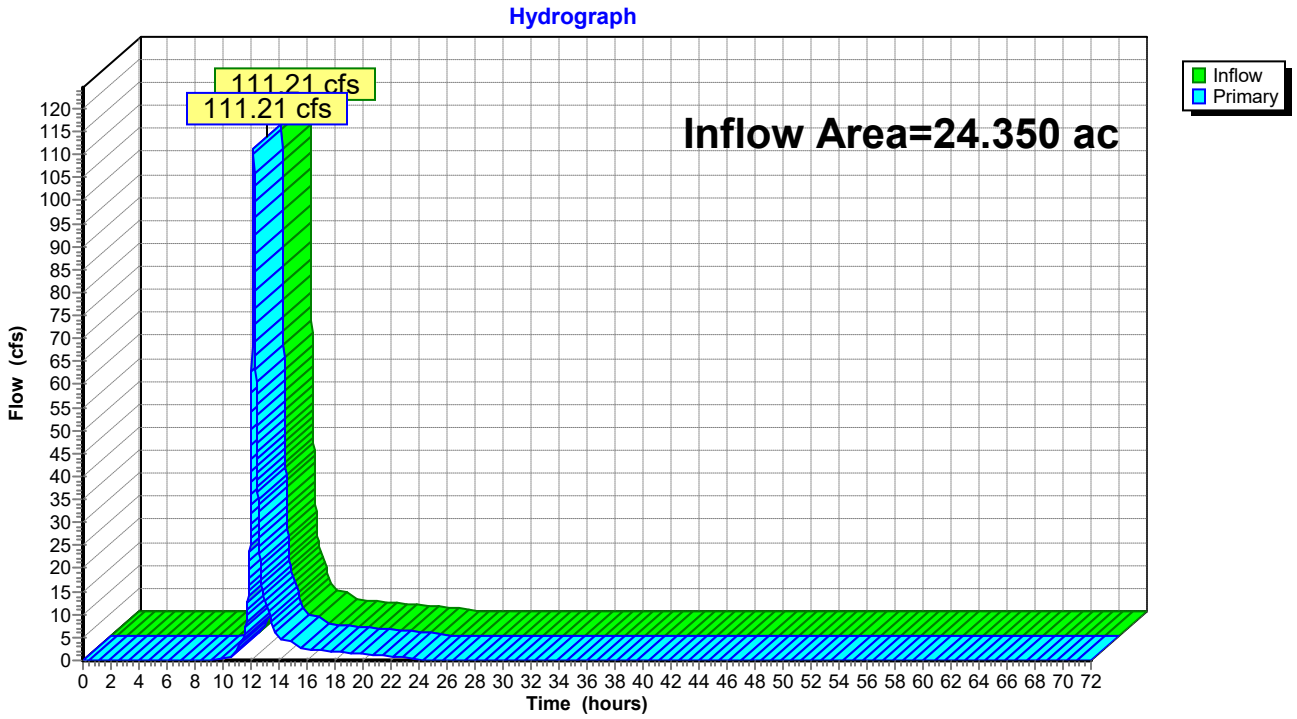


Summary for Link E: Existing Outfall

Inflow Area = 24.350 ac, 4.48% Impervious, Inflow Depth = 3.35" for 100-year event
Inflow = 111.21 cfs @ 12.19 hrs, Volume= 6.800 af
Primary = 111.21 cfs @ 12.19 hrs, Volume= 6.800 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E: Existing Outfall

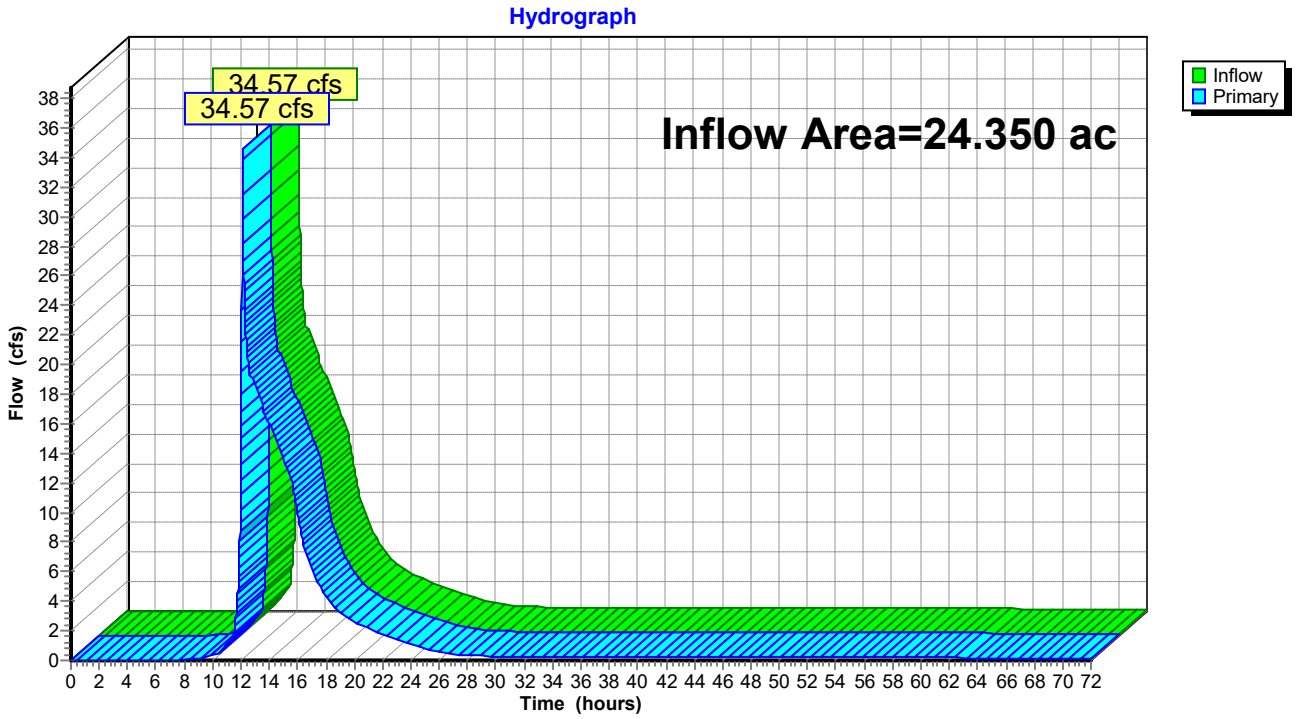


Summary for Link P: Proposed Outfall

Inflow Area = 24.350 ac, 51.01% Impervious, Inflow Depth > 4.40" for 100-year event
Inflow = 34.57 cfs @ 12.14 hrs, Volume= 8.928 af
Primary = 34.57 cfs @ 12.14 hrs, Volume= 8.928 af, Atten= 0%, Lag= 0.0 min

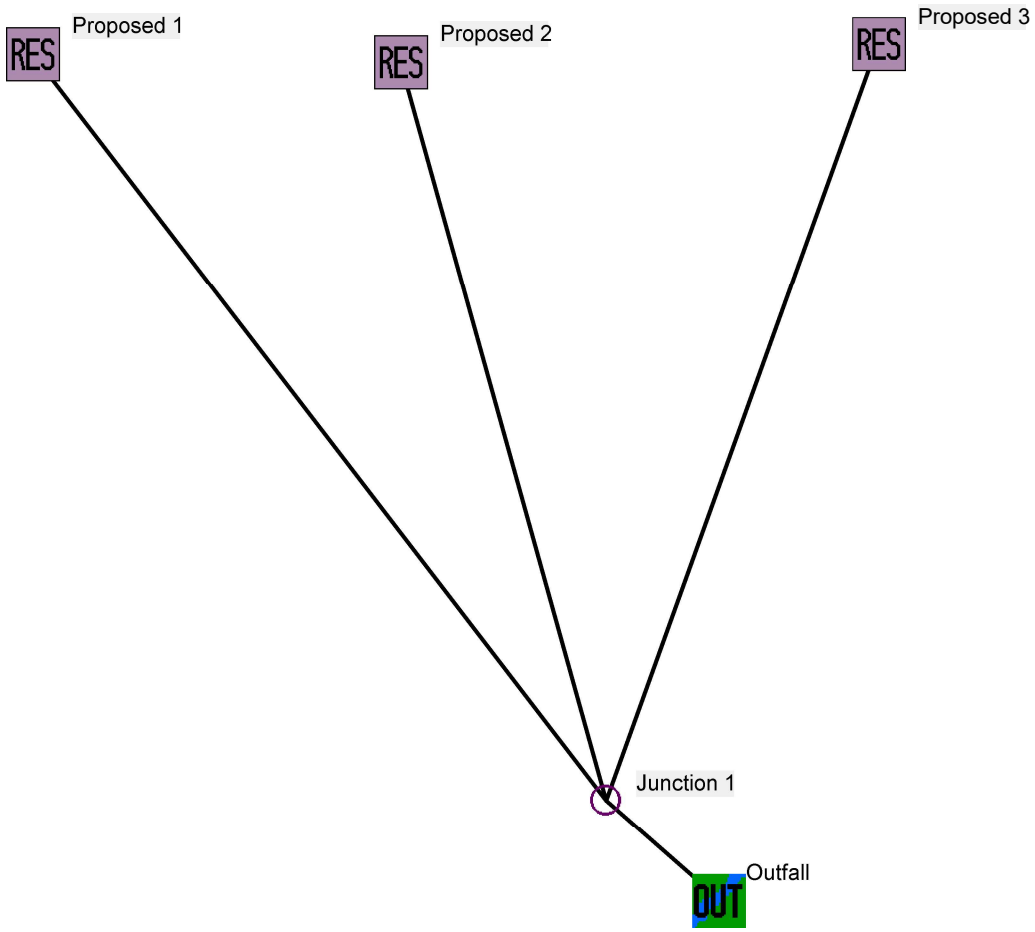
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P: Proposed Outfall



Appendix 5

WinSLAMM Input/Output


RES
Proposed 1
RES
Proposed 2
RES
Proposed 3
Junction 1
OUT
Outfall

Data file name: S:\Design & Construction Services\National Management LLC\491163 - River Crossing\Stormwater\SWMP\WinSLAMM\River Crossing No Controls.mdb
WinSLAMM Version 10.5.0
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 08-31-2026 Time: 11:56:38
Site information:

LU# 1 - Residential: Proposed 1 Total area (ac): 2.450
1 - Roofs: 0.320 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 0.100 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 2.030 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Residential: Proposed 3 Total area (ac): 1.540
1 - Roofs: 0.120 ac. Pitched Disconnected Normal Clayey Low Density PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAM
25 - Driveways 1: 0.170 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 1.250 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

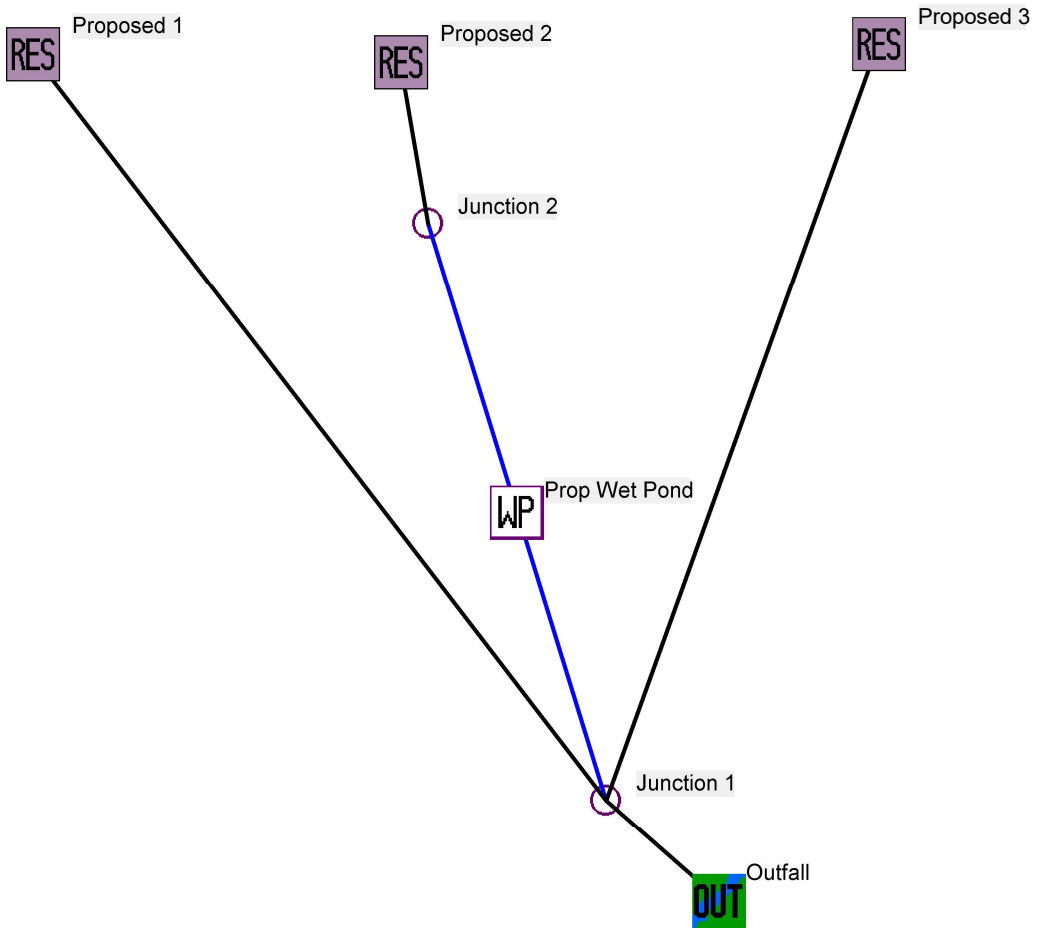
LU# 3 - Residential: Proposed 2 Total area (ac): 20.360
1 - Roofs 1: 4.240 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 5.870 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 8.650 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 1.600 ac. PSD File: Source Area PSD File:

SLAMM for Windows Version 10.5.0
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Data file name: S:\Design & Construction Services\National Management LLC\491163 - River Crossing\Stormwater\SWMP\WinSLAMM\River Crossing No Controls.mdb
WinSLAMM Version 10.5.0
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 08-31-2026 Time of run: 11:55:21
Total Area Modeled (acres): 24.350
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	1.145E+06	-	90.11	6444	-
Outfall Total with Controls:	1.145E+06	0.00%	90.11	6444	0.00%
Annualized Total After Outfall Controls:	1.161E+06			6533	

Pollutant	Conc. No Controls	Conc. With Controls	Conc. Units	Pollutant Yield No Controls	Pollutant Yield With Controls	Pol. Yield Units	Percent Reduction
Particulate Solids	90.11	90.11	mg/L	6444	6444	lbs	0.00 %
Total Phosphorus	0.3556	0.3556	mg/L	25.43	25.43	lbs	0.00 %


RES
Proposed 1
RES
Proposed 2
RES
Proposed 3
Junction 2
WP
Prop Wet Pond
Junction 1
OUT
Outfall

Data file name: S:\Design & Construction Services\National Management LLC\491163 - River Crossing\Stormwater\SWMP\WinSLAMM\River Crossing.mdb
WinSLAMM Version 10.5.0
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 08-31-2026 Time: 11:51:21
Site information:

LU# 1 - Residential: Proposed 1 Total area (ac): 2.450
1 - Roofs: 0.320 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 0.100 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 2.030 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Residential: Proposed 3 Total area (ac): 1.540
1 - Roofs: 0.120 ac. Pitched Disconnected Normal Clayey Low Density PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAM
25 - Driveways 1: 0.170 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 1.250 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Residential: Proposed 2 Total area (ac): 20.360
1 - Roofs 1: 4.240 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 5.870 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 8.650 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 1.600 ac. PSD File: Source Area PSD File:

Control Practice 1: Wet Detention Pond CP# 1 (DS) - Prop Wet Pond
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 5
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Sharp Crested Weir
1. Sharp crested weir length (ft): 4
2. Sharp crested weir height from invert: 4
3. Sharp crested weir invert elevation above datum (ft): 7
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.25
2. Number of orifices: 1
3. Invert elevation above datum (ft): 5
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 20
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 10
Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 4
2. Stand pipe height above datum (ft): 11
Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.5071	0.00	0.00
2	1.00	0.6419	0.00	0.00
3	2.00	0.7797	0.00	0.00
4	3.00	0.9185	0.00	0.00
5	4.00	1.0638	0.00	0.00
6	5.00	1.5613	0.00	0.00
7	6.00	1.7183	0.00	0.00
8	7.00	1.8785	0.00	0.00
9	8.00	2.0416	0.00	0.00
10	9.00	2.2080	0.00	0.00
11	10.00	2.3770	0.00	0.00
12	11.00	2.6027	0.00	0.00

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Data file name: S:\Design & Construction Services\National Management LLC\491163 - River Crossing\Stormwater\SWMP\WinSLAMM\River Crossing.mdb
WinSLAMM Version 10.5.0
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 08-31-2026 Time of run: 11:49:37
Total Area Modeled (acres): 24.350
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	1.145E+06	-	90.11	6444	-
Outfall Total with Controls:	1.147E+06	-0.17%	9.153	655.3	89.83%
Annualized Total After Outfall Controls:	1.163E+06			664.4	

Pollutant	Conc. No Controls	Conc. With Controls	Conc. Units	Pollutant Yield No Controls	Pollutant Yield With Controls	Pol. Yield Units	Percent Reduction
Particulate Solids	90.11	9.153	mg/L	6444	655.3	lbs	89.83 %
Total Phosphorus	0.3556	0.1124	mg/L	25.43	8.049	lbs	68.35 %

Appendix 6

Storm Water Maintenance Plan

Document Number	DECLARATION OF CONDITIONS AND RESTRICTIONS FOR MAINTENANCE OF STORMWATER MANAGEMENT MEASURES

STORMWATER MANAGEMENT PRACTICES
MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 20____, by and between River Crossing _____hereinafter collectively called the "Owner" and the City of Watertown hereinafter called the "City".

WITNESSETH:

WHEREAS, the Owner is the owner of the following described lands situated in the City of Watertown, Jefferson County, State of Wisconsin, to-wit:

Lot 1 of Certified Survey Map No. 6536 recorded January 22, 2025, as Document No. 1491549 being Lot 1 of Certified Survey Map No. 4319, recorded in Vol. 21 of Certified Survey Maps, on Pages 229-231, as document No., 1095342, and lands located in the SE 1/4 of the NW 1/4 of Section 16, T8N, R15E, in the City of Watertown, Jefferson County, Wisconsin.

Tax Key: 291-0815-1624-003

Hereinafter called the "Property".

WHEREAS, the Owner is developing the Property; and

WHEREAS, the Site Plan identified as River Crossing Apartments and Site Improvements hereinafter called the "Plan", which is attached hereto as Exhibit "A" and expressly made a part of hereof, as approved or to be approved by the City, provides for on-site stormwater management practices within the confines of the Property; and

WHEREAS, the City and the Owner, its successors and assigns, agree that the health, safety and welfare of the residents of the City, require that the on-site stormwater management practices as defined in Wisconsin Administrative Code NR 151, be constructed and maintained on the Property; and

WHEREAS, the City requires that on-site stormwater management practices as shown on the Plan be constructed and adequately maintained by the Owner, its successors and assigns.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The Owner, its successors and assigns, in accordance with the plans and specifications identified in the Plan, shall construct the on-site stormwater management facilities.

2. The Owner, its successors and assigns, shall adequately maintain the stormwater management practices, including, but not limited to, all pipes and channels built to convey stormwater to the facility, as well as all structures, improvements and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as keeping the stormwater management facilities in good working condition so that these facilities are performing their design functions and are in accordance with the Storm Water Practice Maintenance Plan attached to this Agreement as Exhibit A and by this reference made a part hereof.

3. The Owner, its successors and assigns, shall regularly inspect the stormwater management practices as often as conditions require, but in any event at least twice each year. The standard Storm Water Maintenance Report attached to this Agreement as Exhibit A and by this reference made a part hereof shall be used for the purpose of the regular inspections of the stormwater management practices. This report form may be periodically updated by the City. The Owner, successors and assigns shall keep the Storm Water Maintenance Reports from past inspections as well as a log of maintenance activity indicating the date and type of maintenance completed. The reports and maintenance log shall be made available to the City for review upon request. The purpose of the inspections is to assure safe and proper functioning of the facilities. The inspections shall cover all facilities including, but not limited to, berms, outlet structures, pond areas and access roads. Deficiencies shall be noted in the Operation and Maintenance Report.

4. The Owner, its successors and assigns, hereby grants permission to the City, its authorized agents and employees, to enter upon the Property and to inspect the stormwater management practices whenever the City deems necessary. The purpose of inspection is to investigate reported deficiencies, to respond to citizen complaints, or verify maintenance of on-site stormwater management practices. The City shall provide the Owner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary. Corrective actions shall be taken within a reasonable time frame as established by the City Engineer.

5. If the Owner, its successors and assigns, fails to maintain the stormwater management practices in good working condition acceptable to the City and does not perform the required corrective actions in the specified time, the City may:

    a. Perform the corrective actions identified in the inspection report and assess the Owner, its successors and assigns for the cost of such work. The cost of such work shall be specially assessed against the Property pursuant to Wisconsin Statutes Section § 66.0703. It is expressly understood and agreed that the City is under no obligation to routinely maintain or repair said stormwater management practices, and in no event shall this Agreement be construed to impose any such obligation on the City.

6. The Owner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management practices (including sediment removal) is outlined in the Operation and Maintenance Plan, the schedule will be followed.

7. This Agreement may be modified by mutual agreement of the *responsible party* and the City. The modification date shall be the date City of records the modified Agreement with the Rock County Register of Deeds, as a property deed restriction so that the modified agreement is binding upon all subsequent owners of the land served by the stormwater management

practices. Responsible party, as used in this paragraph, shall mean the Owner, its successors or assigns, who is responsible for the Agreement at the time of any amendment.

8. In the event the City pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Owner, its successors and assigns, shall reimburse the City upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the City hereunder. Failure of the Owner to make payment within thirty (30) days shall result in the amount being added to the tax roll as a special charge pursuant to paragraph 5(b).

9. This Agreement imposes no liability of any kind whatsoever on the City and the Owner agrees to hold the City harmless from any liability in the event the stormwater management practices fail to operate properly.

10. Upon receipt of the executed Agreement, the City shall record said agreement in the Office of the Register of Deeds.

WITNESS the following signatures and seals:

Owner Name
River Crossing _____

By: _____
Name:_____
Title: Managing Member
Date: _____

River Crossing _____

By: _____
Name:_____
Title: Managing Member
Date: _____

STATE OF WISCONSIN)
JEFFERSON COUNTY) : ss.

The foregoing Agreement was acknowledged before me this _____ day of _____, 20_____ by _____ and _____.

_____
Printed Name: _____
Notary Public, State of Wisconsin
My commission is/expires _____

City of Watertown
By: _____
Name:_____
Title:_____

STATE OF WISCONSIN)
JEFFERSON COUNTY) : ss.

The foregoing Agreement was acknowledged before me this _____ day of _____, 20_____ by _____ and _____.

Printed Name: _____
Notary Public, State of Wisconsin
My commission is/expires _____

This instrument was drafted by: Steve Kolar

Exhibit A

Storm Water Practice Maintenance Plan

River Crossing Apartments

Watertown, WI

This exhibit explains the basic function of each of the storm water practices on the subject property and prescribes the minimum maintenance requirements to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions in perpetuity. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this site.

Lot 1 of Certified Survey Map No. 6536 recorded January 22, 2025, as Document No. 1491549 being Lot 1 of Certified Survey Map No. 4319, recorded in Vol. 21 of Certified Survey Maps, on Pages 229-231, as document No., 1095342, and lands located in the SE 1/4 of the NW 1/4 of Section 16, T8N, R15E, in the City of Watertown, Jefferson County, Wisconsin.

Tax Key: 291-0815-1624-003

Responsible Party:
Name:
National Management LLC
333 Bishops Way, Suite 141
Brookfield, WI 53005
Phone:
Email

System Description:

Stormwater measures on the property are designed to provide the peak flow control for the site prior to discharging off-site into adjacent municipal storm sewers. Wet pond provides at least 80% TSS removal, the ponds also provide peak flow control. Stormwater is conveyed to these ponds by overland flow and on-site storm sewer systems. Best management practices (BMP'S) shall be inspected and maintained on a regular basis.

The BMP'S receive runoff from the development of the subject property. During rainfall or snow melt events, the water level in the BMP'S will temporarily rise and slowly drain down. Performance of the BMP's can be monitored by observing the outflow characteristics of the storm water at the outlet structures for each device.

Minimum Maintenance Requirements:

To ensure the proper long-term function of the storm water management practices described above, the following activities must be completed:

All storm water drainage systems and components shall be inspected and maintained at least semiannually in early spring and in early fall. Additional inspections shall be made after large rainfall events of at least 1-inch. Repairs shall be made whenever deficiencies are found. The owner shall keep a written record of all inspections for a minimum period of five years. The inspections reports shall identify a reasonable schedule for repair or maintenance.

1. Grass Swales
    - Mow, remove trash, brush, trees, and accumulated sediments.
    - Reseed and dead grass or other vegetation as necessary.
2. Riprap Swales
3. Remove trash, brush, trees, and accumulated sediments.

4. Replace rip rap that has moved or washed away exposing bare soil, replace underlying fabric if missing or washed out.
    - Remove accumulated sediment.
5. Catch Basins and Storm Sewer

   The catch basin is considered a confined space and applicable entry requirements should be followed.
    - Inspect in the Spring and Fall for damage and sediment accumulation. Repair damage as needed. Remove accumulated sediments once a year in the fall or as needed. Properly dispose of sediments in accordance with NR528.
    - Inspect riprap at pipe outfalls. Replace riprap as necessary.
6. Detention Basins – Quarterly Inspections
    - Inspect stone weir between wet forebay and infiltration cell and pond overflow for signs of failure.
    - Inspect and repair any eroded areas on or around the embankments, emergency spillway, outlet structures and pipes.
    - Inspect for any damage to the outlet structure and promptly repair any damage that is found.
    - Replace riprap in bottom of basin and emergency spillway as needed.
    - Sediments shall be removed once the average permanent pool depth is 3.5 feet or less (6-inch sediment depth). Bathometric survey or other means to measure sediment depth shall be done once every five years.
    - When sediments are dredged, properly dispose of sediments in accordance with NR528.
7. Steep slopes
    - Inspect for signs or evidence of failure, bare soil, or rill erosion. Promptly repair any eroded areas with erosion matting, seed fertilizer and mulch.
    - Repair any areas along the slope that are starting to channelize runoff or sloughing by regrading.
    - Remove any woody vegetation.