

EXHIBIT 15

Stormwater Management Plan



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Project:

**Hartland Apartments
700 W. Capitol Drive**

**Location:
Village of Hartland, Wisconsin**

STORM WATER MANAGEMENT PLAN

Preparer:

Project Number: 490686
Last Revised: March 4, 2024

The full Storm Water Management Plan, dated March 4, 2024, and prepared by Payne & Dolan, is also on file at the Village of Hartland, WI.

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1.0 INTRODUCTION

The Hartland Apartments development is located at 700/701 W. Capitol Drive, south of STH 16 and east of STH 83. The site lies within a quarry that was mined for road gravel from the 1930s to the 1960s after which concrete plant operations took place in the southwest corner of the property. Neither of these uses are active any longer. Three infiltration basins and two bioretention basins are planned for the property to comply with the storm water management requirements of the Village of Hartland, Waukesha County and Wisconsin Department of Natural Resources (WDNR).

The approximately 50-acre study area is located within part of the NW ¼ of Section 3, T7N, R18E in the Village of Hartland, Waukesha County, Wisconsin. A location map for the site is located in **Appendix 1**.

Storm water management is required by the Wisconsin Department of Natural Resources (DNR) through Chapter NR 151 Runoff Management and the Village of Hartland Chapter 76 – Stormwater Management, Sec. 76-7 – Performance Standards because the proposed development causes a land disturbing activity of one acre or more. Therefore, development is required to implement the following controls:

Total suspended solids. BMPs shall be designed, installed and maintained to control total suspended solids carried in runoff from the post-construction site as follows: for new development TSS Reduction shall be $\geq 80\%$.

Total phosphorous. BMPs shall be designed, installed and maintained to control total phosphorous carried in runoff from the post-construction site as follows: for new development TP Reduction shall be $\geq 30\%$.

Peak discharge. The stormwater management facilities shall contain sufficient storage to contain the runoff from the 100-year, 24-hour rainfall event under developed conditions, while utilizing a peak discharge rate from the developed site which does not exceed the peak runoff rate from the site for a 10-year, 24-hour rainfall even under pre-developed conditions. By design, BMPs shall be employed to maintain or reduce the 10-year, 24-hour post-construction peak runoff discharge rates to the 2-year, 24-hour pre-development peak runoff discharge rate. Peak discharges shall be calculated using TR-55 runoff curve number methodology, Atlas 14 precipitation depths, and the appropriate NRCS Wisconsin MSE3 precipitation distribution.

Frozen condition for internally drained sites. The Village of Hartland refers to the Waukesha County Stormwater Management & Erosion Control Ordinance Chapter 14, Article VIII for modeling the 100-year frozen condition of an internally drained site.

Flows generated by the 100-year, 24-hour design storm under planned land use conditions may exceed the design capacity of conveyance systems, but shall not come in contact with any buildings. For buildings designed for human occupation on a regular basis, the following additional requirements shall apply:

- (i) The lowest elevation of the structure that is exposed to the ground surface shall be a minimum of two (2) feet above the maximum water surface elevation produced by the 100-year, 24 hour design storm, including flows through any stormwater BMP that may temporarily or permanently store water at a depth of greater than one (1) foot; and
- (ii) The structure shall be setback at least 50 feet from any stormwater BMP that may temporarily or permanently store water at a depth of greater than one (1) foot, including

any internally drained area with a significant contributing watershed and/or limited runoff storage capacity, as determined by the LRD. Setback distance shall be measured from the closest edge of water at the elevation produced by the 100-year, 24-hour design storm. The LRD may exempt existing structures and structures with no basement from this requirement if the LRD determines other site risks are minimal based on soil and site conditions.

Infiltration. For development with more than 40 percent and up to 80 percent connected imperviousness, such as medium and high density residential, multi-family development, industrial and institutional development, and office parks, infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 75 percent of the predevelopment infiltration volume, based on an average annual rainfall.

2.0 HYDROLOGIC CALCULATIONS

HydroCAD version 10.20-3c 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 as woods/grass combination, "A" soil type in "poor" condition. This CN 57 exceeds the maximum values for woodland (30) and grassland (39) specified in Chapter 76 but is appropriate since the entire area is considered a gravel pit. Storm water modeling was conducted using the 1-year, 2-year, 10-year and 100-year storm events using the MSE3 rainfall distribution with rainfall depths per Chapter 32. The USDA Web Soil Survey and a Geotechnical Report completed by GeoTest and dated May 4, 2023 are included in **Appendix 2**.

NOAA Atlas 14, Volume 8, Version 2 for Village of Harland, WI, USA
Lat: 43.1028°, Long: -88.3577°

Storm Recurrence Interval	24-hour Rainfall Depth
1-year	2.40 inches
2-year	2.71 inches
10-year	3.83 inches
100-year	6.26 inches

Web Soil Survey
National Cooperative Soil Survey
Hydrologic Soil Group – Waukesha County, WI

Map Unit Name	Rating
Gravel Pit	
Casco-Rodman Complex	B
Theresa Silt Loam	C
Hocheim Loam	D

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. A drainage area map is included in **Appendix 3**. The existing site is generally internally drained but the southern portion does drain south towards Capitol Drive and modeling for this area was completed for comparison with the proposed condition. A 6-minute minimum time of concentration was used for the east pre-development area due to the impervious and steep slope conditions. The following table presents the results of the hydrological analysis for the existing conditions:

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
South (S1)	13.856	72	6.0	10.70	15.02	33.16	79.58

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

4.0 POST-DEVELOPMENT CONDITIONS

The post-development condition consists of fourteen separate buildings, including a single-story clubhouse, two- and three-story apartment buildings and single-story garage buildings. The development also includes parking and drive areas, three stormwater infiltration basins and two stormwater bioretention basins.

The post-development drainage basins match those of the existing conditions. Subareas 1S, 2S and 3S are internally drained. Subareas 4S and 5S combined are smaller than the existing area that discharges towards Capitol Drive.

Referencing the Waukesha County Basement Wetness and Flooding Preventions Standards for design standards, the 100-year frozen condition was modeled for the internally drained subareas and infiltration ponds by using 6.26" rain depth and NRCS runoff curve number 98 and removing any infiltration credit.

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

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
1S	14.24	64	6.0	3.48	6.52	20.99	62.57
2S	16.77	63	6.0	3.22	6.55	22.93	70.85
3S	13.50	66	6.0	4.85	8.11	22.87	63.90
4S (south)	3.42	68	6.0	1.66	2.57	6.56	17.33
5S (south)	4.37	70	6.0	2.73	3.99	9.41	23.63
Total (w/o infiltration or detention)	52.29	---	---	15.84	27.68	82.74	238.27

Detention Features		1-year	2-year	10-year	100-year
Inf Pond 1P	Peak Inflow (cfs)	3.48	6.52	20.99	62.57
	Peak Outflow (cfs) Infiltrated	0.81	0.99	1.44	2.15
	High Water Level	962.31	962.57	963.64	966.30
	FROZEN High Water Level	--	--	--	971.65
Inf Pond 2P	Peak Inflow (cfs)	3.22	6.55	22.93	70.85
	Peak Outflow (cfs) Infiltrated	1.33	1.47	2.15	2.63

	High Water Level	960.12	960.27	961.04	963.30
	FROZEN High Water Level	--	--	--	969.42
Inf Pond 3P	Peak Inflow (cfs)	4.85	8.11	22.87	63.90
	Peak Outflow (cfs) Infiltrated	1.19	1.36	1.93	2.43
	High Water Level	963.23	963.41	964.19	966.35
	FROZEN High Water Level	--	--	--	971.79
Bioretention 4P	Peak Inflow (cfs)	1.66	2.57	6.56	17.33
	Peak Outflow (cfs)	0.48	0.71	1.37	7.44
	High Water Level	954.22	954.70	957.29	958.74
Bioretention 5P	Peak Inflow (cfs)	2.73	3.99	9.41	23.63
	Peak Outflow (cfs)	0.46	0.66	1.16	8.13
	High Water Level	955.39	955.89	958.29	959.64

Detailed hydrologic calculations are included in **Appendix 4 and 5**.

Pond 1P Controls

Forebay NWL = 962.00
 Forebay Surface area = 4365 sf
 Forebay Bottom Elev. = 957.00
 Inf. Surface Elev. = 962.00
 Top of pond elev. = 973.00

Pond 2P Controls

Forebay NWL = 960.00
 Forebay Surface area = 6890 sf
 Forebay Bottom Elev. = 955.00
 Inf. Surface Elev. = 960.00
 Top of pond elev. = 972.00

Pond 3P Controls

Forebay NWL = 963.00
 Forebay Surface area = 7430 sf
 Forebay Bottom Elev. = 958.00
 Inf. Surface Elev. = 963.00
 Top of pond elev. = 975.00

Pond 4P Controls

Bio Surface Elev. = 957.00
 12" Outflow Culvert ie = 953.25
 6" Underdrain inlet ie = 953.55
 6" Underdrain outlet ie = 953.25
 24" Outlet Grate ie = 958.00
 Top of berm Elev. = 959.25

Pond 5P Controls

Bio Surface Elev. = 958.00
 12" Outflow Culvert ie = 954.25
 6" Underdrain inlet ie = 954.75
 6" Underdrain outlet ie = 954.25
 24" Outlet Grate ie = 959.00
 Top of berm Elev. = 960.25

5.0 ALLOWABLE PEAK RUNOFF RATES

Hydrologic analysis included in this report was performed using the HydroCAD hydrologic simulation computer model, version 10.20-3c 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 6-minute minimum time of concentration was used for the post-development area. The following table summarize the results of the analysis.

Comparison of Pre- and Post-Development Flows

	1-year	2-year	10-year	100-year
Total Discharge (cfs)	Pre-developed Flows			
	10.70	15.02	33.16	79.58
	Post-developed Flows			
	0.94	1.35	2.52	15.56

6.0 STORM WATER QUALITY CONTROL

The post-development site will utilize the forebays of the three infiltration basins and the two bioretention basins 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. 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. Detailed computations are provided in **Appendix 6**.

The water quality modeling results for the study area are as follows:

Water Quality Modeling Results	
Site	% Reduction
Total Suspended Solids	73%
Total Phosphorous	55%

TSS reduction is provided via the 3 infiltration ponds' forebays and the bioretention basin(s). The infiltration basins themselves are not modeled in WinSLamm otherwise the output would read 100%. Per WDNR Technical Standard pretreatment for residential development is required upstream of the infiltration basins to remove 60% of the total suspended solids and for ponds 1P, 2P and 3P provide 69%, 75% and 73% reductions respectively. The bioretention basins each provide 80%.

7.0 INFILTRATION

The development will provide infiltration where soil and subsurface conditions permit, per WDNR and Village code requirements. The infiltration basins will be the primary (reported) infiltration practices for the site, however due to the gravel condition, other undeveloped and landscape areas will also contribute to the total infiltration. The south area of the site that is draining toward Capitol Drive has been decreased from the existing condition and the north area will remain internally drained with zero discharged released.

8.0 WISCONSIN DNR SOIL LOSS CALCULATIONS

The erosion control best management practices and construction sequence for the proposed development has been developed using the Wisconsin DNR Sediment Loss & Discharge Calculation Tool Version 2.0. See **Appendix 7**.

9.0 STORMWATER MANAGEMENT MAINTENANCE PLAN

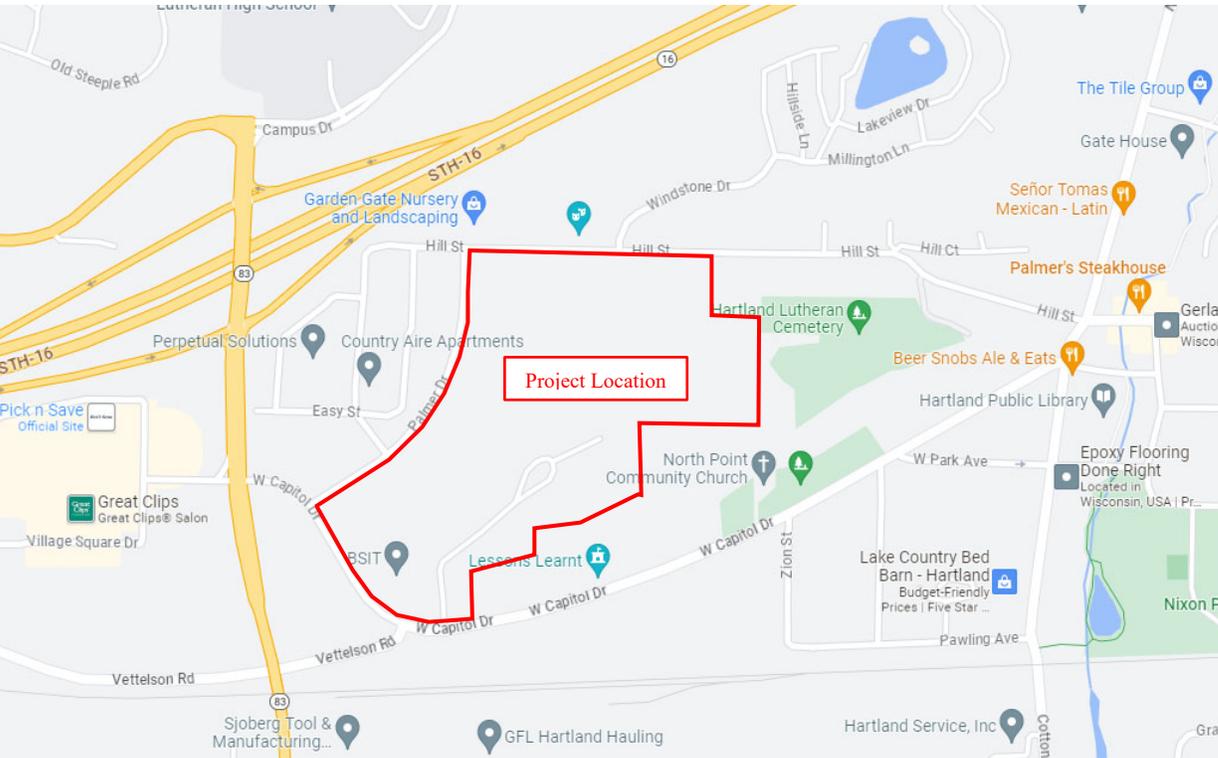
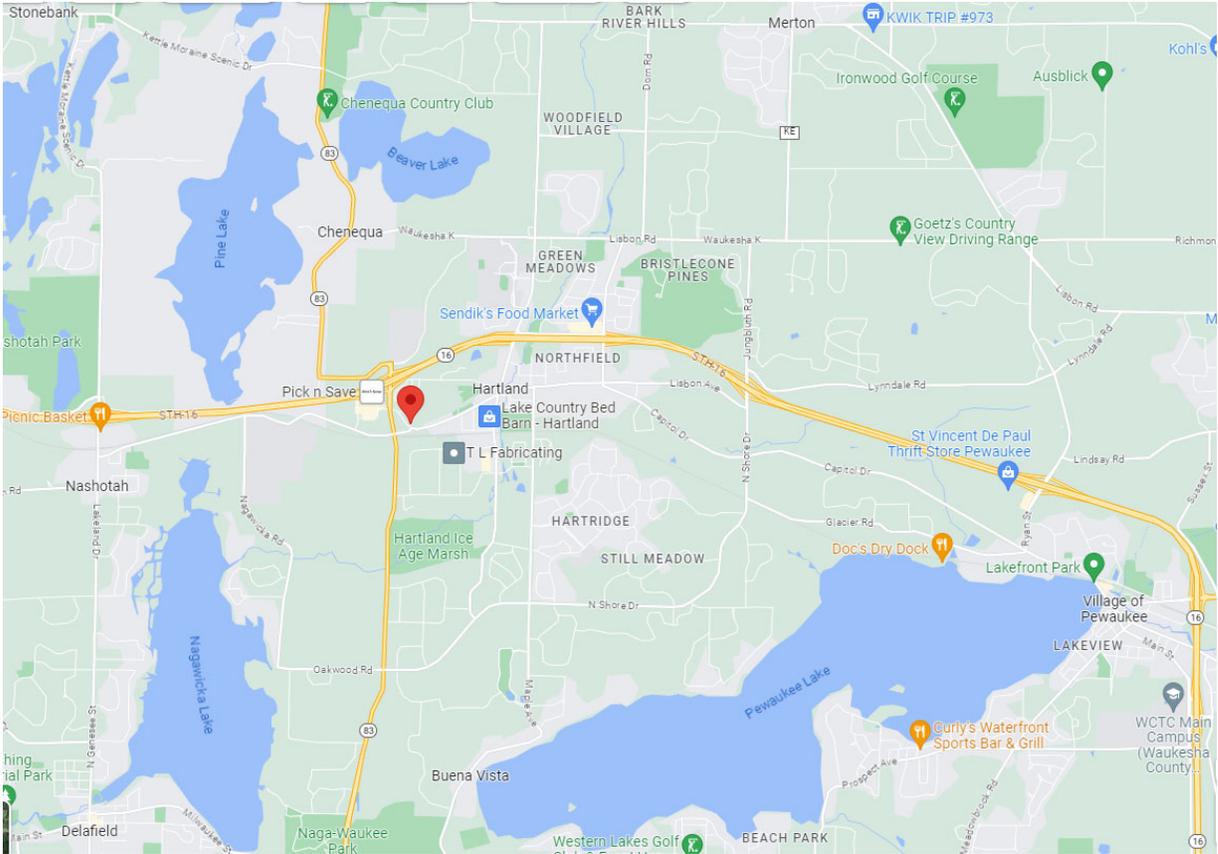
The stormwater management maintenance provisions and inspection checklist are detailed in **Appendix 9**.

Appendix 1

Site Location Map

Site Location Map

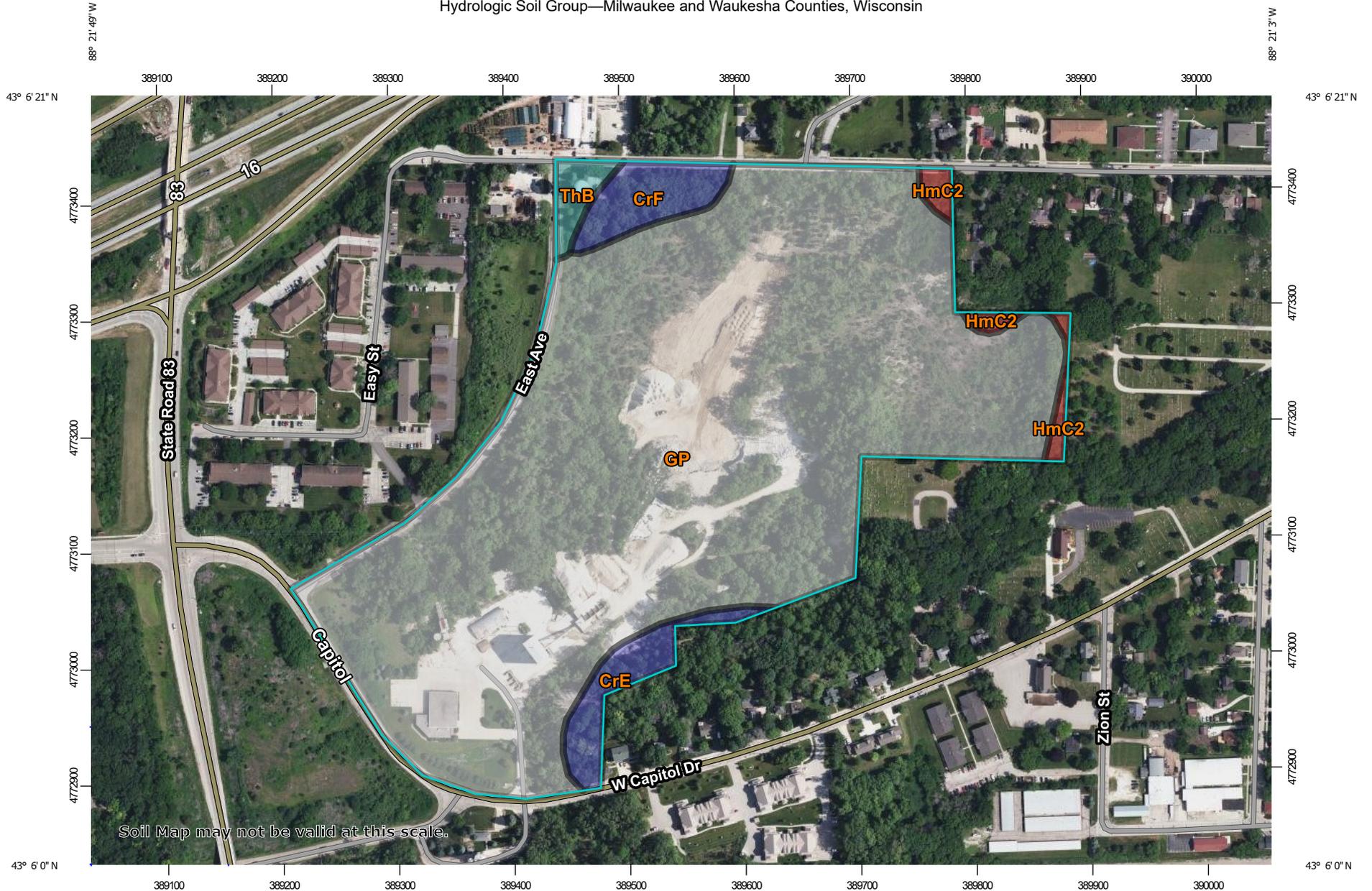
Located at 700/701 W. Capitol Drive, Hartland, Wisconsin 53029:



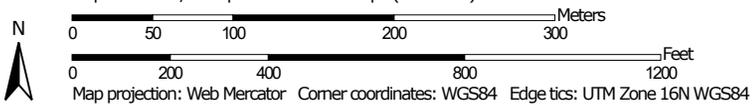
Appendix 2

USDA Web Soil Survey and Geotechnical Report

Hydrologic Soil Group—Milwaukee and Waukesha Counties, Wisconsin



Map Scale: 1:4,670 if printed on A landscape (11" x 8.5") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Milwaukee and Waukesha Counties, Wisconsin
 Survey Area Data: Version 18, Sep 7, 2022

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

Date(s) aerial images were photographed: Jun 6, 2020—Jun 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CrE	Casco-Rodman complex, 20 to 30 percent slopes	B	1.5	3.0%
CrF	Casco-Rodman complex, 30 to 45 percent slopes	B	1.5	3.2%
GP	Gravel pit		44.0	91.0%
HmC2	Hochheim loam, 6 to 12 percent slopes, eroded	D	0.7	1.4%
ThB	Theresa silt loam, 2 to 6 percent slopes	C	0.6	1.3%
Totals for Area of Interest			48.3	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

May 4, 2023

John Ford
President
Three Leaf Partners
504 W. Juneau Avenue
Milwaukee WI, 53203



Subject: Geotechnical Subsurface Investigation
Hartland Quarry Apartments
700/701 W. Capitol Drive, Hartland, Wisconsin

Dear Mr. Ford:

GeoTest, Inc. (GeoTest) has prepared this geotechnical engineering report related to the above-referenced project. This report describes the subsurface exploration and laboratory testing programs and presents recommendations regarding foundation support of the proposed structures, construction of floor slabs, pavements, and stormwater management systems, bluff stabilization, and includes other construction considerations. All environmental-related services are being provided by others.

Project Description

Three Leaf Partners is proposing to develop the property located at 700/701 W. Capitol Drive in the Village of Hartland, Wisconsin. The location of the project is illustrated in Figure 1 in Appendix A. The boundaries of the combined 45-acre property are illustrated in Figure 2 in Appendix A.

The proposed development consists of eighteen separate buildings, including a single-story club house, two- and three-story apartment buildings (some slab-on-grade and some with below-grade parking), and single-story garage buildings. The development will also include parking and drive paved areas and multiple stormwater management devices. The proposed development is illustrated in Figure 3 in Appendix A.

Structural loads have not been provided. However, we anticipate that column and wall loads will not exceed 300 kips and 5 kips per linear foot, respectively.

The finished floor elevations for the new buildings have not been provided but are expected to vary across the property. The preliminary civil engineering plans indicate cuts and fills of up to 15 feet are anticipated to achieve the final site grades.

The stormwater management facilities are designed, on a preliminary basis, to consist of four infiltration ponds. The entire development will be internally drained.

The perimeter bluffs currently have slopes steeper than 1h:1v, with many sections close to 0.75h:1v. The proposed development plan assumes the final slopes will be designed for 2h:1v.

Property History

To develop an appropriate geotechnical scope of work for this project, research and a site walk-through were completed. The research included reviewing local well logs (available from Waukesha County), a past environmental investigation report (produced by Drake Environmental, Inc.), and construction materials testing reports (produced by Gestra Engineering, Inc.). The Well logs and Drake and Gestra documents are included in Appendix B.

We interviewed individuals familiar with past activities at the property, including Jason Palmer with Cass Custom Crushing and Ed Troxell with Riv/Crete Ready Mix. We also toured the property with Jason and Ed, along with employees from Walbec Group, the project's civil engineering consultant.

The geologic setting at the property was described as granular (primarily sand and gravel) glacial deposits. The property was mined for road gravel from the 1930's to the 1960's (known as Palmer Sand & Gravel), after which it became a concrete plant under multiple company names. The concrete plant operations were located in the southwest corner of the property but are no longer active.

The property owners began accepting fill materials in the 1970's, which still occurs. Most of the fills appear to consist of soil and concrete wastes, but also occasional inert materials that include asphalt, building materials, wood, and metal. It is currently being used as an operational base for a trucking company and to store construction equipment.

Most of the property perimeter was lined with bluffs formed by past mining operations. Although the property's ground surface was near the adjacent property elevations in the southwest corner, the remaining elevation differences were as high as 85 feet. Therefore, an integral aspect of the development plan includes addressing the substantial perimeter embankments, not only for safety but also to maximize the buildable area.

Two areas that were unusual, with an unknown history, were the apparent overburden stockpiled soils forming the north boundary of the former concrete plant area at the southwest corner of the property, and the bluff peninsula in the east portion of the former pit that extends northward from the south property boundary. It was believed that the overburden stockpiled soils were placed as a buffer between the adjacent residential area to the west and to serve as a ramp for trucks to unload into a crusher. No one had an explanation for why the bluff peninsula was not excavated during the

mining operations, other than maybe they were unsuitable for production. These two areas were identified for evaluation, in addition to the overall pit base and bluffs.

Scope of Work

Geotechnical Subsurface Exploration

The research identified five areas with different soils and materials to be targeted for evaluation. These areas (described below) are illustrated on Figure 4 in Appendix A. This figure does not illustrate the bluff areas, although they also warranted evaluation.

- Industrial Development Area (including the apparent overburden stockpiled soils)
- Construction Debris Fill
- Soft Clay/Silt Sediment
- Compacted Imported Soil Fill
- Native Soils – Pit Base

The following geotechnical exploration program was developed to evaluate these areas:

- Nine test pits were excavated to depths of about 6 to 11 feet.
- Nineteen surface samples were collected from the perimeter bluffs.

The approximate sampling locations are identified on the Sampling Location Diagram (Figure 5) in Appendix A. Representative samples from the test pits and bluffs were collected in buckets and returned to GeoTest for laboratory testing and classification.

The test pit locations, the ground surface elevations at the test pits, and their depths were measured by a Walbec surveyor at the time they were excavated. Their locations and the elevation/depth data are represented on two figures provided by Walbec, which are included in Appendix B.

Laboratory Testing

The laboratory testing program consisted of the following:

- Modified Proctor testing of four samples.
- Grain Size Analyses of twenty-three samples.
- Atterberg Limits testing of one sample.

All laboratory results are presented in reports included in Appendix C.

In addition, a GeoTest geotechnical engineer examined and visually classified each sample, based on texture and plasticity, in accordance with the Unified Soil Classification System (USCS). General notes and a description of the USCS

classification system are included in Appendix C. The soil descriptions are presented in this report.

The recovered soil samples will be retained for 60 days after the date of this report. Unless other instructions as to their disposition are received, they will be discarded at that point.

Soil and Groundwater Conditions

The following narrative is a generalization of the subsurface conditions encountered on the property. Please recognize that the conditions can vary in areas between the sample locations.

Subsurface Conditions

The dominant geology on the property was described as well-grade granular glacial deposits, consisting of sand and gravel with variable percentages of fines (clay and silt), along with occasional cobbles and boulders. Differences from these native deposits included the placement of imported fill soils and man-made materials, primarily concrete in various forms.

The results of the test pit and bluff sampling programs are presented below. Following that information, the five ground surface areas are discussed.

Test Pits - The GeoTest test pit exploration program was designed to evaluate the subsurface conditions at each of the five areas where different soils or materials were expected. The following table summarizes the soils/materials encountered at the test pits.

Test Pit	Depth, ft	Description
TP-1 & TP-2 ¹	0-6.4	SC-SM: Fine to coarse sand, some gravel, little clay and silt, occasional cobbles and boulders; brown; moist (32.8% gravel, 43.6% sand, 23.6% fines) – appeared to be native soil deposits.
TP-3 ³	0-5.6	SW-SM: Fine to coarse sand and gravel, few clay and silt, occasional cobbles; brown; moist (43.0% gravel, 46.4% sand, 12.6% fines) – appeared to be native soil deposits.
TP-4 ²	0-11.3	FILL (Rubble): Concrete and asphalt fragments, metal, wood, intermixed sand and gravel.
TP-5 ²	0-3	FILL (Rubble): Concrete fragments intermixed sand and gravel.
TP-5 ³	3-9.1	FILL (SP-SM): Fine sand, little medium to coarse sand, little gravel, few silt; brown; moist (20.7% gravel, 66.9% sand, 12.4% fines) – appeared to be fill soils.
TP-6 ⁴	8.1	GW: Fine to coarse gravel, some fine to coarse sand, trace silt, occasional cobbles and boulders; brown; moist (61.8% gravel, 35.3% sand, 2.9% fines) – appeared to be native soil deposits.

TP-7 ⁵	0-9	FILL (SW-SM): Fine to coarse sand, some gravel, few silt; brown; moist – compacted fill (tested by Gestra) that originated from a local utility construction project.
TP-7 ⁴	9-10.4	GW: Fine to coarse gravel, some fine to coarse sand, trace silt, occasional cobbles and boulders; brown; moist – appeared to be native soil deposits.
TP-8 ⁶	0-5.5	SEDIMENT (CL-ML): Clayey silt, trace fine sand; orange-brown; saturated; soft – appeared to be sediment run-off from the adjacent bluff peninsula and concrete fill area.
TP-8 ⁴	5.5-6.2	GW: Fine to coarse gravel, some fine to coarse sand, trace silt, occasional cobbles and boulders; brown; moist – appeared to be native soil deposits.
TP-9	6.6	GW: Fine to coarse gravel, some fine to coarse sand, few silt, occasional cobbles and boulders; brown; moist (56.2% gravel, 37.0% sand, 6.8% fines) – appeared to be native soil deposits.

Notes:

- 1- The samples from TP-1 and TP-2 were composited because these soils are expected to be excavated and reused as an engineered fill.
- 2- No sample was collected because these materials will be segregated, and the soil and concrete will be crushed for reuse as an engineered fill.
- 3- This sample was subjected to the Modified Proctor test because it is projected to be excavated and reused as an engineered fill.
- 4- This sample was not subjected to the Modified Proctor test because it will not be excavated for reuse as an engineered fill.
- 5- This sample was not tested because it will not be excavated for reuse as an engineered fill (the Gestra field density test results passed).
- 6- This sample was not tested because it should be excavated and is not suitable for reuse as an engineered fill.

Bluff Samples - The samples collected from the perimeter bluffs were subjected to Grain Size Analyses (sieve testing) to understand the grain size distribution and determine certain material coefficients that can be used in slope stability analyses. The following table summarizes the distribution of gravel, sand, and fines.

Bluff Sample	Percent Gravel	Percent Sand	Percent Fines	USCS Class
1	54.9	44.0	1.1	GW
2	0.0	3.2	96.8	CL
3	55.1	38.6	6.3	GW-GM
4	56.3	40.6	3.1	GW
5	36.1	57.4	6.5	SW-SM
6	28.5	62.2	9.3	SW-SM
7	8.0	84.3	7.7	SW-SM
8	11.5	57.6	30.9	SM

9	9.4	61.7	28.9	SM
10	42.7	47.9	9.4	SW-SM
11	11.6	61.4	27.0	SM
12	20.1	69.1	10.8	SW-SM
13	54.6	40.9	4.5	GW-GM
14	18.5	45.6	35.9	SM
15	29.5	52.3	18.2	SM
16	13.5	62.1	24.4	SC
17	9.3	67.4	23.3	SC
18	42.4	43.9	13.7	SM
19	42.9	46.2	10.9	SM

In summary, the above results indicate that the bluff soils are almost entirely granular and vary in their fine content. Only one sample was a fine soil (clay), present along the south side of the bluff peninsula in the east portion of the property that extends from the south property boundary. The majority of the bluff soils met the OSHA definition of Type C, which requires a minimum slope of 1.5h:1v. Some areas met Type B, which require a minimum slope of 1h:1v.

Industrial Development Area - The boring logs generated by Drake during their environmental investigation indicated that the soils present in the southwest portion of the property primarily consisted of layered sands, with variable clay, silt, and gravel content. Occasional silt layers were also noted. Most of the soil to depths of 10 to 15 feet was described as fill or possible fill, which could have been placed to facilitate the existing development, including backfill in the former underground storage tank (UST) cavities.

The Drake boring logs indicated the granular soils exhibited very loose to very dense relative densities, with N-values ranging from 1 to 72. The lowest values (less than 5) were located at the former UST cavity. Excluding the UST backfill soils, all N-values (except two) exceeded 10 and averaged 32. The relatively uniform and high N-values suggest most of the soils are likely native deposits and not fills.

Two test pits were excavated (TP-1 and TP-2) and two bluff samples (B18 and B19) were collected to evaluate the nature of the apparent overburden stockpiled soils. The test pit and bluff samples were similar in nature, and all appeared to be native soil. A visual evaluation of the soils making up this area concluded that there is a combination of both native glacial deposits and fills soils that make up this higher ground.

One test pit (TP-3) was excavated to determine if the former concrete plant area is underlain by native or fill soils. This sample appeared to be native and were similar to the samples from TP-1 and TP-2.

Construction Debris Fill Area – Two test pits (TP-4 and TP-5) were excavated in this area. As anticipated, the materials at TP-4 were mostly buried concrete rubble and concrete truck washouts. The profile also included other inert materials, such as asphalt, metal, wood, and intermixed sand and gravel soil. The fill extended deeper than could be excavated. The materials at TP-5 consisted of concrete rubble overlying fine sand fill. The sand fill likely is the remnant of a stockpile created during the past mining and concrete plant operations.

Compacted Soil Fill Area - The soils placed in this area are represented by the Gestra documents and the sample from TP-7. This soil was imported from a local utility construction project by Musson Brothers and described as sandy gravel. We were told that the soil was placed in 1-foot lifts and compacted. Gestra tested them for compaction at three surface locations, which passed the 95% specification. The test pit exposed soils also described as sand and gravel fill to a depth of about 9 feet overlying native sand and gravel. The test pit walls remained vertical, and the soil appeared to be dense and well compacted.

Soft Clay/Silt Sediment – The soils in this area are represented by the sample from TP-8. They appeared to have accumulated as run-off from the adjacent higher finger bluff and concrete rubble fill areas. They were fine grained clay and silt that were saturated. While traversing this area with the backhoe, it sank about 3 feet, prompting the decision to excavate the test pit. The soft, saturated sediments extended to a depth of about 5.5 feet and overlay native sand and gravel soil.

Native Soils – Pit Base Area – Two test pits (TP-6 and TP-9) were excavated in the areas believed to be the final base of the original mining pit. These two samples were similar in nature and both described as mostly well-graded gravel with some sand and trace to few silt fines. These soils were also similar to bluff samples B1, B3, B4, and B13, where the original pit was terminated due to property boundary restrictions.

Groundwater Conditions

Free groundwater was not encountered in any of the test pits. Groundwater was noted in the Drake report at depths of 8 to 10 feet. The nearby potable well reports indicated the depth to groundwater ranged from 55 to 135 feet, from ground surface elevations up to 85 feet above the pit base. Based on this data, the normal groundwater table likely exists at a depth of about 10 to 20 feet below the pit base.

Fluctuations in the groundwater table elevation should be expected with variations in precipitation, evapotranspiration, surface runoff, etc. Also, shallow perched groundwater conditions should be expected where relatively permeable granular soils are underlain by relatively impermeable cohesive soils, especially following precipitation events.

Analysis and Recommendations

There are eight primary issues that should be considered when planning this project.

- Fill materials exist on the property. The fills vary from construction soil placed in the developed area, UST backfill, construction rubble, compacted imported soil, and general grading materials. Other than the compacted imported soil, most other fills are not suitable for support of engineered fill and structural elements.
- Most building foundations will bear upon engineered fill placed to raise low areas of the property. It will be important to plan for sufficient quality-control measures during site grading and construction to ensure competent bearing conditions.
- Saturated clay and silt soils exist in the "Sediment" area, which are highly sensitive to construction activity and are not suitable for the support of engineered fill and structural elements.
- The compacted imported soil area only had three field density tests. Additional testing should be conducted to confirm they are consistent and suitable for the support of engineered fill and structural elements.
- Unexpected materials or items could be buried on the property that would not be suitable for reuse, such as construction equipment, organic material such as timber and vegetation.
- Subsurface elements related to past developments exist, including foundations, slabs, and utilities. These features should be identified and removed within structural areas.
- Although not encountered during this evaluation, it is possible that clay and silt soils could be encountered during the site improvement activities. These soil types are sensitive to moisture variations and could cause construction challenges and schedule delays.
- Although the perimeter bluffs vary in soil type, they should all be uniformly designed for safety and stability.

Foundation Support

Once the property has been properly prepared (described below), the proposed buildings can be supported on conventional, shallow spread footings. The foundations can likely be designed using an allowable bearing capacity value of 3,000 psf to 6,000 psf, depending on the final grades and localized bearing conditions. Properly designed and constructed footings should experience total and differential settlements of less than 1 inch and $\frac{3}{4}$ inch, respectively.

Traditionally, perimeter footings and interior footings in unheated areas should bear at a depth of at least 48 inches below the final exterior grade to provide adequate frost protection. If desired, exterior footings can bear at shallower depths by following ASCE 32-01 (American Society of Civil Engineers, Design and Construction of Frost-Protected Shallow Foundations, 2001). Interior footings not subject to frost can bear directly beneath the floor slab.

Seismic Design

The soil conditions present at a site are utilized in determining the Seismic Design Category (SDC) for structures. Part of selecting the SDC is determining the Site Class for the soils, which categorizes common soil conditions into broad classes, where typical ground motion attenuation and amplification effects are assigned. Site Class is determined based on the average properties of the soil within 100 feet of the ground surface. Geotechnical engineers use a variety of parameters to characterize the engineering properties of these soils, including general soil classifications (e.g., hard rock, soft clay, etc.), N-values, and laboratory testing.

Site Class A includes hard rock that is typically found only in the eastern United States. The types of rock typically found in the western states include various volcanic deposits, sandstones, shales, and granites that commonly have the characteristic appropriate to either Site Class B or C. Sites with very dense sands and gravels or very stiff to hard clay deposits also may qualify as Site Class C. Sites with relatively stiff cohesive or medium dense non-cohesive soils, including mixtures of clays, silts, and sands, are categorized as Site Class D. Site Class D is the most common site class throughout the United States. Sites along rivers or other waterways underlain by deep soft clay deposits are categorized as Site Class E. Sites where soils are subject to liquefaction or other ground instabilities are categorized as Site Class F and site-specific analyses are required.

Based on the types of soils present at the boring locations at this property, and their apparent engineering properties, Site Class D is assigned to the site, as defined in the International Building Code (2015) Section 1613.

Floor Slab Support

The expected final subgrade soils should be suitable for support of concrete floor slabs. However, the floor slab areas should be proof-rolled and soft areas removed or improved prior to the placement of base course materials. An average subgrade modulus value of 150 pounds per cubic inch (pci) is appropriate.

Below-grade Walls

A coefficient of friction of 0.35 may be used with dead load forces for wall footings that bear on suitable (as defined in the geotechnical report) native soils or engineered fill.

The lateral earth pressure value ranges presented below assume that the walls are vertical, that a clean, free-draining granular fill (P200 <6%) is used as backfill within 2 feet behind the wall, the backfill condition at the ground surface is level, and that adequate drainage is provided to prevent the buildup of hydrostatic pressures.

Retaining Wall Design Parameters	
Soil Unit Weight	140 pcf
Angle of Internal Friction	35°
Soil Cohesion	0 psf
Earth Pressure Coefficient	
At Rest Design Parameters	0.46
Active Design Parameters	0.30
Passive Design Parameters	3.35

We recommend using a minimum safety factor of 2.0 in passive earth pressure calculations, ignoring the upper 2 feet of soil in frost protected areas and 4 feet of soil in other areas. For walls that are free to rotate at least 0.001 times the height of the wall, such as a temporary earth retention system and retaining walls, an active earth pressure condition will develop. For walls that will be restrained, such as permanent below-grade walls, an at-rest condition will develop. For walls that rotate towards the soil, a passive condition will develop. Below-grade and retaining wall design should also consider surface and subgrade surcharge loading.

Special attention should be employed during placement of backfill against below-grade and retaining walls. Inadequate placement and compaction of backfill will result in at-grade structural elements and slab/pavement settlement and distress. To achieve a balance between minimizing excessive pressures against the walls during construction and reducing the settlement of the wall backfill, the granular backfill should be compacted to at least 90 percent of the maximum dry density obtained in accordance with ASTM Specification D1557, Modified Proctor Method. Where backfill supports structural elements, sidewalks, or pavements, the upper 4 feet should be compacted to 95% of the maximum dry density (Modified Proctor). Lifts of 4 to 6 inches can be effective in achieving compaction requirements.

Drainage should be provided behind below-grade walls to prevent the buildup of hydrostatic pressures. We recommend that free-draining granular drainage aggregate be placed within 2 feet behind the back face of the walls.

A relatively impermeable barrier at the ground surface is recommended, such as a minimum 2-foot-thick clay cap or Bituminous or Portland cement concrete (i.e., walkways and drives) to minimize surface water infiltration into backfill against walls. The impermeable barrier should slope away from the structure at a minimum 2 percent grade.

Engineered Fill, Wall, and Utility Trench Backfill

The on-site soil and materials (if processed properly) can be reused as engineered fill. All engineered fill, wall, and utility trench backfill should consist of inorganic materials,

free of debris, not exceed 3 inches in size, and should be placed in 8 to 10-inch loose lifts compacted to a minimum of 95 percent of the maximum dry density (Modified Proctor). If the engineered fills are less than 7 feet in thickness, they should be moisture conditioned to be within +/- 3% of the optimum moisture content. Where engineered fills exceed 7 feet, they should be moisture conditioned to be at the optimum moisture to + 3% above.

Pavement Design

The Wisconsin Asphalt Pavement Association (WAPA) Design Guide should be utilized to design the new asphalt surface parking areas. Traffic Class I was assumed for parking areas that are mainly used by light passenger vehicles and Traffic Class II for medium-loaded drive areas.

The minimum pavement section should consist of the following:

Material	Traffic Class I	Traffic Class II	WisDOT Specification
Asphalt Surface Course	2 inches	2 inches	Section 460
Asphalt Binder Course	2 inches	2.5 inches	Section 460
Dense Graded Base Course	8 inches	10 inches	Section 305

The pavement sections above are not intended to support on-going construction traffic. Also, the pavement sections presented above should not be used for areas that experience heavy truck traffic, equipment or truck parking areas, entrances and exit aprons, or trash-dumpster loading zones. In these areas, a Portland Cement Concrete (PCC) pavement should be used. The PCC layer thickness is recommended to be 7 inches with a minimum of 6-inch-thick crushed stone base course. The reinforcement details for PCC layers and final pavement section should be designed by the project design engineer.

These recommendations assume the subgrade is prepared as described in this report. Additional corrective action may be warranted at the time of construction, depending on the site conditions. If any clay or silt soils exist in pavement areas, it may be beneficial to install a geotextile fabric (e.g., GEOTEX 315) as a separating layer between such a subgrade and the base course after the subgrade has been evaluated by proof-roll testing.

Stormwater Management

Three stormwater management devices are proposed for the development. Based on the soil descriptions at two of those areas (TP-6 and TP-9), the prevailing soils were classified as “Coarse Sand and Gravel”. Consequently, the devices would be exempt from the Wisconsin Department of Natural Resources (WDNR) infiltration requirements. The estimated static infiltration rate based on the Standard 1002 – Table 2 would be 3.60 inches per hour (in/hr).

Bluff Stability

The prevailing soil type making up the perimeter bluffs is described as sand and gravel that meet the OSHA definition for Type C. Some soils meet the Type B description, but they are not consistent. Therefore, the bluffs should be designed for minimum slopes of 1.5h:1v for safety and stability.

Construction Considerations

Because of the presence of undocumented fill on the property, extra caution should be exercised during construction. All poor soil/fills should be stripped from structural and engineered fill areas prior to any construction activities. Additional effort should also be taken to identify the former UST cavities, which were likely backfilled with soils that are not suitable for the support of engineered fill and structural elements. The exposed subgrade soils and all engineered fills should be observed, tested, and documented by a representative of the geotechnical engineer. Large structural areas, such as building footprints and beneath engineered fill and pavements, should be proof-rolled to identify low-strength or disturbed areas that need to be removed or improved.

Footing excavations and all engineered fill subgrade soils should be evaluated to confirm the bearing materials are consistent with those identified in this report and anticipated by the geotechnical and structural engineers. If unanticipated conditions are encountered, the geotechnical and structural engineers should be notified immediately. All footing pads must bear upon suitable native soils or engineered fill soils that have been confirmed in the field by a representative of the geotechnical engineer. Where unsuitable bearing soils, such as organic, disturbed, wet, frozen, or low-strength (less than the design bearing capacity) soils are encountered, the excavation should be extended to competent bearing soil. If extended, the footing pads can be constructed at the base of the excavations, or the excavations can be backfilled with clean, crushed stone or lean concrete.

Buried structural elements from past developments exist. Therefore, efforts should be taken during site grading to identify all existing structural elements and undocumented fills. Existing foundations should be removed to a depth of at least 4 feet below proposed foundations. Existing concrete slabs below a depth of 4 feet should be removed or broken into minimum 1-foot pieces to avoid water pooling. Utilities may also exist that could require abandonment.

It is unlikely that excavations will encounter groundwater. However, if any do or if perched water is encountered, filtered sump pumps and drawing water from sump pits should be adequate to remove water that collects in excavations. Excavated sump pits should be lined with a geotextile and filled with open-graded, free-draining aggregate.

Surface water should not be allowed to be collected in excavations or on prepared subgrades during or after construction. Areas should be sloped to facilitate removal of

collected surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of structures and within pavement areas.

Excavation walls may need to be sloped or braced for stability and safety reasons. The Owner and Contractor should be aware of, and become familiar with, applicable local, state, and federal safety regulations, including current OSHA Excavation and Trench Safety Standards. Construction-site safety generally is the responsibility of the Contractor, who should also be responsible for the means, methods, and sequencing of construction operations.

The Contractor should be aware that slope height, slope inclination, or excavation depths should in no case exceed those specified in local, state, or federal safety regulations, (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926), or successor regulations. The on-site soils are generally considered Type C soils when applying the OSHA regulations. Such regulations are strictly enforced, and if they are not followed, the Owner, Contractor, and/or earthwork Subcontractor(s) could be liable for substantial penalties.

General Qualifications

The services provided by GeoTest on this project were performed with the degree of skill and care typically performed by other members of the geotechnical engineering profession, practicing in this locale, at this time. No other warranty, expressed or implied, is given.

We appreciate the opportunity to provide geotechnical engineering services for this project. If you have any questions, or require any further assistance, please feel free to contact us.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael D. Frede".

Michael D. Frede, P.E.
Technical Director/Senior Engineer



Appendix A

Figure 1 – Site Location Diagram

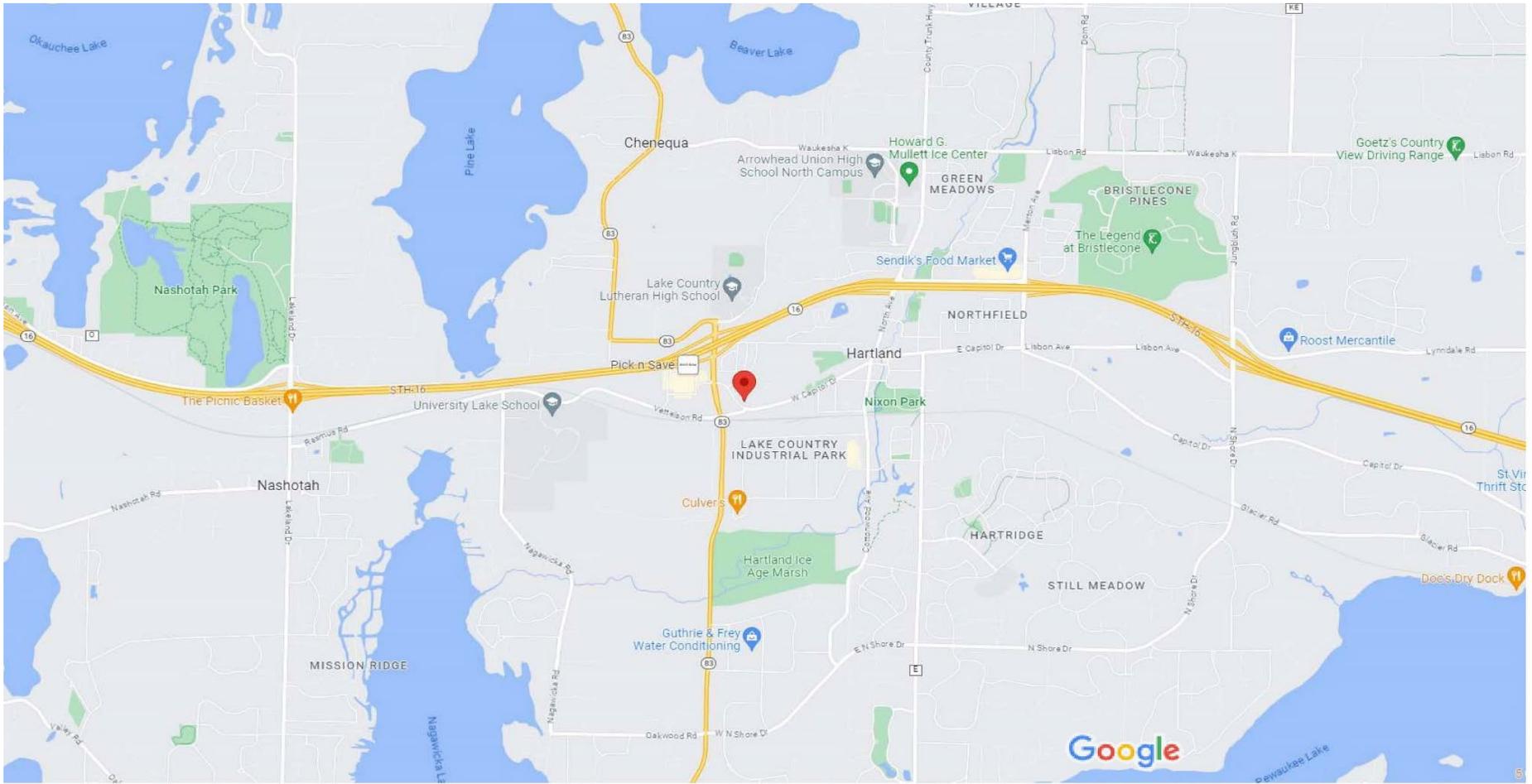
Figure 2 – Property Boundary Diagram

Figure 3 – Proposed Development Diagram

Figure 4 – Geotechnical Areas of Interest Diagram

Figure 5 – Sampling Location Diagram





Map data ©2023 Google 2000 ft



Project Name: Hartland Quarry Apartments
Project Location: 700/701 W. Capitol Drive
Hartland, Wisconsin
Waukesha County

Project No.: 7708
Date: 4/29/23
Drawn By: MDF
Scale: NTS

FIGURE 1
Site Location
Diagram



Legend

- Municipal Boundary_2K
- Parcel_Dimension_2K
- Note_Text_2K
- Lots_2K
 - Lot
 - Unit
 - General Common Element
 - Or lot
- Simultaneous Conveyance
 - Assessor Plat
 - CS#
 - Condominium
 - Subdivision
- Cartline_2K
 - EA-Easement_Line
 - PL-DA
 - PL-Excluded_Tk_Line
 - PL-Meandere_Line
 - PL-Note
 - PL-Tk
 - PL-Tk_Line
 - <all other utilities>
- Railroad_2K



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Notes:
Printed: 2/14/2023



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 Hartland, Wisconsin
 Waukesha County

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Date: 4/29/23
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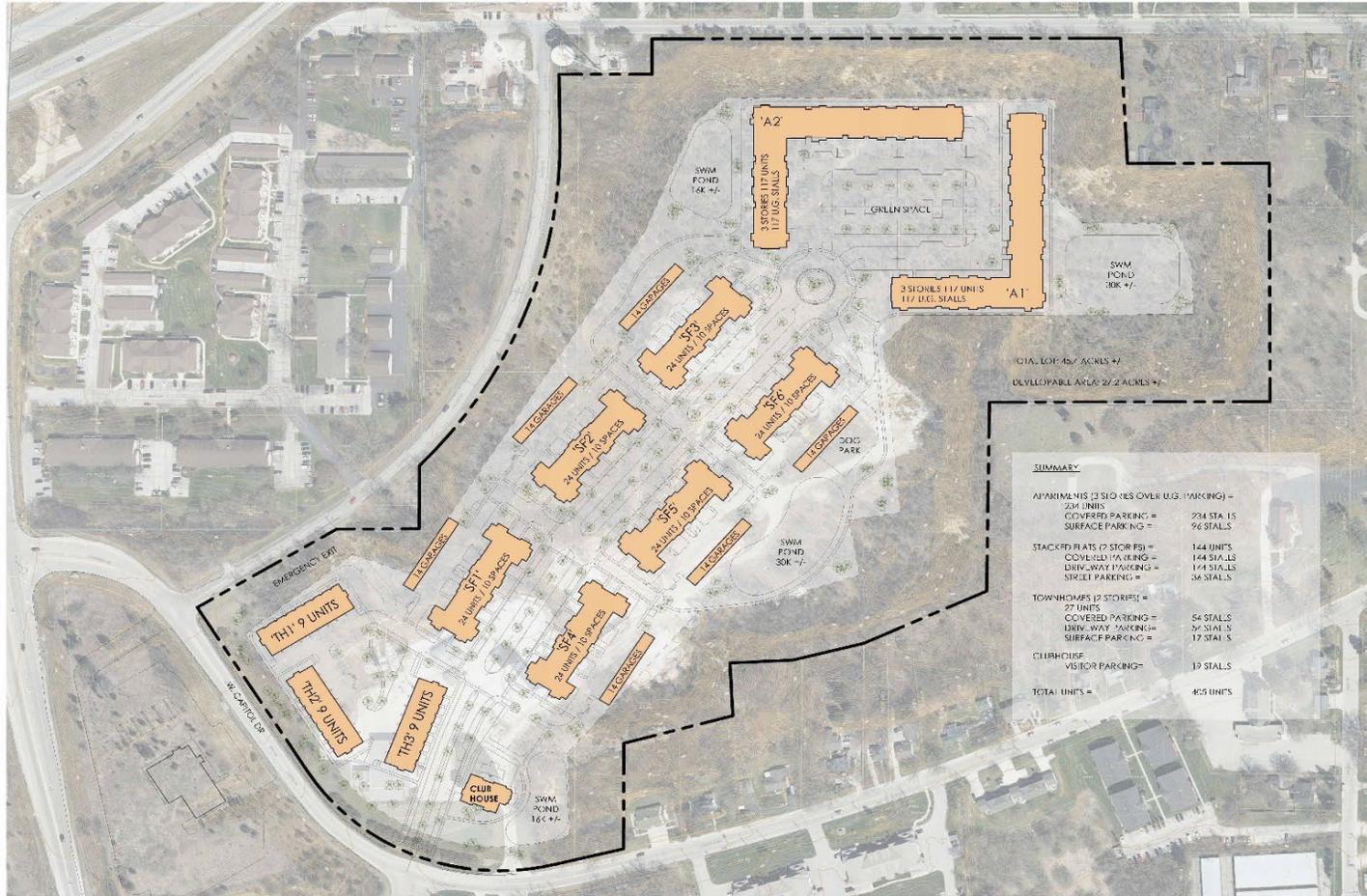
FIGURE 2
Property Boundary
Diagram



JLA
ARCHITECTS
MADISON | MILWAUKEE | DENVER
JLA-AP.COM

JLA PROJECT NUMBER: 22-013

HARTLAND QUARRY APARTMENTS
Plan Commission Submittal



SUMMARY

APARTMENTS (2 STORIES OVER U.S. PARKING) =	234 UNITS
COVERED PARKING =	234 STALLS
SURFACE PARKING =	96 STALLS
STACKED PLATS (2 STORIES) =	144 UNITS
COVERED PARKING =	144 STALLS
DRIVEWAY PARKING =	174 STALLS
STREET PARKING =	36 STALLS
TOWNHOMES (2 STORIES) =	27 UNITS
COVERED PARKING =	54 STALLS
DRIVEWAY PARKING =	59 STALLS
SURFACE PARKING =	17 STALLS
CLUBHOUSE VISITOR PARKING =	13 STALLS
TOTAL UNITS =	465 UNITS

ARCHITECTURAL SITE PLAN
1" = 100'

PROGRESS DOCUMENTS
These documents reflect progress and in final form may be subject to change, including modifications. Use at your own risk. Code values shown are for informational purposes only and should not be used for final bidding or construction without review.

DATE OF ISSUE	04/11/2022
REVISION SCHEDULE	N/A

ARCHITECTURAL SITE LAYOUT PLAN

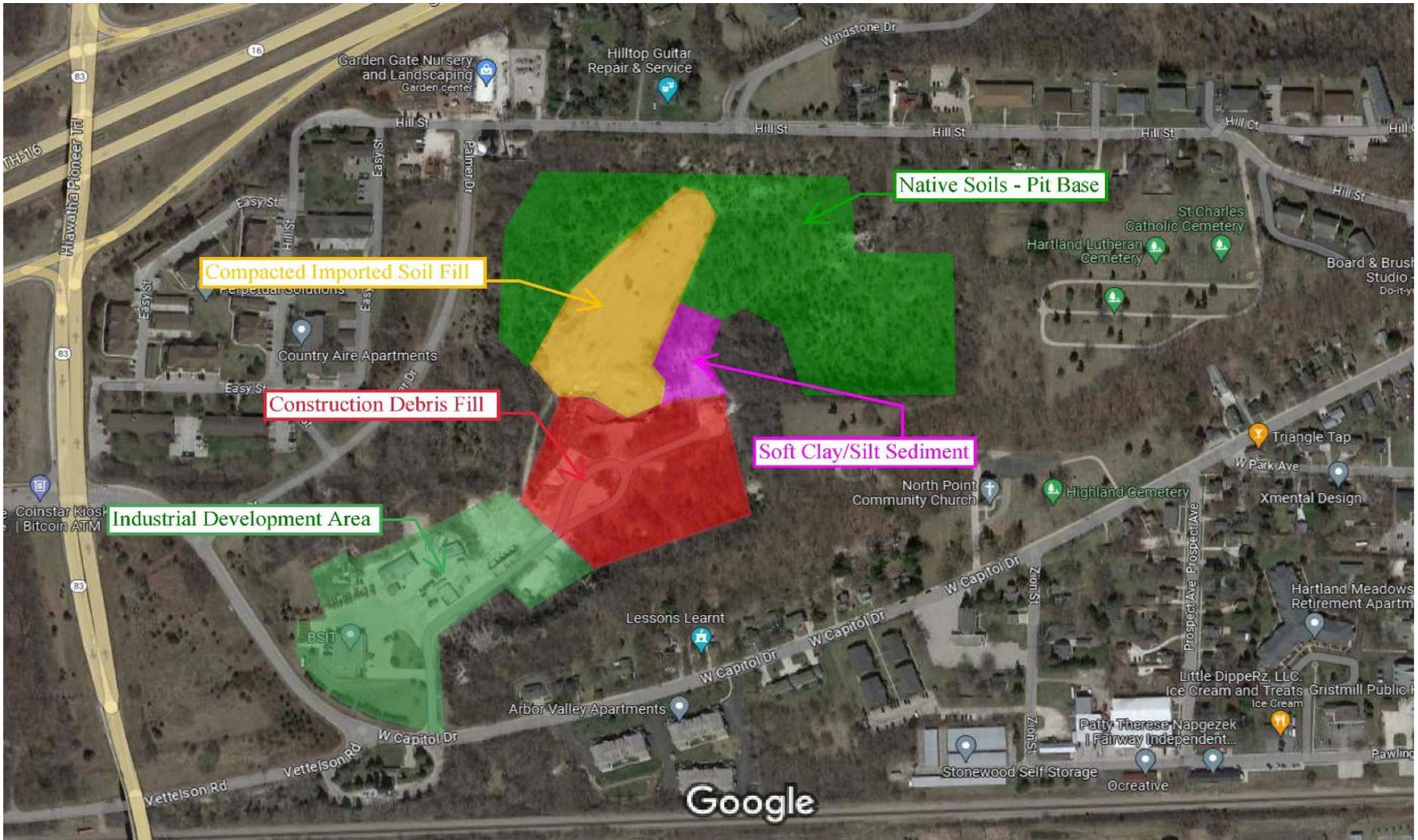
ASP-100



Project Name: Hartland Quarry Apartments
Project Location: 700/701 W. Capitol Drive
Hartland, Wisconsin
Waukesha County

Project No.: 7708
Date: 4/29/23
Drawn By: MDF
Scale: NTS

FIGURE 3
Proposed
Development
Diagram



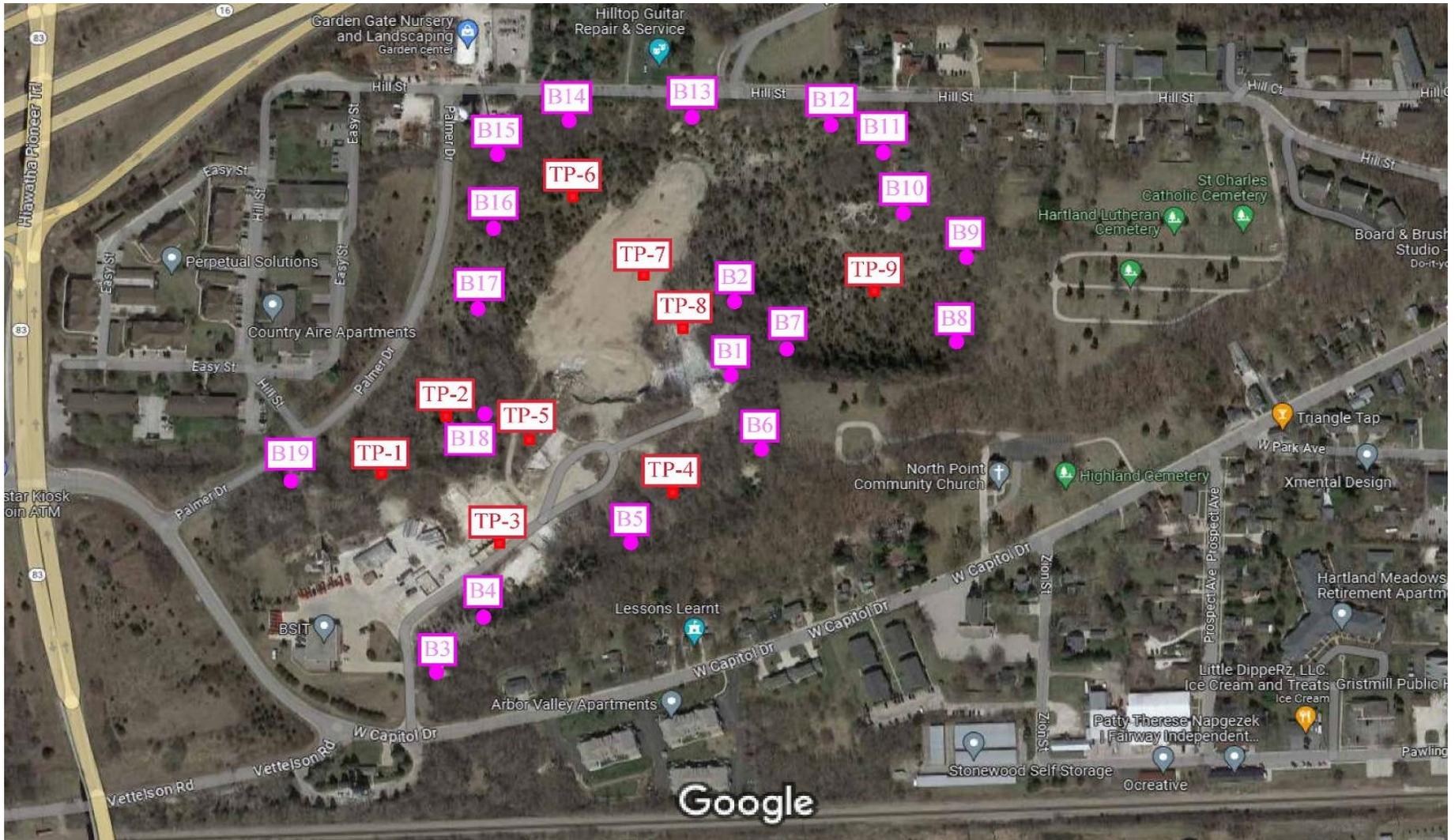
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Project Name: Hartland Quarry Apartments
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Hartland, Wisconsin
Waukesha County

Project No.: 7708
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Drawn By: MDF
Scale: NTS

FIGURE 4
Geotechnical Areas
of Interest Diagram



- Test Pit Locations
- Bluff Samples

Imagery ©2023 CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA/FPAC/GEO, Map data ©2023



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Project Location: 700/701 W. Capitol Drive
Hartland, Wisconsin
Waukesha County

Project No.: 7708
Date: 4/29/23
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Scale: NTS

FIGURE 5
Sampling Location
Diagram



Appendix B

Well Logs

- 8KM754_WCR
- 8KM755_WCR
- 8KM756_WCR
- 8NM185_WCR
- 8NN038_WCR
- IJ288_WCR

Drake Environmental Geologic Information

- Diagrams
- Boring Logs

Gestra Laboratory Reports

- Proctor Analysis (D1557)
- Field Density Testing

Walbec Test Pit Survey Diagrams

- Test Pits 1 through 5
- Test Pits 6 through 9



WELL CONSTRUCTOR'S REPORT

WISCONSIN STATE BOARD OF HEALTH

Wel 6

1. COUNTY Waushara CHECK ONE Town Village City NAME DeLafield

2. LOCATION (Number and Street or 1/4 section, section, township and range. Also give subdivision name, lot and block numbers when available) N 1/4 Sec 3 T 7 N R 18 E. RECEIVED

3. OWNER AT TIME OF DRILLING Robert Steinman JUN 24 1966

4. OWNER'S COMPLETE MAIL ADDRESS Hill St Hartland Wisc

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER	FLOOR DRAIN	FOUNDATION DRAIN	LINE WATER DRAIN
	C. I.	TILE	C. I.	TILE
			SEWER CONNECTED	INDEPENDENT
			C. I.	TILE

CLEAR WATER DRAIN	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
C. I.	TILE							
			60	75				

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for: Home Service Station

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6"	Surface	268			

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand & gravel Brown	Surface	120
Gray sand & gravel	120	170
Clay & sand	170	233
Sand & gravel	233	268

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6"	standard steel	Surface	268

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
	Surface	



11. MISCELLANEOUS DATA

Yield test: 12 Hrs. at 12 GPM

Depth from surface to normal water level 120 ft.

Depth to water level when pumping 130 ft.

Well construction completed on May 11 1966

Well is terminated 8 inches above below final grade

Well disinfected upon completion Yes No

Well sealed watertight upon completion Yes No

Water sample sent to Madison laboratory on: May 11 1966

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumphouses, access pits, etc., should be given on reverse side.

SIGNATURE [Signature] Registered Well Driller COMPLETE MAIL ADDRESS Hartland Wisc

Please do not write in space below

COLIFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS
				plot 752104

1. COUNTY Waushara CHECK ONE Town Village City NAME Delafield

2. LOCATION (Number and Street or 1/4 section, section, township and range. Also give subdivision name, lot and block numbers when available.)
Hartland HY 16 & Hill St T1N R18 E NW 1/4 Sec 3

3. OWNER AT TIME OF DRILLING
Bob Steinman

4. OWNER'S COMPLETE MAIL ADDRESS
Hartland Wis

RECEIVED

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER	FLOOR DRAIN	FOUNDATION DRAIN	WASTE WATER DRAIN
C. I.	TILE	C. I.	SEWER CONNECTED	INDEPENDENT
<u>10</u>				<u>11</u>

CLEAR WATER DRAIN	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK
C. I.	TILE							SECRET
	<u>60</u>		<u>70</u>					ENCLOSURE

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for:
Service Station

7. DRILLHOLE						10. FORMATIONS			
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)	
<u>6</u>	Surface	<u>268</u>					Surface		
						<u>Sand & gravel</u>	-	<u>120</u>	

8. CASING, LINER, CURBING, AND SCREEN					
Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)	Kind	To (ft.)
<u>6</u>	<u>Standard steel</u>	Surface	<u>268</u>	<u>Down sand & gravel</u>	<u>120</u>
				<u>Gray sand & gravel</u>	<u>140</u>
				<u>Gray clay & sand</u>	<u>170</u>
				<u>Brown sand</u>	<u>185</u>
				<u>Gray sand & clay</u>	<u>225</u>
				<u>Brown sand & gravel</u>	<u>233</u>

9. GROUT OR OTHER SEALING MATERIAL		
Kind	From (ft.)	To (ft.)
	Surface	



11. MISCELLANEOUS DATA

Yield test: 6 Hrs. at 20 GPM

Well construction completed on April 13 1966

Well is terminated 6 inches above below final grade

Depth from surface to normal water level 104 ft. Well disinfected upon completion Yes No

Depth to water level when pumping 120 ft. Well sealed watertight upon completion Yes No

Water sample sent to Madison laboratory on: April 13 1966

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumphouses, access pits, etc., should be given on reverse side.

SIGNATURE [Signature] Registered Well Driller COMPLETE MAIL ADDRESS Hartland Wis

Please do not write in space below

COLIFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS
				<u>plot 762103</u>

NW, Sec 3 T7N R18E

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH
See Instructions on Reverse Side

1. County Waubesa Town Village City Hartland
Check one and give name

2. Location SW 1/4 NW 1/4 Sec 3 T7N R18E
Name of street and number of premise or Section, Town and Range numbers

3. Owner or Agent Hartland Washed Sand & Gravel
Name of individual, partnership or firm

4. Mail Address Hartland
Complete address required

5. From well to nearest: Building 10 ft; sewer ft; drain ft; septic tank ft;
dry well or filter bed ft; abandoned well ft.

6. Well is intended to supply water for: Office

7. DRILLHOLE: Table with columns for Dia. (in.), From (ft.), To (ft.)

8. CASING AND LINER PIPE OR CURBING: Table with columns for Dia. (in.), Kind and Weight, From (ft.), To (ft.)

9. GROUT: Table with columns for Kind, From (ft.), To (ft.)

11. MISCELLANEOUS DATA:
Yield test: 3 Hrs. at 10 GPM.
Depth from surface to water-level: 55 ft.
Water-level when pumping: 58 ft.
Water sample was sent to the state laboratory at:
Madison on 19

10. FORMATIONS: Table with columns for Kind, From (ft.), To (ft.)
Includes 'RECEIVED' stamp dated NOV 2 1950

Construction of the well was completed on: Jan 6 1950

The well is terminated inches
above, below the permanent ground surface.

Was the well disinfected upon completion?
Yes No

Was the well sealed watertight upon completion?
Yes No

Signature H. A. BUTLER
WELL CONTRACTOR
Registered Well Driller DELAFIELD, WIS.
Please do not write in space below Complete Mail Address

Rec'd No.
Ans'd
Interpretation
Barcode: W K 3 5 6 4 9

10 ml 10 ml 10 ml 10 ml 10 ml
Gas-24 hrs.
48 hrs.
Confirm
B. Coli
Examiner

1. COUNTY Waukesha CHECK ONE Town Village City NAME Delafield

2. LOCATION (Number and Street or 1/4 section, section, township and range. Also give subdivision name, lot and block numbers when available.)
 SW, NW, NW 1/4 Section 3 T 7 N R 18 E PER APPROVAL LETTER Sw, NW, NW, Sec 3

3. OWNER AT TIME OF DRILLING Hegas Construction Co. (W.F. Hegas + Linda D. Hegas, Owners)

4. OWNER'S COMPLETE MAIL ADDRESS Route #1, Box #63, Delafield, Wis

5. Distance in feet from well to nearest: BUILDING SANITARY SEWER FLOOR DRAIN FOUNDATION DRAIN WASTE WATER DRAIN
 (Record answer in appropriate block) 18 ✓ ✓ 45 ✓ ✓ ✓ ✓

CLEAR WATER DRAIN SEPTIC TANK PRIVY SEEPAGE PIT ABSORPTION FIELD BARN SILO ABANDONED WELL SINK HOLE
 C. I. TILE 306 ✓ ✓ 330 ✓ ✓

6. OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)
None Well #3

7. Well is intended to supply water for: 2 Apartment Houses Misc #26

9. DRILLHOLE				10. FORMATIONS				
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
10	Surface	20				Clay top soil	Surface	8
6	20	120				Gravel	8	104

8. CASING, LINER, CURBING, AND SCREEN			
Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
10	ASTM-A53 Grade B	Surface	20
6	ASTM-A53 Grade B 1.280 P/E welded jts	20	106
6	Silica Brass screen	106	120

7. GROUT OR OTHER SEALING MATERIAL			
Kind	From (ft.)	To (ft.)	
Cement slurry	Surface	20	

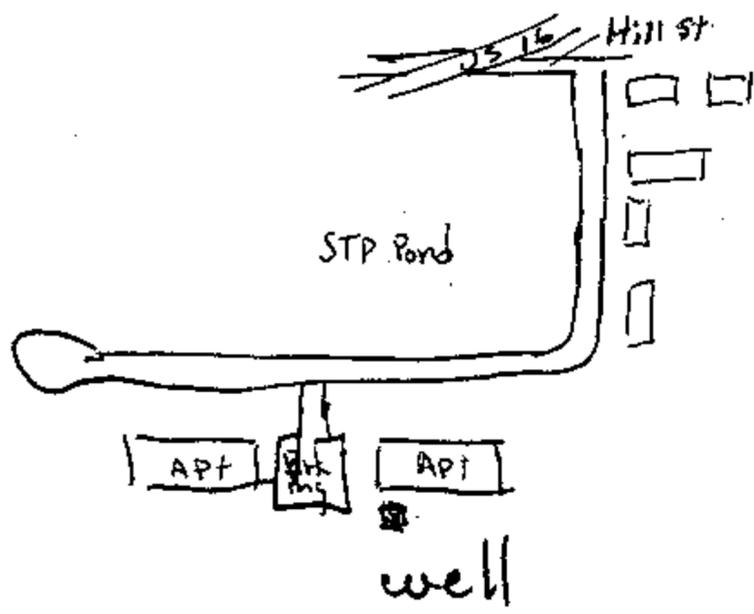
11. MISCELLANEOUS DATA
 Yield test: 24 Hrs. at 60 GPM Well is terminated 20 inches above below final grade
 Depth from surface to normal water level 87 ft. Well disinfected upon completion Yes No
 Depth to water level when pumping 88'-6" ft. Well sealed watertight upon completion Yes No

Water sample sent to Madison laboratory on: 10/26 1968

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE Linda D. Hegas COMPLETE MAIL ADDRESS Rte. 1, Waukesha, Wis.
Fred. Bollmann Registered Well Driller

COLIFORM TEST RESULT 10 Capacity Well. Approved 12-6-68 GAS - 24 HRS. SEE OTHER SIDE GAS - 48 HRS. plot 702105 CONFIRMED 10-8-68 REMARKS As: M. E. Ostrom



8

A/E 934
 D > 520
 < 814
 W - 87

 847 + 10/68

 775

 159

WELL CONSTRUCTOR'S REPORT
 Wel-6.

WHITE COPY - DIVISION'S COPY
 GREEN COPY - DRILLER'S COPY
 YELLOW COPY - OWNER'S COPY

STATE OF WISCONSIN
 DEPARTMENT OF NATURAL RESOURCES
 Box 450
 Madison, Wisconsin 53701

1. COUNTY: WAUKESHA CHECK ONE: Town Village City NAME: MERTON

2. LOCATION (Number and Street or 1/4 section, section, township and range. Also give subdivision name, lot and block numbers when available.)
N. 48 W. 30756 HILL ST. TOWN OF MERTON. T8N R18E

3. OWNER AT TIME OF DRILLING: WAGEN REALTY CO. SE, SE, SW, SW, Sec. 34

4. OWNER'S COMPLETE MAIL ADDRESS: 318 LAKE RD, OCONOMOWOC, WIS.

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER		FLOOR DRAIN		FOUNDATION DRAIN		WASTE WATER DRAIN	
	C. I.	TILE	C. I.	TILE	SEWER CONNECTED	INDEPENDENT	C. I.	TILE
8	40	-	60	-	-	-	45	-

CLEAR WATER DRAIN	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
-	-	70	-	95	-	-	-	-

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for: FURNITURE STORE

7. DRILLHOLE						10. FORMATIONS			
Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)	
6	Surface		UNKNOWN			UNKNOWN	Surface	126	
	Redrill					SAND	126	160	

8. CASING, LINER, CURBING, AND SCREEN			
Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	NEW BLK. STEEL	Surface	134
	T&C . 0.280		
6	UNKNOWN	134	260

9. GROUT OR OTHER SEALING MATERIAL		
Kind	From (ft.)	To (ft.)
UNKNOWN	Surface	134



11. MISCELLANEOUS DATA

Yield test: 8 Hrs. at 10 GPM

Well construction completed on Aug 29 1974

Well is terminated 8 inches above below final grade

Depth from surface to normal water level 135 ft. Well disinfected upon completion Yes No

Depth to water level when pumping 135 ft. Well sealed watertight upon completion Yes No

Water sample sent to Madison, WIS. laboratory on: Sept 16 1974

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumphrooms, access pits, etc., should be given on reverse side.

SIGNATURE: Dennis Hartman Registered Well Driller COMPLETE MAIL ADDRESS: 5100 N. 56 ST. MILWAUKEE, WIS.

Please do not write in space below

COLIFORM TEST RESULT	GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS
See letter	driller's	file	9/29/74	plot 782049

SEP 17 1974 OCT 2 1974

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

NOTE
WHITE COPY - DIVISION'S COPY
GREEN COPY - DRILLER'S COPY
YELLOW COPY - OWNER'S COPY

1. COUNTY WAUKESHA CHECK ONE Town Village City NAME MERTON

2. LOCATION - 1/4 Section Section Township Range
SE, SE, SW SW 34 8N 18E
OR - Grid or street no. Street name
N. 48 W 30756 HILL ST
AND - If available subdivision name, lot & block no.
SE, SE, SW, SW Sec 34

3. OWNER AT TIME OF DRILLING
WASEN REALTY CO.
ADDRESS
318 LAKE RD.
POST OFFICE
DEONOMOUC, WIS

4. Distance in feet from well to nearest:
(Record answer in appropriate block)

BUILDING	SANITARY SEWER	FLOOR DRAIN	FOUNDATION DRAIN	WASTE WATER DRAIN
C.I.	C.I.	C.I.	SEWER CONNECTED	C.I.
TILE	TILE	TILE	INDEPENDENT	TILE
<u>8</u>	<u>40</u>	<u>60</u>	<u>-</u>	<u>45</u>

CLEAR WATER DRAIN	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILLO	ABANDONED WELL	SINK HOLE
C.I.	TILE							
<u>-</u>	<u>-</u>	<u>70</u>	<u>-</u>	<u>95</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

5. Well is intended to supply water for: STORE FURNITURE

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
	Surface	<u>REDRILL</u>			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
<u>6</u>	<u>UNKNOWN</u>	Surface	<u>126</u>
<u>6" New, Steel, BLK, TFC</u>	<u>0.280</u>	<u>126</u>	<u>260</u>

9. FORMATIONS

Kind	From (ft.)	To (ft.)
<u>UNKNOWN</u>	Surface	<u>126</u>
<u>SAND</u>	<u>126</u>	<u>160</u>
<u>HARD PAW</u>	<u>160</u>	<u>205</u>
<u>GRAVEL</u>	<u>205</u>	<u>260</u>

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
<u>X</u>	Surface	<u>X</u>

10. TYPE OF DRILLING MACHINE USED

<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Direct Rotary	<input type="checkbox"/> Reverse Rotary
<input type="checkbox"/> Rotary - air w/drilling mud	<input type="checkbox"/> Rotary - hammer with drilling mud & air	<input type="checkbox"/> Jetting with Air <input type="checkbox"/> Water

Well construction completed on aug 29 1974

11. MISCELLANEOUS DATA

Yield test: 8 Hrs. at 10 GPM

Depth from surface to normal water level 135 ft.

Depth to water level when pumping 135 ft.

Well is terminated 8 inches above below final grade

Well disinfected upon completion Yes No

Well sealed watertight upon completion Yes No

Water sample sent to Madison, Wis laboratory on: Sept 16 1974

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE Henry Hartman Registered Well Driller COMPLETE MAIL ADDRESS 5100 N. 56 St. Milwaukee, Wis

COLIFORM TEST RESULT WK 31760-2 REV. 3-71

GAS - 24 HRS.	GAS - 48 HRS.	CONFIRMED	REMARKS
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Well Construction Report WISCONSIN UNIQUE WELL NUMBER				IJ288		Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707				Form 3300-077A			
Property Owner GARDEN GATE NURSERY					Phone #		1. Well Location				Fire # (if avail.)		
Mailing Address N48 W30756 HILL ST							Town of MERTON						
City HARTLAND					State WI	Zip Code 53029		Street Address or Road Name and Number N48 W30756 HILL ST					
County Waukesha		Co. Permit #	Notification #		Completed 06-22-1995		Subdivision Name			Lot #	Block #		
Well Constructor (Business Name) MICHAEL HARTMAN				Lic. # 436	Facility ID # (Public Wells)		Latitude / Longitude in Decimal Degree (DD) 43.1059 °N -88.3586 °W			Method Code GCD013			
Address W82 N28280 MARSHALL HARTLAND WI 53029				Well Plan Approval #		SW	SW	Section 34	Township 8 N	Range 18 E			
				Approval Date (mm-dd-yyyy)									
Hicap Permanent Well #		Common Well #		Specific Capacity 0.8		2. Well Type Replacement							
						of previous unique well #					constructed in		
						Reason for replaced or reconstructed well ? OUT OF WATER							
3. Well serves 1 # of NURSERY				Hicap Well ? No		Construction Type Drilled							
Non-community				Hicap Property ? No									
Heat Exchange ___ # of drillholes				Hicap Potable ?									
4. Potential Contamination Sources - ON REVERSE SIDE													
5. Drillhole Dimensions and Construction Method						8. Geology							
Dia. (in.)	From (ft.)	To (ft.)	Upper Enlarged Drillhole			Lower Open Bedrock			Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc...		From (ft.)	To (ft.)
6	Surface	278	Rotary - Mud Circulation						C	CLAY		Surface	10
			Rotary - Air						Y	SAND @ GRAVEL		10	50
			Rotary - Air & Foam						P	HARDPAN		50	90
			Drill-Through Casing Hammer						S	SAND		90	125
			Reverse Rotary						P	HARDPAN		125	145
			Cable-tool Bit ___in. dia...						Y	SAND @ GRAVEL		145	170
			Dual Rotary						P	HARDPAN		170	250
			Temp. Outer Casing ___in. dia						Y	SAND @ GRAVEL		250	278
			Removed? ___depth ft. (If NO explain on back side)										
6. Casing, Liner, Screen						9. Static Water Level			11. Well Is				
Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly			From (ft.)	To (ft.)	120 ft. below ground surface			18 in. above grade				
6	0 280 A 53 GRB SAWHILL STEEL WELDED			Surface	278	10. Pump Test			Developed ? Yes				
Dia. (in.)	Screen type, material & slot size			From (ft.)	To (ft.)	Pumping level 180 ft. below surface			Disinfected ? Yes				
						Pumping at 50 GP M for 4 Hrs.			Capped ? Yes				
						Pumping Method ?							
7. Grout or Other Sealing Material						12. Notified Owner of need to fill & seal ?							
Method MOUNDED													
Kind of Sealing Material		From (ft.)	To (ft.)	# Sacks Cement		Filled & Sealed Well(s) as needed? No							
CRUMBLES DRILL		Surface	0			PUMP MAN TO DO							
						13. Constructor / Supervisory Driller		Lic #	Date Signed				
						MH			06-26-1995				
						Drill Rig Operator		Lic or Reg #	Date Signed				
						MA							

4a. Potential Contamination SourcesIs the well located in floodplain ? No

Type	Qualifier	Distance	Type	Qualifier	Distance
Building Overhang		9	Collector Sewer - San or Storm		90
			Sewer - Building Sanitary		40

Comment:

Water Quality Text:

Water Quantity Text:

Difficulty Text:

Created On: 10-10-1995

Created by: HFRC LOAD

Updated On: 07-12-2019

Updated by: PARCEL_MATCH

HILL STREET

U.S. HWY 16

PALMER DRIVE

WEST

LAFARGE - WISCONSIN DIVISION
PROPERTY

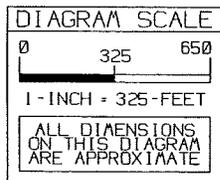
PROPERTY
BOUNDARY

INVESTIGATION
AREA

SEE
FIGURE 3

CAPITOL DRIVE

C. A. S. P. & P. RAILROAD



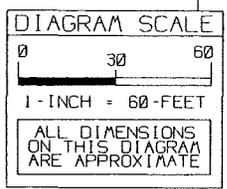
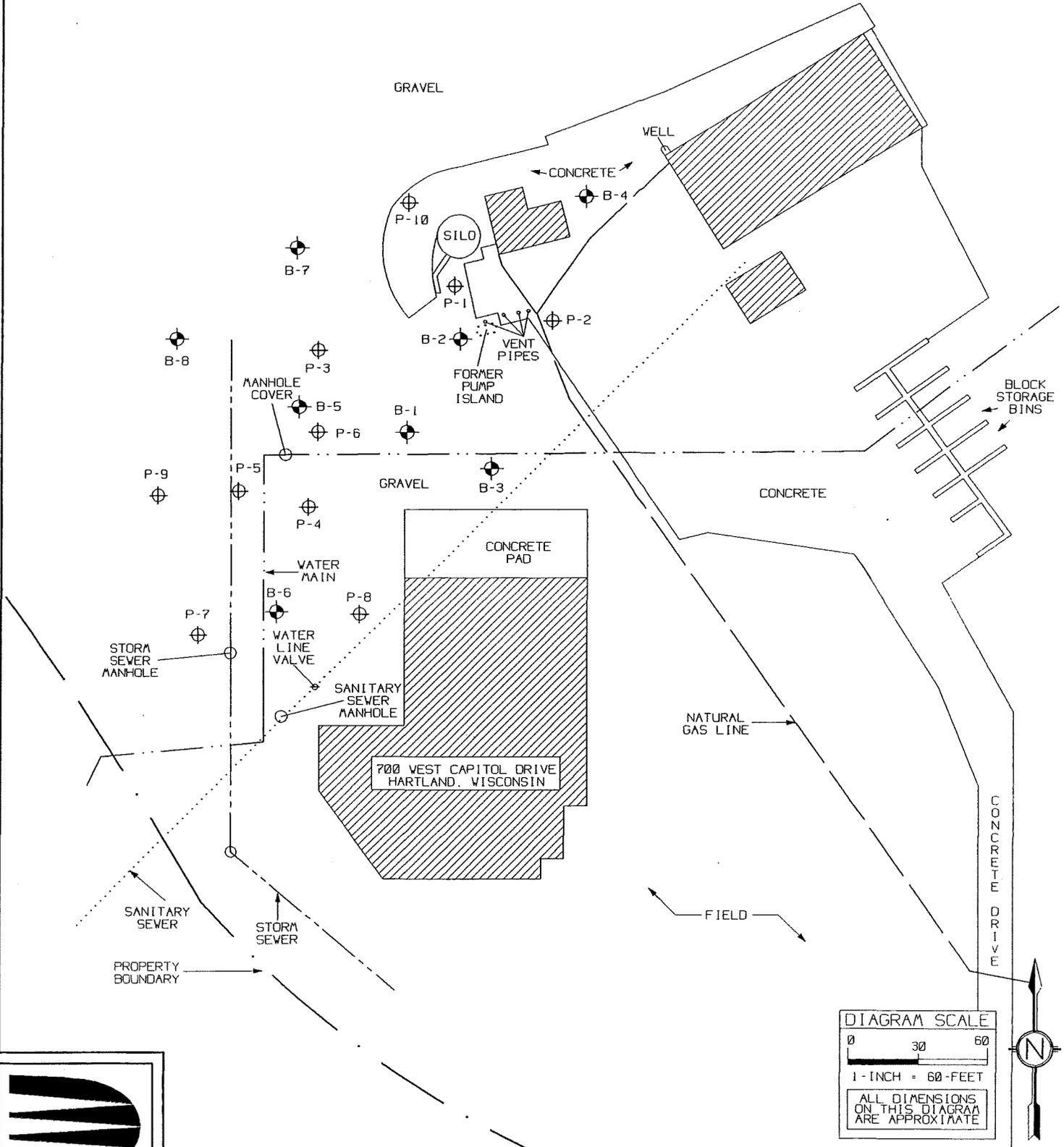
LAFARGE - HARTLAND
REMEDIAL INVESTIGATION

PROJECT NO. J98109	PA DWF
DRAWN BY JMM DATE: 11/18/98	
CHKD BY <i>DWF</i> DATE: <i>12-2-98</i>	
APRVD BY <i>MT</i>	DATE: <i>7-9-99</i>

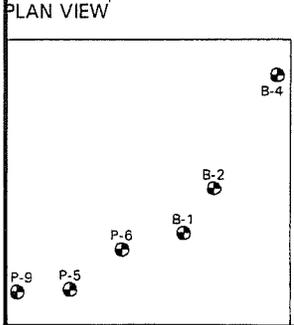
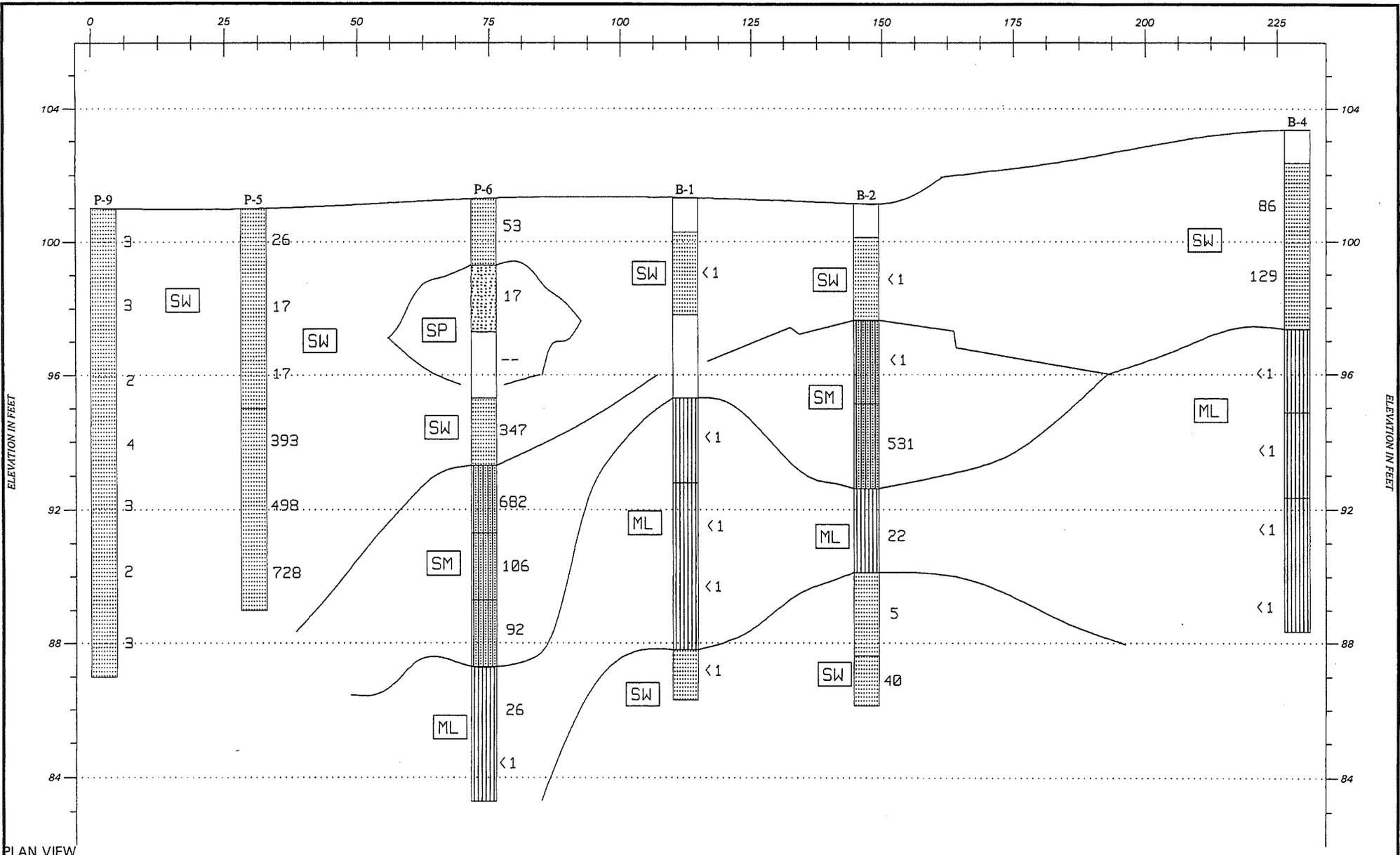
LOCATION
DIAGRAM

FIGURE
2

⊕ = PROBEHOLE LOCATION
 ⊙ = BORING LOCATION

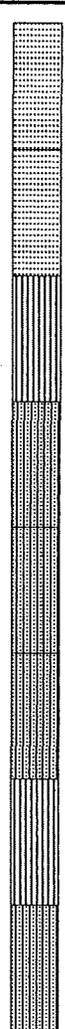


LAFARGE - HARTLAND REMEDIAL INVESTIGATION	PROJECT NO. J98109 PA DVF	PROBEOHOLE AND BORING LOCATIONS DIAGRAM	FIGURE 4
	DRAWN BY JAM DATE: 07/30/99		
	CHKD BY <i>DVF</i> DATE 7-21-99		
	APRVD BY <i>TLO</i> DATE 9-21-99		



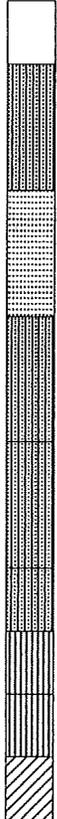
DRAKE ENVIRONMENTAL, INC.		
GEOLOGICAL CROSS SECTION		
HORIZONTAL SCALE: 1" = (proportional)	FIELD TECHNICIAN	DATE DRAWN
VERTICAL SCALE: 1" = 4'	TJO	8/22/1999
LAFARGE - HARTLAND		
PROJECT NUMBER: J98109		FIGURE NUMBER
		8

PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWP	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-1
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 25 FEET NE OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					MEDIUM TO COARSE SAND WITH SILTY FINE SAND AND FINE TO COARSE GRAVEL, TRACE ROOTS - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	SW	<1	
1	1	PR	--	--				
2					MEDIUM TO COARSE SAND, WITH FINE SAND; FEW FINE TO COARSE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL), FINE SANDY SILT TO SILTY CLAY; FEW MEDIUM TO COARSE SAND, DAMP TO MOIST (POSSIBLE FILL)	SW	<1	
3	2	PR	--	--				
4					SILT, TRACE COARSE SAND TO FINE GRAVEL - DARK YELLOWISH BROWN (10YR 4/6) - DAMP (POSSIBLE FILL)	ML	17	
5	3	PR	--	--				
6					SILTY FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL - GRAYISH BROWN (10YR 5/2) - DAMP, PETROLEUM ODOR (POSSIBLE FILL)	SM	*2260	
7	4	PR	--	--				
8					SILTY FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE FINE GRAVEL - GRAYISH BROWN (10YR 5/2) - DAMP TO MOIST, PETROLEUM ODOR (POSSIBLE FILL)	SM	1,073	
9	5	PR	--	--				
10					SILTY FINE SAND TO FINE SANDY SILT, TRACE COARSE SAND - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET, SLIGHT ODOR	SM	70	
11	6	PR	--	--				
12					FINE SANDY SILT, TRACE COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - WET	ML	17	
13	7	PR	--	--				
14					SILTY FINE SAND, TRACE MEDIUM AND COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST, PETROLEUM ODOR	SM	*365	
15	8	PR	--	--				
16					PROBEHOLE TERMINATED AT 16.0 FEET			
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-25-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX 10' DURING DRILLING		

PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-2
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 30 FEET EAST OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					8 INCHES CONCRETE			
1					SILTY FINE SAND, FEW MEDIUM TO COARSE SND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - DAMP (FILL)	SM		
2	1	PR	--	--			<1	
3					FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/6) - DAMP (FILL)	SW		
4	2	PR	--	--			<1	
5					SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - PALE BROWN (10YR 6/3) - DAMP (FILL)	SM		
6	3	PR	--	--			<1	
7					SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - PALE BROWN (10YR 6/3) - DAMP (FILL), LITTLE RECOVERY	SM		
8	4	PR	--	--			*<1	
9					SILTY FINE SAND, FINE MEDIUM TO COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - WET, FILL	SM		
10	5	PR	--	--	FINE SANDY SILT, TRACE COARSE SAND - YELLOWISH BROWN (10YR 5/4) - WET	ML	<1	
11					FINE SANDY SILT, TRACE COARSE SAND AND FINE GRAVEL - BROWN (10YR 5/3)	ML		
12	6	PR	--	--	SILTY CLAY, TRACE SILT, TRACE COARSE SAND AND FINE GRAVEL - DARK GRAY (10YR 4/1) - MOIST TO WET	CL	*<1	
13					PROBEHOLE TERMINATED AT 13.0 FEET			
14								
15								
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-25-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX 9' DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-3
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 70 FEET WEST OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					MEDIUM TO COARSE SAND WITH SILTY FINE SAND AND FINE TO COARSE GRAVEL, TRACE ROOTS - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	SW	<1	
1	1	PR	--	--				
2								
3	2	PR	--	--			<1	
4								
5	3	PR	--	--			8	
6					SILTY FINE SAND WITH MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL - GRAY BROWN (10YR 5/2) - WET, PETROLEUM ODOR (FILL)	SM	610	
7	4	PR	--	--				
8								
9	5	PR	--	--			*697	
10					FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL - GRAYISH BROWN (10YR 5/2) - WET, PETROLEUM ODOR (FILL)	SW	610	
11	6	PR	--	--				
12					SILTY FINE SAND, FEW MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE FINE SANDY SILT - YELLOWISH BROWN (10YR 5/4) - WET, PETROLEUM ODOR (FILL)	SM	346	
13	7	PR	--	--				
14					PEA GRAVEL, TRACE SILTY FINE AND MEDIUM SAND - DARK GRAY TO VERY DARK GRAY (10YR 3.5/1) - WET, PETROLEUM ODOR (FILL)	SP	1,192	
15	8	PR	--	--				
16								
17	9	PR	--	--			*433	
18					PROBEHOLE TERMINATED AT 18.0 FEET			
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-25-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX 7' DURING DRILLING		

PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-4
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 100 FEET SW OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1	1	PR	--	--	MEDIUM TO COARSE SAND WITH SILTY FINE SAND AND FINE TO COARSE GRAVEL, TRACE ROOTS - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	SW	70	
2								
3	2	PR	--	--			26	
4								
5	3	PR	--	--			62	
6								
7	4	PR	--	--	FINE SAND WITH MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - GREYISH BROWN (10YR 5/2) - MOIST, PETROLEUM ODOR, WET	SW	*571	
8								
9	5	PR	--	--	SILTY FINE SAND, TRACE COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST, PETROLEUM ODOR (FILL)	SM	465	
10								
11	6	PR	--	--			149	
12								
13	7	PR	--	--	SILTY FINE SAND TO SANDY SILT, TRACE COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST, PETROLEUM ODOR, FILL	SM	*248	
14					PROBEHOLE TERMINATED AT 14.0 FEET			
15								
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.

DRILLING DATE: 1-25-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX. DURING DRILLING		

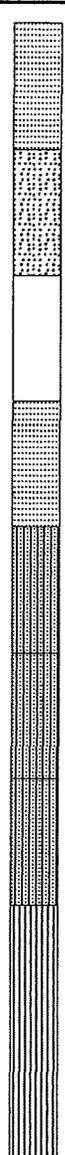


PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-5
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E			LOCATION DESCRIPTION 110 FEET SW OF FORMER UST	

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					MEDIUM TO COARSE SAND WITH SILTY FINE SAND AND FINE TO COARSE GRAVEL, TRACE ROOTS - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	SW	26	
1	1	PR	--	--				
2								
3	2	PR	--	--				
4								
5	3	PR	--	--				
6					MEDIUM TO COARSE SAND, WITH SILTY FINE SAND AND FINE GRAVEL - GRAYISH BROWN (10YR 5/2) - MOIST TO WET, PETROLEUM ODOR (FILL)	SW	*393	
7	4	PR	--	--				
8								
9	5	PR	--	--				
10								
11	6	PR	--	--				
12					PROBEHOLE TERMINATED AT 12.0 FEET			
13								
14								
15								
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-25-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX. DURING DRILLING		

PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-6
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 80 FEET SW OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					MEDIUM TO COARSE SAND WITH SILTY FINE SAND AND FINE TO COARSE GRAVEL, TRACE ROOTS - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	SW	53	
1	1	PR	--	--				
2					FINE GRAVEL, TRACE FINE SAND - YELLOWISH BROWN (10YR 5/4) -DAMP (FILL)	SP	17	
3	2	PR	--	--				
4					NO RECOVERY		--	
5	3	PR	--	--				
6					FINE TO COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET, PETROLEUM ODOR (FILL)	SW	347	
7	4	PR	--	--				
8					SILTY FINE SAND, TRACE MEDIUM AND COARSE SAND - YELLOWISH BROWN (10YR 5/4) - MOIST, PETROLEUM ODOR (FILL)	SM	*682	
9	5	PR	--	--				
10					SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - GRAYISH BROWN (10YR 5/2) - WET, PETROLEUM ODOR (FILL)	SM	106	
11	6	PR	--	--				
12					SILTY FINE SAND, TRACE FINE SANDY SILT, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - GRAYISH BROWN (10YR 5/2) - WET, PETROLEUM ODOR (FILL)	SM	92	
13	7	PR	--	--				
14					FINE SANDY SILT, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - WET	ML	26	
15	8	PR	--	--				
16								
17	9	PR	--	--			*<1	
18					PROBEHOLE TERMINATED AT 18.0 FEET			
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-25-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX 10' DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-7
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 170 FEET SW OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					MEDIUM TO COARSE SAND, WITH SILTY FINE SAND ND FINE TO COARSE GRAVEL, TRACE ROOTS - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	SW	1	
1	1	PR	--	--				
2					FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL)	SW	2	
3	2	PR	--	--				
4								
5	3	PR	--	--			5	
6								
7	4	PR	--	--			*4	
8					FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL, BLACK SILTY SAND LAYER - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL)	SW	3	
9	5	PR	--	--				
10					FINE SILTY SAND, TRACE COARSE SAND AND FINE GRAVEL - LIGHT YELLOWISH BROWN (10YR 6/4) - MOIST (FILL)	SM	5	
11	6	PR	--	--				
12					FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - WET (FILL)	SW	2	
13	7	PR	--	--				
14					PROBEHOLE TERMINATED AT 14.0 FEET			
15								
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-26-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX 12' DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-8
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 130 FEET SW OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1	1	PR	--	--	FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL - DARK YELLOWISH BROWN (10YR 4/4) - MOIST (FILL)	SW	*55	
2								
3	2	PR	--	--	FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL)	SW	8	
4								
5	3	PR	--	--			4	
6								
7	4	PR	--	--	FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL), LITTLE RECOVERY	SW	*4	
8								
9	5	PR	--	--			3	
10								
11	6	PR	--	--	FINE SILTY SAND TO SANDY SILT, TRACE MEDIUM AND COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	SM	2	
12								
13	7	PR	--	--	SILTY FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - WET, FILL	SM	3	
14					PROBEHOLE TERMINATED AT 14.0 FEET			
15								
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-26-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX 11' DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-9
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 150 FEET SW OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - DAMP TO MOIST (FILL)	SW		
1	1	PR	--	--			3	
2								
3	2	PR	--	--			3	
4								
5	3	PR	--	--			2	
6								
7	4	PR	--	--	*4			
8								
9	5	PR	--	--	3			
10								
11	6	PR	--	--	2			
12								
13	7	PR	--	--	3			
14					PROBEHOLE TERMINATED AT 14.0 FEET			
15								
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-26-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX. DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	PROBE NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		P-10
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 65 FEET NW OF FORMER UST		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL - GRAY (10YR 5/1) - WET, CEMENT ODOR (FILL)	SW		
1	1	PR	--	--			351	
2					SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - GRAY (10YR 6/1) - WET, CEMENT ODOR (FILL)	SM		
3	2	PR	--	--			381	
4								
5	3	PR	--	--			483	
6					SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - GRAY (10YR 6/1) - WET, CEMENT AND PETROLEUM ODOR (FILL)	SM		
7	4	PR	--	--			*723	
8					FINE SILTY SAND, FEW MEDIUM TO COARSE SAND AND FINE GRAVEL - VERY DARK GRAYISH BROWN (10YR 3/2) - WET, PETROLEUM ODOR (FILL)	SM		
9	5	PR	--	--			767	
10					FINE TO MEDIUM SILTY SAND, TRACE COARSE SAND - GRAY (10YR 5/1) - WET, PETROLEUM ODOR (FILL)	SM		
11	6	PR	--	--			307	
12								
13	7	PR	--	--			398	
14								
15	8	PR	--	--			*556	
16					PROBEHOLE TERMINATED AT 16.0 FEET			
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 1-26-99	DRILL RIG: Geoprobe Model 5400	NOTES *SUBMITTED FOR LABORATORY ANALYSIS
DRILLED BY: UNDERGROUND POWER CORP.		
BORING DRILLED WITH GEOPROBE 2' INTERVALS		
PROBEHOLE ABANDONED WITH BENTONITE		
GROUND SURFACE AT 0.0 DURING DRILLING		
GROUNDWATER AT APPROX. DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-1
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 75'N, 4'E OF NW CORNER OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1	1	SS	22	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL)	SW	<1	
2								
3								
4	2	SS	--	--	NO RECOVERY		--	
5								
6								
7	3	SS	15	--	FINE SANDY SILT TO SILTY SAND, TRACE MEDIUM SAND, FINE TO MEDIUM GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	ML	*<1	
8								
9	4	SS	33	--	FINE SANDY SILT TO SILTY SAND, TRACE MEDIUM SAND, FINE TO MEDIUM GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL)	ML	<1	
10								
11								
12	5	SS	31	--			<1	
13								
14	6	SS	25	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - MOIST	SW	<1	
15					BOREHOLE TERMINATED AT 15.0 FEET			
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 3-8-99	DRILL RIG: FOREMOST MOBILE	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
BOREHOLE BACKFILLED WITH BENTONITE		
GROUND SURFACE AT 101.30 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-2
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 105'N, 25'E OF NW CRNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1	1	SS	72	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL)	SW	<1	
2								
3								
4	2	SS	19	--	SILTY FINE SAND TO FINE SANDY SILT, TRACE MEDIUM TO COARSE SAND, TRACE COARSE GRAVEL - YELLOWISH BROWN (10YR 5/4) - DAMP (FILL)	SM	<1	
5								
6								
7	3	SS	20	--	SILTY FINE SAND TO FINE SANDY SILT, TRACE MEDIUM TO COARSE SAND, TRACE COARSE GRAVEL - YELLOWISH BROWN (10YR 5/4) - DAMP (FILL), SLIGHT ODOR, VERY LITTLE RECOVERY	SM	531	
8								
9	4	SS	16	--	FINE SANDY SILT, TRACE MEDIUM TO COARSE SAND - YELLOWISH BROWN (10YR 5/4) - MOIST TO WET (FILL)	ML	*22	
10								
11								
12	5	SS	18	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - WET (FILL)	SW	5	
13								
14	6	SS	16	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - WET (FILL), SLIGHT ODOR	SW	*40	
15					BOREHOLE TERMINATED AT 15.0 FEET			
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 3-8-99	DRILL RIG: FOREMOST MOBILE	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON WELL SET AT 15' WITH 10' SCREEN DNR UID #JN379
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
BOREHOLE BACKFILLED WITH BENTONITE		
GROUND SURFACE AT 101.13 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-3
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 48'N, 38'E OF NW CORNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1	1	SS	5	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - WET (FILL)	SW	*108	
2								
3								
4	2	SS	1	--	MEDIUM GRAVEL, WET (FILL)	SP	11	
5								
6								
7	3	SS	1	--			<1	
8								
9	4	SS	21	--	FINE SANDY SILT TO SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - DAMP (FILL)	ML	<1	
10								
11	5	SS	41	--	FINE SANDY SILT TO SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE TO COARSE GRAVEL - YELLOWISH BROWN (10YR 5/4) - WET (FILL)	ML	<1	
12								
13								
14	6	SS	41	--	FINE SAND, TRACE MEDIUM TO COARSE GRAVEL, DAMP (FILL)	SW	<1	
15					BOREHOLE TERMINATED AT 15.0 FEET			
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 3-8-99	DRILL RIG: FOREMOST MOBILE	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON WELL SET AT 15' WITH 10' SCREEN DNR UID #JN378
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
GROUND SURFACE AT 101.06 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-4
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 15' N OF NE CORNER OF SILO BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1								
2	1	SS	47	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL), COARSE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST (FILL), CEMENT ODOR	SW	86	
3								
4	2	SS	27	--			*129	
5								
6								
7	3	SS	34	--	FINE SANDY SILT, TRACE SILTY CLAY, TRACE MEDIUM TO COARSE SAND, TRACE FINE TO MEDIUM GRAVEL - BROWN (10YR 5/3) - DAMP (FILL)	ML	<1	
8								
9	4	SS	9	--	FINE SANDY SILT, TRACE SANDY CLAY, TRACE MEDIUM SAND AND FINE GRAVEL - BROWN (10YR 5/3) - WET	ML	<1	
10								
11								
12	5	SS	14	--	FINE SANDY SILT TO SILTY CLAY, TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL - BROWN (10YR 5/3) - WET	ML	<1	
13								
14	6	SS	21	--			<1	
15					BOREHOLE TERMINATED AT 15.0 FEET			
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 3-8-99	DRILL RIG: FOREMOST MOBILE	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON WELL SET AT 15' WITH 10' SCREEN DNR UID #JN377
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
GROUND SURFACE AT 103.36 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-5
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 75'N, 45'W OF NW CORNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1	1	SS	38	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - DAMP	SW	<1	
2								
3								
4	2	SS	38	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - MOIST	SW	198	
5								
6								
7	3	SS	9	--	FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL (PEA GRAVEL) - YELLOWISH BROWN (10YR 5/4) - MOIST, ODOR	SW	*288	
8								
9	4	SS	3	--	FINE SILTY SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - BROWN (10YR 5/3) - WET (FILL), ODOR	SM	288	
10								
11								
12	5	SS	28	--			*94	
13								
14	6	SS	22	--	NO RECOVERY		--	
15					BOREHOLE TERMINATED AT 15.0 FEET			
16								
17								
18								
19								
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.

DRILLING DATE: 3-8-99	DRILL RIG: FOREMOST MOBILE	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON WELL SET AT 15' WITH 10' SCREEN DNR UID #JK522
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
GROUND SURFACE AT 101.37 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-6
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 15'S, 55'W OF NW CORNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0								
1	1	SS	30	--	FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE FINE GRAVEL - DARK BROWN (10YR 4/3) - DAMP (FILL)	SW	48	
2								
3								
4	2	SS	30	--	FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - DAMP (FILL)	SW	41	
5								
6								
7	3	SS	51	--			11	
8								
9	4	SS	16	--	FINE SANDY SILT, TRACE COARSE SAND TO FINE GRAVEL - BROWN (10YR 5/3) - MOIST TO WET	ML	*3	
10								
11	5	SS	18	--	FINE SANDY SILT TO SILTY FINE SAND, TRACE COARSE SAND AND FINE GRAVEL - BROWN (10YR 5/3) - 3 INCH SEAM, SILT, TRACE SILTY CLAY - DARK GRAY (10YR 4/1) - MOIST	ML	3	
12								
13								
14	6	SS	28	--	FINE SAND, MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - BROWN (10YR 5/3) - MOIST	SW	25	
15								
16								
17	7	SS	30	--			*167	
18								
19					BOREHOLE TERMINATED AT 19.0 FEET			
20								
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 3-26-99	DRILL RIG: FOREMOST MOBILE	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON WELL SET AT 19' WITH 10' SCREEN DNR UID #JK523
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
GROUND SURFACE AT 100.02 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-7
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 145'N, 46'W OF NW CRNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					BLIND DRILLED TO 11.0 FEET			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12	1	SS	9	--	FINE SAND TO SILTY FINE SAND WITH MEDIUM TO COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST	SW	4	
13								
14	2	SS	10	--			6	
15								
16	3	SS	26	--			4	
17								
18	4	SS	43	--	SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST	SM	3	
19								
20	5	SS	26	--	SILTY FINE SAND, TRACE MEDIUM TO COARSE SAND - PALE BROWN (10YR 6/3) - MOIST	SM	5	
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.		
DRILLING DATE: 3-26-99	DRILL RIG: TRACKED ATV	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON WELL SET AT 33' WITH 15' SCREEN DNR UID #JK524
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
GROUND SURFACE AT 108.71 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-7
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 145'N, 46'W OF NW CRNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
21					NO RECOVERY		--	
22	6	SS	35	--			--	
23								
24	7	SS	18	--	FINE SAND TO SILTY FINE SAND WITH MEDIUM TO COARSE SAND AND FINE GRAVEL - YELLOWISH BROWN (10YR 5/4) - MOIST	SW	*8	
25								
26	8	SS	32	--	FINE SAND, TRACE MEDIUM TO COARSE SAND, WET	SW	7	
27								
28	9	SS	14	--			4	
29								
30	10	SS	12	--			*3	
31								
32	11	SS	--	--			--	
33					BOREHOLE TERMINATED AT 33.0 FEET			
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-8
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 105'N, 98'W OF NW CRNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
0					BLIND DRILLED TO 11.0 FEET			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12	1	SS	57	--	FINE SAND WITH MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - LIGHT GRAY (10YR 7/2) - DAMP	SW	1	
13								
14	2	SS	68	--	FINE SAND TO FINE SILTY SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - BROWN (10YR 5/3) - DAMP	SW	<1	
15								
16	3	SS	53	--			1	
17								
18	4	SS	51	--			4	
19								
20	5	SS	49	--			*6	
21								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.

DRILLING DATE: 3-26-99	DRILL RIG: TRACKED ATV	NOTES *SAMPLE SUBMITTED FOR LABORATORY ANALYSIS SS = SPLIT SPOON WELL SET AT 33' WITH 15' SCREEN DNR UID #JK525
DRILLED BY: BRIOHN ENVIRONMENTAL CONTRACTORS		
BORING DRILLED WITH 4.25 INCH I.D. HSA		
GROUND SURFACE AT 112.42 DURING DRILLING		



PROJECT NAME LAFARGE - HARTLAND		FIELD TEC TJO	DRAWN BY DWF	BORING NUMBER
CLIENT LAFARGE - WISCONSIN DIVISION		PROJECT NUMBER J98109		B-8
LOCATION 700 W CAPITOL DR, HARTLAND, WI NW 1/4 NW 1/4 SEC 3 T7N R18E		LOCATION DESCRIPTION 105'N, 98'W OF NW CRNR OF BLDG		

DEPTH	SAMPLE	TYPE	N	QP	DESCRIPTION	USCS	PID	GRAPHIC
21	6	SS	50	--	FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL - BROWN (10YR 5/3) - MOIST, LITTLE RECOVERY	SW	5	
22								
23	7	SS	52	--	FINE TO MEDIUM SAND WITH COARSE SAND, TRACE FINE GRAVEL - BROWN (10YR 5/3) - MOIST	SW	2	
24								
25								
26	8	SS	58	--			3	
27	9	SS	54	--	FINE SAND, TRACE MEDIUM AND COARSE SAND - BROWN (10YR 5/3) - WET	SW	3	
28								
29								
30	10	SS	--	--			*4	
31	11	SS	--	--			--	
32								
33								
34	BOREHOLE TERMINATED AT 33.0 FEET							
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								

NOTE: THE STRATIFICATION LINES ARE APPROXIMATE BOUNDARIES. ACTUAL TRANSITION MAY BE GRADUAL.



Report On: Proctor

Lab No: 20-06843

Report No: 20-06843

Project No: 20072-40

Cust No: 0111

Page 1 of 1

Client: Musson Brothers, Inc.
Bob Draths
1522 Pearl St.
Waukesha, WI 53186

Project: Sunnyslope Dr. Storm Sewer, Sanitary
Sewer and Water Main.

Engineer: Ruckert Mielke

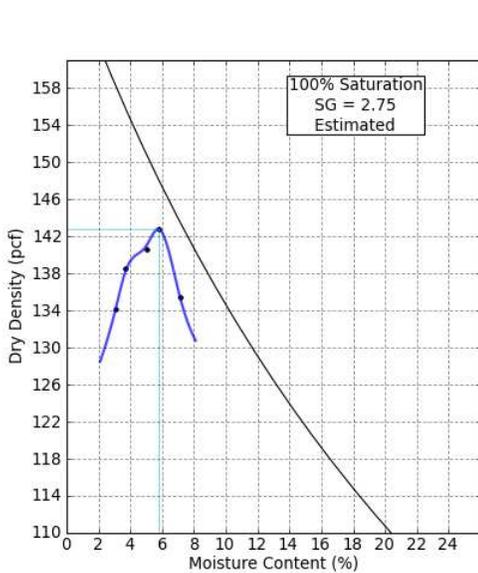
Report Date: 08/11/2020

Location: Fill Site

Sample Date: 08/11/2020

Material: Trench Spoils

Sampled By: Max Piehl



% Moisture	Dry Density Lbs./Cu.Ft.
3.1	134.1
3.7	138.6
5.0	140.6
5.8	142.8
7.1	135.5
5.8	142.8
Optimum	Maximum

Color: Brown
Description: sandy gravel

Desc of Rammer: Mechanical

Preparation Method: Dry

Oversized Material:

Test Method (As Applicable): AASHTO T-180, AASHTO T-99, ASTM D-1557, ASTM D-1559, ASTM D-2041, ASTM D-558, ASTM D-698 Method-C

Orig: Musson Brothers, Inc. Attn: Bob Draths
(1-ec copy)
1-ec Ruckert Mielke Attn: Peter Gesch
1-cc Laboratory

Respectfully Submitted,

Andrew Davis, Project Manager



Appendix C

Laboratory Reports

- Modified Proctor (D1557) & Grain Size Analysis (D6913)
 - TP-1/TP-2 - composite
 - TP-3
 - TP-5
 - B6/B7 - composite (Grain Size Analysis below)

- Grain Size Analysis (D6913)
 - TP-6
 - TP-9
 - B1
 - B2 (including Atterberg Limits (D4318))
 - B3
 - B4
 - B5
 - B6
 - B7
 - B8
 - B9
 - B10
 - B11
 - B12
 - B13
 - B14
 - B15
 - B16
 - B17
 - B18
 - B19

- General Notes

- USCS Description





Material Test Report

Report #: CSPL-000001-00

West Allis
2135 S. 116th Street
West Allis, WI 53227
Phone: 888-436-8378
Fax: 414-321-8359

Client:
Three Leaf Partners
504 W Juneau Avenue
Milwaukee, WI 53203

Project:
7708
Hartland Quarry Apartments
700/701 Capitol Drive
Hartland, WI

Sample Information

Sample Date: 04/17/2023
Sample No: 7157
Source: Jobsite
Supplier: Client
Sampled By: Michael Frede
Sample From: Test Pit
Sampling Method: Not Provided
Field ID: TP-1 + TP-2 Combined
Application: Test Pit
Visual Description: Light Brown Silty Sand with few Gravel
Specification:

Sieve Analysis Data

ASTM C136/C117

Sieve Size	% Passing	Upper/Lower Limits
2 in (50 mm)	100.0	
1-1/2 in (37.5 mm)	100.0	
1-1/4 in (31.75 mm)	93.7	
1 in (25 mm)	91.7	
3/4 in (19 mm)	86.4	
1/2 in (12.5 mm)	79.5	
3/8 in (9.5 mm)	75.3	
No 4 (4.75 mm)	67.2	
No 10 (2 mm)	60.9	
No 20 (850 µm)	55.5	
No 40 (425 µm)	47.5	
No 60 (250 µm)	38.1	
No 100 (150 µm)	30.1	
No 140 (106 µm)	26.3	
No 200 (75 µm)	23.6	

Test Completed Date: 04/21/2023

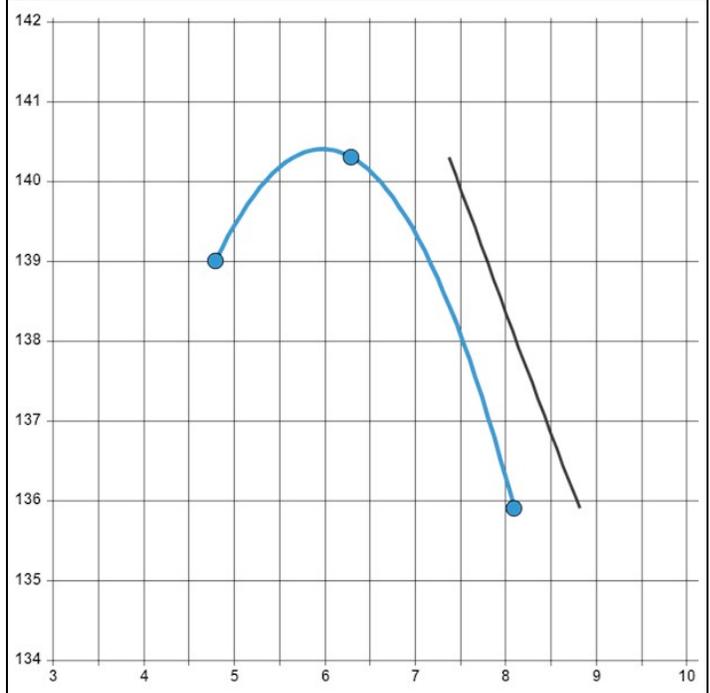
Test Completed By: Abdel Deif

Laboratory Compaction Data (Proctor)

ASTM D1557

Maximum Dry Density (lb/ft³): 140.4

Optimum Moisture (%): 6.0



Compaction Method: B (ASTM D1557)

Type of Rammer: Manual

Est. Specific Gravity: 2.70

Oversize Correction Needed: Yes

Plasticity Details

ASTM D4318

Liquid Limit (LL): **Plastic Limit (PL):**

Plasticity Index (PI):

Intiaz Ahmed, Laboratory Manager

Apr 27, 2023



West Allis
2135 S. 116th Street
West Allis, WI 53227
Phone: 888-436-8378
Fax: 414-321-8359

Client:
Three Leaf Partners
504 W Juneau Avenue
Milwaukee, WI 53203

Project:
7708
Hartland Quarry Apartments
700/701 Capitol Drive
Hartland, WI

Sample Information

Sample Date: 04/17/2023
Sample No: 7158
Source: Jobsite
Supplier: Client
Sampled By: Michael Frede
Sample From: Test Pit
Sampling Method: Not Provided
Field ID: TP-3
Application: Test Pit
Visual Description: Brown Sand and Gravel, trace Silt
Specification:

Sieve Analysis Data

ASTM C136/C117

Sieve Size	% Passing	Upper/Lower Limits
2 in (50 mm)	100.0	
1-1/2 in (37.5 mm)	100.0	
1-1/4 in (31.75 mm)	93.4	
1 in (25 mm)	90.7	
3/4 in (19 mm)	84.0	
1/2 in (12.5 mm)	75.2	
3/8 in (9.5 mm)	69.6	
No 4 (4.75 mm)	57.0	
No 10 (2 mm)	47.6	
No 20 (850 µm)	40.3	
No 40 (425 µm)	32.0	
No 60 (250 µm)	23.0	
No 100 (150 µm)	17.3	
No 140 (106 µm)	14.9	
No 200 (75 µm)	12.6	

Test Completed Date: 04/25/2023

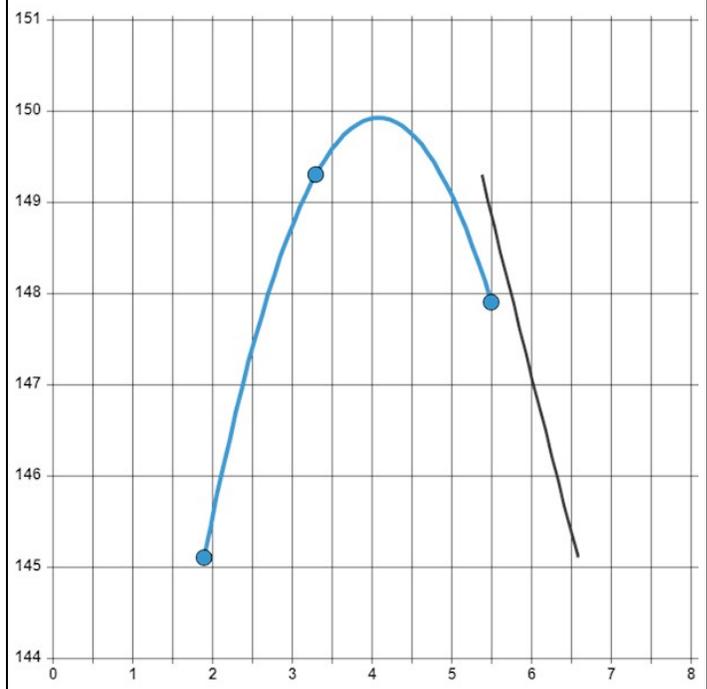
Test Completed By: Abdel Deif

Laboratory Compaction Data (Proctor)

ASTM D1557

Maximum Dry Density (lb/ft³): 150.0

Optimum Moisture (%): 4.1



Compaction Method: C (ASTM D1557)

Type of Rammer: Manual

Est. Specific Gravity: 2.75

Oversize Correction Needed: Yes

Plasticity Details

ASTM D4318

Liquid Limit (LL): **Plastic Limit (PL):**

Plasticity Index (PI):

Intiaz Ahmed, Laboratory Manager

Apr 27, 2023



Material Test Report

Report #: CSPL-000003-00

West Allis
2135 S. 116th Street
West Allis, WI 53227
Phone: 888-436-8378
Fax: 414-321-8359

Client:
Three Leaf Partners
504 W Juneau Avenue
Milwaukee, WI 53203

Project:
7708
Hartland Quarry Apartments
700/701 Capitol Drive
Hartland, WI

Sample Information

Sample Date: 04/17/2023
Sample No: 7159
Source: Jobsite
Supplier: Client
Sampled By: Michael Frede
Sample From: Test Pit
Sampling Method: Not Provided
Field ID: TP-5
Application: Test Pit
Visual Description: Brown Silty Sand with few Gravel
Specification:

Sieve Analysis Data

ASTM C136/C117

Sieve Size	% Passing	Upper/Lower Limits
2 in (50 mm)	100.0	
1-1/2 in (37.5 mm)	100.0	
1-1/4 in (31.75 mm)	97.6	
1 in (25 mm)	95.1	
3/4 in (19 mm)	92.8	
1/2 in (12.5 mm)	88.6	
3/8 in (9.5 mm)	85.6	
No 4 (4.75 mm)	79.3	
No 10 (2 mm)	73.6	
No 20 (850 µm)	68.2	
No 40 (425 µm)	60.0	
No 60 (250 µm)	43.6	
No 100 (150 µm)	24.4	
No 140 (106 µm)	17.0	
No 200 (75 µm)	12.4	

Test Completed Date: 04/24/2023

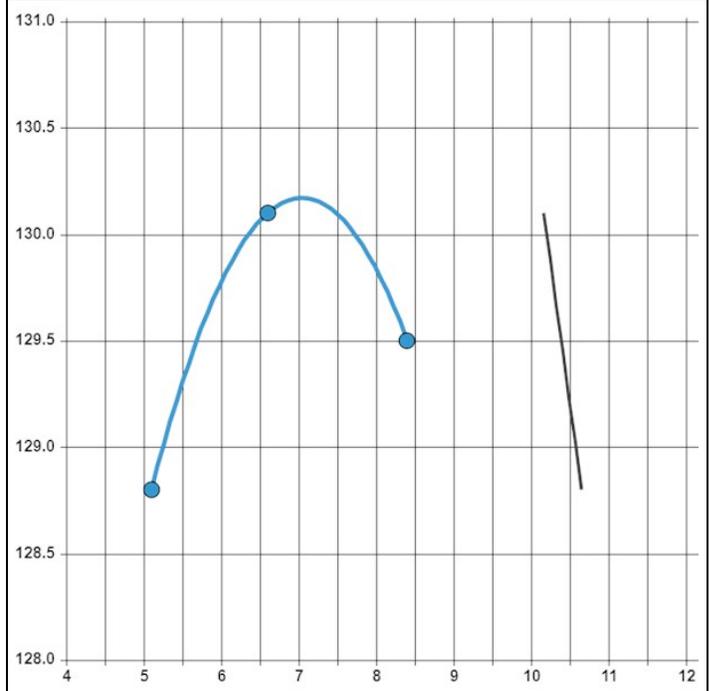
Test Completed By: Abdel Deif

Laboratory Compaction Data (Proctor)

ASTM D1557

Maximum Dry Density (lb/ft³): 130.2

Optimum Moisture (%): 7.1



Compaction Method: A (ASTM D1557)
Type of Rammer: Manual
Est. Specific Gravity: 2.65
Oversize Correction Needed: Yes

Plasticity Details

ASTM D4318

Liquid Limit (LL): **Plastic Limit (PL):**
Plasticity Index (PI):

Intiaz Ahmed, Laboratory Manager
Apr 27, 2023

West Allis
 2135 S. 116th Street
 West Allis, WI 53227
 Phone: 888-436-8378
 Fax: 414-321-8359

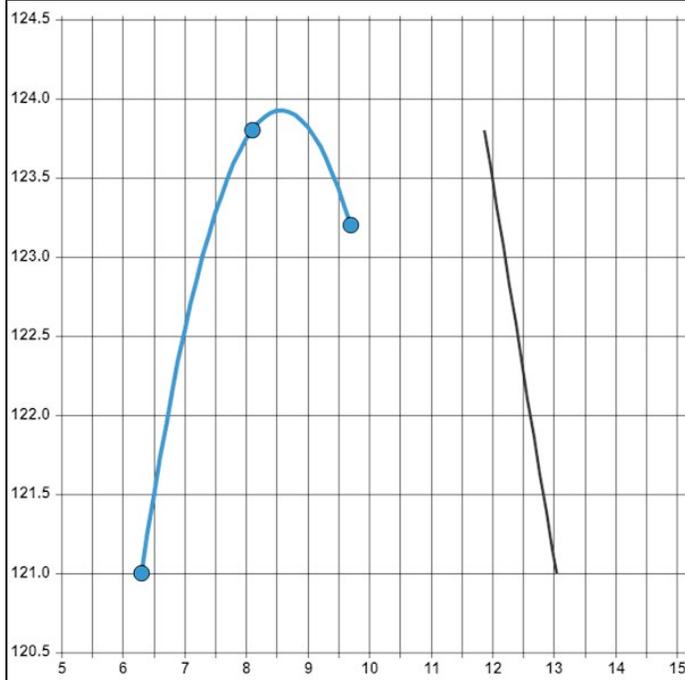
Client:
 Three Leaf Partners
 504 W Juneau Avenue
 Milwaukee, WI 53203

Project:
 7708
 Hartland Quarry Apartments
 700/701 Capitol Drive
 Hartland, WI

Sample Information

Sample Date:	04/18/2023	Sample Number:	7190
Sample From:	Test Pit	Field ID:	Bluff 6 + 7 Combined
Sample Location :	Onsite	Sampled By:	Michael Frede

Test Results



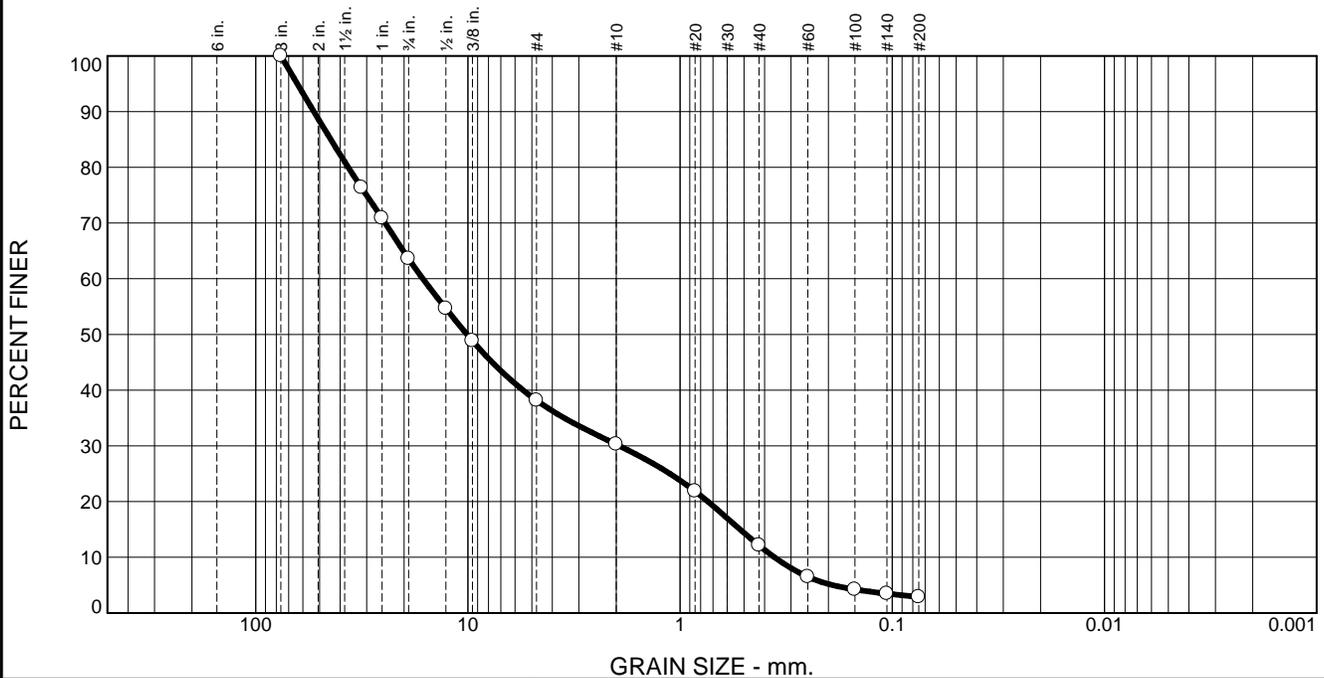
Sample Photo



Oversize Correction Needed:	Yes	Visual Description:	Dark Brown Silty Clay with Organic
Maximum Dry Density (lb/ft³):	123.9	Compaction Method Used:	A (ASTM D1557)
Optimum Moisture (%):	8.5	Type of Rammer Used:	Manual
Test Date:	04/25/2023	Sp. Gravity (Est):	2.60
Lab Technician:	Abdel Deif		

Intiaz Ahmed, Laboratory Manager
 Apr 27, 2023

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	36.4	25.4	7.9	18.2	9.2	2.9	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	76.4		
1"	70.9		
3/4"	63.6		
1/2"	54.7		
3/8"	48.9		
#4	38.2		
#10	30.3		
#20	21.9		
#40	12.1		
#60	6.5		
#100	4.2		
#140	3.5		
#200	2.9		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 53.2485 D₈₅= 44.3097 D₆₀= 16.3112
D₅₀= 10.1019 D₃₀= 1.9347 D₁₅= 0.5218
D₁₀= 0.3589 C_u= 45.45 C_c= 0.64

Remarks

F.M.=5.82

Date Received: 4/17/23 Date Tested: 4/27/23

Tested By: Luke Emery

Checked By: Imtiaz Ahmed

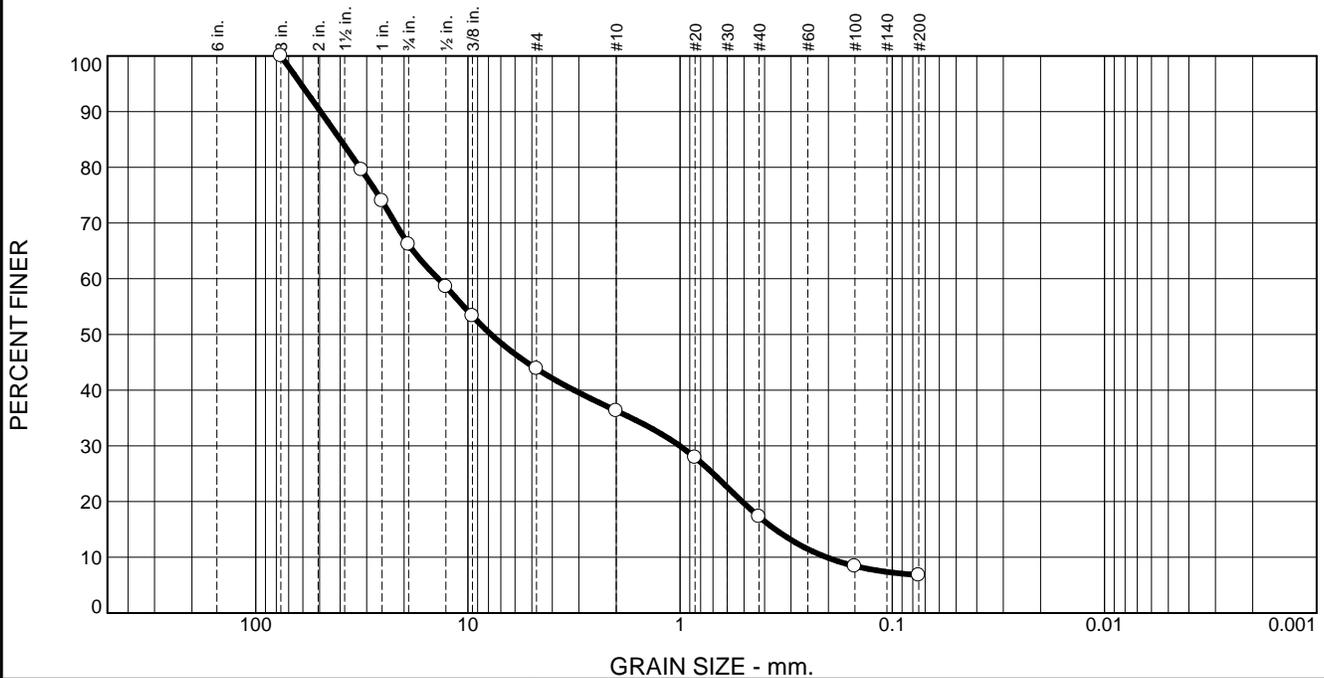
Title: Lab Manager

Source of Sample: TP Depth: Onsite
Sample Number: 6

Date Sampled: 4/17/23

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708	Test No 7160-6836
---	--	--------------------------

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	33.8	22.4	7.5	19.0	10.5	6.8	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	79.5		
1"	74.0		
3/4"	66.2		
1/2"	58.6		
3/8"	53.3		
#4	43.8		
#10	36.3		
#20	27.9		
#40	17.3		
#100	8.4		
#200	6.8		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 49.4912 D₈₅= 39.9751 D₆₀= 13.8034
D₅₀= 7.7767 D₃₀= 1.0033 D₁₅= 0.3560
D₁₀= 0.2043 C_u= 67.57 C_c= 0.36

Remarks

F.M.=5.39

Date Received: 4/17/23 Date Tested: 4/27/23

Tested By: Luke Emery

Checked By: Imtiaz Ahmed

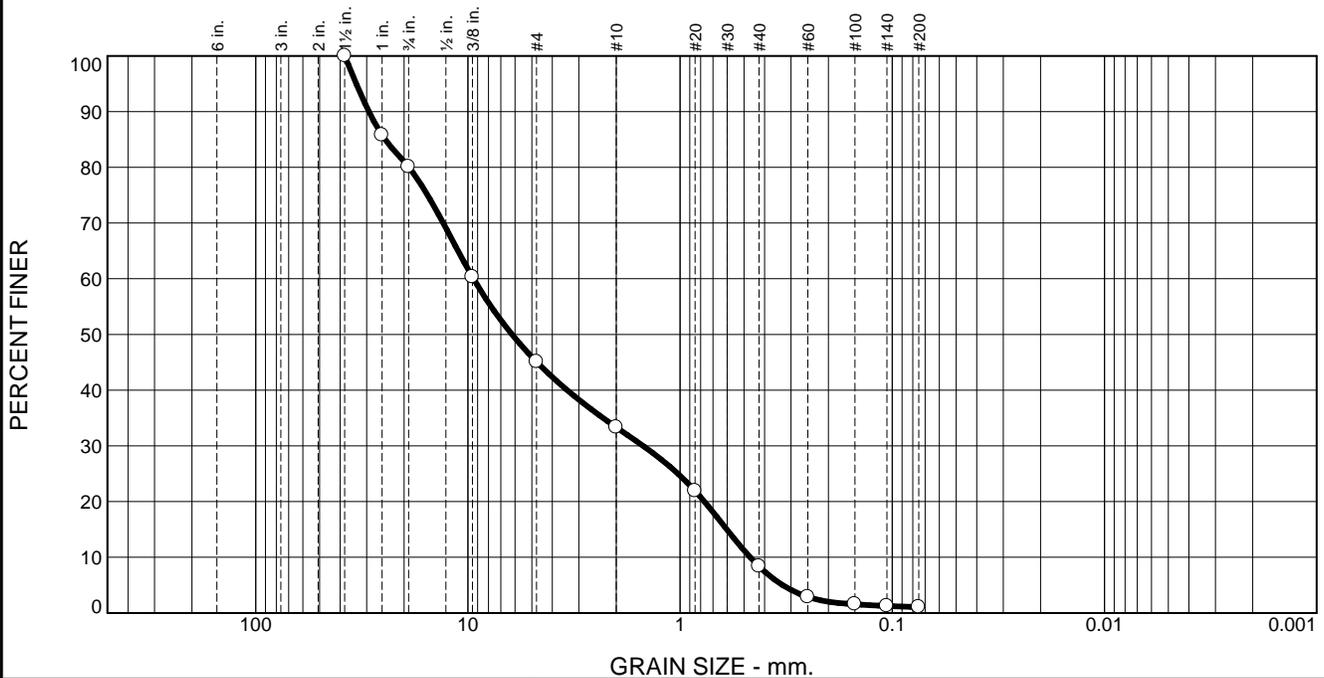
Title: Lab Manager

Source of Sample: TP Depth: Onsite
Sample Number: 9

Date Sampled: 4/17/23

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7162-6838
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.9	35.0	11.8	24.9	7.3	1.1	

Test Results (ASTM D6913 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	85.8		
3/4"	80.1		
3/8"	60.3		
#4	45.1		
#10	33.3		
#20	21.9		
#40	8.4		
#60	2.9		
#100	1.6		
#140	1.3		
#200	1.1		

* (no specification provided)

Material Description

Brown f to c sand

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 29.3003 D₈₅= 24.5860 D₆₀= 9.4124
D₅₀= 6.1982 D₃₀= 1.4946 D₁₅= 0.6023
D₁₀= 0.4674 C_u= 20.14 C_c= 0.51

Remarks

F.M.=5.32

Date Received: 4/17/23 Date Tested: 4/19/23

Tested By: Hiten Soni

Checked By: Imtiaz Ahmed

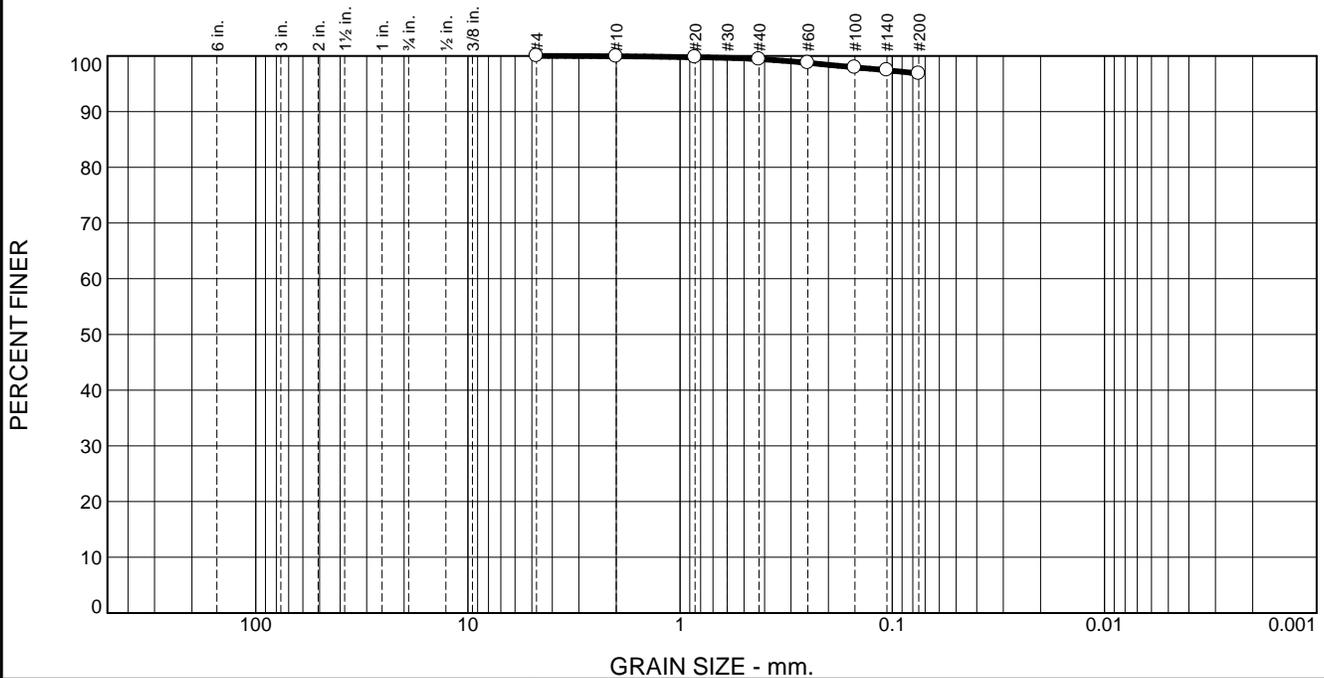
Title: Lab Manager

Source of Sample: Bluff Depth: Onsite
Sample Number: 1

Date Sampled: 4/17/23

<p>GeoTest, Inc.</p> <p>West Allis, WI</p>	<p>Client: Three Leaf Partners</p> <p>Project: Hatland Quarry Apartments</p> <p>Project No: 7708</p> <p style="text-align: right;">Test No</p>
--	--

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.5	2.6	96.8	

Test Results (ASTM D6913 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.9		
#20	99.8		
#40	99.4		
#60	98.8		
#100	97.9		
#140	97.4		
#200	96.8		

Material Description

Brown lean clay

Atterberg Limits (ASTM D 4318)

PL= 22.5 LL= 34.7 PI= 12.2

Classification

USCS (D 2487)= CL AASHTO (M 145)= A-6(13)

Coefficients

D₉₀= D₈₅= D₆₀=
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Remarks

F.M.=0.04

Date Received: 4/17/23 Date Tested: 4/19/23

Tested By: Hiten Soni

Checked By: Imtiaz Ahmed

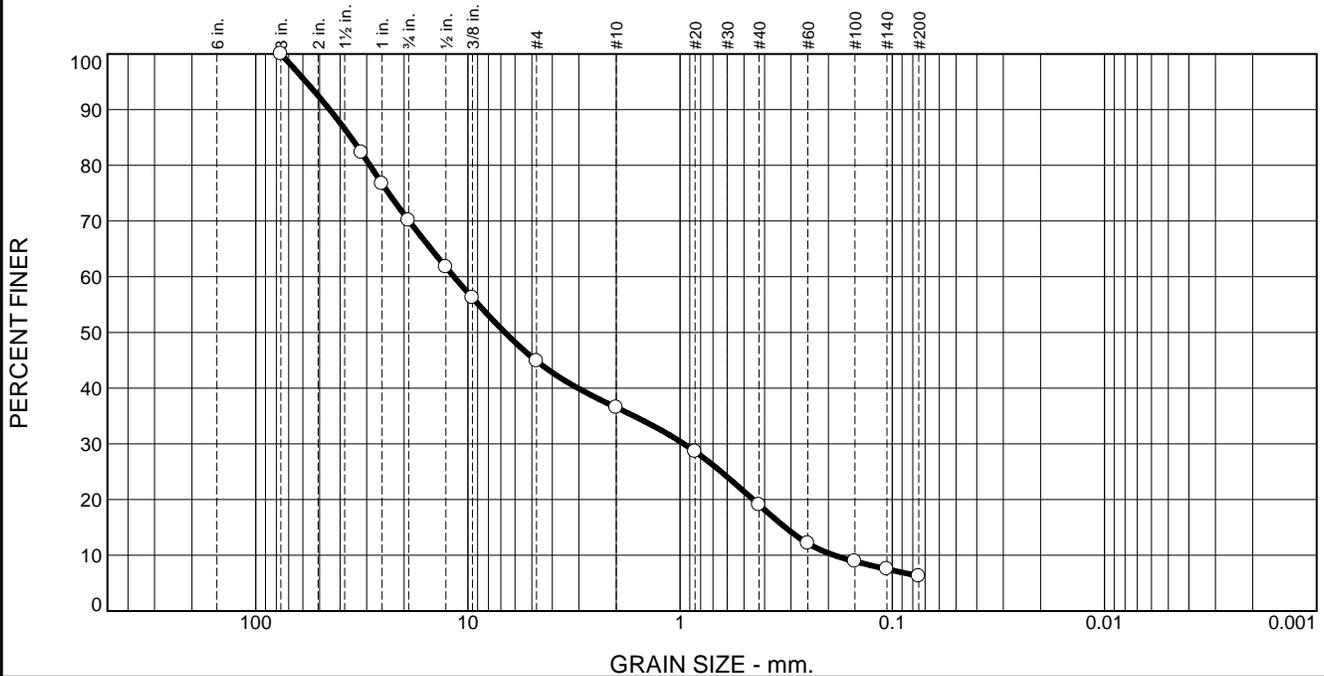
Title: Lab Manager

* (no specification provided)

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/17/23
Sample Number: 2

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7164-6840
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	29.9	25.2	8.4	17.4	12.8	6.3	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	82.3		
1"	76.7		
3/4"	70.1		
1/2"	61.7		
3/8"	56.2		
#4	44.9		
#10	36.5		
#20	28.6		
#40	19.1		
#60	12.1		
#100	8.9		
#140	7.5		
#200	6.3		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 44.8239 D₈₅= 35.5744 D₆₀= 11.6219
D₅₀= 6.6981 D₃₀= 0.9602 D₁₅= 0.3195
D₁₀= 0.1880 C_u= 61.82 C_c= 0.42

Remarks

F.M.=5.25

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

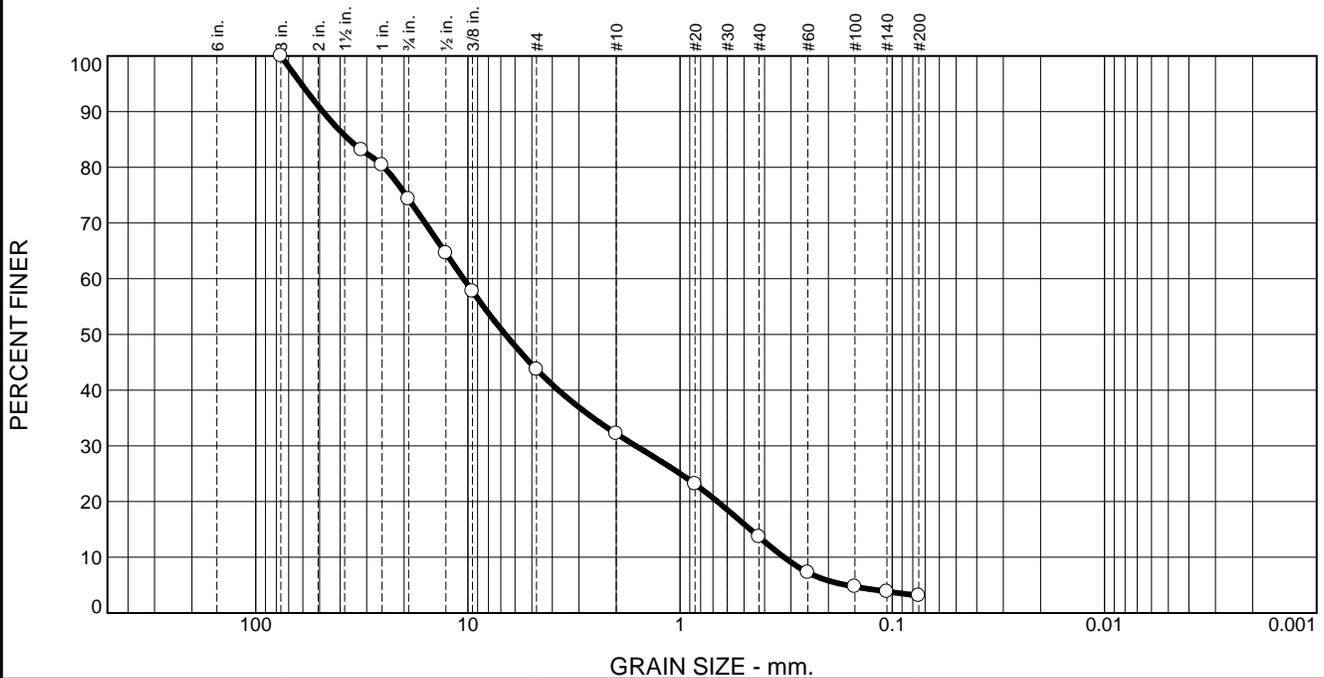
Checked By: Imtiaz Ahmed

Title: Lab Manager

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 3

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7173-6848
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	25.7	30.6	11.5	18.5	10.6	3.1	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	83.1		
1"	80.4		
3/4"	74.3		
1/2"	64.6		
3/8"	57.7		
#4	43.7		
#10	32.2		
#20	23.1		
#40	13.7		
#60	7.3		
#100	4.7		
#140	3.8		
#200	3.1		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 48.2763 D₈₅= 36.4131 D₆₀= 10.4876
D₅₀= 6.6655 D₃₀= 1.6184 D₁₅= 0.4670
D₁₀= 0.3238 C_u= 32.39 C_c= 0.77

Remarks

F.M.=5.45

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund _____

Checked By: Imtiaz Ahmed _____

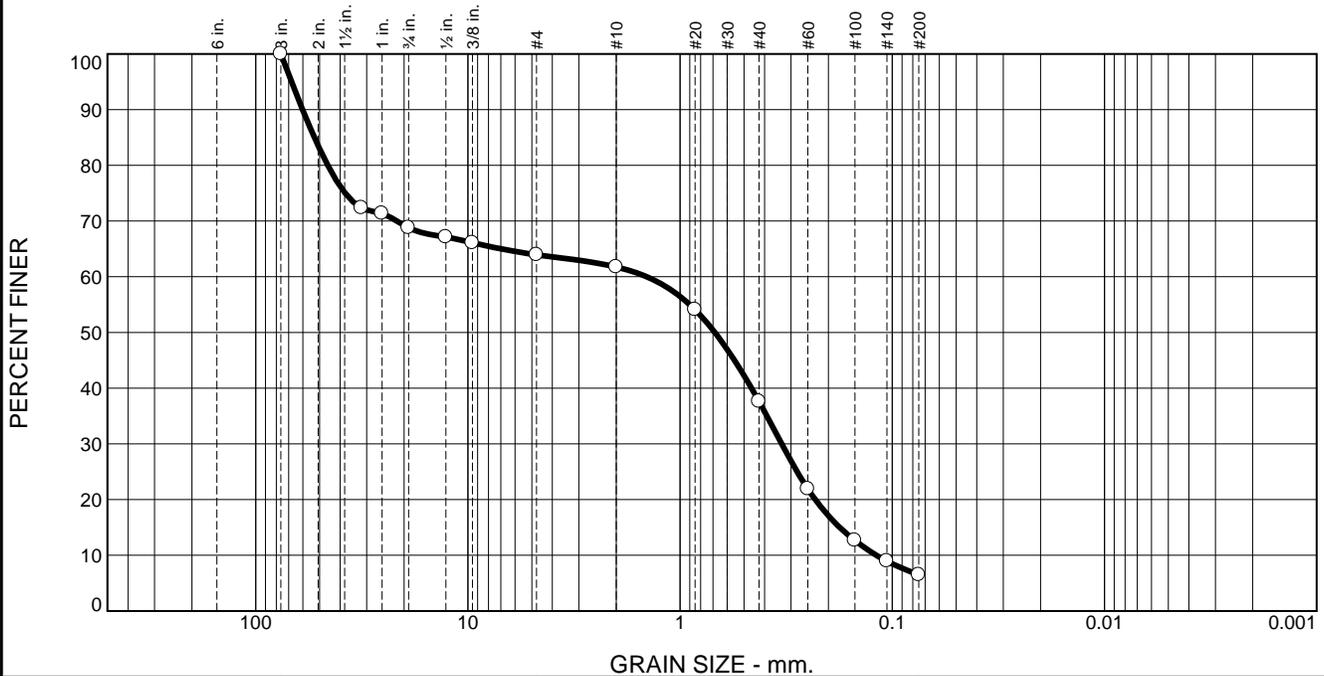
Title: Lab Manager _____

Source of Sample: Bluff Depth: Onsite
Sample Number: 4

Date Sampled: 4/18/23

<p>GeoTest, Inc.</p> <p>West Allis, WI</p>	<p>Client: Three Leaf Partners</p> <p>Project: Hatland Quarry Apartments</p> <p>Project No: 7708</p>	<p>Test No 7174-6849</p>
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Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	31.2	4.9	2.2	24.1	31.1	6.5	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	72.3		
1"	71.3		
3/4"	68.8		
1/2"	67.1		
3/8"	66.1		
#4	63.9		
#10	61.7		
#20	54.1		
#40	37.6		
#60	21.9		
#100	12.7		
#140	8.9		
#200	6.5		

* (no specification provided)

Material Description

Dark Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 60.1653 D₈₅= 52.9287 D₆₀= 1.4365
D₅₀= 0.6859 D₃₀= 0.3320 D₁₅= 0.1768
D₁₀= 0.1188 C_u= 12.09 C_c= 0.65

Remarks

F.M.=4.19

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund _____

Checked By: Imtiaz Ahmed _____

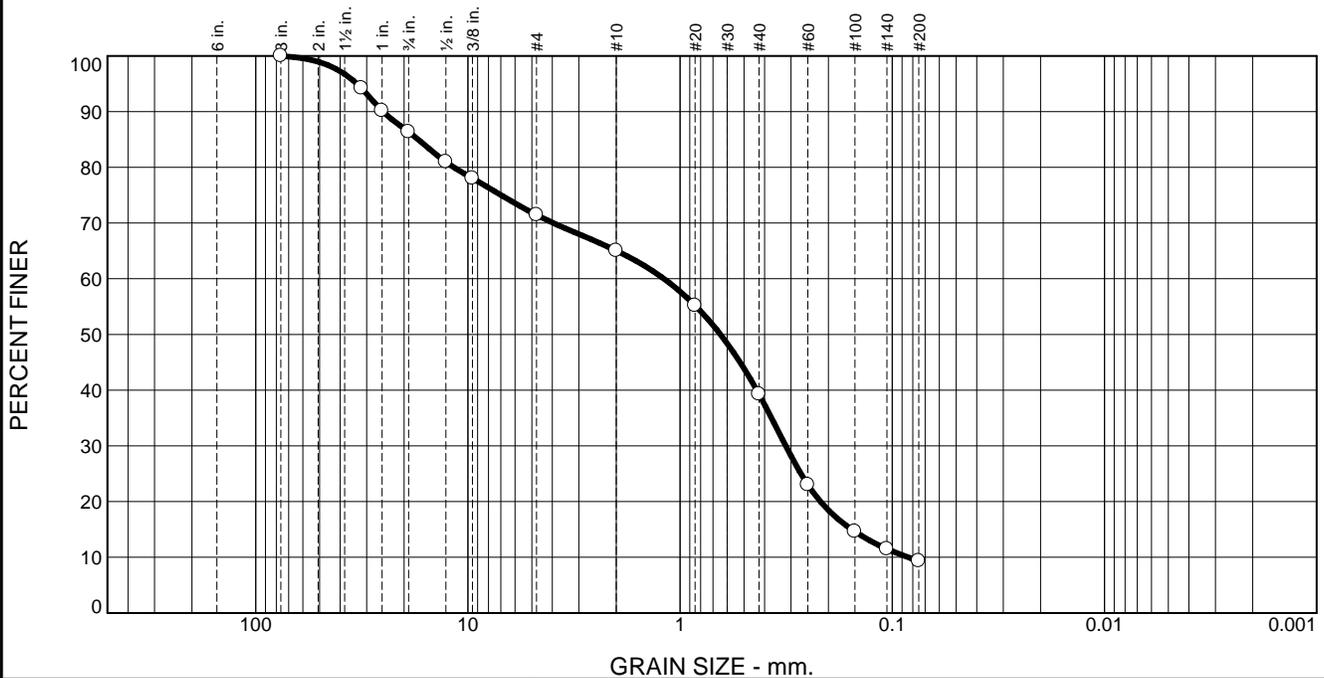
Title: Lab Manager _____

Source of Sample: Bluff Depth: Onsite
Sample Number: 5

Date Sampled: 4/18/23

<p>GeoTest, Inc.</p> <p>West Allis, WI</p>	<p>Client: Three Leaf Partners</p> <p>Project: Hatland Quarry Apartments</p> <p>Project No: 7708</p>	<p>Test No 7175-6850</p>
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Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.6	14.9	6.5	25.7	30.0	9.3	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	94.2		
1"	90.2		
3/4"	86.4		
1/2"	81.0		
3/8"	78.0		
#4	71.5		
#10	65.0		
#20	55.2		
#40	39.3		
#60	23.0		
#100	14.6		
#140	11.5		
#200	9.3		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 25.1604 D₈₅= 17.1823 D₆₀= 1.1920
D₅₀= 0.6455 D₃₀= 0.3180 D₁₅= 0.1553
D₁₀= 0.0841 C_u= 14.17 C_c= 1.01

Remarks

F.M.=3.50

Date Received: 11/18/23 Date Tested: 4/27/23

Tested By: Luke Emery

Checked By: Imtiaz Ahmed

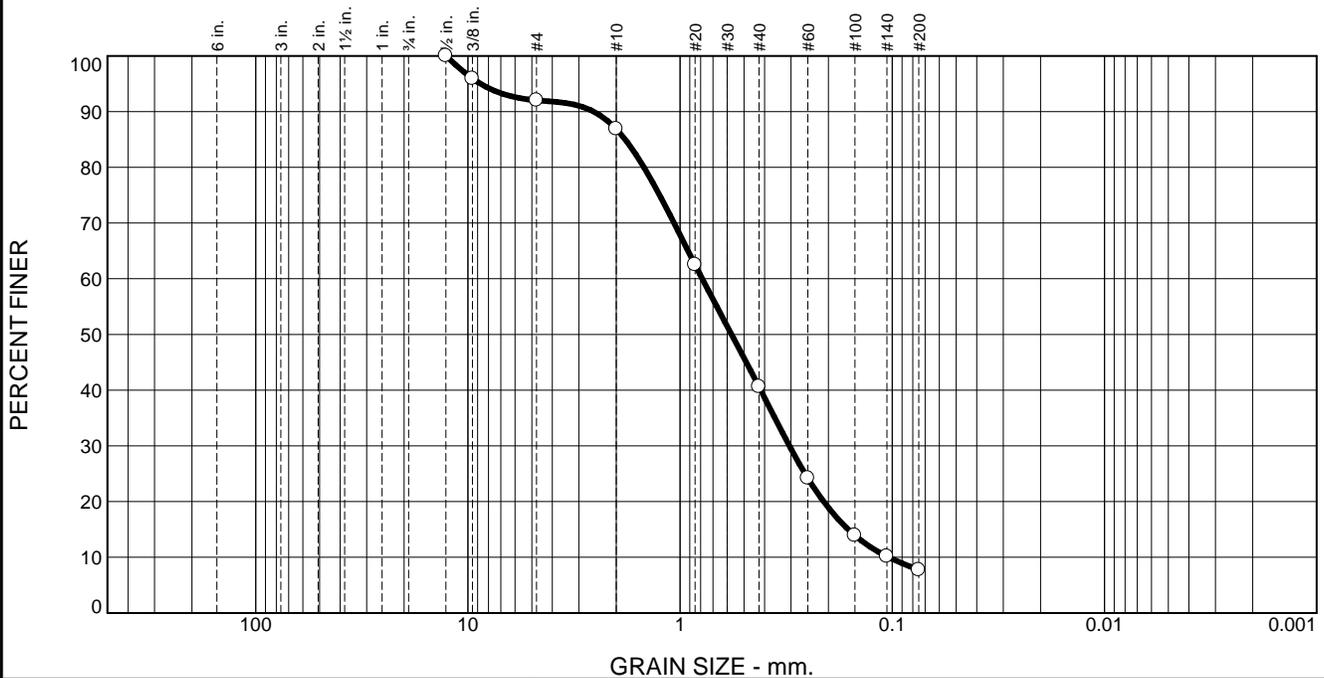
Title: Lab Manager

Source of Sample: Bluff Depth: Onsite
Sample Number: 6

Date Sampled: 11/18/23

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7176-6851
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.0	5.1	46.3	32.9	7.7	

Test Results (ASTM D6913 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	95.9		
#4	92.0		
#10	86.9		
#20	62.5		
#40	40.6		
#60	24.2		
#100	13.9		
#140	10.2		
#200	7.7		

Material Description

Brown f to c sand

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 2.5558 D₈₅= 1.8143 D₆₀= 0.7865
D₅₀= 0.5722 D₃₀= 0.3055 D₁₅= 0.1615
D₁₀= 0.1040 C_u= 7.56 C_c= 1.14

Remarks

F.M.=2.55

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Luke Emery

Checked By: Imtiaz Ahmed

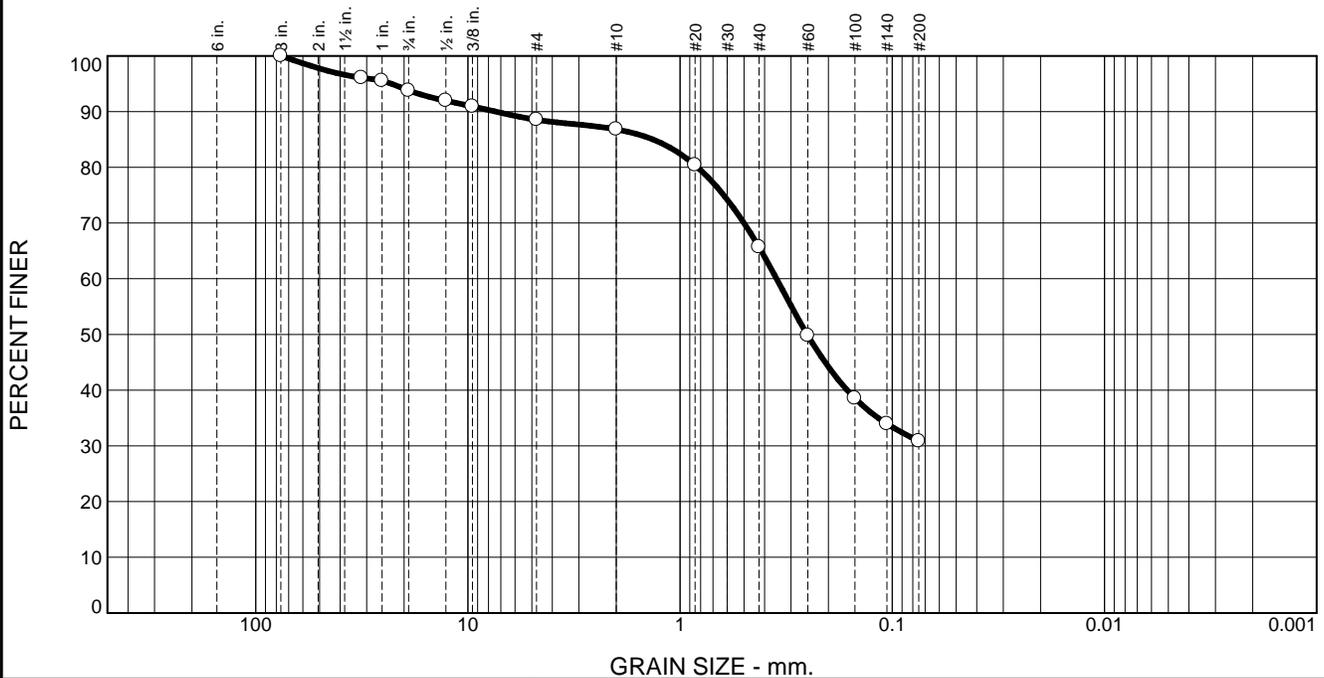
Title: Lab Manager

* (no specification provided)

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 7

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7177-6852
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.2	5.3	1.7	21.1	34.8	30.9	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	96.1		
1"	95.5		
3/4"	93.8		
1/2"	92.0		
3/8"	90.9		
#4	88.5		
#10	86.8		
#20	80.4		
#40	65.7		
#60	49.8		
#100	38.5		
#140	34.0		
#200	30.9		

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 7.4064 D₈₅= 1.3432 D₆₀= 0.3512
D₅₀= 0.2518 D₃₀= _____ D₁₅= _____
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=1.91

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund _____

Checked By: Imtiaz Ahmed _____

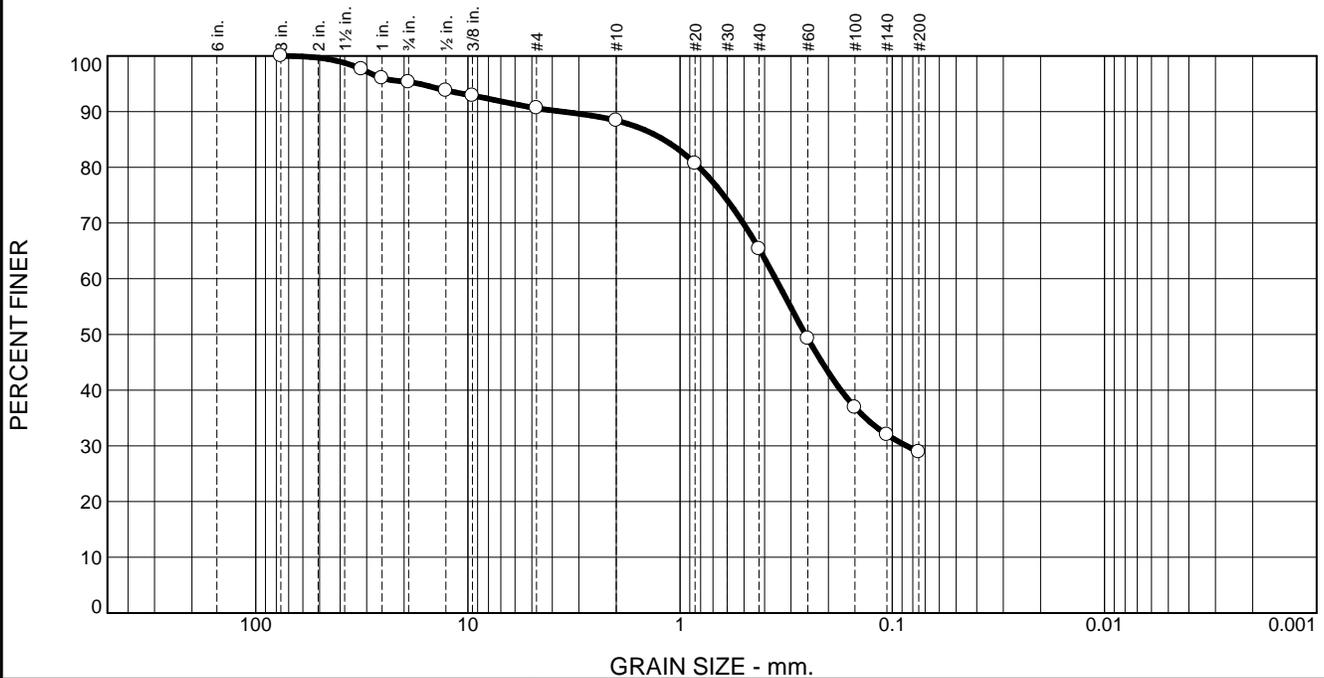
Title: Lab Manager _____

* (no specification provided)

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 8

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7178-6853
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.7	4.7	2.2	23.0	36.5	28.9	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	97.6		
1"	96.0		
3/4"	95.3		
1/2"	93.8		
3/8"	92.9		
#4	90.6		
#10	88.4		
#20	80.7		
#40	65.4		
#60	49.3		
#100	36.9		
#140	32.0		
#200	28.9		

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 3.6204 D₈₅= 1.1979 D₆₀= 0.3550
D₅₀= 0.2564 D₃₀= 0.0857 D₁₅= _____
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=1.83

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

Checked By: Imtiaz Ahmed

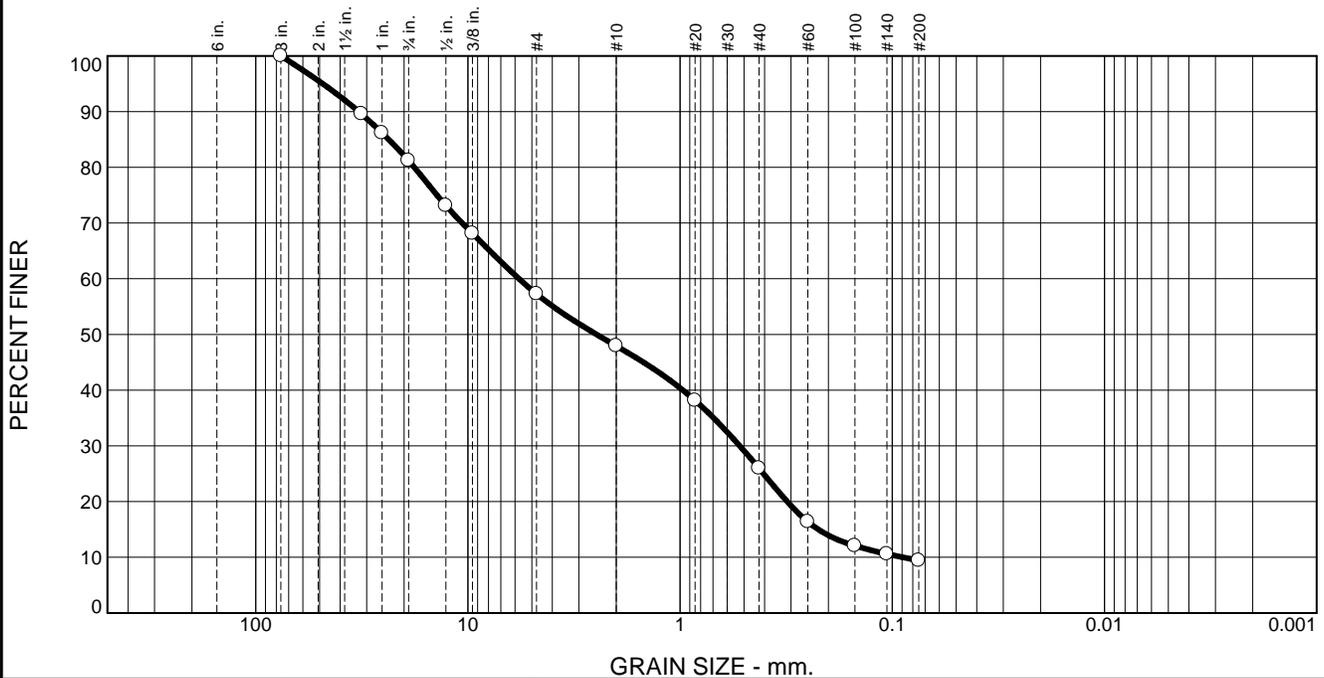
Title: Lab Manager

* (no specification provided)

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 9

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7179-6854
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.8	23.9	9.4	21.9	16.6	9.4	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	89.6		
1"	86.2		
3/4"	81.2		
1/2"	73.1		
3/8"	68.1		
#4	57.3		
#10	47.9		
#20	38.2		
#40	26.0		
#60	16.4		
#100	12.1		
#140	10.6		
#200	9.4		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 32.6990 D₈₅= 23.6371 D₆₀= 5.7505
D₅₀= 2.4748 D₃₀= 0.5236 D₁₅= 0.2235
D₁₀= 0.0894 C_u= 64.32 C_c= 0.53

Remarks

F.M.=4.46

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

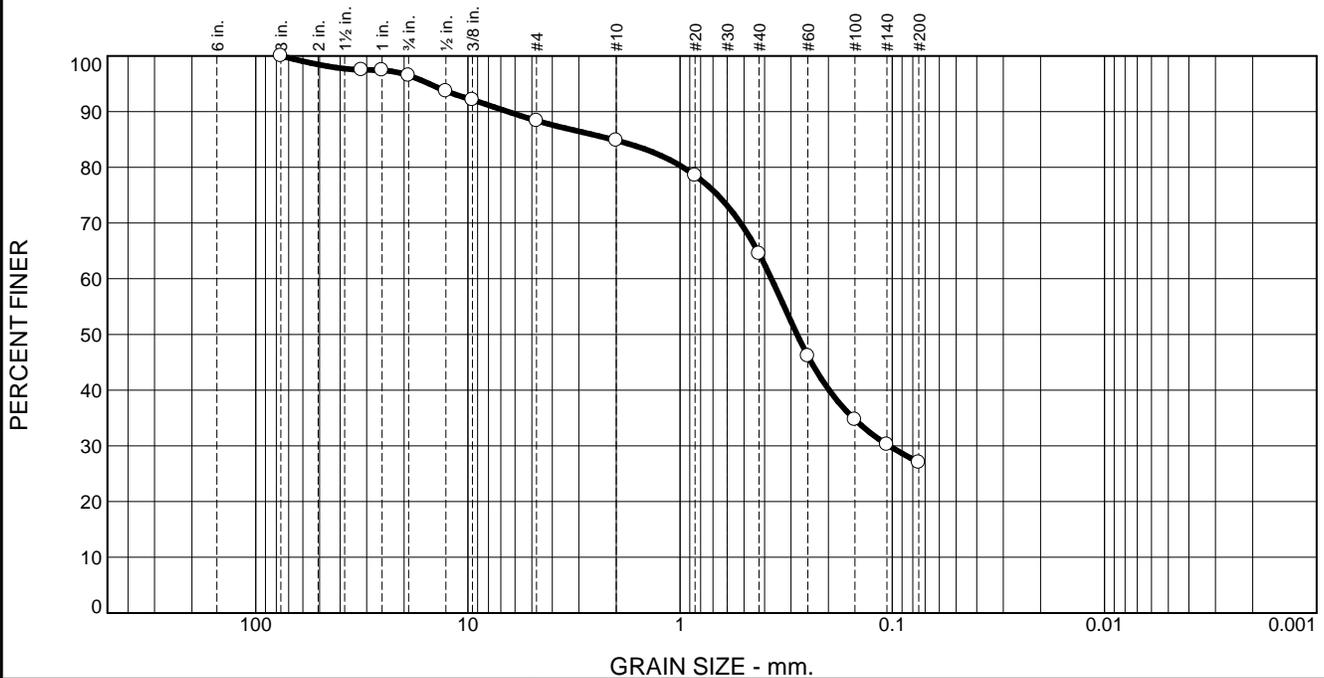
Checked By: Imtiaz Ahmed

Title: Lab Manager

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 10

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7180-6855
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.5	8.1	3.6	20.3	37.5	27.0	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	97.5		
1"	97.4		
3/4"	96.5		
1/2"	93.7		
3/8"	92.1		
#4	88.4		
#10	84.8		
#20	78.5		
#40	64.5		
#60	46.1		
#100	34.7		
#140	30.3		
#200	27.0		

* (no specification provided)

Material Description

Brown sandy silt, little topsoil

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 6.4931 D₈₅= 2.0810 D₆₀= 0.3712
D₅₀= 0.2810 D₃₀= 0.1034 D₁₅= _____
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=1.98

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

Checked By: Imtiaz Ahmed

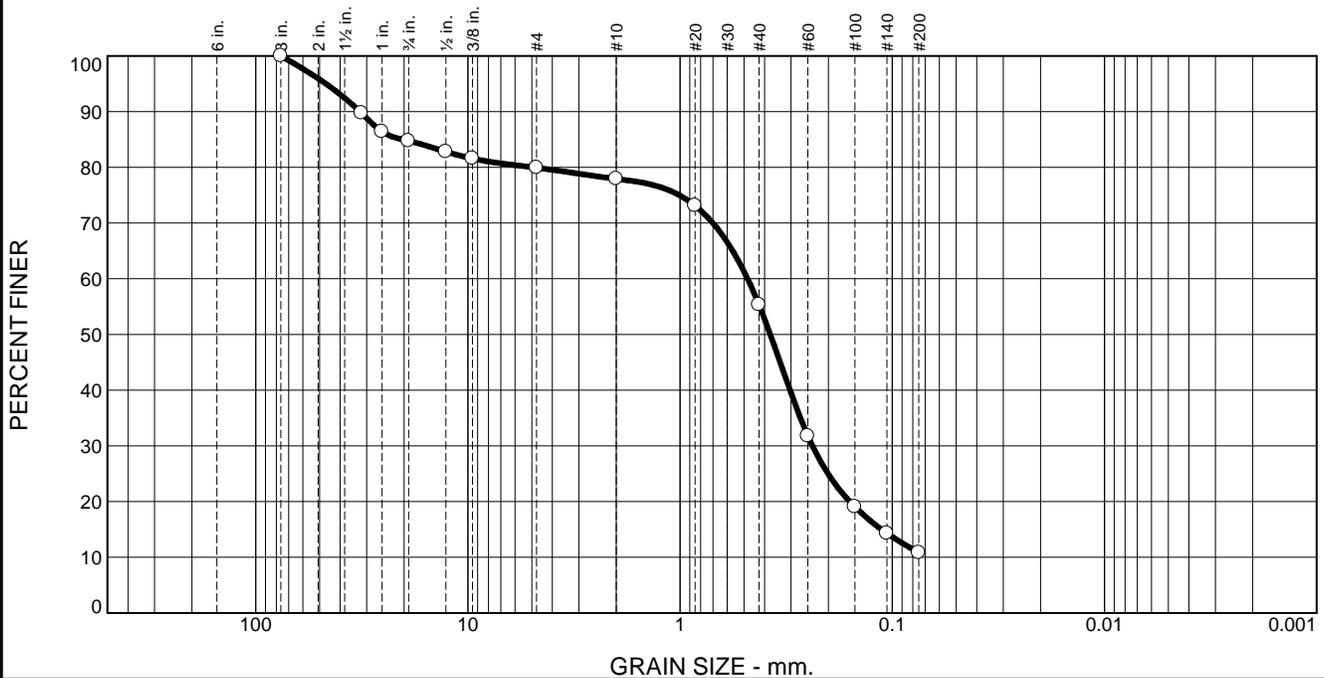
Title: Lab Manager

Source of Sample: Bluff Depth: Onsite
Sample Number: 11

Date Sampled: 4/18/23

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7181-6856
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.3	4.8	2.0	22.6	44.5	10.8	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	89.7		
1"	86.4		
3/4"	84.7		
1/2"	82.8		
3/8"	81.6		
#4	79.9		
#10	77.9		
#20	73.1		
#40	55.3		
#60	31.8		
#100	19.1		
#140	14.3		
#200	10.8		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 32.2820 D₈₅= 20.4121 D₆₀= 0.4808
D₅₀= 0.3760 D₃₀= 0.2379 D₁₅= 0.1125
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=2.82

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

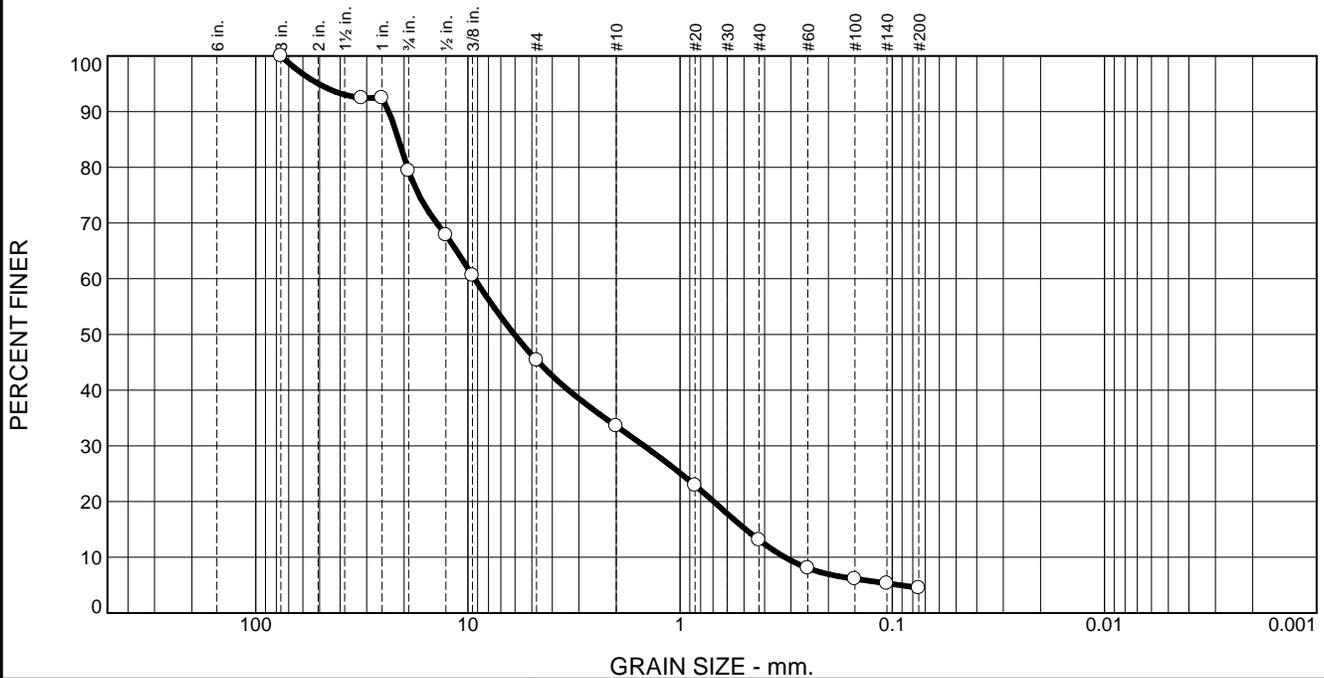
Checked By: Imtiaz Ahmed

Title: Lab Manager

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 12

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7182-6857
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Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.6	34.0	11.8	20.5	8.6	4.5	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	92.5		
1"	92.5		
3/4"	79.4		
1/2"	67.8		
3/8"	60.6		
#4	45.4		
#10	33.6		
#20	22.9		
#40	13.1		
#60	8.0		
#100	6.1		
#140	5.3		
#200	4.5		

* (no specification provided)

Material Description

Brown sand and gravel, little topsoil

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 23.5441 D₈₅= 21.2405 D₆₀= 9.3029
D₅₀= 6.0393 D₃₀= 1.4790 D₁₅= 0.4908
D₁₀= 0.3207 C_u= 29.01 C_c= 0.73

Remarks

F.M.=5.25

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

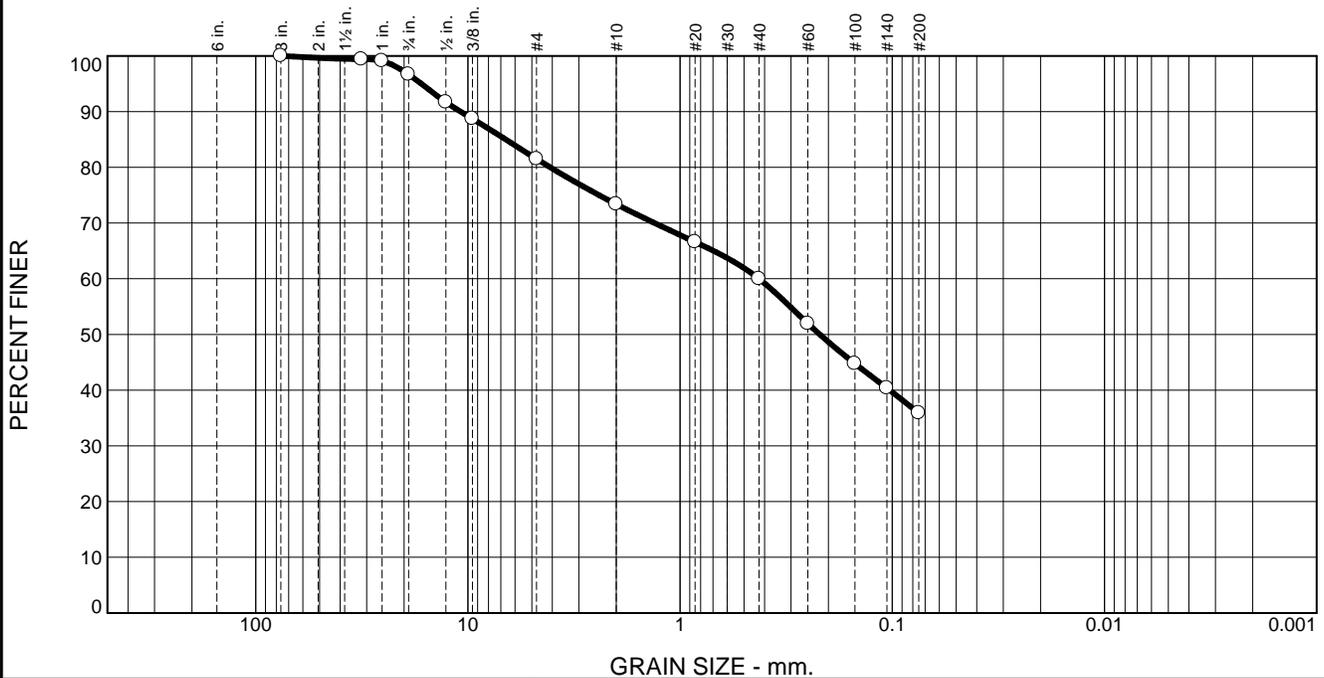
Checked By: Imtiaz Ahmed

Title: Lab Manager

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 13

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7183-6858
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	15.2	8.1	13.4	24.1	35.9	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	99.4		
1"	99.1		
3/4"	96.7		
1/2"	91.7		
3/8"	88.7		
#4	81.5		
#10	73.4		
#20	66.6		
#40	60.0		
#60	52.0		
#100	44.8		
#140	40.4		
#200	35.9		

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 10.8312 D₈₅= 6.6383 D₆₀= 0.4254
D₅₀= 0.2195 D₃₀= _____ D₁₅= _____
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=2.26

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

Checked By: Imtiaz Ahmed

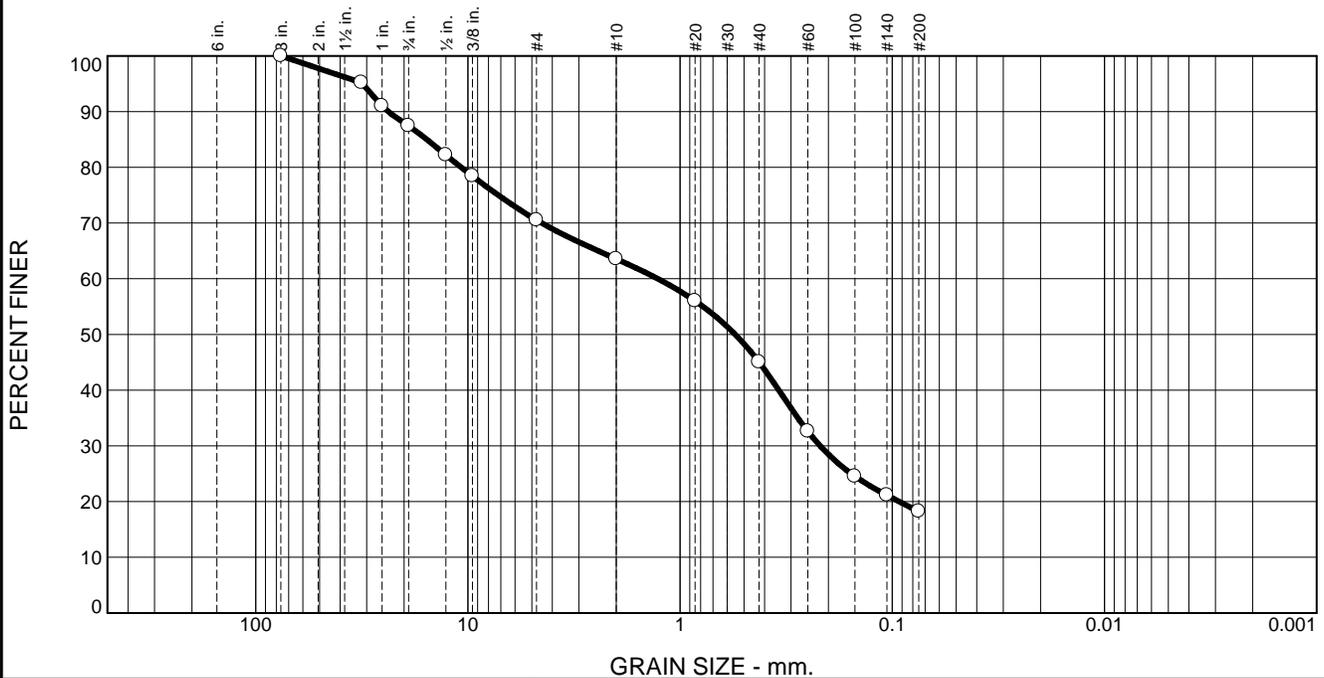
Title: Lab Manager

* (no specification provided)

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 14

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7184-6859
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.6	16.9	6.9	18.5	26.9	18.2	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	95.2		
1"	91.0		
3/4"	87.4		
1/2"	82.2		
3/8"	78.4		
#4	70.5		
#10	63.6		
#20	56.0		
#40	45.1		
#60	32.6		
#100	24.5		
#140	21.1		
#200	18.2		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 23.7282 D₈₅= 15.6351 D₆₀= 1.2733
D₅₀= 0.5496 D₃₀= 0.2188 D₁₅= _____
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=3.31

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund _____

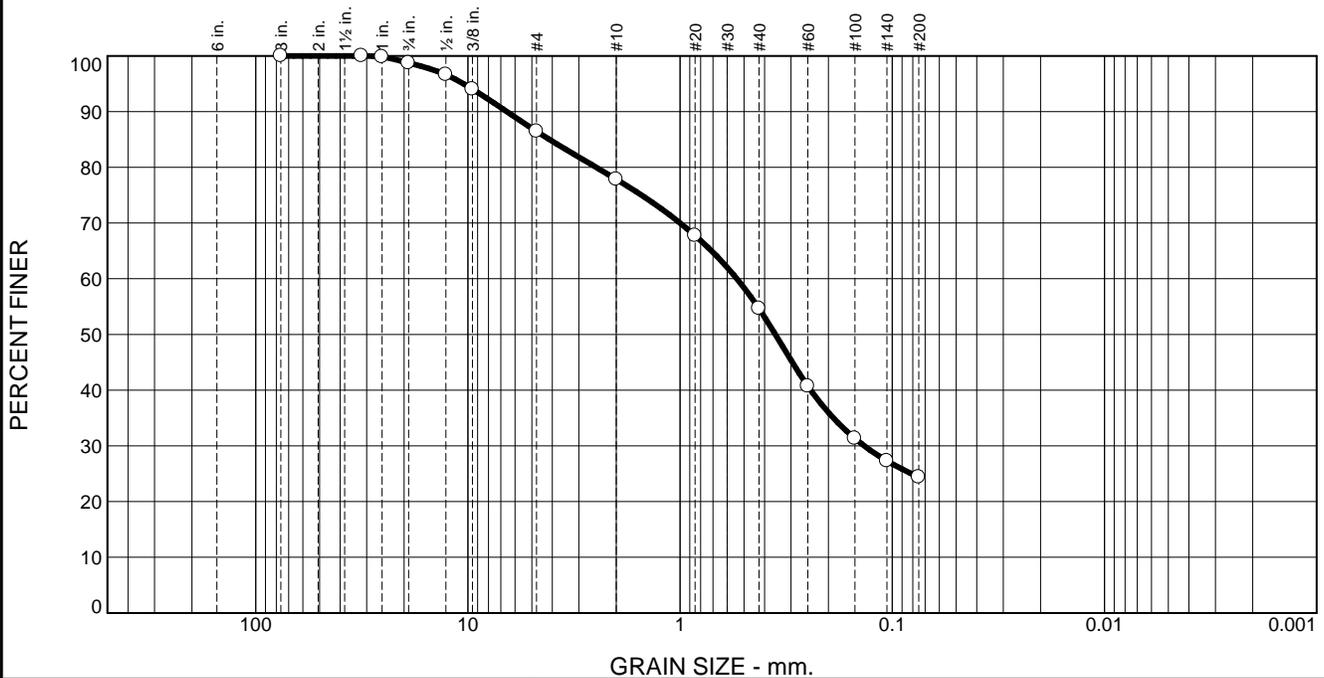
Checked By: Imtiaz Ahmed _____

Title: Lab Manager _____

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 15

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7185-6860
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.3	12.2	8.6	23.3	30.2	24.4	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	100.0		
1"	99.8		
3/4"	98.7		
1/2"	96.6		
3/8"	94.0		
#4	86.5		
#10	77.9		
#20	67.7		
#40	54.6		
#60	40.7		
#100	31.3		
#140	27.3		
#200	24.4		

* (no specification provided)

Material Description

Brown clay with gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 6.5592 D₈₅= 4.1299 D₆₀= 0.5399
D₅₀= 0.3558 D₃₀= 0.1356 D₁₅= _____
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=2.30

Date Received: 4/18/23 Date Tested: 4/27/23

Tested By: Craig Englund

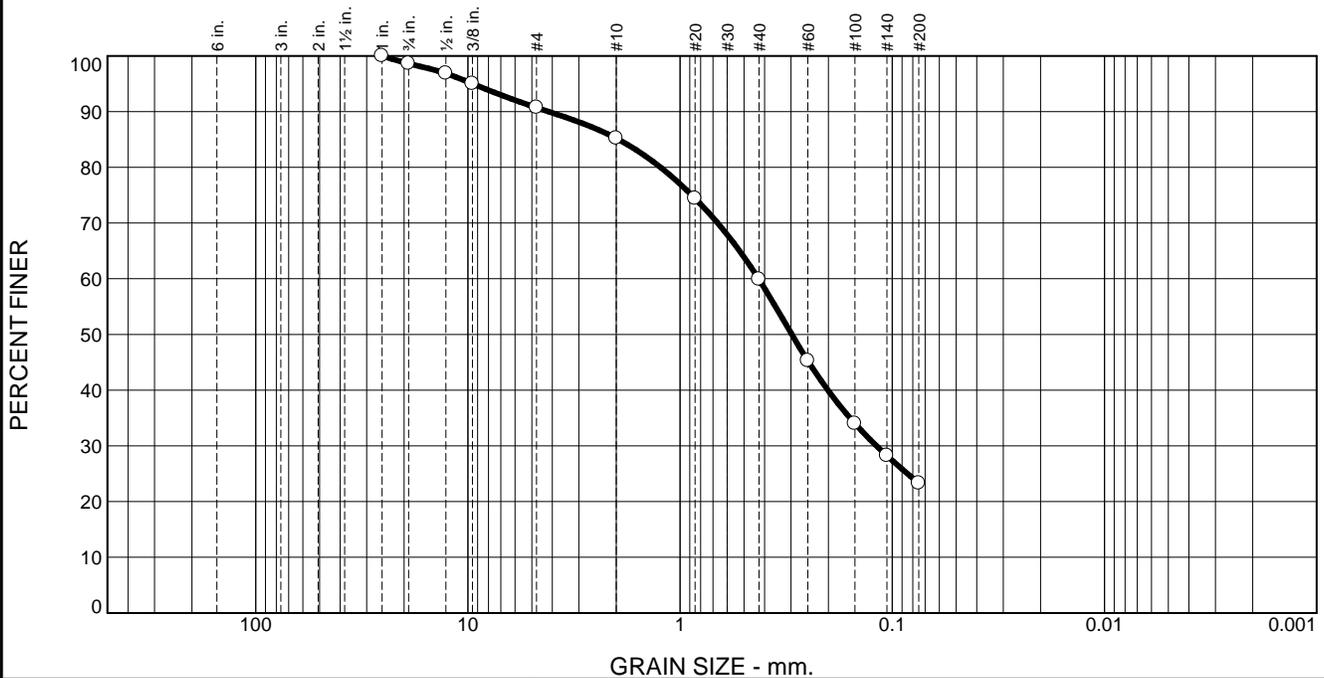
Checked By: Imtiaz Ahmed

Title: Lab Manager

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 16

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7186-6861
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.4	7.9	5.5	25.3	36.6	23.3	

Test Results (ASTM D6913 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	98.6		
1/2"	96.9		
3/8"	95.0		
#4	90.7		
#10	85.2		
#20	74.4		
#40	59.9		
#60	45.3		
#100	34.0		
#140	28.2		
#200	23.3		

Material Description

Brown clay

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 4.1716 D₈₅= 1.9521 D₆₀= 0.4269
D₅₀= 0.2976 D₃₀= 0.1187 D₁₅= _____
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=1.98

Date Received: 4/18/23 Date Tested: 4/28/23

Tested By: Craig Englund _____

Checked By: Imtiaz Ahmed _____

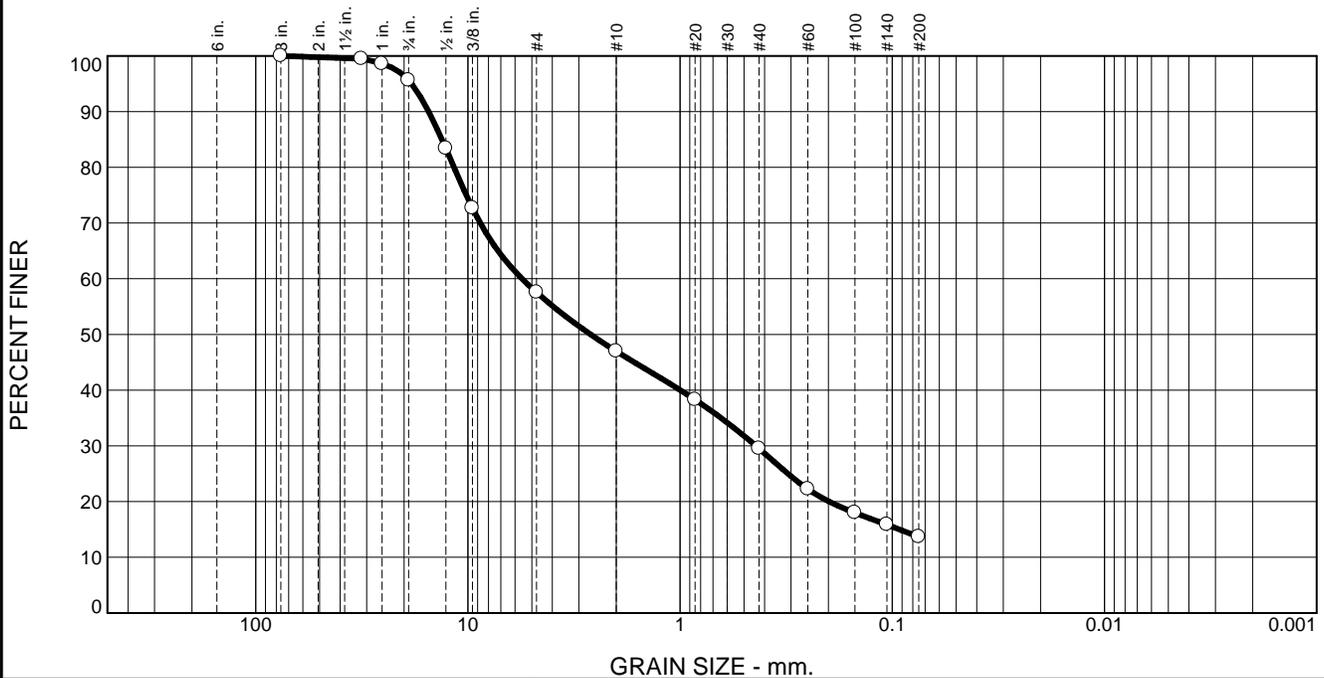
Title: Lab Manager _____

* (no specification provided)

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 17

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7187-6862
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.4	38.0	10.6	17.5	15.8	13.7	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	99.5		
1"	98.6		
3/4"	95.6		
1/2"	83.4		
3/8"	72.7		
#4	57.6		
#10	47.0		
#20	38.3		
#40	29.5		
#60	22.2		
#100	18.0		
#140	15.8		
#200	13.7		

* (no specification provided)

Material Description

Brown sand and gravel

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 15.3163 D₈₅= 13.2611 D₆₀= 5.5607
D₅₀= 2.6404 D₃₀= 0.4391 D₁₅= 0.0926
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=4.07

Date Received: 4/18/23 Date Tested: 4/28/23

Tested By: Craig Englund

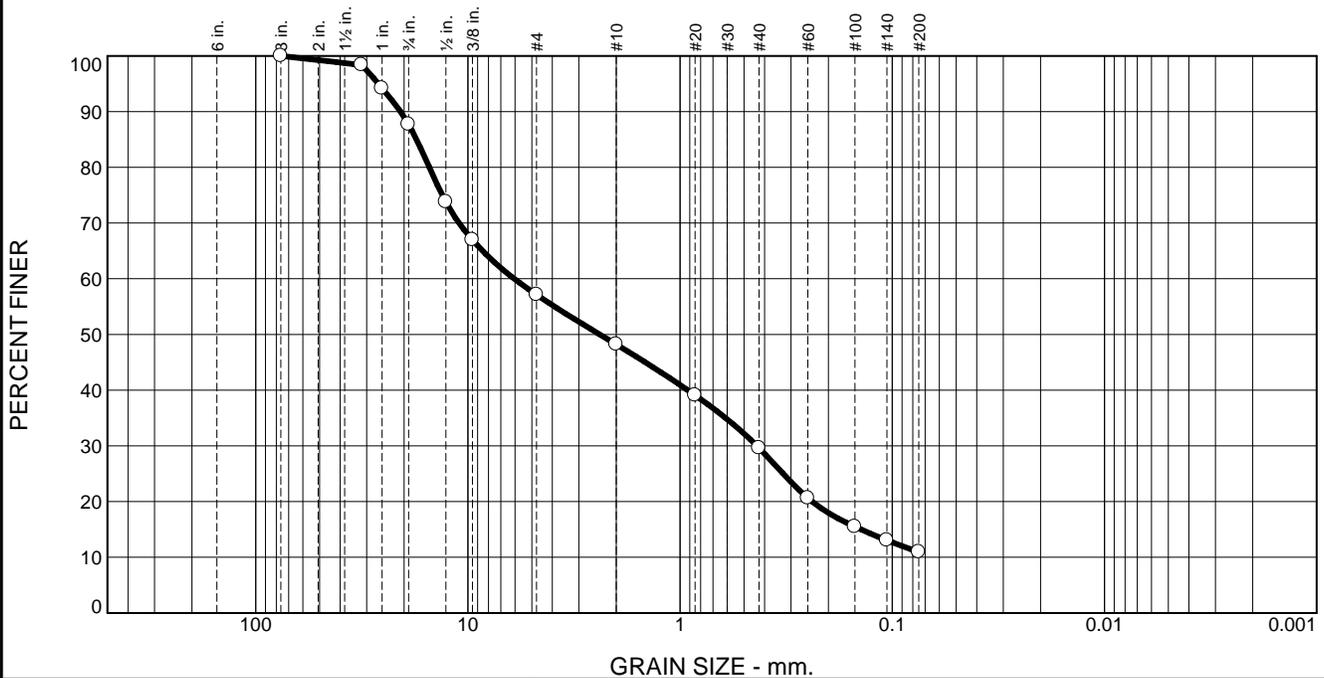
Checked By: Imtiaz Ahmed

Title: Lab Manager

Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 18

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7188-6863
---	---

Sieve Analysis Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.3	30.6	8.9	18.6	18.7	10.9	

Test Results (ASTM C136 & ASTM C117)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/4"	98.4		
1"	94.2		
3/4"	87.7		
1/2"	73.8		
3/8"	67.0		
#4	57.1		
#10	48.2		
#20	39.1		
#40	29.6		
#60	20.6		
#100	15.5		
#140	13.1		
#200	10.9		

* (no specification provided)

Material Description

Brown sand and gravel with topsoil

Atterberg Limits (ASTM D 4318)

PL= _____ LL= _____ PI= _____

Classification

USCS (D 2487)= _____ AASHTO (M 145)= _____

Coefficients

D₉₀= 20.7905 D₈₅= 17.4838 D₆₀= 6.0538
D₅₀= 2.3916 D₃₀= 0.4347 D₁₅= 0.1404
D₁₀= _____ C_u= _____ C_c= _____

Remarks

F.M.=4.23

Date Received: 4/18/23 Date Tested: 4/28/23

Tested By: Craig Englund _____

Checked By: Imtiaz Ahmed _____

Title: Lab Manager _____

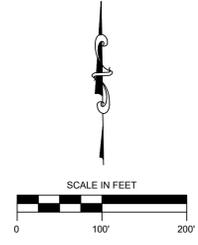
Source of Sample: Bluff Depth: Onsite Date Sampled: 4/18/23
Sample Number: 19

GeoTest, Inc. West Allis, WI	Client: Three Leaf Partners Project: Hatland Quarry Apartments Project No: 7708 Test No 7189-6864
---	---

Appendix 3

Drainage Area Maps

**PRELIMINARY
NOT FOR
CONSTRUCTION**



(1S):
0.49 AC PAVED ROADS
1.56 AC PAVED DRIVES
1.54 AC ROOFS
0.41 AC PAVED PARKING
0.45 AC PAVED WALKS
0.27 AC STORMWATER
6.59 AC LANDSCAPE
2.40 AC UNDEVELOPED
TOTAL: 13.71 AC, tc=6.0 min., CN 62

NW INF 1P
2-YR HWL=962.40
10-YR HWL=963.37
100-YR HWL=965.89
FROZEN 100-YR HWL=971.48

(2S):
0.16 AC PAVED ROADS
1.23 AC PAVED DRIVES
1.34 AC ROOFS
0.31 AC PAVED PARKING
0.34 AC PAVED WALKS
0.51 AC STORMWATER
6.38 AC LANDSCAPE
3.39 AC UNDEVELOPED
TOTAL: 13.66 AC, tc=6.0 min., CN 60

(4S):
0.06 AC PAVED ROADS
0.51 AC PAVED DRIVES
0.59 AC ROOFS
0.28 AC PAVED PARKING
0.17 AC PAVED WALKS
0.07 AC STORMWATER
1.74 AC LANDSCAPE
TOTAL: 3.42 AC, tc=6.0 min., CN 68

NE INF 2P
2-YR HWL=960.11
10-YR HWL=960.64
100-YR HWL=962.38
FROZEN 100-YR HWL=968.28

EAST INF 3P
2-YR HWL=963.41
10-YR HWL=964.19
100-YR HWL=966.35
FROZEN 100-YR HWL=971.79

(3S):
1.94 AC PAVED DRIVES
1.89 AC ROOFS
0.47 AC PAVED PARKING
0.65 AC PAVED WALKS
0.44 AC STORMWATER
5.24 AC LANDSCAPE
2.87 AC UNDEVELOPED
TOTAL: 13.50 AC, tc=6.0 min., CN 66

(5S):
0.87 AC PAVED DRIVES
0.47 AC ROOFS
0.14 AC PAVED PARKING
0.35 AC PAVED WALKS
0.13 AC STORMWATER
1.29 AC LANDSCAPE
1.12 AC UNDEVELOPED
TOTAL: 4.37 AC, tc=6.0 min., CN 70

SW BIO 4P
2-YR HWL=954.70
10-YR HWL=957.29
100-YR HWL=958.75

SE BIO 5P
2-YR HWL=955.89
10-YR HWL=958.29
100-YR HWL=959.69

NO.	REVISION DESCRIPTION	DATE

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PROJECT: **HARTLAND APARTMENTS**
700 W. CAPITOL DRIVE
VILLAGE OF HARTLAND, WI

CLIENT: **THREE LEAF PARTNERS**
504 W. JUNEAU AVENUE
MILWAUKEE, WI 53203

PROPOSED HYDROLOGY EXHIBIT

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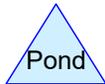
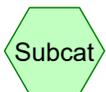
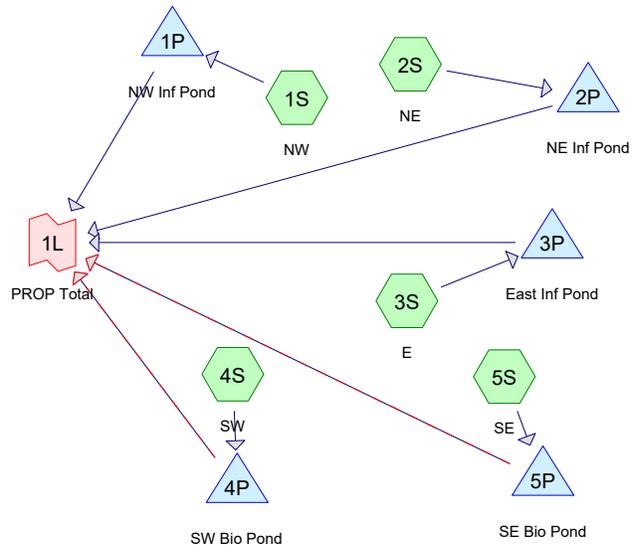
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Drawn: JNL 08/25/2023
Checked: CTD 08/25/2023
P&D Project No: 490686
Sheet No:

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EX2

Appendix 4

HydroCAD Model Results



2024 03 04 Hartland Apartments

Prepared by Payne & Dolan

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Page 2

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	2.40	2
2	2-year	MSE 24-hr	3	Default	24.00	1	2.71	2
3	10-year	MSE 24-hr	3	Default	24.00	1	3.83	2
4	100-year	MSE 24-hr	3	Default	24.00	1	6.26	2

2024 03 04 Hartland Apartments

Prepared by Payne & Dolan

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Page 3

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
21.237	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S, 5S)
2.034	61	>75% Grass cover, Good, HSG B (2S)
4.858	98	Gravel, HSG A (S1)
0.588	98	Offsite Impervious yard area, HSG B (2S)
6.106	98	Paved drives, HSG A (1S, 2S, 3S, 4S, 5S)
1.603	98	Paved parking, HSG A (1S, 2S, 3S, 4S, 5S)
1.891	98	Paved roads, HSG B (1S, 2S, 4S, S1)
1.957	98	Paved walks, HSG A (1S, 2S, 3S, 4S, 5S)
5.835	98	Roofs, HSG A (1S, 2S, 3S, 4S, 5S)
18.615	57	Undeveloped Woods/grass comb., Poor, HSG A (1S, 2S, 3S, 5S, S1)
1.424	98	Water Surface, 0% imp, HSG A (1S, 2S, 3S, 4S, 5S)
66.148	66	TOTAL AREA

2024 03 04 Hartland Apartments

Prepared by Payne & Dolan

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Page 4

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
61.635	HSG A	1S, 2S, 3S, 4S, 5S, S1
4.513	HSG B	1S, 2S, 4S, S1
0.000	HSG C	
0.000	HSG D	
0.000	Other	
66.148		TOTAL AREA

2024 03 04 Hartland Apartments

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Page 5

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcat Numbers
21.237	2.034	0.000	0.000	0.000	23.271	>75% Grass cover, Good	
4.858	0.000	0.000	0.000	0.000	4.858	Gravel	
0.000	0.588	0.000	0.000	0.000	0.588	Offsite Impervious yard area	
6.106	0.000	0.000	0.000	0.000	6.106	Paved drives	
1.603	0.000	0.000	0.000	0.000	1.603	Paved parking	
0.000	1.891	0.000	0.000	0.000	1.891	Paved roads	
1.957	0.000	0.000	0.000	0.000	1.957	Paved walks	
5.835	0.000	0.000	0.000	0.000	5.835	Roofs	
18.615	0.000	0.000	0.000	0.000	18.615	Undeveloped Woods/grass comb., Poor	
1.424	0.000	0.000	0.000	0.000	1.424	Water Surface, 0% imp	
61.635	4.513	0.000	0.000	0.000	66.148	TOTAL AREA	

2024 03 04 Hartland Apartments

Prepared by Payne & Dolan

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Page 6

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	4P	953.25	952.84	73.9	0.0055	0.013	0.0	12.0	0.0	
2	4P	953.55	953.25	60.0	0.0050	0.010	0.0	6.0	0.0	
3	5P	954.25	952.91	71.4	0.0188	0.013	0.0	12.0	0.0	
4	5P	954.75	954.25	100.0	0.0050	0.010	0.0	6.0	0.0	

2024 03 04 Hartland Apartments

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MSE 24-hr 3 1-year Rainfall=2.40"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1S: NW	Runoff Area=14.237 ac 35.02% Impervious Runoff Depth=0.24" Tc=6.0 min CN=64 Runoff=3.48 cfs 0.280 af
Subcatchment 2S: NE	Runoff Area=16.766 ac 26.58% Impervious Runoff Depth=0.21" Tc=6.0 min CN=63 Runoff=3.22 cfs 0.296 af
Subcatchment 3S: E	Runoff Area=13.501 ac 36.63% Impervious Runoff Depth=0.29" Tc=6.0 min CN=66 Runoff=4.85 cfs 0.324 af
Subcatchment 4S: SW	Runoff Area=3.418 ac 46.78% Impervious Runoff Depth=0.35" Tc=6.0 min CN=68 Runoff=1.66 cfs 0.098 af
Subcatchment 5S: SE	Runoff Area=4.370 ac 41.76% Impervious Runoff Depth=0.41" Tc=6.0 min CN=70 Runoff=2.73 cfs 0.149 af
Subcatchment S1: SOUTH	Runoff Area=13.856 ac 36.27% Impervious Runoff Depth=0.48" Tc=6.0 min CN=72 Runoff=10.70 cfs 0.551 af
Pond 1P: NW Inf Pond	Peak Elev=962.31' Storage=2,605 cf Inflow=3.48 cfs 0.280 af Outflow=0.81 cfs 0.280 af
Pond 2P: NE Inf Pond	Peak Elev=960.12' Storage=1,904 cf Inflow=3.22 cfs 0.296 af Outflow=1.33 cfs 0.296 af
Pond 3P: East Inf Pond	Peak Elev=963.23' Storage=3,006 cf Inflow=4.85 cfs 0.324 af Outflow=1.19 cfs 0.324 af
Pond 4P: SW Bio Pond	Peak Elev=954.22' Storage=1,035 cf Inflow=1.66 cfs 0.098 af Primary=0.48 cfs 0.091 af Secondary=0.00 cfs 0.000 af Outflow=0.48 cfs 0.091 af
Pond 5P: SE Bio Pond	Peak Elev=955.39' Storage=2,214 cf Inflow=2.73 cfs 0.149 af Primary=0.46 cfs 0.126 af Secondary=0.00 cfs 0.000 af Outflow=0.46 cfs 0.126 af
Link 1L: PROP Total	Inflow=0.94 cfs 0.217 af Primary=0.94 cfs 0.217 af

Total Runoff Area = 66.148 ac Runoff Volume = 1.697 af Average Runoff Depth = 0.31"
65.47% Pervious = 43.310 ac 34.53% Impervious = 22.838 ac

Summary for Subcatchment 1S: NW

Runoff = 3.48 cfs @ 12.17 hrs, Volume= 0.280 af, Depth= 0.24"
 Routed to Pond 1P : NW Inf Pond

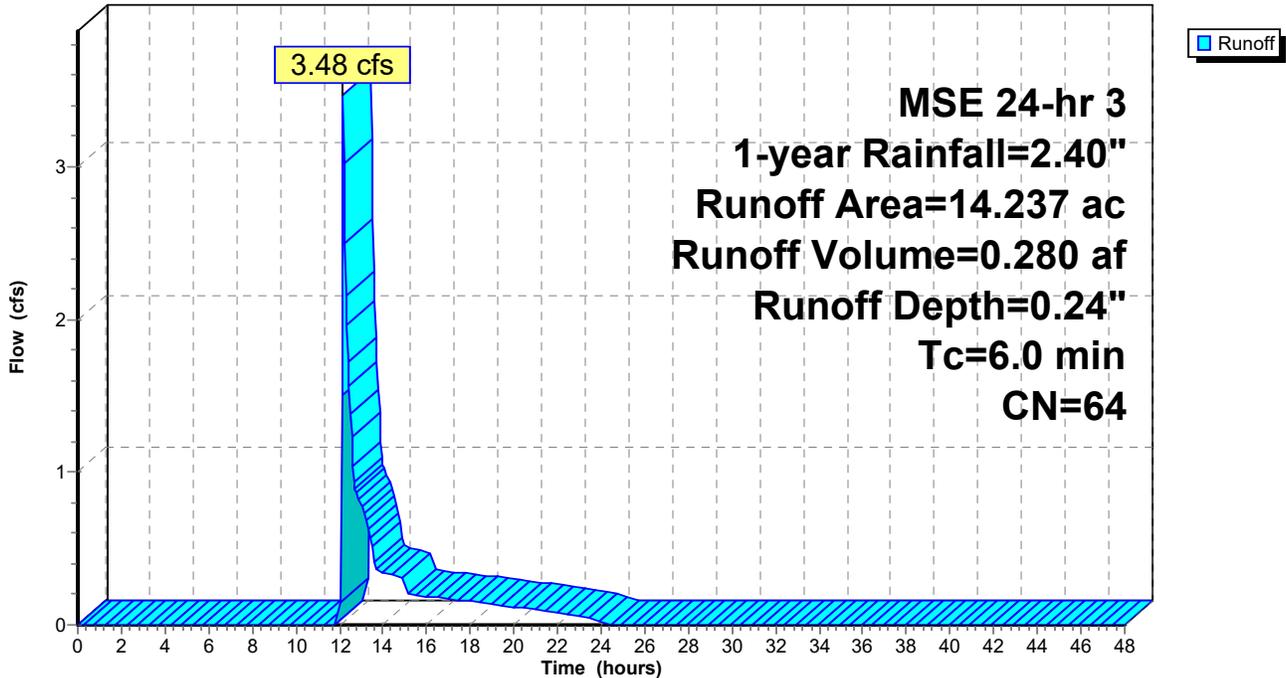
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 1-year Rainfall=2.40"

Area (ac)	CN	Description
* 1.017	98	Paved roads, HSG B
* 1.562	98	Paved drives, HSG A
1.544	98	Roofs, HSG A
0.408	98	Paved parking, HSG A
* 0.455	98	Paved walks, HSG A
0.267	98	Water Surface, 0% imp, HSG A
6.586	39	>75% Grass cover, Good, HSG A
2.398	57	Undeveloped Woods/grass comb., Poor, HSG A
14.237	64	Weighted Average
9.251		64.98% Pervious Area
4.986		35.02% Impervious Area

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

Subcatchment 1S: NW

Hydrograph



Summary for Subcatchment 2S: NE

Runoff = 3.22 cfs @ 12.17 hrs, Volume= 0.296 af, Depth= 0.21"
 Routed to Pond 2P : NE Inf Pond

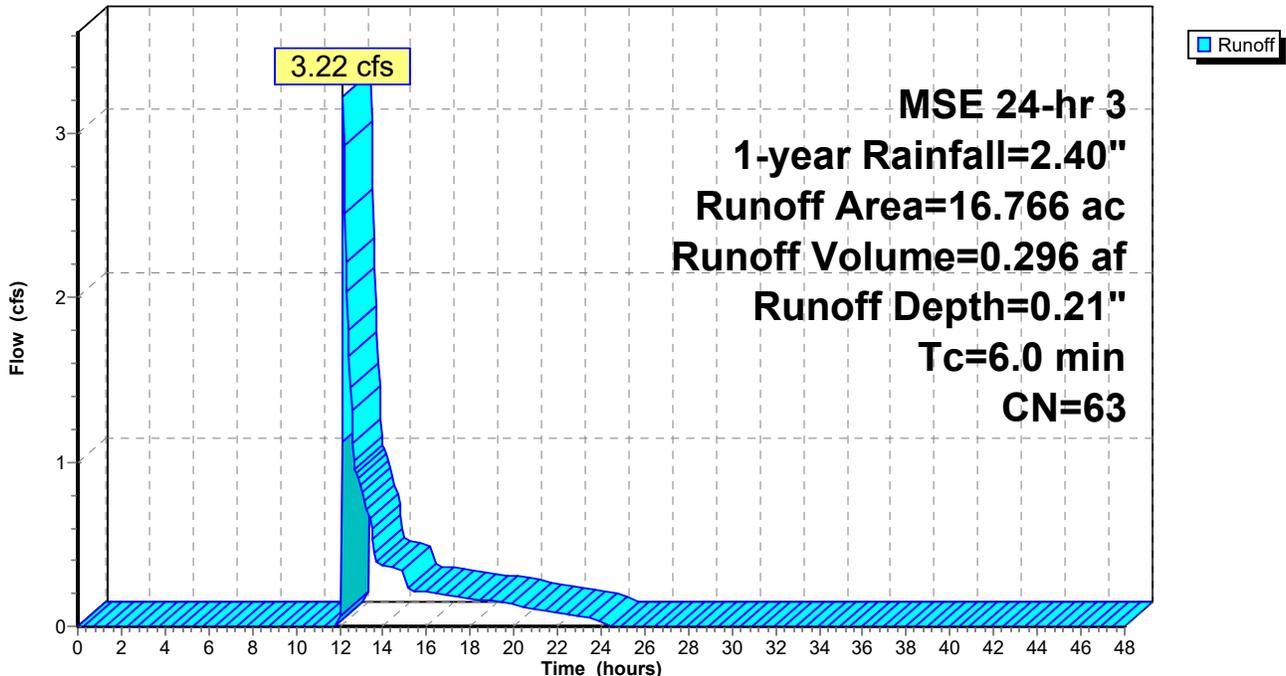
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 1-year Rainfall=2.40"

Area (ac)	CN	Description
* 0.652	98	Paved roads, HSG B
* 1.227	98	Paved drives, HSG A
1.346	98	Roofs, HSG A
0.307	98	Paved parking, HSG A
* 0.337	98	Paved walks, HSG A
* 0.588	98	Offsite Impervious yard area, HSG B
0.506	98	Water Surface, 0% imp, HSG A
6.376	39	>75% Grass cover, Good, HSG A
2.034	61	>75% Grass cover, Good, HSG B
3.393	57	Undeveloped Woods/grass comb., Poor, HSG A
16.766	63	Weighted Average
12.309		73.42% Pervious Area
4.457		26.58% Impervious Area

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

Subcatchment 2S: NE

Hydrograph



Summary for Subcatchment 3S: E

Runoff = 4.85 cfs @ 12.16 hrs, Volume= 0.324 af, Depth= 0.29"
 Routed to Pond 3P : East Inf Pond

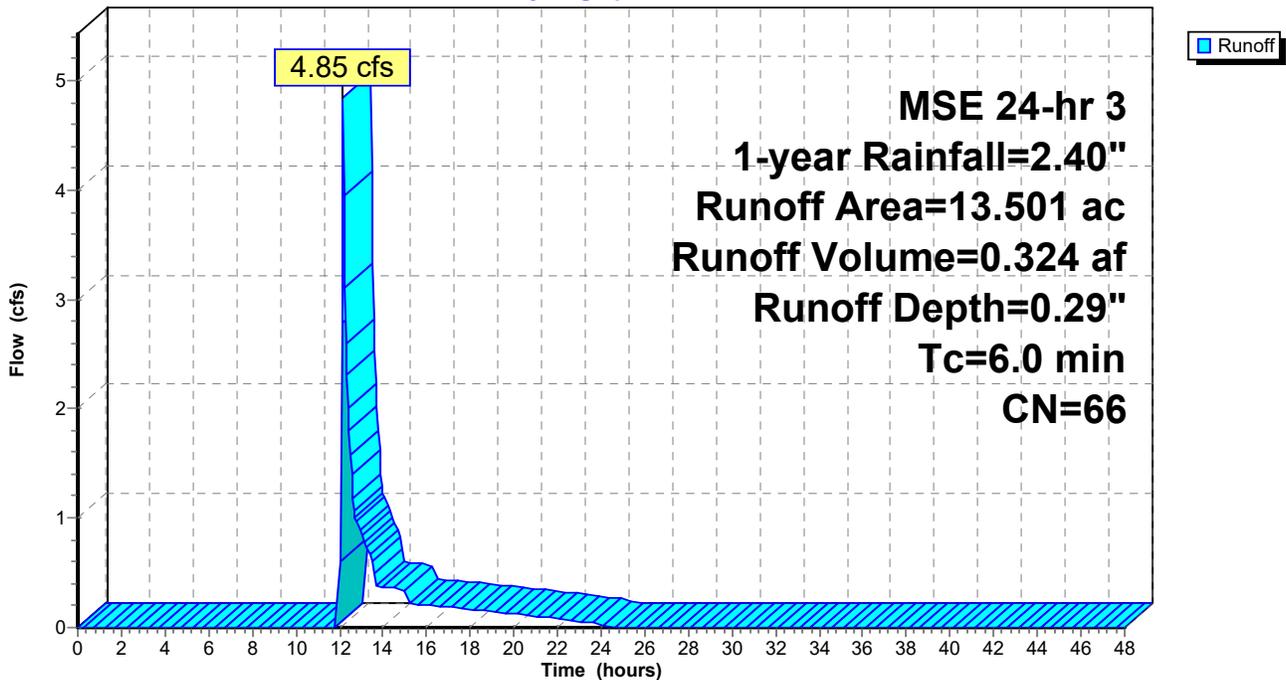
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 1-year Rainfall=2.40"

Area (ac)	CN	Description
* 1.934	98	Paved drives, HSG A
1.888	98	Roofs, HSG A
0.472	98	Paved parking, HSG A
* 0.652	98	Paved walks, HSG A
0.442	98	Water Surface, 0% imp, HSG A
5.239	39	>75% Grass cover, Good, HSG A
2.874	57	Undeveloped Woods/grass comb., Poor, HSG A
13.501	66	Weighted Average
8.555		63.37% Pervious Area
4.946		36.63% Impervious Area

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

Subcatchment 3S: E

Hydrograph



Summary for Subcatchment 4S: SW

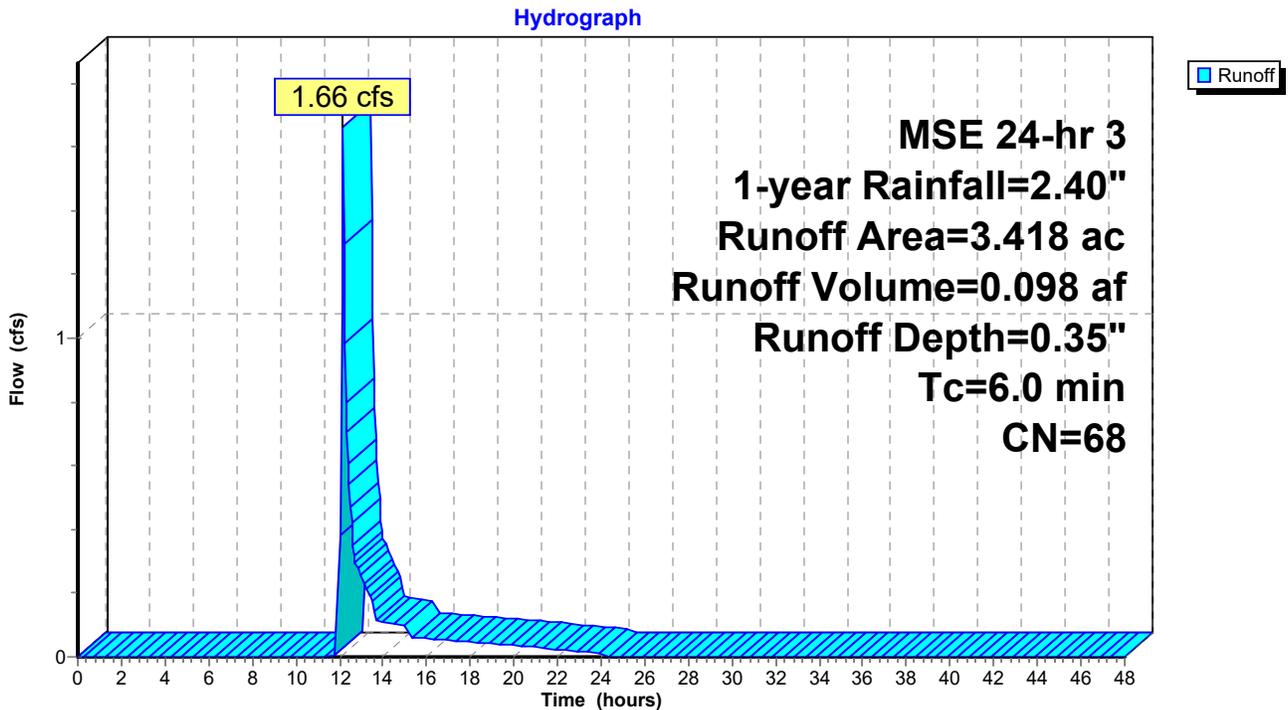
Runoff = 1.66 cfs @ 12.15 hrs, Volume= 0.098 af, Depth= 0.35"
 Routed to Pond 4P : SW Bio Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 1-year Rainfall=2.40"

Area (ac)	CN	Description
* 0.055	98	Paved roads, HSG B
* 0.514	98	Paved drives, HSG A
0.587	98	Roofs, HSG A
0.275	98	Paved parking, HSG A
* 0.168	98	Paved walks, HSG A
0.074	98	Water Surface, 0% imp, HSG A
1.745	39	>75% Grass cover, Good, HSG A
0.000	57	Undeveloped Woods/grass comb., Poor, HSG A
3.418	68	Weighted Average
1.819		53.22% Pervious Area
1.599		46.78% Impervious Area

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

Subcatchment 4S: SW



Summary for Subcatchment 5S: SE

Runoff = 2.73 cfs @ 12.15 hrs, Volume= 0.149 af, Depth= 0.41"
 Routed to Pond 5P : SE Bio Pond

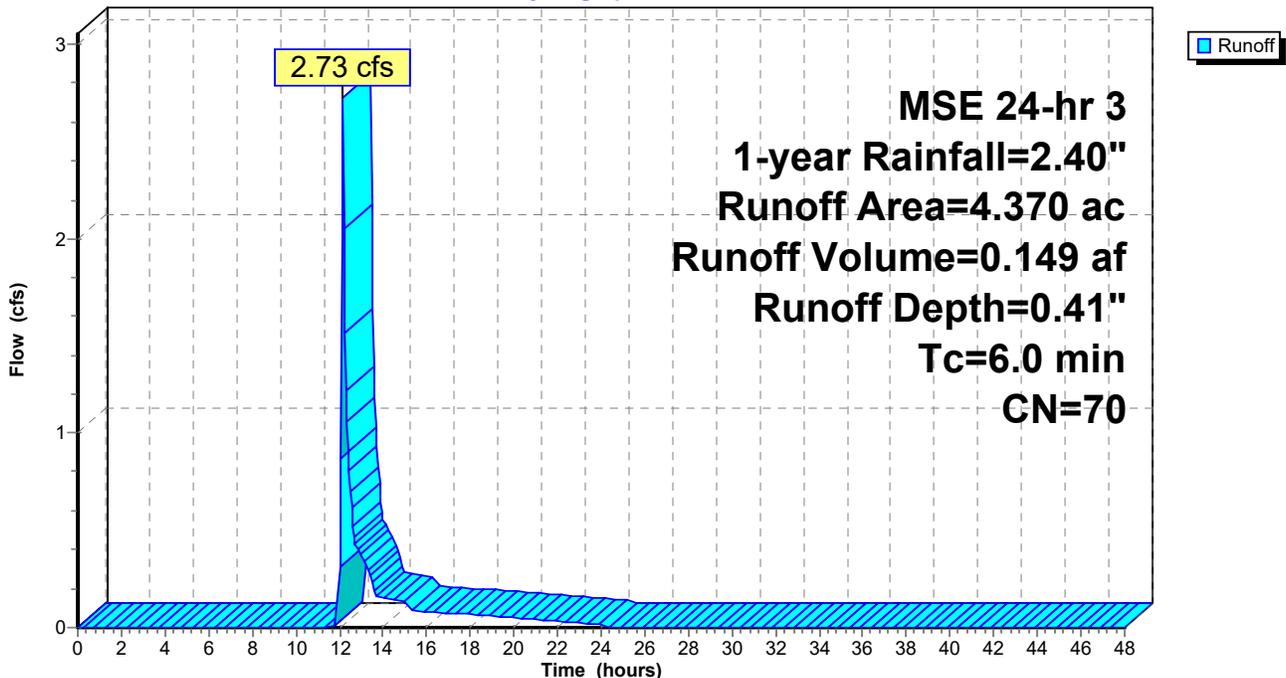
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 1-year Rainfall=2.40"

Area (ac)	CN	Description
* 0.869	98	Paved drives, HSG A
0.470	98	Roofs, HSG A
0.141	98	Paved parking, HSG A
* 0.345	98	Paved walks, HSG A
0.135	98	Water Surface, 0% imp, HSG A
1.291	39	>75% Grass cover, Good, HSG A
1.119	57	Undeveloped Woods/grass comb., Poor, HSG A
4.370	70	Weighted Average
2.545		58.24% Pervious Area
1.825		41.76% Impervious Area

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

Subcatchment 5S: SE

Hydrograph



Summary for Subcatchment S1: SOUTH

Runoff = 10.70 cfs @ 12.15 hrs, Volume= 0.551 af, Depth= 0.48"

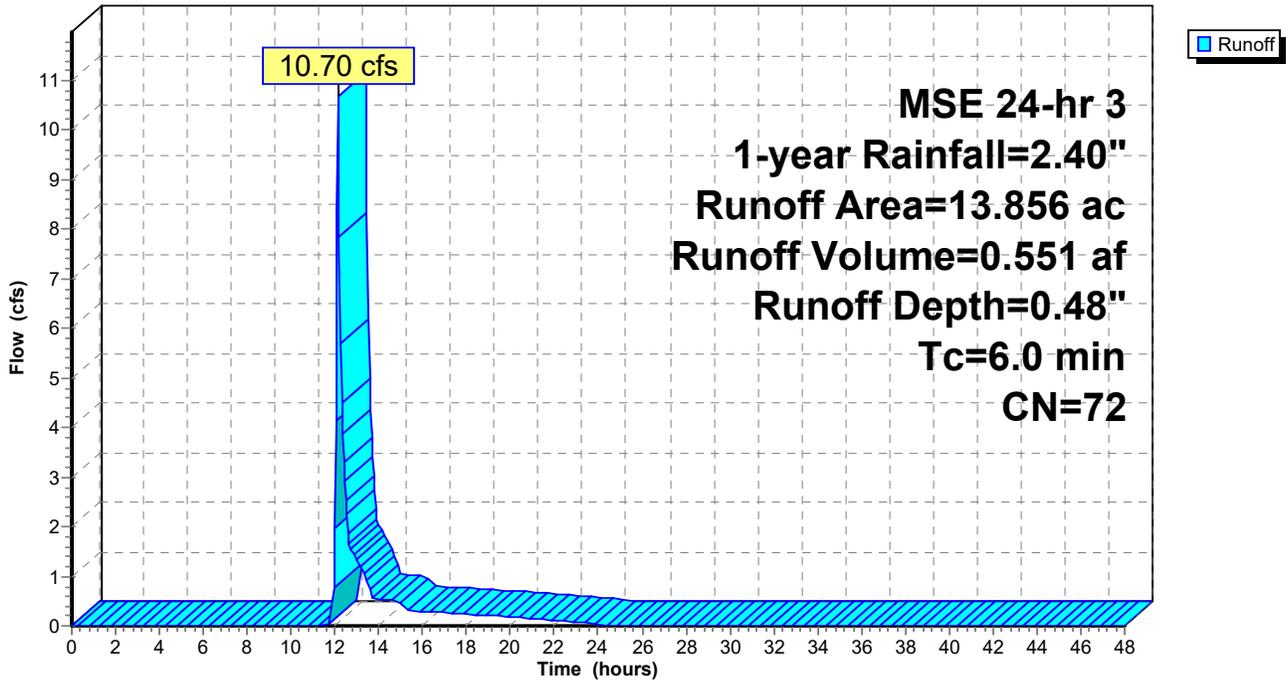
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 1-year Rainfall=2.40"

Area (ac)	CN	Description
* 0.167	98	Paved roads, HSG B
* 4.858	98	Gravel, HSG A
* 8.831	57	Undeveloped Woods/grass comb., Poor, HSG A
13.856	72	Weighted Average
8.831		63.73% Pervious Area
5.025		36.27% Impervious Area

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

Subcatchment S1: SOUTH

Hydrograph



Summary for Pond 1P: NW Inf Pond

Inflow Area = 14.237 ac, 35.02% Impervious, Inflow Depth = 0.24" for 1-year event
 Inflow = 3.48 cfs @ 12.17 hrs, Volume= 0.280 af
 Outflow = 0.81 cfs @ 12.94 hrs, Volume= 0.280 af, Atten= 77%, Lag= 46.2 min
 Discarded = 0.81 cfs @ 12.94 hrs, Volume= 0.280 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 962.31' @ 12.94 hrs Surf.Area= 9,727 sf Storage= 2,605 cf

Plug-Flow detention time= 33.4 min calculated for 0.279 af (100% of inflow)
 Center-of-Mass det. time= 33.4 min (921.0 - 887.6)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	416,608 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

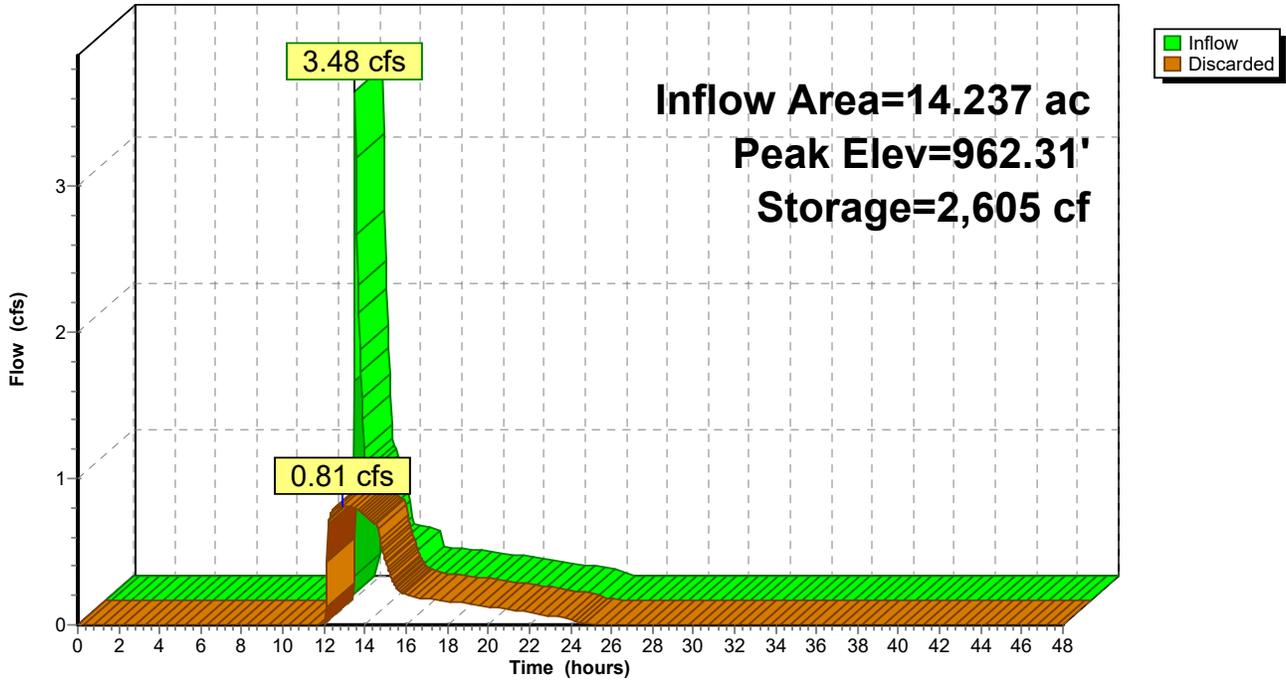
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	7,245	0	0
963.00	15,330	11,288	11,288
964.00	18,315	16,823	28,110
965.00	21,405	19,860	47,970
966.00	24,600	23,003	70,973
967.00	28,570	26,585	97,558
968.00	34,660	31,615	129,173
969.00	41,790	38,225	167,398
970.00	49,670	45,730	213,128
971.00	61,720	55,695	268,823
972.00	73,620	67,670	336,493
973.00	86,610	80,115	416,608

Device	Routing	Invert	Outlet Devices
#1	Discarded	962.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.81 cfs @ 12.94 hrs HW=962.31' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.81 cfs)

Pond 1P: NW Inf Pond

Hydrograph



Summary for Pond 2P: NE Inf Pond

Inflow Area = 16.766 ac, 26.58% Impervious, Inflow Depth = 0.21" for 1-year event
 Inflow = 3.22 cfs @ 12.17 hrs, Volume= 0.296 af
 Outflow = 1.33 cfs @ 12.54 hrs, Volume= 0.296 af, Atten= 59%, Lag= 22.1 min
 Discarded = 1.33 cfs @ 12.54 hrs, Volume= 0.296 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 960.12' @ 12.54 hrs Surf.Area= 15,976 sf Storage= 1,904 cf

Plug-Flow detention time= 23.0 min calculated for 0.295 af (100% of inflow)
 Center-of-Mass det. time= 23.0 min (916.9 - 893.9)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	567,415 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	14,595	0	0
961.00	25,680	20,138	20,138
962.00	28,185	26,933	47,070
963.00	30,790	29,488	76,558
964.00	33,495	32,143	108,700
965.00	39,885	36,690	145,390
966.00	43,300	41,593	186,983
967.00	47,800	45,550	232,533
968.00	53,360	50,580	283,113
969.00	60,550	56,955	340,068
970.00	69,030	64,790	404,858
971.00	80,830	74,930	479,788
972.00	94,425	87,628	567,415

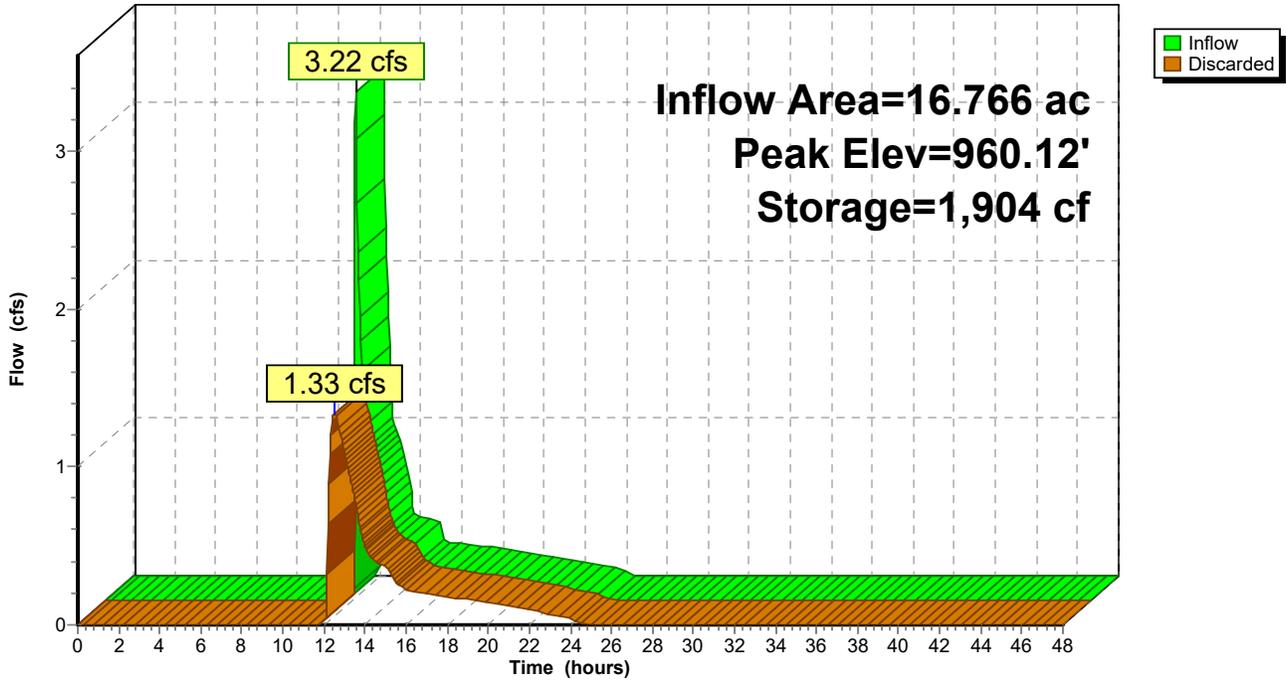
Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.33 cfs @ 12.54 hrs HW=960.12' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 1.33 cfs)

Pond 2P: NE Inf Pond

Hydrograph



Summary for Pond 3P: East Inf Pond

Inflow Area = 13.501 ac, 36.63% Impervious, Inflow Depth = 0.29" for 1-year event
 Inflow = 4.85 cfs @ 12.16 hrs, Volume= 0.324 af
 Outflow = 1.19 cfs @ 12.61 hrs, Volume= 0.324 af, Atten= 75%, Lag= 26.7 min
 Discarded = 1.19 cfs @ 12.61 hrs, Volume= 0.324 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 963.23' @ 12.61 hrs Surf.Area= 14,302 sf Storage= 3,006 cf

Plug-Flow detention time= 28.5 min calculated for 0.323 af (100% of inflow)
 Center-of-Mass det. time= 28.6 min (905.1 - 876.5)

Volume	Invert	Avail.Storage	Storage Description
#1	963.00'	544,443 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
963.00	11,805	0	0
964.00	22,650	17,228	17,228
965.00	25,340	23,995	41,223
966.00	28,125	26,733	67,955
967.00	31,015	29,570	97,525
968.00	34,225	32,620	130,145
969.00	38,050	36,138	166,283
970.00	43,800	40,925	207,208
971.00	49,335	46,568	253,775
972.00	57,675	53,505	307,280
973.00	69,980	63,828	371,108
974.00	85,260	77,620	448,728
975.00	106,170	95,715	544,443

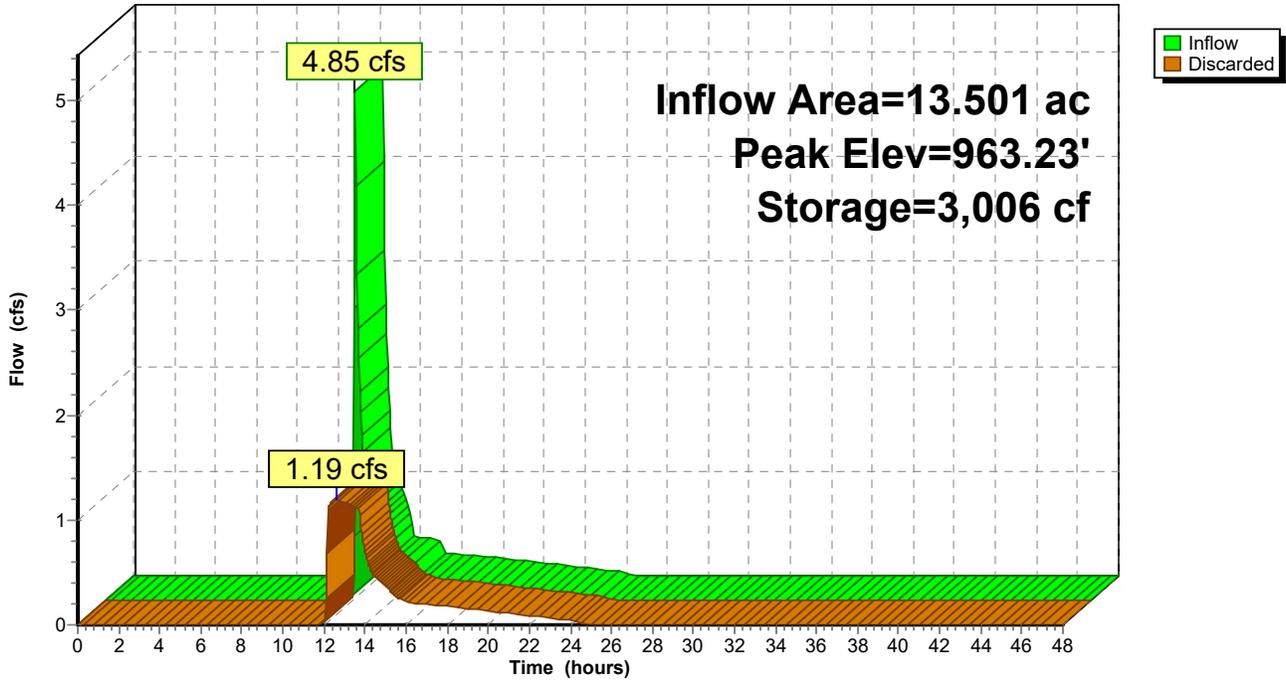
Device	Routing	Invert	Outlet Devices
#1	Discarded	963.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.19 cfs @ 12.61 hrs HW=963.23' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 1.19 cfs)

Pond 3P: East Inf Pond

Hydrograph



Summary for Pond 4P: SW Bio Pond

Inflow Area = 3.418 ac, 46.78% Impervious, Inflow Depth = 0.35" for 1-year event
 Inflow = 1.66 cfs @ 12.15 hrs, Volume= 0.098 af
 Outflow = 0.48 cfs @ 12.50 hrs, Volume= 0.091 af, Atten= 71%, Lag= 20.5 min
 Primary = 0.48 cfs @ 12.50 hrs, Volume= 0.091 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 954.22' @ 12.50 hrs Surf.Area= 3,240 sf Storage= 1,035 cf

Plug-Flow detention time= 85.1 min calculated for 0.091 af (92% of inflow)
 Center-of-Mass det. time= 50.8 min (917.7 - 866.9)

Volume	Invert	Avail.Storage	Storage Description	
#1	953.25'	11,962 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
953.25	3,240	0.0	0	0
954.42	3,240	33.0	1,251	1,251
954.75	3,240	33.0	353	1,604
957.00	3,240	27.0	1,968	3,572
959.00	5,150	100.0	8,390	11,962

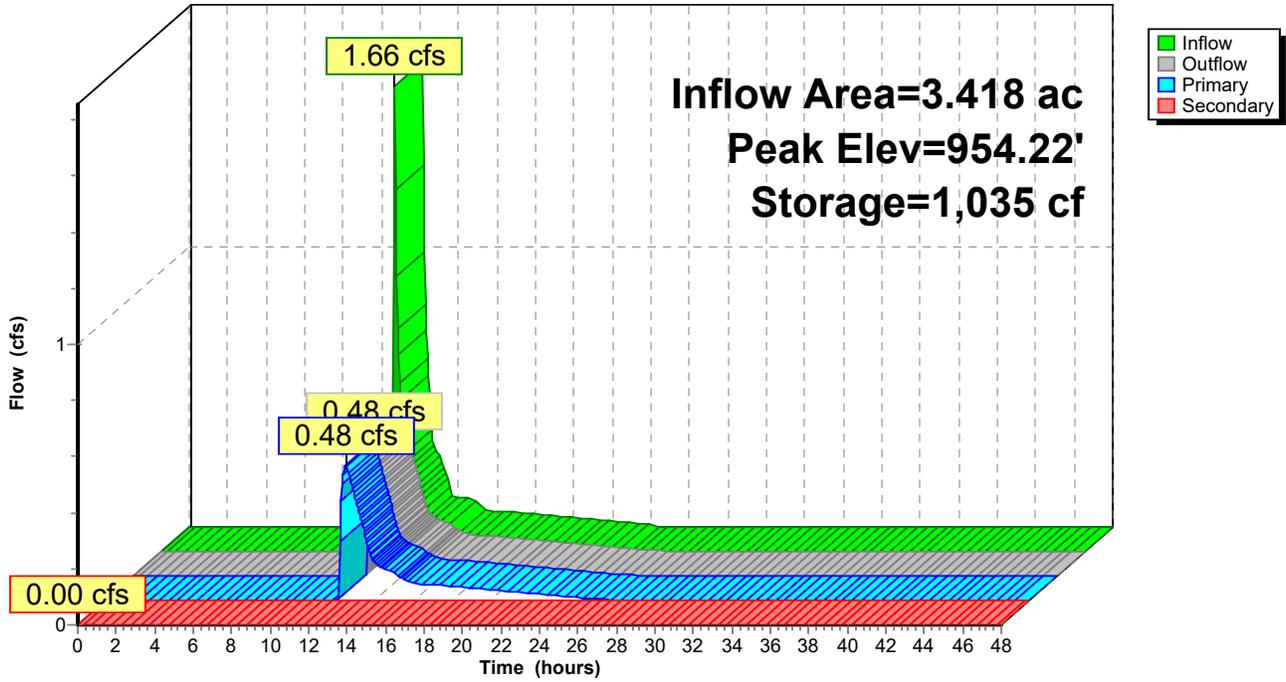
Device	Routing	Invert	Outlet Devices
#1	Primary	953.25'	12.0" Round Culvert L= 73.9' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 953.25' / 952.84' S= 0.0055 1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	953.55'	6.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 953.55' / 953.25' S= 0.0050 1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	958.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	958.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.48 cfs @ 12.50 hrs HW=954.22' (Free Discharge)
 ↑ **1=Culvert** (Passes 0.48 cfs of 2.27 cfs potential flow)
 ↑ **2=Culvert** (Inlet Controls 0.48 cfs @ 2.46 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=953.25' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: SW Bio Pond

Hydrograph



Summary for Pond 5P: SE Bio Pond

Inflow Area = 4.370 ac, 41.76% Impervious, Inflow Depth = 0.41" for 1-year event
 Inflow = 2.73 cfs @ 12.15 hrs, Volume= 0.149 af
 Outflow = 0.46 cfs @ 12.66 hrs, Volume= 0.126 af, Atten= 83%, Lag= 30.4 min
 Primary = 0.46 cfs @ 12.66 hrs, Volume= 0.126 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 955.39' @ 12.66 hrs Surf.Area= 5,895 sf Storage= 2,214 cf

Plug-Flow detention time= 150.1 min calculated for 0.126 af (85% of inflow)
 Center-of-Mass det. time= 87.6 min (946.0 - 858.4)

Volume	Invert	Avail.Storage	Storage Description	
#1	954.25'	20,934 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
954.25	5,895	0.0	0	0
955.42	5,895	33.0	2,276	2,276
955.75	5,895	33.0	642	2,918
958.00	5,895	27.0	3,581	6,499
960.00	8,540	100.0	14,435	20,934

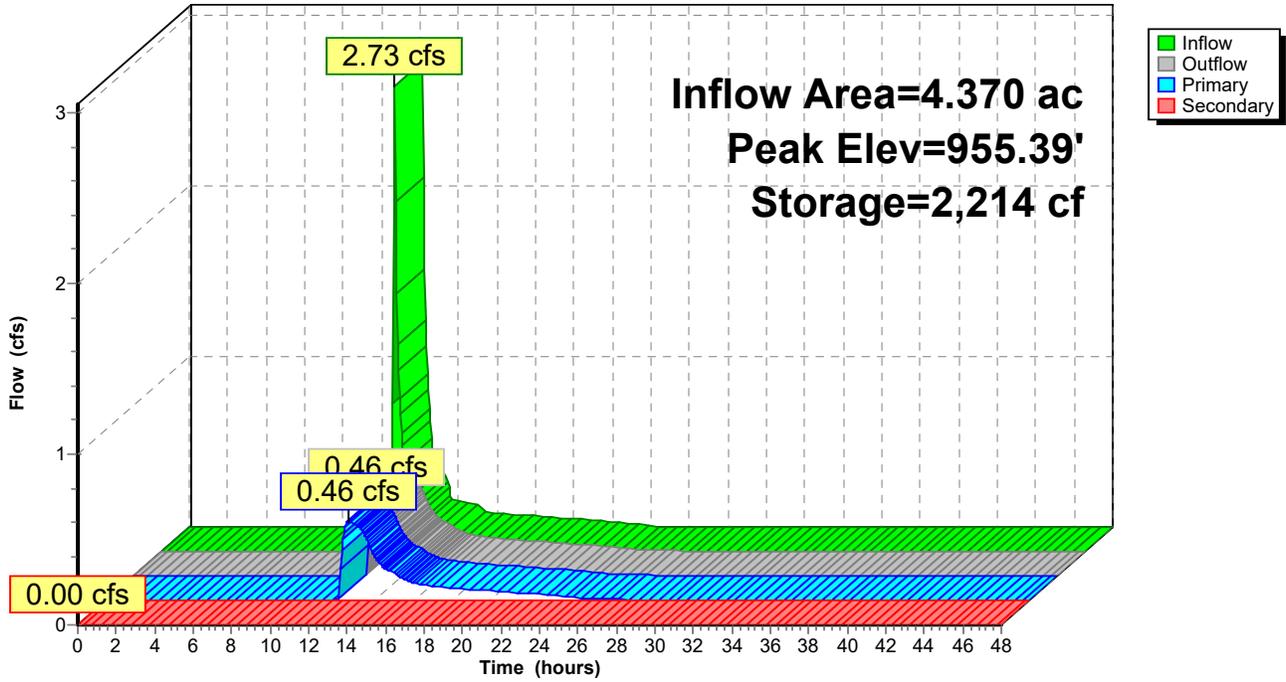
Device	Routing	Invert	Outlet Devices
#1	Primary	954.25'	12.0" Round Culvert L= 71.4' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 954.25' / 952.91' S= 0.0188 1/8" Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	954.75'	6.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 954.75' / 954.25' S= 0.0050 1/2" Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	959.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.46 cfs @ 12.66 hrs HW=955.39' (Free Discharge)
 ↑ **1=Culvert** (Passes 0.46 cfs of 3.77 cfs potential flow)
 ↑ **2=Culvert** (Inlet Controls 0.46 cfs @ 2.37 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=954.25' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: SE Bio Pond

Hydrograph



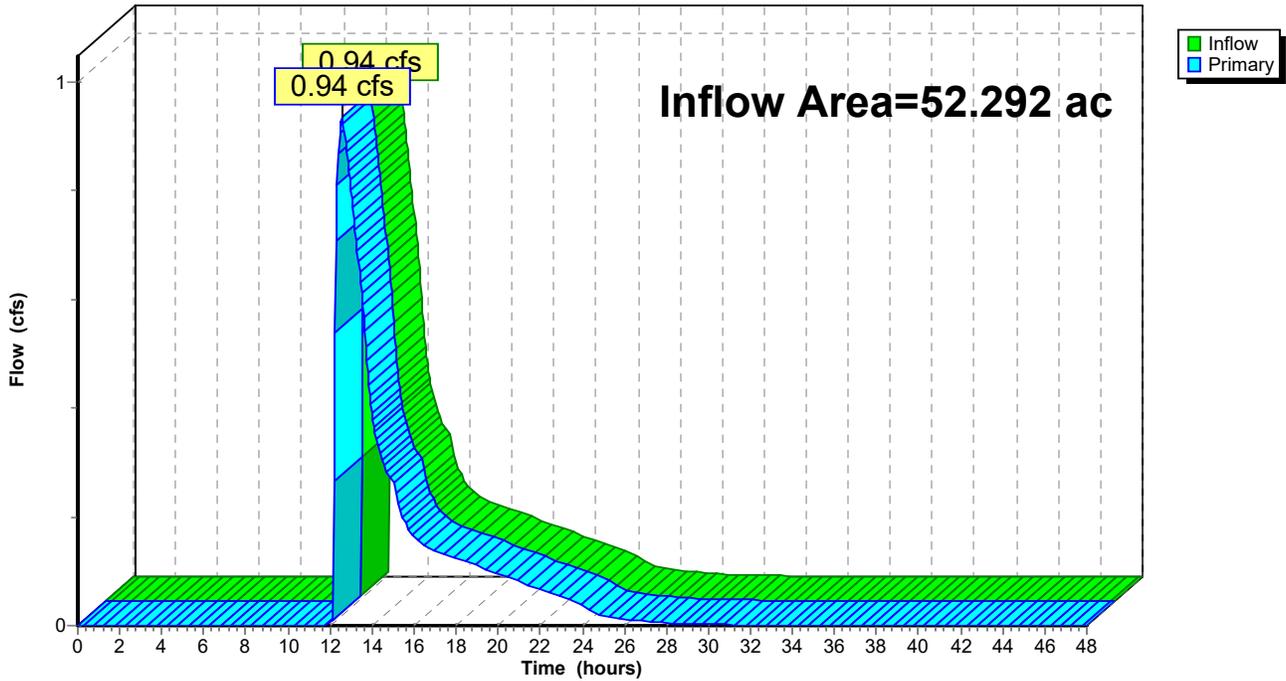
Summary for Link 1L: PROP Total

Inflow Area = 52.292 ac, 34.06% Impervious, Inflow Depth > 0.05" for 1-year event
Inflow = 0.94 cfs @ 12.56 hrs, Volume= 0.217 af
Primary = 0.94 cfs @ 12.56 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: PROP Total

Hydrograph



2024 03 04 Hartland Apartments

Prepared by Payne & Dolan

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MSE 24-hr 3 2-year Rainfall=2.71"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1S: NW	Runoff Area=14.237 ac 35.02% Impervious Runoff Depth=0.35" Tc=6.0 min CN=64 Runoff=6.52 cfs 0.413 af
Subcatchment 2S: NE	Runoff Area=16.766 ac 26.58% Impervious Runoff Depth=0.32" Tc=6.0 min CN=63 Runoff=6.55 cfs 0.445 af
Subcatchment 3S: E	Runoff Area=13.501 ac 36.63% Impervious Runoff Depth=0.41" Tc=6.0 min CN=66 Runoff=8.11 cfs 0.465 af
Subcatchment 4S: SW	Runoff Area=3.418 ac 46.78% Impervious Runoff Depth=0.48" Tc=6.0 min CN=68 Runoff=2.57 cfs 0.138 af
Subcatchment 5S: SE	Runoff Area=4.370 ac 41.76% Impervious Runoff Depth=0.56" Tc=6.0 min CN=70 Runoff=3.99 cfs 0.204 af
Subcatchment S1: SOUTH	Runoff Area=13.856 ac 36.27% Impervious Runoff Depth=0.64" Tc=6.0 min CN=72 Runoff=15.02 cfs 0.741 af
Pond 1P: NW Inf Pond	Peak Elev=962.57' Storage=5,402 cf Inflow=6.52 cfs 0.413 af Outflow=0.99 cfs 0.413 af
Pond 2P: NE Inf Pond	Peak Elev=960.27' Storage=4,332 cf Inflow=6.55 cfs 0.445 af Outflow=1.47 cfs 0.445 af
Pond 3P: East Inf Pond	Peak Elev=963.41' Storage=5,768 cf Inflow=8.11 cfs 0.465 af Outflow=1.36 cfs 0.465 af
Pond 4P: SW Bio Pond	Peak Elev=954.70' Storage=1,547 cf Inflow=2.57 cfs 0.138 af Primary=0.71 cfs 0.130 af Secondary=0.00 cfs 0.000 af Outflow=0.71 cfs 0.130 af
Pond 5P: SE Bio Pond	Peak Elev=955.89' Storage=3,137 cf Inflow=3.99 cfs 0.204 af Primary=0.66 cfs 0.181 af Secondary=0.00 cfs 0.000 af Outflow=0.66 cfs 0.181 af
Link 1L: PROP Total	Inflow=1.35 cfs 0.311 af Primary=1.35 cfs 0.311 af

Total Runoff Area = 66.148 ac Runoff Volume = 2.405 af Average Runoff Depth = 0.44"
65.47% Pervious = 43.310 ac 34.53% Impervious = 22.838 ac

Summary for Subcatchment 1S: NW

Runoff = 6.52 cfs @ 12.16 hrs, Volume= 0.413 af, Depth= 0.35"
 Routed to Pond 1P : NW Inf Pond

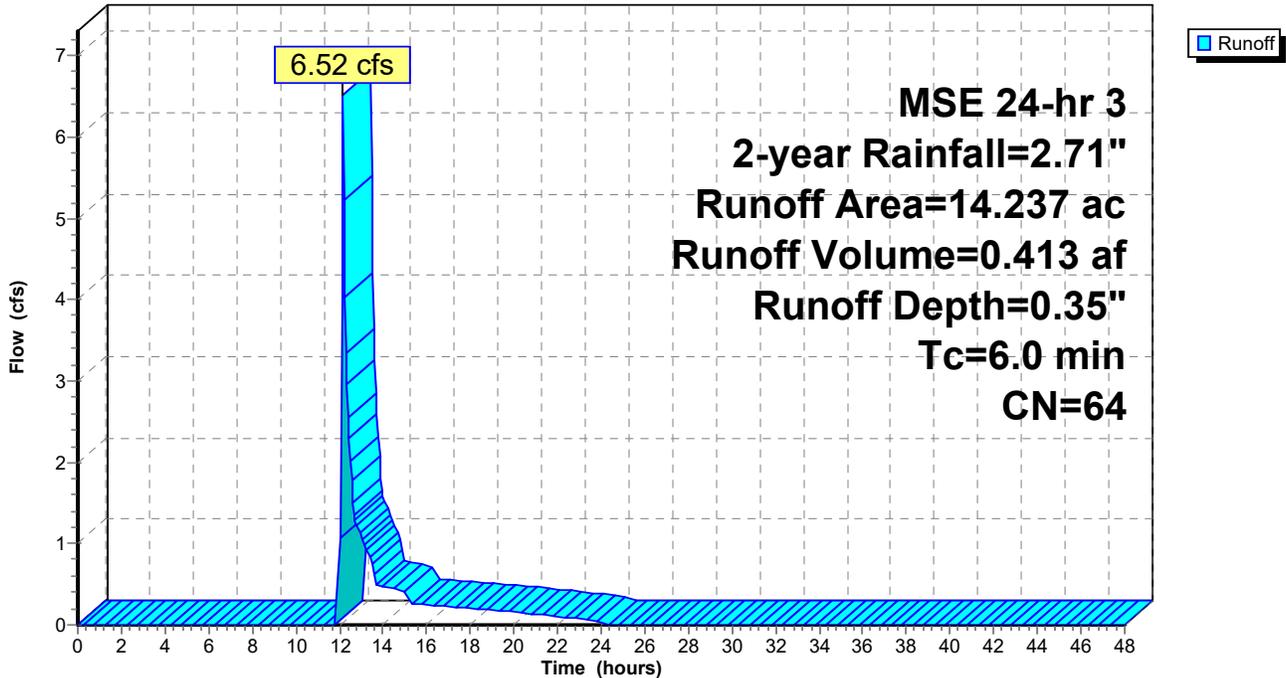
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-year Rainfall=2.71"

Area (ac)	CN	Description
* 1.017	98	Paved roads, HSG B
* 1.562	98	Paved drives, HSG A
1.544	98	Roofs, HSG A
0.408	98	Paved parking, HSG A
* 0.455	98	Paved walks, HSG A
0.267	98	Water Surface, 0% imp, HSG A
6.586	39	>75% Grass cover, Good, HSG A
2.398	57	Undeveloped Woods/grass comb., Poor, HSG A
14.237	64	Weighted Average
9.251		64.98% Pervious Area
4.986		35.02% Impervious Area

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

Subcatchment 1S: NW

Hydrograph



Summary for Subcatchment 2S: NE

Runoff = 6.55 cfs @ 12.16 hrs, Volume= 0.445 af, Depth= 0.32"
 Routed to Pond 2P : NE Inf Pond

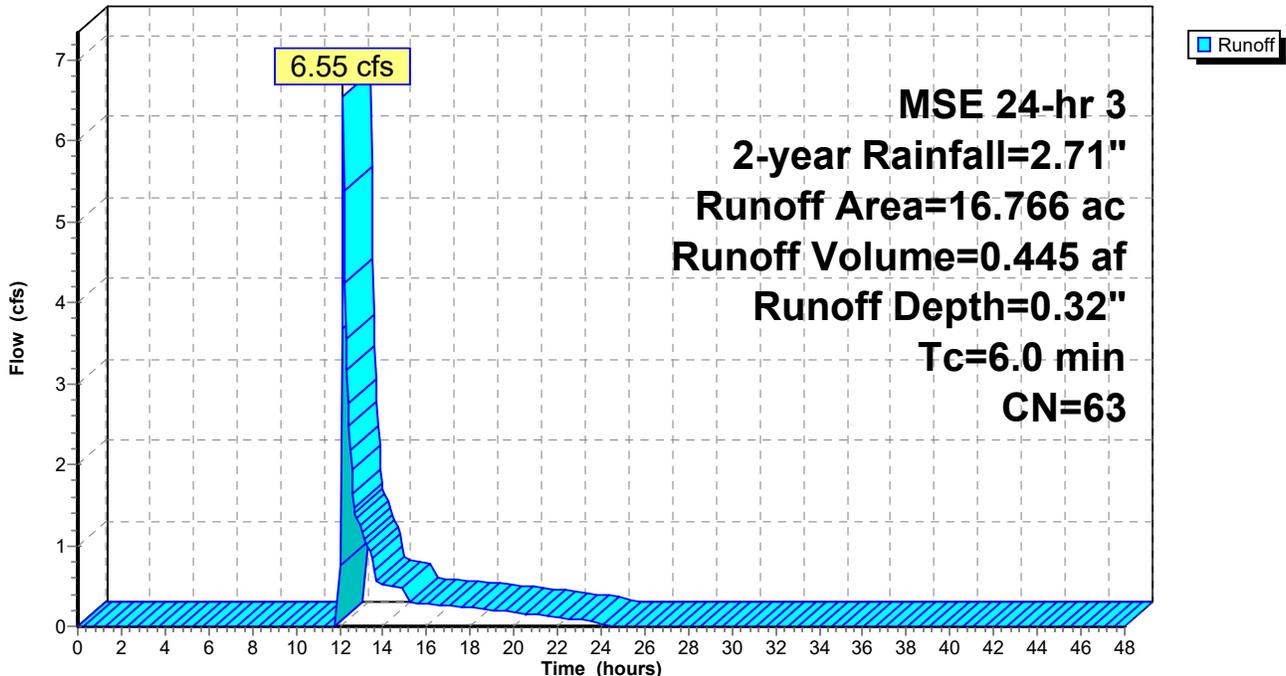
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-year Rainfall=2.71"

Area (ac)	CN	Description
* 0.652	98	Paved roads, HSG B
* 1.227	98	Paved drives, HSG A
1.346	98	Roofs, HSG A
0.307	98	Paved parking, HSG A
* 0.337	98	Paved walks, HSG A
* 0.588	98	Offsite Impervious yard area, HSG B
0.506	98	Water Surface, 0% imp, HSG A
6.376	39	>75% Grass cover, Good, HSG A
2.034	61	>75% Grass cover, Good, HSG B
3.393	57	Undeveloped Woods/grass comb., Poor, HSG A
16.766	63	Weighted Average
12.309		73.42% Pervious Area
4.457		26.58% Impervious Area

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

Subcatchment 2S: NE

Hydrograph



Summary for Subcatchment 3S: E

Runoff = 8.11 cfs @ 12.15 hrs, Volume= 0.465 af, Depth= 0.41"
 Routed to Pond 3P : East Inf Pond

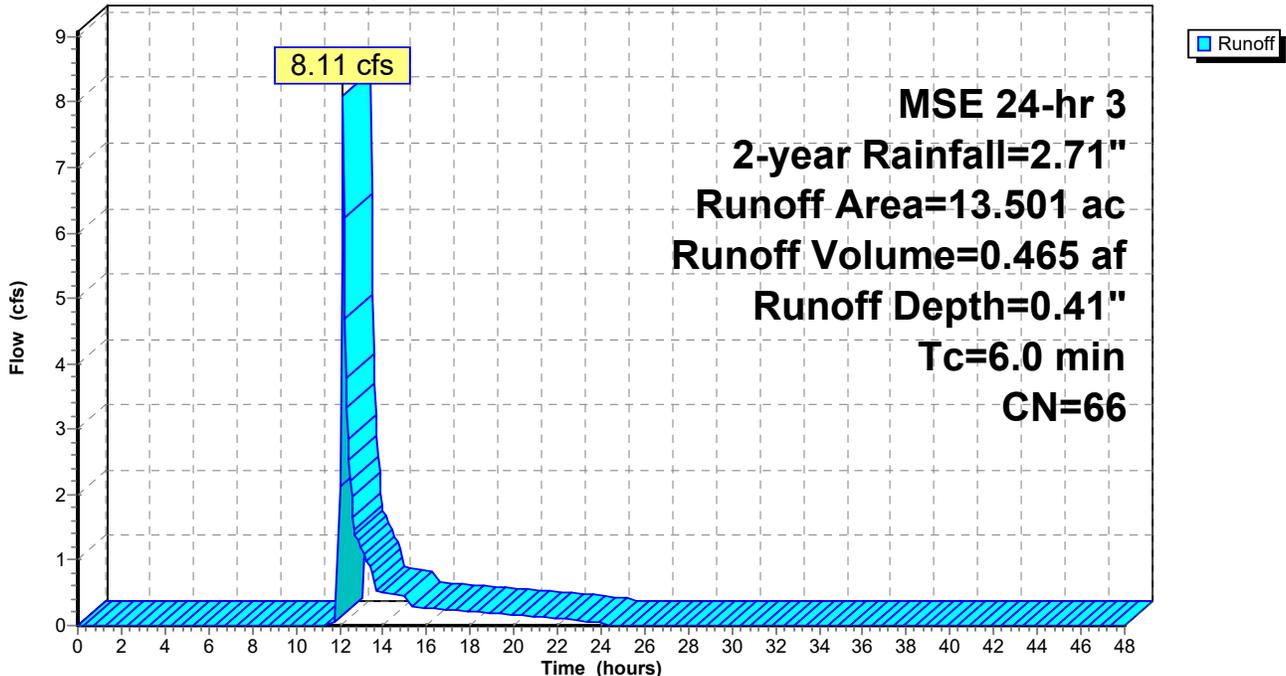
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-year Rainfall=2.71"

Area (ac)	CN	Description
* 1.934	98	Paved drives, HSG A
1.888	98	Roofs, HSG A
0.472	98	Paved parking, HSG A
* 0.652	98	Paved walks, HSG A
0.442	98	Water Surface, 0% imp, HSG A
5.239	39	>75% Grass cover, Good, HSG A
2.874	57	Undeveloped Woods/grass comb., Poor, HSG A
13.501	66	Weighted Average
8.555		63.37% Pervious Area
4.946		36.63% Impervious Area

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

Subcatchment 3S: E

Hydrograph



Summary for Subcatchment 4S: SW

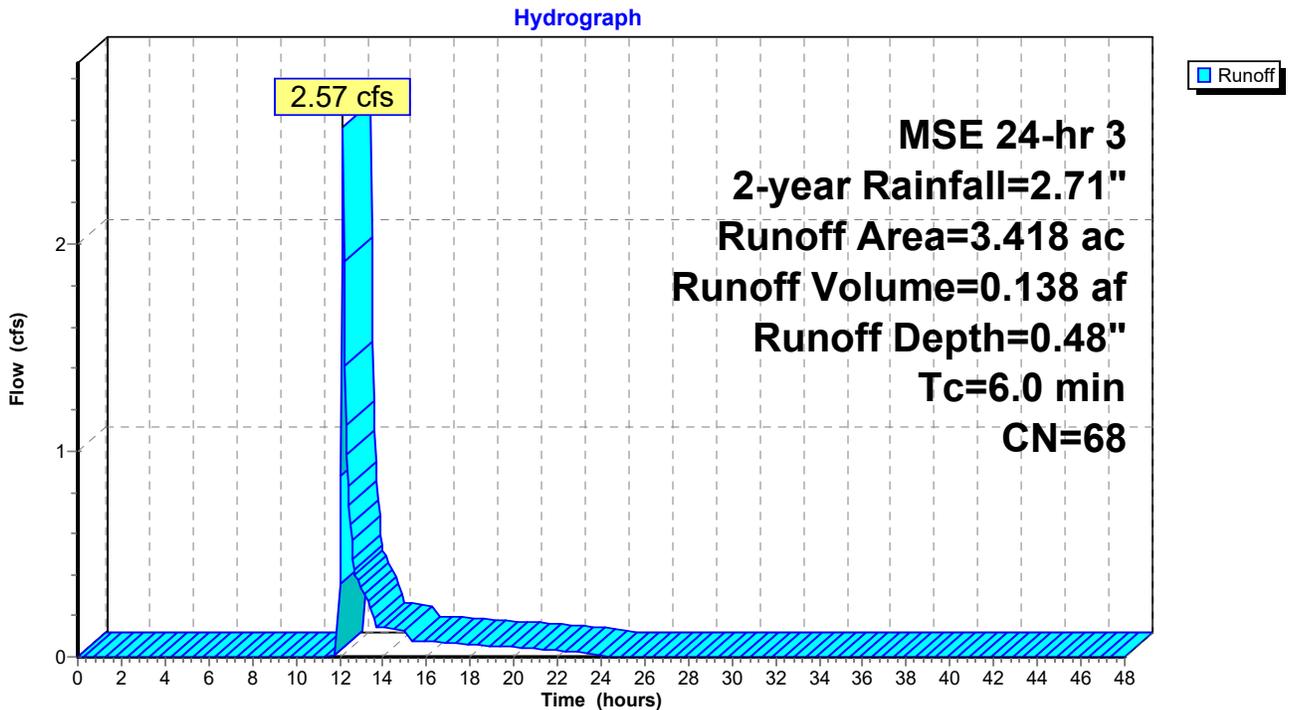
Runoff = 2.57 cfs @ 12.15 hrs, Volume= 0.138 af, Depth= 0.48"
 Routed to Pond 4P : SW Bio Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-year Rainfall=2.71"

Area (ac)	CN	Description
* 0.055	98	Paved roads, HSG B
* 0.514	98	Paved drives, HSG A
0.587	98	Roofs, HSG A
0.275	98	Paved parking, HSG A
* 0.168	98	Paved walks, HSG A
0.074	98	Water Surface, 0% imp, HSG A
1.745	39	>75% Grass cover, Good, HSG A
0.000	57	Undeveloped Woods/grass comb., Poor, HSG A
3.418	68	Weighted Average
1.819		53.22% Pervious Area
1.599		46.78% Impervious Area

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

Subcatchment 4S: SW



Summary for Subcatchment 5S: SE

Runoff = 3.99 cfs @ 12.15 hrs, Volume= 0.204 af, Depth= 0.56"
 Routed to Pond 5P : SE Bio Pond

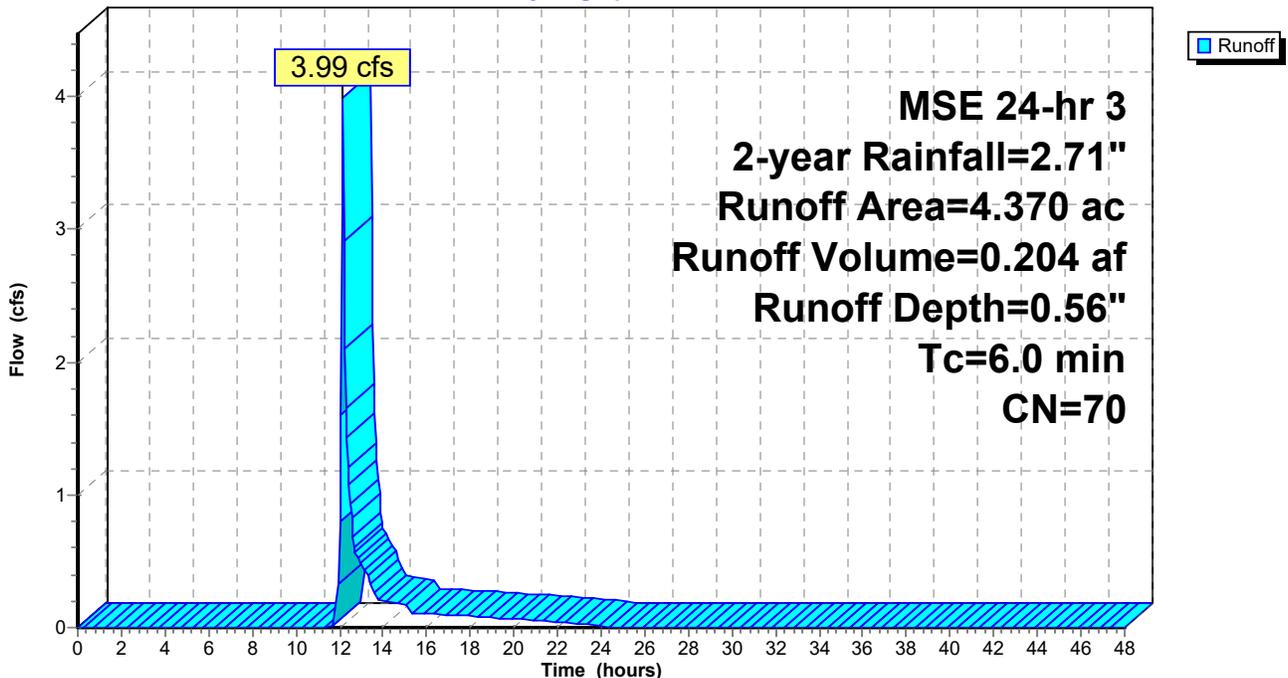
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-year Rainfall=2.71"

Area (ac)	CN	Description
* 0.869	98	Paved drives, HSG A
0.470	98	Roofs, HSG A
0.141	98	Paved parking, HSG A
* 0.345	98	Paved walks, HSG A
0.135	98	Water Surface, 0% imp, HSG A
1.291	39	>75% Grass cover, Good, HSG A
1.119	57	Undeveloped Woods/grass comb., Poor, HSG A
4.370	70	Weighted Average
2.545		58.24% Pervious Area
1.825		41.76% Impervious Area

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

Subcatchment 5S: SE

Hydrograph



Summary for Subcatchment S1: SOUTH

Runoff = 15.02 cfs @ 12.14 hrs, Volume= 0.741 af, Depth= 0.64"

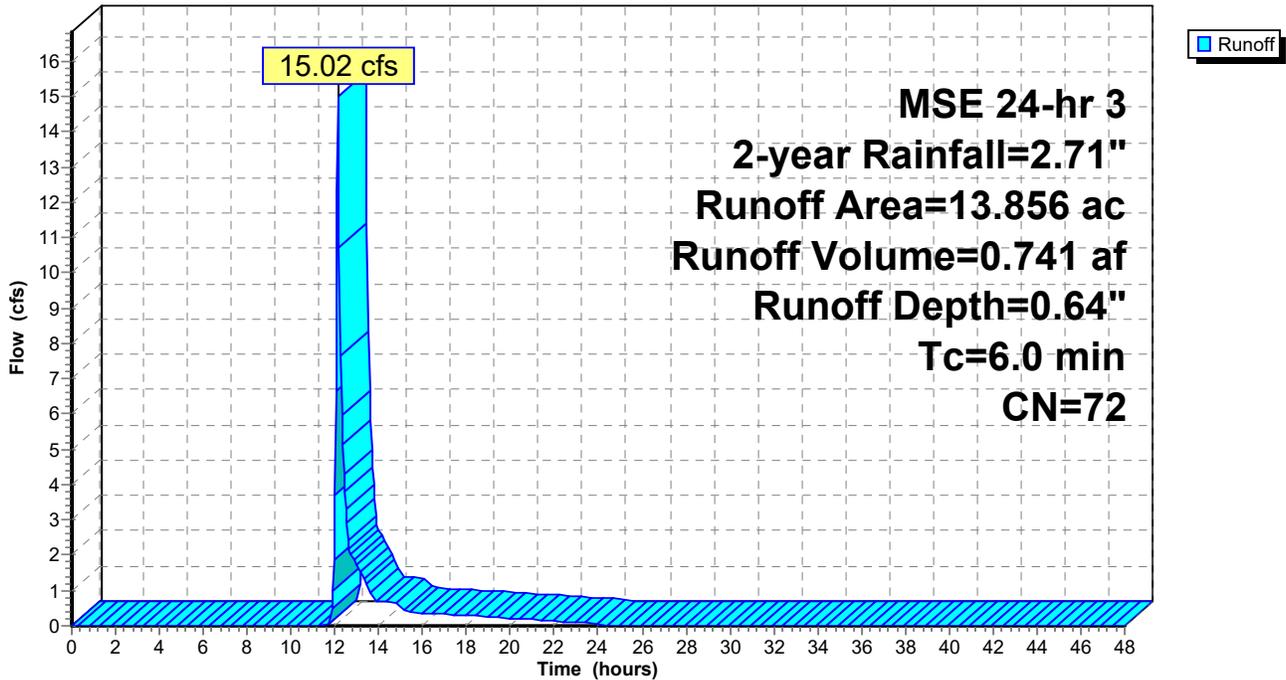
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-year Rainfall=2.71"

Area (ac)	CN	Description
* 0.167	98	Paved roads, HSG B
* 4.858	98	Gravel, HSG A
* 8.831	57	Undeveloped Woods/grass comb., Poor, HSG A
13.856	72	Weighted Average
8.831		63.73% Pervious Area
5.025		36.27% Impervious Area

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

Subcatchment S1: SOUTH

Hydrograph



Summary for Pond 1P: NW Inf Pond

Inflow Area = 14.237 ac, 35.02% Impervious, Inflow Depth = 0.35" for 2-year event
 Inflow = 6.52 cfs @ 12.16 hrs, Volume= 0.413 af
 Outflow = 0.99 cfs @ 13.17 hrs, Volume= 0.413 af, Atten= 85%, Lag= 61.0 min
 Discarded = 0.99 cfs @ 13.17 hrs, Volume= 0.413 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 962.57' @ 13.17 hrs Surf.Area= 11,825 sf Storage= 5,402 cf

Plug-Flow detention time= 55.5 min calculated for 0.413 af (100% of inflow)
 Center-of-Mass det. time= 55.5 min (928.2 - 872.7)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	416,608 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

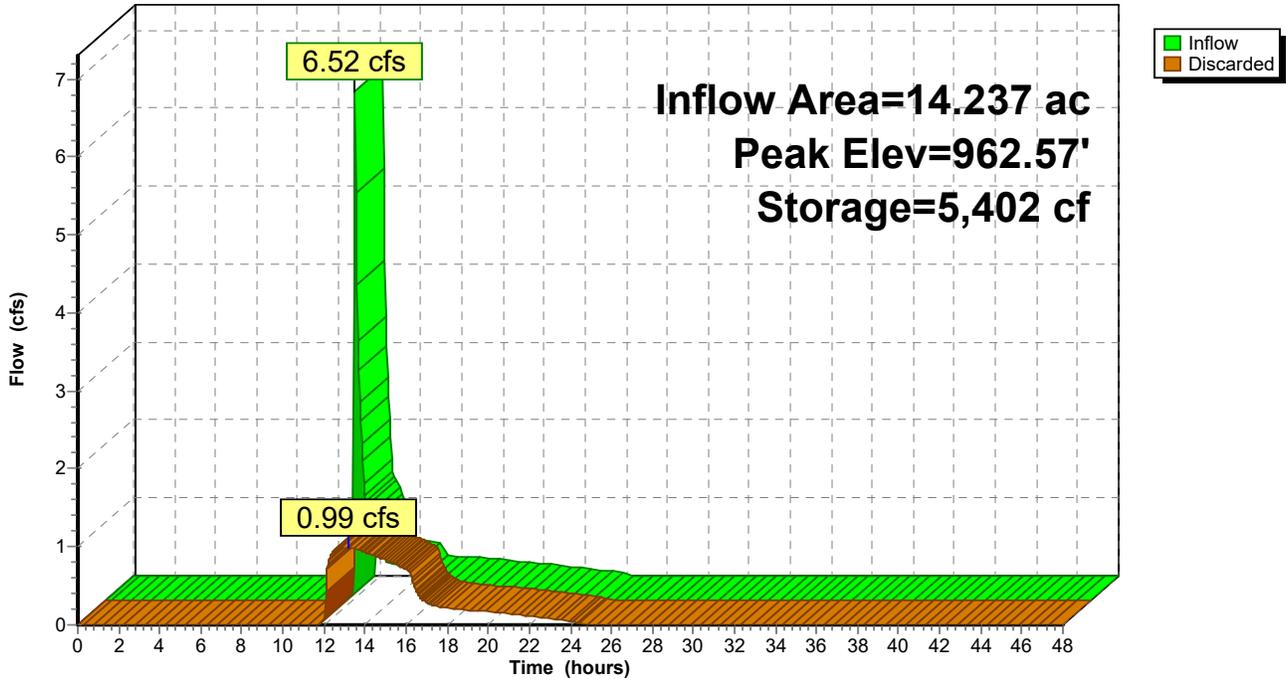
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	7,245	0	0
963.00	15,330	11,288	11,288
964.00	18,315	16,823	28,110
965.00	21,405	19,860	47,970
966.00	24,600	23,003	70,973
967.00	28,570	26,585	97,558
968.00	34,660	31,615	129,173
969.00	41,790	38,225	167,398
970.00	49,670	45,730	213,128
971.00	61,720	55,695	268,823
972.00	73,620	67,670	336,493
973.00	86,610	80,115	416,608

Device	Routing	Invert	Outlet Devices
#1	Discarded	962.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.99 cfs @ 13.17 hrs HW=962.57' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.99 cfs)

Pond 1P: NW Inf Pond

Hydrograph



Summary for Pond 2P: NE Inf Pond

Inflow Area = 16.766 ac, 26.58% Impervious, Inflow Depth = 0.32" for 2-year event
 Inflow = 6.55 cfs @ 12.16 hrs, Volume= 0.445 af
 Outflow = 1.47 cfs @ 12.66 hrs, Volume= 0.445 af, Atten= 78%, Lag= 29.9 min
 Discarded = 1.47 cfs @ 12.66 hrs, Volume= 0.445 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 960.27' @ 12.66 hrs Surf.Area= 17,580 sf Storage= 4,332 cf

Plug-Flow detention time= 32.0 min calculated for 0.444 af (100% of inflow)
 Center-of-Mass det. time= 32.0 min (909.6 - 877.6)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	567,415 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	14,595	0	0
961.00	25,680	20,138	20,138
962.00	28,185	26,933	47,070
963.00	30,790	29,488	76,558
964.00	33,495	32,143	108,700
965.00	39,885	36,690	145,390
966.00	43,300	41,593	186,983
967.00	47,800	45,550	232,533
968.00	53,360	50,580	283,113
969.00	60,550	56,955	340,068
970.00	69,030	64,790	404,858
971.00	80,830	74,930	479,788
972.00	94,425	87,628	567,415

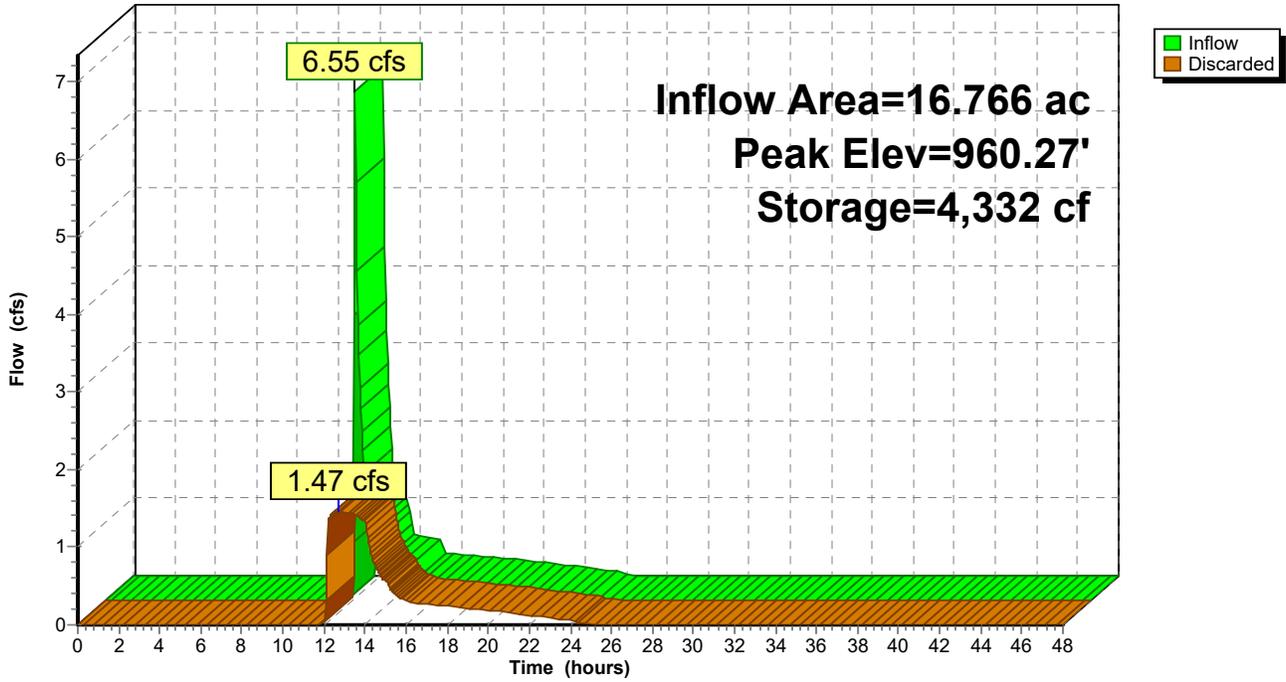
Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.46 cfs @ 12.66 hrs HW=960.27' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 1.46 cfs)

Pond 2P: NE Inf Pond

Hydrograph



Summary for Pond 3P: East Inf Pond

Inflow Area = 13.501 ac, 36.63% Impervious, Inflow Depth = 0.41" for 2-year event
 Inflow = 8.11 cfs @ 12.15 hrs, Volume= 0.465 af
 Outflow = 1.36 cfs @ 12.76 hrs, Volume= 0.465 af, Atten= 83%, Lag= 36.2 min
 Discarded = 1.36 cfs @ 12.76 hrs, Volume= 0.465 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 963.41' @ 12.76 hrs Surf.Area= 16,262 sf Storage= 5,768 cf

Plug-Flow detention time= 43.5 min calculated for 0.464 af (100% of inflow)
 Center-of-Mass det. time= 43.5 min (907.4 - 863.9)

Volume	Invert	Avail.Storage	Storage Description
#1	963.00'	544,443 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
963.00	11,805	0	0
964.00	22,650	17,228	17,228
965.00	25,340	23,995	41,223
966.00	28,125	26,733	67,955
967.00	31,015	29,570	97,525
968.00	34,225	32,620	130,145
969.00	38,050	36,138	166,283
970.00	43,800	40,925	207,208
971.00	49,335	46,568	253,775
972.00	57,675	53,505	307,280
973.00	69,980	63,828	371,108
974.00	85,260	77,620	448,728
975.00	106,170	95,715	544,443

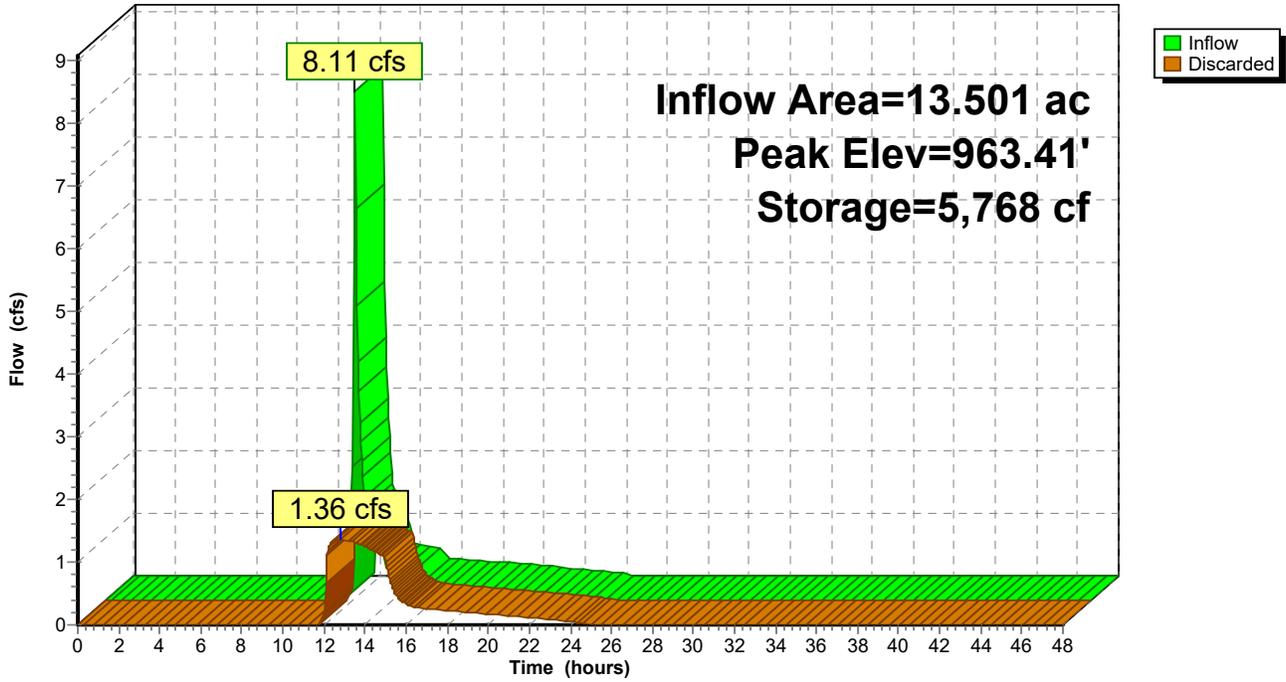
Device	Routing	Invert	Outlet Devices
#1	Discarded	963.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.36 cfs @ 12.76 hrs HW=963.41' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 1.36 cfs)

Pond 3P: East Inf Pond

Hydrograph



Summary for Pond 4P: SW Bio Pond

Inflow Area = 3.418 ac, 46.78% Impervious, Inflow Depth = 0.48" for 2-year event
 Inflow = 2.57 cfs @ 12.15 hrs, Volume= 0.138 af
 Outflow = 0.71 cfs @ 12.47 hrs, Volume= 0.130 af, Atten= 73%, Lag= 19.0 min
 Primary = 0.71 cfs @ 12.47 hrs, Volume= 0.130 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 954.70' @ 12.47 hrs Surf.Area= 3,240 sf Storage= 1,547 cf

Plug-Flow detention time= 70.2 min calculated for 0.130 af (95% of inflow)
 Center-of-Mass det. time= 43.5 min (899.6 - 856.2)

Volume	Invert	Avail.Storage	Storage Description	
#1	953.25'	11,962 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
953.25	3,240	0.0	0	0
954.42	3,240	33.0	1,251	1,251
954.75	3,240	33.0	353	1,604
957.00	3,240	27.0	1,968	3,572
959.00	5,150	100.0	8,390	11,962

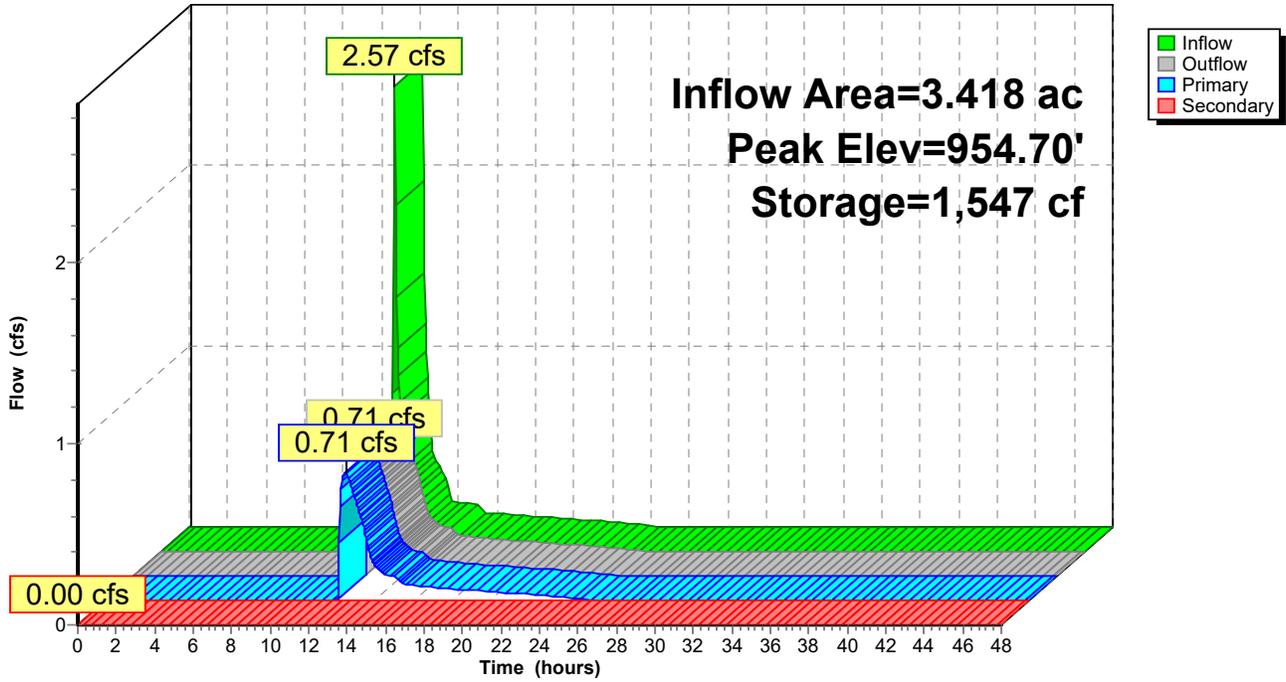
Device	Routing	Invert	Outlet Devices
#1	Primary	953.25'	12.0" Round Culvert L= 73.9' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 953.25' / 952.84' S= 0.0055 1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	953.55'	6.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 953.55' / 953.25' S= 0.0050 1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	958.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	958.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.71 cfs @ 12.47 hrs HW=954.70' (Free Discharge)
 ↑ **1=Culvert** (Passes 0.71 cfs of 3.11 cfs potential flow)
 ↑ **2=Culvert** (Barrel Controls 0.71 cfs @ 3.60 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=953.25' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: SW Bio Pond

Hydrograph



Summary for Pond 5P: SE Bio Pond

Inflow Area = 4.370 ac, 41.76% Impervious, Inflow Depth = 0.56" for 2-year event
 Inflow = 3.99 cfs @ 12.15 hrs, Volume= 0.204 af
 Outflow = 0.66 cfs @ 12.62 hrs, Volume= 0.181 af, Atten= 84%, Lag= 28.5 min
 Primary = 0.66 cfs @ 12.62 hrs, Volume= 0.181 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 955.89' @ 12.62 hrs Surf.Area= 5,895 sf Storage= 3,137 cf

Plug-Flow detention time= 125.1 min calculated for 0.181 af (89% of inflow)
 Center-of-Mass det. time= 76.3 min (925.4 - 849.1)

Volume	Invert	Avail.Storage	Storage Description	
#1	954.25'	20,934 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
954.25	5,895	0.0	0	0
955.42	5,895	33.0	2,276	2,276
955.75	5,895	33.0	642	2,918
958.00	5,895	27.0	3,581	6,499
960.00	8,540	100.0	14,435	20,934

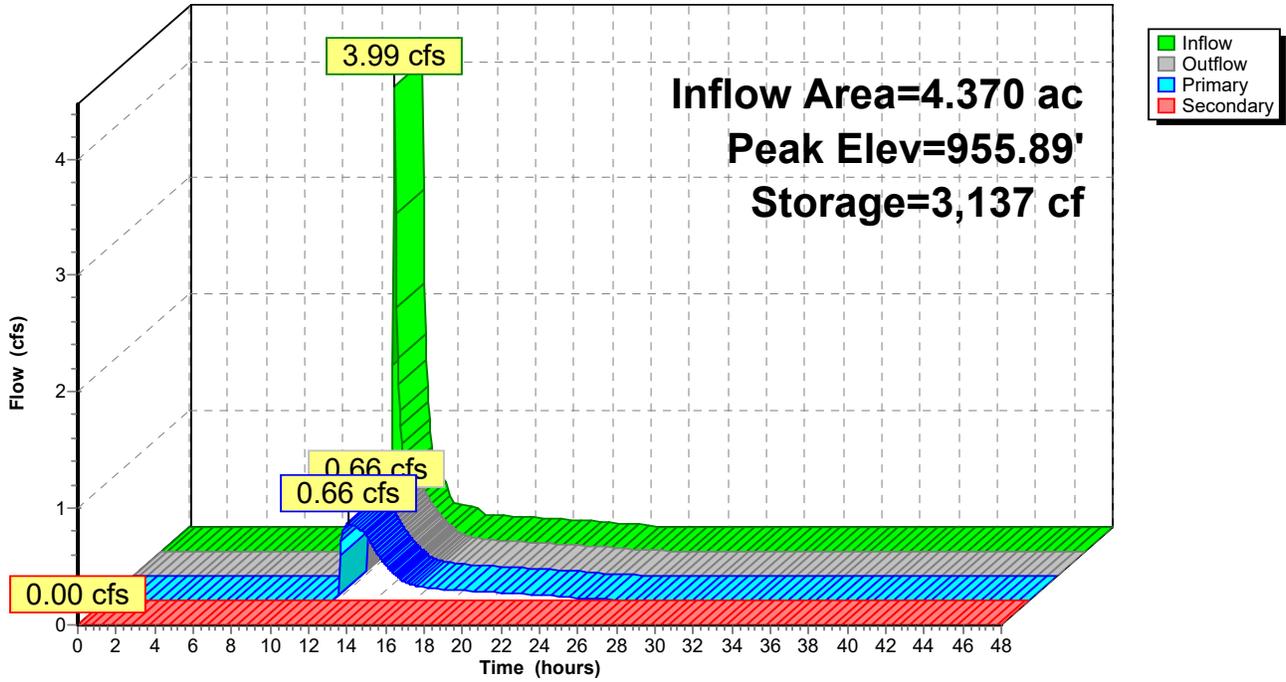
Device	Routing	Invert	Outlet Devices
#1	Primary	954.25'	12.0" Round Culvert L= 71.4' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 954.25' / 952.91' S= 0.0188 1/8" Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	954.75'	6.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 954.75' / 954.25' S= 0.0050 1/2" Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	959.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.65 cfs @ 12.62 hrs HW=955.89' (Free Discharge)
 ↑ 1=Culvert (Passes 0.65 cfs of 4.78 cfs potential flow)
 ↑ 2=Culvert (Barrel Controls 0.65 cfs @ 3.33 fps)
 ↑ 3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=954.25' (Free Discharge)
 ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: SE Bio Pond

Hydrograph



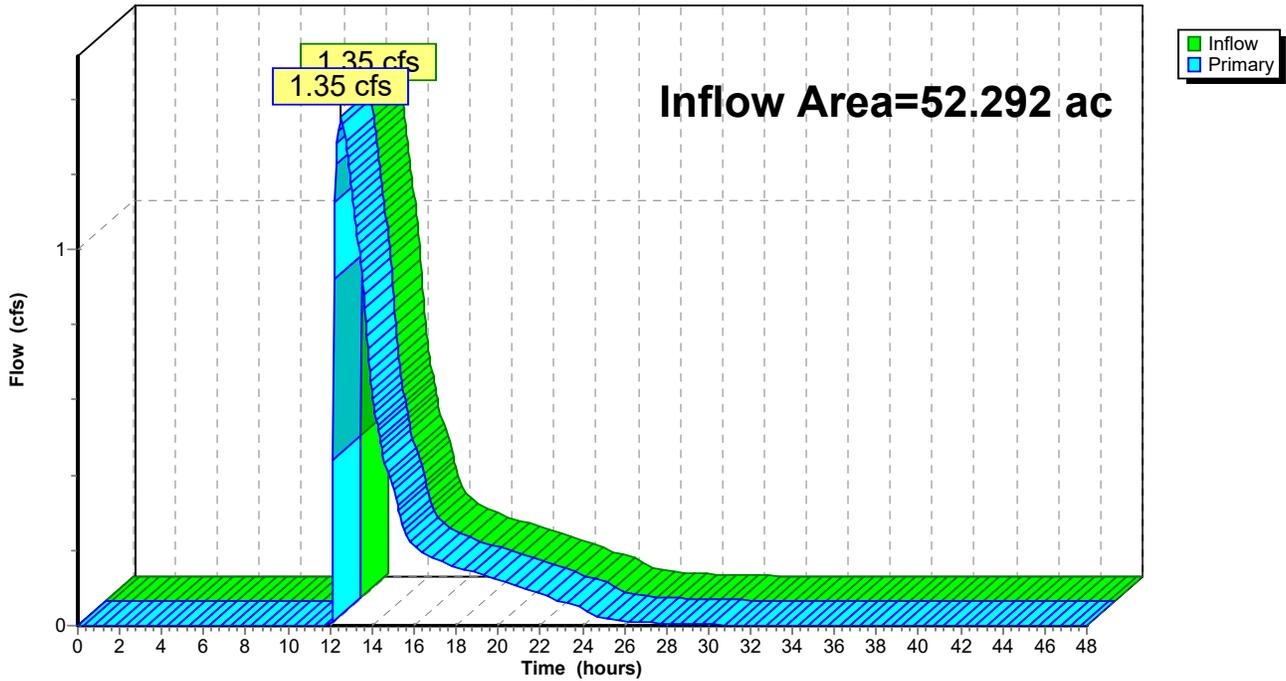
Summary for Link 1L: PROP Total

Inflow Area = 52.292 ac, 34.06% Impervious, Inflow Depth > 0.07" for 2-year event
Inflow = 1.35 cfs @ 12.53 hrs, Volume= 0.311 af
Primary = 1.35 cfs @ 12.53 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: PROP Total

Hydrograph



2024 03 04 Hartland Apartments

Prepared by Payne & Dolan

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MSE 24-hr 3 10-year Rainfall=3.83"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1S: NW	Runoff Area=14.237 ac 35.02% Impervious Runoff Depth=0.88" Tc=6.0 min CN=64 Runoff=20.99 cfs 1.042 af
Subcatchment 2S: NE	Runoff Area=16.766 ac 26.58% Impervious Runoff Depth=0.83" Tc=6.0 min CN=63 Runoff=22.93 cfs 1.155 af
Subcatchment 3S: E	Runoff Area=13.501 ac 36.63% Impervious Runoff Depth=0.99" Tc=6.0 min CN=66 Runoff=22.87 cfs 1.109 af
Subcatchment 4S: SW	Runoff Area=3.418 ac 46.78% Impervious Runoff Depth=1.10" Tc=6.0 min CN=68 Runoff=6.56 cfs 0.313 af
Subcatchment 5S: SE	Runoff Area=4.370 ac 41.76% Impervious Runoff Depth=1.22" Tc=6.0 min CN=70 Runoff=9.41 cfs 0.443 af
Subcatchment S1: SOUTH	Runoff Area=13.856 ac 36.27% Impervious Runoff Depth=1.34" Tc=6.0 min CN=72 Runoff=33.16 cfs 1.550 af
Pond 1P: NW Inf Pond	Peak Elev=963.64' Storage=21,754 cf Inflow=20.99 cfs 1.042 af Outflow=1.44 cfs 1.042 af
Pond 2P: NE Inf Pond	Peak Elev=961.04' Storage=21,044 cf Inflow=22.93 cfs 1.155 af Outflow=2.15 cfs 1.155 af
Pond 3P: East Inf Pond	Peak Elev=964.19' Storage=21,649 cf Inflow=22.87 cfs 1.109 af Outflow=1.93 cfs 1.109 af
Pond 4P: SW Bio Pond	Peak Elev=957.29' Storage=4,549 cf Inflow=6.56 cfs 0.313 af Primary=1.37 cfs 0.306 af Secondary=0.00 cfs 0.000 af Outflow=1.37 cfs 0.306 af
Pond 5P: SE Bio Pond	Peak Elev=958.29' Storage=8,243 cf Inflow=9.41 cfs 0.443 af Primary=1.16 cfs 0.421 af Secondary=0.00 cfs 0.000 af Outflow=1.16 cfs 0.421 af
Link 1L: PROP Total	Inflow=2.52 cfs 0.726 af Primary=2.52 cfs 0.726 af

Total Runoff Area = 66.148 ac Runoff Volume = 5.613 af Average Runoff Depth = 1.02"
65.47% Pervious = 43.310 ac 34.53% Impervious = 22.838 ac

Summary for Subcatchment 1S: NW

Runoff = 20.99 cfs @ 12.14 hrs, Volume= 1.042 af, Depth= 0.88"
 Routed to Pond 1P : NW Inf Pond

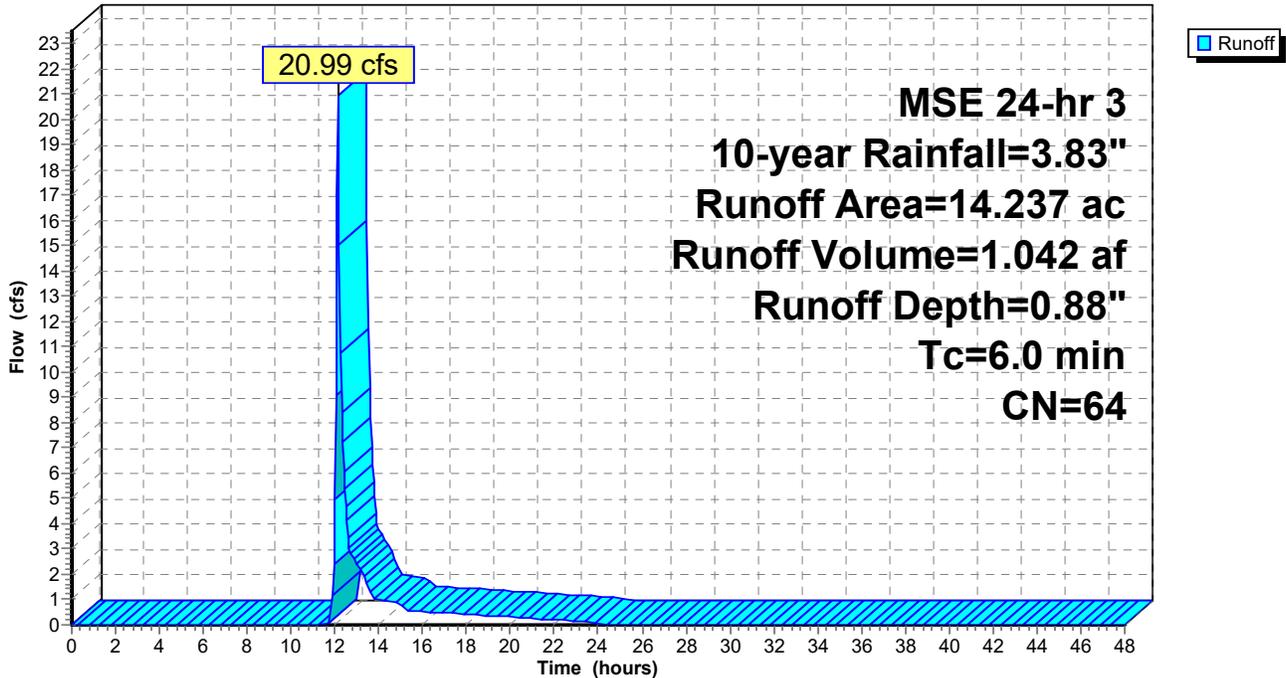
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-year Rainfall=3.83"

Area (ac)	CN	Description
* 1.017	98	Paved roads, HSG B
* 1.562	98	Paved drives, HSG A
1.544	98	Roofs, HSG A
0.408	98	Paved parking, HSG A
* 0.455	98	Paved walks, HSG A
0.267	98	Water Surface, 0% imp, HSG A
6.586	39	>75% Grass cover, Good, HSG A
2.398	57	Undeveloped Woods/grass comb., Poor, HSG A
14.237	64	Weighted Average
9.251		64.98% Pervious Area
4.986		35.02% Impervious Area

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

Subcatchment 1S: NW

Hydrograph



Summary for Subcatchment 2S: NE

Runoff = 22.93 cfs @ 12.15 hrs, Volume= 1.155 af, Depth= 0.83"
 Routed to Pond 2P : NE Inf Pond

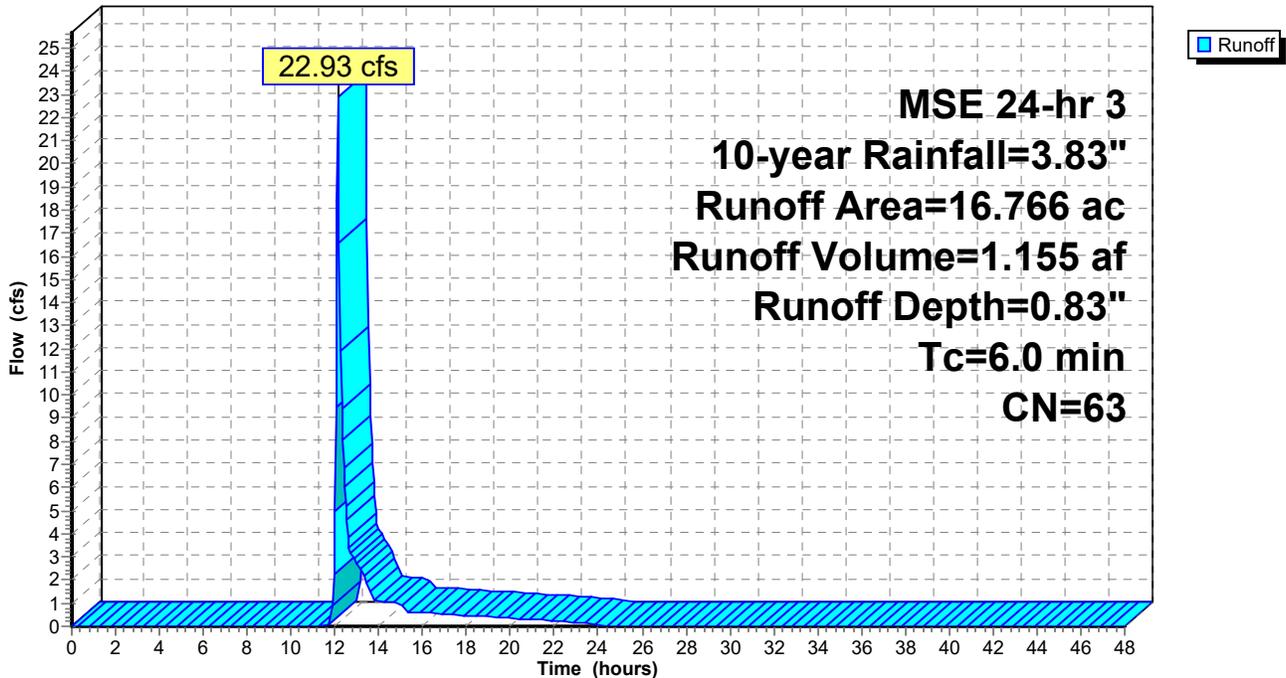
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-year Rainfall=3.83"

Area (ac)	CN	Description
* 0.652	98	Paved roads, HSG B
* 1.227	98	Paved drives, HSG A
1.346	98	Roofs, HSG A
0.307	98	Paved parking, HSG A
* 0.337	98	Paved walks, HSG A
* 0.588	98	Offsite Impervious yard area, HSG B
0.506	98	Water Surface, 0% imp, HSG A
6.376	39	>75% Grass cover, Good, HSG A
2.034	61	>75% Grass cover, Good, HSG B
3.393	57	Undeveloped Woods/grass comb., Poor, HSG A
16.766	63	Weighted Average
12.309		73.42% Pervious Area
4.457		26.58% Impervious Area

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

Subcatchment 2S: NE

Hydrograph



Summary for Subcatchment 3S: E

Runoff = 22.87 cfs @ 12.14 hrs, Volume= 1.109 af, Depth= 0.99"
 Routed to Pond 3P : East Inf Pond

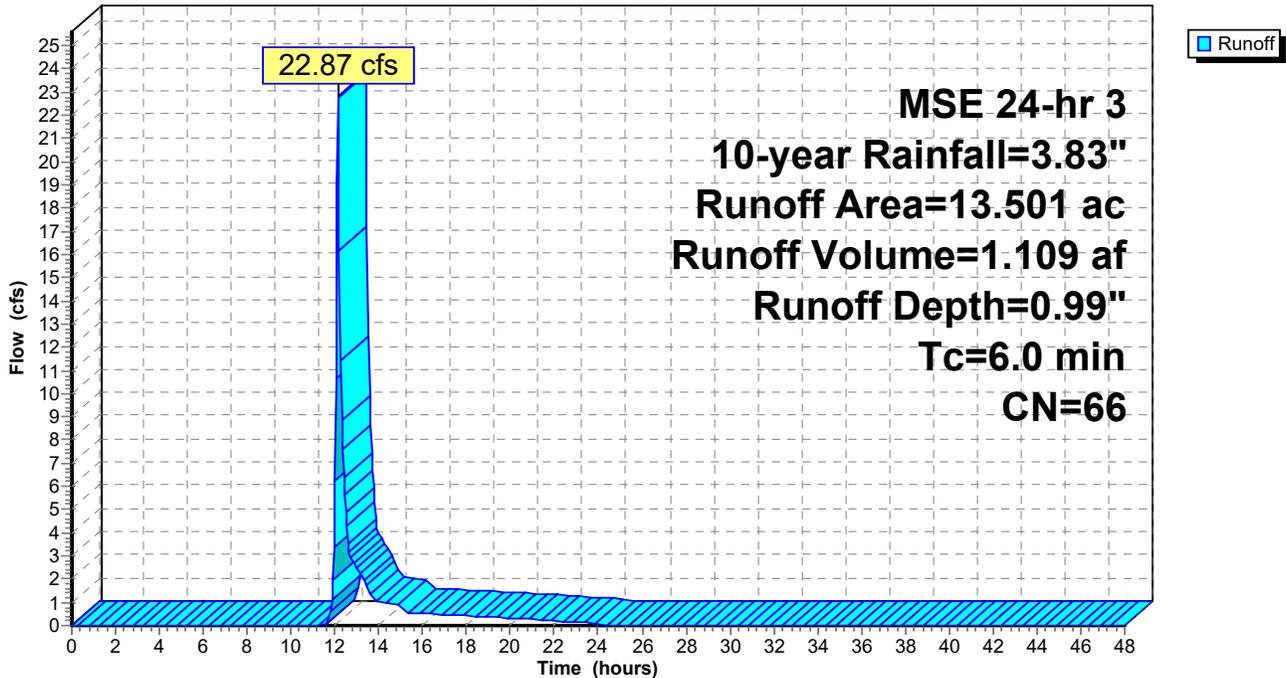
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-year Rainfall=3.83"

Area (ac)	CN	Description
* 1.934	98	Paved drives, HSG A
1.888	98	Roofs, HSG A
0.472	98	Paved parking, HSG A
* 0.652	98	Paved walks, HSG A
0.442	98	Water Surface, 0% imp, HSG A
5.239	39	>75% Grass cover, Good, HSG A
2.874	57	Undeveloped Woods/grass comb., Poor, HSG A
13.501	66	Weighted Average
8.555		63.37% Pervious Area
4.946		36.63% Impervious Area

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

Subcatchment 3S: E

Hydrograph



Summary for Subcatchment 4S: SW

Runoff = 6.56 cfs @ 12.14 hrs, Volume= 0.313 af, Depth= 1.10"
 Routed to Pond 4P : SW Bio Pond

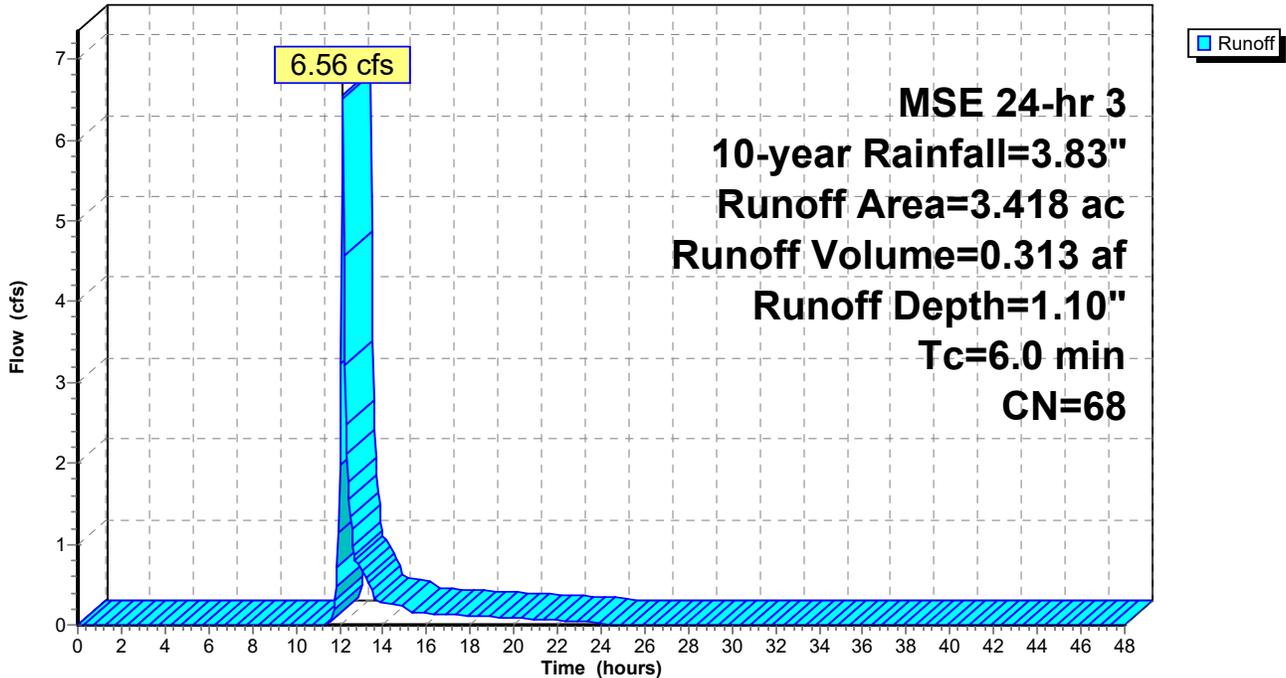
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-year Rainfall=3.83"

Area (ac)	CN	Description
* 0.055	98	Paved roads, HSG B
* 0.514	98	Paved drives, HSG A
0.587	98	Roofs, HSG A
0.275	98	Paved parking, HSG A
* 0.168	98	Paved walks, HSG A
0.074	98	Water Surface, 0% imp, HSG A
1.745	39	>75% Grass cover, Good, HSG A
0.000	57	Undeveloped Woods/grass comb., Poor, HSG A
3.418	68	Weighted Average
1.819		53.22% Pervious Area
1.599		46.78% Impervious Area

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

Subcatchment 4S: SW

Hydrograph



Summary for Subcatchment 5S: SE

Runoff = 9.41 cfs @ 12.14 hrs, Volume= 0.443 af, Depth= 1.22"
 Routed to Pond 5P : SE Bio Pond

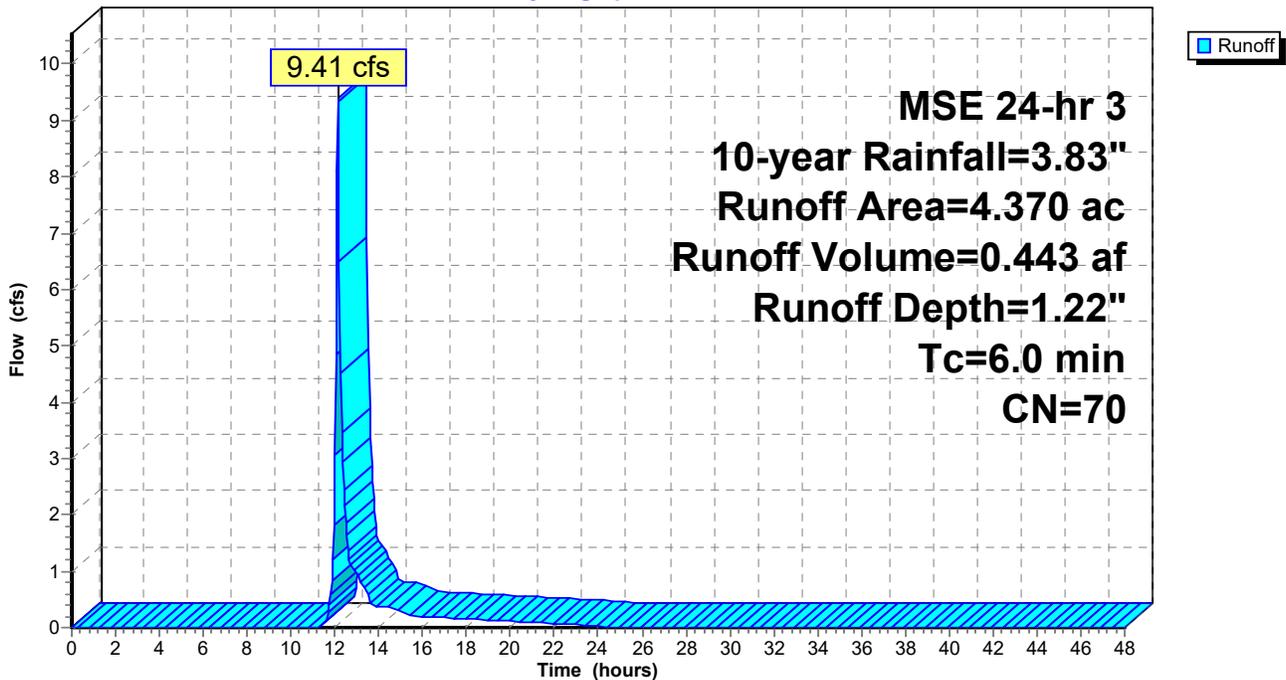
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-year Rainfall=3.83"

Area (ac)	CN	Description
* 0.869	98	Paved drives, HSG A
0.470	98	Roofs, HSG A
0.141	98	Paved parking, HSG A
* 0.345	98	Paved walks, HSG A
0.135	98	Water Surface, 0% imp, HSG A
1.291	39	>75% Grass cover, Good, HSG A
1.119	57	Undeveloped Woods/grass comb., Poor, HSG A
4.370	70	Weighted Average
2.545		58.24% Pervious Area
1.825		41.76% Impervious Area

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

Subcatchment 5S: SE

Hydrograph



Summary for Subcatchment S1: SOUTH

Runoff = 33.16 cfs @ 12.14 hrs, Volume= 1.550 af, Depth= 1.34"

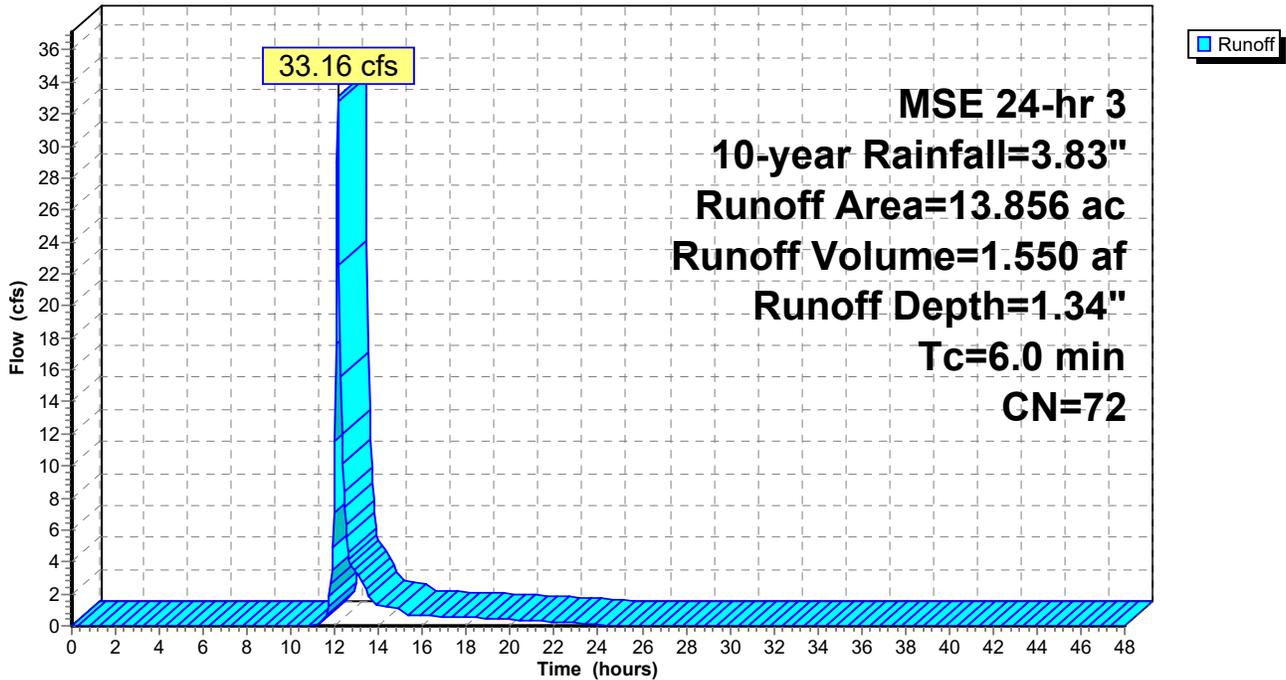
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-year Rainfall=3.83"

Area (ac)	CN	Description
* 0.167	98	Paved roads, HSG B
* 4.858	98	Gravel, HSG A
* 8.831	57	Undeveloped Woods/grass comb., Poor, HSG A
13.856	72	Weighted Average
8.831		63.73% Pervious Area
5.025		36.27% Impervious Area

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

Subcatchment S1: SOUTH

Hydrograph



Summary for Pond 1P: NW Inf Pond

Inflow Area = 14.237 ac, 35.02% Impervious, Inflow Depth = 0.88" for 10-year event
 Inflow = 20.99 cfs @ 12.14 hrs, Volume= 1.042 af
 Outflow = 1.44 cfs @ 13.54 hrs, Volume= 1.042 af, Atten= 93%, Lag= 83.7 min
 Discarded = 1.44 cfs @ 13.54 hrs, Volume= 1.042 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 963.64' @ 13.54 hrs Surf.Area= 17,248 sf Storage= 21,754 cf

Plug-Flow detention time= 163.7 min calculated for 1.041 af (100% of inflow)
 Center-of-Mass det. time= 163.5 min (1,007.7 - 844.2)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	416,608 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

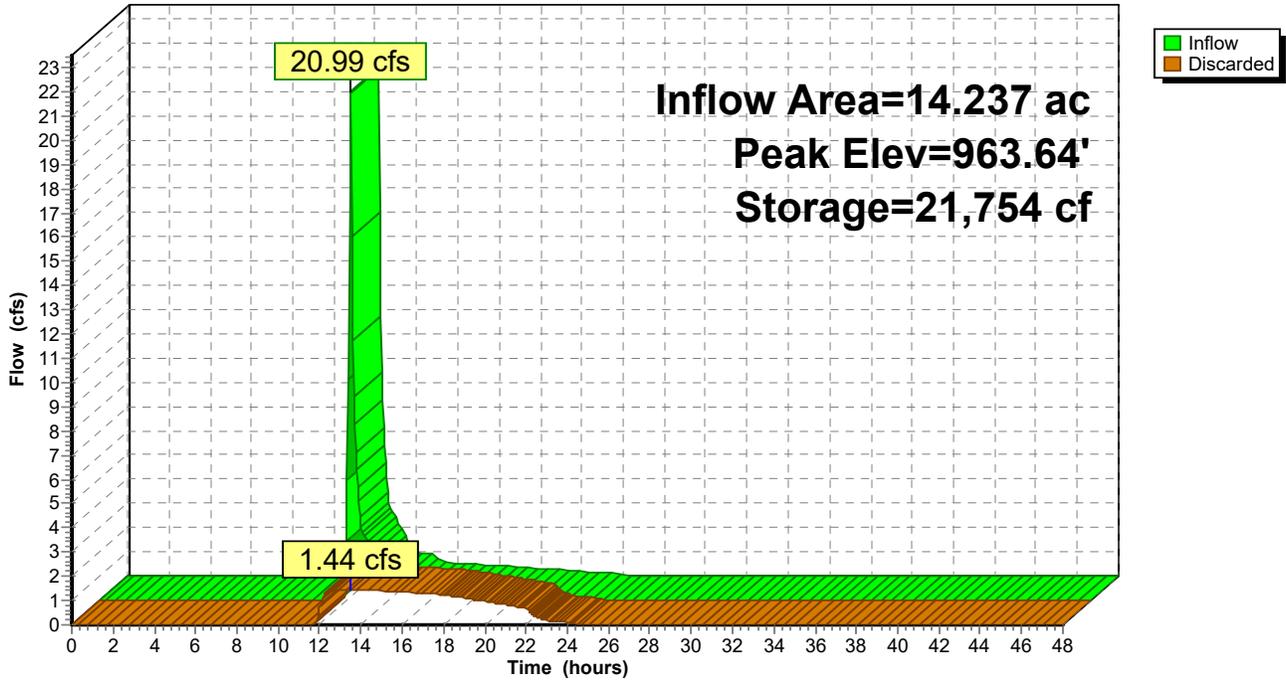
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	7,245	0	0
963.00	15,330	11,288	11,288
964.00	18,315	16,823	28,110
965.00	21,405	19,860	47,970
966.00	24,600	23,003	70,973
967.00	28,570	26,585	97,558
968.00	34,660	31,615	129,173
969.00	41,790	38,225	167,398
970.00	49,670	45,730	213,128
971.00	61,720	55,695	268,823
972.00	73,620	67,670	336,493
973.00	86,610	80,115	416,608

Device	Routing	Invert	Outlet Devices
#1	Discarded	962.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.44 cfs @ 13.54 hrs HW=963.64' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 1.44 cfs)

Pond 1P: NW Inf Pond

Hydrograph



Summary for Pond 2P: NE Inf Pond

Inflow Area = 16.766 ac, 26.58% Impervious, Inflow Depth = 0.83" for 10-year event
 Inflow = 22.93 cfs @ 12.15 hrs, Volume= 1.155 af
 Outflow = 2.15 cfs @ 13.31 hrs, Volume= 1.155 af, Atten= 91%, Lag= 69.9 min
 Discarded = 2.15 cfs @ 13.31 hrs, Volume= 1.155 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 961.04' @ 13.31 hrs Surf.Area= 25,768 sf Storage= 21,044 cf

Plug-Flow detention time= 102.5 min calculated for 1.154 af (100% of inflow)
 Center-of-Mass det. time= 102.4 min (949.5 - 847.0)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	567,415 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	14,595	0	0
961.00	25,680	20,138	20,138
962.00	28,185	26,933	47,070
963.00	30,790	29,488	76,558
964.00	33,495	32,143	108,700
965.00	39,885	36,690	145,390
966.00	43,300	41,593	186,983
967.00	47,800	45,550	232,533
968.00	53,360	50,580	283,113
969.00	60,550	56,955	340,068
970.00	69,030	64,790	404,858
971.00	80,830	74,930	479,788
972.00	94,425	87,628	567,415

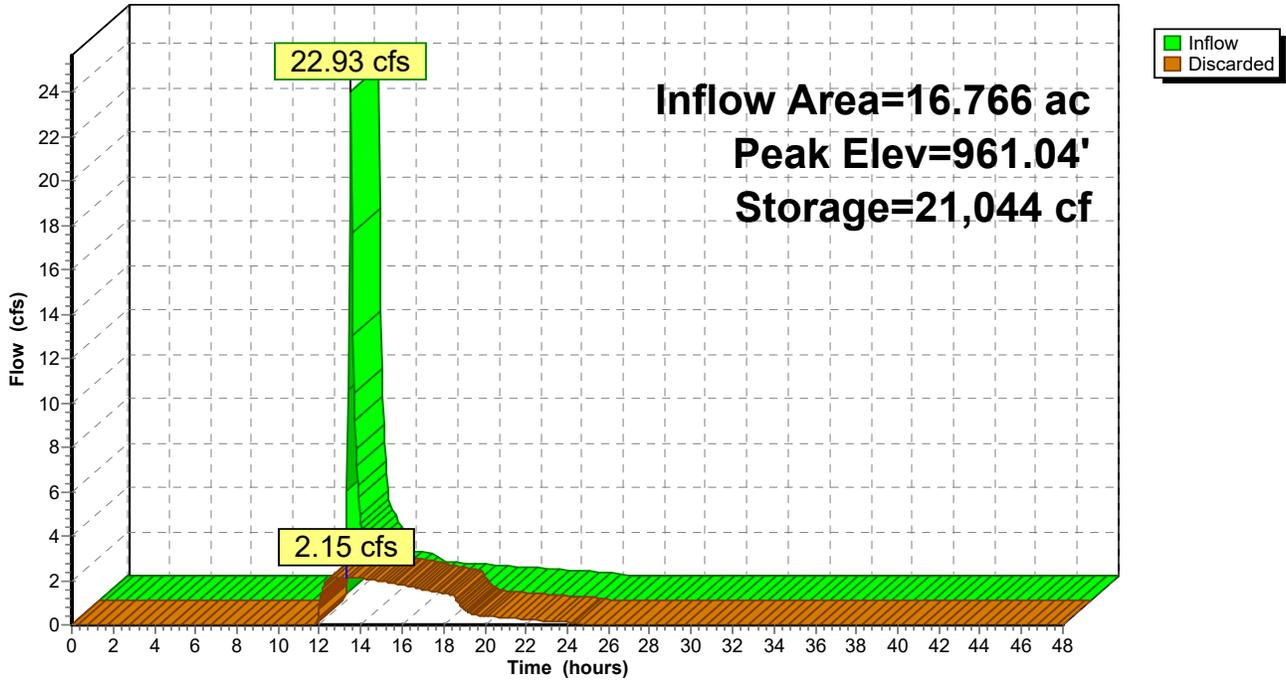
Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=2.15 cfs @ 13.31 hrs HW=961.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 2.15 cfs)

Pond 2P: NE Inf Pond

Hydrograph



Summary for Pond 3P: East Inf Pond

Inflow Area = 13.501 ac, 36.63% Impervious, Inflow Depth = 0.99" for 10-year event
 Inflow = 22.87 cfs @ 12.14 hrs, Volume= 1.109 af
 Outflow = 1.93 cfs @ 13.33 hrs, Volume= 1.109 af, Atten= 92%, Lag= 70.9 min
 Discarded = 1.93 cfs @ 13.33 hrs, Volume= 1.109 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 964.19' @ 13.33 hrs Surf.Area= 23,169 sf Storage= 21,649 cf

Plug-Flow detention time= 116.5 min calculated for 1.108 af (100% of inflow)
 Center-of-Mass det. time= 116.4 min (955.3 - 838.9)

Volume	Invert	Avail.Storage	Storage Description
#1	963.00'	544,443 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

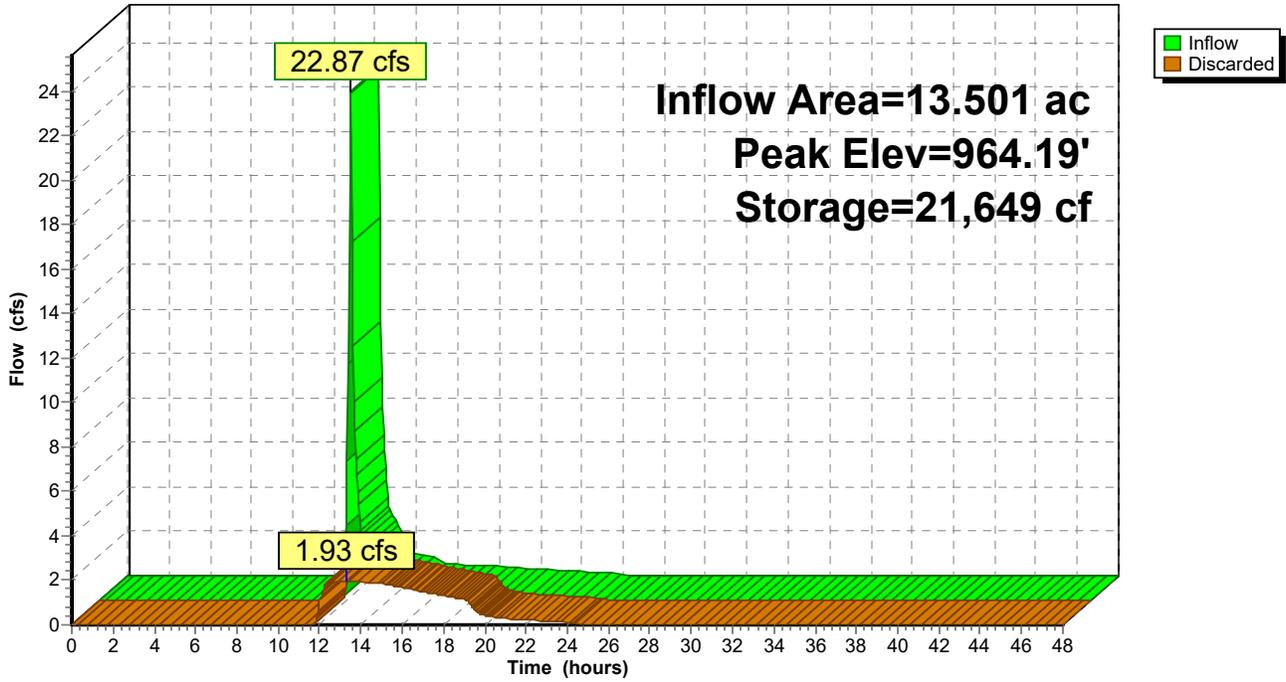
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
963.00	11,805	0	0
964.00	22,650	17,228	17,228
965.00	25,340	23,995	41,223
966.00	28,125	26,733	67,955
967.00	31,015	29,570	97,525
968.00	34,225	32,620	130,145
969.00	38,050	36,138	166,283
970.00	43,800	40,925	207,208
971.00	49,335	46,568	253,775
972.00	57,675	53,505	307,280
973.00	69,980	63,828	371,108
974.00	85,260	77,620	448,728
975.00	106,170	95,715	544,443

Device	Routing	Invert	Outlet Devices
#1	Discarded	963.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.93 cfs @ 13.33 hrs HW=964.19' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 1.93 cfs)

Pond 3P: East Inf Pond

Hydrograph



Summary for Pond 4P: SW Bio Pond

Inflow Area = 3.418 ac, 46.78% Impervious, Inflow Depth = 1.10" for 10-year event
 Inflow = 6.56 cfs @ 12.14 hrs, Volume= 0.313 af
 Outflow = 1.37 cfs @ 12.50 hrs, Volume= 0.306 af, Atten= 79%, Lag= 21.3 min
 Primary = 1.37 cfs @ 12.50 hrs, Volume= 0.306 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 957.29' @ 12.50 hrs Surf.Area= 3,516 sf Storage= 4,549 cf

Plug-Flow detention time= 54.4 min calculated for 0.305 af (98% of inflow)
 Center-of-Mass det. time= 42.1 min (876.1 - 833.9)

Volume	Invert	Avail.Storage	Storage Description	
#1	953.25'	11,962 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
953.25	3,240	0.0	0	0
954.42	3,240	33.0	1,251	1,251
954.75	3,240	33.0	353	1,604
957.00	3,240	27.0	1,968	3,572
959.00	5,150	100.0	8,390	11,962

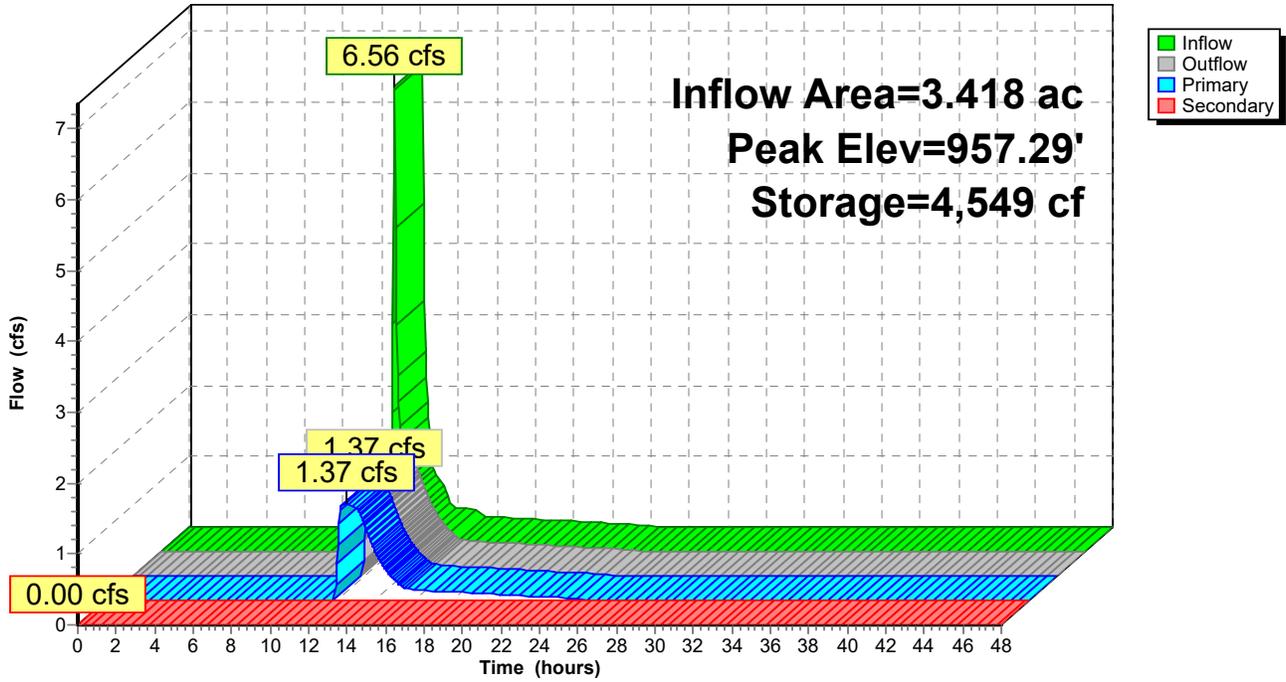
Device	Routing	Invert	Outlet Devices
#1	Primary	953.25'	12.0" Round Culvert L= 73.9' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 953.25' / 952.84' S= 0.0055 1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	953.55'	6.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 953.55' / 953.25' S= 0.0050 1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	958.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	958.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=1.37 cfs @ 12.50 hrs HW=957.29' (Free Discharge)
 ↑ **1=Culvert** (Passes 1.37 cfs of 6.24 cfs potential flow)
 ↑ **2=Culvert** (Barrel Controls 1.37 cfs @ 6.96 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=953.25' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: SW Bio Pond

Hydrograph



Summary for Pond 5P: SE Bio Pond

Inflow Area = 4.370 ac, 41.76% Impervious, Inflow Depth = 1.22" for 10-year event
 Inflow = 9.41 cfs @ 12.14 hrs, Volume= 0.443 af
 Outflow = 1.16 cfs @ 12.68 hrs, Volume= 0.421 af, Atten= 88%, Lag= 32.7 min
 Primary = 1.16 cfs @ 12.68 hrs, Volume= 0.421 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 958.29' @ 12.68 hrs Surf.Area= 6,274 sf Storage= 8,243 cf

Plug-Flow detention time= 109.0 min calculated for 0.421 af (95% of inflow)
 Center-of-Mass det. time= 83.4 min (912.6 - 829.3)

Volume	Invert	Avail.Storage	Storage Description	
#1	954.25'	20,934 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
954.25	5,895	0.0	0	0
955.42	5,895	33.0	2,276	2,276
955.75	5,895	33.0	642	2,918
958.00	5,895	27.0	3,581	6,499
960.00	8,540	100.0	14,435	20,934

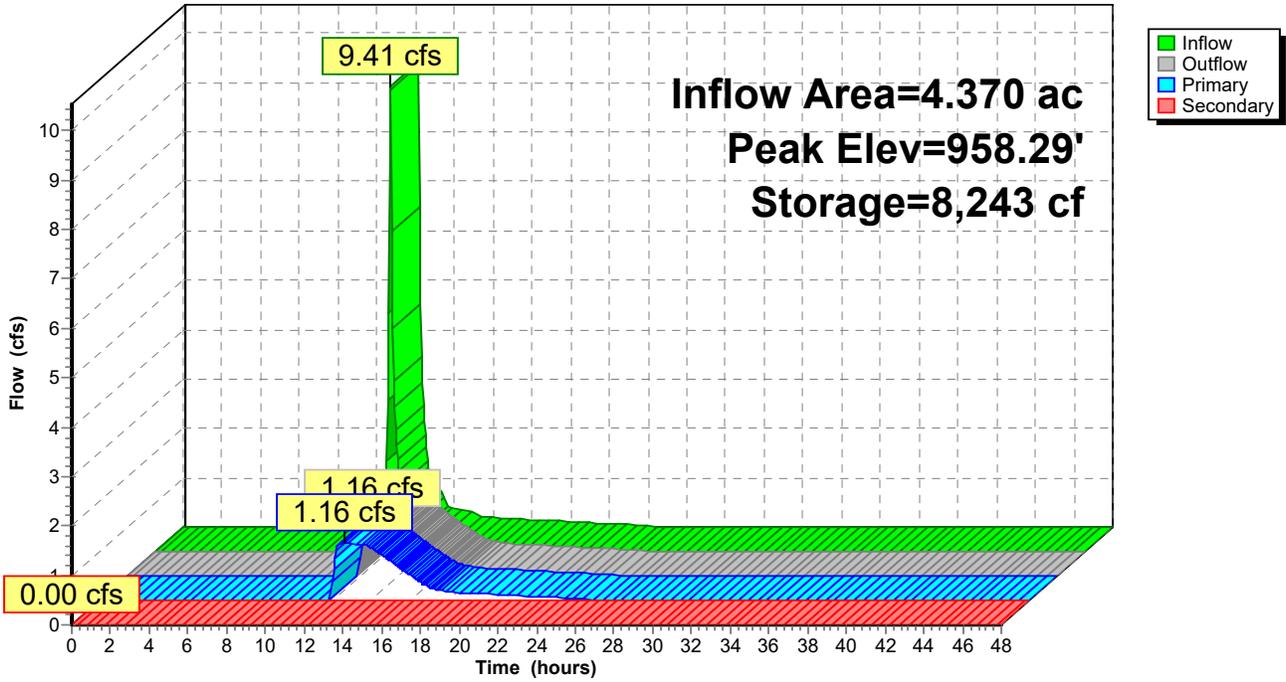
Device	Routing	Invert	Outlet Devices
#1	Primary	954.25'	12.0" Round Culvert L= 71.4' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 954.25' / 952.91' S= 0.0188 1/1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	954.75'	6.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 954.75' / 954.25' S= 0.0050 1/1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	959.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=1.16 cfs @ 12.68 hrs HW=958.29' (Free Discharge)
 ↑ 1=Culvert (Passes 1.16 cfs of 7.11 cfs potential flow)
 ↑ 2=Culvert (Barrel Controls 1.16 cfs @ 5.88 fps)
 ↑ 3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=954.25' (Free Discharge)
 ↑ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: SE Bio Pond

Hydrograph



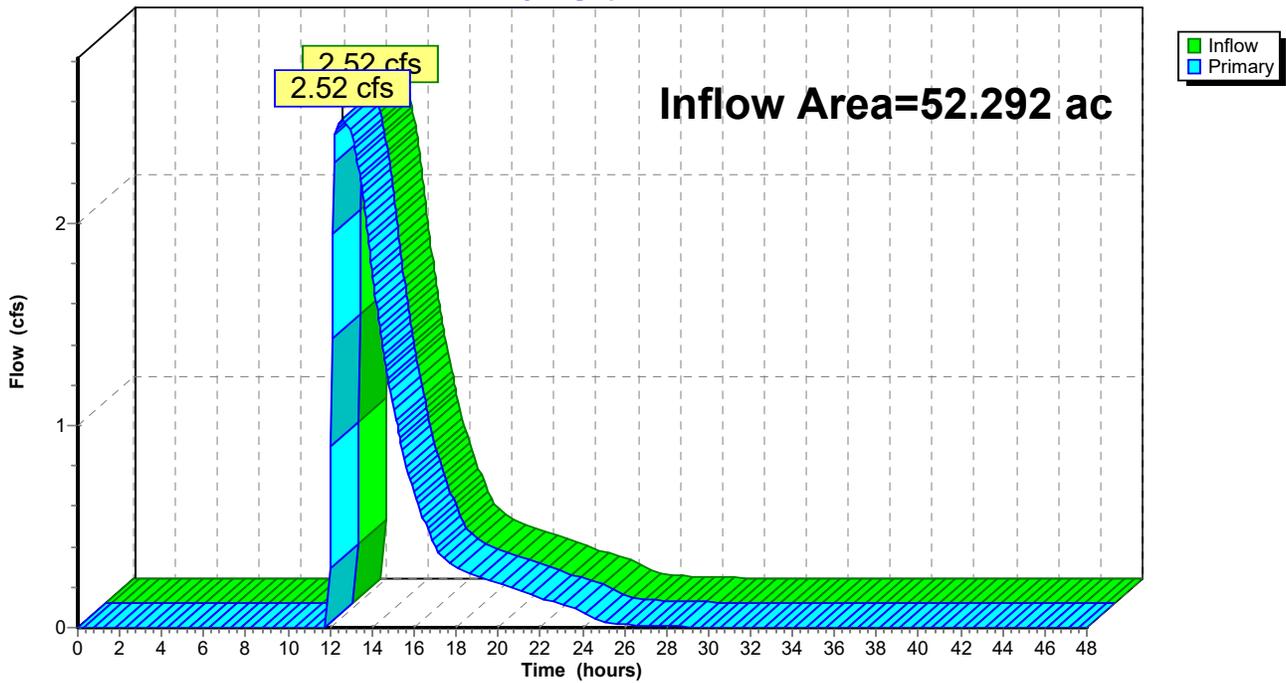
Summary for Link 1L: PROP Total

Inflow Area = 52.292 ac, 34.06% Impervious, Inflow Depth = 0.17" for 10-year event
Inflow = 2.52 cfs @ 12.55 hrs, Volume= 0.726 af
Primary = 2.52 cfs @ 12.55 hrs, Volume= 0.726 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: PROP Total

Hydrograph



2024 03 04 Hartland Apartments

MSE 24-hr 3 100-year Rainfall=6.26"

Prepared by Payne & Dolan

Printed 3/6/2024

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1S: NW	Runoff Area=14.237 ac 35.02% Impervious Runoff Depth=2.45" Tc=6.0 min CN=64 Runoff=62.57 cfs 2.907 af
Subcatchment 2S: NE	Runoff Area=16.766 ac 26.58% Impervious Runoff Depth=2.36" Tc=6.0 min CN=63 Runoff=70.85 cfs 3.297 af
Subcatchment 3S: E	Runoff Area=13.501 ac 36.63% Impervious Runoff Depth=2.63" Tc=6.0 min CN=66 Runoff=63.90 cfs 2.964 af
Subcatchment 4S: SW	Runoff Area=3.418 ac 46.78% Impervious Runoff Depth=2.82" Tc=6.0 min CN=68 Runoff=17.33 cfs 0.804 af
Subcatchment 5S: SE	Runoff Area=4.370 ac 41.76% Impervious Runoff Depth=3.01" Tc=6.0 min CN=70 Runoff=23.63 cfs 1.097 af
Subcatchment S1: SOUTH	Runoff Area=13.856 ac 36.27% Impervious Runoff Depth=3.21" Tc=6.0 min CN=72 Runoff=79.58 cfs 3.703 af
Pond 1P: NW Inf Pond	Peak Elev=966.30' Storage=78,424 cf Inflow=62.57 cfs 2.907 af Outflow=2.15 cfs 2.907 af
Pond 2P: NE Inf Pond	Peak Elev=963.30' Storage=86,056 cf Inflow=70.85 cfs 3.297 af Outflow=2.63 cfs 3.297 af
Pond 3P: East Inf Pond	Peak Elev=966.35' Storage=78,038 cf Inflow=63.90 cfs 2.964 af Outflow=2.43 cfs 2.964 af
Pond 4P: SW Bio Pond	Peak Elev=958.74' Storage=10,677 cf Inflow=17.33 cfs 0.804 af Primary=7.44 cfs 0.796 af Secondary=0.00 cfs 0.000 af Outflow=7.44 cfs 0.796 af
Pond 5P: SE Bio Pond	Peak Elev=959.64' Storage=17,950 cf Inflow=23.63 cfs 1.097 af Primary=8.13 cfs 1.075 af Secondary=0.00 cfs 0.000 af Outflow=8.13 cfs 1.075 af
Link 1L: PROP Total	Inflow=15.56 cfs 1.871 af Primary=15.56 cfs 1.871 af

Total Runoff Area = 66.148 ac Runoff Volume = 14.773 af Average Runoff Depth = 2.68"
65.47% Pervious = 43.310 ac 34.53% Impervious = 22.838 ac

Summary for Subcatchment 1S: NW

Runoff = 62.57 cfs @ 12.14 hrs, Volume= 2.907 af, Depth= 2.45"
 Routed to Pond 1P : NW Inf Pond

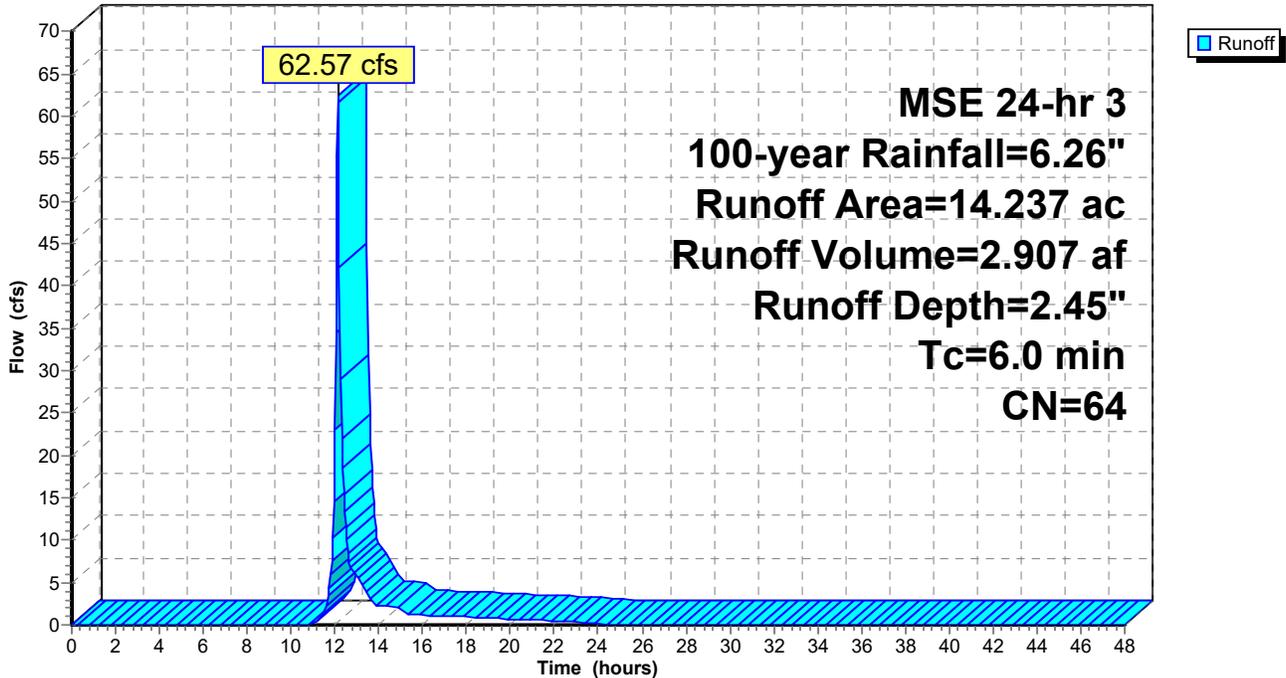
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 1.017	98	Paved roads, HSG B
* 1.562	98	Paved drives, HSG A
1.544	98	Roofs, HSG A
0.408	98	Paved parking, HSG A
* 0.455	98	Paved walks, HSG A
0.267	98	Water Surface, 0% imp, HSG A
6.586	39	>75% Grass cover, Good, HSG A
2.398	57	Undeveloped Woods/grass comb., Poor, HSG A
14.237	64	Weighted Average
9.251		64.98% Pervious Area
4.986		35.02% Impervious Area

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

Subcatchment 1S: NW

Hydrograph



Summary for Subcatchment 2S: NE

Runoff = 70.85 cfs @ 12.14 hrs, Volume= 3.297 af, Depth= 2.36"
 Routed to Pond 2P : NE Inf Pond

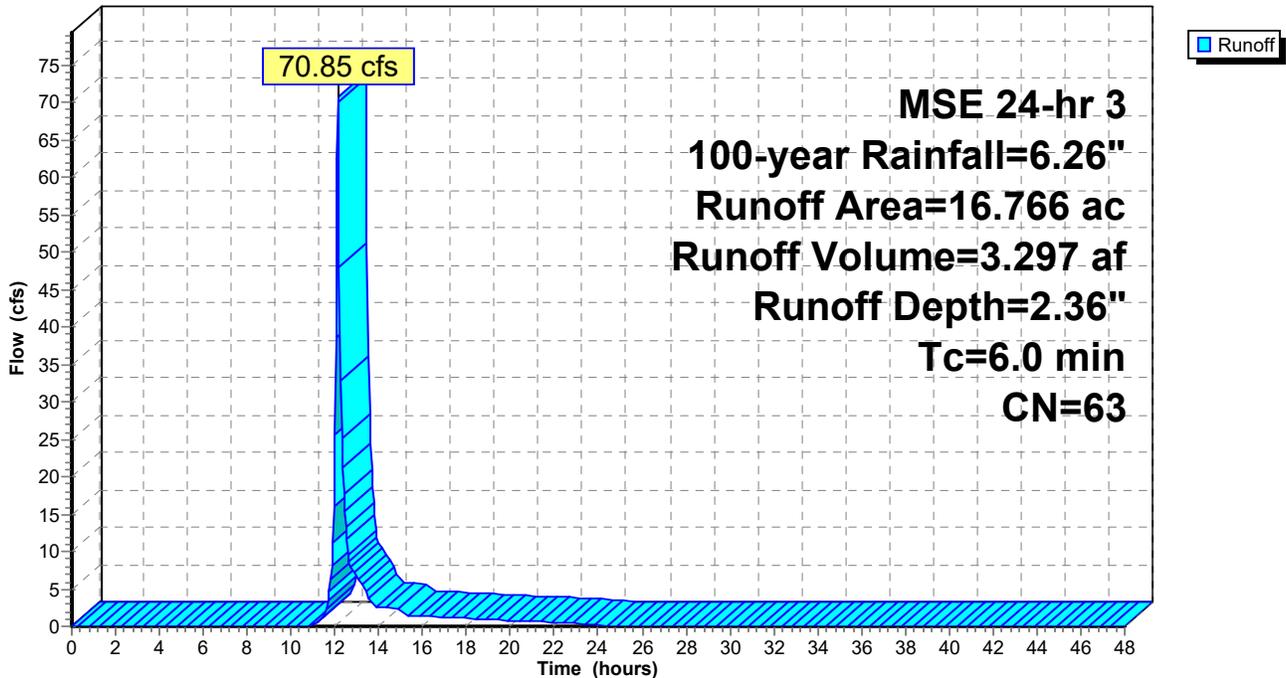
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 0.652	98	Paved roads, HSG B
* 1.227	98	Paved drives, HSG A
1.346	98	Roofs, HSG A
0.307	98	Paved parking, HSG A
* 0.337	98	Paved walks, HSG A
* 0.588	98	Offsite Impervious yard area, HSG B
0.506	98	Water Surface, 0% imp, HSG A
6.376	39	>75% Grass cover, Good, HSG A
2.034	61	>75% Grass cover, Good, HSG B
3.393	57	Undeveloped Woods/grass comb., Poor, HSG A
16.766	63	Weighted Average
12.309		73.42% Pervious Area
4.457		26.58% Impervious Area

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

Subcatchment 2S: NE

Hydrograph



Summary for Subcatchment 3S: E

Runoff = 63.90 cfs @ 12.14 hrs, Volume= 2.964 af, Depth= 2.63"
 Routed to Pond 3P : East Inf Pond

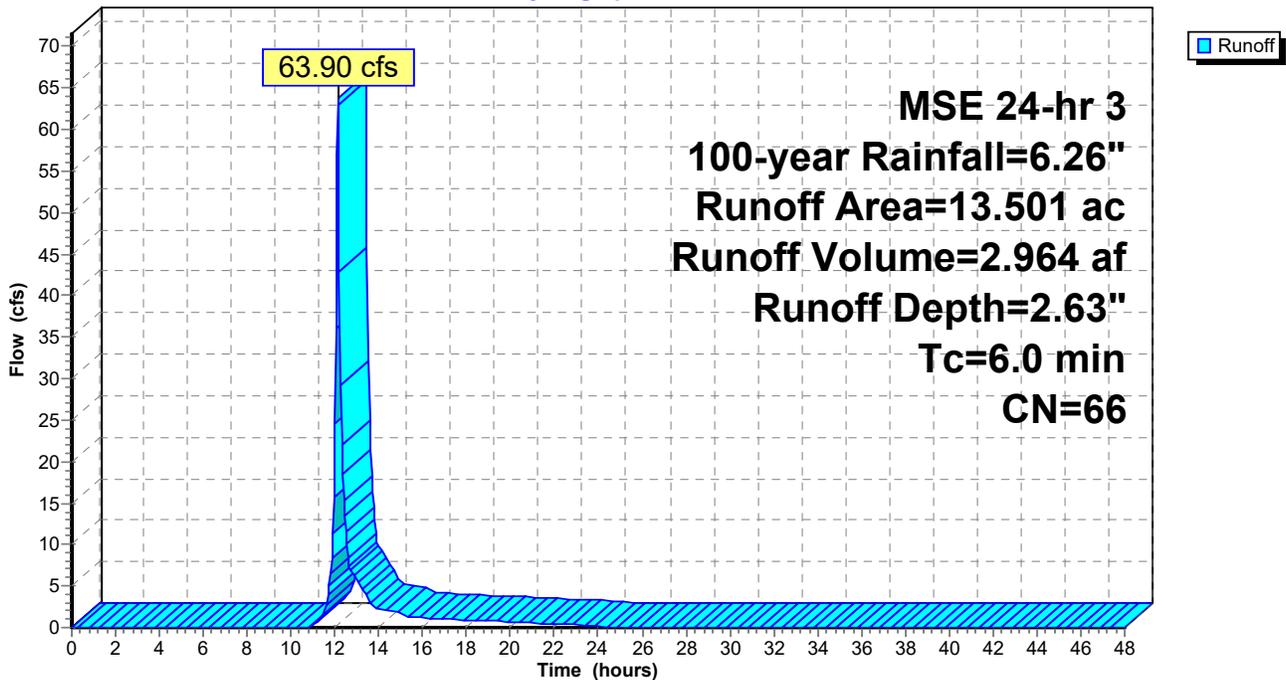
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 1.934	98	Paved drives, HSG A
1.888	98	Roofs, HSG A
0.472	98	Paved parking, HSG A
* 0.652	98	Paved walks, HSG A
0.442	98	Water Surface, 0% imp, HSG A
5.239	39	>75% Grass cover, Good, HSG A
2.874	57	Undeveloped Woods/grass comb., Poor, HSG A
13.501	66	Weighted Average
8.555		63.37% Pervious Area
4.946		36.63% Impervious Area

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

Subcatchment 3S: E

Hydrograph



Summary for Subcatchment 4S: SW

Runoff = 17.33 cfs @ 12.14 hrs, Volume= 0.804 af, Depth= 2.82"
 Routed to Pond 4P : SW Bio Pond

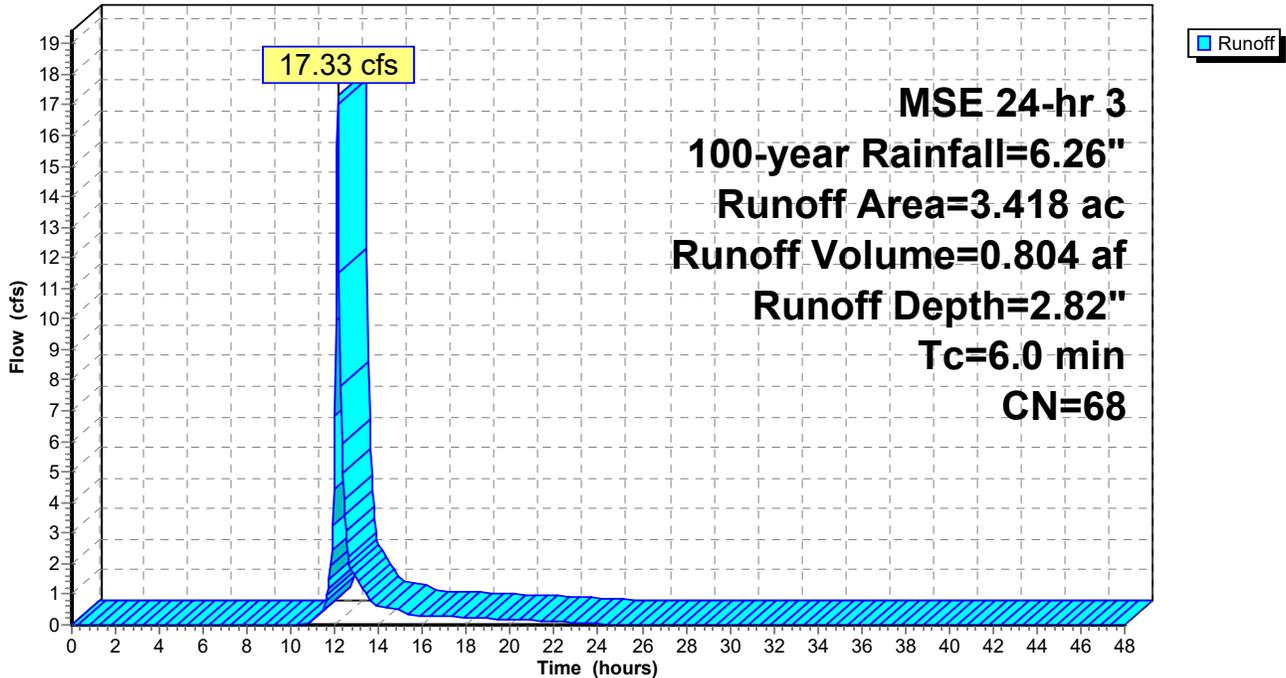
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 0.055	98	Paved roads, HSG B
* 0.514	98	Paved drives, HSG A
0.587	98	Roofs, HSG A
0.275	98	Paved parking, HSG A
* 0.168	98	Paved walks, HSG A
0.074	98	Water Surface, 0% imp, HSG A
1.745	39	>75% Grass cover, Good, HSG A
0.000	57	Undeveloped Woods/grass comb., Poor, HSG A
3.418	68	Weighted Average
1.819		53.22% Pervious Area
1.599		46.78% Impervious Area

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

Subcatchment 4S: SW

Hydrograph



Summary for Subcatchment 5S: SE

Runoff = 23.63 cfs @ 12.13 hrs, Volume= 1.097 af, Depth= 3.01"
 Routed to Pond 5P : SE Bio Pond

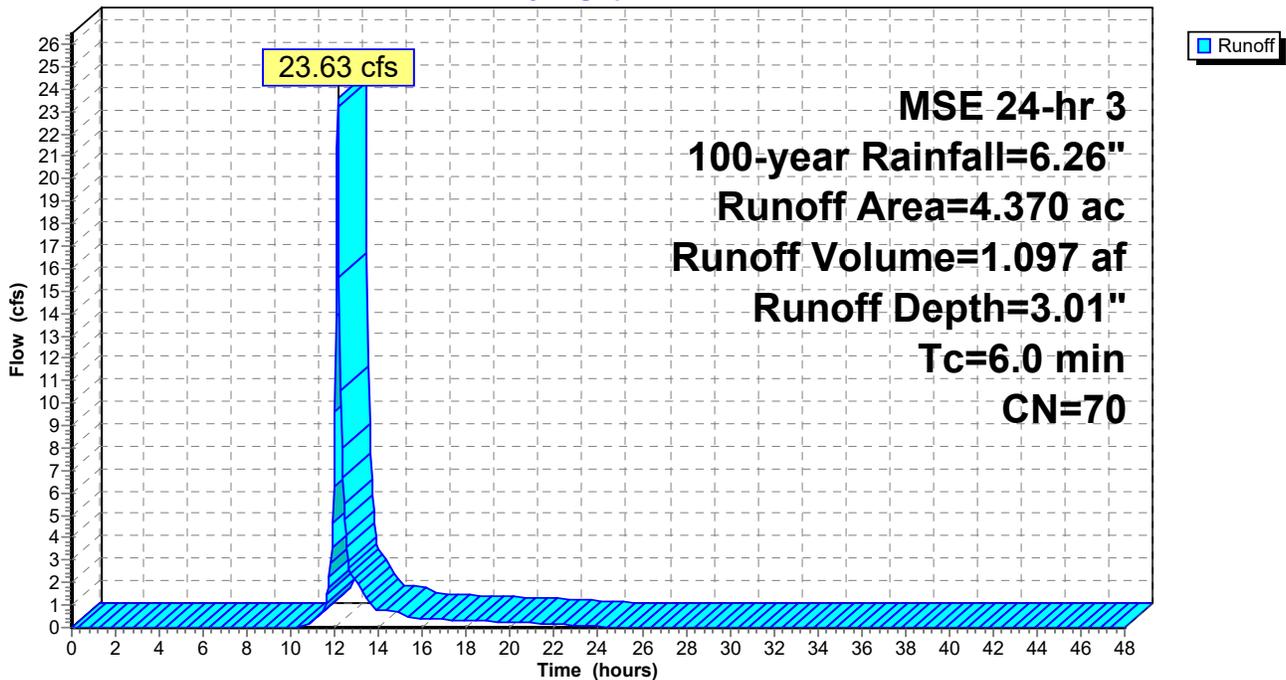
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 0.869	98	Paved drives, HSG A
0.470	98	Roofs, HSG A
0.141	98	Paved parking, HSG A
* 0.345	98	Paved walks, HSG A
0.135	98	Water Surface, 0% imp, HSG A
1.291	39	>75% Grass cover, Good, HSG A
1.119	57	Undeveloped Woods/grass comb., Poor, HSG A
4.370	70	Weighted Average
2.545		58.24% Pervious Area
1.825		41.76% Impervious Area

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

Subcatchment 5S: SE

Hydrograph



Summary for Subcatchment S1: SOUTH

Runoff = 79.58 cfs @ 12.13 hrs, Volume= 3.703 af, Depth= 3.21"

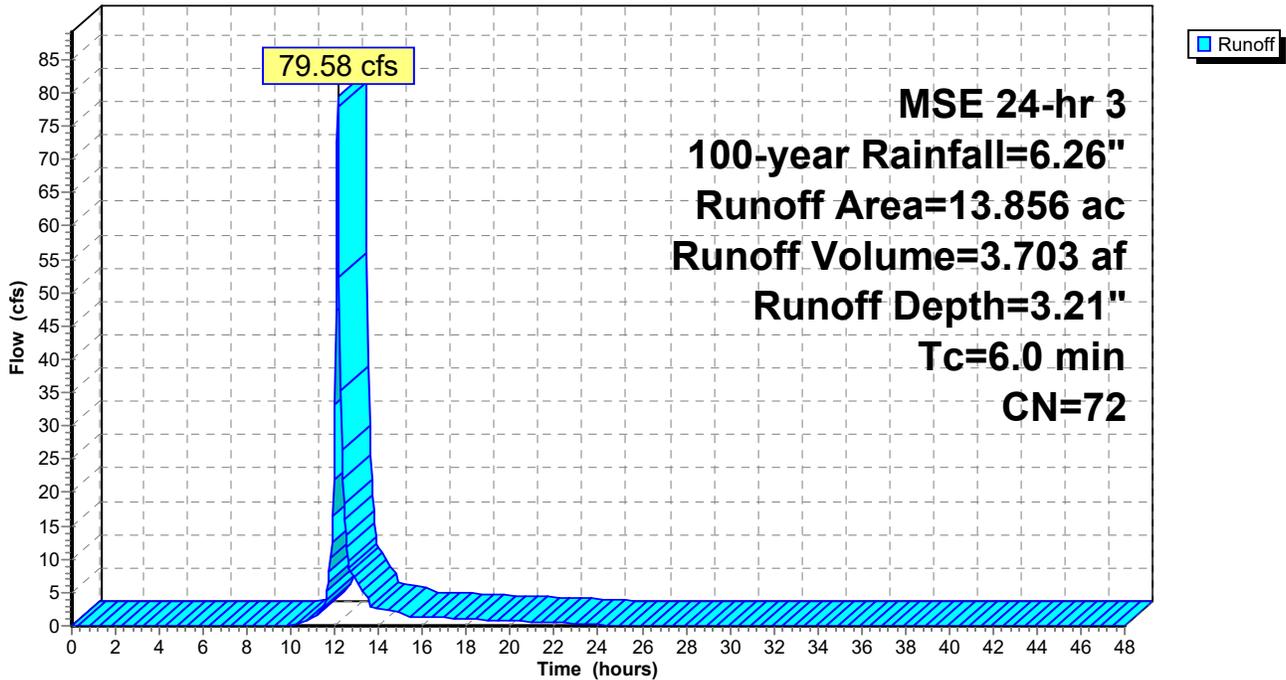
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 0.167	98	Paved roads, HSG B
* 4.858	98	Gravel, HSG A
* 8.831	57	Undeveloped Woods/grass comb., Poor, HSG A
13.856	72	Weighted Average
8.831		63.73% Pervious Area
5.025		36.27% Impervious Area

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

Subcatchment S1: SOUTH

Hydrograph



Summary for Pond 1P: NW Inf Pond

Inflow Area = 14.237 ac, 35.02% Impervious, Inflow Depth = 2.45" for 100-year event
 Inflow = 62.57 cfs @ 12.14 hrs, Volume= 2.907 af
 Outflow = 2.15 cfs @ 14.45 hrs, Volume= 2.907 af, Atten= 97%, Lag= 138.7 min
 Discarded = 2.15 cfs @ 14.45 hrs, Volume= 2.907 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 966.30' @ 14.45 hrs Surf.Area= 25,775 sf Storage= 78,424 cf

Plug-Flow detention time= 432.3 min calculated for 2.907 af (100% of inflow)
 Center-of-Mass det. time= 432.0 min (1,251.7 - 819.7)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	416,608 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

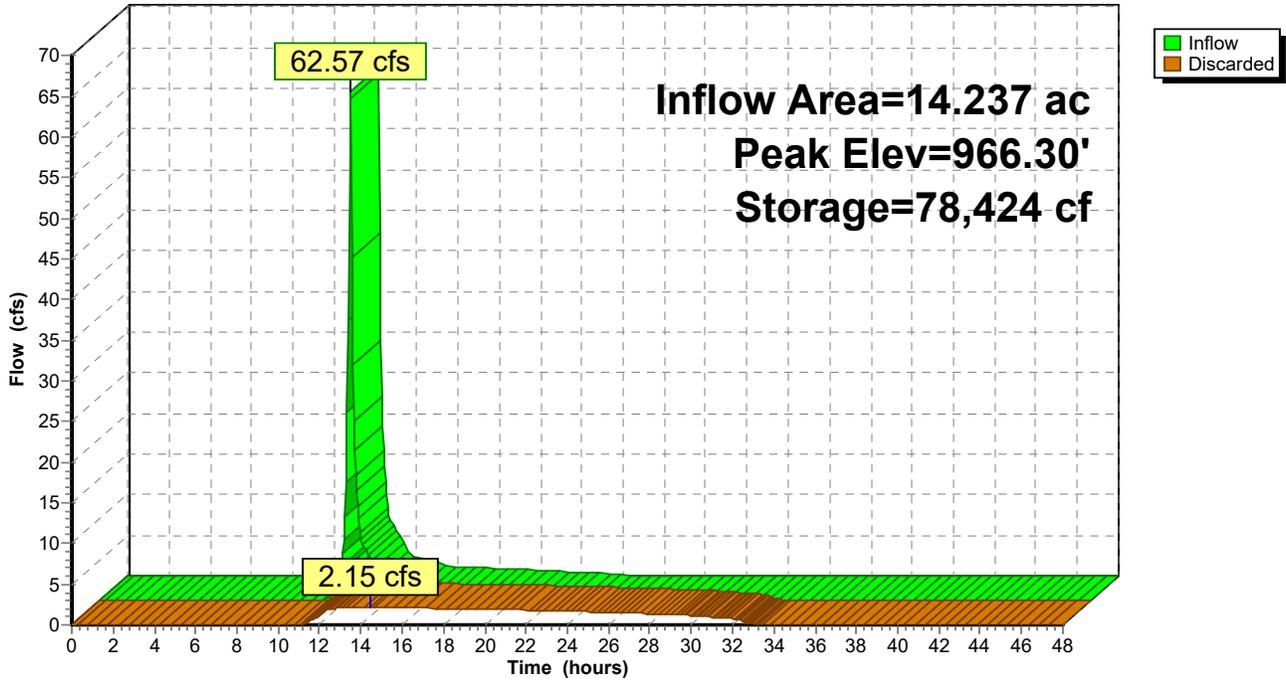
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	7,245	0	0
963.00	15,330	11,288	11,288
964.00	18,315	16,823	28,110
965.00	21,405	19,860	47,970
966.00	24,600	23,003	70,973
967.00	28,570	26,585	97,558
968.00	34,660	31,615	129,173
969.00	41,790	38,225	167,398
970.00	49,670	45,730	213,128
971.00	61,720	55,695	268,823
972.00	73,620	67,670	336,493
973.00	86,610	80,115	416,608

Device	Routing	Invert	Outlet Devices
#1	Discarded	962.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=2.15 cfs @ 14.45 hrs HW=966.30' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 2.15 cfs)

Pond 1P: NW Inf Pond

Hydrograph



Summary for Pond 2P: NE Inf Pond

Inflow Area = 16.766 ac, 26.58% Impervious, Inflow Depth = 2.36" for 100-year event
 Inflow = 70.85 cfs @ 12.14 hrs, Volume= 3.297 af
 Outflow = 2.63 cfs @ 13.85 hrs, Volume= 3.297 af, Atten= 96%, Lag= 102.8 min
 Discarded = 2.63 cfs @ 13.85 hrs, Volume= 3.297 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 963.30' @ 13.85 hrs Surf.Area= 31,613 sf Storage= 86,056 cf

Plug-Flow detention time= 363.7 min calculated for 3.297 af (100% of inflow)
 Center-of-Mass det. time= 363.5 min (1,184.9 - 821.4)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	567,415 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	14,595	0	0
961.00	25,680	20,138	20,138
962.00	28,185	26,933	47,070
963.00	30,790	29,488	76,558
964.00	33,495	32,143	108,700
965.00	39,885	36,690	145,390
966.00	43,300	41,593	186,983
967.00	47,800	45,550	232,533
968.00	53,360	50,580	283,113
969.00	60,550	56,955	340,068
970.00	69,030	64,790	404,858
971.00	80,830	74,930	479,788
972.00	94,425	87,628	567,415

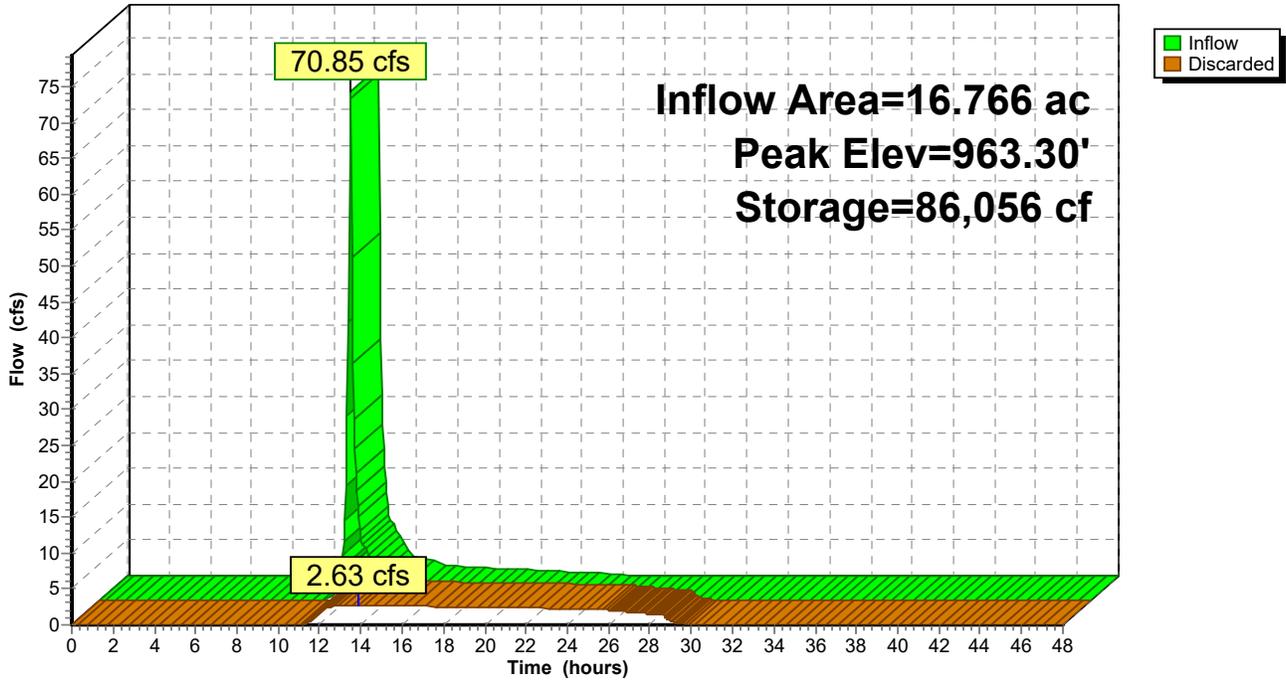
Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=2.63 cfs @ 13.85 hrs HW=963.30' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 2.63 cfs)

Pond 2P: NE Inf Pond

Hydrograph



Summary for Pond 3P: East Inf Pond

Inflow Area = 13.501 ac, 36.63% Impervious, Inflow Depth = 2.63" for 100-year event
 Inflow = 63.90 cfs @ 12.14 hrs, Volume= 2.964 af
 Outflow = 2.43 cfs @ 13.66 hrs, Volume= 2.964 af, Atten= 96%, Lag= 91.7 min
 Discarded = 2.43 cfs @ 13.66 hrs, Volume= 2.964 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 966.35' @ 13.66 hrs Surf.Area= 29,143 sf Storage= 78,038 cf

Plug-Flow detention time= 356.7 min calculated for 2.961 af (100% of inflow)
 Center-of-Mass det. time= 356.7 min (1,173.0 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1	963.00'	544,443 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
963.00	11,805	0	0
964.00	22,650	17,228	17,228
965.00	25,340	23,995	41,223
966.00	28,125	26,733	67,955
967.00	31,015	29,570	97,525
968.00	34,225	32,620	130,145
969.00	38,050	36,138	166,283
970.00	43,800	40,925	207,208
971.00	49,335	46,568	253,775
972.00	57,675	53,505	307,280
973.00	69,980	63,828	371,108
974.00	85,260	77,620	448,728
975.00	106,170	95,715	544,443

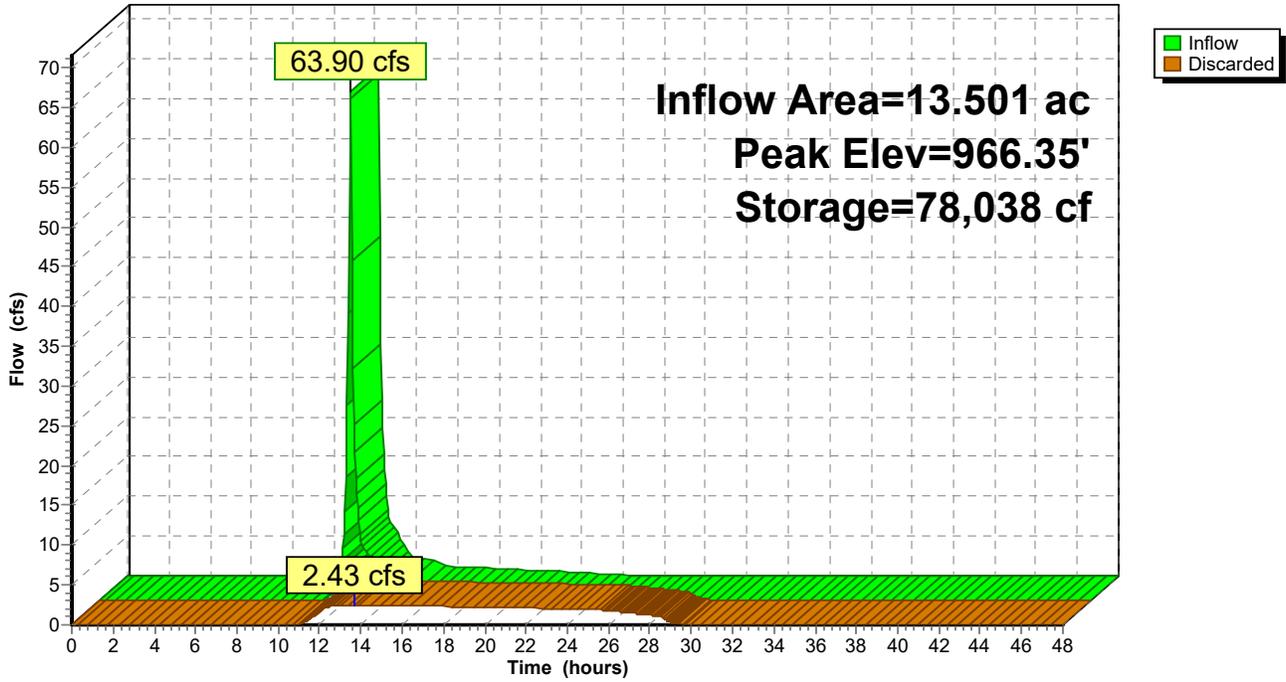
Device	Routing	Invert	Outlet Devices
#1	Discarded	963.00'	3.600 in/hr Exfiltration over Surface area

Discarded OutFlow Max=2.43 cfs @ 13.66 hrs HW=966.35' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 2.43 cfs)

Pond 3P: East Inf Pond

Hydrograph



Summary for Pond 4P: SW Bio Pond

Inflow Area = 3.418 ac, 46.78% Impervious, Inflow Depth = 2.82" for 100-year event
 Inflow = 17.33 cfs @ 12.14 hrs, Volume= 0.804 af
 Outflow = 7.44 cfs @ 12.27 hrs, Volume= 0.796 af, Atten= 57%, Lag= 7.8 min
 Primary = 7.44 cfs @ 12.27 hrs, Volume= 0.796 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 958.74' @ 12.27 hrs Surf.Area= 4,906 sf Storage= 10,677 cf

Plug-Flow detention time= 47.4 min calculated for 0.796 af (99% of inflow)
 Center-of-Mass det. time= 41.5 min (854.4 - 812.9)

Volume	Invert	Avail.Storage	Storage Description	
#1	953.25'	11,962 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
953.25	3,240	0.0	0	0
954.42	3,240	33.0	1,251	1,251
954.75	3,240	33.0	353	1,604
957.00	3,240	27.0	1,968	3,572
959.00	5,150	100.0	8,390	11,962

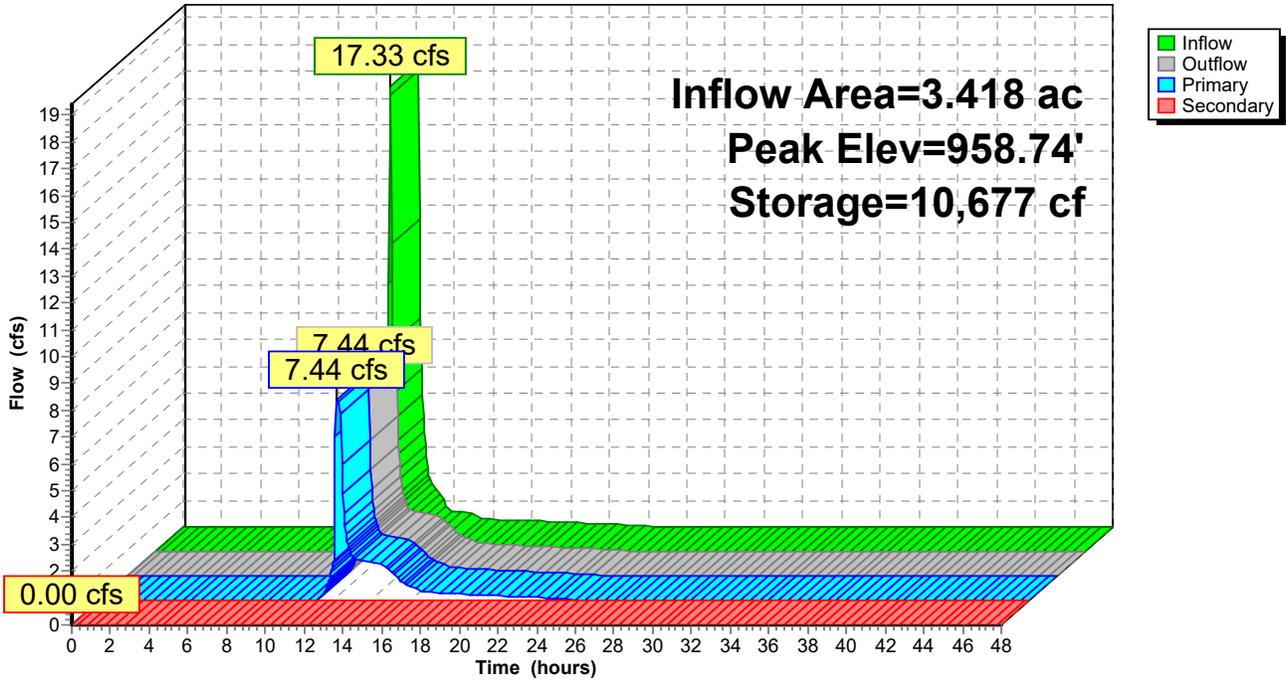
Device	Routing	Invert	Outlet Devices
#1	Primary	953.25'	12.0" Round Culvert L= 73.9' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 953.25' / 952.84' S= 0.0055 1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	953.55'	6.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 953.55' / 953.25' S= 0.0050 1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	958.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	958.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=7.43 cfs @ 12.27 hrs HW=958.73' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 7.43 cfs @ 9.46 fps)
 ↑ **2=Culvert** (Passes < 1.62 cfs potential flow)
 ↑ **3=Orifice/Grate** (Passes < 12.90 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=953.25' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: SW Bio Pond

Hydrograph



Summary for Pond 5P: SE Bio Pond

Inflow Area = 4.370 ac, 41.76% Impervious, Inflow Depth = 3.01" for 100-year event
 Inflow = 23.63 cfs @ 12.13 hrs, Volume= 1.097 af
 Outflow = 8.13 cfs @ 12.30 hrs, Volume= 1.075 af, Atten= 66%, Lag= 10.2 min
 Primary = 8.13 cfs @ 12.30 hrs, Volume= 1.075 af
 Routed to Link 1L : PROP Total
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 1L : PROP Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.64' @ 12.30 hrs Surf.Area= 8,065 sf Storage= 17,950 cf

Plug-Flow detention time= 93.7 min calculated for 1.073 af (98% of inflow)
 Center-of-Mass det. time= 82.9 min (892.5 - 809.6)

Volume	Invert	Avail.Storage	Storage Description	
#1	954.25'	20,934 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
954.25	5,895	0.0	0	0
955.42	5,895	33.0	2,276	2,276
955.75	5,895	33.0	642	2,918
958.00	5,895	27.0	3,581	6,499
960.00	8,540	100.0	14,435	20,934

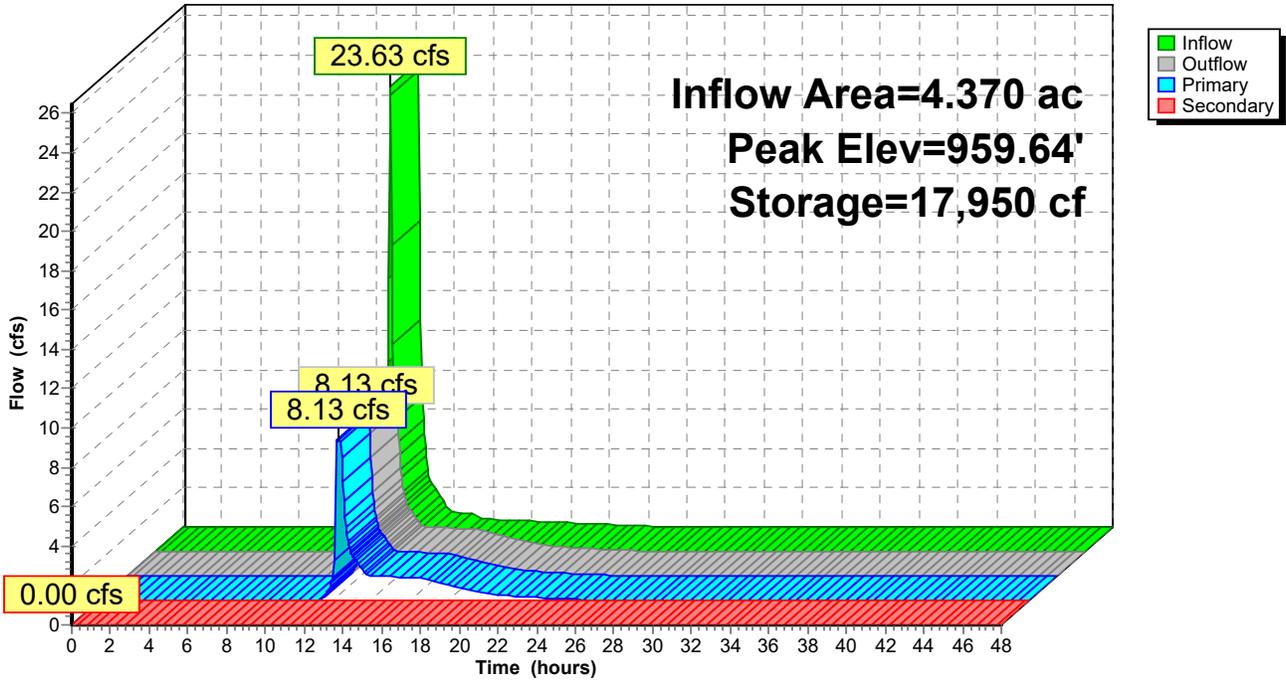
Device	Routing	Invert	Outlet Devices
#1	Primary	954.25'	12.0" Round Culvert L= 71.4' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 954.25' / 952.91' S= 0.0188 1/8" Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	954.75'	6.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 954.75' / 954.25' S= 0.0050 1/2" Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	959.75'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=8.13 cfs @ 12.30 hrs HW=959.64' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 8.13 cfs @ 10.35 fps)
 ↑ **2=Culvert** (Passes < 1.36 cfs potential flow)
 ↑ **3=Orifice/Grate** (Passes < 10.49 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=954.25' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: SE Bio Pond

Hydrograph



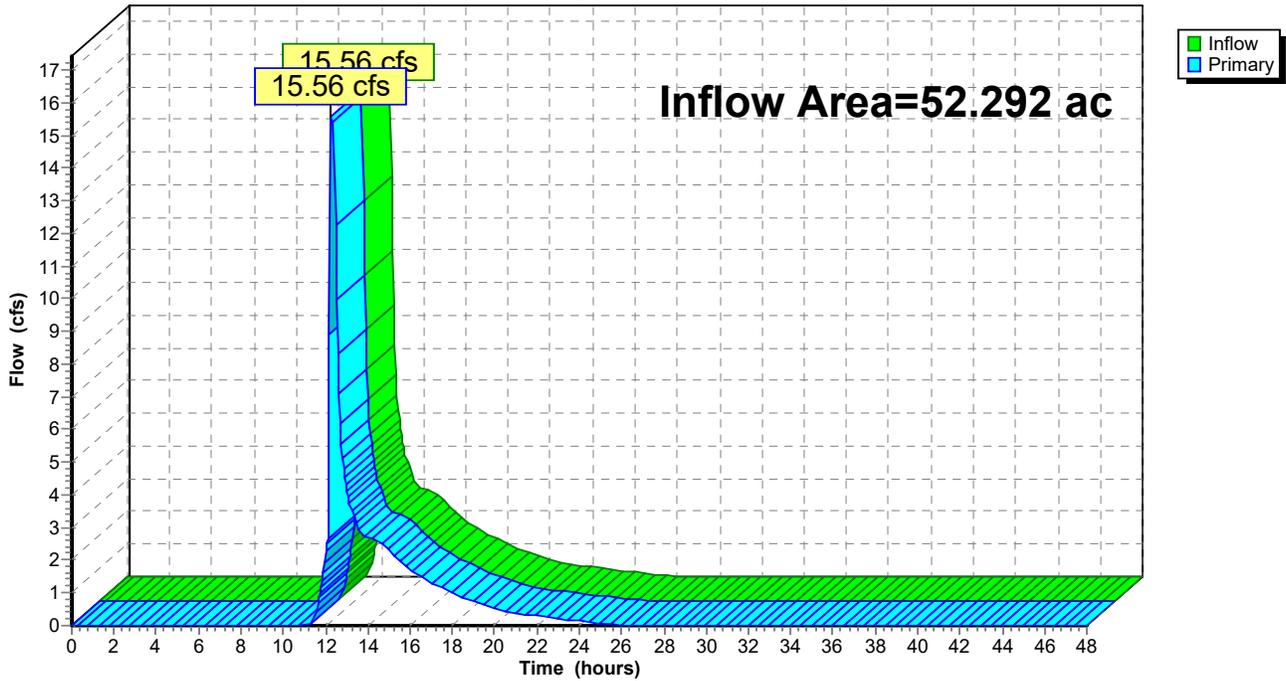
Summary for Link 1L: PROP Total

Inflow Area = 52.292 ac, 34.06% Impervious, Inflow Depth = 0.43" for 100-year event
Inflow = 15.56 cfs @ 12.28 hrs, Volume= 1.871 af
Primary = 15.56 cfs @ 12.28 hrs, Volume= 1.871 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: PROP Total

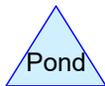
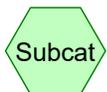
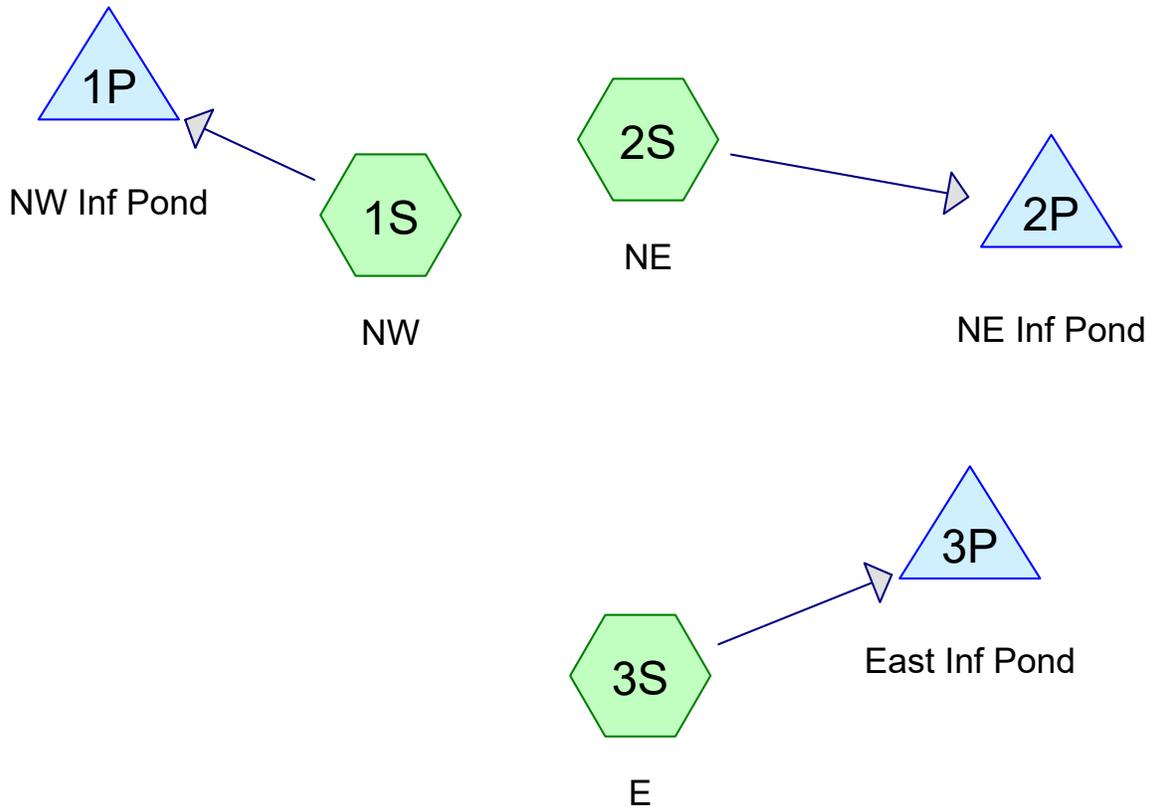
Hydrograph



Appendix 5

Frozen Condition

HydroCAD Model Results



2024 03 04 FROZEN Hartland Apartments

Prepared by Payne & Dolan

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
18.201	98	>75% Grass cover, Good, HSG A (1S, 2S, 3S)
2.034	98	>75% Grass cover, Good, HSG B (2S)
0.588	98	Offsite Impervious yard area, HSG B (2S)
4.723	98	Paved drives, HSG A (1S, 2S, 3S)
1.187	98	Paved parking, HSG A (1S, 2S, 3S)
1.669	98	Paved roads, HSG B (1S, 2S)
1.444	98	Paved walks, HSG A (1S, 2S, 3S)
4.778	98	Roofs, HSG A (1S, 2S, 3S)
8.665	98	Undeveloped Woods/grass comb., Poor, HSG A (1S, 2S, 3S)
1.215	98	Water Surface, 0% imp, HSG A (1S, 2S, 3S)
44.504	98	TOTAL AREA

2024 03 04 FROZEN Hartland Apartments

Prepared by Payne & Dolan

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
40.213	HSG A	1S, 2S, 3S
4.291	HSG B	1S, 2S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
44.504		TOTAL AREA

2024 03 04 FROZEN Hartland Apartments

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcat Numbers
18.201	2.034	0.000	0.000	0.000	20.235	>75% Grass cover, Good	
0.000	0.588	0.000	0.000	0.000	0.588	Offsite Impervious yard area	
4.723	0.000	0.000	0.000	0.000	4.723	Paved drives	
1.187	0.000	0.000	0.000	0.000	1.187	Paved parking	
0.000	1.669	0.000	0.000	0.000	1.669	Paved roads	
1.444	0.000	0.000	0.000	0.000	1.444	Paved walks	
4.778	0.000	0.000	0.000	0.000	4.778	Roofs	
8.665	0.000	0.000	0.000	0.000	8.665	Undeveloped Woods/grass comb., Poor	
1.215	0.000	0.000	0.000	0.000	1.215	Water Surface, 0% imp	
40.213	4.291	0.000	0.000	0.000	44.504	TOTAL AREA	

2024 03 04 FROZEN Hartland Apartments

MSE 24-hr 3 100-year Rainfall=6.26"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1S: NW	Runoff Area=14.237 ac 98.12% Impervious Runoff Depth=6.02" Tc=6.0 min CN=98 Runoff=128.14 cfs 7.144 af
Subcatchment 2S: NE	Runoff Area=16.766 ac 96.98% Impervious Runoff Depth=6.02" Tc=6.0 min CN=98 Runoff=150.90 cfs 8.413 af
Subcatchment 3S: E	Runoff Area=13.501 ac 96.73% Impervious Runoff Depth=6.02" Tc=6.0 min CN=98 Runoff=121.52 cfs 6.775 af
Pond 1P: NW Inf Pond	Peak Elev=971.65' Storage=311,182 cf Inflow=128.14 cfs 7.144 af Outflow=0.00 cfs 0.000 af
Pond 2P: NE Inf Pond	Peak Elev=969.42' Storage=366,462 cf Inflow=150.90 cfs 8.413 af Outflow=0.00 cfs 0.000 af
Pond 3P: East Inf Pond	Peak Elev=971.79' Storage=295,100 cf Inflow=121.52 cfs 6.775 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 44.504 ac Runoff Volume = 22.332 af Average Runoff Depth = 6.02"
2.73% Pervious = 1.215 ac 97.27% Impervious = 43.289 ac

Summary for Subcatchment 1S: NW

Runoff = 128.14 cfs @ 12.13 hrs, Volume= 7.144 af, Depth= 6.02"
 Routed to Pond 1P : NW Inf Pond

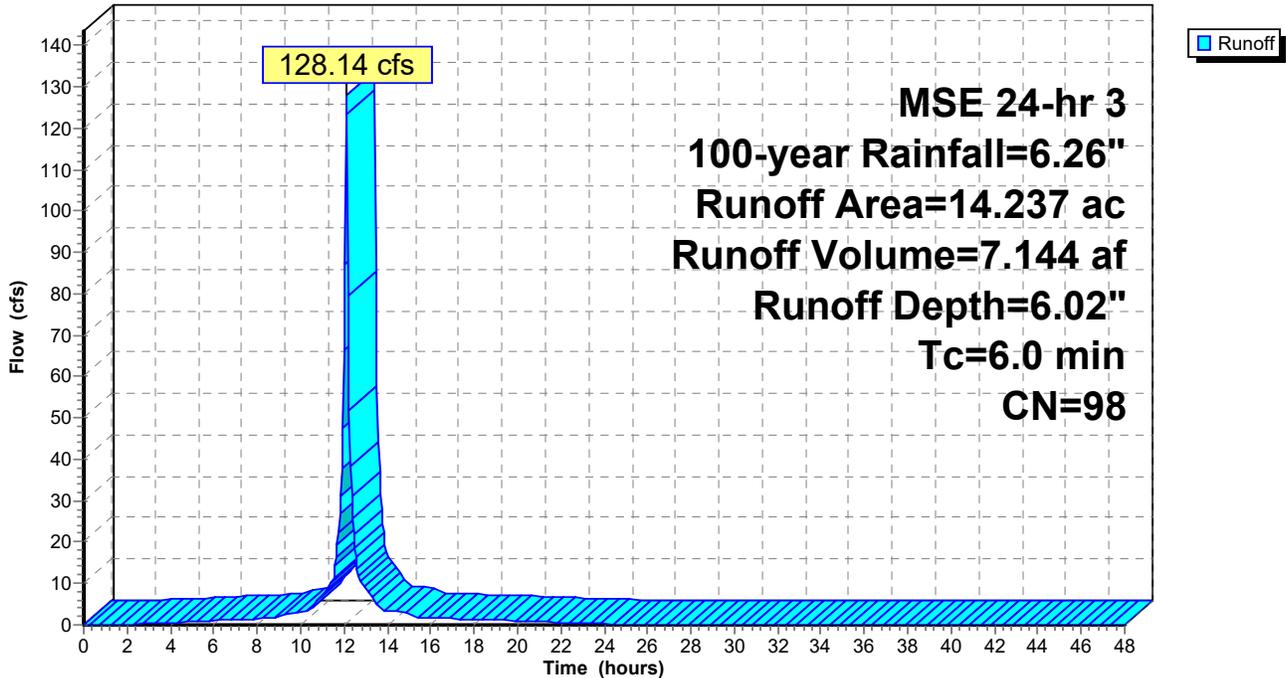
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 1.017	98	Paved roads, HSG B
* 1.562	98	Paved drives, HSG A
1.544	98	Roofs, HSG A
0.408	98	Paved parking, HSG A
* 0.455	98	Paved walks, HSG A
0.267	98	Water Surface, 0% imp, HSG A
* 6.586	98	>75% Grass cover, Good, HSG A
* 2.398	98	Undeveloped Woods/grass comb., Poor, HSG A
14.237	98	Weighted Average
0.267		1.88% Pervious Area
13.970		98.12% Impervious Area

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

Subcatchment 1S: NW

Hydrograph



Summary for Subcatchment 2S: NE

Runoff = 150.90 cfs @ 12.13 hrs, Volume= 8.413 af, Depth= 6.02"
 Routed to Pond 2P : NE Inf Pond

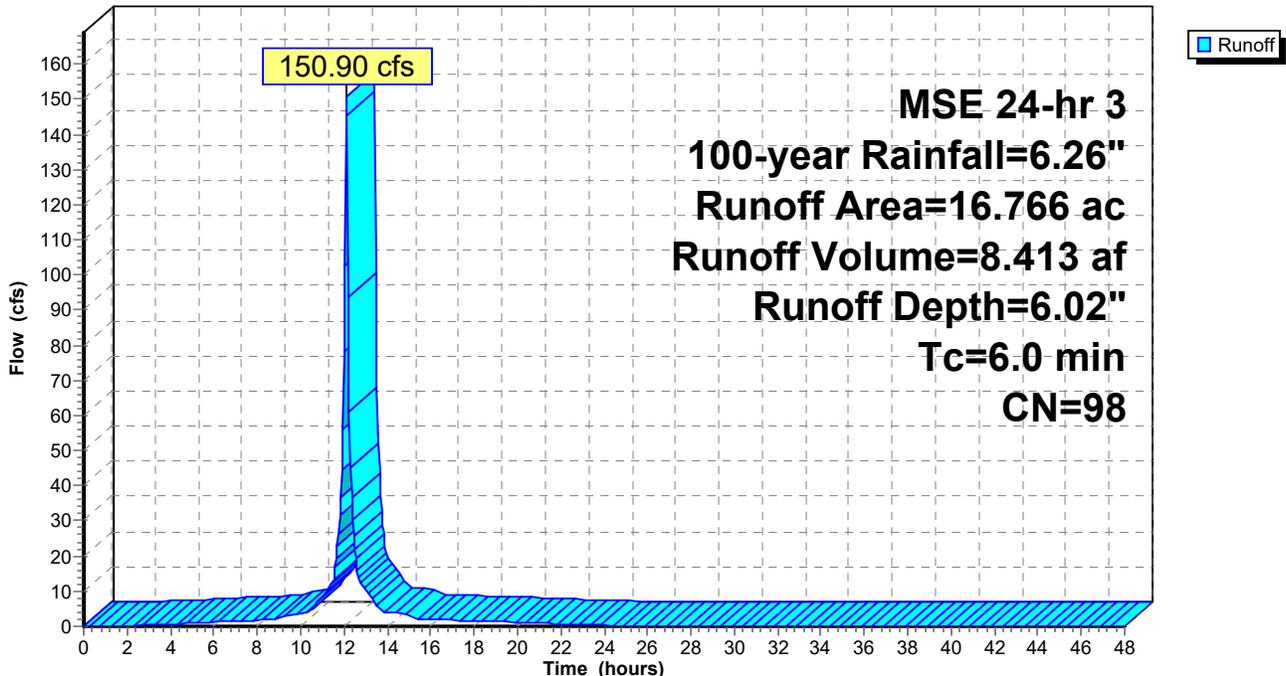
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 0.652	98	Paved roads, HSG B
* 1.227	98	Paved drives, HSG A
1.346	98	Roofs, HSG A
0.307	98	Paved parking, HSG A
* 0.337	98	Paved walks, HSG A
* 0.588	98	Offsite Impervious yard area, HSG B
0.506	98	Water Surface, 0% imp, HSG A
* 6.376	98	>75% Grass cover, Good, HSG A
* 2.034	98	>75% Grass cover, Good, HSG B
* 3.393	98	Undeveloped Woods/grass comb., Poor, HSG A
16.766	98	Weighted Average
0.506		3.02% Pervious Area
16.260		96.98% Impervious Area

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

Subcatchment 2S: NE

Hydrograph



Summary for Subcatchment 3S: E

Runoff = 121.52 cfs @ 12.13 hrs, Volume= 6.775 af, Depth= 6.02"
 Routed to Pond 3P : East Inf Pond

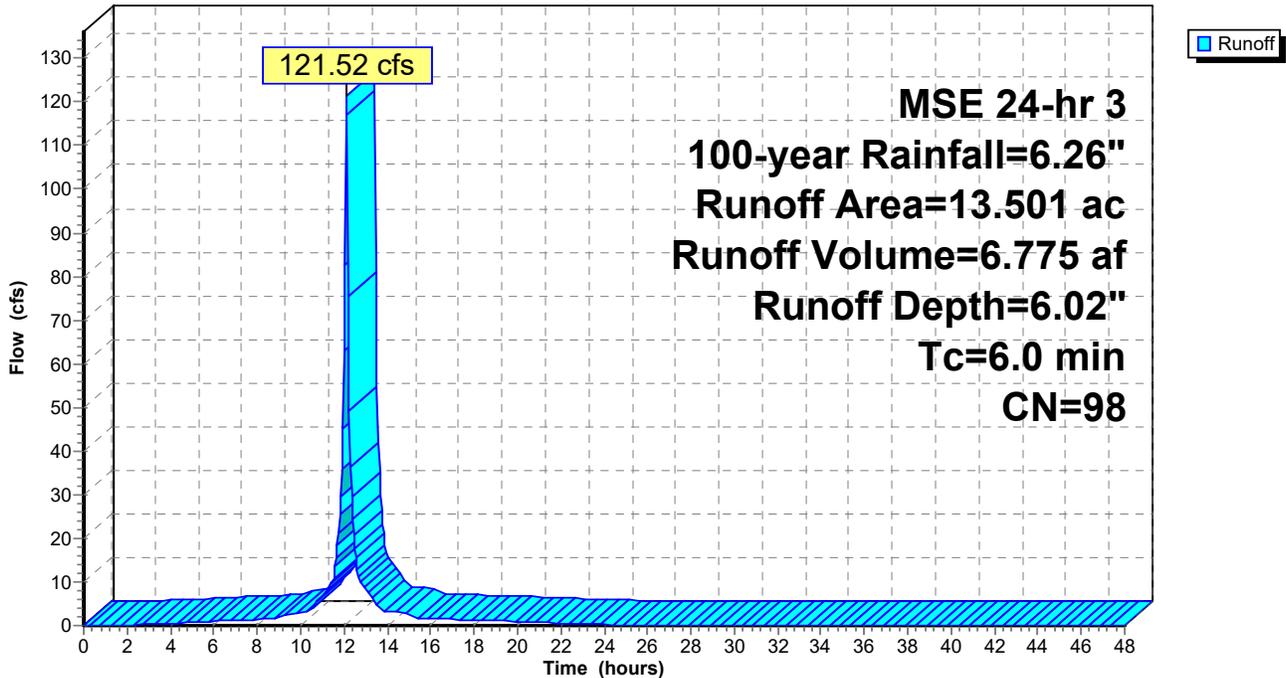
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-year Rainfall=6.26"

Area (ac)	CN	Description
* 1.934	98	Paved drives, HSG A
1.888	98	Roofs, HSG A
0.472	98	Paved parking, HSG A
* 0.652	98	Paved walks, HSG A
0.442	98	Water Surface, 0% imp, HSG A
* 5.239	98	>75% Grass cover, Good, HSG A
* 2.874	98	Undeveloped Woods/grass comb., Poor, HSG A
13.501	98	Weighted Average
0.442		3.27% Pervious Area
13.059		96.73% Impervious Area

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

Subcatchment 3S: E

Hydrograph



Summary for Pond 1P: NW Inf Pond

Inflow Area = 14.237 ac, 98.12% Impervious, Inflow Depth = 6.02" for 100-year event
 Inflow = 128.14 cfs @ 12.13 hrs, Volume= 7.144 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 971.65' @ 24.40 hrs Surf.Area= 69,408 sf Storage= 311,182 cf

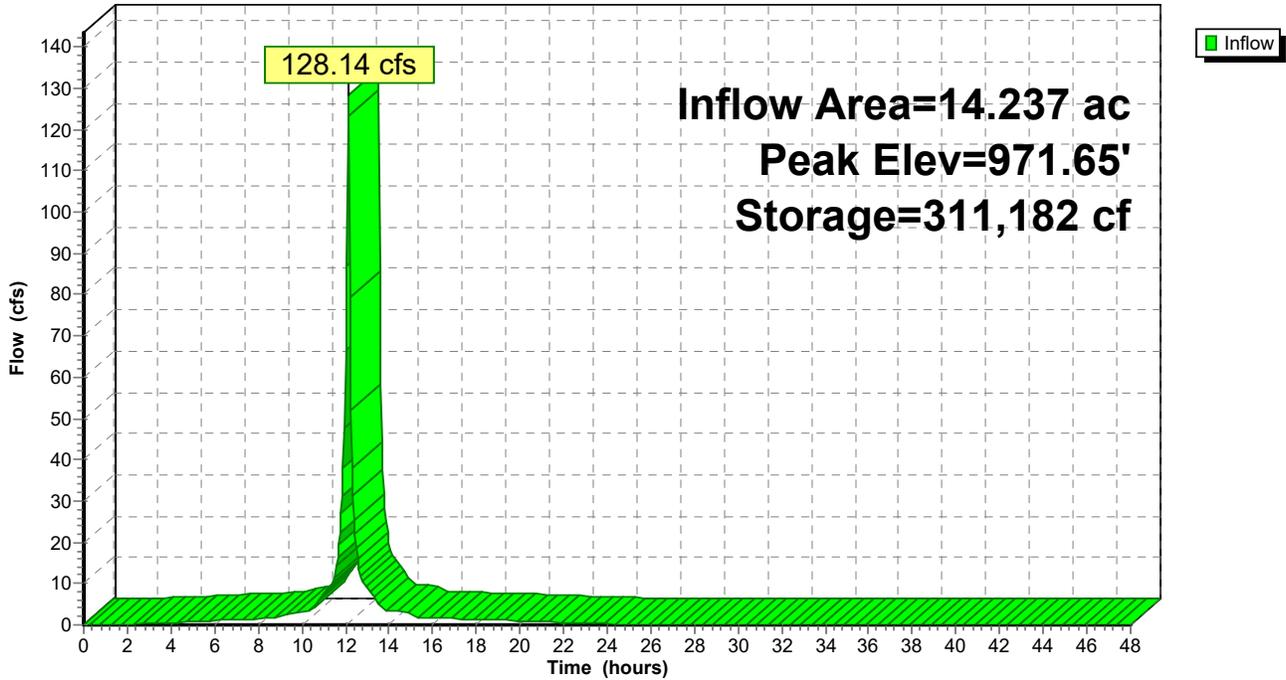
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	416,608 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	7,245	0	0
963.00	15,330	11,288	11,288
964.00	18,315	16,823	28,110
965.00	21,405	19,860	47,970
966.00	24,600	23,003	70,973
967.00	28,570	26,585	97,558
968.00	34,660	31,615	129,173
969.00	41,790	38,225	167,398
970.00	49,670	45,730	213,128
971.00	61,720	55,695	268,823
972.00	73,620	67,670	336,493
973.00	86,610	80,115	416,608

Pond 1P: NW Inf Pond

Hydrograph



Summary for Pond 2P: NE Inf Pond

Inflow Area = 16.766 ac, 96.98% Impervious, Inflow Depth = 6.02" for 100-year event
 Inflow = 150.90 cfs @ 12.13 hrs, Volume= 8.413 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 969.42' @ 24.40 hrs Surf.Area= 64,140 sf Storage= 366,462 cf

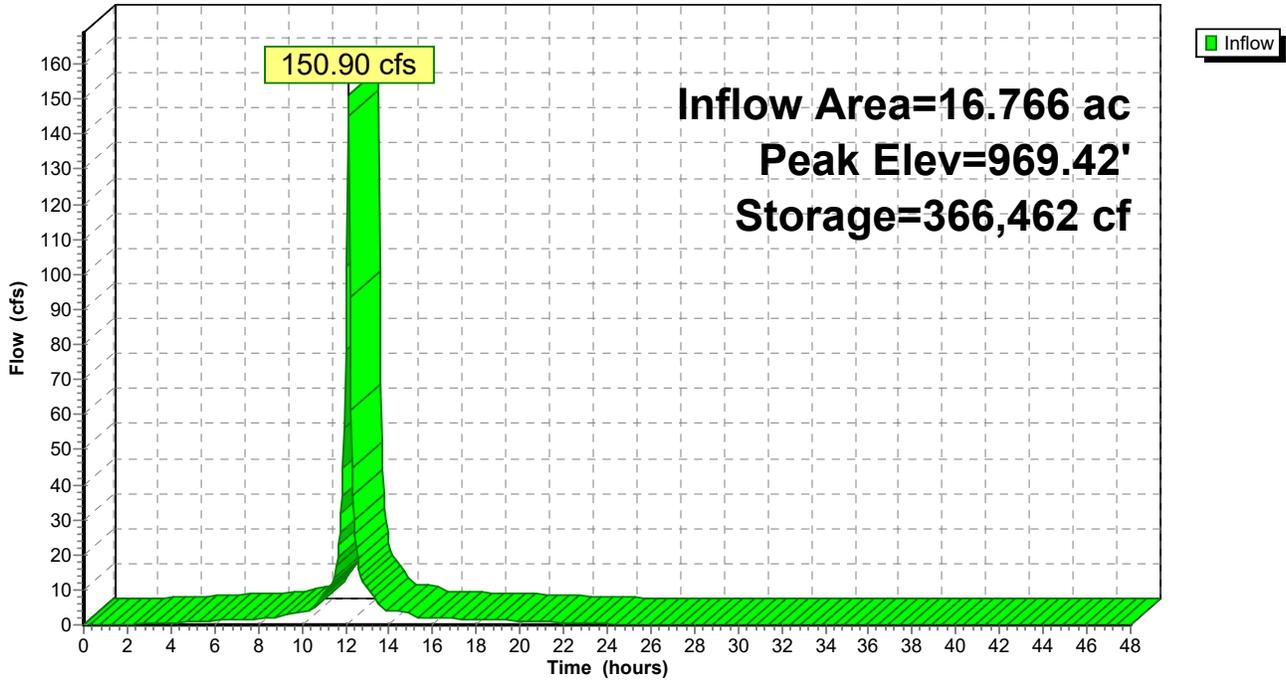
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	567,415 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	14,595	0	0
961.00	25,680	20,138	20,138
962.00	28,185	26,933	47,070
963.00	30,790	29,488	76,558
964.00	33,495	32,143	108,700
965.00	39,885	36,690	145,390
966.00	43,300	41,593	186,983
967.00	47,800	45,550	232,533
968.00	53,360	50,580	283,113
969.00	60,550	56,955	340,068
970.00	69,030	64,790	404,858
971.00	80,830	74,930	479,788
972.00	94,425	87,628	567,415

Pond 2P: NE Inf Pond

Hydrograph



Summary for Pond 3P: East Inf Pond

Inflow Area = 13.501 ac, 96.73% Impervious, Inflow Depth = 6.02" for 100-year event
 Inflow = 121.52 cfs @ 12.13 hrs, Volume= 6.775 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 971.79' @ 24.40 hrs Surf.Area= 55,886 sf Storage= 295,100 cf

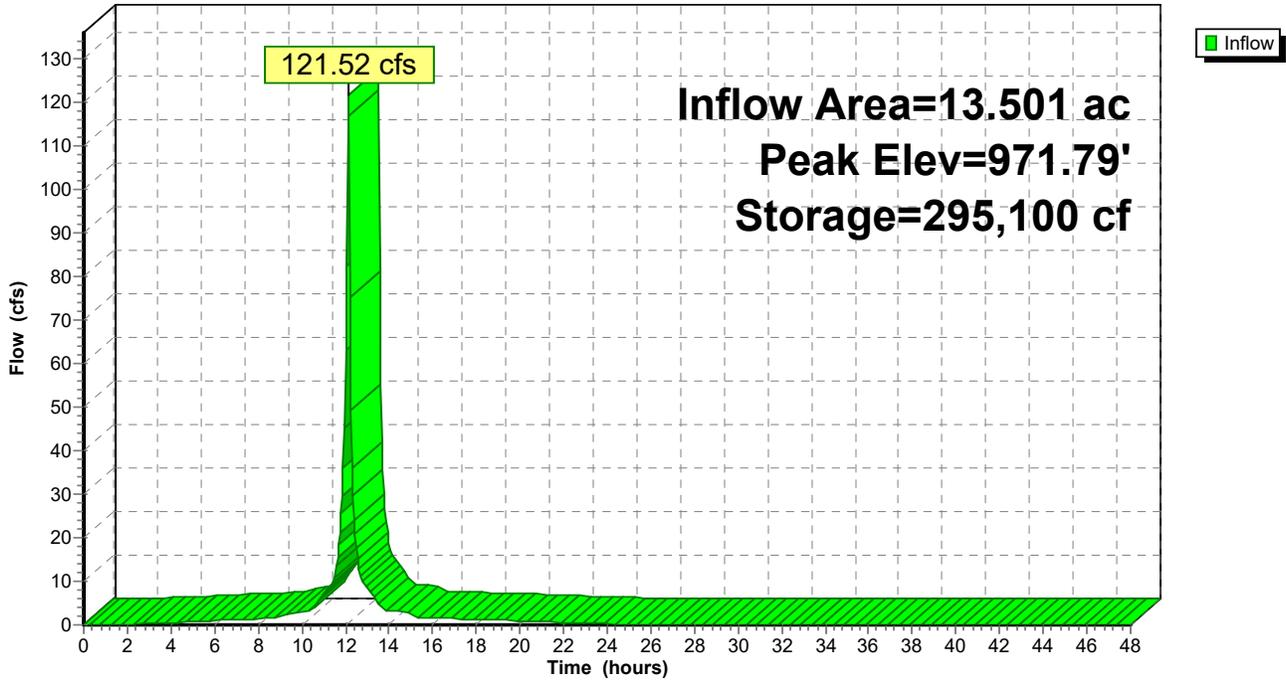
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	963.00'	544,443 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
963.00	11,805	0	0
964.00	22,650	17,228	17,228
965.00	25,340	23,995	41,223
966.00	28,125	26,733	67,955
967.00	31,015	29,570	97,525
968.00	34,225	32,620	130,145
969.00	38,050	36,138	166,283
970.00	43,800	40,925	207,208
971.00	49,335	46,568	253,775
972.00	57,675	53,505	307,280
973.00	69,980	63,828	371,108
974.00	85,260	77,620	448,728
975.00	106,170	95,715	544,443

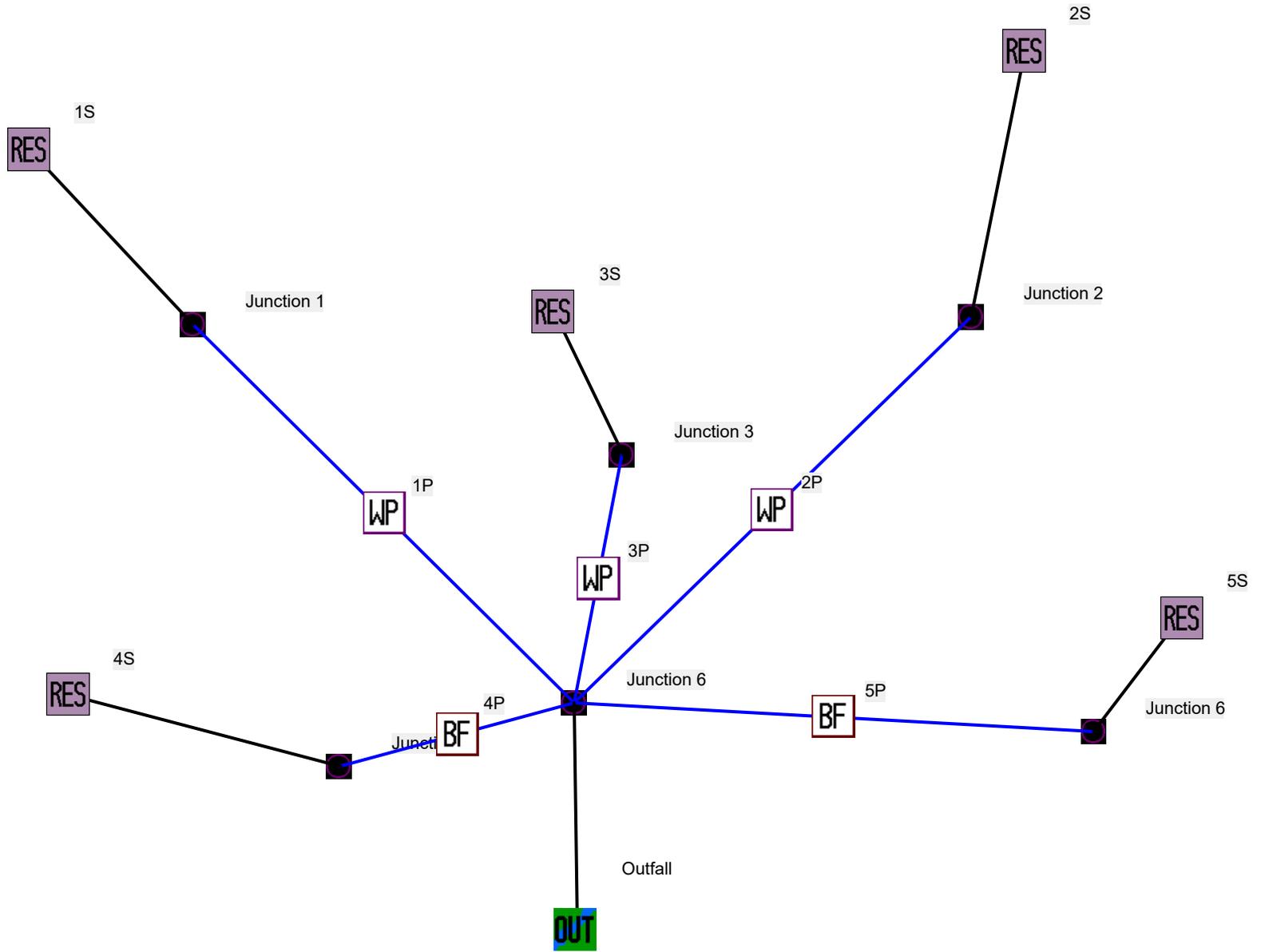
Pond 3P: East Inf Pond

Hydrograph



Appendix 6

WinSLAMM Input/Output



Data file name: S:\Design & Construction Services\Mandel\490686 Hartland\Stormwater\WinSLAMM\2024 03 04 Hartland Apartments.mdb

WinSLAMM Version 10.5.0

Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee Five Year Rainfall.ran

Particulate Solids Concentration file name: C:\WinSLAMM Files\w10.1 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:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations

Seed for random number generator: -42

Study period starting date: 01/02/66

Study period ending date: 12/29/70

Start of Winter Season: 12/02

End of Winter Season: 03/12

Date: 03-04-2024

Time: 18:46:47

Site information: Hartland Apartments Site

LU# 1 - Residential: 1S Total area (ac): 14.237

1 - Roofs 1: 1.544 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1: 0.408 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

25 - Driveways 1: 1.562 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.455 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

37 - Streets 1: 1.017 ac. Intermediate Street Length = 0.3496 mi Street Width = 23.99957 ft Street Edges = 2

Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 6.586 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

57 - Undeveloped Areas 1: 2.398 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

70 - Water Body Areas: 0.267 ac. PSD File: Source Area PSD File:

LU# 2 - Residential: 2S Total area (ac): 16.766

1 - Roofs 1: 1.346 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1: 0.307 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

25 - Driveways 1: 1.227 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.337 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

37 - Streets 1: 0.652 ac. Intermediate Street Length = 0.2241 mi Street Width = 24.00268 ft Street Edges = 1

Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 6.376 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

57 - Undeveloped Areas 1: 3.393 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

70 - Water Body Areas: 0.506 ac. PSD File: Source Area PSD File:

71 - Other Pervious Areas 1: 2.034 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

78 - Other Part Con Imp Areas 1: 0.588 ac. Disconnected Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Residential: 3S Total area (ac): 13.501

1 - Roofs 1: 1.888 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1: 0.472 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

25 - Driveways 1: 1.934 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.652 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 5.239 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

57 - Undeveloped Areas 1: 2.874 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

70 - Water Body Areas: 0.442 ac. PSD File: Source Area PSD File:

LU# 4 - Residential: 4S Total area (ac): 3.418

1 - Roofs 1: 0.587 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1: 0.275 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

25 - Driveways 1: 0.514 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.168 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

37 - Streets 1: 0.055 ac. Intermediate Street Length = 0.0378 mi Street Width = 12.00397 ft Street Edges = 1

Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 1.745 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

70 - Water Body Areas: 0.074 ac. PSD File: Source Area PSD File:

LU# 5 - Residential: 5S Total area (ac): 4.370

1 - Roofs 1: 0.470 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

13 - Paved Parking 1: 0.141 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

25 - Driveways 1: 0.869 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

31 - Sidewalks 1: 0.345 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

51 - Small Landscaped Areas 1: 1.291 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

57 - Undeveloped Areas 1: 1.119 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

70 - Water Body Areas: 0.135 ac. PSD File: Source Area PSD File:

Control Practice 1: Wet Detention Pond CP# 1 (DS) - 1P

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: Broad Crested Weir

1. Weir crest length (ft): 45

2. Weir crest width (ft): 10

3. Height from datum to bottom of weir opening: 5.5

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	0.0083	0.00	0.00
2	1.00	0.0147	0.00	0.00
3	2.00	0.0232	0.00	0.00
4	3.00	0.0344	0.00	0.00
5	4.00	0.0489	0.00	0.00
6	5.00	0.1003	0.00	0.00
7	6.00	0.3519	0.00	0.00
8	7.00	0.4205	0.00	0.00
9	8.00	0.4914	0.00	0.00
10	9.00	0.5647	0.00	0.00
11	10.00	0.6559	0.00	0.00
12	11.00	0.7957	0.00	0.00
13	12.00	0.9594	0.00	0.00
14	13.00	1.1403	0.00	0.00
15	14.00	1.4169	0.00	0.00
16	15.00	1.6901	0.00	0.00
17	16.00	1.9883	0.00	0.00

Control Practice 2: Wet Detention Pond CP# 2 (DS) - 2P

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: Broad Crested Weir

1. Weir crest length (ft): 165

2. Weir crest width (ft): 10

3. Height from datum to bottom of weir opening: 5.5

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	0.0151	0.00	0.00
2	1.00	0.0281	0.00	0.00
3	2.00	0.0420	0.00	0.00
4	3.00	0.0566	0.00	0.00
5	4.00	0.0720	0.00	0.00
6	5.00	0.1582	0.00	0.00
7	6.00	0.5895	0.00	0.00
8	7.00	0.6470	0.00	0.00
9	8.00	0.7068	0.00	0.00
10	9.00	0.7689	0.00	0.00
11	10.00	0.9156	0.00	0.00
12	11.00	0.9940	0.00	0.00
13	12.00	1.0973	0.00	0.00
14	13.00	1.2250	0.00	0.00
15	14.00	1.3900	0.00	0.00
16	15.00	1.5847	0.00	0.00
17	16.00	1.8556	0.00	0.00
18	17.00	2.1677	0.00	0.00

Control Practice 3: Wet Detention Pond CP# 3 (DS) - 3P

Particle Size Distribution file name: Not needed - calculated by program

Initial stage elevation (ft): 0

Peak to Average Flow Ratio: 3.8

Maximum flow allowed into pond (cfs): No maximum value entered

Outlet Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 70

2. Weir crest width (ft): 10

3. Height from datum to bottom of weir opening: 5.5

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	0.0605	0.00	0.00
2	1.00	0.0701	0.00	0.00
3	2.00	0.0804	0.00	0.00
4	3.00	0.0913	0.00	0.00
5	4.00	0.1029	0.00	0.00
6	5.00	0.1706	0.00	0.00
7	6.00	0.5200	0.00	0.00
8	7.00	0.5817	0.00	0.00
9	8.00	0.6457	0.00	0.00
10	9.00	0.7120	0.00	0.00
11	10.00	0.7857	0.00	0.00
12	11.00	0.8735	0.00	0.00
13	12.00	1.0055	0.00	0.00
14	13.00	1.1326	0.00	0.00
15	14.00	1.3240	0.00	0.00
16	15.00	1.6065	0.00	0.00
17	16.00	1.9573	0.00	0.00
18	17.00	2.4373	0.00	0.00

Data file name: S:\Design & Construction Services\Mandel\490686 Hartland\Stormwater\WinSLAMM\2024 03 04 Hartland Apartments.mdb
WinSLAMM Version 10.5.0

Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee Five Year Rainfall.ran

Particulate Solids Concentration file name: C:\WinSLAMM Files\10.1 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:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations

Seed for random number generator: -42

Study period starting date: 01/02/66 Study period ending date: 12/29/70

Start of Winter Season: 12/02 End of Winter Season: 03/12

Date: 03-04-2024 Time: 18:47:30

Site information: Hartland Apartments Site

LU# 1 - Residential: 1S Total area (ac): 14.237

- 1 - Roofs 1: 1.544 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 13 - Paved Parking 1: 0.408 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 25 - Driveways 1: 1.562 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 31 - Sidewalks 1: 0.455 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 37 - Streets 1: 1.017 ac. Intermediate Street Length = 0.3496 mi Street Width = 23.99957 ft Street Edges = 2
- Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 51 - Small Landscaped Areas 1: 6.586 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 57 - Undeveloped Areas 1: 2.398 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 70 - Water Body Areas: 0.267 ac. PSD File: Source Area PSD File:

LU# 2 - Residential: 2S Total area (ac): 16.766

- 1 - Roofs 1: 1.346 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 13 - Paved Parking 1: 0.307 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 25 - Driveways 1: 1.227 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 31 - Sidewalks 1: 0.337 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 37 - Streets 1: 0.652 ac. Intermediate Street Length = 0.2241 mi Street Width = 24.00268 ft Street Edges = 1
- Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 51 - Small Landscaped Areas 1: 6.376 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 57 - Undeveloped Areas 1: 3.393 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 70 - Water Body Areas: 0.506 ac. PSD File: Source Area PSD File:
- 71 - Other Pervious Areas 1: 2.034 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
- 78 - Other Part Con Imp Areas 1: 0.588 ac. Disconnected Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Residential: 3S Total area (ac): 13.501

1 - Roofs 1: 1.888 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 13 - Paved Parking 1: 0.472 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 25 - Driveways 1: 1.934 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 31 - Sidewalks 1: 0.652 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 51 - Small Landscaped Areas 1: 5.239 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 57 - Undeveloped Areas 1: 2.874 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 70 - Water Body Areas: 0.442 ac. PSD File: Source Area PSD File:

LU# 4 - Residential: 4S Total area (ac): 3.418

1 - Roofs 1: 0.587 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 13 - Paved Parking 1: 0.275 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 25 - Driveways 1: 0.514 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 31 - Sidewalks 1: 0.168 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 37 - Streets 1: 0.055 ac. Intermediate Street Length = 0.0378 mi Street Width = 12.00397 ft Street Edges = 1
 Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 51 - Small Landscaped Areas 1: 1.745 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 70 - Water Body Areas: 0.074 ac. PSD File: Source Area PSD File:

LU# 5 - Residential: 5S Total area (ac): 4.370

1 - Roofs 1: 0.470 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 13 - Paved Parking 1: 0.141 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 25 - Driveways 1: 0.869 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 31 - Sidewalks 1: 0.345 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 51 - Small Landscaped Areas 1: 1.291 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 57 - Undeveloped Areas 1: 1.119 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
 70 - Water Body Areas: 0.135 ac. PSD File: Source Area PSD File:

Control Practice 1: Wet Detention Pond CP# 1 (DS) - 1P

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: Broad Crested Weir

1. Weir crest length (ft): 45
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 5.5

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	0.0083	0.00	0.00
2	1.00	0.0147	0.00	0.00
3	2.00	0.0232	0.00	0.00
4	3.00	0.0344	0.00	0.00
5	4.00	0.0489	0.00	0.00
6	5.00	0.1003	0.00	0.00
7	6.00	0.3519	0.00	0.00
8	7.00	0.4205	0.00	0.00
9	8.00	0.4914	0.00	0.00
10	9.00	0.5647	0.00	0.00
11	10.00	0.6559	0.00	0.00
12	11.00	0.7957	0.00	0.00
13	12.00	0.9594	0.00	0.00
14	13.00	1.1403	0.00	0.00
15	14.00	1.4169	0.00	0.00
16	15.00	1.6901	0.00	0.00
17	16.00	1.9883	0.00	0.00

Control Practice 2: Wet Detention Pond CP# 2 (DS) - 2P

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: Broad Crested Weir

1. Weir crest length (ft): 165
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 5.5

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	0.0151	0.00	0.00

2	1.00	0.0281	0.00	0.00
3	2.00	0.0420	0.00	0.00
4	3.00	0.0566	0.00	0.00
5	4.00	0.0720	0.00	0.00
6	5.00	0.1582	0.00	0.00
7	6.00	0.5895	0.00	0.00
8	7.00	0.6470	0.00	0.00
9	8.00	0.7068	0.00	0.00
10	9.00	0.7689	0.00	0.00
11	10.00	0.9156	0.00	0.00
12	11.00	0.9940	0.00	0.00
13	12.00	1.0973	0.00	0.00
14	13.00	1.2250	0.00	0.00
15	14.00	1.3900	0.00	0.00
16	15.00	1.5847	0.00	0.00
17	16.00	1.8556	0.00	0.00
18	17.00	2.1677	0.00	0.00

Control Practice 3: Wet Detention Pond CP# 3 (DS) - 3P

Particle Size Distribution file name: Not needed - calculated by program

Initial stage elevation (ft): 0

Peak to Average Flow Ratio: 3.8

Maximum flow allowed into pond (cfs): No maximum value entered

Outlet Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 70

2. Weir crest width (ft): 10

3. Height from datum to bottom of weir opening: 5.5

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	0.0605	0.00	0.00
2	1.00	0.0701	0.00	0.00
3	2.00	0.0804	0.00	0.00
4	3.00	0.0913	0.00	0.00
5	4.00	0.1029	0.00	0.00
6	5.00	0.1706	0.00	0.00
7	6.00	0.5200	0.00	0.00
8	7.00	0.5817	0.00	0.00
9	8.00	0.6457	0.00	0.00
10	9.00	0.7120	0.00	0.00
11	10.00	0.7857	0.00	0.00
12	11.00	0.8735	0.00	0.00
13	12.00	1.0055	0.00	0.00
14	13.00	1.1326	0.00	0.00
15	14.00	1.3240	0.00	0.00
16	15.00	1.6065	0.00	0.00
17	16.00	1.9573	0.00	0.00
18	17.00	2.4373	0.00	0.00

Data file name: S:\Design & Construction Services\Mandel\490686 Hartland\Stormwater\WinSLAMM\2024 03 04 Hartland Apartments.mdb

WinSLAMM Version 10.5.0

Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee Five Year Rainfall.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\W1_GEO03.ppd
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/02/66 Study period ending date: 12/29/70
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 03-04-2024 Time: 18:47:41
Site information: Hartland Apartments Site

LU# 1 - Residential: 1S Total area (ac): 14.237

1 - Roofs 1: 1.544 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.408 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 1.562 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.455 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
37 - Streets 1: 1.017 ac. Intermediate Street Length = 0.3496 mi Street Width = 23.99957 ft Street Edges = 2
Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
51 - Small Landscaped Areas 1: 6.586 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
57 - Undeveloped Areas 1: 2.398 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.267 ac. PSD File: Source Area PSD File:

LU# 2 - Residential: 2S Total area (ac): 16.766

1 - Roofs 1: 1.346 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.307 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 1.227 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.337 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
37 - Streets 1: 0.652 ac. Intermediate Street Length = 0.2241 mi Street Width = 24.00268 ft Street Edges = 1
Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
51 - Small Landscaped Areas 1: 6.376 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
57 - Undeveloped Areas 1: 3.393 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.506 ac. PSD File: Source Area PSD File:
71 - Other Pervious Areas 1: 2.034 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
78 - Other Part Con Imp Areas 1: 0.588 ac. Disconnected Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Residential: 3S Total area (ac): 13.501

1 - Roofs 1: 1.888 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.472 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 1.934 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.652 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
51 - Small Landscaped Areas 1: 5.239 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
57 - Undeveloped Areas 1: 2.874 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.442 ac. PSD File: Source Area PSD File:

LU# 4 - Residential: 4S Total area (ac): 3.418

1 - Roofs 1: 0.587 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.275 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 0.514 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.168 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
37 - Streets 1: 0.055 ac. Intermediate Street Length = 0.0378 mi Street Width = 12.00397 ft Street Edges = 1
Default St. Dirt Accum. Annual Winter Load = 2500 lbs PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
51 - Small Landscaped Areas 1: 1.745 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.074 ac. PSD File: Source Area PSD File:

LU# 5 - Residential: 5S Total area (ac): 4.370

1 - Roofs 1: 0.470 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.141 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 0.869 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.345 ac. Disconnected Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
51 - Small Landscaped Areas 1: 1.291 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
57 - Undeveloped Areas 1: 1.119 ac. Normal Sandy PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.135 ac. PSD File: Source Area PSD File:

Control Practice 1: Wet Detention Pond CP# 1 (DS) - 1P

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: Broad Crested Weir
1. Weir crest length (ft): 45
2. Weir crest width (ft): 10

3. Height from datum to bottom of weir opening: 5.5

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	0.0083	0.00	0.00
2	1.00	0.0147	0.00	0.00
3	2.00	0.0232	0.00	0.00
4	3.00	0.0344	0.00	0.00
5	4.00	0.0489	0.00	0.00
6	5.00	0.1003	0.00	0.00
7	6.00	0.3519	0.00	0.00
8	7.00	0.4205	0.00	0.00
9	8.00	0.4914	0.00	0.00
10	9.00	0.5647	0.00	0.00
11	10.00	0.6559	0.00	0.00
12	11.00	0.7957	0.00	0.00
13	12.00	0.9594	0.00	0.00
14	13.00	1.1403	0.00	0.00
15	14.00	1.4169	0.00	0.00
16	15.00	1.6901	0.00	0.00
17	16.00	1.9883	0.00	0.00

Control Practice 2: Wet Detention Pond CP# 2 (DS) - 2P

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: Broad Crested Weir

1. Weir crest length (ft): 165

2. Weir crest width (ft): 10

3. Height from datum to bottom of weir opening: 5.5

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	0.0151	0.00	0.00
2	1.00	0.0281	0.00	0.00
3	2.00	0.0420	0.00	0.00
4	3.00	0.0566	0.00	0.00
5	4.00	0.0720	0.00	0.00
6	5.00	0.1582	0.00	0.00
7	6.00	0.5895	0.00	0.00
8	7.00	0.6470	0.00	0.00
9	8.00	0.7068	0.00	0.00
10	9.00	0.7689	0.00	0.00
11	10.00	0.9156	0.00	0.00
12	11.00	0.9940	0.00	0.00
13	12.00	1.0973	0.00	0.00
14	13.00	1.2250	0.00	0.00
15	14.00	1.3900	0.00	0.00
16	15.00	1.5847	0.00	0.00
17	16.00	1.8556	0.00	0.00
18	17.00	2.1677	0.00	0.00

Control Practice 3: Wet Detention Pond CP# 3 (DS) - 3P

Particle Size Distribution file name: Not needed - calculated by program

Initial stage elevation (ft): 0

Peak to Average Flow Ratio: 3.8

Maximum flow allowed into pond (cfs): No maximum value entered

Outlet Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 70

2. Weir crest width (ft): 10

3. Height from datum to bottom of weir opening: 5.5

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	0.0605	0.00	0.00
2	1.00	0.0701	0.00	0.00
3	2.00	0.0804	0.00	0.00
4	3.00	0.0913	0.00	0.00
5	4.00	0.1029	0.00	0.00
6	5.00	0.1706	0.00	0.00
7	6.00	0.5200	0.00	0.00
8	7.00	0.5817	0.00	0.00
9	8.00	0.6457	0.00	0.00
10	9.00	0.7120	0.00	0.00
11	10.00	0.7857	0.00	0.00
12	11.00	0.8735	0.00	0.00
13	12.00	1.0055	0.00	0.00
14	13.00	1.1326	0.00	0.00
15	14.00	1.3240	0.00	0.00
16	15.00	1.6065	0.00	0.00
17	16.00	1.9573	0.00	0.00
18	17.00	2.4373	0.00	0.00

Data file name: S:\Design & Construction Services\Mandel\490686 Hartland\Stormwater\WinSLAMM\2024 03 04 Hartland Apartments.mdb
WinSLAMM Version 10.5.0

Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee Five Year Rainfall.ran

Particulate Solids Concentration file name: C:\WinSLAMM Files\w10.1 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:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations

Seed for random number generator: -42

Study period starting date: 01/02/66 Study period ending date: 12/29/70

Start of Winter Season: 12/02 End of Winter Season: 03/12

Model Run Start Date: 01/02/66 Model Run End Date: 12/29/70

Date of run: 03-04-2024 Time of run: 18:46:17

Total Area Modeled (acres): 52.292

Years in Model Run: 4.99

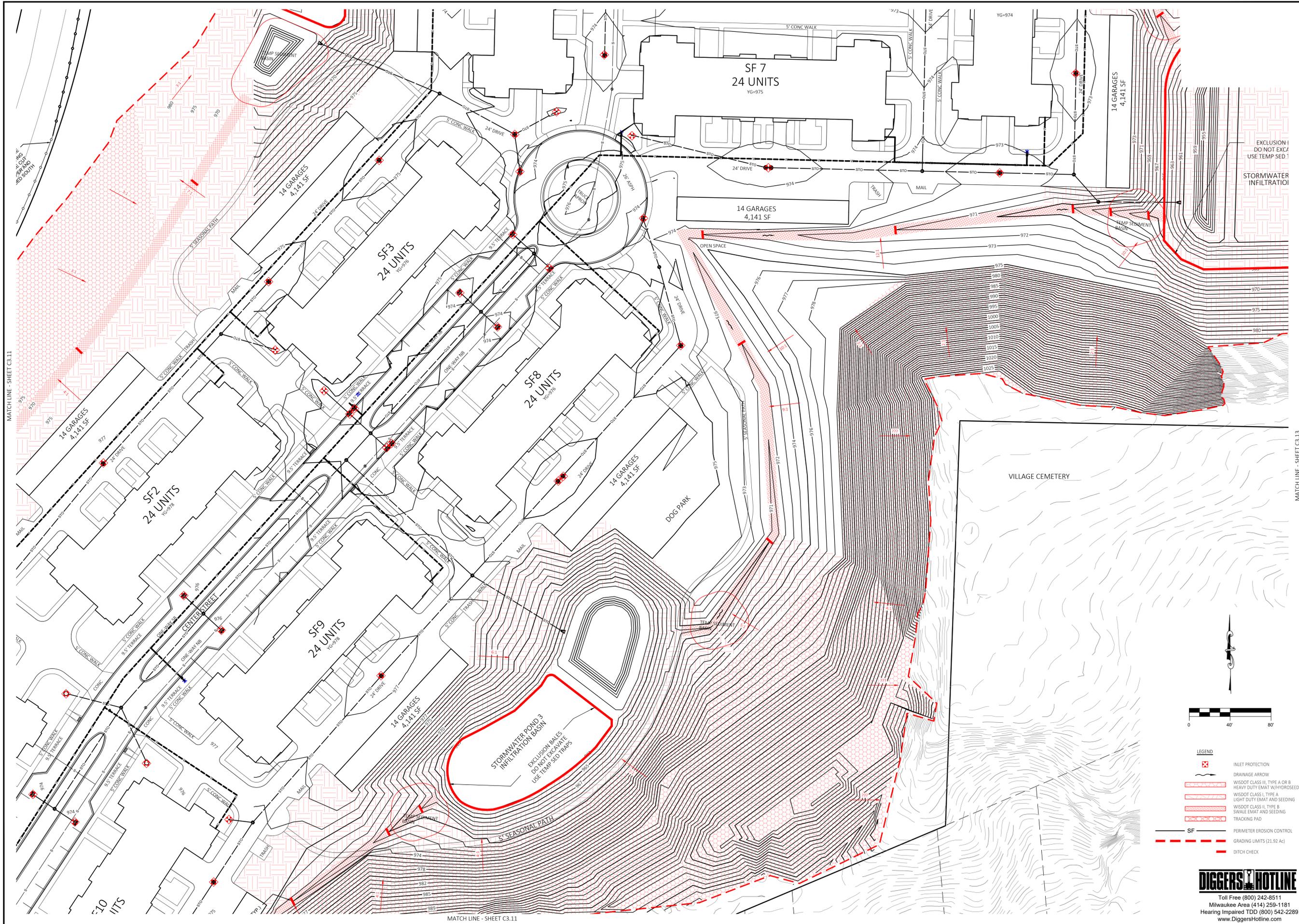
	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	6.326E+06	-	99.91	39456	-
Outfall Total with Controls:	6.284E+06	0.66%	26.74	10492	73.41%
Annualized Total After Outfall Controls:	1.259E+06			2102	

Pollutant	Conc. No Controls	Conc. With Controls	Conc. Units	Pollutant Yield No Controls	Pollutant Yield With Controls	Pol. Yield Units	Percent Reduction
Particulate Solids	99.91	26.74	mg/L	39456	10492	lbs	73.41 %
Total Phosphorus	0.3346	0.1510	mg/L	132.1	59.22	lbs	55.17 %

Biofilter # 1 is expected to clog in 11.85 years.. Percent Solids Reduction due to Engineered Media = 80
Biofilter # 2 is expected to clog in 20.59 years.. Percent Solids Reduction due to Engineered Media = 80

Appendix 7

USLE Soil Loss Calculation and Erosion Control Plan



MATCH LINE - SHEET C3.11

MATCH LINE - SHEET C3.13

MATCH LINE - SHEET C3.11

NO.	REVISION DESCRIPTION	DATE
1	VILLAGE COMMENTS	07/23/2023
2	VILLAGE COMMENTS	8/1/2024



HARTLAND APARTMENTS
 700 W. CAPITOL DRIVE
 VILLAGE OF HARTLAND, WI

THREE LEAF PARTNERS
 504 W. JUNEAU AVE.
 MILWAUKEE, WI 53203

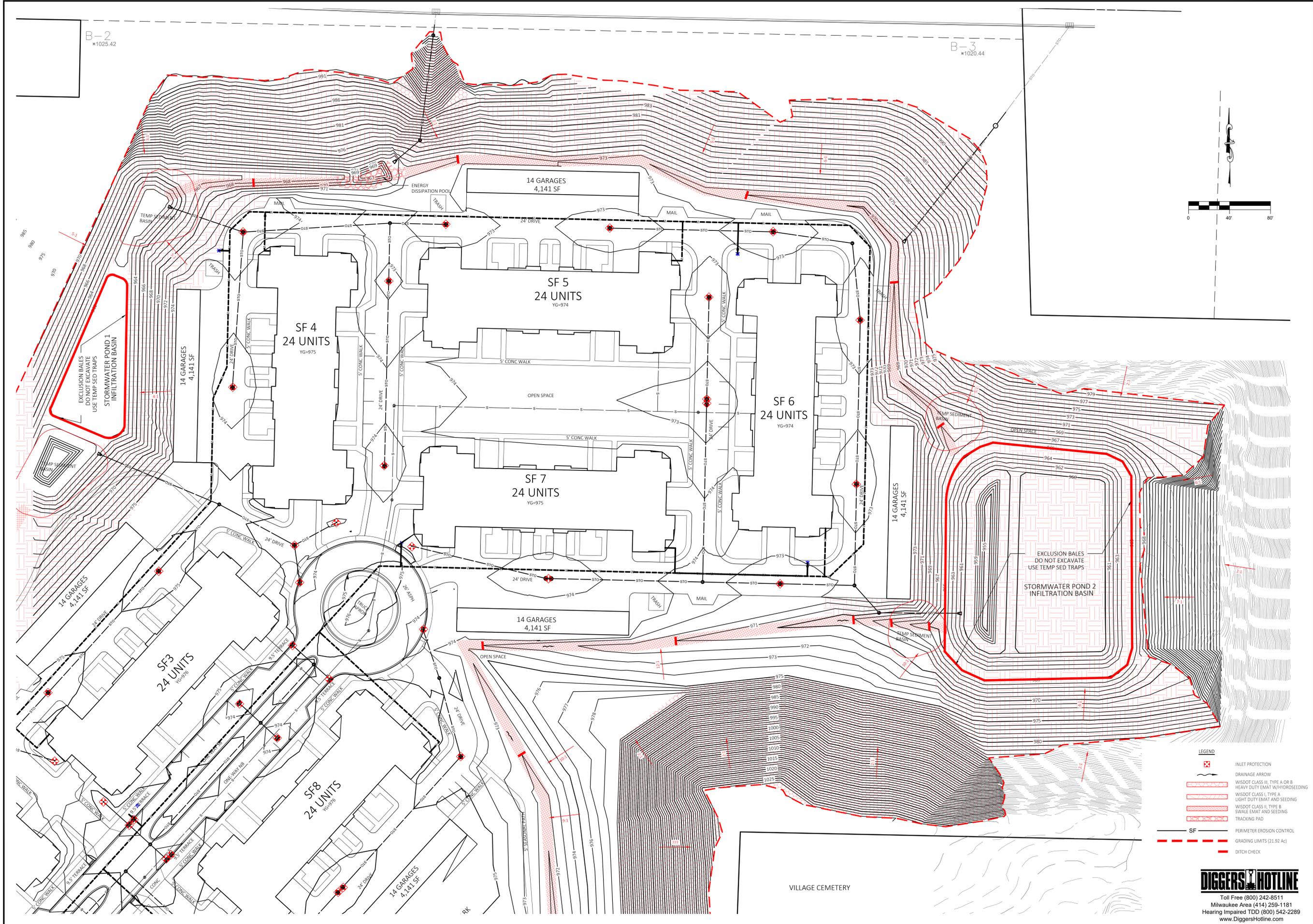
EROSION CONTROL PLAN

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 Checked: HAM 09/08/2023
 P&D Project No: 490686
 Sheet No:

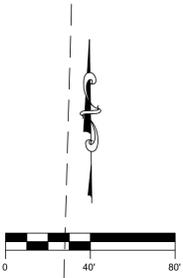
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B-2
#1025.42

B-3
#1020.44



DATE	3/27/2023
REVISION DESCRIPTION	VILLAGE COMMENTS
NO.	1
	VILLAGE COMMENTS



PROJECT
HARTLAND APARTMENTS
700 W. CAPITOL DRIVE
VILLAGE OF HARTLAND, WI

CLIENT
THREE LEAF PARTNERS
504 W. JUNEAU AVE.
MILWAUKEE, WI 53203

EROSION CONTROL PLAN

LEGEND

- INLET PROTECTION
- DRAINAGE ARROW
- WISDOT CLASS III, TYPE A OR B HEAVY DUTY EMAT WITH HYDROSEEDING
- WISDOT CLASS, TYPE A LIGHT DUTY EMAT AND SEEDING
- WISDOT CLASS II, TYPE B SWALE EMAT AND SEEDING
- TRACKING PAD
- SF PERIMETER EROSION CONTROL
- GRADING LIMITS (21.92 Ac)
- DITCH CHECK

DRIVING SCALE: 1" = 40'

DRAWN: GME
09/08/2023

CHECKED: HAM
09/08/2023

PKD PROJECT NO.: 490686

SHEET NO.: C3.13

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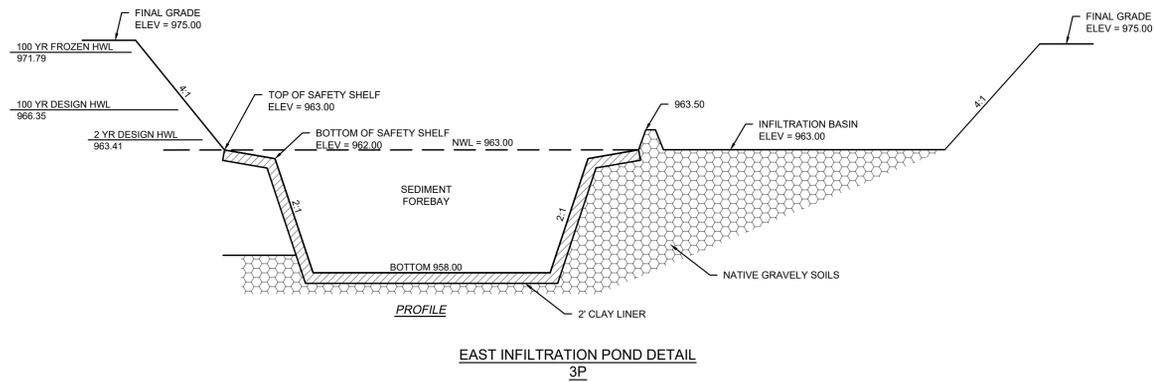
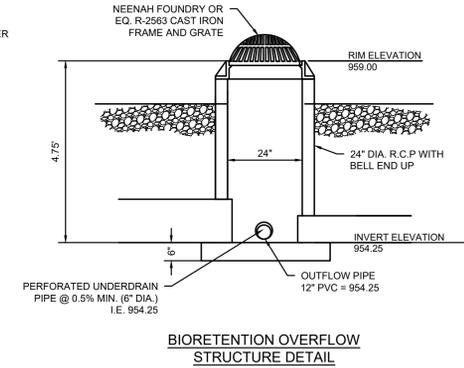
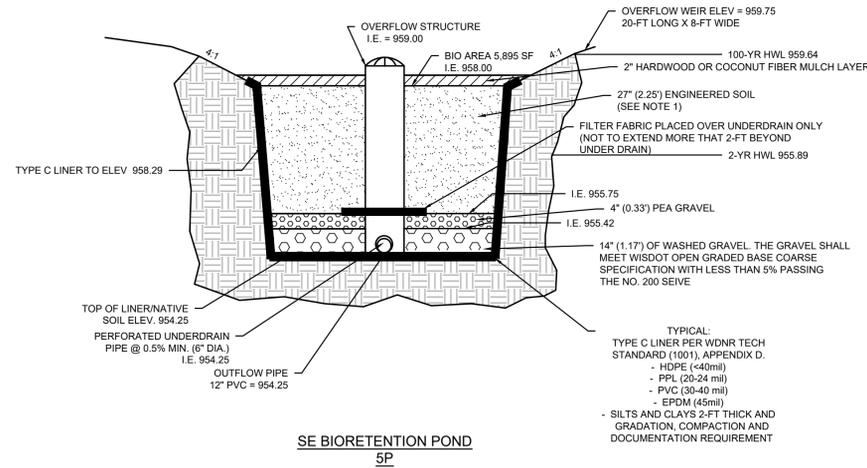
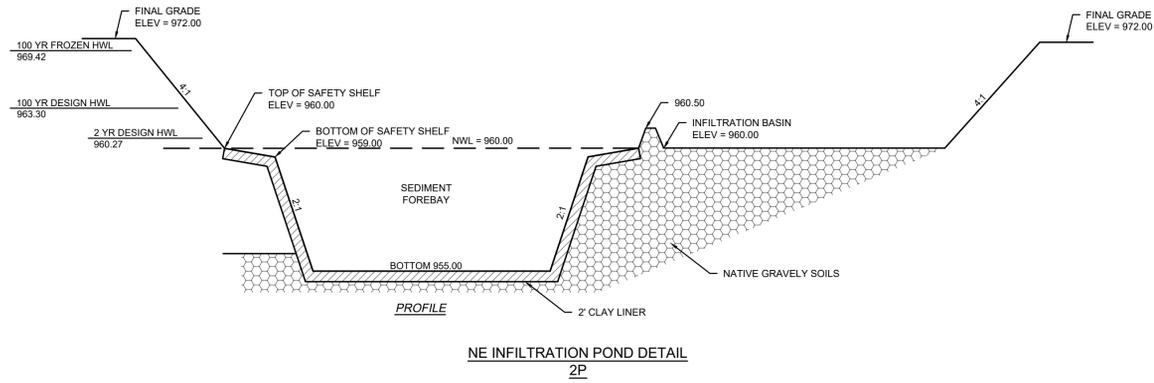
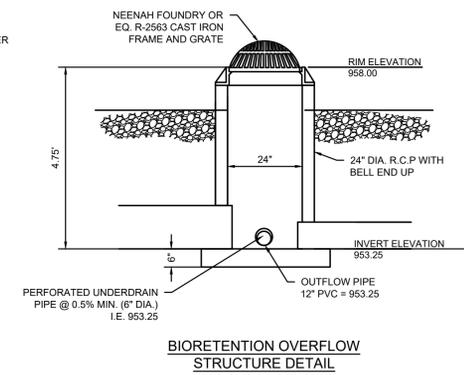
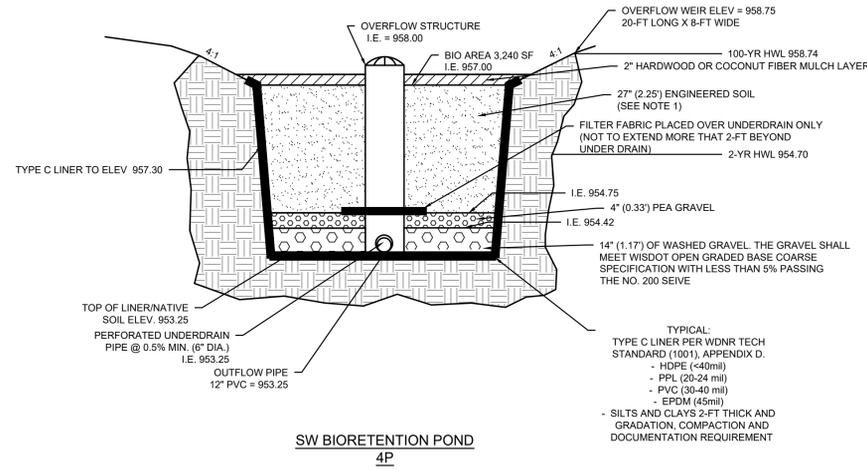
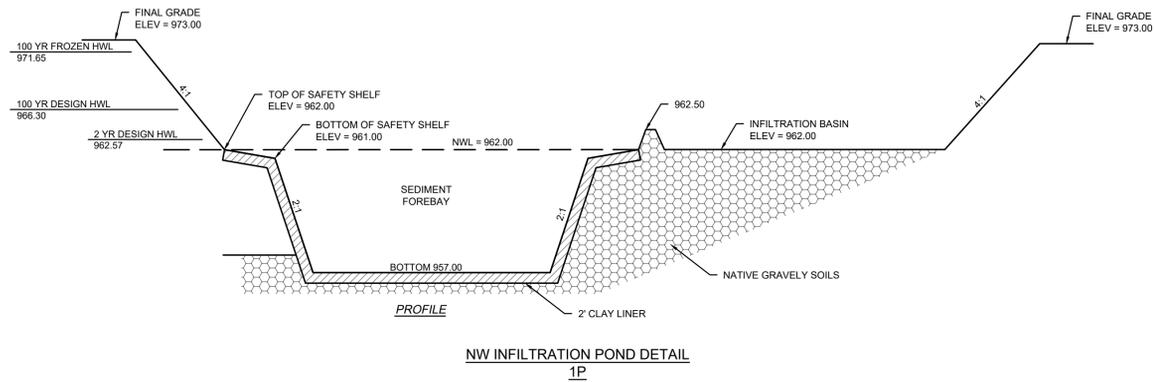
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MATCH LINE - SHEET C3.12

MATCH LINE - SHEET C3.12

Appendix 8

Storm Water Details



- BIORETENTION NOTES:**
- DO NOT ADD ENGINEERED MEDIA UNTIL AFTER THE PAVING IS COMPLETED AND LANDSCAPE AREAS ARE STABILIZED.
 - ENGINEERED SOIL MIX SHALL BE PLACED WITH NO MECHANICAL COMPACTION (INCLUDING EQUIPMENT TRACKING OVER THE SURFACE).
 - ENGINEERED SOIL SHALL BE PLACED IN 6" LIFTS AND SPRINKLED WITH WATER AFTER EACH LIFT TO ACHIEVE SETTLEMENT.
 - ENGINEERED SOIL SHALL CONSIST OF A MIXTURE OF 70% TO 75% SAND AND 25% TO 30% COMPOST. THE PERCENTAGES ARE BASED ON VOLUME. THE ENGINEERED SOIL SHALL MEET THE REQUIREMENTS OF WDNR TECHNICAL STANDARD 1004.
 - SAND INTERFACE LAYER: 3-INCHES OF SAND SHALL BE PLACED BELOW THE GRAVEL LAYER AND VERTICALLY MIXED WITH THE NATIVE SOIL TO A DEPTH OF 4-INCHES, PER WDNR TECHNICAL STANDARD 1002.
 - A PERSON TRAINED AND EXPERIENCED IN THE CONSTRUCTION, OPERATION AND MAINTENANCE OF INFILTRATIONS DEVICES SHALL BE RESPONSIBLE FOR CONSTRUCTION OF THE DEVICE.
 - CONSTRUCTION OF THE BIORETENTION DEVICE SHALL FOLLOW THE REQUIREMENTS OF WDNR TECHNICAL STANDARD 1002. CONSTRUCTION AND OVERSIGHT SHALL FOLLOW SECTION "C" OF THE TECHNICAL STANDARD.

NO.	REVISION DESCRIPTION	DATE

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 A WALBECC COMPANY
 www.walbeccgroup.com
 (202) 757-7556

HARTLAND APARTMENTS
 700 W CAPITOL DR
 VILLAGE OF HARTLAND, WI

THREE LEAF PARTNERS
 504 W. JUNEAU AVE
 MILWAUKEE, WI 53203

CONSTRUCTION DETAILS
POND DETAILS

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