STORMWATER MANAGEMENT PLAN

FOR

Good Harvest Market II, LLC

City of Waukesha, WI

May 28, 2014

McClure
Engineering Associates, Inc.

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Storm Water Management Report

INTRODUCTION

McClure Engineering is designing The Good Harvest Market site in the City of Waukesha, Wisconsin. The property is located at the southwest corner of Silvernail Road and Meadow Lane. Excluding the wetlands on the south, the site is approximately 5.13 acres.

Storm water from the developed portion of the site will be routed through one of two stormwater management devices. Runoff from the southern portion of the site, Area 1, will be will directed to a stormwater detention basin in the southwest corner of the site. Runoff from the northern portion of the site, Area 2, will be directed to a small stormwater detention basin in the north part of the site.

This stormwater management design was prepared in conformance with the requirements set forth by Wisconsin DNR Chapter NR 151 and the City of Waukesha Storm Water Management and Erosion Control Code.

HYDRAULIC SOFTWARE

The hydrographs contained in this report were generated and routed through the proposed detention ponds using HydroCad-9 – Stormwater Modeling Systems, Version 9.1 for Windows.

SOIL CLASSIFICATION

Predominant soil types found in the proposed developed portion of the site:

HmB2	Hochheim loam, 2 to 6 percent slopes, eroded
HoD3	Hochheim soils, 12 to 20 percent slopes, severely eroded

The above soil types both classify in Hydrologic Soil Group "B," as seen in the Site Soil Survey in Appendix A. The curve number used for the existing land cover is 70 as determined by the City of Waukesha Stormwater Management and Erosion Control Technical Standards and Specifications.

RAINFALL DATA

The following rainfall events, derived from NRCS for the City of Waukesha, were used to conduct the storm water modeling represented in this report:

24-Hour 1-Year Design Storm	2.3 inches
24-Hour 2-Year Design Storm	2.7 inches
24-Hour 10-Year Design Storm	4.0 inches
24-Hour 100-Year Design Storm	5.6 inches

ANALYSIS OF STORMWATER MANAGEMENT TECHNIQUES

Drainage Area 1 will direct stormwater to the large detention basin in the southwest corner of the site. This detention facility was designed as a water quality pond (wet pond) with adequate capacity to contain the 100-year, 24-hour rainfall event without overtopping the overflow weir. The pond was designed in such a way as to allow sediment to settle out prior to discharge. The facility is a wet pond with a normal water level (NWL) of 101.0. Stormwater is discharged south to the existing wetland area on the property from the pond through a 5" orifice grouted into a 12" pipe to prevent clogging.

Drainage Area 2 will direct stormwater to a small detention basin in the northern corner of the site. This detention facility was designed as a water quality pond (wet pond) with adequate capacity to contain the 100-year, 24-hour rainfall event without overtopping the overflow weir. The pond was designed in such a way as to allow sediment to settle out prior to discharge. This detention pond was designed to discharge via a 4" orifice grouted into a 12" pipe. The facility is a wet pond with a normal water level (NWL) of 99.0.

CITY OF WAUKESHA – STORMWATER MANAGEMENT REQUIREMENTS AND PERFORMANCE CONTROL

The calculated post-development peak stormwater discharge rate shall not exceed the calculated pre-development discharge rate for the 2-year, 10-year, or 100-year, 24-hour design storms.

DNR – CHAPTER NR 151 RUNOFF OFF MANAGEMENT REQUIREMENT

Site Assessment – A *Geotechnical Engineering Report* prepared by LandMark Engineering Sciences, Inc. has been conducted at the drainage facility locations. Based upon the soil type found on site it has been determined that the soil does not have necessary properties conducive for infiltration.

The Stormwater Management Plan is in compliance with the DNR NR 151 Code.

-*Total Suspended Solids*:
Compliance with DNR Code 151.12(5)(a)1; Refer to WinSLAMM Calcs
-*Peak Discharge*:
2-year, 24-hour design storm for Post-Development is maintained or reduced, as compared to pre-Development.
Post-Development (1.76 cfs) ≤ Pre-Development (1.95 cfs)
-*Infiltration*:
Exemption: Areas where the infiltration rate of the soil is less than 0.6 inches/hour (See *Geotechnical Engineering Report*)
-*Protective areas*:
Locations of proposed impervious surfaces exceed the minimum required setback from lakes, streams, rivers, and delineated wetland boundaries. Areas of proposed wetland buffer encroachment are currently under permit review by Wisconsin DNR. Said areas are proposed to be mitigated.

RESULTS

The storm water modeling results are summarized in the table below and can be reviewed in Appendix B.

Storm Event	Existing Site Runoff (cfs)	Proposed Site Runoff (cfs)
2-Year, 24-Hour	1.95	1.76
10-Year, 24-Hour	5.53	3.66
100-Year, 24-Hour	10.87	6.34

WATER QUALITY

WinSLAMM version 10 was used to determine the percentage of total suspended solids removal. The input and output files can be found in Appendix F. The water quality results are summarized below. The requirement is a minimum of 80% removal for new development.

	% Total Suspended Solids Removal
North Pond	88.23%
South Pond	82.93%

APPENDIX A

SUPPORTING DOCUMENTATION & RELEVANT DATA

LOCATION MAP

HYDROLOGIC SOIL GROUP RATING FOR MILWAUKEE AND WAUKESHA COUNTIES, WISCONSIN; UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE

ENGINEERING PROPERTIES; UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE

GEOTECHNICAL ENGINEERING REPORT; LANDMARK ENGINEERING SCIENCES, INC.

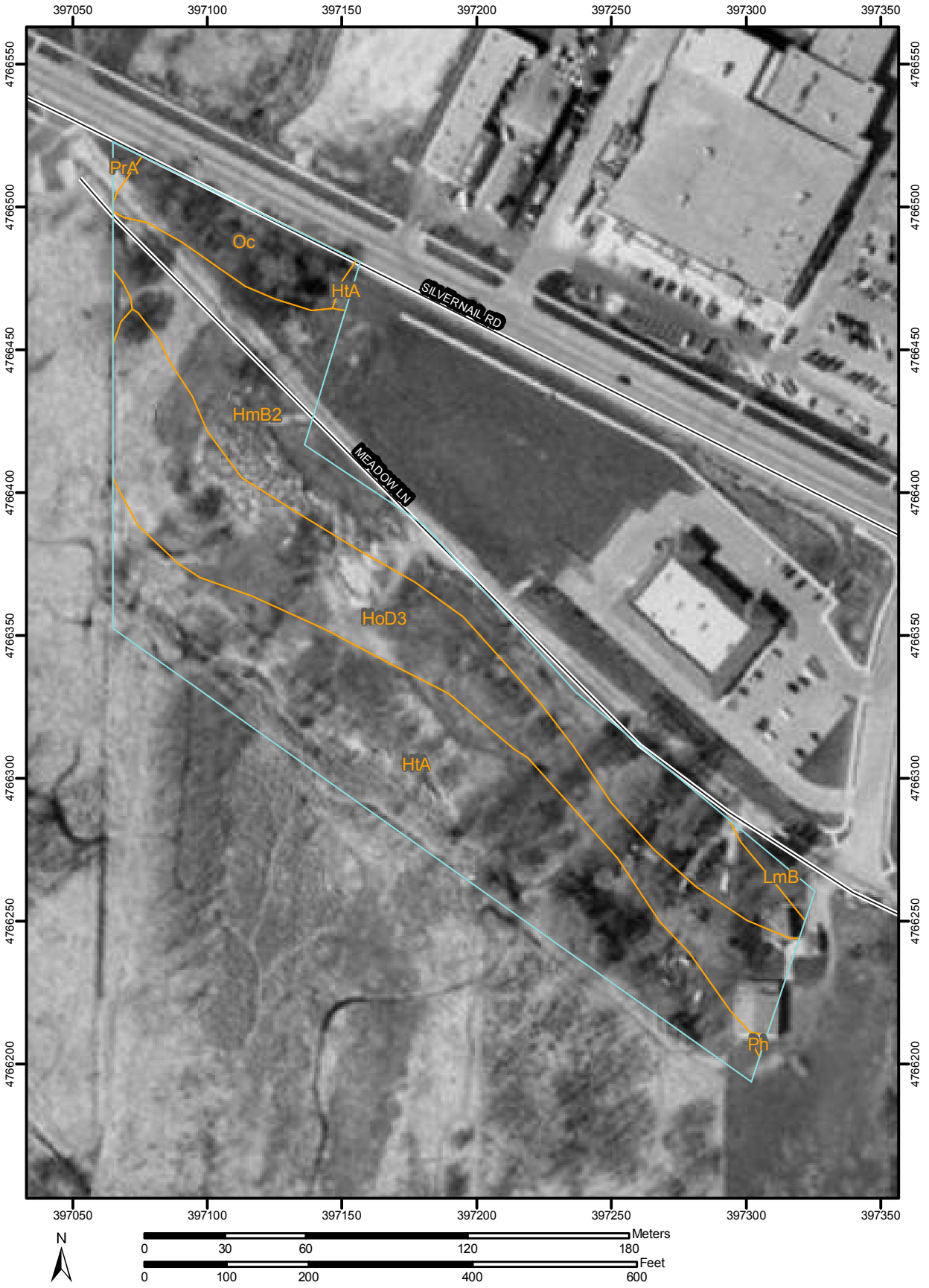
RAINFALL DEPTH & NRCS RUNOFF CURVE NUMBER; CITY OF WAUKESHA STORMWATER MANAGEMENT AND EROSION CONTROL TECHNICAL STANDARDS AND SPECIFICTIONS, CHAPTER 32

EXISTING CONDITIONS EXHIBIT

PROPOSED CONDITIONS EXHIBIT

DETAIL SHEET SHOWING OUTLET STRUCTURES AND POND CROSS SECTION


Dr
Golf Rd
94
293
Silvernail Rd
Waukesha
N Grandview Blvd
Fielding Ln
Marshview St
Meadow Ln
TJ
Project
Location
Pebble Valley
Park
Pebble Valley Rd


397050
397100
397150
397200
397250
397300
397350
4766550
4766500
4766450
4766400
4766350
4766300
4766250
4766200
PrA
Oc
HtA
SILVERNAIL RD
HmB2
MEADOW LN
HoD3
HtA
LmB
Ph
N
Meters
0
30
60
120
180
Feet
0
100
200
400
600

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N

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 3, Feb 14, 2007

Date(s) aerial images were photographed: 2000

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

Map Unit Legend

Milwaukee and Waukesha Counties, Wisconsin (WI602)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
HmB2	Hochheim loam, 2 to 6 percent slopes, eroded	2.2	27.5%
HoD3	Hochheim soils, 12 to 20 percent slopes, severely eroded	2.3	28.6%
HtA	Houghton muck, 0 to 2 percent slopes	2.9	36.2%
LmB	Lamartine silt loam, 1 to 4 percent slopes	0.1	0.8%
Oc	Ogden muck	0.5	6.5%
Ph	Pella silt loam	0.0	0.1%
PrA	Pistakee silt loam, 1 to 3 percent slopes	0.0	0.3%
Totals for Area of Interest (AOI)		8.1	100.0%

Engineering Properties

Milwaukee and Waukesha Counties, Wisconsin

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				Pct	Pct					Pct	
HmB2:												
Hochheim	0-6	Loam	CL, CL-ML	A-4	---	0-15	90-100	85-100	70-100	50-90	20-30	4-9
	6-17	Clay loam, Loam	CH, CL, SC	A-6, A-7	---	0-15	75-100	70-100	60-100	45-90	30-60	10-35
	17-60	Gravelly loam, Loam, Sandy loam	CL, ML, SC, SM	A-1, A-2, A-4	---	0-15	51-95	50-90	30-85	15-70	15-26	NP-8
HoD3:												
Hochheim	0-6	Clay loam	CL	A-6	---	0-15	85-100	80-100	75-100	55-80	35-40	15-18
	6-17	Clay loam, Loam	CH, CL, SC	A-6, A-7	---	0-15	75-100	70-100	60-100	45-90	30-60	10-35
	17-60	Gravelly loam, Loam, Sandy loam	CL, ML, SC, SM	A-1, A-2, A-4	---	0-15	51-95	50-90	30-85	15-70	15-26	NP-8
HtA:												
Houghton	0-9	Muck	PT	A-8	0	0	---	---	---	---	---	---
	9-60	Muck	PT	A-8	0	0	---	---	---	---	---	---

Engineering Properties

Milwaukee and Waukesha Counties, Wisconsin

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				Pct	Pct					Pct	
LmB:												
Lamartine	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-95	25-35	5-15
	8-25	Silty clay loam, Silt loam	CH, CL	A-6, A-7	0	0	100	100	90-100	85-95	35-60	15-40
	25-36	Clay loam, Loam	CL, SC	A-6, A-7	0	0	75-100	75-100	65-95	45-80	30-45	11-25
	36-60	Fine sandy loam, Loam, Sandy loam	GM, ML, SC, SM	A-2, A-4, A-6	---	0-5	50-90	40-90	40-80	25-70	15-30	NP-11
Pella soils	---	---	---	---	---	---	---	---	---	---	---	---
Oc:												
Ogden	0-24	Muck	PT	---	---	---	0	0	---	---	---	---
	24-60	Clay, Silty clay	CH, CL	A-7	0	0	100	95-100	90-100	85-95	45-65	25-40
PrA:												
Pistakee	0-7	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	80-100	25-35	4-12
	7-48	Silty clay loam, Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	85-100	20-40	4-18
	48-60	Stratified sand to silt loam	CL, CL-ML	A-4	0	0	80-100	80-100	80-100	80-100	20-30	4-10
Wet alluvial land	---	---	---	---	---	---	---	---	---	---	---	---
Wetter soils	---	---	---	---	---	---	---	---	---	---	---	---

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

"Depth" to the upper and lower boundaries of each layer is indicated.

"Texture" is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

"Classification" of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

"Rock fragments" larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

"Percentage (of soil particles) passing designated sieves" is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

"Liquid limit" and "plasticity index" (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

LANDMARK
ENGINEERING SCIENCES, INC.

119 COOLIDGE AVENUE - SUITE 100, WAUKESHA, WISCONSIN 53186-6602
TELEPHONE: 414-719-2769
LANDMARK-ENGINEERING@LIVE.COM

January 31, 2014

Good Harvest Market
Attn: Joe Nolan
1850 Meadow Lane
Pewaukee, WI 53072

RE: **Geotechnical Evaluation**
Good Harvest Market Site, Silvernail Road & Meadow Lane, Waukesha, Wisconsin
LandMark Project No. 2160.03

Dear Mr. Nolan:

LANDMARK ENGINEERING SCIENCES, INC. (LandMark) is pleased to submit the attached completed *Geotechnical Evaluation* for the proposed new store location referenced above. This report provides you with the results of the field activities, geotechnical considerations, and general recommendations for the design of storm water structures, building foundations and pavement with respect to the subsurface conditions encountered.

LandMark appreciates the opportunity to provide these geotechnical engineering services to you; we look forward to providing construction phase services of this project. If you have any questions or comments, or if we can be of further assistance to you, your call or letter will receive our prompt response.

Respectfully,

LANDMARK ENGINEERING SCIENCES, INC.

Mark D. Augustine, PE, RLS, CHMM
President

Enclosures: Geotechnical Evaluation

c: File 2160.02

C:\Users\Asus\Documents\Landmark\2160 - Mehmert (Waukesha-ESA)\Geotech\2160-Soilsreport.Docx

Geotechnical Evaluation
for Good Harvest Market Site

Silvernail Drive & Meadow Lane
Waukesha, Wisconsin 53188

PREPARED FOR:

Good Harvest Market
Attn: Joe Nolan
1850 Meadow Lane
Pewaukee, WI 53072

Telephone: (262) 544-9380
Email: jnolan9511@gmail.com

PREPARED BY:

Mark D. Augustine, PE, RLS, CHMM
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Project No.: 2160.03

January 31, 2014

LANDMARK
ENGINEERING SCIENCES, INC.

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LANDMARK
ENGINEERING SCIENCES, INC.

119 COOLIDGE AVENUE - SUITE 100, WAUKESHA, WISCONSIN 53186-6602
TELEPHONE: 414-719-2769
LANDMARK-ENGINEERING@LIVE.COM

1.0 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

LANDMARK ENGINEERING SCIENCES, INC. (LandMark) has completed the geotechnical evaluation for the proposed commercial building at Silvernail Road and Meadow Lane, City of Waukesha, Wisconsin (henceforth referred to as the "Site"). LandMark's services were conducted in general accordance with the local industry standards.

1.2 PROJECT DESCRIPTION

LandMark understands that the project consists of evaluating the foundation subgrade and groundwater conditions for the proposed commercial building (store) with a driveway and parking lot areas. LandMark assumes the structure utilizes exterior load bearing walls and interior steel columns supported by continuous and isolated spread footings. Based on this type of construction, the structural loads are anticipated to be moderate.

The proposed development parcel is for 5.7 acres of vacant land described as being a part of the Northwest 1/4 of Section 28, Township 7 North, Range 19 East, City of Waukesha, Waukesha County, Wisconsin. The proposed building will be located in the northern quarter of the Site, with access drives and parking lot areas proposed for most of the rest of the Site. The Site is located on the south side of Silvernail Road and on the west side of the vacated portion and active right-of-way portion of Meadow Lane.

1.3 SCOPE OF SERVICES

LandMark's scope of services was limited to cursory observations of the subject property, geotechnical subsurface exploration, field observations, analyses of findings, and design recommendations. The subsurface exploration consisted of completing four (4) soil borings advanced to nominal depths of twenty feet below ground surface (20' bgs), three (3) soil borings advanced to nominal depths of 5' bgs, and six (6) test pits excavated to nominal depths of 15' bgs. Geotechnical design recommendations are based upon subsurface conditions encountered at these soil test locations.

This report provides preliminary information regarding the foundation and pavement design options. LandMark's scope of services at this time also included a limited environmental assessment for addressing the concerns expressed in the Phase I Environmental Site Assessment (ESA). Specifically, the exposed soil profiles were field evaluated for potential methane vapor issues and suspect fill materials on this Site. Any statements in this report regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes only.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 SITE DESCRIPTION

The Site is currently a commercial office building with the following abbreviated legal description:

PT NW1/4 SEC 28 T7N R19E COM W1/4 COR SEC 28; N89 5'30 E 1322.30'; N0 10'30 E 447.75' TO BEG; N0 10'30 E 294.13'; N48 55'30 W 392.30'; N42 36'30 E 251.54'; N49 13'11 W 330'; N43 21'51 W 739.2'; N19 31"7 W 23.56'; N64 4'30 W 238.25'; S0 2'14 W 1125.98'; S42 42'30 E678.74'; N89 5'30 E 642.51' TO BEG& S1/2 VACATED MEADOW

LN ADJOINING ON N - EXCEPT PT FOR HWY, EXCEPT CSM NO 9095 (V82 CSMP70) & EXCEPT DOC NO 3116408 -5.71 AC R2444/1125 & R2918/119

Site elevations are sloping primarily from the central and northeastern portions of the lot outward towards the wetlands on the western and southern portions. Based on topographical data of the project area, about 14' of differential elevation exists across the Site from the lowest point to the highest point on the lot.

2.2 USDA SOIL SURVEY

A review of the *Soil Survey of Milwaukee & Waukesha Counties, Wisconsin* prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NCRS) indicates the soils on the Site are primarily eroded loams of the Hochheim (HmB2 and HoD3) series. However, the soils within the wetland areas on the southern and western portions of the site are listed as Houghton muck (HtA) series.

Generally, Hochheim soils have a subsoil of loam transitioning to clay loam, underlain by gravelly loam within the upper 5'. These soils are well drained, moderately or moderately slowly permeable soils formed in loamy deposits over dense loamy till. The Soil Survey also indicates the depth to seasonal high groundwater is greater than 5' bgs; i.e., Hochheim soils are not considered to be hydric soils.

The Houghton muck has a subsoil of "muck" described for the entire 5' profile depth. Muck is very poorly drained soil formed in herbaceous organic matter with a thickness of greater than 51" deep. These soils are considered to be hydric soils. Thus, Houghton muck presents severe constructability issues.

2.3 SUBSURFACE EXPLORATION

On December 13 and 17, 2013, seven (7) soil borings and six (6) test pits were advanced within the proposed development areas. Three (3) soil borings were conducted to nominal termination depths of 5' bgs within the proposed parking lot area. Four (4) soil borings was conducted along the perimeter of the proposed building to nominal termination depths of 20' bgs. A total of six (6) soil test pits, two (2) test pits in each of three (3) proposed storm water management areas, were conducted to nominal depths of 15' bgs.

The soil borings were drilled using a truck-mounted, rotary drilling rig. Soil samples were routinely obtained from the soil borings at ASTM standard intervals of 2.5' down to 10' bgs and 5' intervals thereafter. Soil samples were collected and visually classified using the Unified Soil Classification System (USCS) as a general guide. The samples were also subject to limited testing to measure their engineering properties. The results of the field exploration were used to determine geotechnical engineering recommendations. The drilling of the soil borings, sampling, and testing methods were conducted in general accordance with ASTM procedures.

The soil test pits were conducted using a tracked excavator. Soil samples were collected and visually classified from the test pits at various depths, according to the soil profiles observed. Observed soils were classified via Visual-Manual methods (ASTM 2387) according to USDA Soil Classification System (SCS) guidelines. The samples were also subject to limited testing to measure their engineering properties. The results of the field exploration were used to determine storm water infiltration potential and design recommendations. The excavation of the soil borings, sampling, and testing methods were conducted in general accordance with NR 151 procedures.

Soil samples collected during field classification were not discarded. These samples will be retained for thirty (30) days from the date of the fieldwork.

The soil test locations and surface elevations were determined via land survey methods, utilizing City datum information. Soil boring depths were measured by tabulating the number and amount of 5' auger sections used. Soil test pit depths were determined utilizing scaled tape measures.

2.4 SUBSURFACE CONDITIONS

LandMark encountered very dense, gravelly sand and silt with concrete, asphalt and/or boulders (fill material) of varying depths at many of the soil test locations. The fill material appeared to increase in depth from minor amounts along Meadow Lane (east-northeast side of the Site) up to 14' bgs in one test pit on the west-northwest side of the Site (within the proposed rain garden area). Below the fill, soils typically consisted of brown, medium dense, silty loam and silty clay, transitioning to wet, medium dense to dense, fine sands at deeper depths.

The above subsurface soil description is generalized; a more detailed discussion of observed soil conditions can be found in subsequent sections of this report. The *Soil Boring Logs* and *Soil Evaluation Forms* included in the Appendix should be reviewed for specific information regarding the subsurface conditions at each soil test location. The soil stratification shown on the *Soil Boring Logs* represents approximate boundaries between the subsurface materials; the actual transition may be gradual. Subsurface variations may occur and should be expected between soil test locations.

2.5 GROUNDWATER CONDITIONS

The soil on site was generally damp to saturated down to termination depths. Based on field observations, the colorization/moisture content of the recovered soils samples, and a review of site topographical data, the seasonal high groundwater levels are estimated to range between elev. 95.2' in the north to elev. 101.7' in the south of the Site. Please note that groundwater levels may fluctuate both seasonally and annually due to variations in precipitation, evaporation, ground surface runoff conditions, and other factors not apparent during the field exploration.

3.0 EVALUATIONS AND RECOMMENDATIONS

3.1 GEOTECHNICAL DISCUSSION

Generally, the subsurface soils encountered consisted of varying depths and types of fill material underlain by granular soils (mostly fine sands) to the soil boring and test pit termination depths (see attached *Soil Boring Logs* for detailed soils information). The soils were generally moist to saturated, with medium dense to very dense consistencies (blow counts (N) of 12 to 50+ blows per foot) within the observed soils.

The native soils are considered suitable for foundation load bearing if the design vertical loads are not greater than 4,000 pounds per square foot (psf).

The proposed building can be supported by shallow strip and isolated footing pads designed to bear within the underlying suitable load-bearing soils. Please be aware that all foundations must extend to the suitable load bearing soils. Also, long-term groundwater elevations were not monitored and may fluctuate considerably from the water levels observed during the field exploration. Specific recommendations are discussed in the "Foundation Design" section of this report.

3.2 FOUNDATION DESIGN

Prior to field exploration, the Site was not graded to approximate finished grade elevations. LandMark anticipates excavation operations are required to prepare foundation areas for the building foundation pad. LandMark presents the following recommendations to provide a suitable subgrade below the foundation pad area.

1) Shallow strip footings and isolated column pad footings can be used to support the proposed foundation for this structure. Footings must be founded directly into and underlain by suitable load bearing soils. Suitable load bearing soils were encountered below a depth of about 3' bgs in the soil borings completed.

However, a saturated soil layer with lower load bearing capacities was encountered approximately between 13' bgs and 17' bgs.

2) For the proposed Good Harvest Market building location, LandMark recommends that foundation loads be transferred down to the native soils found at depths between 3' bgs and 10' bgs. The net allowable design load bearing capacity for the soil at this depth is ≤4,000 pounds per square foot (psf). If footing depths are required to be greater than 10' bgs, the net allowable design soil load bearing capacity must be reduced to ≤3,000 psf.

3) LandMark recommends that a qualified geotechnical engineer test and approve the foundation support soils prior to foundation construction to verify that the soils are capable of supporting the design loads and are consistent with the soils discussed in this report. If over-excavation is required for the foundation to extend to suitable load bearing soils, the footings can be designed to:

   a) extend to the suitable load bearing native soils at a greater depth, or

   b) bear on engineered compacted fill or lean mix concrete used to bring the area back up to design elevation and founded upon the deeper suitable bearing soils.

4) If compacted-in-place engineered fill is used, then the excavation will need to be widened a minimum of 6" beyond each side of the foundation face for every 12" of over-excavated depth. Over-excavated areas should be backfilled to the proposed footing grade in 8" deep loose lifts. Backfill materials should be suitable granular fill compacted in place to at least 95% of the maximum Modified Proctor dry density (ASTM D-1557). A qualified geotechnical engineer must approve the backfill materials and direct the over-excavation of unsuitable soils within the foundation areas during construction.

5) Alternatively, footings may also be designed to bear upon lean mix concrete fill founded on the undisturbed, suitable soils. If lean mix concrete is used, the footing over-excavation will need to extend a minimum of 12" beyond the footing face.

6) Exterior footings and footings in unheated or poorly heated areas will need to be at least 4' below the final exterior grade to provide adequate frost protection. Also, footings must be adequately protected from weather during construction.

7) If the building will have below grade walls for a basement, the walls must be designed to resist lateral pressure and pressure from surface and subsurface surcharges. LandMark assumes that the below grade walls will be above the groundwater level and therefore will not be subjected to hydrostatic pressures or buoyant uplift. LandMark also assumes that the top and bottom of the walls will be fixed.

8) LandMark recommends that an underdrain system be included at the base of all basement wall areas to prevent the buildup of hydrostatic pressures on the wall. The underdrain system should be designed by a firm specializing in this type of work, but at a minimum should include perforated or slotted drain tiles along the interior and exterior of the basement footings. Drain lines should be connected at maximum 10' intervals by bleeder pipes passing through the footing walls and connected to sump pits from which water can be pumped or drained, as required. LandMark believes this site has topography well-suited for the use of a gravity drain discharge for the foundation drain system.

9) All foundation drain lines should be surrounded by at least 12 inches of free-draining aggregate, such as clean sand or gravel containing no more than 2% fines passing a No. 200 sieve. A suitable filter fabric to prevent clogging of the system with silts and fine sands should also surround drainage aggregate.

10) Free-draining granular fill consisting of clean sand or gravel with no more than 5% fines passing through the No. 200 sieve should be used for backfill within 4' of any basement walls. Some of the native sand and gravel material may be suitable for use as backfill material. The free-draining material should be capped by 2' of less pervious soil to minimize infiltration of surface water. Also, the surface of the site must be graded to provide for positive drainage away from the basement/foundation walls.

11) Backfill materials should be placed in uniform layers no greater than 12" thick (loose measured) and compacted to between 90% and 95% of the Standard Proctor (ASTM D-698) maximum dry density. The backfill should be compacted using hand-operated vibratory plates; heavy compaction and grading equipment should not be operated within 10' of the below-grade walls, to prevent excessive temporary or long-term lateral pressures on the walls. Backfilling should not take place until the walls have had adequate time to cure. The below-grade walls must be braced during backfill placement operations and must remain braced until the top and bottom of the walls are secured. LandMark also recommends that a qualified geotechnical engineer's representative monitor all backfill placement and compaction operations.

12) Any foundation excavations should be constructed as quickly as possible to avoid exposing the soil to adverse weather. If the shallow footings are dug with temperatures at or below freezing, the exposed footing soils must be insulated prior to the placement of concrete. After concrete is placed, the footings should remain insulated for at least 24-hours to allow for minimum concrete curing time. Surface runoff must be drained away from the excavations and not allowed to pond within the excavation. Any standing water present in the foundation excavation must be pumped out, the saturated/unstable soils removed, and the soils re-tested prior to concrete placement. If possible, the foundation concrete should be placed during the same day the excavation is made.

13) LandMark estimates that the total foundation settlement will be about 1", based upon the engineering properties of the soils encountered at the soil borings and the recommended maximum net allowable soil load bearing capacity. Differential settlement will likely be about 75% of the total settlement. While settlement of this amount is generally tolerable, the structure must be properly designed to accommodate the estimated settlements.

3.3 FLOOR SLAB DESIGN

1) A subgrade modulus of 125 pounds per cubic inch (pci) should be used for design of the floor slab on grade.

2) LandMark recommends that the floor slab be a reinforced concrete "floating slab" design suitable to allow for differential movement between the foundation walls and the floor slab as well as to resist shrinkage cracking.

3) A minimum six-inch (6") thick layer of well-graded, free-draining gravel with less than five percent (5%) fines passing the No. 200 sieve is recommended to be placed under the floor slab to serve as a capillary break. This will reduce the effects of concrete slab "curling". A minimum six-millimeter (6-mil) thick plastic vapor barrier should also be placed directly beneath the concrete course. LandMark recommends that a representative of a qualified geotechnical engineer test and approve the floor slab base course materials prior to and during placement.

4) If unsuitable fill material is encountered within the footprint of the building floor plan, the unsuitable material must be undercut a minimum of 1' and replaced with compacted-in-place granular fill materials.

5) A methane vapor barrier/mitigation system under the floor is not required for the proposed building location.

3.4 PAVEMENT DESIGN

1) Based on the upper 5' subsurface soil profiles observed in these borings as well as previous borings conducted by Giles Engineering in 1997 and Gestra Engineering in 2007, the pavement subgrade soils will consist of clayey sand, mixed fill, and newly-placed compacted structural base materials. The clayey sands and mixed fill are somewhat to very sensitive to moisture, depending on the amount of fines in the

soil. Thus, they are susceptible to reduced load-bearing characteristics if allowed to get too wet and/or over-worked due to heavy construction traffic.

2) The observed soils have a CBR value of ≥5 and an AASHTO classification of A-6. The CBR value and the AASHTO classification are based on the soil description as well as field testing results. The WisDOT program for pavement design, WISPAVE, can be used to design pavement and base course thicknesses by inputting the soil parameters for pavement design provided in Table 3.3-1 below.

TABLE 3.3-1

AASHTO CLASSIFICATION	SOIL SUPPORT VALUE	WISCONSIN DESIGN GROUP INDEX	FROST INDEX	SUBGRADE (K)	RESILIENT MODULUS (Mr)
A-6	3.8	14	F-3	125	2800

Soil parameters for pavement design were obtained from Chapter 14 – *State of Wisconsin Department of Transportation Facilities Development Manual.*

3) In lieu of pavement design via WISPAVE, LandMark recommends designing the pavement section utilizing Wisconsin Asphalt Pavement Association (WAPA) guidelines. Assuming 1 to 5 Design Daily ESALs (18,000 pound equivalent single axle loads) for the parking lot structure of greater than 50 stalls, the parking lot should be designed as Traffic Class II. The subgrade is considered "medium", provided this report's design and construction recommendations are followed. Medium subgrade areas designed for Traffic Class II are recommended to include minimum 3.5" asphalt layer (WisDOT Type E0.3 mix) in combination with minimum 8" crushed aggregate base. Higher traffic volumes or heavy truck areas (i.e., supply truck delivery docks) will require thicker pavement sections.

4) LandMark also recommends that the contractor develop and implement a satisfactory quality control program during construction to ensure the pavement material placed on site meets the required physical properties outlined in the *WisDOT Standard Specifications – 2012 Edition.*

5) Pavement areas, to a minimum of 5' outside the planned pavement edges, should be proof-rolled during subgrade preparation to identify the presence of unstable soils. Any unstable soils identified during the proof-roll should be undercut and replaced with suitably compacted structural fill materials. Areas exhibiting high instability during the proof-roll may require additional stabilization methods, such as incorporating geotextile fabric or grid reinforcement. A geotechnical engineer should determine the appropriate response action on a case-by-case basis.

6) Base course materials should consist of a dense-graded crushed stone meeting the requirements of Section 305 of the *WisDOT Standard Specifications – 2012 Edition*. The granular base course materials must be compacted in place to a minimum 95% maximum dry density as determined by *ASTM D1557 Modified Proctor* soil density testing. Maximum backfill loose lift thickness is 8". When placing the structural backfill materials, each lift layer should be uniformly placed with uniform moisture contents within 3% of the soil's optimum moisture content. Each backfill layer should be tested and approved by a qualified geotechnical engineer prior to the placement of the next subsequent layer. Any improperly placed and compacted fill materials must be removed and replaced with suitably compacted material.

7) Pavement should be sloped to provide positive surface drainage. Water should not be allowed to pond on or adjacent to the pavements as this could saturate the subgrade and cause premature roadway pavement deterioration. The granular base course should be protected from water inflow along drainage paths. Additionally, the granular base course should extend at least 2' beyond the edges of the pavement to allow water entering the base course a path for exit.

3.5 SITE SEISMIC CLASS

In the 2002 Wisconsin Enrolled Commercial Building Code, the State of Wisconsin has adopted the provisions of the 2000 International Building Code (IBC). Under the current code provisions, the effect of soil amplification on earthquake ground motions must be taken into account by adjusting the earthquake spectral response accelerations for the soil or rock conditions at the site. The code groups soil or rock conditions into five Site Classes, as defined in Table 1615.1.1, with the site coefficients F_a and F_v increasing from Site Class A through F. The Site Class is based on the weighted average of known or estimated soil properties for the uppermost 100' of the subsurface profile.

Soil borings at the project site extended to depths of 20' bgs, where they terminated within outwash deposits. Based on regional geologic mapping, we anticipate that the subsurface conditions below the explored depth may generally consist of unconsolidated glacial deposits overlying limestone bedrock. Based on our review of the available data, knowledge of regional geology, and the field observations, we recommend that the seismic design for this project be based on Site Class D.

4.0 PRELIMINARY STORM WATER INFILTRATION EVALUATION

4.1 SITE DESCRIPTION

The Site consists of two vacant parcels with a combined +/-6.4 acres, which is proposed for future commercial development. At this time, the proposed storm water management plan improvements include the construction of rain garden, bio-swale, and detention areas.

4.2 HISTORICAL INFORMATION PROVIDED

Previous information provided to LandMark included Giles Engineering's Preliminary Geotechnical Report (1997) and Gestra Engineering's Geotechnical Report (2007).

4.3 FIELD TESTING

Test Pits TP-1 through TP-6 were utilized to evaluate the infiltration potential of the onsite soils. Two (2) test pits were conducted in each of the three (3) proposed storm water management structure areas.

The observed subsurface soils in the proposed detention basin area (northern end of the Site) generally consisted of 1.5' of native silt loams underlain by 2' to 3' of silt clays. This was underlain by 2' of gravelly silt loams, which then transitioned to silts extending down to test pit termination depths (maximum depth = 11' bgs). Seasonal high groundwater redox indicators were observed in the soils at 1.5' bgs (redox @ elev.95.2').

The observed subsurface soils in the proposed rain garden and bio-swale areas (west-southwestern portion of the Site) generally consisted of 4' to 8.5' of miscellaneous fill material, some of it crushed asphalt and concrete. Below this were native soils consisting of silty loams and silt clays transitioning to very fine and fine sands extending down to test pit termination depths (maximum depth = 15.5' bgs). Seasonal high groundwater redox indicators were observed at 7' bgs in the soils of the rain garden area (redox @ elev.101.7') and the bio-swale area (redox @ elev.99.4').

The subgrade soils encountered in the test pits were classified in accordance with the USDA textural soil classification system. Estimated design infiltration rates for the various soil types are shown below as they appear in Table 2 of the *Site Evaluation for Stormwater Infiltration (1002)* document, published by the WDNR Conservation Practice Standards.

SOIL TEXTURE[1]	DESIGN INFILTRATION WITHOUT MEASUREMENT (inches/hour)[2]
Coarse sand or coarser (COS)	3.60
Loamy coarse sand (LCOS)	3.60
Sand (S)	3.60
Loamy sand (LS)	1.63
Sandy loam (SL)	0.50
Loam (L)	0.24
Silt loam (Si, L)	0.13
Sandy clay loam (SCL)	0.11
Clay loam (CL)	0.03
Silty clay loam (Si, CL)	0.04[3]
Sandy clay (SC)	0.04
Silty clay (Si, C)	0.07
Clay (C)	0.07

[1] Use sandy loam design infiltration rates for fine sand, very fine sand and loamy fine sand soil textures.
[2] Infiltration rates represent the lowest value for each textural class presented in Table 2 of Rawls, 1998.
[3] Infiltration rate is an average based on Rawls, 1982 and Clapp & Hornberger, 1978.

4.4 EVALUATION - INFILTRATION

The soils observed in the proposed detention basin area are prohibited from storm water infiltration in accordance with NR151.12(5)(C)5i, which outlines a minimum soil layer thickness and fines content above groundwater or bedrock. The seasonal high water table level in this area of the site as determined in accordance with SPS385.30 will not provide the required 3' minimum separation between the basin bottom and the seasonal high water table elevation. This area is still appropriate for use as a wet detention area.

The fill materials (mixed soils and miscellaneous road debris) observed in the test pits for the proposed rain garden and bio-swale areas are not suitable for storm water infiltration. This is due to the potential for negative impacts to the infiltration water quality. However, these areas can be made suitable for storm water infiltration, provided that the existing fill material is replaced with engineered infiltration soils. Also, the elevation at the bottom of the rain garden must be $\geq$104.7' and the elevation at the bottom of the bio-swale must be $\geq$102.4' to provide the required separation from seasonal high water table levels.

4.5 EVALUATION - CLAY LINER

A wet detention basin placed in the proposed storm water management area located in the northern end of the Site will require a liner due to the close proximity to the seasonal high water table levels. The native silty clay soils present on site are suitable for use as a "Type A" clay liner.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 GENERAL CONSIDERATIONS

A qualified geotechnical engineer, such as one provided by LandMark, should be retained for observation and testing of the construction activities involved in the foundation activities of this project. LandMark will not accept responsibility for any conditions deviating from those described in this report, nor for the performance of structures, if we are not engaged to provide construction observation and testing for this project. If another qualified engineering firm other than LandMark is engaged to provide construction observation and testing for this project, that firm assumes the liability for deviating soil conditions and subsequent structural performances.

5.2 EXCAVATIONS

Excavations may be unstable within the onsite soils. It is mandated that excavations, whether they be for utility trenches or footing excavations, be constructed in accordance with the current Occupational Safety and Health Administration (OSHA) guidelines to protect workers and others during construction. LandMark recommends that these regulations be strictly enforced.

The Contractor is solely responsible for designing and constructing stable excavations and must shore, slope, or bench the sides of the excavations as required to maintain stability. The Contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the Contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth (including utility trench excavation depth) exceed those specified in local, state, and federal safety regulations.

Trench/excavation spoil, heavy equipment, and heavy vibrating machinery should not be permitted within a lateral distance of the depth of the trench/excavation or 3', whichever is greater. Nor should these types of activities be located within 5' of any existing foundation.

This information is provided solely as a service to our client. LandMark does not assume any responsibility for construction site safety or the Contractor's compliance with local, state, and federal safety or other regulations.

6.0 LIMITED PHASE II ESA

Per the findings of the Phase I Environmental Site Assessment (ESA), LandMark conducted a limited Phase II ESA during the geotechnical field activities. The recognized environmental concerns (RECs) addressed were the potential for:

1. Asbestos and lead-based paints/varnishes contained on/in construction debris used for fill material.
2. Methane sources beneath the proposed building area.

Samples collected from the soil borings and test pits were field screened to assess whether additional testing and/or sampling efforts were needed to address the listed RECs. LandMark noted only road construction debris materials within the fill materials exposed in the test pits and soil borings conducted on site. These materials do not typically pose a concern for asbestos or lead-based coatings. Also, methane sources of buried organic matter were not observed within the proposed building footprint or its nearby surrounding areas.

Therefore, LandMark concludes that the potential RECs determined from the Phase I ESA information have been addressed and are considered to have de minimus environmental liability associated for this property.

7.0 REPORT LIMITATIONS

The recommendations in this report are based on assumptions made by LandMark, project details furnished by the Client, the subsurface conditions encountered at the soil boring locations, and site conditions encountered at the time of the field data collection. If assumptions are inaccurate, if there are changes to the project, or if the subsurface conditions encountered during construction differ from those noted in this report, LandMark must be notified immediately (in writing) to determine if the recommendations provided in this report must be changed or supplemented. If LandMark is not notified of deviations encountered, we will not be responsible for the impact of those deviations on the project.

LandMark warrants that the findings, recommendations, and professional advice contained herein have been made

in accordance with generally accepted professional geotechnical engineering practices at this time. No other warranties are implied or expressed.

After the plans and specifications for the project are complete, LandMark should be retained and allowed to review the final design plans and specifications to check that our engineering recommendations have been properly interpreted and are correctly incorporated into the design documents. At that time, it may be necessary to revise the recommendations provided in this report or submit supplemental recommendations.

This report has been prepared for the exclusive use of our Client for the proposed project construction.

After you have reviewed this report, please contact us with any questions or comments you may have. LandMark appreciates the opportunity to be of service to you on this project; we look forward to additional opportunities to provide you with our engineering services.

LANDMARK ENGINEERING SCIENCES, INC.

Mark D. Augustine, PE, RLS, CHMM
President

Appendices: Topographical Map with Boring Locations
USDA Soil Survey Map
Soil Boring Logs
Soil Evaluation Report
General Notes and Conditions

C:\Users\asus\Documents\LandMark\2160 - Mehmert (Waukesha-ESA)\geotech\2160-soilsreport.docx

APPENDICES

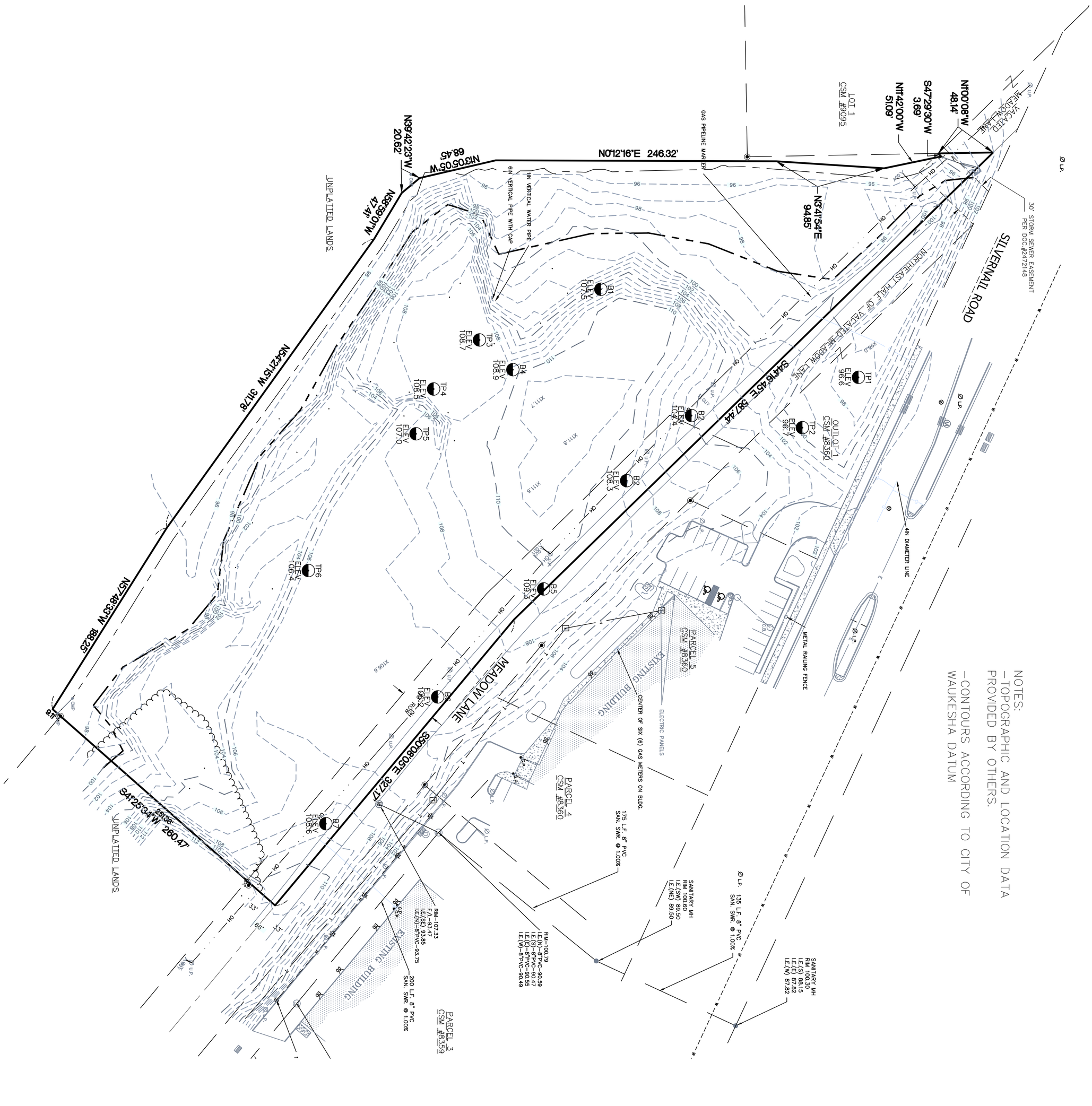
Topographical Map with Boring Location

USDA Soil Survey Map

Soil Boring Logs

Soil Evaluation Report

General Notes and Conditions



NOTES:
- TOPOGRAPHIC AND LOCATION DATA PROVIDED BY OTHERS.
- CONTOURS ACCORDING TO CITY OF WAUKESHA DATUM

GOOD HARVEST MARKET

MEADOW LANE
WAUKESHA, WI 53188

SOIL BORING MAP

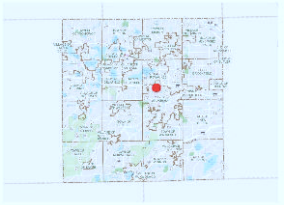
LANDMARK
ENGINEERING SCIENCES, INC.

3021 MINOT LANE, SUITE 200, WAUKESHA, WI 53188-4453
PHONE: 414-719-2769

PROJECT # 2160.00
DATE 12-12-13
DRAWN BY BK
DESIGNED BY MA
REVISIONS
SHEET NUMBER 1
OF 1 SHEETS

WAUKESHA COUNTY
LAND INFORMATION SYSTEMS DIVISION

2160.00: Mehmert Store Services



Legend

- Retired Parcels
- Soils
- Plats
  - Assessor Plat
  - CSM
  - Condo Plat
  - Subdivision Plat

0 218.79 Feet

Notes: USDA Soil Survey

Printed: 10/1/2013

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other [x] geotech eval

Facility/Project Name: Good Harvest Market	License/Permit/Monitoring Number:	Boring Number: B-1
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Luke Last Name: Firm: Wisconsin Soil Testing	Date Drilling Started: 12/17/2013	Date Drilling Completed: 12/17/2013
		Drilling Method: hollow stem auger
WI Unique Well No.: _ _ _ _ _ _ _	DNR Well ID No.: _ _ _ _	Well Name:
Final Static Water Level: _____ Feet MSL	Surface Elevation: 107.5 Feet MSL	Borehole Diameter: 2.25 inches
Local Grid Origin ☐ (estimated: ☐) or Boring Location x State Plane _____ N, _____ E _____ 1/4 of NW 1/4 of Section 28, T 7 N, R 19 E	Lat ° ' " Long ° ' "	Local Grid Location ☐ N ☐ E _____ Feet ☐ S _____ Feet ☐ W
Facility ID	County: WAUKESHA	County Code: 68
		Civil Town/City/ or Village: Waukesha

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
ss-1	18/9	35	0.0 - 2.5	FILL - brown, wet, very stiff to hard, gravelly clay LOAM	OL									
ss-2	9/6	50+	2.5 - 5.0	FILL - brown, moist, hard, gravelly sandy CLAY	CL									
ss-3	18/4	50+	5.0 - 7.5	brown, moist, hard, gravelly sandy CLAY	CL									
ss-4	18/6	41	7.5 - 10.0	light brown, damp, dense, silty SAND & GRAVEL	GM									
ss-5	18/14	22	10.0 - 15.0	gravish brown, wet, very stiff, very fine sandy SILT some boulders	ML									
ss-6	18/14	20	15.0 - 20.0	gray, saturated, medium dense, silty very fine SAND some cobble	SM									cave-in @ 17'

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	LandMark Engineering Sciences, Inc.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other [x] geotech eval

Facility/Project Name: Good Harvest Market	License/Permit/Monitoring Number:	Boring Number: B-2	
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Luke Last Name: Firm: Wisconsin Soil Testing	Date Drilling Started: 12/17/2013	Date Drilling Completed: 12/17/2013	Drilling Method: hollow stem auger
WI Unique Well No.: _ _ _ _ _ _ _	DNR Well ID No.: _ _ _ _	Well Name:	Final Static Water Level: _____ Feet MSL
Surface Elevation: 104.4 Feet MSL	Borehole Diameter: 2.25 inches		
Local Grid Origin ☐ (estimated: ☐) or Boring Location x State Plane _____ N, _____ E _____ 1/4 of NW 1/4 of Section 28, T 7 N, R 19 E	Lat ° ' " Long ° ' "	Local Grid Location ☐ N ☐ E _____ Feet ☐ S _____ Feet ☐ W	
Facility ID	County: WAUKESHA	County Code: 68	Civil Town/City/ or Village: Waukesha

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
ss-1	1/0	50+	0.0 - 2.5	brown, moist, very dense, SAND & GRAVEL	SW									
ss-2	18/5	50+	2.5 - 5.0	brown, damp, very dense, SAND & GRAVEL	SW									
ss-3	4/4	50+	5.0 - 7.5	brown, damp, very dense, SAND & GRAVEL	SW									
			7.5 - 9.0	same (boring refusal)	SW									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____ Firm: LandMark Engineering Sciences, Inc.

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other [x] geotech eval

Facility/Project Name: Good Harvest Market	License/Permit/Monitoring Number:	Boring Number: B-3	
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Luke Last Name: Firm: Wisconsin Soil Testing	Date Drilling Started: 12/17/2013	Date Drilling Completed: 12/17/2013	Drilling Method: hollow stem auger
WI Unique Well No.: _ _ _ _ _ _ _	DNR Well ID No.: _ _ _ _	Well Name:	Final Static Water Level: 96.3 Feet MSL
Surface Elevation: 108.3 Feet MSL	Borehole Diameter: 2.25 inches		
Local Grid Origin ☐ (estimated: ☐) or Boring Location x State Plane _____ N, _____ E _____ 1/4 of NW 1/4 of Section 28, T 7 N, R 19 E	Lat ° ' " Long ° ' "	Local Grid Location ☐ N ☐ E _____ Feet ☐ S _____ Feet ☐ W	
Facility ID	County: WAUKESHA	County Code: 68	Civil Town/City/ or Village: Waukesha

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
ss-1	18/9	46	0.0 - 2.5	FILL - brown, moist, dense, SAND with gravel	SW									
ss-2	18/9	31	2.5 - 5.0	brown, moist, dense, fine SAND	SP									
ss-3	18/10	34	5.0 - 7.5	brown, moist, dense, fine to medium SAND	SP									
ss-4	18/12	37	7.5 - 10.0	brown, moist, dense, fine to medium SAND trace gravel	SP									cave-in @ 10'
ss-5	18/11	10	10.0 - 15.0	brown, wet to saturated, medium dense, SAND some gravel	SW									
ss-6	18/15	15	15.0 - 20.0	gray, saturated, medium dense, silty SAND some gravel	SW									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature  Firm: LandMark Engineering Sciences, Inc.

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other [x] geotech eval

Facility/Project Name: Good Harvest Market	License/Permit/Monitoring Number	Boring Number: B-4	
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Luke Last Name: Firm: Wisconsin Soil Testing	Date Drilling Started: 12 / 17 / 2013	Date Drilling Completed: 12 / 17 / 2013	Drilling Method: hollow stem auger
WI Unique Well No. _ _ _ _ _ _ _ / DNR Well ID No. _ _ _ _ / Well Name	Final Static Water Level: _____ Feet MSL	Surface Elevation: 108.9 Feet MSL	Borehole Diameter: 2.25 inches
Local Grid Origin ☐ (estimated: ☐) or Boring Location x State Plane _____ N, _____ E _____ 1/4 of NW 1/4 of Section 28, T 7 N, R 19 E	Lat ° ' " Long ° ' "	Local Grid Location ☐ N ☐ E _____ Feet ☐ S _____ Feet ☐ W	
Facility ID	County: WAUKESHA	County Code: 68	Civil Town/City/ or Village: Waukesha

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
ss-1	18/9	19	0	0.0 - 2.5 FILL - brown, wet, medium dense, sandy LOAM with gravel, some organics	SM-S									
ss-2	18/7	27	2	2.5 - 5.0 dark brown, moist to wet, very stiff, sandy CLAY with gravel	CL									
ss-3	18/12	17	4	5.0 - 7.5 light brown, damp, medium dense, silty fine SAND	SM									
ss-4	18/14	24	6	7.5 - 10.0 light brown, damp, medium dense, fine SAND	SP									
ss-5	18/4	13	8	10.0 - 15.0 grayish brown, saturated, medium dense, silty fine SAND	SM									cave-in @ 12'
ss-6	18/15	32	10	15.0 - 20.0 grayish brown, saturated, dense, fine to medium SAND with gravel	SP									heaving sand @ 17'
			12											
			14											
			16											
			18											
			20											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature  Firm: LandMark Engineering Sciences, Inc.

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other [x] geotech eval

Facility/Project Name: Good Harvest Market	License/Permit/Monitoring Number:	Boring Number: B-5
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Luke Last Name: Firm: Wisconsin Soil Testing	Date Drilling Started: 12 / 13 / 2013 (m m / d d / y y y y)	Date Drilling Completed: 12 / 13 / 2013 (m m / d d / y y y y) Drilling Method: hollow stem auger
WI Unique Well No.: _ _ _ _ _ _ _	DNR Well ID No.: _ _ _ _	Well Name: Final Static Water Level: _____ Feet MSL
Surface Elevation: 109.3 Feet MSL	Borehole Diameter: 2.25 inches	
Local Grid Origin ☐ (estimated: ☐) or Boring Location x State Plane _____ N, _____ E _____ 1/4 of NW 1/4 of Section 28, T 7 N, R 19 E	Lat ° ' " Long ° ' "	Local Grid Location ☐ N ☐ E _____ Feet ☐ S _____ Feet ☐ W
Facility ID	County: WAUKESHA	County Code: 68 Civil Town/City/ or Village: Waukesha

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
ss-1	18/9	19	0.0 - 2.5	dark brown, moist, very stiff, gravelly CLAY	CL									
ss-2	18/7	12	2.5 - 5.0	brown, moist, medium dense, clayey SAND & GRAVEL	GC									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____ Firm: LandMark Engineering Sciences, Inc.

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other [x] geotech eval

Facility/Project Name: Good Harvest Market	License/Permit/Monitoring Number:	Boring Number: B-6	
Boring Drilled By: Name of crew chief (first, last) and Firm First Name: Luke Last Name: Firm: Wisconsin Soil Testing	Date Drilling Started: 12/13/2013	Date Drilling Completed: 12/13/2013	Drilling Method: hollow stem auger
WI Unique Well No.: _ _ _ _ _ _ _	DNR Well ID No.: _ _ _ _	Well Name:	Final Static Water Level: _____ Feet MSL
Surface Elevation: 106.2 Feet MSL	Borehole Diameter: 2.25 inches		
Local Grid Origin ☐ (estimated: ☐) or Boring Location x State Plane _____ N, _____ E _____ 1/4 of NW 1/4 of Section 28, T 7 N, R 19 E	Lat ° ' " Long ° ' "	Local Grid Location ☐ N ☐ E _____ Feet ☐ S _____ Feet ☐ W	
Facility ID	County: WAUKESHA	County Code: 68	Civil Town/City/ or Village: Waukesha

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
ss-1	18/13	48	0.0 - 2.5	FILL - brown, moist, dense to very dense, silty SAND with gravel	SW									
ss-2	18/11	20	2.5 - 5.0	dark reddish brown, moist, medium dense, clayey SAND trace gravel	SC									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____ Firm: LandMark Engineering Sciences, Inc.

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other [x] geotech eval

Facility/Project Name: Good Harvest Market	License/Permit/Monitoring Number:	Boring Number: B-7

Boring Drilled By: Name of crew chief (first, last) and Firm
First Name: Luke Last Name:
Firm: Wisconsin Soil Testing

Date Drilling Started	Date Drilling Completed	Drilling Method
12 / 13 / 2013 (m m / d d / y y y y)	12 / 13 / 2013 (m m / d d / y y y y)	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _ _ _ _ _	_ _ _ _		_____ Feet MSL	108.6 Feet MSL	2.25 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location x
State Plane _____ N, _____ E
____ 1/4 of NW 1/4 of Section 28, T 7 N, R 19 E
Lat ° ' "
Long ° ' "
Local Grid Location ☐ N ☐ E _____ Feet ☐ S _____ Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	WAUKESHA	68	Waukesha

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
ss-1	18/12	26	0.0 - 2.5	brown, moist, medium dense, silty fine to medium SAND trace gravel	SM									
ss-2	18/11	14	2.5 - 5.0	brown, moist, medium dense, medium to coarse SAND with gravel	SP									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____ Firm LandMark Engineering Sciences, Inc.

Wisconsin
Department of Commerce
Division of Safety and Buildings

SOIL EVALUATION REPORT

in accordance with Comm 85, Wis. Adm. Code

#3144

Badgerland Soil Testing

Attach complete site plan on paper not less than 8½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and location and distance to nearest road.

Please print all information.

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

County	Waukesha
Parcel I.D.	
Reviewed By	Date

Property Owner: Good Harvest Market		Property Location Govt. Lot: NW1/4, NW1/4, S28, T7N, R19E	
Property Owner's Mailing Address: 1850 Meadow Lane		Lot # Outlet 1	Block # -	Subd. Name or CSM# CSM 8360
City: Pewaukee	State: WI	Zip Code: 53072	Phone Number	☒ City ☐ Village ☐ Town: Waukesha	Nearest Road: Silvernail Road

☐ New Construction ☐ Replacement

Use: ☒ Residential / Number of bedrooms _____ Code derived design flow rate _____ GPD

☐ Public or commercial - Describe: _____

Parent material: Glacial Till

Flood plain elevation, if applicable _____ ft.

General comments and recommendations: Mark Augustine, LandMark Engineering Sciences on-site.

1 Boring # ☐ Boring ☒ Pit Ground surface elev. 96.6 ft. Depth to limiting factor 0 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	Roots	Soil Application Rate GPD/ft² *Eff#1	*Eff#2
1	0-18	10yr 2/1	None	si	1fgr	mfr	gw	3fmc	0.0	0.0
2	18-48	10yr 7/1	m3p 10yr 5/8 7/1	sic	0m	mvfi	gw	-	0.0	0.0
3	48-72	10yr 7/1	m3p 10yr 5/8 7/1	grsil	0m	mfr	gw	-	0.0	0.2
4	72-84	10yr 7/1	m3p 10yr 5/8 7/1	si	2mpl	mfr	-	-	0.0	0.0
Water at 18 inches										

2 Boring # ☐ Boring ☒ Pit Ground surface elev. 96.7 ft. Depth to limiting factor 0 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	Roots	Soil Application Rate GPD/ft² *Eff#1	*Eff#2
1	0-18	10yr 2/1	None	sil	2fgr	mfr	gw	2fmc	0.6	0.8
2	18-36	10yr 7/1	m3p 10yr 5/8 7/1	sic	1cpr	mvfi	gw	-	0.0	0.0
3	36-60	10yr 7/1	m3p 10yr 5/8 7/1	grsil	0m	mfr	gw	-	0.0	0.2
4	60-132	10yr 7/1	m3p 10yr 5/8 7/1	si	2mpl	mvfi	-	-	0.0	0.0
Water in grls pockets										

* Effluent #1 = BOD_5 > 30 ≤ 220 mg/L and TSS >30 ≤ 150 mg/L

* Effluent #2 = BOD_5 ≤ 30 mg/L and TSS ≤ 30 mg/L

CST Name (Please Print): Roger J. Hilmer	Signature: Roger Hilmer		CST Number: 226473
Address: Badgerland Soil Testing, 1615 S. Arcadian Dr. New Berlin, WI 53151		Date Evaluation Conducted: 12/19/2013	Telephone Number: 1-88-TEST-SOIL

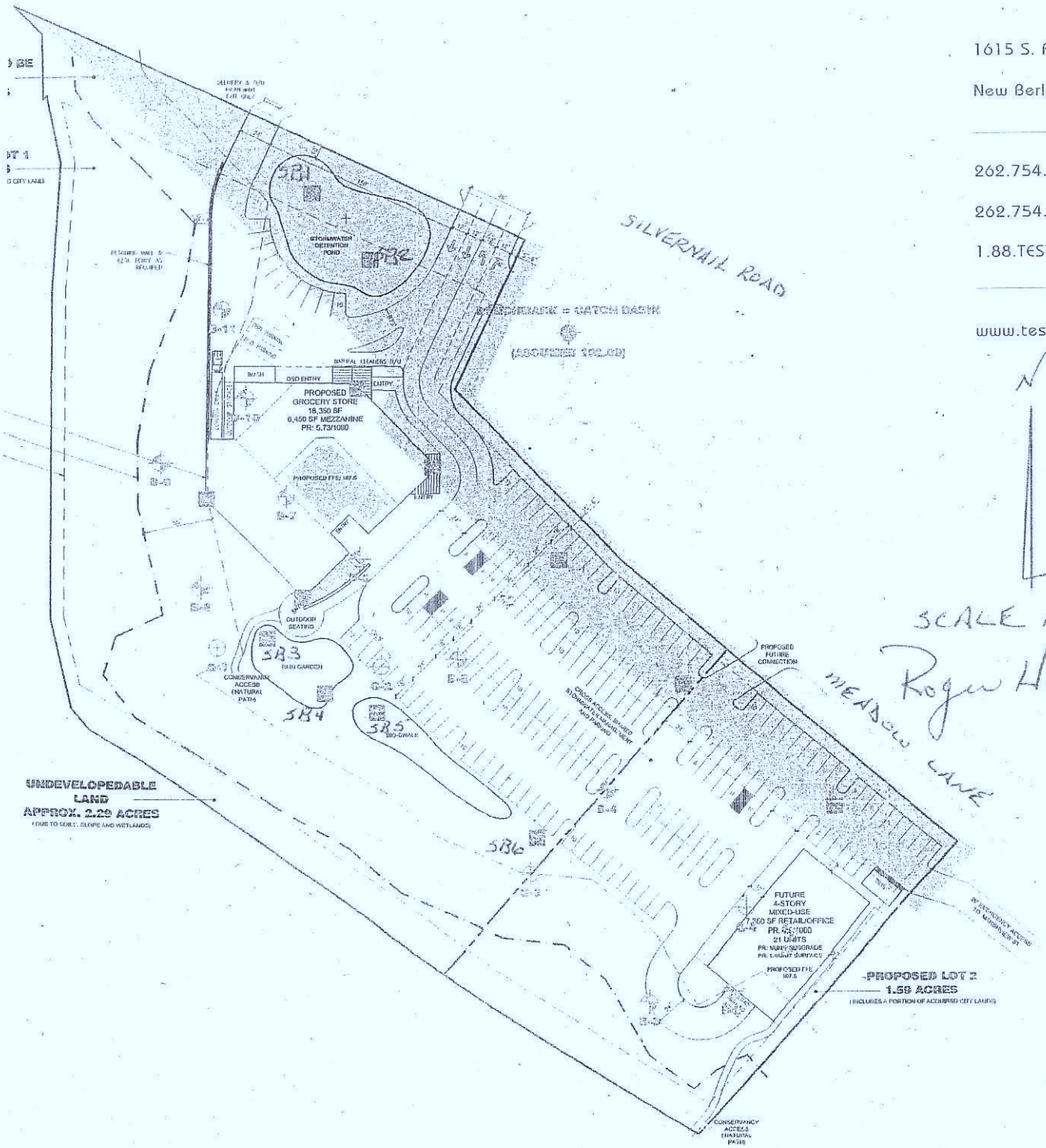
SBD-8330 (R.07/00)

badgerland
soil testing, inc.

1615 S. Arcadian Drive
New Berlin, WI 53151

262.754.1670
262.754.1671 fax
1.88.TEST.SOIL

www.testsoil.com



Wisconsin
Department of Commerce
Division of Safety and Buildings

SOIL EVALUATION REPORT

in accordance with Comm 85, Wis. Adm. Code

#3145

Badgerland Soil Testing

Attach complete site plan on paper not less than 8½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and location and distance to nearest road.

Please print all information.

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

County	Waukesha
Parcel I.D.	
Reviewed By	Date

Property Owner: Good Harvest Market		Property Location Govt. Lot: NW1/4, NW1/4, S28, T7N, R19E	
Property Owner's Mailing Address: 1850 Meadow Lane		Lot #: -	Block #: -
		Subd. Name or CSM#: Metes And Bounds	
City: Pewaukee	State: WI / Zip Code: 53072 / Phone Number:	☒ City ☐ Village ☐ Town: Waukesha	Nearest Road: Meadow Lane

☐ New Construction ☐ Replacement

Use: ☒ Residential / Number of bedrooms _____ Code derived design flow rate _____ GPD

☐ Public or commercial - Describe: _____

Parent material: Glacial Till Flood plain elevation, if applicable _____ ft.

General comments and recommendations: Mark Augustine, LandMark Engineering Sciences on-site

3 Boring # ☐ Boring ☒ Pit Ground surface elev. 108.7 ft. Depth to limiting factor 0 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	Roots	Soil Application Rate GPD/ft² *Eff#1	*Eff#2
1	0-78	10yr 3/4	None Asphalt in fill	grl fill	0m	mfi	gw	2f	0.2	0.5
2	78-84	10yr 3/2	c2d 10yr 5/8	sil	2mpl	mfi	gw	-	0.0	0.2
3	84-108	10yr 4/4	c2d 10yr 5/8 7/1	cl	1fsbk	mfr	gw	-	0.2	0.3
4	108-138	10yr 5/4	c2d 10yr 5/8 7/1	lvfs	0vfsg	mfr	gw	-	0.4	0.6
5	138-156	10yr 5/4	c2d 10yr 5/8 7/1	lfs	0fsg	mvfr	gw	-	0.5	1.0
6	156-180	10yr 5/4	c2d 10yr 5/8 7/1	fs	0fsg	ml	-	-	0.5	1.0
			Wet at 156"							

4 Boring # ☐ Boring ☒ Pit Ground surface elev. 108.5 ft. Depth to limiting factor 0 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	Roots	Soil Application Rate GPD/ft² *Eff#1	*Eff#2
1	0-102	10yr 5/4	None	grl fill	0m	mfi	gw	2f	0.2	0.5
2	102-114	10yr 3/2	m3p 10yr 5/8	sil	0m	mvfi	gw	-	0.0	0.2
3	114-144	10yr 4/4	m3p 10yr 5/8 7/1	sic	0m	mvfi	gw	-	0.0	0.0
4	144-168	10yr 5/4	m3p 10yr 5/8 7/1	lvfs	0vfs	mfr	gw	-	0.4	0.6
5	168-180	10yr 5/4	m3p 10yr 5/8 7/1	fs	0fs	mvfr	-	-	0.5	1.0
			Asphalt in fill							

* Effluent #1 = BOD_5 > 30 ≤ 220 mg/L and TSS >30 ≤ 150 mg/L

* Effluent #2 = BOD_5 ≤ 30 mg/L and TSS ≤ 30 mg/L

CST Name (Please Print): Roger J. Hilmer	Signature: Roger Hilmer	CST Number: 226473
Address: Badgerland Soil Testing, 1615 S. Arcadian Dr. New Berlin, WI 53151	Date Evaluation Conducted: 12/19/2013	Telephone Number: 1-88-TEST-SOIL

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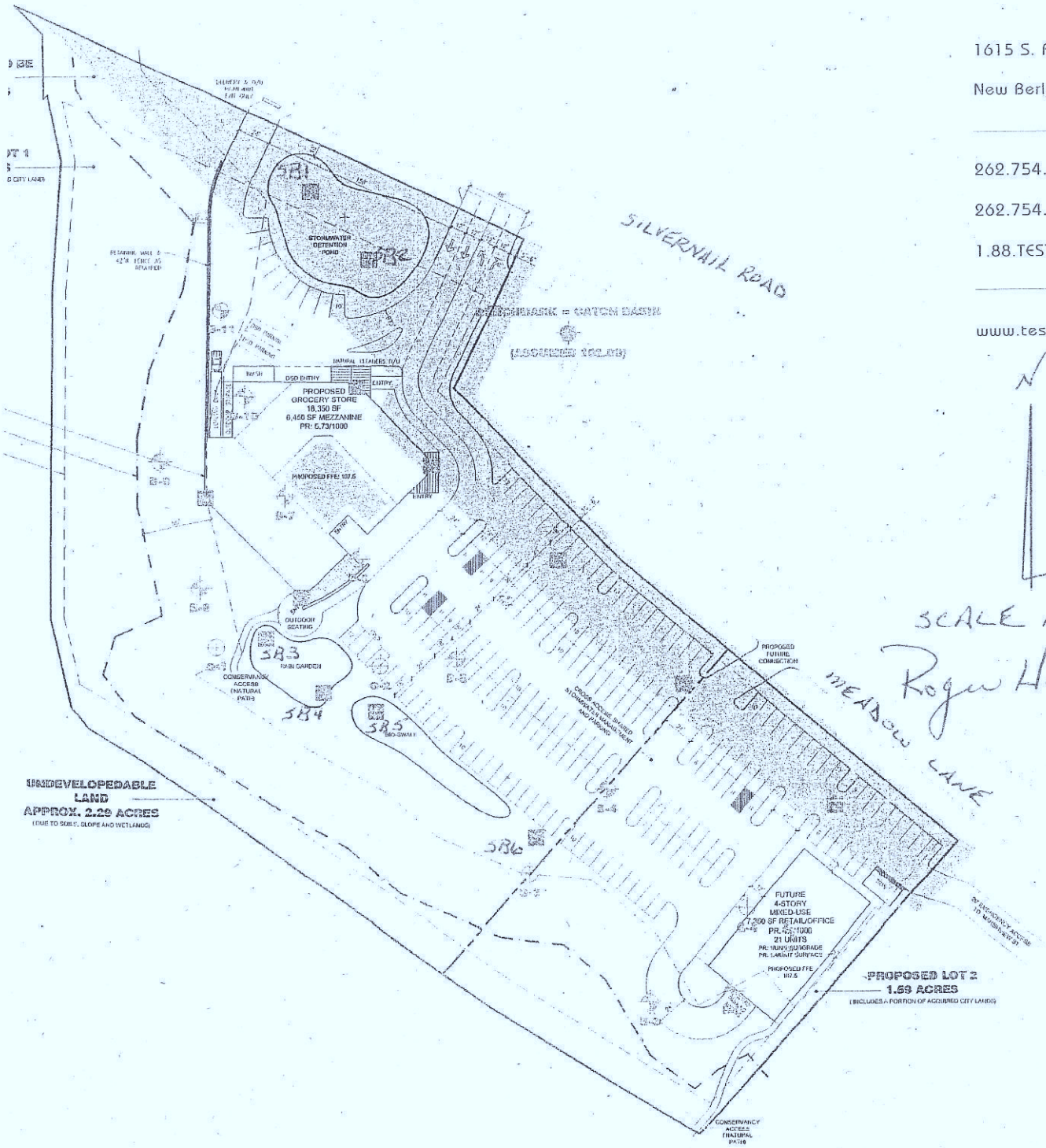

N

SCALE 1" = 100'

Roger Hilmer

Wisconsin
Department of Commerce
Division of Safety and Buildings

SOIL EVALUATION REPORT

in accordance with Comm 85, Wis. Adm. Code

#3146

Badgerland Soil Testing

Attach complete site plan on paper not less than 8½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and location and distance to nearest road.

Please print all information.

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

County	Waukesha
Parcel I.D.	
Reviewed By / Date	

Property Owner: Good Harvest Market		Property Location Govt. Lot: NW1/4, NW1/4, S28, T7N, R19E	
Property Owner's Mailing Address: 1850 Meadow Lane		Lot #: -	Block #: -
City: Pewaukee	State: WI / Zip Code: 53072 / Phone Number:	Subd. Name or CSM#: Metes And Bounds	
		☒ City ☐ Village ☐ Town: Waukesha	Nearest Road: Meadow Lane

☐ New Construction ☐ Replacement

Use: ☒ Residential / Number of bedrooms _____ Code derived design flow rate _____ GPD

☐ Public or commercial - Describe: _____

Parent material: Glacial Till

Flood plain elevation, if applicable _____ ft.

General comments and recommendations: Mark Augustine, LandMark Engineering Sciences on-site.

5 Boring # ☐ Boring ☒ Pit

Ground surface elev. 107.0 ft. Depth to limiting factor 0 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	Roots	Soil Application Rate GPD/ft² *Eff#1	*Eff#2
1	0-78	10yr 3/4	None	grl fill	1fsbk	mfr	gw	2f	0.4	0.6
2	78-96	10yr 3/2	m3p 10yr 5/8	sil	0m	mfi	gw	-	0.0	0.2
3	96-120	10yr 4/4	m3p 10yr 5/8 7/1	sic	0m	mvfi	gw	-	0.0	0.0
4	120-132	10yr 5/4	m3p 10yr 5/8 7/1	grsil	0m	mvfi	gw	-	0.0	0.2
5	132-174	10yr 5/4	m3p 10yr 5/8 7/1	vlfs	0vfsg	mvfr	gw	-	0.5	1.0
6	174-186	10yr 5/4	m3p 10yr 5/8 7/1 Wet at 132"	fs	0fsg	mvfr	gw	-	0.5	1.0
			Water at 174"							

6 Boring # ☐ Boring ☒ Pit

Ground surface elev. 106.4 ft. Depth to limiting factor 0 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	Roots	Soil Application Rate GPD/ft² *Eff#1	*Eff#2
1	0-48	10yr 5/4	None	grl fill	2fsbk	mvfr	gw	2f	0.6	0.8
2	48-84	10yr 3/2	f2d 10yr 5/8	grsil fill	1fsbk	mfr	gw	-	0.4	0.6
3	84-168	10yr 7/1	m3p 10yr 5/8 7/1	grsil fill	0m	mfr	gw	-	0.0	0.2
4	168-186	10yr 3/3	f2d 10yr 7/1	peat	2mpl	mfr	-	-	0.0	0.0
Saturated 84-168", concrete and asphalt in fill										

* Effluent #1 = BOD_5 > 30 ≤ 220 mg/L and TSS >30 ≤ 150 mg/L

* Effluent #2 = BOD_5 ≤ 30 mg/L and TSS ≤ 30 mg/L

CST Name (Please Print): Roger J. Hilmer	Signature: Roger Hilmer	CST Number: 226473
Address: Badgerland Soil Testing, 1615 S. Arcadian Dr. New Berlin, WI 53151	Date Evaluation Conducted: 12/19/2013	Telephone Number: 1-88-TEST-SOIL

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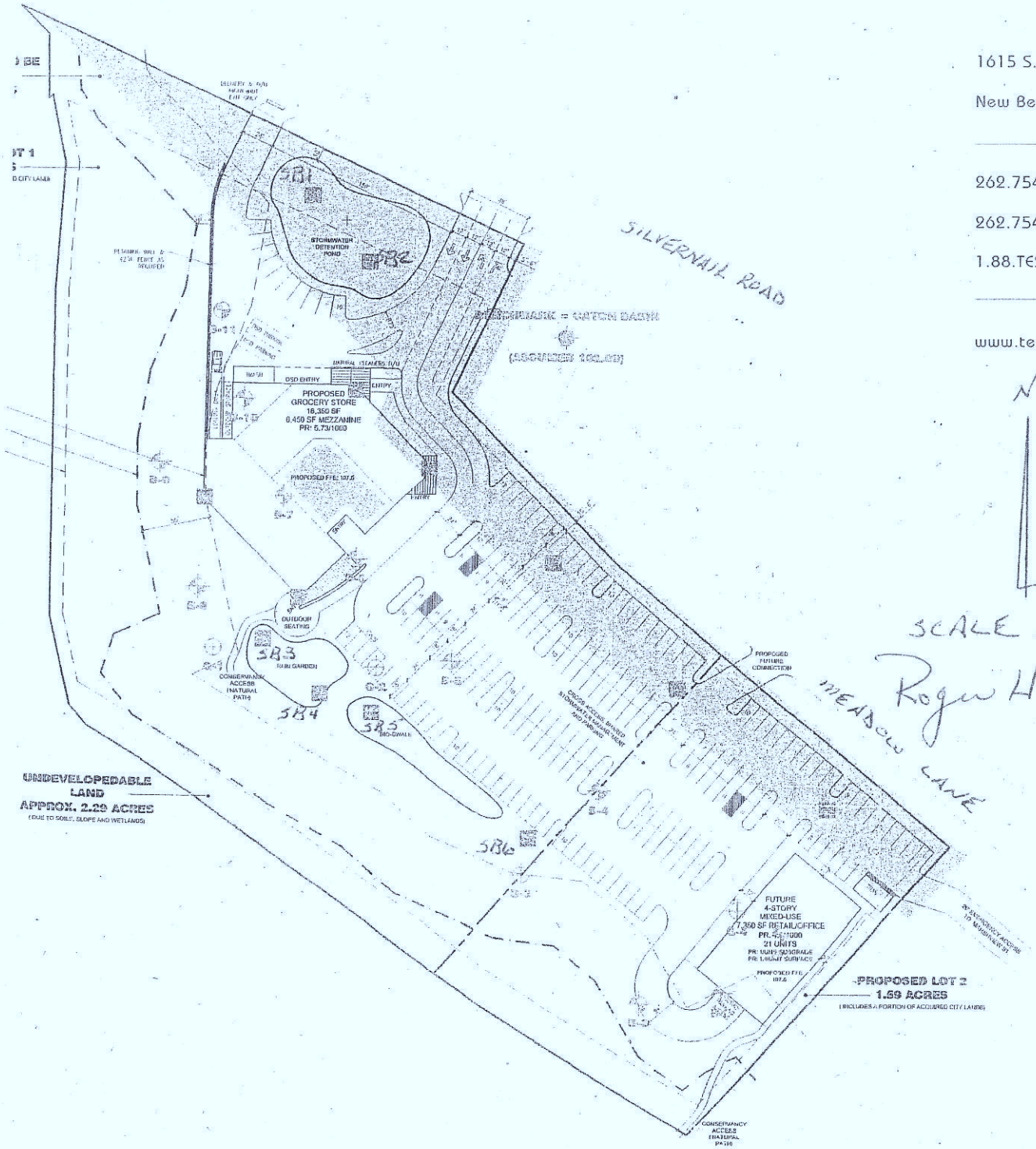


SCALE 1" = 100'

Roger Hilmer

GENERAL NOTES

SAMPLE IDENTIFICATION

Visual soil classifications are made in general accordance with the Unified Soil Classification System on the basis of textural and particle size categorization, and various soil behavior characteristics. Visual classifications should be substantiated by appropriate laboratory testing when a more exact soil identification is required to satisfy specific project applications criteria.

PARTICLE SIZE ±

Boulders: 8 inches Cobbles: 3 to 8 inches Gravel: 5 mm to 3 inches	Coarse Sand: 2mm to 4 mm Medium sand: 0.42mm to 2mm Fine Sand: 0.074 to 0.42mm	Silt: 0.005mm to 0.074mm Clay: -0.005mm

DRILLING & SAMPLING SYMBOLS

SS:	Split-spoon, 2" O.D. by 1 3/8" I.D.		
ST:	Shelby Tube, 2" O.D. or 3" O.D., as noted in text	RB:	Roller Bit
AU:	Auger Sample	WS:	Wash Sample
DB:	Diamond Bit	BS:	Bag Sample
CB:	Carbide Bit	HA:	Hand Auger

SOIL PROPERTY SYMBOLS

N: Standard penetration count, indicating number of blows of a 140lb. hammer with a 30 inch drop, required to advance a split-spoon sampler one foot.
Qu: Unconfined compressive strength, tons per square foot (tsf)
Qp: Calibrated hand penetrometer resistance, tsf
MC: Moisture Content, %
LL: Liquid Limit PL: Plastic Limit PI: Plasticity Index
Dd: Dry Density, pounds per cubic foot (pcf)
PID: Photoionization Detector (Hnu meter) volatile vapor level, ppm

SOIL RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

NON-COHESIVE SOILS		COHESIVE SOILS		
Classifier	N-Value Range	Classifier	Qu Range (tsf)	N-Value Range
very loose	0 – 3	very soft	0 – 0.25	0 – 2
loose	3 – 7	soft	0.25 – 0.5	2 – 5
medium dense	7 – 15	medium stiff	0.5 – 1.0	5 – 10
dense	15 – 38	stiff	1.0 – 2.0	10 – 14
very dense	38 +	very stiff	2.0 – 4.0	14 – 32
		hard	4.0 +	32 +

GROUNDWATER

▼ Approximate Groundwater level at time noted on soil boring log, measured in open bore hole unless otherwise noted. Groundwater levels often vary with time, and are affected by soil permeability characteristics, weather conditions, & lateral drainage conditions.

Chapter 32
Stormwater Management and Erosion Control
(Rep. & recr. #34-05)

32.11 Technical Standards and Specifications

(a) Hydrologic and Hydraulic Computations. 1. Models. All computations of runoff volumes and peak flow rates used in the development of erosion control and storm water management plans in accordance with this ordinance shall be based on United States Department of Agriculture - Natural Resources Conservation Service (NRCS) methodology. Models such as Source Load And Management Model ("SLAMM"), P8 or other approved models may be used to evaluate the efficiency of the design in reducing total suspended solids to meet this ordinance.

2. Rainfall depths. To determine compliance with this ordinance, the following design storm rainfall depths shall be used, which are derived from NRCS publications and extrapolated for City of Waukesha:

Design Storm	1-year 24-hour	2-year 24-hour	10-year 24-hour	100-year 24-hour
Rainfall Depth	2.3 inches	2.7 inches	4.0 inches	5.6 inches

3. Runoff curve numbers. All computations of pre-development conditions as specified in this ordinance shall use those NRCS runoff curve numbers assigned for a "good" hydrologic condition for each land cover type. For lands where the pre-development land use was cropland, the following NRCS curve number values shall be used as maximums:

Soil Hydrologic Group	A	B	C	D
NRCS Runoff Curve Number	56	70	79	83

4. Average annual rainfalls. All modeling involving average annual rainfall or runoff volumes shall use rainfall data from the Milwaukee area between March 28 and December 6, 1969 as the typical annual rainfall pattern for the City of Waukesha.

5. Rainfall distribution. All peak flow calculations shall use Type II rainfall distribution patterns, as defined in NRCS methodologies.

6. Other methods. All velocity and peak flow computations for open channels and storm sewer pipe flows shall be based on the formula commonly known as "Manning's Formula" used to mathematically predict hydraulic flow rates through channels. Flow routing, culvert design, weir and orifice flow and other related hydraulic computations used to design storm water management facilities shall be

TOTAL EXISTING SITE
223,263 S.F. (5.13 ACRES)
Q2 = 1.95 CFS
Q10 = 5.53 CFS
Q100 = 10.87 CFS

LEGEND

- EXISTING CONTOUR
- TIME OF CONCENTRATION FLOW PATH
- DRAINAGE DIVIDE

EXISTING SITE- NORTH BASIN
69,770 S.F. (1.60 ACRES)
Tc = 29.5 MIN
CN = 70
Q2 = 0.62 CFS
Q10 = 1.75 CFS
Q100 = 3.43 CFS

EXISTING SITE- SOUTH BASIN
153,493 S.F. (3.52 ACRES)
Tc = 30.2 MIN
CN = 70
Q2 = 1.34 CFS
Q10 = 3.78 CFS
Q100 = 7.44 CFS

SILVERNAIL ROAD
ROW VARIES

MEADOW LANE
66' ROW

33' ROW

CONCRETE BOX CULVERT

30' STORM SEWER EASEMENT PER DOC.#2472148

WETLAND DELINEATION DATED APRIL 2014

WETLAND DELINEATION DATED OCTOBER 2013

CENTER LINE OF STREAM

CENTERLINE STREAM PER AERIAL PHOTO

AT CREEK

UNPLATTED LANDS

BENCHMARK: P.K. NAIL ELEV. 880.31

METAL RAILING FENCE

GAS PIPELINE MARKER

ELECTRIC PANELS

CENTER OF SIX (6) GAS METERS ON BLDG.

EXISTING BUILDING

SANITARY MH
RIM 100.30
I.E.(S) 88.15
I.E.(E) 87.82
I.E.(W) 87.82

SANITARY MH
RIM 100.60
I.E.(W) 89.50
I.E.(NE) 89.60

BENCMARK 1
RIM=100.55
I.E.(N) 15"PVC=97.80
I.E.(S) 12"PVC=97.80
I.E.(W) 12"PVC=97.85

RIM ELEVATION=101.27
I.E. SE=12"PVC=98.75
I.E. E=12"PVC=98.72

RIM ELEVATION=102.24
I.E. SE=6"PVC=99.49
I.E. N=12"PVC=99.31

RIM=100.79
I.E.(N)=6"PVC=90.59
I.E.(S)=8"PVC=90.47
I.E.(E)=8"PVC=90.55
I.E.(W)=8"PVC=90.49

RIM=101.29
I.E.(E)=8"PVC=91.43
I.E.(W)=8"PVC=91.33

10IN DIA. CONTROL VALVE FOR SPRINKLERS

RIM=99.91
F/L=96.26
I.E.(N) 12"PVC=97.49

RIM=103.03
I.E.(N) 12"PVC=97.63
I.E.(SW) 12"PVC=98.03
I.E.(E) 12"PVC=98.03

RIM=102.50
F/L=98.13
I.E.(NE) 12"PVC=98.25

RIM=102.68
F/L=97.97
I.E.(NW) 12"PVC=97.95
I.E.(E) 12"PVC=98.30

RIM=103.71
I.E.(S)=8"PVC=92.65
I.E.(E)=8"PVC=92.71
I.E.(W)=8"PVC=92.81

RIM=100.65
F/L=96.40
I.E.(E) 12"CONC.=97.16
I.E.(W) 8"TILE=97.80

RIM=100.67
F/L=97.27
I.E.(S) 12"CONC.=96.77
I.E.(W) 12"CONC.=96.87
I.E.(E) 8"TILE=98.12

RIM=101.98
F/L=96.91
I.E.(N) 12"CONC.=96.91
I.E.(S) 12"CONC.=96.81

RIM=100.64
F/L=97.49
I.E.(N) 12"CONC.=96.69
I.E.(W) 12"CONC.=98.06
I.E.(E) 8"TILE=97.99

RIM=101.13
F/L=96.72
I.E.(N) 12"CONC.=96.48
I.E.(S) 12"CONC.=96.78

RIM=100.67
F/L=97.27
I.E.(S) 12"CONC.=96.77
I.E.(W) 12"CONC.=96.87
I.E.(E) 8"TILE=98.12

RIM=100.67
F/L=97.27
I.E.(S) 12"CONC.=96.77
I.E.(W) 12"CONC.=96.87
I.E.(E) 8"TILE=98.12

RIM=107.33
F/L=93.47
I.E.(SW) 93.85
I.E.(NE) 8"PVC=93.75

200 L.F. 8" PVC
SAN. SWR. @ 1.00%

175 L.F. 8" PVC
SAN. SWR. @ 1.00%

136 L.F. 8" PVC
SAN. SWR. @ 1.00%

264 L.F. 8" PVC
SAN. SWR. @ 0.50%

232 L.F. SC
FLOW @ 1.32%

268 L.F. SHEET
FLOW @ 4.78%

148 L.F. SHEET
FLOW @ 4.80%

128 L.F. SHEET
FLOW @ 3.91%

1"IP FND
E 0.33'

1"IP FND
N 4.14'
E 1.43'

N1°00'08"W 48.14'
S47°29'30"W 3.69'
N11°42'00"W 51.09'
S1°00'08"E 167.67'
N3°41'54"E 94.85'
S88°59'52"W 328.41'
N0°12'16"E 246.32'
N1°30'05"W 68.45'
N39°42'23"W 20.62'
N58°59'01"W 47.41'
N54°21'15"W 311.78'
N57°48'33"W 188.25'
N50°08'05"E 327.17'
S41°25'34"W 260.47'

98.56'
235.59'
214.74'
111.37'
327.96'
111.10'
104.00'
227.46'
251.56'
9.11'

24" x 30" CMP
F/L=96.05

24" x 30" CMP
F/L=96.25

30" CMP
F/L = 95.33
RUN SOUTH

CMP

NORTH
0 40 80
Scale in Feet

Know what's below.
Call before you dig.

EXISTING CONDITIONS

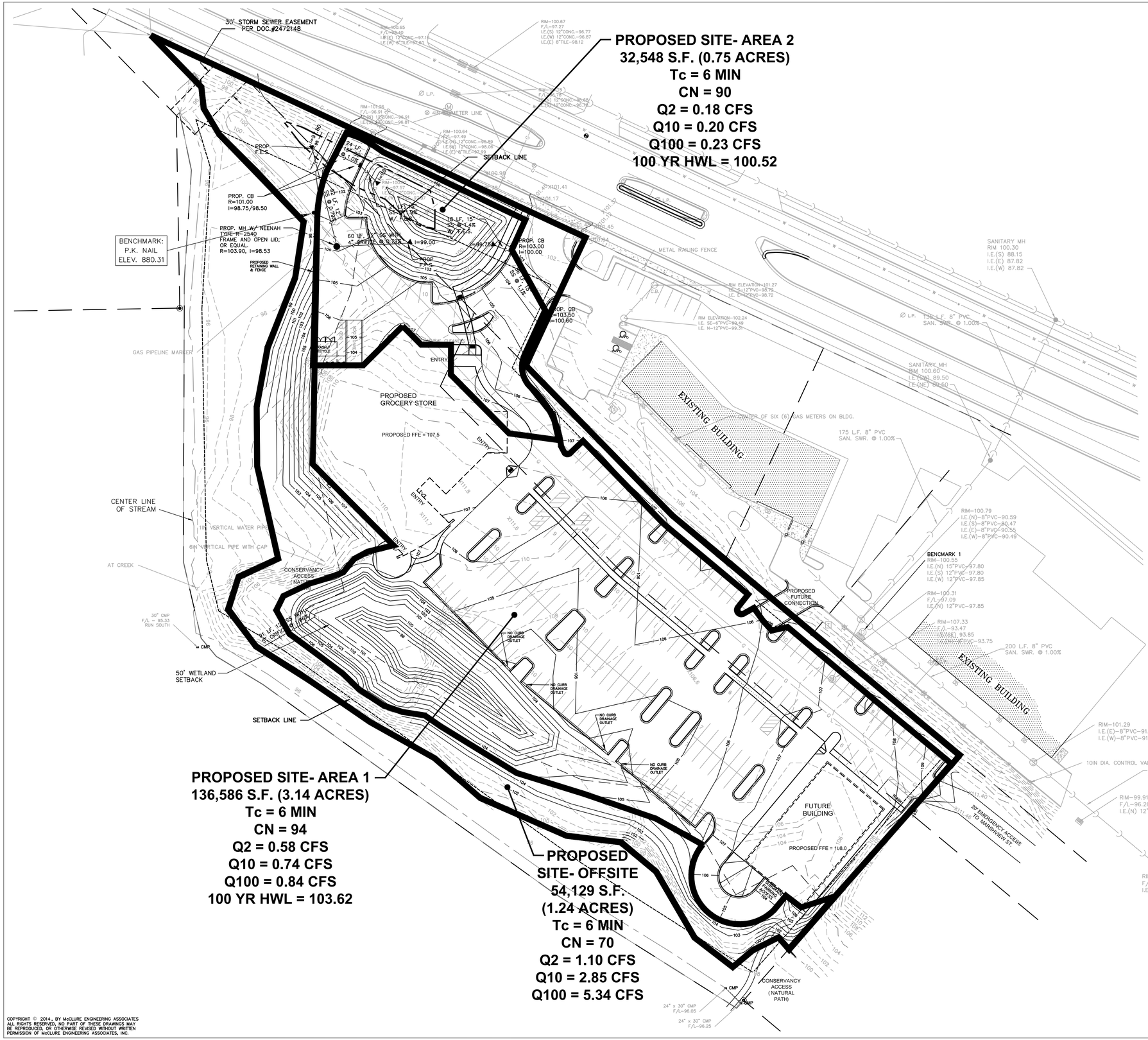
GOOD HARVEST MARKET II, LLC
1850 MEADOW LANE PEWAUKEE, WI 53072
262-554-9380
JOB NUMBER: 08-15-13-025
FILE NAME: T:\land projects\13025\Stormwater\Stormwater Exhibits.dwg

McClure Engineering Associates, Inc.
5417 North 118th Court Milwaukee, Wisconsin 53225
(414) 616-4880 FAX (414) 616-4885

PLOTTING SCALE:	1" = 40'
DESIGNED BY:	KCH
DRAWN BY:	KCH
CHECKED BY:	
DATE:	MAY 28, 2014

NO.	ITEM	DATE
	REVISIONS	

SHEET NO.
C1
08-15-13-025



LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- TIME OF CONCENTRATION FLOW PATH
- DRAINAGE DIVIDE

TOTAL PROPOSED SITE
223,263 S.F. (5.13 ACRES)
Q2 = 1.76 CFS
Q10 = 3.66 CFS
Q100 = 6.34 CFS

NORTH
0 40 80
Scale in Feet

Know what's below. Call before you dig.

PROPOSED CONDITIONS

GOOD HARVEST MARKET II, LLC
1850 MEADOW LANE PEWAUKEE, WI 53072
262-554-9380

FILE NAME: T:\land projects\13025\Stormwater\Stormwater Exhibits North Pond 5-28-14.dwg 08-15-13-025

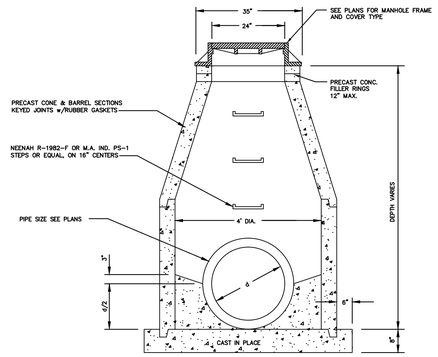
McClure Engineering Associates, Inc.
5417 North 118th Court
Milwaukee, Wisconsin 53225
(414) 616-4880
FAX (414) 616-4885

PLOTTING SCALE: 1" = 40'
DESIGNED BY: KCH
DRAWN BY: KCH
CHECKED BY: KCH
DATE: MAY 28, 2014

NO.	ITEM	DATE

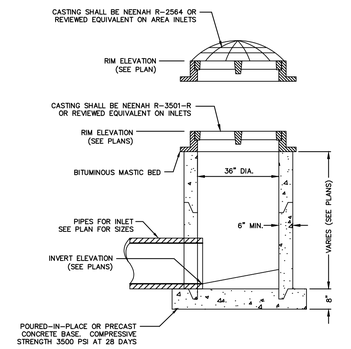
REVISIONS

SHEET NO.
C2
08-15-13-025



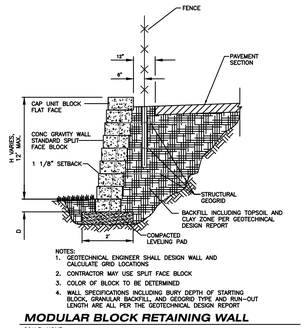
STORM SEWER MANHOLE

NOT TO SCALE



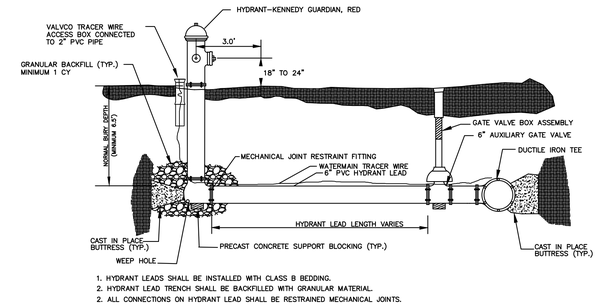
INLET DETAIL

NOT TO SCALE



MODULAR BLOCK RETAINING WALL

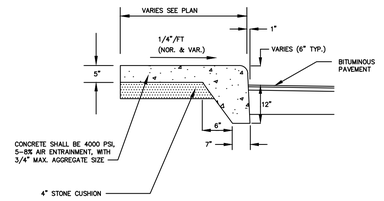
SCALE: NONE



1. HYDRANT LEADS SHALL BE INSTALLED WITH CLASS B BEDDING.
2. HYDRANT LEAD TRENCH SHALL BE BACKFILLED WITH GRANULAR MATERIAL.
2. ALL CONNECTIONS ON HYDRANT LEAD SHALL BE RESTRAINED MECHANICAL JOINTS.

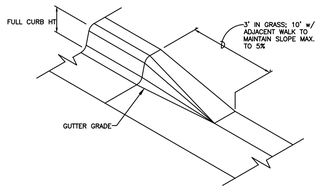
PVC HYDRANT BRANCH DETAIL

NOT TO SCALE



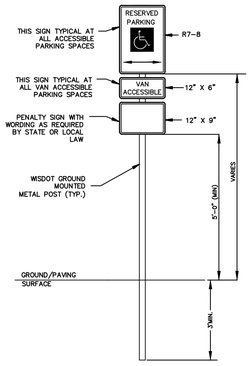
THICKENED EDGE CONCRETE WALK

NOT TO SCALE



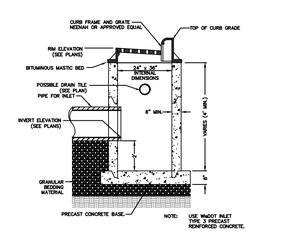
NOSE DOWN CURB

NOT TO SCALE



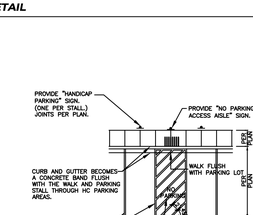
HANDICAP PARKING SIGN DETAIL

NOT TO SCALE



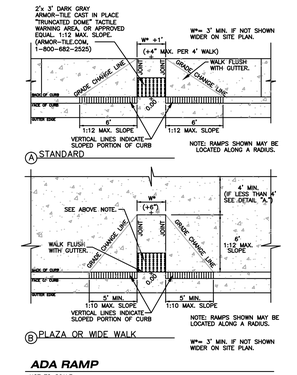
CATCH BASIN DETAIL

NOT TO SCALE



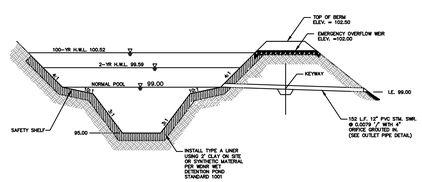
ADA VAN PARKING

NOT TO SCALE



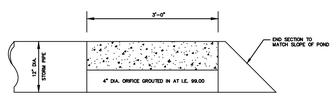
ADA RAMP

NOT TO SCALE



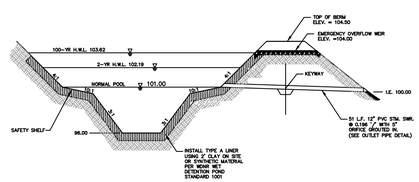
NORTH STORMWATER DETENTION BASIN CROSS SECTION

NOT TO SCALE



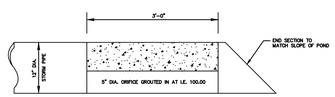
NORTH STORMWATER DETENTION BASIN OUTLET PIPE DETAIL

NOT TO SCALE



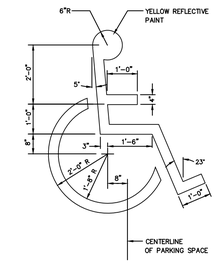
SOUTH STORMWATER DETENTION BASIN CROSS SECTION

NOT TO SCALE



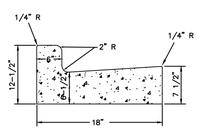
SOUTH STORMWATER DETENTION BASIN OUTLET PIPE DETAIL

NOT TO SCALE



INTERNATIONAL HANDICAP SYMBOL

NOT TO SCALE



NOTES:

1. FOR SLIPFORM CONSTRUCTION OF CURB AND GUTTER, HALF INCH EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM SPACING OF 250 FEET AND CONSTRUCTION JOINTS SHALL BE SAWED OR SCORED ON 10 FOOT CENTERS.

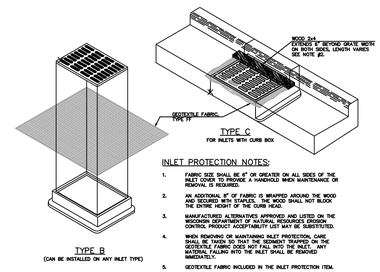
2. WHEN SLIPFORM CONSTRUCTION IS NOT USED, THE CURB AND GUTTER SHALL HAVE CONSTRUCTION JOINTS PLACED AT 10 FOOT CENTERS AND HALF INCH EXPANSION JOINTS SHALL BE PLACED EVERY 50 FEET.

3. HALF INCH EXPANSION JOINTS SHALL BE PLACED 10 FEET FROM EACH SIDE OF STORM INLETS OR CATCH BASINS.

4. ALL CURB RADII DIMENSIONED TO FACE-OF-CURB.

TYPICAL PRIVATE CURB DETAIL

NOT TO SCALE

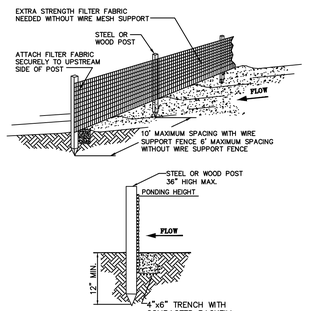


INLET PROTECTION NOTES:

1. FABRIC SIZE SHALL BE 4' OR GREATER ON ALL SIDES OF THE INLET COVER TO PROVIDE A HANDHOLD WHEN MAINTENANCE OR REMOVAL IS REQUIRED.
2. AN ADDITIONAL 6" OF FABRIC IS WRAPPED AROUND THE WOOD AND SECURED WITH STAPLES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB HEAD.
3. MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.
4. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE FABRIC DOES NOT FALL INTO THE INLET. ANY SEDIMENT OR MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.
5. GEOTEXTILE FABRIC INCLUDED IN THE INLET PROTECTION ITEM.

STORM INLET SEDIMENTATION PROTECTION DETAIL

NOT TO SCALE



TRENCH DETAIL

NOTES:

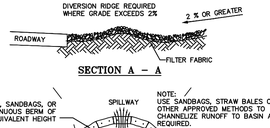
1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.

2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" MAXIMUM RECOMMENDED STORAGE HEIGHT.

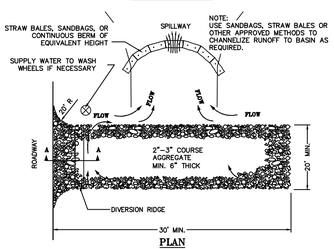
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.

SILT FENCE

NOT TO SCALE



SECTION A – A



PLAN

NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY.

3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

TEMPORARY GRAVEL TRACKING PAD

NOT TO SCALE

DETAILS

GOOD HARVEST MARKET II, LLC
1850 MEADOW LANE 262-544-9380
WAUKESHA, WI.
JOB NUMBER: 08-15-13-025
FILE NAME: T:\land projects\13025\Drawings\13025 E8.dwg

McClure Engineering Associates, Inc.
5417 North 118th Court
Milwaukee, Wisconsin 53225
(414) 616-4880
FAX (414) 616-4885

PLOTTING SCALE: 1" = 40'
DESIGNED BY: KCH
DRAWN BY: JBB
CHECKED BY: KCH
DATE: MAY 28, 2014

REVISIONS

NO.	ITEM	DATE

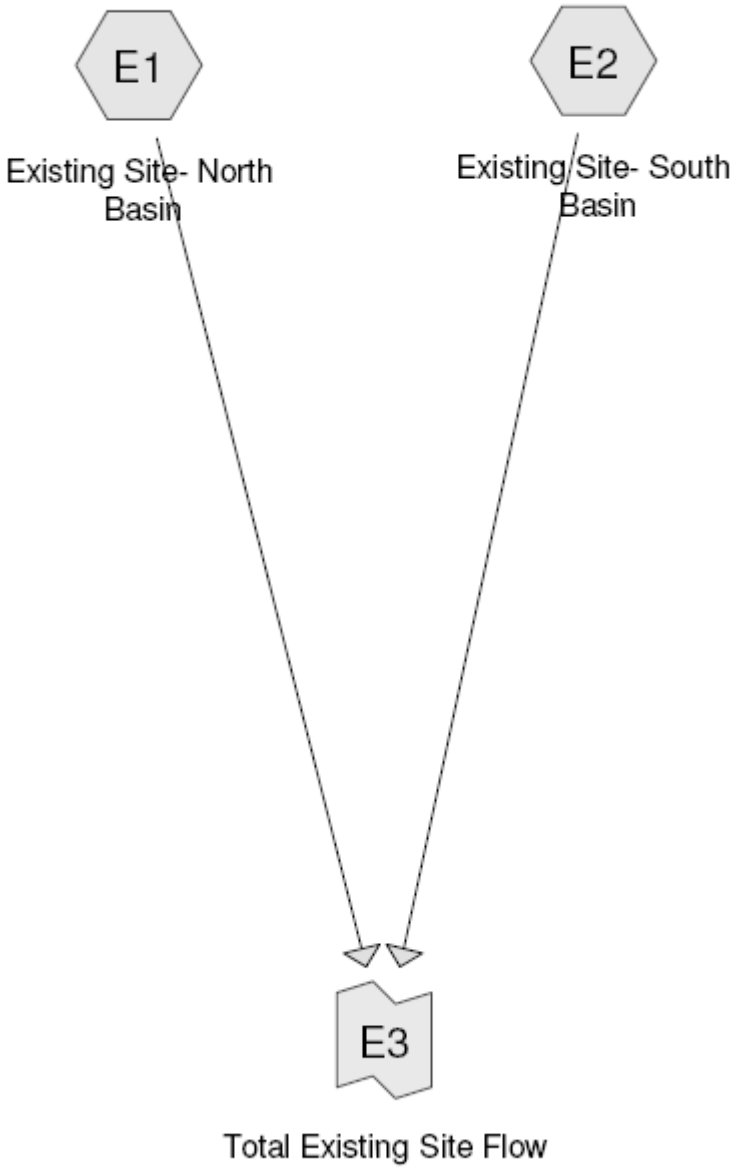
SHEET NO.
C900
08-15-13-025

APPENDIX B

EXISTING CONDITIONS STORMWATER CALCULATIONS

EXISTING CONDITIONS STORMWATER MODEL

HYDROCAD 9.10, HYDROGRAPHS SUMMARY REPORTS; 2-YEAR, 10-YEAR, AND 100-YEAR, 24-HOUR RAINFALL EVENTS FOR THE EXISTING CONDITIONS


E1
E2
Existing Site- North Basin
Existing Site- South Basin
E3
Total Existing Site Flow

Summary for Subcatchment E1: Existing Site- North Basin

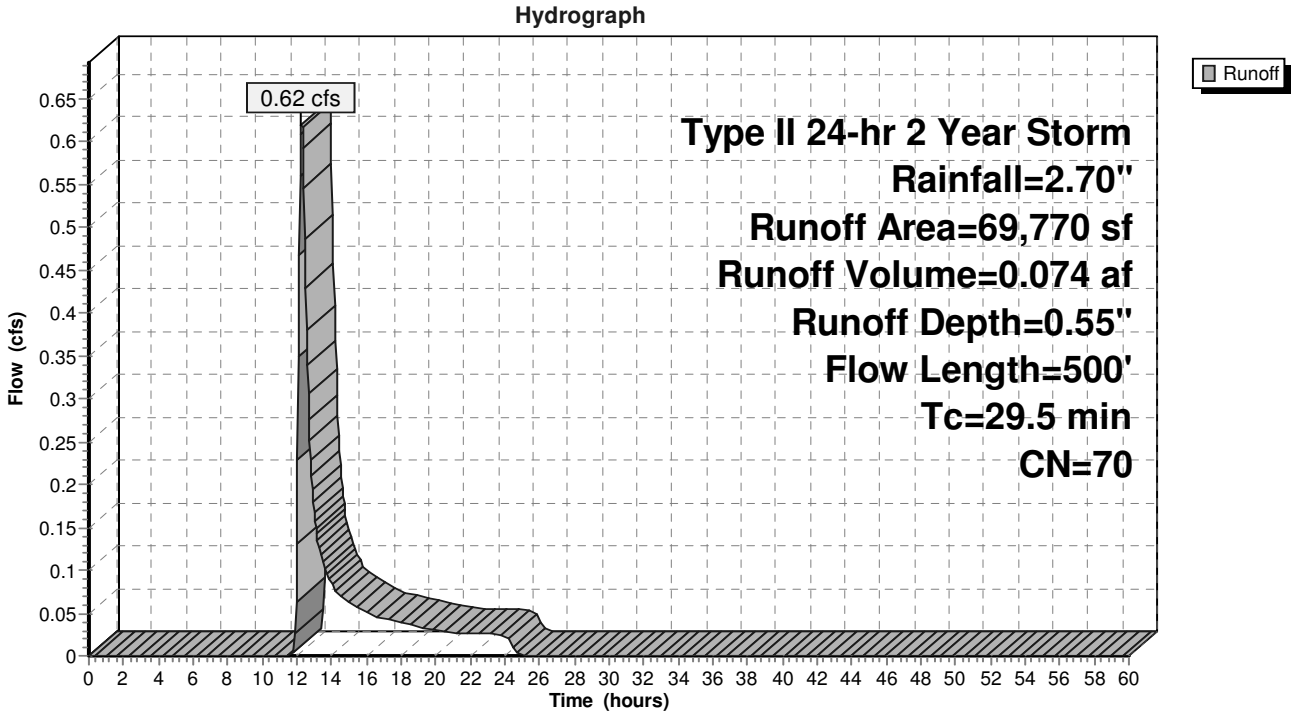
Runoff = 0.62 cfs @ 12.29 hrs, Volume= 0.074 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 Year Storm Rainfall=2.70"

Area (sf)	CN	Description
69,770	70	Pasture, HSG B
69,770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	268	0.0478	0.18		**Sheet Flow, Overland Flow** n= 0.240 P2= 2.57"
4.8	232	0.0132	0.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.5	500	Total			

Subcatchment E1: Existing Site- North Basin



Summary for Subcatchment E2: Existing Site- South Basin

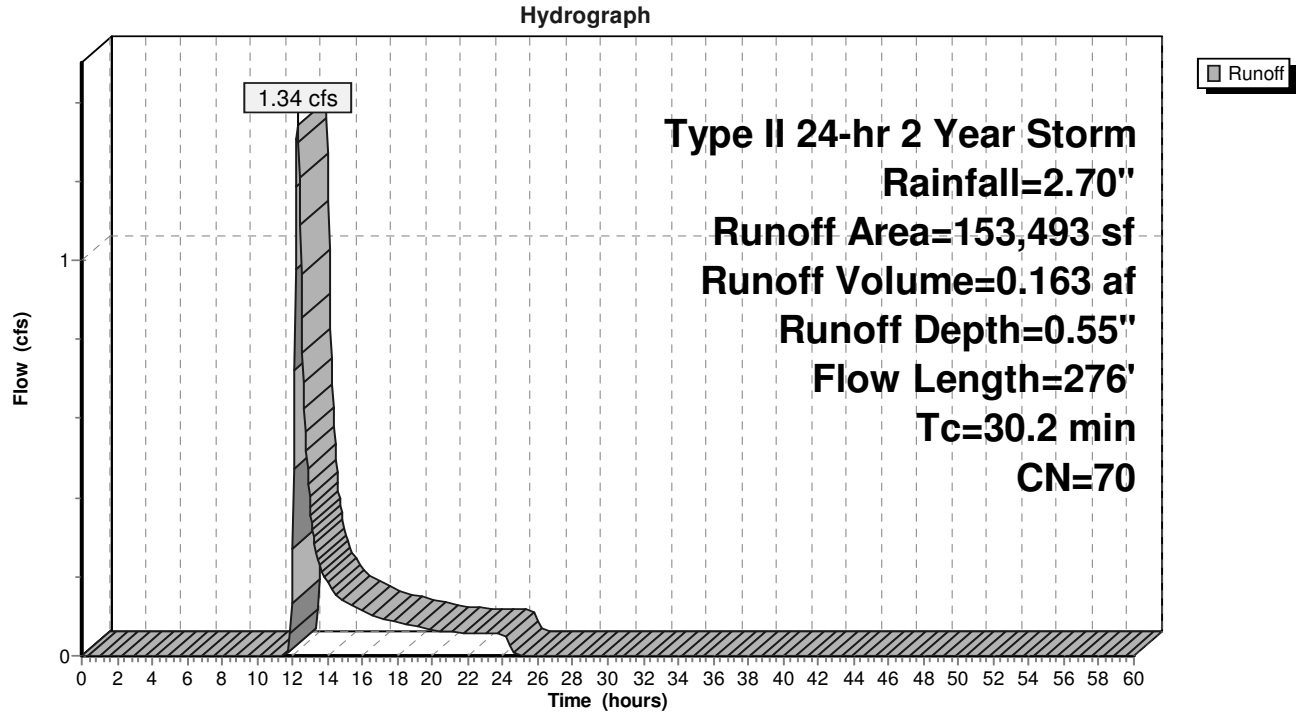
Runoff = 1.34 cfs @ 12.30 hrs, Volume= 0.163 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 Year Storm Rainfall=2.70"

Area (sf)	CN	Description
153,493	70	Pasture, HSG B
153,493		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	148	0.0480	0.16		**Sheet Flow, Overland Flow** Grass: Dense n= 0.240 P2= 2.57"
14.8	128	0.0391	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.57"
30.2	276	Total			

Subcatchment E2: Existing Site- South Basin

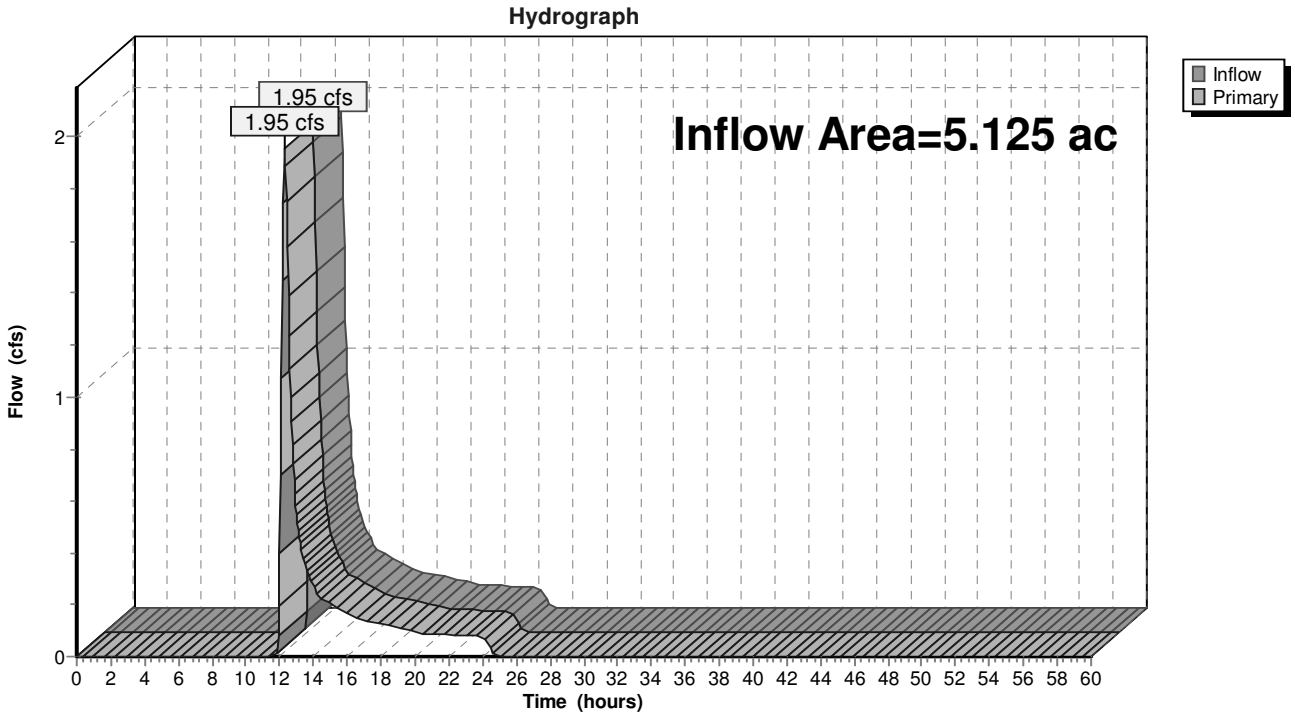


Summary for Link E3: Total Existing Site Flow

Inflow Area = 5.125 ac, 0.00% Impervious, Inflow Depth = 0.55" for 2 Year Storm event
Inflow = 1.95 cfs @ 12.29 hrs, Volume= 0.237 af
Primary = 1.95 cfs @ 12.29 hrs, Volume= 0.237 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link E3: Total Existing Site Flow



Summary for Subcatchment E1: Existing Site- North Basin

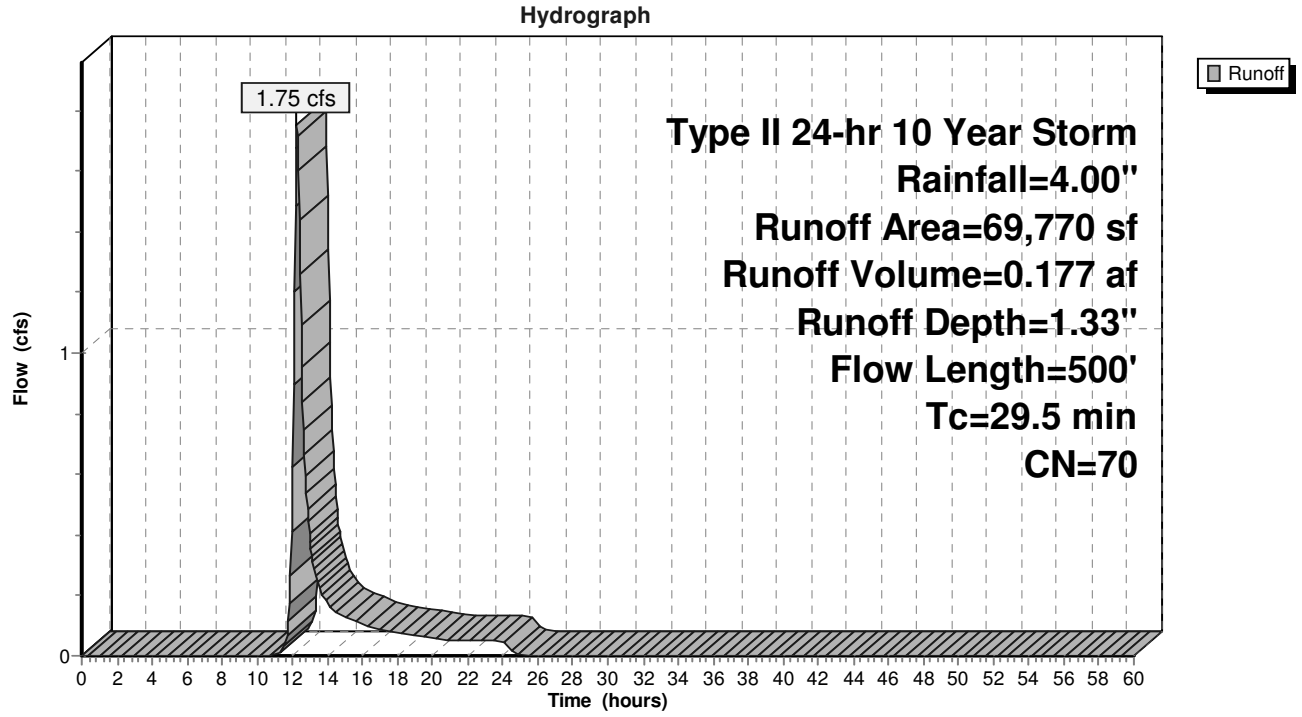
Runoff = 1.75 cfs @ 12.26 hrs, Volume= 0.177 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year Storm Rainfall=4.00"

Area (sf)	CN	Description
69,770	70	Pasture, HSG B
69,770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	268	0.0478	0.18		**Sheet Flow, Overland Flow** n= 0.240 P2= 2.57"
4.8	232	0.0132	0.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.5	500	Total			

Subcatchment E1: Existing Site- North Basin



Summary for Subcatchment E2: Existing Site- South Basin

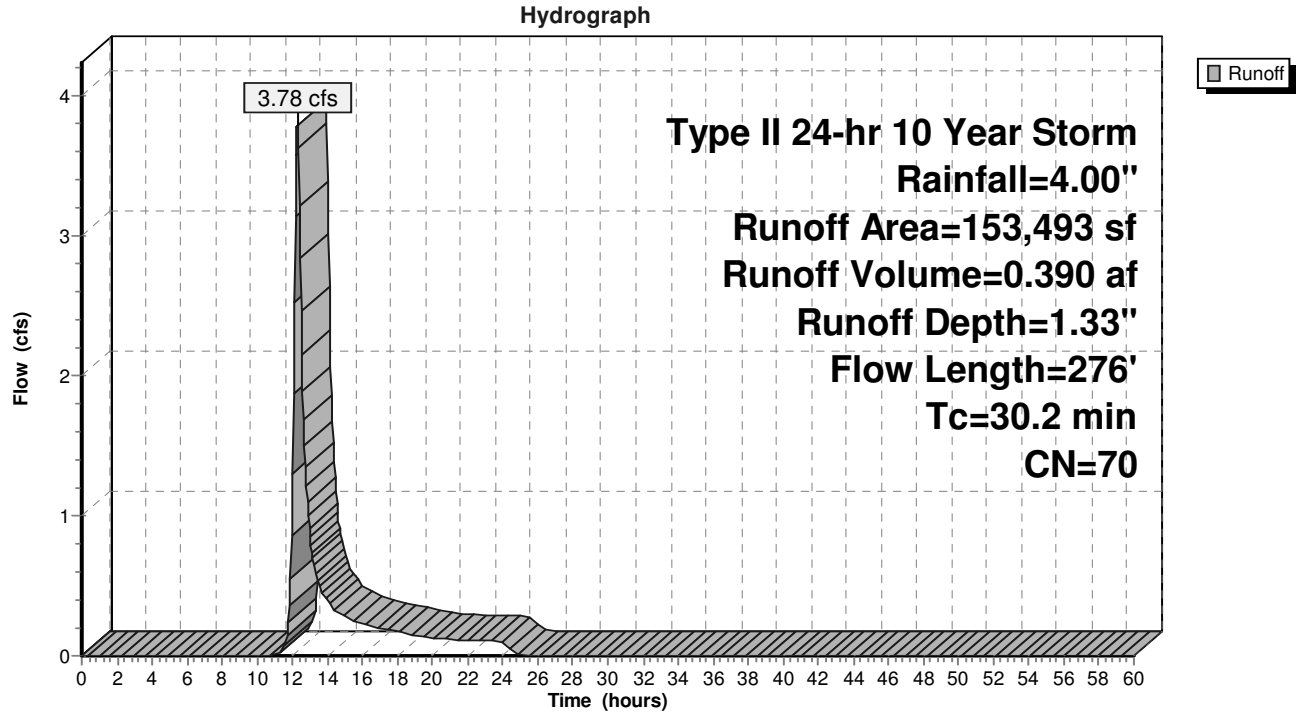
Runoff = 3.78 cfs @ 12.27 hrs, Volume= 0.390 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year Storm Rainfall=4.00"

Area (sf)	CN	Description
153,493	70	Pasture, HSG B
153,493		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	148	0.0480	0.16		**Sheet Flow, Overland Flow** Grass: Dense n= 0.240 P2= 2.57"
14.8	128	0.0391	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.57"
30.2	276	Total			

Subcatchment E2: Existing Site- South Basin

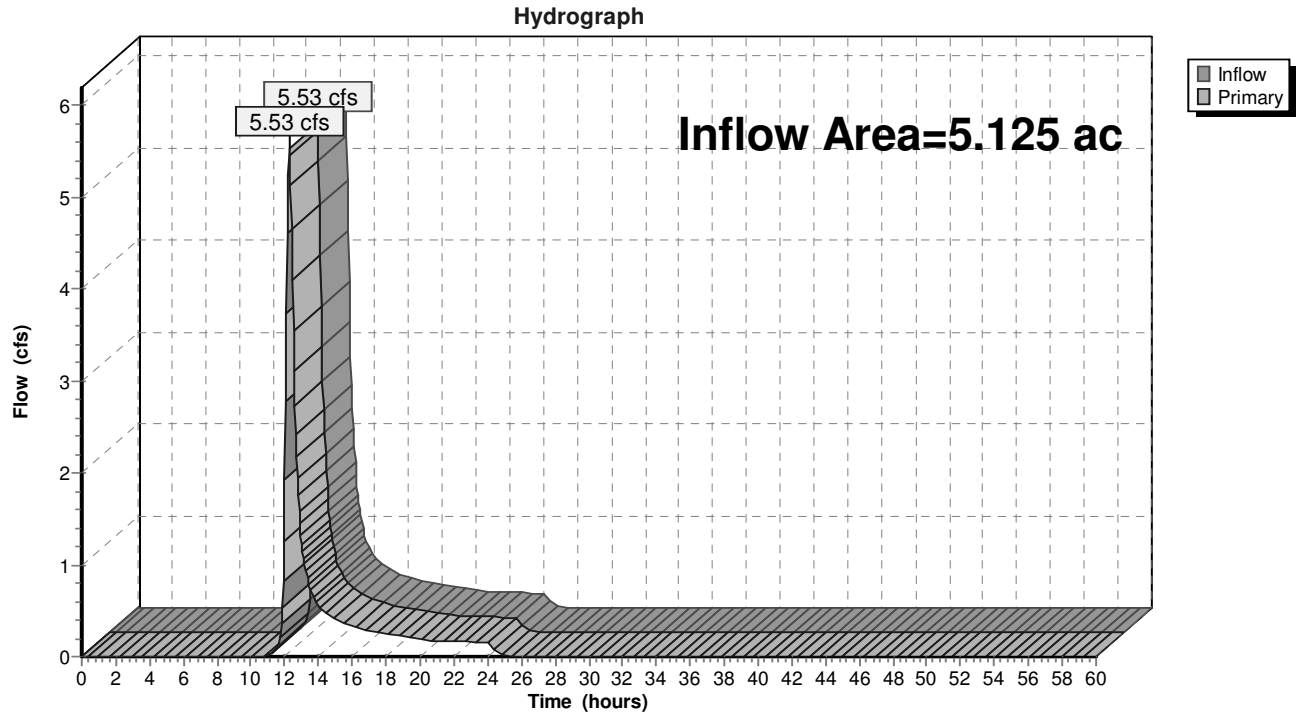


Summary for Link E3: Total Existing Site Flow

Inflow Area = 5.125 ac, 0.00% Impervious, Inflow Depth = 1.33" for 10 Year Storm event
Inflow = 5.53 cfs @ 12.26 hrs, Volume= 0.568 af
Primary = 5.53 cfs @ 12.26 hrs, Volume= 0.568 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link E3: Total Existing Site Flow



Summary for Subcatchment E1: Existing Site- North Basin

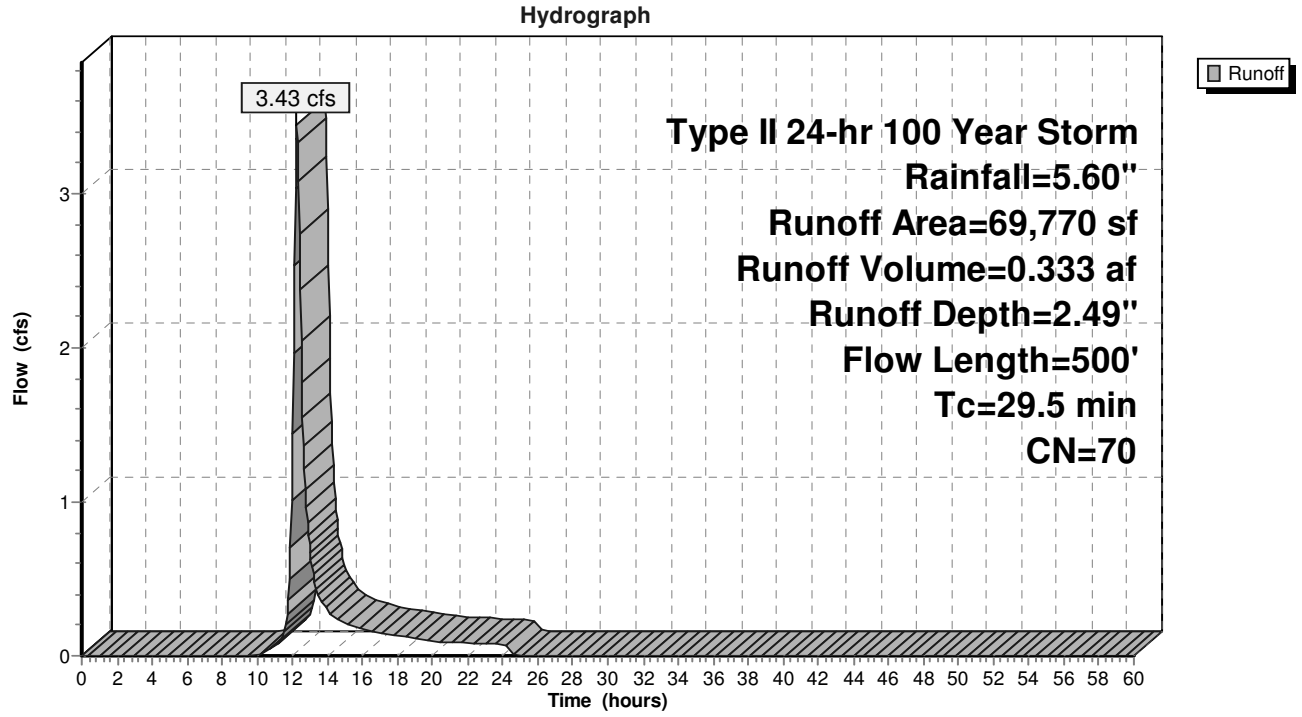
Runoff = 3.43 cfs @ 12.25 hrs, Volume= 0.333 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 Year Storm Rainfall=5.60"

Area (sf)	CN	Description
69,770	70	Pasture, HSG B
69,770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	268	0.0478	0.18		**Sheet Flow, Overland Flow** n= 0.240 P2= 2.57"
4.8	232	0.0132	0.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
29.5	500	Total			

Subcatchment E1: Existing Site- North Basin



Summary for Subcatchment E2: Existing Site- South Basin

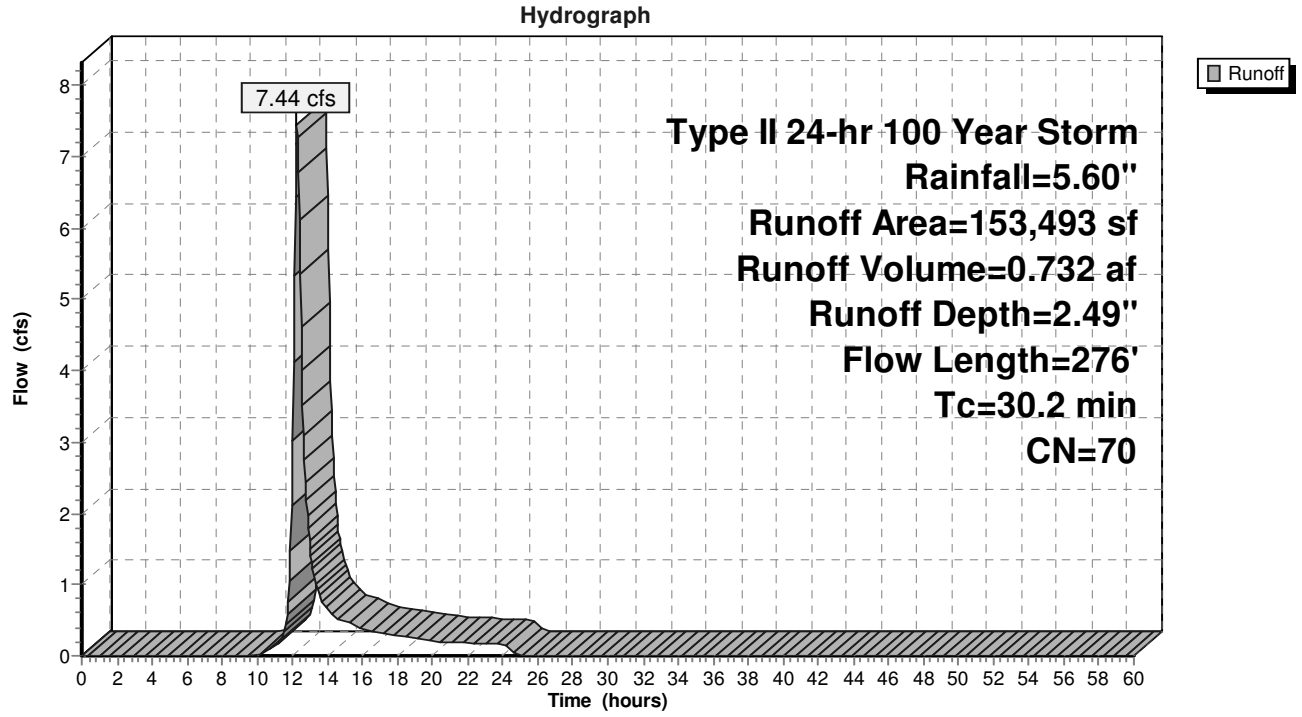
Runoff = 7.44 cfs @ 12.26 hrs, Volume= 0.732 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 Year Storm Rainfall=5.60"

Area (sf)	CN	Description
153,493	70	Pasture, HSG B
153,493		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	148	0.0480	0.16		**Sheet Flow, Overland Flow** Grass: Dense n= 0.240 P2= 2.57"
14.8	128	0.0391	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.57"
30.2	276	Total			

Subcatchment E2: Existing Site- South Basin

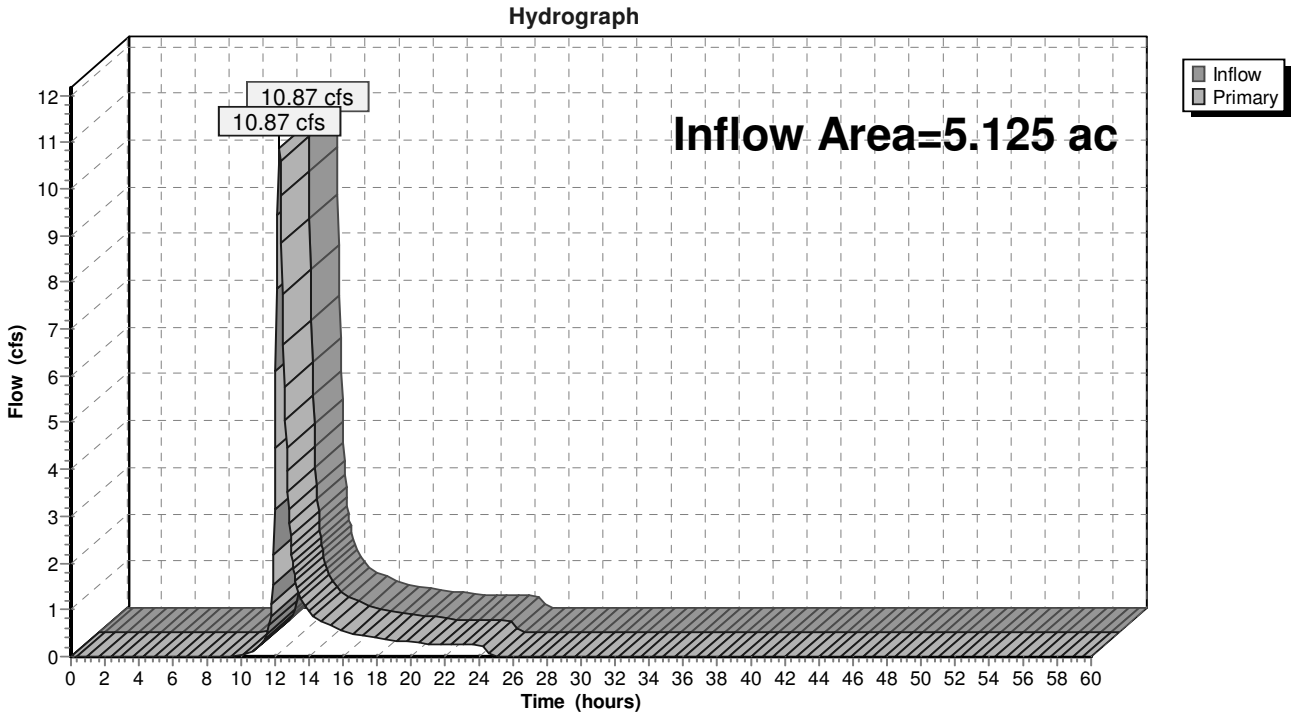


Summary for Link E3: Total Existing Site Flow

Inflow Area = 5.125 ac, 0.00% Impervious, Inflow Depth = 2.49" for 100 Year Storm event
Inflow = 10.87 cfs @ 12.25 hrs, Volume= 1.064 af
Primary = 10.87 cfs @ 12.25 hrs, Volume= 1.064 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link E3: Total Existing Site Flow

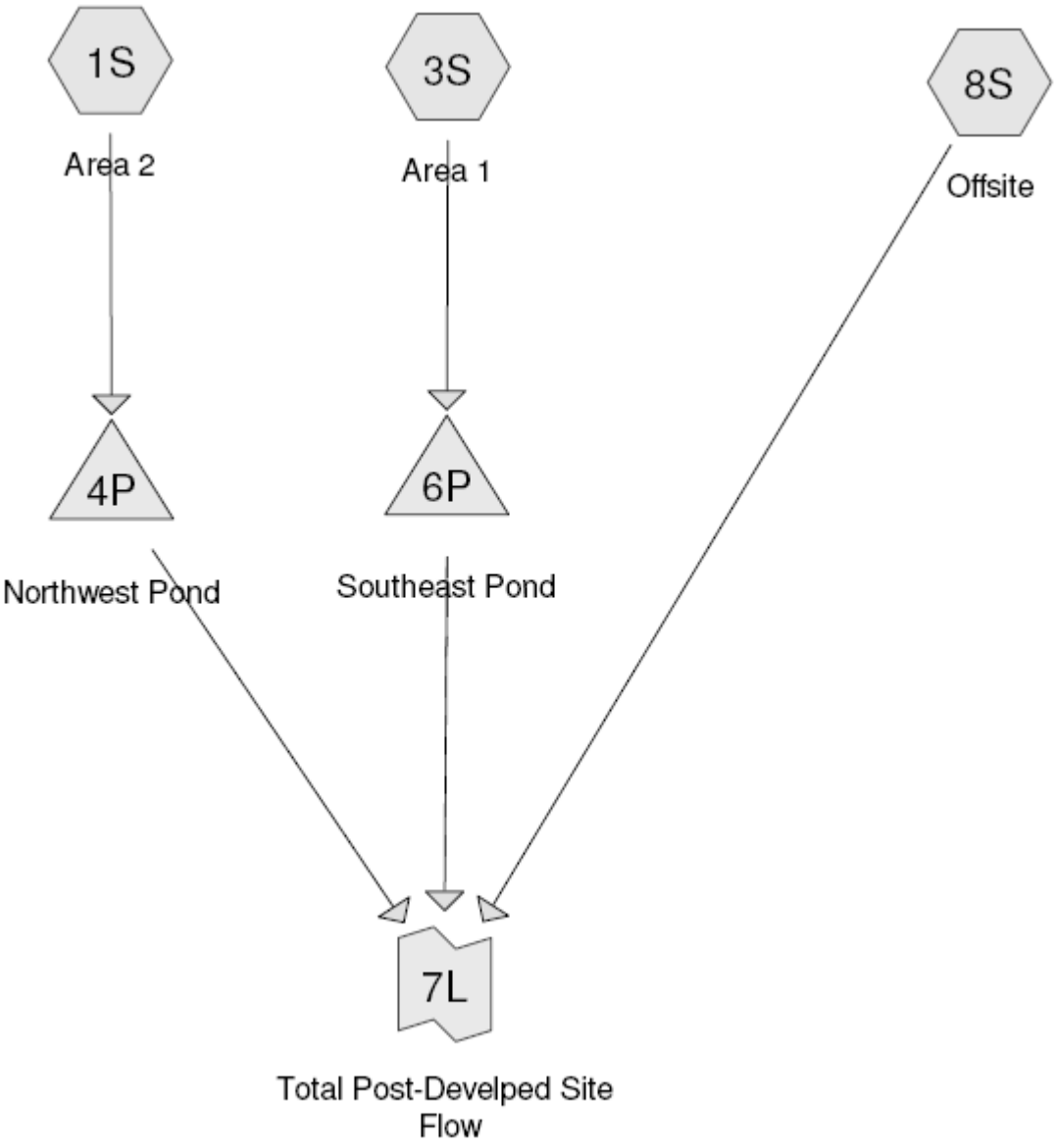


APPENDIX C

STORMWATER DETENTION CALCULATIONS

POST-CONSTRUCTION STORMWATER MODEL OUTPUT

HYDROCAD 9.10, HYDROGRAPHS SUMMARY REPORTS; 2-YEAR, 24-HOUR RAINFALL EVENT FOR THE PROPOSED CONDITIONS


1S
Area 2
3S
Area 1
8S
Offsite
4P
Northwest Pond
6P
Southeast Pond
7L
Total Post-Develped Site Flow

Summary for Subcatchment 1S: Area 2

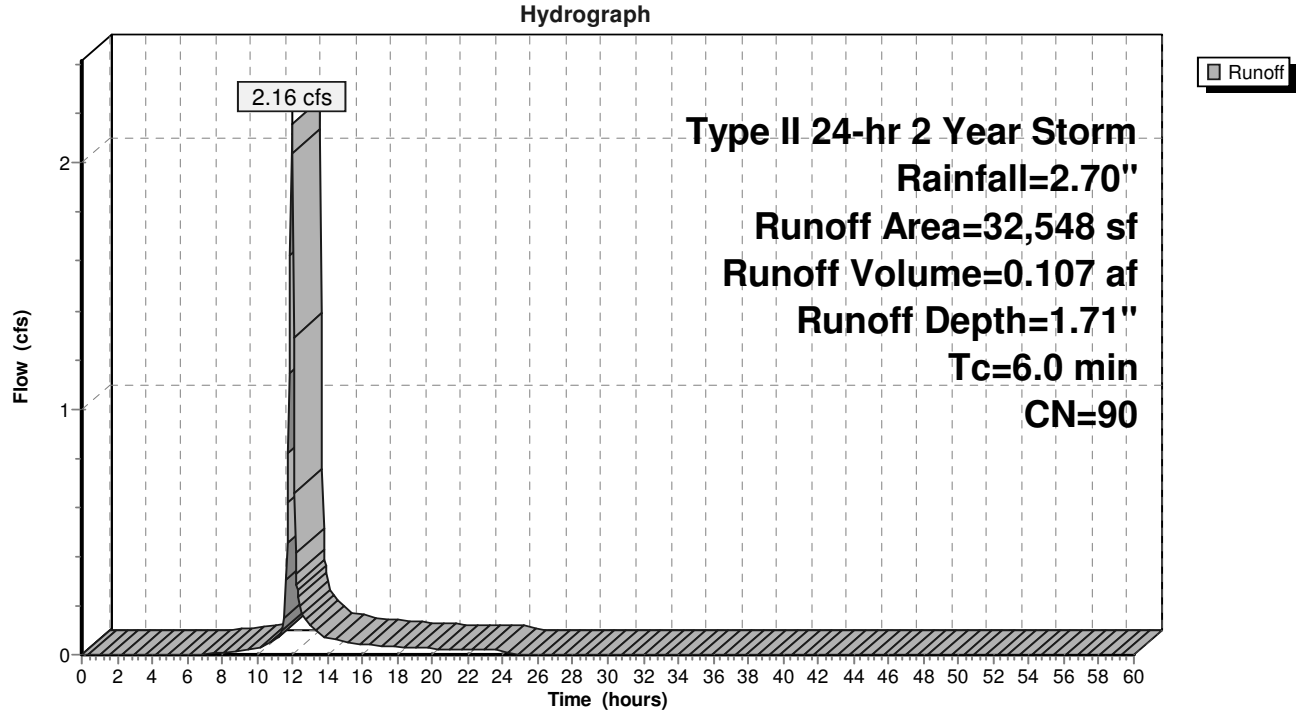
Runoff = 2.16 cfs @ 11.97 hrs, Volume= 0.107 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 Year Storm Rainfall=2.70"

	Area (sf)	CN	Description
	8,756	70	Grass Cover, HSG B
*	19,655	98	road
	4,137	98	Water Surface, HSG B
	32,548	90	Weighted Average
	8,756		26.90% Pervious Area
	23,792		73.10% Impervious Area

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

Subcatchment 1S: Area 2



Summary for Subcatchment 3S: Area 1

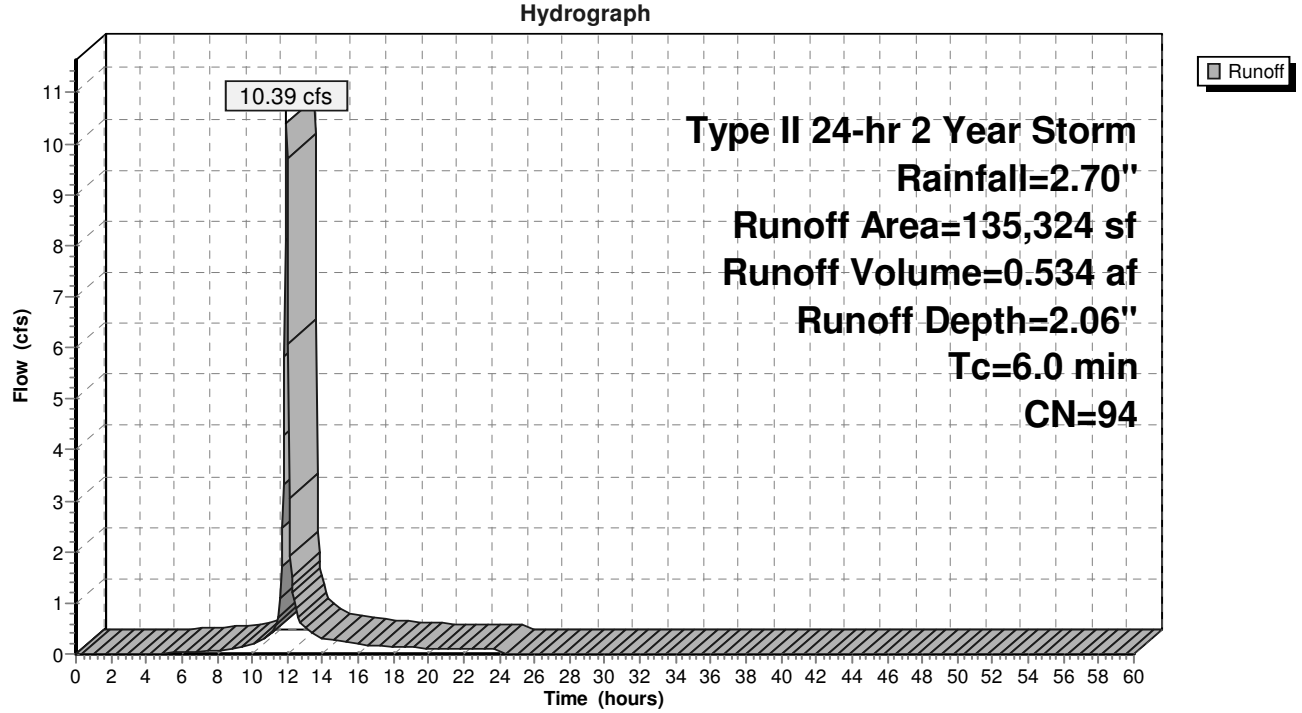
Runoff = 10.39 cfs @ 11.96 hrs, Volume= 0.534 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 Year Storm Rainfall=2.70"

Area (sf)	CN	Description
21,259	70	Grass Cover, HSG B
78,385	98	Paved parking
25,721	98	roof
9,959	98	Water Surface, HSG B
135,324	94	Weighted Average
21,259		15.71% Pervious Area
114,065		84.29% Impervious Area

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

Subcatchment 3S: Area 1



Summary for Subcatchment 8S: Offsite

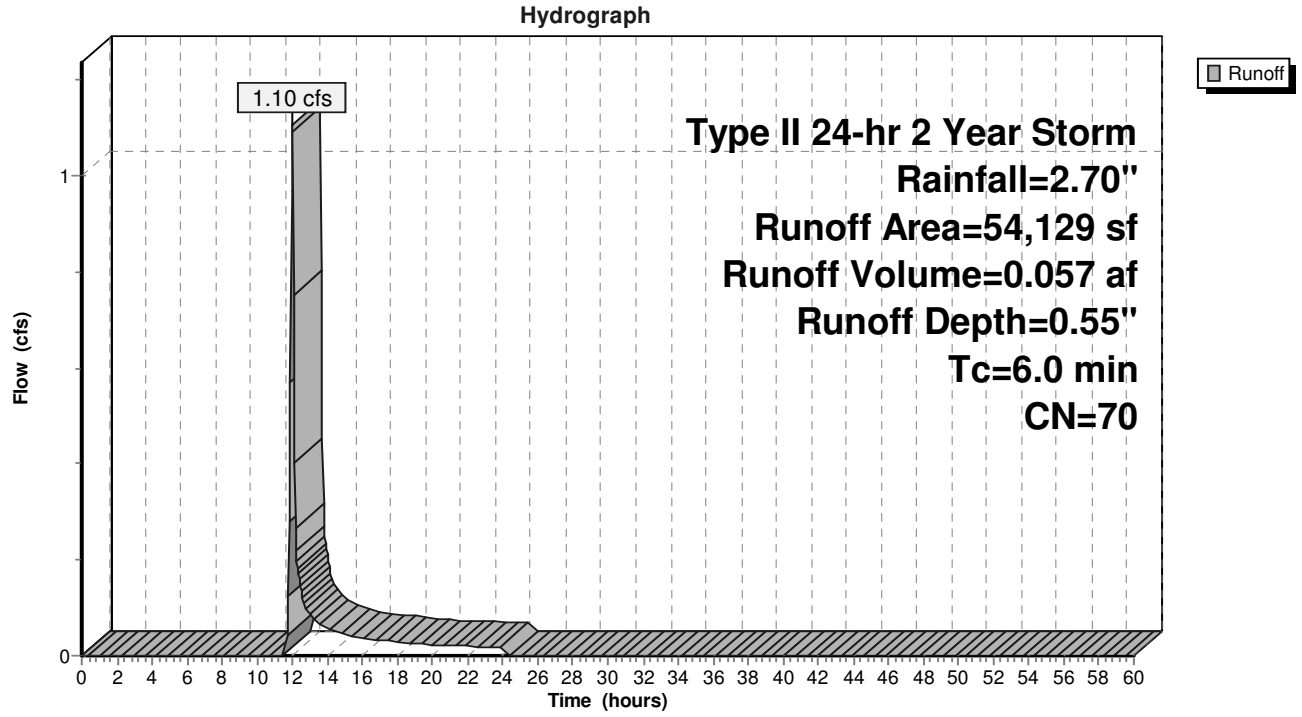
Runoff = 1.10 cfs @ 11.99 hrs, Volume= 0.057 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 Year Storm Rainfall=2.70"

	Area (sf)	CN	Description
*	54,129	70	
	54,129		100.00% Pervious Area

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

Subcatchment 8S: Offsite



Summary for Pond 4P: Northwest Pond

Inflow Area = 0.747 ac, 73.10% Impervious, Inflow Depth = 1.71" for 2 Year Storm event
Inflow = 2.16 cfs @ 11.97 hrs, Volume= 0.107 af
Outflow = 0.18 cfs @ 14.86 hrs, Volume= 0.106 af, Atten= 92%, Lag= 173.5 min
Primary = 0.18 cfs @ 14.86 hrs, Volume= 0.106 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 99.59' @ 12.52 hrs Surf.Area= 4,326 sf Storage= 2,372 cf

Plug-Flow detention time= 214.7 min calculated for 0.106 af (99% of inflow)
Center-of-Mass det. time= 212.4 min (1,023.0 - 810.6)

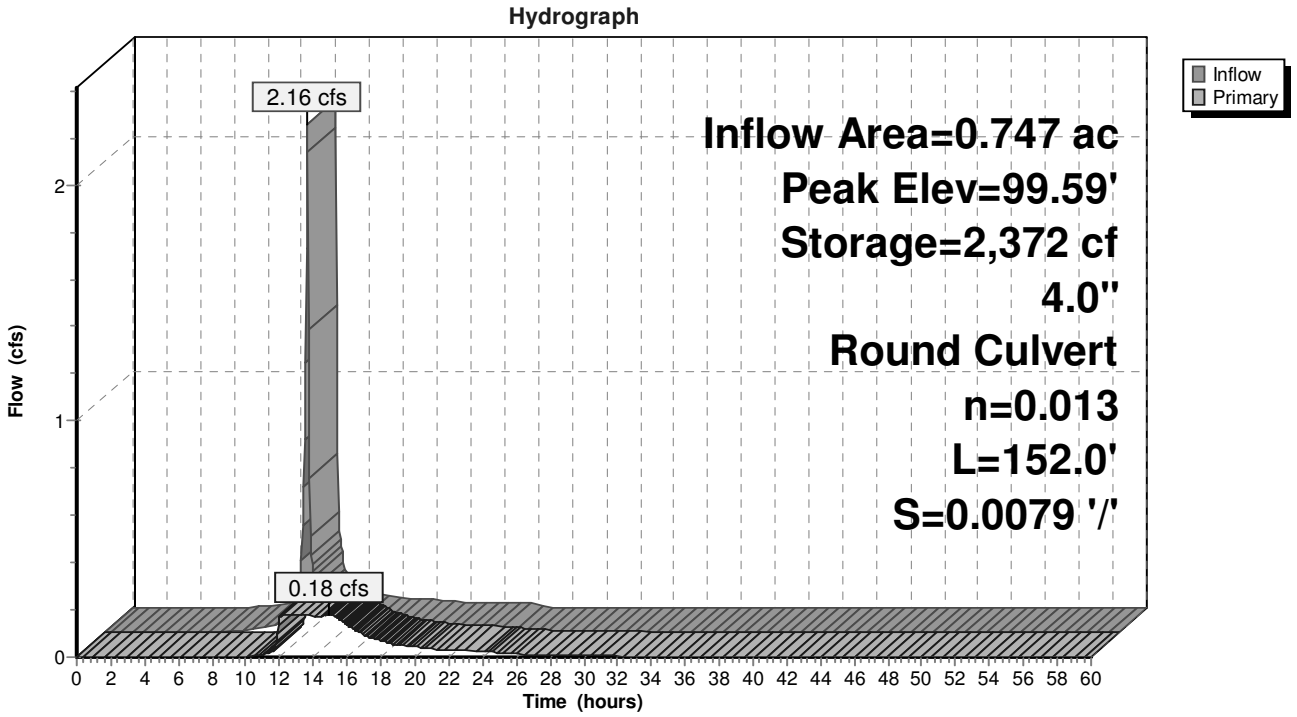
Volume	Invert	Avail.Storage	Storage Description
#1	99.00'	20,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.00	3,670	0	0
100.00	4,775	4,223	4,223
101.00	5,993	5,384	9,607
102.00	7,364	6,679	16,285
102.50	8,443	3,952	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	99.00'	**4.0" Round Culvert** L= 152.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 99.00' / 97.80' S= 0.0079 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=0.18 cfs @ 14.86 hrs HW=99.42' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.18 cfs @ 2.13 fps)

Pond 4P: Northwest Pond



Summary for Pond 6P: Southeast Pond

Inflow Area = 3.107 ac, 84.29% Impervious, Inflow Depth = 2.06" for 2 Year Storm event
Inflow = 10.39 cfs @ 11.96 hrs, Volume= 0.534 af
Outflow = 0.58 cfs @ 12.87 hrs, Volume= 0.527 af, Atten= 94%, Lag= 54.4 min
Primary = 0.58 cfs @ 12.87 hrs, Volume= 0.527 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 102.19' @ 12.87 hrs Surf.Area= 12,487 sf Storage= 13,397 cf

Plug-Flow detention time= 342.4 min calculated for 0.527 af (99% of inflow)
Center-of-Mass det. time= 336.2 min (1,125.8 - 789.6)

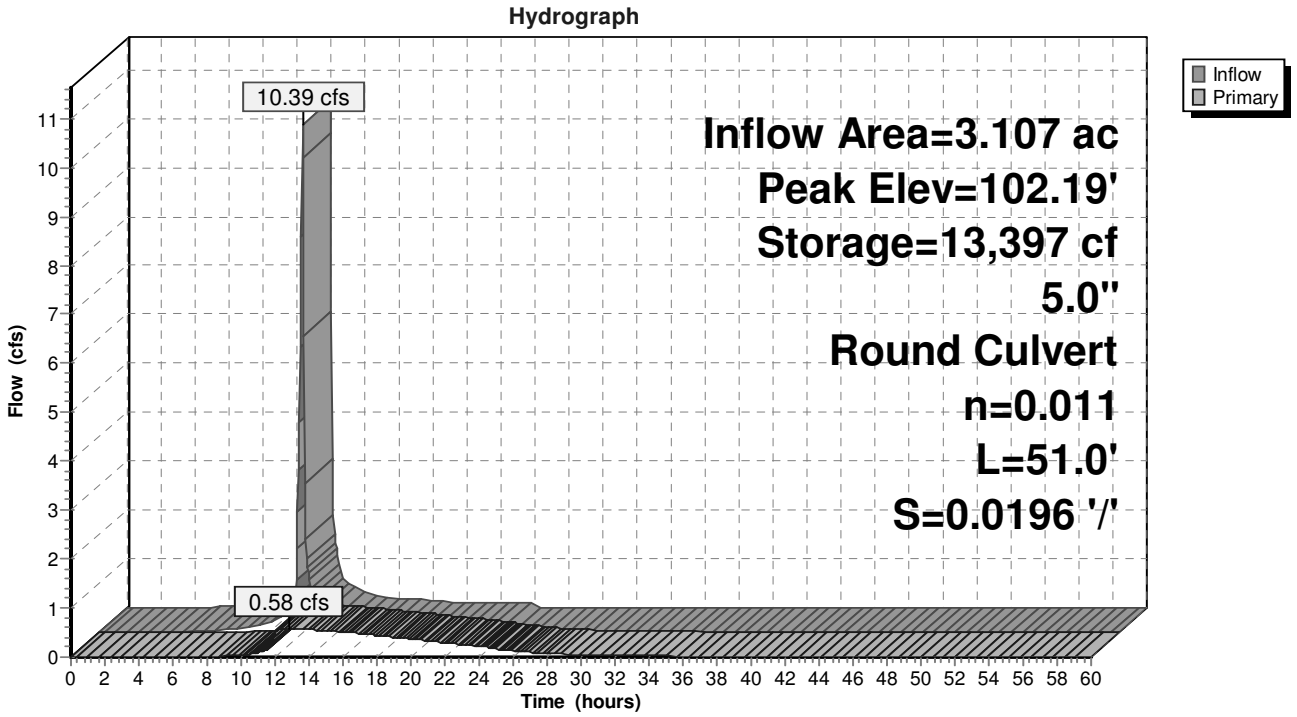
Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	49,893 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	9,959	0	0
102.00	12,058	11,009	11,009
103.00	14,264	13,161	24,170
104.00	17,119	15,692	39,861
104.50	23,009	10,032	49,893

Device	Routing	Invert	Outlet Devices
#1	Primary	101.00'	**5.0" Round Culvert** L= 51.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 101.00' / 100.00' S= 0.0196 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.58 cfs @ 12.87 hrs HW=102.19' (Free Discharge)
1=Culvert (Inlet Controls 0.58 cfs @ 4.22 fps)

Pond 6P: Southeast Pond

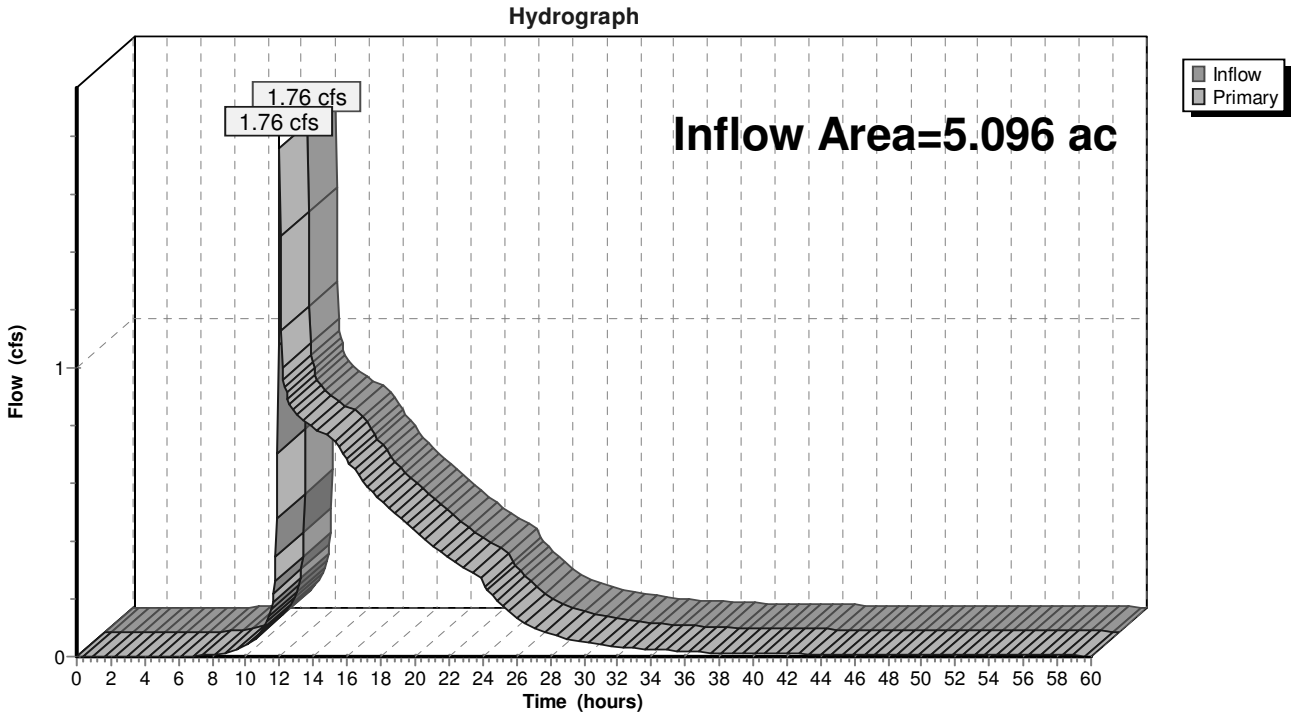


Summary for Link 7L: Total Post-Develped Site Flow

Inflow Area = 5.096 ac, 62.10% Impervious, Inflow Depth > 1.63" for 2 Year Storm event
Inflow = 1.76 cfs @ 11.99 hrs, Volume= 0.690 af
Primary = 1.76 cfs @ 11.99 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link 7L: Total Post-Develped Site Flow



APPENDIX D

STORMWATER DETENTION CALCULATIONS

POST CONSTRUCTION STORMWATER MODEL OUTPUTS

HYDROCAD 9.10, HYDROGRAPHS SUMMARY REPORTS; 10-YEAR, 24-HOUR RAINFALL EVENT FOR THE PROPOSED CONDITIONS

Summary for Subcatchment 1S: Area 2

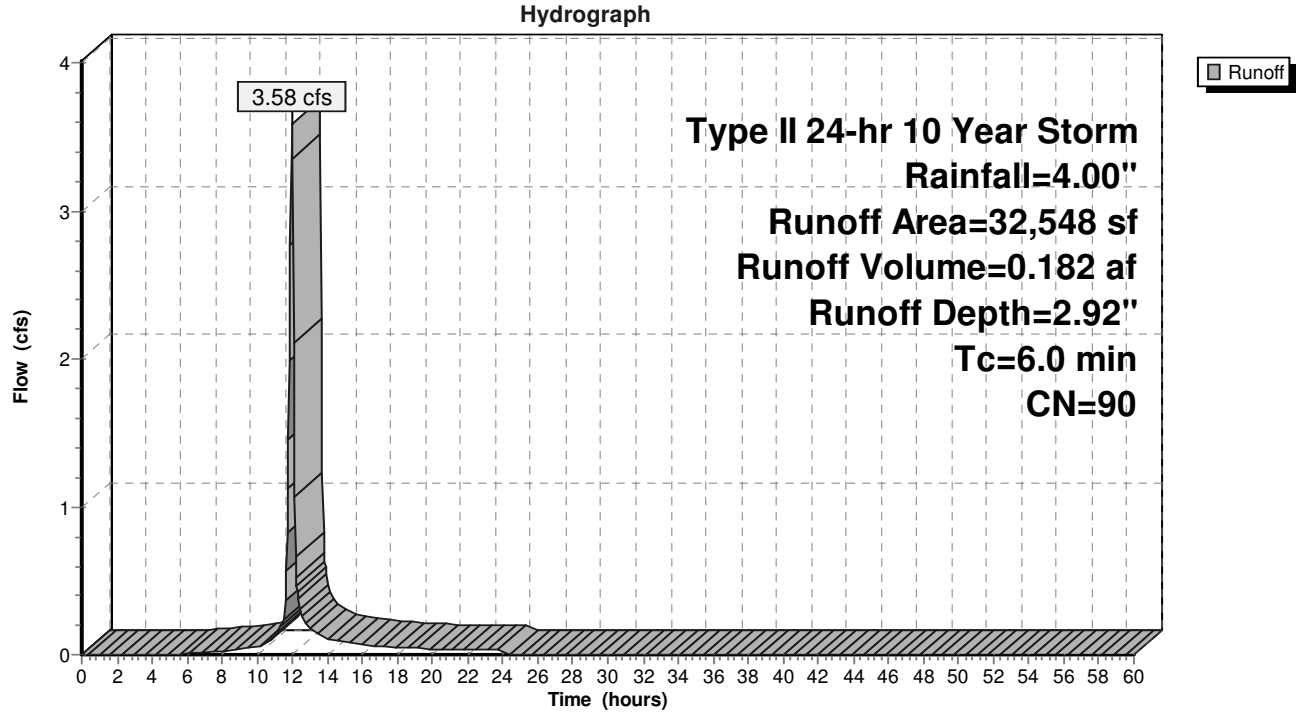
Runoff = 3.58 cfs @ 11.97 hrs, Volume= 0.182 af, Depth= 2.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year Storm Rainfall=4.00"

	Area (sf)	CN	Description
	8,756	70	Grass Cover, HSG B
*	19,655	98	road
	4,137	98	Water Surface, HSG B
	32,548	90	Weighted Average
	8,756		26.90% Pervious Area
	23,792		73.10% Impervious Area

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

Subcatchment 1S: Area 2



Summary for Subcatchment 3S: Area 1

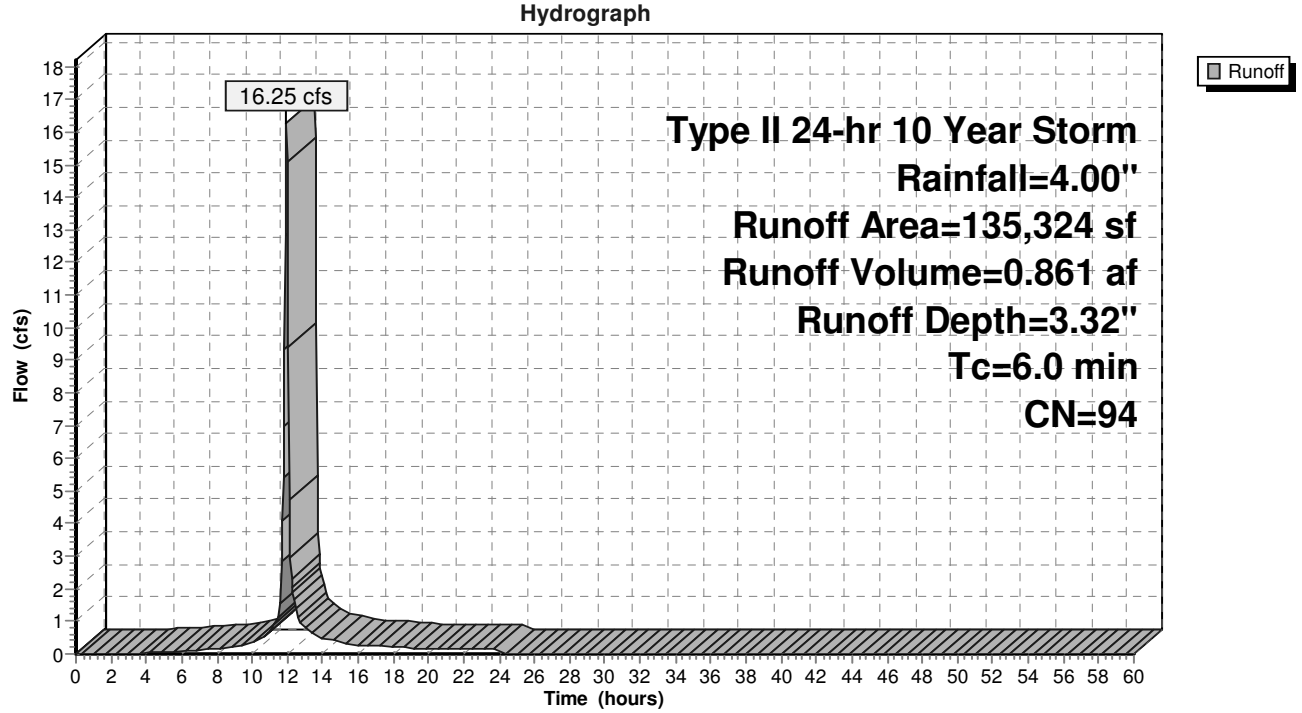
Runoff = 16.25 cfs @ 11.96 hrs, Volume= 0.861 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year Storm Rainfall=4.00"

Area (sf)	CN	Description
21,259	70	Grass Cover, HSG B
78,385	98	Paved parking
25,721	98	roof
9,959	98	Water Surface, HSG B
135,324	94	Weighted Average
21,259		15.71% Pervious Area
114,065		84.29% Impervious Area

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

Subcatchment 3S: Area 1



Summary for Subcatchment 8S: Offsite

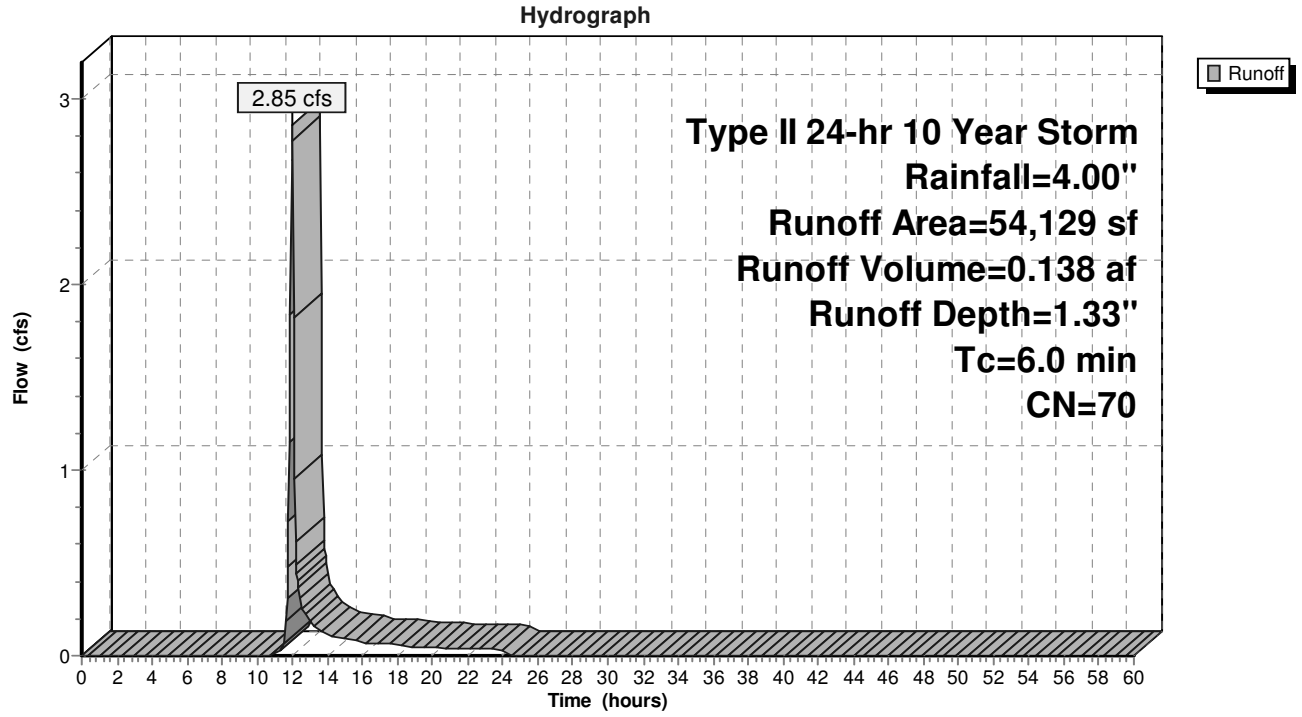
Runoff = 2.85 cfs @ 11.98 hrs, Volume= 0.138 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 Year Storm Rainfall=4.00"

	Area (sf)	CN	Description
*	54,129	70	
	54,129		100.00% Pervious Area

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

Subcatchment 8S: Offsite



Summary for Pond 4P: Northwest Pond

Inflow Area = 0.747 ac, 73.10% Impervious, Inflow Depth = 2.92" for 10 Year Storm event
Inflow = 3.58 cfs @ 11.97 hrs, Volume= 0.182 af
Outflow = 0.20 cfs @ 12.85 hrs, Volume= 0.181 af, Atten= 94%, Lag= 52.9 min
Primary = 0.20 cfs @ 12.85 hrs, Volume= 0.181 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 100.02' @ 12.85 hrs Surf.Area= 4,800 sf Storage= 4,322 cf

Plug-Flow detention time= 261.6 min calculated for 0.181 af (100% of inflow)
Center-of-Mass det. time= 260.6 min (1,056.0 - 795.4)

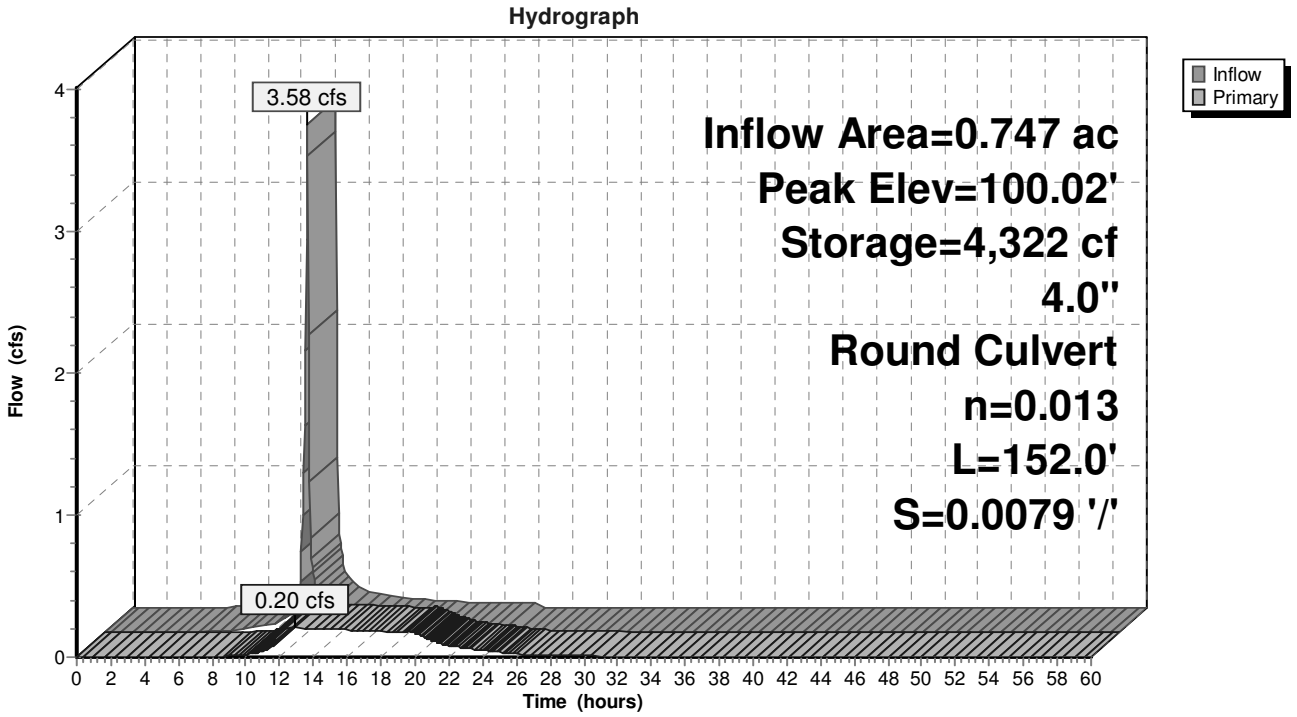
Volume	Invert	Avail.Storage	Storage Description
#1	99.00'	20,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.00	3,670	0	0
100.00	4,775	4,223	4,223
101.00	5,993	5,384	9,607
102.00	7,364	6,679	16,285
102.50	8,443	3,952	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	99.00'	**4.0" Round Culvert** L= 152.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 99.00' / 97.80' S= 0.0079 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=0.20 cfs @ 12.85 hrs HW=100.02' (Free Discharge)
1=Culvert (Barrel Controls 0.20 cfs @ 2.34 fps)

Pond 4P: Northwest Pond



Summary for Pond 6P: Southeast Pond

Inflow Area = 3.107 ac, 84.29% Impervious, Inflow Depth = 3.32" for 10 Year Storm event
Inflow = 16.25 cfs @ 11.96 hrs, Volume= 0.861 af
Outflow = 0.74 cfs @ 13.11 hrs, Volume= 0.853 af, Atten= 95%, Lag= 69.1 min
Primary = 0.74 cfs @ 13.11 hrs, Volume= 0.853 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 102.86' @ 13.11 hrs Surf.Area= 13,949 sf Storage= 22,154 cf

Plug-Flow detention time= 398.4 min calculated for 0.853 af (99% of inflow)
Center-of-Mass det. time= 392.9 min (1,169.5 - 776.7)

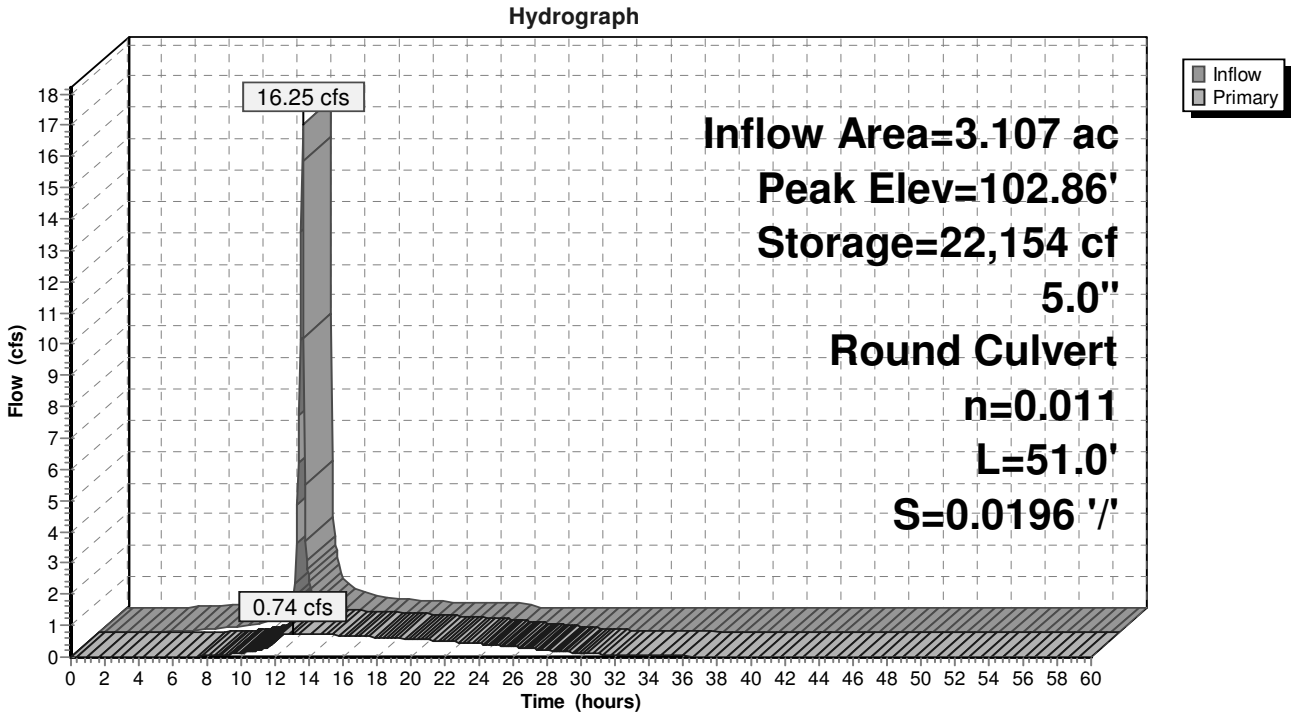
Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	49,893 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	9,959	0	0
102.00	12,058	11,009	11,009
103.00	14,264	13,161	24,170
104.00	17,119	15,692	39,861
104.50	23,009	10,032	49,893

Device	Routing	Invert	Outlet Devices
#1	Primary	101.00'	**5.0" Round Culvert** L= 51.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 101.00' / 100.00' S= 0.0196 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.74 cfs @ 13.11 hrs HW=102.86' (Free Discharge)
1=Culvert (Barrel Controls 0.74 cfs @ 5.40 fps)

Pond 6P: Southeast Pond

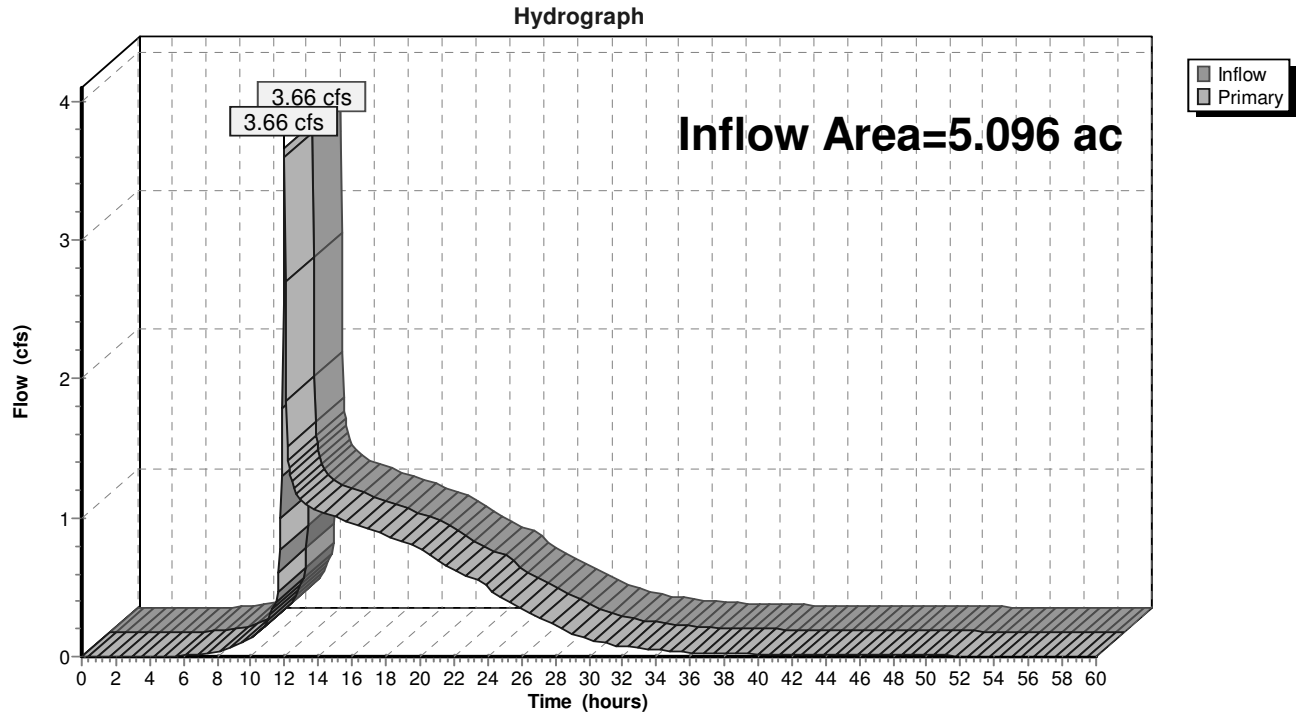


Summary for Link 7L: Total Post-Develped Site Flow

Inflow Area = 5.096 ac, 62.10% Impervious, Inflow Depth > 2.76" for 10 Year Storm event
Inflow = 3.66 cfs @ 11.98 hrs, Volume= 1.172 af
Primary = 3.66 cfs @ 11.98 hrs, Volume= 1.172 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link 7L: Total Post-Develped Site Flow



APPENDIX E

STORMWATER DETENTION CALCULATIONS

POST CONSTRUCTION STORMWATER MODEL OUTPUTS

HYDROCAD 9.10, HYDROGRAPHS SUMMARY REPORTS; 100-YEAR, 24-HOUR RAINFALL EVENT FOR THE PROPOSED CONDITIONS

Summary for Subcatchment 1S: Area 2

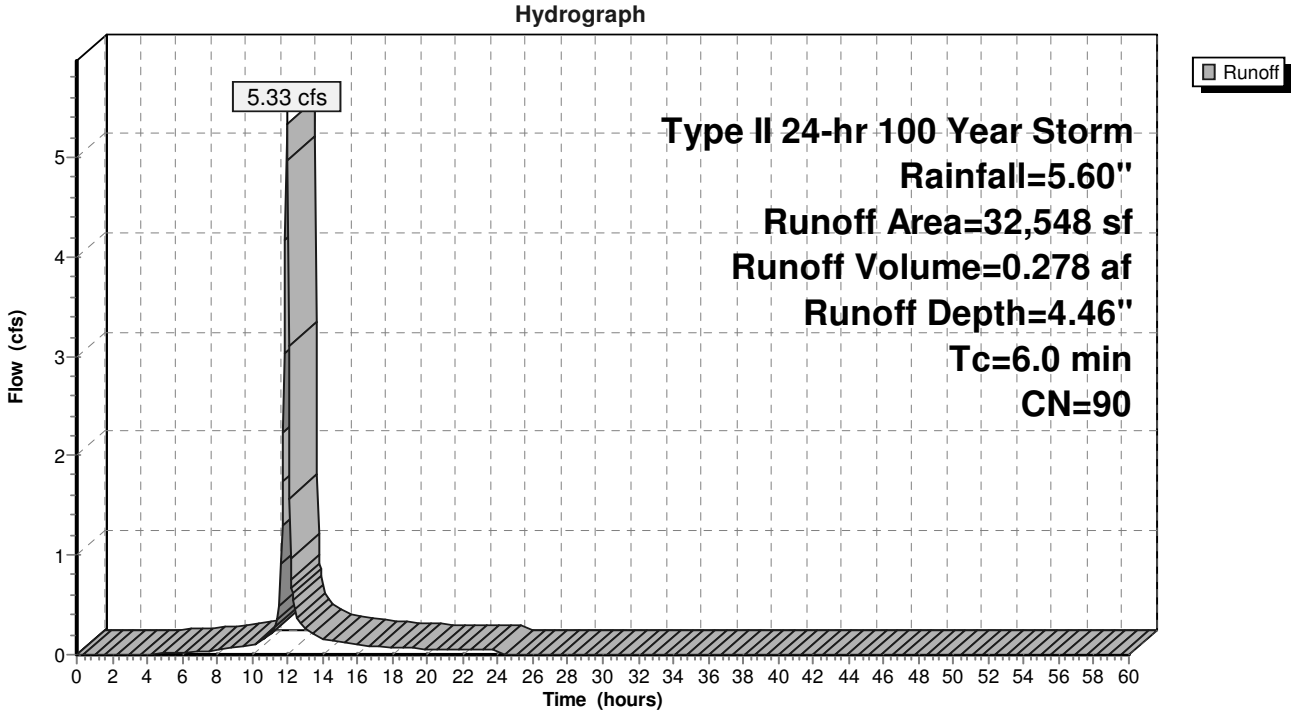
Runoff = 5.33 cfs @ 11.96 hrs, Volume= 0.278 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 Year Storm Rainfall=5.60"

	Area (sf)	CN	Description
	8,756	70	Grass Cover, HSG B
*	19,655	98	road
	4,137	98	Water Surface, HSG B
	32,548	90	Weighted Average
	8,756		26.90% Pervious Area
	23,792		73.10% Impervious Area

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

Subcatchment 1S: Area 2



Summary for Subcatchment 3S: Area 1

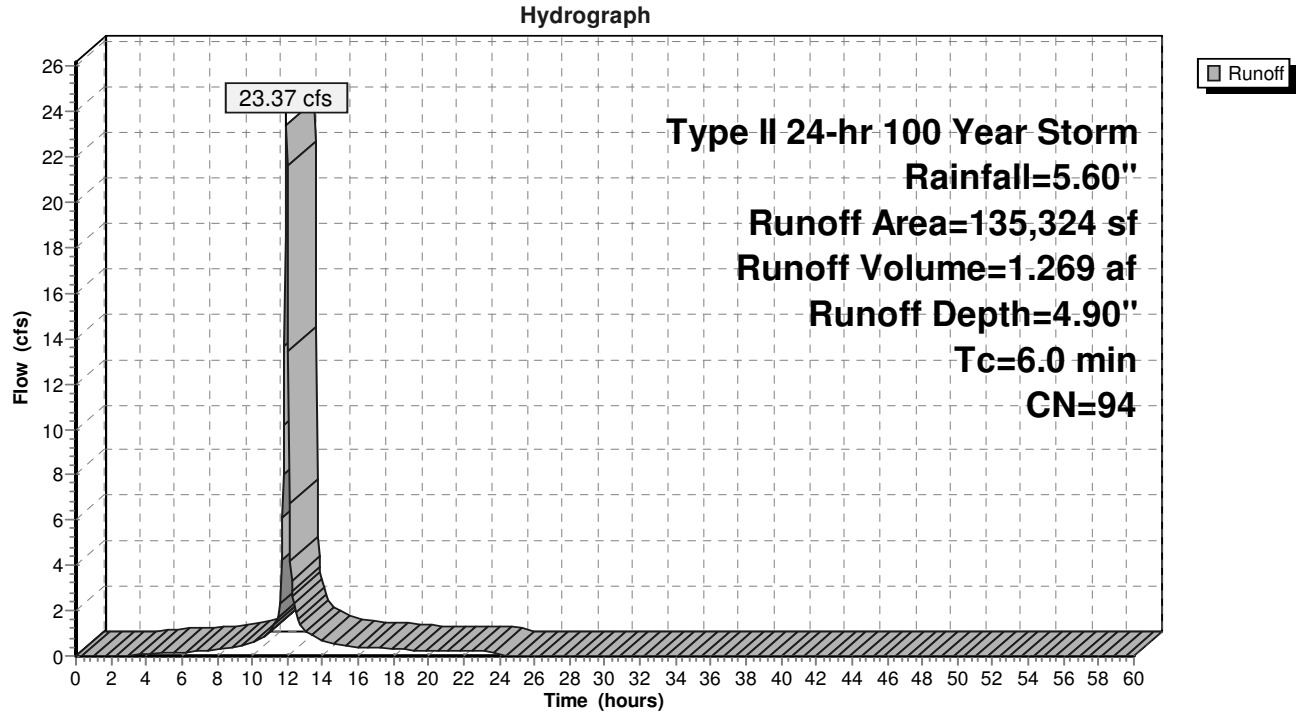
Runoff = 23.37 cfs @ 11.96 hrs, Volume= 1.269 af, Depth= 4.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 Year Storm Rainfall=5.60"

Area (sf)	CN	Description
21,259	70	Grass Cover, HSG B
78,385	98	Paved parking
25,721	98	roof
9,959	98	Water Surface, HSG B
135,324	94	Weighted Average
21,259		15.71% Pervious Area
114,065		84.29% Impervious Area

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

Subcatchment 3S: Area 1



Summary for Subcatchment 8S: Offsite

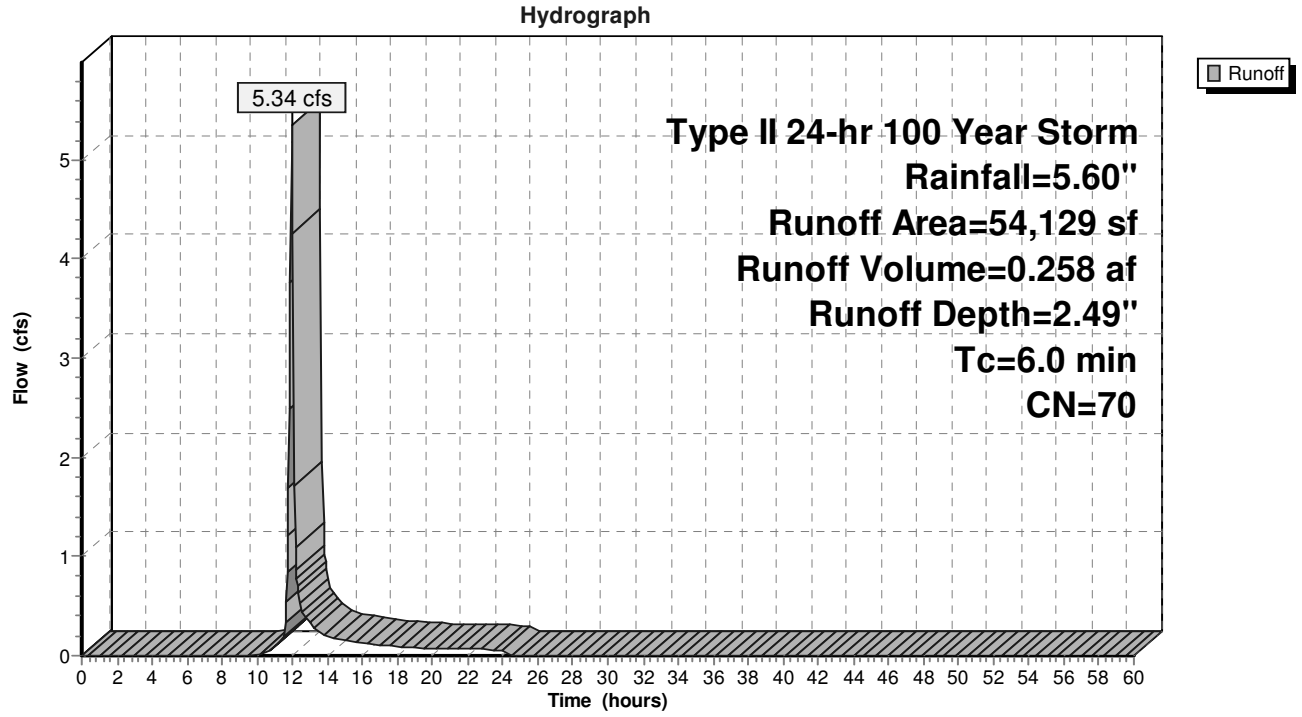
Runoff = 5.34 cfs @ 11.97 hrs, Volume= 0.258 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 Year Storm Rainfall=5.60"

	Area (sf)	CN	Description
*	54,129	70	
	54,129		100.00% Pervious Area

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

Subcatchment 8S: Offsite



Summary for Pond 4P: Northwest Pond

Inflow Area = 0.747 ac, 73.10% Impervious, Inflow Depth = 4.46" for 100 Year Storm event
Inflow = 5.33 cfs @ 11.96 hrs, Volume= 0.278 af
Outflow = 0.23 cfs @ 13.24 hrs, Volume= 0.277 af, Atten= 96%, Lag= 76.3 min
Primary = 0.23 cfs @ 13.24 hrs, Volume= 0.277 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 100.52' @ 13.24 hrs Surf.Area= 5,404 sf Storage= 6,852 cf

Plug-Flow detention time= 344.8 min calculated for 0.277 af (100% of inflow)
Center-of-Mass det. time= 342.7 min (1,126.4 - 783.7)

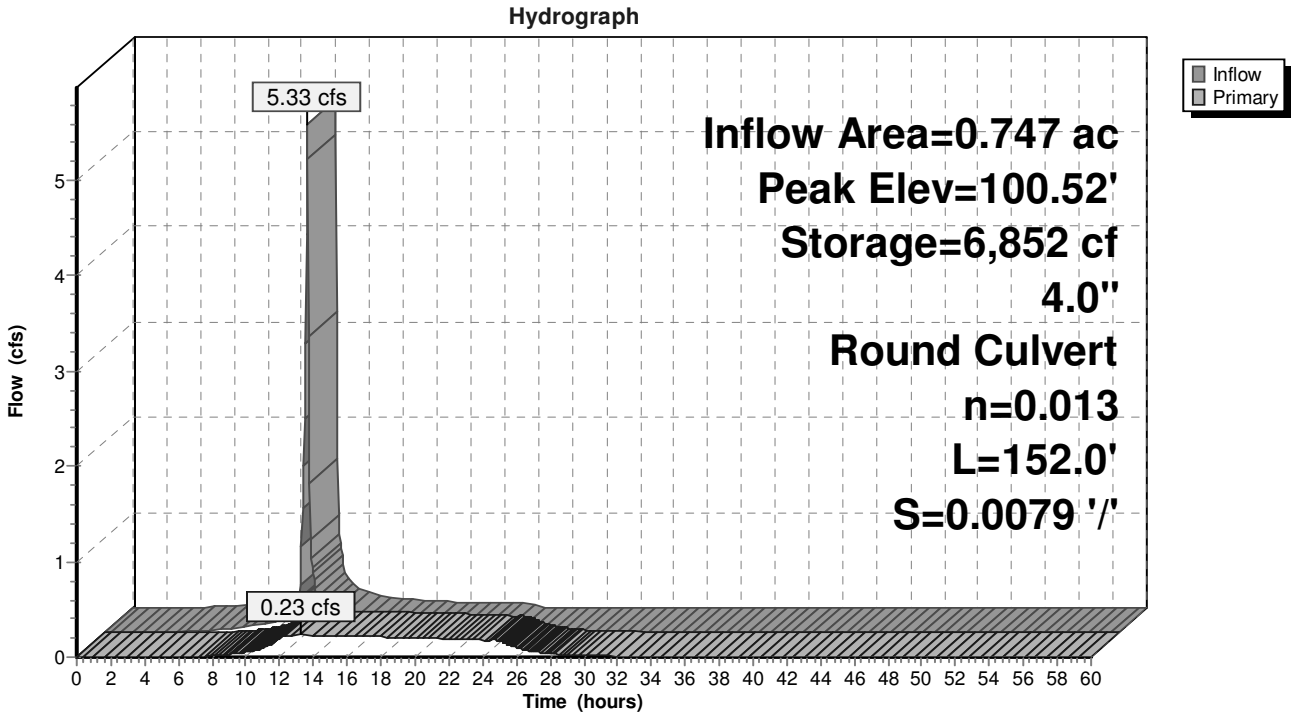
Volume	Invert	Avail.Storage	Storage Description
#1	99.00'	20,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.00	3,670	0	0
100.00	4,775	4,223	4,223
101.00	5,993	5,384	9,607
102.00	7,364	6,679	16,285
102.50	8,443	3,952	20,237

Device	Routing	Invert	Outlet Devices
#1	Primary	99.00'	**4.0" Round Culvert** L= 152.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 99.00' / 97.80' S= 0.0079 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=0.23 cfs @ 13.24 hrs HW=100.52' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.23 cfs @ 2.63 fps)

Pond 4P: Northwest Pond



Summary for Pond 6P: Southeast Pond

Inflow Area = 3.107 ac, 84.29% Impervious, Inflow Depth = 4.90" for 100 Year Storm event
Inflow = 23.37 cfs @ 11.96 hrs, Volume= 1.269 af
Outflow = 0.84 cfs @ 13.52 hrs, Volume= 1.260 af, Atten= 96%, Lag= 93.6 min
Primary = 0.84 cfs @ 13.52 hrs, Volume= 1.260 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 103.62' @ 13.52 hrs Surf.Area= 16,044 sf Storage= 33,619 cf

Plug-Flow detention time= 483.7 min calculated for 1.260 af (99% of inflow)
Center-of-Mass det. time= 479.3 min (1,246.1 - 766.8)

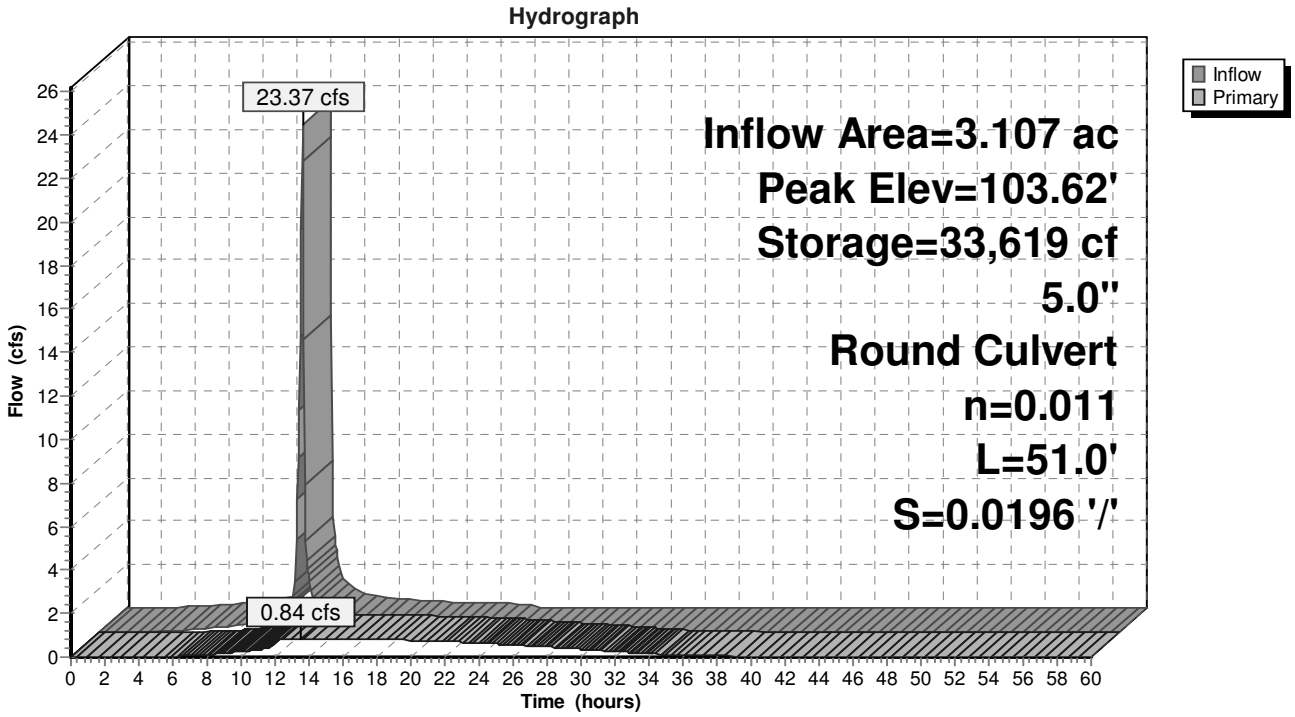
Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	49,893 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	9,959	0	0
102.00	12,058	11,009	11,009
103.00	14,264	13,161	24,170
104.00	17,119	15,692	39,861
104.50	23,009	10,032	49,893

Device	Routing	Invert	Outlet Devices
#1	Primary	101.00'	**5.0" Round Culvert** L= 51.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 101.00' / 100.00' S= 0.0196 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.84 cfs @ 13.52 hrs HW=103.62' (Free Discharge)
1=Culvert (Barrel Controls 0.84 cfs @ 6.19 fps)

Pond 6P: Southeast Pond

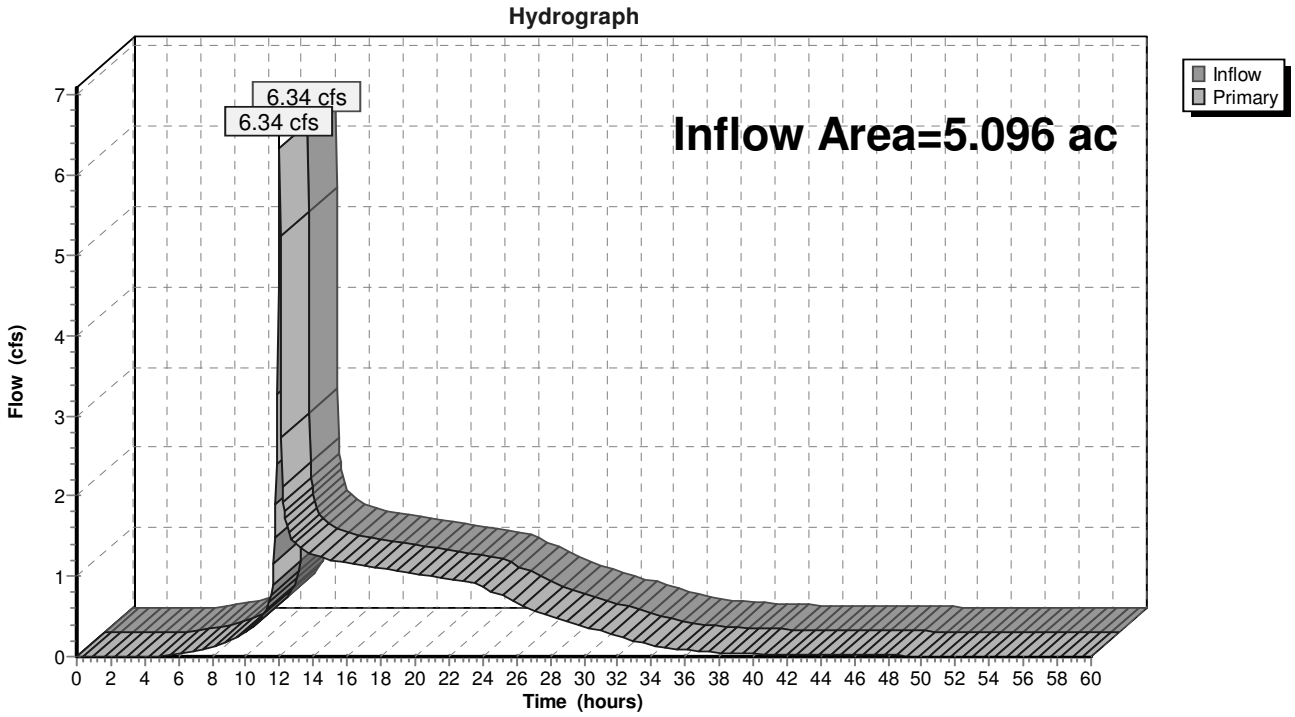


Summary for Link 7L: Total Post-Develped Site Flow

Inflow Area = 5.096 ac, 62.10% Impervious, Inflow Depth > 4.23" for 100 Year Storm event
Inflow = 6.34 cfs @ 11.98 hrs, Volume= 1.795 af
Primary = 6.34 cfs @ 11.98 hrs, Volume= 1.795 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

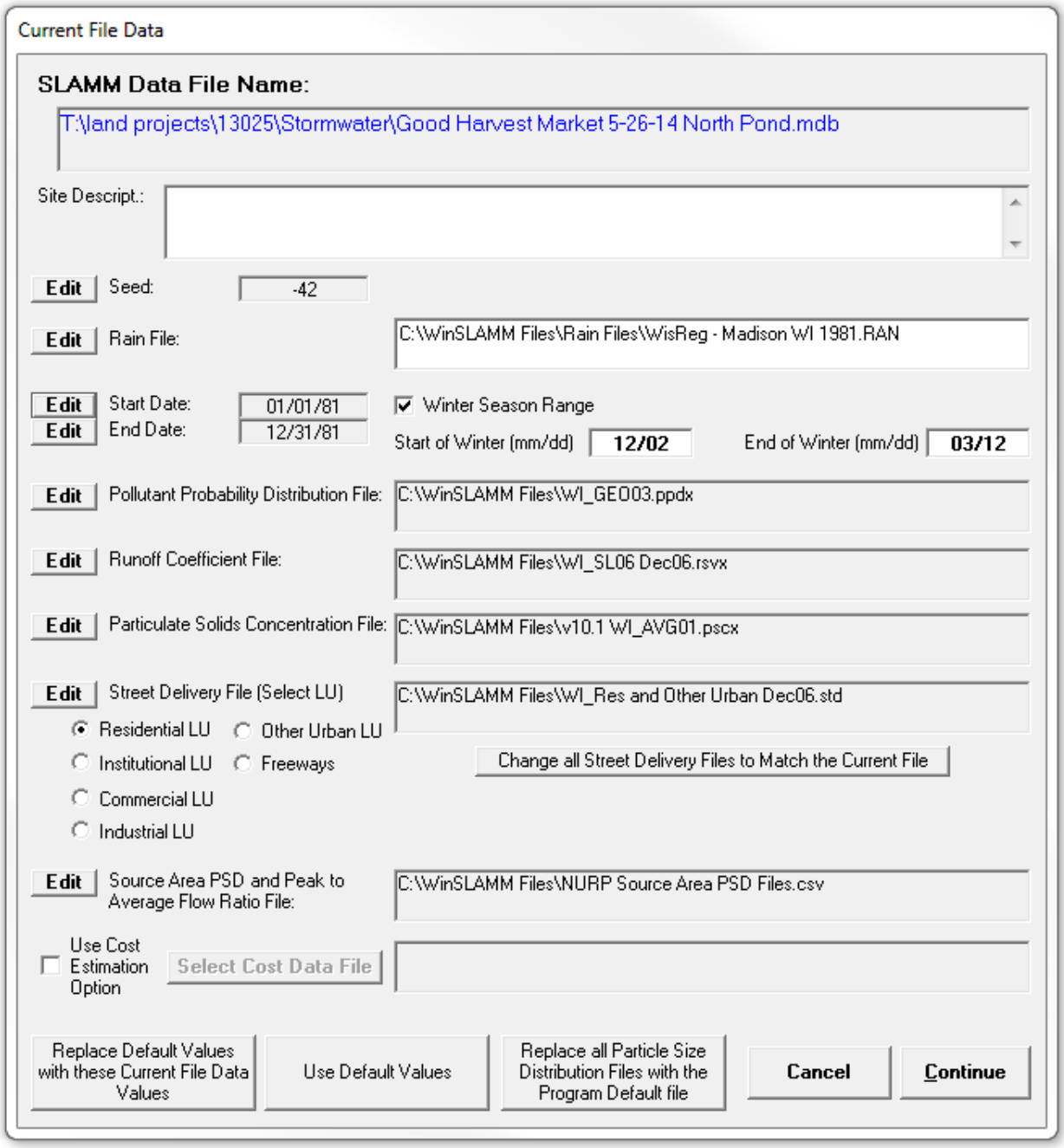
Link 7L: Total Post-Develped Site Flow



APPENDIX F

WATER QUALITY COMPLIANCE

WINSLAMM INPUT AND OUTPUT

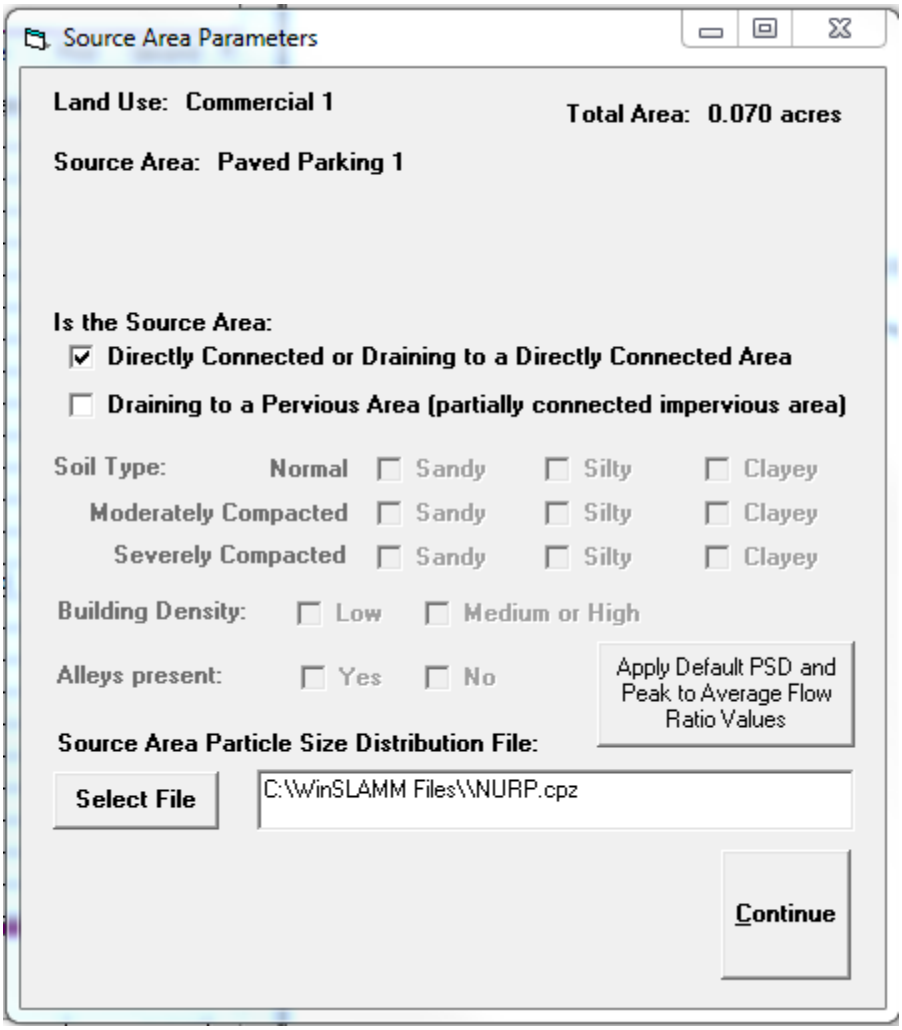

Current File Data
SLAMM Data File Name:
T:\land projects\13025\Stormwater\Good Harvest Market 5-26-14 North Pond.mdb
Site Descript.:
Edit
Seed:
-42
Edit
Rain File:
C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Edit
Start Date:
01/01/81
Edit
End Date:
12/31/81
Winter Season Range
Start of Winter (mm/dd)
12/02
End of Winter (mm/dd)
03/12
Edit
Pollutant Probability Distribution File:
C:\WinSLAMM Files\WI_GEO03.ppdx
Edit
Runoff Coefficient File:
C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Edit
Particulate Solids Concentration File:
C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Edit
Street Delivery File (Select LU)
C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Residential LU
Other Urban LU
Institutional LU
Freeways
Commercial LU
Industrial LU
Change all Street Delivery Files to Match the Current File
Edit
Source Area PSD and Peak to Average Flow Ratio File:
C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Use Cost Estimation Option
Select Cost Data File
Replace Default Values with these Current File Data Values
Use Default Values
Replace all Particle Size Distribution Files with the Program Default file
Cancel
Continue

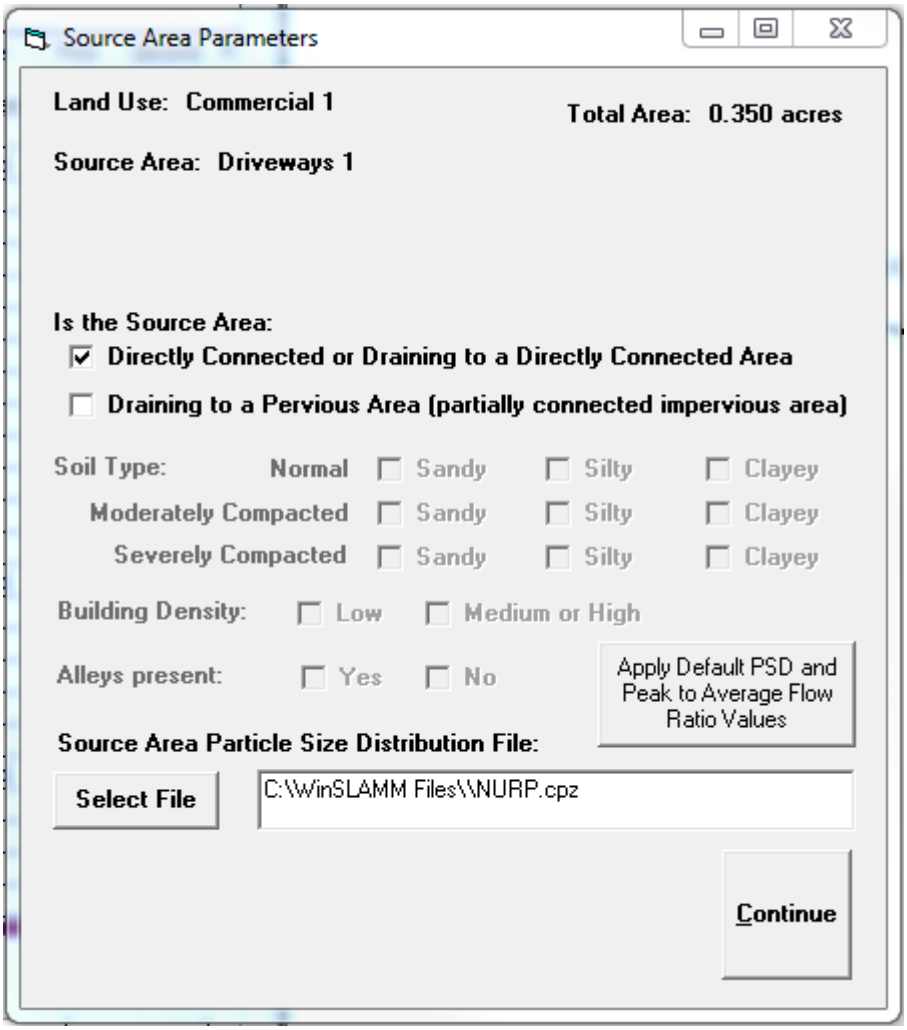
Land Use:

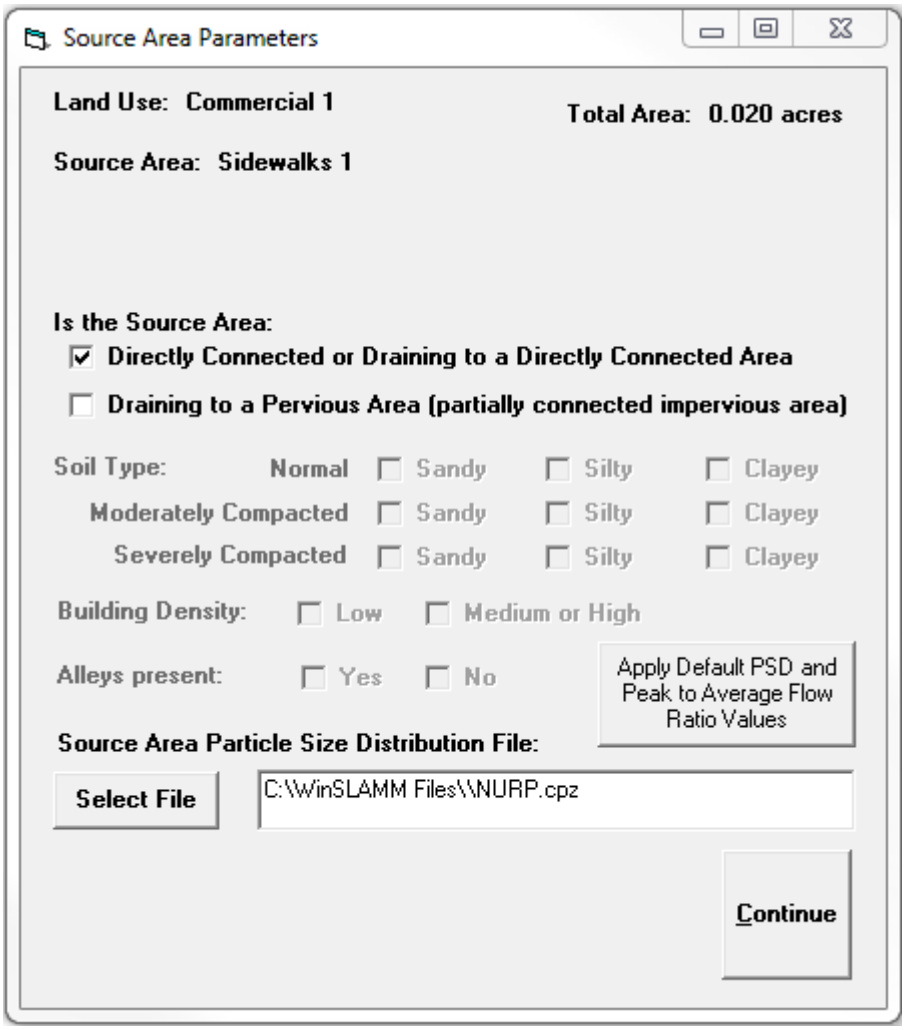
Commercial 1

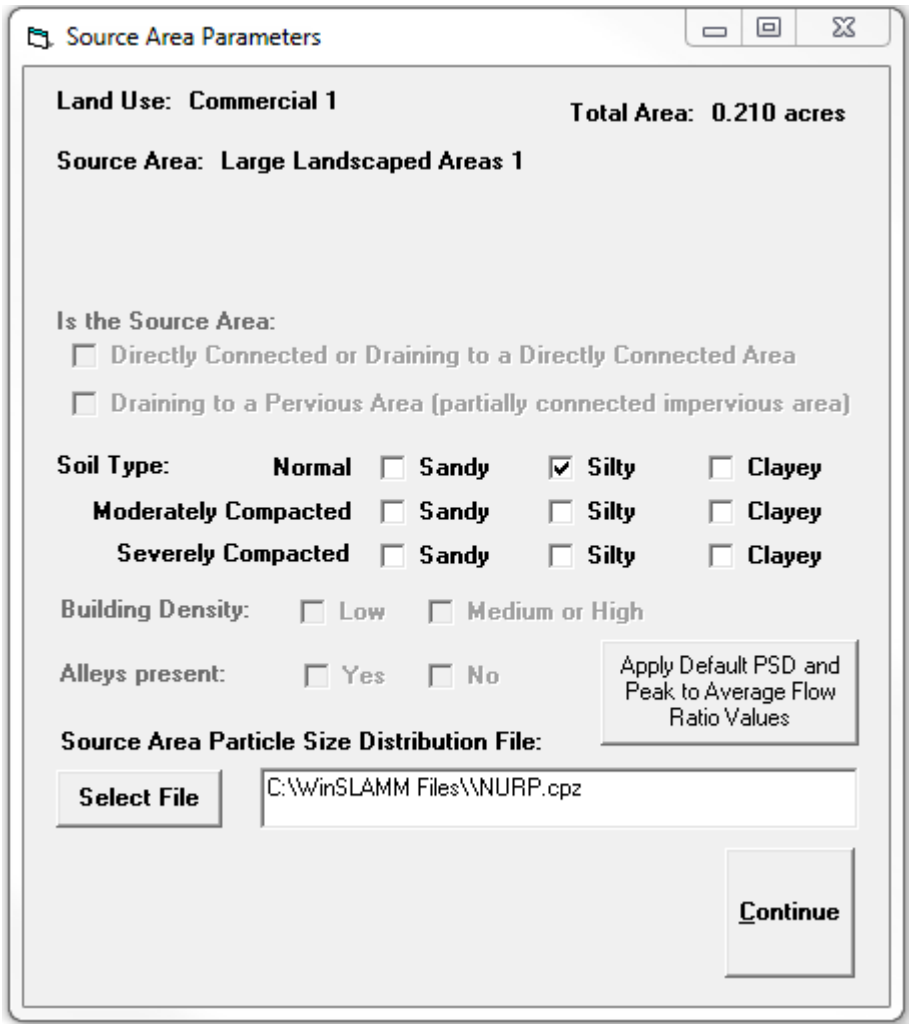
Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.000			
	Parking	0.070			
	Driveways/Sidewalks	0.370			
	Streets	0.000			
	Landscaped Areas	0.210			
	Other Areas	0.090			

Land Use #	Land Use Type	Land Use Label	Land Use Area (acres)
1	**Commercial**	**Commercial 1**	**0.740**


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.070 acres
Source Area: Paved Parking 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.350 acres
Source Area: Driveways 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.020 acres
Source Area: Sidewalks 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.210 acres
Source Area: Large Landscaped Areas 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue

Wet Detention Control Device

Pond Number 1

Drainage System Control Practice

CP Index # : 1

Total Area

Select Particle Size Distribution File

Not needed - calculated by program

Initial Stage Elevation (ft):

Peak to Average Flow Ratio: 3.80

Maximum Inflow into Pond (cfs)
Enter 0 or leave blank for no limit:

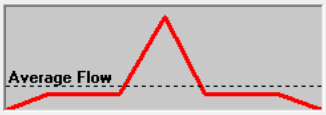
Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button: 0.00

Modify Pond Areas

	Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000	0.000
1	0.01	0.0001	0.000
2	1.00	0.0048	0.002
3	2.00	0.0119	0.011
4	3.00	0.0211	0.027
5	4.00	0.0326	0.054
6	5.00	0.0843	0.113
7	6.00	0.1096	0.210
8	7.00	0.1376	0.333
9	8.00	0.1691	0.486
10	8.50	0.1938	0.577
11			
12			
13			
14			
15			
16			
17			

Recalculate Cumulative Volume

Flow



Time (1.2 * Rainfall Duration)

Copy Pond Data

Paste Pond Data

Save this Pond as a WinDETPOND File

Delete Pond | Cancel | Continue

Add **Sharp Crested Weir**

Weir Length (ft)	
Height from datum to bottom of weir opening (ft)	

Add **V-Notch Weir**

Weir Angle (<180 degrees)	
Height from datum to bottom of weir opening (ft)	
Number of V-Notch weirs	

Remove **Orifice Set 1**

Orifice Diameter (ft)	0.33
Invert elevation above datum (ft)	6.00
Number of orifices in set	1

Add **Orifice Set 2**

Orifice Diameter (ft)	
Invert elevation above datum (ft)	
Number of orifices in set	

Add **Orifice Set 3**

Orifice Diameter (ft)	
Invert elevation above datum (ft)	
Number of orifices in set	

Add **Stone Weeper**

Width at bottom of weeper (ft)	
Weeper side slope (_H:1V)	
Upstream side slope (_H:1V)	
Downstream side slope (_H:1V)	
Horizontal flow path length at top of weeper (ft)	
Average rock diameter (ft)	
Distance from bottom to top of weeper (ft)	
Height from datum to bottom of weeper (ft)	

Add **Vertical Stand Pipe**

Pipe diameter (ft)	
Height above datum (ft)	

Add Add

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Add Add

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.01	0.00	0.000
1.00	0.00	0.000
2.00	0.00	0.000
3.00	0.00	0.000
4.00	0.00	0.000
5.00	0.00	0.000

Add **Broad Crested Weir (Required)**

Weir crest length (ft)	
Weir crest width (ft)	
Height of weir opening (ft)	
Height from datum to bottom of weir opening (ft)	

Add **Seepage Basin**

Infiltration rate (in/hr)	
Width of device (ft)	
Length of device (ft)	
Invert elevation of seepage basin inlet above datum (ft)	

Control Practice # : 1 | CP Index # : 1

File Name:

T:\land projects\13025\Stormwater\Good Harvest Market 5-26-14 North Pond.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	44129		0.51	117.7	324.3	
Outfall Total with Controls	34278	22.32 %	0.40	17.83	38.16	88.23 %
Current File Output: Annualized Total After Outfall Controls	34372	Years in Model Run:	1.00		38.26	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 0.740

Total Control Practice Costs

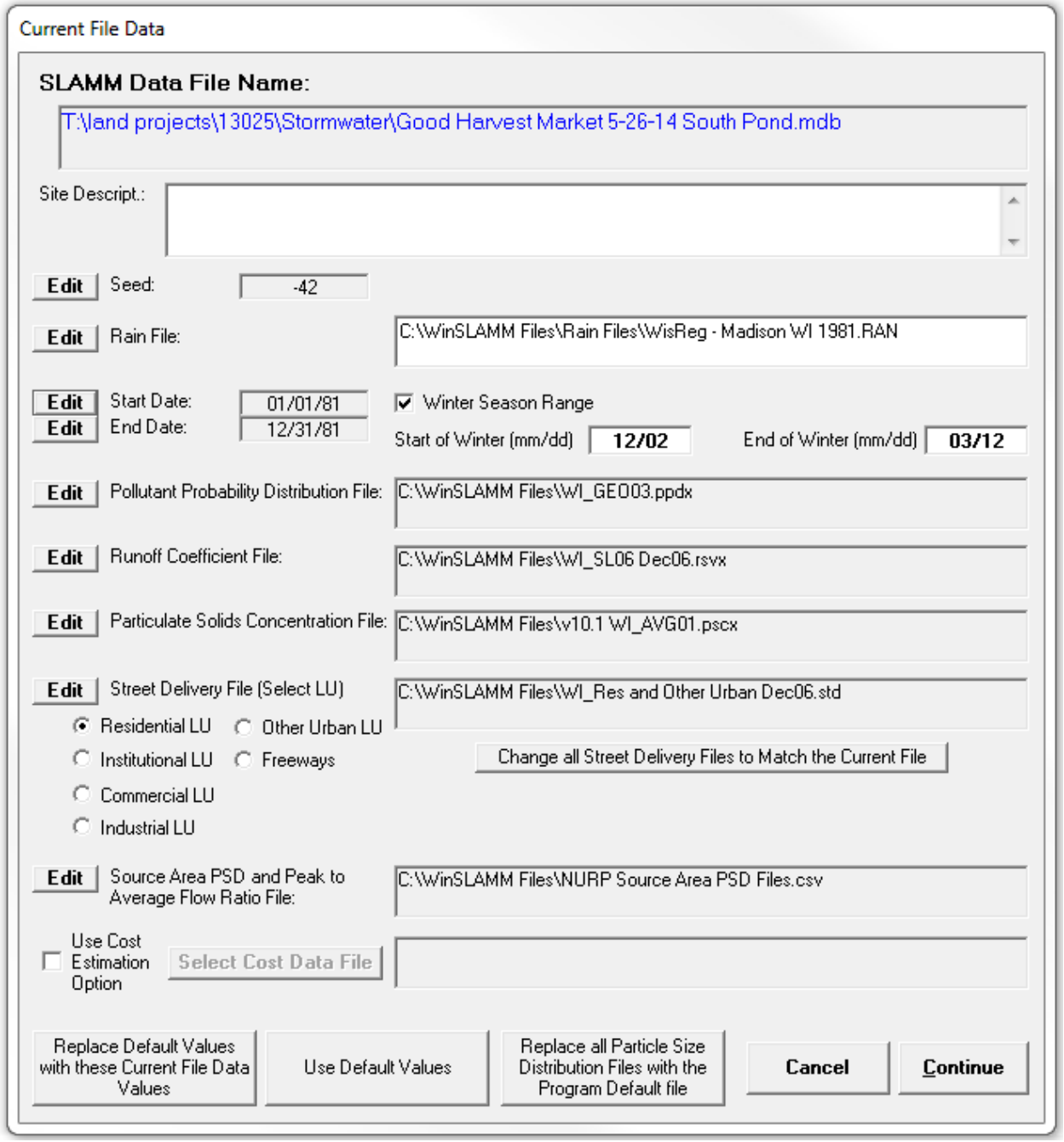
Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.51	Poor
With Controls	0.40	Poor


Current File Data
SLAMM Data File Name:
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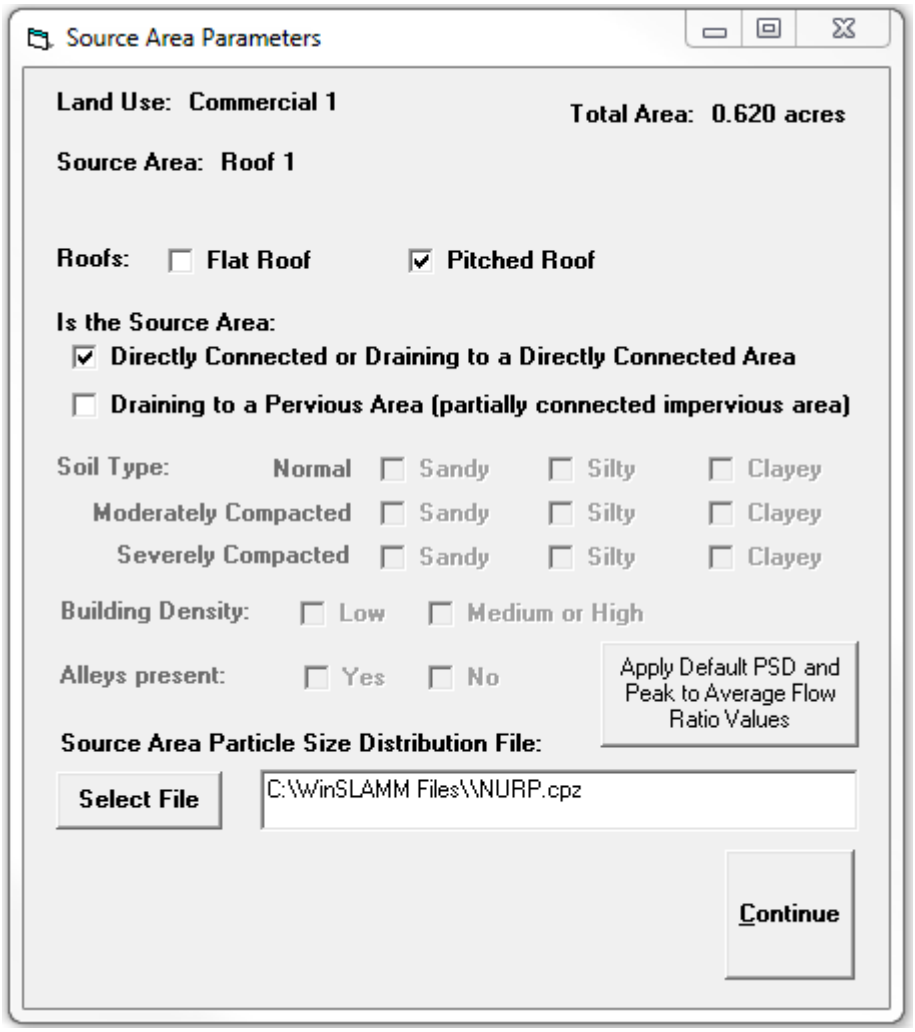
Site Descript.:
Edit
Seed:
-42
Edit
Rain File:
C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Edit
Start Date:
01/01/81
Edit
End Date:
12/31/81
Winter Season Range
Start of Winter (mm/dd)
12/02
End of Winter (mm/dd)
03/12
Edit
Pollutant Probability Distribution File:
C:\WinSLAMM Files\WI_GEO03.ppdx
Edit
Runoff Coefficient File:
C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Edit
Particulate Solids Concentration File:
C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Edit
Street Delivery File (Select LU)
C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Residential LU
Other Urban LU
Institutional LU
Freeways
Commercial LU
Industrial LU
Change all Street Delivery Files to Match the Current File
Edit
Source Area PSD and Peak to Average Flow Ratio File:
C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Use Cost Estimation Option
Select Cost Data File
Replace Default Values with these Current File Data Values
Use Default Values
Replace all Particle Size Distribution Files with the Program Default file
Cancel
Continue

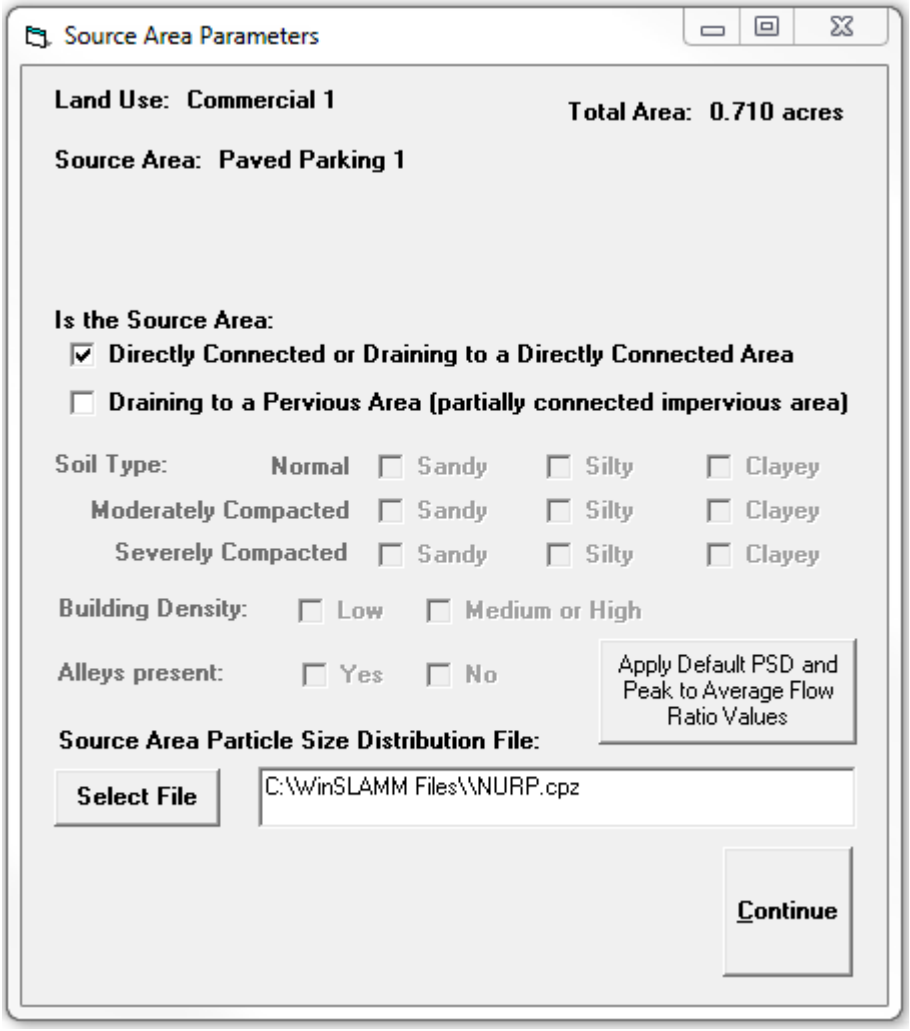
Land Use:

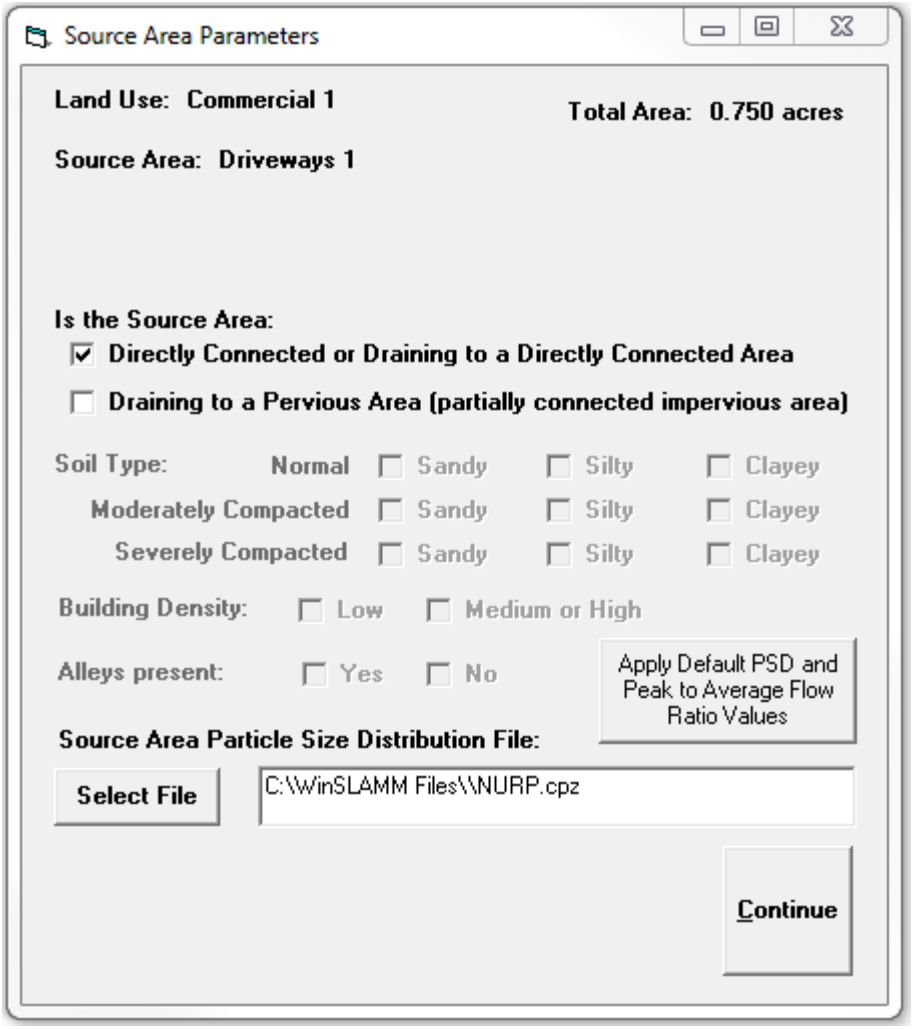
Commercial 1

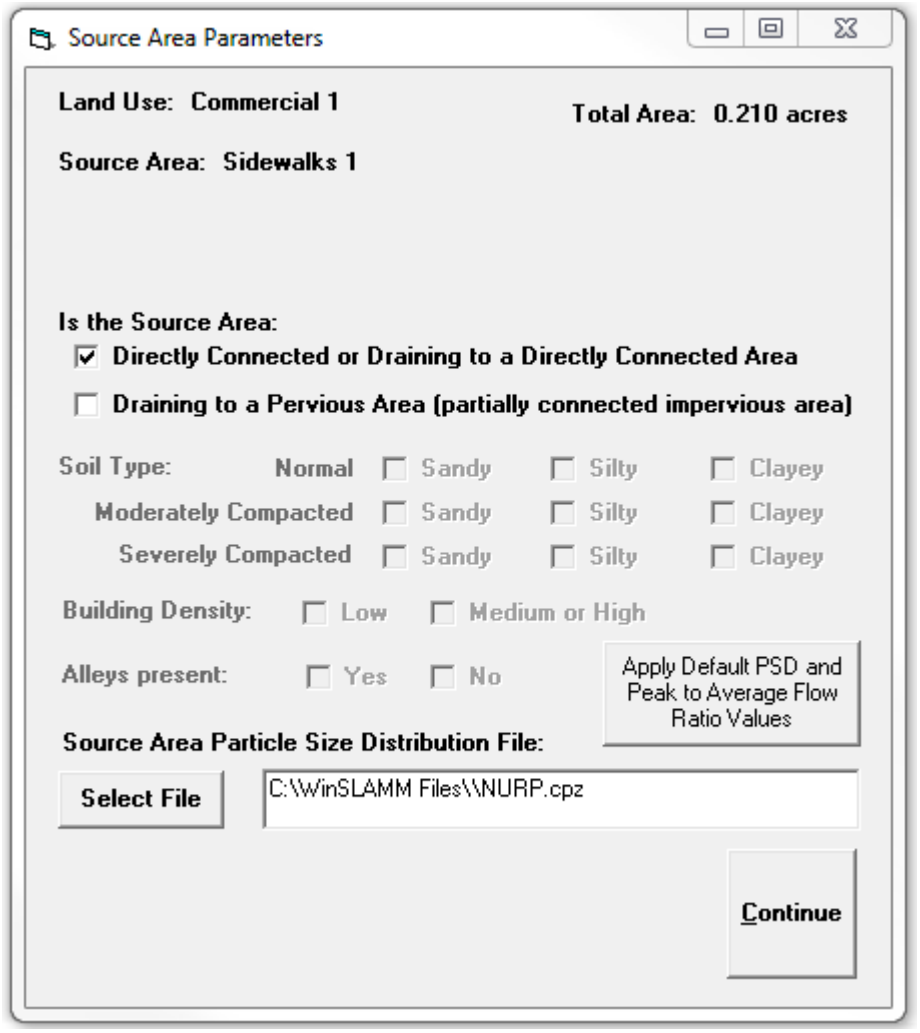
Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.620			
	Parking	0.710			
	Driveways/Sidewalks	0.960			
	Streets	0.000			
	Landscaped Areas	0.620			
	Other Areas	0.230			

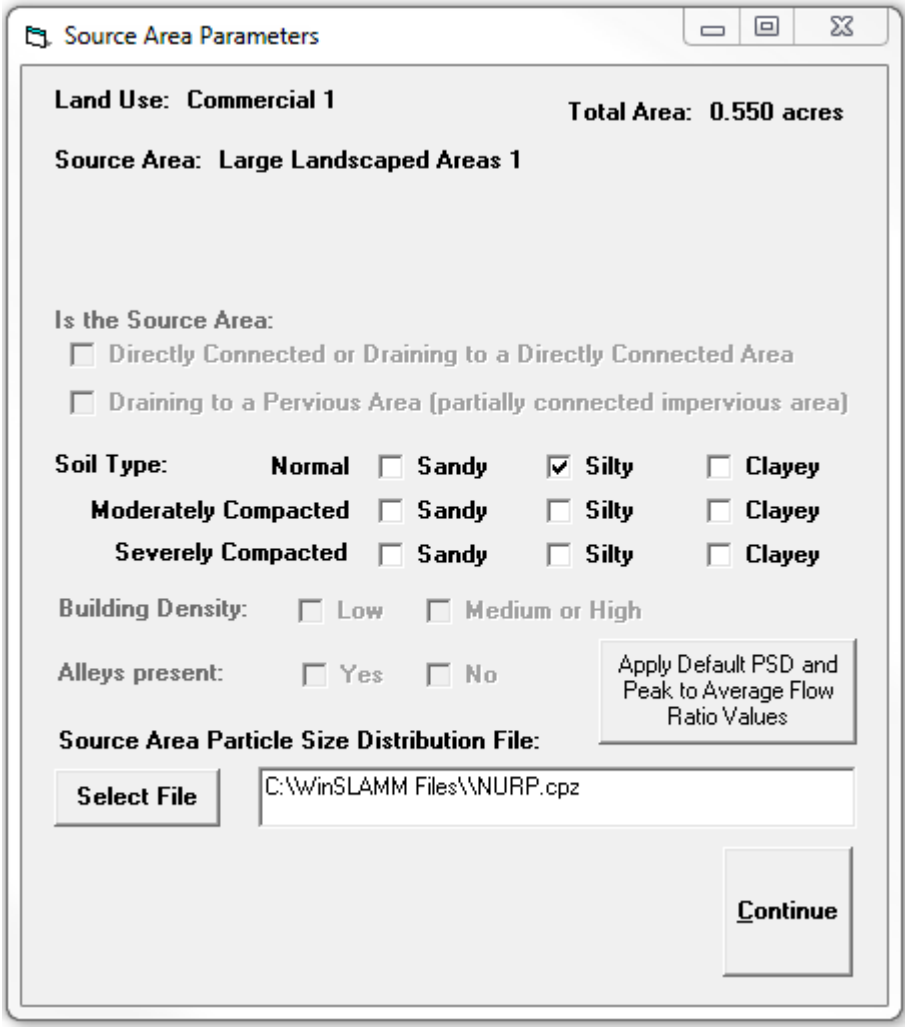
Land Use #	Land Use Type	Land Use Label	Land Use Area (acres)
1	**Commercial**	**Commercial 1**	**3.140**

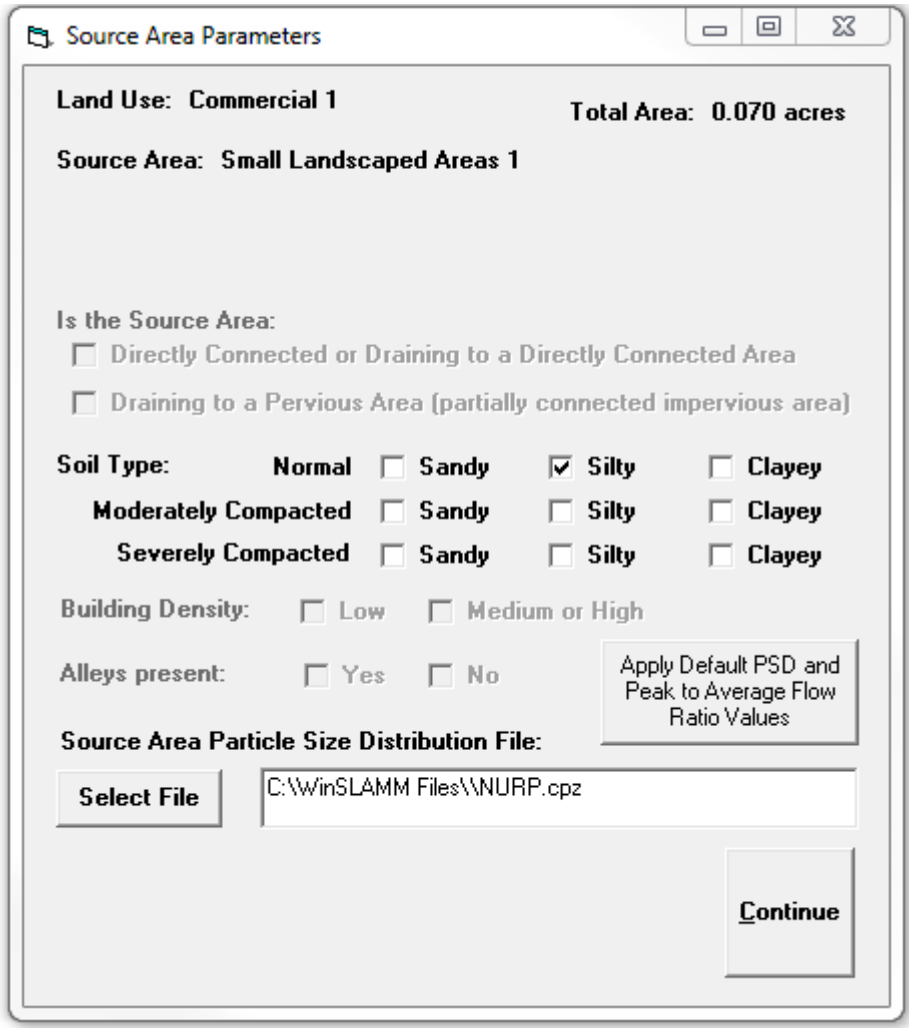

Source Area Parameters
Land Use: Commercial 1
Total Area: 0.620 acres
Source Area: Roof 1
Roofs: Flat Roof Pitched Roof
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type: Normal Sandy Silty Clayey
Moderately Compacted Sandy Silty Clayey
Severely Compacted Sandy Silty Clayey
Building Density: Low Medium or High
Alleys present: Yes No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.710 acres
Source Area: Paved Parking 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.750 acres
Source Area: Driveways 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.210 acres
Source Area: Sidewalks 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.550 acres
Source Area: Large Landscaped Areas 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type: Normal Sandy Silty Clayey
Moderately Compacted Sandy Silty Clayey
Severely Compacted Sandy Silty Clayey
Building Density: Low Medium or High
Alleys present: Yes No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue


Source Area Parameters
Land Use: Commercial 1
Total Area: 0.070 acres
Source Area: Small Landscaped Areas 1
Is the Source Area:
Directly Connected or Draining to a Directly Connected Area
Draining to a Pervious Area (partially connected impervious area)
Soil Type:
Normal
Sandy
Silty
Clayey
Moderately Compacted
Sandy
Silty
Clayey
Severely Compacted
Sandy
Silty
Clayey
Building Density:
Low
Medium or High
Alleys present:
Yes
No
Apply Default PSD and Peak to Average Flow Ratio Values
Source Area Particle Size Distribution File:
Select File
C:\WinSLAMM Files\\NURP.cpz
Continue

Wet Detention Control Device

Pond Number 1

Drainage System Control Practice

CP Index # : 1

Total Area

Select Particle Size Distribution File

Not needed - calculated by program

Initial Stage Elevation (ft):

Peak to Average Flow Ratio: 3.80

Maximum Inflow into Pond (cfs)
Enter 0 or leave blank for no limit:

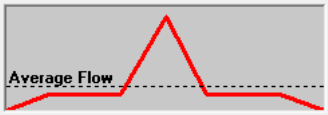
Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button: 0.00

Modify Pond Areas

	Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000	0.000
1	0.01	0.0001	0.000
2	1.00	0.0217	0.011
3	2.00	0.0414	0.042
4	3.00	0.0652	0.096
5	4.00	0.0919	0.174
6	5.00	0.1204	0.280
7	6.00	0.2286	0.455
8	7.00	0.2768	0.708
9	8.00	0.3275	1.010
10	9.00	0.3930	1.370
11	9.50	0.5282	1.600
12			
13			
14			
15			
16			
17			

Recalculate Cumulative Volume

Flow



Time (1.2 * Rainfall Duration)

Copy Pond Data

Paste Pond Data

Save this Pond as a WinDETPOND File

Delete Pond | Cancel | Continue

Control Practice # : 1 | CP Index # : 1

Add **Sharp Crested Weir**

Weir Length (ft)	
Height from datum to bottom of weir opening (ft)	

Add **V-Notch Weir**

Weir Angle (<180 degrees)	
Height from datum to bottom of weir opening (ft)	
Number of V-Notch weirs	

Remove **Orifice Set 1**

Orifice Diameter (ft)	0.42
Invert elevation above datum (ft)	6.00
Number of orifices in set	1

Add **Orifice Set 2**

Orifice Diameter (ft)	
Invert elevation above datum (ft)	
Number of orifices in set	

Add **Orifice Set 3**

Orifice Diameter (ft)	
Invert elevation above datum (ft)	
Number of orifices in set	

Add **Stone Weeper**

Width at bottom of weeper (ft)	
Weeper side slope (_H:1V)	
Upstream side slope (_H:1V)	
Downstream side slope (_H:1V)	
Horizontal flow path length at top of weeper (ft)	
Average rock diameter (ft)	
Distance from bottom to top of weeper (ft)	
Height from datum to bottom of weeper (ft)	

Add **Vertical Stand Pipe**

Pipe diameter (ft)	
Height above datum (ft)	

Add | Add

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Add | Add

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.01	0.00	0.000
1.00	0.00	0.000
2.00	0.00	0.000
3.00	0.00	0.000
4.00	0.00	0.000
5.00	0.00	0.000

Add **Broad Crested Weir (Required)**

Weir crest length (ft)	
Weir crest width (ft)	
Height of weir opening (ft)	
Height from datum to bottom of weir opening (ft)	

Add **Seepage Basin**

Infiltration rate (in/hr)	
Width of device (ft)	
Length of device (ft)	
Invert elevation of seepage basin inlet above datum (ft)	

File Name:

T:\land projects\13025\Stormwater\Good Harvest Market 5-26-14 South Pond.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	214137		0.59	92.53	1237	
Outfall Total with Controls	191526	10.56 %	0.52	17.66	211.2	82.93 %
Current File Output: Annualized Total After Outfall Controls	192053	Years in Model Run:	1.00		211.8	

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 3.140

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.59	Poor
With Controls	0.52	Poor

APPENDIX G

LONG TERM MAINTENANCE AGREEMENT

(SIGNED AGREEMENT TO BE ADDED UPON EXECUTION)