STORM WATER MANAGEMENT PLAN

FOR

WAUKESHA EXPRESS WASH

City of Waukesha, Waukesha County, Wisconsin

January 4, 2023

PREPARED FOR:
Tracey Erickson
Peak, Inc.
250 S. Diversatech Drive
Manteno, IL 60950
Ph: (815) 468-1100
Email: terickson@peak-inc.net

PREPARED BY:
Joshua Murray, P.E.
Nielsen Madsen + Barber
1458 Horizon Boulevard
Suite 200
Racine, WI 53406
Ph: (262) 634-5588
Email: jmurray@nmbsc.net

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1458 Horizon Blvd, Suite 200, Racine, WI 53406
Ph: (262) 634-5588 * Fax: (262) 634-5024
www.nmbsc.net

INTRODUCTION

Nielsen Madsen + Barber (NMB) was retained by Peak, Inc. to prepare a site grading, drainage and Storm Water Management Plan for the proposed Waukesha Express Wash located at 300 and 316 West Sunset Drive in the City of Waukesha, Wisconsin.

The proposed improvements include the car wash and associated driveway and parking areas, landscaping, and storm water management facilities.

The project is a redevelopment with a reduction in impervious surface of approximately 17,350 sq. ft. The applicable storm water requirements include the City of Waukesha's Total Suspended Solids (TSS) requirements for redevelopment.

An Underground Detention System (UDS) has been designed to meet the TSS requirements of the City.

METHOD OF ANALYSIS

The method used for this storm water analysis was the United States Department of Agriculture, Natural Resources Conservation Service, Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55). The specific software is HydroCAD V10, as produced by HydroCAD Software Solutions, LLC. In running this model, NMB determined runoff curve numbers (CN) and times of concentration (Tc) for the individual drainage areas. This information was then used to generate storm hydrographs and peak discharge rates. In addition, WinSLAMM V10.4 as produced by PV and Associates, LLC was utilized to analyze the water quality of the Post-Developed runoff.

EXISTING CONDITIONS

The Existing Site Conditions consist of roof, pavements, and limited lawn area resulting in 94.4% imperviousness. Since water quantity and quality considerations for this development are determined by the post-developed conditions only, an existing conditions model was not prepared.

POST - DEVELOPED CONDITIONS

Post-Developed conditions consist of pavement, rooftop, and lawn resulting in 57.7% imperviousness for the total site. An Underground Detention System (UDS) has been designed to provide water quality and detain runoff from the site.

All of the site's impervious surfaces and a portion of the lawn area will discharge to the UDS. A storm sewer system has been designed to accommodate runoff from the 10-year storm. Calculations for the storm sewer sizing can be found in Appendix "E" of this report.

A Post-Developed Conditions Drainage Map can be found in Appendix "D" of this report.

The post-developed drainage area is further described as follows:

DEV-1 (Area Tributary to the UDS)

DEV-1 totals 0.881 acres and includes pavement, rooftop, and lawn. The post-developed conditions Tc flow path starts in the lawn area near the northeast corner of the site and travels west and then south overland until it enters the proposed UDS.

STORM WATER QUALITY AND QUANTITY

Storm water quality and quantity standards have been established by the WDNR through the "NR 151 Runoff Management" regulation. This regulation establishes runoff pollution performance standards for post-construction development sites consisting of one acre or more of land disturbing construction activity. The City of Waukesha has also established its own storm water quality and quantity standards in its Storm Water Management Ordinance.

Due to the net decrease in impervious surface (from 94.4% to 57.7%), the development is exempt from WDNR NR 151 regulations. The proposed Waukesha Express Wash development will be required to follow the storm water management standards established by the City of Waukesha which apply as follows:

Infiltration: Existing soils have been reviewed using the Web Soil Survey developed by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The Web Soil Survey indicates predominately Warsaw loam and Warsaw silt loam throughout the site. Redevelopment sites are typically exempted from infiltration requirements. Additionally, from the WDNR Technical Standard 1002, "Site Evaluation for Stormwater Infiltration", loam and silt loam are listed with design infiltration rates of 0.24 and 0.13 inches/hour, respectively. These infiltration rates are each less than the 0.6 inches/hour exemption threshold rate. A map of the existing soils on site is included in Appendix "A" of this report.

A December 22, 2022, report of geotechnical investigation for the site, prepared by Pioneer Engineering & Environmental Services, LLC, has also been submitted to the City. The report recommended a design infiltration rate of 0.5 inches/hour which is less than the exemption threshold rate.

Total Suspended Solids Load Reduction: Since this project is considered a redevelopment, it must meet the City of Waukesha's storm water quality requirement of providing a 40% reduction in TSS. To achieve a 40% reduction in TSS, an Underground Detention System (UDS) has been designed to treat runoff from the site.

The UDS consists of 18 partial elliptical chambers (MC-3500 StormTech Chambers) in a modular configuration (3 rows of 6 chambers) including clean, angular stone as a structural component

below, between, and above the chambers. The first row of chambers in the UDS (Isolator Row) is surrounded with filter fabric to provide settling and filtration of sediment. The outlet control structure is a multi-stage device with an orifice and weir designed to restrict discharge rates. The discharge from this device will then enter a 15" storm sewer that will connect to the City's existing storm sewer system. A WinSLAMM model was assembled for the post-developed drainage area including the land usage and treatment methods. The "ADS StormTech Isolator Row" is a control practice in WinSLAMM and was used to model the UDS in accordance with WinSLAMM guidance.

When these parameters were analyzed in WinSLAMM, the UDS was found to provide a TSS reduction of 41.30% for the 0.881-acre development area (DEV-1). The proposed UDS, as designed, meets the City of Waukesha's treatment goals by achieving a TSS reduction greater than 40%. The WinSLAMM input data and the output summary can be found in Appendix "B" of this report.

Peak Discharge Management: Due to the reduction in impervious area of this redevelopment from 94.4% to 57.7%, the site is exempt from specific peak-discharge requirements.

The UDS has been designed to pass the 100-year, 24-hour rainfall event. Detailed routing information can be found in Appendix "C" of this report.

Proposed UDS

Contributory Watershed:	0.881 Acres (DEV-1)
System Design:	18 chambers (MC-3500 StormTech)
Bottom of UDS:	848.21
Top of UDS:	853.71
High Water Mark (100-Year):	851.57
High Water Mark (10-Year):	851.30
High Water Mark (2-Year):	850.77
High Water Mark (1-Year):	850.30

OUTLET CONTROL STRUCTURE

Proposed Outlet:	Multi-Stage Outlet: 81'-15" RCP @ 0.26%, IE @ 848.21 3" Orifice @ 848.21 4' Sharp Crested Weir @ 851.00

Emergency Spillway Conditions:
A 100-year emergency spillway conditions was routed for the proposed underground detention system assuming the 3" orifice was plugged and flow over the weir was the only available outflow for the multi-stage outlet. The resultant routing indicates a peak elevation of 851.60 which is below the top of the UDS storage and below the lowest contributing system catch basin rim elevation.

ROUTING DATA

UDS	System Bottom	Peak Inflow	Peak Outflow	HWM	Storage (Ac-ft)
1-Yr. 24-Hour Storm	848.21	1.61 cfs	0.33 cfs	850.30	0.035
2-Yr. 24-Hour Storm	848.21	1.94 cfs	0.37 cfs	850.77	0.044
10-Yr. 24-Hour Storm	848.21	3.18 cfs	2.47 cfs	851.30	0.054
100-Yr. 24-Hour Storm	848.21	5.88 cfs	5.83 cfs	851.57	0.059

CONCLUSION

By utilizing the proposed UDS, the water quality goals have been met reducing the total suspended solids loading of the development site by 41.30% on an average annual basis. In addition, the UDS has been designed to safely pass the 100-year, 24-hour rainfall event.

We conclude that the proposed UDS meets the City's design standards.

APPENDIX
“A”

Custom Soil Resource Report
Soil Map

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

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

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

Date(s) aerial images were photographed: May 20, 2020—Aug 20, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GP	Gravel pit	0.0	2.8%
WeB	Warsaw loam, 2 to 6 percent slopes	0.4	35.7%
WhA	Warsaw silt loam, 0 to 2 percent slopes	0.7	61.5%
Totals for Area of Interest		**1.2**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

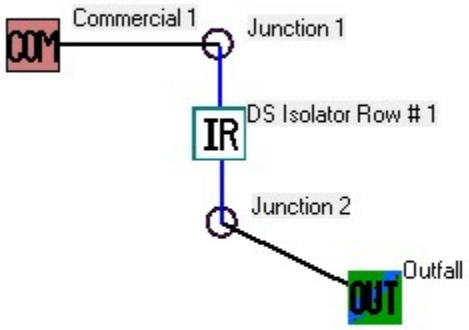
The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

APPENDIX
“B”

Waukesha Express Wash

Water Quality Analysis

System Map



1458 Horizon Blvd, Suite 200, Racine, WI 53406
Ph: (262) 634-5588 * Fax: (262) 634-5024
www.nmbsc.net

Data file name: Z:\2022\2022.0186.01\Design Documents\Storm Water Management\WinSLAMM\2022.0186.01-WinSLAMM.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 12-22-2022 Time: 08:04:21
Site information:

LU# 1 - Commercial: Commercial 1 Total area (ac): 0.881
1 - Roofs 1: 0.113 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 0.511 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.257 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Isolator Row CP# 1 (DS) - DS Isolator Row # 1
Total available system length (ft) = 58
Total available system width (ft) = 23
Available height from chamber base to surface (ft) = 7.00
Number of isolator rows = 1
Native soil infiltration rate (in/hr) = 0.00
Assumed stone porosity () = 0.40
Sizing option: Number of rows and row length
Number of rows = 3
Row length (ft) = 45
Selected Chamber Information
Chamber type: MC-3500
Chamber height (in): 45.00
Chamber width (in): 86.00
Chamber segment length (in): 86.00
Final storage volume (cf): 3576.6
Number of rows: 3
Row length (ft): 45.0
Total system length (ft): 135.0
Total system width (ft): 21.5
Number of chambers: 18
Overflow weir invert elevation (ft) = 2.79
Orifice 1 invert elevation (ft) = 0.00
Orifice 1 diameter (ft) = 0.25
Orifice 2 invert elevation (ft) = 0.00
Orifice 2 diameter (ft) = 0.00

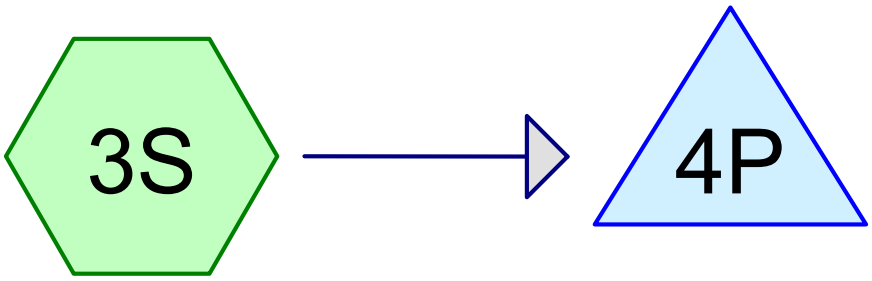
SLAMM for Windows Version 10.4.1

Data file name: Z:\2022\2022.0186.01\Design Documents\Storm Water Management\WinSLAMM\2022.0186.01-WinSLAMM.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 12-22-2022 Time of run: 08:03:38
Total Area Modeled (acres): 0.881
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	51553	-	111.9	360.3	-
Outfall Total with Controls:	49958	3.09%	67.82	211.5	41.30%
Annualized Total After Outfall Controls:	50652			214.5	

APPENDIX
“C”

POST-DEVELOPED CONDITIONS



DEV-1 NMB - 3 Row System

Subcat Reach Pond Link

Routing Diagram for 2022.0186.01 - Post-Developed
Prepared by Nielsen Madsen and Barber, SC, Printed 12/22/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.257	61	>75% Grass cover, Good, HSG B (3S)
0.511	98	Paved parking, HSG B (3S)
0.113	98	Roofs, HSG B (3S)
0.881	**87**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	4P	848.21	848.00	81.0	0.0026	0.013	0.0	15.0	0.0

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: DEV-1 Runoff Area=0.881 ac 70.83% Impervious Runoff Depth=1.23"
Flow Length=90' Tc=11.0 min CN=87 Runoff=1.61 cfs 0.090 af

Pond 4P: NMB - 3 Row System Peak Elev=850.30' Storage=0.035 af Inflow=1.61 cfs 0.090 af
Outflow=0.33 cfs 0.090 af

Total Runoff Area = 0.881 ac Runoff Volume = 0.090 af Average Runoff Depth = 1.23"
29.17% Pervious = 0.257 ac 70.83% Impervious = 0.624 ac

Summary for Subcatchment 3S: DEV-1

Runoff = 1.61 cfs @ 12.19 hrs, Volume= 0.090 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.257	61	>75% Grass cover, Good, HSG B
0.113	98	Roofs, HSG B
0.511	98	Paved parking, HSG B
0.881	87	Weighted Average
0.257		29.17% Pervious Area
0.624		70.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	67	0.0224	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
0.2	23	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.0	90	Total			

Summary for Pond 4P: NMB - 3 Row System

Inflow Area = 0.881 ac, 70.83% Impervious, Inflow Depth = 1.23" for 1-Year event
Inflow = 1.61 cfs @ 12.19 hrs, Volume= 0.090 af
Outflow = 0.33 cfs @ 12.59 hrs, Volume= 0.090 af, Atten= 79%, Lag= 24.1 min
Primary = 0.33 cfs @ 12.59 hrs, Volume= 0.090 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 850.30' @ 12.59 hrs Surf.Area= 0.025 ac Storage= 0.035 af

Plug-Flow detention time= 51.7 min calculated for 0.090 af (100% of inflow)
Center-of-Mass det. time= 51.2 min (862.3 - 811.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	848.21'	0.037 af	**22.75'W x 48.72'L x 5.50'H Field A** 0.140 af Overall - 0.047 af Embedded = 0.092 af x 40.0% Voids
#2A	848.96'	0.047 af	**ADS_StormTech MC-3500 d +Cap** x 18 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 18 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.084 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	848.21'	**15.0" Round RCP_Round 15"** L= 81.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 848.21' / 848.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	848.21'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	851.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.33 cfs @ 12.59 hrs HW=850.30' (Free Discharge)
└**1=RCP_Round 15"** (Passes 0.33 cfs of 5.49 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 6.75 fps)
  └**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: NMB - 3 Row System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

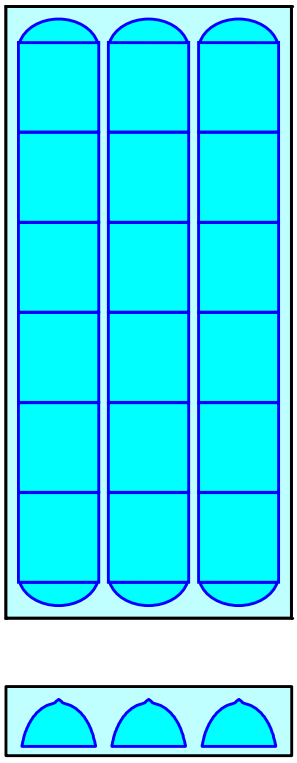
6 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 46.72' Row Length +12.0" End Stone x 2 = 48.72' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Stone Base + 45.0" Chamber Height + 12.0" Stone Cover = 5.50' Field Height

18 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 2,068.5 cf Chamber Storage

6,096.1 cf Field - 2,068.5 cf Chambers = 4,027.6 cf Stone x 40.0% Voids = 1,611.0 cf Stone Storage

Chamber Storage + Stone Storage = 3,679.6 cf = 0.084 af
Overall Storage Efficiency = 60.4%
Overall System Size = 48.72' x 22.75' x 5.50'

18 Chambers
225.8 cy Field
149.2 cy Stone



Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: DEV-1 Runoff Area=0.881 ac 70.83% Impervious Runoff Depth=1.48"
Flow Length=90' Tc=11.0 min CN=87 Runoff=1.94 cfs 0.109 af

Pond 4P: NMB - 3 Row System Peak Elev=850.77' Storage=0.044 af Inflow=1.94 cfs 0.109 af
Outflow=0.37 cfs 0.109 af

Total Runoff Area = 0.881 ac Runoff Volume = 0.109 af Average Runoff Depth = 1.48"
29.17% Pervious = 0.257 ac 70.83% Impervious = 0.624 ac

Summary for Subcatchment 3S: DEV-1

Runoff = 1.94 cfs @ 12.19 hrs, Volume= 0.109 af, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

Area (ac)	CN	Description
0.257	61	>75% Grass cover, Good, HSG B
0.113	98	Roofs, HSG B
0.511	98	Paved parking, HSG B
0.881	87	Weighted Average
0.257		29.17% Pervious Area
0.624		70.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	67	0.0224	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
0.2	23	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.0	90	Total			

Summary for Pond 4P: NMB - 3 Row System

Inflow Area = 0.881 ac, 70.83% Impervious, Inflow Depth = 1.48" for 2-Year event
Inflow = 1.94 cfs @ 12.19 hrs, Volume= 0.109 af
Outflow = 0.37 cfs @ 12.61 hrs, Volume= 0.109 af, Atten= 81%, Lag= 25.2 min
Primary = 0.37 cfs @ 12.61 hrs, Volume= 0.109 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 850.77' @ 12.61 hrs Surf.Area= 0.025 ac Storage= 0.044 af

Plug-Flow detention time= 57.5 min calculated for 0.109 af (100% of inflow)
Center-of-Mass det. time= 57.0 min (864.3 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	848.21'	0.037 af	**22.75'W x 48.72'L x 5.50'H Field A** 0.140 af Overall - 0.047 af Embedded = 0.092 af x 40.0% Voids
#2A	848.96'	0.047 af	**ADS_StormTech MC-3500 d +Cap** x 18 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 18 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.084 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	848.21'	**15.0" Round RCP_Round 15"** L= 81.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 848.21' / 848.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	848.21'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	851.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.37 cfs @ 12.61 hrs HW=850.77' (Free Discharge)
└─**1=RCP_Round 15"** (Passes 0.37 cfs of 6.59 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.37 cfs @ 7.51 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: NMB - 3 Row System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

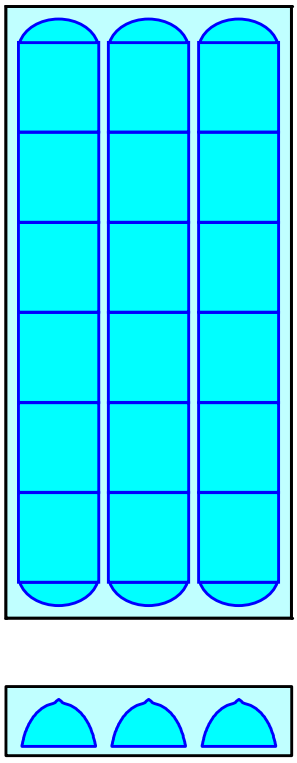
6 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 46.72' Row Length +12.0" End Stone x 2 = 48.72' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Stone Base + 45.0" Chamber Height + 12.0" Stone Cover = 5.50' Field Height

18 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 2,068.5 cf Chamber Storage

6,096.1 cf Field - 2,068.5 cf Chambers = 4,027.6 cf Stone x 40.0% Voids = 1,611.0 cf Stone Storage

Chamber Storage + Stone Storage = 3,679.6 cf = 0.084 af
Overall Storage Efficiency = 60.4%
Overall System Size = 48.72' x 22.75' x 5.50'

18 Chambers
225.8 cy Field
149.2 cy Stone



Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: DEV-1 Runoff Area=0.881 ac 70.83% Impervious Runoff Depth=2.46"
Flow Length=90' Tc=11.0 min CN=87 Runoff=3.18 cfs 0.181 af

Pond 4P: NMB - 3 Row System Peak Elev=851.30' Storage=0.054 af Inflow=3.18 cfs 0.181 af
Outflow=2.47 cfs 0.181 af

Total Runoff Area = 0.881 ac Runoff Volume = 0.181 af Average Runoff Depth = 2.46"
29.17% Pervious = 0.257 ac 70.83% Impervious = 0.624 ac

Summary for Subcatchment 3S: DEV-1

Runoff = 3.18 cfs @ 12.19 hrs, Volume= 0.181 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

Area (ac)	CN	Description
0.257	61	>75% Grass cover, Good, HSG B
0.113	98	Roofs, HSG B
0.511	98	Paved parking, HSG B
0.881	87	Weighted Average
0.257		29.17% Pervious Area
0.624		70.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	67	0.0224	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
0.2	23	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.0	90	Total			

Summary for Pond 4P: NMB - 3 Row System

Inflow Area = 0.881 ac, 70.83% Impervious, Inflow Depth = 2.46" for 10-Year event
Inflow = 3.18 cfs @ 12.19 hrs, Volume= 0.181 af
Outflow = 2.47 cfs @ 12.28 hrs, Volume= 0.181 af, Atten= 22%, Lag= 5.4 min
Primary = 2.47 cfs @ 12.28 hrs, Volume= 0.181 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 851.30' @ 12.28 hrs Surf.Area= 0.025 ac Storage= 0.054 af

Plug-Flow detention time= 48.9 min calculated for 0.181 af (100% of inflow)
Center-of-Mass det. time= 49.0 min (846.0 - 797.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	848.21'	0.037 af	**22.75'W x 48.72'L x 5.50'H Field A** 0.140 af Overall - 0.047 af Embedded = 0.092 af x 40.0% Voids
#2A	848.96'	0.047 af	**ADS_StormTech MC-3500 d +Cap** x 18 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 18 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.084 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	848.21'	**15.0" Round RCP_Round 15"** L= 81.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 848.21' / 848.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	848.21'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	851.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.45 cfs @ 12.28 hrs HW=851.29' (Free Discharge)
└**1=RCP_Round 15"** (Passes 2.45 cfs of 7.65 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.41 cfs @ 8.28 fps)
  └**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.04 cfs @ 1.77 fps)

Pond 4P: NMB - 3 Row System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

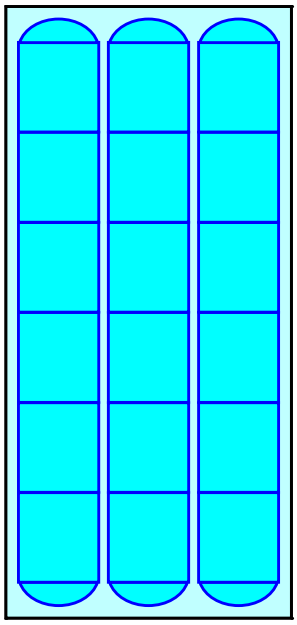
6 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 46.72' Row Length +12.0" End Stone x 2 = 48.72' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Stone Base + 45.0" Chamber Height + 12.0" Stone Cover = 5.50' Field Height

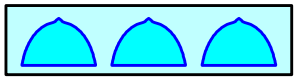
18 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 2,068.5 cf Chamber Storage

6,096.1 cf Field - 2,068.5 cf Chambers = 4,027.6 cf Stone x 40.0% Voids = 1,611.0 cf Stone Storage

Chamber Storage + Stone Storage = 3,679.6 cf = 0.084 af
Overall Storage Efficiency = 60.4%
Overall System Size = 48.72' x 22.75' x 5.50'

18 Chambers
225.8 cy Field
149.2 cy Stone





Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: DEV-1 Runoff Area=0.881 ac 70.83% Impervious Runoff Depth=4.69"
Flow Length=90' Tc=11.0 min CN=87 Runoff=5.88 cfs 0.344 af

Pond 4P: NMB - 3 Row System Peak Elev=851.57' Storage=0.059 af Inflow=5.88 cfs 0.344 af
Outflow=5.83 cfs 0.344 af

Total Runoff Area = 0.881 ac Runoff Volume = 0.344 af Average Runoff Depth = 4.69"
29.17% Pervious = 0.257 ac 70.83% Impervious = 0.624 ac

Summary for Subcatchment 3S: DEV-1

Runoff = 5.88 cfs @ 12.18 hrs, Volume= 0.344 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

Area (ac)	CN	Description
0.257	61	>75% Grass cover, Good, HSG B
0.113	98	Roofs, HSG B
0.511	98	Paved parking, HSG B
0.881	87	Weighted Average
0.257		29.17% Pervious Area
0.624		70.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	67	0.0224	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
0.2	23	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.0	90	Total			

Summary for Pond 4P: NMB - 3 Row System

Inflow Area = 0.881 ac, 70.83% Impervious, Inflow Depth = 4.69" for 100-Year event
Inflow = 5.88 cfs @ 12.18 hrs, Volume= 0.344 af
Outflow = 5.83 cfs @ 12.20 hrs, Volume= 0.344 af, Atten= 1%, Lag= 0.9 min
Primary = 5.83 cfs @ 12.20 hrs, Volume= 0.344 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 851.57' @ 12.20 hrs Surf.Area= 0.025 ac Storage= 0.059 af

Plug-Flow detention time= 36.2 min calculated for 0.344 af (100% of inflow)
Center-of-Mass det. time= 36.3 min (820.5 - 784.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	848.21'	0.037 af	**22.75'W x 48.72'L x 5.50'H Field A** 0.140 af Overall - 0.047 af Embedded = 0.092 af x 40.0% Voids
#2A	848.96'	0.047 af	**ADS_StormTech MC-3500 d +Cap** x 18 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 18 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.084 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	848.21'	**15.0" Round RCP_Round 15"** L= 81.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 848.21' / 848.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	848.21'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	851.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.83 cfs @ 12.20 hrs HW=851.57' (Free Discharge)
└**1=RCP_Round 15"** (Passes 5.83 cfs of 8.14 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.42 cfs @ 8.65 fps)
  └**3=Sharp-Crested Rectangular Weir** (Weir Controls 5.40 cfs @ 2.46 fps)

Pond 4P: NMB - 3 Row System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

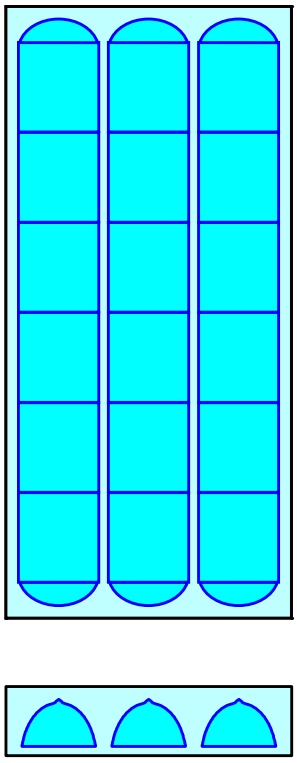
6 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 46.72' Row Length +12.0" End Stone x 2 = 48.72' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Stone Base + 45.0" Chamber Height + 12.0" Stone Cover = 5.50' Field Height

18 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 2,068.5 cf Chamber Storage

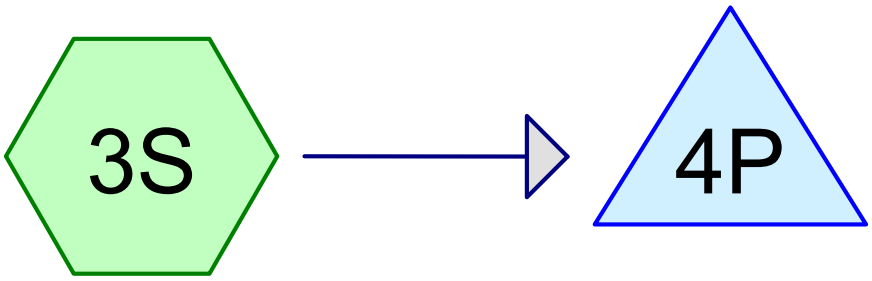
6,096.1 cf Field - 2,068.5 cf Chambers = 4,027.6 cf Stone x 40.0% Voids = 1,611.0 cf Stone Storage

Chamber Storage + Stone Storage = 3,679.6 cf = 0.084 af
Overall Storage Efficiency = 60.4%
Overall System Size = 48.72' x 22.75' x 5.50'

18 Chambers
225.8 cy Field
149.2 cy Stone



POST-DEVELOPED CONDITIONS
(EMERGENCY SPILLWAY)



DEV-1 NMB - 3 Row System

Subcat Reach Pond Link

Routing Diagram for 2022.0186.01 - Post-Developed-Emergency Spillway

Prepared by Nielsen Madsen and Barber, SC, Printed 12/22/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.257	61	>75% Grass cover, Good, HSG B (3S)
0.511	98	Paved parking, HSG B (3S)
0.113	98	Roofs, HSG B (3S)
0.881	**87**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	4P	848.21	848.00	81.0	0.0026	0.013	0.0	15.0	0.0

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: DEV-1 Runoff Area=0.881 ac 70.83% Impervious Runoff Depth=4.69"
Flow Length=90' Tc=11.0 min CN=87 Runoff=5.88 cfs 0.344 af

Pond 4P: NMB - 3 Row System Peak Elev=851.60' Storage=0.059 af Inflow=5.88 cfs 0.344 af
Outflow=5.84 cfs 0.296 af

Total Runoff Area = 0.881 ac Runoff Volume = 0.344 af Average Runoff Depth = 4.69"
29.17% Pervious = 0.257 ac 70.83% Impervious = 0.624 ac

Summary for Subcatchment 3S: DEV-1

Runoff = 5.88 cfs @ 12.18 hrs, Volume= 0.344 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

Area (ac)	CN	Description
0.257	61	>75% Grass cover, Good, HSG B
0.113	98	Roofs, HSG B
0.511	98	Paved parking, HSG B
0.881	87	Weighted Average
0.257		29.17% Pervious Area
0.624		70.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	67	0.0224	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
0.2	23	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.0	90	Total			

Summary for Pond 4P: NMB - 3 Row System

Inflow Area = 0.881 ac, 70.83% Impervious, Inflow Depth = 4.69" for 100-Year event
Inflow = 5.88 cfs @ 12.18 hrs, Volume= 0.344 af
Outflow = 5.84 cfs @ 12.20 hrs, Volume= 0.296 af, Atten= 1%, Lag= 0.9 min
Primary = 5.84 cfs @ 12.20 hrs, Volume= 0.296 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 851.60' @ 12.20 hrs Surf.Area= 0.025 ac Storage= 0.059 af

Plug-Flow detention time= 76.2 min calculated for 0.296 af (86% of inflow)
Center-of-Mass det. time= 25.4 min (809.7 - 784.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	848.21'	0.037 af	**22.75'W x 48.72'L x 5.50'H Field A** 0.140 af Overall - 0.047 af Embedded = 0.092 af x 40.0% Voids
#2A	848.96'	0.047 af	**ADS_StormTech MC-3500 d +Cap** x 18 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 18 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.084 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	848.21'	**15.0" Round RCP_Round 15"** L= 81.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 848.21' / 848.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	851.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.83 cfs @ 12.20 hrs HW=851.60' (Free Discharge)
↑└**1=RCP_Round 15"** (Passes 5.83 cfs of 8.19 cfs potential flow)
↑└**2=Sharp-Crested Rectangular Weir** (Weir Controls 5.83 cfs @ 2.52 fps)

Pond 4P: NMB - 3 Row System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

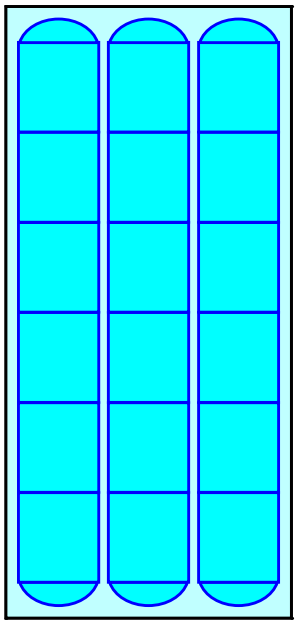
6 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 46.72' Row Length +12.0" End Stone x 2 = 48.72' Base Length
3 Rows x 77.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 22.75' Base Width
9.0" Stone Base + 45.0" Chamber Height + 12.0" Stone Cover = 5.50' Field Height

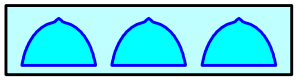
18 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 3 Rows = 2,068.5 cf Chamber Storage

6,096.1 cf Field - 2,068.5 cf Chambers = 4,027.6 cf Stone x 40.0% Voids = 1,611.0 cf Stone Storage

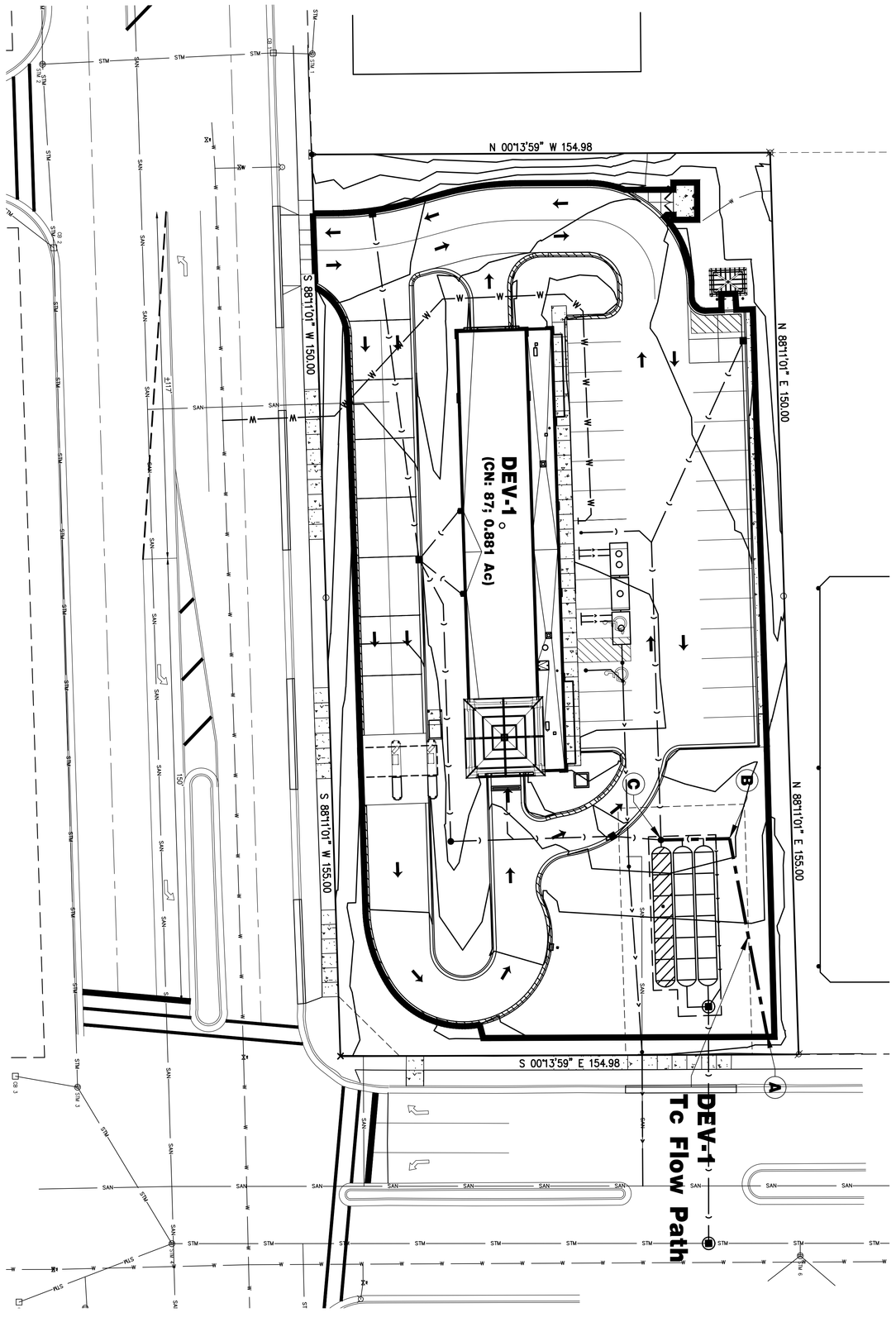
Chamber Storage + Stone Storage = 3,679.6 cf = 0.084 af
Overall Storage Efficiency = 60.4%
Overall System Size = 48.72' x 22.75' x 5.50'

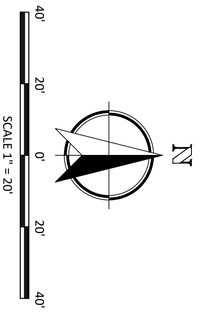
18 Chambers
225.8 cy Field
149.2 cy Stone





APPENDIX
“D”





NO.	REVISION	BY	DATE

PROJ. MGR: MRM
DRAFTED: ALI
DATE: 11-14-2022
CHECKED: JAM
DATE: 12-29-2022

2022.0186.01

SHEET DEV-1

WAUKESHA EXPRESS WASH

POST-DEVELOPED DRAINAGE AREAS

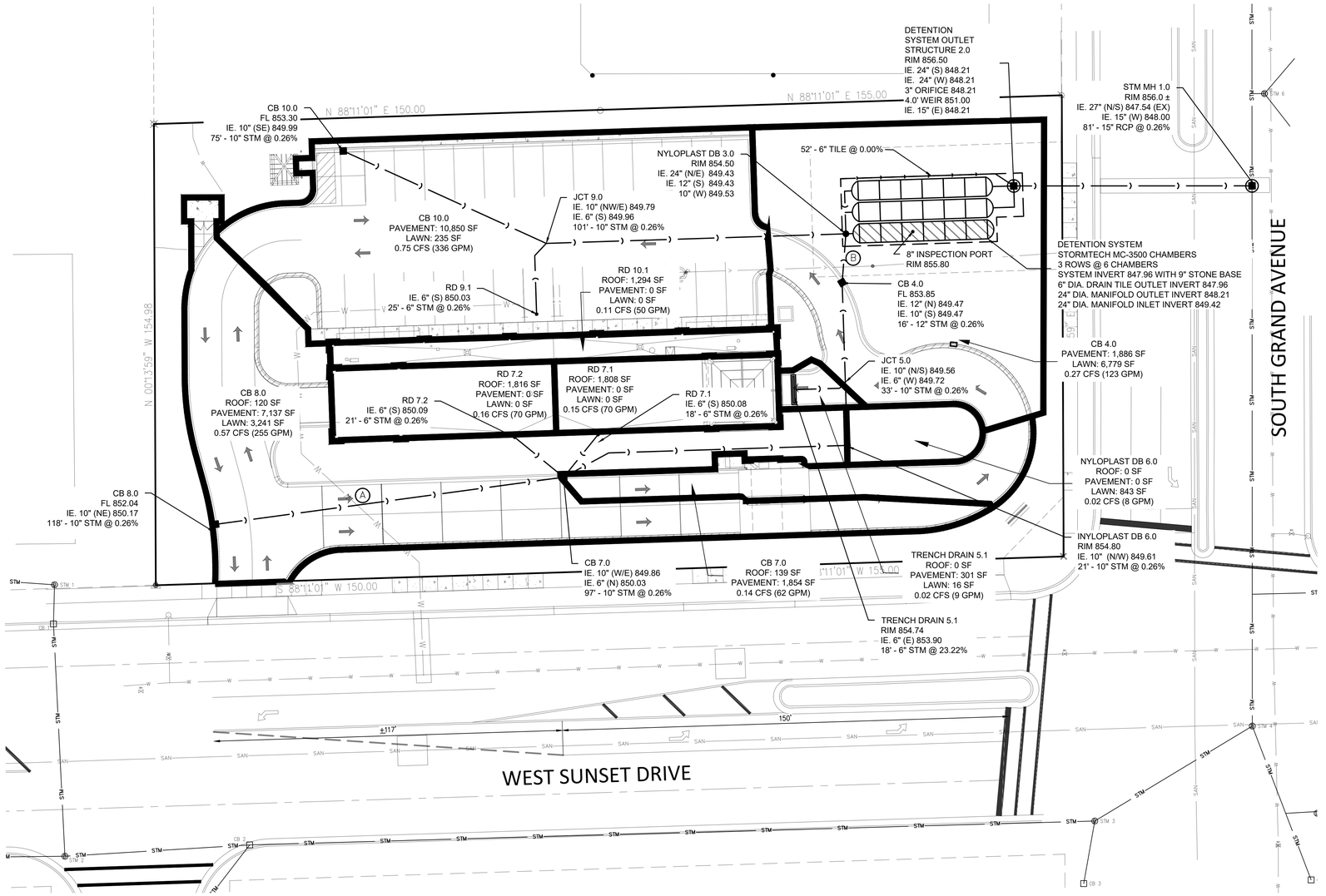
FOR

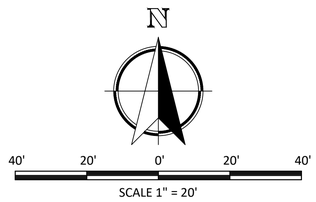
TSUNAMI CAR WASH
INTERMEDIATE HOLDCO, LLC.

CITY OF WAUKESHA, WAUKESHA COUNTY, WISCONSIN

Nielsen Madsen + Barber
CIVIL ENGINEERS AND LAND SURVEYORS
1458 Horizon Blvd. Suite 200, Racine, WI. 53406
Tele: (262)634-5588 Website: www.nmbsc.net

APPENDIX
“E”





REFERENCES

EROSION CONTROL, EARTHWORK, SITE GRADING AND PAVEMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE "STATE OF WISCONSIN, STANDARD SPECIFICATIONS FOR HIGHWAY AND STRUCTURE CONSTRUCTION", CURRENT EDITION, HEREIN REFERRED TO AS THE "STATE SPECIFICATIONS".

SANITARY SEWER AND WATER MAIN CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE WITH THE "STANDARD SPECIFICATIONS FOR SEWER & WATER CONSTRUCTION IN WISCONSIN", 6TH EDITION, DECEMBER 22, 2003 WITH ADDENDA NO. 1 AND NO. 2, HEREIN REFERRED TO AS THE "STANDARD SPECIFICATIONS".

PUBLIC UTILITY NOTES

CABLE TV AND TELEPHONE SERVICE INSTALLATION TO BE COORDINATED WITH THE ELECTRICAL SERVICE.

ELECTRICAL SERVICE TO BE COORDINATED WITH WE ENERGIES. EXACT LOCATION OF THE SERVICE ENTRANCE / METER TO BE COORDINATED WITH WE ENERGIES, THE MECHANICAL DESIGNER AND THE ARCHITECT.

CONCRETE FILLED STEEL PIPE BOLLARDS TO BE PAINTED WITH TWO COATS OF EXTERIOR PAINT. COLOR TO COMPLIMENT BUILDING (RED)

THE EXACT LOCATION OF THE SANITARY SEWER LATERAL, DOMESTIC WATER LINE, FIRE PROTECTION LEAD, NATURAL GAS SERVICE, ELECTRIC, AND PHONE LINES (AS THEY ENTER THE BUILDING) SHALL BE PER THE ARCHITECTURAL OR MECHANICAL DRAWINGS.

UTILITY CONSTRUCTION GENERAL NOTES

CONTRACTOR SHALL VERIFY ALL ELEVATIONS, LOCATIONS AND SIZES OF EXISTING SANITARY AND STORM SEWERS, WATER MAINS, GAS & ELECTRIC LINES OR OTHER UTILITIES PRIOR TO STARTING CONSTRUCTION. AS-BUILT (FIELD) DATA SHALL BE USED TO CHECK ALL PROPOSED UTILITY CROSSINGS FOR CONFLICTS.

CONTRACTOR SHALL CONTACT DIGGER'S HOTLINE A MINIMUM OF 72 HOURS BEFORE THE START OF CONSTRUCTION TO IDENTIFY ADJACENT UNDERGROUND UTILITIES. THE LOCATION OF EXISTING PRIVATE UTILITIES MAY NOT BE SHOWN ON THE PLANS AND SHOULD BE LOCATED BY THE OWNER PRIOR TO CONSTRUCTION.

ANY WATER PUMPED FROM PITS, TRENCHES, WELLS OR PONDS SHALL BE TREATED FOR SEDIMENT REMOVAL PRIOR TO DISCHARGE OFF-SITE. PUMPING OPERATIONS SHALL BE IN ACCORDANCE WITH WDNR TECHNICAL STANDARD 1061. PUMPED WATER CAN BE TREATED IN RETENTION BASINS, FILTER BAGS, STONE FILTERS OR BY OTHER WDNR APPROVED METHODS. QUALITY OF PUMPED WATER SHALL BE CONTINUOUSLY MONITORED DURING PUMPING OPERATIONS.

THE EXACT LOCATION OF ALL BUILDING LATERALS, ROOF DRAIN RISERS AND DOWNSPOUTS (IF APPLICABLE) SHALL BE PER THE ARCHITECTURAL OR MECHANICAL DRAWINGS.

STORM SEWER NOTES

STORM SEWERS WERE SIZED IN ACCORDANCE WITH SPS TABLE 382.36-4 "MAXIMUM CAPACITY OF STORM WATER HORIZONTAL CONVEYANCE PIPING FOR CONCRETE, ASTM C76 AND ASTM C14". ANY MATERIAL APPROVED BY THE CITY OF OAK CREEK AND THE WISCONSIN DEPARTMENT OF SAFETY AND PROFESSIONAL SERVICES MAY BE USED AT THE SLOPES AND SIZES DESIGNED.

STORM SEWER, ROOF DRAIN AND STORM BUILDING SEWER PIPE AND TUBING MATERIALS SHALL CONFORM TO SPS 384.30 OF THE WISCONSIN ADMINISTRATIVE CODE. REINFORCED CONCRETE PIPE (RCP) AND POLYVINYL CHLORIDE (PVC) MATERIALS SHALL BE SELECTED FROM TABLE 384.30-6. CORRUGATED HIGH DENSITY POLYETHYLENE (HDPE) PIPE MATERIAL (IF SELECTED) SHALL MEET THE REQUIREMENTS OF AASHTO M-252 FOR 4"-10" DIAMETER SIZES AND AASHTO M294 FOR 12"-48" DIAMETER SIZES.

UNDERGROUND DETENTION SYSTEM NOTE

A WDNR TYPE "A" APPROVED LINER PER WDNR STANDARD 1001 APPENDIX D WILL BE REQUIRED WITH THE INSTALLATION OF THE UNDERGROUND DETENTION SYSTEM.

PRIVATE STORM SEWER DESIGN CALCULATIONS

Pipe No.		Upstream Flow (GPM)	Pipe Inflow (GPM)	Total Flow (GPM)	Pipe Length (feet)	Min. Pipe Diameter (inches)	Min. Slope (%)	Design Pipe Diameter	Design Slope (%)	Design Pipe Capacity (CFS/GPM)
P-1	CB 8.0 - CB 7.0	0	255	255	118	10"	0.26%	10"	0.26%	1.11 / 500
P-2	RD 7.2 - CB 7.0	0	70	70	21	6"	0.26%	6"	0.26%	0.29 / 130
P-3	RD 7.1 - CB 7.0	0	70	70	18	6"	0.26%	6"	0.26%	0.29 / 130
P-4	CB 7.0 - NYLOPLAST DB 6.0	395	62	457	97	10"	0.26%	10"	0.26%	1.11 / 500
P-6	NYLOPLAST DB 6.0 - JCT 5.0	457	8	465	21	10"	0.26%	10"	0.26%	1.11 / 500
P-7	TRENCH DRAIN 5.1 - JCT 5.0	0	9	9	18	6"	0.26%	6"	21.89%	+1.14 / +510
P-8	JCT 5.0 - CB 4.0	475	0	475	33	10"	0.26%	10"	0.26%	1.11 / 500
P-9	CB 4.0 - NYLOPLAST DB 3.0	475	123	598	16	12"	0.26%	12"	0.26%	1.83 / 820
P-10	CB 10.0 - JCT 9.0	0	336	336	75	10"	0.26%	10"	0.26%	1.11 / 500
P-11	RD 9.1 - JCT 9.0	0	50	50	25	6"	0.26%	6"	0.26%	0.29 / 130
P-12	JCT 9.0 - NYLOPLAST DB 3.0	386	0	386	101	10"	0.26%	10"	0.26%	1.11 / 500
P-13	(DB 3.0) DSOS 2.0 - MH 1.0	984	0	984	80	15"	0.26%	15"	0.26%	3.30 / 1480

UTILITY CONFLICT RESOLUTION TABLE

LOCATION	UTILITY	BOTTOM OF PIPE	TOP OF PIPE	CLEARANCE
Ⓐ	10" STM	850.04	851.02	2.87'
	2" WTR	847.00	847.17	
Ⓑ	12" STM	849.56	850.73	2.51'
	6" SAN	846.50	847.05	

STORM SEWER LEGEND

- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN/SERVICE
- PROPOSED STORM SEWER
- PROPOSED DRAINAGE AREAS

DIGGERS HOTLINE
Call 811 or (800) 242-8511
www.DiggersHotline.com

UTILITY NOTE

EXISTING UTILITIES ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY AND ARE NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE TYPE, LOCATION, SIZE AND ELEVATION OF UNDERGROUND UTILITIES AS THEY DEEM NECESSARY FOR PROPOSED UTILITY CONNECTIONS AND / OR TO AVOID DAMAGE THERETO, CONTRACTOR SHALL CALL "DIGGER'S HOTLINE" PRIOR TO ANY CONSTRUCTION.

Nielsen Madsen + Barber
CIVIL ENGINEERS AND LAND SURVEYORS
1458 Horizon Blvd. Suite 200, Racine, WI. 53406
Tele: (262)634-5588 Website: www.nmbsc.net

WAUKESHA EXPRESS WASH
STORM SEWER DRAINAGE AREAS
FOR
TSUNAMI CAR WASH
INTERMEDIATE HOLDCO, LLC.
CITY OF WAUKESHA, WAUKESHA COUNTY, WISCONSIN

NO.	REVISION	BY	DATE

PROJ. MGR: MRM
DRAFTED: ALI
DATE: 11-14-2022
CHECKED: MRM
DATE: 01-03-2023

2022.0186.01

SHEET
STM-1

ISSUE FOR APPROVAL: 01-04-2023

Wednesday, January 04, 2023 5:30:09 AM