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GRAEF

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MEMORANDUM

TO: Josh Meyerhofer, Senior Project Engineer

FROM: Patricia Chin, Site Development Civil Engineer

DATE: June 23, 2025

SUBJECT: Weldall MFG Expansion – Storm Water Management Overview

The proposed project comprises of a 52,300-sf building expansion of a manufacturing facility located at 2001 S Prairie Ave. The site is subject to the City of Waukesha and WDNR regulations. An existing wet pond, constructed with a previous expansion, is sized to capture, treat, and detain the run-off from the developed site in accordance with the City Stormwater Ordinance, as established in the approved Storm Water Management Practice Maintenance Agreement (SWA 4654932), recorded on March 3, 2022 (**Attachment H**). The proposed redevelopment will result in an increase of 1,260-sf of impervious surface area and an ultimate decrease in paved surface area of 47,330-sf. No changes will be made to the drainage patterns of the site as a whole. No changes to the existing pond will be required to maintain compliance with the current City of Waukesha Municipal Code, Chapter 32.

Pre-development Conditions

SWA 4654932 references the September 2008 Stormwater Calculation Summary provided by Jahnke & Jahnke Associates, Inc (**Attachment I**), which establishes the pre-development conditions for the watershed. Utilizing the acreage, runoff curve number, and time of concentration listed in this report, GRAEF has analyzed the pre-development conditions per the current rainfall data set forth by the current Municipal Code (Chapter 32, Section 32.11.2, Table 3). The updated peak flows are described in **Table 1**, below. Hydrologic Calculations are included in **Attachment C**.

Table 1

Pre-Development Peak Runoff Rate Adjustment		
	Peak Runoff Rates (cfs), 2008 Jahnke & Jahnke	Peak Runoff Rates (cfs), City of Waukesha Municipal Code, Rev'd 05/06/2025
1-yr/24hr Storm	1.64	**2.05**
2-yr/24hr Storm	2.49	**3.08**
10-yr/24hr Storm	6.50	**7.85**
100-yr/24hr Storm	17.25	**20.51**

Runoff Rate Reduction (City of Waukesha Controls)

Requirement: §32.10(D)(1) The calculated post-development peak storm water discharge rate shall not exceed the calculated pre-development discharge rates for the 1-year, 2-year, 10-year, and 100-year, 24-hour design storms. NR 151.123(2) provides an exemption from their peak discharge performance standard for redevelopment sites.

A site survey was completed May 30, 2025 (**Attachment A**), which shows that the outfall control structure (OCS) of the existing pond has been reconfigured from the original design to replace the 2" orifices with a 6" PVC intake orifice with a valve mechanism that opens during storm events. This information was used to analyze the function of the pond under the proposed redevelopment conditions. A summary of these findings can be found in **Table 2** below. This analysis shows that the existing pond will remain in compliance with the City's runoff rate reduction requirements following the buildout of the proposed building addition. Hydrologic Calculations of the proposed redevelopment conditions are included in **Attachment D**.

Table 2

Comparison of Peak Runoff Rates		
	Pre-Development Conditions (cfs)	Post-Development Conditions (cfs)
1-yr/24hr Storm	2.05	**1.54**
2-yr/24hr Storm	3.08	**1.72**
10-yr/24hr Storm	7.85	**6.42**
100-yr/24hr Storm	20.51	**16.94**

Total Suspended Solids (City of Waukesha Controls)

Requirement: §32.10(D)(2) By design, each storm water management plan shall meet the following post-development total suspended solids reduction targets, based on average annual rainfalls, as compared to no runoff management controls: For new land development and in-fill development, 80% reduction in total suspended solids load; For redevelopment, 40% reduction of total suspended solids load from parking areas and roads. The City's Code is more stringent than WDNR NR 151 requirements.

TSS removal was previously analyzed for this pond in the September 2008 Stormwater Calculation Summary provided by Jahnke & Jahnke Associates, Inc. This report established the use of a weighted average of pollutant removal requirement of 66% as compared to no runoff management controls based on the acreage of existing impervious and proposed impervious. Computational analysis provided in this report shows that the pond exceeded this requirement by removing 75% of pollutants.

Pavement added to the site to connect the 2001 S Prairie Ave property with 1901 S Prairie Ave to the north added additional acreage to the drainage area of the pond. Analysis of the current drainage boundaries of the site (**Attachment B**) show a total area of 8.60 acres draining to the wet pond, a difference of 1.80 acres from the drainage area indicated in the Jahnke & Jahnke report. Aerial imagery suggests that this paving was completed

within the same time frame as the construction of the wet pond, between June 2008 and May 2010. Accounting for this additional acreage, the revised weighted average pollutant removal requirement for this site would be as follows:

2.11 Ac	Existing Impervious @ 40%	0.844
3.96 Ac	New Impervious @ 80%	3.168
1.80 Ac	Additional Impervious @ 80%	1.440
7.87 Ac	Total Impervious	5.452 / 7.870
		= 69.3% Removal Required

The proposed redevelopment of this site will incorporate a 52,300-sf building expansion that will be located fully within the limits of an existing paved parking lot. Two existing satellite buildings, totaling 3,710-sf will be demolished and replaced with paving, and an additional 1,260 sf of paved surface will be added along the eastern edge of the site. In total, the amount of exposed paved surface area will be decreasing by approximately 47,330-sf, thus reducing the overall TSS loads from the development. Analysis of the proposed redevelopment was completed using WinSLAMM software (**Attachment E**), and shows that the TSS reduction provided by the existing pond will increase to 78.12% as constructed.

Infiltration

Per the September 2008 Stormwater Calculation Summary provided by Jahnke & Jahnke Associates, Inc, this site was deemed as exempt from infiltration requirements due to its industrial classification.

Pipe Capacity

Per the City requirement, all storm sewer infrastructure has been designed to convey the 10-year, 24-hr storm event. See **Attachments F & G** for internal drainage boundary delineation and storm sewer pipe sizing calculations, respectively.

ATTACHMENTS:

Attachment A – Existing Pond Survey Exhibit

Attachment B – Overall Drainage Boundary Exhibit

Attachment C – Pre-Development Hydrologic Calculations

Attachment D – Post-Development Hydrologic Calculations

Attachment E – Water Quality Computations

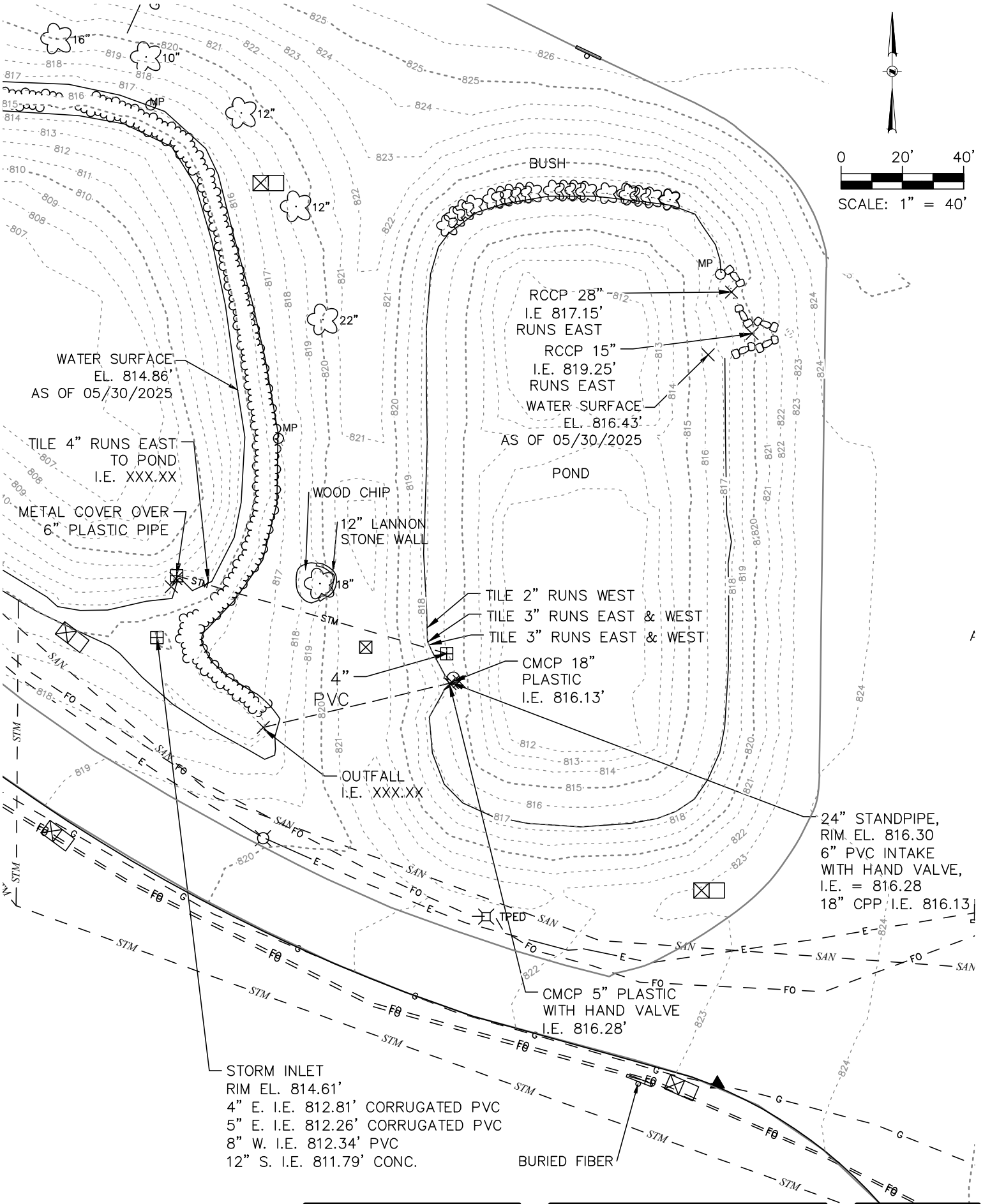
Attachment F – Internal Storm Sewer Drainage Boundary Exhibit

Attachment G – Storm Sewer Calculations

Attachment H – Storm Water Management Practice Maintenance Agreement (SWA 4654932)

Attachment I – September 2008 Stormwater Calculation Summary (Jahnke & Jahnke Associates)

PMC:pmc
X:\ML\2025\20250121\Design\Reports



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GRAEF

Source:

PROJECT NUMBER:	2025-0121	PROJECT TITLE:	WELDALL MFG EXPANSION	ATTACHMENT:	
DATE:	6/23/2025				
SCALE:	AS SHOWN	SHEET TITLE:	EXISTING STORM POND EXHIBIT		A
REFERENCE SHEET:	N/A				

ATTACHMENT B

GRAEF

WELDALL MFG - BUILDING EXPANSION

OVERALL DRAINAGE BOUNDARY EXHIBIT

CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN

LEGEND

- PERVIOUS AREA
- IMPERVIOUS SURFACE AREA
- BUILDING
- DRAINAGE BOUNDARY
- T_C FLOW PATH

S PRAIRIE AVE

CANADA NATIONAL RAIL ROAD

DRAINAGE FLOW PATH
T_C = 7.5 min

EXISTING BUILDING
(TO REMAIN)
F.F.E = 829.03±

PROPOSED BUILDING
ADDITION
F.F.E. = 825.88

EXISTING BUILDING
(TO REMAIN)
F.F.E = 825.88±

LIMITS OF
DISTURBANCE (TYP.)

WET POND DRAINAGE SHED
PAVED AREA (IMPERVIOUS) = 5.02 Ac.
BUILDING AREA (IMPERVIOUS) = 2.36 Ac.
PERVIOUS AREA = 0.83 Ac.
POND SURFACE AREA = 0.39 Ac.

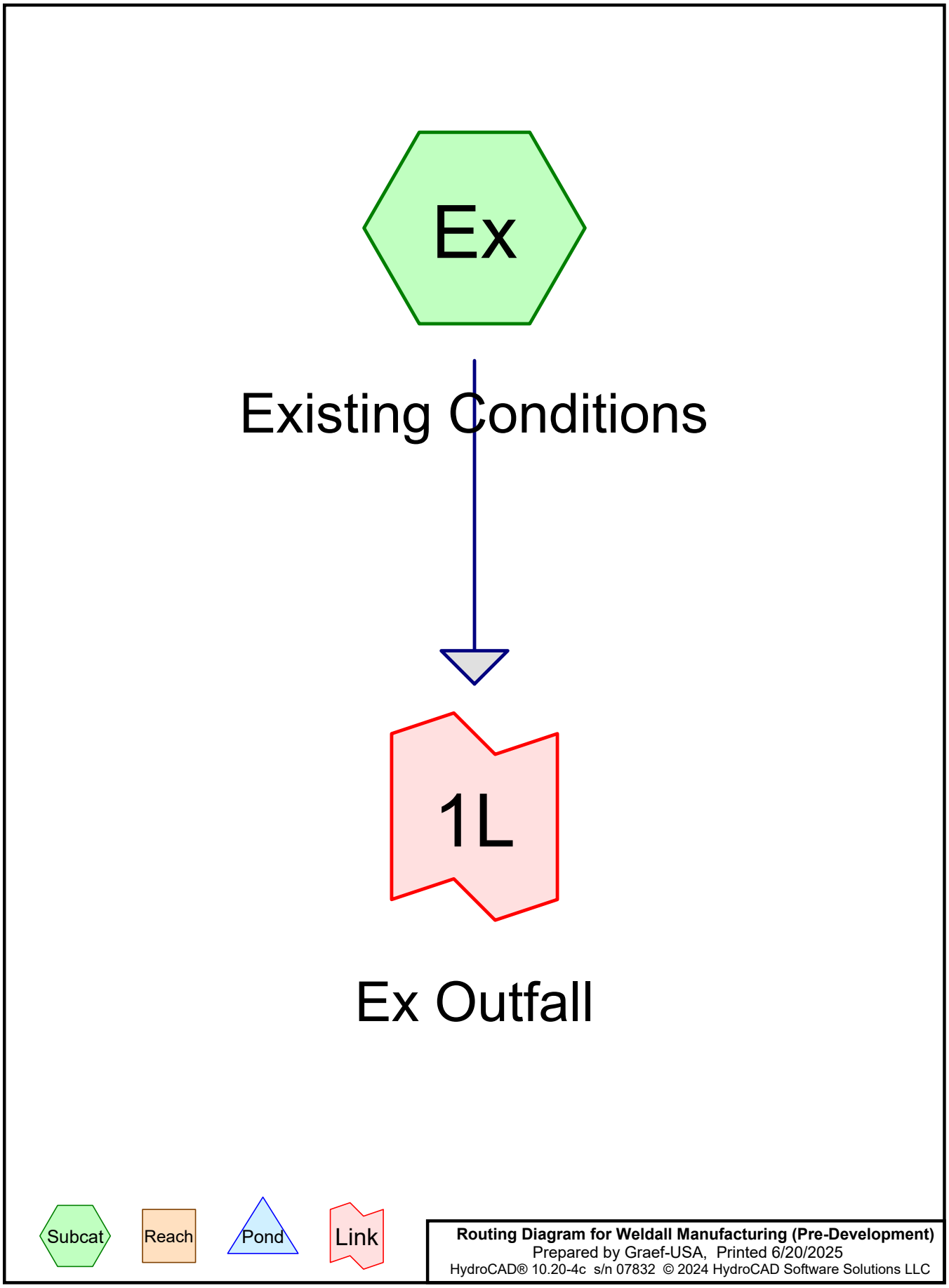
TOTAL ACREAGE = 8.60 Ac.
RUN-OFF COEFFICIENT (CN) = 95

N88° 07' 25.31"E
853.540

S85° 25'25"W 345.64'

0 20' 40'
SCALE: 1" = 40'

Proj. Number: XXXX-XXXX-XX Source: Insert Source Here



Routing Diagram for Weldall Manufacturing (Pre-Development)
Prepared by Graef-USA, Printed 6/20/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr 24-hr	MSE 24-hr	3	Default	24.00	1	2.40	2
2	2-yr 24-hr	MSE 24-hr	3	Default	24.00	1	2.70	2
3	10-yr 24-hr	MSE 24-hr	3	Default	24.00	1	3.81	2
4	100-yr 24-hr	MSE 24-hr	3	Default	24.00	1	6.18	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.230	69	Pasture/grassland/range, Fair, HSG B (Ex)
5.230	**69**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 Ex: Existing Conditions Runoff Area=5.230 ac 0.00% Impervious Runoff Depth=0.38"
Tc=13.0 min CN=69 Runoff=2.05 cfs 0.164 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.164 af Average Runoff Depth = 0.38"
100.00% Pervious = 5.230 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment Ex: Existing Conditions

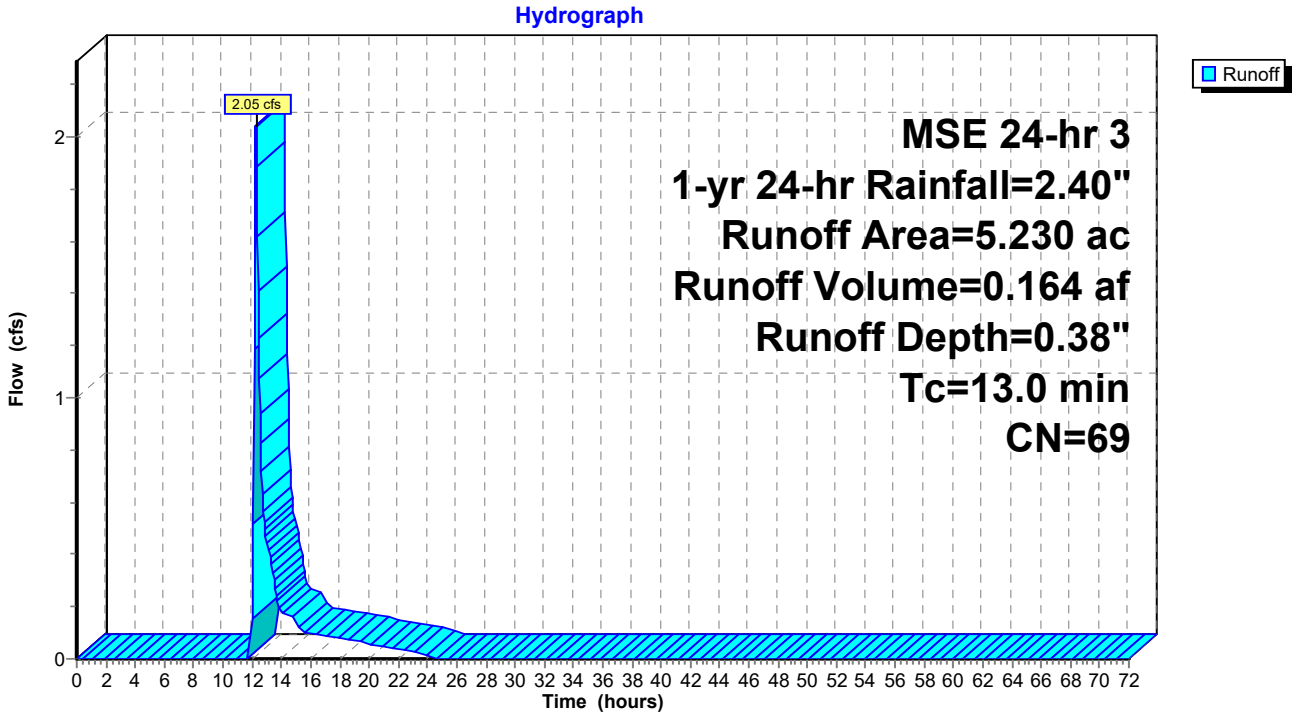
Runoff = 2.05 cfs @ 12.25 hrs, Volume= 0.164 af, Depth= 0.38"
Routed to Link 1L : Ex Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-yr 24-hr Rainfall=2.40"

Area (ac)	CN	Description
5.230	69	Pasture/grassland/range, Fair, HSG B
5.230		100.00% Pervious Area

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

Subcatchment Ex: Existing Conditions



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 Ex: Existing Conditions Runoff Area=5.230 ac 0.00% Impervious Runoff Depth=0.52"
Tc=13.0 min CN=69 Runoff=3.08 cfs 0.225 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.225 af Average Runoff Depth = 0.52"
100.00% Pervious = 5.230 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment Ex: Existing Conditions

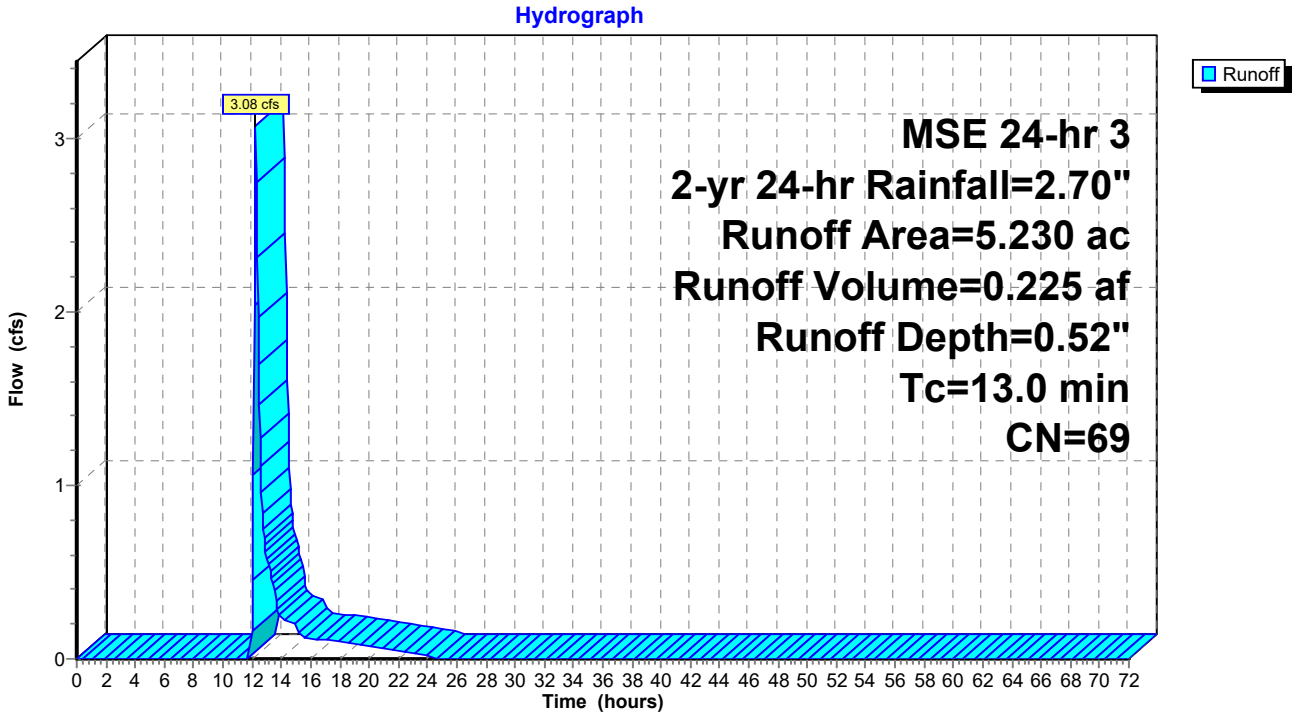
Runoff = 3.08 cfs @ 12.24 hrs, Volume= 0.225 af, Depth= 0.52"
Routed to Link 1L : Ex Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr 24-hr Rainfall=2.70"

Area (ac)	CN	Description
5.230	69	Pasture/grassland/range, Fair, HSG B
5.230		100.00% Pervious Area

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

Subcatchment Ex: Existing Conditions



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEx: Existing Conditions Runoff Area=5.230 ac 0.00% Impervious Runoff Depth=1.14"
Tc=13.0 min CN=69 Runoff=7.85 cfs 0.499 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.499 af Average Runoff Depth = 1.14"
100.00% Pervious = 5.230 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment Ex: Existing Conditions

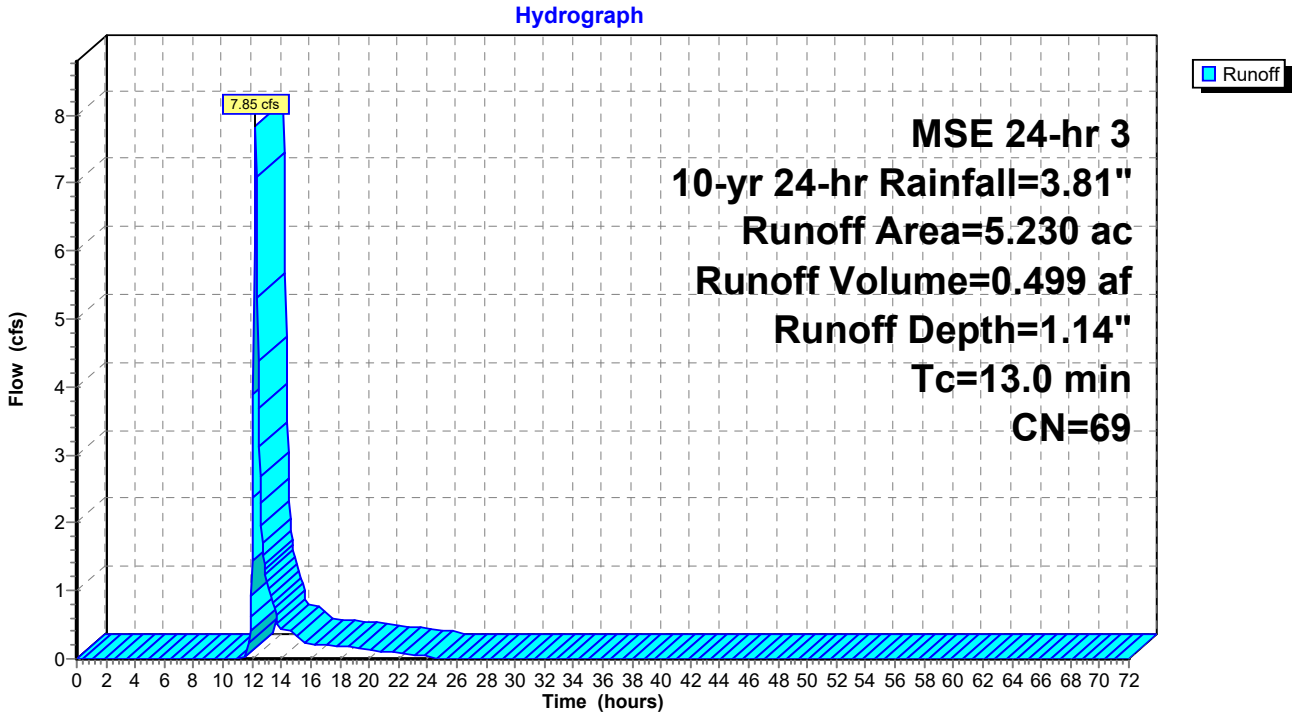
Runoff = 7.85 cfs @ 12.22 hrs, Volume= 0.499 af, Depth= 1.14"
Routed to Link 1L : Ex Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr 24-hr Rainfall=3.81"

Area (ac)	CN	Description
5.230	69	Pasture/grassland/range, Fair, HSG B
5.230		100.00% Pervious Area

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

Subcatchment Ex: Existing Conditions



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEx: Existing Conditions Runoff Area=5.230 ac 0.00% Impervious Runoff Depth=2.85"
Tc=13.0 min CN=69 Runoff=20.51 cfs 1.244 af

Total Runoff Area = 5.230 ac Runoff Volume = 1.244 af Average Runoff Depth = 2.85"
100.00% Pervious = 5.230 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment Ex: Existing Conditions

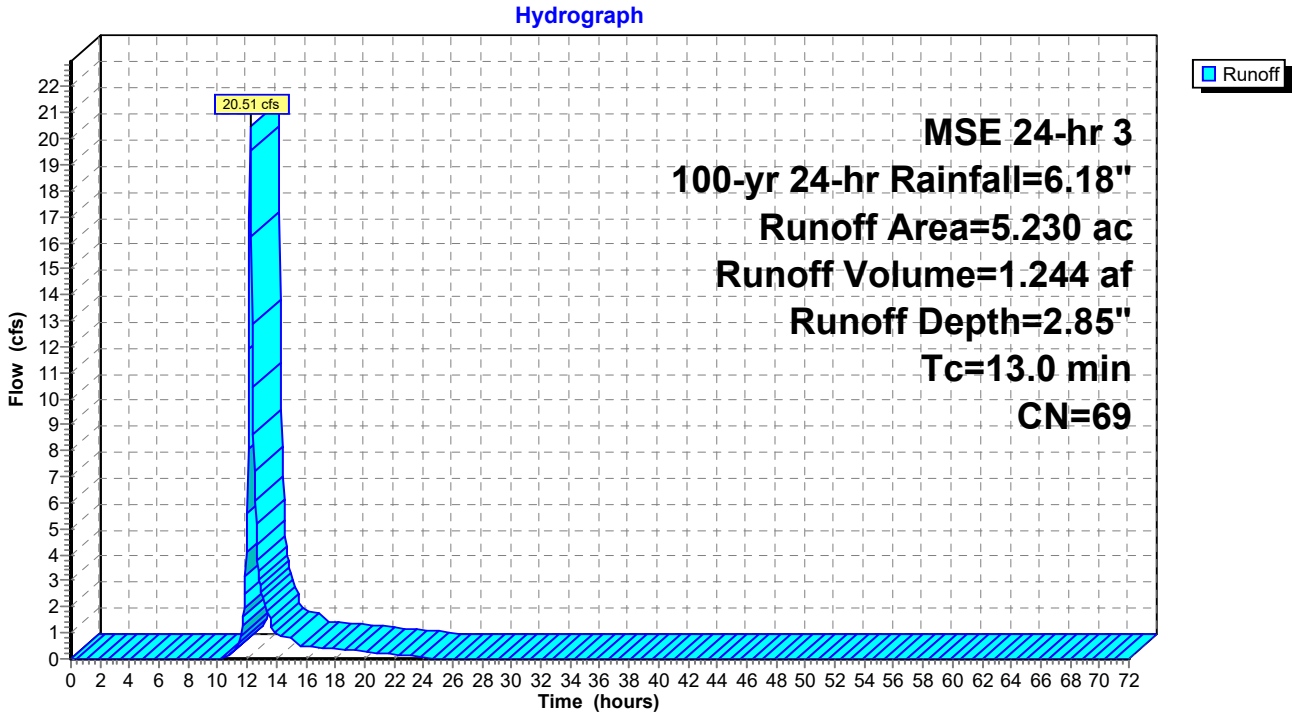
Runoff = 20.51 cfs @ 12.22 hrs, Volume= 1.244 af, Depth= 2.85"
Routed to Link 1L : Ex Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr 24-hr Rainfall=6.18"

Area (ac)	CN	Description
5.230	69	Pasture/grassland/range, Fair, HSG B
5.230		100.00% Pervious Area

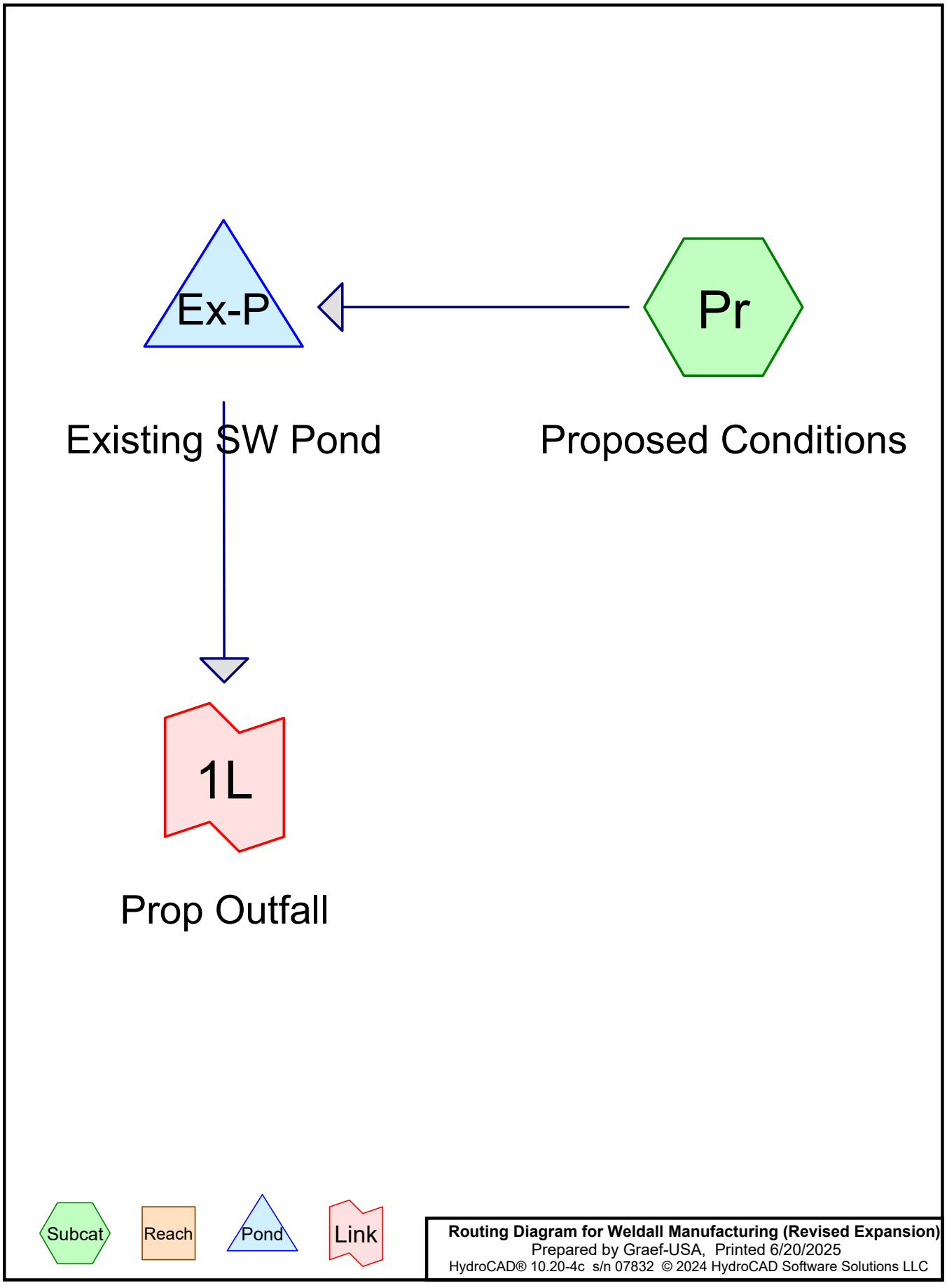
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0					**Direct Entry,**

Subcatchment Ex: Existing Conditions



Events for Subcatchment Ex: Existing Conditions

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr 24-hr	2.40	2.05	0.164	0.38
2-yr 24-hr	2.70	3.08	0.225	0.52
10-yr 24-hr	3.81	7.85	0.499	1.14
100-yr 24-hr	**6.18**	**20.51**	**1.244**	**2.85**



Routing Diagram for Weldall Manufacturing (Revised Expansion)
Prepared by Graef-USA, Printed 6/20/2025

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr 24-hr	MSE 24-hr	3	Default	24.00	1	2.40	2
2	2-yr 24-hr	MSE 24-hr	3	Default	24.00	1	2.70	2
3	10-yr 24-hr	MSE 24-hr	3	Default	24.00	1	3.81	2
4	100-yr 24-hr	MSE 24-hr	3	Default	24.00	1	6.18	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.831	69	50-75% Grass cover, Fair, HSG B (Pr)
7.378	98	Paved parking, HSG B (Pr)
0.387	98	Water Surface, HSG B (Pr)
8.596	**95**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPr: Proposed Conditions Runoff Area=8.596 ac 90.33% Impervious Runoff Depth=1.87"
Tc=7.5 min CN=95 Runoff=25.85 cfs 1.337 af

Pond Ex-P: Existing SW Pond Peak Elev=818.35' Storage=36,257 cf Inflow=25.85 cfs 1.337 af
Outflow=1.54 cfs 1.337 af

Total Runoff Area = 8.596 ac Runoff Volume = 1.337 af Average Runoff Depth = 1.87"
9.67% Pervious = 0.831 ac 90.33% Impervious = 7.765 ac

Summary for Subcatchment Pr: Proposed Conditions

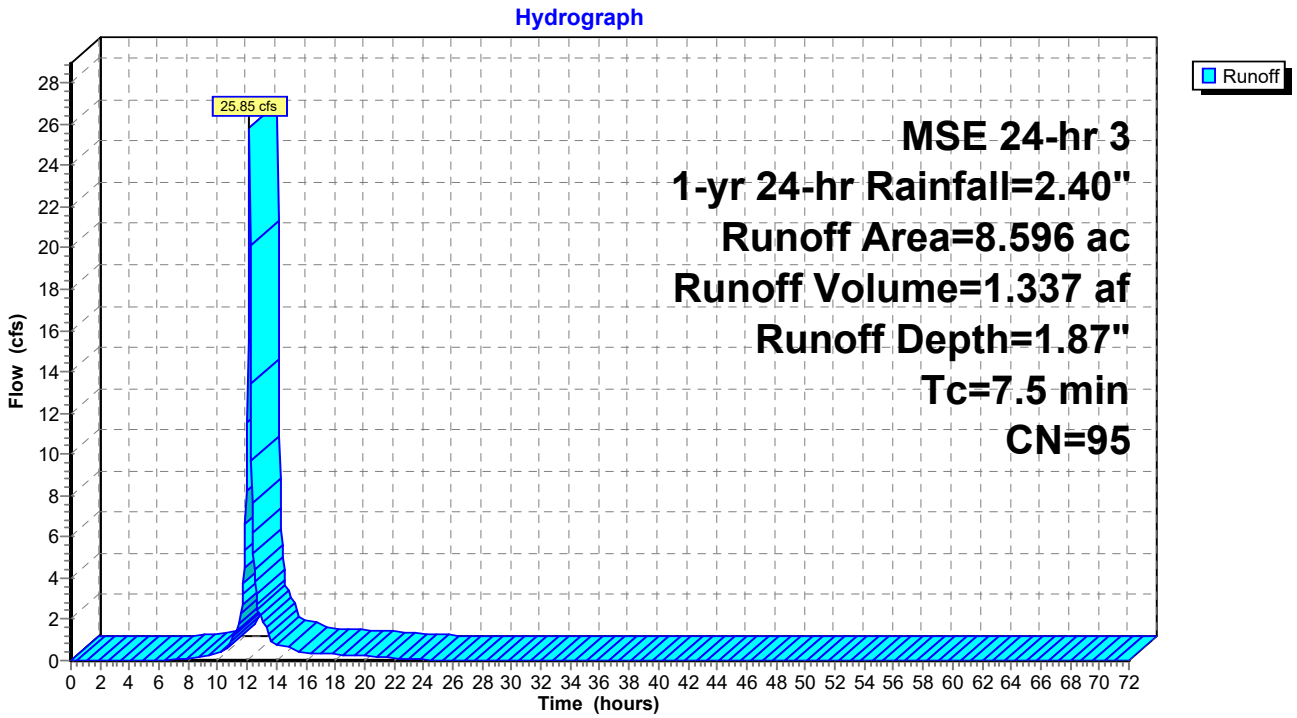
Runoff = 25.85 cfs @ 12.14 hrs, Volume= 1.337 af, Depth= 1.87"
Routed to Pond Ex-P : Existing SW Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-yr 24-hr Rainfall=2.40"

Area (ac)	CN	Description
7.378	98	Paved parking, HSG B
0.831	69	50-75% Grass cover, Fair, HSG B
0.387	98	Water Surface, HSG B
8.596	95	Weighted Average
0.831		9.67% Pervious Area
7.765		90.33% Impervious Area

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

Subcatchment Pr: Proposed Conditions



Summary for Pond Ex-P: Existing SW Pond

Inflow Area = 8.596 ac, 90.33% Impervious, Inflow Depth = 1.87" for 1-yr 24-hr event
Inflow = 25.85 cfs @ 12.14 hrs, Volume= 1.337 af
Outflow = 1.54 cfs @ 13.30 hrs, Volume= 1.337 af, Atten= 94%, Lag= 69.2 min
Primary = 1.54 cfs @ 13.30 hrs, Volume= 1.337 af
Routed to Link 1L : Prop Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 818.35' @ 13.30 hrs Surf.Area= 20,605 sf Storage= 36,257 cf

Plug-Flow detention time= 330.8 min calculated for 1.337 af (100% of inflow)
Center-of-Mass det. time= 330.2 min (1,108.8 - 778.6)

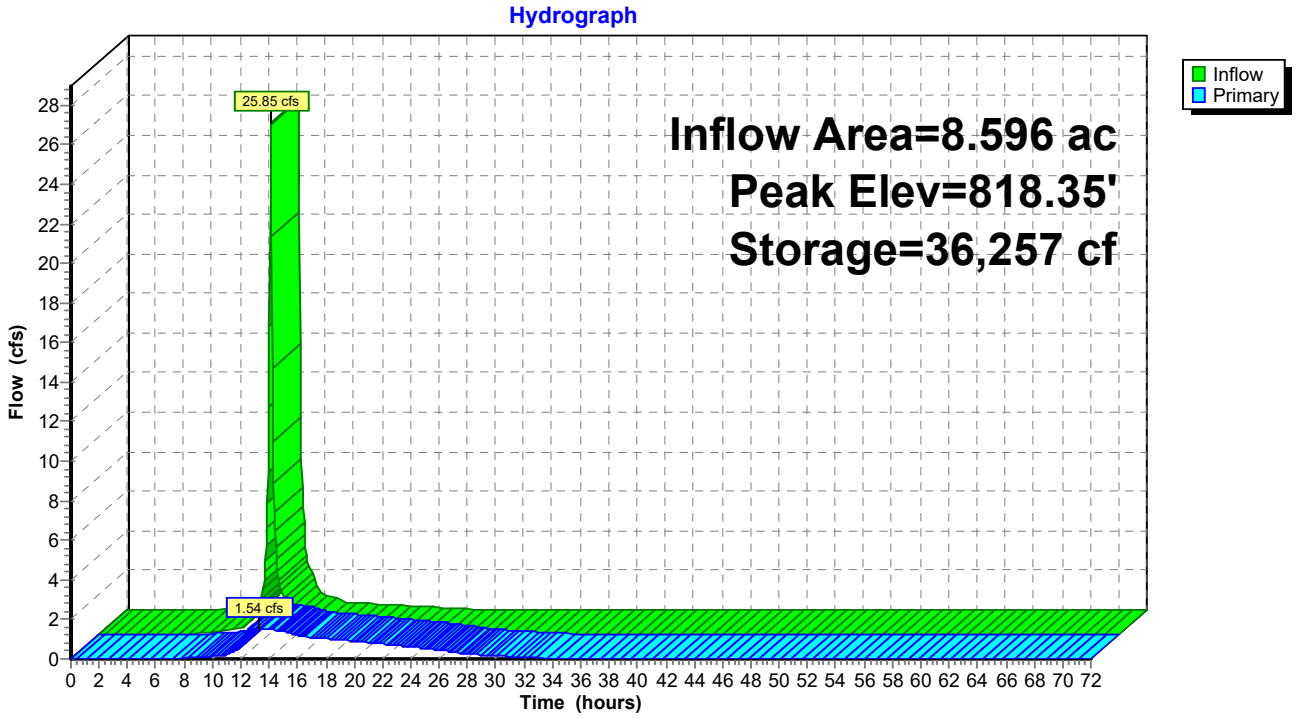
Volume	Invert	Avail.Storage	Storage Description
#1	816.43'	122,279 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
816.43	16,835	0	0
817.00	18,611	10,102	10,102
818.00	19,765	19,188	29,290
819.00	22,199	20,982	50,272
820.00	24,617	23,408	73,680
820.50	25,900	12,629	86,309
821.00	27,230	13,283	99,592
821.50	28,631	13,965	113,557
821.80	29,518	8,722	122,279

Device	Routing	Invert	Outlet Devices
#1	Primary	820.60'	**10.0' long + 3.0 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	816.13'	**18.0" Round Culvert** L= 63.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 816.13' / 815.72' S= 0.0065 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 2	816.28'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	818.99'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	816.63'	**4.0" Round Culvert** L= 81.3' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 816.63' / 814.51' S= 0.0261 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#6	Device 5	817.94'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.54 cfs @ 13.30 hrs HW=818.35' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Passes 1.27 cfs of 9.54 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 1.27 cfs @ 6.49 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Culvert** (Passes 0.27 cfs of 0.46 cfs potential flow)
  - **6=Orifice/Grate** (Orifice Controls 0.27 cfs @ 3.06 fps)

Pond Ex-P: Existing SW Pond



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPr: Proposed Conditions Runoff Area=8.596 ac 90.33% Impervious Runoff Depth=2.16"
Tc=7.5 min CN=95 Runoff=29.60 cfs 1.545 af

Pond Ex-P: Existing SW Pond Peak Elev=818.63' Storage=42,190 cf Inflow=29.60 cfs 1.545 af
Outflow=1.72 cfs 1.545 af

Total Runoff Area = 8.596 ac Runoff Volume = 1.545 af Average Runoff Depth = 2.16"
9.67% Pervious = 0.831 ac 90.33% Impervious = 7.765 ac

Summary for Subcatchment Pr: Proposed Conditions

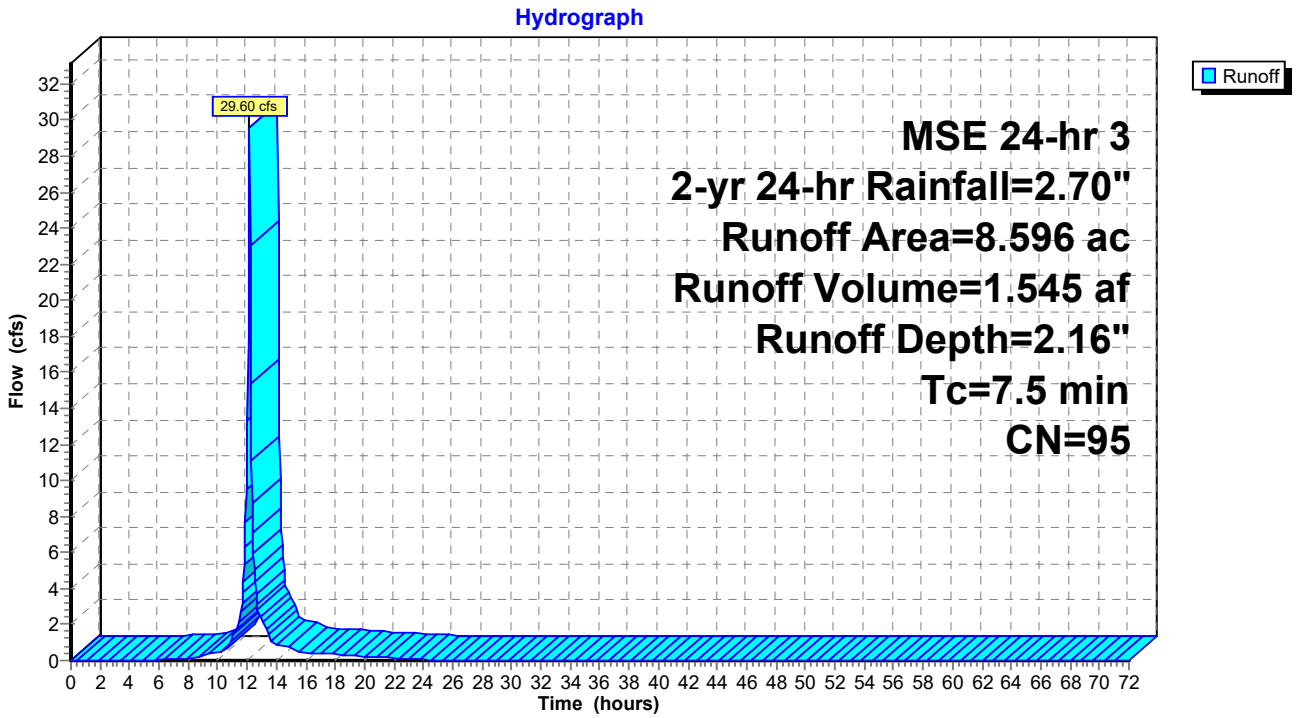
Runoff = 29.60 cfs @ 12.14 hrs, Volume= 1.545 af, Depth= 2.16"
Routed to Pond Ex-P : Existing SW Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr 24-hr Rainfall=2.70"

Area (ac)	CN	Description
7.378	98	Paved parking, HSG B
0.831	69	50-75% Grass cover, Fair, HSG B
0.387	98	Water Surface, HSG B
8.596	95	Weighted Average
0.831		9.67% Pervious Area
7.765		90.33% Impervious Area

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

Subcatchment Pr: Proposed Conditions



Summary for Pond Ex-P: Existing SW Pond

Inflow Area = 8.596 ac, 90.33% Impervious, Inflow Depth = 2.16" for 2-yr 24-hr event
Inflow = 29.60 cfs @ 12.14 hrs, Volume= 1.545 af
Outflow = 1.72 cfs @ 13.32 hrs, Volume= 1.545 af, Atten= 94%, Lag= 70.4 min
Primary = 1.72 cfs @ 13.32 hrs, Volume= 1.545 af
Routed to Link 1L : Prop Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 818.63' @ 13.32 hrs Surf.Area= 21,294 sf Storage= 42,190 cf

Plug-Flow detention time= 341.0 min calculated for 1.544 af (100% of inflow)
Center-of-Mass det. time= 341.5 min (1,117.3 - 775.8)

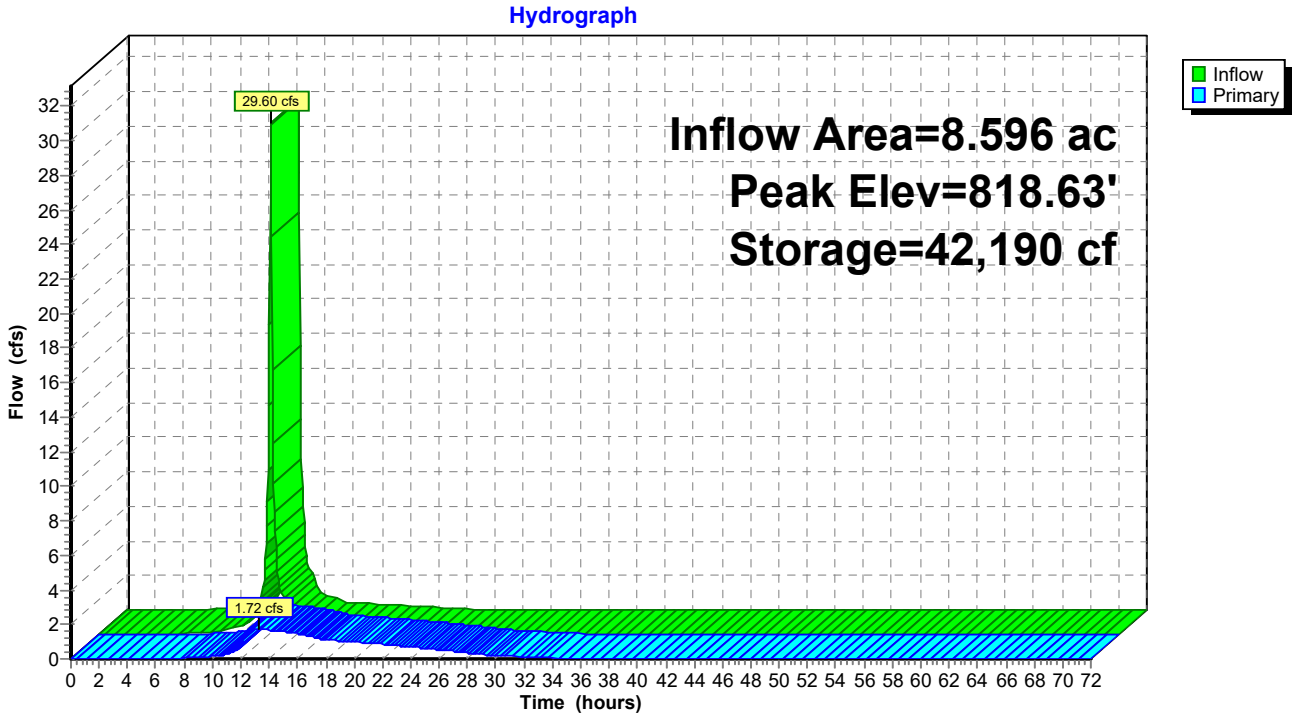
Volume	Invert	Avail.Storage	Storage Description
#1	816.43'	122,279 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
816.43	16,835	0	0
817.00	18,611	10,102	10,102
818.00	19,765	19,188	29,290
819.00	22,199	20,982	50,272
820.00	24,617	23,408	73,680
820.50	25,900	12,629	86,309
821.00	27,230	13,283	99,592
821.50	28,631	13,965	113,557
821.80	29,518	8,722	122,279

Device	Routing	Invert	Outlet Devices
#1	Primary	820.60'	**10.0' long + 3.0 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	816.13'	**18.0" Round Culvert** L= 63.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 816.13' / 815.72' S= 0.0065 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 2	816.28'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	818.99'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	816.63'	**4.0" Round Culvert** L= 81.3' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 816.63' / 814.51' S= 0.0261 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#6	Device 5	817.94'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.72 cfs @ 13.32 hrs HW=818.63' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Passes 1.37 cfs of 10.67 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 1.37 cfs @ 6.97 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Culvert** (Passes 0.35 cfs of 0.48 cfs potential flow)
  - **6=Orifice/Grate** (Orifice Controls 0.35 cfs @ 3.99 fps)

Pond Ex-P: Existing SW Pond



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPr: Proposed Conditions Runoff Area=8.596 ac 90.33% Impervious Runoff Depth=3.24"
Tc=7.5 min CN=95 Runoff=43.37 cfs 2.324 af

Pond Ex-P: Existing SW Pond Peak Elev=819.34' Storage=58,055 cf Inflow=43.37 cfs 2.324 af
Outflow=6.42 cfs 2.324 af

Total Runoff Area = 8.596 ac Runoff Volume = 2.324 af Average Runoff Depth = 3.24"
9.67% Pervious = 0.831 ac 90.33% Impervious = 7.765 ac

Summary for Subcatchment Pr: Proposed Conditions

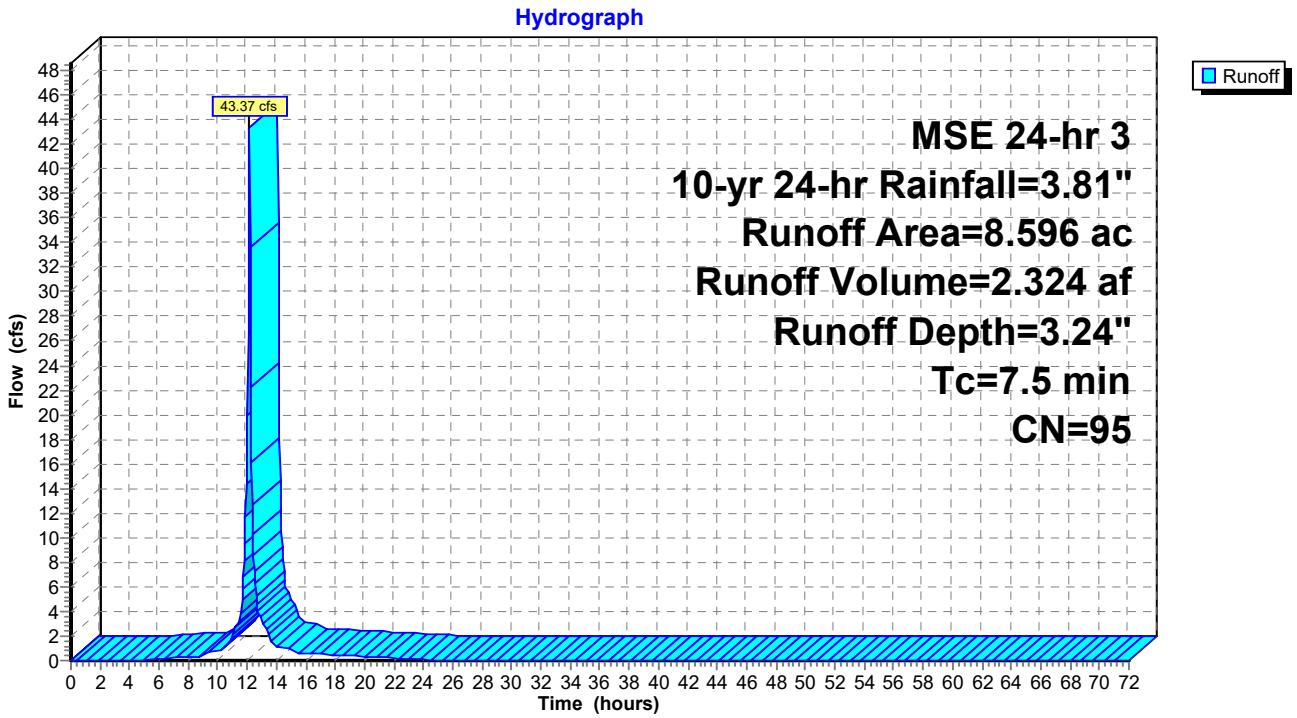
Runoff = 43.37 cfs @ 12.14 hrs, Volume= 2.324 af, Depth= 3.24"
Routed to Pond Ex-P : Existing SW Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr 24-hr Rainfall=3.81"

Area (ac)	CN	Description
7.378	98	Paved parking, HSG B
0.831	69	50-75% Grass cover, Fair, HSG B
0.387	98	Water Surface, HSG B
8.596	95	Weighted Average
0.831		9.67% Pervious Area
7.765		90.33% Impervious Area

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

Subcatchment Pr: Proposed Conditions



Summary for Pond Ex-P: Existing SW Pond

Inflow Area = 8.596 ac, 90.33% Impervious, Inflow Depth = 3.24" for 10-yr 24-hr event
Inflow = 43.37 cfs @ 12.14 hrs, Volume= 2.324 af
Outflow = 6.42 cfs @ 12.54 hrs, Volume= 2.324 af, Atten= 85%, Lag= 24.0 min
Primary = 6.42 cfs @ 12.54 hrs, Volume= 2.324 af
Routed to Link 1L : Prop Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 819.34' @ 12.54 hrs Surf.Area= 23,031 sf Storage= 58,055 cf

Plug-Flow detention time= 316.1 min calculated for 2.324 af (100% of inflow)
Center-of-Mass det. time= 315.5 min (1,083.5 - 768.0)

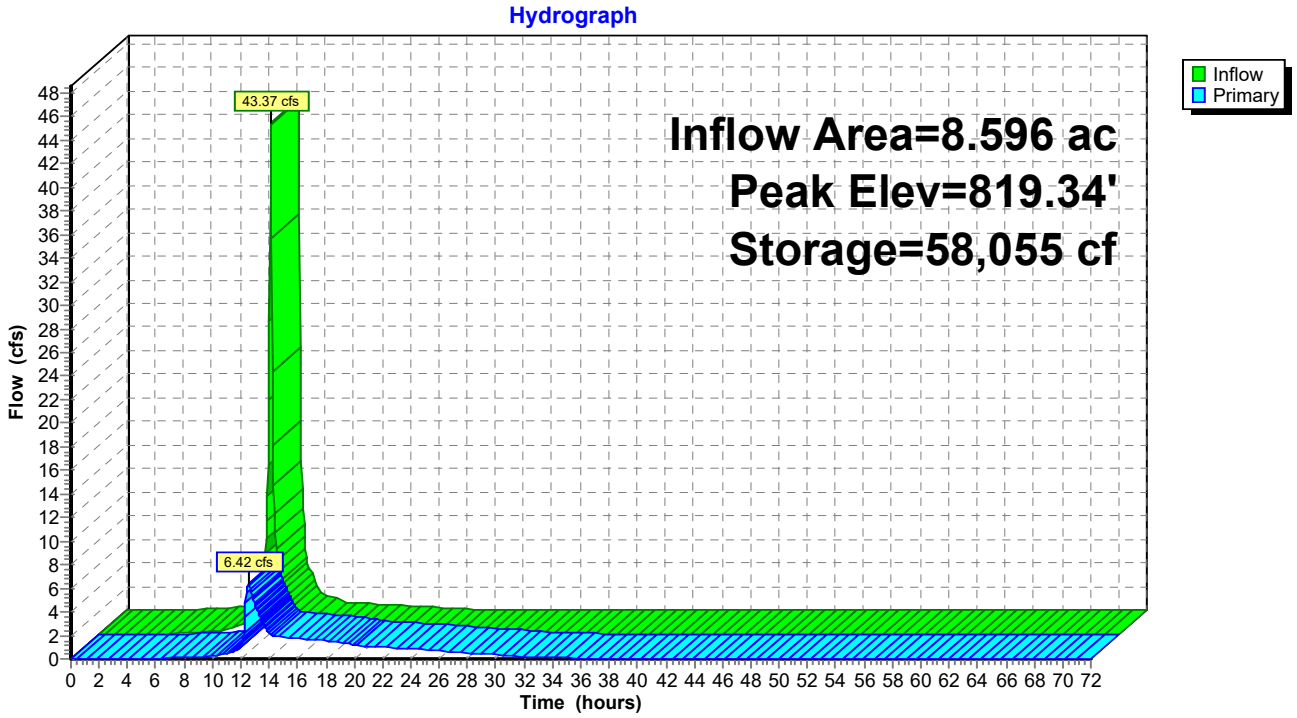
Volume	Invert	Avail.Storage	Storage Description
#1	816.43'	122,279 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
816.43	16,835	0	0
817.00	18,611	10,102	10,102
818.00	19,765	19,188	29,290
819.00	22,199	20,982	50,272
820.00	24,617	23,408	73,680
820.50	25,900	12,629	86,309
821.00	27,230	13,283	99,592
821.50	28,631	13,965	113,557
821.80	29,518	8,722	122,279

Device	Routing	Invert	Outlet Devices
#1	Primary	820.60'	**10.0' long + 3.0 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	816.13'	**18.0" Round Culvert** L= 63.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 816.13' / 815.72' S= 0.0065 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 2	816.28'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	818.99'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	816.63'	**4.0" Round Culvert** L= 81.3' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 816.63' / 814.51' S= 0.0261 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#6	Device 5	817.94'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.41 cfs @ 12.54 hrs HW=819.34' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Passes 5.91 cfs of 13.10 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 1.59 cfs @ 8.08 fps)
  - **4=Orifice/Grate** (Weir Controls 4.32 cfs @ 1.94 fps)
- **5=Culvert** (Passes 0.50 cfs of 0.52 cfs potential flow)
  - **6=Orifice/Grate** (Orifice Controls 0.50 cfs @ 5.70 fps)

Pond Ex-P: Existing SW Pond



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPr: Proposed Conditions Runoff Area=8.596 ac 90.33% Impervious Runoff Depth=5.59"
Tc=7.5 min CN=95 Runoff=72.36 cfs 4.005 af

Pond Ex-P: Existing SW Pond Peak Elev=820.57' Storage=88,165 cf Inflow=72.36 cfs 4.005 af
Outflow=16.94 cfs 4.005 af

Total Runoff Area = 8.596 ac Runoff Volume = 4.005 af Average Runoff Depth = 5.59"
9.67% Pervious = 0.831 ac 90.33% Impervious = 7.765 ac

Summary for Subcatchment Pr: Proposed Conditions

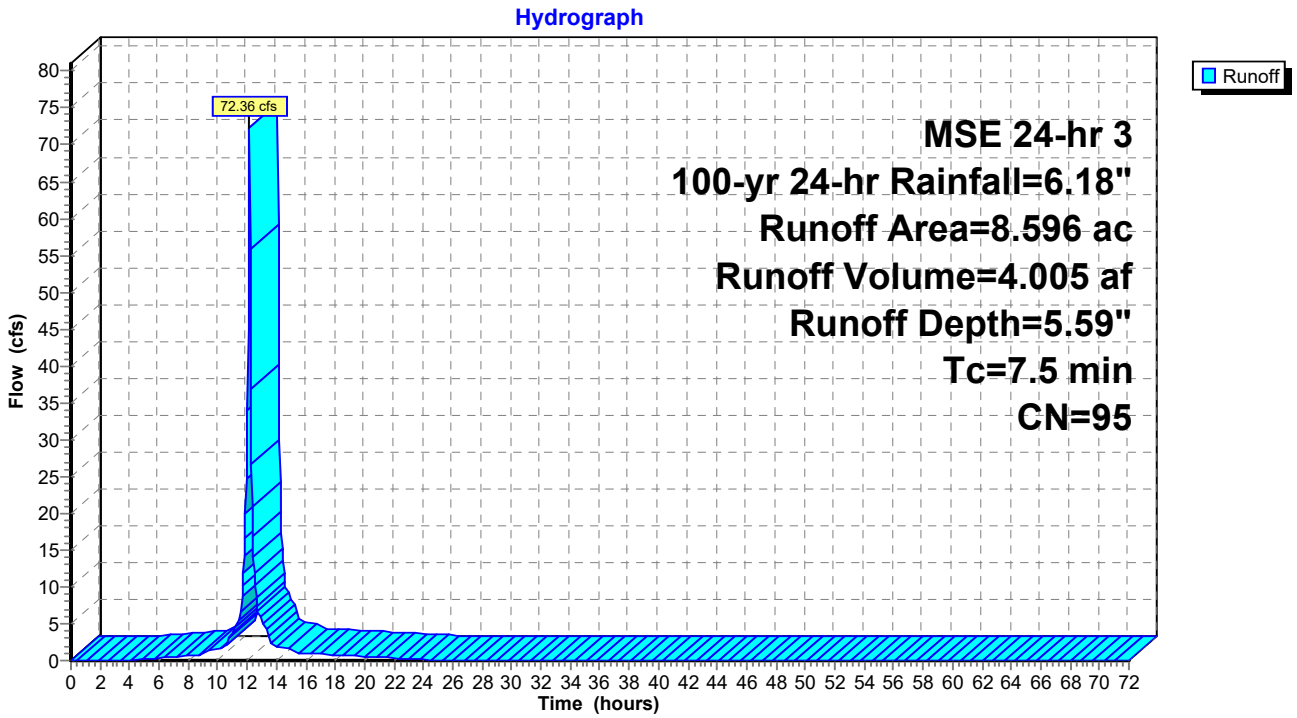
Runoff = 72.36 cfs @ 12.14 hrs, Volume= 4.005 af, Depth= 5.59"
Routed to Pond Ex-P : Existing SW Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr 24-hr Rainfall=6.18"

Area (ac)	CN	Description
7.378	98	Paved parking, HSG B
0.831	69	50-75% Grass cover, Fair, HSG B
0.387	98	Water Surface, HSG B
8.596	95	Weighted Average
0.831		9.67% Pervious Area
7.765		90.33% Impervious Area

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

Subcatchment Pr: Proposed Conditions



Summary for Pond Ex-P: Existing SW Pond

Inflow Area = 8.596 ac, 90.33% Impervious, Inflow Depth = 5.59" for 100-yr 24-hr event
Inflow = 72.36 cfs @ 12.14 hrs, Volume= 4.005 af
Outflow = 16.94 cfs @ 12.40 hrs, Volume= 4.005 af, Atten= 77%, Lag= 15.6 min
Primary = 16.94 cfs @ 12.40 hrs, Volume= 4.005 af
Routed to Link 1L : Prop Outfall

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 820.57' @ 12.40 hrs Surf.Area= 26,090 sf Storage= 88,165 cf

Plug-Flow detention time= 231.6 min calculated for 4.005 af (100% of inflow)
Center-of-Mass det. time= 231.0 min (989.3 - 758.3)

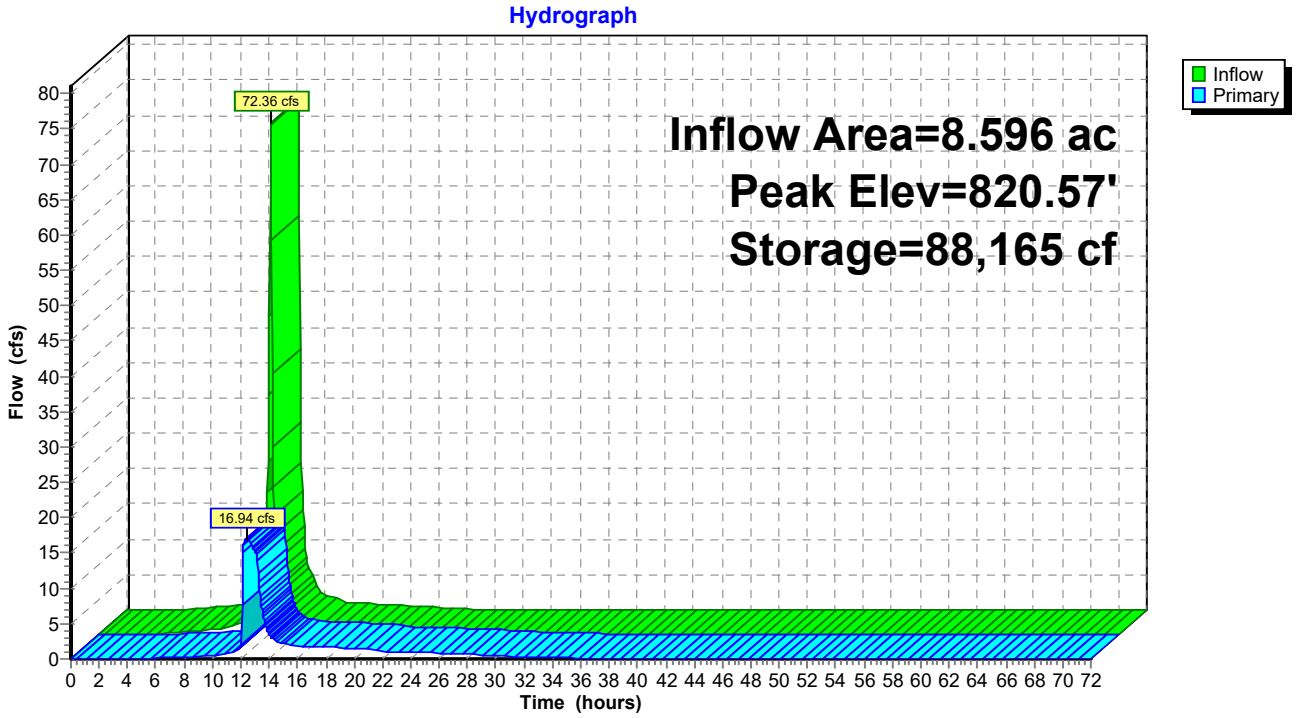
Volume	Invert	Avail.Storage	Storage Description
#1	816.43'	122,279 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
816.43	16,835	0	0
817.00	18,611	10,102	10,102
818.00	19,765	19,188	29,290
819.00	22,199	20,982	50,272
820.00	24,617	23,408	73,680
820.50	25,900	12,629	86,309
821.00	27,230	13,283	99,592
821.50	28,631	13,965	113,557
821.80	29,518	8,722	122,279

Device	Routing	Invert	Outlet Devices
#1	Primary	820.60'	**10.0' long + 3.0 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	816.13'	**18.0" Round Culvert** L= 63.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 816.13' / 815.72' S= 0.0065 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 2	816.28'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	818.99'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	816.63'	**4.0" Round Culvert** L= 81.3' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 816.63' / 814.51' S= 0.0261 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#6	Device 5	817.94'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.94 cfs @ 12.40 hrs HW=820.57' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Inlet Controls 16.35 cfs @ 9.25 fps)
  - **3=Orifice/Grate** (Passes < 1.90 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 19.02 cfs potential flow)
- **5=Culvert** (Barrel Controls 0.59 cfs @ 6.78 fps)
  - **6=Orifice/Grate** (Passes 0.59 cfs of 0.68 cfs potential flow)

Pond Ex-P: Existing SW Pond

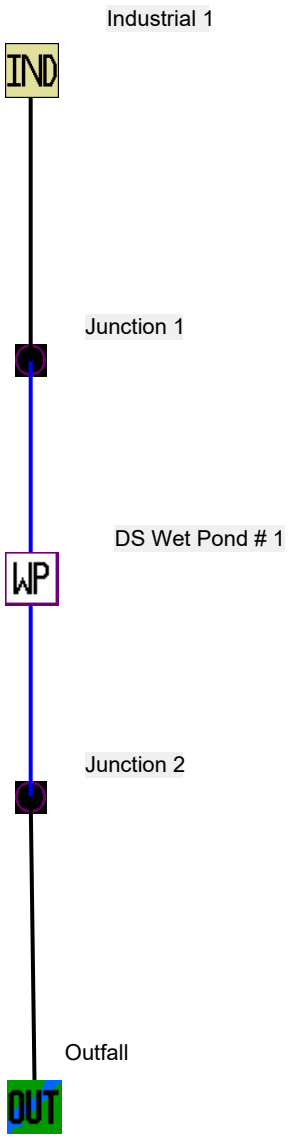


Events for Subcatchment Pr: Proposed Conditions

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr 24-hr	2.40	25.85	1.337	1.87
2-yr 24-hr	2.70	29.60	1.545	2.16
10-yr 24-hr	3.81	43.37	2.324	3.24
100-yr 24-hr	**6.18**	**72.36**	**4.005**	**5.59**

Events for Pond Ex-P: Existing SW Pond

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
1-yr 24-hr	25.85	1.54	818.35	36,257
2-yr 24-hr	29.60	1.72	818.63	42,190
10-yr 24-hr	43.37	6.42	819.34	58,055
100-yr 24-hr	**72.36**	**16.94**	**820.57**	**88,165**


Industrial 1
IND
Junction 1
DS Wet Pond # 1
WP
Junction 2
Outfall
OUT

Data file name: X:\ML\2025\20250121\Design\Calcs\Stormwater\Weldall Mfg - WinSLAMM.mdb
WinSLAMM Version 10.5.0
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.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: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 06-20-2025 Time: 11:36:31
Site information:

LU# 1 - Industrial: Industrial 1 Total area (ac): 8.596
1 - Roofs 1: 2.349 ac. Pitched Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
2 - Roofs 2: 0.009 ac. Pitched Disconnected Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.c
13 - Paved Parking 1: 3.986 ac. Connected PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
14 - Paved Parking 2: 1.034 ac. Disconnected Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.c
51 - Small Landscaped Areas 1: 0.831 ac. Normal Silty PSD File: C:\WinSLAMM Files\NURP.cpz Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.387 ac. PSD File: Source Area PSD File:

Control Practice 1: Wet Detention Pond CP# 1 (DS) - DS Wet Pond # 1
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 5.33
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.5
2. Number of orifices: 1
3. Invert elevation above datum (ft): 5.18
Outlet type: Orifice 2
1. Orifice diameter (ft): 0.33
2. Number of orifices: 1
3. Invert elevation above datum (ft): 6.84
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 8
3. Height from datum to bottom of weir opening: 9.5
Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 2
2. Stand pipe height above datum (ft): 7.89
Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0010	0.00	0.00
2	0.30	0.0714	0.00	0.00
3	0.40	0.0830	0.00	0.00
4	0.90	0.1270	0.00	0.00
5	1.90	0.1840	0.00	0.00
6	2.20	0.1990	0.00	0.00
7	2.30	0.2050	0.00	0.00
8	2.90	0.2360	0.00	0.00
9	3.90	0.2920	0.00	0.00
10	4.90	0.3570	0.00	0.00
11	5.33	0.3870	0.00	0.00
12	5.90	0.4270	0.00	0.00
13	6.90	0.4540	0.00	0.00
14	7.90	0.5100	0.00	0.00
15	8.90	0.5650	0.00	0.00
16	9.40	0.5950	0.00	0.00
17	9.50	0.6010	0.00	0.00
18	9.90	0.6250	0.00	0.00
19	10.40	0.6570	0.00	0.00
20	10.70	0.6780	0.00	0.00

SLAMM for Windows Version 10.5.0

Data file name: X:\ML\2025\20250121\Design\Calcs\Stormwater\Weldall Mfg - WinSLAMM.mdb
WinSLAMM Version 10.5.0
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.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: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Model Run Start Date: 01/01/81 Model Run End Date: 12/31/81
Date of run: 06-20-2025 Time of run: 11:37:11
Total Area Modeled (acres): 8.596
Years in Model Run: 1.00

	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:	579958	-	146.9	5319	-
Outfall Total with Controls:	581526	-0.27%	32.07	1164	78.12%
Annualized Total After Outfall Controls:	583123			1167	

ATTACHMENT F

GRAEF

LEGEND

- PERVIOUS AREA
- IMPERVIOUS SURFACE AREA
- BUILDING
- OVERALL DRAINAGE BOUNDARY
- INTERNAL DRAINAGE BOUNDARY
- T_c FLOW PATH

S PRAIRIE AVE

CANADA NATIONAL RAIL ROAD

N88° 07' 25.31"E
853.540

S88° 07' 25"W 345.64'

EXISTING BUILDING
(TO REMAIN)
F.F.E = 829.03±

DRAINAGE FLOW PATH
(TYP.)

DA-1
DA-2
DA-3
DA-4
DA-5
DA-6
DA-7
DA-8

RD-1
RD-2
RD-3
RD-4
RD-5

PROPOSED BUILDING
ADDITION
F.F.E. = 825.88

EXISTING BUILDING
(TO REMAIN)
F.F.E = 825.88±

STM

AREA SUMMARY

	IMPERVIOUS AREA (Ac.)	PERVIOUS AREA (Ac.)	TOTAL AREA (Ac.)	RUN-OFF COEFFICIENT (C)	OVERLAND T_c (MIN)
DA–1	0.03	0.02	0.05	0.65	0.82
DA–2	0.38	0.20	0.58	0.71	4.34
DA–3	0.44	0.00	0.44	0.95	4.36
DA–4	0.61	0.00	0.61	0.95	3.76
DA–5	0.31	0.00	0.31	0.95	2.28
DA–6	0.33	0.00	0.33	0.95	1.68
DA–7	0.77	0.00	0.77	0.95	3.37
DA–8	1.20	0.12	1.32	0.89	6.60
RD–1	0.31	0.00	0.31	0.95	0.60
RD–2	0.49	0.00	0.49	0.95	0.60
RD–3	0.49	0.00	0.49	0.95	0.60
RD–4	0.49	0.00	0.49	0.95	0.60
RD–5	0.49	0.00	0.49	0.95	0.60

N

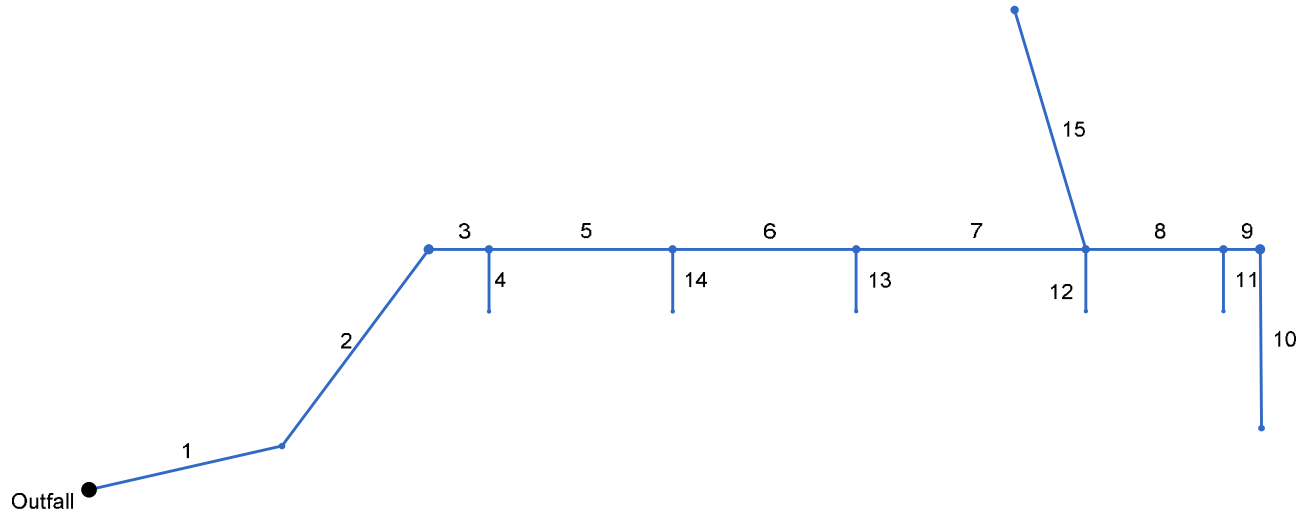
0 20' 40'
SCALE: 1" = 40'

WELDALL MFG - BUILDING EXPANSION

INTERNAL STORM SEWER DRAINAGE BOUNDARY EXHIBIT

CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN

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



Project File: Weldall Mfg - Storm Sewer Sizing.stm	Number of lines: 15	Date: 6/23/2025

MyReport

Line No.	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Line Type	Line Size (in)	Line Length (ft)	Drng Area (ac)	Runoff Coeff (C)	Tc (min)	Flow Rate (cfs)	Invert Dn (ft)	Invert Up (ft)	Cover Dn (ft)	Cover Up (ft)	n-val Pipe	Line Slope (%)	Sf Ave (%)	Capac Full (cfs)	Junct Type	J-Loss Coeff	HGL Dn (ft)	HGL Up (ft)
1	819.48	824.31	Cir	36	107.668	0.77	0.95	9.2	33.93	816.43	816.75	0.05	4.56	0.013	0.30	0.226	36.36	MH	0.70	819.34	819.57
2	824.31	825.10	Cir	30	134.167	0.00	0.00	8.9	30.43	816.75	817.55	5.06	5.05	0.013	0.60	0.551	31.67	MH	0.83	819.84	820.57
3	825.10	824.78	Cir	30	32.604	0.33	0.95	8.8	30.57	817.55	817.75	5.05	4.53	0.013	0.61	0.556	32.13	MH	1.00	821.07	821.25
4	824.78	825.73	Cir	10	33.984	0.49	0.95	5.0	3.33	820.70	821.38	3.25	3.52	0.011	2.00	1.653	3.66	MH	1.00	821.85	822.42
5	824.78	824.88	Cir	30	100.000	0.31	0.95	8.5	26.57	817.75	818.20	4.53	4.18	0.013	0.45	0.420	27.51	MH	1.00	821.85	822.27
6	824.88	824.99	Cir	30	100.000	0.61	0.95	8.1	22.61	818.20	818.65	4.18	3.84	0.013	0.45	0.304	27.51	MH	1.00	822.73	823.03
7	824.99	825.08	Cir	24	125.126	0.44	0.95	7.7	16.81	818.65	819.40	4.34	3.68	0.013	0.60	0.553	17.51	MH	1.00	823.36	824.06
8	825.08	825.19	Cir	15	74.869	0.58	0.71	7.4	4.52	819.40	819.77	4.43	4.17	0.013	0.49	0.489	4.54	MH	1.00	824.50	824.87
9	825.19	825.62	Cir	12	20.056	0.00	0.00	6.3	0.21	821.27	821.42	2.92	3.20	0.013	0.75	0.004	3.08	MH	1.00	825.08	825.08
10	825.62	826.18	Cir	12	97.849	0.05	0.65	0.8	0.23	821.42	822.15	3.20	3.03	0.013	0.75	0.004	3.08	MH	1.00	825.08	825.08
11	825.19	825.71	Cir	10	33.815	0.31	0.95	5.0	2.10	820.70	821.38	3.66	3.50	0.011	2.01	0.662	3.67	MH	1.00	825.08	825.30
12	825.08	825.72	Cir	10	33.868	0.49	0.95	5.0	3.33	820.95	821.63	3.30	3.26	0.011	2.01	1.653	3.67	MH	1.00	824.50	825.06
13	824.99	825.71	Cir	10	33.900	0.49	0.95	5.0	3.33	820.70	821.38	3.46	3.50	0.011	2.01	1.653	3.67	MH	1.00	823.36	823.93
14	824.88	825.67	Cir	10	33.942	0.49	0.95	5.0	3.33	820.70	821.38	3.35	3.46	0.011	2.00	1.653	3.66	MH	1.00	822.73	823.29
15	825.08	826.38	Cir	18	136.587	1.32	0.89	6.6	7.55	819.40	820.26	4.18	4.62	0.013	0.63	0.517	8.33	MH	1.00	824.50	825.21

Project File: Weldall Mfg - Storm Sewer Sizing.stm | Number of lines: 15 | Date: 6/23/2025

NOTES: ** Critical depth

MyReport

HGL Junct (ft)	Vel Ave (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	EGL Dn (ft)	EGL Up (ft)	EGL Jnct (ft)	DnStm Ln No
819.84	4.88	0.36	0.38	819.70	819.95	820.21	Outfall
821.07	6.20	0.60	0.60	820.43	821.17	821.67	1
821.85	6.23	0.60	0.60	821.67	821.85	822.46	2
823.00	6.10	0.58	0.58	822.43	823.00	823.57	3
822.73	5.41	0.46	0.46	822.31	822.73	823.19	3
823.36	4.61	0.33	0.33	823.06	823.36	823.69	5
824.50	5.35	0.45	0.45	823.81	824.50	824.95	6
825.08	3.68	0.21	0.21	824.71	825.08	825.29	7
825.08	0.27	0.00	0.00	825.08	825.08	825.08	8
825.09	0.30	0.00	0.00	825.08	825.09	825.09	9
825.53	3.86	0.23	0.23	825.31	825.53	825.77	8
825.64	6.10	0.58	0.58	825.08	825.64	826.22	7
824.50	6.10	0.58	0.58	823.94	824.50	825.08	6
823.87	6.10	0.58	0.58	823.31	823.87	824.45	5
825.49	4.27	0.28	0.28	824.79	825.49	825.78	7

Project File: Weldall Mfg - Storm Sewer Sizing.stm | Number of lines: 15 | Date: 6/23/2025

NOTES: ** Critical depth

DB

~~(Sample)~~ Storm Water Management Practice Maintenance Agreement

4654932

REGISTER OF DEEDS
WAUKESHA COUNTY, WI
RECORDED ON

March 03, 2022 03:05 PM
James R Behrend
Register of Deeds
17 PGS
TOTAL FEE:$30.00
TRANS FEE:$0.00

Book Page -

Triple D Management, LLC. and Weld-all Manufacturing, as "Owner" of the property described below, in accordance with Chapter 32 City of Waukesha Storm Water Management and Erosion Control, agrees to install and maintain storm water management practice(s) on the subject property in accordance with approved plans and Storm Water Management Plan conditions. The owner further agrees to the terms stated in this document to ensure that the storm water management practice(s) continues serving the intended functions in perpetuity. This Agreement includes the following exhibits:

Exhibit A: Legal Description of the real estate for which this Agreement applies ("Property").
Exhibit B: Location Map(s) – shows an accurate location of each storm water management practice affected by this Agreement.
Exhibit C: Maintenance Plan – prescribes those activities that must be carried out to maintain compliance with this Agreement.

Note: After construction verification has been accepted by the City of Waukesha, for all planned storm water management practices, an addendum(s) to this agreement shall be recorded by the Owner showing design and construction details. The addendum(s) may contain several additional exhibits, including certification by City of Waukesha of Storm Water and Erosion Control Permit termination, as described below.

Name and Return Address

City of Waukesha
~~130~~ 201 Delafield Street
Waukesha, WI 53188
DB

WAKC 1355-991-002
Parcel Identification Number(s) – (PIN)

Through this Agreement, the Owner hereby subjects the Property to the following covenants, conditions and restrictions:

1. The Owner shall be responsible for the routine and extraordinary maintenance and repair of the storm water management practice(s) and drainage easements identified in Exhibit B until Storm Water and Erosion Control Permit termination by the City of Waukesha in accordance with Chapter 32 of the City Code of Ordinances.
2. After Storm Water and Erosion Control Permit termination under 1., the current Owner(s) shall be solely responsible for maintenance and repair of the storm water management practices and drainage easements in accordance with the maintenance plan contained in Exhibit C.
3. The Owner(s) shall, at their own cost, complete inspections of the storm water management practices at the time intervals listed in Exhibit C, and conduct the inspections by a qualified professional, file the reports with the City of Waukesha after each inspection and complete any maintenance or repair work recommended in the report. The Owner(s) shall be liable for the failure to undertake any maintenance or repairs. After the work is completed by the Contractor, the qualified professional shall verify that the work was properly completed and submit the follow-up report to the City within 30 days.
4. In addition, and independent of the requirements under paragraph 3 above, the City of Waukesha, or its designee, is authorized to access the property as necessary to conduct inspections of the storm water management practices or drainage easements to ascertain compliance with the intent of this Agreement and the activities prescribed in Exhibit C. The City of Waukesha may require work to be done which differs from the report described in paragraph 3 above, if the City of Waukesha reasonably concludes that such work is necessary and consistent with the intent of this agreement. Upon notification by the City of Waukesha of required maintenance or repairs, the Owner(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Waukesha.
5. If the Owner(s) do not complete an inspection under item 3 above or required maintenance or repairs under item 4 above within the specified time period, the City of Waukesha is authorized, but not required, to perform the specified inspections, maintenance or repairs. In the case of an emergency situation, as determined by the City of Waukesha, no notice shall be required prior to the City of Waukesha performing emergency maintenance or repairs. The City of Waukesha may levy the costs and expenses of such inspections, maintenance or repair related actions as a special charge against the Property and collected as such in accordance with the procedures under s. 66.0627 Wis. Stats. or subch. VII of ch. 66 Wis. Stats.

6. This Agreement shall run with the Property and be binding upon all heirs, successors and assigns. After the Owner records the addendum noted above, the City of Waukesha shall have the sole authority to modify this agreement upon a 30-day notice to the current Owner(s).

Dated this 8th day of February, 2019.

Owner:

Dave Bahl, Sr., President

Dave Bahl, Sr.
(Owners Typed Name)

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this 8th day of ~~July~~ February, ~~2019~~ 2022, the above named Dave Bahl, Sr. to me known to be the person who executed the foregoing instrument and acknowledged the same.

SHERYL SCHUBEL NOTARY PUBLIC STATE OF WISCONSIN

[Name]
Notary Public, Waukesha County, WI
My commission expires: 04/03/2023.

This document was drafted by:

Craig Donze, PE PLS
One Source Consulting
19435 W. Capitol Drive
Brookfield, WI 53045

City of Waukesha Common Council Approval

Dated this 3rd day of Sept., 2019

Shawn N. Reilly

Shawn N. Reilly, Mayor

Gina Kozlik

Gina Kozlik, City Clerk

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this 28th day of February, ~~2019~~ 2022, the above named Gina Kozlik Shawn N. Reilly to me known to be the person who executed the foregoing instrument and acknowledged the same.

SANDEE L. POLICELLO NOTARY PUBLIC STATE OF WISCONSIN

Sandee L. Policello

[Name] Sandee L. Policello
Notary Public, Waukesha County, WI
My commission expires: 3-24-2022

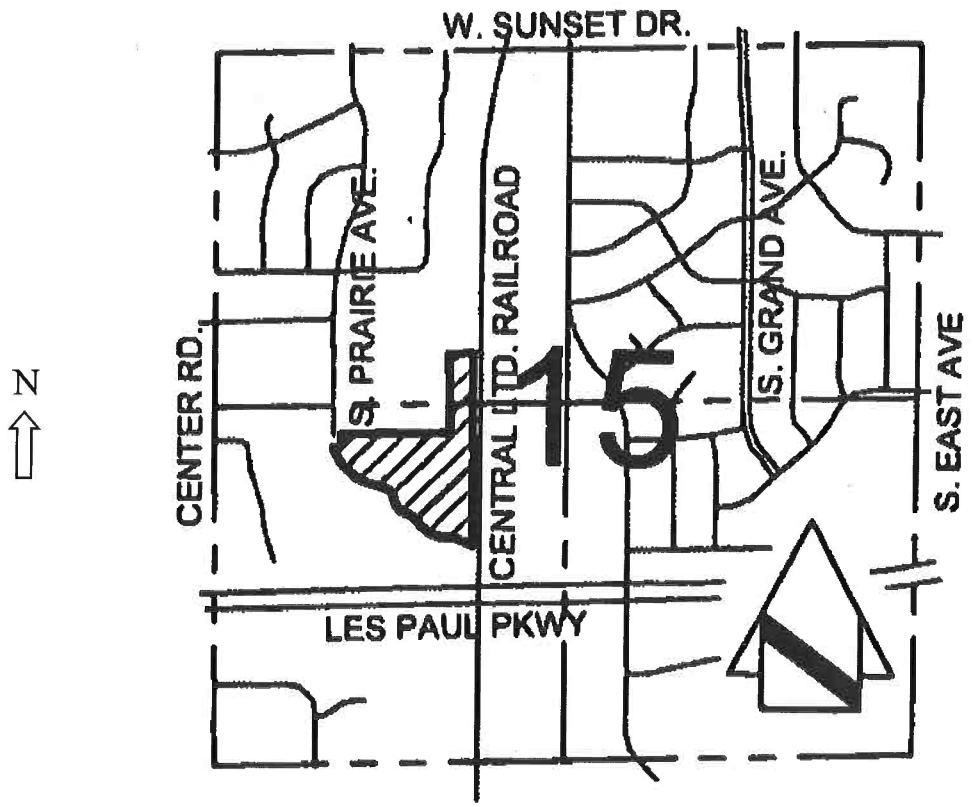
(Sample)

Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcel(s) affected by this Agreement. For a larger scale view of the referenced document, contact the Waukesha County Register of Deeds office.

Project Identifier: **Weld-All Manufacturing** Acres: **16.110 Acres**
Date of Recording: **February 11, 2009**
Map Produced By: **Jahnke & Jahnke Assoc., Inc. Waukesha, WI 53188**
Legal Description: **Lot 1 of CSM 10650, being a part of the NW 1/4 and NE 1/4 of the SW 1/4 and SE 1/4 of the NW 1/4 of Section 15, Township 6N, Range 19E, City of Waukesha, Waukesha County, Wisconsin.**

Lot 1 of CSM 10650



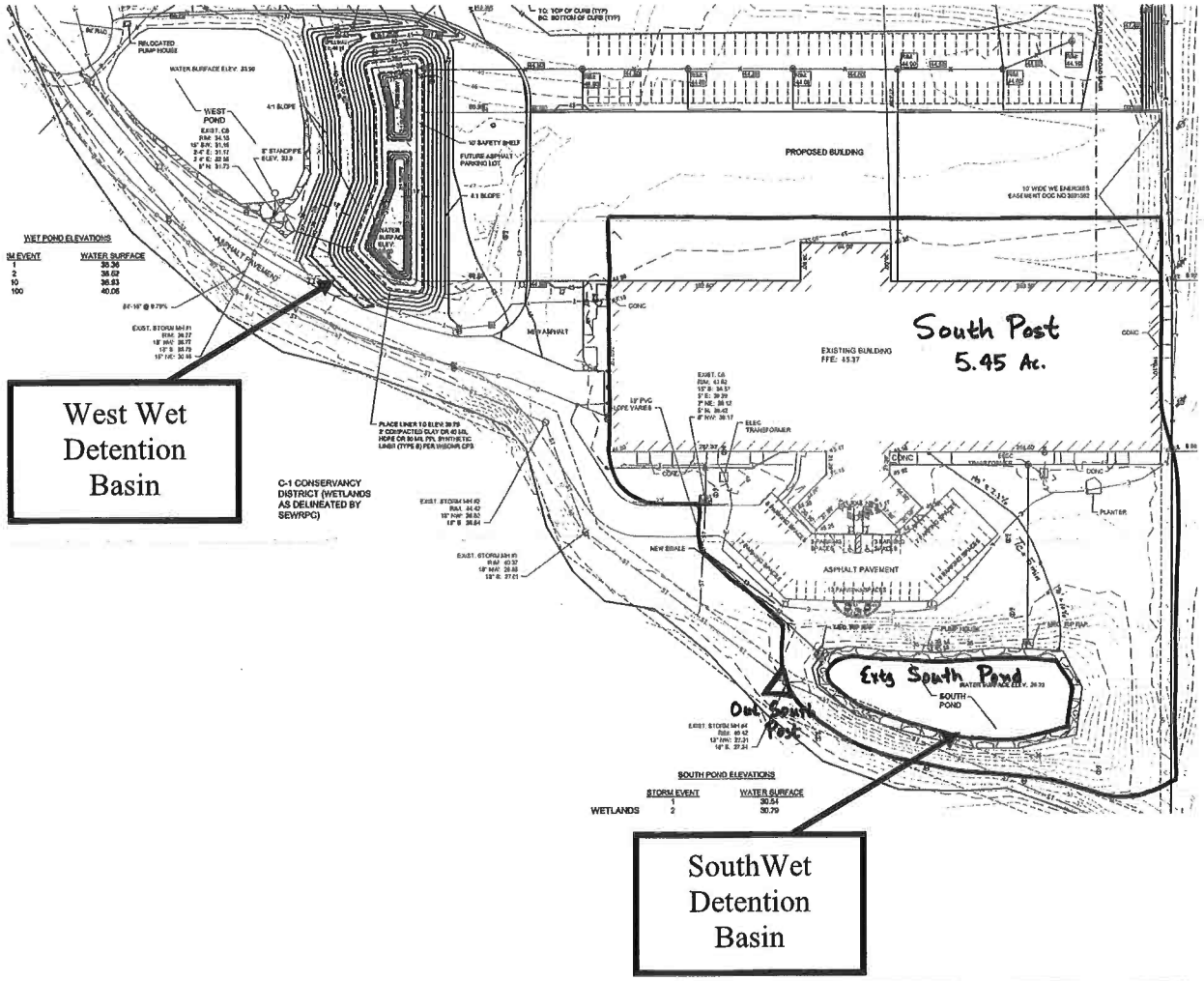
LOCATION MAP
SCALE 1" = 3000'
SECTION 15-6-19

Exhibit B - Location Map
Storm Water Management Practices Covered by this Agreement

The storm water management practices covered by this Agreement are depicted in the reduced copy of a portion of the construction plans, as shown below. The practices include two wet detention basins and all associated conveyance swales, pipes, earthen berms, and other components of these practices. All of the noted storm water management practices are located on the subject property, as noted in Exhibit A.

Project Identifier: **Weld-All Manufacturing, 2001 S. Prairie Avenue**
Storm water Practices: **South Wet Detention Basin (Constructed in 1997)**
West Wet Detention Basin (Constructed in 2009)
Location of Practices: **2001 S. Prairie Avenue, Waukesha, WI**

Figure 1
Plan View of Storm Water Practices



Temporary Right-of-Entry Easement: Permission is hereby granted to the City of Waukesha or their designee to access the entirety of the property described in Exhibit A for the purposes of inspecting the stormwater management features contained therein. The City of Waukesha shall notify the property owner of the City's intent to inspect said facilities not less than 3 days prior to entering said property. By exercising this right-of-entry, the City of Waukesha agrees, as required by Wisconsin law, to pay any liabilities arising out of the exercise of rights of entry whenever those liabilities result from an act or omission of an employee or acting agent within the scope of their authority. The right-of-entry shall expire only upon termination by the City of Waukesha.

(Sample)

Exhibit C
Storm Water Practice Maintenance Plan

This exhibit explains the basic function of each of the storm water practices listed in Exhibit B and prescribes the minimum maintenance requirements to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions in perpetuity. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this particular site. Access to the stormwater practices for maintenance vehicles is shown in Exhibit B. Any failure of a storm water practice that is caused by a lack of maintenance will subject the Owner(s) to enforcement of the provisions listed on page 1 of this Agreement by the City of Waukesha.

System Description (West Wet Detention Basin):
The west wet detention basin was constructed in 2009 and designed to trap 80% of sediment in runoff and maintain pre-development downstream peak flows. The west pond includes a 4 foot deep forebay that is connected to the main pool. The forebay will trap coarse sediments in runoff, such as road sands, thus reducing maintenance of the main basin. The main pool will trap the finer suspended sediment. To do this, the pond size, water level and outlet structures must be maintained as specified in this Agreement (see Figures 1, 2 and 3).

The main basin receives runoff from a 6.8 acre drainage area which primarily includes the lands north of the building. During high rainfall or snow melt events, the water level will temporarily rise and slowly drain down to the elevation of the control structure. The water level is controlled by a 24-inch concrete pipe extending through the berm on the southwest corner of the basin (see Figures 1 and 3). The discharge from the wet detention basin drains into the west pond located at the northwest corner of the property adjacent to the cul de sac at the south end of Prairie Avenue. The outlet structure includes a 2-inch low flow orifice that controls the water level and causes the pond to temporarily rise during runoff events. High flows may enter the grated concrete riser or flow over the emergency spillway located at the northwest corner of the pond.

System Description (South Wet Detention Basin):
The south wet detention basin was constructed in 1997 and traps 80% of sediment in runoff and maintain pre-development downstream peak flows. The south pond includes a 7.5 foot deep main pool which will traps sediments in runoff. To do this, the pond size, water level and outlet structures must be maintained as specified in this Agreement (see Figures 1, 2 and 3).

The main basin receives runoff from a 5.45 acre drainage area which primarily includes the lands south of the building. During high rainfall or snow melt events, the water level will temporarily rise and slowly drain down to the elevation of the control structure. The water level is uncontrolled with no outlet to the pond.

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

1. All outlet pipes must be checked monthly to ensure there is no blockage from floating debris or ice, especially the washed stone in front of the 3-inch orifice and the trash rack on the riser in the main basin. Any blockage must be removed immediately. The washed stone must be replaced when it becomes clogged.
2. Grass swales shall be preserved to allow free flowing of surface runoff in accordance with approved grading plans. No buildings or other structures are allowed in these areas. No grading or filling is allowed that may interrupt flows in any way.
3. Grass swales, inlets and outlets must be checked after heavy rains (minimum of annually) for signs of erosion. Any eroding areas must be repaired immediately to prevent premature sediment build-up in the downstream forebays or basin. Erosion matting is recommended for repairing grassed areas.
4. Invasive plant and animal species shall be managed in compliance with Wisconsin Administrative Code Chapter NR 40. This may require eradication of invasive species in some cases.
5. If the permanent pool falls below the safety shelf, a review shall be performed to determine whether the cause is liner leakage or an insufficient water budget. If the cause is leakage, the liner shall be repaired. Leakage due to muskrat burrows may require removal of the animals. If the permanent pool cannot be sustained at the design elevation, benching of the safety shelf may be necessary.

6. If floating algae or weed growth becomes a nuisance (decay odors, etc.), it must be removed from the basin or the forebay and deposited where it cannot drain back into the basin. Removal of the vegetation from the water reduces regrowth the following season (by harvesting the nutrients). Wetland vegetation must be maintained along the waters edge for safety and pollutant removal purposes.
7. When sediment in the forebays or the basin has accumulated to an elevation of three feet below the outlet elevation, it must be removed (see Exhibit D). All removed sediment must be placed in an appropriate upland disposal site and stabilized (grass cover) to prevent sediment from washing back into the basin. The forebays will likely need sediment removal first. Failure to remove sediment from the forebays will cause resuspension of previously trapped sediments and increase downstream deposition.
8. No grading or filling of the basin or berm other than for sediment removal is allowed, unless otherwise approved by the City of Waukesha.
9. Periodic mowing of the grass swales will encourage vigorous grass cover and allow better inspections for erosion. Waiting until after August 1 will avoid disturbing nesting wildlife. Mowing around the basin or the forebays may attract nuisance populations of geese to the property and is not necessary or recommended.
10. Any other repair or maintenance needed to ensure the continued function of the storm water practices or as ordered by the City of Waukesha under the provisions listed on page 1 of this Agreement.
11. The titleholder(s) or their designee must document all inspections as specified above. Documentation shall include as a minimum: (a) Inspectors Name, Address and Telephone Number, (b) Date of Inspections, (c) Condition Report of the Storm Water Management Practice, (d) Corrective Actions to be Taken and Time Frame for Completion, (e) Follow-up Documentation after Completion of the Maintenance Activities. All documentation is to be delivered to the attention of the City Engineer at the City of Waukesha Engineering Department on January 10th and July 10th each year.

Addendum 1
Storm Water Management Practice Maintenance Agreement

The purpose of this addendum is to record verified "as-built" construction details, supporting design data and permit termination documentation for the storm water management practice(s) located on Outlot 1 of the Highland Preserve Subdivision, described as being all that part of the Southwest Quarter (SW ¼) of Section 4, Township 8N, Range 19E (Town of Lisbon) Waukesha County, Wisconsin. This document shall serve as an addendum to document # _____, herein referred to as the "Maintenance Agreement". This addendum includes all of the following exhibits:

Exhibit D: Design Summary – contains a summary of key engineering calculations and other data used to design the wet detention basin.
Exhibit E: As-built Survey – shows detailed "as-built" cross-section and plan view of the wet detention basin.
Exhibit F: Engineering/Construction Verification – provides verification from the project engineer that the design and construction of the wet detention basin complies with all applicable technical standards and Waukesha County ordinance requirements.
Exhibit G: Storm Water Management & Erosion Control Permit Termination – provides certification by the City of Waukesha that the Storm Water and Erosion Control Permit for the above noted site has been terminated.

Weld-All
2001 S. Prairie Avenue
Waukesha, WI 53189

WAKC 1355-991-002
Parcel Identification Number(s) – (PIN)

Dated this 8th day of ~~July, 2019~~ FEB 2022.

Owner: _____
Dave Bahl, Sr., President

Dave Bahl, Sr.
(Owners Typed Name)

Acknowledgements

State of Wisconsin;
County of Waukesha
Personally came before me this 8th day of ~~July, 2019~~ FEBRUARY 2022, the above named Dave Bahl, Sr. to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
Notary Public, Waukesha County, WI
My commission expires: 04/03/2023.

SHERYL SCHUBEL NOTARY PUBLIC STATE OF WISCONSIN

This document was drafted by:
Craig Donze, PE PLS
One Source Consulting
19435 W. Capitol Drive, Suite L05
Brookfield, WI 53045

Exhibit D
Design Summary

Project Identifier: **Weld-All Manufacturing** Project Size: **16.11 Ac** No. of Lots: **N/A**
Number of Runoff Discharge Points: 2 **Watershed (ultimate discharge)**: Fox (Illinois) River
Watershed Area (including off-site runoff traveling through project area): 16.11 Acres

Watershed Data Summary. The following table summarizes the watershed data used to determine peak flows and runoff volumes required to design the west wet detention basin using information obtained from the September 2008 Stormwater Calculation Summary prepared by Jahnke & Jahnke Associates, Inc. and obtained from the City of Waukesha Engineering archives.

Summary Data Elements	Subwatershed A (West Pond)		Subwatershed B (South Pond)	
	Pre-develop	Post-develop	Pre-develop	Post-develop
Watershed Areas *(in acres) (see attached map)*	5.23 acres	6.84 acres	5.45 acres	5.45 acres
Average Watershed Slopes (%)	<2%	<2%	<2%%	<2%
Land Uses *(% of each) (see attached map)*	100% cropland	Impervious (5.28 Ac) Landscape (1.56 Ac)	100% cropland	Impervious (5.02 Ac) Landscape (0.43 Ac)
Runoff Curve Numbers	CN = 69	CN = 98	CN = 68	CN = 70
Conveyance Systems Types	Grass Waterway	100% storm sewer	Grass Waterway	100% grass swale
Summary of Average Conveyance System Data	Overland	Overland & Storm Sewer to West Pond	Overland	Overland to South Pond
Time of Concentration *(Tc) (see attached map & worksheets)*	0.216 hrs.	.083 hrs.	.74 hrs.	.65 hrs.
25% of 2-yr 24-hr post-dev runoff volume	N/A	N/A	N/A	N/A
1-yr./24 hour Peak Flow	1.64 cfs	0.31 cfs	2.08 cfs	0.0 cfs
2-yr./24 hour Peak Flow *(see attached hydrographs)*	2.49 cfs	0.67 cfs	3.08 cfs	0.0 cfs
10-yr./24 hour Peak Flow	6.50 cfs	6.45 cfs	7.72 cfs	0.0 cfs
100-yr./24 hour Peak Flow	17.25 cfs	15.87 cfs	20.81 cfs	0.4 cfs

Exhibit D (continued)

Practice Design Summary. The following table summarizes the data used to design the west wet detention basin. The data contained herein was obtained from the September 2008 Stormwater Calculation Summary prepared by Jahnke & Jahnke Associates, Inc. and obtained from the City of Waukesha Engineering archives.

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin (subwatershed A & B)	6.84 acres
Distance to nearest private well (including off-site wells)	> 100 feet
Distance to municipal well (including off-site wells)	> 1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	1 to 2%
Any buried or overhead utilities in the area?	Yes
Proposed outfall conveyance system/discharge (w/ distances)	To existing City Storm Sewer
Any downstream roads or other structures? (describe)	Yes – driveway
Floodplain, shoreland or wetlands?	Wetlands >60' – Not hydraulically connected
Soil investigation data (see attached map & soil logs):	
Number of soil investigations completed	1 (in basin area)
Do elevations of test holes extend 3 ft. below proposed bottom?	Yes
Average soil texture at pond bottom elevation (USDA)	Sandy Loam
Distance from pond bottom to bedrock	> 5 feet
Distance from pond bottom to seasonal water table	Pond bottom 2 ft. below mottling 0 – 4 feet
General basin design data (see attached detailed drawings):	
Permanent pool surface area	11,652 sf
Design permanent pool water surface elevation	36.00
Top of berm elevation (after settling) and width	elev. 41.25 / 12 feet wide
Length/width (dimensions/ratio)	~3:1
Safety shelf design (length, grade, max. depth)	10 ft. @ 10% slope
Ave. water depth (minus safety shelf/sediment)	5 ft. (in center)
Sediment forebay size & depth	.08 acres/5 feet
Sediment storage depth & design maintenance	2 ft. depth for forebay & pool 20 year maintenance schedule

Design Basin Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
18.03 cfs (Post 1-yr./24 hr.)	0.31 cfs	38.36 ft.	0.774 acre feet	#1
20.44 cfs (Post 2-yr./24 hr. peak)	0.67 cfs	38.52 ft.	0.837 acre feet	#1 and #2
29.84 cfs (Post 10-yr./24 hr. peak)	6.45 cfs	38.93 ft.	1.006 acre feet	#1 and #2
50.04 cfs (Post 100-yr./24 hr. peak)	15.86 cfs	40.06 ft.	1.524 acre feet	#1 and #2

* #1 = 2 @ 2 inch orifice for water level control @ EL. 36.00 in stand pipe.
#2 = 24" Standpipe @ EL. 38.45

Practice Design Summary. The following table summarizes the data used to design the south wet detention basin. The data contained herein was obtained from the September 2008 Stormwater Calculation Summary prepared by Jahnke & Jahnke Associates, Inc. and obtained from the City of Waukesha Engineering archives and updated to reflect the 2019 Office & Parking Lot Expansion.

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin (subwatershed A & B)	5.45 acres
Distance to nearest private well (including off-site wells)	> 100 feet
Distance to municipal well (including off-site wells)	> 1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	1 to 30%
Any buried or overhead utilities in the area?	Yes
Proposed outfall conveyance system/discharge (w/ distances)	None
Any downstream roads or other structures? (describe)	No
Floodplain, shoreland or wetlands?	Wetlands >50' – Not hydraulically connected
Soil investigation data (see attached map & soil logs):	
Number of soil investigations completed	n/a
Do elevations of test holes extend 3 ft. below proposed bottom?	n/a
Average soil texture at pond bottom elevation (USDA)	Sandy Loam
Distance from pond bottom to bedrock	> 5 feet
Distance from pond bottom to seasonal water table	0 feet
General basin design data (see attached detailed drawings):	
Permanent pool surface area	14,450 sf
Design permanent pool water surface elevation	29.23 (810.55)
Top of berm elevation (after settling) and width	elev. 38.70 / 12 feet wide
Length/width (dimensions/ratio)	~2:1
Safety shelf design (length, grade, max. depth)	10 ft. @ 10% slope
Ave. water depth (minus safety shelf/sediment)	11 ft. (in center)
Sediment forebay size & depth	n/a
Sediment storage depth & design maintenance	5 ft. depth for pool 20 year maintenance schedule

Design Basin Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
1.39 cfs (Post 1-yr./24 hr.)	0.21 cfs	811.60 ft.	16,576 cf	#1
2.11 cfs (Post 2-yr./24 hr. peak)	0.23 cfs	811.83 ft.	20,481 cf	#1
5.51 cfs (Post 10-yr./24 hr. peak)	0.30 cfs	812.69 ft.	35,794 cf	#1
14.63 cfs (Post 100-yr./24 hr. peak)	0.41 cfs	814.44 ft.	71,542 cf	#1

#1 = (2) 2 inch diameter orifice – flow line elev. @ 810.55
#2 = 10 foot wide earthen/grass emergency overflow spillway – flow line elev. @ 818.00

Exhibit D (continued)

Watershed Map. The watershed map shown below was used to determine the post-development data contained in this exhibit. The post-developed watershed areas are the same as the pre-development watershed areas for this project.

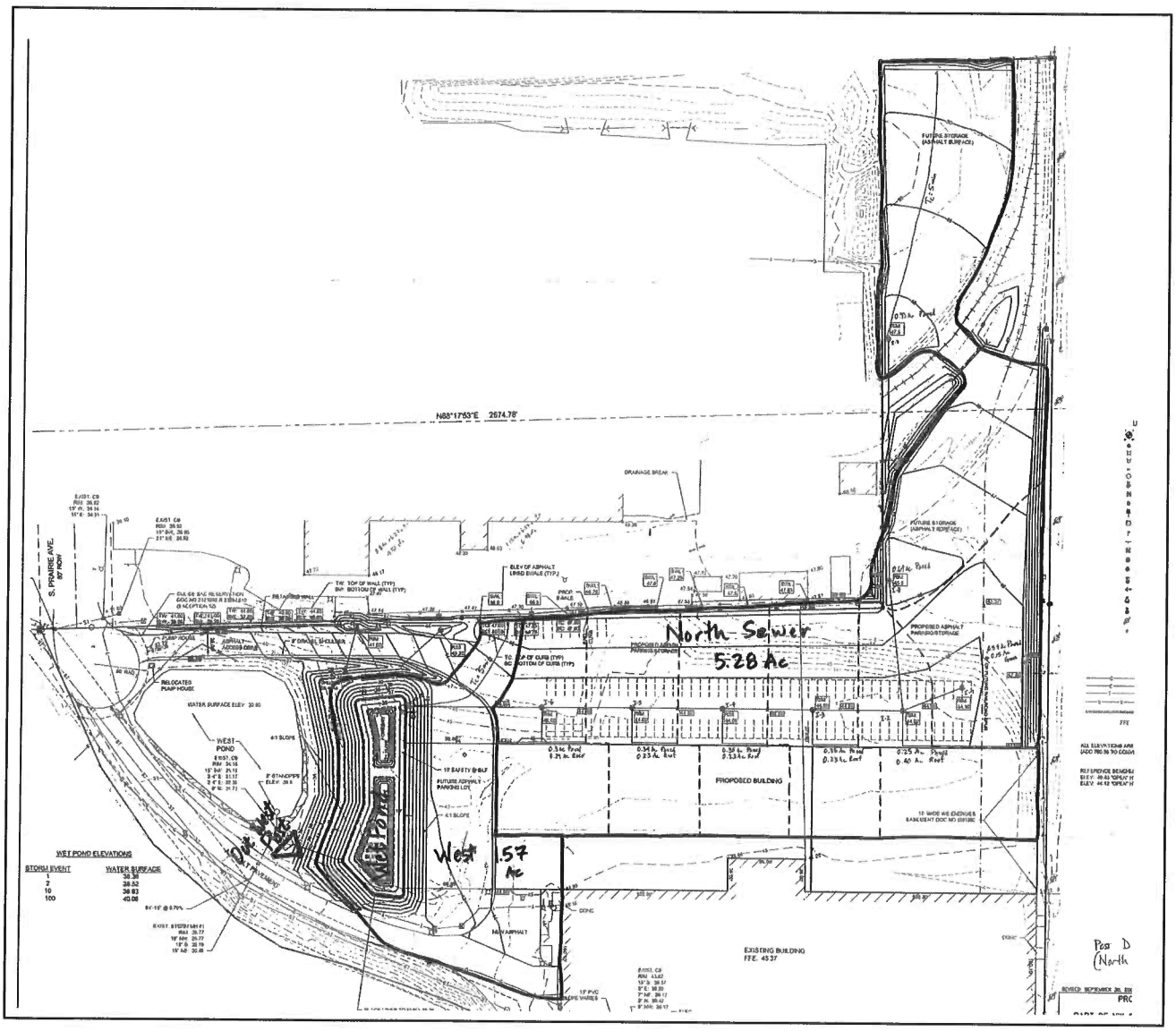


Exhibit D (continued)

Watershed Map (continued). The watershed map shown below was used to determine the post-development data contained in this exhibit. The post-developed watershed areas are the same as the pre-development watershed areas for this project.

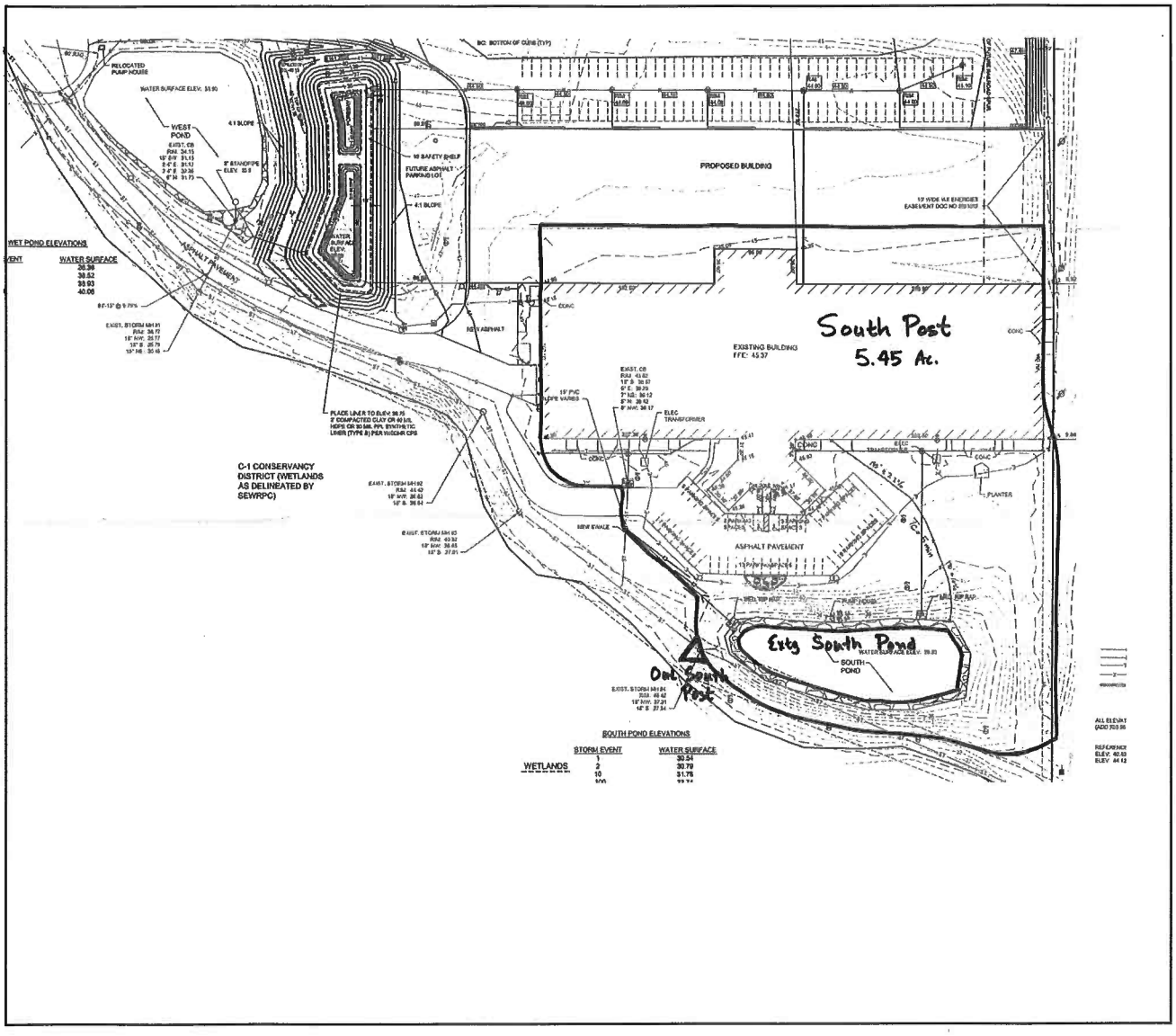


Exhibit E
As-built Survey for Wet Detention Basins

Project Identifier: **Weld-All Manufacturing**
Storm water Practice: **Wet Detention Basins**
Location of Practice: **2001 S. Prairie Avenue, Waukesha, WI:**

Figure 1 – South Detention Basin

The wet detention basins depicted in Figure 1 is a reduced copy of the as-built plan.

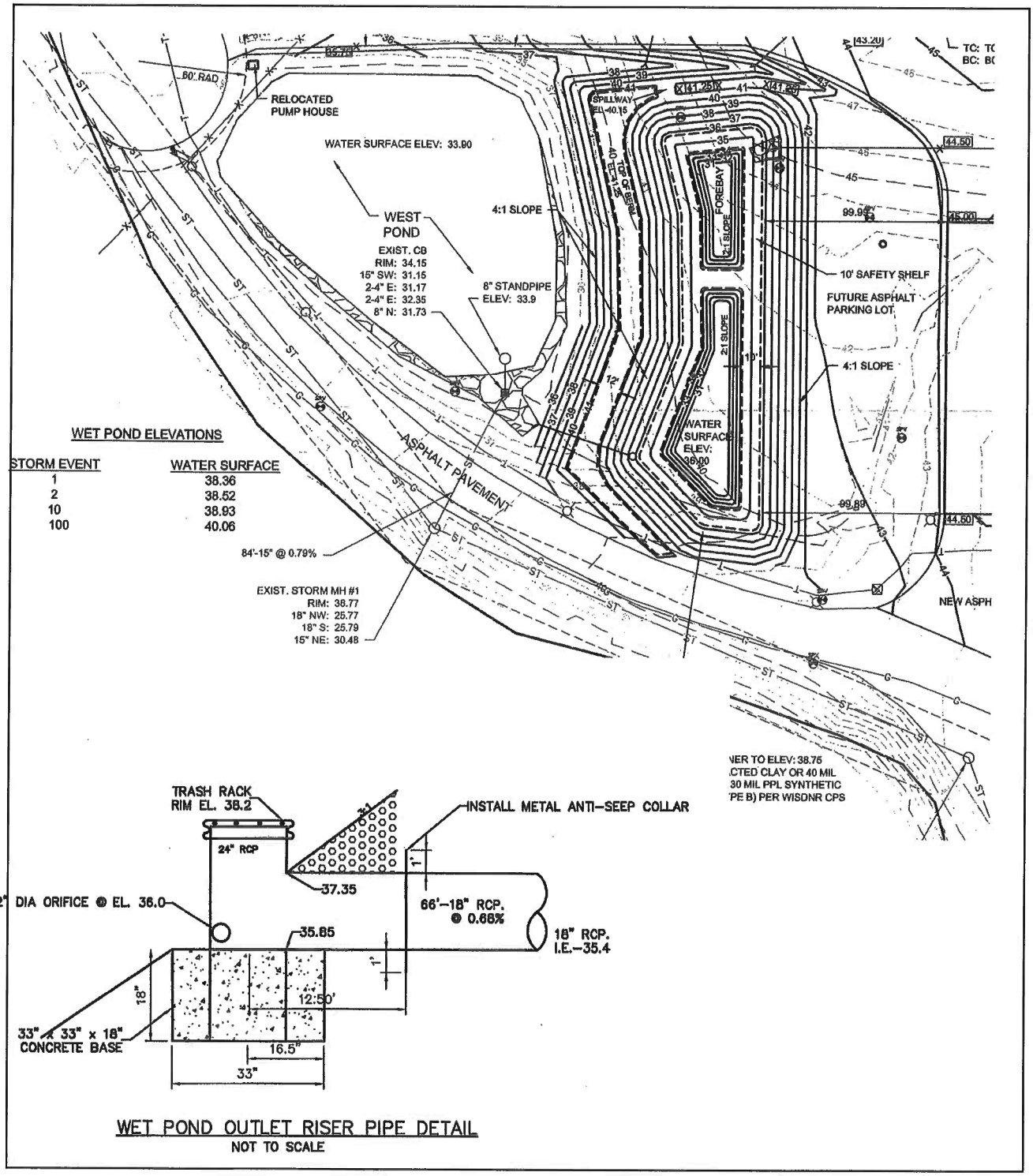


Figure 1 – South Detention Basin

The wet detention basins depicted in Figure 1 is a reduced copy of the as-built plan.

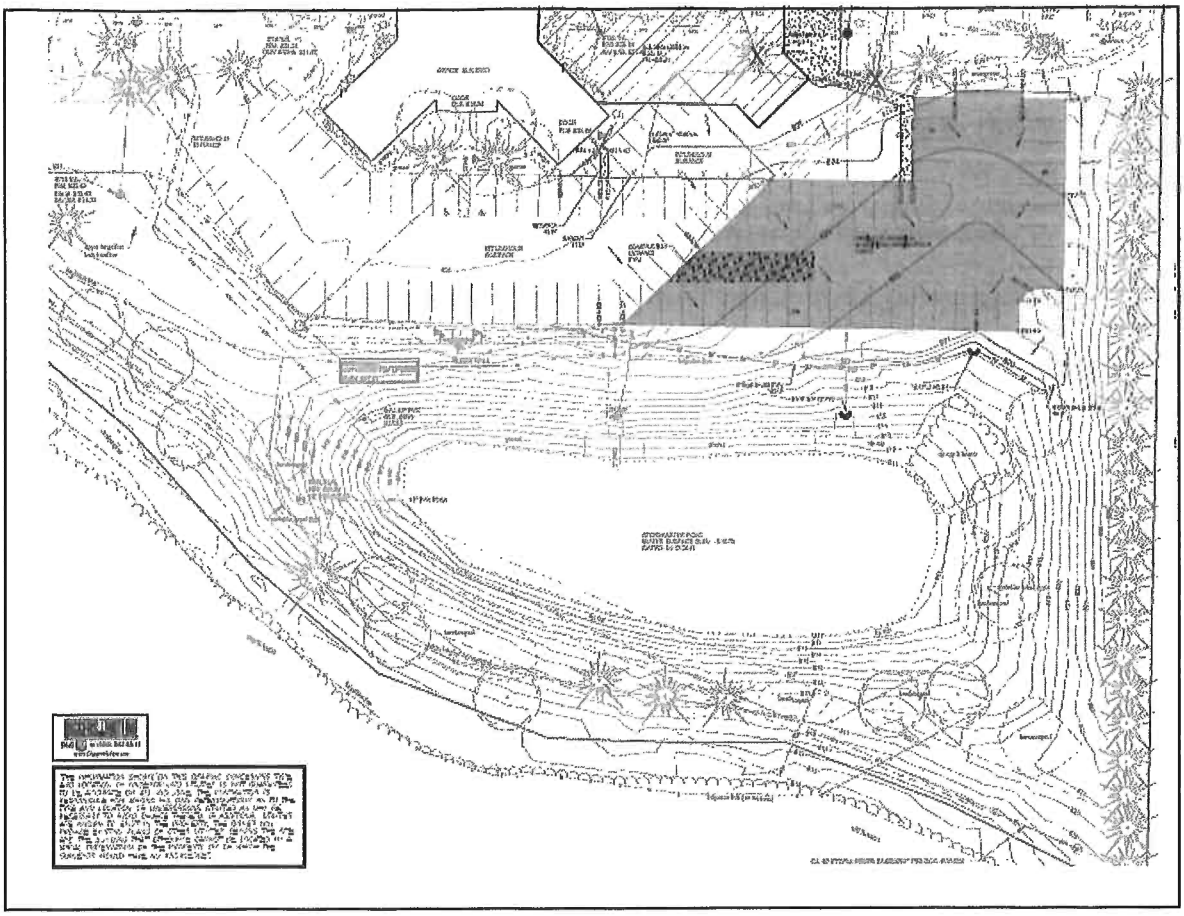


Exhibit "F"
Engineering/Construction Verification

DATE: 2/4/2022 | 9:39 AM CST

TO: Public Works Department
City of Waukesha

FROM: Craig Donze, PE PLS, Payne & Dolan, Waukesha, WI (262) 366-5086

RE: Engineering/Construction Verification for the following project:

Project Name: Weld-All Manufacturing, 2001 S. Prairie Avenue, Waukesha, WI

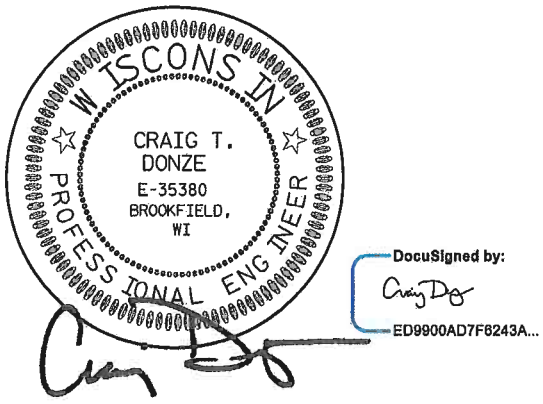
Section 15, City of Waukesha, Waukesha County

Storm Water Permit # EC 19-00037

Storm Water Management Practices: Wet Detention Pond

For the above-referenced project and storm water management practices, this correspondence shall serve as verification that: 1) all site inspections outlined in approved inspection plans have been successfully completed; and 2) the storm water management practice design data presented in Exhibit D, and the "as-built" construction documentation presented in Exhibit E comply with all applicable state and local technical standards, in accordance with the City of Waukesha Storm Water Management and Erosion Control Ordinance.

1. Any variations from the originally approved construction plans are noted in Exhibit E. These variations are considered to be within the tolerances of standard construction techniques and do not affect the original design as presented in Exhibit D in any way.



City of Waukesha
Looking Back - Reaching Forward

DEPARTMENT OF PUBLIC WORKS

Alex Damien, PE, Interim Director
adamien@waukesha-wi.gov

CERTIFICATION

I, David Buechl, of the City of Waukesha, do hereby certify that the attached photos and maps are a true and correct copy of the original and if they are not legible or readable, a copy of the original is available at the City of Waukesha Engineering Division.

Date: March 2, 2022

David Buechl

David Buechl, Engineer II
City of Waukesha Engineering Department

JAHNKE & JAHNKE ASSOCIATES INC.

CONSULTANTS IN

ENGINEERING, PLANNING, SUBDIVISIONS AND SURVEYING

711 W. Moreland Blvd.
Waukesha, WI 53188-2479

Telephone: 262-542-5797
Fax: 262-542-7698
E-Mail: mbirschbach@jahnkeandjahnke.com

Stormwater Calculation Summary
Plan Commission Submittal 9/30/2008

Weldall Manufacturing

Assumptions are based upon predeveloped area being classified as farmland (based upon 1941 to 1995 air photos).

North/West Side

Stormwater management objectives will be met utilizing storm sewers for conveyance to a new wet detention pond. WDNR water quality requirements will be met in the proposed wet pond. Given that this is an industrial property with outdoor storage, infiltration will not be utilized.

The outlet of proposed wet pond will be the existing west pond. The existing pond will remain unchanged. The stormwater will ultimately discharge to the existing City storm sewer system through existing conveyance systems located along the south side of the property.

The results of the stormwater analysis is shown below.

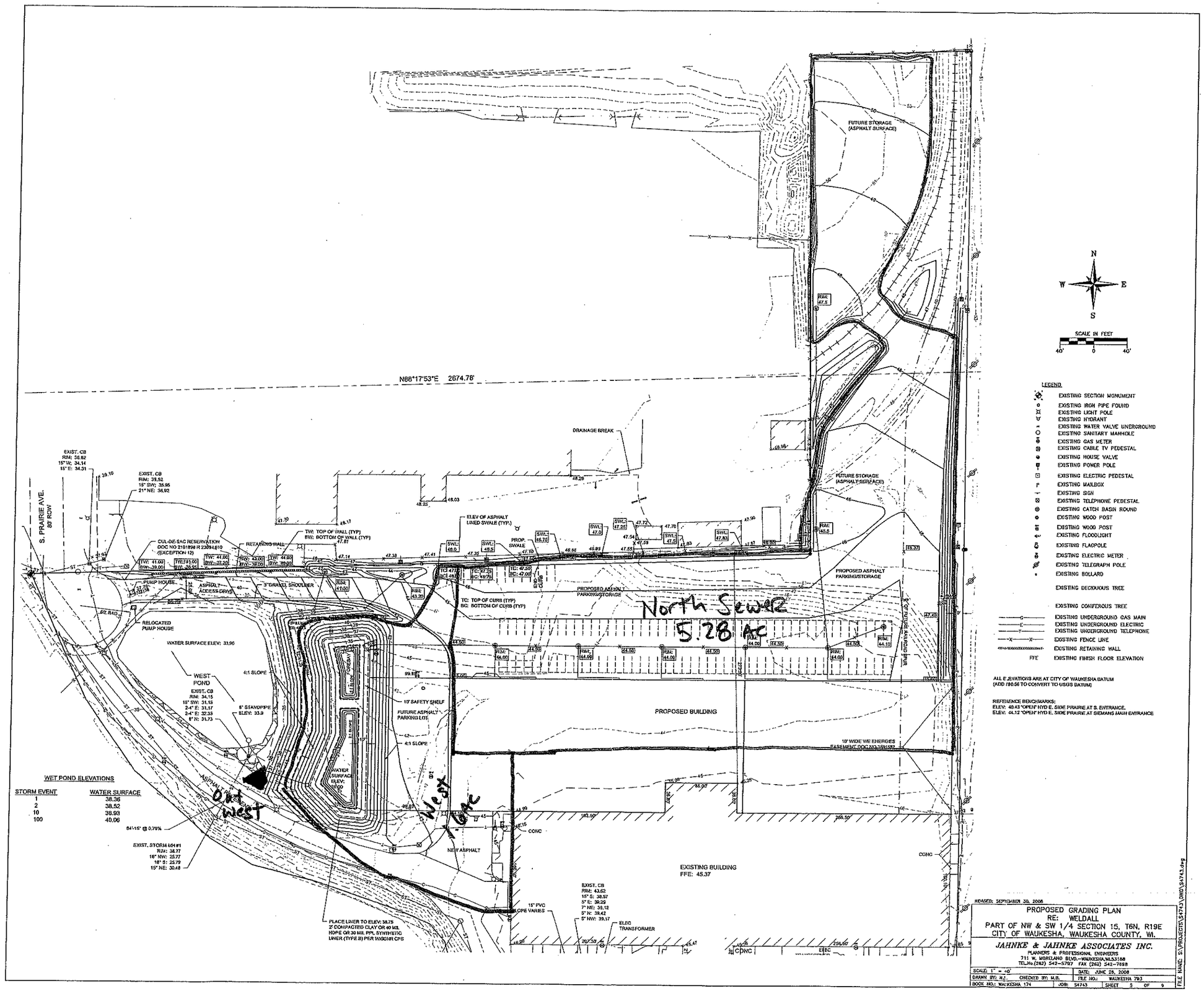
	Predeveloped	Postdeveloped
Area	5.23 ac	6.8 ac
CN	69	96
Peak Flow 1 yr.	1.64 cfs	0.31 cfs
Peak Flow 2 yr.	2.49 cfs	0.67 cfs
Peak Flow 10 yr.	6.50 cfs	6.45 cfs
Peak Flow 100 yr.	17.25 cfs	15.87 cfs

South Side

The existing pond was evaluated for the estimated runoff. Current runoff from the south side of the site results from the existing connection of an inlet to the City storm sewer system. This connection will be removed and the site storm sewer will drain into the existing South Pond. There is currently no outlet from this pond. Per DNR request, a new outlet will be installed at elevation 36.

	Predeveloped	Postdeveloped
Area	5.45 ac	5.45 ac
CN	69	85
Peak Flow 1 yr.	2.08 cfs	0.0 cfs
Peak Flow 2 yr.	3.08 cfs	0.0 cfs
Peak Flow 10 yr.	7.72 cfs	0.0 cfs
Peak Flow 100 yr.	20.81 cfs	0.0 cfs

The summary sheets are attached.



WET POND ELEVATIONS

STORM EVENT	WATER SURFACE
1	38.36
2	38.52
10	38.93
100	40.06

LEGEND

- EXISTING SECTION MONUMENT
- EXISTING IRON PIPE FOUND
- EXISTING LIGHT POLE
- EXISTING HYDRANT
- EXISTING WATER VALVE UNERGROUND
- EXISTING SANITARY MANHOLE
- EXISTING GAS METER
- EXISTING CABLE TV PEDESTAL
- EXISTING HOUSE VALVE
- EXISTING POWER POLE
- EXISTING ELECTRIC PEDESTAL
- EXISTING MAILBOX
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING CATCH BASIN ROUND
- EXISTING WOOD POST
- EXISTING WOOD POST
- EXISTING FLOODLIGHT
- EXISTING FLAGPOLE
- EXISTING ELECTRIC METER
- EXISTING TELEGRAPH POLE
- EXISTING BOLLARD
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- EXISTING UNDERGROUND GAS MAIN
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FENCE LINE
- EXISTING RETAINING WALL
- FFE EXISTING FINISH FLOOR ELEVATION

ALL ELEVATIONS ARE AT CITY OF WAUKESHA DATUM
(ADD 780.56 TO CONVERT TO USGS DATUM)

REFERENCE BENCHMARKS:
ELEV: 40.43 "OPEN" HYD E. SIDE PRAIRIE AT S. ENTRANCE.
ELEV: 44.12 "OPEN" HYD E. SIDE PRAIRIE AT SIEMANS MAIN ENTRANCE

REVISED: SEPTEMBER 30, 2008

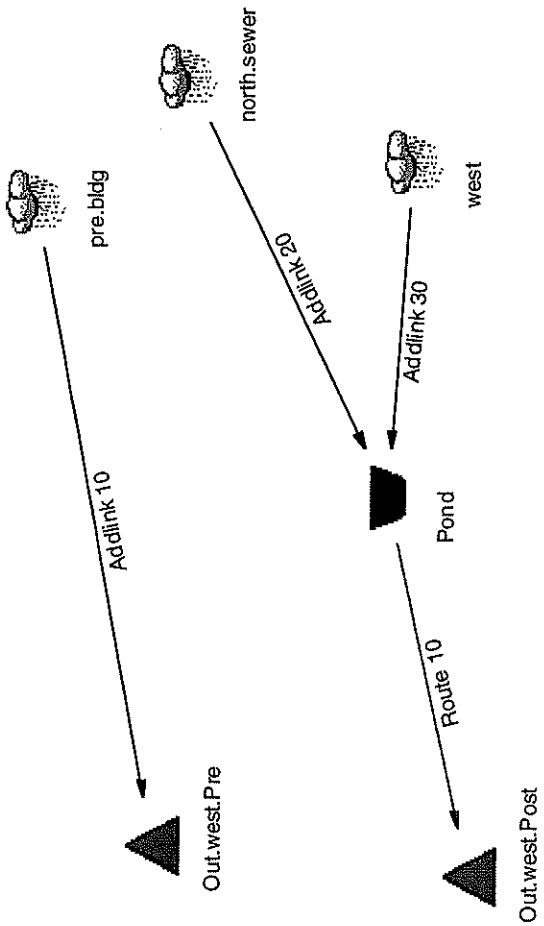
PROPOSED GRADING PLAN
RE: WELDALL
PART OF NW & SW 1/4 SECTION 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WI.

JAHNKE & JAHNKE ASSOCIATES INC.
PLANNERS & PROFESSIONAL ENGINEERS
711 W. MORELAND BLVD.-WAUKESHA,WI.53188
TEL.No.(262) 542-5797 FAX (262) 542-7698

SCALE: 1" = 40'		DATE: JUNE 26, 2008	
DRAWN BY: MJ	CHECKED BY: MJB	FILE NO.:	WAUKESHA 793
BOOK NO.: WAUKESHA 174	JOB: 54743	SHEET 5	OF 9

FILE NAME: S:\PROJECTS\54743\DWG\54743.dwg

West


pre.bldg
north.sewer
west
Addlink 10
Addlink 20
Addlink 30
Pond
Route 10
Out.west.Pre
Out.west.Post

North/west

Job File: P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW
Rain Dir: P:\Pondpack\s-4743 Weldall\

****
JOB TITLE
****

Project Date: 8/19/2008
Project Engineer: J&J
Project Title: Watershed
Project Comments:

Table of Contents

MASTER DESIGN STORM SUMMARY

Network Storm Collection: SEWRPC 2000

Return Event	Total Depth in	Rainfall Type	RNF ID
2-Yr	2.5700	Synthetic Curve	TypeII 24hr
10-Yr	3.6200	Synthetic Curve	TypeII 24hr
100-Yr	5.8800	Synthetic Curve	TypeII 24hr
1-Yr	2.3000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
NORTH SEWER	AREA	2	1.029		11.9000	17.04		
NORTH SEWER	AREA	10	1.489		11.9000	24.24		
NORTH SEWER	AREA	100	2.481		11.9000	39.65		
NORTH SEWER	AREA	1	.911		11.9000	15.18		
*OUT.WEST.POST	JCT	2	1.213		13.8500	.67		
*OUT.WEST.POST	JCT	10	1.795		12.1000	6.45		
*OUT.WEST.POST	JCT	100	3.065		12.1000	15.87		
*OUT.WEST.POST	JCT	1	1.066		14.5000	.31		
*OUT.WEST.PRE	JCT	2	.198		12.0500	2.49		
*OUT.WEST.PRE	JCT	10	.447		12.0500	6.50		
*OUT.WEST.PRE	JCT	100	1.141		12.0500	17.25		
*OUT.WEST.PRE	JCT	1	.145		12.0500	1.64		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
POND 10	IN POND	2	1.217		11.9000	20.44		
POND 10	IN POND	10	1.799		11.9000	29.84		
POND 10	IN POND	100	3.070		11.9000	50.04		
POND 10	IN POND	1	1.069		11.9000	18.03		
POND 10	OUT POND	2	1.213		13.8500	.67	38.52	.837
POND 10	OUT POND	10	1.795		12.1000	6.45	38.93	1.006
POND 10	OUT POND	100	3.065		12.1000	15.87	40.06	1.524
POND 10	OUT POND	1	1.066		14.5000	.31	38.36	.774
PRE BLDG	AREA	2	.198		12.0500	2.49		
PRE BLDG	AREA	10	.447		12.0500	6.50		
PRE BLDG	AREA	100	1.141		12.0500	17.25		
PRE BLDG	AREA	1	.145		12.0500	1.64		
WEST	AREA	2	.188		11.9000	3.40		
WEST	AREA	10	.310		11.9000	5.60		
WEST	AREA	100	.589		11.9000	10.40		
WEST	AREA	1	.158		11.9000	2.85		

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0130
Hydraulic Length	300.00 ft
2yr, 24hr P	2.7000 in
Slope	.020000 ft/ft
Avg.Velocity	1.38 ft/sec

Segment #1 Time: .0605 hrs

Total Tc: .0605 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

Tc Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0250	
Hydraulic Length	300.00	ft
2yr, 24hr P	2.7000	in
Slope	.006700	ft/ft
Avg.Velocity	.53	ft/sec

Segment #1 Time: .1581 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	560.00	ft
Slope	.028000	ft/ft
Unpaved		
Avg.Velocity	2.70	ft/sec

Segment #2 Time: .0576 hrs

Total Tc: .2158 hrs

Tc Equations used...

---- SCS TR-55 Sheet Flow ----

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

---- SCS TR-55 Shallow Concentrated Flow ----

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .0833 hrs

Total Tc: .0833 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

Tc Equations used...

---- User Defined ----

Tc = Value entered by user

Where: Tc = Time of concentration

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
Paved parking &stge storm sewers	98	2.280			98.00
roof	98	1.377			98.00
north leg storage	98	1.620			98.00
COMPOSITE AREA & WEIGHTED CN --->		5.277			98.00 (98)

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RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
crops type b soil	69	5.230			69.00
COMPOSITE AREA & WEIGHTED CN --->		5.230			69.00 (69)

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RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
drive	98	.290			98.00
pond	98	.340			98.00
roof	98	.103			98.00
landscape	61	.433			61.00
future parking	98	.400			98.00
COMPOSITE AREA & WEIGHTED CN --->		1.566			87.77 (88)

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POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
36.00	11652.000	.2675	.0000	.000	.000
37.00	13884.000	.3187	.8782	.293	.293
38.00	16217.000	.3723	1.0355	.345	.638
39.00	18653.000	.4282	1.1998	.400	1.038
40.00	21190.000	.4865	1.3711	.457	1.495
41.00	23830.000	.5471	1.5494	.516	2.011
42.00	26000.000	.5969	1.7154	.572	2.583

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 36.00 ft
Increment = .10 ft
Max. Elev.= 42.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	s1	--->	C1	38.450	42.000
Orifice-Circular	o2	--->	C1	36.000	42.000
Culvert-Circular	c1	--->	TW	35.850	42.000

TW SETUP, DS Channel

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = s1
Structure Type = Stand Pipe

# of Openings	=	1
Invert Elev.	=	38.45 ft
Diameter	=	2.0000 ft
Orifice Area	=	3.1416 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	6.28 ft
Weir Coeff.	=	3.000
K, Submerged	=	.000
K, Reverse	=	1.000
Xb,Barrel	=	.000000 (per ft of full flow)
Barrel Length	=	.00 ft
Mannings n	=	.0000

Structure ID = o2
Structure Type = Orifice-Circular

# of Openings	=	2
Invert Elev.	=	36.00 ft
Diameter	=	.1670 ft
Orifice Coeff.	=	.600

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	=	c1
Structure Type	=	Culvert-Circular
No. Barrels	=	1
Barrel Diameter	=	1.5000 ft
Upstream Invert	=	35.85 ft
Dnstream Invert	=	35.30 ft
Horiz. Length	=	55.00 ft
Barrel Length	=	55.00 ft
Barrel Slope	=	.01000 ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.5000	(forward entrance loss)
Kb	=	.018213	(per ft of full flow)
Kr	=	1.0000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1
Inlet Control K	=	.0098
Inlet Control M	=	2.0000
Inlet Control c	=	.03980
Inlet Control Y	=	.6700
T1 ratio (HW/D)	=	1.155
T2 ratio (HW/D)	=	1.302
Slope Factor	=	-.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 37.58 ft ---> Flow = 7.58 cfs
At T2 Elev = 37.80 ft ---> Flow = 8.66 cfs

Structure ID	=	TW
Structure Type	=	TW SETUP, DS Channel

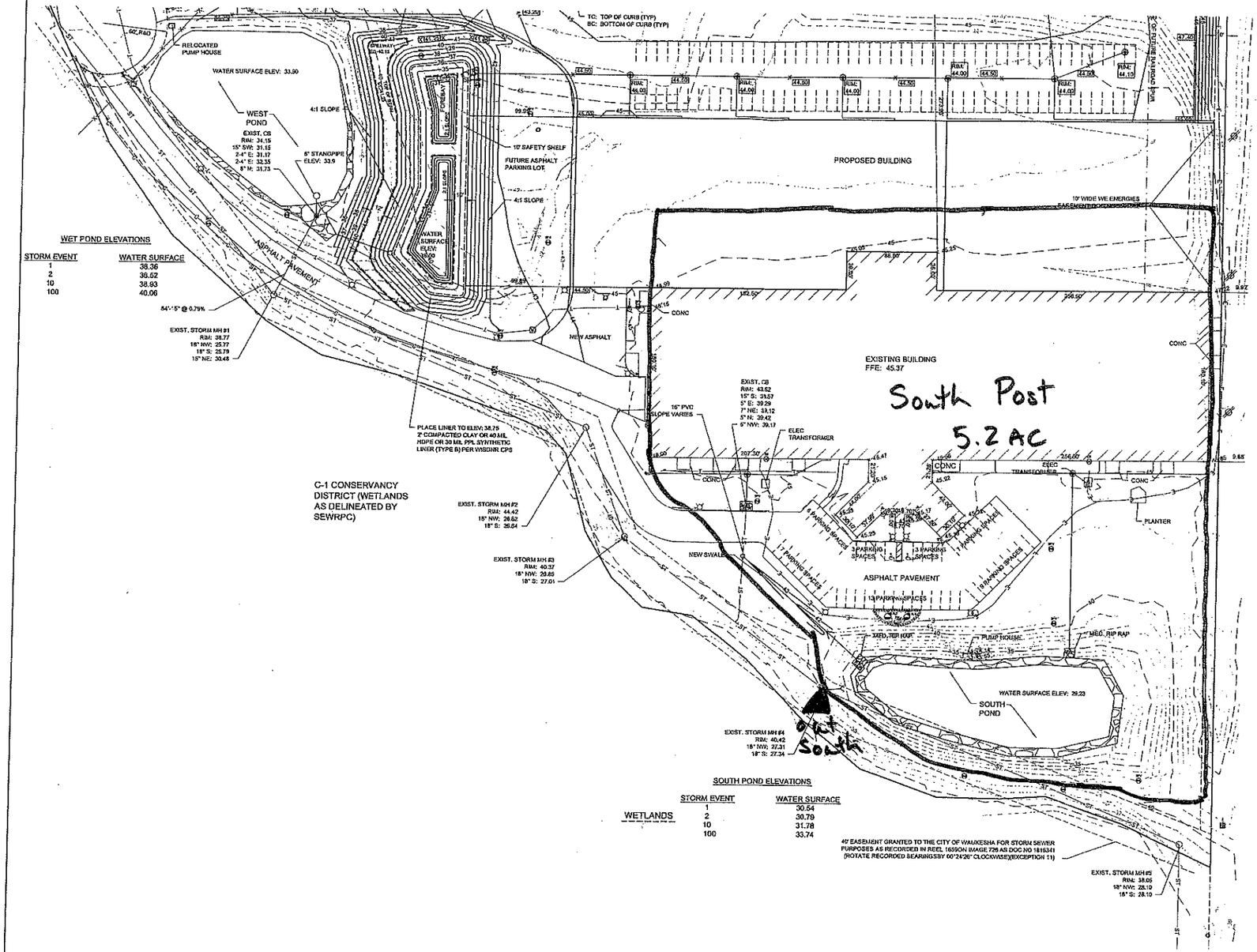
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations	=	30
Min. TW tolerance	=	.01 ft
Max. TW tolerance	=	.01 ft
Min. HW tolerance	=	.01 ft
Max. HW tolerance	=	.01 ft
Min. Q tolerance	=	.10 cfs
Max. Q tolerance	=	.10 cfs

Index of Starting Page Numbers for ID Names

S/N: B21C011070CB
PondPack Ver. 8.0067
Jahnke & Jahnke Associates
Time: 11:00 AM
Date: 9/30/2008



WET POND ELEVATIONS

STORM EVENT	WATER SURFACE
1	38.36
2	38.52
10	38.93
100	40.06

SOUTH POND ELEVATIONS

	STORM EVENT	WATER SURFACE
WETLANDS	1	30.54
	2	30.79
	10	31.78
	100	33.74

LEGEND

- EXISTING SECTION MONUMENT
- EXISTING IRON PIPE FOUND
- EXISTING LIGHT POLE
- EXISTING HYDRANT
- EXISTING WATER VALVE UNERGROUND
- EXISTING SANITARY MANHOLE
- EXISTING GAS METER
- EXISTING CABLE TV PEDESTAL
- EXISTING HOUSE VALVE
- EXISTING POWER POLE
- EXISTING ELECTRIC PEDESTAL
- EXISTING MAILBOX
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING CATCH BASIN ROUND
- EXISTING WOOD POST
- EXISTING WOOD POST
- EXISTING FLOODLIGHT
- EXISTING FLAGPOLE
- EXISTING ELECTRIC METER
- EXISTING TELEGRAPH POLE
- EXISTING BOLLARD
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- EXISTING UNDERGROUND GAS MAIN
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FENCE LINE
- EXISTING RETAINING WALL
- FFE EXISTING FINISH FLOOR ELEVATION

ALL ELEVATIONS ARE AT CITY OF WAUKESHA DATUM (ADD 760.56 TO CONVERT TO USGS DATUM)

REFERENCE BENCHMARKS:
ELEV: 40.43 "OPEN" HYD E. SIDE PRAIRIE AT S. ENTRANCE.
ELEV: 44.12 "OPEN" HYD E. SIDE PRAIRIE AT SIEMANS MAIN ENTRANCE

REVISED: SEPTEMBER 30, 2008

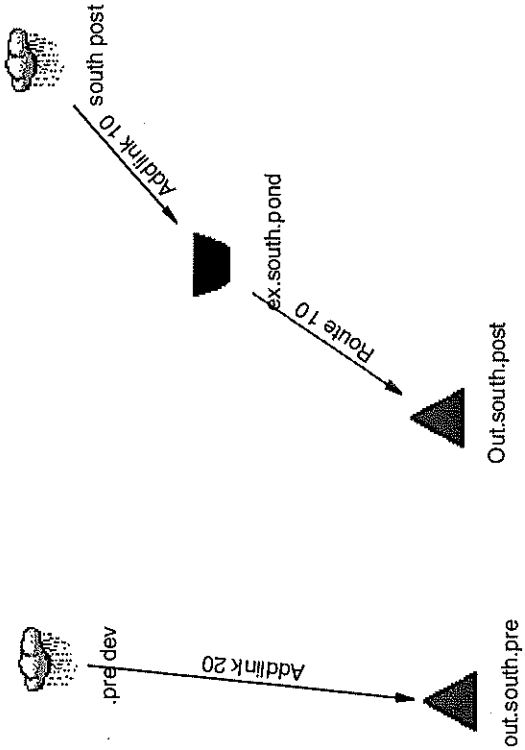
PROPOSED GRADING PLAN
RE: WELDALL
PART OF NW & SW 1/4 SECTION 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WI.

JAHNKE & JAHNKE ASSOCIATES INC.
PLANNERS & PROFESSIONAL ENGINEERS
711 W. MORELAND BLVD.-WAUKESHA,WI.53188
TEL.No.(262) 542-5797 FAX (262) 542-7898

SCALE: 1" = 40'	DATE: JUNE 28, 2008
DRAWN BY: N.S. CHECKED BY: M.B.	FILE NO.: WAUKESHA 793
BOOK NO.: WAUKESHA 174	JOB: 54743 SHEET 6 OF 9

FILE NAME: S:\PROJECTS\54743\DWGS\54743.dwg

South


south post
Addlink 10
ex.south.pond
Route 10
Out.south.post
pre dev
Addlink 20
out.south.pre

South

Job File: P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW
Rain Dir: P:\Pondpack\s-4743 Weldall\

JOB TITLE

Project Date: 6/19/2008
Project Engineer: Michael Birschbach
Project Title: Watershed
Project Comments:

Table of Contents

MASTER DESIGN STORM SUMMARY

Network Storm Collection: SEWRPC 2000

Return Event	Total Depth in	Rainfall Type	RNF ID
2-Yr	2.5700	Synthetic Curve	TypeII 24hr
10-Yr	3.6200	Synthetic Curve	TypeII 24hr
100-Yr	5.8800	Synthetic Curve	TypeII 24hr
1-Yr	2.3000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
.PRE DEV	AREA	2	.206		12.0000	3.08		
.PRE DEV	AREA	10	.466		12.0000	7.72		
.PRE DEV	AREA	100	1.190		11.9500	20.81		
.PRE DEV	AREA	1	.151		12.0000	2.08		
EX.SOUTH.PONDIN	POND	2	.561		11.9500	10.12		
EX.SOUTH.PONDIN	POND	10	.963		11.9000	17.43		
EX.SOUTH.PONDIN	POND	100	1.903		11.9000	34.04		
EX.SOUTH.PONDIN	POND	1	.464		11.9500	8.39		
EX.SOUTH.PONDOUT	POND	2	.000		8.8000	.00	30.79	.561
EX.SOUTH.PONDOUT	POND	10	.000		7.0500	.00	31.78	.963
EX.SOUTH.PONDOUT	POND	100	.000		4.9000	.00	33.74	1.902
EX.SOUTH.PONDOUT	POND	1	.000		9.3000	.00	30.54	.464

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*OUT.SOUTH.POST	JCT	2	.000		.0500	.00		
*OUT.SOUTH.POST	JCT	10	.000		.0500	.00		
*OUT.SOUTH.POST	JCT	100	.000		.0500	.00		
*OUT.SOUTH.POST	JCT	1	.000		.0500	.00		
*OUT.SOUTH.PRE	JCT	2	.206		12.0000	3.08		
*OUT.SOUTH.PRE	JCT	10	.466		12.0000	7.72		
*OUT.SOUTH.PRE	JCT	100	1.190		11.9500	20.81		
*OUT.SOUTH.PRE	JCT	1	.151		12.0000	2.08		
SOUTH POST	AREA	2	.561		11.9500	10.12		
SOUTH POST	AREA	10	.963		11.9000	17.43		
SOUTH POST	AREA	100	1.903		11.9000	34.04		
SOUTH POST	AREA	1	.464		11.9500	8.39		

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0230	
Hydraulic Length	300.00	ft
2yr, 24hr P	2.5700	in
Slope	.023000	ft/ft

Avg.Velocity .90 ft/sec

Segment #1 Time: .0926 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	280.00	ft
Slope	.028600	ft/ft
Unpaved		

Avg.Velocity 2.73 ft/sec

Segment #2 Time: .0285 hrs

Total Tc: .1211 hrs

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ====

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0250
Hydraulic Length	145.00 ft
2yr, 24hr P	2.5700 in
Slope	.023000 ft/ft
Avg.Velocity	.73 ft/sec

Segment #1 Time: .0553 hrs

Segment #2: Tc: TR-55 Sheet

Mannings n	.0250
Hydraulic Length	90.00 ft
2yr, 24hr P	2.5700 in
Slope	.100000 ft/ft
Avg.Velocity	1.19 ft/sec

Segment #2 Time: .0210 hrs

Total Tc: .0763 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

Tc Equations used...

**** SCS TR-55 Sheet Flow ****

$$Tc = (.007 * ((n * Lf)^{0.8})) / ((P^{.5}) * (Sf^{.4}))$$

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Crops	69	5.450			69.00
COMPOSITE AREA & WEIGHTED CN --->		5.450			69.00 (69)

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Paved parking lots, roofs, driveway	98	2.760			98.00
Paved parking lots, roofs, driveway	98	.390			98.00
Good condition; grass cover > 75%	61	1.970			61.00
Pond	98	.330			98.00
COMPOSITE AREA & WEIGHTED CN --->		5.450			84.63 (85)

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
29.23	14449.000	.3317	.0000	.000	.000
30.00	15624.000	.3587	1.0353	.266	.266
31.00	17304.000	.3972	1.1334	.378	.644
32.00	18948.000	.4350	1.2479	.416	1.060
33.00	20664.000	.4744	1.3636	.455	1.514
34.00	26454.000	.6073	1.6184	.539	2.054
35.00	26384.000	.6057	1.8195	.606	2.660
36.00	29601.000	.6795	1.9268	.642	3.302
37.00	32862.000	.7544	2.1500	.717	4.019
38.00	36564.000	.8394	2.3896	.797	4.815

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 29.23 ft
Increment = .10 ft
Max. Elev.= 38.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Circular	O1	--->	TW	36.000	38.000
TW SETUP, DS Channel					

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	=	O1
Structure Type	=	Culvert-Circular

No. Barrels	=	1	
Barrel Diameter	=	1.0000	ft
Upstream Invert	=	36.00	ft
Dnstream Invert	=	35.85	ft
Horiz. Length	=	15.00	ft
Barrel Length	=	15.00	ft
Barrel Slope	=	.01000	ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.0000	(forward entrance loss)
Kb	=	.031274	(per ft of full flow)
Kr	=	.0000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1	
Inlet Control K	=	.0078	
Inlet Control M	=	2.0000	
Inlet Control c	=	.03790	
Inlet Control Y	=	.6900	
T1 ratio (HW/D)	=	1.130	
T2 ratio (HW/D)	=	1.291	
Slope Factor	=	-.500	

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...

At T1 Elev =	37.13 ft	--->	Flow =	2.75	cfs
At T2 Elev =	37.29 ft	--->	Flow =	3.14	cfs

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	=	TW
Structure Type	=	TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations	=	30	
Min. TW tolerance	=	.01	ft
Max. TW tolerance	=	.01	ft
Min. HW tolerance	=	.01	ft
Max. HW tolerance	=	.01	ft
Min. Q tolerance	=	.10	cfs
Max. Q tolerance	=	.10	cfs

Index of Starting Page Numbers for ID Names

JAHNKE & JAHNKE ASSOCIATES INC.

Consultants in
Engineering, Planning, Subdivisions, and Surveying

STORMWATER MANAGEMENT PLAN

Weldall Manufacturing
2001 S. Prairie Avenue
Part of the NW ¼ & SW 1/4 of Section 15, T6N, R19E
City of Waukesha, Waukesha County, Wisconsin
Jahnke & Jahnke Project No. S-4743

Prepared for
Weldall Manufacturing

Prepared by:
Michael P. Birschbach, P.E.
Project Engineer
Jahnke & Jahnke Associates Inc.

October 14, 2008

711 West Moreland Boulevard, Waukesha, Wisconsin 53188-2479 Telephone: (262) 542-5797 Fax: (262) 542-7698

WELDALL MANUFACTURING
STORMWATER PLAN NARRATIVE

This Stormwater Management plan was prepared for the Weldall Manufacturing property which is a Tier 2 Industrial Manufacturing Facility located at 2001 S. Prairie Avenue in the City of Waukesha. The property is in the NW ¼ and SW ¼ of Section 15, Township 6 North, Range 19 East, Waukesha County. The site is located within the Upper Fox River (Illinois) watershed of the Fox River (Illinois) Basin. The total property is 16.1 acres in size.

The site is currently occupied by a 92,000 sq. ft. industrial building with associated parking and outdoor storage areas. The facility was constructed in 1997. The site is generally sloping down to the South and West towards ponds which were constructed as part of the property development in 1997. The proposed project will consist of the construction of a 96,000 sq. ft. addition, new drive, and up to 1.6 acres of new parking and outdoor storage.

Stormwater Management on this site is achieved by two distinct sub-watersheds (labeled South and West) at this property. All of the existing building stormwater runoff and 0.69 ac. of the addition roof top runoff will be directed to the existing south pond (South sub-watershed). A new wet pond will be constructed on the west side of the site to provide treatment of 1.5 acres of runoff from the proposed addition and ultimately 4.5 acres of paved area. All of the post-developed drainage from the northern portion of the site will be routed into the new wet pond (West sub-watershed). The stormwater released from the site will discharge to the City of Waukesha storm sewer which drains to the Fox River.

A review of the USGS Soil Conservation Maps for the area of the site indicates silt loam and Fox loam to be the prominent soil types at the property. These soils are classified as type B soil. To analyze the hydraulic analysis the post-developed information is based upon the proposed ultimate build-out of the site which includes outdoor storage on the north leg of the site and a parking lot on the west side of the existing building. The pre-developed rates are based upon the site being used for Row crops (pre 1997). The pre-development watershed areas and time of concentration are shown on the Pre-developed Drainage map. Using the calculated input data, the flows were analyzed using Haestad Methods Pondpack Version 8.0 computer program.

As allowed by WDNR guidelines, the runoff from the northern adjacent property is being routed around the proposed wet pond and will discharge to the existing pond located on the West side of the site. The runoff onto the northern leg of the subject site from the eastern portion of this northern adjacent property will be allowed to pond on the Northern leg of the subject site (as it currently does). This area is currently internally drained and will remain as such after the storage areas on the subject property are constructed. While the storm water storage area will be modified to some degree, the available storm water storage volume will remain unchanged.

The stormwater management requirements for the City of Waukesha and the Wisconsin DNR are as follows:

1. Peak Discharge.
   a. For all flow passing through the stormwater management facilities, contain the post-developed 2, 10 & 100 year, 24 hour storm event peak flow rates to less than or equal to the 2, 10 & 100 year pre-developed 24 hour storm event peak flow rate. This matches the Wis.DNR standard.
2. Total Suspended Solids. Reduce the total suspended solids load by 80% for new impervious areas and 40% for existing based on the average annual as compared to no runoff management controls.
3. Infiltration. Due to the industrial classification of the site, no infiltration is required.

The post-development conditions were analyzed using Haestad Methods Pondpack Version 8.0 computer program.

To address water quality of the runoff, a wet pond is being proposed at the western portion of the subject site. The drainage from the new parking, storage and portions of the new addition area on the subject site is collected by storm sewers which are connected to this wet pond. To provide maximum protection of the proposed structure, the storm sewer is designed to accommodate the 100 year storm. The outlet from the stormwater facility (Wet Pond) flows into the existing man made pond (West Pond) on the site.

The reduction of the peak flow rate from the outlet acre structure is designed to meet the flow requirements of the City and WDNR.

NR 151 Requirements

The proposed storm water management and erosion plan satisfies the current Wisconsin Department of Natural Resources (WDNR) Chapter NR 151 Runoff Management Regulations and WDNR Conservation Practice Standard (WDNR CPS). Specifically those discussed in NR 151.11 and NR 151.12. The proposed plan includes best management erosion control measures (NR 151.11) during construction to achieve the following:

- The installation of a diversion swale to direct water from northern adjacent property around the proposed graded areas.

- To the maximum extent practicable, a reduction of 80% of the sediment load carried in runoff, on an average annual basis, with culvert inlet protection, silt fence, the use of the proposed wet pond as a temporary sediment basin, and prompt disturbed area restoration.

- Prevent tracking of sediment from the construction site onto roads and other paved surfaces with tracking pads.

- Two, 2" orifices in the wet pond outlet will be utilized to limit flows from site during construction to provide water quality in accordance with WDNR CPS 1063.

The post construction storm water management plan satisfies the requirements identified in NR 151.12 and WDNR CPS by accomplishing the following:

- Installing and maintaining wet detention pond to reduce the maximum extent practicable, the total suspended solids load by a minimum of 66%, based on an average annual rainfall, as compared to no runoff management controls (NR 151.12(5)(a)1). The 66% removal requirement is based upon a weighted average of 80% removal for new impervious areas and 40% removal for existing impervious areas.

- After the site is vegetated, the 2, 2" orifices in the wet pond outlet will meet water quality requirements of WDNR CPS 1001.

- The PondPack model was utilized to determine the peak flow rate for the pre-developed and post-developed site conditions. The 2-year, 10-year, and 100-year, 24-hour design storm peak discharge rates for the post-developed conditions are less than the similar design storm for the pre-developed condition (NR 151.12(5)(b) 1).

The Western sub-watershed meets the requirements. There will be no release from the existing pond in Southern sub-watershed, as such this area exceeds the requirements.

The Summary Sheets and Supporting PondPack model calculations are included within this report. Associated maps and additional calculations are also included.

JAHNKE & JAHNKE ASSOCIATES INC.

CONSULTANTS IN

ENGINEERING, PLANNING, SUBDIVISIONS AND SURVEYING

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E-Mail: mbirschbach@jahnkeandjahnke.com

Stormwater Calculation Summary
Plan Commission Submittal 9/30/2008

Weldall Manufacturing

Assumptions are based upon predeveloped area being classified as farmland (based upon 1941 to 1995 air photos).

North/West Side

Stormwater management objectives will be met utilizing storm sewers for conveyance to a new wet detention pond. WDNR water quality requirements will be met in the proposed wet pond. Given that this is an industrial property with outdoor storage, infiltration will not be utilized.

The outlet of proposed wet pond will be the existing west pond. The existing pond will remain unchanged. The stormwater will ultimately discharge to the existing City storm sewer system through existing conveyance systems located along the south side of the property.

The results of the stormwater analysis is shown below.

	Predeveloped	Postdeveloped
Area	5.23 ac	6.8 ac
CN	69	96
Peak Flow 1 yr.	1.64 cfs	0.31 cfs
Peak Flow 2 yr.	2.49 cfs	0.67 cfs
Peak Flow 10 yr.	6.50 cfs	6.45 cfs
Peak Flow 100 yr.	17.25 cfs	15.87 cfs

South Side

The existing pond was evaluated for the estimated runoff. Current runoff from the south side of the site results from the existing connection of an inlet to the City storm sewer system. This connection will be removed and the site storm sewer will drain into the existing South Pond. There is currently no outlet from this pond. Per DNR request, a new outlet will be installed at elevation 36.

	Predeveloped	Postdeveloped
Area	5.45 ac	5.45 ac
CN	69	85
Peak Flow 1 yr.	2.08 cfs	0.0 cfs
Peak Flow 2 yr.	3.08 cfs	0.0 cfs
Peak Flow 10 yr.	7.72 cfs	0.0 cfs
Peak Flow 100 yr.	20.81 cfs	0.0 cfs

The summary sheets are attached.

DATA SUMMARY SHEET STORMWATER MANAGEMENT PLAN

Weldall Manufacturing Building Addition

City of Waukesha, Waukesha County, Wisconsin

Project Size: 12.25 acres

Project Type: Industrial Construction

Number of Runoff Discharge Points: 2

Watershed (ultimate discharge): Fox River

Watershed Area (including off-site runoff traveling through project area): 6.84 acres

Public Land Survey Location: Part of the NW 1/4 & SW 1/4 of Sec. 15,T6N, R19E

WEST POND AREA	**Pre Bldg**	**West**	**North Sewer**	**Out West Pre**	**Out West Post**	
Summary Data Elements	Pre-develop	Post-develop	Post-develop	Pre-develop	Post-develop	
Watershed Areas (in acres)	5.23	1.57	5.28	5.23	6.84	
Average Watershed Slopes (%)	2% - 4%	2% - 4%	2% - 4%			
Land Uses	Land Use: crops, b Acres: 5.23	Land Use: drive, pond, roof, lawn, future parking Acres: 0.29, 0.34, 0.10, 0.43, 0.4	Land Use: parking storage, roof, north storage Acres: 2.28, 1.38, 1.62			
Runoff Curve Numbers	Acres: 5.23 CN: 69 Net 360.87 / 5.23 CN= 69	Acres: 0.29, 0.34, 0.10, 0.43, 0.40 CN: 98, 98, 98, 61, 98 Net 137.45 / 1.57 CN= 88	Acres: 2.28, 1.38, 1.62 CN: 98, 98, 98 Net 517.15 / 5.28 CN= 98			
Conveyance System Types	Overland	Overland to Wet Pond to West Pond	Overland to Storm Sewer to Wet Pond to West Pond			
Time of Concentration (Tc) (hrs)	0.22	0.08	0.08			
1-year/24 hour Runoff Volume ac-ft	0.15	0.16	0.91	*Target Rate*	**Calculated Rate**	
2-yr/24 Hour Peak Flow (cfs)	2.49	3.40	17.04	*2.49*	**0.61**	
10-yr/24 Hour Peak Flow (cfs)	6.50	5.60	24.24	*6.50*	**6.45**	
100-yr/24 Hour Peak Flow (cfs)	17.25	10.40	39.65	*17.25*	**15.87**	

DATA SUMMARY SHEET STORMWATER MANAGEMENT PLAN

Weldall Manufacturing Building Addition

City of Waukesha, Waukesha County, Wisconsin

Project Size: 12.25 acres

Project Type: Industrial Construction

Number of Runoff Discharge Points: 2

Watershed (ultimate discharge): Fox River

Watershed Area (including off-site runoff traveling through project area): 5.45 acres

Public Land Survey Location: Part of the NW 1/4 & SW 1/4 of Sec. 15,T6N, R19E

SOUTH POND AREA	**Pre dev**	**South post**	**Out South Pre**	**Out South Post**		
Summary Data Elements	Pre-develop	Post-develop	Pre-develop	Post-develop		
Watershed Areas (in acres)	5.45	5.45	5.45	5.45		
Average Watershed Slopes (%)	2% - 4%	2% - 4%				
Land Uses	Land Use: crops, b; Acres: 5.45	Land Use / Acres: roof 2.76; parking 0.39; lawn 1.97; pond 0.33				
Runoff Curve Numbers	Acres / CN: 5.45 / 69; Net 376.05 / 5.45; CN= 69	Acres / CN: 2.76 / 98; 0.39 / 98; 1.97 / 61; 0.33 / 98; Net 461.21 / 5.45; CN= 85				
Conveyance System Types	Overland	Overland to South Pond				
Time of Concentration (Tc) (hrs)	0.12	0.08				
1-year/24 hour Runoff Volume ac-ft	0.15	0.46	*Target Rate*	**Calculated Rate**		
2-yr/24 Hour Peak Flow (cfs)	3.08	10.12	*3.08*	**0.00**		
10-yr/24 Hour Peak Flow (cfs)	7.72	17.43	*7.72*	**0.00**		
100-yr/24 Hour Peak Flow (cfs)	20.81	34.04	*20.81*	**0.00**		

WELDALL MANUFACTURING
WATER QUALITY CALCULATIONS

WEST OUT

Weighted Average of Pollutant Removal

2.11 ac	Existing Impervious @ 40%	0.844
3.96 ac	New Impervious @ 80%	3.168
6.07 ac	Total Proposed Impervious	4.01 / 6.07= **66% Removal Required**

Percentage of Drainage Area Required as Wet Basin Permanent Pool:

Land Use: Industrial

% of Drainage Area = 2.8%

	Drainage Area:	Min. permanent pool required	permanent pool provided
Wet Pond :	6.8 ac.	8,293 sq. ft.	11,652 sq. ft.

WET POND - POST CONSTRUCTION per WDNR CPS 1001

Q_{out} (cfs) = (0.0000191 (fps) x SA (sf)) / 1.2 (safety factor)

Q_{out} = Peak discharge rate from the pond during 1-yr, 24-hr design storm in cfs

0.0000191 = Settling velocity of 3 micron particle in ft/sec (80%) Per WDNR CPS 1001

0.0000737 = Settling velocity of 6 micron particle in ft/sec (60%) Per WDNR CPS 1001

SA = Surface area of the permanent pool in sq ft

SA = 11,652 sq ft (perm. pool @ elev. = 36.00)

Q_{out} 80%:(0.0000191 x 11,652) / 1.2 = 0.19 cfs

Q_{out} 60%:(0.0000737 x 11,652) / 1.2 = 0.71 cfs

Q_{out} from PondPack = **0.31 cfs** for 2 @ 2" orifices in wet pond outlet = **75% Removal**

* Water quality requirement met

WET POND/ Sediment Basin -DURING CONSTRUCTION per WDNR CPS 1064

Predominant Soil Type at exposed subgrade during construction are Type 2 based upon the soil boring report

Q_{out} (cfs) = (0.000073 (fps) x SA (sf)) / 1.2 (safety factor)

Q_{out} = Peak discharge rate from the pond during 1-yr, 24-hr design storm in cfs

0.000073 = Settling velocity of 5 to 20 micron particle in ft/sec Per WDNR CPS 1064

SA = Surface area of the permanent pool in sq ft

SA = 11,652 sq ft (perm. pool @ elev. = 36.00)

Q_{out} target:(0.000073 x 11,652) / 1.2 = 0.85 cfs

Q_{out} from PondPack = **0.31 cfs** for 2 @ 2" orifices in wet pond outlet

* Water quality requirement met

DATA SUMMARY SHEET FOR WET POND DESIGN
Weldall Manufacturing, Waukesha WI

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin (subwatershed)	6.8 acres
Distance to nearest private well (including off-site wells)	>100 feet
Distance to municipal well (including off-site wells)	>1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	1.0 to 2.0%
Any buried or overhead utilities in the area?	yes- south of pond
Proposed outfall conveyance system/discharge (w/distances)	to existing West Pond to City Storm
Any downstream roads or other structures? (describe)	yes- driveway
Floodplain, shoreland or wetlands?	Wetland over 60' south of pond- Not hydraulically connected
Soil investigation data (see attached map & soil logs):	
Number of soil investigations completed	5
Do elevations of test holes extend 3ft. below proposed bottom?	Yes
Average soil texture at pond bottom elevation (USDA)	Sandy loam, Fine sand
Infiltration rate at pond bottom and method of analysis	site exempt per
Distance from pond bottom to bedrock	>5 feet
Distance from pond bottom to seasonal water table	0 to 4 feet
General basin design data (see attached detailed drawings):	
Infiltration area	exempt
Infiltration elevation	exempt
Top of berm elevation (after settling) and width	Elev. 41.25/ 12' wide
Volume below high water level (2 yr. storm)	0.837ac-ft
Time to infiltrate stored water	na
Wet forebay size & depth	.08 ac /5 ft.
Wet forebay maintenance	20 year cleaning frequency

Wet Pond Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
(1-yr./24 hr.) 18.03 cfs/1.069 ac. ft.	0.31	38.36	0.774 acre feet	#1
(2-yr./24 hr. peak) 20.44 cfs/1.217 ac. ft.	0.67	38.52	0.837 acre feet	#1, #2
(10-yr./24 hr. peak) 29.84 cfs/1.799 ac. ft.	6.45	38.93	1.006 acre feet	#1, #2
(100-yr./24 hr. peak) 50.04 cfs/3.070 ac. ft.	15.87	40.06	1.524 acre feet	#1, #2

***The controlling elements are summarized below (See attached detail drawing of outlet structure):**

#1 = 2 @ 2 inch orifice at elev. @ EL. 36.0 in Stand pipe to 18" RCP

#2 = 2' dia RCP Standpipe @ EL. 38.45 to 18' dia RCP

DATA SUMMARY SHEET FOR EXISTING SOUTH POND
Weldall Manufacturing, Waukesha WI

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin (subwatershed)	5.45 acres
Distance to nearest private well (including off-site wells)	>100 feet
Distance to municipal well (including off-site wells)	>1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	1 to 30%
Any buried or overhead utilities in the area?	Storm Sewer south of pond
Proposed outfall conveyance system/discharge (w/distances)	None
Any downstream roads or other structures? (describe)	no
Floodplain, shoreland or wetlands?	Wetland over 50' south of pond- Not hydraulically connected
Soil investigation data (see attached map & soil logs):	
Number of soil investigations completed	n/a
Do elevations of test holes extend 3ft. below proposed bottom?	n/a
Average soil texture at pond bottom elevation (USDA)	n/a
Infiltration rate at pond bottom and method of analysis	high-historical information
Distance from pond bottom to bedrock	>5 feet
Distance from pond bottom to seasonal water table	0 feet
General basin design data (see attached detailed drawings):	
Infiltration area	n/a
Infiltration elevation	n/a
Top of berm elevation (after settling) and width	Elev. 38.7
Volume below high water level (2 yr. storm)	0.561 ac-ft
Time to infiltrate stored water	n/a
Wet forebay size & depth	n/a
Pond maintenance	Inspect yearly maintain as needed

Pond Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
(1-yr./24 hr.) 8.39cfs/ 0.464 ac. ft.	0	30.54	0.464acre feet	No
(2-yr./24 hr. peak) 10.12 cfs/ 0.561 ac. ft.	0	30.79	0.561 acre feet	No
(10-yr./24 hr. peak) 17.43 cfs/ 0.963 ac. ft.	0	31.78	0.963 acre feet	No
(100-yr./24 hr. peak) 34.04 cfs/ 1.903 ac. ft.	0	33.74	1.902 acre feet	No

***The controlling elements are summarized below (See attached detail drawing of outlet structure):**

#1 = 1' dia RCP @ EL. 36.0 to Storm Sewer

#2 = earthen weir at el 38.7

T:\...\S4743\S-4743Data summary sheet

1 SITE LOCATION MAP
SOILS MAP

2 PRE-DEVELOPED SITE
- WATERSHED MAP

3 SOUTH
- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP

4 NORTH/WEST
- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP

5 STORM SEWER CALCULATIONS

6 SLAMM ANAYLSIS

7 SOIL BORING REPORT

8

1 SITE LOCATION MAP
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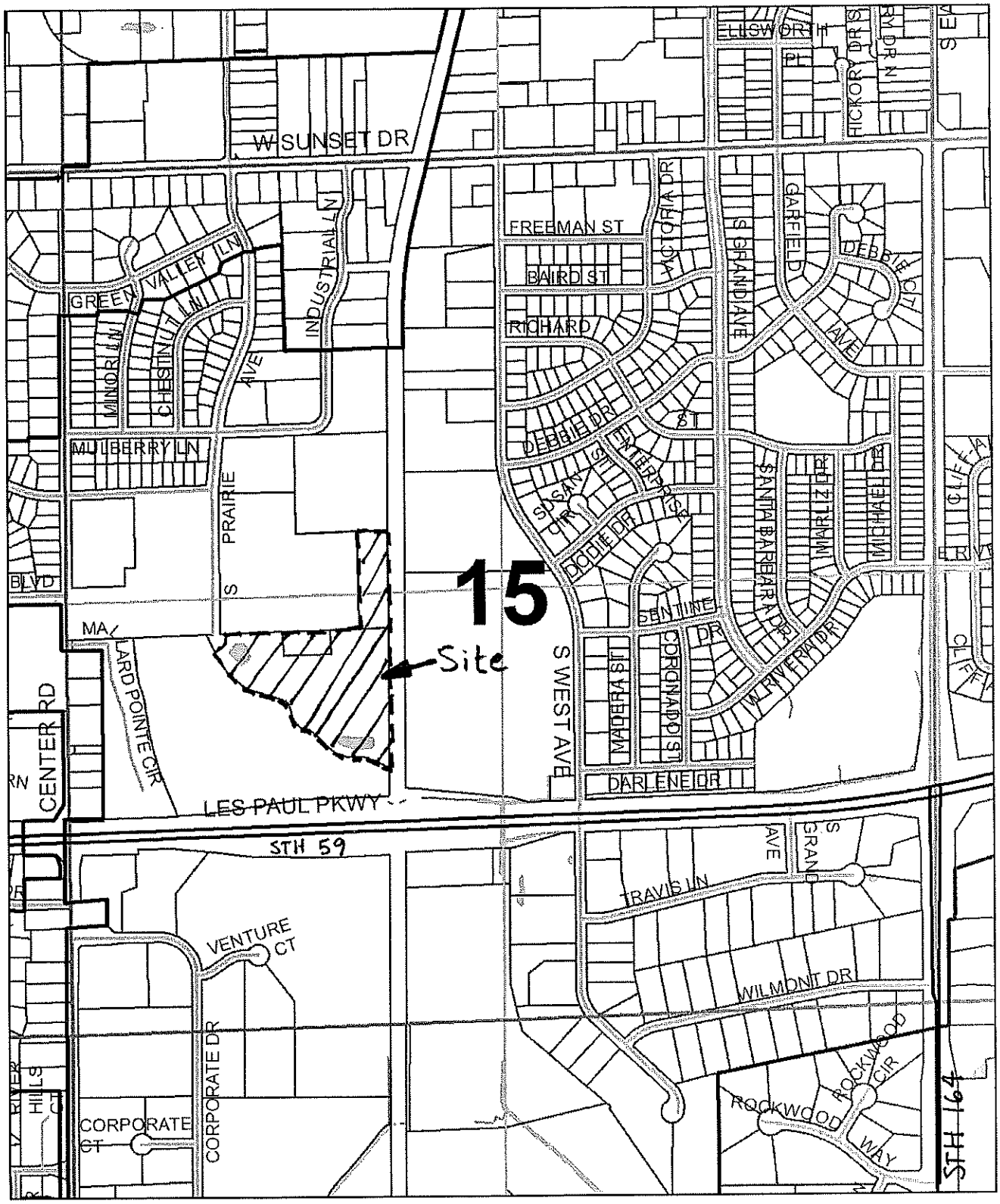
8

WAUKESHA COUNTY
Internet Mapping Site

Waukesha County GIS Map



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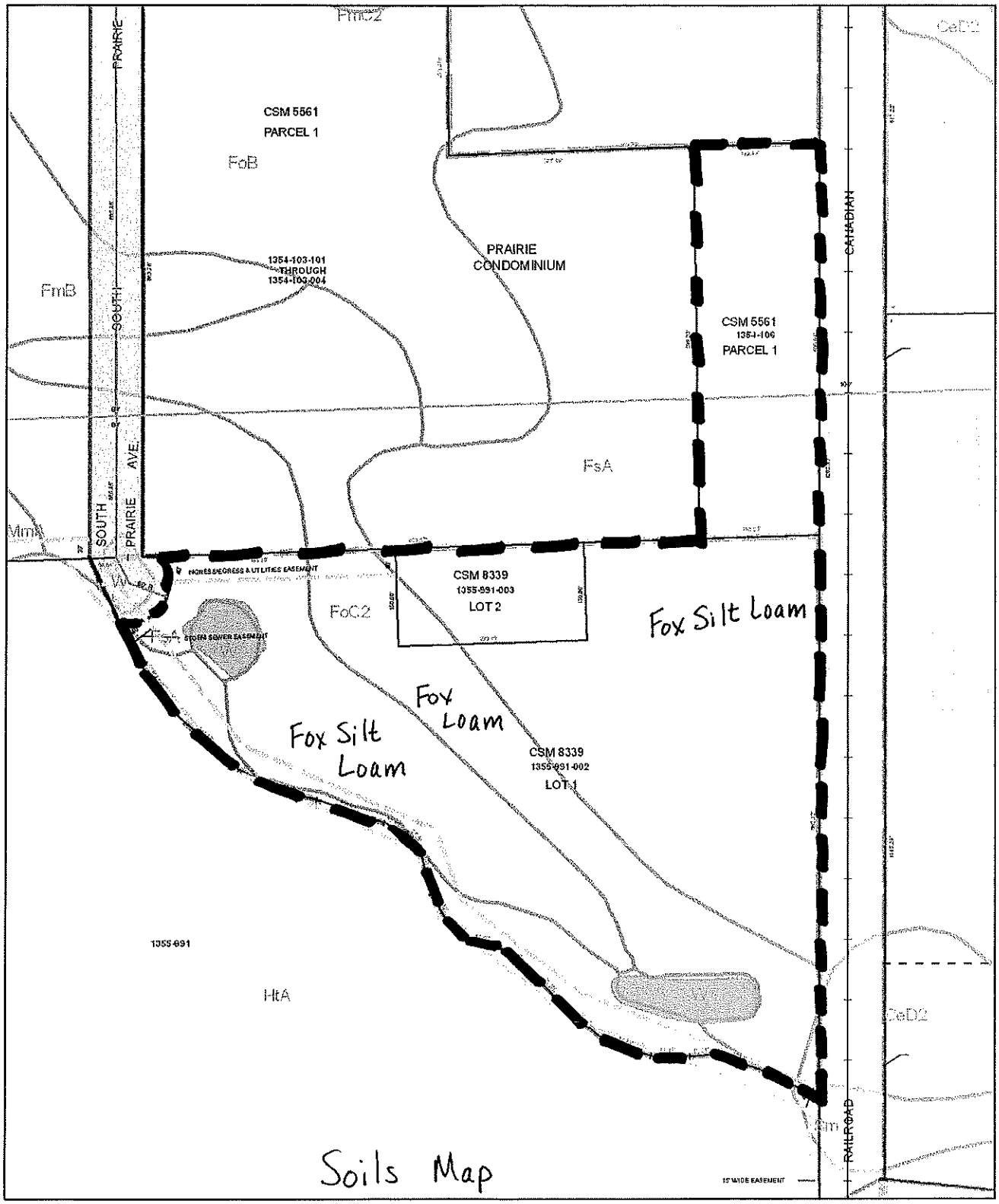
Site Location Map

Date Map Generated: Oct 16, 2008

Waukesha County GIS Map



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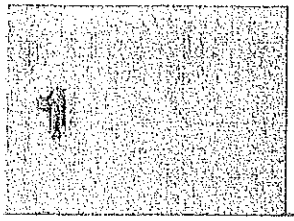
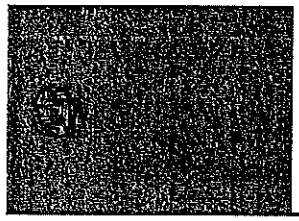


SITE LOCATION MAP
SOILS MAP

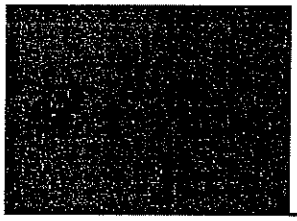
PRE-DEVELOPED SITE

- WATERSHED MAP



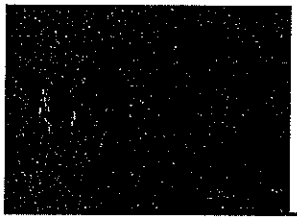
SOUTH

- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP

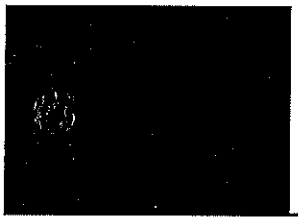


NORTH/WEST

- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP



STORM SEWER CALCULATIONS



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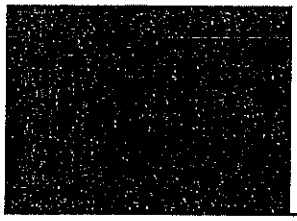
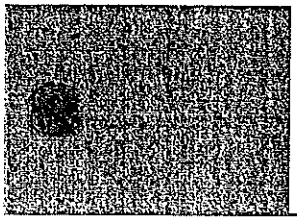
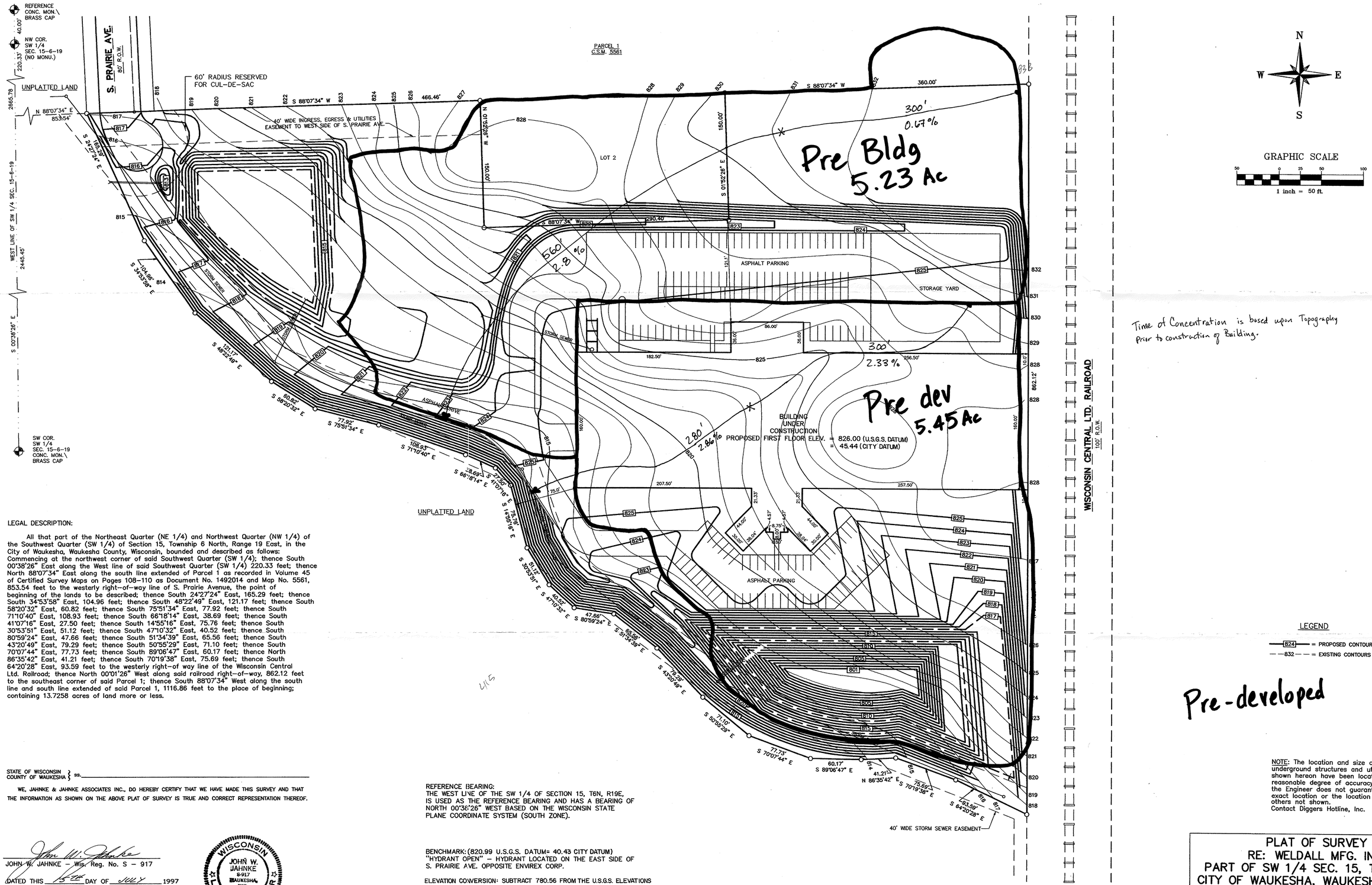


SOIL BORING REPORT





GRAPHIC SCALE

50 0 25 50 100

1 inch = 50 ft.

Time of Concentration is based upon Topography prior to construction of Building.

LEGAL DESCRIPTION:

All that part of the Northeast Quarter (NE 1/4) and Northwest Quarter (NW 1/4) of the Southwest Quarter (SW 1/4) of Section 15, Township 6 North, Range 19 East, in the City of Waukesha, Waukesha County, Wisconsin, bounded and described as follows: Commencing at the northwest corner of said Southwest Quarter (SW 1/4); thence South 00°38'26" East along the West line of said Southwest Quarter (SW 1/4) 220.33 feet; thence North 88°07'34" East along the south line extended of Parcel 1 as recorded in Volume 45 of Certified Survey Maps on Pages 108-110 as Document No. 1492014 and Map No. 5561, 853.54 feet to the westerly right-of-way line of S. Prairie Avenue, the point of beginning of the lands to be described; thence South 24°27'24" East, 165.29 feet; thence South 34°53'58" East, 104.96 feet; thence South 48°22'49" East, 121.17 feet; thence South 58°20'32" East, 60.82 feet; thence South 75°51'34" East, 77.92 feet; thence South 71°10'40" East, 108.93 feet; thence South 66°18'14" East, 38.69 feet; thence South 41°07'16" East, 27.50 feet; thence South 14°55'16" East, 75.76 feet; thence South 30°53'51" East, 51.12 feet; thence South 47°10'32" East, 40.52 feet; thence South 80°59'24" East, 47.66 feet; thence South 51°34'39" East, 65.56 feet; thence South 43°20'49" East, 79.29 feet; thence South 50°55'29" East, 71.10 feet; thence South 70°07'44" East, 77.73 feet; thence South 89°06'47" East, 60.17 feet; thence North 86°35'42" East, 41.21 feet; thence South 70°19'38" East, 75.69 feet; thence South 64°20'28" East, 93.59 feet to the westerly right-of way line of the Wisconsin Central Ltd. Railroad; thence North 00°01'26" West along said railroad right-of-way, 862.12 feet to the southeast corner of said Parcel 1; thence South 88°07'34" West along the south line and south line extended of said Parcel 1, 1116.86 feet to the place of beginning; containing 13.7258 acres of land more or less.

STATE OF WISCONSIN } ss.
COUNTY OF WAUKESHA }

WE, JAHNKE & JAHNKE ASSOCIATES INC., DO HEREBY CERTIFY THAT WE HAVE MADE THIS SURVEY AND THAT THE INFORMATION AS SHOWN ON THE ABOVE PLAT OF SURVEY IS TRUE AND CORRECT REPRESENTATION THEREOF.

JOHN W. JAHNKE - Wis. Reg. No. S - 917

DATED THIS 15th DAY OF JULY 1997
REVISED THIS 17th DAY OF JULY 1997
REVISED THIS 24th DAY OF JULY 1997

WISCONSIN JOHN W. JAHNKE S-917 WAUKESHA, WIS. LAND SURVEYOR

REFERENCE BEARING:
THE WEST LINE OF THE SW 1/4 OF SECTION 15, T6N, R19E, IS USED AS THE REFERENCE BEARING AND HAS A BEARING OF NORTH 00°36'26" WEST BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM (SOUTH ZONE).

BENCHMARK: (820.99 U.S.G.S. DATUM= 40.43 CITY DATUM)
"HYDRANT OPEN" - HYDRANT LOCATED ON THE EAST SIDE OF S. PRAIRIE AVE. OPPOSITE ENVIREX CORP.

ELEVATION CONVERSION: SUBTRACT 780.56 FROM THE U.S.G.S. ELEVATIONS TO CONVERT TO CITY DATUM.

LEGEND

824 = PROPOSED CONTOURS
832 = EXISTING CONTOURS

Pre-developed

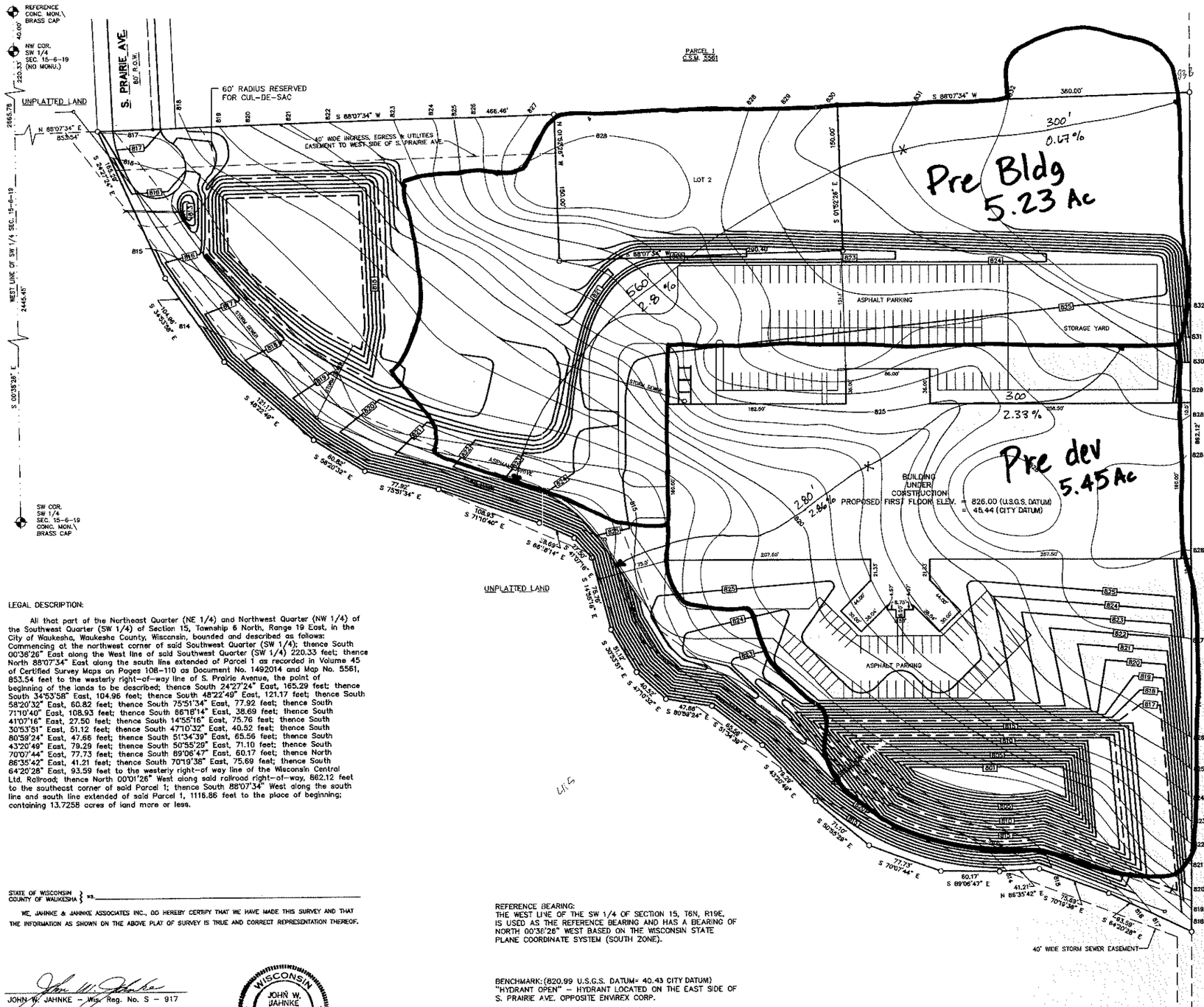
NOTE: The location and size of the underground structures and utilities shown hereon have been located to a reasonable degree of accuracy, but the Engineer does not guarantee their exact location or the location of others not shown. Contact Diggers Hotline, Inc.

PLAT OF SURVEY
RE: WELDALL MFG. INC.
PART OF SW 1/4 SEC. 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA CO., WI.

JAHNKE & JAHNKE ASSOCIATES INC.
PLANNERS & PROFESSIONAL ENGINEERS
711 W. MORELAND BLVD.-WAUKESHA,WI.53188
TEL.No.(414) 542-5797 FAX (414) 542-7698

SCALE: 1" = 50'	DATE: JULY 15, 1997
DRAWN BY: D.J.H. CHECKED BY: A.S.Z.	FILE NO.: WAUKESHA 793
BOOK NO.: WAUKESHA 142 JOB: S-4743	SHEET 1 OF 1

FILE NAME: DOUG\S4743POS



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PLAT OF SURVEY
RE: WELDALL MFG. INC.
PART OF SW 1/4 SEC. 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA CO., WI.

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FILE NAME: DOUG\S4743PDS


10/15/2008


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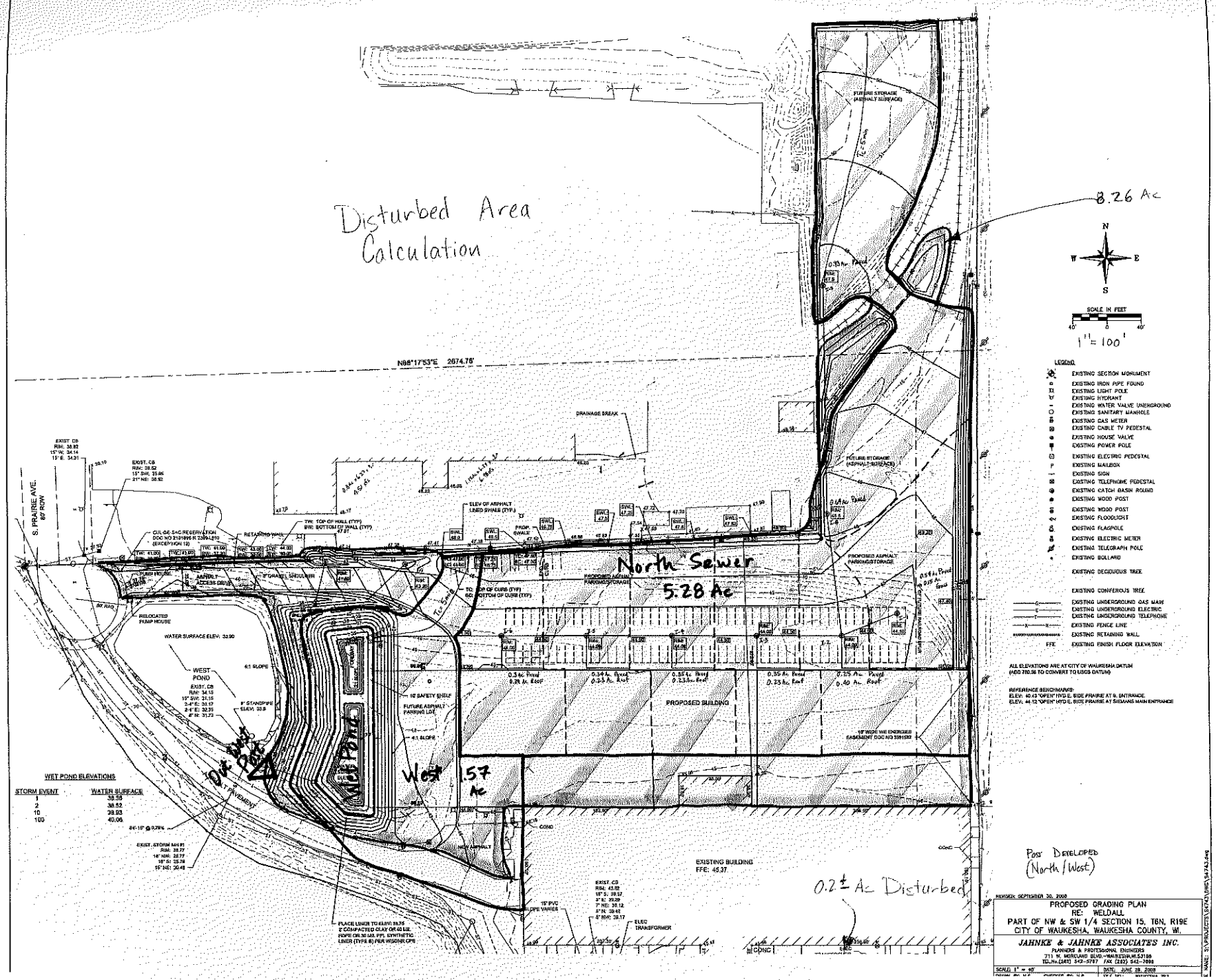


REVISED: SEPTEMBER 30, 2008

PROPOSED GRADING PLAN
RE: WELDALL
PART OF NW & SW 1/4 SECTION 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WI.

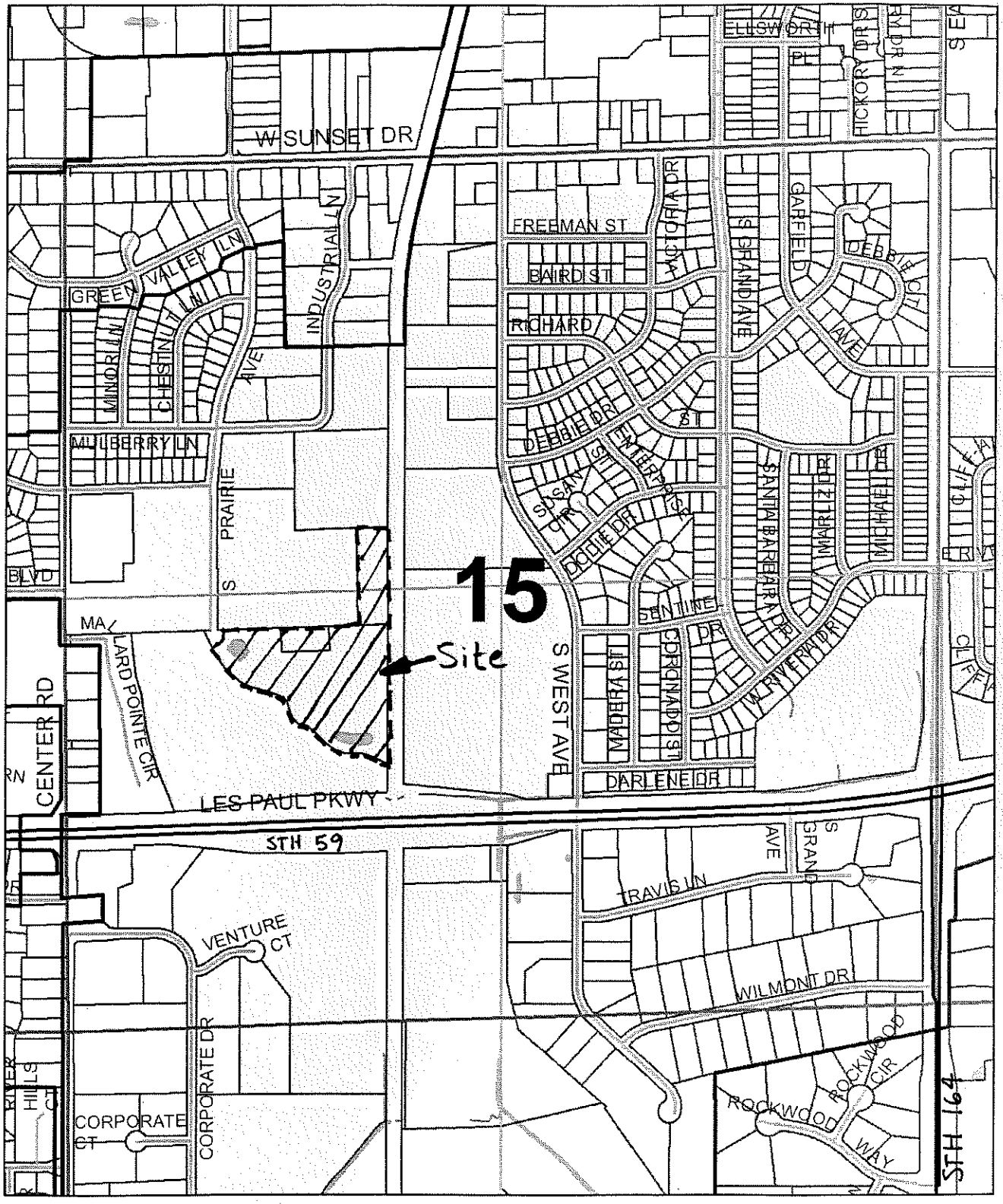
JAHNKE & JAHNKE ASSOCIATES INC.
PLANNERS & PROFESSIONAL ENGINEERS
711 W. MORELAND BLVD.–WAUKESHA, WI. 53188
TEL.No.(262) 542-5757 FAX (262) 542-7888

SCALE: 1" = 40' | DATE: JUNE 28, 2008

E. NAME: S:\PROJECTS\SKETCH.DWG\SK743.dwg

WAUKESHA COUNTY
Internet Mapping Site

Waukesha County GIS Map



0 900 1800 ft.

Site Location Map

Date Map Generated: Oct 16, 2008

1 SITE LOCATION MAP
SOILS MAP

2 PRE-DEVELOPED SITE
- WATERSHED MAP

3 SOUTH
- PRE & POST DEVELOPED CALCULATIONS
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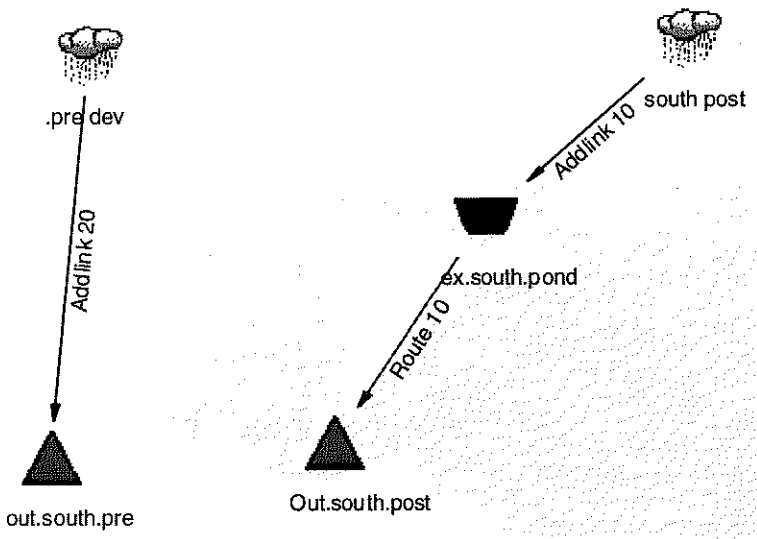
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Route 10
Out.south.post

South

South

==========
JOB TITLE
==========

Project Date: 6/19/2008
Project Engineer: Michael Birschbach
Project Title: Watershed
Project Comments:

Table of Contents

MASTER DESIGN STORM SUMMARY

Network Storm Collection: SEWRPC 2000

Return Event	Total Depth in	Rainfall Type	RNF ID
2-Yr	2.5700	Synthetic Curve	TypeII 24hr
10-Yr	3.6200	Synthetic Curve	TypeII 24hr
100-Yr	5.8800	Synthetic Curve	TypeII 24hr
1-Yr	2.3000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
.PRE DEV	AREA	2	.206		12.0000	3.08		
.PRE DEV	AREA	10	.466		12.0000	7.72		
.PRE DEV	AREA	100	1.190		11.9500	20.81		
.PRE DEV	AREA	1	.151		12.0000	2.08		
EX.SOUTH.PONDIN	POND	2	.561		11.9500	10.12		
EX.SOUTH.PONDIN	POND	10	.963		11.9000	17.43		
EX.SOUTH.PONDIN	POND	100	1.903		11.9000	34.04		
EX.SOUTH.PONDIN	POND	1	.464		11.9500	8.39		
EX.SOUTH.PONDOUT	POND	2	.000		8.8000	.00	30.79	.561
EX.SOUTH.PONDOUT	POND	10	.000		7.0500	.00	31.78	.963
EX.SOUTH.PONDOUT	POND	100	.000		4.9000	.00	33.74	1.902
EX.SOUTH.PONDOUT	POND	1	.000		9.3000	.00	30.54	.464

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*OUT.SOUTH.POST	JCT	2	.000		.0500	.00		
*OUT.SOUTH.POST	JCT	10	.000		.0500	.00		
*OUT.SOUTH.POST	JCT	100	.000		.0500	.00		
*OUT.SOUTH.POST	JCT	1	.000		.0500	.00		
*OUT.SOUTH.PRE	JCT	2	.206		12.0000	3.08		
*OUT.SOUTH.PRE	JCT	10	.466		12.0000	7.72		
*OUT.SOUTH.PRE	JCT	100	1.190		11.9500	20.81		
*OUT.SOUTH.PRE	JCT	1	.151		12.0000	2.08		
SOUTH POST	AREA	2	.561		11.9500	10.12		
SOUTH POST	AREA	10	.963		11.9000	17.43		
SOUTH POST	AREA	100	1.903		11.9000	34.04		
SOUTH POST	AREA	1	.464		11.9500	8.39		

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0230	
Hydraulic Length	300.00	ft
2yr, 24hr P	2.5700	in
Slope	.023000	ft/ft
Avg.Velocity	.90	ft/sec

Segment #1 Time: .0926 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	280.00	ft
Slope	.028600	ft/ft
Unpaved		
Avg.Velocity	2.73	ft/sec

Segment #2 Time: .0285 hrs

Total Tc: .1211 hrs

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ====

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0250
Hydraulic Length	145.00 ft
2yr, 24hr P	2.5700 in
Slope	.023000 ft/ft
Avg.Velocity	.73 ft/sec

Segment #1 Time: .0553 hrs

Segment #2: Tc: TR-55 Sheet

Mannings n	.0250
Hydraulic Length	90.00 ft
2yr, 24hr P	2.5700 in
Slope	.100000 ft/ft
Avg.Velocity	1.19 ft/sec

Segment #2 Time: .0210 hrs

Total Tc: .0763 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Crops	69	5.450			69.00
COMPOSITE AREA & WEIGHTED CN --->		5.450			69.00 (69)

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Paved parking lots, roofs, driveway	98	2.760			98.00
Paved parking lots, roofs, driveway	98	.390			98.00
Good condition; grass cover > 75%	61	1.970			61.00
Pond	98	.330			98.00
COMPOSITE AREA & WEIGHTED CN --->		5.450			84.63 (85)

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
29.23	14449.000	.3317	.0000	.000	.000
30.00	15624.000	.3587	1.0353	.266	.266
31.00	17304.000	.3972	1.1334	.378	.644
32.00	18948.000	.4350	1.2479	.416	1.060
33.00	20664.000	.4744	1.3636	.455	1.514
34.00	26454.000	.6073	1.6184	.539	2.054
35.00	26384.000	.6057	1.8195	.606	2.660
36.00	29601.000	.6795	1.9268	.642	3.302
37.00	32862.000	.7544	2.1500	.717	4.019
38.00	36564.000	.8394	2.3896	.797	4.815

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 29.23 ft
Increment = .10 ft
Max. Elev.= 38.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Circular	O1	--->	TW	36.000	38.000

TW SETUP, DS Channel

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = O1
Structure Type = Culvert-Circular

No. Barrels	=	1
Barrel Diameter	=	1.0000 ft
Upstream Invert	=	36.00 ft
Dnstream Invert	=	35.85 ft
Horiz. Length	=	15.00 ft
Barrel Length	=	15.00 ft
Barrel Slope	=	.01000 ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.0000	(forward entrance loss)
Kb	=	.031274	(per ft of full flow)
Kr	=	.0000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1
Inlet Control K	=	.0078
Inlet Control M	=	2.0000
Inlet Control c	=	.03790
Inlet Control Y	=	.6900
T1 ratio (HW/D)	=	1.130
T2 ratio (HW/D)	=	1.291
Slope Factor	=	-.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 37.13 ft ---> Flow = 2.75 cfs
At T2 Elev = 37.29 ft ---> Flow = 3.14 cfs

File.... P:\Pondpack\s-4743 Weldall\SOUTHEAST POST DEV.PPW

OUTLET STRUCTURE INPUT DATA

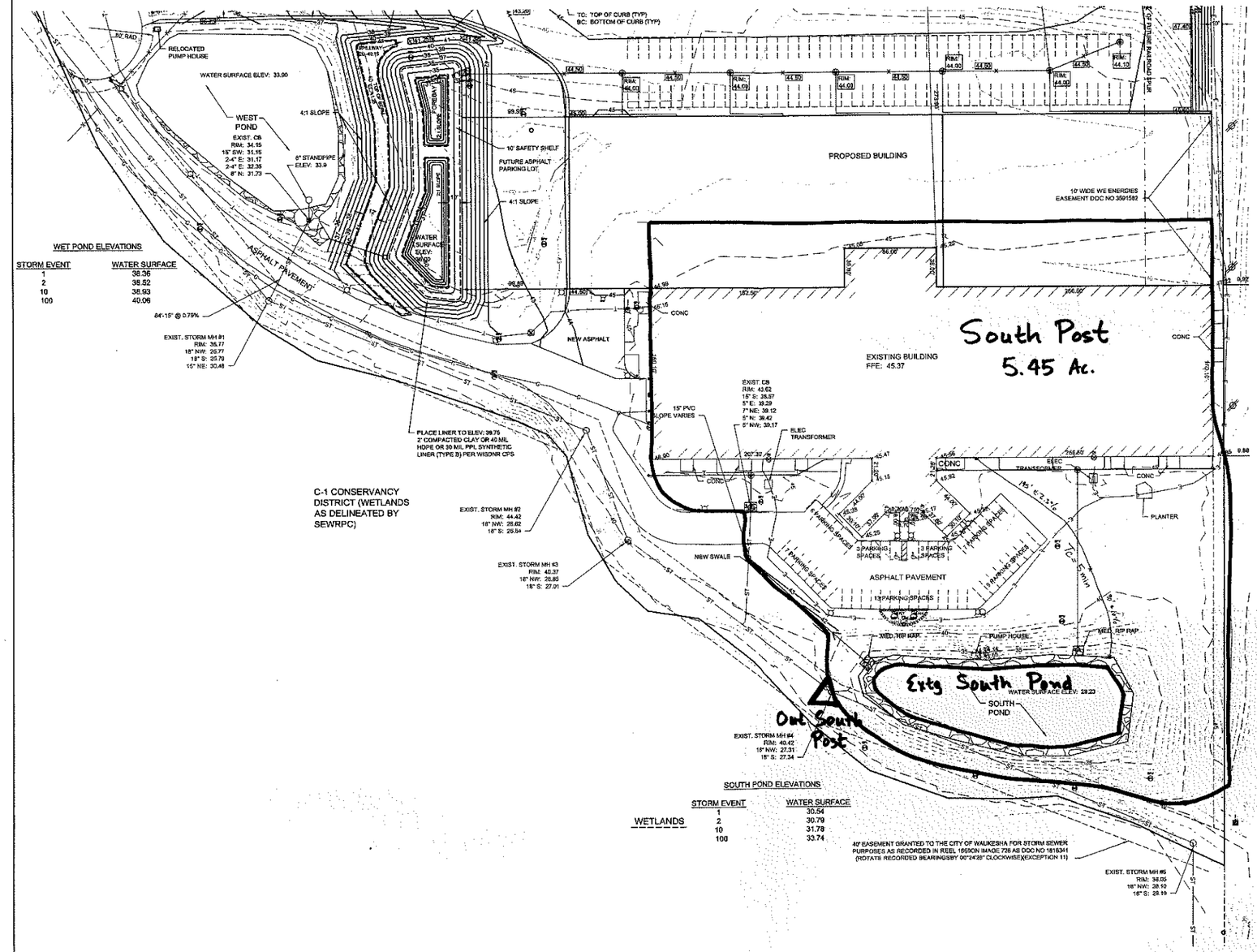
Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations	=	30
Min. TW tolerance	=	.01 ft
Max. TW tolerance	=	.01 ft
Min. HW tolerance	=	.01 ft
Max. HW tolerance	=	.01 ft
Min. Q tolerance	=	.10 cfs
Max. Q tolerance	=	.10 cfs

Index of Starting Page Numbers for ID Names



WET POND ELEVATIONS

STORM EVENT	WATER SURFACE
1	36.36
2	36.62
10	36.93
100	40.06

SOUTH POND ELEVATIONS

	STORM EVENT	WATER SURFACE
WETLANDS	1	30.54
	2	30.79
	10	31.78
	100	33.74

LEGEND

- EXISTING SECTION MONUMENT
- EXISTING IRON PIPE FOUND
- EXISTING LIGHT POLE
- EXISTING HYDRANT
- EXISTING WATER VALVE UNERGROUND
- EXISTING SANITARY MANHOLE
- EXISTING GAS METER
- EXISTING CABLE TV PEDESTAL
- EXISTING HOUSE VALVE
- EXISTING POWER POLE
- EXISTING ELECTRIC PEDESTAL
- EXISTING MAILBOX
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING CATCH BASIN ROUND
- EXISTING WOOD POST
- EXISTING WOOD POST
- EXISTING FLOODLIGHT
- EXISTING FLAGPOLE
- EXISTING ELECTRIC METER
- EXISTING TELEGRAPH POLE
- EXISTING BOLLARD
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- EXISTING UNDERGROUND GAS MAIN
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FENCE LINE
- EXISTING RETAINING WALL
- FFE EXISTING FINISH FLOOR ELEVATION

ALL ELEVATIONS ARE AT CITY OF WAUKESHA DATUM (ADD 760.56 TO CONVERT TO USGS DATUM)

REFERENCE BENCHMARKS:
ELEV: 40.43 "OPEN" HYD E. SIDE PRAIRIE AT E. ENTRANCE.
ELEV: 44.12 "OPEN" HYD E. SIDE PRAIRIE AT SIEMANS MAIN ENTRANCE

Post Developed (South)

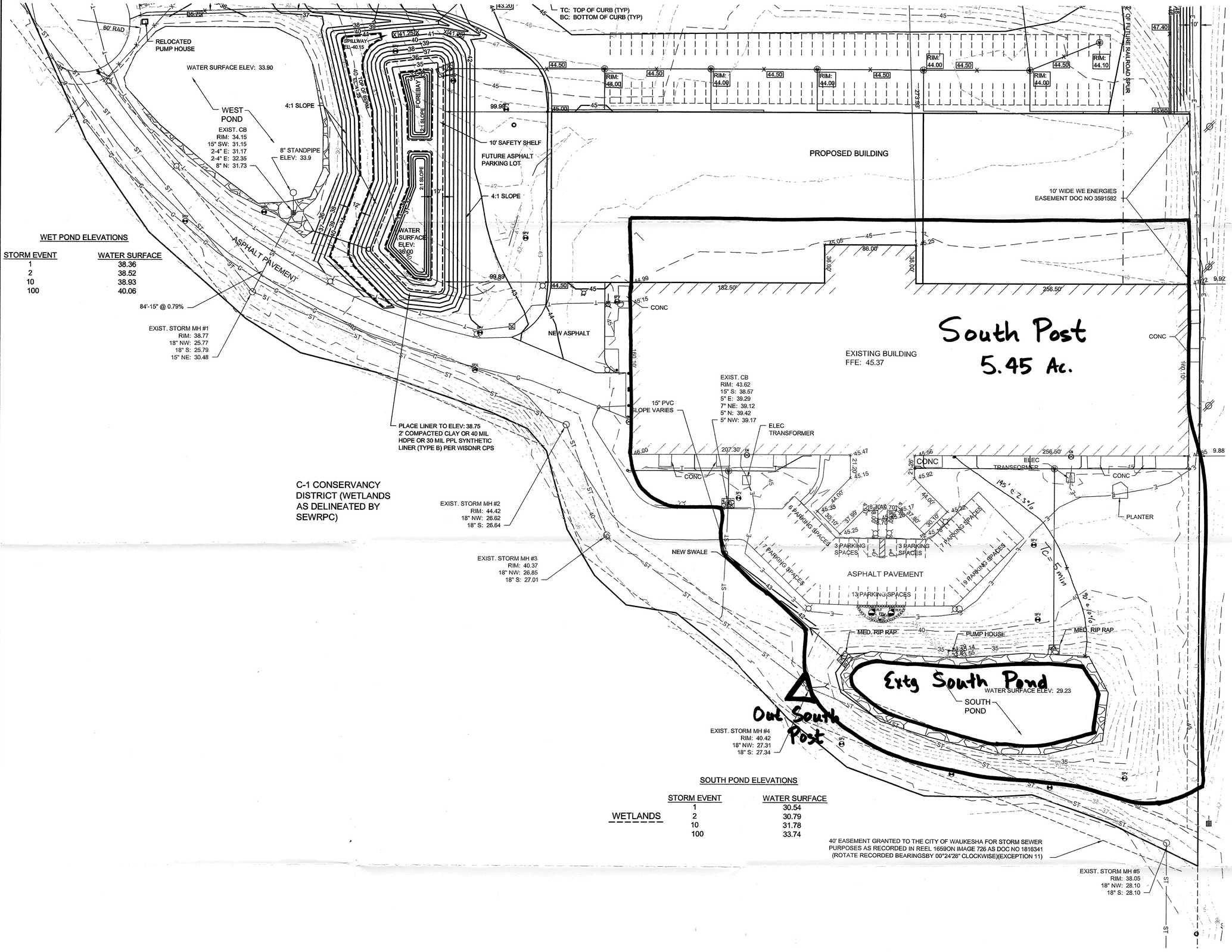
REVISED: SEPTEMBER 30, 2008

PROPOSED GRADING PLAN
RE: WELDALL
PART OF NW & SW 1/4 SECTION 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WI.

JAHNKE & JAHNKE ASSOCIATES, INC.
PLANNERS & PROFESSIONAL ENGINEERS
711 N. MORELAND BLVD.-WAUKESHA, WI. 53188
TEL.No.(262) 542-5797 FAX (262) 542-7668

SCALE: 1" = 40'		DATE: JUNE 26, 2008	
DRAWN BY: N.S.	CHECKED BY: M.B.	FILE NO.: WAUKESHA 793	
BOOK NO.: WAUKESHA 174	JOB: 54743	SHEET 6 OF 9	

FILE NAME: S:\PROJECTS\54743\DWG\54743.dwg



WET POND ELEVATIONS

STORM EVENT	WATER SURFACE
1	38.36
2	38.52
10	38.93
100	40.06

SOUTH POND ELEVATIONS

	STORM EVENT	WATER SURFACE
WETLANDS	1	30.54
	2	30.79
	10	31.78
	100	33.74

LEGEND

- EXISTING SECTION MONUMENT
- EXISTING IRON PIPE FOUND
- EXISTING LIGHT POLE
- EXISTING HYDRANT
- EXISTING WATER VALVE UNERGROUND
- EXISTING SANITARY MANHOLE
- EXISTING GAS METER
- EXISTING CABLE TV PEDESTAL
- EXISTING HOUSE VALVE
- EXISTING POWER POLE
- EXISTING ELECTRIC PEDESTAL
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- EXISTING ELECTRIC METER
- EXISTING TELEGRAPH POLE
- EXISTING BOLLARD
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- G — EXISTING UNDERGROUND GAS MAIN
- E — EXISTING UNDERGROUND ELECTRIC
- T — EXISTING UNDERGROUND TELEPHONE
- X — X — EXISTING FENCE LINE
- EXISTING RETAINING WALL
- FFE — EXISTING FINISH FLOOR ELEVATION

ALL ELEVATIONS ARE AT CITY OF WAUKESHA DATUM
(ADD 780.56 TO CONVERT TO USGS DATUM)

REFERENCE BENCHMARKS:
ELEV: 40.43 "OPEN" HYD E. SIDE PRAIRIE AT S. ENTRANCE.
ELEV: 44.12 "OPEN" HYD E. SIDE PRAIRIE AT SIEMANS MAIN ENTRANCE

Post Developed (South)

REVISED: SEPTEMBER 30, 2008

PROPOSED GRADING PLAN
RE: WELDALL
PART OF NW & SW 1/4 SECTION 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WI.

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DRAWN BY: N.S.	CHECKED BY: M.B.	FILE NO.: WAUKESHA 793
BOOK NO.: WAUKESHA 174	JOB: S4743	SHEET 6 OF 9

FILE NAME: S:\PROJECTS\S4743\DWG\S4743.dwg

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SITE LOCATION MAP
SOILS MAP

2

PRE-DEVELOPED SITE
- WATERSHED MAP

3

SOUTH
- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP

4

NORTH/WEST
- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP

5

STORM SEWER CALCULATIONS

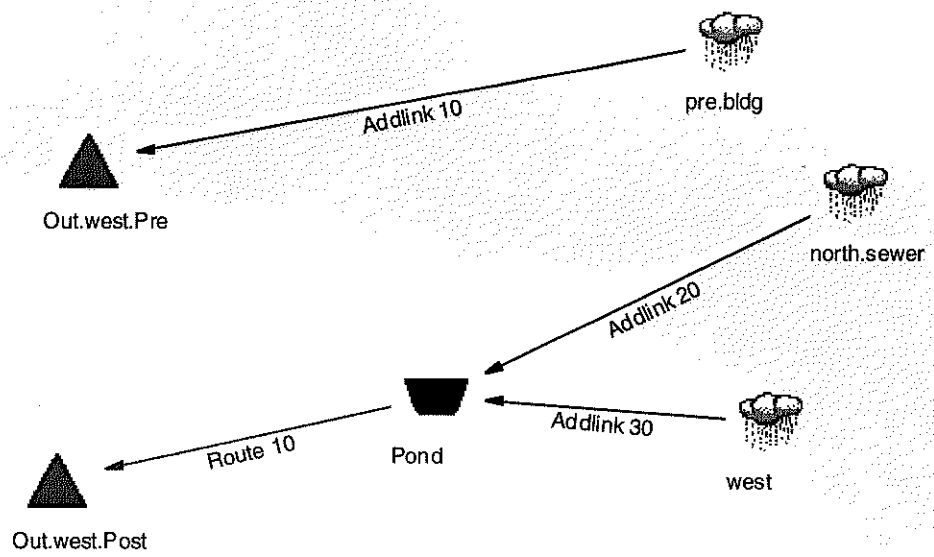
6

SLAMM ANAYLSIS

7

SOIL BORING REPORT

8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North / West

North/west

Job File: P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW
Rain Dir: P:\Pondpack\s-4743 Weldall\

==========
JOB TITLE
==========

Project Date: 8/19/2008
Project Engineer: J&J
Project Title: Watershed
Project Comments:

Table of Contents

MASTER DESIGN STORM SUMMARY

Network Storm Collection: SEWRPC 2000

Return Event	Total Depth in	Rainfall Type	RNF ID
2-Yr	2.5700	Synthetic Curve	TypeII 24hr
10-Yr	3.6200	Synthetic Curve	TypeII 24hr
100-Yr	5.8800	Synthetic Curve	TypeII 24hr
1-Yr	2.3000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
NORTH SEWER	AREA	2	1.029		11.9000	17.04		
NORTH SEWER	AREA	10	1.489		11.9000	24.24		
NORTH SEWER	AREA	100	2.481		11.9000	39.65		
NORTH SEWER	AREA	1	.911		11.9000	15.18		
*OUT.WEST.POST	JCT	2	1.213		13.8500	.67		
*OUT.WEST.POST	JCT	10	1.795		12.1000	6.45		
*OUT.WEST.POST	JCT	100	3.065		12.1000	15.87		
*OUT.WEST.POST	JCT	1	1.066		14.5000	.31		
*OUT.WEST.PRE	JCT	2	.198		12.0500	2.49		
*OUT.WEST.PRE	JCT	10	.447		12.0500	6.50		
*OUT.WEST.PRE	JCT	100	1.141		12.0500	17.25		
*OUT.WEST.PRE	JCT	1	.145		12.0500	1.64		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
POND 10	IN	POND 2	1.217		11.9000	20.44		
POND 10	IN	POND 10	1.799		11.9000	29.84		
POND 10	IN	POND 100	3.070		11.9000	50.04		
POND 10	IN	POND 1	1.069		11.9000	18.03		
POND 10	OUT	POND 2	1.213		13.8500	.67	38.52	.837
POND 10	OUT	POND 10	1.795		12.1000	6.45	38.93	1.006
POND 10	OUT	POND 100	3.065		12.1000	15.87	40.06	1.524
POND 10	OUT	POND 1	1.066		14.5000	.31	38.36	.774
PRE BLDG	AREA	2	.198		12.0500	2.49		
PRE BLDG	AREA	10	.447		12.0500	6.50		
PRE BLDG	AREA	100	1.141		12.0500	17.25		
PRE BLDG	AREA	1	.145		12.0500	1.64		
WEST	AREA	2	.188		11.9000	3.40		
WEST	AREA	10	.310		11.9000	5.60		
WEST	AREA	100	.589		11.9000	10.40		
WEST	AREA	1	.158		11.9000	2.85		

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0130
Hydraulic Length	300.00 ft
2yr, 24hr P	2.7000 in
Slope	.020000 ft/ft
Avg.Velocity	1.38 ft/sec

Segment #1 Time: .0605 hrs

Total Tc: .0605 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.0250	
Hydraulic Length	300.00	ft
2yr, 24hr P	2.7000	in
Slope	.006700	ft/ft

Avg.Velocity .53 ft/sec

Segment #1 Time: .1581 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	560.00	ft
Slope	.028000	ft/ft
Unpaved		

Avg.Velocity 2.70 ft/sec

Segment #2 Time: .0576 hrs

Total Tc: .2158 hrs

Tc Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ====

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: User Defined

Segment #1 Time: .0833 hrs

Total Tc: .0833 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Paved parking &stge storm sewers	98	2.280			98.00
roof	98	1.377			98.00
north leg storage	98	1.620			98.00
COMPOSITE AREA & WEIGHTED CN --->		5.277			98.00 (98)

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
crops type b soil	69	5.230			69.00
COMPOSITE AREA & WEIGHTED CN --->		5.230			69.00 (69)

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
drive	98	.290			98.00
pond	98	.340			98.00
roof	98	.103			98.00
landscape	61	.433			61.00
future parking	98	.400			98.00
COMPOSITE AREA & WEIGHTED CN --->		1.566			87.77 (88)

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
36.00	11652.000	.2675	.0000	.000	.000
37.00	13884.000	.3187	.8782	.293	.293
38.00	16217.000	.3723	1.0355	.345	.638
39.00	18653.000	.4282	1.1998	.400	1.038
40.00	21190.000	.4865	1.3711	.457	1.495
41.00	23830.000	.5471	1.5494	.516	2.011
42.00	26000.000	.5969	1.7154	.572	2.583

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 36.00 ft
Increment = .10 ft
Max. Elev.= 42.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	s1	--->	C1	38.450	42.000
Orifice-Circular	o2	--->	C1	36.000	42.000
Culvert-Circular	c1	--->	TW	35.850	42.000

TW SETUP, DS Channel

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = s1
Structure Type = Stand Pipe

# of Openings	=	1
Invert Elev.	=	38.45 ft
Diameter	=	2.0000 ft
Orifice Area	=	3.1416 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	6.28 ft
Weir Coeff.	=	3.000
K, Submerged	=	.000
K, Reverse	=	1.000
Kb,Barrel	=	.000000 (per ft of full flow)
Barrel Length	=	.00 ft
Mannings n	=	.0000

Structure ID = o2
Structure Type = Orifice-Circular

# of Openings	=	2
Invert Elev.	=	36.00 ft
Diameter	=	.1670 ft
Orifice Coeff.	=	.600

File.... P:\Pondpack\s-4743 Weldall\POST WITH NORTH LEG.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = c1
Structure Type = Culvert-Circular

No. Barrels	=	1
Barrel Diameter	=	1.5000 ft
Upstream Invert	=	35.85 ft
Dnstream Invert	=	35.30 ft
Horiz. Length	=	55.00 ft
Barrel Length	=	55.00 ft
Barrel Slope	=	.01000 ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.5000	(forward entrance loss)
Kb	=	.018213	(per ft of full flow)
Kr	=	1.0000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1
Inlet Control K	=	.0098
Inlet Control M	=	2.0000
Inlet Control c	=	.03980
Inlet Control Y	=	.6700
T1 ratio (HW/D)	=	1.155
T2 ratio (HW/D)	=	1.302
Slope Factor	=	-.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 37.58 ft ---> Flow = 7.58 cfs
At T2 Elev = 37.80 ft ---> Flow = 8.66 cfs

Structure ID = TW
Structure Type = TW SETUP, DS Channel

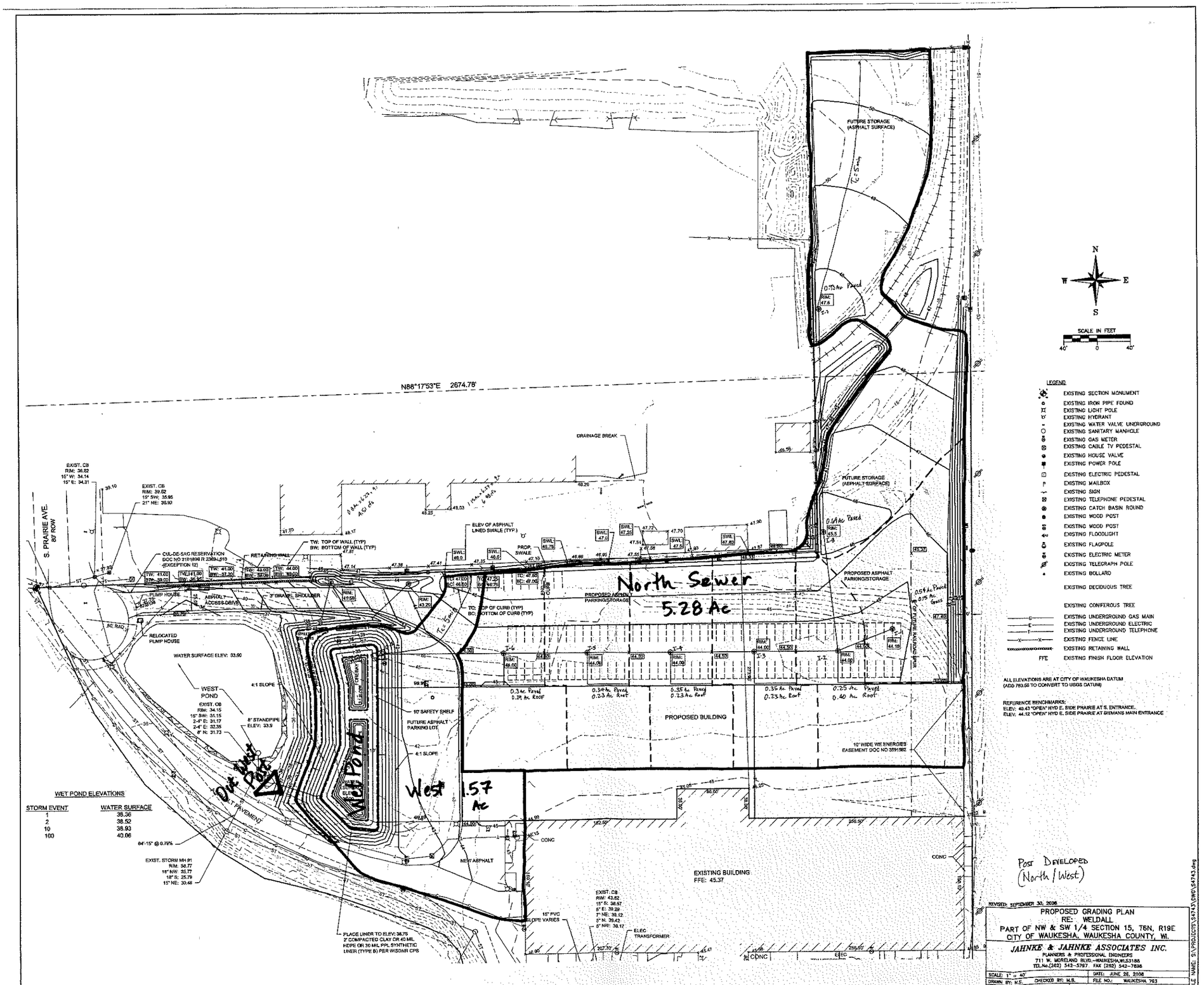
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations	=	30
Min. TW tolerance	=	.01 ft
Max. TW tolerance	=	.01 ft
Min. HW tolerance	=	.01 ft
Max. HW tolerance	=	.01 ft
Min. Q tolerance	=	.10 cfs
Max. Q tolerance	=	.10 cfs

Index of Starting Page Numbers for ID Names

S/N: B21C011070CB Jahnke & Jahnke Associates
PondPack Ver. 8.0067 Time: 11:00 AM Date: 9/30/2008



REVISED: SEPTEMBER 30, 2008

PROPOSED GRADING PLAN
RE: WELDALL
PART OF NW & SW 1/4 SECTION 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WI.

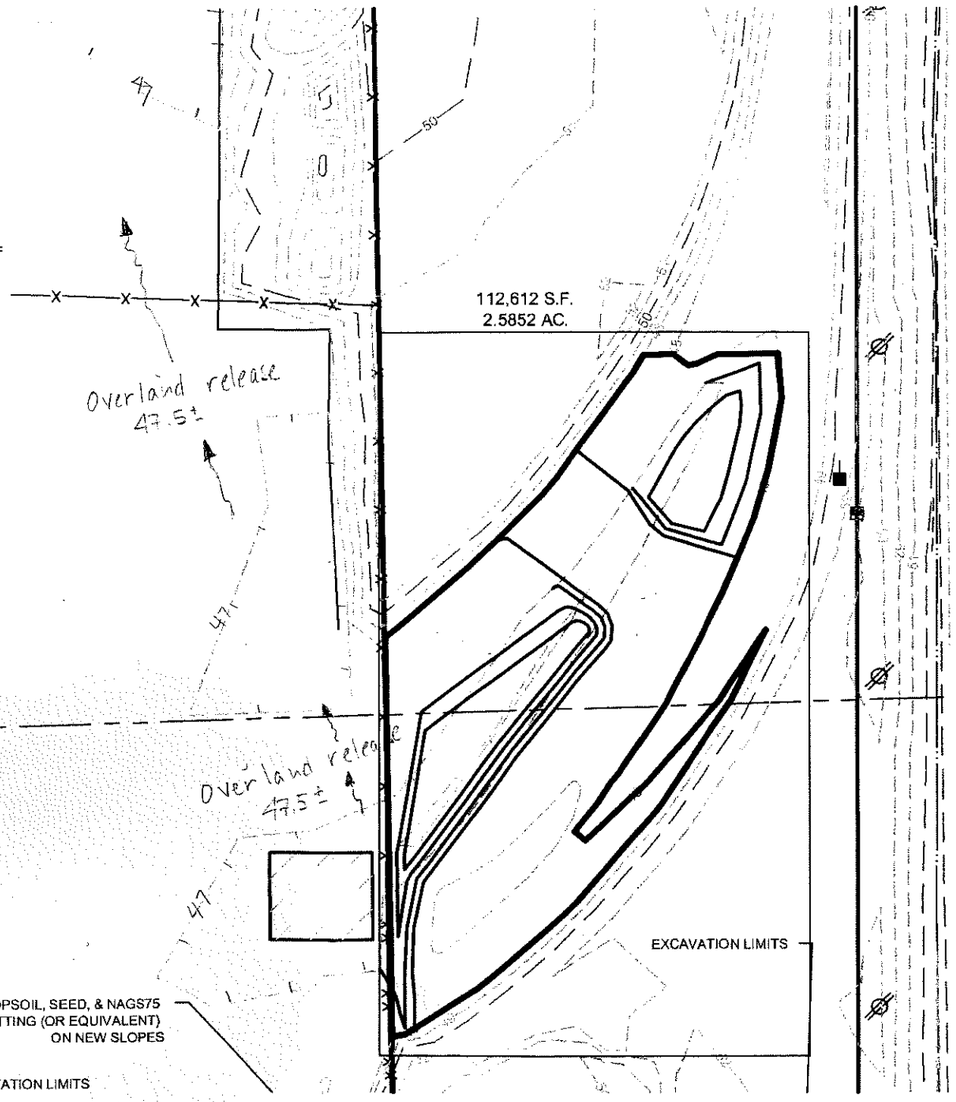
JAHNKE & JAHNKE ASSOCIATES INC.
PLANNERS & PROFESSIONAL ENGINEERS
711 W. MORELAND BLVD.--WAUKESHA,WI.53188
TEL.No.(262) 542-5797 FAX (262) 542-7696

SCALE: 1" = 40'	DATE: JUNE 26, 2008
DRAWN BY: N.S.	CHECKED BY: M.S.
FILE NO.: WAUKESHA 763	
BOOK NO.: WAUKESHA 174	JOB: 54743
SHEET 5 OF 9	

C:\Z NAME: S:\PROJECTS\54743\DWG\54743.dwg

Site Volume Table: Unadjusted

Site	Stratum	Surf1	Surf2	Cut yards	Fill yards	Net yards	Method	
CF	cf 2.0	exist	48					
				5	568	563 (F)	Composite	Existing Condition (Volume of H_2O Stored to Elev 48)
				5	568	563 (F)	Prismoidal	
				5	568	563 (F)	End area	
	cf5.0	prop	for volume 48					
				0	554	554 (F)	Composite	Condition after grading North Leg
				0	564	564 (F)	Prismoidal	
				0	565	565 (F)	End area	



Cut/Fill Analysis of Stormwater Storage on North leg of Subject Property. Storage Area recieves off site Runoff

N88°17'53"E 2674.78'

S. PRAIRIE AVE.
80' ROW

EXIST. CB
RIM: 36.82
15" W: 34.14
15" E: 34.31

EXIST. CB
RIM: 39.52
15" SW: 35.95
21" NE: 36.92

CUL-DE-SAC RESERVATION
DOC NO 2181896 R 2369 L610
(EXCEPTION 12)

RETAINING WALL

TW: TOP OF WALL (TYP)
BW: BOTTOM OF WALL (TYP)

PUMP HOUSE

ASPHALT ACCESS DRIVE

3' GRAVEL SHOULDER

RELOCATED PUMP HOUSE

WATER SURFACE ELEV: 33.90

WEST POND

EXIST. CB
RIM: 34.15
15" SW: 31.15
2-4" E: 31.17
2-4" E: 32.35
8" N: 31.73

8" STANDPIPE
ELEV: 33.9

4:1 SLOPE

10' SAFETY SHELF

FUTURE ASPHALT PARKING LOT

FOREBAY

WATER SURFACE ELEV: 39.00

West Pond

Out West Pond

West 1.57 Ac

ASPHALT PAVEMENT

84'-15" @ 0.79%

EXIST. STORM MH #1
RIM: 38.77
18" NW: 25.77
18" S: 25.79
15" NE: 30.48

PLACE LINER TO ELEV: 38.75
2' COMPACTED CLAY OR 40 MIL
HDPE OR 30 MIL PPL SYNTHETIC
LINER (TYPE B) PER WISDNR CPS

DRAINAGE BREAK

0.8Ac x 6.27 x 9.2 = 46.1 cfs

1.15Ac x 6.27 x 9.2 = 6.98 cfs

ELEV OF ASPHALT LINED SWALE (TYP.)

PROP. SWALE

SWL: 46.0
SWL: 46.5
SWL: 46.75
SWL: 47.0
SWL: 47.25
SWL: 47.5
SWL: 47.83

TC: 47.00
BC: 46.50
TC: 47.25
BC: 46.75
TC: 47.50
BC: 47.00

END CURB

TC: TOP OF CURB (TYP)
BC: BOTTOM OF CURB (TYP)

Tc = 5 min

FUTURE STORAGE
(ASPHALT SURFACE)

0.93 Ac Paved

RIM: 47.5
I-7

RIM: 45.5
I-8

0.69 Ac Paved

FUTURE STORAGE
(ASPHALT SURFACE)

PROPOSED ASPHALT
PARKING/STORAGE

PROPOSED ASPHALT
PARKING/STORAGE

North Sewer
5.28 Ac

0.54 Ac Paved
0.15 Ac Grass

OF FUTURE RAILROAD SPUR

RIM: 41.50
RIM: 43.20

I-6
I-5
I-4
I-3
I-2
I-1

RIM: 44.00
RIM: 44.09
RIM: 44.09
RIM: 44.00
RIM: 44.00
RIM: 44.10

0.3 Ac Paved
0.29 Ac ROOF

0.34 Ac Paved
0.23 Ac Roof

0.35 Ac Paved
0.23 Ac Roof

0.35 Ac Paved
0.23 Ac Roof

0.25 Ac Paved
0.40 Ac Roof

PROPOSED BUILDING

10' WIDE WE ENERGIES
EASEMENT DOC NO 3591582

EXISTING BUILDING
FFE: 45.37

CONC

NEW ASPHALT

EXIST. CB
RIM: 43.62
15" S: 38.57
5" E: 39.29
7" NE: 39.12
5" N: 39.42
5" NW: 39.17

15" PVC
SLOPE VARIES

ELEC TRANSFORMER

CONC

ELEC

WET POND ELEVATIONS

STORM EVENT	WATER SURFACE
1	38.36
2	38.52
10	38.93
100	40.06

N
W E
S

SCALE IN FEET
40' 0 40'

LEGEND

- EXISTING SECTION MONUMENT
- EXISTING IRON PIPE FOUND
- EXISTING LIGHT POLE
- EXISTING HYDRANT
- EXISTING WATER VALVE UNERGROUND
- EXISTING SANITARY MANHOLE
- EXISTING GAS METER
- EXISTING CABLE TV PEDESTAL
- EXISTING HOUSE VALVE
- EXISTING POWER POLE
- EXISTING ELECTRIC PEDESTAL
- P EXISTING MAILBOX
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING CATCH BASIN ROUND
- EXISTING WOOD POST
- EXISTING WOOD POST
- EXISTING FLOODLIGHT
- EXISTING FLAGPOLE
- EXISTING ELECTRIC METER
- EXISTING TELEGRAPH POLE
- EXISTING BOLLARD
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- G EXISTING UNDERGROUND GAS MAIN
- E EXISTING UNDERGROUND ELECTRIC
- T EXISTING UNDERGROUND TELEPHONE
- X—X— EXISTING FENCE LINE
- EXISTING RETAINING WALL
- FFE EXISTING FINISH FLOOR ELEVATION

ALL ELEVATIONS ARE AT CITY OF WAUKESHA DATUM
(ADD 780.56 TO CONVERT TO USGS DATUM)

REFERENCE BENCHMARKS:
ELEV: 40.43 "OPEN" HYD E. SIDE PRAIRIE AT S. ENTRANCE.
ELEV: 44.12 "OPEN" HYD E. SIDE PRAIRIE AT SIEMANS MAIN ENTRANCE

Post Developed
(North / West)

REVISED: SEPTEMBER 30, 2008

PROPOSED GRADING PLAN
RE: WELDALL
PART OF NW & SW 1/4 SECTION 15, T6N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WI.

JAHNKE & JAHNKE ASSOCIATES INC.
PLANNERS & PROFESSIONAL ENGINEERS
711 W. MORELAND BLVD.–WAUKESHA,WI.53188
TEL.No.(262) 542–5797 FAX (262) 542–7698

SCALE: 1" = 40'		DATE: JUNE 26, 2008	
DRAWN BY: N.S.	CHECKED BY: M.B.	FILE NO.:	WAUKESHA 793
BOOK NO.: WAUKESHA 174	JOB: S4743	SHEET 5	OF 9

FILE NAME: S:\PROJECTS\S4743\DWG\S4743.dwg

1 SITE LOCATION MAP
SOILS MAP

2 PRE-DEVELOPED SITE
- WATERSHED MAP

3 SOUTH
- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP

4 NORTH/WEST
- PRE & POST DEVELOPED CALCULATIONS
- POST DEVELOPED WATERSHED MAP

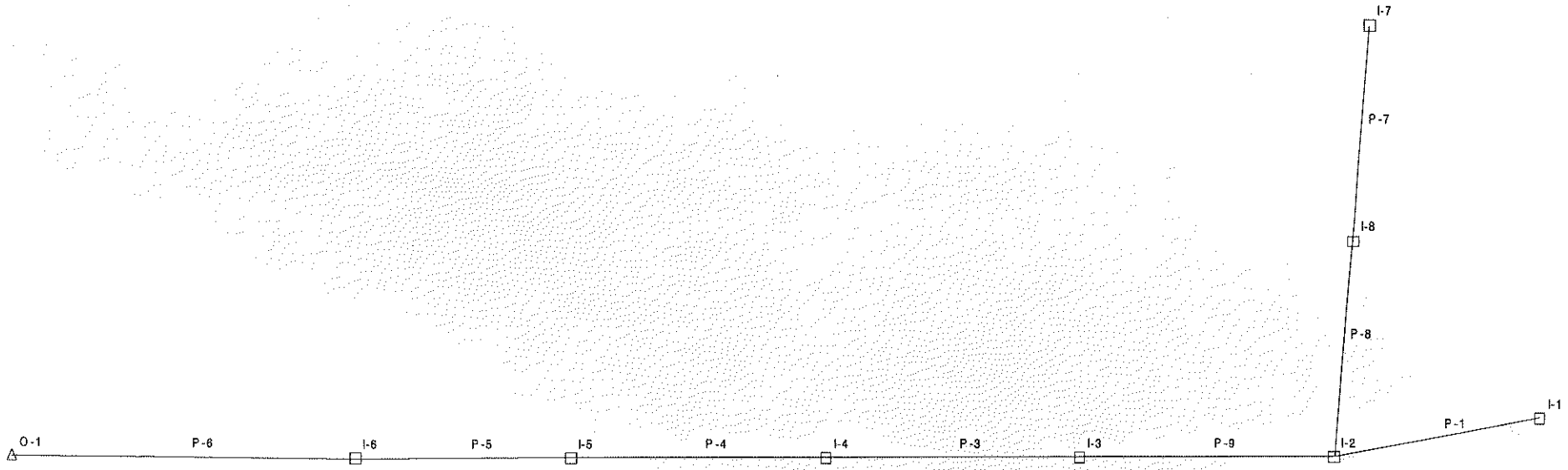
5 STORM SEWER CALCULATIONS

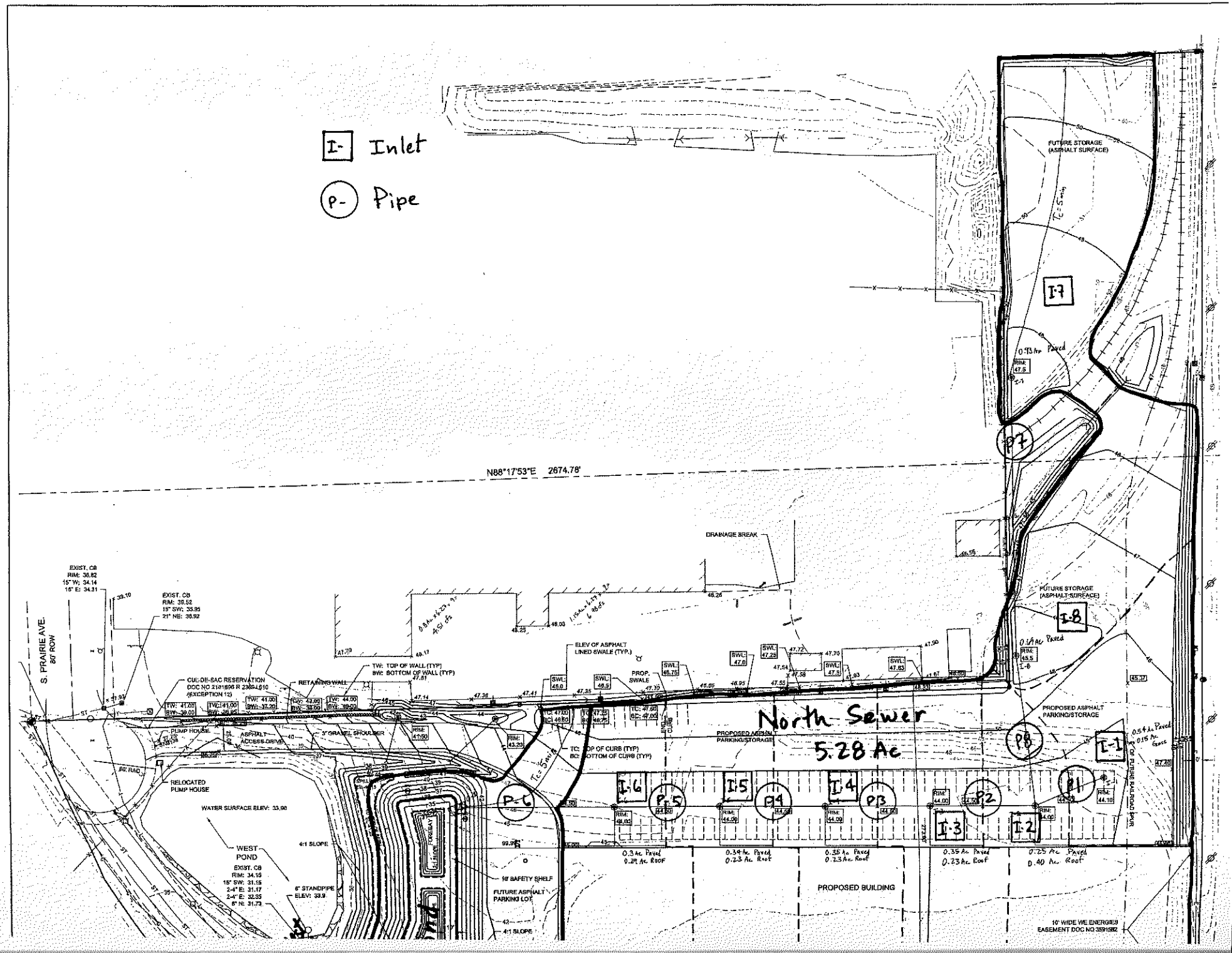
6 SLAMM ANAYLSIS

7 SOIL BORING REPORT

8

Scenario: Base



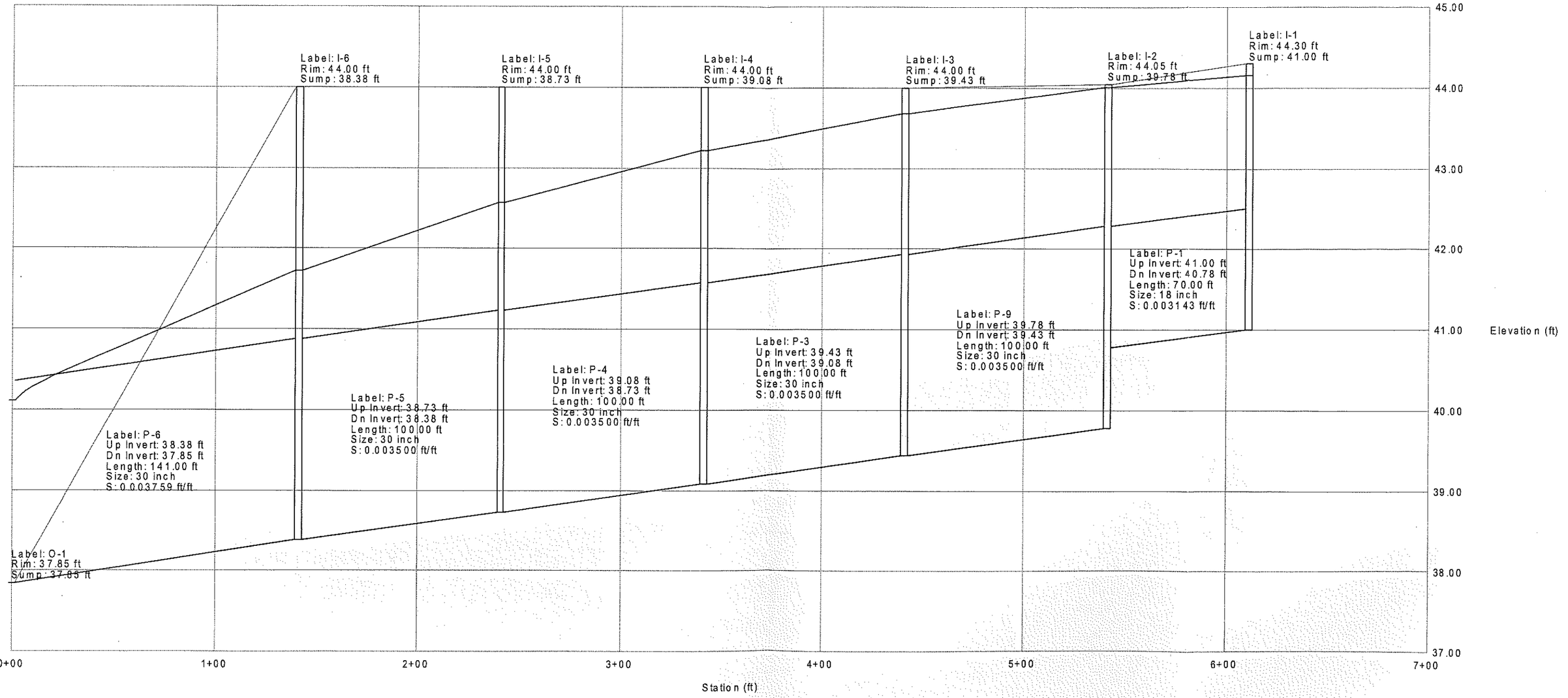

I- Inlet
P- Pipe
FUTURE STORAGE (ASPHALT SURFACE)
I-7
P7
0.93Ac Paved
N88°17'53"E 2674.78'
DRAINAGE BREAK
FUTURE STORAGE (ASPHALT SURFACE)
I-8
0.14Ac Paved
EXIST. CB RIM: 38.82 15" W: 34.14 15" E: 34.31
EXIST. CB RIM: 39.52 15" SW: 33.95 21" NE: 33.92
S. PRAIRIE AVE. 80' ROW
CUL-DE-SAC RESERVATION DOC NO 2181896 R 2360-610 (EXCEPTION 12)
RETAINING WALL
TW: TOP OF WALL (TYP) BW: BOTTOM OF WALL (TYP)
ELEV OF ASPHALT LINED SWALE (TYP.)
PROP. SWALE
TC: TOP OF CURB (TYP) BC: BOTTOM OF CURB (TYP)
PUMP HOUSE
ASPHALT ACCESS DRIVE
3' GRAVEL SHOULDER
RELOCATED PUMP HOUSE
WATER SURFACE ELEV: 33.98
WEST POND
EXIST. CB RIM: 34.19 15" SW: 31.15 2-4" E: 31.17 2-4" E: 32.35 6" N: 31.73
6" STANDPIPE ELEV: 39.9
4:1 SLOPE
10' SAFETY SHELF
FUTURE ASPHALT PARKING LOT
PROPOSED ASPHALT PARKING/STORAGE
North Sewer
5.28 Ac
PROPOSED ASPHALT PARKING/STORAGE
PROPOSED BUILDING
I-6
I-5
I-4
I-3
I-2
I-1
P-6
P5
P4
P3
P2
P1
0.3 Ac Paved 0.21 Ac Roof
0.34 Ac Paved 0.23 Ac Roof
0.35 Ac Paved 0.23 Ac Roof
0.35 Ac Paved 0.23 Ac Roof
0.25 Ac Paved 0.40 Ac Roof
0.54 Ac Paved 0.015 Ac Grass
10' WIDE WE ENERGIES EASEMENT DOC NO 3591582

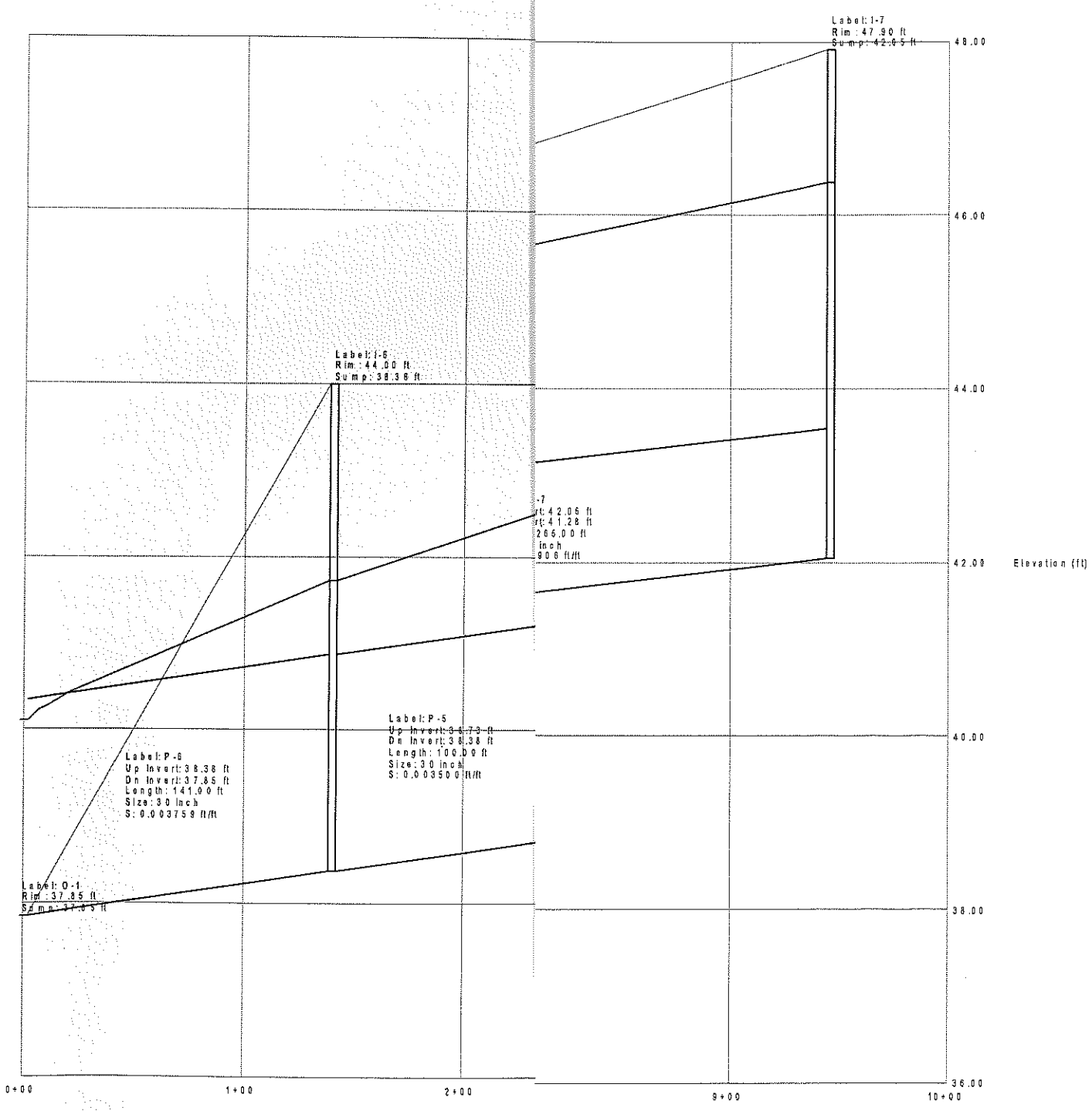
Scenario: Base

Combined Pipe/Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Area (acres)	Inlet C	Inlet CA (acres)	System Contributing Area (acres)	Local Rational Flow (cfs)	Section Size	Capacity (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Description
P-7	I-7	I-8	265.00	0.93	0.90	0.84	0.84	7.62	18 inch	5.66	4.31	42.05	41.28	0.002906	
P-1	I-1	I-2	70.00	0.69	0.77	0.53	0.53	4.83	18 inch	5.89	2.74	41.00	40.78	0.003143	
P-8	I-8	I-2	140.00	0.69	0.90	0.62	1.46	5.65	21 inch	9.47	5.52	41.03	40.53	0.003571	
P-9	I-2	I-3	100.00	0.65	0.90	0.59	2.57	5.32	30 inch	24.26	4.77	39.78	39.43	0.003500	
P-3	I-3	I-4	100.00	0.58	0.90	0.53	3.10	4.78	30 inch	24.26	5.75	39.43	39.08	0.003500	
P-4	I-4	I-5	100.00	0.58	0.90	0.52	3.62	4.77	30 inch	24.26	6.72	39.08	38.73	0.003500	
P-5	I-5	I-6	100.00	0.57	0.90	0.51	4.13	4.64	30 inch	24.26	7.67	38.73	38.38	0.003500	
P-6	I-6	O-1	141.00	0.59	0.90	0.53	4.66	4.83	30 inch	25.15	8.87	38.38	37.85	0.003759	

Profile
Scenario: Base

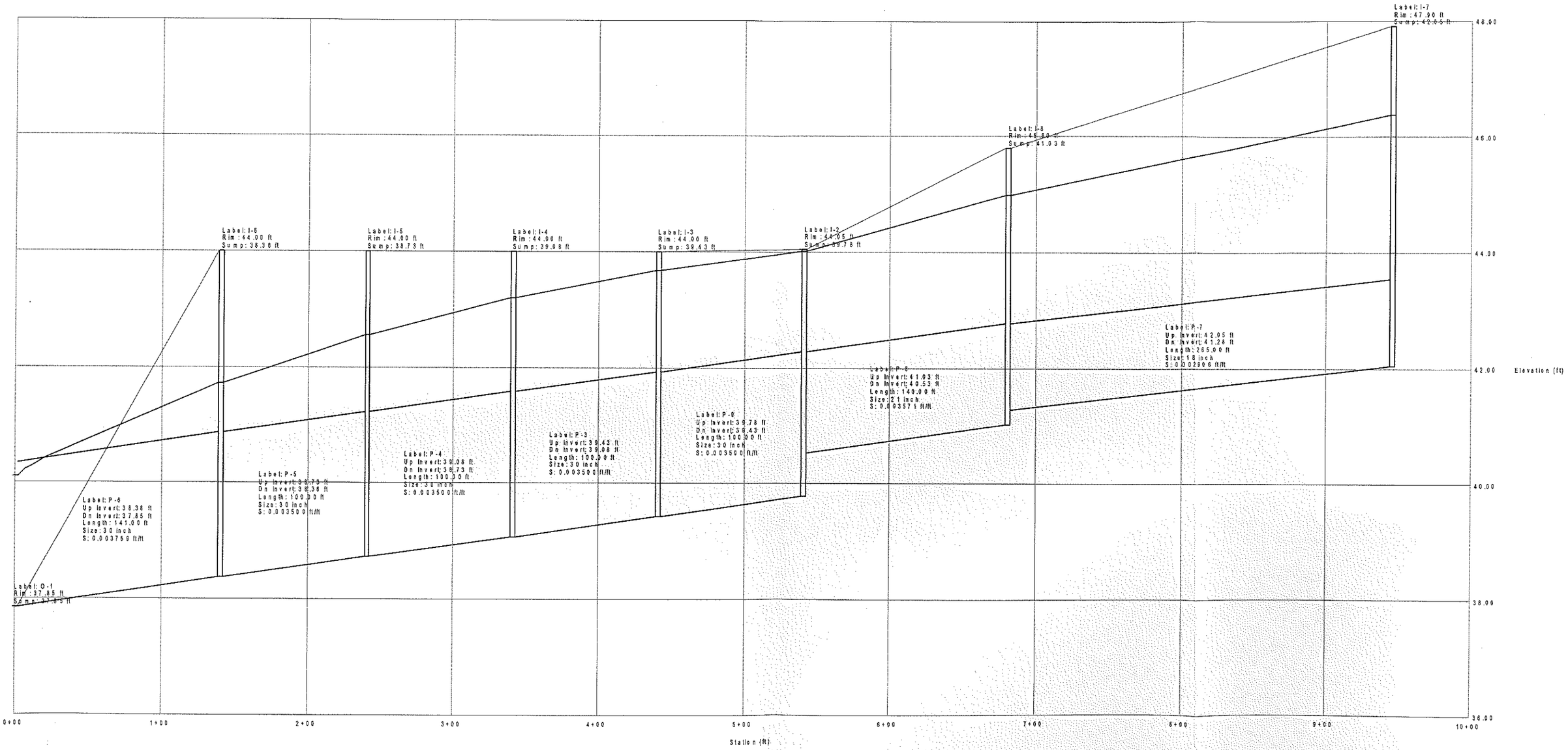




Title: Weldall
p:\storm cad\weldall north line.stm
09/26/08 07:58:14 AM

Project Engineer: Michael Birschbach
StormCAD v3.0 [319]
Page 1 of 1

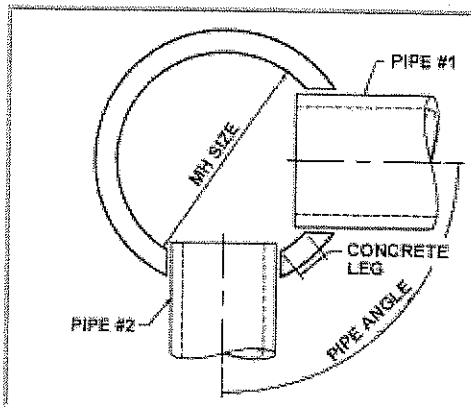
Profile
Scenario: Base



Manhole Calculations | Iowa Concrete Products Co.

Iowa Concrete Products Co.

Sizing Calculations



60" MANHOLE
Minimum Diameter Required

Pipe 1: PVC

Pipe Size: 30 Inches — 60" Minimum Manhole Required For Pipe Specified

Hole Req'd: 42 Inches

Pipe 2: PVC

Pipe Size: 12 Inches — 48" Minimum Manhole Required For Pipe Specified

Hole Req'd: 16 Inches

Pipe Angle: 90 Degrees

Concrete Leg Width Measured Along Inside of Manhole: 15.8 Inches

Calculate | Reset | Print Form | Exit

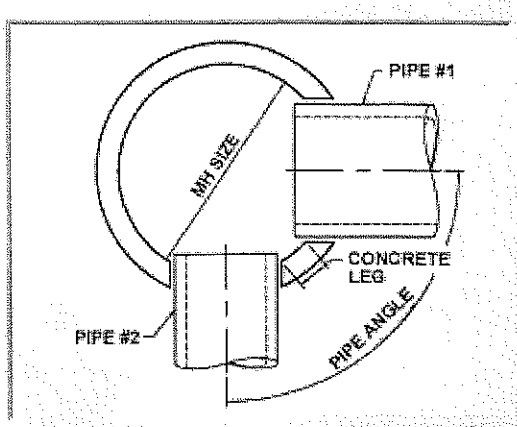
Version 2.1

I-6
I-5
I-4
I-3

Manhole Calculations | Iowa Concrete Products Co.

Iowa Concrete Products Co.

Sizing Calculations



60" MANHOLE
Minimum Diameter Required

Pipe 1:	RCP		
Pipe Size	21	Inches	48" Minimum Manhole Required For Pipe Specified
Hole Req'd	30	Inches	
Pipe 2:	RCP		
Pipe Size	30	Inches	60" Minimum Manhole Required For Pipe Specified
Hole Req'd	42	Inches	
Pipe Angle	86	Degrees	
Concrete Leg Width Measured Along Inside of Manhole	6.1	Inches	

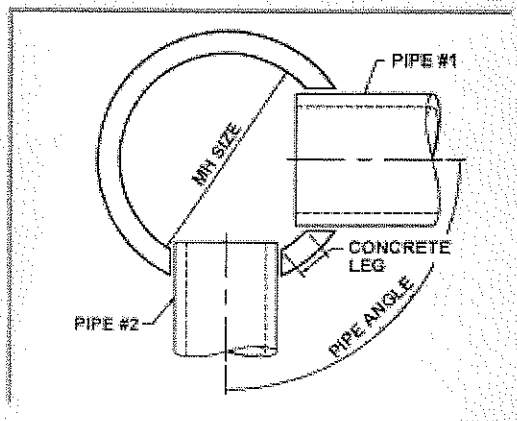
Calculate | Reset | Print Form | Exit

Version 2.1

Manhole Calculations | Iowa Concrete Products Co.

Iowa Concrete Products Co.

Sizing Calculations



60" MANHOLE
Minimum Diameter Required

Pipe 1:	RCP		
Pipe Size	18	Inches	48" Minimum Manhole Required For Pipe Specified
Hole Req'd	26	Inches	
Pipe 2:	RCP		
Pipe Size	21	Inches	48" Minimum Manhole Required For Pipe Specified
Hole Req'd	30	Inches	
Pipe Angle	75	Degrees	
Concrete Leg Width Measured Along Inside of Manhole	10.1	Inches	

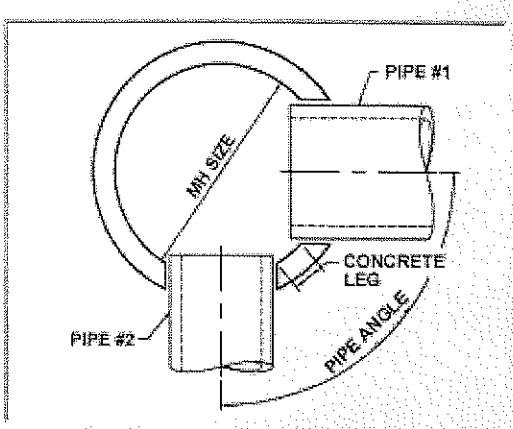
Calculate | Reset | Print Form | Exit

Version 2.1

Manhole Calculations | Iowa Concrete Products Co.

Iowa Concrete Products Co.

Sizing Calculations



48" MANHOLE

Minimum Diameter Required

Pipe 1: PIPE

Pipe Size: 18 Inches — 48" Minimum Manhole Required For Pipe Specified

Hole Req'd: 26 Inches

Pipe 2: PVC

Pipe Size: 21 Inches — 48" Minimum Manhole Required For Pipe Specified

Hole Req'd: 24 Inches

Pipe Angle: 180 Degrees

Concrete Leg Width Measured Along Inside of Manhole: 49.1 Inches

Calculate | Reset | Print Form | Exit

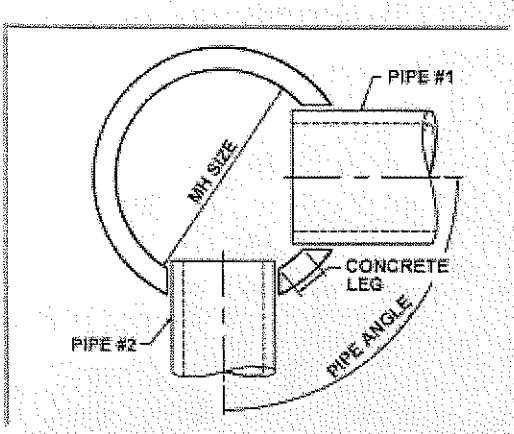
Version 2.1

I-8

Manhole Calculations | Iowa Concrete Products Co.

Iowa Concrete Products Co.

Sizing Calculations



48" MANHOLE

Minimum Diameter Required

Pipe 1:	PVC		
Pipe Size	12	Inches	48" Minimum Manhole Required For Pipe Specified
Hole Req'd	16	Inches	
Pipe 2:	PVC		
Pipe Size	12	Inches	48" Minimum Manhole Required For Pipe Specified
Hole Req'd	16	Inches	
Pipe Angle	90	Degrees	
Concrete Leg Width Measured Along Inside of Manhole	21.4	Inches	

Calculate | Reset | Print Form | Exit

Version 2.1

Weir and Orifice Equation

Weir & Orifice Flow Comparison

$Q = 0.6A\sqrt{2gh}$

(Orifice Flow Equation)

Q = Capacity in CFS
A = Free open area of grate in sq. ft.
g = 32.2 (feet per sec/sec)
h = Head in feet

Orifice Information

Instructions:

1. Either Select catalog number (will automatically fill in Open Area and Perimeter) or enter your own values
2. Enter head value
3. Press CALCULATE

The results will determine automatically if your situation falls into a Weir, Transitional or Orifice flow. Additionally, a pop-up window will offer Neenah grates which fall within the parameters chosen.

$Q = 3.3P(h)^{1.5}$

(Weir Equation)

Q = Capacity in CFS
P = Feet perimeter
h = Head in feet

Weir Information

Catalog number and grate type: R-5901-H:G

Head in feet (h): .5

Feet perimeter (P): 8.9

Calculate

Free open area in sq. ft. (A): 2.5

Weir capacity in cfs:

Transitional flow in cfs:

Orifice capacity in cfs: 8.5

(Results assume no debris restriction.)

NOTE: The above results do not account for the dome height of Beehive-type grates. Please take note of this when determining the Head (h) value.

For additional information regarding Neenah Inlet Grate Capacities, please contact our Manager of Product Engineering, Steve Akkala P.E., at 920-729-3653 or at **sakkala@nfco.com**.

2121 Brooks Avenue, Neenah, WI 54956
800.558.5075 • Fax: 920.729.3661
Terms & Conditions

OUTLET
30" IE: 37.85
30" CLASS III RCP 141 LF @ 0.38%

6" ELBOW
IE: 40.24

40'-8" PVC
@ 0.5%

484gpm

30" CLASS III RCP 100 LF @ 0.35%

RIM: 44.00
30" E: 38.38
30" W: 38.38
8" S: 40.21

49'-6" PVC @
0.3%

50'-6" PVC @
0.3%

6x8 CROSS
W/6"
REDUCER & 6"
ELBOW
IE: 40.09

100 gpm

192 gpm

192gpm

6" ELBOW
IE: 40.24

40'-8" PVC
@ 0.3%

6x8 WYE
W/6"
REDUCER
& ELBOW
IE: 40.76

384gpm

30" CLASS III RCP 100 LF @ 0.35%

RIM: 44.00
30" E: 38.73
30" W: 38.73
8" S: 40.21

50'-6" PVC @ 0.3%

40'-8" PVC
@ 0.3%

6x8 WYE
W/6"
REDUCER
& ELBOW
IE: 41.11

6" ELBOW
IE: 40.91

192gpm

192gpm

384gpm

30" CLASS IV RCP 100 LF @ 0.35%

RIM: 44.00
30" E: 39.08
30" W: 39.08
8" S: 40.91

50'-6" PVC @ 0.3%

40'-8" PVC
@ 0.3%

6" ELBOW
IE: 41.18

192gpm

192gpm

384 gpm

30" CLASS IV RCP 100 LF @ 0.35%

RIM: 44.00
30" E: 39.43
30" W: 39.43
8" S: 41.76

50'-6" PVC @ 0.3%

40'-10"
CONTECH
A2000 PVC
(TYP) @
0.25%

6x8 WYE
W/6"
REDUCER
& ELBOW
IE: 41.46

6" ELBOW
IE: 41.61

192gpm

192 gpm

733 gpm

21" CLASS I

18" CLASS IV RCP
70 LF @ 0.31%

RIM: 44.05
18" E: 40.78
30" W: 39.78
21" N: 40.53
10" S: 41.45

50'-8" PVC @ 0.4%

8x10 WYE
W/6"
REDUCER
& ELBOW
IE: 41.72

484gpm

50'-8" PVC @0.3%

6x6x8"
WYE W/6"
ELBOW
IE: 41.83

192gpm

292 gpm

6" ELBOW
IE: 42.21

49'-6" PVC @ 0.3%

6x6x8"
WYE W/6"
ELBOW
IE: 42.03

192 gpm

100 gpm

GRATE & FRAME (TYP)

UTURE RAILROAD SPUR

PROPOSED BUILDING

PLACE INSULATING BOARDS OVER
ALL PVC PIPING FROM BUILDING
DOWN SPOUTS

10' WIDE WE ENERGIES
EASEMENT DOC NO 3591582

FUTURE ASPHALT
PARKING LOT

55 LF 18" CLASS IV RCP @ 1.0%

RELOCATE
HYDRANT

86.00'

36.00'

36.00'

152.50'

256.50'

CONC

NEW ASPHALT

160.10'

211 gpm

420gpm

420gpm

420gpm

529 gpm

EXISTING BUILDING
FFE: 45.37

529gpm

420 gpm

420gpm

420 gpm

420 gpm

CONC

214 gpm

160.10'

EXIST. CB
RIM: 43.62
15" S: 38.57
5" E: 39.29
7" NE: 39.12
5" N: 39.42
5" NW: 39.17

15" PVC
SLOPE VARIES
16 LF 8" PVC
@ 1.04%
IE: 40.43

ELEC
TRANSFORMER

RIM: 44.69
10" W: 39.96
10" E: 39.96
12" S: 39.62

13 LF 8" PVC
@ 1.04%

IE: 41.25

13 LF 8" PVC
@ 1.04%
IE: 40.70

13 LF 8" PVC
@ 1.04%
IE: 40.18

23 LF 10" PVC
@ 1.04%

13 LF 8" PVC
@ 1.04%
IE: 40.20

13 LF 8" PVC
@ 1.04%
IE: 40.72

50 LF 8" PVC
@ 1.04%

IE: 41.35

IE: 41.11

207.30'

631gpm

1044 gpm

21.20'

21.26'

CONC

624gpm

624 gpm

53 LF 8"
PVC @ 1.04%

1044 gpm

50 LF 10" PVC
@ 1.04%

CONC

634 gpm

50 LF 8" PVC
@ 1.04%

30 LF 8"
PVC @ 1.04%

675gpm

IE: 40.38

44 LF 10" PVC
SDR35 @ 1.04%

29.5' LF 8"
PVC @ 1.04%

48gpm

48gpm

44.00'

44.00'

1054gpm

21 LF 10" PVC
@ 1.04%

PLANTER

60 LF 8"
PVC @ 1.04%

29 LF 10"
PVC @ 3.0%

10" IE: 38.75

RIM: 44.71
8" W: 40.12
10" E: 39.92
10" S: 39.62

30.10'

37.89'

8.70'

8.00'

8.70'

8.70'

8.00'

8.70'

30.10'

6 PARKING SPACES

7 PARKING SPACES

3 PARKING
SPACES

3 PARKING
SPACES

7 PARKING SPACES

9 PARKING SPACES

15" IE: 36.00
(CONTRACTOR TO VERIFY)
PROP. 15" SE: 36.00

EXIST. STORM MH #2
RIM: 44.42
18" NW: 26.62
18" S: 26.64

EXIST. STORM MH #3
RIM: 40.37
18" NW: 26.85
18" S: 27.01

CAP EXIST
STORM SEWER

145 LF 15" PVC SDR 35

ASPHALT PAVEMENT

13 PARKING SPACES

166 LF 12" PVC SDR 35 @ 2.08%

2098 gpm

SERVANCY
T (WETLANDS
NEATED BY

ction in Wisconsin,
ts of the City of

or is responsible for
eneral Contractor.

ROOF RUNOFF

Flow rates computed using
1 GPM per 26 sq ft of Roof

Full Flow Capacity for PVC pipe

Size (in)	Slope %	Capacity (gpm)
6	0.3	200
8	0.3	430
8	0.4	500
8	0.5	550
8	1.04	800
10	0.25	710
10	1.04	1450
10	3	2460
12	2.08	3300

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	0.3000	%
Diameter	6.00	in

Results		
Depth	6.0	in
Discharge	200	gal/min
Flow Area	0.20	ft²
Wetted Perimeter	1.57	ft
Top Width	0.00	ft
Critical Depth	0.34	ft
Percent Full	100.00	
Critical Slope	0.004643	ft/ft
Velocity	2.26	ft/s
Velocity Head	0.08	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	0.48	cfs
Full Flow Capacity	0.44	cfs
Full Flow Slope	0.003000	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	0.3000	%
Diameter	8.00	in

Results		
Depth	8.0	in
Discharge	430	gal/min
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Top Width	0.00	ft
Critical Depth	0.46	ft
Percent Full	100.00	
Critical Slope	0.004349	ft/ft
Velocity	2.74	ft/s
Velocity Head	0.12	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	1.03	cfs
Full Flow Capacity	0.96	cfs
Full Flow Slope	0.003000	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	0.4000	%
Diameter	8.00	in

Results		
Depth	8.0	in
Discharge	500	gal/min
Flow Area	0.35	ft^2
Wetted Perimeter	2.09	ft
Top Width	0.00	ft
Critical Depth	0.50	ft
Percent Full	100.00	
Critical Slope	0.004845	ft/ft
Velocity	3.16	ft/s
Velocity Head	0.16	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	1.19	cfs
Full Flow Capacity	1.10	cfs
Full Flow Slope	0.004000	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	0.5000	%
Diameter	8.00	in

Results		
Depth	8.0	in
Discharge	550	gal/min
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Top Width	0.00	ft
Critical Depth	0.53	ft
Percent Full	100.00	
Critical Slope	0.005383	ft/ft
Velocity	3.54	ft/s
Velocity Head	0.19	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	1.33	cfs
Full Flow Capacity	1.23	cfs
Full Flow Slope	0.005000	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	1.0400	%
Diameter	8.00	in

Results		
Depth	8.0	in
Discharge	800	gal/min
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Top Width	0.00	ft
Critical Depth	0.61	ft
Percent Full	100.00	
Critical Slope	0.009071	ft/ft
Velocity	5.10	ft/s
Velocity Head	0.40	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	1.91	cfs
Full Flow Capacity	1.78	cfs
Full Flow Slope	0.010400	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	0.2500	%
Diameter	10.00	in

Results		
Depth	10.0	in
Discharge	710	gal/min
Flow Area	0.55	ft^2
Wetted Perimeter	2.62	ft
Top Width	0.00	ft
Critical Depth	0.56	ft
Percent Full	100.00	
Critical Slope	0.003902	ft/ft
Velocity	2.90	ft/s
Velocity Head	0.13	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	1.70	cfs
Full Flow Capacity	1.58	cfs
Full Flow Slope	0.002500	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	1.0400	%
Diameter	10.00	in

Results		
Depth	10.0	in
Discharge	1,450	gal/min
Flow Area	0.55	ft²
Wetted Perimeter	2.62	ft
Top Width	0.00	ft
Critical Depth	0.77	ft
Percent Full	100.00	
Critical Slope	0.009022	ft/ft
Velocity	5.92	ft/s
Velocity Head	0.54	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	3.47	cfs
Full Flow Capacity	3.23	cfs
Full Flow Slope	0.010400	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	3.0000	%
Diameter	10.00	in

Results		
Depth	10.0	in
Discharge	2,460	gal/min
Flow Area	0.55	ft²
Wetted Perimeter	2.62	ft
Top Width	0.00	ft
Critical Depth	0.82	ft
Percent Full	100.00	
Critical Slope	0.027547	ft/ft
Velocity	10.05	ft/s
Velocity Head	1.57	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	5.90	cfs
Full Flow Capacity	5.48	cfs
Full Flow Slope	0.030000	ft/ft

Worksheet
Worksheet for Circular Channel

Project Description	
Project File	p:\flowmaster\weldall.fm2
Worksheet	Building drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.009	
Channel Slope	2.0400	%
Diameter	12.00	in

Results		
Depth	12.0	in
Discharge	3,300	gal/min
Flow Area	0.79	ft²
Wetted Perimeter	3.14	ft
Top Width	0.00	ft
Critical Depth	0.98	ft
Percent Full	100.00	
Critical Slope	0.018246	ft/ft
Velocity	9.36	ft/s
Velocity Head	1.36	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	7.91	cfs
Full Flow Capacity	7.35	cfs
Full Flow Slope	0.020400	ft/ft

SLAMM for Windows Version 9.3.0

Data file name: P:\Winslamm9.3***weldall.dat***
Data file description: Weldall Manufacturing
Rain file name: P:\Winslamm9.3\Rain Files\WI Milwaukee 69.RAN
Particulate Solids Concentration file name: P:\Winslamm9.3\WI_AVG01.psc
Runoff Coefficient file name: P:\Winslamm9.3\WI_SL06 Dec06.rsv
Particulate Residue Delivery file name: P:\Winslamm9.3\WI_DLV01.prr
Residential Street Delivery file name: P:\Winslamm9.3\WI_Com Inst Indust Dec06.std
Institutional Street Delivery file name: P:\Winslamm9.3\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: P:\Winslamm9.3\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: P:\Winslamm9.3\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: P:\Winslamm9.3\WI_Com Inst Indust Dec06.std
Freeway Street Delivery file name: P:\Winslamm9.3\WI_Com Inst Indust Dec06.std
Pollutant Relative Concentration file name: P:\Winslamm9.3\WI_GEO01.ppd
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Model Run Start Date: 03/28/69 Model Run End Date: 12/06/69
Date of run: 09-26-2008 Time of run: 10:26:01
Total Area Modeled (acres): 6.493
Years in Model Run: 0.67

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Source Area Total without Controls:	438754	0 %	182.5	4995	0 %
Total Before Drainage System:	438753	0.00%	182.5	4995	0.00%
Total After Drainage System:	438753	0.00%	182.5	4995	0.00%
Total After Outfall Controls:	438753	0.00%	26.80	733.4	85.32%
Annualized Total After Outfall Controls:	659033			1102	

Street Area 1	0.00	0.00	0.00	0.00	0.00
Street Area 2	0.00	0.00	0.00	0.00	0.00
Street Area 3	0.00	0.00	0.00	0.00	0.00
Large Landscaped Area 1	0.00	0.00	0.00	0.43	0.00
Large Landscaped Area 2	0.00	0.00	0.00	0.00	0.00
Undeveloped Area	0.00	0.00	0.00	0.00	0.00
Small Landscaped Area 1	0.00	0.00	0.00	0.00	0.00
Small Landscaped Area 2	0.00	0.00	0.00	0.00	0.00
Small Landscaped Area 3	0.00	0.00	0.00	0.00	0.00
Isolated/Water Body Area	0.00	0.00	0.00	0.00	0.00
Other Pervious Area	0.00	0.00	0.00	0.00	0.00
Other Dir Cnctd Imp Area	0.00	0.00	0.00	0.00	0.00
Other Part Cnctd Imp Area	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	6.49	0.00

Freeway Source Area	Area (acres)
Pavd Lane & Shldr Area 1	0.00
Pavd Lane & Shldr Area 2	0.00
Pavd Lane & Shldr Area 3	0.00
Pavd Lane & Shldr Area 4	0.00
Pavd Lane & Shldr Area 5	0.00
Large Turf Areas	0.00
Undeveloped Areas	0.00
Other Pervious Areas	0.00
Other Directly Conctd Imp	0.00
Other Partially Conctd Imp	0.00
Total	0.00

Total of All Source Areas	6.49
Total of All Source Areas less All Isolated Areas	6.49

Source Area Control Practice Information

Land Use: Industrial

Roofs 1 Source area number: 91

The roof is pitched

The Source Area is directly connected or draining to a directly connected area

Roofs 2 Source area number: 92

The roof is pitched

The Source Area is draining to a pervious area (partially connected impervious area)

The SCS Hydrologic Soil Type is Silty

Paved Parking/Storage 1 Source area number: 96
The Source Area is directly connected or draining to a directly connected area
Paved Parking/Storage 2 Source area number: 97
The Source Area is directly connected or draining to a directly connected area
Paved Parking/Storage 3 Source area number: 98
The Source Area is draining to a pervious area (partially connected impervious area)
The SCS Hydrologic Soil Type is Silty
Driveways 1 Source area number: 103
The Source Area is draining to a pervious area (partially connected impervious area)
The SCS Hydrologic Soil Type is Silty
Large Landscaped Area 1 Source area number: 111
The SCS Hydrologic Soil Type is Silty

Drainage System

Outfall
Control Practice 1 : Wet Detention Ponds
1. Area served by detention ponds (acres)= 6.493
2. Particle Size Distribution file name: P:\WINSLAMM9.3\NURP.CPZ
3. Initial stage elevation (ft): 0
4. Peak to Average Flow Ratio: 3.8
5. Maximum flow allowed into pond (cfs): No maximum value entered
6. Outlet Characteristics:
Outlet number 1
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Discharge Coefficient (ft): 0
4. Height of weir opening (cfs): 1.88
5. Height from datum to bottom of weir opening: 9.12
Outlet number 2
Outlet type: Orifice
1. Orifice diameter (ft): 0.167
2. Invert elevation above datum (ft): 5
Outlet number 3
Outlet type: Orifice
1. Orifice diameter (ft): 0.167
2. Invert elevation above datum (ft): 5
Outlet number 4
Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 2
2. Stand pipe height above datum (ft): 7.45
7. Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0530	0.00	0.00

2	1.00	0.0720	0.00	0.00
3	2.00	0.0910	0.00	0.00
4	3.00	0.1120	0.00	0.00
5	3.50	0.1230	0.00	0.00
6	4.00	0.1830	0.00	0.00
7	4.50	0.2430	0.00	0.00
8	5.00	0.2670	0.00	0.00
9	6.00	0.3190	0.00	0.00
10	7.00	0.3720	0.00	0.00
11	8.00	0.4280	0.00	0.00
12	9.00	0.4870	0.00	0.00
13	10.00	0.5470	0.00	0.00
14	11.00	0.5970	0.00	0.00

Pollutants to be Analyzed and Printed:

Pollutant Name	Pollutant Type
Solids	Particulate

midwest engineering services, inc.
geotechnical environmental materials engineers

SUBSURFACE EXPLORATION AND FOUNDATION EVALUATION

Proposed Addition

Weldall Manufacturing, Inc.

Waukesha, Wisconsin

Prepared for

Weldall Manufacturing, Inc.

2001 South Prairie Avenue

Waukesha, WI 53189

July 30, 2008

MES Project No. 7-83087

midwest engineering services, inc.

geotechnical • environmental • materials engineers

821 Corporate Court
Suite 102
Waukesha, WI 53189-5010
262-521-2125
FAX 262-521-2471
www.midwesteng.com

July 30, 2008

Mr. David L. Bahl
Weldall Manufacturing, Inc.
2001 South Prairie Avenue
Waukesha, WI 53189

SUBJECT: Subsurface Exploration and Foundation Evaluation
Proposed Addition
Weldall Manufacturing, Inc.
Waukesha, Wisconsin
MES Project No. 7-83087

Dear Mr. Bahl,

The subsurface exploration and foundation evaluation for the referenced project has been completed. Three (3) copies of the report are included herein. A copy has also been previously provided electronically. As requested, we have also submitted one electronic copies to Mr. Brian Fischer of Fischer, Fischer, Theis, Inc. and to Mr. Mike Birschbach of Jahnke and Jahnke Associates, Inc.

After you have had the opportunity of reading the report, please call at any time with any questions or comments you may have. Midwest Engineering Services, Inc. appreciates the opportunity to be of service on this project, and looks forward to continuing as your geotechnical consultant during the design and construction phases, as well as on your upcoming projects.

Very truly yours,

MIDWEST ENGINEERING SERVICES, INC.

Bradley J. Broback, P.E.
Project Engineer

Daniel B. Anderson, P.E.
Branch Manager

TABLE OF CONTENTS

INTRODUCTION

General

This report presents the results of the subsurface exploration and foundation evaluation for the proposed Weldall Manufacturing Addition in Waukesha, Wisconsin. The work was performed for Weldall Manufacturing, Inc. at the request of Mr. David L. Bahl.

Purpose

The purpose of this study was to evaluate the subsurface conditions at specific boring locations on the site, and to establish parameters for use by the design engineers and architects in preparing the foundation, floor slab, pavement, and stormwater management area designs for the proposed project.

Scope

The scope of services included a site reconnaissance, the subsurface exploration, a determination of soil characteristics by field and laboratory testing, and an evaluation and analysis of the data obtained. The scope of the field work, including the number, depth, and locations of the borings was determined by MES after consultation with the client.

Authorization

The description of services and authorization to perform this subsurface exploration and analysis were in the form of a signed acceptance copy of MES Proposal No. 7-8187 dated July 14, 2008. The general conditions for the performance of the work were referenced in the proposal. This report has been prepared on behalf of, and exclusively for the use of Weldall Manufacturing, Inc. The information contained in this report may not be relied upon by any other parties without the express written consent of MES, and acceptance by such parties of MES' General Conditions.

SITE AND PROJECT DESCRIPTION

Site Features

The project site is located at 2001 South Prairie Avenue in Waukesha, Wisconsin. Currently, the site consists of an approximate 90,000 square foot building (including office and warehouse) with associated parking/drive areas, and two (2) ponds (see Figure 1). The site is bound by wetlands to the south and west, and Wisconsin Central Ltd. Railroad tracks to the east. At the time of the exploration, the area of the addition generally consisted of an asphalt paved parking/drive area or vacant field with ground

cover generally consisting of grass and a few trees. Site topography was rolling and generally sloped down to the west with about 13 feet of elevation difference between boring locations.

Project Description

From the information provided by the client, it is understood that the proposed project will consist of a single story warehouse addition to the existing building, about 80,000 square feet in plan area (see Figure 2). The building construction is estimated to be of steel frame, with a concrete slab-on-grade floor (without a basement), to match the existing building. The addition development also includes a new paved parking/drive area to the north, and a new stormwater management area to the west. It is also estimated that the addition will include loading docks.

The finished floor of the addition is estimated to be the same as the existing building, EL. 45.37. The existing grades in the area of the building addition presently range between about EL. 51.0 and EL. 48.2. Therefore, on the basis of the estimated first floor elevation, only minor grade changes, generally consisting of about 3 to 6 feet of cut, are anticipated. However, this will also be dependent on the subgrade preparation criteria, to be discussed in a later section.

Structural loading of the proposed building addition was not provided, but is estimated to be moderate to heavy in magnitude. It is understood that the addition may include one or more cranes. It is estimated that the proposed pavement areas will be subjected to relatively moderate to heavy traffic volumes and loading. The size, type, bottom elevation and other design details of the proposed stormwater management area were not provided.

EXPLORATION AND LABORATORY PROCEDURES

Scope Summary

The field and laboratory data utilized in the evaluation and analysis of the subsurface materials were obtained by drilling exploratory test borings, securing soil samples by the split-spoon sampling method, and subjecting the samples to laboratory testing.

With respect to the stormwater management area, the field and laboratory work for classification of the subgrade soils was performed to provide information for use by the basin design personnel when considering requirements of Chapter NR151 of the Wisconsin Administrative Code, and of WDNR Technical Standard 1002, "Site Evaluation for Stormwater Infiltration" guidelines. The design of the proposed stormwater management area was beyond the scope of services for this project.

Field Exploration

Twenty-six (26) soil test borings were drilled for this project to depths ranging from 6.5 feet to 21.5 feet below the existing ground surface. Fifteen (15) borings were performed to a depth of 21.5 feet within proposed building and pond areas; eight (8) borings were performed to a depth of 6.5 feet in proposed pavement areas; and three (3) borings (B-1, B-2, and B-6) were performed to a depth of 16 feet in a potential borrow area. The number, depths, and locations of the borings were generally provided by the client. The borings were staked in the field by the client's representative. The surface elevations shown on the logs were provided by the client and refer to the City of Waukesha datum.

The soil test borings were performed with both truck mounted and all-terrain vehicle (ATV) mounted rotary drilling rigs utilizing continuous flight hollow stem augers to advance the holes. Representative samples were obtained by the Standard Penetration Test (SPT) method in general accordance with ASTM D-1586 procedures at 2.5 foot intervals to 10 feet, and at 5 foot intervals thereafter, to the end of the borings. As an exception, samples were obtained at continuous 2 foot intervals at the borings performed within the proposed stormwater management area and within the potential borrow area. The SPT provides a means of determining the relative density of granular soils and comparative consistency of cohesive soils, thereby providing a method of evaluating the relative strength and compressibility characteristics of the subsoils.

The SPT soil samples were transferred to clean glass jars immediately after retrieval, and returned to the laboratory upon completion of the field operations. Samples will be discarded unless other instructions are received. All soil samples were visually classified by a soils engineer in general accordance with the Unified Soil Classification System (ASTM D-2488-75), except the stormwater management area borings, which were classified by the USDA soil classification system. After completion of the borings, the auger holes were backfilled to the ground surface with bentonite chips and the boreholes performed in pavement areas were patched with cold patch asphalt.

A copy of the Soil Boring Logs and Boring Location Diagram (Figure 1) are enclosed in the Appendix. The soil stratification shown on the logs represents the approximate soil conditions in the actual boring locations at the time of the exploration. The terms and symbols used on the logs are described in the General Notes found in the Appendix.

Laboratory Physical Testing

Soil samples obtained from the exploration were visually classified in the laboratory, and subjected to testing, which included moisture content determination, Atterberg Limits determination, and grain size analysis by mechanical and hydrometer methods.

Selected cohesive soil samples were tested in unconfined compression with a controlled strain loading rate and/or with a calibrated hand penetrometer to aid in evaluating the soil strength characteristics. The values of strength tests performed on soil samples obtained by the Standard Penetration Test Method (SPT) are considered approximate, recognizing that the SPT method provides a representative but somewhat disturbed soil sample.

The laboratory testing was performed in general accordance with the respective ASTM methods, as applicable, and the results are shown on the boring logs and data sheets in the Appendix.

DESCRIPTION OF SUBSURFACE CONDITIONS

General

A description of the subsurface conditions encountered at the test boring locations is shown on the Soil Boring Logs. The lines of demarcation shown on the logs represent approximate boundaries between the various soil classifications. It must be recognized that the soil descriptions are considered representative for the specific test hole locations, and that variations may occur between and beyond the sampling intervals and boring locations. Soil depths, topsoil and layer thicknesses, and demarcation lines can be utilized for preconstruction planning, but should not be expected to yield exact and final quantities. A summary of the major soil profile components is described in the following paragraphs.

Soil Conditions

The surficial soils at the boring locations consisted of about 2 to 13 inches of topsoil or topsoil fill generally comprised of sandy clay; about 3 to 4 inches of asphalt overlying about 6 to 14 inches of crushed stone (aggregate base); or about 7 to 12 inches of crushed concrete or crushed stone fill. The underlying soils generally consisted of natural loose to dense light brown sand with fine sand seams, to the maximum depths explored. Strength tests indicated N-values ranging from about 5 to 28 blows per foot. At some locations, a thin layer of natural sandy clay was present overlying the granular soils.

Exceptions to the foregoing included fill and possible fill comprised of silty sand to silty clay present at B-23 through B-26, to depths of about 1.5 to 7 feet (El. 39.3 to EL. 33.0). Additionally, topsoil and possible buried topsoil were present at B-25 and B-26 to depths of about 2 and 3 feet (El. 39.1 and EL. 36.9). Strength tests on the fill and possible fill indicated N-values ranging from about 4 to 16 blows per foot.

Atterberg Limits determination testing and grainsize analysis on samples obtained from B-1(0-2 feet), B-2 (0-2 feet), and B-6 (2-4 feet) found that these materials has liquid limits ranging from about 26 to 37; plasticity indices ranging from about 14 to 23; clay contents of about 12, 28.1, and 13.5 percent; and percent fines of about 22.7, 57, 25.1, respectively.

The foregoing discussion of soil conditions on this site represents a generalized soil profile as determined at the test boring locations. A more detailed description and supporting data for each test location can be found on the individual Soil Boring Logs.

Groundwater Observations

Groundwater observations were made during the drilling operations, and in the open boreholes at completion. Groundwater was encountered during auger advancement in most of the borings, at depths ranging from about 10 to 15 feet (EL. 32.3 to EL. 26.0) below the ground surface. Upon completion and removal of the augers, no groundwater was present above the caved granular soils at any of the borings.

On the basis of the field observations, the soil coloration and relative moisture contents, the free water level at the borings is judged to be in the depth range of about 10 to 15 feet (EL. 32.3 to EL. 26.0) below the existing ground surface at the time of the exploration.

The groundwater observations reported herein are considered approximate. It must be recognized that groundwater levels fluctuate with time due to variations in seasonal precipitation, lateral drainage conditions, and soil permeability characteristics. Longer term monitoring would be required to better evaluate groundwater levels on this site.

EVALUATION AND RECOMMENDATIONS

General Development Considerations

In view of the subsurface conditions encountered in the test borings, together with the structural loading criteria and development grades anticipated, conventional spread footings, along with conventional slab-on-grade construction, can be used for support of the proposed structure.

The existing soils can be utilized for support of the paved parking/drive areas after proper subgrade preparation. However, overexcavation of unsuitable buried topsoil and existing fill soils will be necessary in the area of B-25 and B-26. A discussion of the building foundation and pavement design parameters, as well as the support conditions for the floor slab and pavement are included in later sections.

Although no major difficulties with groundwater control are expected, the predominance of granular soils will result in significant excavation related difficulties.

Site Preparation

The presence of organic topsoil and vegetation in the subgrade can adversely affect the serviceability of structural fills, foundations, floor slabs, pavements, and other structures placed upon them. Approximately 2 to 13 inches of topsoil were present on the surface of the site at the boring locations. However, some variation should be anticipated. All topsoil, vegetation, trees, roots and other organic matter must be stripped from the areas of footings, floor slabs, pavements, sidewalks, and other structures.

Topsoil depths may increase substantially within and encroaching upon wetland areas. It is generally recommended that development within wetland areas not be performed due to the typical presence of highly organic soils and shallow groundwater. If such development is contemplated, special permits will likely be required from the Army Corps of Engineers, the WDNR, or other government agencies.

Backfill adjacent to the existing foundation walls, and within any existing utility trenches, must be evaluated by a representative of the soil engineer to determine its suitability to support new fill, floor slabs, and footings. Some removal of loose or unsuitable soils may be expected to be necessary. New construction must be performed in a manner that will prevent the undermining of existing footings where excavations extend near the existing building. If excavation is performed within the foundation influence zone of the existing footings, the existing foundations must be properly underpinned to prevent instability and damage to the existing structure. Existing utilities or portions of the existing structures that extend into the planned addition area must be completely removed or rerouted, as necessary, and the area properly backfilled.

After stripping the topsoil and cutting high areas of the site to the planned finished grade, and prior to the placement of new fill which may be placed to raise grades, the subgrade must be thoroughly proofrolled to detect unstable, yielding soils, which must be removed or improved by appropriate preparation and compaction techniques. Proofrolling should consist of overlapping passes in a perpendicular grid pattern of a fully-loaded tandem-axle dump truck, or other equipment of similar size and weight. However, care must be used on this site to avoid disturbing the near surface fine-grained soils during the proofrolling, especially during periods of precipitation or spring thaw. Proofrolling with rubber tired equipment may be preferable, but should be performed in consultation with the geotechnical engineer at the time of construction. Unstable soils should be expected, at least on an isolated basis. When encountered, they must be properly remediated. Scarification, drying and recompaction of wet soils or removal and replacement with suitable fill, are two methods which can be considered, but this must be determined by the soils engineer at the time of

construction. Low areas may then be raised to the planned grades with suitable properly compacted fill.

The exposed subgrade in the building and pavement areas is expected to consist of at least some areas of cohesive soils. Such soils are considered highly moisture sensitive and subject to softening. Therefore, equipment and worker traffic must be kept to a minimum on subgrade bearing surfaces, especially during times of precipitation or following spring thaw. Some difficulty with subgrade preparation can be expected in wet or cold weather conditions. Removal of unsuitable portions of the near surface soils and replacement with structural fill will likely be required, on at least an isolated basis, especially if earthwork is not carried out during periods of relatively warm, dry weather, which provide more favorable conditions for drying of these soils. Any soft zones, which cannot be improved by scarification and aeration, must be removed and replaced with compacted structural fill, such as clean crushed stone, possibly in conjunction with the use of a geotextile fabric. Lime and fly ash modification are two additional remedial measures which can be considered. However, this must only be performed at the direction and under the supervision of the geotechnical engineer. A proper mix design must be performed prior to the performance of any modification. Substantial construction delays and difficulty with subgrade stabilization should be expected during periods of wet and/or cool weather. Consideration should be given to installing construction roads to reduce disturbance to the sensitive subgrade soils.

Every effort must be made to keep excavations dry. If construction proceeds during wet weather, some additional overexcavation may be necessary. If weather permits, the soil could be dried and recompacted. A crushed stone working mat, possibly in conjunction with a geotextile fabric may also be feasible to help stabilize subgrades. Site grading runoff should be directed to catch basins, so that the potential for the softening of the foundation and pavement subgrade soils is reduced.

Where the removal of unsuitable bearing material is performed beneath proposed footings, the excavation must extend laterally beyond the perimeter of the foundation for a distance at least equal to the thickness of the fill below the footing bottom. This general guideline also applies to instances where a raised structural fill pad is constructed to achieve a bearing elevation greater than existing grades. The influence zone of footing stresses can be represented as an imaginary 45° line extending downward and outward from the footing bottom. All fill placed within this zone after cutting to firm soil must be properly engineered, from the bottom of the cut, up to the floor slab subgrade elevation.

If site grades are raised in excess of 2 feet, the first lift of new fill must be placed so as to extend a minimum lateral distance of 5 feet beyond the planned top building pad dimension (for fills less than 5 feet in thickness), or for a distance equal to at least 1 foot laterally beyond the top pad dimension for every foot of fill thickness (for fills greater than 5 feet in depth). Subsequent lifts can then be placed on an approximate

1H:1V slope back up to the planned top perimeter dimension of the pad. Proper moisture control is essential to reduce the amount of compactive effort necessary to achieve the desired densities.

When a firm and stable subgrade is established, low areas may be raised to planned grades with properly compacted structural fill. Any new fill should be a clean granular soil, such as those materials meeting the gradations outlined in Section 209 or 305 of the State of Wisconsin Standard Specification for Highway and Structure Construction. If fine-grained soils, such as those with high silt or clay content are used, they should generally be placed over large open areas, where conditions are more favorable for the proper placement and compaction of such materials. It must be recognized that high silt or clay content materials are difficult to compact when placed at moisture contents beyond a few percent of the optimum moisture content. Fill must be placed in layers of not more than nine (9) inches in thickness, at moisture contents at or near optimum, and be compacted to a minimum density of 95 percent of the maximum dry density as determined by ASTM designation D-698. The on-site soils beneath the topsoil are considered suitable for use as new fill to raise grades, generally over large areas. However, some sorting or moisture conditioning may be required. Silt, clay, wet granular soils, or organic materials are not suitable for reuse as compacted fill in trenches, or adjacent to foundation stem walls or retaining walls.

Proper moisture control is essential to reduce the amount of compactive effort necessary to achieve the desired densities. This is especially true of clayey soils, where scarification and aeration may be required to achieve near optimum moisture levels prior to compaction. A sheepsfoot roller is generally required for compaction of clayey soils, whereas a vibratory smooth drum roller is preferred for granular material. Small hand-operated compactors and granular fill should be used in confined areas. Granular fills are generally more readily compacted to the required densities in such applications.

It is recommended that well-graded granular soils be utilized as backfill in new utility trenches and alongside below grade walls to reduce the potential for consolidation and settlement of the fill. All fill soils must be placed and compacted under engineering controlled conditions, to provide suitable support for overlaying structures and roadways. Additional guidance can be provided at the time of construction in the selection process for grade-raising fill and trench backfill.

When excavations encroach upon or extend below the groundwater or perched zones, and into sandy or silty soils, subgrade instability and sloughing/caving of sidewalls can occur. Some overexcavation of softened or loosened soils, in conjunction with the use of a crushed stone working mat, may be necessary. Additionally, significantly widened excavations may result, or be required for stability.

The selection of fill materials for various applications should be done in consultation with the soils engineer. Similarly, the evaluation of the subgrade and placement and compaction of fill for structural applications should be monitored and tested by a qualified representative of the soils engineer.

Foundation Analysis

The proposed addition may be supported by a conventional spread foundation system, bearing on suitable naturally occurring soils or within structural fill, prepared as discussed in a previous section. Considering the estimated finished floor elevation (EL. 45.37), interior and exterior footings will bear at about EL. 43.9 and EL. 41.4, respectively. Based upon the borings, natural sand or sandy clay soils are generally expected to be present at these approximate elevations. Spread and continuous wall footings bearing upon suitable natural soils, or upon compacted structural fill, may be designed for a net allowable soil pressure of 3000 psf.

The suitability of the existing soils for support of the proposed foundation must be determined by testing by a qualified geotechnical engineer during construction, utilizing static cone penetrometer tests or dynamic cone penetrometer tests for cohesive and granular soils, respectively. Soft, loose, or otherwise unsuitable materials not disclosed by the borings, may be encountered in the foundation excavations at the bearing elevation. If unsuitable existing soil is present, it must be removed throughout a zone extending one foot laterally for each foot removed below the foundation, on either side of the planned footing. The overexcavated area can then be backfilled with structural compacted fill.

In lieu of the use of deep spread footings or the placement of compacted structural fill, any unsuitable materials could be removed from beneath footings and the excavation backfilled to the original planned bearing depth with a lean concrete slurry mix. If it is elected to utilize a lean concrete slurry to replace the unsuitable soils, the foundation excavations should be 4 inches wider than the proposed footing width and must extend through the unsuitable bearing materials to the natural soils. The slurry must be placed immediately after excavation to avoid intrusion of soil into the excavation. The concrete should contain sufficient aggregate and cement to attain a 28-day compressive strength of at least 1000 psi. Some sloughing or caving of the overlying soils may be experienced. Should this occur during the slurry placement, the area must be removed and recast. Additionally, should caving become extensive, it may be necessary to substantially widen excavations to avoid soil intrusion into the concrete slurry. This may result in the use of additional slurry quantities significantly in excess of preconstruction budget estimates.

Where new foundations are planned adjacent to existing foundations, the effects of overlapping soil stresses must be considered. The net allowable soil bearing pressure of 3000 psf must not be exceeded. It should be noted that backfill materials may be

encountered within existing utility trenches and adjacent to existing foundation walls. Overexcavation of unsuitable trench backfill and replacement with structural fill may be necessary for proper foundation support. All foundations must bear upon suitable natural soils or properly placed and compacted structural fill.

All perimeter footings must be placed at a depth of at least 4 feet below the finished grade for frost protection. Due to periodic severity of winters in this area, it is recommended that footings in poorly heated or unheated areas of the building also be placed at least 4 feet below the adjacent exterior grade. Interior footings not subject to frost action may be placed at a shallow depth of 18 inches below the floor slab, provided they bear on suitable natural soils or engineered fills. All footings must be protected from the effects of frost if construction is carried out during winter months.

It is recommended that the footings supporting individual columns have a minimum dimension of 30 inches, and continuous footings have a minimum width of 24 inches, even if the maximum recommended allowable bearing pressure is not fully utilized. In order to minimize the effects of any slight differential movement that may occur due to variations in the character of the supporting soils and any variations in seasonal moisture contents, it is recommended that all continuous footings be suitably reinforced to make them as rigid as needed.

In general, the performance of the foundation system on this site is dependent on the various factors discussed herein. The excavation, preparation, and concreting of foundations should be monitored and tested by a representative of the soils engineer.

Floor Slabs

Prior to constructing the floor slab or pavements, and prior to the placement of any fill used to raise grades, the exposed subgrade must be prepared utilizing the proofrolling procedures described previously. The existing fill/possible fill and buried topsoil encountered at B-25 and B-26 should be removed to expose suitable underlying natural soils, present at depths of about 3 to 3.5 feet (EL. 37.6 to EL. 36.9). It is recommended that the undercutting operations and subsequent proofrolling operations be monitored by a representative of the geotechnical engineer to ensure that a firm, suitable subgrade is present prior to placement of new fills, or to construction of the floor slab and pavements. In areas that exhibit soft, yielding or unstable soil conditions, the following remedial measures are recommended to provide a stable subgrade.

Localized wet, soft or unstable areas can be undercut to such depths determined necessary in the field to reach stable material, and the area backfilled with imported crushed stone, such as the 1.25-inch gradation specified in Section 305 of the WisDOT Standard Specifications, placed and compacted as recommended in the *Site Preparation* section of this report. If relatively thick zones or areas of extensive yielding are observed, and they cannot be stabilized by normal discing, aeration and

recompaction procedures, undercutting and replacement with crushed stone and geotextile fabric (if needed) may also be required in these areas.

The floor slab may be designed utilizing an estimated modulus of subgrade reaction of 150 pci based on the presence of natural sandy clay in areas, prepared as discussed in this report. The final design and detailing should be performed by a qualified structural engineer based on the intended slab use, loading conditions and anticipated subgrade conditions.

A granular mat, which can be designed as a drainage layer, should be provided below the floor slab. This must be a minimum of six (6) inches in thickness and properly compacted. In moisture sensitive areas, a vapor retarder may be placed beneath the floor slab or base course. However, it is recommended that the architect be consulted in this regard. The proper use of a vapor retarder may not completely prevent moisture beneath or on top of slabs. If the base course contains sharp particles, a cushion layer of sand approximately 2 inches in thickness may be required to provide protection from puncture.

The floor slab should be suitably reinforced to make it as rigid as necessary and proper joints provided at the junction of the slab and the foundation system so that a small amount of independent movement can occur without causing damage. Large floor areas must be provided with joints at frequent intervals (maximum spacing of 30 times the slab thickness, per ACI) to compensate for concrete volume changes (shrinkage). Where the slab will be supporting live loads, such as from moving vehicles, joints must be keyed or dowelled to permit proper load transfer. It is recommended that appropriate construction methods and curing procedures be used to minimize shrinkage and curling of the floor slab.

Exterior/Unheated Area Slabs

Entry slabs, sidewalks, aprons, and other slabs in exterior or unheated areas may bear upon silty or clayey soils. Such materials are highly frost susceptible and poorly drained. Slabs placed directly upon such soils are subject to heaving and subsequent settlement due to freeze/thaw cycles. This can result in cracking, misalignment, and other related effects (especially at joints). It is recommended that consideration be given to limited undercutting of the frost susceptible materials to a depth of 1 to 2 feet below the slab, and replacement with well graded, properly placed and compacted granular soils. A properly designed underdrain system connected to the municipal sewer (if permissible) or directed to on-site stormwater management areas should also be incorporated to reduce the potential effects of freeze/thaw cycles.

Utility Construction

In general, the on-site soils can be used for support of utility lines. Substantial difficulty with the stability of utility trenches should be expected due to the presence of granular soils across the site, especially in the presence of water. The use of shoring, bracing, or trench boxes will be required. Additionally, excavations encroaching upon or extending below the groundwater within granular soils can become substantially unstable when the confining effect of the overburden is removed. Some undercutting of softened soils, in conjunction with the placement of crushed stone or other suitable granular backfill may be necessary to establish a stable working mat and/or bearing subgrade. An adequate dewatering effort and bracing of sidewalls may be required. Utility construction should be performed in accordance with "The Standard Specifications for Sewer and Water Line Construction" for the State of Wisconsin.

It is recommended that well graded granular soils such as those specified in Tables 37 and 39 of the Standard Specification for Sewer and Water Construction be utilized as backfill in utility trenches to reduce the potential for consolidation and settlement of the backfill. The existing sand soils are considered suitable for re-use in such applications. However, those obtained from below the groundwater will require long drying times, and importing of suitable granular soils may be necessary in order to avoid construction delays. All fill soils should be properly placed and compacted under engineering controlled conditions to provide suitable support for overlaying structures and roadways. Silty and clayey soils are not recommended for use as backfill within utility trenches due to the substantial difficulty of obtaining proper compaction in confined areas.

As with all excavation work, all open cut trenches must be properly shored and braced as required by applicable federal and state OSHA codes, and as necessary to protect life and property.

Loading Dock Walls

It is recommended that any loading dock walls be protected by a suitable drainage system to prevent development of excessive lateral pressures. The walls must therefore be backfilled for a lateral distance of 3 to 4 feet with a well-graded, free draining granular material such as crushed stone or sand and gravel. Silty and clayey soils, wet granular materials, and organic soils are not recommended for such applications. The granular materials must be placed in lifts not exceeding 12 inches in thickness, and be compacted to at least 90% of the maximum dry density as determined by Standard Proctor (ASTM D698). However, where the wall backfill will be within the influence zone of the building footings, floor slabs, or other structural areas, compaction must be increased to at least 95 percent of the Standard Proctor value.

Based upon the use of free draining granular backfill (ϕ=30; γ_m=130 pcf), an equivalent fluid pressure of 40 psf may be used as the horizontal component of the active earth pressure for walls which are not restrained from movement. For "fixed" walls, an at rest fluid pressure of 65 psf should be used. It must be recognized that the above values are based upon a drained condition, and are exclusive of traffic and other surcharge loads near the walls, which must be factored into the design. It is therefore recommended that a fabric wrapped footing drain be placed behind the walls, and directed to a suitable outlet, such as the municipal sewer (if permissible). If this is not feasible, the drains must be properly daylighted to an appropriate area of the site to prevent pavement icing in winter.

CONSTRUCTION CONSIDERATIONS

Groundwater Control

The groundwater level in the borings was at depths of about 10 to 15 feet (EL. 32.3 to EL. 26.0) at the time of the exploration. On the basis of the observations and the estimated finished floor elevation, major difficulty with groundwater is not expected during excavation work on this site. Where excavations extend a few inches or so below the groundwater, or into perched conditions, it is expected that filtered sump pumps or other conventional means should suffice to control the groundwater. However, for deeper excavations, or for substantial perched zones, prolonged dewatering with a series of sumps or well points and high capacity sump pumps, or other more comprehensive means may be necessary to facilitate construction.

Since the foundation materials are subject to softening when exposed to free moisture, every effort should be made to keep excavations dry. Discharge water from roof drains should be directed away from the building, and the site grading direct runoff to catch basins, so that the potential for the softening of the foundation and pavement subgrade soils is reduced.

Excavations and Site Drainage

Sloping, shoring or bracing of the excavation sidewalls will be necessary. Trenching in granular soils may be difficult due to the instability of vertical slopes, and will therefore require a flattening of trench sides, or some other means of protection, to facilitate construction and to protect life and property. Substantial sloughing and caving should be expected within unprotected excavations. The degree of excavation instability problems is dependent upon the depth and length of time that excavations remain open, excavation bank slopes, water levels and the effectiveness of any dewatering systems. However, severe instability can be expected within granular soils, especially encroaching upon and extending below the groundwater. All excavation work must be performed in accordance with OSHA and local building code requirements.

Where excavations encroach upon or extend below the groundwater or perched zones and into fine sand, silt, or soft clay, they may become substantially unstable when the confining effect of the overburden is removed. Significant sloughing or caving of sidewalls may also occur. Some overexcavation of softened or loosened soils, in conjunction with the use of a crushed stone working mat, may be necessary to establish a stable bearing subgrade. Additionally, significantly widened excavations may result, or be required to maintain or achieve sidewall stability.

Excavations in close proximity of the existing structure must be performed with caution and utilize methods which will prevent undermining of existing foundations and destabilizing the existing structure. New building foundations should be stepped to match the bearing elevation of the existing building foundations and bear on suitable natural soil or structural fill. The use of properly designed shoring and bracing or sheet piling, or underpinning of the existing foundations will be necessary if excavation is performed within the influence zone of existing foundations. This must be performed by an experienced specialty contractor.

Since the subgrade soils are generally sensitive to moisture, every effort should be made to provide adequate drainage across the site during construction, and to prevent ponding of runoff on the subgrade. These soils are also subject to erosion caused by runoff, and erosion control measures should be implemented where needed or required by local ordinances.

Seismic Design Considerations

On-site natural soils generally consist of loose to dense granular soils. The on-site natural soils are considered to meet the criteria for Site Class D in accordance with Table 1615.1.1 of the International Building Code-2006.

STORMWATER MANAGEMENT AREA CONSIDERATIONS

A stormwater management area is proposed for the northwest portion of the development. Borings B-22 through B-24 were performed, as requested by the client, for the purpose of evaluating the subsoils in these areas. The depth, type, and other design details of the stormwater management area were not known at time of this analysis. The subgrade soils encountered at these locations were classified in general accordance with the USDA textural soil classification system. Estimated infiltration rates for various soil types are shown. Table 2 of the Site Evaluation for Stormwater Infiltration (1002) document, which is published by the Wisconsin Department of Natural Resources Conservation Practice Standards, is shown below.

Soil Texture[1]	Design Infiltration Rate Without Measurement Inches/hour
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
Sandy clay (SC)	0.04
Silty clay (Si, C)	0.07
Clay (C)	0.07

[1]Use sandy loam design infiltration for fine sand, loamy fine sand, very fine sand, and loamy fine sand soil textures.

NR-151 guidelines indicate infiltration rates shall be based on the least permeable soil horizon within 5 feet of the bottom elevation of the proposed infiltration system.

In general, the soils encountered at B-22 through B-24 consisted predominantly of silt loam, sandy loam, loam, fine sand, or loamy fine sand materials to the maximum depths explored. These soils have Table 2 estimated infiltration rates ranging from 0.13 to 0.5 inches per hour, which are less than 0.60 inches per hour. However, field verification testing of the actual infiltration rates is required under Step 5c of The Site Evaluation for Stormwater Infiltration documents, to confirm that these materials are exempt from the infiltration requirements of NR151.12(5)(c), under NR151.12(5)(c)6a.

Exceptions to the foregoing were intermittent layers of sand or gravelly sand. These materials have an estimated infiltration rate of 3.60 inches per hour based upon Table 2. This rate is greater than 0.6 inches per hour, and these soils are not exempt from the requirements of NR151.12(5)(c) under NR151.12(5)(c)6a. It should be noted that the groundwater level at B-22 through B-24 was at depths of about 10 to 15 feet (EL. 32.3 to EL 26.0±). As a result, dependent upon bottom elevations, areas of the site may be exempt or excluded under NR 151.12(5)(c)5e due to the presence of groundwater within 3 feet of the basin bottom.

The preceding infiltration rate estimates are intended only for use in preliminary planning. In-situ testing, such as with a double ring infiltrometer, along with test pits in other areas of the basins are recommended to allow more detailed evaluation of subsurface conditions, including groundwater levels, and to provide more representative infiltration rates to be used in the final basin design. It is recommended

that the bottom of the stormwater management area be observed by qualified geotechnical personnel at the time of construction to verify the soil types.

It must be recognized that actual infiltration rates will be somewhat variable depending upon the uniformity, in-place density, and/or grading of the subsoils below the individual basin or trench footprint. It should also be recognized that the performance of the basin could be affected by other factors such as densification by construction equipment and sedimentation. A maintenance program must be developed to address the removal of sedimentation and or organic materials should they develop. Additionally, it is recommended that the basin design be performed by an experienced civil engineering firm, and that thorough review of applicable codes (especially NR151) and regulations be performed. Proper design and construction of sidewalls and berms will also be essential for proper basin performance.

Preliminary Liner and Embankment Design

It is understood that the proposed stormwater management area may be designed as a wet pond. As such, the placement of a properly designed clay liner is likely to be required. The soils encountered within B-22 through B-24 generally consisted of silt loam, sandy loam, or loamy fine sand materials. Thin layers of sandy clay to silty clay were present in areas of the site, at shallow depths. However, Atterberg Limits determination testing and grainsize analysis on samples obtained from B-1(0-2 feet), B-2 (0-2 feet), and B-6 (2-4 feet) found that these materials has liquid limits ranging from about 26 to 37; plasticity indices ranging from about 14 to 23; clay contents of about 12, 28.1, and 13.5 percent; and percent fines of about 22.7, 57, 25.1, respectively.

Soils used for clay liners must be relatively impermeable and are generally specified to have a hydraulic conductivity of $1x10^{-7}$ cm/sec or less. In general, experience has shown that soils which have 50% or more passing the No. 200 sieve, a clay content of 25% or more, a liquid limit of 20 or more, and a plasticity index of 12 or more, have the potential to exhibit hydraulic conductivity of $1x10^{-7}$ cm/sec when properly compacted. However, the above material properties are general guidelines. The hydraulic conductivity of a given material can vary significantly depending on its density/compaction level. In addition, the soils used for the embankment must also meet the requirements for the soil used for the clay liner. Field testing to verify proper compaction and hydraulic conductivity is recommended. Based upon the laboratory testing performed for this project, the on-site soils do not meet these general guidelines, and are therefore not considered suitable for use in constructing a clay liner. Importing of suitable clay materials will be necessary if construction of a clay liner is necessary.

The liner must be designed to resist lateral earth and water pressure, as well as outward migration that may occur, possibly through shrinkage or tension type cracks. If inlet and outlet structures are installed, they should be provided with splash blocks or other energy dissipation devices to prevent scouring. It is further recommended that all

liner and embankment construction be monitored by the soils engineer. Clay liner material and the soil used for the construction of the embankment must be placed in maximum 6 inch thick lifts, at moisture contents at or near optimum, and be compacted to at least 95 percent of the maximum dry density as determined by the Standard Proctor method (ASTM D698). The clay liner must be at least 24 inches in thickness and extend up the side of the embankment to an elevation above the planned high water level for the wet pond. Further, it is recommended that a keyway of like material used in the construction of the berm be placed beneath the embankment to inhibit outward movement of the berm structure.

PAVEMENT DESIGN RECOMMENDATIONS

Based upon the borings, the near surface pavement subgrade soils are anticipated to generally consist of sand or sandy clay. The following recommendations are based upon the poorer sandy clay soils. These cohesive soils have been assigned an estimated visual classification of A-6 by the AASHTO soil classification method. They are generally rated as poor for pavement subgrade support due to moderate to high frost susceptibility, poor drainage characteristics, and high susceptibility to strength loss when exposed to free water. Provided that the subgrade soils are prepared as outlined in the *Site Preparation* section of this report, the in-place subgrade soils and any new structural fill can be used for standard flexible or rigid pavement construction.

Analysis of the visual soil classification and SCS soils survey information has been made in determining pertinent subgrade design coefficients as described in the Wisconsin Soils Manual for Pavement Design. Based on the soils encountered, and with proper subgrade preparation and drainage, the following pavement subgrade design parameters are recommended for the pavement section design. However, if soils with support characteristics different from the sandy clay materials are encountered or are used to raise grades in new pavement areas, revised coefficients will need to be provided.

PAVEMENT SUBGRADE DESIGN COEFFICIENTS

AASHTO Soil Classification	**A-6**
Design Frost Index	**F-3**
Design Group Index	**14**
Soil Support Value	**4.0**
Estimated Subgrade Modulus (k)	**150 pci**

The subject site is located in an area that experiences annual freezing cycles and the subgrade soils encountered have been classified as highly susceptible to frost action when free water is present. In order to reduce the potential for frost action, it will be necessary to control surface runoff and water seepage as complete removal and

replacement of the frost susceptible subgrade soils is not considered economically feasible. It is recommended that underdrains be placed within the subgrade, just below the granular base, to help reduce the potential for trapping water within the aggregate base layer. At a minimum, this should consist of installing 3 to 4 drain tiles extending radially outward, 20 feet from each interior catch basin. In addition, drain tiles should extend along curb lines, 20 feet up the slope from curb inlets. The drain tile should be directly connected to the storm sewer manholes or catch basins. The drain tile should consist of 4 inch diameter perforated PVC pipe placed beneath the base layer, extending at least 8 inches into the subgrade. The pipe should be surrounded by 1 inch size clean stone, with the pipe and stone being wrapped with a geotextile filter fabric to reduce the potential of soils from migrating into and obstructing the pipe. It is also recommended that roof drains be connected to the stormwater collection system to minimize the potential for this water to enter the base and subgrade.

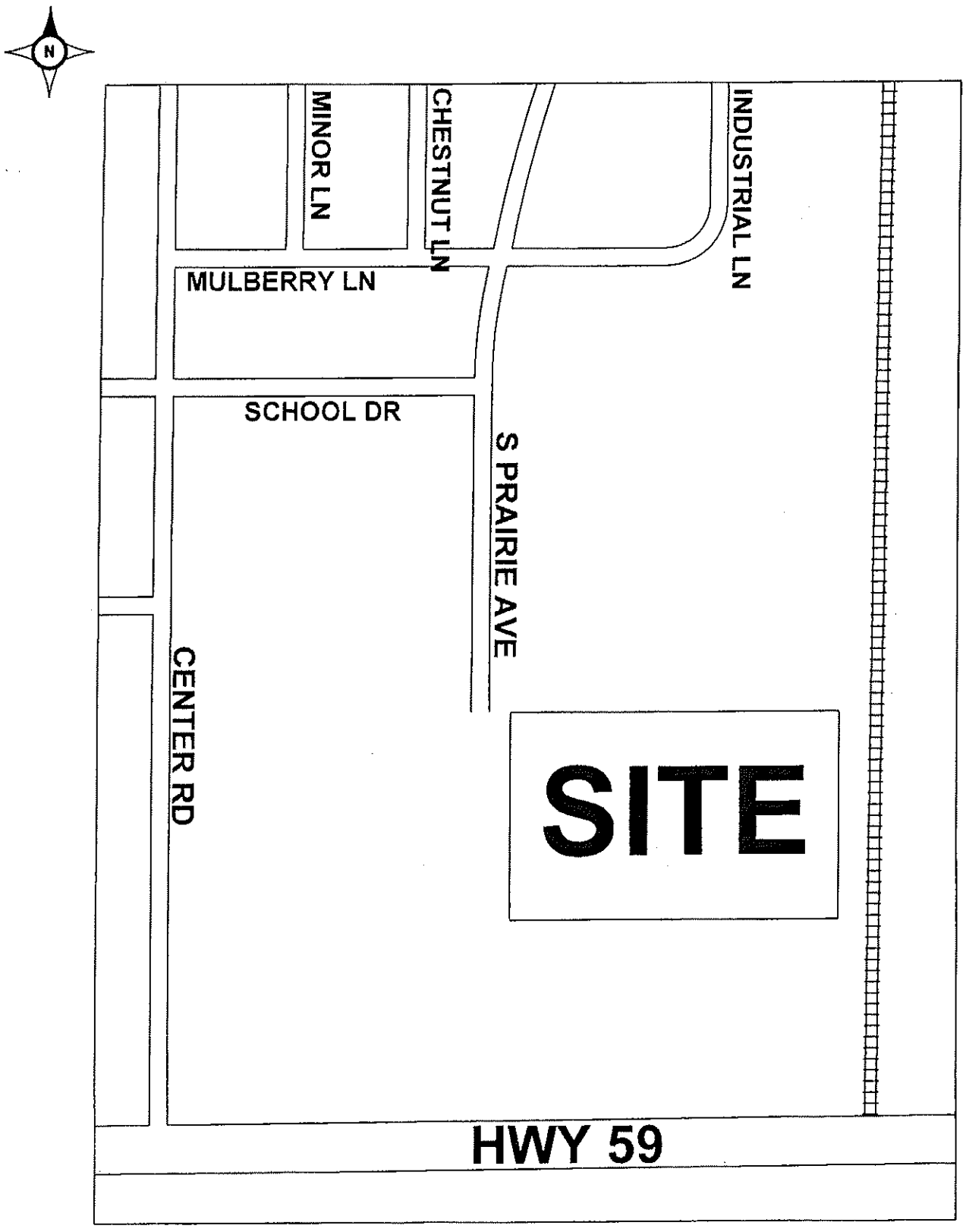
GENERAL COMMENTS

This geotechnical exploration and foundation analysis has been prepared to aid in the evaluation of the foundation conditions on this site. The recommendations presented herein are based on the available soil information and the design information provided. Any changes in the design information or building locations should be brought to the attention of the soils engineer to determine if modifications in the recommendations are required. The final design plans and specifications should also be reviewed by the soils engineer to determine that the recommendations presented herein have been interpreted and implemented as intended.

This geotechnical study has been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. The findings, recommendations and opinions contained herein have been promulgated in accordance with generally accepted practice in the fields of foundation engineering, soils mechanics, and engineering geology. No other representations, expressed or implied, and no warranty or guarantee is included or intended in this report.

It is recommended that the earthwork and foundation operations be monitored by the soils engineer, to test and evaluate the bearing capacities, and the selection, placement and compaction of controlled fills.

APPENDIX



midwest engineering services, inc.

GENERAL AREA PLAN

WELDALL MANUFACTURING ADDITION
2001 S PRAIRIE AVE
WAUKESHA, WI

Scale: NOT TO SCALE
Project Number: 7-83087
Date: 7-28-08
Drawn By: SEE NOTES

PLAN1

Figure 1

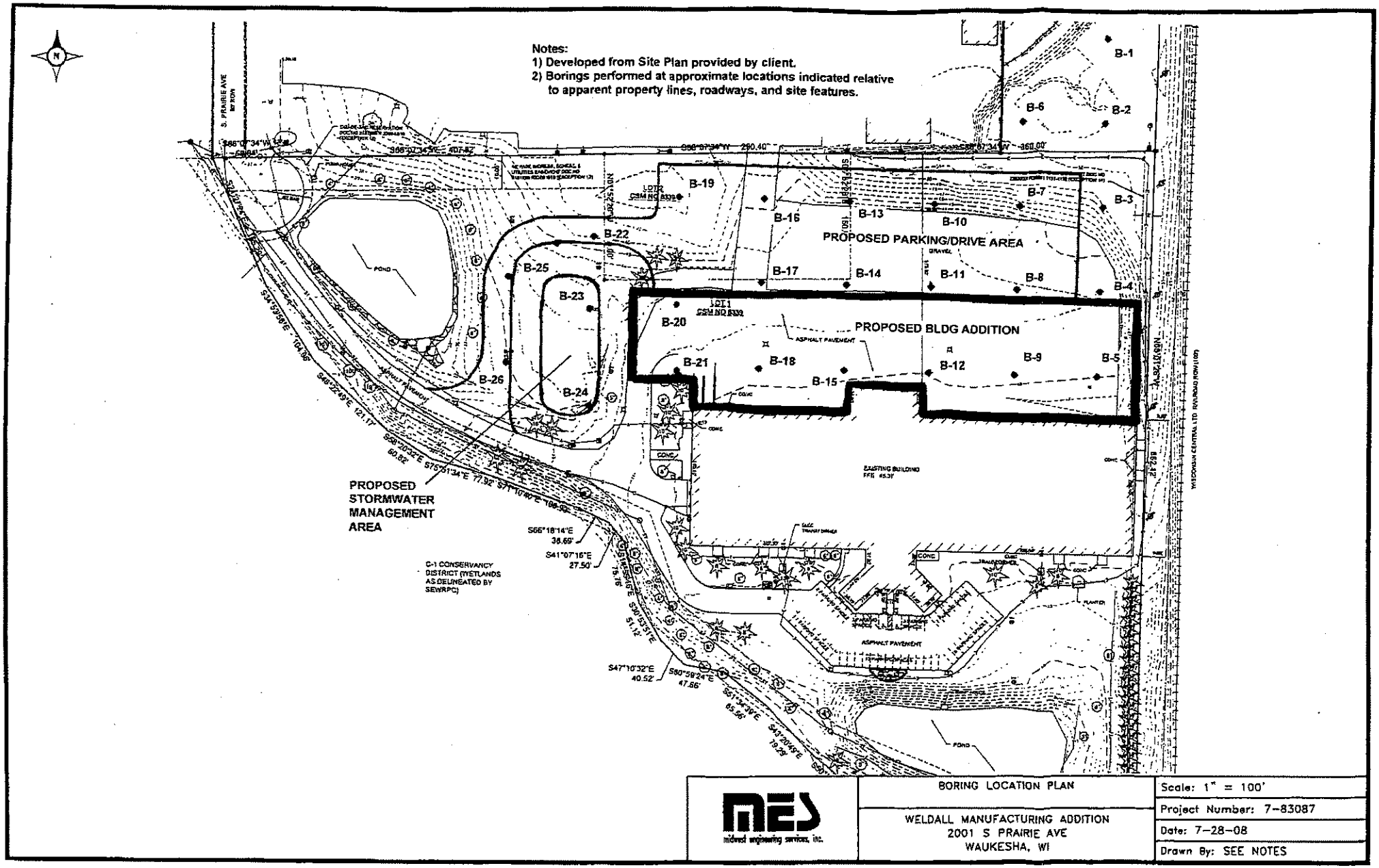

Notes:
1) Developed from Site Plan provided by client.
2) Borings performed at approximate locations indicated relative to apparent property lines, roadways, and site features.
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-14
B-15
B-16
B-17
B-18
B-19
B-20
B-21
B-22
B-23
B-24
B-25
B-26
PROPOSED PARKING/DRIVE AREA
PROPOSED BLDG ADDITION
PROPOSED STORMWATER MANAGEMENT AREA
EXISTING BUILDING
ASPHALT PAVEMENT
POND
C-1 CONSERVANCY DISTRICT (WETLANDS AS DELINEATED BY SEWRPC)
S. PRAIRIE AVE
S66°18'14"E 38.69'
S41°07'16"E 27.50'
S47°10'32"E 40.52'
S60°59'24"E 47.66'
S51°34'39"E 65.36'
S43°20'49"E 19.29'
midwest engineering services, inc.
BORING LOCATION PLAN
WELDALL MANUFACTURING ADDITION
2001 S PRAIRIE AVE
WAUKESHA, WI
Scale: 1" = 100'
Project Number: 7-83087
Date: 7-28-08
Drawn By: SEE NOTES

FIGURE 2

midwest engineering services, inc.

SOIL BORING LOG: B-1

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 52.1	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 51.1	10"± Dark brown Sandy CLAY, moist (Topsoil)	1-AU	-	-	-		-	
2 — 50.1	Brown Sandy CLAY, trace gravel, moist							
3 — 49.1		2-SS	8	-	-	4	-	
4 — 48.1								
5 — 47.1		3-SS	11	-	-	4	-	
6 — 46.1								
7 — 45.1		4-SS	11	-	-	3	-	
8 — 44.1								
9 — 43.1	Light brown to brown SAND, trace to some gravel, moist	5-SS	13	-	-	3	-	
10 — 42.1								
11 — 41.1		6-SS	12	-	-	3	-	
12 — 40.1								
13 — 39.1		7-SS	14	-	-	3	-	
14 — 38.1								
15 — 37.1		8-SS	19	-	-	3	-	
16 — 36.1								

End of Boring: 16'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 6 ± ft (El. 46.1±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-2

Project: Proposed Weidall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 52.7	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 51.7	9"± Dark Brown Sandy CLAY, moist (Topsoil)	1-AU	-	-	-		-	
2 / 50.7	Reddish Brown Silty CLAY, little sand, to Sandy CLAY, moist							
3 / 49.7		2-SS	6	-	-	11	-	
4 / 48.7								
5 / 47.7	Brown SAND, little to some gravel, moist	3-SS	15	-	-	5	-	poor recovery
6 / 46.7								
7 / 45.7		4-SS	15	-	-	5	-	
8 / 44.7								
9 / 43.7		5-SS	10	-	-	3	-	
10 / 42.7								
11 / 41.7	Light brown SAND, trace gravel, moist	6-SS	10	-	-	3	-	
12 / 40.7								
13 / 39.7		7-SS	17	-	-	4	-	
14 / 38.7								
15 / 37.7	Light brown fine SAND, moist	8-SS	15	-	-	6	-	
16 / 36.7								

End of Boring: 16'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 8 ± ft (El. 44.7±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-3

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 51.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 50.0	5"± Dark brown Silty SAND, moist (Topsoil)	1-AU	-	-	-	10	-	
2 / 49.0	Brown Sandy CLAY, moist							
3 / 48.0		2-SS	16	-	-	4	-	
4 / 47.0	Light brown SAND, trace to little gravel, moist							
5 / 46.0								
6 / 45.0		3-SS	13	-	-	4	-	
	End of Boring: 6½'							

Notes:

Water Level / Caving Observations:

Water Level During Drilling: dry
Water Level Upon Completion: dry
Caved at Upon Completion: 3 ± ft (El. 48±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-4

Project: Proposed Weidall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.5	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 43.5	9"± Crushed CONCRETE, damp (FILL)	1-AU	-	-	-	7	-	
2 / 42.5	15"± Dark brown Sandy CLAY, moist							
3 / 41.5		2-SS	16	-	-	3	-	
4 / 40.5								
5 / 39.5		3-SS	12	-	-	4	-	
6 / 38.5								
7 / 37.5		4-SS	19	-	-	1	-	
8 / 36.5								
9 / 35.5		5-SS	13	-	-	2	-	
10 / 34.5								
11 / 33.5								
12 / 32.5	Light brown SAND, trace to little gravel, damp to wet							▽
13 / 31.5								
14 / 30.5								
15 / 29.5		6-SS	11	-	-	15	-	
16 / 28.5								
17 / 27.5								
18 / 26.5								
19 / 25.5								
20 / 24.5		7-SS	9	-	-	26	-	
21 / 23.5								

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 14 ± ft (El. 30.5±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 11 ± ft (El. 33.5±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-5

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.6	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 44.6	Note A	1-AU	-	-	-	2	-	
5 / 39.6	Light brown SAND, trace to little gravel, damp to moist	2-SS	9	-	-	1	-	
		3-SS	9	-	-	2	-	
		4-SS	10	-	-	2	-	
10 / 34.6		5-SS	15	-	-	3	-	
15 / 29.6	Brown coarse SAND, little to with gravel, wet	6-SS	9	-	-	14	-	▽
		7-SS	10	-	-	18	-	
21 / 23.6	**End of Boring: 21½'**							

Notes:

Note A : 3"± ASPHALT
6"± Crushed STONE, moist (Aggregate Base)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 15 ± ft (El. 29.6±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 10 ± ft (El. 34.6±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-6

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 53.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 52.0	2"± Dark brown Clayey SAND, moist (Topsoil)	1-AU	-	-	-	9	-	
2 / 51.0	Brown Clayey SAND/Sandy CLAY, with gravel, moist							
3 / 50.0		2-SS	7	-	-		-	
4 / 49.0	Light brown Silty fine SAND, very moist							
5 / 48.0		3-SS	10	-	-	10	-	
6 / 47.0								
7 / 46.0		4-SS	17	-	-	4	-	
8 / 45.0								
9 / 44.0		5-SS	15	-	-	3	-	
10 / 43.0								
11 / 42.0	Light brown SAND, trace to little gravel, damp to moist	6-SS	12	-	-	3	-	
12 / 41.0								
13 / 40.0		7-SS	17	-	-	3	-	
14 / 39.0								
15 / 38.0		8-SS	15	-	-	2	-	
16 / 37.0								

End of Boring: 16'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 8 ± ft (El. 45±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-7

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 45.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0	3"± Dark brown Silty SAND, moist (Topsoil)	1-AU	-	-	-	10	-	
1 / 44.4								
2 / 43.4								
3 / 42.4		2-SS	16	-	-	2	-	
4 / 41.4	Light brown SAND, trace gravel, moist							
5 / 40.4								
6 / 39.4		3-SS	8	-	-	3	-	
	End of Boring: 6½'							

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 2 ± ft (El. 43.4±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-8

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 43.9	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 42.9	7"± Gray crushed STONE, moist (FILL)	1-AU	-	-	-	9	-	
2 / 41.9	Brown Sandy CLAY, moist							
3 / 40.9		2-SS	17	-	-	4	-	
4 / 39.9								
5 / 38.9		3-SS	10	-	-	4	-	
6 / 37.9								
7 / 36.9		4-SS	14	-	-	6	-	
8 / 35.9								
9 / 34.9		5-SS	12	-	-	7	-	
10 / 33.9								
11 / 32.9	Light brown SAND, trace gravel, with a fine sand seam at 10± feet, moist to wet							▽
12 / 31.9								
13 / 30.9								
14 / 29.9								
15 / 28.9		6-SS	9	-	-	20	-	
16 / 27.9								
17 / 26.9								
18 / 25.9								
19 / 24.9								
20 / 23.9								
21 / 22.9		7-SS	11	-	-	22	-	

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level During Drilling: 13 ± ft (El. 30.9±) ▽
Water Level Upon Completion: dry
Caved at Upon Completion: 10 ± ft (El. 33.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-9

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.8	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 44.8	Note A	1-AU	-	-	-	3	-	
1 / 43.8								
2 / 42.8		2-SS	13	-	-	2	-	
3 / 41.8								
4 / 40.8		3-SS	8	-	-	3	-	
5 / 39.8								
6 / 38.8		4-SS	9	-	-	2	-	
7 / 37.8								
8 / 36.8		5-SS	8	-	-	2	-	
9 / 35.8								
10 / 34.8	Light brown SAND, trace gravel, moist to wet	6-SS	10	-	-	20	-	▽
11 / 33.8								
12 / 32.8		7-SS	10	-	-	14	-	
13 / 31.8								
14 / 30.8								
15 / 29.8								
16 / 28.8								
17 / 27.8								
18 / 26.8								
19 / 25.8								
20 / 24.8								
21 / 23.8	Brown SAND and GRAVEL, wet							

End of Boring: 21½'

Notes:

Note A : 3"± ASPHALT
8"± Gray crushed STONE, moist (Aggregate Base)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 15 ± ft (El. 29.8±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 11 ± ft (El. 33.8±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-10

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.7	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
	6"± Dark brown Silty SAND, moist (Topsoil)	1-AU	-	-	-	10	-	
1 / 43.7	Brown Silty CLAY, moist							
2 / 42.7								
3 / 41.7		2-SS	9	-	-	2	-	
4 / 40.7	Light brown SAND, trace gravel, moist							
5 / 39.7								
6 / 38.7		3-SS	13	-	-	3	-	
	End of Boring: 6½'							

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 3 ± ft (El. 41.7±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-11

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 43.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 42.3	12"± Crushed CONCRETE, moist (FILL)	1-AU	-	-	-	8	-	
2 / 41.3								
3 / 40.3		2-SS	15	-	-	3	-	
4 / 39.3								
5 / 38.3		3-SS	12	-	-	3	-	
6 / 37.3								
7 / 36.3		4-SS	7	-	-	7	-	
8 / 35.3								
9 / 34.3		5-SS	8	-	-	5	-	
10 / 33.3	Light brown SAND, trace to little gravel, with a fine silty sand seam at 15± feet, moist							
11 / 32.3								
12 / 31.3								
13 / 30.3								
14 / 29.3								▽
15 / 28.3								
16 / 27.3		6-SS	8	-	-	26	-	
17 / 26.3								
18 / 25.3								
19 / 24.3								
20 / 23.3								
21 / 22.3		7-SS	9	-	-	23	-	

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level During Drilling: 14 ± ft (El. 29.3±) ▽
Water Level Upon Completion: dry
Caved at Upon Completion: 9 ± ft (El. 34.3±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: 5± feet east
Reason for Offset: existing equipment

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-12

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue, Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.9	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 43.9	Note A	1-AU	-	-	-	2	-	
2 / 42.9								
3 / 41.9		2-SS	22	-	-	7	-	poor recovery
4 / 40.9								
5 / 39.9		3-SS	14	-	-	2	-	
6 / 38.9								
7 / 37.9		4-SS	18	-	-	2	-	
8 / 36.9								
9 / 35.9		5-SS	15	-	-	2	-	
10 / 34.9								
11 / 33.9	Light brown SAND, trace to some gravel, moist							
12 / 32.9								
13 / 31.9								
14 / 30.9								
15 / 29.9								▽
16 / 28.9		6-SS	7	-	-	20	-	
17 / 27.9								
18 / 26.9								
19 / 25.9								
20 / 24.9								
21 / 23.9		7-SS	17	-	-	20	-	

End of Boring: 21½'

Notes:

Note A : 4"± ASPHALT
8"± Gray crushed STONE, moist (Aggregate Base)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 15 ± ft (El. 29.9±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 10 ± ft (El. 34.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-13

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 43.9	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
	3"± Brown Silty SAND, trace gravel, moist (Topsoil)	1-AU	-	-	-	5	-	
1 / 42.9								
2 / 41.9								
3 / 40.9	Light brown SAND, moist	2-SS	6	-	-	5	-	
4 / 39.9								
5 / 38.9								
6 / 37.9		3-SS	9	-	-	5	-	
	End of Boring: 6½'							

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 2 ± ft (El. 41.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-14

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2007
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 43.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 42.3	12"± Crushed CONCRETE, moist (FILL)	1-AU	-	-	-	10	-	
2 / 41.3	Brown Sandy CLAY, very moist							
3 / 40.3		2-SS	15	-	-	4	-	
4 / 39.3								
5 / 38.3		3-SS	14	-	-	4	-	
6 / 37.3								
7 / 36.3		4-SS	14	-	-	6	-	
8 / 35.3	Light brown SAND, trace gravel, with a fine sand seam at 8± feet, moist							
9 / 34.3		5-SS	14	-	-	3	-	
10 / 33.3								
11 / 32.3		6-SS	6	-	-	21	-	
12 / 31.3								
13 / 30.3		7-SS	6	-	-	27	-	
14 / 29.3								
15 / 28.3	Brown Silty fine SAND, wet							
16 / 27.3								
17 / 26.3								
18 / 25.3								
19 / 24.3								
20 / 23.3	Brown SAND, wet							
21 / 22.3								

▽

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 13 ± ft (El. 30.3±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 12 ± ft (El. 31.3±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: 4± feet south
Reason for Offset: automobiles

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-15

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.7	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 43.7	Note A	1-AU	-	-	-	3	-	
2 / 42.7								
3 / 41.7		2-SS	14	-	-	3	-	
4 / 40.7								
5 / 39.7		3-SS	11	-	-	20	-	
6 / 38.7								
7 / 37.7		4-SS	17	-	-	6	-	
8 / 36.7								
9 / 35.7		5-SS	13	-	-	5	-	
10 / 34.7	Light brown SAND, with a silt/silty fine sand seam at 5± feet, moist to wet							
11 / 33.7								
12 / 32.7								
13 / 31.7								
14 / 30.7								
15 / 29.7								▽
16 / 28.7		6-SS	7	-	-	21	-	
17 / 27.7								
18 / 26.7								
19 / 25.7								
20 / 24.7								
21 / 23.7		7-SS	8	-	-	21	-	

End of Boring: 21½'

Notes:

Note A : 4"± ASPHALT
7"± Gray crushed STONE, moist (Aggregate Base)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 15 ± ft (El. 29.7±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 12 ± ft (El. 32.7±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset:
Reason for Offset:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-16

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 45.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 — 44.4	4"± ASPHALT	1-AU	-	-	-	7	-	
1 — 44.4	12"± Gray crushed STONE, moist (Aggregate Base)							
2 — 43.4	Brown medium to coarse SAND, trace to little gravel, moist							
3 — 42.4		2-SS	15	-	-	3	-	
4 — 41.4								
5 — 40.4								
6 — 39.4		3-SS	9	-	-	5	-	

End of Boring: 6½'

Notes:

Water Level / Caving Observations:

Water Level During Drilling: dry
Water Level Upon Completion: dry
Caved at Upon Completion: 3 ± ft (El. 42.4±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-17

Project: Proposed Weidall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 43.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 42.4	Note A	1-AU	-	-	-	7	-	
2 / 41.4	Brown Sandy CLAY, moist							
3 / 40.4		2-SS	17	-	-	16	-	
4 / 39.4								
5 / 38.4		3-SS	15	-	-	8	-	
6 / 37.4								
7 / 36.4		4-SS	16	-	-	14	-	
8 / 35.4								
9 / 34.4		5-SS	15	-	-	5	-	
10 / 33.4								
11 / 32.4	Light brown SAND, with fine sand seams at 3±, 8±, and 15± feet, moist to wet							▽
12 / 31.4								
13 / 30.4								
14 / 29.4								
15 / 28.4		6-SS	9	-	-	24	-	
16 / 27.4								
17 / 26.4								
18 / 25.4								
19 / 24.4								
20 / 23.4								
21 / 22.4		7-SS	7	-	-	25	-	

End of Boring: 21½'

Notes:

Note A : 4"± ASPHALT
14"± Crushed CONCRETE (Aggregate Base)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 14 ± ft (El. 29.4±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 14 ± ft (El. 29.4±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-18

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.6	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 43.6	Note A	1-AU	-	-	-	2	-	
2 / 42.6								
3 / 41.6		2-SS	17	-	-	3	-	
4 / 40.6	Light brown SAND, trace gravel, moist to wet							
5 / 39.6		3-SS	9	-	-	3	-	
6 / 38.6								
7 / 37.6		4-SS	8	-	-	11	-	
8 / 36.6	Light brown fine SAND, moist							
9 / 35.6		5-SS	9	-	-	3	-	
10 / 34.6								
11 / 33.6		6-SS	8	-	-	24	-	
12 / 32.6								
13 / 31.6		7-SS	13	-	-	21	-	
14 / 30.6								
15 / 29.6	Brown SAND, trace gravel, moist to wet							▽
16 / 28.6								
17 / 27.6								
18 / 26.6								
19 / 25.6								
20 / 24.6								
21 / 23.6								

End of Boring: 21½'

Notes:

Note A : 4"± ASPHALT
8"± Gray crushed STONE, moist (Aggregate Base)

Water Level / Caving Observations:

Water Level During Drilling: 15 ± ft (El. 29.6±) ▽
Water Level Upon Completion: dry
Caved at Upon Completion: 12 ± ft (El. 32.6±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-19

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 48.2	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0	8"± Dark brown Clayey SILT, little sand, moist (Topsoil)	1-AU	-	-	-	8	-	
1 / 47.2								
2 / 46.2								
3 / 45.2	Light brown SAND, trace to little gravel, with fine sand seams, moist	2-SS	20	-	-	4	-	
4 / 44.2								
5 / 43.2								
6 / 42.2		3-SS	20	-	-	9	-	

End of Boring: 6½'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 3 ± ft (El. 45.2±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: 5± feet north, 5± feet west
Reason for Offset: sprinkler system

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-20

Project: Proposed Weidall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 43.2	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 42.2	Note A	1-AU	-	-	-	3	-	
2 / 41.2								
3 / 40.2		2-SS	18	-	-	2	-	
4 / 39.2								
5 / 38.2	Brown SAND, trace gravel, damp to moist	3-SS	16	-	-	3	-	
6 / 37.2								
7 / 36.2								
8 / 35.2		4-SS	11	-	-	16	-	
9 / 34.2	Light brown and gray mottled Silty fine SAND, moist							
10 / 33.2		5-SS	6	-	-	8	-	
11 / 32.2								
12 / 31.2								
13 / 30.2								
14 / 29.2								
15 / 28.2	Brown SAND, trace gravel, moist to wet							▽
16 / 27.2		6-SS	8	-	-	22	-	
17 / 26.2								
18 / 25.2								
19 / 24.2								
20 / 23.2								
21 / 22.2	Brown Silty fine SAND, wet	7-SS	12	-	-	23	-	

End of Boring: 21½'

Notes:

Note A : 4"± ASPHALT
13"± Gray crushed STONE, moist (Aggregate Base)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 15 ± ft (El. 28.2±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 12 ± ft (El. 31.2±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: 30± feet south
Reason for Offset: cobbles

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-21

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 44.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 43.3	6"± Dark brown Sandy CLAY, very moist (Topsoil)	1-AU	-	-	-	17	-	
2 / 42.3	Brown Clayey SAND to Silty SAND, little gravel, moist							
3 / 41.3								
4 / 40.3		2-SS	18	-	-	8	-	
5 / 39.3	Reddish brown Clayey SAND to Silty SAND, very moist							
6 / 38.3		3-SS	21	-	-	8	-	
7 / 37.3								
8 / 36.3	Light brown fine SAND, moist							
9 / 35.3		4-SS	11	-	-	17	-	
10 / 34.3								
11 / 33.3		5-SS	11	-	-	8	-	
12 / 32.3								
13 / 31.3								
14 / 30.3								▽
15 / 29.3	Light brown SAND, moist to wet							
16 / 28.3		6-SS	19	-	-	18	-	
17 / 27.3								
18 / 26.3								
19 / 25.3								
20 / 24.3								
21 / 23.3		7-SS	16	-	-	26	-	

End of Boring: 21½'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 14 ± ft (El. 30.3±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 16 ± ft (El. 28.3±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-22

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 17, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 46.1	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 45.1	12"± 10YR, 2/1, Black, GRAVELLY SILTY CLAY LOAM, roots (1, f), 1, pl, thin, mfi-Moist (FILL)	1-AU	13	-	-	9	-	
2 / 44.1 3 / 43.1 4 / 42.1	10YR, 4/4, Dark Yellowish Brown, GRAVELLY SAND, 0, gr, f, mi-Moist	2-SS	24	-	-	3	-	
5 / 41.1		3-SS	14	-	-	5	-	
6 / 40.1 7 / 39.1	10YR, 6/3, Very Pale Brown, LOAMY FINE SAND, with 10YR, 6/4, Light Yellowish Brown, f, 1, f, streaks, 0, gr, vf, mi-Moist	4-SS	14	-	-	18	-	
8 / 38.1	Note A							
9 / 37.1	10YR, 6/4, Light Yellowish Brown, SILT LOAM, with 10YR, 4/4, Dark Yellowish Brown, f, 1, d, streaks, 1, pl, thin, mfr-Moist	5-SS	15	-	-	7	-	
10 / 36.1 11 / 35.1	10YR, 6/4, Light Yellowish Brown, FINE SANDY LOAM, 1, pl, thin, mvfr-Moist	6-SS	8	-	-	20	-	
12 / 34.1 13 / 33.1 14 / 32.1		7-SS	19	-	-	12	-	
15 / 31.1 16 / 30.1 17 / 29.1 18 / 28.1	10YR, 6/4, Light Yellowish Brown, LOAMY FINE SAND, 1, pl, thin, mvfr-Moist to Wet	8-SS 9-SS	16 13	- -	- -	21 22	- -	V
19 / 27.1 20 / 26.1		10-SS	11	-	-	20	-	

End of Boring: 20'

Notes:

Note A : 10YR, 6/4, Light Yellowish Brown, FINE SANDY LOAM, 0, m, mvfr-Very Moist

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 15 ± ft (El. 31.1±) V
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 12 ± ft (El. 34.1±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-23

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 42.3	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 41.3	6"± 10YR, 2/1, Black, GRAVELLY SILTY CLAY LOAM, roots (1, f), 1, pl, thin, mfl-Moist (FILL)	1-AU	8	-	-	21	-	
2 / 40.3	10YR, 4/3, Brown, FINE SANDY LOAM, with 10YR, 6/3, Pale Brown, f, 1, f, streaks, 1, sbk, f, mvfr-Moist (FILL)	2-SS	9	-	-	12	-	
3 / 39.3								
4 / 38.3	10YR, 4/2, Dark Grayish Brown, FINE SANDY LOAM, with 10YR, 4/6, Dark Yellowish Brown, f, 2, d, streaks, roots (1, vf), 1, sbk, mvfr-Moist							
5 / 37.3		3-SS	5	-	-	15	-	
6 / 36.3	10YR, 6/4, Light Yellowish Brown, LOAMY FINE SAND, 1, pl, very thin, mvfr-Moist	4-SS	10	-	-	5	-	
7 / 35.3								
8 / 34.3								
9 / 33.3		5-SS	12	-	-	7	-	
10 / 32.3								▽
11 / 31.3	10YR, 6/4, Light Yellowish Brown, FINE SAND, 0, gr, f, ml-Moist to Wet	6-SS	14	-	-	19	-	
12 / 30.3								
13 / 29.3		7-SS	16	-	-	20	-	
14 / 28.3								
15 / 27.3		8-SS	17	-	-	21	-	
16 / 26.3								
17 / 25.3	10YR, 5/3, Brown, SAND, 0, gr, f, ml-Wet	9-SS	22	-	-	20	-	
18 / 24.3								
19 / 23.3		10-SS	20	-	-	16	-	
20 / 22.3								

End of Boring: 20'

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 10 ± ft (El. 32.3±) ▽

Water Level $_{\text{Upon Completion}}$: dry

Caved at $_{\text{Upon Completion}}$: 13 ± ft (El. 29.3±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: 10± feet north

Reason for Offset: sprinkler system

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-24

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 18, 2008
Drilled by: Steve Gonyer
Logged by: Nick Ellison

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 40.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 39.0	Note A	1-AU	-	-	-	15	-	
2 / 38.0	10YR, 3/1, Very Dark Gray, LOAM, with 2.5YR, 2.5/4, Dark Reddish Brown, f, 1, f, streaks, 1, pl, thin, mfr-Moist (FILL)							
3 / 37.0		2-SS	16	-	-	7	-	
4 / 36.0	10YR, 5/4, Yellowish Brown, GRAVELLY SAND, 0, gr, f, ml-moist (FILL)							
5 / 35.0		3-SS	4	-	-	15	-	
6 / 34.0	10YR, 4/3, Brown and 10YR, 3/1, Very Dark Gray, SILTY CLAY LOAM, 1, pl, thin, mfi-Moist (Possible FILL)							
7 / 33.0		4-SS	28	-	-	7	-	
8 / 32.0								
9 / 31.0	10YR, 5/4, Yellowish Brown, GRAVELLY SAND, with 5YR, 4/4, Reddish Brown, f, 1, f, spots, 0, gr, f, ml-Moist, with 10YR, 5/3, Brown, SANDY LOAM, with 10YR, 7/1, Light Gray, and 10YR, 4/4, Dark Yellowish Brown, f, 1, f, streaks, 1, sbk, vf, mvfr-Moist (~ 2" thick layers @ 9')	5-SS	25	-	-	5	-	
10 / 30.0								
11 / 29.0		6-SS	23	-	-	4	-	
12 / 28.0								
13 / 27.0		7-SS	18	-	-	10	-	
14 / 26.0	10YR, 5/6, Yellowish Brown, FINE SAND, with 7.5YR, 4/6, Strong Brown, f, 1, f, streaks, 0, gr, f, ml-Moist							▽
15 / 25.0	10YR, 6/3, Pale Brown, VERY FINE SANDY LOAM, 0, m, mvfr-Wet	8-SS	6	-	-	28	-	
16 / 24.0								
17 / 23.0	10YR, 5/3, Brown, FINE SAND, 0, gr, f, ml-Wet	9-SS	5	-	-	23	-	
18 / 22.0								
19 / 21.0	10YR, 6/3, Pale Brown, FINE SANDY LOAM, 0, m, mvfr-Wet	10-SS	8	-	-	25	-	
20 / 20.0								

End of Boring: 20'

Notes:

Note A : 4"± 10YR, 2/1, Black, GRAVELLY SILTY CLAY LOAM, roots (1, f), 1, pl, thin, mfi-Moist (FILL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 14 ± ft (El. 26±) ▽
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 13 ± ft (El. 27±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

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SOIL BORING LOG: B-25

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 21, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 41.1	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 40.1	Note A	1-AU	-	-	-	25	-	
	Dark brown to black Sandy CLAY, moist (Possible Buried Topsoil)							
2 / 39.1								
	Brown Silty SAND, very moist (Possible FILL)							
3 / 38.1		2-SS	7	-	-	11	-	
4 / 37.1								
5 / 36.1	Brown mottled Clayey SAND, moist							
6 / 35.1		3-SS	5	-	-	14	-	

End of Boring: 6½'

Notes:

Note A : 4"± Dark brown Silty CLAY, little sand, moist (Topsoil FILL)
8"± Brown Silty SAND, little silty clay, moist (FILL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 4 ± ft (El. 37.1±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

midwest engineering services, inc.

SOIL BORING LOG: B-26

Project: Proposed Weldall Manufacturing Addition

Location: 2001 South Prairie Avenue
Waukesha, WI

Project No.: 7-83087
Drill Date: July 21, 2008
Drilled by: Pete Rotaru
Logged by: Toshi White

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 39.9	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 38.9	13"± Dark brown to black Silty CLAY, moist (Topsoil FILL)	1-AU	-	-	-	24	-	
2 / 37.9	Brown Clayey SAND, moist (FILL)							
3 / 36.9	Dark brown and dark gray Sandy CLAY, very moist (Buried Topsoil)	2-SS	11	2.25	-	17	-	
4 / 35.9	Brown mottled Silty CLAY, little sand, trace gravel, moist							
5 / 34.9								
6 / 33.9	Light brown mottled SILT, moist	3-SS	7	-	-	13	-	
	End of Boring: 6½'							

Notes:

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: dry
Water Level $_{\text{Upon Completion}}$: dry
Caved at $_{\text{Upon Completion}}$: 3.5 ± ft (El. 36.4±)

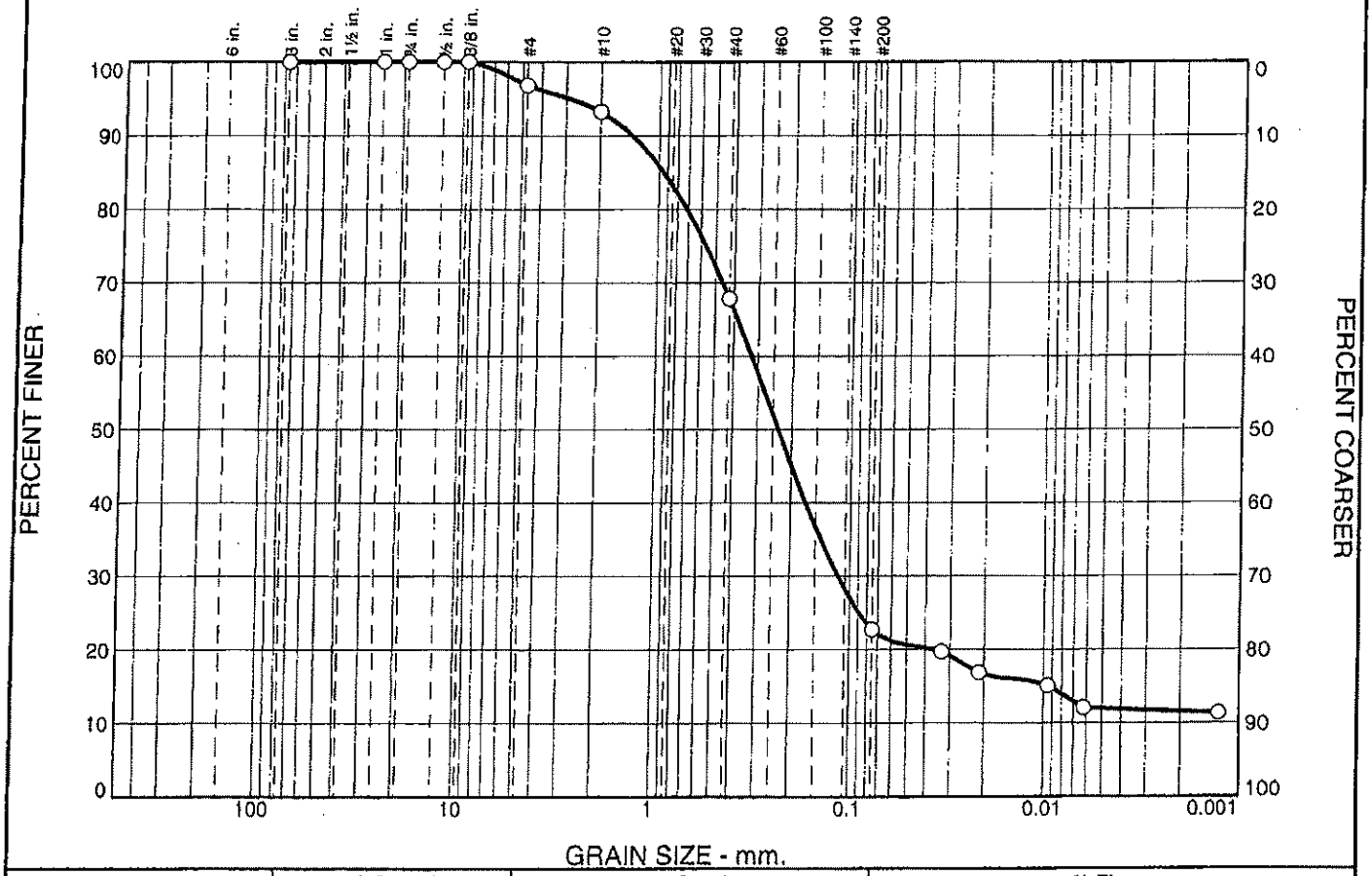
Additional Comments:

*N value may be elevated due to cobbles and boulders

Boring Location Offset: none

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

Particle Size Analysis of Soil ASTM D422



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	3.6	25.4	45.2	10.7	12.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	96.9		
#10	93.3		
#40	67.9		
#200	22.7		

* (no specification provided)

Material Description

Brown clayey sand, trace gravel

Atterberg Limits (ASTM D 4318)

PL= 12 LL= 26 PI= 14

Classification

USCS= SC AASHTO= A-2-6(0)

Coefficients

D_{85}= 0.9442 D_{60}= 0.3237 D_{50}= 0.2345
D_{30}= 0.1152 D_{15}= 0.0094 D_{10}=
C_u= C_c=

Date Tested: 7/28/08 **Tested By:** C. Kitson

Remarks

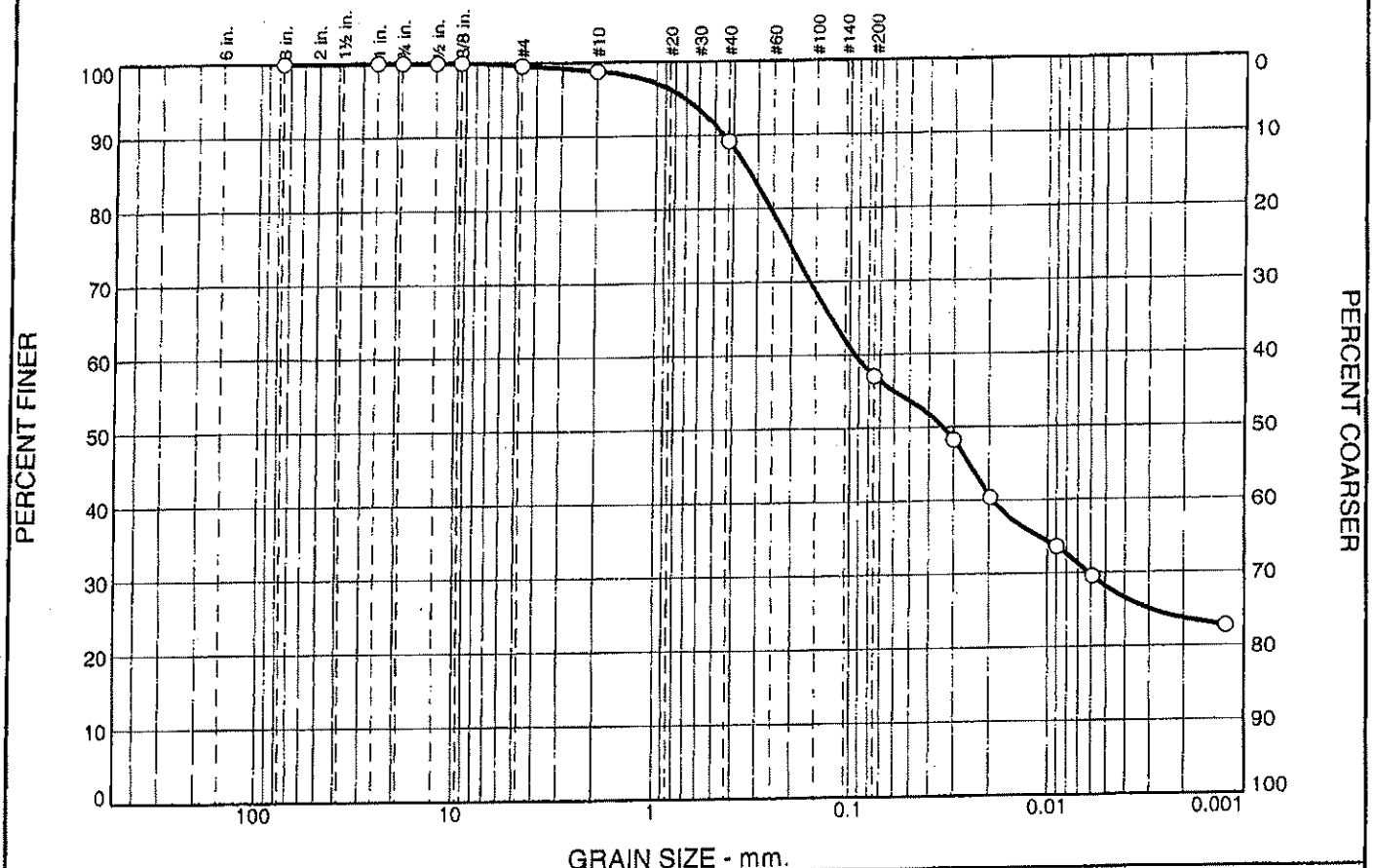
Sample No.: GE08102 **Source of Sample:** Soil Boring **Date Sampled:** 7/24/08
Location: Boring B-1 **Elev./Depth:** -0'-2'
Checked By: Joe Misik **Title:** Lab Manager

Midwest Engineering Services

Waukesha, Wisconsin

Client: Weldall Manufacturing, Inc.-2001 South Prairie Ave-Waukesha, WI
Project: Proposed Weldall Manufacturing Addition
Waukesha, WI
Project No: 7-83087 **Figure** 1

Particle Size Analysis of Soil ASTM D422



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.8	9.6	32.2	28.9	28.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	99.6		
#10	98.8		
#40	89.2		
#200	57.0		

* (no specification provided)

Material Description

Reddish-brown sandy lean clay

Atterberg Limits (ASTM D 4318)

PL= 14 LL= 37 PI= 23

Classification

USCS= CL AASHTO= A-6(10)

Coefficients

D_{85}= 0.3316 D_{60}= 0.0939 D_{50}= 0.0338
D_{30}= 0.0062 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 7/28/08 **Tested By:** C. Kitson

Remarks

Sample No.: GE08103 **Source of Sample:** Soil Boring **Date Sampled:** 7/24/08
Location: Boring B-2 **Elev./Depth:** -0'-2'
Checked By: Joe Misik **Title:** Lab Manager

Midwest Engineering Services

Waukesha, Wisconsin

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(a) 2 layer [illegible]

FILL to Possible Fill to 84" Water @ 168"

Property Owner Weldall Manufacturing Parcel ID # _____ Page 2 of 2

3 Obs. # ☒ Boring B-24 ☐ Pit Ground surface elev. 40 ft. Depth to limiting factor 156 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	~~Boundary~~ roots	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0-4	10YR,7/1	—	grsicl	1thinpl	mfi	1f	>15	0.04
2	4-36	10YR,3/1	f1f,2.5YR,2.5/4	l	1thmpl	mfr	—	<15	0.24
3	36-48	10YR, 5/4	—	grs	0fgr	ml	—	>15	3.60
4	48-84	10YR 4/3; 3/1	—	sicl	1thmpl	mfi	—	<15	0.04
(a) 5	84-156	10YR, 5/4	f1f, 5YR, 4/4	grs	0fgr	mvfr	—	>15	3.60
6	156-168	10YR, 5/6	f1f, 7.5YR, 4/6	fs	0fgr	ml	—	<15	0.5
7	168-192	10YR, 6/3	—	vyfsl	0m	mvfr	—	<15	0.5
8	192-216	10YR, 5/3	—	fs	0fgr	ml	—	<15	0.5
9	216-240	10YR, 6/3	—	fsl	0m	mvfr	—	<15	0.5

Obs. # ☐ Boring ☐ Pit Ground surface elev. _____ ft. Depth to limiting factor _____ in.

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

Obs. # ☐ Boring ☐ Pit Ground surface elev. _____ ft. Depth to limiting factor _____ in.

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

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

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 140 lb. 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 borehole unless otherwise noted. Groundwater levels often vary with time, and are affected by soil permeability characteristics, weather conditions, & lateral drainage conditions.