



Village of Menomonee Falls
W156 N8480 Pilgrim Road
Menomonee Falls, WI 53051-3140
Telephone: (262) 532-4200

STORMWATER MANAGEMENT FACILITIES
OPERATION AND INSPECTION REPORT

Quarter Section SE: NE 1/4 of 28 Name of Business/Subdivision A5 DYNAMICS LP
Property Tax ID Number MNFV 0112917006 Address of Property W1175 N 5750 TECHNOLOGY DR.
MENOMONEE FALLS, WI 53051

Dry Pond	
Wet Pond	<input checked="" type="checkbox"/>
Other	

Description: SWP 28 S011

Location Of
Pond

SOUTH SIDE OF PROPERTY

Year Pond Constructed MODIFIED IN 2006 Year of Last Certification —

Compliance Verification	Design	Actual	Compliant Yes	Comments (Condition of Structure)
Primary Outlet Pipe				
Opening Diameter	12"	12"	X	SEE ATTACHED LETTER
Upstream Invert	839.00	839.35	X	
Downstream Invert	838.80	839.04	X	
Length	40'	42'	X	
Slope	0.58	0.747	X	
Secondary Outlet Pipe				
Opening Diameter			N/A	
Upstream Invert				
Downstream Invert				
Length				
Slope				
Riser				
Opening Diameter	—	12"		NOT IN ORIGINAL DESIGN
Elevation	—	841.23		
Upper Discharge Control				
Opening Diameter	—	2"		NOT IN ORIGINAL DESIGN.
Elevation	—	839.48		NEEDS CLEANING.

Compliance Verification	Design	Actual	Compliant		Comments	
			Yes	No		
Lower Discharge Control	(If Applicable)		N	A		
Opening Diameter						
Elevation						
Other (Description)			N	A		
Opening Type						
Elevation						
Emergency Spillway						
Elevation	842	842.4				
Length of spillway	10'	10'				
Embankment			Present (Yes No)			
Unauthorized plantings, trees, or woody vegetation			X			
Animal burrows or slope erosion			X			
Storage Properties		Design	Actual	Compliant Yes No	Points Surveyed	Equipment Used
Normal Water Elevation (Wet Ponds)	839.0	839.48	X		YES	GPS
Design High Water Elevation	841.95	842.60	X			
Area at Normal Water Elevation (Ac) (Wet Ponds)	0.62	0.58	X			
Area at Design High Water Elevation (Ac)	1.31	1.33	X			
Active Storage Available (Ac-Ft)*	2.85	3.18	X			
Lowest Elevation at Top of Embankment (If Applicable)	843.3	843.3	X			
Average Elevation at Top of Embankment (If Applicable)	843.4	843.4	X			
Maximum Bottom Elevation	833	832.3	X			
Average Pond Bottom Elevation	833	833	X			
Pond Bottom Area (Ac)	6700	7160	X			
Maximum Pond Depth	6.0	6.7	X			
Average Pond Depth	6.0	6.0	X			

*To Determine Active Storage $V=H/3(A1+A2+(A1 \times A2)1/2)$

Wet Ponds Use H = Height of Section, $A1$ = area at normal water elevation, $A2$ = area at top section
 Dry Ponds Use H = Height of Section, $A1$ = pond bottom area, $A2$ = area at top section

Sketch Outlet

SEE ATTACHED

Place Photograph of Pond

SEE ATTACHED

Place Photograph of Pond

Inspection Firm: DAAR ENGINEERING, INC. Inspector Name :
Phone Number: 414-225-9817 Inspection Date:
Address: 325 E. CHICAGO ST. SUITE 500
MILWAUKEE, WI 53202

AARON E. KOCH
8/8/11

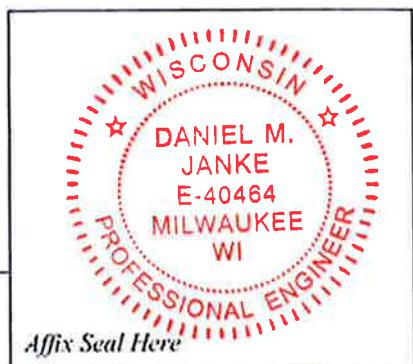
Certifying
Professional Name: AARON E. KOCH
Phone Number: 414-225-9817

Date:

8/9/11

Signature:

CEK



Affix Seal Here



View of west pond looking east (Kohl's in background)



View of east pond looking south



Outlet Structure

AS-BUILT 8-9-11*Type II 24-hr 2-yr Rainfall=2.60"*

Page 1

Prepared by {enter your company name here}

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8/10/2011

Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: AREA 1SRunoff Area=9.688 ac Runoff Depth=1.78"
Tc=14.2 min CN=92 Runoff=22.43 cfs 1.438 af**Pond 2P: AS-BUILT POND**Peak Elev=841.10' Storage=1.309 af Inflow=22.43 cfs 1.438 af
Outflow=0.13 cfs 0.129 af**Total Runoff Area = 9.688 ac Runoff Volume = 1.438 af Average Runoff Depth = 1.78"**

Subcatchment 1S: AREA 1S

Runoff = 22.43 cfs @ 12.06 hrs, Volume= 1.438 af, Depth= 1.78"

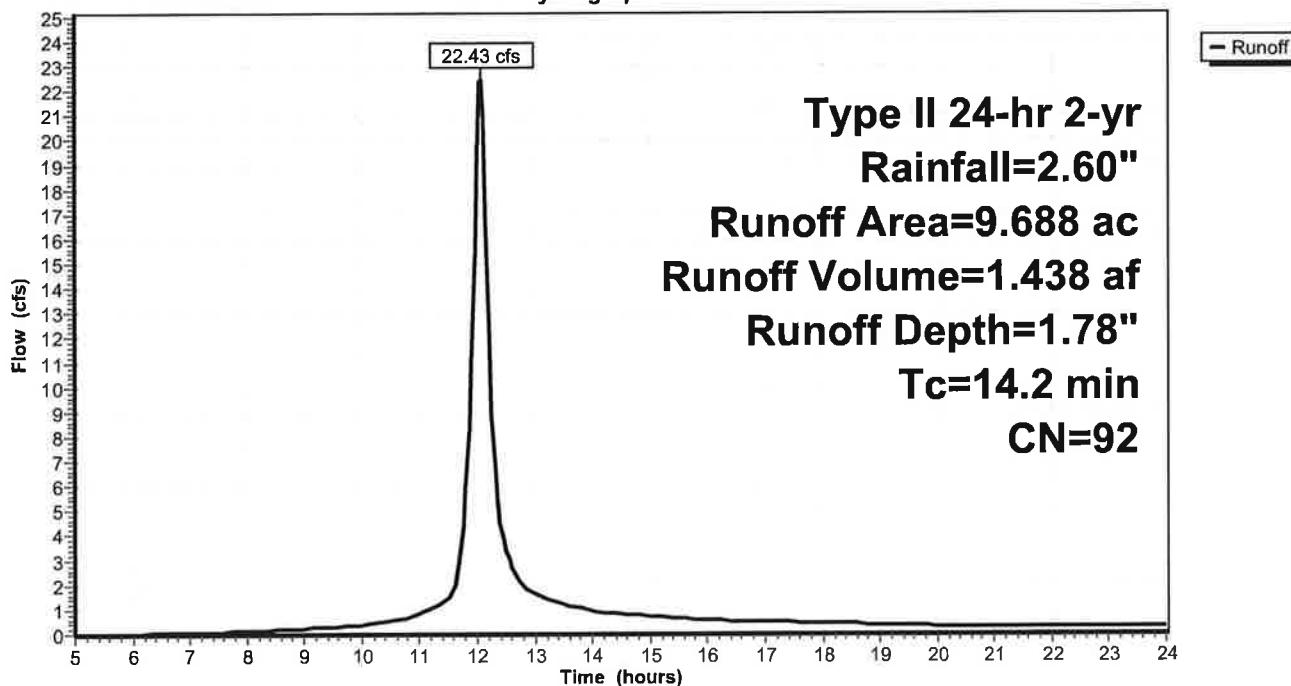
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.60"

Area (ac)	CN	Description
9.688	92	

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

Subcatchment 1S: AREA 1S

Hydrograph



Pond 2P: AS-BUILT POND

Inflow Area = 9.688 ac, Inflow Depth = 1.78" for 2-yr event
 Inflow = 22.43 cfs @ 12.06 hrs, Volume= 1.438 af
 Outflow = 0.13 cfs @ 24.00 hrs, Volume= 0.129 af, Atten= 99%, Lag= 716.5 min
 Primary = 0.13 cfs @ 24.00 hrs, Volume= 0.129 af

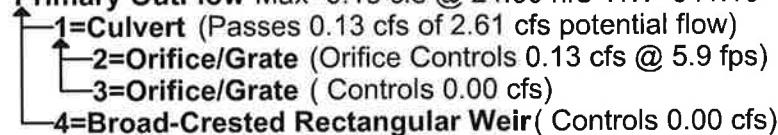
Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 841.10' @ 24.00 hrs Surf.Area= 1.136 ac Storage= 1.309 af
 Plug-Flow detention time= 474.1 min calculated for 0.128 af (9% of inflow)
 Center-of-Mass det. time= 262.0 min (1,070.1 - 808.1)

#	Invert	Avail.Storage	Storage Description
1	839.50'	3.705 af	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
839.50	0.580	0.000	0.000
840.00	0.640	0.305	0.305
841.00	1.120	0.880	1.185
842.00	1.270	1.195	2.380
843.00	1.380	1.325	3.705

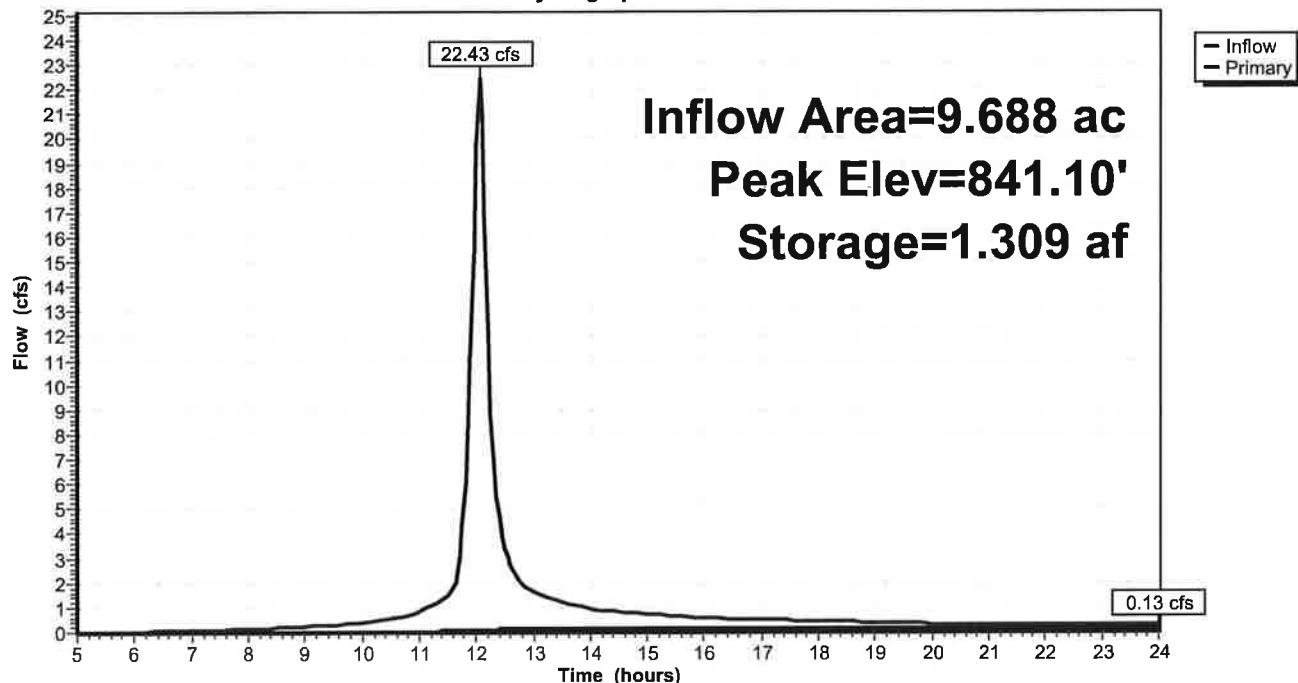
#	Routing	Invert	Outlet Devices
1	Primary	839.35'	12.0" x 42.0' long Culvert CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 839.04' S= 0.0074 '/' n= 0.024 Cc= 0.900
2	Device 1	839.50'	2.0" Vert. Orifice/Grate C= 0.600
3	Device 1	841.23'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Primary	842.50'	10.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.13 cfs @ 24.00 hrs HW=841.10' (Free Discharge)



Pond 2P: AS-BUILT POND

Hydrograph



AS-BUILT 8-9-11

Type II 24-hr 10-yr Rainfall=4.00"

Prepared by {enter your company name here}

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: AREA 1S

Runoff Area=9.688 ac Runoff Depth=3.10"
Tc=14.2 min CN=92 Runoff=38.15 cfs 2.507 af

Pond 2P: AS-BUILT POND

Peak Elev=841.48' Storage=1.761 af Inflow=38.15 cfs 2.507 af
Outflow=1.45 cfs 0.917 af

Total Runoff Area = 9.688 ac Runoff Volume = 2.507 af Average Runoff Depth = 3.10"

Subcatchment 1S: AREA 1S

Runoff = 38.15 cfs @ 12.06 hrs, Volume= 2.507 af, Depth= 3.10"

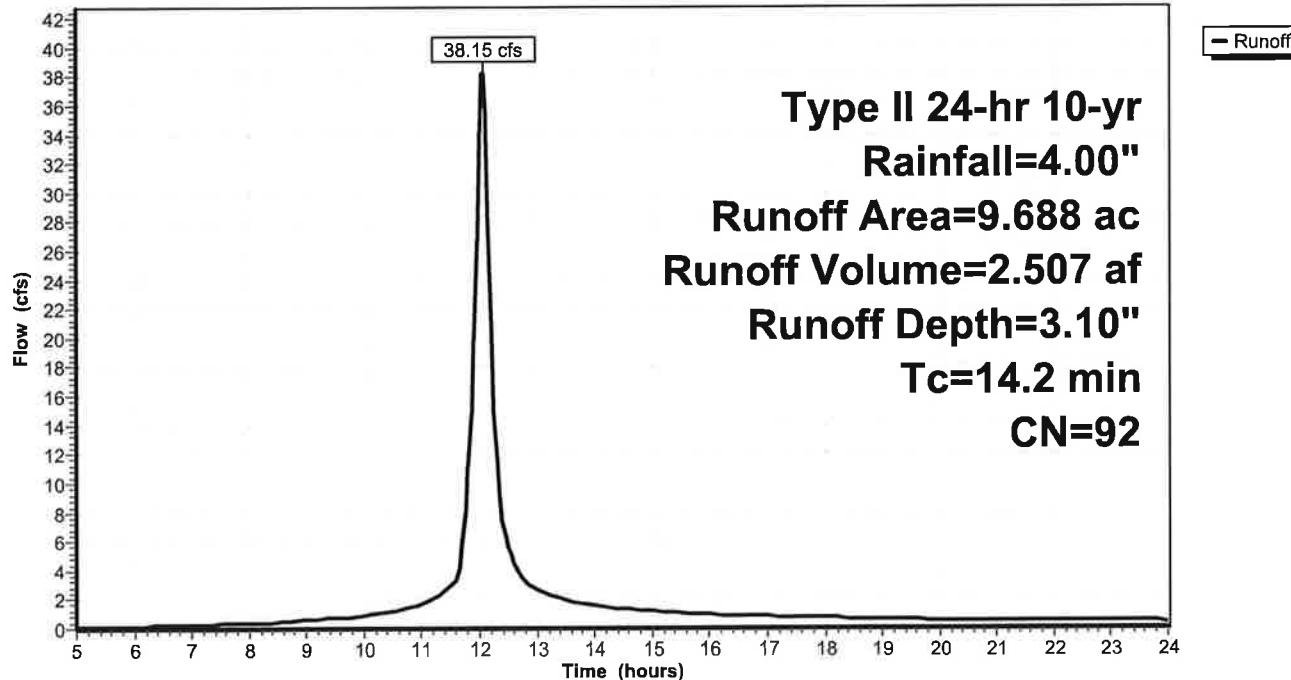
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.00"

Area (ac)	CN	Description
9.688	92	

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

Subcatchment 1S: AREA 1S

Hydrograph



Pond 2P: AS-BUILT POND

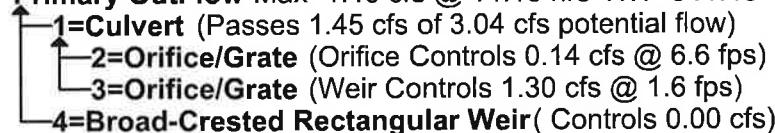
[82] Warning: Early inflow requires earlier time span

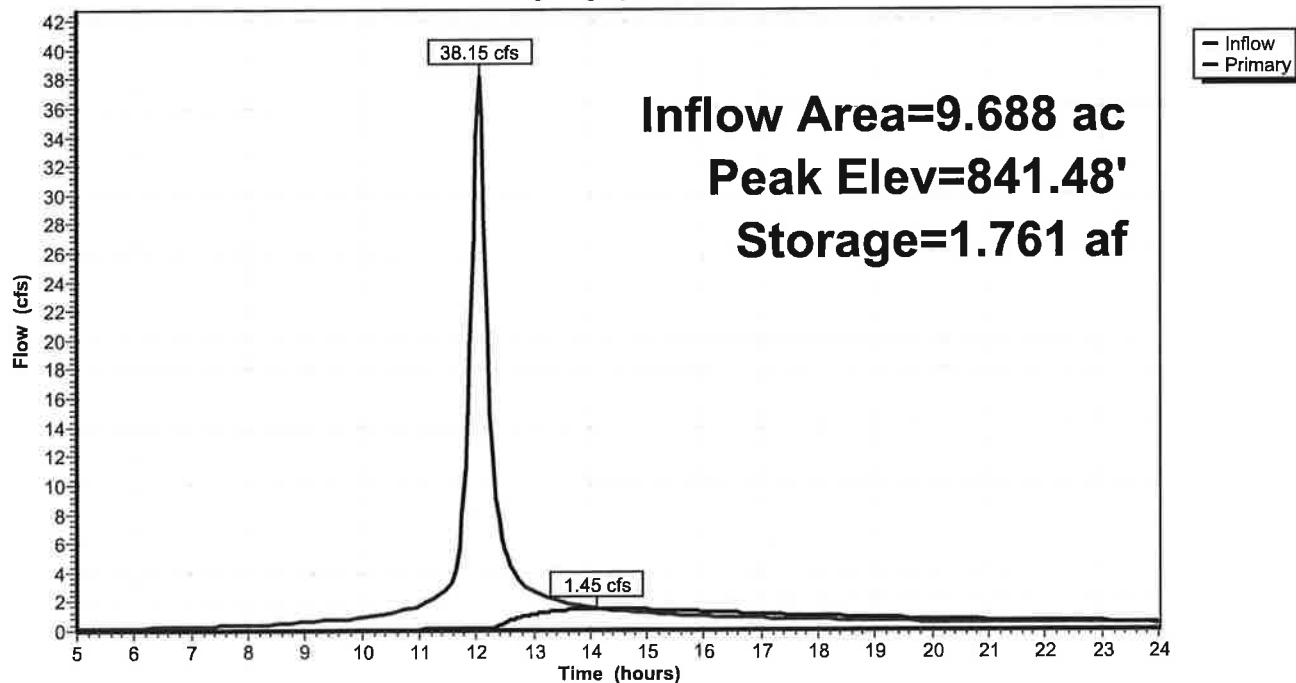
Inflow Area = 9.688 ac, Inflow Depth = 3.10" for 10-yr event
 Inflow = 38.15 cfs @ 12.06 hrs, Volume= 2.507 af
 Outflow = 1.45 cfs @ 14.13 hrs, Volume= 0.917 af, Atten= 96%, Lag= 124.4 min
 Primary = 1.45 cfs @ 14.13 hrs, Volume= 0.917 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 841.48' @ 14.13 hrs Surf.Area= 1.192 ac Storage= 1.761 af
 Plug-Flow detention time= 362.0 min calculated for 0.914 af (36% of inflow)
 Center-of-Mass det. time= 234.6 min (1,027.9 - 793.3)

#	Invert	Avail.Storage	Storage Description
1	839.50'	3.705 af	Custom Stage Data (Prismatic) Listed below
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
839.50	0.580	0.000	0.000
840.00	0.640	0.305	0.305
841.00	1.120	0.880	1.185
842.00	1.270	1.195	2.380
843.00	1.380	1.325	3.705
#	Routing	Invert	Outlet Devices
1	Primary	839.35'	12.0" x 42.0' long Culvert CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 839.04' S= 0.0074 '/' n= 0.024 Cc= 0.900
2	Device 1	839.50'	2.0" Vert. Orifice/Grate C= 0.600
3	Device 1	841.23'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Primary	842.50'	10.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.45 cfs @ 14.13 hrs HW=841.48' (Free Discharge)



Pond 2P: AS-BUILT POND**Hydrograph**

AS-BUILT 8-9-11*Type II 24-hr 100-yr Rainfall=7.10"*

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8/10/2011

Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: AREA 1SRunoff Area=9.688 ac Runoff Depth=6.08"
Tc=14.2 min CN=92 Runoff=72.46 cfs 4.912 af**Pond 2P: AS-BUILT POND**Peak Elev=842.60' Storage=3.176 af Inflow=72.46 cfs 4.912 af
Outflow=4.92 cfs 3.199 af**Total Runoff Area = 9.688 ac Runoff Volume = 4.912 af Average Runoff Depth = 6.08"**

Subcatchment 1S: AREA 1S

Runoff = 72.46 cfs @ 12.05 hrs, Volume= 4.912 af, Depth= 6.08"

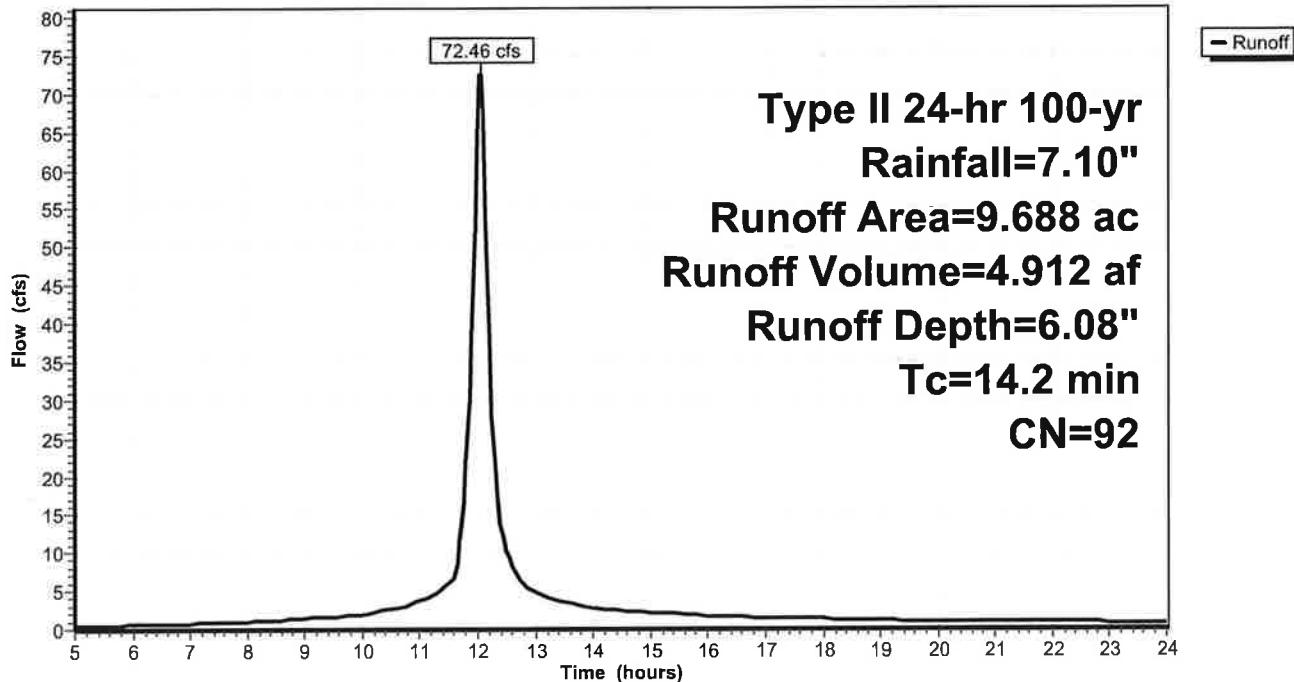
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=7.10"

Area (ac)	CN	Description
9.688	92	

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

Subcatchment 1S: AREA 1S

Hydrograph



Pond 2P: AS-BUILT POND

[82] Warning: Early inflow requires earlier time span

Inflow Area = 9.688 ac, Inflow Depth = 6.08" for 100-yr event

Inflow = 72.46 cfs @ 12.05 hrs, Volume= 4.912 af

Outflow = 4.92 cfs @ 13.01 hrs, Volume= 3.199 af, Atten= 93%, Lag= 57.2 min

Primary = 4.92 cfs @ 13.01 hrs, Volume= 3.199 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 842.60' @ 13.01 hrs Surf.Area= 1.336 ac Storage= 3.176 af

Plug-Flow detention time= 331.2 min calculated for 3.199 af (65% of inflow)

Center-of-Mass det. time= 233.2 min (1,012.7 - 779.4)

#	Invert	Avail.Storage	Storage Description
1	839.50'	3.705 af	Custom Stage Data (Prismatic) Listed below
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
839.50	0.580	0.000	0.000
840.00	0.640	0.305	0.305
841.00	1.120	0.880	1.185
842.00	1.270	1.195	2.380
843.00	1.380	1.325	3.705
#	Routing	Invert	Outlet Devices
1	Primary	839.35'	12.0" x 42.0' long Culvert CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 839.04' S= 0.0074 '/' n= 0.024 Cc= 0.900
2	Device 1	839.50'	2.0" Vert. Orifice/Grate C= 0.600
3	Device 1	841.23'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600
4	Primary	842.50'	10.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.91 cfs @ 13.01 hrs HW=842.60' (Free Discharge)

1=Culvert (Barrel Controls 4.05 cfs @ 5.2 fps)

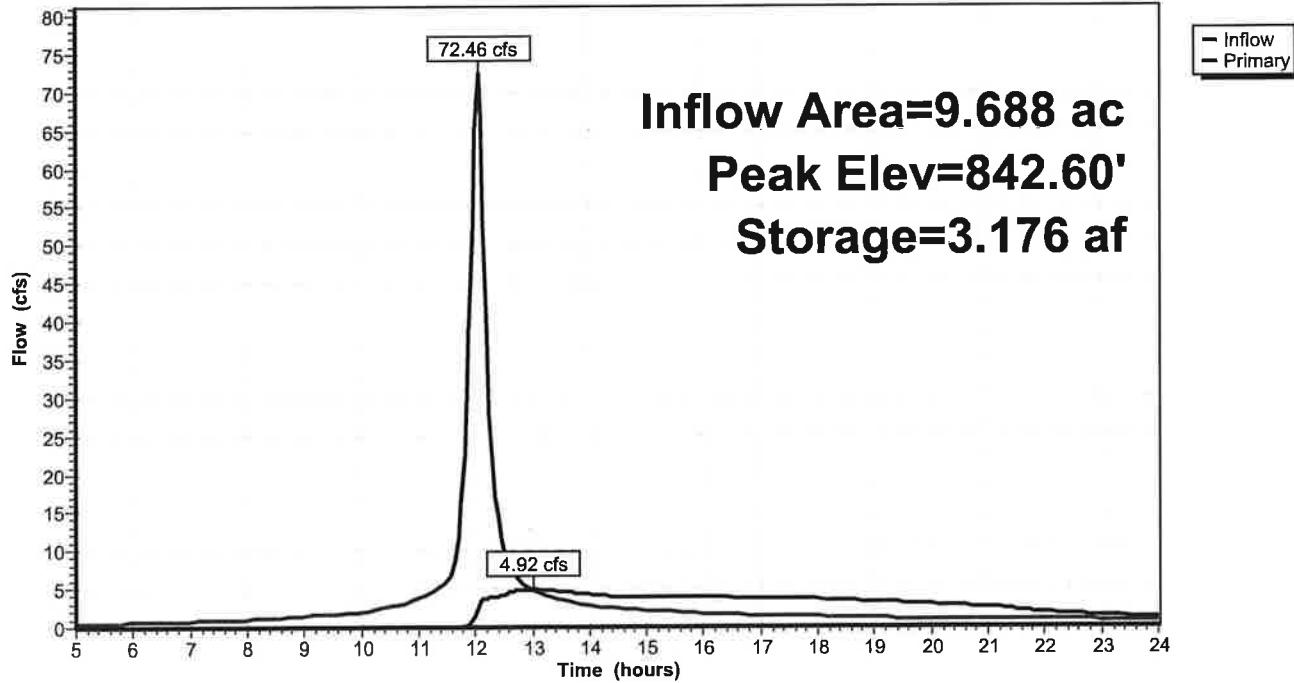
2=Orifice/Grate (Passes < 0.18 cfs potential flow)

3=Orifice/Grate (Passes < 4.43 cfs potential flow)

4=Broad-Crested Rectangular Weir (Weir Controls 0.85 cfs @ 0.8 fps)

Pond 2P: AS-BUILT POND

Hydrograph





DAAR ENGINEERING, INC.

Engineers • Planners • Surveyors • Construction Services

Rec 8/15/11
Reich Tool

Land Development Division

August 10, 2011

Nancy Greifenhagen
Village of Menomonee Falls
W156 N8480 Pilgrim Road
Menomonee Falls, WI 53051

RE: Reich Tool & Design
Stormwater Certification

Dear Ms. Greifenhagen;

DAAR Engineering has completed an inspection and as-built survey of the existing pond per the Village's requirements. This pond was originally constructed around 2002 and modified around 2006. The Village has supplied us with the previous report dated May 1, 2006.

Our review indicates that the pond water surface is slightly (4"-6") higher than originally designed. However, the overflow slipway is also 6" higher than design. This could be due to a discrepancy in datum. In any case, the pond area and volume is relatively close to design and appears to be able to function as intended.

The pond outlet was intended to be a 12" concrete culvert. Currently, there is a 12" CMP outlet with a stand pipe. Presumably, this riser was installed for sedimentation reduction purposes during construction, and was never removed. Based on my calculations, the riser could remain and still meet the peak flow requirements of the original report. There would be a small amount of discharge (0.18cfs) through the emergency spillway in the 100-year event. Since the original design was for the 100-year event to be 0.05' below the spillway anyway, I do not see this as a problem. By leaving the riser in place, the pond will achieve a higher TSS removal rate and enhance water quality.

HF2009\Projects\090291\SWMP\SWMP Memo.doc

The following table summarizes the peak flows and water elevations for the 2 through 100 year events for both plan and as-built conditions.

Storm Event	Design Flow (cfs)	Design Water Elevation	As-built Flow (cfs)	As-built Elevation
2-year	2.62	840.17	0.13	841.1
10-year	3.87	840.84	1.45	841.5
100-year	5.57	841.95	4.92	842.6
Normal Water Elevation		839.0	---	839.5
Spillway Elevation		842.0	---	842.5

Since the pond flows and elevations remain relatively unaffected by the riser pipe, and water quality is improved, I would recommend leaving the outlet structure as currently constructed. The 2" orifice is currently clogged resulting in a higher normal water. This should be cleaned and some medium stone placed in front of the outlet to minimize clogging in the future.

Enclosed is the inspection report and relevant calculations. Please review and issue your approval if you find no objections. Feel free to contact me with any questions. Thank you.

Sincerely,
DAAR Engineering, Inc.



Aaron E. Koch, P.E.
Engineering Manager

Encl.

cc: Cathy Howard, Reich Tool & Design

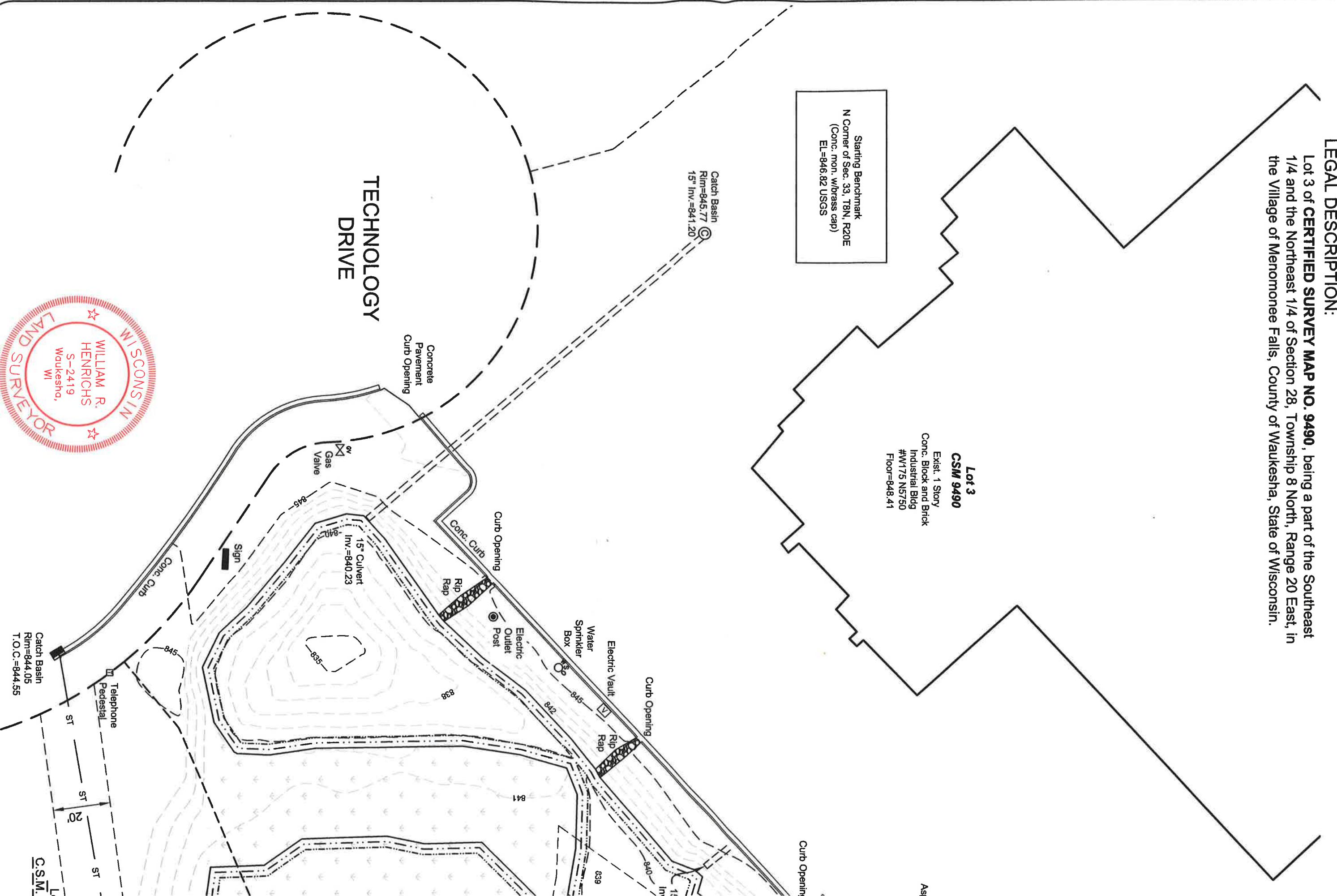
LEGAL DESCRIPTION:

Lot 3 of **CERTIFIED SURVEY MAP NO. 9490**, being a part of the Southeast 1/4 and the Northeast 1/4 of Section 28, Township 8 North, Range 20 East, in the Village of Menomonee Falls, County of Waukesha, State of Wisconsin.

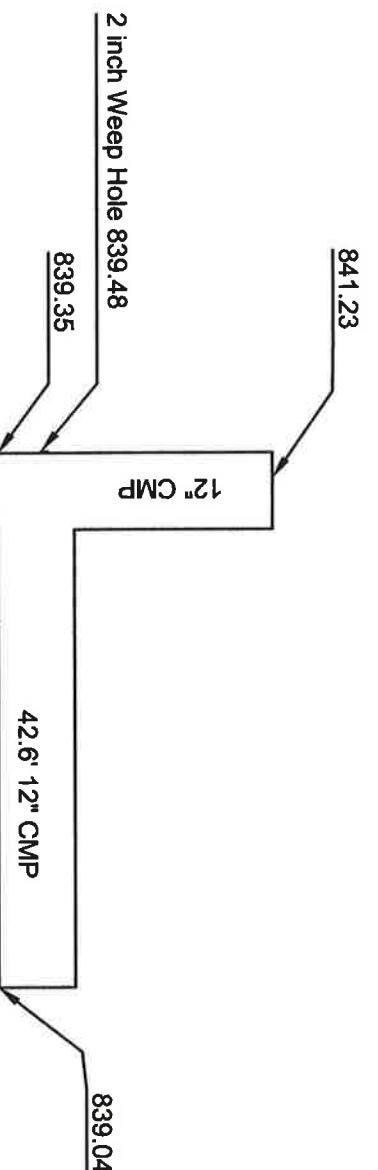
CSM 9490 **Lot 3**
Exist. 1 Story
One. Block and B
Industrial Bldg
#W175 N5750
Floor=848.41

Starting Benchmark
N Corner of Sec. 33, T8N, R20E
(Conc. mon. w/brass cap)
EL=846.82 USGS

CSM 9490
Exist. 1 Story
Conc. Block and Brick
Industrial Bldg
#W1175 N5750
Floor=848.41



OUTFALL DETAIL-NOT TO SCALE



100 Year Floodplain

EL=840.4

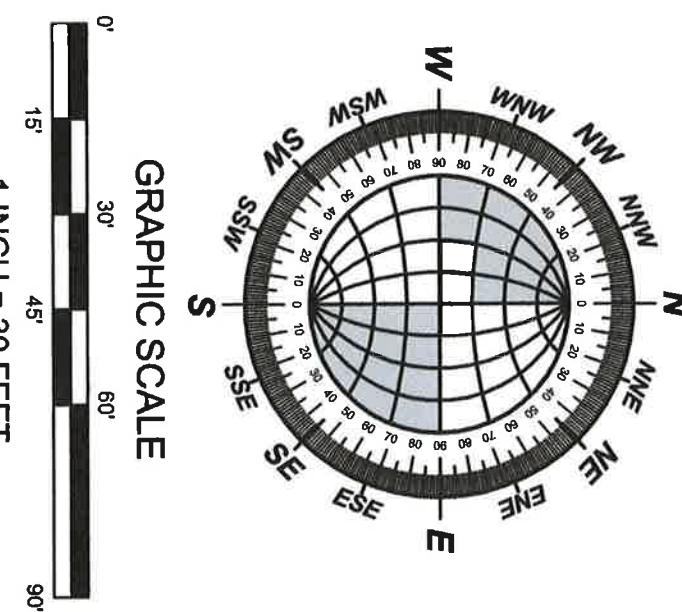
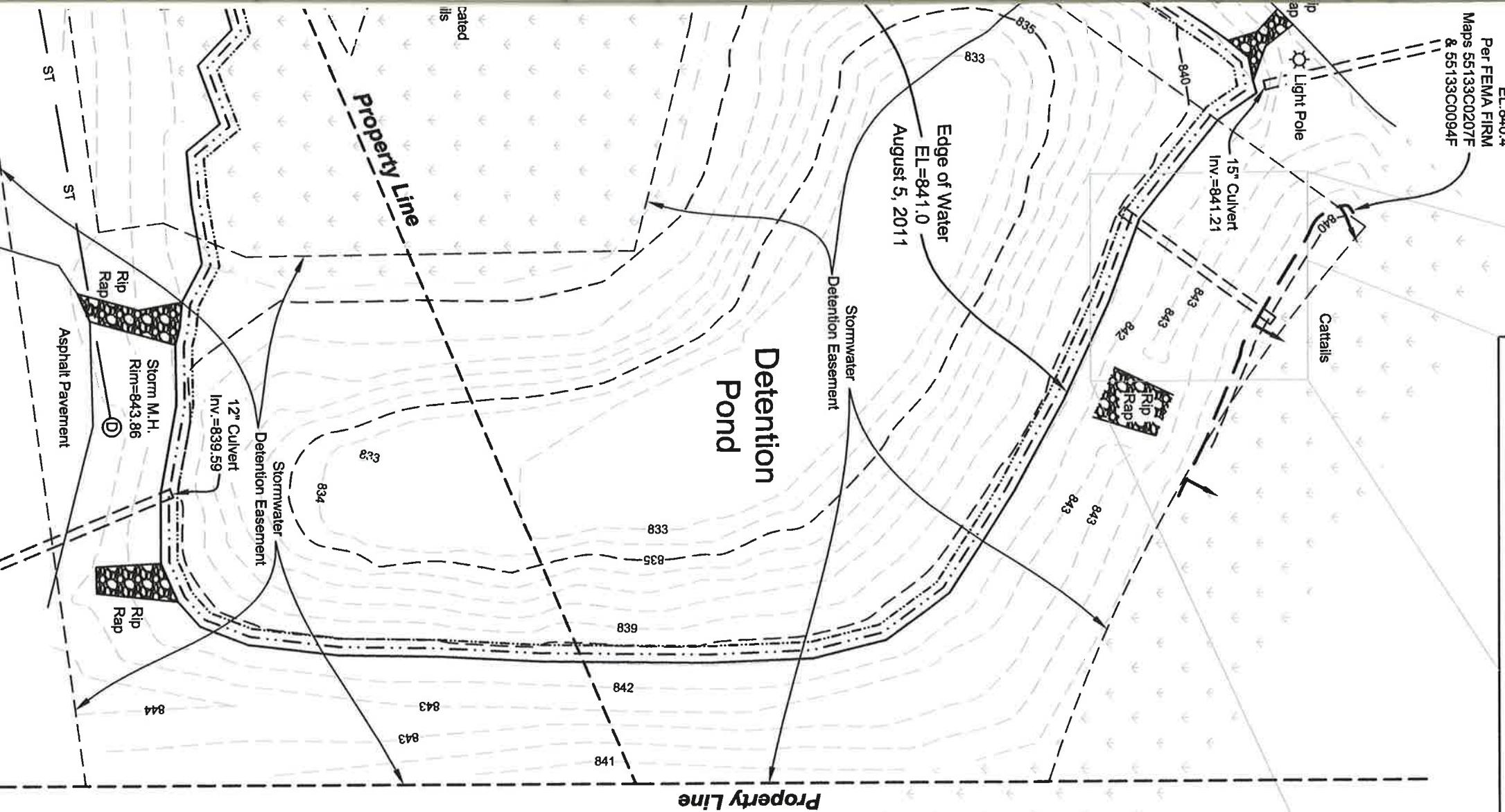
Per FEMA FIRM

Maps 55133C0207F

& 55133C0094F

15" Culvert

Inv=841.72



D A A R
E N G I N E E R I N G, I N C.
ENGINEERS PLANNERS SURVEYORS
518 West Cherry Street, Milwaukee, WI 53212
PHONE (414) 604-0674 FAX (414) 604-0677
www.darcorp.com

I HEREBY CERTIFY THAT I HAVE SURVEYED THE ABOVE DESCRIBED PROPERTY AND THAT
THE ABOVE MAP IS A TRUE REPRESENTATION THEREOF AND SHOWS THE SIZE AND LOCATION
THE PROPERTY, ITS EXTERIOR BOUNDARIES, THE LOCATION OF ALL VISIBLE STRUCTURES
AND DIMENSIONS OF ALL PRINCIPAL BUILDINGS THEREON, BOUNDARY FENCES, APPARENT
EASEMENTS AND ROADWAYS AND VISIBLE ENCROACHMENT, IF ANY.
THIS SURVEY IS MADE FOR THE EXCLUSIVE USE OF THE PRESENT OWNERS OF THE
PROPERTY, AND ALSO THOSE WHO PURCHASE, MORTGAGE, OR GUARANTEE THE TITLE
THERETO WITHIN ONE (1) YEAR FROM THE DATE HEREOF.

DRAWING BY:ST

SIGNED