A STORMWATER MANAGMENT ANALYSIS

OF THE PROPOSED DEVELOPMENT OF

PROGRESS WEST LOT 2

IN

CITY OF O'FALLON, MISSOURI

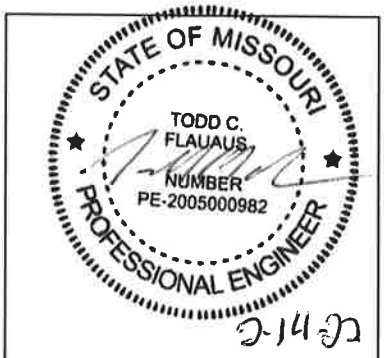
FOR

DAVIS FAMILY TRUST
2209 DROSTE ROAD
ST. CHARLES, MO 63301

BAX PROJECT NO. 21-18493

February 11, 2022

Prepared by:
Bax Engineering co., INC.
221 Point West Blvd.
Saint Charles, MO 63301
(636) 928-5552



Todd C Flauaus
Civil Engineer
2005000982

Bax Engineering Co.
Missouri State
Certificate of Authority
Engineering Authority No. 000655

INTRODUCTION:

The currently undeveloped site is located in the City of O'Fallon, Missouri and is comprised of 3.47 acres of land. The site shall be analyzed for the construction of the proposed building disturbing approximately 1.49 acres of land. An existing dry detention basin shall be modified into a shallow wetland to provide the Stormwater Attenuation and water quality treatment required by the City of O'Fallon Design Standards for the proposed development and the existing improvements. The storage volume and outflow rates shall be proportioned to ensure that the peak rate of runoff leaving the tract under Postdeveloped conditions is less than or equal to the peak rate of runoff under Predeveloped conditions for the 2, 15, 25, and 100 Year 20 Minute Design Storms. The safe passage of the 100 Year 20 Minute Design Storm will also be analyzed assuming the low flow slot is blocked.

GENERAL SITE DATA AND RUNOFF CALCULATIONS

The Predeveloped Runoff Factors used for the analysis are:

Land Use	Percent Impervious	PI Factors (cfs/ac)			
		2 year	15 year	25 year	100 year
Greenspace	0-5%	1.15	1.70	2.00	2.29

The Postdeveloped Runoff Factors used for the analysis are:

Land Use	Percent Impervious	PI Factors (cfs/ac)			
		2 year	15 year	25 year	100 year
Greenspace	0-5%	1.15	1.70	2.00	2.29
Building/Pavement	100%	2.39	3.54	4.16	4.77

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

WATER QUALITY

To ensure that sedimentation and pollution in receiving streams due to development of this site is minimized, our design will consider the Water Quality Volume requirement as described in "Georgia Stormwater Management Manual Volumes 1, 2 and 3". Water quality volume is defined as "The storage needed to capture and treat the runoff from 90% of the recorded daily rainfall events." Water Quality treatment will be provided by a shallow wetland.

SHALLOW WETLAND

Water Quality treatment is provided by utilizing a Shallow Wetland and incorporating wetland vegetation for both the proposed development and the existing development.

Area Treated

		Impervious Area	Pervious Area
Greenspace	0% Impervious	-	0.80 ac
Pavement/Building	100% Impervious	1.16 ac	-
Total	1.96	1.16 ac	0.80 ac

WATER QUALITY VOLUME

$WQ_v = PR_vA/12$

Where: P = 1.14"
$R_v = 0.05 + 0.009(I)$
I = % Impervious
A = Watershed Area = 1.96 ac
A_I = Impervious Area = 1.16 ac

$I = A_I/A$

I = 1.16 ac / 1.96 ac = 0.5918= 59.18%
$R_v = 0.05 + 0.009(59.18) = 0.5826$
$WQ_v = 1.14(0.5826)(1.96)/12 = 0.1085$ ac-ft = 4,725 ft^3

The total water quality volume for this watershed is 4,725 ft^3.

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

Water Quality Treatment

A shallow wetland is used to treat the runoff going into the basin for this watershed. Following the City of O'Fallon Design Standards and the Georgia Stormwater Management Manual a shallow wetland needs to be 3% to 5% of the runoff. The shallow wetland is then divided into 2 zones since it is a level 1 wetland: Deep Pools, High Marsh, Low Marsh, and Low Land Each zone has different requirements for depth and certain plant species that go along with it.

Runoff Area = 1.96 ac or 85,378 ft^2

Since the Design Requirements requires that the shallow wetland area has to be between 3-5% of the runoff. Each percent was analyzed for the calculations.

The Shallow Wetland Area @ 3% Runoff Area = (85,378 ft^2)*(0.03 ft/ft) = 2,561 ft^2
The Shallow Wetland Area @ 4% Runoff Area = (85,378 ft^2)*(0.04 ft/ft) = 3,415 ft^2
The Shallow Wetland Area @ 5% Runoff Area = (85,378 ft^2)*(0.05 ft/ft) = 4,269 ft^2

Shallow Wetland Area Provided = 3,596 ft^2 = 4.21%

Basin Storage Volume

Contour Elevation	Contour Area	Incremental Volume	Total Volume
(Ft)	(Ft^2)	(Ft^3)	(Ft^3)
553.78	109	0	0
556.28	857	1,913	1,913
556.78	1,765	1,058	2,971
557.28	2,485	1,798	4,769
557.78	3,596	3,140	7,472

Water Quality treatment
The water quality volume will be treated by providing the equivalents volume or more in the shallow wetland.

Total Water Quality Volume = Basin storage volume at 557.78
= 7,472 ft^3

Water Quality Volume needed = 4,725 ft^3

Volume Provided = 7,472 ft^3 > 4,725 ft^3 √

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

Pretreatment Forebay
The forebay shall be sized to contain a runoff volume of 0.1 inches per impervious acre in the watershed.

West Forebay

A_I = Impervious Area = 0.49 acres → 21,345 ft^2

$V_{forebay} = A_I * 0.1$ in*/12 in/foot= 21,345 ft^2 * 0.1/12 = 178 ft^3

Elev.	Area ft^2	Incremental Volume ft^3	Total Volume ft^3
557.78	17	0	0
560.00	166	214	214

$V_{forebay}$ = 214 ft^3 >178 ft^3 ✓

East Forebay Forebay

A_I = Impervious Area = 0.67 acres → 29,186 ft^2

$V_{forebay} = A_I * 0.1$ in*/12 in/foot= 29,186 ft^2 * 0.1/12 = 243 ft^3

Elev.	Area ft^2	Incremental Volume ft^3	Total Volume ft^3
557.78	43	0	0
560.00	296	33	334

$V_{forebay}$ = 334 ft^3 >243 ft^3 ✓

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

DETENTION CALCULATIONS

PREDEVELOPED CONDITIONS:

The Predeveloped site has three separate discharge points to be analyzed for the total runoff from the watershed. Using the rational method the Predeveloped Peak Runoff rate can be determined for each watershed. For this analysis, the Predeveloped Runoff for the 2, 15, 25, and 100 year 20 minute design storms will be calculated for comparison to the Postdeveloped Runoff to determine the quantity of detention that will be required.

The predeveloped site was analyzed assuming 100% Greenspace to ensure detention is provided for the existing improvements and the proposed development.

Watershed A

Stormwater Runoff in Watershed A is comprised of the northern portion of the site, flowing into the existing detention basin.

2 Year				
Greenspace	2.84 ac	x 1.15 cfs/ac	=	3.27 cfs
Total	2.84 ac			3.27 cfs
15 Year				
Greenspace	2.84 ac	x 1.70 cfs/ac	=	4.83 cfs
Total	2.84 ac			4.83 cfs
25 Year				
Greenspace	2.84 ac	x 2.00 cfs/ac	=	5.68 cfs
Total	2.84 ac			5.68 cfs
100 Year				
Greenspace	2.84 ac	x 2.29 cfs/ac	=	6.50 cfs
Total	2.84 ac			6.50 cfs

2 year-20 minute storm:	3.27 cfs
15 year-20 minute storm:	4.83 cfs
25 year-20 minute storm:	5.68 cfs
100 year-20 minute storm:	6.50 cfs

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

Watershed B

Watershed B discharges to the existing Area Inlet near the intersection of Hoff Road and Progress West Lane.

2 Year				
Greenspace	0.50 ac	x 1.15 cfs/ac	=	0.58 cfs
Total	0.50 ac			0.58 cfs
15 Year				
Greenspace	0.50 ac	x 1.70 cfs/ac	=	0.85 cfs
Total	0.50 ac			0.85 cfs
25 Year				
Greenspace	0.50 ac	x 2.00 cfs/ac	=	1.00 cfs
Total	0.50 ac			1.00 cfs
100 Year				
Greenspace	0.50 ac	x 2.29 cfs/ac	=	1.15 cfs
Total	0.50 ac			1.15 cfs

2 year-20 minute storm:	0.58 cfs
15 year-20 minute storm:	0.85 cfs
25 year-20 minute storm:	1.00 cfs
100 year-20 minute storm:	1.15 cfs

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

Watershed C

Stormwater Runoff in Watershed C drains offsite to the south of the site.

2 Year			
Greenspace	1.09 ac x	1.15 cfs/ac =	1.25 cfs
Total	1.09 ac		1.25 cfs
15 Year			
Greenspace	1.09 ac x	1.70 cfs/ac =	1.85 cfs
Total	1.09 ac		1.85 cfs
25 Year			
Greenspace	1.09 ac x	2.00 cfs/ac =	2.18 cfs
Total	1.09 ac		2.18 cfs
100 Year			
Greenspace	1.09 ac x	2.29 cfs/ac =	2.50 cfs
Total	1.09 ac		2.50 cfs

2 year-20 minute storm:	1.25 cfs
15 year-20 minute storm:	1.85 cfs
25 year-20 minute storm:	2.18 cfs
100 year-20 minute storm:	2.50 cfs

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

POSTDEVELOPED CONDITIONS:

The Postdeveloped site maintains the same three discharge points. The Postdeveloped site was analyzed including the existing building, the existing parking lot and the proposed improvements to determine the differential runoff for the watersheds. The total runoff from the watersheds will be calculated using the rational method to determine the Postdeveloped Peak Runoff rates for each watershed. For this analysis, the Postdeveloped runoff for the 2, 15, 25, and 100 year 20 minute design storms will be calculated for comparison to the previously calculated Predeveloped Runoff to determine the quantity of detention that will be required.

Watershed A

2 Year				
Greenspace	1.39 ac	x	1.15 cfs/ac =	1.60 cfs
Pavement/Building	1.89 ac	x	2.39 cfs/ac =	4.52 cfs
Total	3.28 ac			6.12 cfs
15 Year				
Greenspace	1.39 ac	x	1.70 cfs/ac =	2.36 cfs
Pavement/Building	1.89 ac	x	3.54 cfs/ac =	6.69 cfs
Total	3.28 ac			9.05 cfs
25 Year				
Greenspace	1.39 ac	x	2.00 cfs/ac =	2.78 cfs
Pavement/Building	1.89 ac	x	4.16 cfs/ac =	7.86 cfs
Total	3.28 ac			10.54 cfs
100 Year				
Greenspace	1.39 ac	x	2.29 cfs/ac =	3.18 cfs
Pavement/Building	1.89 ac	x	4.77 cfs/ac =	9.02 cfs
Total	3.28 ac			12.20 cfs

2 year-20 minute storm:	6.12 cfs
15 year-20 minute storm:	9.05 cfs
25 year-20 minute storm:	10.54 cfs
100 year-20 minute storm:	12.20 cfs

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

Watershed B

2 Year				
Greenspace	0.41 ac	x 1.15 cfs/ac	=	0.47 cfs
Pavement	0.04 ac	x 2.39 cfs/ac	=	0.10 cfs
Total	0.42 ac			0.57 cfs
15 Year				
Greenspace	0.41 ac	x 1.70 cfs/ac	=	0.70 cfs
Pavement	0.04 ac	x 3.54 cfs/ac	=	0.14 cfs
Total	0.42 ac			0.84 cfs
25 Year				
Greenspace	0.41 ac	x 2.00 cfs/ac	=	0.82 cfs
Pavement	0.04 ac	x 4.16 cfs/ac	=	0.17 cfs
Total	0.42 ac			0.99 cfs
100 Year				
Greenspace	0.41 ac	x 2.29 cfs/ac	=	0.94 cfs
Pavement	0.04 ac	x 4.77 cfs/ac	=	0.19 cfs
Total	0.42 cfs			1.13 cfs

2 year-20 minute storm:	0.57 cfs
15 year-20 minute storm:	0.84 cfs
25 year-20 minute storm:	0.99 cfs
100 year-20 minute storm:	1.13 cfs

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

Watershed C

2 Year				
Greenspace	0.35 ac	x 1.15 cfs/ac	=	0.40 cfs
Pavement	0.35 ac	x 2.39 cfs/ac	=	0.84 cfs
Total	0.70 ac			1.24 cfs
15 Year				
Greenspace	0.35 ac	x 1.70 cfs/ac	=	0.60 cfs
Pavement	0.35 ac	x 3.54 cfs/ac	=	1.24 cfs
Total	0.70 ac			1.84 cfs
25 Year				
Greenspace	0.35 ac	x 2.00 cfs/ac	=	0.70 cfs
Pavement	0.35 ac	x 4.16 cfs/ac	=	1.46 cfs
Total	0.70 ac			2.16 cfs
100 Year				
Greenspace	0.35 ac	x 2.29 cfs/ac	=	0.80 cfs
Pavement	0.35 ac	x 4.77 cfs/ac	=	1.67 cfs
Total	0.70 ac			2.47 cfs

2 year-20 minute storm:	1.24 cfs
15 year-20 minute storm:	1.84 cfs
25 year-20 minute storm:	2.16 cfs
100 year-20 minute storm:	2.47 cfs

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

DIFFERENTIAL RUNOFF

The differential runoff for each discharge point is determined by subtracting the Predeveloped Runoff rate from the Postdeveloped Runoff rate. A differential runoff greater than 0 cfs requires stormwater detention within that watershed.

Watershed A

Design Storm	Postdeveloped Runoff (cfs)	Predeveloped Runoff (cfs)	Differential Runoff (cfs)
2 Year 20 minute	6.12	3.27	2.85
15 Year 20 minute	9.05	4.83	4.22
25 Year 20 minute	10.54	5.68	4.86
100 Year 20 minute	12.20	6.50	5.70

Detention is required in Watershed A.

Watershed B

Design Storm	Postdeveloped Runoff (cfs)	Predeveloped Runoff (cfs)	Differential Runoff (cfs)
2 Year 20 minute	0.57	0.58	-0.01
15 Year 20 minute	0.84	0.85	-0.01
25 Year 20 minute	0.99	1.00	-0.01
100 Year 20 minute	1.13	1.15	-0.02

Detention is not required in Watershed B.

Watershed C

Design Storm	Postdeveloped Runoff (cfs)	Predeveloped Runoff (cfs)	Differential Runoff (cfs)
2 Year 20 minute	1.24	1.25	-0.01
15 Year 20 minute	1.84	1.85	-0.01
25 Year 20 minute	2.16	2.18	-0.02
100 Year 20 minute	2.47	2.50	-0.03

Detention is not required in Watershed C.

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

DISCHARGE POINT A – BASIN ROUTING

TIME OF CONCENTRATION:

Time of concentration is defined as the time needed for stormwater to flow from the most remote point in the watershed to the proposed detention basin. The most remote point of the site tributary to the detention basin lies near the southeast corner of the watershed. Flow travels overland for 193.45 feet until it reaches the storm sewer. Then flow travels for 163.25 feet until it enters the detention basin. Time of Concentration is calculated as follows:

Watershed A

$T_{overland}$:	L = 193.45 feet
	Elevation difference = 1.82 feet
	Surface Coefficient = 1.0 (greenspace)
	$T_{overland}$ = 2.9 min*1.0 = 2.9 minutes
$T_{storm\ sewer}$:	L = 163.25 feet
	Average Velocity = 7 ft/s
	$T_{storm\ sewer}$ = 163.25 feet/7 ft/s/60 sec/min = 0.39 min

Total time = 2.9 + 0.39= 3.29 min => **use 3 minute**

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

Basin Peak Inflow

Watershed A

2 Year			
Greenspace	0.80 ac x	1.15 cfs/ac =	0.92 cfs
Pavement/Building	1.16 ac x	2.39 cfs/ac =	2.77 cfs
Total	1.96 ac		3.69 cfs
15 Year			
Greenspace	0.80 ac x	1.70 cfs/ac =	1.36 cfs
Pavement/Building	1.16 ac x	3.54 cfs/ac =	4.11 cfs
Total	1.96		5.47 cfs
25 Year			
Greenspace	0.80 ac x	2.00 cfs/ac =	1.60 cfs
Pavement/Building	1.16 ac x	4.16 cfs/ac =	4.83 cfs
Total	1.96 ac		6.43 cfs
100 Year			
Greenspace	0.80 ac x	2.29 cfs/ac =	1.83 cfs
Pavement/Building	1.16 ac x	4.77 cfs/ac =	5.53 cfs
Total	1.96 ac		7.36 cfs

2 year-20 minute storm:	3.69 cfs
15 year-20 minute storm:	5.47 cfs
25 year-20 minute storm:	6.43 cfs
100 year-20 minute storm:	7.36 cfs

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

ALLOWABLE RELEASE RATE

The Allowable Release Rate is defined as the maximum amount of stormwater that can be released from the proposed basin for each design storm and is determined by subtracting the Differential Runoff Rate from the Basin Inflow. The following table shows the calculated Allowable Release Rate for the basin:

STORM FREQUENCY (20 MINUTE DURATION)	BASIN INFLOW (cfs)	DIFFERENTIAL RUNOFF RATE (cfs)	ALLOWABLE RELEASE RATE (cfs)
2 YEAR	3.69	2.85	0.84
15 YEAR	5.47	4.22	1.25
25 YEAR	6.43	4.86	1.57
100 YEAR	7.36	5.70	1.66

STORM ROUTING CALCULATIONS AND RESULTS

The computer program PONDPACK was used in routing the 2, 15, 25 and 100 year storms through the shallow wetland. The routing calculations can be found in Appendix B for the 2, 15, 25 and 100 year storms for the watershed and also the calculations for safe passage of the 100 year storms with the low flow blocked (LFB) and the basin ponded full to the top of the outfall structure. As found in the routing calculations, the results are as follows:

STORM FREQUENCY (20 MINUTE DURATION)	PEAK INFLOW (cfs)	ALLOWABLE RELEASE RATE (cfs)	CALCULATED RELEASE RATE (cfs)	PEAK ELEVATION (ft)
2 Year	3.69	0.84	0.83	558.72
15 Year	5.47	1.25	1.06	559.14
25 Year	6.43	1.57	1.27	559.35
100 Year	7.36	1.66	1.63	559.54
100 Year LFB	7.36	NA	7.28	559.91

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

SUMMARY

Shallow Wetland

	Flow Rate	High Water
2 Year 20 Minute	0.83 cfs	558.72
15 Year 20 Minute	1.06 cfs	559.14
25 Year 20 Minute	1.27 cfs	559.35
100 Year 20 Minute	1.63 cfs	559.54
100 Year 20 Minute LFB	7.28 cfs	559.91
Low Flow Slot		10” W x 6” H
Flow Line		557.78
Upper Flow Slot		7” W x 4.2” H
Flow Line		559.25
Type of Structure		Double Untrapped Street Inlet
Top of Structure		559.60
Top of Berm		561.00
Freeboard		1.09 ft

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
(636) 928-5552 Fax: (636) 928-1718
www.baxengineering.com

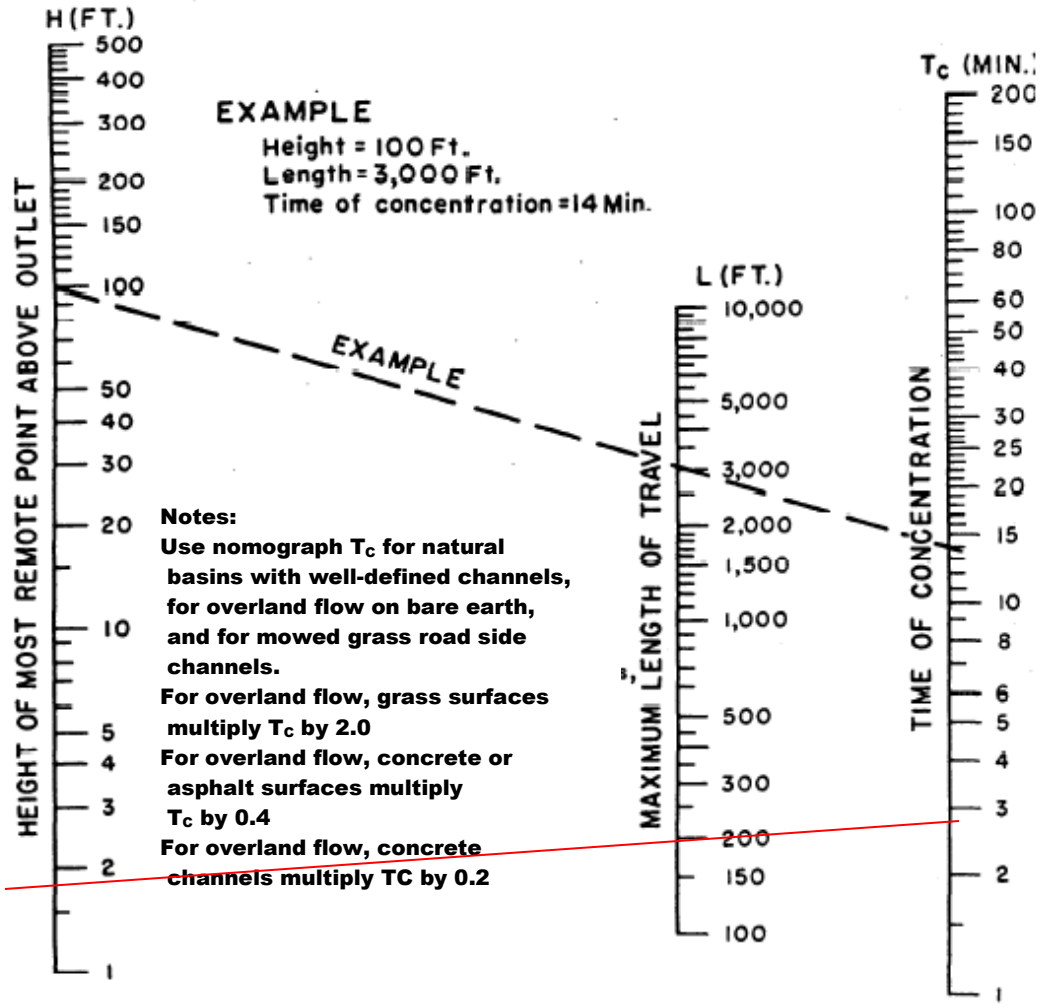
Appendix A

-Structure Details
-Time of Concentration
-Misc Figures

BAX ENGINEERING
Engineering - Planning – Surveying
221 Point West Blvd.
St. Charles, MO 63301
636 928-5552 FAX 636 928-1718

Project: Progress West Lot 2
Date: 01/24/2021 Project No: 21-18493
Designer: MDF Checked:

TIME OF CONCENTRATION FOR SMALL DRAINAGE BASINS



OVERLAND FLOW

Δ Height = 1.82 ft

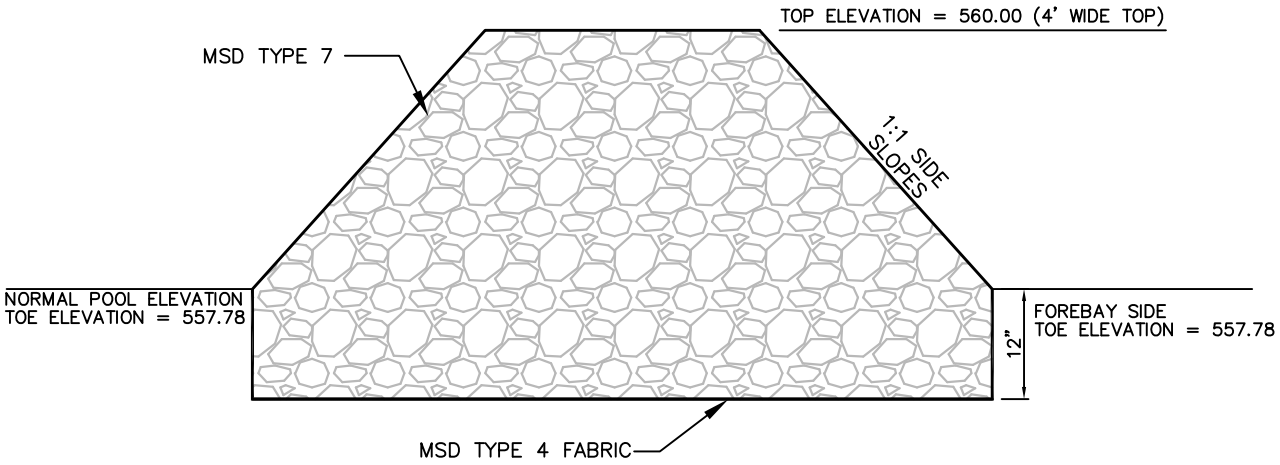
Length = 193.45 ft

$T_{Overland}$ = 2.9 min

STORM SEWER TRAVEL TIME

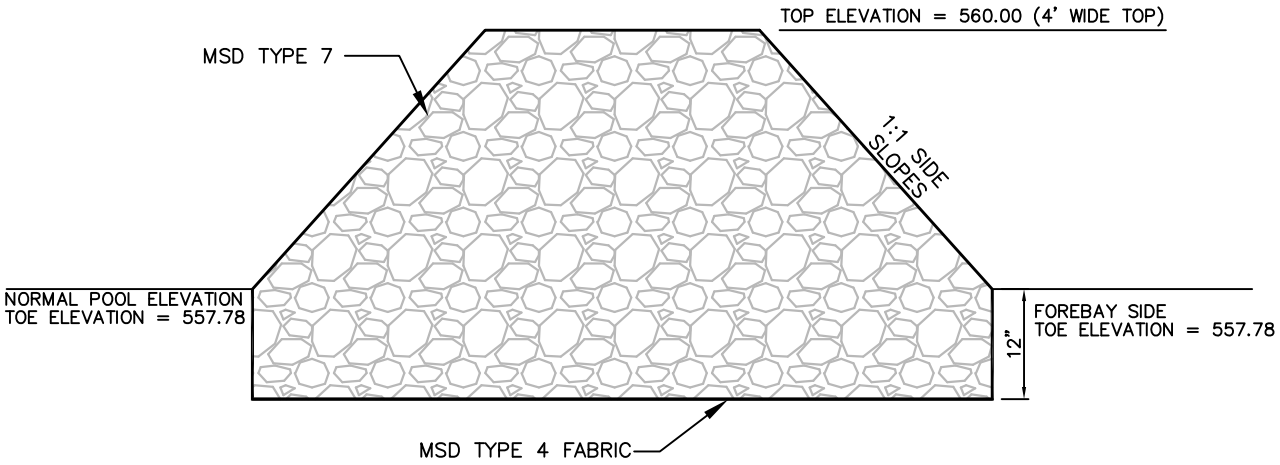
T_{storm}=Pipe Length (L) * Assumed Velocity (V)
L = 163.25 ft
V = 7 ft/s
T_{storm} = 163.25 ft / 7 ft/s / 60 sec/min =0.39 min

Total Time of Concentration = $T_{Overland}$ + T_{storm} = 2.9*1.0 + 0.39 = 3.28 →USE 3 min.



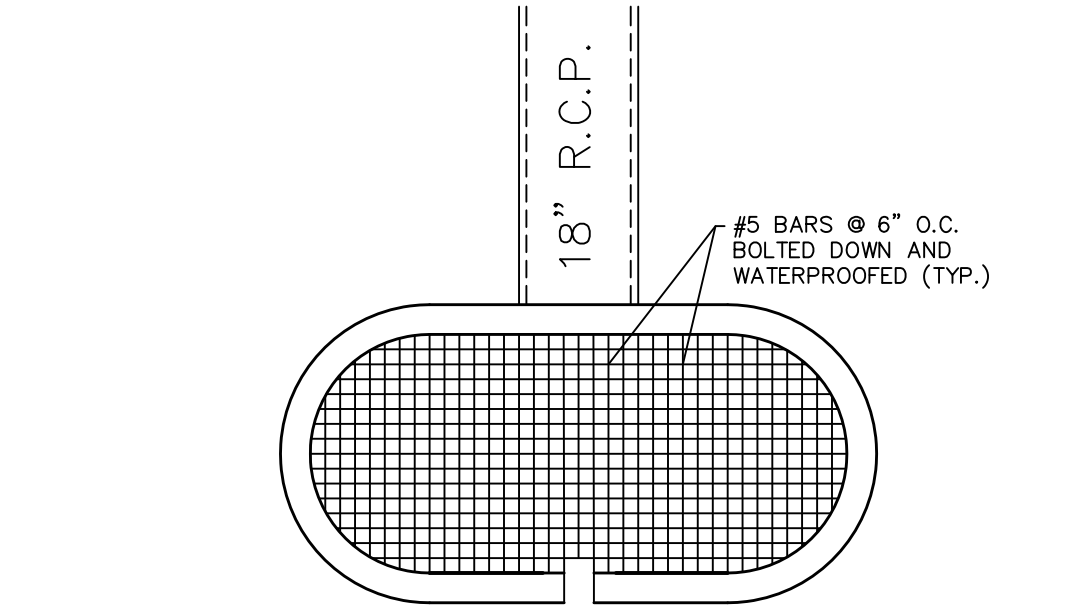
EAST FOREBAY

NOT TO SCALE

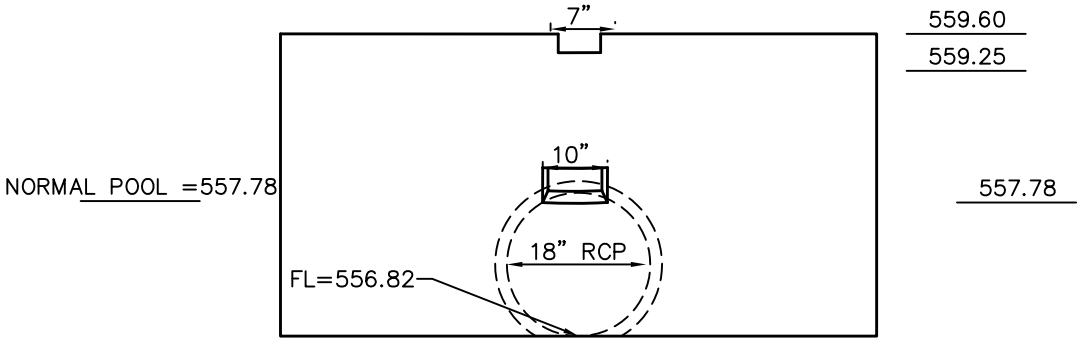


WEST FOREBAY

NOT TO SCALE



TOP VIEW
N.T.S.



DETENTION BASIN OS 1 DETAIL
N.T.S.

The overflow structure is to be a standard double untrapped precast concrete street inlet (without top). See. M.S.D. detail 37. The bottom must be constructed to the correct height so that no brick will be used. A rectangular orifice 10"w x 6"h with a flowline of 557.78 will be used as the low flow slot. The high flow slot is a rectangular orifice that is 7"w x 4.2" with a flowline of 559.25. The top of the structure will be at an elevation of 559.60.

2 YEAR HIGHWATER 558.72
15 YEAR HIGHWATER = 559.14
25 YEAR HIGHWATER 559.35
100 YEAR HIGHWATER = 559.54
100 YEAR HIGHWATER LFB 559.91

Appendix B

Basin Routing

-2 year Detention Routing
-15 year Detention Routing
-25 year Detention Routing
-100 year Detention Routing LFB

Table of Contents

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)
Watershed A	100 year LFB	0	0.203	3.000	7.36
Watershed A	Post-Development 2 year	0	0.102	3.000	3.69
Watershed A	Post-Development 15 year	0	0.151	3.000	5.47
Watershed A	Post-Development 25 year	0	0.177	3.000	6.43
Watershed A	Post- Development 100 year	0	0.203	3.000	7.36

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)
O-1	100 year LFB	0	0.203	20.000	7.28
O-1	Post-Development 2 year	0	0.102	22.000	0.83
O-1	Post-Development 15 year	0	0.151	22.000	1.06
O-1	Post-Development 25 year	0	0.177	22.000	1.27
O-1	Post- Development 100 year	0	0.203	22.000	1.63

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Detention Basin (IN)	100 year LFB	0	0.203	3.000	7.36	(N/A)	(N/A)
Detention Basin (OUT)	100 year LFB	0	0.203	20.000	7.28	559.91	0.222
Detention Basin (IN)	Post-Development 2 year	0	0.102	3.000	3.69	(N/A)	(N/A)
Detention Basin (OUT)	Post-Development 2 year	0	0.102	22.000	0.83	558.72	0.087
Detention Basin (IN)	Post-Development 15 year	0	0.151	3.000	5.47	(N/A)	(N/A)
Detention Basin (OUT)	Post-Development 15 year	0	0.151	22.000	1.06	559.14	0.130

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Detention Basin (IN)	Post-Development 25 year	0	0.177	3.000	6.43	(N/A)	(N/A)
Detention Basin (OUT)	Post-Development 25 year	0	0.177	22.000	1.27	559.35	0.154
Detention Basin (IN)	Post-Development 100 year	0	0.203	3.000	7.36	(N/A)	(N/A)
Detention Basin (OUT)	Post-Development 100 year	0	0.203	22.000	1.63	559.54	0.177

Subsection: Read Hydrograph
Label: Watershed A
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event:

Peak Discharge	3.69 ft³/s
Time to Peak	13.000 min
Hydrograph Volume	0.102 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.000 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	1.23	2.46	3.69	3.69
5.000	3.69	3.69	3.69	3.69	3.69
10.000	3.69	3.69	3.69	3.69	3.69
15.000	3.69	3.69	3.69	3.69	3.69
20.000	3.69	2.46	1.23	0.00	0.00
25.000	0.00	0.00	0.00	0.00	0.00
30.000	0.00	0.00	0.00	0.00	0.00
35.000	0.00	0.00	0.00	0.00	0.00
40.000	0.00	0.00	0.00	0.00	0.00
45.000	0.00	0.00	0.00	0.00	0.00
50.000	0.00	0.00	0.00	0.00	0.00
55.000	0.00	0.00	0.00	0.00	0.00
60.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Read Hydrograph
Label: Watershed A
Scenario: Post-Development 15 year

Return Event: 15 years
Storm Event:

Peak Discharge	5.47 ft³/s
Time to Peak	13.000 min
Hydrograph Volume	0.151 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.000 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	1.82	3.65	5.47	5.47
5.000	5.47	5.47	5.47	5.47	5.47
10.000	5.47	5.47	5.47	5.47	5.47
15.000	5.47	5.47	5.47	5.47	5.47
20.000	5.47	3.65	1.82	0.00	0.00
25.000	0.00	0.00	0.00	0.00	0.00
30.000	0.00	0.00	0.00	0.00	0.00
35.000	0.00	0.00	0.00	0.00	0.00
40.000	0.00	0.00	0.00	0.00	0.00
45.000	0.00	0.00	0.00	0.00	0.00
50.000	0.00	0.00	0.00	0.00	0.00
55.000	0.00	0.00	0.00	0.00	0.00
60.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Read Hydrograph
Label: Watershed A
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event:

Peak Discharge	6.43 ft³/s
Time to Peak	13.000 min
Hydrograph Volume	0.177 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.000 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	2.14	4.29	6.43	6.43
5.000	6.43	6.43	6.43	6.43	6.43
10.000	6.43	6.43	6.43	6.43	6.43
15.000	6.43	6.43	6.43	6.43	6.43
20.000	6.43	4.29	2.14	0.00	0.00
25.000	0.00	0.00	0.00	0.00	0.00
30.000	0.00	0.00	0.00	0.00	0.00
35.000	0.00	0.00	0.00	0.00	0.00
40.000	0.00	0.00	0.00	0.00	0.00
45.000	0.00	0.00	0.00	0.00	0.00
50.000	0.00	0.00	0.00	0.00	0.00
55.000	0.00	0.00	0.00	0.00	0.00
60.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Read Hydrograph
Label: Watershed A
Scenario: Post- Development 100 year

Return Event: 100 years
Storm Event:

Peak Discharge	7.36 ft³/s
Time to Peak	13.000 min
Hydrograph Volume	0.203 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1.000 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	2.45	4.91	7.36	7.36
5.000	7.36	7.36	7.36	7.36	7.36
10.000	7.36	7.36	7.36	7.36	7.36
15.000	7.36	7.36	7.36	7.36	7.36
20.000	7.36	4.91	2.45	0.00	0.00
25.000	0.00	0.00	0.00	0.00	0.00
30.000	0.00	0.00	0.00	0.00	0.00
35.000	0.00	0.00	0.00	0.00	0.00
40.000	0.00	0.00	0.00	0.00	0.00
45.000	0.00	0.00	0.00	0.00	0.00
50.000	0.00	0.00	0.00	0.00	0.00
55.000	0.00	0.00	0.00	0.00	0.00
60.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Elevation-Area Volume Curve
Label: Detention Basin
Scenario: 100 year LFB

Return Event: 100 years
Storm Event:

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	Volume (ac-ft)	Volume (Total) (ac-ft)
557.78	0.00	3,595.000	0.000	0.000	0.000
558.00	0.00	3,777.000	11,056.877	0.019	0.019
559.00	0.00	4,661.000	12,633.783	0.097	0.115
560.00	0.00	5,637.000	15,423.823	0.118	0.233
561.00	0.00	6,952.000	18,849.066	0.144	0.378

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

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(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

Subsection: Outlet Input Data
Label: OS 1
Scenario: Post- Development 100 year

Return Event: 100 years
Storm Event:

Requested Pond Water Surface Elevations	
Minimum (Headwater)	557.78 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	561.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Lower Weir	Forward	Culvert - 1	557.78	558.28
Orifice-Area	Upper Orifice	Forward	Culvert - 1	559.60	561.00
Rectangular Weir	Upper Weir	Forward	Culvert - 1	559.25	559.60
Inlet Box	Riser - 1	Forward	Culvert - 1	559.60	561.00
Orifice-Area	Lower Orifice	Forward	Culvert - 1	558.28	561.00
Culvert-Circular	Culvert - 1	Forward	TW	556.82	561.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	559.60 ft
Orifice Area	21.07 ft²
Orifice Coefficient	0.600
Weir Length	18.76 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.00 in
Length	20.38 ft
Length (Computed Barrel)	20.38 ft
Slope (Computed)	0.008 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.091
T2 ratio (HW/D)	1.193
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

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

T1 Elevation	558.46 ft	T1 Flow	7.58 ft³/s
T2 Elevation	558.61 ft	T2 Flow	8.66 ft³/s

Structure ID: Lower Weir Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	557.78 ft
Weir Length	0.83 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Lower Orifice Structure Type: Orifice-Area	
Number of Openings	1
Elevation	557.78 ft
Orifice Area	0.21 ft²
Top Elevation	558.28 ft
Datum Elevation	558.03 ft
Orifice Coefficient	0.600

Structure ID: Upper Weir Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	559.25 ft
Weir Length	0.58 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Upper Orifice Structure Type: Orifice-Area	
Number of Openings	1
Elevation	559.25 ft
Orifice Area	0.23 ft²
Top Elevation	559.60 ft
Datum Elevation	559.42 ft
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft

Convergence Tolerances	
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Composite Rating Curve
Label: OS 1
Scenario: Post- Development 100 year

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
557.78	0.00	(N/A)	0.00
558.28	0.51	(N/A)	0.00
558.78	0.88	(N/A)	0.00
559.25	1.12	(N/A)	0.00
559.28	1.14	(N/A)	0.00
559.60	1.74	(N/A)	0.00
559.78	6.20	(N/A)	0.00
560.28	15.47	(N/A)	0.00
560.78	16.99	(N/A)	0.00
561.00	17.62	(N/A)	0.00

Contributing Structures
(no Q: Lower Weir,Upper Orifice,Upper Weir,Riser - 1,Lower Orifice,Culvert - 1)
Lower Orifice,Culvert - 1 (no Q: Lower Weir,Upper Orifice,Upper Weir,Riser - 1)
Lower Orifice,Culvert - 1 (no Q: Lower Weir,Upper Orifice,Upper Weir,Riser - 1)
Lower Orifice,Culvert - 1 (no Q: Lower Weir,Upper Orifice,Upper Weir,Riser - 1)
Upper Weir,Lower Orifice,Culvert - 1 (no Q: Lower Weir,Upper Orifice,Riser - 1)
Upper Orifice,Lower Orifice,Culvert - 1 (no Q: Lower Weir,Upper Weir,Riser - 1)
Upper Orifice,Riser - 1,Lower Orifice,Culvert - 1 (no Q: Lower Weir,Upper Weir)
Riser - 1,Culvert - 1 (no Q: Lower Weir,Upper Orifice,Upper Weir,Lower Orifice)
Riser - 1,Culvert - 1 (no Q: Lower Weir,Upper Orifice,Upper Weir,Lower Orifice)

Subsection: Composite Rating Curve
Label: OS 1
Scenario: Post- Development 100 year

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Contributing Structures
Riser - 1,Culvert - 1 (no Q: Lower Weir,Upper Orifice,Upper Weir,Lower Orifice)

Subsection: Outlet Input Data
Label: OS 1 LFB
Scenario: 100 year LFB

Return Event: 100 years
Storm Event:

Requested Pond Water Surface Elevations	
Minimum (Headwater)	557.78 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	561.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	559.60	561.00
Culvert-Circular	Culvert - 1	Forward	TW	556.82	561.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	559.60 ft
Orifice Area	21.07 ft²
Orifice Coefficient	0.600
Weir Length	18.76 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.00 in
Length	20.38 ft
Length (Computed Barrel)	20.38 ft
Slope (Computed)	0.008 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.091
T2 ratio (HW/D)	1.193
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

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

T1 Elevation	558.46 ft	T1 Flow	7.58 ft³/s
T2 Elevation	558.61 ft	T2 Flow	8.66 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Composite Rating Curve
Label: OS 1 LFB
Scenario: 100 year LFB

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
557.78	0.00	(N/A)	0.00
558.28	0.00	(N/A)	0.00
558.78	0.00	(N/A)	0.00
559.28	0.00	(N/A)	0.00
559.60	0.00	(N/A)	0.00
559.78	4.30	(N/A)	0.00
560.28	15.47	(N/A)	0.00
560.78	16.99	(N/A)	0.00
561.00	17.62	(N/A)	0.00

Contributing Structures
(no Q: Riser - 1,Culvert - 1)
(no Q: Riser - 1,Culvert - 1)
(no Q: Riser - 1,Culvert - 1)
(no Q: Riser - 1,Culvert - 1)
(no Q: Riser - 1,Culvert - 1)
Riser - 1,Culvert - 1
Riser - 1,Culvert - 1
Riser - 1,Culvert - 1
Riser - 1,Culvert - 1

Subsection: Level Pool Pond Routing Summary
Label: Detention Basin (IN)
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	557.78 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.69 ft³/s	Time to Peak (Flow, In)	3.000 min
Flow (Peak Outlet)	0.83 ft³/s	Time to Peak (Flow, Outlet)	22.000 min

Elevation (Water Surface, Peak)	558.72 ft
Volume (Peak)	0.087 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.102 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.102 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary
Label: Detention Basin (IN)
Scenario: Post-Development 15 year

Return Event: 15 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	557.78 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	5.47 ft³/s	Time to Peak (Flow, In)	3.000 min
Flow (Peak Outlet)	1.06 ft³/s	Time to Peak (Flow, Outlet)	22.000 min

Elevation (Water Surface, Peak)	559.14 ft
Volume (Peak)	0.130 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.151 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.151 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary
Label: Detention Basin (IN)
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	557.78 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	6.43 ft³/s	Time to Peak (Flow, In)	3.000 min
Flow (Peak Outlet)	1.27 ft³/s	Time to Peak (Flow, Outlet)	22.000 min

Elevation (Water Surface, Peak)	559.35 ft
Volume (Peak)	0.154 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.177 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.177 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary
Label: Detention Basin (IN)
Scenario: 100 year LFB

Return Event: 100 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	559.60 ft
Volume (Initial)	0.183 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	7.36 ft³/s	Time to Peak (Flow, In)	3.000 min
Flow (Peak Outlet)	7.28 ft³/s	Time to Peak (Flow, Outlet)	20.000 min

Elevation (Water Surface, Peak)	559.91 ft
Volume (Peak)	0.222 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.183 ac-ft
Volume (Total Inflow)	0.203 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.203 ac-ft
Volume (Retained)	0.183 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary
Label: Detention Basin (IN)
Scenario: Post- Development 100 year

Return Event: 100 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	557.78 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	7.36 ft³/s	Time to Peak (Flow, In)	3.000 min
Flow (Peak Outlet)	1.63 ft³/s	Time to Peak (Flow, Outlet)	22.000 min

Elevation (Water Surface, Peak)	559.54 ft
Volume (Peak)	0.177 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.203 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.203 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Summary for Hydrograph Addition at 'Detention Basin'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Watershed A

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Watershed A	0.102	3.000	3.69
Flow (In)	Detention Basin	0.102	3.000	3.69

Summary for Hydrograph Addition at 'Detention Basin'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Watershed A

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Watershed A	0.151	3.000	5.47
Flow (In)	Detention Basin	0.151	3.000	5.47

Summary for Hydrograph Addition at 'Detention Basin'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Watershed A

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Watershed A	0.177	3.000	6.43
Flow (In)	Detention Basin	0.177	3.000	6.43

Subsection: Pond Inflow Summary
Label: Detention Basin (IN)
Scenario: 100 year LFB

Return Event: 100 years
Storm Event:

Summary for Hydrograph Addition at 'Detention Basin'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Watershed A

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Watershed A	0.203	3.000	7.36
Flow (In)	Detention Basin	0.203	3.000	7.36

Subsection: Pond Inflow Summary
Label: Detention Basin (IN)
Scenario: Post- Development 100 year

Return Event: 100 years
Storm Event:

Summary for Hydrograph Addition at 'Detention Basin'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Watershed A

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Watershed A	0.203	3.000	7.36
Flow (In)	Detention Basin	0.203	3.000	7.36

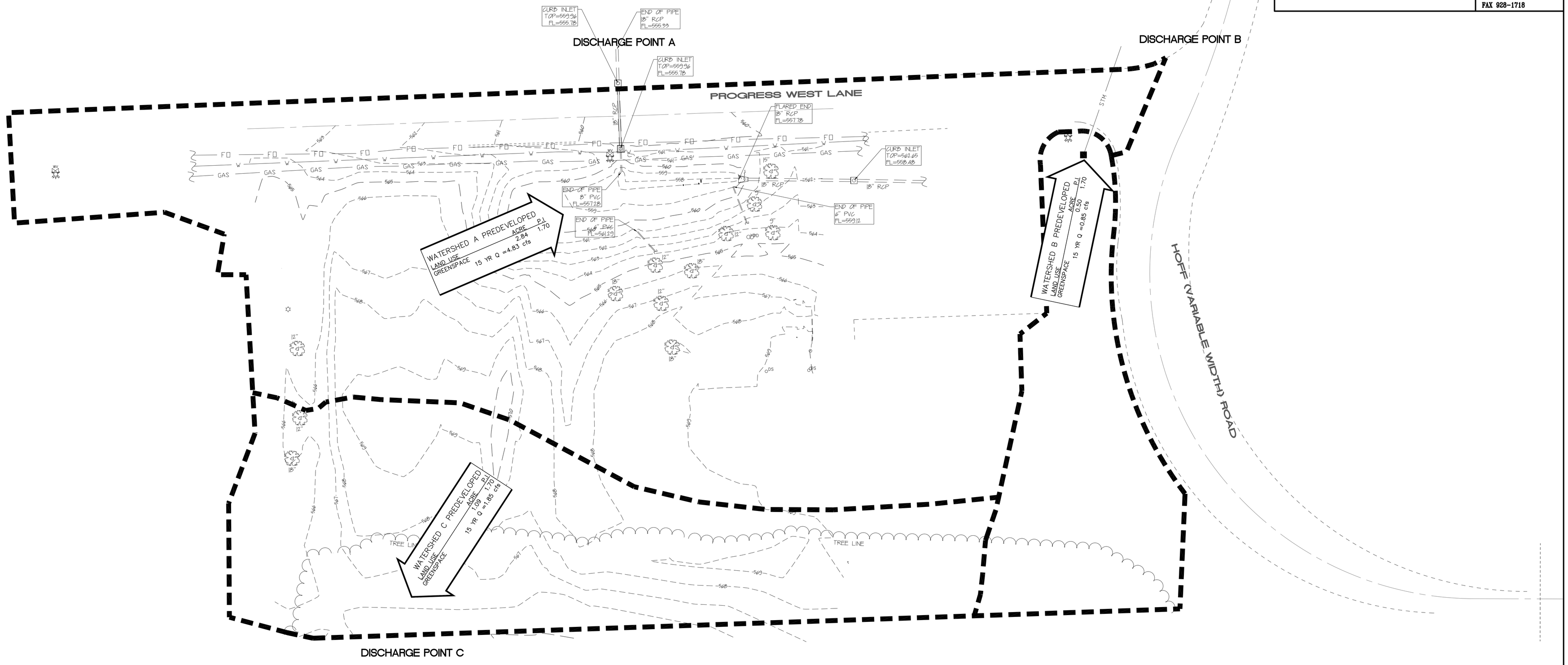
Index

Appendix C
Drainage Maps

Exhibit A
Predeveloped Drainage Map
PROGRESS WEST LOT 2
21-18943

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

ENGINEERING
PLANNING
SURVEYING
221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX 928-1718



UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

Todd C. Flauaus
Civil Engineer
2005000982
2022

Exhibit B
Postdeveloped Drainage Map
PROGRESS WEST LOT 2
21-18943

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

BAX
ENGINEERING
PLANNING
SURVEYING
221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX 928-1718

DISCHARGE POINT A

DISCHARGE POINT B

DISCHARGE POINT C

PROGRESS WEST LANE

S88°03'42"W 479.74'

S01°56'18"E 629.16'

N88°03'42"E 532.91'

N02°32'18"E 70.75'

R=25.00'
L=23.64'

R=96.00'
L=45.31'

R=224.00'
L=141.12'

HOFF (VARIABLE WIDTH) ROAD

SANITARY MANHOLE
TOP=558.54
FL=549.09

CURB INLET
TOP=559.56
FL=555.78

END OF PIPE
18" RCP
FL=555.33

CURB INLET
TOP=559.96
FL=555.78

FLARED END
18" RCP
FL=557.78

CURB INLET
TOP=562.85
FL=558.45

END OF PIPE
6" PVC
FL=559.12

ASPHALT PAVEMENT W/TERRA CURB

PROPOSED BUILDING
12,000 SQ.F.T.
FF=566.30

CONCRETE PAVEMENT

EXISTING CONCRETE

EX CONC WALL

EXISTING ASPHALT

EX BUILDING #1500

EXISTING GRAVEL

LOADING DOCKS

562.30

566
TRUCK AREA

TREE LINE

NEW TREELINE

10' EASEMENT

WATERSHED A POSTDEVELOPED
LAND USE — ACRE — P.I.
GREENSPACE — 1.39 — 1.70
PAVEMENT/BUILDING — 1.89 — 3.54
15 YR Q =9.05 cfs

WATERSHED B POSTDEVELOPED
LAND USE — ACRE — P.I.
GREENSPACE — 0.41 — 1.70
PAVEMENT — 0.04 — 3.54
15 YR Q =0.84 cfs

WATERSHED C POSTDEVELOPED
LAND USE — ACRE — P.I.
GREENSPACE — 0.53 — 1.70
PAVEMENT — 0.55 — 3.54
15 YR Q =1.84 cfs

SANITARY MANHOLE
TOP=545.85
FL=555.86

SANITARY MANHOLE
TOP=565.59
FL=554.70

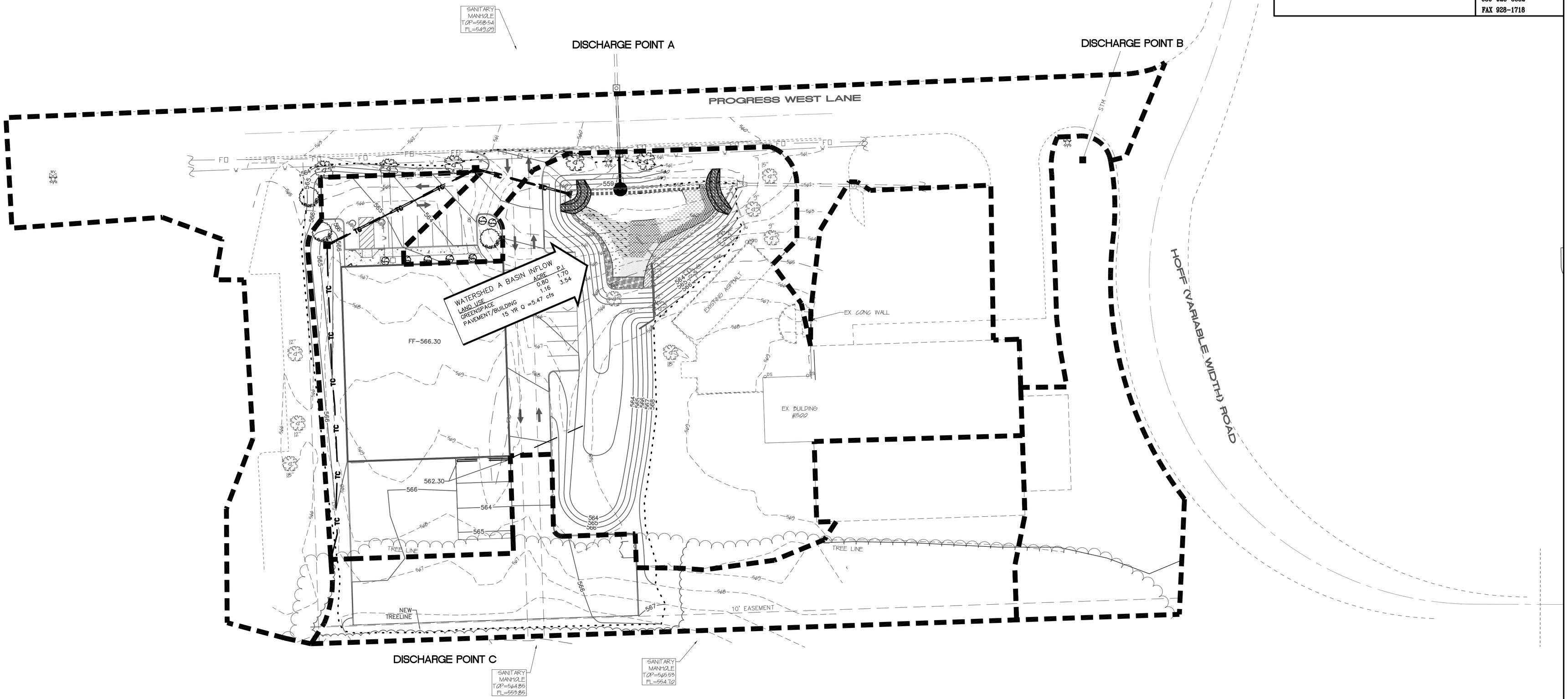
Todd C. Flauaus
Civil Engineer
2005000982
2022

UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

Exhibit C
Basin Inflow Drainage Map
PROGRESS WEST LOT 2
21-18943

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

ENGINEERING
PLANNING
SURVEYING
221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX 928-1718



UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

Todd C. Flauaus
Civil Engineer
2005000982
2022