APPROVED

Jeannie Greenlee 06/26/2018

A STORMWATER DETENTION ANALYSIS

OF THE PROPOSED DEVELOPMENT OF

TYKE TOWN DEVELOPMENT CENTERS

IN

CITY OF O'FALLON, MISSOURI

FOR

THERESA CHAMBERS
2240 LAKE SAINT LOUIS BOULEVARD
LAKE SAINT LOUIS, MO 63367

BAX PROJECT NO. 00-11214CA

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Prepared by:
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INTRODUCTION:

The currently undeveloped site is located in the City of O'Fallon, Missouri and is comprised of 1.95 acres of land. The site shall be analyzed for the construction of the proposed Tyke Town Development Centers disturbing approximately 1.66 acres of land. On this site, an underground detention basin will be designed to provide the Stormwater Attenuation required by the City of O'Fallon Design Standards for the current development. 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	1.87	2.31	2.95
Impervious	100%	2.39	3.85	4.75	6.08

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	1.87	2.31	2.95
Impervious	100%	2.39	3.85	4.75	6.08

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 Stormtech Isolator Row which is part of the proposed underground detention basin.

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Stormtech Chambers

The underground detention system addresses water quality in several aspects. First the sump of the manhole has an extended depth to remove larger sediment from the inflow. The smaller more often storms are then diverted to the isolator row of the chamber system where the inflow is filtered as it is released into the storage volume in the rock fill. Flows from the larger storm events pond up to the Stormtech manifolds where the flows are evenly distributed to the Stormtech Chambers. Lastly the 12" rock layer beneath the chambers is design to store the filtered inflow and allow it to infiltrate into the subgrade to reduce the runoff volume.

$WQ_v = PR_vA/12$

Where: P = 1.14"
$R_v = 0.05 + 0.009(I)$
I = % Impervious
A_I = Impervious Area = 0.69 ac
A = Watershed Area = 0.93 ac

$I = A_I/A = 0.69 \text{ ac} / 0.93 \text{ ac} = 0.7419 = 74.19\%$
$R_v = 0.05 + 0.009(74.19) = 0.7177$
$WQ_v = 1.14(.7177)(0.93)/12 = 0.0634 \text{ ac-ft} = 2{,}762 \text{ ft}^3$

The total water quality volume for this watershed is 2,762 ft^3.

The isolator row will treat 2.5 gpm/sq. ft. of filter area while removing more than 80% TSS.

Impervious Area = 0.69 acres
Total Area = 0.93 acres
$I = A_I/A = 0.69 \text{ ac} / 0.93 \text{ ac} = 0.7419 = 74.19\%$
$R_v = 0.05 + 0.009(74.19) = 0.7177$

Qa = P*Rv
P = 1.14"
Qa = 1.14*0.7177 = 0.82 watershed inches

$$CN = \frac{1000}{[10+5P+10Qa-10\sqrt{(Qa^2+1.25QaP)}]}.$$

CN = 96.76
Ia=(200/CN)-2= 0.067
Ia/P = 0.059
From Chart D.11.1 qu = 1000 csm/in
Qp = qu x A x Qa
A = 0.93 acres → 0.00145 mi
Qp = 1000 x 0.00145 x 0.82 = 1.19 cfs

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Max treated flow =2.5 gpm/sq.ft.* 43.2 sq.ft./Chamber * 11 Chambers = 1,188 gpm→2.65 cfs

Manifold Height Calculation

To divert flow into the Isolator Chamber, the proposed Stormtech Manifolds are elevated to a higher flowline. This allows storms larger than the water quality flow rate to be bypassed around the Isolator Rows into the other chambers. To accomplish this, the flowline of the Inflow Manifold to the Stormtech Chambers is set at a flowline of 494.59, 1.52 ft above the Isolator Row flowline, based on the stub location on the MC-3500 Technical Specifications, which can be found in Appendix A. This allows the smaller storms to be diverted to the Isolator Rows and the larger storms to be bypassed to the Stormtech Chambers.

The bypass manifold shall be set 1.52 ft above the Inflow Pipe leading to the Underground detention basin.

Flow Line of Inflow pipe to Isolator Row – 493.07 ft
Flow Line of Inflow Manifold to Underground Detention Chambers– 494.59 ft

Future Stormtech Chambers

The underground detention system is also designed to treat a future scenario of a building addition to the east of the currently proposed building. Additional parking stalls, sidewalk and pavement as well as a future building will contribute to an increased impervious area being routed to the underground detention basin.

$WQ_v = PR_vA/12$

Where: P = 1.14"
$R_v = 0.05 + 0.009(I)$
I = % Impervious
A_I = Impervious Area = 0.96 ac
A = Watershed Area = 1.11 ac

$I = A_I/A = 0.96 \text{ ac} / 1.11 \text{ ac} = 0.8649 = 86.49\%$
$R_v = 0.05 + 0.009(86.49) = 0.8284$
$WQ_v = 1.14(0.8284)(1.11)/12 = 0.0874 \text{ ac-ft} = 3{,}805 \text{ ft}^3$

The total water quality volume for this watershed is 3,805 ft^3.

The isolator row will treat 2.5 gpm/sq. ft. of filter area while removing more than 80% TSS.

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Impervious Area = 0.96 acres
Total Area = 1.11 acres
$I = A_I/A = 0.96 \text{ ac} / 1.11 \text{ ac} = 0.8649 = 86.49\%$
$R_v = 0.05 + 0.009(86.49) = 0.8284$

$Qa = P*Rv$
$P = 1.14"$
$Qa = 1.14*0.8284 = 0.94$ watershed inches

$$CN = \frac{1000}{[10+5P+10Qa-10\sqrt{(Qa^2+1.25QaP)}]}$$

$CN = 98.18$
$Ia=(200/CN)-2= 0.037$
$Ia/P = 0.032$
From Chart D.11.1 qu = 1000 csm/in
$Qp = qu \times A \times Qa$
A = 1.11 acres → 0.00173 mi
$Qp = 1000 \times 0.00173 \times 0.82 = 1.64$ cfs
Max treated flow =2.5 gpm/sq.ft.* 43.2 sq.ft./Chamber * 11 Chambers = 1,188 gpm→2.65 cfs

Manifold Height Calculation

To divert flow into the Isolator Chamber, the proposed Stormtech Manifolds are elevated to a higher flowline. This allows storms larger than the water quality flow rate to be bypassed around the Isolator Rows into the other chambers. To accomplish this, the flowline of the Inflow Manifold to the Stormtech Chambers is set at a flowline of 494.59, 1.52 ft above the Isolator Row flowline, based on the stub location on the MC-3500 Technical Specifications, which can be found in Appendix A. This allows the smaller storms to be diverted to the Isolator Rows and the larger storms to be bypassed to the Stormtech Chambers.

The bypass manifold shall be set 1.52 ft above the Inflow Pipe leading to the Underground detention basin.

Flow Line of Inflow pipe to Isolator Row – 493.07 ft
Flow Line of Inflow Manifold to Underground Detention Chambers– 494.59 ft

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DETENTION BASIN CALCULATIONS

PREDEVELOPED CONDITIONS:

The Predeveloped site has two separate discharge points to be analyzed for the total runoff from the watershed using the rational method to determine the Predeveloped Runoff rates leaving the site. 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.

Watershed A

2 Year				
Onsite Greenspace	0.50 ac x	1.15 cfs/ac	=	0.58 cfs
Onsite Impervious	0.01 ac x	2.39 cfs/ac	=	0.02 cfs
		Total	=	0.60 cfs
15 Year				
Onsite Greenspace	0.50 ac x	1.87 cfs/ac	=	0.94 cfs
Onsite Impervious	0.01 ac x	3.85 cfs/ac	=	0.04 cfs
		Total	=	0.98 cfs
25 Year				
Onsite Greenspace	0.50 ac x	2.31 cfs/ac	=	1.16 cfs
Onsite Impervious	0.01 ac x	4.75 cfs/ac	=	0.05 cfs
		Total	=	1.21 cfs
100 Year				
Onsite Greenspace	0.50 ac x	2.95 cfs/ac	=	1.48 cfs
Onsite Impervious	0.01 ac x	6.08 cfs/ac	=	0.06 cfs
		Total	=	1.54 cfs

2 year-20 minute storm:	0.60 cfs
15 year-20 minute storm:	0.98 cfs
25 year-20 minute storm:	1.21 cfs
100 year-20 minute storm:	1.54 cfs

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Watershed B

2 Year				
Onsite Greenspace	1.38 ac	x 1.15 cfs/ac	=	1.59 cfs
Onsite Impervious	0.12 ac	x 2.39 cfs/ac	=	0.29 cfs
		Total	=	1.88 cfs
15 Year				
Onsite Greenspace	1.38 ac	x 1.87 cfs/ac	=	2.58 cfs
Onsite Impervious	0.12 ac	x 3.85 cfs/ac	=	0.46 cfs
		Total	=	3.04 cfs
25 Year				
Onsite Greenspace	1.38 ac	x 2.31 cfs/ac	=	3.19 cfs
Onsite Impervious	0.12 ac	x 4.75 cfs/ac	=	0.57 cfs
		Total	=	3.76 cfs
100 Year				
Onsite Greenspace	1.38 ac	x 2.95 cfs/ac	=	4.07 cfs
Onsite Impervious	0.12 ac	x 6.08 cfs/ac	=	0.73 cfs
		Total	=	4.80 cfs

2 year-20 minute storm:	1.88 cfs
15 year-20 minute storm:	3.04 cfs
25 year-20 minute storm:	3.76 cfs
100 year-20 minute storm:	4.80 cfs

POSTDEVELOPED CONDITIONS:

The Postdeveloped site maintains the same two distinct watersheds. Each one discharges into a different area on the site. The total runoff from the watersheds will be calculated using the rational method to determine the Postdeveloped Runoff rates leaving the site. 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				
Onsite Greenspace	0.10 ac	x 1.15 cfs/ac	=	0.12 cfs
Onsite Impervious	0.06 ac	x 2.39 cfs/ac	=	0.14 cfs
		Total	=	0.26 cfs
15 Year				
Onsite Greenspace	0.10 ac	x 1.87 cfs/ac	=	0.19 cfs
Onsite Impervious	0.06 ac	x 3.85 cfs/ac	=	0.23 cfs
		Total	=	0.42 cfs

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25 Year				
Onsite Greenspace	0.10 ac	x 2.31 cfs/ac	=	0.23 cfs
Onsite Impervious	0.06 ac	x 4.75 cfs/ac	=	0.29 cfs
		Total	=	0.52 cfs
100 Year				
Onsite Greenspace	0.10 ac	x 2.95 cfs/ac	=	0.30 cfs
Onsite Impervious	0.06 ac	x 6.08 cfs/ac	=	0.36 cfs
		Total	=	0.66 cfs

2 year-20 minute storm:	0.26 cfs
15 year-20 minute storm:	0.42 cfs
25 year-20 minute storm:	0.52 cfs
100 year-20 minute storm:	0.66 cfs

Watershed B

2 Year				
Onsite Greenspace	1.07 ac	x 1.15 cfs/ac	=	1.23 cfs
Onsite Impervious	0.77 ac	x 2.39 cfs/ac	=	1.84 cfs
		Total	=	3.07 cfs
15 Year				
Onsite Greenspace	1.07 ac	x 1.87 cfs/ac	=	2.00 cfs
Onsite Impervious	0.77 ac	x 3.85 cfs/ac	=	2.96 cfs
		Total	=	4.96 cfs
25 Year				
Onsite Greenspace	1.07 ac	x 2.31 cfs/ac	=	2.47 cfs
Onsite Impervious	0.77 ac	x 4.75 cfs/ac	=	3.66 cfs
		Total	=	6.13 cfs
100 Year				
Onsite Greenspace	1.07 ac	x 2.95 cfs/ac	=	3.16 cfs
Onsite Impervious	0.77 ac	x 6.08 cfs/ac	=	4.68 cfs
		Total	=	7.84 cfs

2 year-20 minute storm:	3.07 cfs
15 year-20 minute storm:	4.96 cfs
25 year-20 minute storm:	6.13 cfs
100 year-20 minute storm:	7.84 cfs

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DIFFERENTIAL RUNOFF

The differential runoff for each discharge point is determined by subtracting the Predeveloped Runoff rate from the Postdeveloped Runoff rate. A positive Differential Runoff demonstrates the need for stormwater detention within that watershed.

Watershed A

Design Storm	Postdeveloped Runoff	Predeveloped Runoff	Differential Runoff
2 yr	0.26 cfs	0.60 cfs	-0.34 cfs
15 yr	0.42 cfs	0.98 cfs	-0.56 cfs
25 yr	0.52 cfs	1.21 cfs	-0.69 cfs
100 yr	0.66 cfs	1.54 cfs	-0.88 cfs

Watershed B

Design Storm	Postdeveloped Runoff	Predeveloped Runoff	Differential Runoff
2 yr	3.07 cfs	1.88 cfs	1.19 cfs
15 yr	4.96 cfs	3.04 cfs	1.92 cfs
25 yr	6.13 cfs	3.76 cfs	2.37 cfs
100 yr	7.84 cfs	4.80 cfs	3.04 cfs

Detention must be provided in Watershed B.

TIME OF CONCENTRATION:

Time of Concentration is defined as the time needed for stormwater to flow from the most remote point in a watershed to the proposed Detention Facility. The most remote point of flow on this site tributary to the Detention Facility lies on the western side of the wall on the western side of the site. Flow travels over grass along the wall for 76 feet until it reaches pavement. Then flow travels for 250 feet over pavement into CI103. Flow travels through the storm sewer system for 89 feet until it enters the underground detention basin. Time of Concentration is estimated as follows:

Watershed B

$T_{overland}$:

L = 76 feet
Elevation difference = 4.8 feet
Surface Coefficient = 2.0 (grass)
$T_{overland}$ = 1 min*2.0 = 2.0 minutes:

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L = 250 feet
Elevation difference = 4.2 feet
Surface Coefficient = 0.4 (pavement)
$T_{overland}$ = 2.7 min*0.4 = 1.08 minutes:

See figure 1 in Appendix A

$T_{storm\ sewer}$: L = 89 feet
Average Velocity = 7 ft/s
$T_{storm\ sewer}$ = 89 feet/7 ft/s/60 sec/min = 0.21 min

Total time = 2.0 + 1.08 + 0.21 = 3.29 min => **use 3 minutes**

Basin Peak Inflow

Discharge Point 1

2 Year				
Onsite Greenspace	0.24 ac x	1.15 cfs/ac	=	0.28 cfs
Onsite Impervious	0.69 ac x	2.39 cfs/ac	=	1.65 cfs
		Total	=	1.93 cfs
15 Year				
Onsite Greenspace	0.24 ac x	1.87 cfs/ac	=	0.45 cfs
Onsite Impervious	0.69 ac x	3.85 cfs/ac	=	2.66 cfs
		Total	=	3.11 cfs
25 Year				
Onsite Greenspace	0.24 ac x	2.31 cfs/ac	=	0.55 cfs
Onsite Impervious	0.69 ac x	4.75 cfs/ac	=	3.28 cfs
		Total	=	3.83 cfs
100 Year				
Onsite Greenspace	0.24 ac x	2.95 cfs/ac	=	0.71 cfs
Onsite Impervious	0.69 ac x	6.08 cfs/ac	=	4.20 cfs
		Total	=	4.91 cfs

2 year-20 minute storm:	1.93 cfs
15 year-20 minute storm:	3.11 cfs
25 year-20 minute storm:	3.83 cfs
100 year-20 minute storm:	4.91 cfs

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ALLOWABLE RELEASE RATE

Allowable Release Rate is defined as the maximum amount of stormwater that can be released from the proposed basin in any given storm duration. This calculation can be done by taking the Basin Inflow and subtracting the Differential Runoff Rate for each design storm. The following table is the representation of the Allowable Release Rate for this site:

STORM	BASIN INFLOW	-	DIFFERENTIAL RUNOFF RATE	=	ALLOWABLE RELEASE RATE
2 yr	1.93 cfs	-	1.19 cfs	=	0.74 cfs
15 yr	3.11 cfs	-	1.92 cfs	=	1.19 cfs
25 yr	3.83 cfs	-	2.37 cfs	=	1.46 cfs
100 yr	4.91 cfs	-	3.04 cfs	=	1.87 cfs

STORM ROUTING CALCULATIONS AND RESULTS

The computer program PONDPACK was used in routing the 2, 15, 25 and 100 year storms through the underground detention basin required for this site. 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:

Basin 1

STORM (20 MIN)	PEAK INFLOW	ALLOWABLE RELEASE RATE	CALCULATED RELEASE	PEAK ELEVATION
2 yr	1.93 cfs	0.74 cfs	0.63 cfs	493.74 ft
15 yr	3.11 cfs	1.19 cfs	0.85 cfs	494.34 ft
25 yr	3.83 cfs	1.46 cfs	1.09 cfs	494.72 ft
100 yr	4.91 cfs	1.87 cfs	1.57 cfs	495.28 ft
100 yr LFB	4.91 cfs	N/A	4.91 cfs	496.95 ft

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FUTURE SCENARIO

In addition to the Postdeveloped scenario, a future scenario with a potential building addition, parking stalls, pavement and sidewalk is accounted for in the design of the underground detention basin. The above described future scenario will increase the impervious area entering the underground detention basin. Therefore, the underground detention basin will be designed to attentuate the additional stormwater runoff.

Future Postdeveloped Watershed A

2 Year				
Onsite Greenspace	0.05 ac x	1.15 cfs/ac	=	0.06 cfs
Onsite Impervious	0.06 ac x	2.39 cfs/ac	=	0.14 cfs
		Total	=	0.20 cfs
15 Year				
Onsite Greenspace	0.05 ac x	1.87 cfs/ac	=	0.09 cfs
Onsite Impervious	0.06 ac x	3.85 cfs/ac	=	0.23 cfs
		Total	=	0.32 cfs
25 Year				
Onsite Greenspace	0.05 ac x	2.31 cfs/ac	=	0.12 cfs
Onsite Impervious	0.06 ac x	4.75 cfs/ac	=	0.29 cfs
		Total	=	0.41 cfs
100 Year				
Onsite Greenspace	0.05 ac x	2.95 cfs/ac	=	0.15 cfs
Onsite Impervious	0.06 ac x	6.08 cfs/ac	=	0.36 cfs
		Total	=	0.51 cfs

2 year-20 minute storm:	0.20 cfs
15 year-20 minute storm:	0.32 cfs
25 year-20 minute storm:	0.41 cfs
100 year-20 minute storm:	0.51 cfs

Future Postdeveloped Watershed B

2 Year				
Onsite Greenspace	0.87 ac x	1.15 cfs/ac	=	1.00 cfs
Onsite Impervious	1.04 ac x	2.39 cfs/ac	=	2.49 cfs
		Total	=	3.49 cfs
15 Year				
Onsite Greenspace	0.87 ac x	1.87 cfs/ac	=	1.63 cfs
Onsite Impervious	1.04 ac x	3.85 cfs/ac	=	4.00 cfs
		Total	=	5.63 cfs

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25 Year			
Onsite Greenspace	0.87 ac x	2.31 cfs/ac =	2.01 cfs
Onsite Impervious	1.04 ac x	4.75 cfs/ac =	4.94 cfs
		Total =	6.95 cfs
100 Year			
Onsite Greenspace	0.87 ac x	2.95 cfs/ac =	2.57 cfs
Onsite Impervious	1.04 ac x	6.08 cfs/ac =	6.32 cfs
		Total =	8.89 cfs

2 year-20 minute storm:	3.49 cfs
15 year-20 minute storm:	5.63 cfs
25 year-20 minute storm:	6.95 cfs
100 year-20 minute storm:	8.89 cfs

FUTURE DIFFERENTIAL RUNOFF

The future differential runoff for each discharge point is determined by subtracting the Predeveloped Runoff rate from the Future Postdeveloped Runoff rate. A positive Differential Runoff demonstrates the need for stormwater detention within that watershed.

Watershed A

Design Storm	Future Runoff	Predeveloped Runoff	Differential Runoff
2 yr	0.20 cfs	0.60 cfs	-0.40 cfs
15 yr	0.32 cfs	0.98 cfs	-0.66 cfs
25 yr	0.41 cfs	1.21 cfs	-0.80 cfs
100 yr	0.51 cfs	1.54 cfs	-1.03 cfs

Watershed B

Design Storm	Future Runoff	Predeveloped Runoff	Differential Runoff
2 yr	3.49 cfs	1.88 cfs	1.61 cfs
15 yr	5.63 cfs	3.04 cfs	2.59 cfs
25 yr	6.95 cfs	3.76 cfs	3.19 cfs
100 yr	8.89 cfs	4.80 cfs	4.09 cfs

Detention must be provided in Watershed B.

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Future Basin Peak Inflow

2 Year				
Onsite Greenspace	0.15 ac x	1.15 cfs/ac	=	0.17 cfs
Onsite Impervious	0.96 ac x	2.39 cfs/ac	=	2.29 cfs
		Total	=	2.46 cfs
15 Year				
Onsite Greenspace	0.15 ac x	1.87 cfs/ac	=	0.28 cfs
Onsite Impervious	0.96 ac x	3.85 cfs/ac	=	3.70 cfs
		Total	=	3.98 cfs
25 Year				
Onsite Greenspace	0.15 ac x	2.31 cfs/ac	=	0.35 cfs
Onsite Impervious	0.96 ac x	4.75 cfs/ac	=	4.56 cfs
		Total	=	4.91 cfs
100 Year				
Onsite Greenspace	0.15 ac x	2.95 cfs/ac	=	0.44 cfs
Onsite Impervious	0.96 ac x	6.08 cfs/ac	=	5.84 cfs
		Total	=	6.28 cfs

2 year-20 minute storm:	2.46 cfs
15 year-20 minute storm:	3.98 cfs
25 year-20 minute storm:	4.91 cfs
100 year-20 minute storm:	6.28 cfs

FUTURE ALLOWABLE RELEASE RATE

The Future Allowable Release Rate is defined as the maximum amount of stormwater that can be released from the proposed basin in any given storm duration. This calculation can be done by taking the Future Basin Inflow and subtracting the Differential Runoff Rate for each design storm. The following table is the representation of the Allowable Release Rate for this site:

STORM	BASIN INFLOW	-	DIFFERENTIAL RUNOFF RATE	=	ALLOWABLE RELEASE RATE
2 yr	2.46 cfs	-	1.61 cfs	=	0.85 cfs
15 yr	3.98 cfs	-	2.59 cfs	=	1.39 cfs
25 yr	4.91 cfs	-	3.19 cfs	=	1.72 cfs
100 yr	6.28 cfs	-	4.09 cfs	=	2.19 cfs

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FUTURE STORM ROUTING CALCULATIONS AND RESULTS

The computer program PONDPACK was used in routing the 2, 15, 25 and 100 year storms through the underground detention basin required for this site. 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 (20 MIN)	PEAK INFLOW	ALLOWABLE RELEASE RATE	CALCULATED RELEASE	PEAK ELEVATION
2 yr	2.46 cfs	0.85 cfs	0.73 cfs	494.00 ft
15 yr	3.98 cfs	1.39 cfs	1.16 cfs	494.79 ft
25 yr	4.91 cfs	1.72 cfs	1.57 cfs	495.28 ft
100 yr	6.28 cfs	2.19 cfs	2.00 cfs	496.08 ft
100 yr LFB	6.28 cfs	N/A	6.28 cfs	497.05 ft

FUTURE SEDIMENT STORAGE CALCULATIONS

The City of O'Fallon design standards require that all detention basins are designed to accommodate two years of sediment storage. The future scenario will be used to calculate sediment storage due to the increased stormwater runoff compared to the postdeveloped scenario. This is accomplished by routing the design storms through the outfall structure and determining the 100 year, 20 minute storm high-water elevation. Using the annual sediment storage nomograph included in Appendix A of this report, we calculate the volume of sediment delivered to the detention basin over a two year period. By adding the volume of sediment to the storage volume required for the 100 year, 20 minute storm, we can calculate the crest elevation of the standpipe which must be above the volume required for the 100 year, 20 minute storm and the volume required sediment storage when added together. Pondpack has been used to calculate this elevation and the results are as follows:

100 Year, 20 Minute Storage	= 6,815 ft^3
Volume Achieved at Elevation	= 496.06 ft
2 Year Sediment Storage Volume	= 355 ft^3
Required Storage Volume	= 7,170 ft^3
Volume Achieved at Elevation	= 498.34 ft
Crest of Outfall Structure and Sill	= 498.40 ft

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SUMMARY

Postdeveloped Underground Detention Basin

	Flow Rate	High Water
2 Year 20 Minute	0.63 cfs	493.74 ft
15 Year 20 Minute	0.85 cfs	494.34 ft
25 Year 20 Minute	1.09 cfs	494.72 ft
100 Year 20 Minute	1.57 cfs	495.28 ft
100 Year 20 Minute LFB	4.91 cfs	496.95 ft
Low Flow Slot		0.33 'W x 0.5' H
Flow Line		492.80 ft
Upper Slot		0.25 'W x 0.5' H
Flow Line		494.40 ft
Overflow Weir		4' W @ 496.40 ft
Lowest Top of Basin		499.00 ft
Freeboard		2.05 ft

Future Postdeveloped Underground Detention Basin

	Flow Rate	High Water
2 Year 20 Minute	0.73 cfs	494.00 cfs
15 Year 20 Minute	1.16 cfs	494.79 cfs
25 Year 20 Minute	1.57 cfs	495.28 cfs
100 Year 20 Minute	2.00 cfs	496.08 cfs
100 Year 20 Minute LFB	6.28 cfs	497.05 cfs
Low Flow Slot		0.33 'W x 0.5' H
Flow Line		492.80 ft
Upper Slot		0.25 'W x 0.5' H
Flow Line		494.40 ft
Overflow Weir		4' W @ 496.40 ft
Lowest Top of Basin		499.00 ft
Freeboard		1.95 ft

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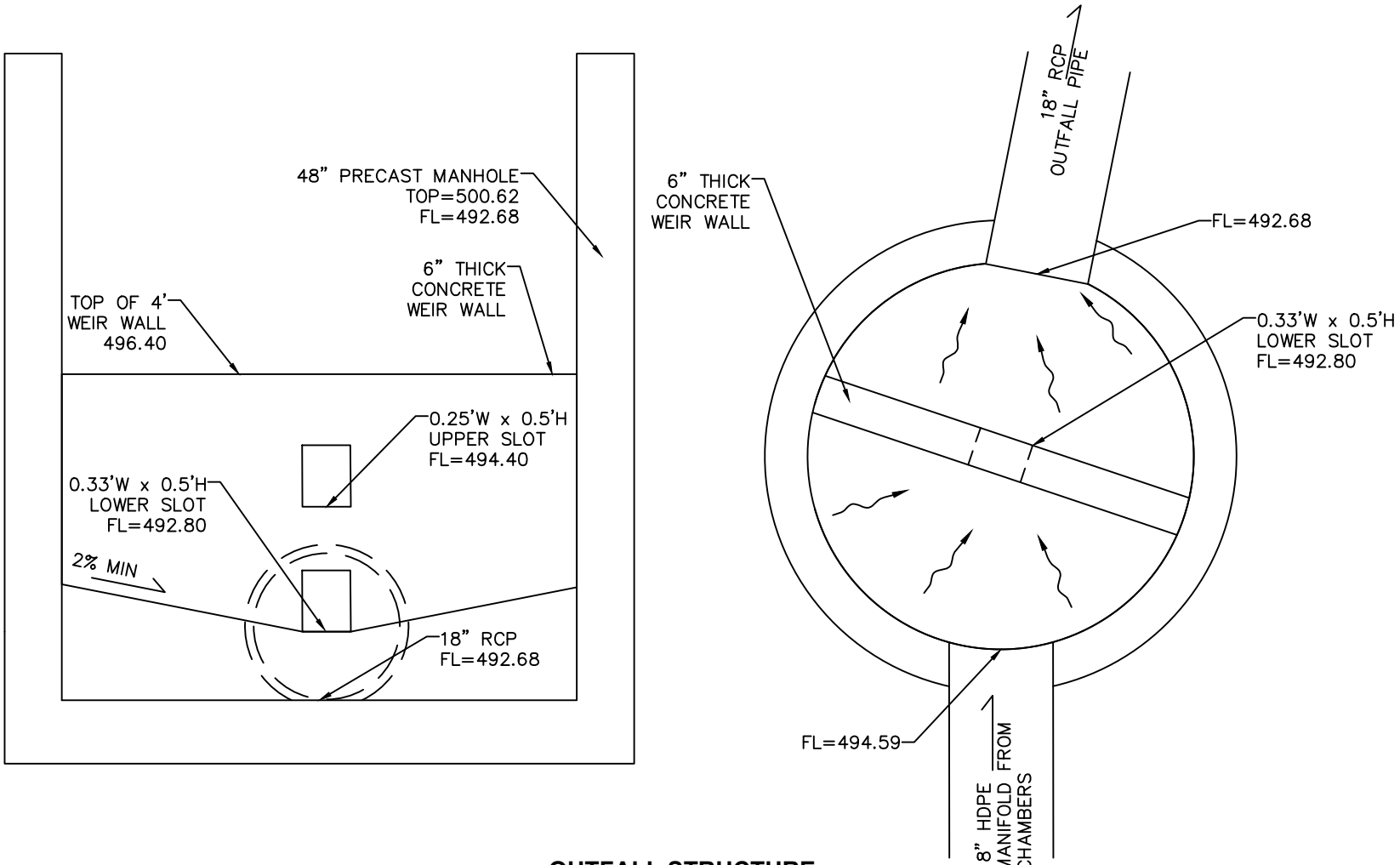
Appendix A

-Structure Details
-Time of Concentration
-Misc Figures



OUTFALL STRUCTURE

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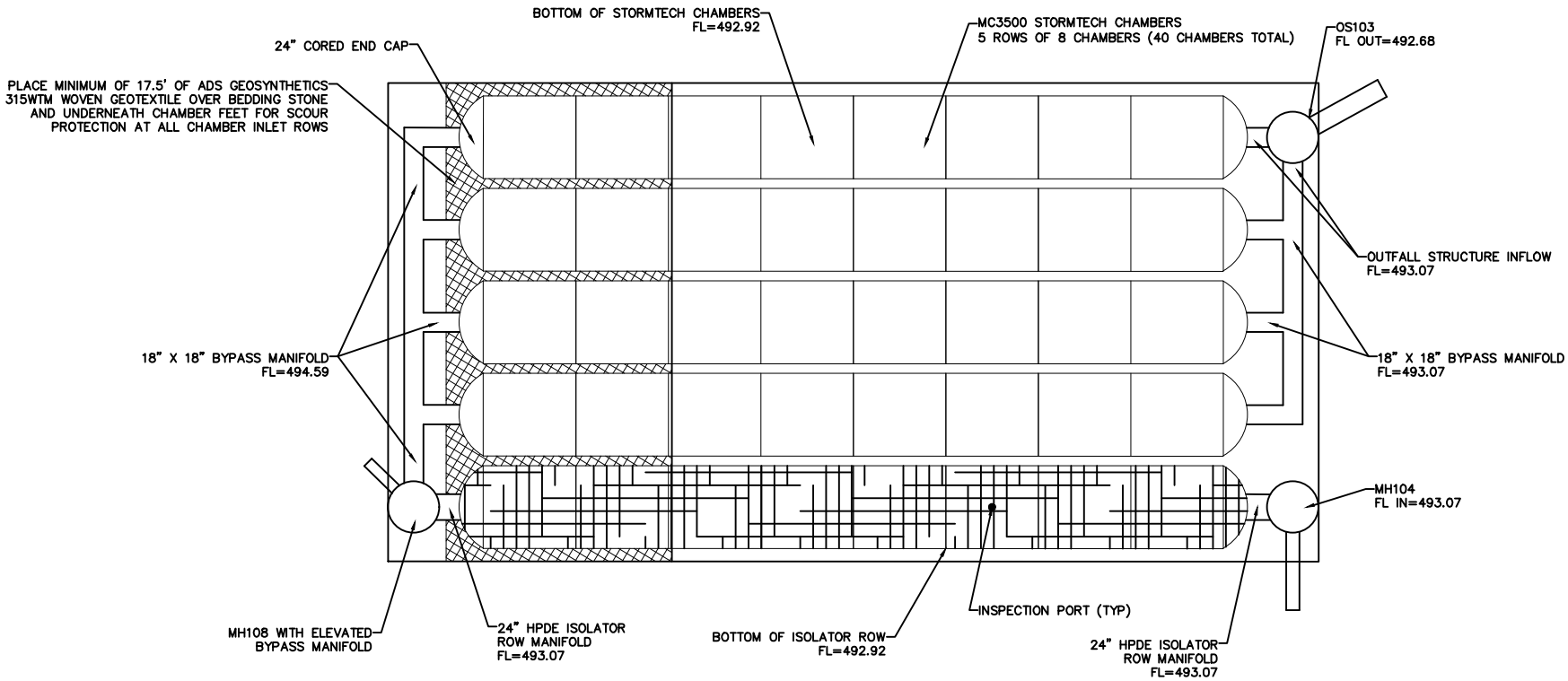

UNDERGROUND DETENTION SCHEMATIC

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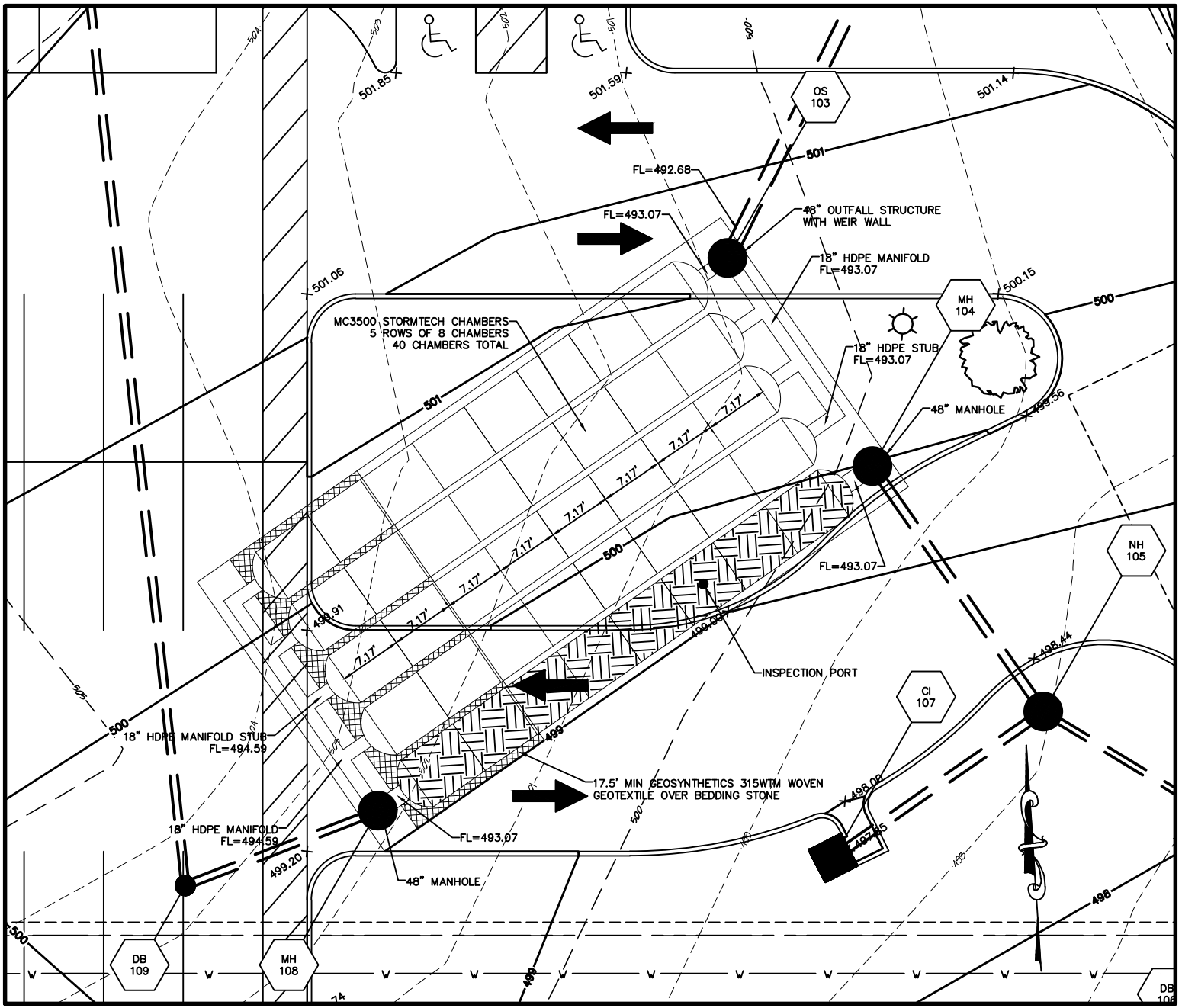

UNDERGROUND DETENTION LAYOUT

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StormTech
Detention • Retention • Recharge
Subsurface Stormwater Management™

MC-3500 Site Calculator

Project Information:

Project Name:	Tyke Town	11214CA
Location:	O'Fallon	
Date:		3/1/2018
Engineer:	MDS	
StormTech RPM:		

System Requirements

Units		Imperial	
Required Storage Volume		7600	CF
Stone Porosity (Industry Standard = 40%)		40	%
Stone Above Chambers	(12 inch min.)	12	inches
Stone Foundation Depth	(9 inch min.)	9	inches
Average Cover over Chambers	(24 inch min.)	24	inches
Bed size controlled by WIDTH or LENGTH?		WIDTH	
Limiting WIDTH or LENGTH dimension		40	feet
Storage Volume per Chamber		178.9	CF
Storage Volume per End Cap		46.9	CF

System Sizing

Number of Chambers Required	40	each
Number of End Caps Required	10	each
Bed Size (including perimeter stone)	2,303	square feet
Stone Required (including perimeter stone)	419	tons
Volume of Excavation	554	cubic yards
Non-woven Filter Fabric Required (20% Safety Factor)	760	square yards
Length of Isolator Row	62.1	feet
Non-woven Isolator Row Fabric (20% Safety Factor)	108	square yards
Woven Isolator Row Fabric (20% Safety Factor)	137	square yards
Installed Storage Volume	7,625	cubic feet

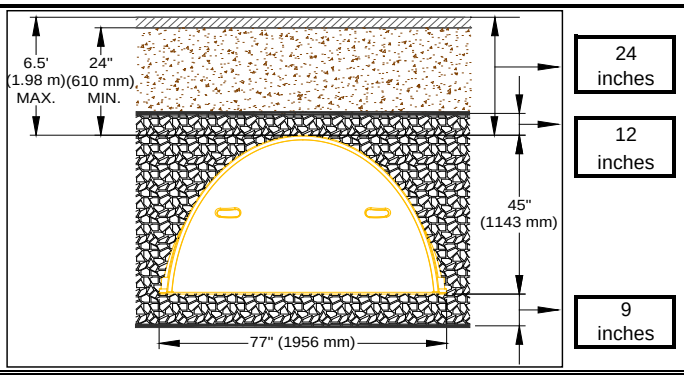
Controlled by Width (Rows)

Maximum Width = 40 feet

5 rows of 8 chambers

Maximum Length = 62.1 feet

Maximum Width = 37.1 feet



*This represents the estimated material and site work costs (US dollars) for the project. Materials excluded from this estimate are conveyance pipe, pavement design, etc. It is always advisable to seek detailed construction costs from local installers. Please contact STORMTECH at 888-892-2694 for additional cost information.

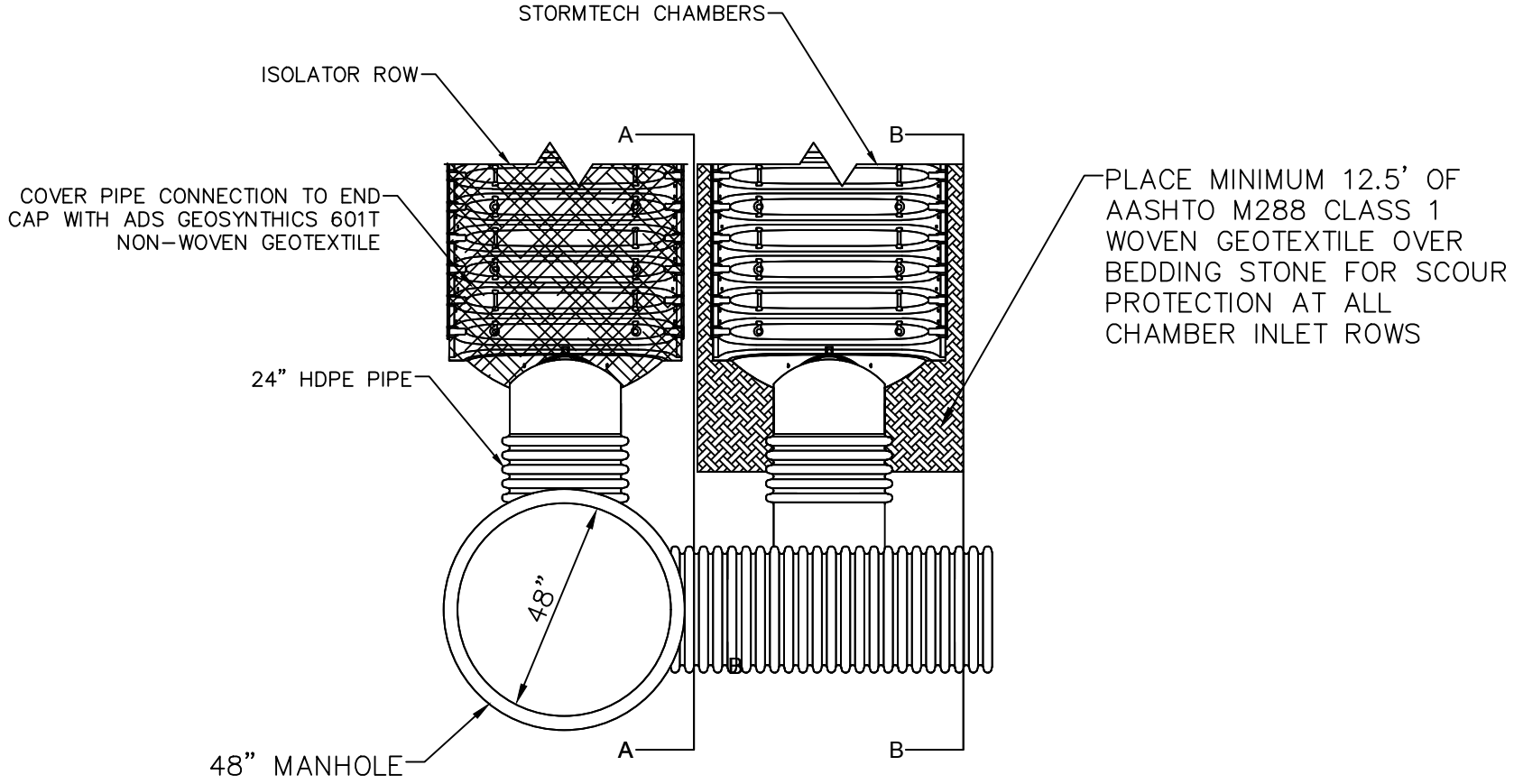
Project: **Tyke Town 11214CA**

Chamber Model -	MC-3500	
Units -	**Imperial**	Click Here for Metric
Number of Chambers -	40	
Number of End Caps -	10	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	492.17	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	9	in
Area of system -	2675	sf Min. Area - 2223 sf min. area

☑ Include Perimeter Stone in Calculations

StormTech MC-3500 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Single End Cap *(cubic feet)*	Incremental Chambers *(cubic feet)*	Incremental End Cap *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch, EC and Stone *(cubic feet)*	Cumulative System (cubic feet)	Elevation (feet)
66	0.00	0.00	0.00	0.00	89.17	89.17	8613.47	497.67
65	0.00	0.00	0.00	0.00	89.17	89.17	8524.30	497.59
64	0.00	0.00	0.00	0.00	89.17	89.17	8435.14	497.50
63	0.00	0.00	0.00	0.00	89.17	89.17	8345.97	497.42
62	0.00	0.00	0.00	0.00	89.17	89.17	8256.80	497.34
61	0.00	0.00	0.00	0.00	89.17	89.17	8167.64	497.25
60	0.00	0.00	0.00	0.00	89.17	89.17	8078.47	497.17
59	0.00	0.00	0.00	0.00	89.17	89.17	7989.30	497.09
58	0.00	0.00	0.00	0.00	89.17	89.17	7900.14	497.00
57	0.00	0.00	0.00	0.00	89.17	89.17	7810.97	496.92
56	0.00	0.00	0.00	0.00	89.17	89.17	7721.80	496.84
55	0.00	0.00	0.00	0.00	89.17	89.17	7632.64	496.75
54	0.06	0.00	2.32	0.00	88.24	90.56	7543.47	496.67
53	0.19	0.02	7.76	0.24	85.97	93.97	7452.91	496.59
52	0.29	0.04	11.76	0.38	84.31	96.45	7358.94	496.50
51	0.40	0.05	16.15	0.52	82.50	99.16	7262.49	496.42
50	0.69	0.07	27.49	0.68	77.90	106.06	7163.33	496.34
49	1.03	0.09	41.13	0.88	72.36	114.38	7057.26	496.25
48	1.25	0.11	49.98	1.07	68.75	119.80	6942.89	496.17
47	1.42	0.13	56.89	1.26	65.91	124.06	6823.09	496.09
46	1.57	0.14	62.93	1.44	63.42	127.79	6699.03	496.00
45	1.71	0.16	68.29	1.63	61.20	131.12	6571.24	495.92
44	1.83	0.18	73.14	1.82	59.18	134.14	6440.13	495.84
43	1.94	0.20	77.51	2.01	57.36	136.88	6305.99	495.75
42	2.04	0.22	81.63	2.18	55.64	139.46	6169.11	495.67
41	2.13	0.23	85.39	2.35	54.07	141.81	6029.66	495.59
40	2.22	0.25	88.97	2.51	52.58	144.05	5887.85	495.50
39	2.31	0.27	92.27	2.66	51.20	146.12	5743.80	495.42
38	2.38	0.28	95.39	2.80	49.89	148.08	5597.67	495.34
37	2.46	0.29	98.36	2.94	48.65	149.95	5449.59	495.25
36	2.53	0.31	101.13	3.08	47.48	151.69	5299.64	495.17
35	2.59	0.32	103.75	3.21	46.38	153.34	5147.95	495.09
34	2.66	0.33	106.24	3.34	45.33	154.92	4994.61	495.00
33	2.72	0.35	108.60	3.47	44.34	156.41	4839.69	494.92
32	2.77	0.36	110.85	3.60	43.39	157.84	4683.28	494.84
31	2.82	0.37	112.99	3.72	42.48	159.19	4525.44	494.75
30	2.88	0.38	115.02	3.84	41.62	160.48	4366.25	494.67
29	2.92	0.40	116.97	3.96	40.80	161.72	4205.77	494.59
28	2.97	0.41	118.80	4.08	40.02	162.89	4044.04	494.50
27	3.01	0.42	120.50	4.19	39.29	163.98	3881.15	494.42
26	3.05	0.43	122.13	4.30	38.60	165.02	3717.18	494.34
25	3.09	0.44	123.77	4.40	37.90	166.07	3552.15	494.25
24	3.13	0.45	125.22	4.51	37.27	167.00	3386.08	494.17
23	3.17	0.46	126.63	4.61	36.67	167.91	3219.08	494.09
22	3.20	0.47	127.98	4.71	36.09	168.78	3051.17	494.00
21	3.23	0.48	129.24	4.80	35.55	169.59	2882.39	493.92
20	3.26	0.49	130.46	4.89	35.03	170.38	2712.80	493.84
19	3.29	0.50	131.61	4.98	34.53	171.12	2542.42	493.75
18	3.32	0.51	132.72	5.06	34.05	171.84	2371.30	493.67
17	3.34	0.51	133.76	5.14	33.60	172.51	2199.47	493.59
16	3.37	0.52	134.74	5.22	33.18	173.15	2026.95	493.50
15	3.39	0.53	135.70	5.30	32.77	173.76	1853.81	493.42
14	3.41	0.54	136.58	5.37	32.39	174.34	1680.04	493.34
13	3.44	0.54	137.48	5.43	32.00	174.91	1505.71	493.25
12	3.46	0.55	138.31	5.49	31.65	175.45	1330.79	493.17
11	3.48	0.56	139.15	5.55	31.29	175.99	1155.35	493.09
10	3.51	0.59	140.20	5.95	30.71	176.86	979.36	493.00
9	0.00	0.00	0.00	0.00	89.17	89.17	802.50	492.92
8	0.00	0.00	0.00	0.00	89.17	89.17	713.33	492.84
7	0.00	0.00	0.00	0.00	89.17	89.17	624.17	492.75
6	0.00	0.00	0.00	0.00	89.17	89.17	535.00	492.67
5	0.00	0.00	0.00	0.00	89.17	89.17	445.83	492.59
4	0.00	0.00	0.00	0.00	89.17	89.17	356.67	492.50
3	0.00	0.00	0.00	0.00	89.17	89.17	267.50	492.42
2	0.00	0.00	0.00	0.00	89.17	89.17	178.33	492.34
1	0.00	0.00	0.00	0.00	89.17	89.17	89.17	492.25



MANIFOLD LAYOUT

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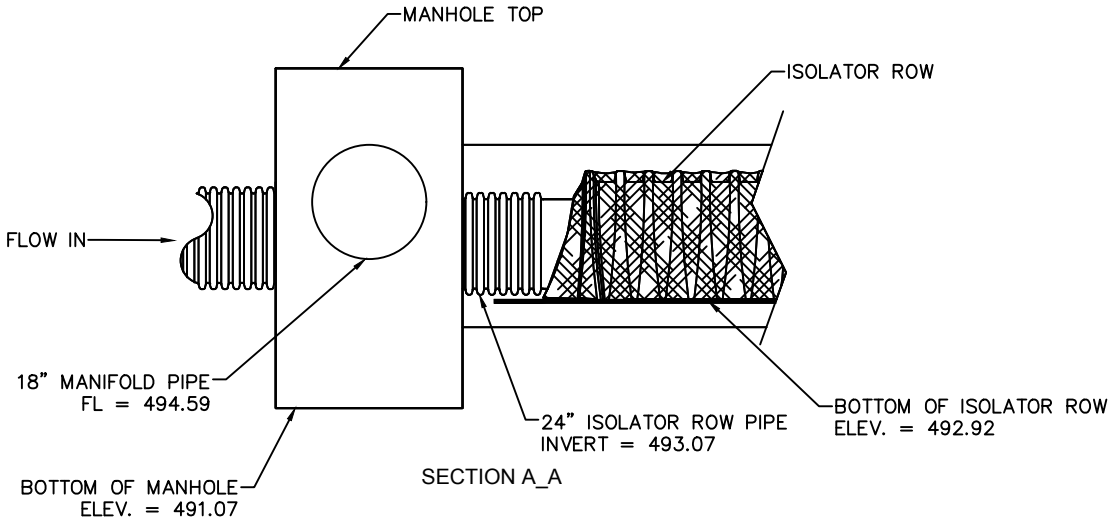

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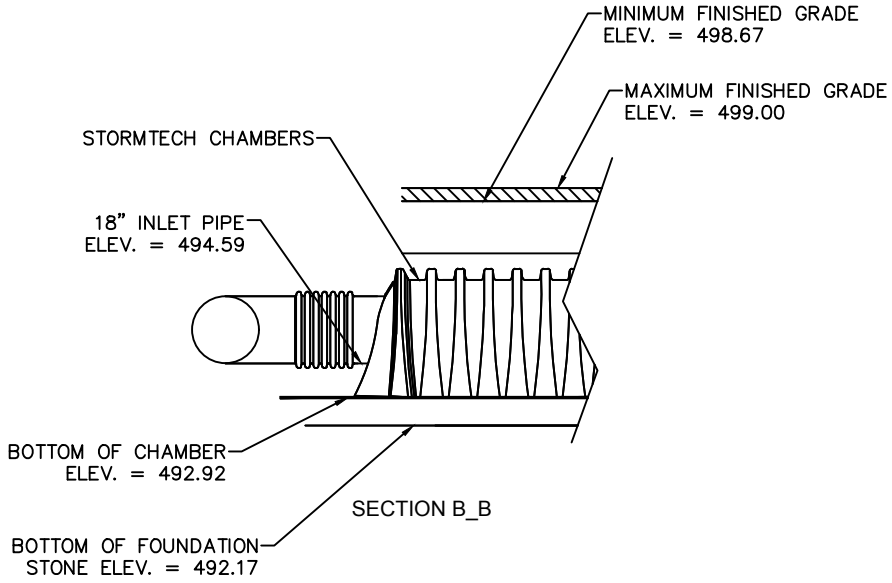

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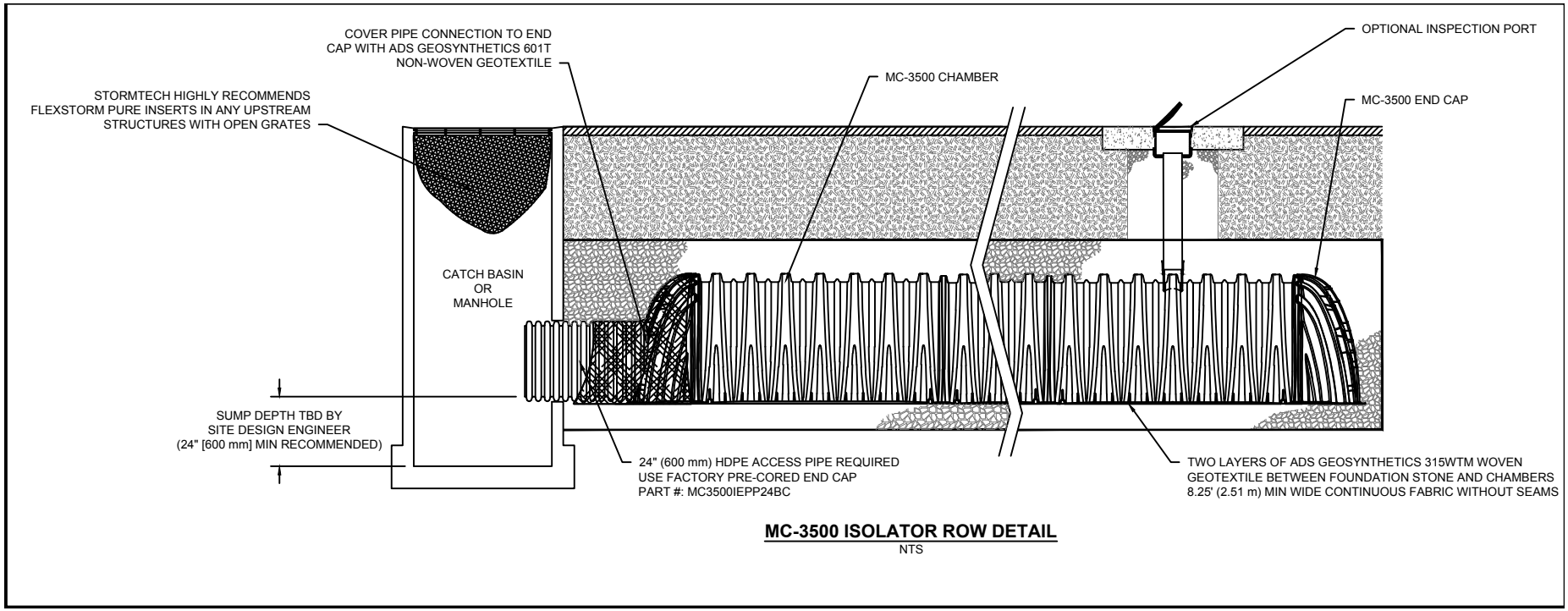

MC-3500 ISOLATOR ROW DETAIL

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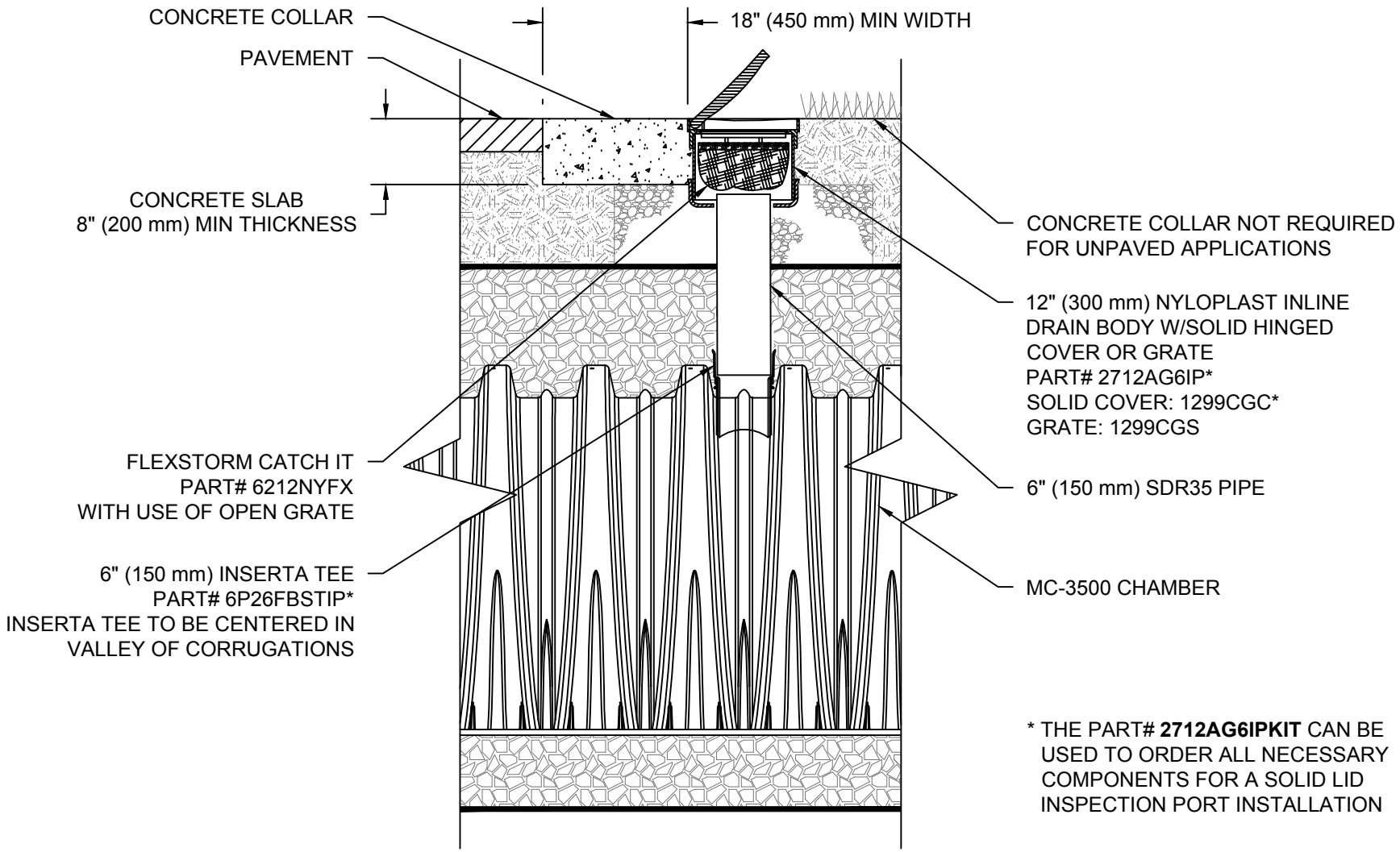

MC-3500 6" INSPECTION PORT DETAIL

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221 Point West Blvd.
St. Charles, MO 63301
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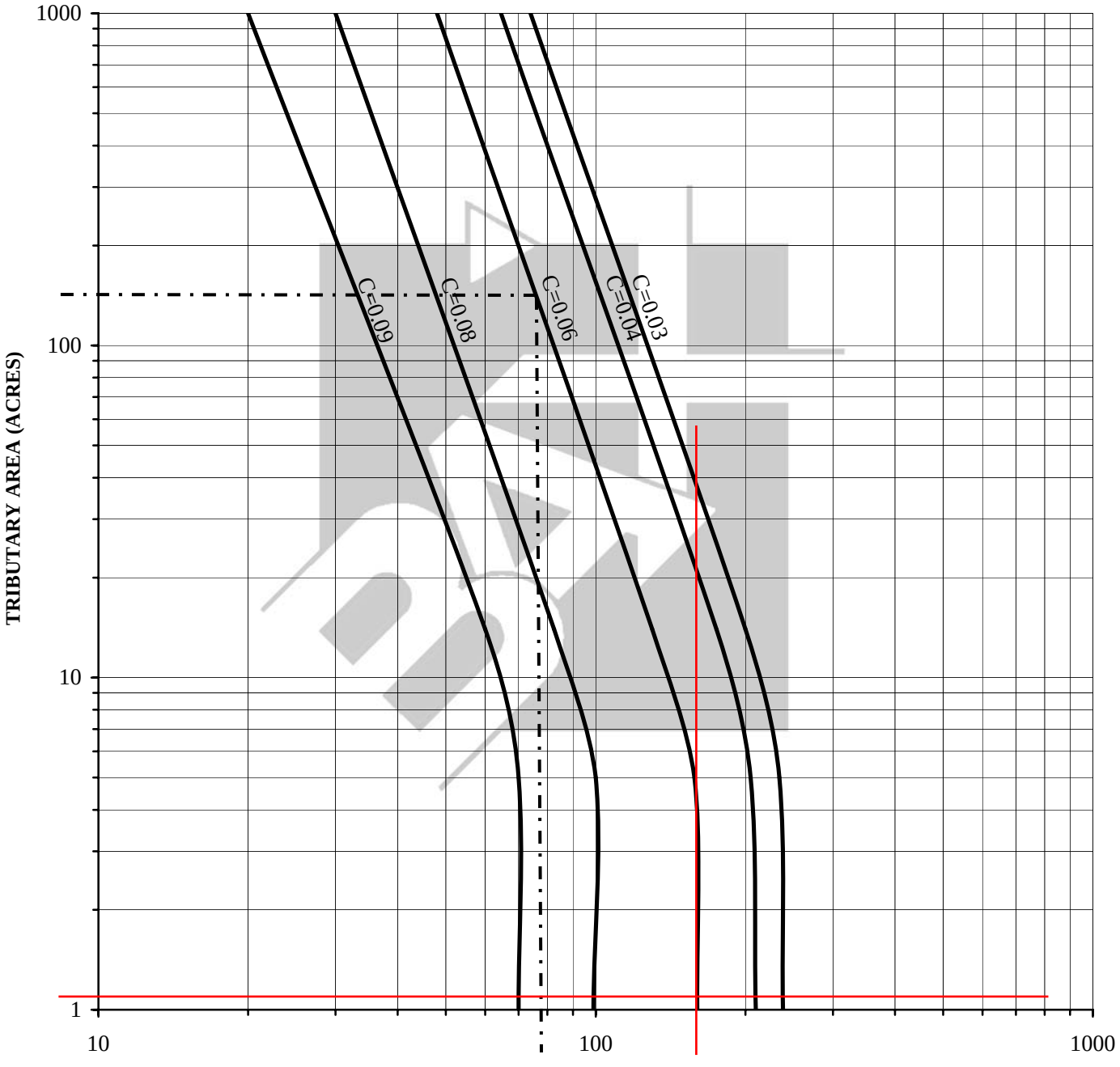
Project: Tyke Town
Date: 3/12/18 Project: 00-11214CA
Designer: MDS Checked: TCF

ANNUAL SEDIMENT STORAGE



Storage Required = Years of Storage * Annual Sediment * Drainage Area

RUNOFF C VALUE = 0.06
DRAINAGE AREA = 1.11 acres
ANNUAL SEDIMENT = 160 CU FT per acre

YEARS OF STORAGE = 2 years
STORAGE REQUIRED = 2*160*1.11=355 CU FT

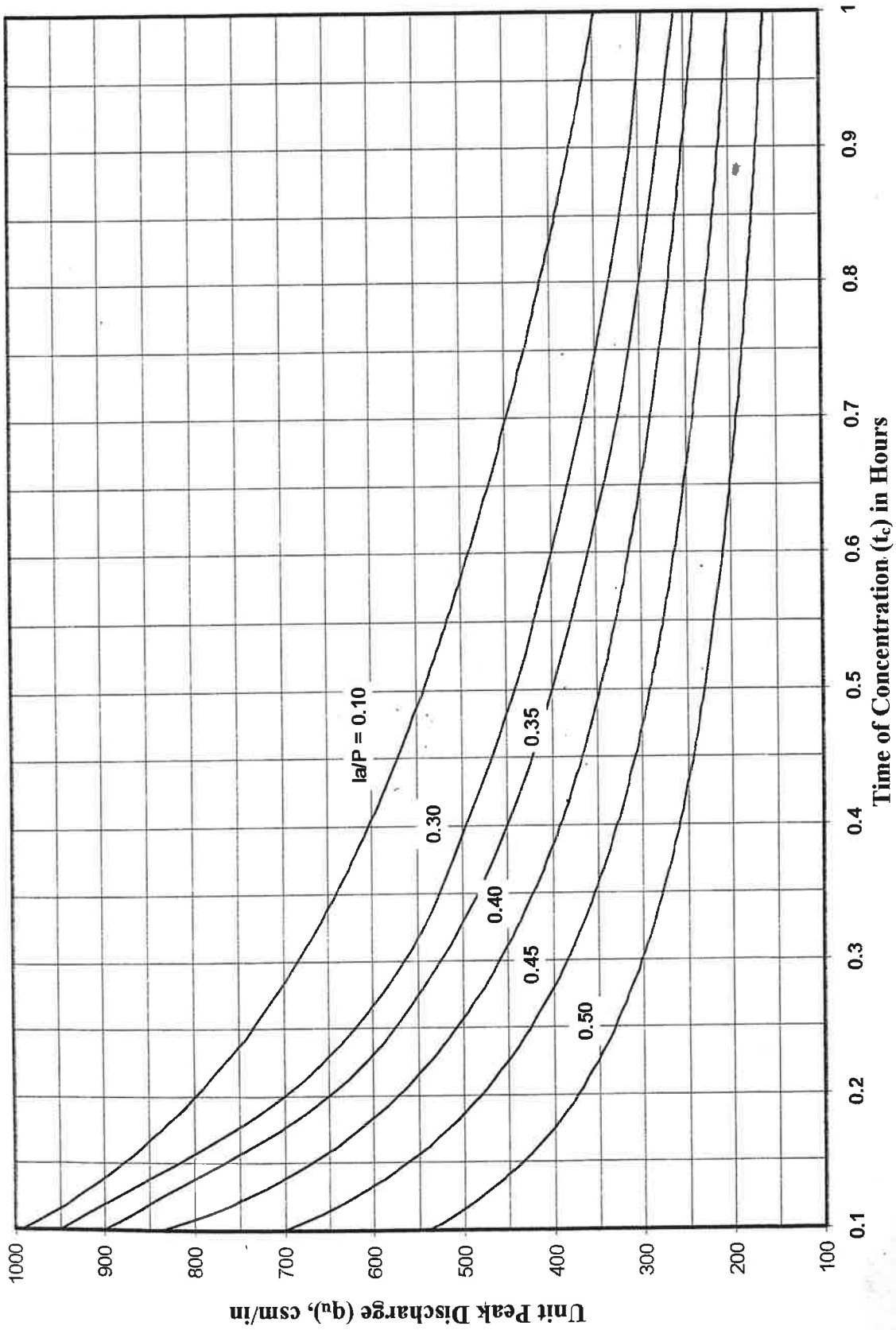


Figure D.11.1 **SCS Graphical Method of Determining Peak Discharge (q_u) in csm/in for 24-Hour Type II Storm Distribution**

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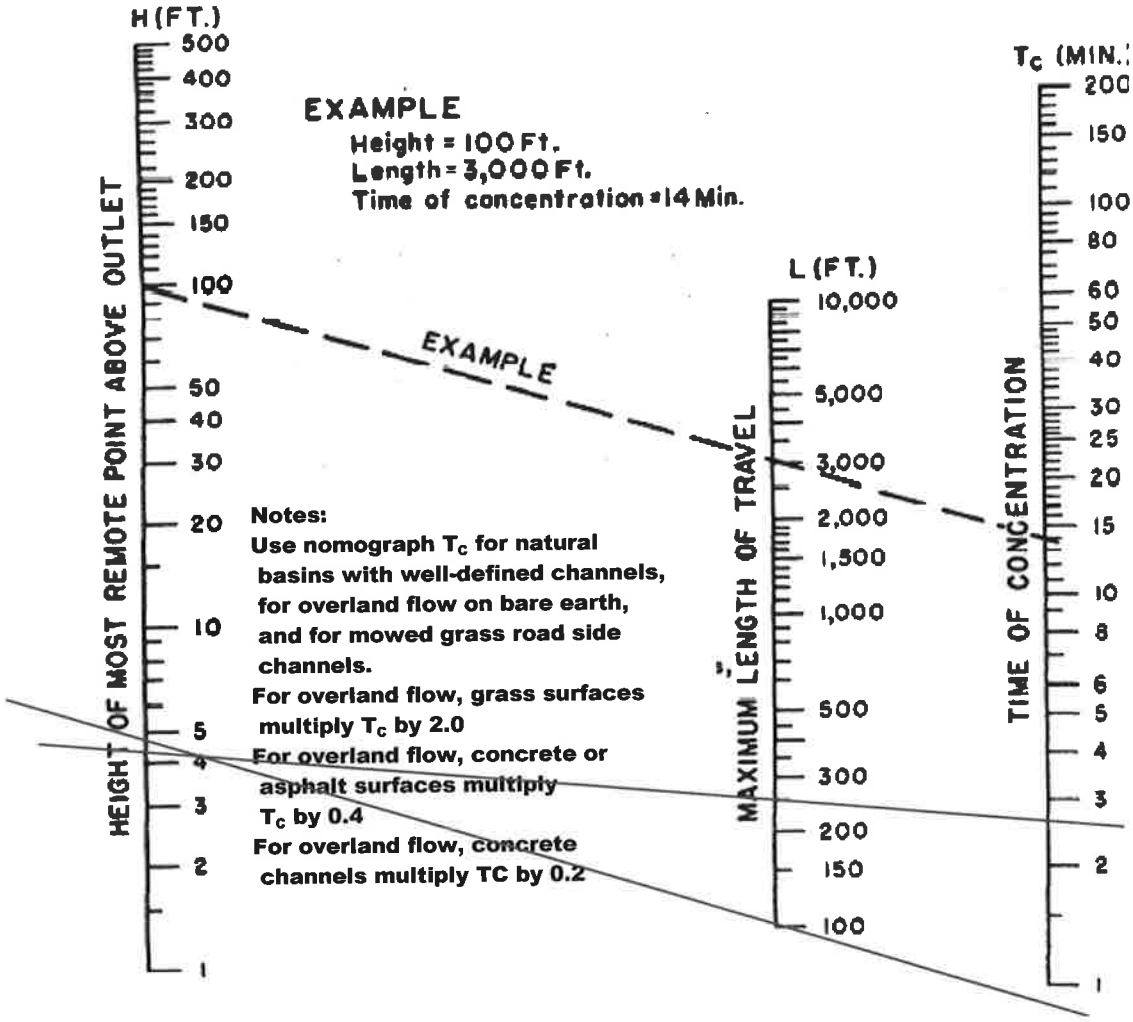
636 928-5552 FAX 636 928-1718

Project: Tyke Town
Date: 3-21-18 Project No: 00-11214CA
Designer: MDS Checked: TCF

TIME OF CONCENTRATION FOR SMALL DRAINAGE BASINS



OVERLAND FLOW

Δ Height = Grass 4.8ft; Pavement 4.2ft

Length = Grass 76ft; Pavement 250ft

$T_{Overland}$ = Grass (1)(2)=2 min; Pavement (2.7)(0.4)=1.08 min

STORM SEWER TRAVEL TIME

T_{storm}=Pipe Length (L) * Assumed Velocity (V)

L = 89 ft

V = 7 ft/s

T_{storm} = 89 ft / 7 ft/s / 60 sec/min =0.21min

Total Time of Concentration = $T_{Overland}$ + T_{storm} = 2 + 1.08 + 0.21 = 3.29 →USE 3 min.

Appendix B

Basin Routing

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

Table of Contents

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Basin B Inflow	2 Year 20 Min	0	2,316.000	3	1.93
Basin B Inflow	15 Year 20 Min	0	3,732.000	3	3.11
Basin B Inflow	25 Year 20 Min	0	4,596.000	3	3.83
Basin B Inflow	100 Year 20 Min	0	5,892.000	3	4.91
Basin B Inflow	100 Yr LFB	0	5,892.000	3	4.91

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Outfall B	2 Year 20 Min	0	2,177.000	22	0.63
Outfall B	15 Year 20 Min	0	3,514.000	22	0.85
Outfall B	25 Year 20 Min	0	4,324.000	22	1.09
Outfall B	100 Year 20 Min	0	5,553.000	22	1.57
Outfall B	100 Yr LFB	0	5,892.000	20	4.91

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
Underground Basin B (IN)	2 Year 20 Min	0	2,316.000	3	1.93	(N/A)	(N/A)
Underground Basin B (OUT)	2 Year 20 Min	0	2,177.000	22	0.63	493.74	2,519.000
Underground Basin B (IN)	15 Year 20 Min	0	3,732.000	3	3.11	(N/A)	(N/A)
Underground Basin B (OUT)	15 Year 20 Min	0	3,514.000	22	0.85	494.34	3,714.000
Underground Basin B (IN)	25 Year 20 Min	0	4,596.000	3	3.83	(N/A)	(N/A)
Underground Basin B (OUT)	25 Year 20 Min	0	4,324.000	22	1.09	494.72	4,457.000
Underground Basin B (IN)	100 Year 20 Min	0	5,892.000	3	4.91	(N/A)	(N/A)
Underground Basin B (OUT)	100 Year 20 Min	0	5,553.000	22	1.57	495.28	5,496.000
Underground Basin B (IN)	100 Yr LFB	0	5,892.000	3	4.91	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft^3)
Underground Basin B (OUT)	100 Yr LFB	0	5,892.000	20	4.91	496.95	7,845.000

Peak Discharge	1.93 ft³/s
Time to Peak	13 min
Hydrograph Volume	2,316.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	0.64	1.29	1.93	1.93
5	1.93	1.93	1.93	1.93	1.93
10	1.93	1.93	1.93	1.93	1.93
15	1.93	1.93	1.93	1.93	1.93
20	1.93	1.29	0.64	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Peak Discharge	3.11 ft³/s
Time to Peak	13 min
Hydrograph Volume	3,732.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	1.03	2.08	3.11	3.11
5	3.11	3.11	3.11	3.11	3.11
10	3.11	3.11	3.11	3.11	3.11
15	3.11	3.11	3.11	3.11	3.11
20	3.11	2.08	1.03	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Peak Discharge	3.83 ft³/s
Time to Peak	13 min
Hydrograph Volume	4,596.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	1.26	2.57	3.83	3.83
5	3.83	3.83	3.83	3.83	3.83
10	3.83	3.83	3.83	3.83	3.83
15	3.83	3.83	3.83	3.83	3.83
20	3.83	2.57	1.26	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Peak Discharge	4.91 ft³/s
Time to Peak	13 min
Hydrograph Volume	5,892.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	1.62	3.29	4.91	4.91
5	4.91	4.91	4.91	4.91	4.91
10	4.91	4.91	4.91	4.91	4.91
15	4.91	4.91	4.91	4.91	4.91
20	4.91	3.29	1.62	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
492.17	0.000
492.25	89.170
492.34	178.330
492.42	267.500
492.50	356.670
492.59	445.830
492.67	535.000
492.75	624.170
492.84	713.330
492.92	802.500
493.00	979.360
493.09	1,155.350
493.17	1,330.790
493.25	1,505.710
493.34	1,680.040
493.42	1,853.810
493.50	2,026.950
493.59	2,199.470
493.67	2,371.300
493.75	2,542.420
493.84	2,712.800
493.92	2,882.390
494.00	3,051.170
494.09	3,219.080
494.17	3,386.080
494.25	3,552.150
494.34	3,717.180
494.42	3,881.150
494.50	4,044.040
494.59	4,205.770
494.67	4,366.250
494.75	4,525.440
494.84	4,683.280
494.92	4,839.690
495.00	4,994.610
495.09	5,147.950
495.17	5,299.640
495.25	5,449.590
495.34	5,597.670
495.42	5,743.800
495.50	5,887.850
495.59	6,029.660
495.67	6,169.110
495.75	6,305.990
495.84	6,440.130

Subsection: Elevation vs. Volume Curve
Label: Underground Basin B

Return Event: 2 years
Storm Event:

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
495.92	6,571.240
496.00	6,699.030
496.09	6,823.090
496.17	6,942.890
496.25	7,057.260
496.34	7,163.330
496.42	7,262.490
496.50	7,358.940
496.59	7,452.910
496.67	7,543.470
496.75	7,632.640
496.84	7,721.800
496.92	7,810.970
497.00	7,900.140
497.09	7,989.300
497.17	8,078.470
497.25	8,167.640
497.34	8,256.800
497.42	8,345.970
497.50	8,435.140
497.59	8,524.300
497.67	8,613.470

Requested Pond Water Surface Elevations	
Minimum (Headwater)	499.13 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	505.28 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	Culvert - 1	496.40	497.67
Culvert-Circular	Culvert - 1	Forward	TW	492.68	497.67
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	69.12 ft
Length (Computed Barrel)	69.12 ft
Slope (Computed)	0.002 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)	1.094
T2 ratio (HW/D)	1.196
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	494.32 ft	T1 Flow	7.58 ft³/s
T2 Elevation	494.47 ft	T2 Flow	8.66 ft³/s

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	496.40 ft
Weir Length	4.00 ft
Weir Coefficient	3.00 (ft^0.5)/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: LFB 1

Return Event: 101 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
492.17	0.00	(N/A)	0.00
492.27	0.00	(N/A)	0.00
492.37	0.00	(N/A)	0.00
492.47	0.00	(N/A)	0.00
492.57	0.00	(N/A)	0.00
492.67	0.00	(N/A)	0.00
492.68	0.00	(N/A)	0.00
492.77	0.00	(N/A)	0.00
492.87	0.00	(N/A)	0.00
492.97	0.00	(N/A)	0.00
493.07	0.00	(N/A)	0.00
493.17	0.00	(N/A)	0.00
493.27	0.00	(N/A)	0.00
493.37	0.00	(N/A)	0.00
493.47	0.00	(N/A)	0.00
493.57	0.00	(N/A)	0.00
493.67	0.00	(N/A)	0.00
493.77	0.00	(N/A)	0.00
493.87	0.00	(N/A)	0.00
493.97	0.00	(N/A)	0.00
494.07	0.00	(N/A)	0.00
494.17	0.00	(N/A)	0.00
494.27	0.00	(N/A)	0.00
494.37	0.00	(N/A)	0.00
494.47	0.00	(N/A)	0.00
494.57	0.00	(N/A)	0.00
494.67	0.00	(N/A)	0.00
494.77	0.00	(N/A)	0.00
494.87	0.00	(N/A)	0.00
494.97	0.00	(N/A)	0.00
495.07	0.00	(N/A)	0.00
495.17	0.00	(N/A)	0.00
495.27	0.00	(N/A)	0.00
495.37	0.00	(N/A)	0.00
495.47	0.00	(N/A)	0.00
495.57	0.00	(N/A)	0.00
495.67	0.00	(N/A)	0.00
495.77	0.00	(N/A)	0.00
495.87	0.00	(N/A)	0.00
495.97	0.00	(N/A)	0.00
496.07	0.00	(N/A)	0.00
496.17	0.00	(N/A)	0.00
496.27	0.00	(N/A)	0.00
496.37	0.00	(N/A)	0.00

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
496.40	0.00	(N/A)	0.00
496.47	0.22	(N/A)	0.00
496.57	0.84	(N/A)	0.00
496.67	1.68	(N/A)	0.00
496.77	2.70	(N/A)	0.00
496.87	3.86	(N/A)	0.00
496.97	5.17	(N/A)	0.00
497.07	6.58	(N/A)	0.00
497.17	8.11	(N/A)	0.00
497.27	9.74	(N/A)	0.00
497.37	11.47	(N/A)	0.00
497.47	13.28	(N/A)	0.00
497.57	14.65	(N/A)	0.00
497.67	15.37	(N/A)	0.00

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

Subsection: Composite Rating Curve
Label: LFB 1

Return Event: 101 years
Storm Event:

Composite Outflow Summary

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

Requested Pond Water Surface Elevations	
Minimum (Headwater)	492.17 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	497.67 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Area	Orifice - 1	Forward + Reverse	Culvert - 1	493.30	497.67
Rectangular Weir	Weir - 1	Forward + Reverse	Culvert - 1	492.80	493.30
Orifice-Area	Orifice - 2	Forward + Reverse	Culvert - 1	494.90	497.67
Rectangular Weir	Weir - 2	Forward + Reverse	Culvert - 1	494.40	494.90
Culvert-Circular	Culvert - 1	Forward	TW	492.68	497.67
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	492.80 ft
Weir Length	0.33 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Orifice - 1 Structure Type: Orifice-Area	
Number of Openings	1
Elevation	492.80 ft
Orifice Area	0.17 ft²
Top Elevation	493.30 ft
Datum Elevation	493.05 ft
Orifice Coefficient	0.600

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	69.12 ft
Length (Computed Barrel)	69.12 ft
Slope (Computed)	0.002 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)	1.094
T2 ratio (HW/D)	1.196
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	494.32 ft	T1 Flow	7.58 ft³/s
T2 Elevation	494.47 ft	T2 Flow	8.66 ft³/s

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	494.40 ft
Weir Length	0.25 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Orifice - 2 Structure Type: Orifice-Area	
Number of Openings	1
Elevation	494.40 ft
Orifice Area	0.13 ft²
Top Elevation	494.90 ft
Datum Elevation	494.65 ft
Orifice Coefficient	0.600

Subsection: Composite Rating Curve
Label: OS 101

Return Event: 2 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
492.17	0.00	489.00	0.00
492.27	0.00	489.00	0.00
492.37	0.00	489.00	0.00
492.47	0.00	489.00	0.00
492.57	0.00	489.00	0.00
492.67	0.00	489.00	0.00
492.68	0.00	489.00	0.00
492.77	0.00	489.00	0.00
492.80	0.00	489.00	0.00
492.87	0.02	489.00	0.00
492.97	0.07	489.00	0.00
493.07	0.13	489.00	0.00
493.17	0.20	489.00	0.00
493.27	0.29	489.00	0.00
493.37	0.45	489.00	0.00
493.47	0.50	489.00	0.00
493.57	0.55	489.00	0.00
493.67	0.60	489.00	0.00
493.77	0.64	489.00	0.00
493.87	0.68	489.00	0.00
493.97	0.72	489.00	0.00
494.07	0.76	489.00	0.00
494.17	0.79	489.00	0.00
494.27	0.83	489.00	0.00
494.37	0.86	489.00	0.00
494.40	0.87	489.00	0.00
494.47	0.91	489.00	0.00
494.57	0.97	489.00	0.00
494.67	1.05	489.00	0.00
494.77	1.14	489.00	0.00
494.87	1.24	489.00	0.00
494.97	1.36	489.00	0.00
495.07	1.43	489.00	0.00
495.17	1.50	489.00	0.00
495.27	1.57	489.00	0.00
495.37	1.63	489.00	0.00
495.47	1.69	489.00	0.00
495.57	1.74	489.00	0.00
495.67	1.80	489.00	0.00
495.77	1.85	489.00	0.00
495.87	1.90	489.00	0.00
495.97	1.95	489.00	0.00
496.07	2.00	489.00	0.00
496.17	2.04	489.00	0.00

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
496.27	2.09	489.00	0.00
496.37	2.13	489.00	0.00
496.47	2.18	489.00	0.00
496.57	2.22	489.00	0.00
496.67	2.26	489.00	0.00
496.77	2.31	489.00	0.00
496.87	2.34	489.00	0.00
496.97	2.38	489.00	0.00
497.07	2.42	489.00	0.00
497.17	2.46	489.00	0.00
497.27	2.50	489.00	0.00
497.37	2.54	489.00	0.00
497.47	2.58	489.00	0.00
497.57	2.61	489.00	0.00
497.67	2.65	489.00	0.00

Contributing Structures
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)

Composite Outflow Summary

Contributing Structures
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)

Composite Outflow Summary

Contributing Structures
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 2 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.95
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 15 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.95
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.95
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 100 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.95
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.40 ft
Volume (Initial)	7,238.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.87	0.00	746.769	0.00	0.00	0.00	24.89
492.97	0.00	913.038	0.00	0.00	0.00	30.43
493.07	0.00	1,116.241	0.00	0.00	0.00	37.21
493.17	0.00	1,330.790	0.00	0.00	0.00	44.36
493.27	0.00	1,544.450	0.00	0.00	0.00	51.48
493.37	0.00	1,745.204	0.00	0.00	0.00	58.17
493.47	0.00	1,962.023	0.00	0.00	0.00	65.40
493.57	0.00	2,161.132	0.00	0.00	0.00	72.04
493.67	0.00	2,371.300	0.00	0.00	0.00	79.04
493.77	0.00	2,580.282	0.00	0.00	0.00	86.01
493.87	0.00	2,776.396	0.00	0.00	0.00	92.55
493.97	0.00	2,987.878	0.00	0.00	0.00	99.60
494.07	0.00	3,181.767	0.00	0.00	0.00	106.06
494.17	0.00	3,386.080	0.00	0.00	0.00	112.87
494.27	0.00	3,588.823	0.00	0.00	0.00	119.63
494.37	0.00	3,778.669	0.00	0.00	0.00	125.96
494.47	0.00	3,982.956	0.00	0.00	0.00	132.77
494.57	0.00	4,169.830	0.00	0.00	0.00	138.99
494.67	0.00	4,366.250	0.00	0.00	0.00	145.54
494.77	0.00	4,560.516	0.00	0.00	0.00	152.02
494.87	0.00	4,741.934	0.00	0.00	0.00	158.06
494.97	0.00	4,936.515	0.00	0.00	0.00	164.55
495.07	0.00	5,113.874	0.00	0.00	0.00	170.46

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 101 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ft^3)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
495.17	0.00	5,299.640	0.00	0.00	0.00	176.65
495.27	0.00	5,482.497	0.00	0.00	0.00	182.75
495.37	0.00	5,652.469	0.00	0.00	0.00	188.42
495.47	0.00	5,833.831	0.00	0.00	0.00	194.46
495.57	0.00	5,998.147	0.00	0.00	0.00	199.94
495.67	0.00	6,169.110	0.00	0.00	0.00	205.64
495.77	0.00	6,335.799	0.00	0.00	0.00	211.19
495.87	0.00	6,489.296	0.00	0.00	0.00	216.31
495.97	0.00	6,651.109	0.00	0.00	0.00	221.70
496.07	0.00	6,795.521	0.00	0.00	0.00	226.52
496.17	0.00	6,942.890	0.00	0.00	0.00	231.43
496.27	0.00	7,080.831	0.00	0.00	0.00	236.03
496.37	0.00	7,200.515	0.00	0.00	0.00	240.02
496.40	0.00	7,237.700	0.00	0.00	0.00	241.26
496.47	0.22	7,322.771	0.00	0.00	0.22	244.31
496.57	0.84	7,432.028	0.00	0.00	0.84	248.57
496.67	1.68	7,543.470	0.00	0.00	1.68	253.13
496.77	2.70	7,652.453	0.00	0.00	2.70	257.78
496.87	3.86	7,755.239	0.00	0.00	3.86	262.37
496.97	5.17	7,866.701	0.00	0.00	5.17	267.39
497.07	6.58	7,969.487	0.00	0.00	6.58	272.23
497.17	8.11	8,078.470	0.00	0.00	8.11	277.39
497.27	9.74	8,187.453	0.00	0.00	9.74	282.66
497.37	11.47	8,290.239	0.00	0.00	11.47	287.81
497.47	13.28	8,401.701	0.00	0.00	13.28	293.34
497.57	14.65	8,504.487	0.00	0.00	14.65	298.14
497.67	15.37	8,613.470	0.00	0.00	15.37	302.48

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1.93 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	0.63 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	493.74 ft
Volume (Peak)	2,519.114 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	2,316.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	2,177.000 ft³
Volume (Retained)	789.000 ft³
Volume (Unrouted)	-23.000 ft³
Error (Mass Balance)	1.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.11 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	0.85 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	494.34 ft
Volume (Peak)	3,713.760 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	3,732.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	3,514.000 ft³
Volume (Retained)	880.000 ft³
Volume (Unrouted)	-12.000 ft³
Error (Mass Balance)	0.3 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.83 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	1.09 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	494.72 ft
Volume (Peak)	4,456.582 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	4,596.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	4,324.000 ft³
Volume (Retained)	943.000 ft³
Volume (Unrouted)	-2.000 ft³
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	4.91 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	1.57 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	495.28 ft
Volume (Peak)	5,495.613 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	5,892.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	5,553.000 ft³
Volume (Retained)	1,011.000 ft³
Volume (Unrouted)	-2.000 ft³
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.40 ft
Volume (Initial)	7,238.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	4.91 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	4.91 ft³/s	Time to Peak (Flow, Outlet)	20 min

Elevation (Water Surface, Peak)	496.95 ft
Volume (Peak)	7,844.576 ft³

Mass Balance (ft³)	
Volume (Initial)	7,238.000 ft³
Volume (Total Inflow)	5,892.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	5,892.000 ft³
Volume (Retained)	7,238.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.0 %

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	2,316.000	3	1.93
Flow (In)	Underground Basin B	2,316.000	3	1.93

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	3,732.000	3	3.11
Flow (In)	Underground Basin B	3,732.000	3	3.11

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	4,596.000	3	3.83
Flow (In)	Underground Basin B	4,596.000	3	3.83

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	5,892.000	3	4.91
Flow (In)	Underground Basin B	5,892.000	3	4.91

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	5,892.000	3	4.91
Flow (In)	Underground Basin B	5,892.000	3	4.91

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Appendix C

Future Basin Routing

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

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Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Basin B Inflow	2 Year 20 Min	0	2,952.000	3	2.46
Basin B Inflow	15 Year 20 Min	0	4,776.000	3	3.98
Basin B Inflow	25 Year 20 Min	0	5,892.000	3	4.91
Basin B Inflow	100 Year 20 Min	0	7,536.000	3	6.28
Basin B Inflow	100 Yr LFB	0	7,536.000	3	6.28

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
Outfall B	2 Year 20 Min	0	2,780.000	22	0.73
Outfall B	15 Year 20 Min	0	4,494.000	22	1.16
Outfall B	25 Year 20 Min	0	5,552.000	22	1.57
Outfall B	100 Year 20 Min	0	7,114.000	22	2.00
Outfall B	100 Yr LFB	0	7,536.000	20	6.28

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
Underground Basin B (IN)	2 Year 20 Min	0	2,952.000	3	2.46	(N/A)	(N/A)
Underground Basin B (OUT)	2 Year 20 Min	0	2,780.000	22	0.73	494.00	3,054.000
Underground Basin B (IN)	15 Year 20 Min	0	4,776.000	3	3.98	(N/A)	(N/A)
Underground Basin B (OUT)	15 Year 20 Min	0	4,494.000	22	1.16	494.79	4,602.000
Underground Basin B (IN)	25 Year 20 Min	0	5,892.000	3	4.91	(N/A)	(N/A)
Underground Basin B (OUT)	25 Year 20 Min	0	5,552.000	22	1.57	495.28	5,496.000
Underground Basin B (IN)	100 Year 20 Min	0	7,536.000	3	6.28	(N/A)	(N/A)
Underground Basin B (OUT)	100 Year 20 Min	0	7,114.000	22	2.00	496.08	6,815.000
Underground Basin B (IN)	100 Yr LFB	0	7,536.000	3	6.28	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft^3)
Underground Basin B (OUT)	100 Yr LFB	0	7,536.000	20	6.28	497.05	7,948.000

Peak Discharge	2.46 ft³/s
Time to Peak	13 min
Hydrograph Volume	2,952.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	0.81	1.65	2.46	2.46
5	2.46	2.46	2.46	2.46	2.46
10	2.46	2.46	2.46	2.46	2.46
15	2.46	2.46	2.46	2.46	2.46
20	2.46	1.65	0.81	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Read Hydrograph
Label: Basin B Inflow

Return Event: 15 years
Storm Event:

Peak Discharge	3.98 ft³/s
Time to Peak	13 min
Hydrograph Volume	4,776.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	1.31	2.67	3.98	3.98
5	3.98	3.98	3.98	3.98	3.98
10	3.98	3.98	3.98	3.98	3.98
15	3.98	3.98	3.98	3.98	3.98
20	3.98	2.67	1.31	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Peak Discharge	4.91 ft³/s
Time to Peak	13 min
Hydrograph Volume	5,892.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	1.62	3.29	4.91	4.91
5	4.91	4.91	4.91	4.91	4.91
10	4.91	4.91	4.91	4.91	4.91
15	4.91	4.91	4.91	4.91	4.91
20	4.91	3.29	1.62	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Peak Discharge	6.28 ft³/s
Time to Peak	13 min
Hydrograph Volume	7,536.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 1 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	0.00	2.07	4.21	6.28	6.28
5	6.28	6.28	6.28	6.28	6.28
10	6.28	6.28	6.28	6.28	6.28
15	6.28	6.28	6.28	6.28	6.28
20	6.28	4.21	2.07	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00
90	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
492.17	0.000
492.25	89.170
492.34	178.330
492.42	267.500
492.50	356.670
492.59	445.830
492.67	535.000
492.75	624.170
492.84	713.330
492.92	802.500
493.00	979.360
493.09	1,155.350
493.17	1,330.790
493.25	1,505.710
493.34	1,680.040
493.42	1,853.810
493.50	2,026.950
493.59	2,199.470
493.67	2,371.300
493.75	2,542.420
493.84	2,712.800
493.92	2,882.390
494.00	3,051.170
494.09	3,219.080
494.17	3,386.080
494.25	3,552.150
494.34	3,717.180
494.42	3,881.150
494.50	4,044.040
494.59	4,205.770
494.67	4,366.250
494.75	4,525.440
494.84	4,683.280
494.92	4,839.690
495.00	4,994.610
495.09	5,147.950
495.17	5,299.640
495.25	5,449.590
495.34	5,597.670
495.42	5,743.800
495.50	5,887.850
495.59	6,029.660
495.67	6,169.110
495.75	6,305.990
495.84	6,440.130

Subsection: Elevation vs. Volume Curve
Label: Underground Basin B

Return Event: 2 years
Storm Event:

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
495.92	6,571.240
496.00	6,699.030
496.09	6,823.090
496.17	6,942.890
496.25	7,057.260
496.34	7,163.330
496.42	7,262.490
496.50	7,358.940
496.59	7,452.910
496.67	7,543.470
496.75	7,632.640
496.84	7,721.800
496.92	7,810.970
497.00	7,900.140
497.09	7,989.300
497.17	8,078.470
497.25	8,167.640
497.34	8,256.800
497.42	8,345.970
497.50	8,435.140
497.59	8,524.300
497.67	8,613.470

Requested Pond Water Surface Elevations	
Minimum (Headwater)	492.17 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	497.67 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	Culvert - 1	496.40	497.67
Culvert-Circular	Culvert - 1	Forward	TW	492.68	497.67
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	69.01 ft
Length (Computed Barrel)	69.01 ft
Slope (Computed)	0.002 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)	1.094
T2 ratio (HW/D)	1.196
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	494.32 ft	T1 Flow	7.58 ft³/s
T2 Elevation	494.47 ft	T2 Flow	8.66 ft³/s

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	496.40 ft
Weir Length	4.00 ft
Weir Coefficient	3.00 (ft^0.5)/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: LFB 1

Return Event: 101 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
492.17	0.00	(N/A)	0.00
492.27	0.00	(N/A)	0.00
492.37	0.00	(N/A)	0.00
492.47	0.00	(N/A)	0.00
492.57	0.00	(N/A)	0.00
492.67	0.00	(N/A)	0.00
492.68	0.00	(N/A)	0.00
492.77	0.00	(N/A)	0.00
492.87	0.00	(N/A)	0.00
492.97	0.00	(N/A)	0.00
493.07	0.00	(N/A)	0.00
493.17	0.00	(N/A)	0.00
493.27	0.00	(N/A)	0.00
493.37	0.00	(N/A)	0.00
493.47	0.00	(N/A)	0.00
493.57	0.00	(N/A)	0.00
493.67	0.00	(N/A)	0.00
493.77	0.00	(N/A)	0.00
493.87	0.00	(N/A)	0.00
493.97	0.00	(N/A)	0.00
494.07	0.00	(N/A)	0.00
494.17	0.00	(N/A)	0.00
494.27	0.00	(N/A)	0.00
494.37	0.00	(N/A)	0.00
494.47	0.00	(N/A)	0.00
494.57	0.00	(N/A)	0.00
494.67	0.00	(N/A)	0.00
494.77	0.00	(N/A)	0.00
494.87	0.00	(N/A)	0.00
494.97	0.00	(N/A)	0.00
495.07	0.00	(N/A)	0.00
495.17	0.00	(N/A)	0.00
495.27	0.00	(N/A)	0.00
495.37	0.00	(N/A)	0.00
495.47	0.00	(N/A)	0.00
495.57	0.00	(N/A)	0.00
495.67	0.00	(N/A)	0.00
495.77	0.00	(N/A)	0.00
495.87	0.00	(N/A)	0.00
495.97	0.00	(N/A)	0.00
496.07	0.00	(N/A)	0.00
496.17	0.00	(N/A)	0.00
496.27	0.00	(N/A)	0.00
496.37	0.00	(N/A)	0.00

Subsection: Composite Rating Curve
Label: LFB 1

Return Event: 101 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
496.40	0.00	(N/A)	0.00
496.47	0.22	(N/A)	0.00
496.57	0.84	(N/A)	0.00
496.67	1.68	(N/A)	0.00
496.77	2.70	(N/A)	0.00
496.87	3.86	(N/A)	0.00
496.97	5.17	(N/A)	0.00
497.07	6.58	(N/A)	0.00
497.17	8.11	(N/A)	0.00
497.27	9.74	(N/A)	0.00
497.37	11.46	(N/A)	0.00
497.47	13.28	(N/A)	0.00
497.57	14.66	(N/A)	0.00
497.67	15.37	(N/A)	0.00

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

Subsection: Composite Rating Curve
Label: LFB 1

Return Event: 101 years
Storm Event:

Composite Outflow Summary

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

Requested Pond Water Surface Elevations	
Minimum (Headwater)	492.17 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	497.67 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Area	Orifice - 1	Forward + Reverse	Culvert - 1	493.30	497.67
Rectangular Weir	Weir - 1	Forward + Reverse	Culvert - 1	492.80	493.30
Orifice-Area	Orifice - 2	Forward + Reverse	Culvert - 1	494.90	497.67
Rectangular Weir	Weir - 2	Forward + Reverse	Culvert - 1	494.40	494.90
Culvert-Circular	Culvert - 1	Forward	TW	492.68	497.67
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	492.80 ft
Weir Length	0.33 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Orifice - 1 Structure Type: Orifice-Area	
Number of Openings	1
Elevation	492.80 ft
Orifice Area	0.17 ft²
Top Elevation	493.30 ft
Datum Elevation	493.05 ft
Orifice Coefficient	0.600

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	69.01 ft
Length (Computed Barrel)	69.01 ft
Slope (Computed)	0.002 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)	1.094
T2 ratio (HW/D)	1.196
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	494.32 ft	T1 Flow	7.58 ft³/s
T2 Elevation	494.47 ft	T2 Flow	8.66 ft³/s

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	494.40 ft
Weir Length	0.25 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Orifice - 2 Structure Type: Orifice-Area	
Number of Openings	1
Elevation	494.40 ft
Orifice Area	0.13 ft²
Top Elevation	494.90 ft
Datum Elevation	494.65 ft
Orifice Coefficient	0.600

Subsection: Composite Rating Curve
Label: OS 101

Return Event: 2 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
492.17	0.00	489.00	0.00
492.27	0.00	489.00	0.00
492.37	0.00	489.00	0.00
492.47	0.00	489.00	0.00
492.57	0.00	489.00	0.00
492.67	0.00	489.00	0.00
492.68	0.00	489.00	0.00
492.77	0.00	489.00	0.00
492.80	0.00	489.00	0.00
492.87	0.02	489.00	0.00
492.97	0.07	489.00	0.00
493.07	0.13	489.00	0.00
493.17	0.20	489.00	0.00
493.27	0.29	489.00	0.00
493.37	0.45	489.00	0.00
493.47	0.50	489.00	0.00
493.57	0.55	489.00	0.00
493.67	0.60	489.00	0.00
493.77	0.64	489.00	0.00
493.87	0.68	489.00	0.00
493.97	0.72	489.00	0.00
494.07	0.76	489.00	0.00
494.17	0.79	489.00	0.00
494.27	0.83	489.00	0.00
494.37	0.86	489.00	0.00
494.40	0.87	489.00	0.00
494.47	0.91	489.00	0.00
494.57	0.97	489.00	0.00
494.67	1.05	489.00	0.00
494.77	1.14	489.00	0.00
494.87	1.24	489.00	0.00
494.97	1.36	489.00	0.00
495.07	1.43	489.00	0.00
495.17	1.50	489.00	0.00
495.27	1.57	489.00	0.00
495.37	1.63	489.00	0.00
495.47	1.69	489.00	0.00
495.57	1.74	489.00	0.00
495.67	1.80	489.00	0.00
495.77	1.85	489.00	0.00
495.87	1.90	489.00	0.00
495.97	1.95	489.00	0.00
496.07	2.00	489.00	0.00
496.17	2.04	489.00	0.00

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
496.27	2.09	489.00	0.00
496.37	2.13	489.00	0.00
496.47	2.18	489.00	0.00
496.57	2.22	489.00	0.00
496.67	2.26	489.00	0.00
496.77	2.31	489.00	0.00
496.87	2.34	489.00	0.00
496.97	2.38	489.00	0.00
497.07	2.42	489.00	0.00
497.17	2.46	489.00	0.00
497.27	2.50	489.00	0.00
497.37	2.54	489.00	0.00
497.47	2.58	489.00	0.00
497.57	2.61	489.00	0.00
497.67	2.65	489.00	0.00

Contributing Structures
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
(no Q: Orifice - 1,Weir - 1,Orifice - 2,Weir - 2,Culvert - 1)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Weir - 1,Culvert - 1 (no Q: Orifice - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)

Composite Outflow Summary

Contributing Structures
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Culvert - 1 (no Q: Weir - 1,Orifice - 2,Weir - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
Orifice - 1,Weir - 2,Culvert - 1 (no Q: Weir - 1,Orifice - 2)
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Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
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Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)

Composite Outflow Summary

Contributing Structures
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)
Orifice - 1,Orifice - 2,Culvert - 1 (no Q: Weir - 1,Weir - 2)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 2 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ft^3)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.96
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 15 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ft^3)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.96
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 25 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.96
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Subsection: Elevation-Volume-Flow Table (Pond)
Label: Underground Basin B

Return Event: 100 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.80	0.00	673.703	0.00	0.00	0.00	22.46
492.87	0.02	746.769	0.00	0.00	0.02	24.91
492.97	0.07	913.038	0.00	0.00	0.07	30.50
493.07	0.13	1,116.241	0.00	0.00	0.13	37.34
493.17	0.20	1,330.790	0.00	0.00	0.20	44.56
493.27	0.29	1,544.450	0.00	0.00	0.29	51.77
493.37	0.45	1,745.204	0.00	0.00	0.45	58.62
493.47	0.50	1,962.023	0.00	0.00	0.50	65.90
493.57	0.55	2,161.132	0.00	0.00	0.55	72.59
493.67	0.60	2,371.300	0.00	0.00	0.60	79.64
493.77	0.64	2,580.282	0.00	0.00	0.64	86.65
493.87	0.68	2,776.396	0.00	0.00	0.68	93.23
493.97	0.72	2,987.878	0.00	0.00	0.72	100.32
494.07	0.76	3,181.767	0.00	0.00	0.76	106.82
494.17	0.79	3,386.080	0.00	0.00	0.79	113.66
494.27	0.83	3,588.823	0.00	0.00	0.83	120.46
494.37	0.86	3,778.669	0.00	0.00	0.86	126.82
494.40	0.87	3,840.157	0.00	0.00	0.87	128.88
494.47	0.91	3,982.956	0.00	0.00	0.91	133.67
494.57	0.97	4,169.830	0.00	0.00	0.97	139.97
494.67	1.05	4,366.250	0.00	0.00	1.05	146.59
494.77	1.14	4,560.516	0.00	0.00	1.14	153.16
494.87	1.24	4,741.934	0.00	0.00	1.24	159.30

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 100 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ft^3)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
494.97	1.36	4,936.515	0.00	0.00	1.36	165.91
495.07	1.43	5,113.874	0.00	0.00	1.43	171.90
495.17	1.50	5,299.640	0.00	0.00	1.50	178.16
495.27	1.57	5,482.497	0.00	0.00	1.57	184.32
495.37	1.63	5,652.469	0.00	0.00	1.63	190.04
495.47	1.69	5,833.831	0.00	0.00	1.69	196.15
495.57	1.74	5,998.147	0.00	0.00	1.74	201.68
495.67	1.80	6,169.110	0.00	0.00	1.80	207.43
495.77	1.85	6,335.799	0.00	0.00	1.85	213.04
495.87	1.90	6,489.296	0.00	0.00	1.90	218.21
495.97	1.95	6,651.109	0.00	0.00	1.95	223.65
496.07	2.00	6,795.521	0.00	0.00	2.00	228.51
496.17	2.04	6,942.890	0.00	0.00	2.04	233.47
496.27	2.09	7,080.831	0.00	0.00	2.09	238.12
496.37	2.13	7,200.515	0.00	0.00	2.13	242.15
496.47	2.18	7,322.771	0.00	0.00	2.18	246.27
496.57	2.22	7,432.028	0.00	0.00	2.22	249.96
496.67	2.26	7,543.470	0.00	0.00	2.26	253.71
496.77	2.31	7,652.453	0.00	0.00	2.31	257.39
496.87	2.34	7,755.239	0.00	0.00	2.34	260.85
496.97	2.38	7,866.701	0.00	0.00	2.38	264.61
497.07	2.42	7,969.487	0.00	0.00	2.42	268.07
497.17	2.46	8,078.470	0.00	0.00	2.46	271.74
497.27	2.50	8,187.453	0.00	0.00	2.50	275.41
497.37	2.54	8,290.239	0.00	0.00	2.54	278.88
497.47	2.58	8,401.701	0.00	0.00	2.58	282.63
497.57	2.61	8,504.487	0.00	0.00	2.61	286.09
497.67	2.65	8,613.470	0.00	0.00	2.65	289.76

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.40 ft
Volume (Initial)	7,238.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
492.17	0.00	0.000	0.00	0.00	0.00	0.00
492.27	0.00	108.983	0.00	0.00	0.00	3.63
492.37	0.00	211.769	0.00	0.00	0.00	7.06
492.47	0.00	323.231	0.00	0.00	0.00	10.77
492.57	0.00	426.017	0.00	0.00	0.00	14.20
492.67	0.00	535.000	0.00	0.00	0.00	17.83
492.68	0.00	546.146	0.00	0.00	0.00	18.20
492.77	0.00	643.983	0.00	0.00	0.00	21.47
492.87	0.00	746.769	0.00	0.00	0.00	24.89
492.97	0.00	913.038	0.00	0.00	0.00	30.43
493.07	0.00	1,116.241	0.00	0.00	0.00	37.21
493.17	0.00	1,330.790	0.00	0.00	0.00	44.36
493.27	0.00	1,544.450	0.00	0.00	0.00	51.48
493.37	0.00	1,745.204	0.00	0.00	0.00	58.17
493.47	0.00	1,962.023	0.00	0.00	0.00	65.40
493.57	0.00	2,161.132	0.00	0.00	0.00	72.04
493.67	0.00	2,371.300	0.00	0.00	0.00	79.04
493.77	0.00	2,580.282	0.00	0.00	0.00	86.01
493.87	0.00	2,776.396	0.00	0.00	0.00	92.55
493.97	0.00	2,987.878	0.00	0.00	0.00	99.60
494.07	0.00	3,181.767	0.00	0.00	0.00	106.06
494.17	0.00	3,386.080	0.00	0.00	0.00	112.87
494.27	0.00	3,588.823	0.00	0.00	0.00	119.63
494.37	0.00	3,778.669	0.00	0.00	0.00	125.96
494.47	0.00	3,982.956	0.00	0.00	0.00	132.77
494.57	0.00	4,169.830	0.00	0.00	0.00	138.99
494.67	0.00	4,366.250	0.00	0.00	0.00	145.54
494.77	0.00	4,560.516	0.00	0.00	0.00	152.02
494.87	0.00	4,741.934	0.00	0.00	0.00	158.06
494.97	0.00	4,936.515	0.00	0.00	0.00	164.55
495.07	0.00	5,113.874	0.00	0.00	0.00	170.46

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 101 years
Label: Underground Basin B Storm Event:

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
495.17	0.00	5,299.640	0.00	0.00	0.00	176.65
495.27	0.00	5,482.497	0.00	0.00	0.00	182.75
495.37	0.00	5,652.469	0.00	0.00	0.00	188.42
495.47	0.00	5,833.831	0.00	0.00	0.00	194.46
495.57	0.00	5,998.147	0.00	0.00	0.00	199.94
495.67	0.00	6,169.110	0.00	0.00	0.00	205.64
495.77	0.00	6,335.799	0.00	0.00	0.00	211.19
495.87	0.00	6,489.296	0.00	0.00	0.00	216.31
495.97	0.00	6,651.109	0.00	0.00	0.00	221.70
496.07	0.00	6,795.521	0.00	0.00	0.00	226.52
496.17	0.00	6,942.890	0.00	0.00	0.00	231.43
496.27	0.00	7,080.831	0.00	0.00	0.00	236.03
496.37	0.00	7,200.515	0.00	0.00	0.00	240.02
496.40	0.00	7,237.700	0.00	0.00	0.00	241.26
496.47	0.22	7,322.771	0.00	0.00	0.22	244.31
496.57	0.84	7,432.028	0.00	0.00	0.84	248.58
496.67	1.68	7,543.470	0.00	0.00	1.68	253.13
496.77	2.70	7,652.453	0.00	0.00	2.70	257.78
496.87	3.86	7,755.239	0.00	0.00	3.86	262.37
496.97	5.17	7,866.701	0.00	0.00	5.17	267.39
497.07	6.58	7,969.487	0.00	0.00	6.58	272.23
497.17	8.11	8,078.470	0.00	0.00	8.11	277.39
497.27	9.74	8,187.453	0.00	0.00	9.74	282.66
497.37	11.46	8,290.239	0.00	0.00	11.46	287.80
497.47	13.28	8,401.701	0.00	0.00	13.28	293.34
497.57	14.66	8,504.487	0.00	0.00	14.66	298.14
497.67	15.37	8,613.470	0.00	0.00	15.37	302.49

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.46 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	0.73 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	494.00 ft
Volume (Peak)	3,054.059 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	2,952.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	2,780.000 ft³
Volume (Retained)	820.000 ft³
Volume (Unrouted)	-26.000 ft³
Error (Mass Balance)	0.9 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.98 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	1.16 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	494.79 ft
Volume (Peak)	4,601.667 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	4,776.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	4,494.000 ft³
Volume (Retained)	954.000 ft³
Volume (Unrouted)	-1.000 ft³
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	4.91 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	1.57 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	495.28 ft
Volume (Peak)	5,495.594 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	5,892.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	5,552.000 ft³
Volume (Retained)	1,011.000 ft³
Volume (Unrouted)	-2.000 ft³
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	492.80 ft
Volume (Initial)	674.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	6.28 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	2.00 ft³/s	Time to Peak (Flow, Outlet)	22 min

Elevation (Water Surface, Peak)	496.08 ft
Volume (Peak)	6,815.273 ft³

Mass Balance (ft³)	
Volume (Initial)	674.000 ft³
Volume (Total Inflow)	7,536.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	7,114.000 ft³
Volume (Retained)	1,089.000 ft³
Volume (Unrouted)	-6.000 ft³
Error (Mass Balance)	0.1 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.40 ft
Volume (Initial)	7,238.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	6.28 ft³/s	Time to Peak (Flow, In)	3 min
Flow (Peak Outlet)	6.28 ft³/s	Time to Peak (Flow, Outlet)	20 min

Elevation (Water Surface, Peak)	497.05 ft
Volume (Peak)	7,948.343 ft³

Mass Balance (ft³)	
Volume (Initial)	7,238.000 ft³
Volume (Total Inflow)	7,536.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	7,536.000 ft³
Volume (Retained)	7,238.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.0 %

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	2,952.000	3	2.46
Flow (In)	Underground Basin B	2,952.000	3	2.46

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	4,776.000	3	3.98
Flow (In)	Underground Basin B	4,776.000	3	3.98

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	5,892.000	3	4.91
Flow (In)	Underground Basin B	5,892.000	3	4.91

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	Basin B Inflow	7,536.000	3	6.28
Flow (In)	Underground Basin B	7,536.000	3	6.28

Summary for Hydrograph Addition at 'Underground Basin B'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B Inflow

Node Inflows

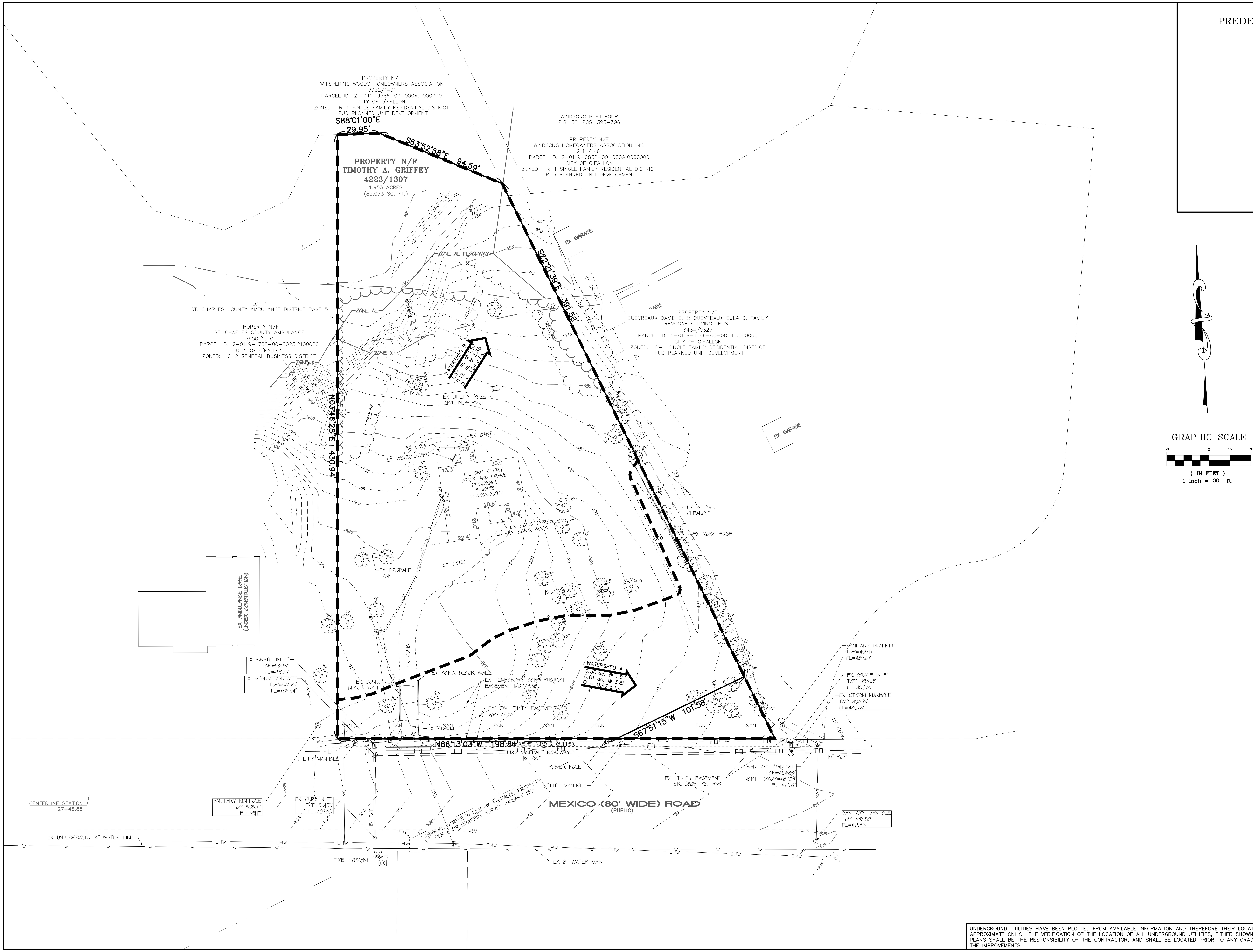
Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	Basin B Inflow	7,536.000	3	6.28
Flow (In)	Underground Basin B	7,536.000	3	6.28

Index

Appendix D
Drainage Maps

EXHIBIT A
PREDEVELOPED DRAINAGE MAP
TYKE TOWN
00-11214CA

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

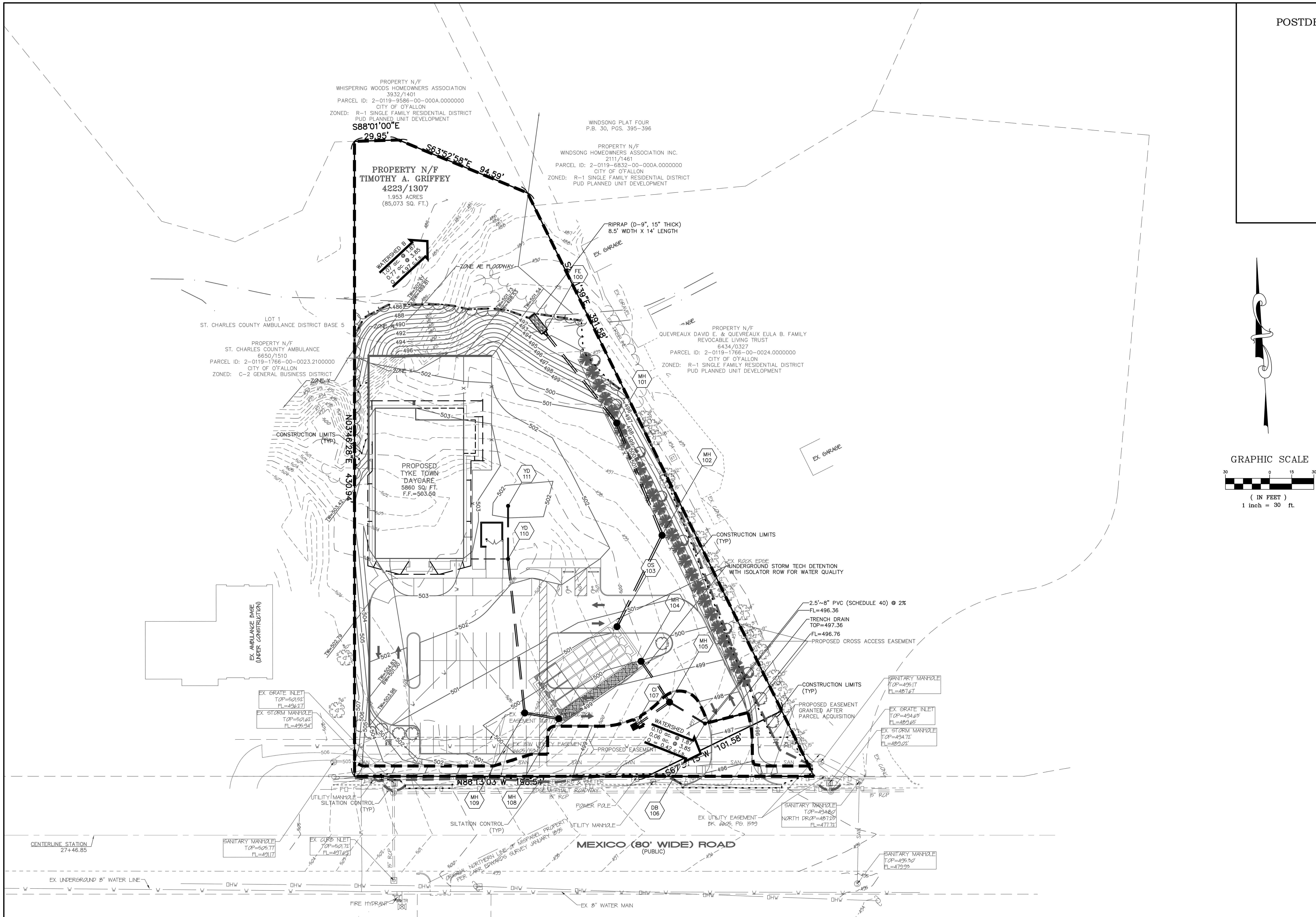

PROPERTY N/F
WHISPERING WOODS HOMEOWNERS ASSOCIATION
3932/1401
PARCEL ID: 2-0119-9586-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
S88°01'00"E
29.95'
S63°52'58"E 94.59'
PROPERTY N/F
TIMOTHY A. GRIFFEY
4223/1307
1.953 ACRES
(85,073 SQ. FT.)
WINDSONG PLAT FOUR
P.B. 30, PGS. 395-396
PROPERTY N/F
WINDSONG HOMEOWNERS ASSOCIATION INC.
2111/1461
PARCEL ID: 2-0119-6832-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
EX GARAGE
S22°21'39"E 391.58'
ZONE AE FLOODWAY
ZONE AE
ZONE X
LOT 1
ST. CHARLES COUNTY AMBULANCE DISTRICT BASE 5
PROPERTY N/F
ST. CHARLES COUNTY AMBULANCE
6650/1510
PARCEL ID: 2-0119-1766-00-0023.2100000
CITY OF O'FALLON
ZONED: C-2 GENERAL BUSINESS DISTRICT
PROPERTY N/F
QUEVREAUX DAVID E. & QUEVREAUX EULA B. FAMILY
REVOCABLE LIVING TRUST
6434/0327
PARCEL ID: 2-0119-1766-00-0024.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
WATERSHED B
EX UTILITY POLE
NOT IN SERVICE
N03°46'28"E 430.94'
EX CONC
EX WOOD STEPS
EX ONE-STORY
BRICK AND FRAME
RESIDENCE
EX GARAGE
EX 4" P.V.C.
CLEANOUT
EX ROCK EDGE
EX PROPANE
TANK
EX AMBULANCE BASE
(UNDER CONSTRUCTION)
WATERSHED A
0.50 ac. @ 1.87
0.01 ac. @ 3.85
Q = 0.97 c.f.s.
EX CONC BLOCK WALL
EX TEMPORARY CONSTRUCTION
EASEMENT
EX 15'W UTILITY EASEMENT
SANITARY MANHOLE
EX GRATE INLET
EX STORM MANHOLE
S67°51'15"W 101.58'
N86°13'03"W 198.54'
UTILITY MANHOLE
POWER POLE
EX UTILITY EASEMENT
CENTERLINE STATION
27+46.85
EX CURB INLET
MEXICO (80' WIDE) ROAD
(PUBLIC)
EX UNDERGROUND 8" WATER LINE
FIRE HYDRANT
EX 8" WATER MAIN
GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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

EXHIBIT B
POSTDEVELOPED DRAINAGE MAP
TYKE TOWN
00-11214CA

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



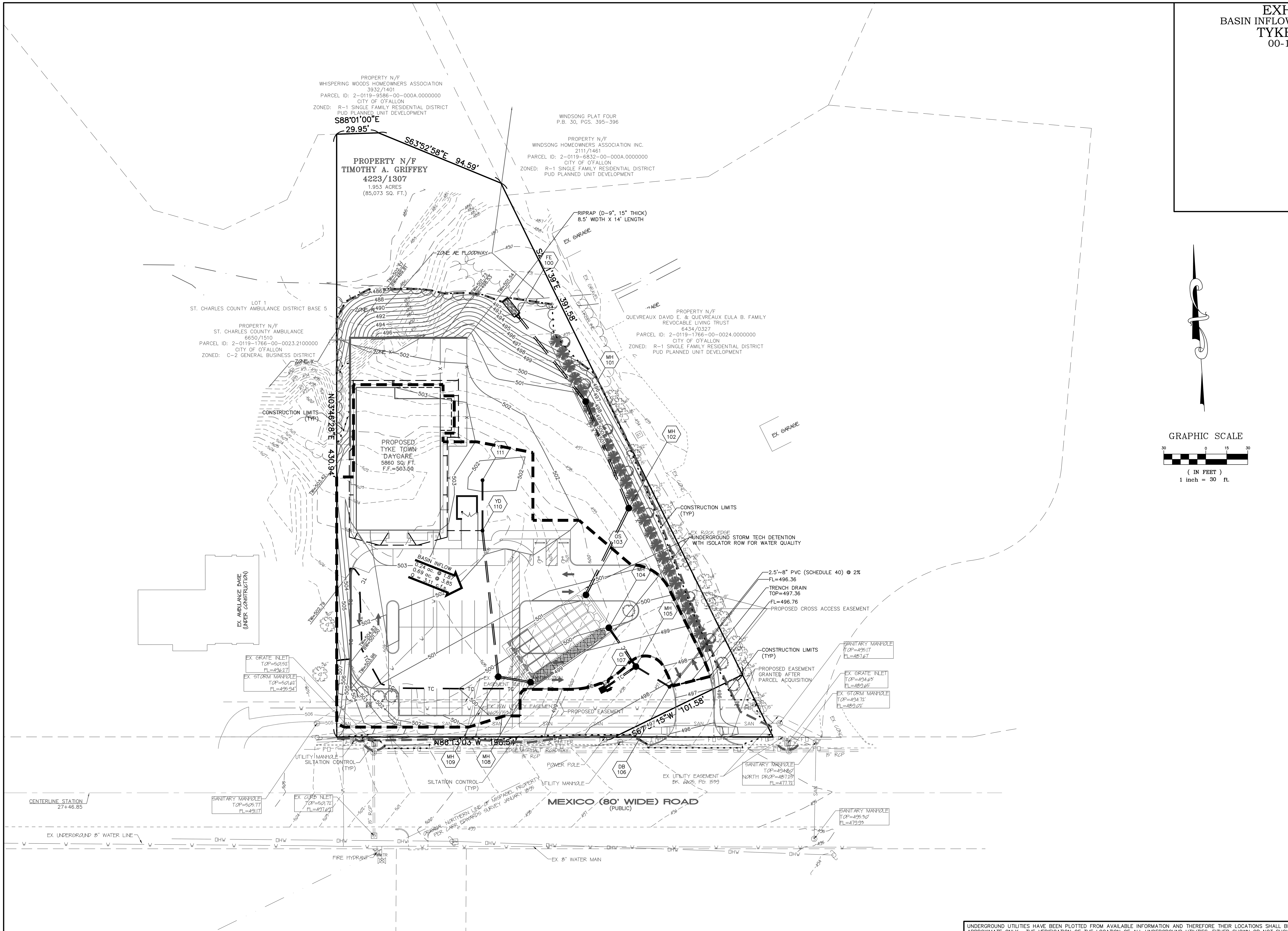
PROPERTY N/F
WHISPERING WOODS HOMEOWNERS ASSOCIATION
3932/1401
PARCEL ID: 2-0119-9586-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
WINDSONG PLAT FOUR
P.B. 30, PGS. 395-396
PROPERTY N/F
WINDSONG HOMEOWNERS ASSOCIATION INC.
2111/1461
PARCEL ID: 2-0119-6832-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
S88°01'00"E
29.95'
S63°52'58"E 94.59'
PROPERTY N/F
TIMOTHY A. GRIFFEY
4223/1307
1.953 ACRES
(85,073 SQ. FT.)
RIPRAP (D-9", 15" THICK)
8.5' WIDTH X 14' LENGTH
EX GARAGE
ZONE AE FLOODWAY
LOT 1
ST. CHARLES COUNTY AMBULANCE DISTRICT BASE 5
PROPERTY N/F
ST. CHARLES COUNTY AMBULANCE
6650/1510
PARCEL ID: 2-0119-1766-00-0023.2100000
CITY OF O'FALLON
ZONED: C-2 GENERAL BUSINESS DISTRICT
PROPERTY N/F
QUEVREAUX DAVID E. & QUEVREAUX EULA B. FAMILY
REVOCABLE LIVING TRUST
6434/0327
PARCEL ID: 2-0119-1766-00-0024.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
ZONE X
CONSTRUCTION LIMITS
(TYP)
N03°46'28"E 430.94'
PROPOSED
TYKE TOWN
DAYCARE
5860 SQ. FT.
F.F.=503.50
EX GARAGE
EX AMBULANCE BASE
(UNDER CONSTRUCTION)
CONSTRUCTION LIMITS
(TYP)
EX ROCK EDGE
UNDERGROUND STORM TECH DETENTION
WITH ISOLATOR ROW FOR WATER QUALITY
2.5'-8" PVC (SCHEDULE 40) @ 2%
FL=496.36
TRENCH DRAIN
TOP=497.36
FL=496.76
PROPOSED CROSS ACCESS EASEMENT
CONSTRUCTION LIMITS
(TYP)
PROPOSED EASEMENT
GRANTED AFTER
PARCEL ACQUISITION
WATERSHED A
WATERSHED B
PROPOSED EASEMENT
EX GRATE INLET
EX STORM MANHOLE
SANITARY MANHOLE
EX GRATE INLET
EX STORM MANHOLE
N86°13'03"W 198.54'
S67° 15" W 101.58'
UTILITY MANHOLE
SILTATION CONTROL
(TYP)
POWER POLE
SILTATION CONTROL
(TYP)
UTILITY MANHOLE
EX UTILITY EASEMENT
SANITARY MANHOLE
CENTERLINE STATION
27+46.85
SANITARY MANHOLE
EX CURB INLET
MEXICO (80' WIDE) ROAD
(PUBLIC)
SANITARY MANHOLE
EX UNDERGROUND 8" WATER LINE
FIRE HYDRANT
EX 8" WATER MAIN
MH 101
MH 102
FE 100
YD 111
YD 110
OS 103
MH 104
MH 105
CI 107
MH 109
MH 108
DB 106
GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.

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

EXHIBIT C
BASIN INFLOW DRAINAGE MAP
TYKE TOWN
00-11214CA

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

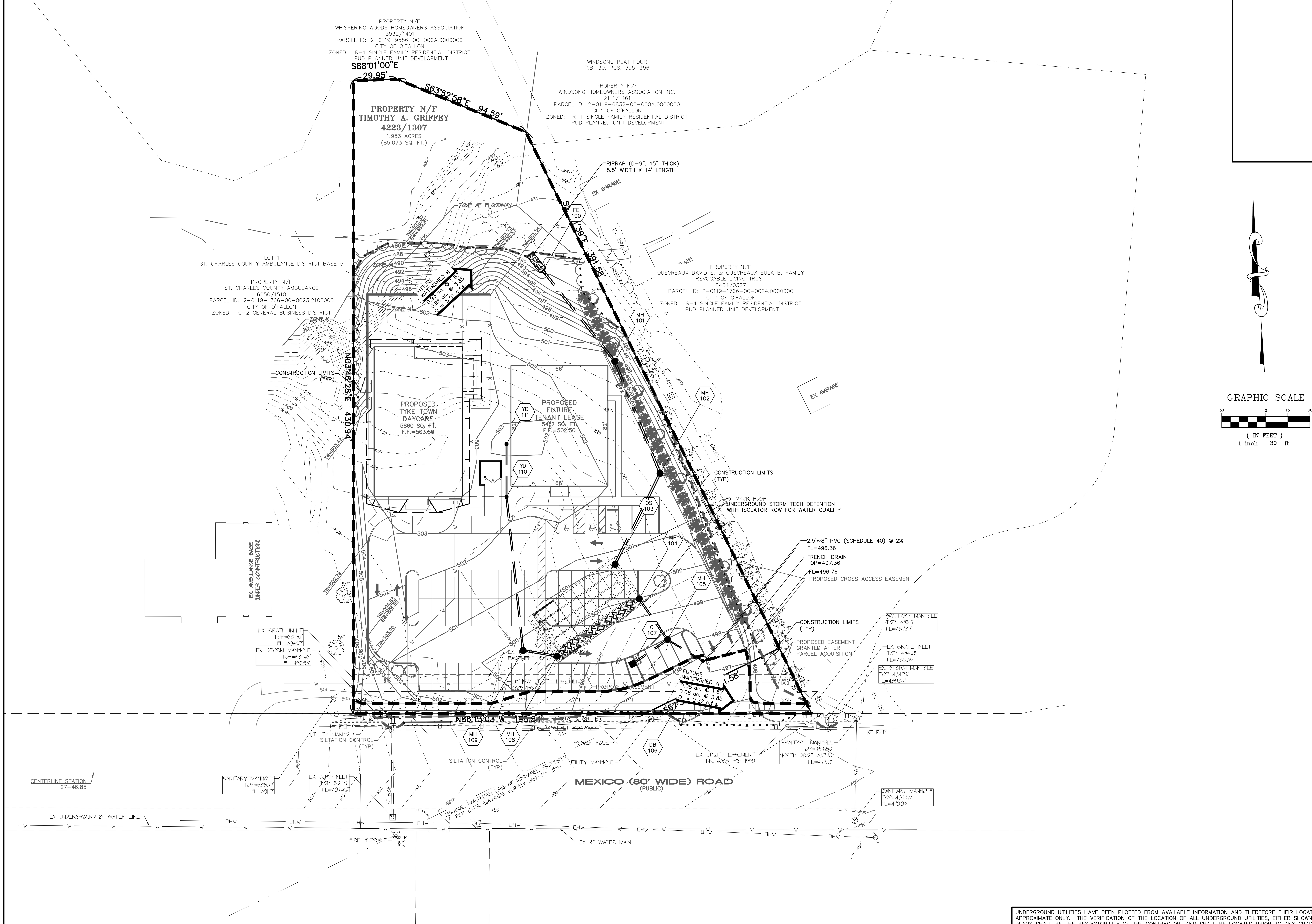

PROPERTY N/F
WHISPERING WOODS HOMEOWNERS ASSOCIATION
3932/1401
PARCEL ID: 2-0119-9586-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
S88°01'00"E
29.95'
S63°52'58"E 94.59'
WINDSONG PLAT FOUR
P.B. 30, PGS. 395-396
PROPERTY N/F
WINDSONG HOMEOWNERS ASSOCIATION INC.
2111/1461
PARCEL ID: 2-0119-6832-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
PROPERTY N/F
TIMOTHY A. GRIFFEY
4223/1307
1.953 ACRES
(85,073 SQ. FT.)
RIPRAP (D-9", 15" THICK)
8.5' WIDTH X 14' LENGTH
ZONE AE FLOODWAY
LOT 1
ST. CHARLES COUNTY AMBULANCE DISTRICT BASE 5
PROPERTY N/F
ST. CHARLES COUNTY AMBULANCE
6650/1510
PARCEL ID: 2-0119-1766-00-0023.2100000
CITY OF O'FALLON
ZONED: C-2 GENERAL BUSINESS DISTRICT
PROPERTY N/F
QUEVREAUX DAVID E. & QUEVREAUX EULA B. FAMILY
REVOCABLE LIVING TRUST
6434/0327
PARCEL ID: 2-0119-1766-00-0024.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
EX GARAGE
CONSTRUCTION LIMITS (TYP)
N03°46'28"E 430.94'
PROPOSED
TYKE TOWN
DAYCARE
5860 SQ. FT.
F.F.=503.50
BASIN INFLOW
EX AMBULANCE BASE (UNDER CONSTRUCTION)
UNDERGROUND STORM TECH DETENTION
WITH ISOLATOR ROW FOR WATER QUALITY
2.5'-8" PVC (SCHEDULE 40) @ 2%
FL=496.36
TRENCH DRAIN
TOP=497.36
FL=496.76
PROPOSED CROSS ACCESS EASEMENT
PROPOSED EASEMENT
GRANTED AFTER
PARCEL ACQUISITION
PROPOSED EASEMENT
S67°15'W 101.58'
N86°13'03"W 198.54'
UTILITY MANHOLE
SILTATION CONTROL (TYP)
POWER POLE
EX UTILITY EASEMENT
MEXICO (80' WIDE) ROAD
(PUBLIC)
CENTERLINE STATION
27+46.85
EX UNDERGROUND 8" WATER LINE
FIRE HYDRANT
EX 8" WATER MAIN
GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.

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

EXHIBIT D
FUTURE POSTDEVELOPED DRAINAGE MAP
TYKE TOWN
00-11214CA

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



PROPERTY N/F
WHISPERING WOODS HOMEOWNERS ASSOCIATION
3932/1401
PARCEL ID: 2-0119-9586-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
S88°01'00"E
29.95'
S63°52'58"E 94.59'
PROPERTY N/F
TIMOTHY A. GRIFFEY
4223/1307
1.953 ACRES
(85,073 SQ. FT.)
WINDSONG PLAT FOUR
P.B. 30, PGS. 395-396
PROPERTY N/F
WINDSONG HOMEOWNERS ASSOCIATION INC.
2111/1461
PARCEL ID: 2-0119-6832-00-000A.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
RIPRAP (D-9", 15" THICK)
8.5' WIDTH X 14' LENGTH
EX GARAGE
ZONE AE FLOODWAY
FE 100
391.58'
LOT 1
ST. CHARLES COUNTY AMBULANCE DISTRICT BASE 5
PROPERTY N/F
ST. CHARLES COUNTY AMBULANCE
6650/1510
PARCEL ID: 2-0119-1766-00-0023.2100000
CITY OF O'FALLON
ZONED: C-2 GENERAL BUSINESS DISTRICT
FUTURE WATERSHED B
PROPERTY N/F
QUEVREAUX DAVID E. & QUEVREAUX EULA B. FAMILY
REVOCABLE LIVING TRUST
6434/0327
PARCEL ID: 2-0119-1766-00-0024.0000000
CITY OF O'FALLON
ZONED: R-1 SINGLE FAMILY RESIDENTIAL DISTRICT
PUD PLANNED UNIT DEVELOPMENT
ZONE X
MH 101
CONSTRUCTION LIMITS (TYP)
N03°46'28"E 430.94'
EX GARAGE
MH 102
PROPOSED TYKE TOWN DAYCARE
5860 SQ. FT.
F.F.=503.50
YD 111
PROPOSED FUTURE TENANT LEASE
5412 SQ. FT.
F.F.=502.50
YD 110
CONSTRUCTION LIMITS (TYP)
EX ROCK EDGE
UNDERGROUND STORM TECH DETENTION
WITH ISOLATOR ROW FOR WATER QUALITY
OS 103
MH 104
2.5'-8" PVC (SCHEDULE 40) @ 2%
FL=496.36
TRENCH DRAIN
TOP=497.36
FL=496.76
PROPOSED CROSS ACCESS EASEMENT
MH 105
EX AMBULANCE BASE (UNDER CONSTRUCTION)
CI 107
CONSTRUCTION LIMITS (TYP)
PROPOSED EASEMENT
GRANTED AFTER
PARCEL ACQUISITION
SANITARY MANHOLE
EX GRATE INLET
EX STORM MANHOLE
FUTURE WATERSHED A
0.05 ac. @ 1.87
0.06 ac. @ 3.85
Q = 0.32 c.f.s.
PROPOSED EASEMENT
N86°13'03"W 198.54'
EDGE ASPHALT ROADWAY
UTILITY MANHOLE
SILTATION CONTROL (TYP)
MH 109
MH 108
POWER POLE
DB 106
EX UTILITY EASEMENT
SANITARY MANHOLE
SILTATION CONTROL (TYP)
UTILITY MANHOLE
CENTERLINE STATION
27+46.85
SANITARY MANHOLE
EX CURB INLET
MEXICO (80' WIDE) ROAD
(PUBLIC)
SANITARY MANHOLE
EX UNDERGROUND 8" WATER LINE
FIRE HYDRANT
EX 8" WATER MAIN
GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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

EXHIBIT E
FUTURE BASIN INFLOW DRAINAGE MAP
TYKE TOWN
00-11214CA

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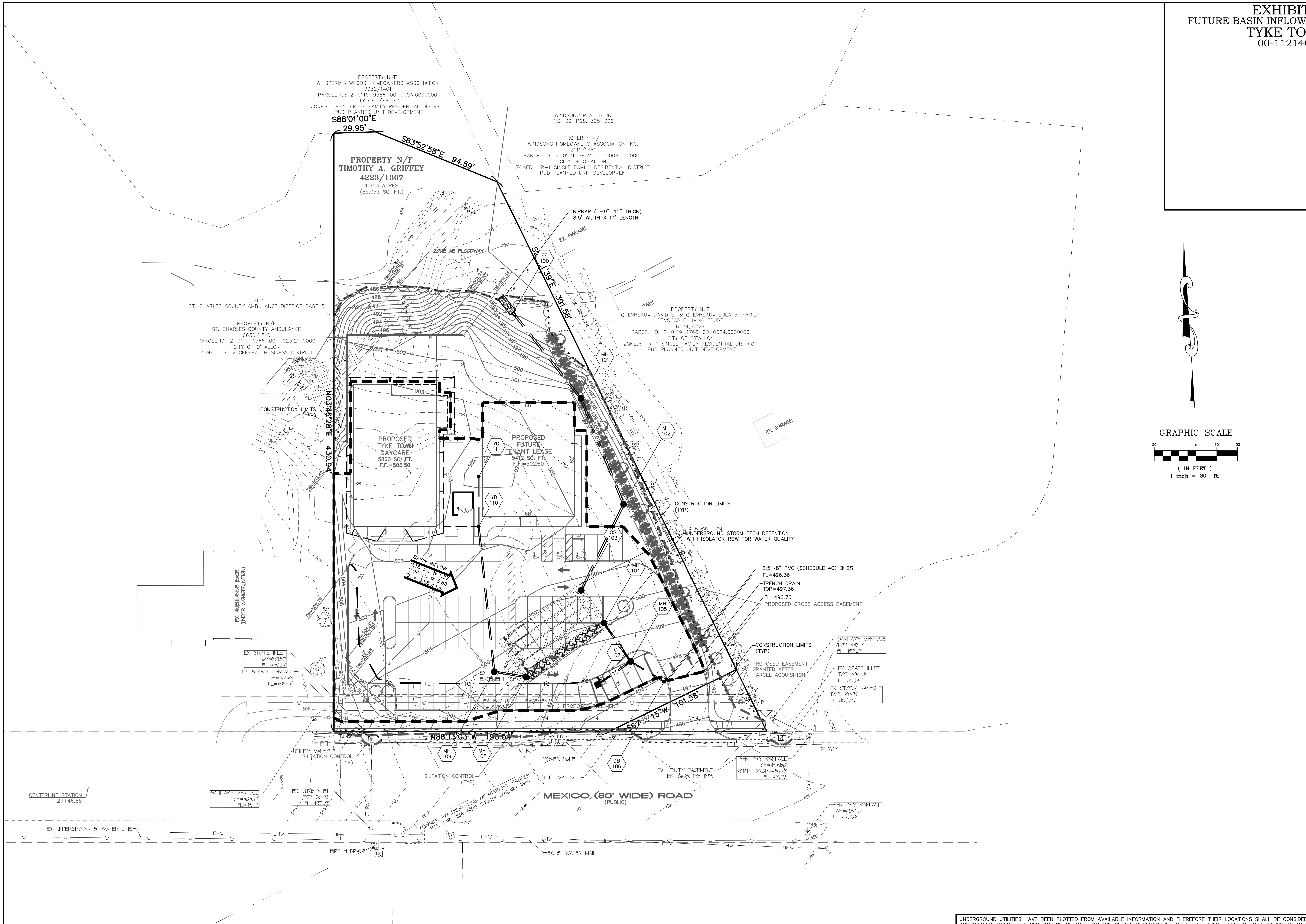
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