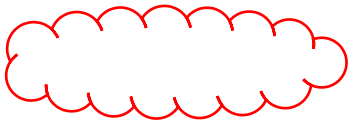
KEEFE PROPERTY TRACT 2 & 3

Detention Calculations

LIBERTY WAY

WEST CHESTER TOWNSHIP, BUTLER COUNTY, OHIO

As-Built 03-16-17



PREPARED BY:

BAYER BECKER

6900 TYLERSVILLE ROAD

MASON, OHIO 45040

P (513) 336-6600

SUMMARY OF DATA

Method of Hydrograph Development: TR-55

Software: Autodesk Storm and Sanitary Stand Alone

Site Stormwater Summary

See Previous Keefe Detention Reports

Critical Storm = 50yr

Drainage Area Descriptions	Drainage Area (Acres)	CN	Tc (Mins)	Q1 (cfs)	Q1 (Cu. Ft.)	Q10 (cfs)	Q50 (cfs)	
On-Site Pre-Dev Areas								
Previously Detained Areas	44.88	71.0	13.80	15.70		71.24	123.57	Pg 6
16.4 + 4.3+18.3+5.9 = 44.90 (rounding error)								
New Commercial	7.66	71.0	13.80	2.68	9,724	12.64	21.19	Pg 7
New Residential	5.23	71.0	13.80	1.83	6,647	8.63	14.44	Pg 8
On-Site Post Developed to Basin								
Weatherington Pointe Cabelas & Outlots	18.30	94.0	12.00	37.48		73.47	100.72	Pg 9
Tylers Place Blvd to Pond	4.30	90.0	12.00	7.19		15.69	22.18	Pg 10
Keefe Tract 2 to Basin	5.90	94.0	12.00	12.08		24.15	32.49	Pg 11
Weatherington Residential	16.40	74.0	13.80	8.09		30.84	52.33	Pg 12
New Commerical	7.02	96.0	12.00	15.62	45,136	29.26	39.54	Pg 13 / Pg 18
Off-Site Areas								
Golf Course	41.60	77.0	22.20	21.29		73.09	119.72	Pg 16
Liberty Way	6.50	90.0	11.00	10.87		23.73	33.53	Pg 17
Bypass Areas								
New Commerical	0.57	95.0	10.00	1.26	3,454	2.40	3.25	Pg 14 / Pg 19
New Residential	5.21	81.0	12.00	5.02	13,889	14.41	22.23	Pg 15 / Pg 21

Allowable Release Rate=	
Q1 On-Site Pre Developed + Q10 Previously Detained + Q50 Offsite	**223.27 CFS**

Note: CN for pre-developed conditions are based on previously developed and approved stormwater calculations for the Keefe Property.
These numbers were based on a composite of B and C soils with open space in fair condition

See Page 30 for routed flow rates

Storm Water
Detention/Retention Summary

Date:	9/21/2016	Revised:	
Design By:	MJL	Revised:	
Checked By:	MJL	Revised:	3/16/2017

Project: Keefe Tract 2 File No.: 15M053-000
County: Butler City/Township: West Chester Twp

Basin Primary Basin

On-Site Area	29.32 Acres
Off-Site Area	41.60 Acres
Bypass Area	5.78 Acres

Primary Basin		
Orifice	Size	Inv Elev
Spillway	60'	862.54
1	16'	860.50
1	66" ø	854.43
1	6" ø	852.10

Primary Basin

A Event	B Inflow	C Outflow	D Elev	E Storage	F Com Byp	G Res Byp	=F+G Bypass	=C+F+G Total	Allowable
Q_1	79.90	16.67	855.43	144,335	1.27	5.09	6.36	23.03	
Q_{10}	203.64	105.33	858.07	281,247	2.44	14.42	16.86	122.19	
Q_{50}	296.85	173.75	859.71	369,687	3.25 Pg 19	22.23 Pg 21	25.48	199.23	223.27 Pg 30
Q_{100}	329.42	204.53	860.18	396,530	3.56 Pg 26	25.11 Pg 27	28.67	233.20	325.08 Pg 31

Basin Existing Pond

On-Site Area	4.30 Acres
Off-Site Area	0.00 Acres
Bypass Area	0.00 Acres

Existing Pond		
Orifice	Size	Inv Elev
T/GR	8'	867.30
Spillway	35'	866.80
3	12"X36"	865.50

A Event	B Inflow	C Outflow	D Elev	E Storage
Q_1	17.85	10.73	864.98	10,583
Q_{10}	52.24	36.79	865.67	26,321
Q_{50}	63.93	41.16	866.25	42,017
Q_{100}	67.81	42.67	866.53	49,766

Storm Water
Detention/Retention Summary

Date:	9/9/2016	Revised:	
Design By:	MJL	Revised:	
Checked By:		Revised:	

Project:	Keefe Tract 2	File No.:	15M053-000
County:	Butler	City/Township:	West Chester Twp

Basin Cabelas WQ Basin

On-Site Area	18.30	Acres
Off-Site Area	6.50	Acres
Bypass Area	0.00	Acres

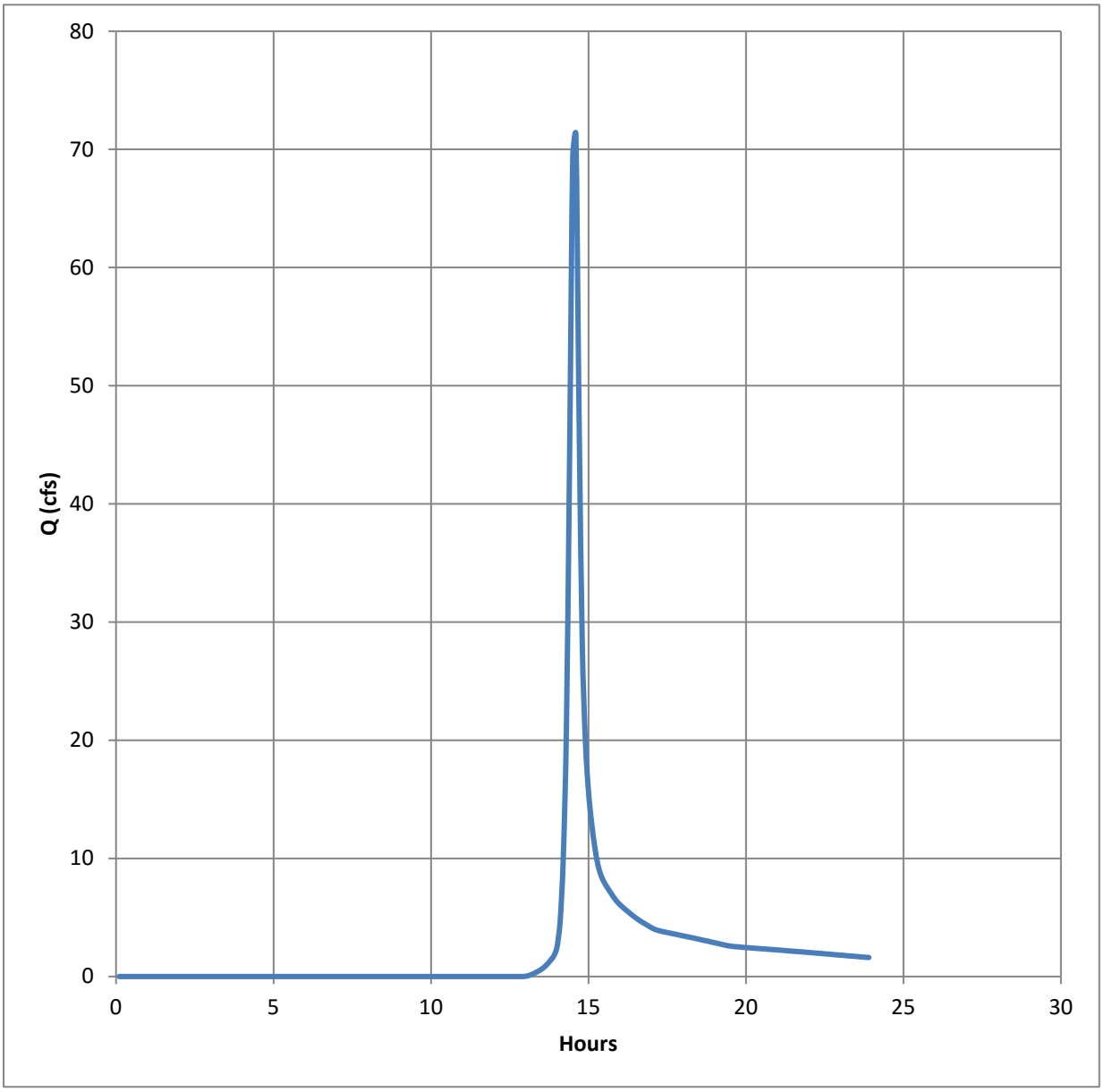
Cabelas WQ		
Orifice	Size	Inv Elev
T/Dike		871.00
South	8'	869.17
North	16'	868.92
1	3.75" ø	866.97

A	B	C	D	E
Event	Inflow	Outflow	Elev	Storage
Q_1	48.15	43.28	869.72	80,402
Q_{10}	97.12	84.16	870.48	91,769
Q_{50}	134.06	102.19	871.41	107,120
Q_{100}	146.85	108.61	871.84	114,387

Previously Detained Areas

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	71.24
Storm Frequency	=	10 yrs	Time to Peak	=	14:36
Time Interval	=	6 min	Hyd. Volume	=	216,358 Ft^3
Drainage Area	=	44.88 Acres	Curve Number	=	71
Tc Method	=	User	Time of conc. (Tc)	=	13.80 Mins
Total precip.	=	3.9 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

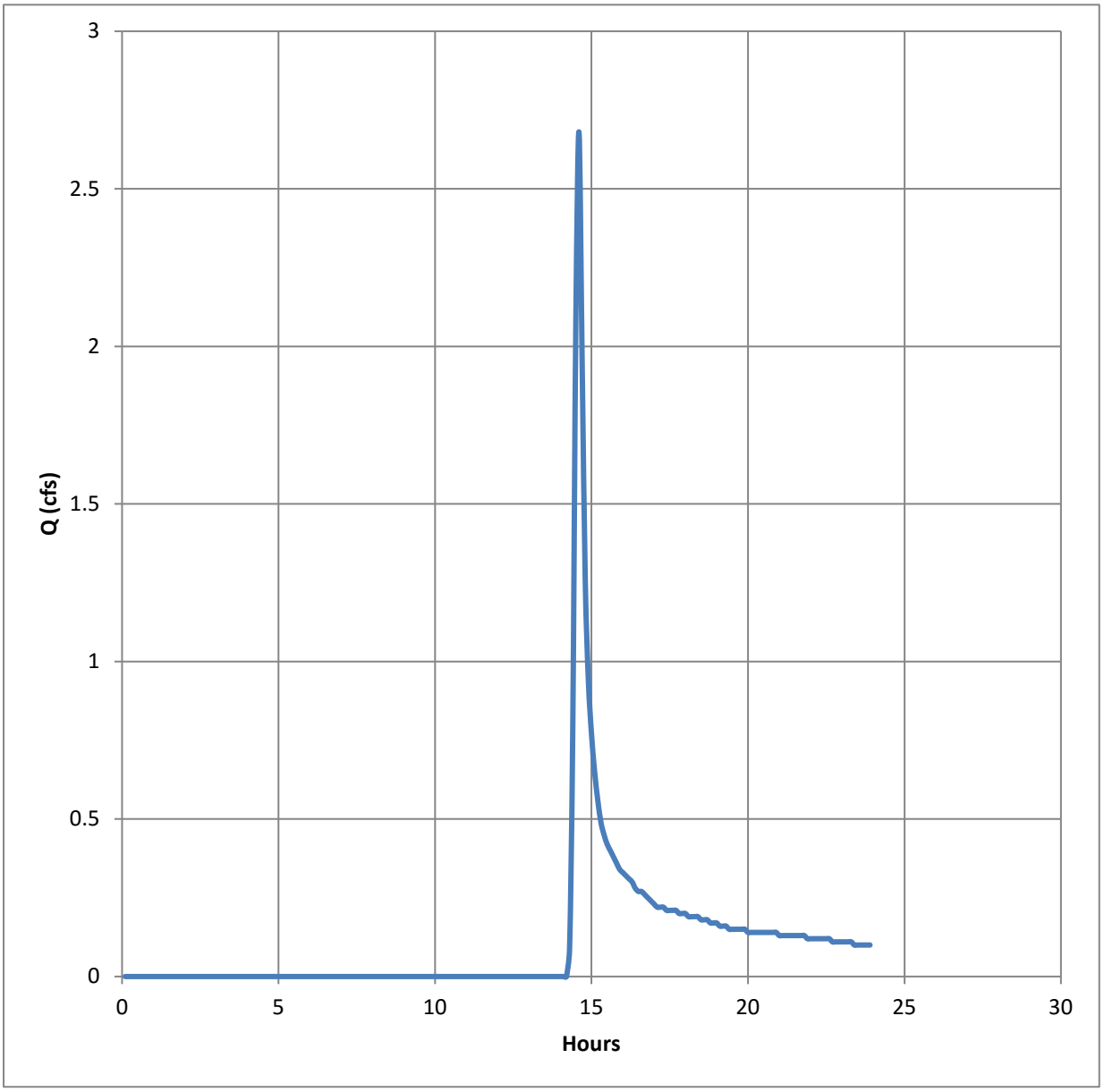
Notes:



Predeveloped Commercial Areas

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	2.68
Storm Frequency	=	1 yrs	Time to Peak	=	14:36
Time Interval	=	6 min	Hyd. Volume	=	9,724 Ft^3
Drainage Area	=	7.66 Acres	Curve Number	=	71
Tc Method	=	User	Time of conc. (Tc)	=	13.80 Mins
Total precip.	=	2.4 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

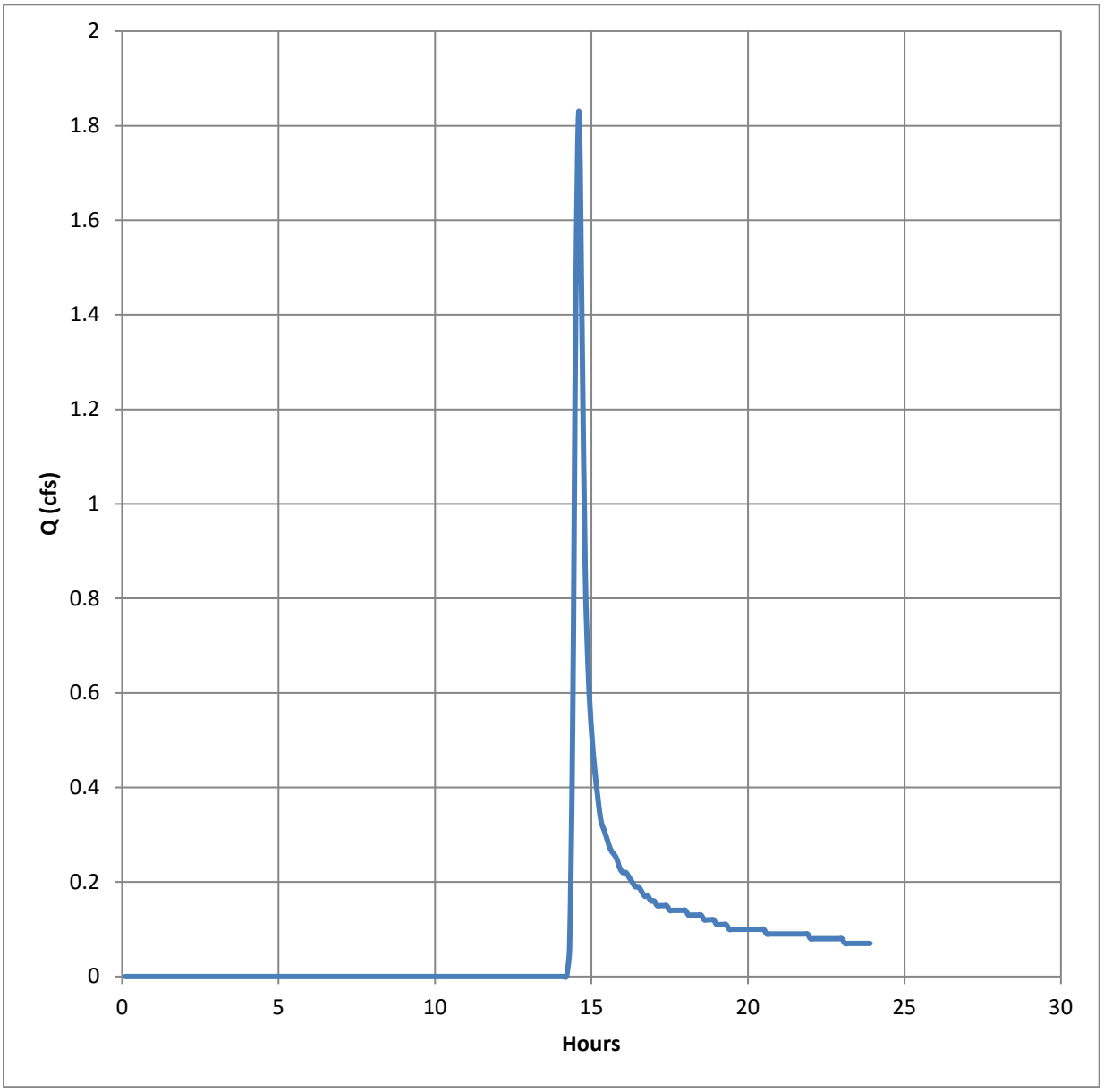
Notes:



Predeveloped Residential Area

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	1.83
Storm Frequency	=	1 yrs	Time to Peak	=	14:36
Time Interval	=	6 min	Hyd. Volume	=	6,647 Ft^3
Drainage Area	=	5.23 Acres	Curve Number	=	71
Tc Method	=	User	Time of conc. (Tc)	=	13.80 Mins
Total precip.	=	2.4 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

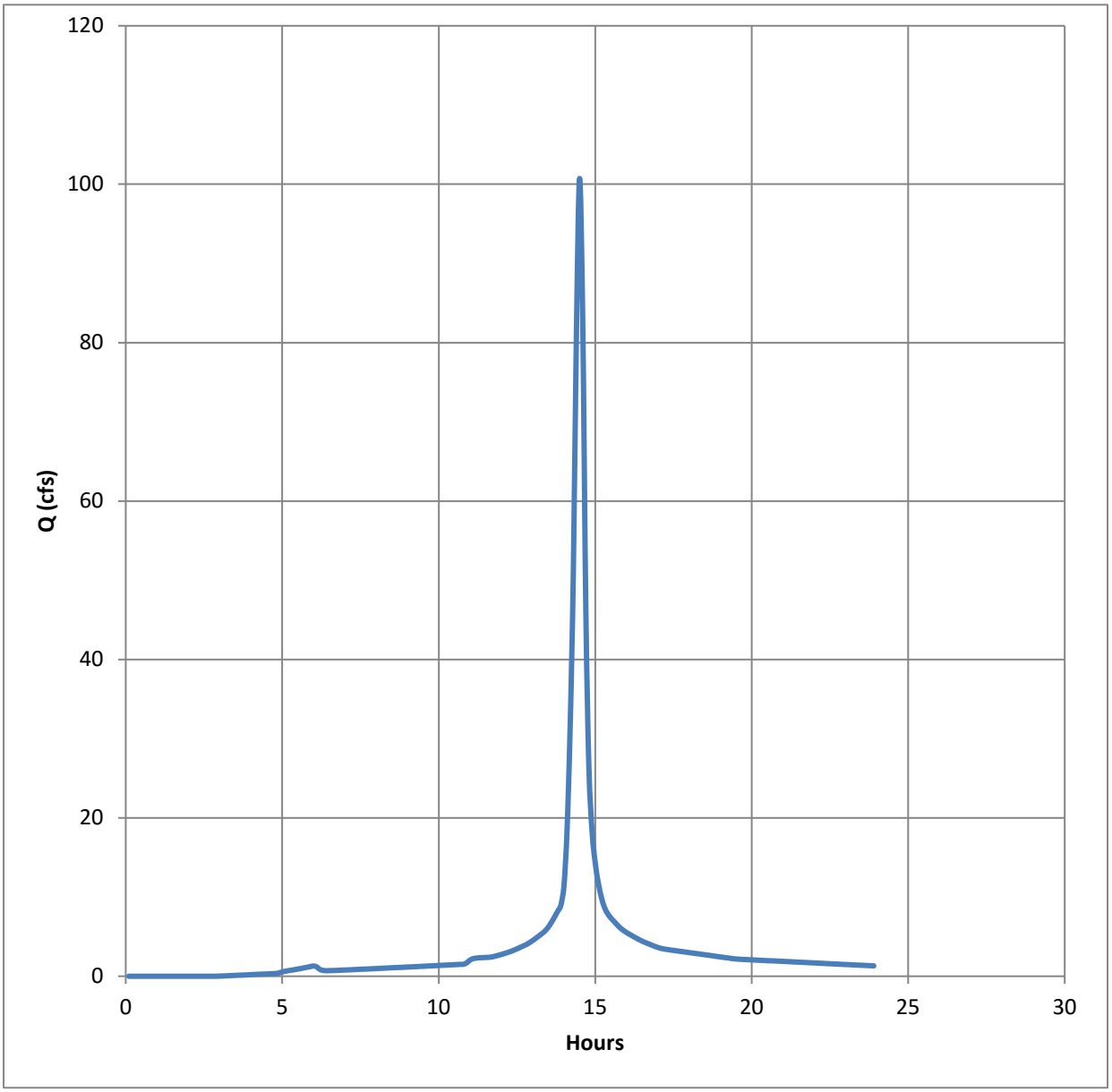
Notes:



Weatherington Pointe Cabelas & Outlots

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	100.72
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	299,066 Ft^3
Drainage Area	=	18.30 Acres	Curve Number	=	94
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	5.2 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

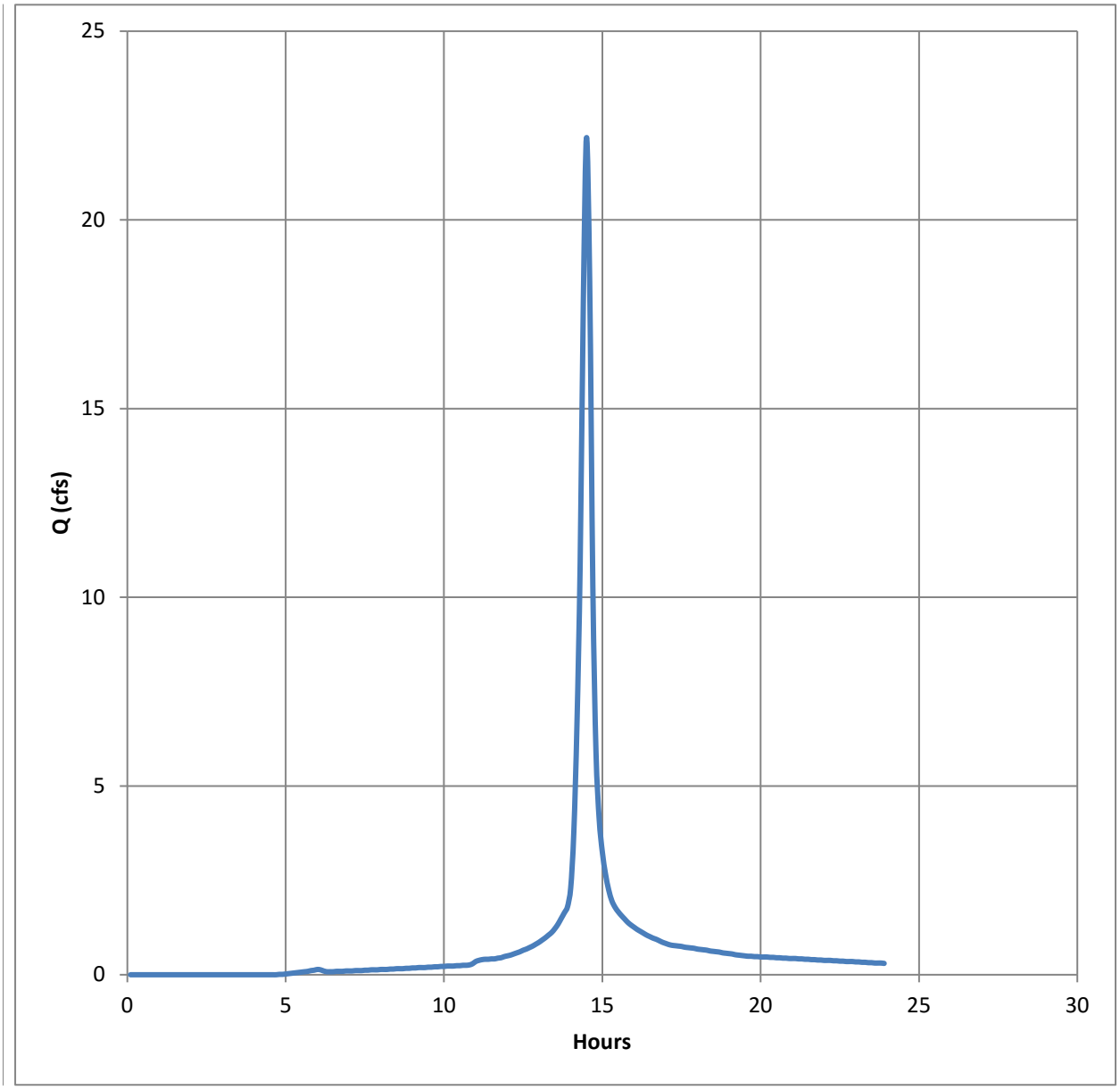
Notes:



Tylers Place Blvd to Pond

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	22.18
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	63,568 Ft^3
Drainage Area	=	4.30 Acres	Curve Number	=	90
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	5.2 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

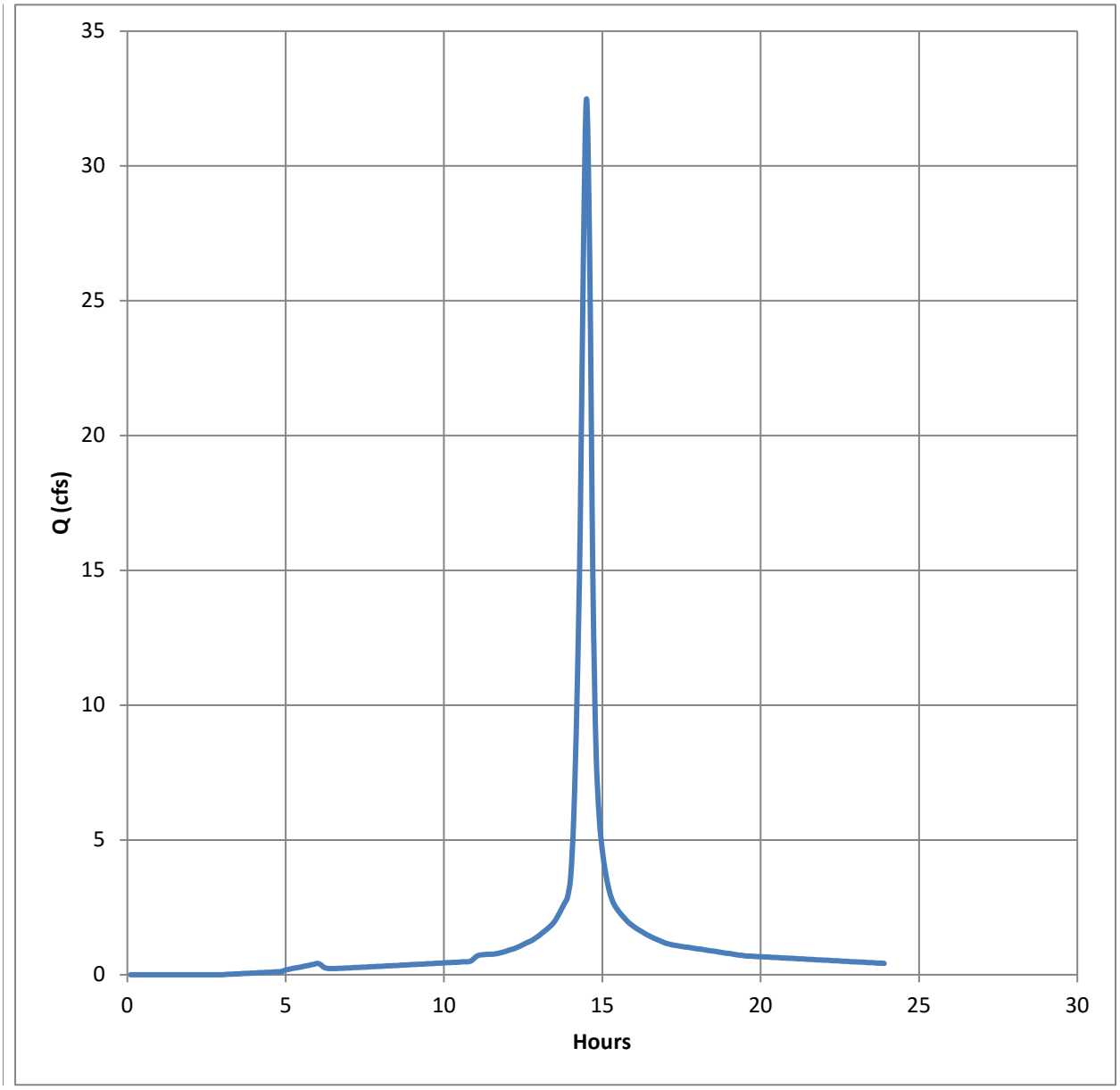
Notes:



Keefe Tract 2 to Basin

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	32.49
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	96,465 Ft^3
Drainage Area	=	5.90 Acres	Curve Number	=	94
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	5.2 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

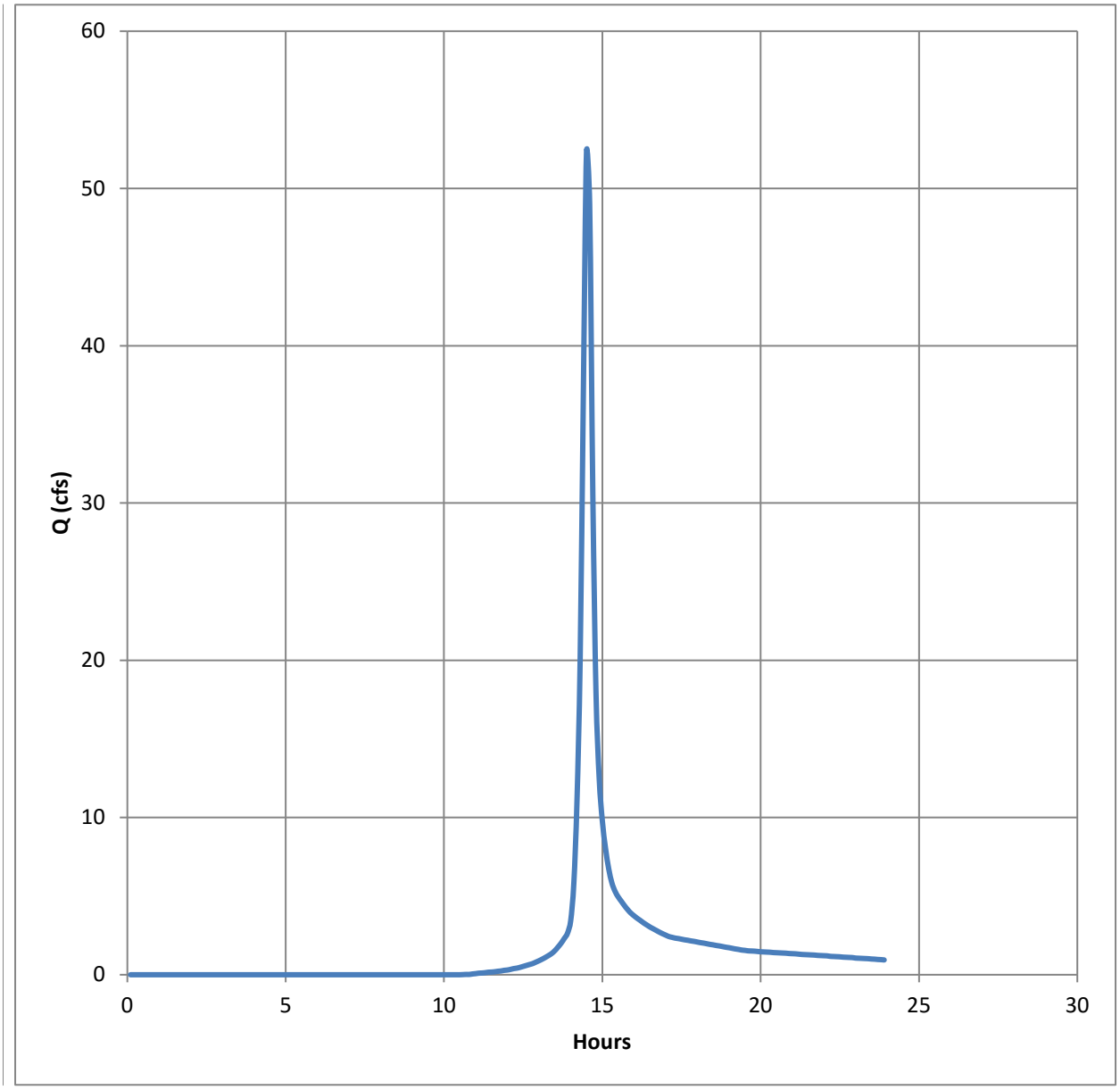
Notes:



Weatherington Residential

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	52.33
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	150,217 Ft^3
Drainage Area	=	16.40 Acres	Curve Number	=	74
Tc Method	=	User	Time of conc. (Tc)	=	13.80 Mins
Total precip.	=	5.2 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

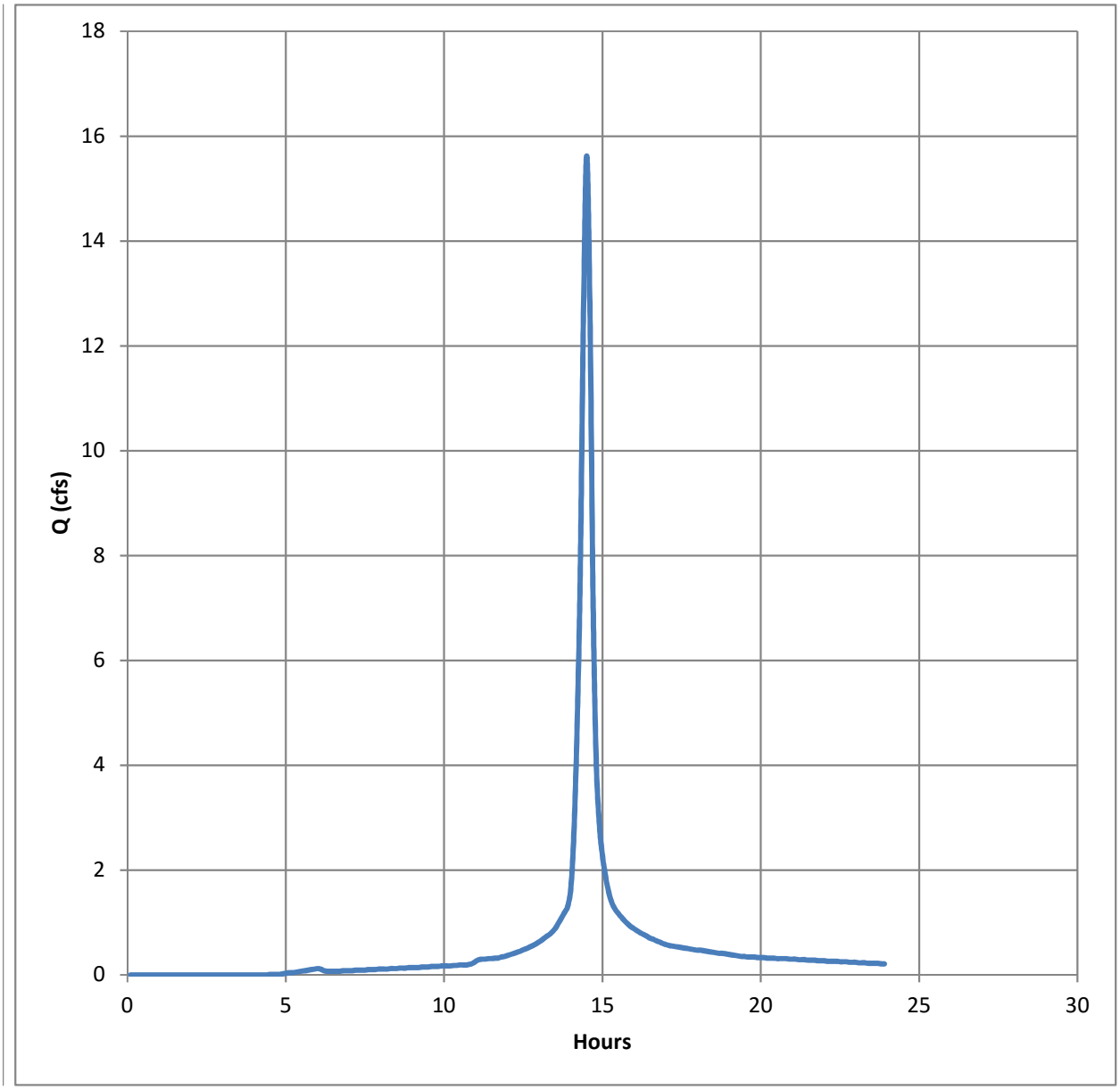
Notes:



Postdeveloped New Commerical to Basin

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	15.62
Storm Frequency	=	1 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	45,136 Ft^3
Drainage Area	=	6.86 Acres	Curve Number	=	96
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	2.4 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

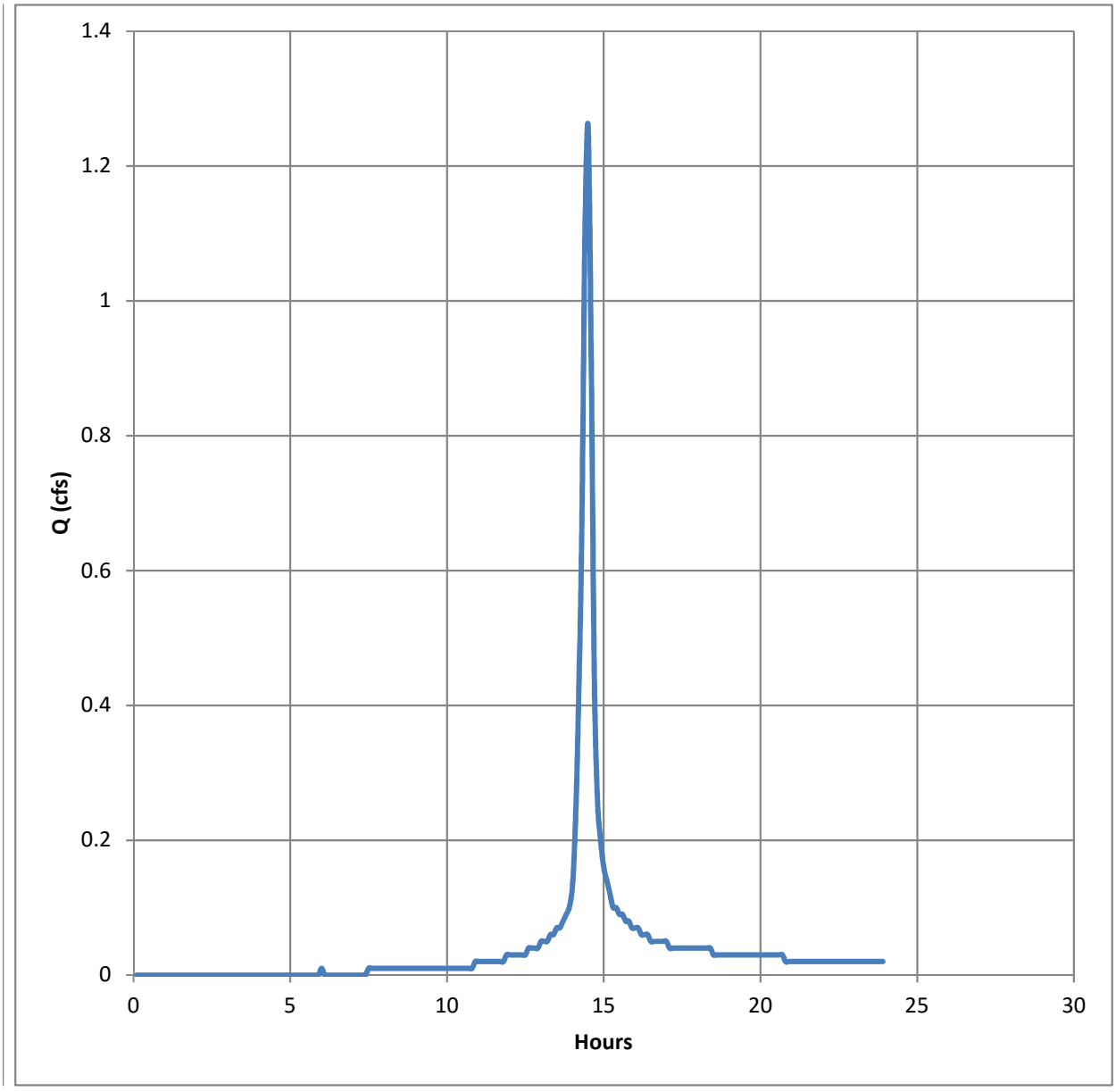
Notes:



Postdeveloped New Commercial to Bypass

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	1.26
Storm Frequency	=	1 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	3.454 Ft^3
Drainage Area	=	0.80 Acres	Curve Number	=	95
Tc Method	=	User	Time of conc. (Tc)	=	10.00 Mins
Total precip.	=	2.4 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

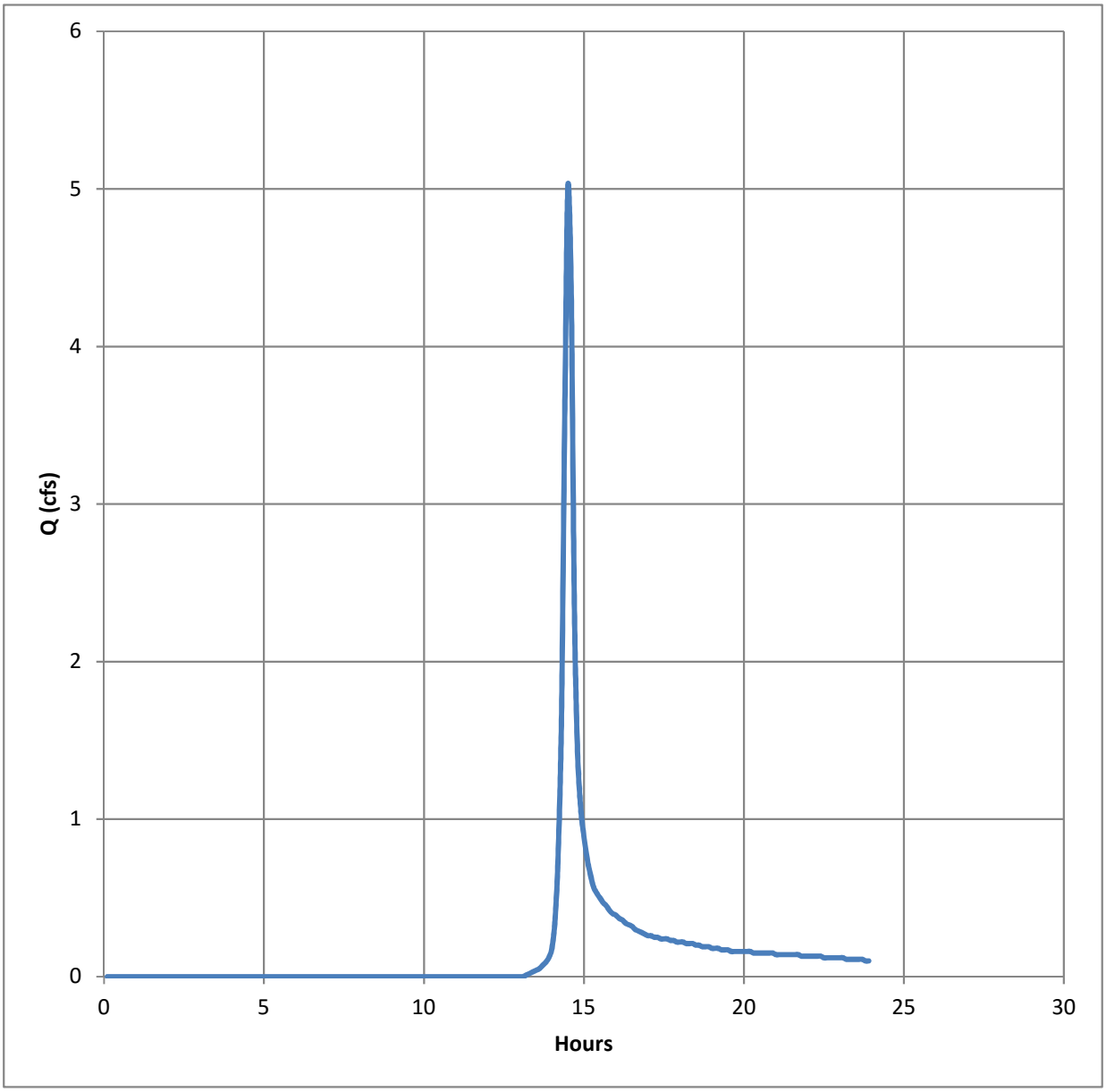
Notes:



Postdeveloped New Residential

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	5.02
Storm Frequency	=	1 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	13,889 Ft^3
Drainage Area	=	5.23 Acres	Curve Number	=	81
Tc Method	=	User	Time of conc. (Tc)	=	10.00 Mins
Total precip.	=	2.4 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

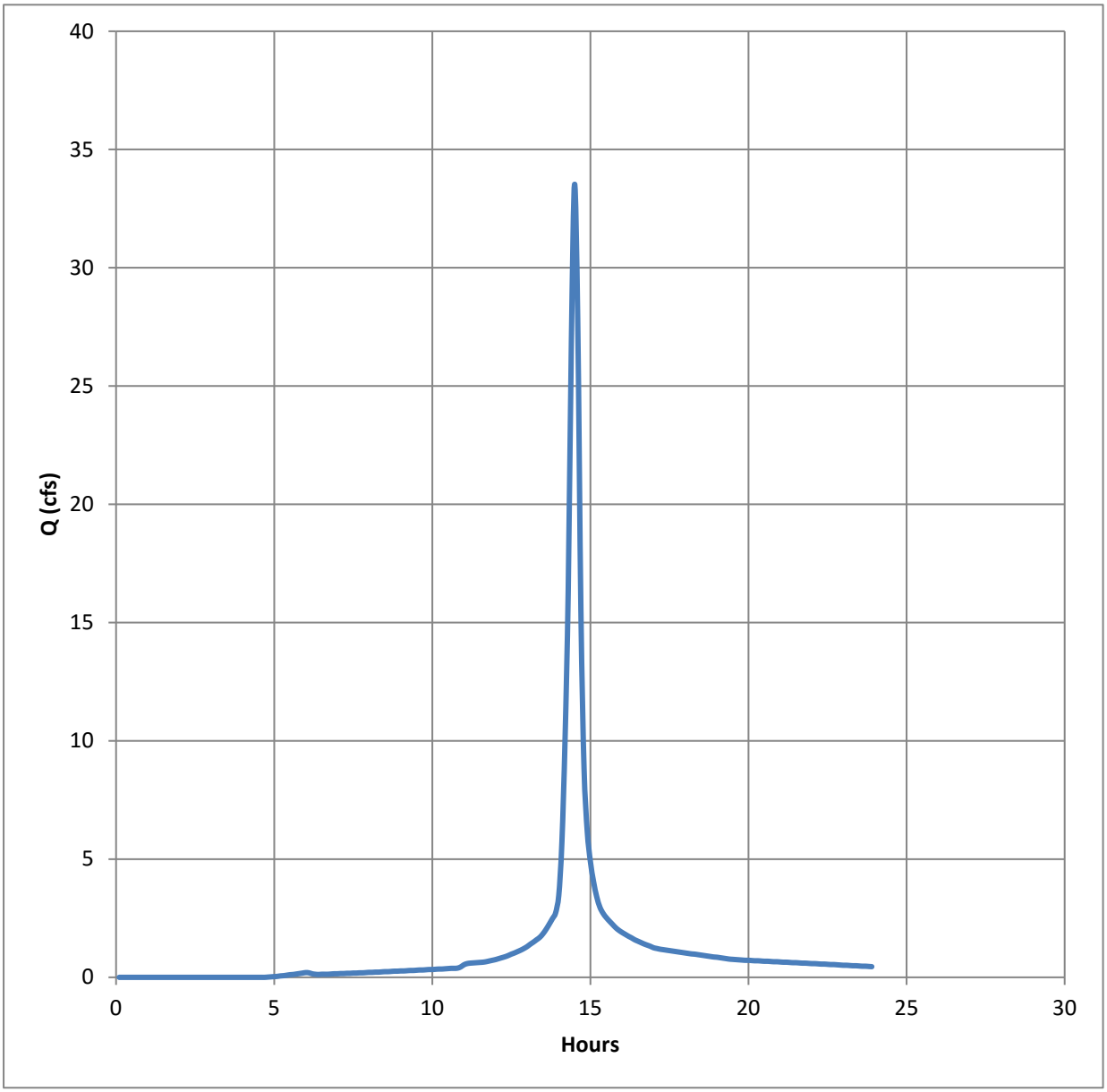
Notes:



Liberty Way Off-Site

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	33.53
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	96,034 Ft^3
Drainage Area	=	6.50 Acres	Curve Number	=	90
Tc Method	=	User	Time of conc. (Tc)	=	11.00 Mins
Total precip.	=	5.20 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

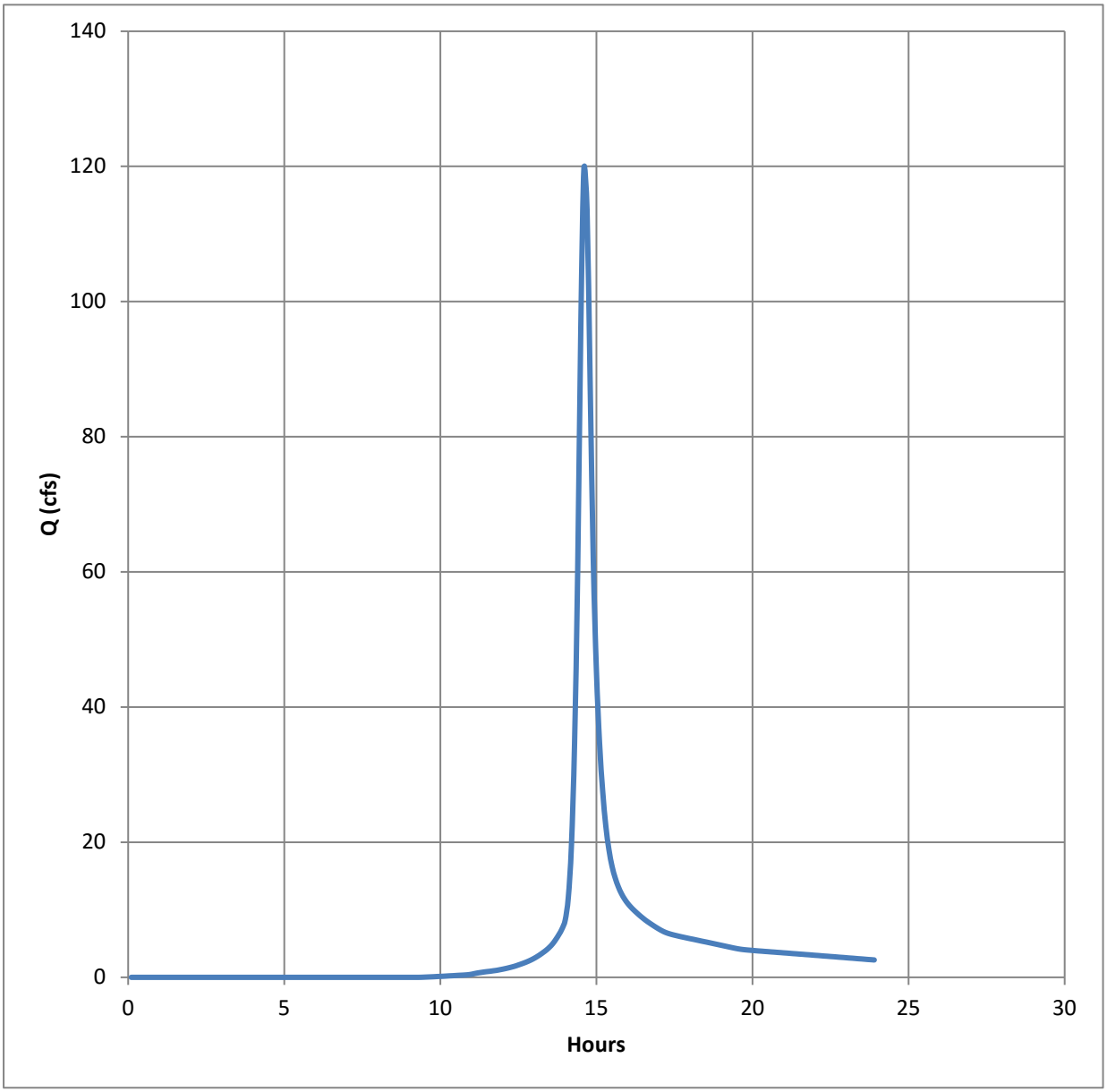
Notes:



Golf Course - Off Site

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	119.72
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	421,422 Ft^3
Drainage Area	=	41.60 Acres	Curve Number	=	77
Tc Method	=	User	Time of conc. (Tc)	=	22.20 Mins
Total precip.	=	5.2 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

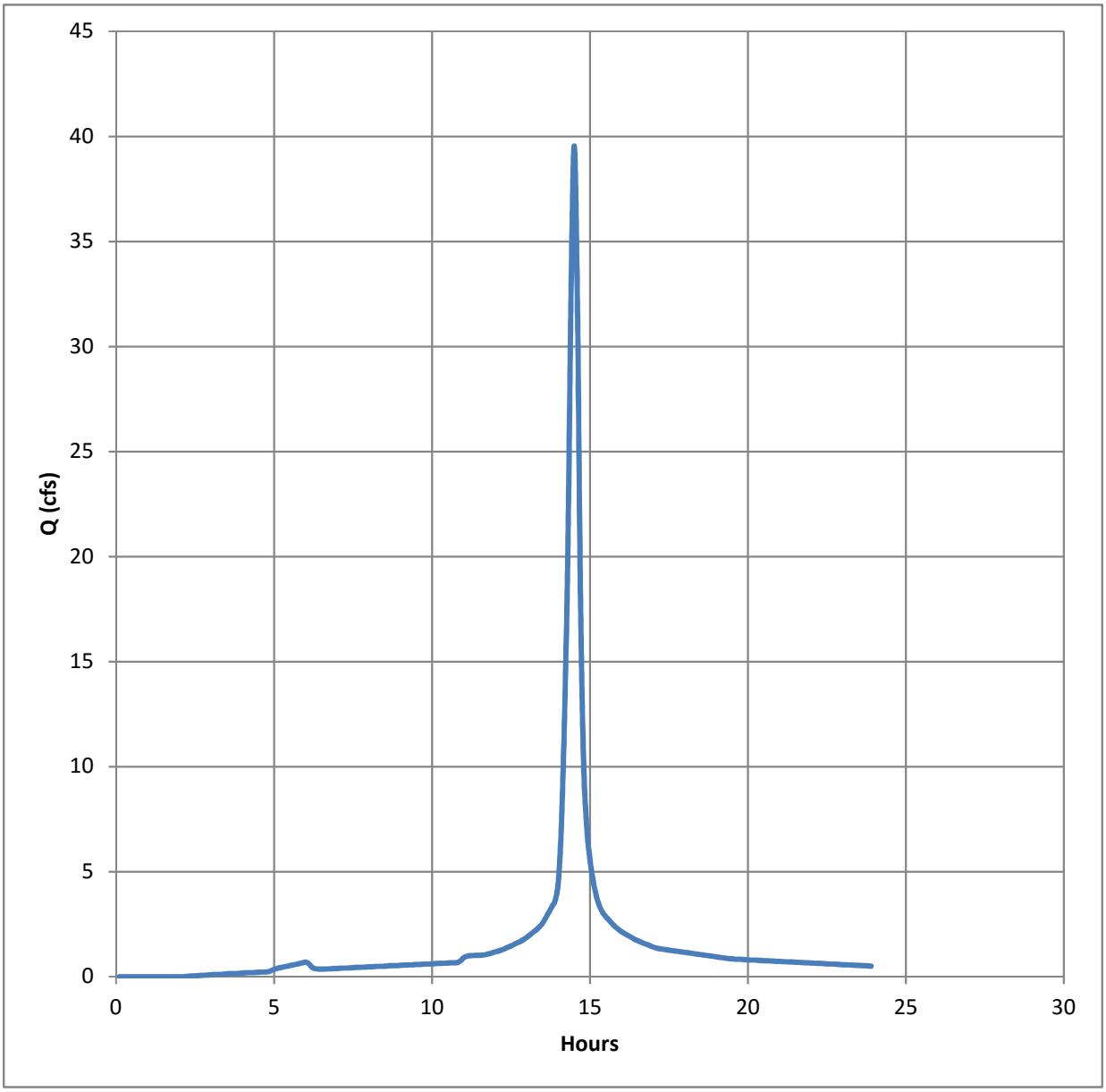
Notes:



Postdeveloped New Commercial

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	39.54
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	120,512 Ft^3
Drainage Area	=	6.86 Acres	Curve Number	=	96
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	5.2 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

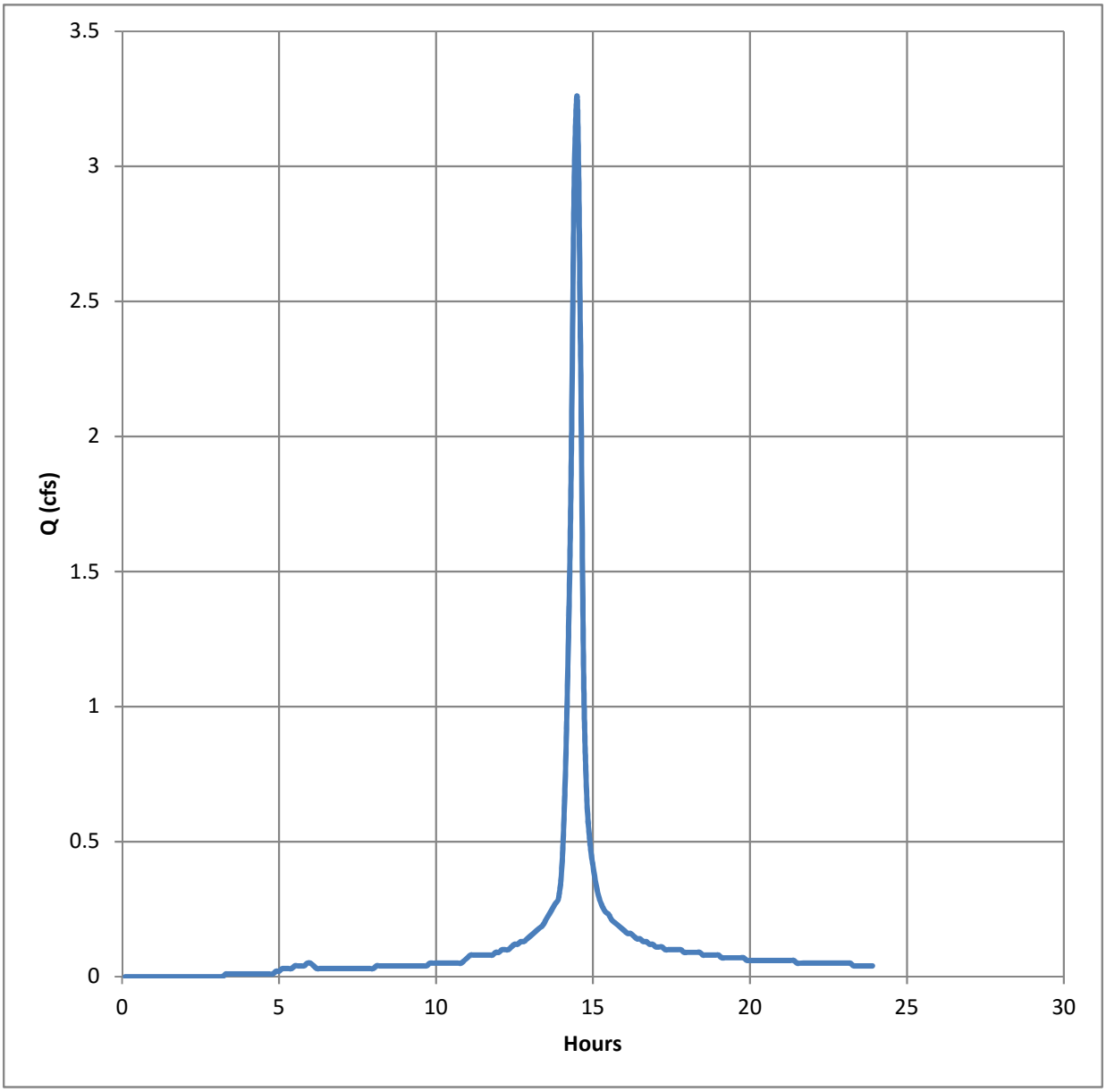
Notes:



Postdeveloped New Commercial to Bypass

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	3.25
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	9,544 Ft^3
Drainage Area	=	0.80 Acres	Curve Number	=	95
Tc Method	=	User	Time of conc. (Tc)	=	10.00 Mins
Total precip.	=	5.2 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

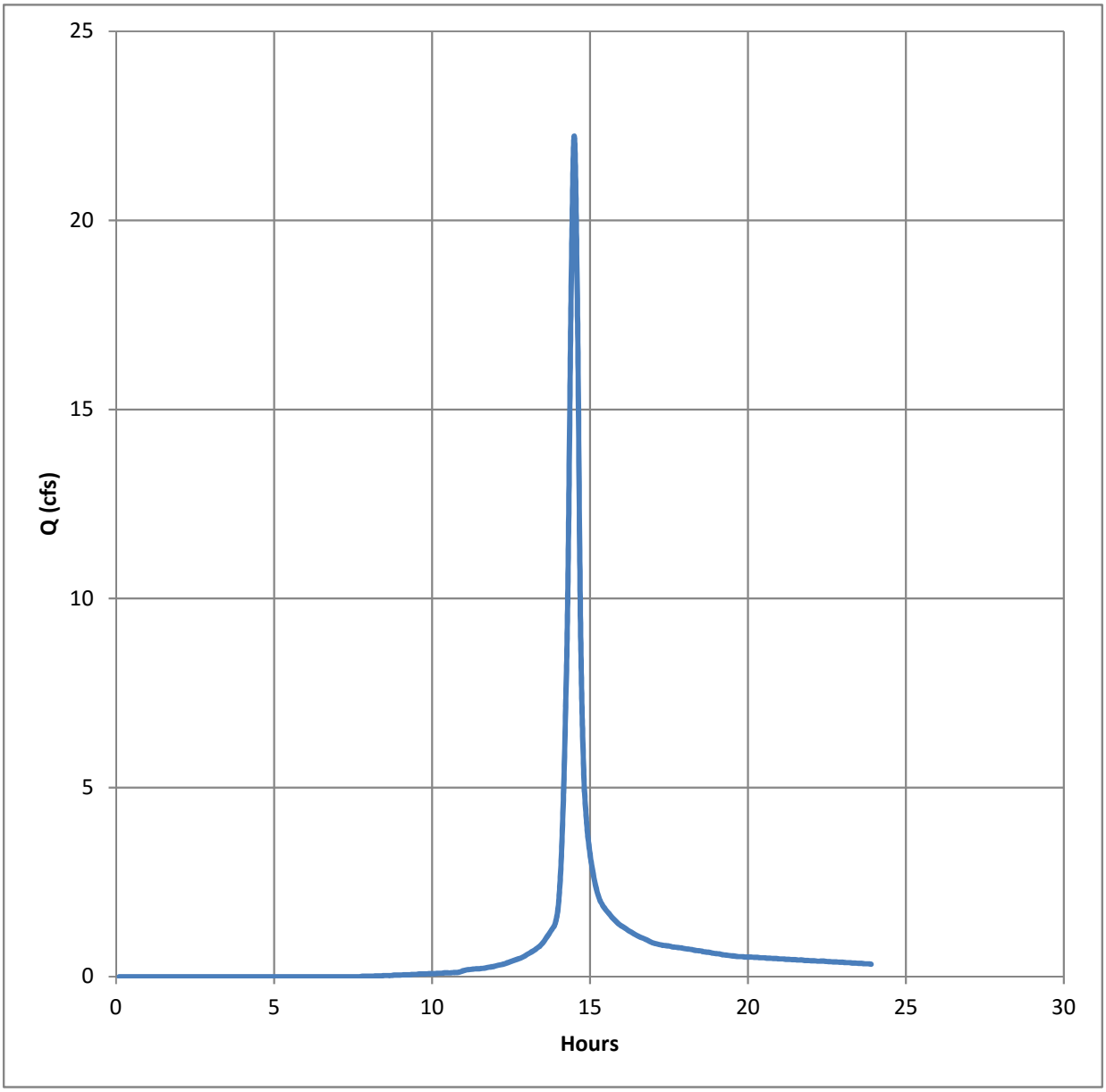
Notes:



Postdeveloped New Residential

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	22.23
Storm Frequency	=	50 yrs	Time to Peak	=	14:30
Time Interval	=	6 min	Hyd. Volume	=	59,816 Ft^3
Drainage Area	=	5.23 Acres	Curve Number	=	81
Tc Method	=	User	Time of conc. (Tc)	=	11.00 Mins
Total precip.	=	5.2 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

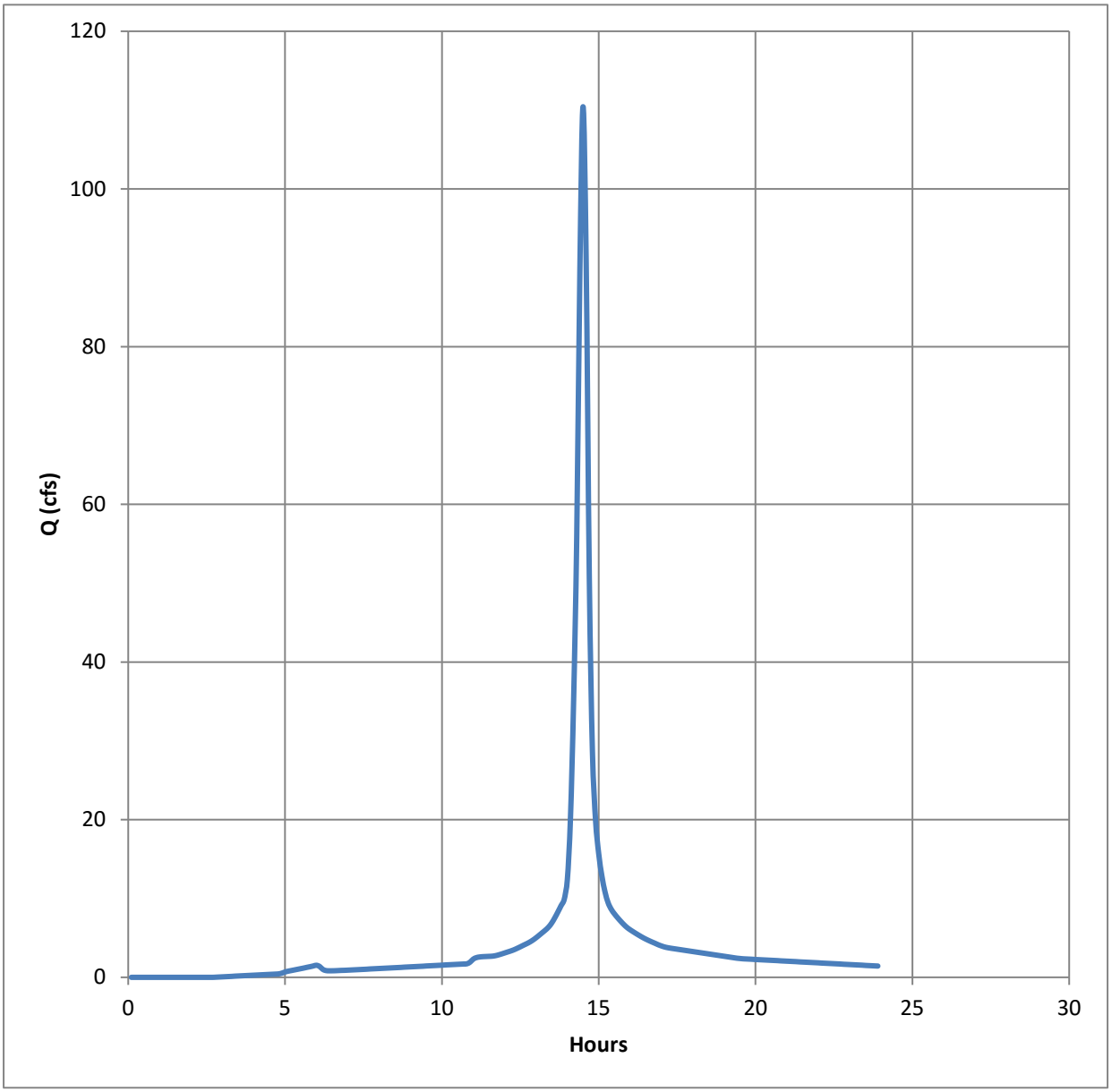
Notes:



Weatherington Pointe Cabelas and Outlots

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	110.43
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	329,991 Ft^3
Drainage Area	=	18.30 Acres	Curve Number	=	94
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	5.67 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

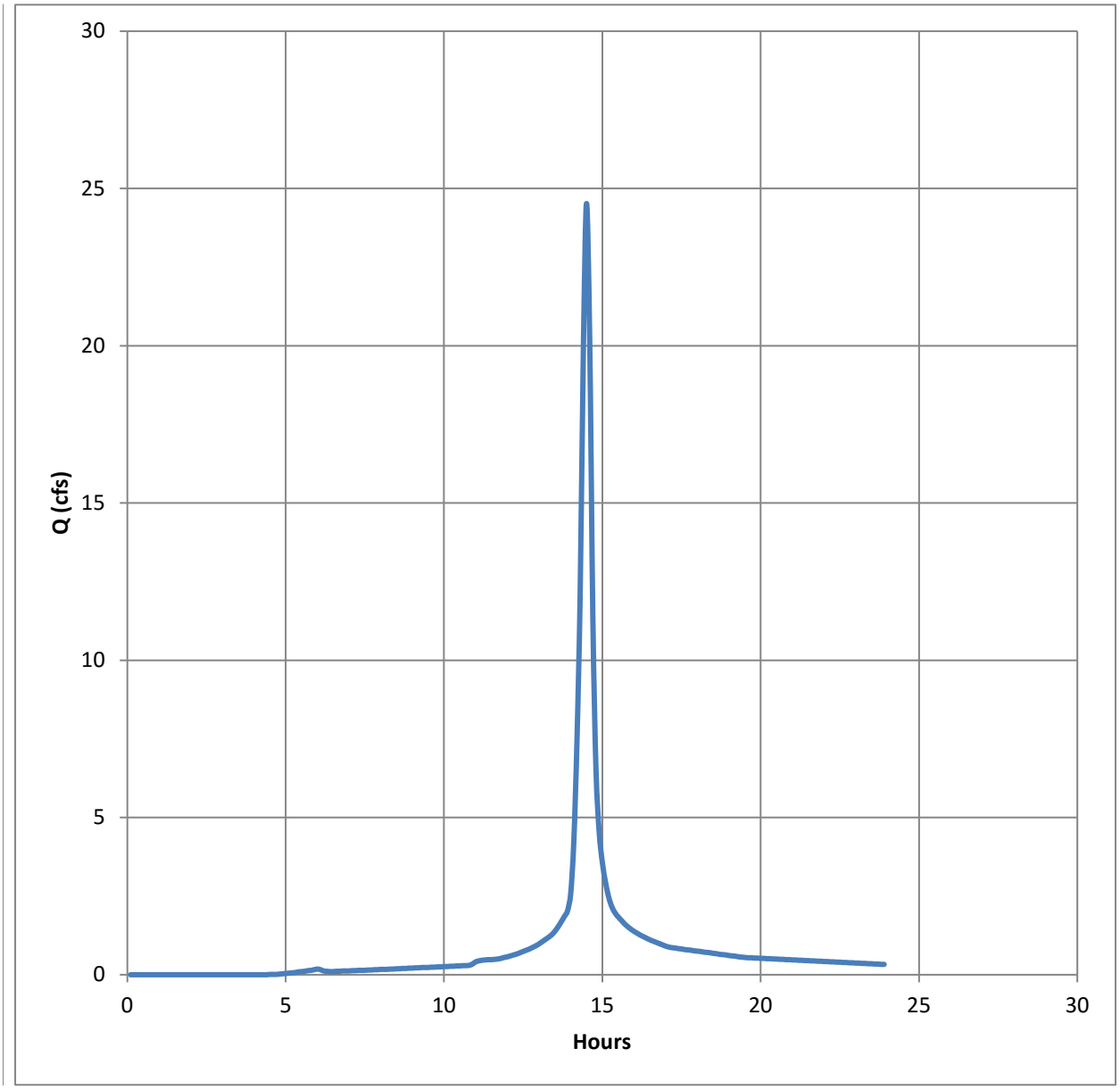
Notes:



Tylers Place Blvd to Pond

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	24.52
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	70,708 Ft^3
Drainage Area	=	4.30 Acres	Curve Number	=	90
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	5.67 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

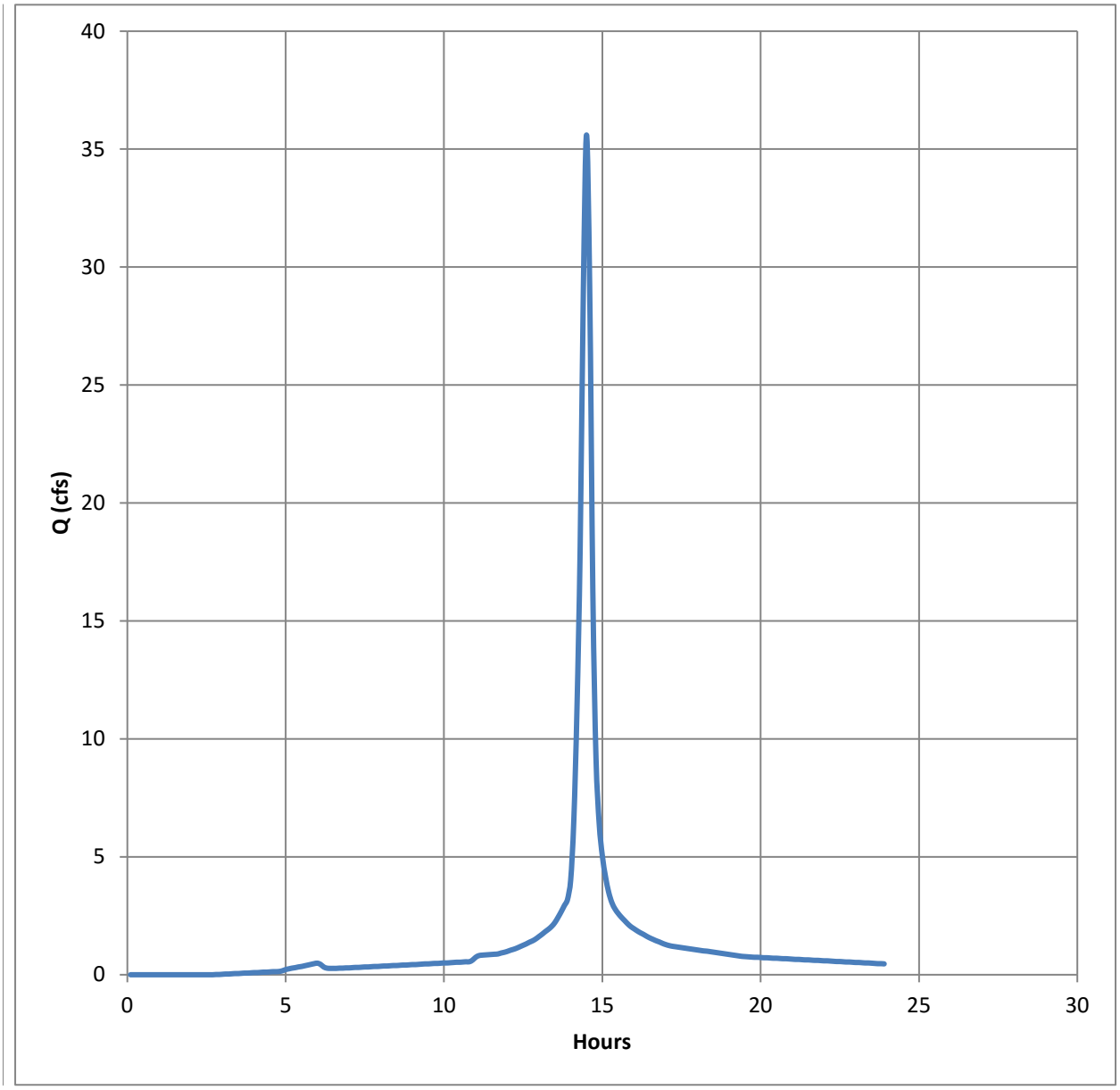
Notes:



Keefe Tract 2 to Basin

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	35.6
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	106,363 Ft^3
Drainage Area	=	5.90 Acres	Curve Number	=	94
Tc Method	=	User	Time of conc. (Tc)	=	12.00 Mins
Total precip.	=	5.67 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

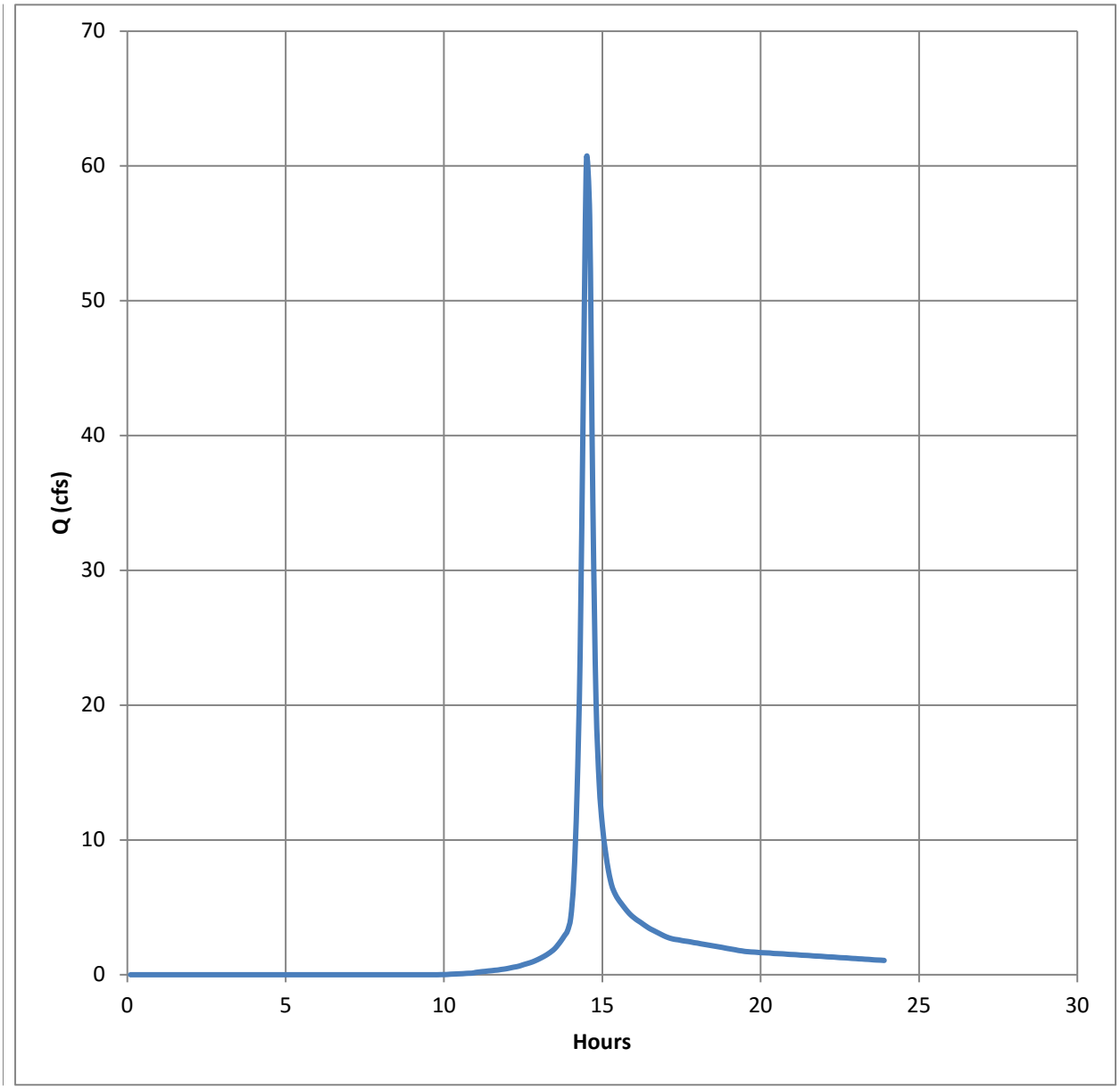
Notes:



Weatherington Residential

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	60.54
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	173,243 Ft^3
Drainage Area	=	16.40 Acres	Curve Number	=	74
Tc Method	=	User	Time of conc. (Tc)	=	13.80 Mins
Total precip.	=	5.67 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

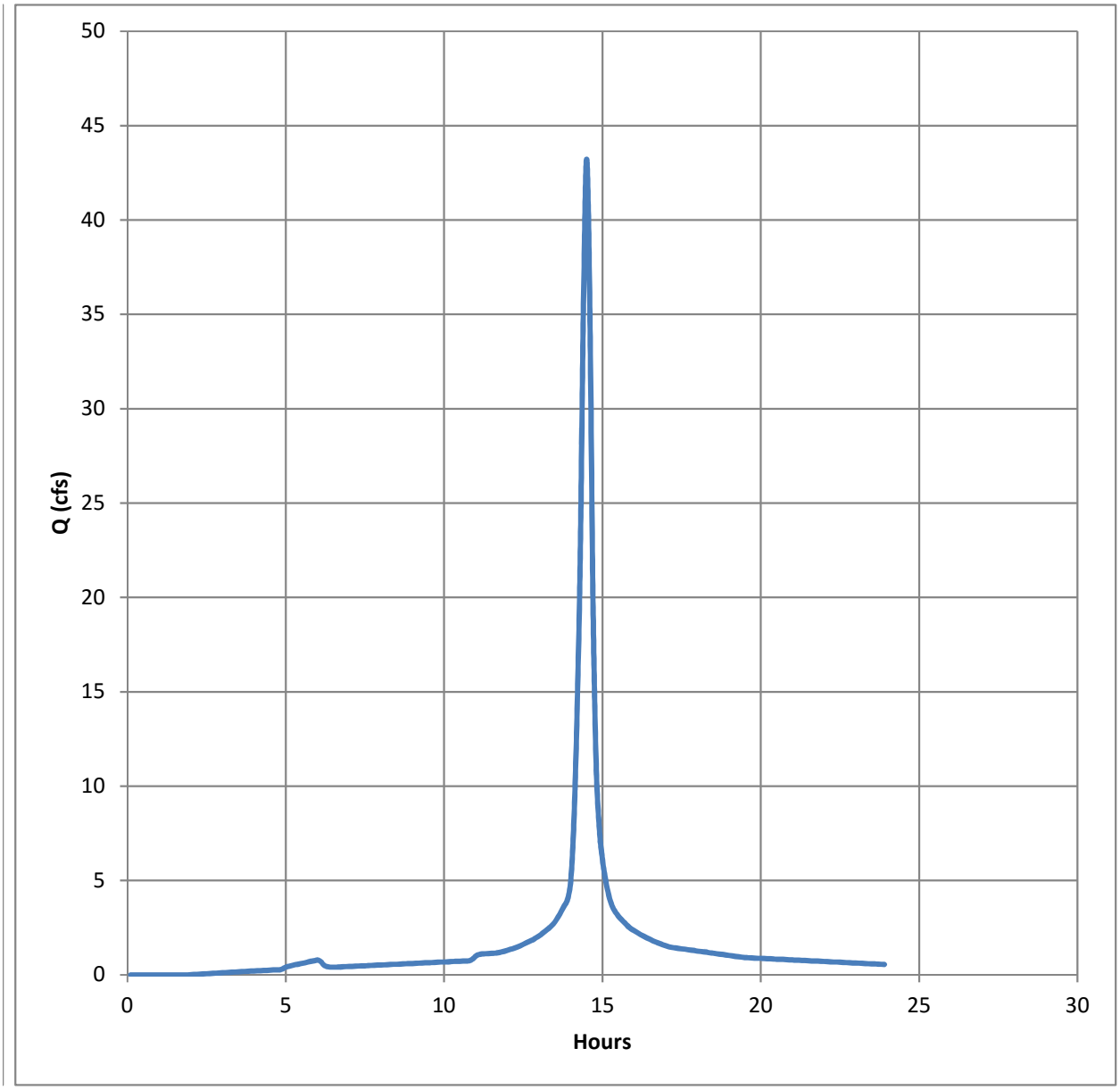
Notes:



Postdeveloped New Commercial to Basin

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	43.22
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	132,674 Ft^3
Drainage Area	=	6.86 Acres	Curve Number	=	96
Tc Method	=	User	Time of conc. (Tc)	=	13.80 Mins
Total precip.	=	5.67 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

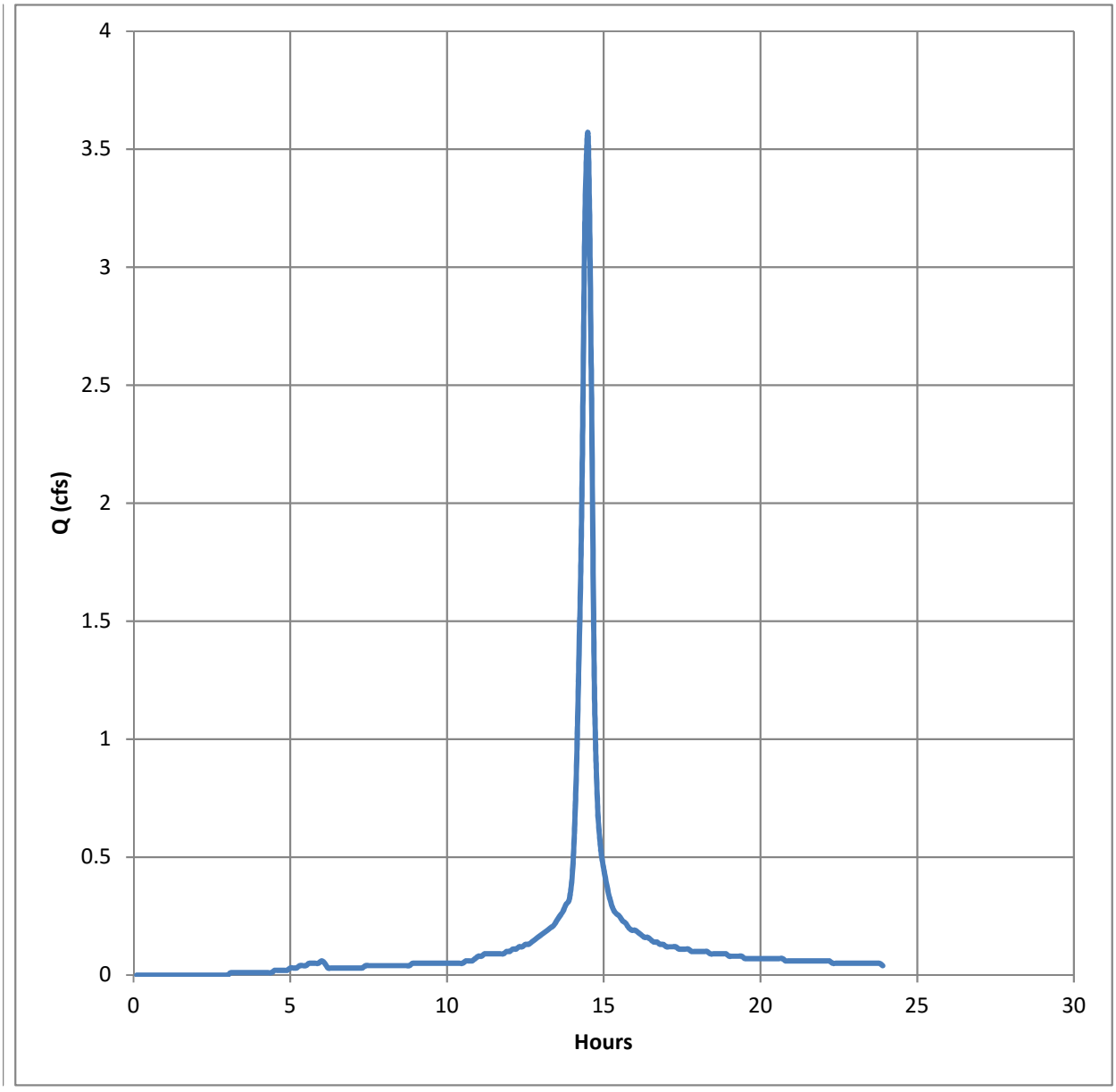
Notes:



Postdeveloped New Commercial to Bypass

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	3.56
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	10,517 Ft^3
Drainage Area	=	0.80 Acres	Curve Number	=	95
Tc Method	=	User	Time of conc. (Tc)	=	10.00 Mins
Total precip.	=	5.67 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

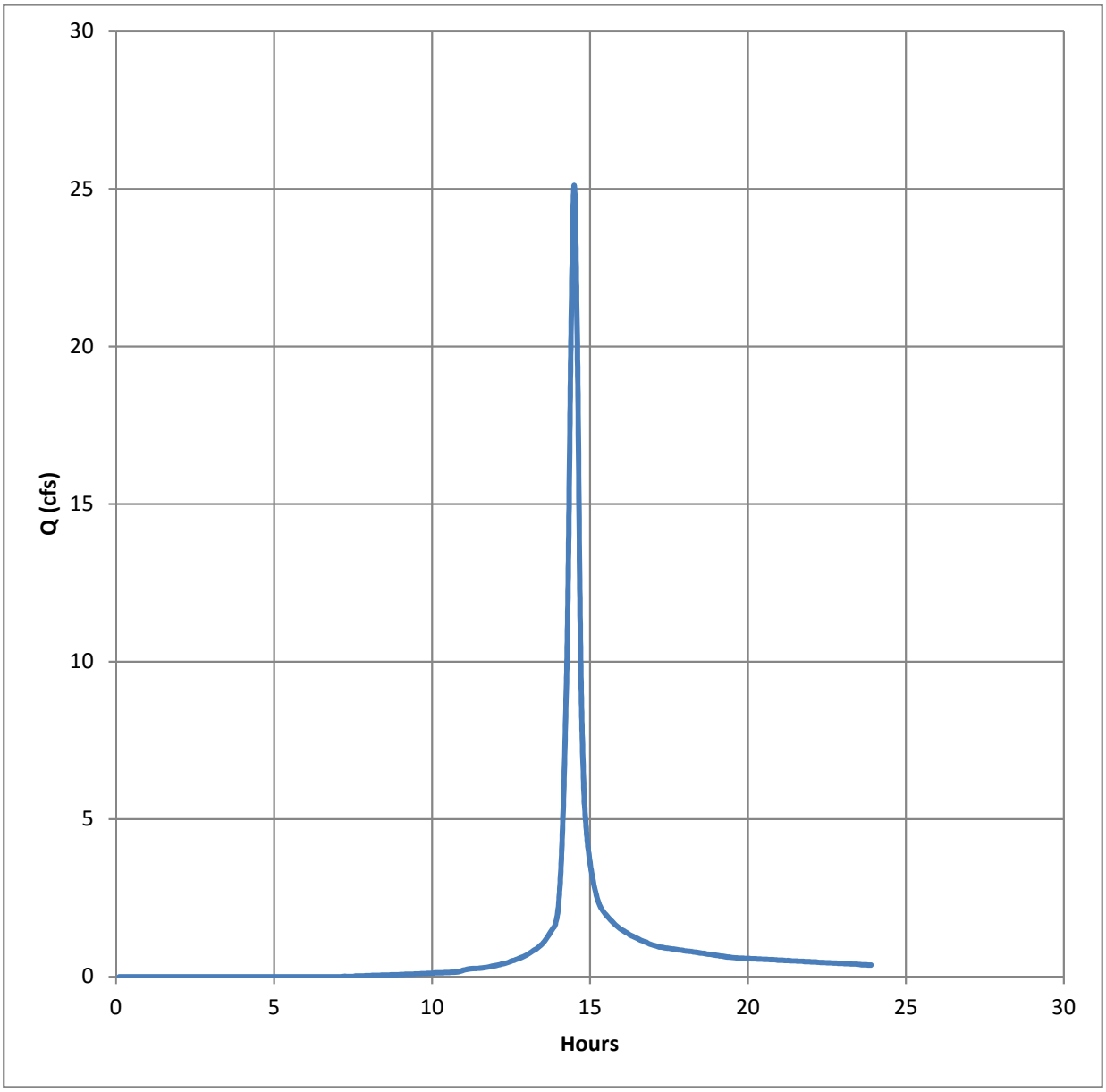
Notes:



Postdeveloped New Residential

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	25.11
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	67,792 Ft^3
Drainage Area	=	5.23 Acres	Curve Number	=	81
Tc Method	=	User	Time of conc. (Tc)	=	10.00 Mins
Total precip.	=	5.67 in	Date	=	9/8/2016
Storm Duration	=	24 hrs			

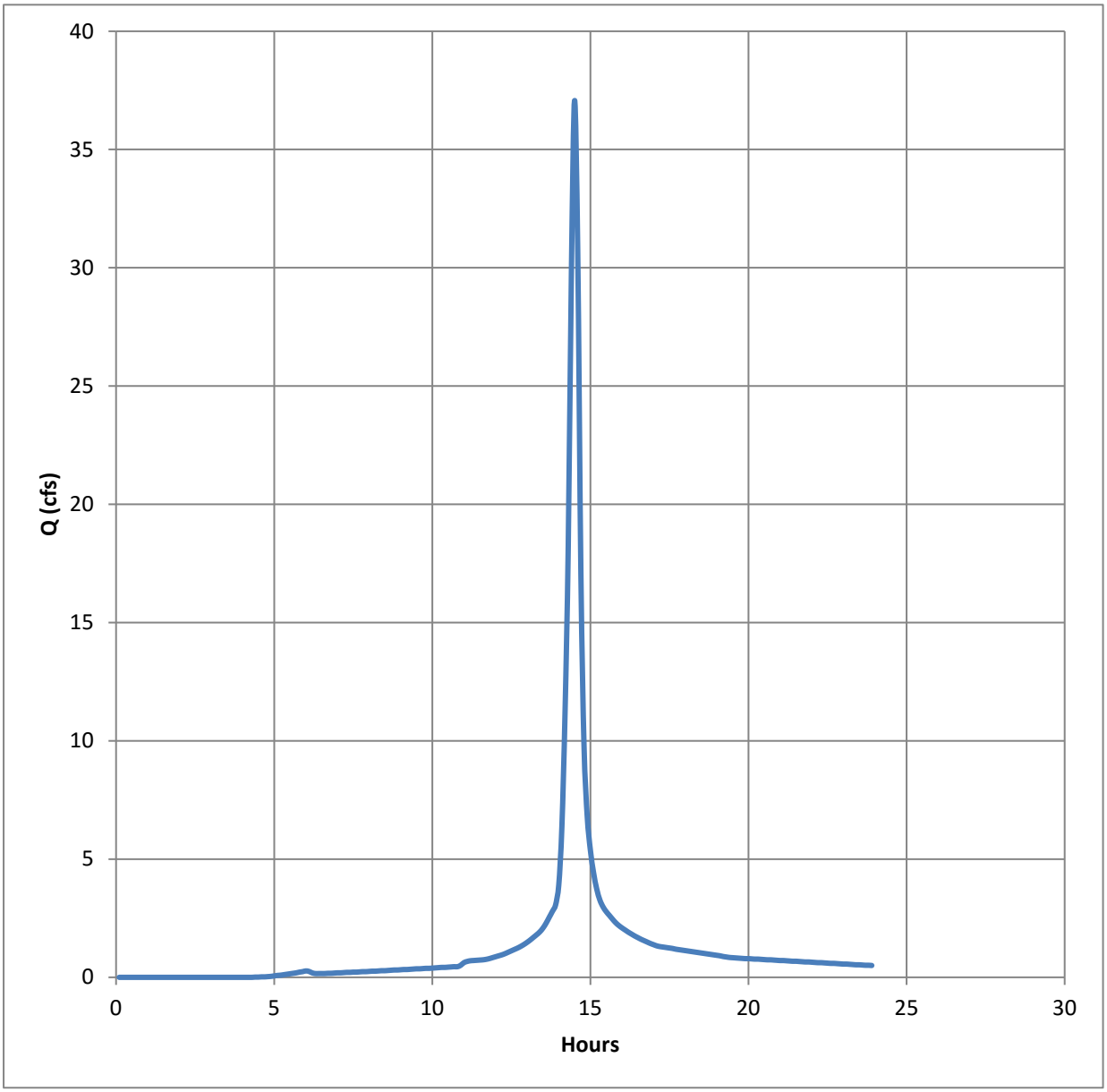
Notes:



Liberty Way Off-Site

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	37.07
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	106,730 Ft^3
Drainage Area	=	6.50 Acres	Curve Number	=	90
Tc Method	=	User	Time of conc. (Tc)	=	11.00 Mins
Total precip.	=	5.67 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

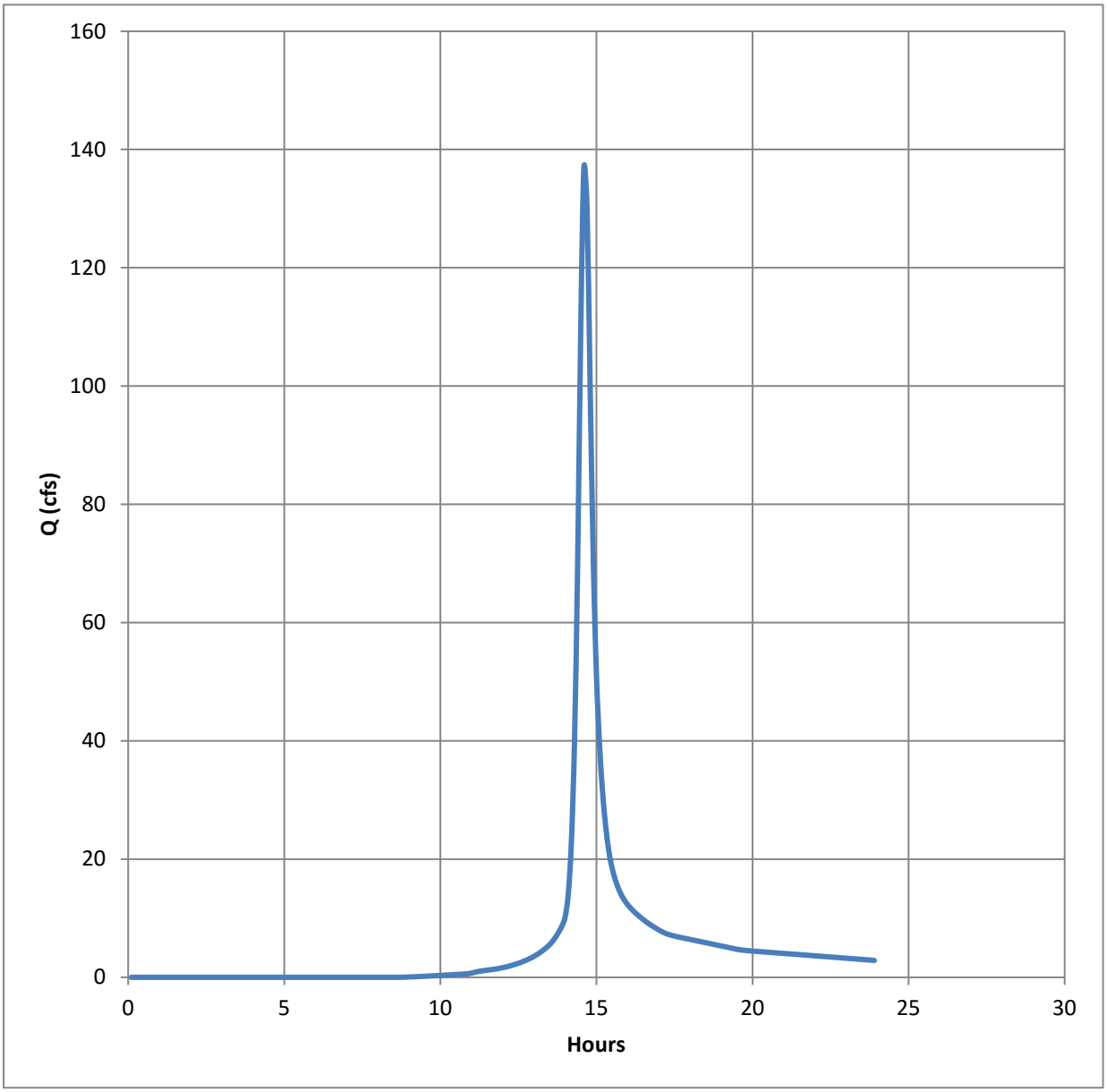
Notes:



Golf Course - Off Site

Hydrograph Type	=	SCS Runoff Type II	Peak Discharge	=	137.07
Storm Frequency	=	100 yrs	Time to Peak	=	12:30
Time Interval	=	6 min	Hyd. Volume	=	482,093 Ft^3
Drainage Area	=	41.60 Acres	Curve Number	=	77
Tc Method	=	User	Time of conc. (Tc)	=	22.20 Mins
Total precip.	=	5.67 in	Date	=	6/2/2016
Storm Duration	=	24 hrs			

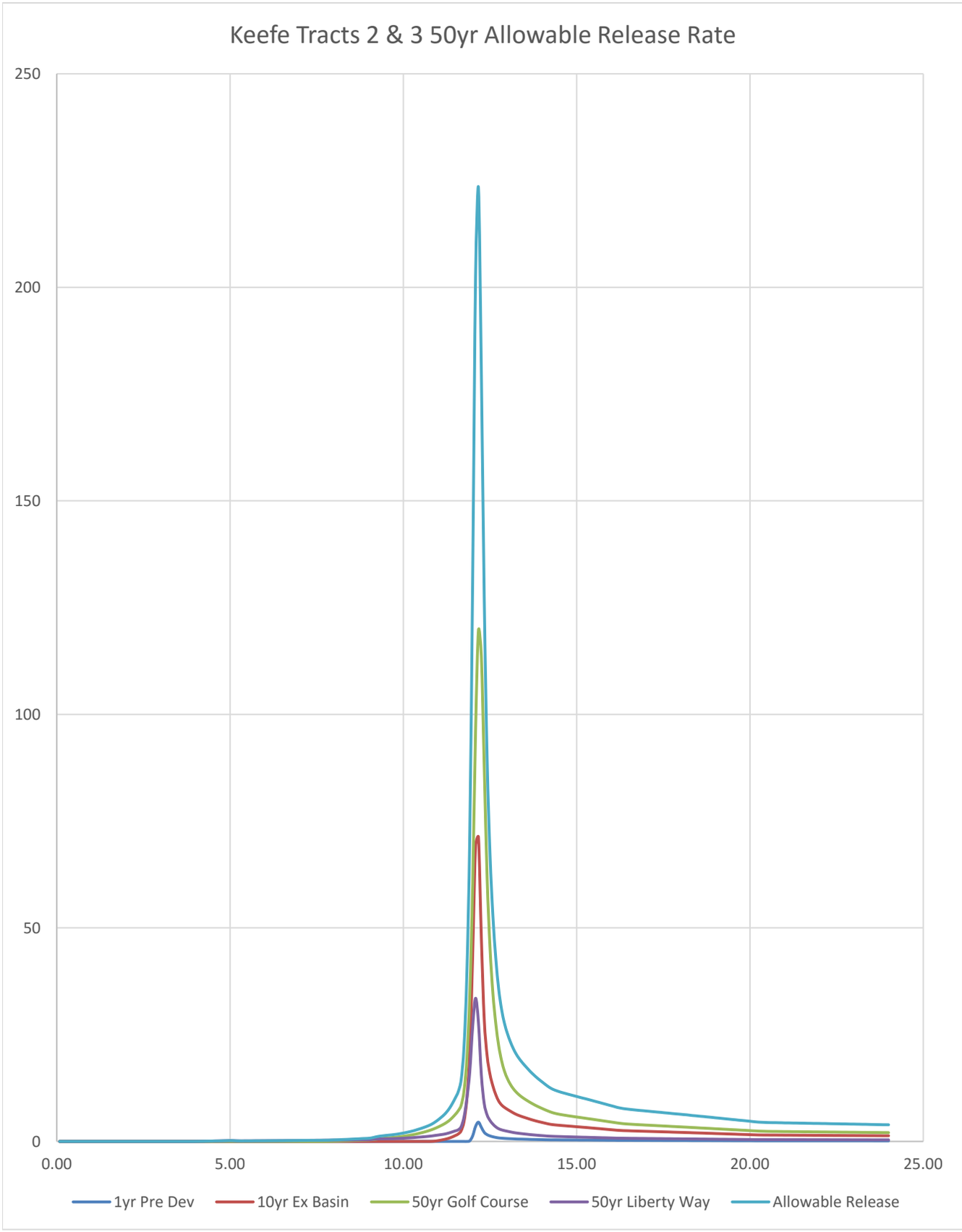
Notes:



Allowable Release Rate Hydrograph

Method of Hydrograph Development: TR-55

Software: Autodesk Storm and Sanitary Stand Alone

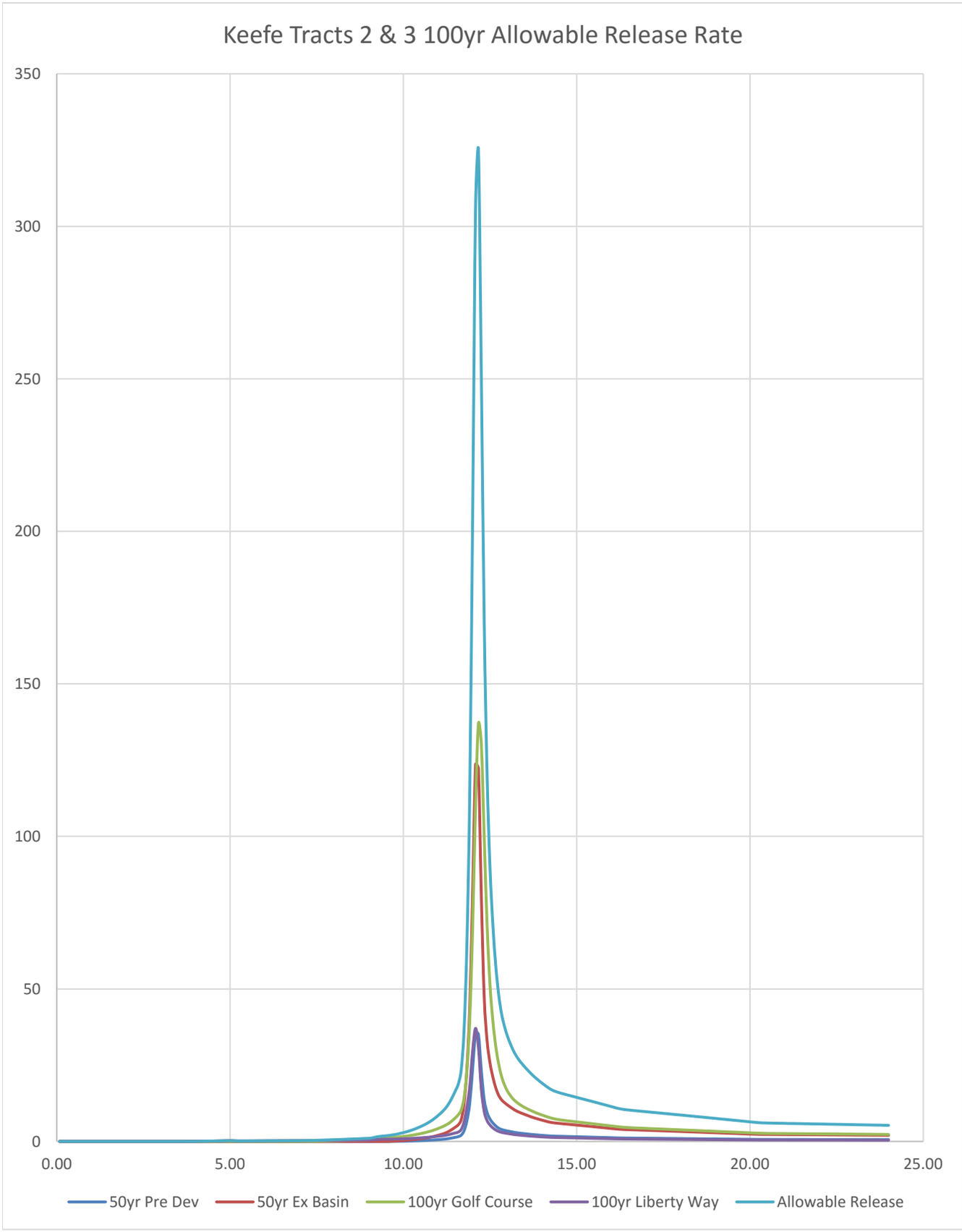


	Peak				
1yr Pre Dev	4.51	cfs Pg7 + Pg8	50yr Golf	119.72	cfs Pg 16
10yr Ex Basin	71.24	cfs Pg 6	50yr Lib Way	33.53	cfs Pg 17
			50yr Allowabl	223.27	cfs

Allowable Release Rate Hydrograph

Method of Hydrograph Development: TR-55

Software: Autodesk Storm and Sanitary Stand Alone



	Peak		
50yr Pre Dev	35.63 cfs	100yr Golf	137.07 cfs
50yr Ex Basin	123.57 cfs	100yr Lib Way	37.07 cfs
		100yr Allowab	325.08 cfs

Water Quality Volume

Project:	Keefe Tracts 2 & 3	Designed By:	MJL	Date:	9/13/16
Job No.:	15M053-000	Checked By:	ASB	Date:	3/16/17
Basin ID:	Primary Basin	Revised By:		Date:	

Required Water Quality Volume

$WQ_v = P\ C\ A/12$

Site Drainage Area (A) =	81.56	acres	(To Basin)	WQ_v =	2.368 acre-ft.
Rainfall Depth (P) =	0.75	in.			103,150 cu.ft.
Runoff Coefficient (C) =	0.46				
				75% Wet Pond	1.78 acre-ft.
Residential Area (A) =	16.40	acres			77,363 cu.ft.
Residential (C) =	0.40	acres			
Commercial Area (A) =	23.56	acres			
Commerical (C) =	0.80	acres			
Golf Course Area (A) =	41.60	acres			
Golf Course (C) =	0.30	acres			

Water Quality Release Rate

Q_{wqv} = Total WQ_v/RT

Retention Time (RT) = 24 hours

Q_{wqv} = 0.90 cfs

Provided Retention Time = 33.92 Hours

Water Quality Outlet Orifice

Contour Areas

	Elevation ft	Area ft^2	Volume ft^3	Cum. Vol. ft^3	Elevation at V	Storage at Elev
Basin Inv. =	844.00	8608.90	0.00	0.00		
Contour 1 =	845.00	10164.05	9386.48	9386.48		
Contour 2 =	846.00	11827.50	10995.78	20382.25		
Contour 3 =	847.00	13596.40	12711.95	33094.20		
Contour 4 =	848.00	15472.65	14534.53	47628.73		
Contour 5 =	849.00	17455.30	16463.98	64092.70		
Contour 6 =	850.00	19545.30	18500.30	82593.00	849.72	
Contour 7 =	851.00	29644.75	24595.03	107188.03		
Contour 8 =	852.00	44649.05	37146.90	144334.93		
Contour 9 =	852.50	47003.00	57485.81	0.00		
Contour 10 =	853.00	48279.00	23820.50	23820.50		
Contour 11 =	854.00	49398.00	48838.50	72659.00		
Contour 12 =	855.00	50343.00	49870.50	122529.50	854.09	109345.58
Contour 13 =	856.00	51255.00	50799.00	173328.50		
Contour 14 =	857.00	52205.00	51730.00	225058.50		
Contour 15 =	858.00	53176.00	52690.50	277749.00		
Contour 16 =	859.00	54341.00	53758.50	331507.50		
Contour 17 =	860.00	55910.00	55125.50	386633.00		
Contour 18 =	861.00	55910.00	55910.00	442543.00		
Contour 19 =	862.00	55910.00	55910.00	498453.00		
Contour 20 =	863.00	55910.00	55910.00	554363.00		

$Q = N\ C_d\ A_o\ (2\ g\ \Delta h)^{1/2}$

C_d = 0.61

$A_o = \pi\ D^2/4$ for circular orifices; = h * w for rectangular orifices

g = 32.20 ft/sec^2

Q = Q_{wqv} = 0.895 cfs

Required Volume = V = 77363 ft^3

Elevation at V = 854.09

Number of orifices = N = 1

Orifice h = 6.000 inch

Orifice w = 0.00 inch (= 0 for circular orifice)

Δh_{min}^{avg} = (Elev at V - Basin Inv)/2 - 1/2 h = 4.80 ft

$A_{trial} = Q/(N\ C_d\ (2\ g\ \Delta h_{min}^{avg})^{1/2})$ = 12.03 in^2

Actual A = A_o = 28.27 in^2

$\Delta h^{avg} = (Q/(N\ C_d\ A_o))^2/(2\ g)$ = 0.87 ft

Elev = 854.74 > Elevation at V = 854.09 Good

Storage = 109345.58 ft^3

Q = 0.895 cfs

Water Quality Volume

Project:	Keefe Tracts 2 & 3	Designed By:	MJL	Date:	6/2/16
Job No.:	15M053-000	Checked By:		Date:	
Basin ID:	Residential	Revised By:		Date:	

Required Water Quality Volume

$WQ_v = P\ C\ A/12$

Site Drainage Area (A) =	5.23	acres	(To Basin)	WQ_v =	0.119 acre-ft.
Rainfall Depth (P) =	0.75	in.			5,180 cu.ft.
Impervious Area =	2.81	acres			
i=	0.54			20% Sediment	1,036 cu.ft.
				Total WQ=	6,215 cu.ft.
Runoff Coefficient (C) =	0.36				

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

Residential Water Quality Volume and Release Rates will be provided per each building in underground storage at building permits

Pond Report

Pond No. 2 - Existing Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 853.10 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	853.10	00	0	0
0.90	854.00	109	33	33
1.90	855.00	8,505	3,192	3,225
2.90	856.00	20,179	13,927	17,151
3.90	857.00	34,118	26,843	43,994
4.90	858.00	48,025	40,870	84,864
5.90	859.00	61,936	54,828	139,692
6.90	860.00	71,234	66,524	206,216
7.90	861.00	74,999	73,101	279,317

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 60.00	0.00	0.00	0.00
Span (in)	= 60.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 853.10	0.00	0.00	0.00
Length (ft)	= 92.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .024	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	853.10	0.00	---	---	---	---	---	---	---	---	---	0.000
0.09	3	853.19	0.08 oc	---	---	---	---	---	---	---	---	---	0.077
0.18	7	853.28	0.33 ic	---	---	---	---	---	---	---	---	---	0.329
0.27	10	853.37	0.73 ic	---	---	---	---	---	---	---	---	---	0.731
0.36	13	853.46	1.29 ic	---	---	---	---	---	---	---	---	---	1.288
0.45	16	853.55	2.01 ic	---	---	---	---	---	---	---	---	---	2.015
0.54	20	853.64	2.87 ic	---	---	---	---	---	---	---	---	---	2.875
0.63	23	853.73	3.90 ic	---	---	---	---	---	---	---	---	---	3.896
0.72	26	853.82	5.04 ic	---	---	---	---	---	---	---	---	---	5.041
0.81	29	853.91	6.35 ic	---	---	---	---	---	---	---	---	---	6.346
0.90	33	854.00	7.77 ic	---	---	---	---	---	---	---	---	---	7.768
1.00	352	854.10	9.55 ic	---	---	---	---	---	---	---	---	---	9.547
1.10	671	854.20	11.46 ic	---	---	---	---	---	---	---	---	---	11.46
1.20	990	854.30	13.52 ic	---	---	---	---	---	---	---	---	---	13.52
1.30	1,309	854.40	15.79 ic	---	---	---	---	---	---	---	---	---	15.79
1.40	1,629	854.50	18.13 ic	---	---	---	---	---	---	---	---	---	18.13
1.50	1,948	854.60	20.66 ic	---	---	---	---	---	---	---	---	---	20.66
1.60	2,267	854.70	23.11 oc	---	---	---	---	---	---	---	---	---	23.11
1.70	2,586	854.80	25.54 oc	---	---	---	---	---	---	---	---	---	25.54
1.80	2,905	854.90	28.07 oc	---	---	---	---	---	---	---	---	---	28.07
1.90	3,225	855.00	30.58 oc	---	---	---	---	---	---	---	---	---	30.58
2.00	4,617	855.10	33.15 oc	---	---	---	---	---	---	---	---	---	33.15
2.10	6,010	855.20	35.79 oc	---	---	---	---	---	---	---	---	---	35.79
2.20	7,403	855.30	38.47 oc	---	---	---	---	---	---	---	---	---	38.47
2.30	8,795	855.40	41.09 oc	---	---	---	---	---	---	---	---	---	41.09
2.40	10,188	855.50	43.83 oc	---	---	---	---	---	---	---	---	---	43.83
2.50	11,581	855.60	46.49 oc	---	---	---	---	---	---	---	---	---	46.49
2.60	12,973	855.70	49.25 oc	---	---	---	---	---	---	---	---	---	49.25
2.70	14,366	855.80	51.91 oc	---	---	---	---	---	---	---	---	---	51.91
2.80	15,759	855.90	54.65 oc	---	---	---	---	---	---	---	---	---	54.65
2.90	17,151	856.00	57.37 oc	---	---	---	---	---	---	---	---	---	57.37
3.00	19,836	856.10	60.04 oc	---	---	---	---	---	---	---	---	---	60.04
3.10	22,520	856.20	62.67 oc	---	---	---	---	---	---	---	---	---	62.67
3.20	25,204	856.30	65.24 oc	---	---	---	---	---	---	---	---	---	65.24

Continues on next page...

Existing Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.30	27,888	856.40	67.84 oc	---	---	---	---	---	---	---	---	---	67.84
3.40	30,573	856.50	70.35 oc	---	---	---	---	---	---	---	---	---	70.35
3.50	33,257	856.60	72.77 oc	---	---	---	---	---	---	---	---	---	72.77
3.60	35,941	856.70	75.26 oc	---	---	---	---	---	---	---	---	---	75.26
3.70	38,625	856.80	77.54 oc	---	---	---	---	---	---	---	---	---	77.54
3.80	41,310	856.90	79.84 oc	---	---	---	---	---	---	---	---	---	79.84
3.90	43,994	857.00	81.99 oc	---	---	---	---	---	---	---	---	---	81.99
4.00	48,081	857.10	84.04 oc	---	---	---	---	---	---	---	---	---	84.04
4.10	52,168	857.20	86.03 oc	---	---	---	---	---	---	---	---	---	86.03
4.20	56,255	857.30	87.87 oc	---	---	---	---	---	---	---	---	---	87.87
4.30	60,342	857.40	89.53 oc	---	---	---	---	---	---	---	---	---	89.53
4.40	64,429	857.50	91.07 oc	---	---	---	---	---	---	---	---	---	91.07
4.50	68,516	857.60	92.42 oc	---	---	---	---	---	---	---	---	---	92.42
4.60	72,603	857.70	93.53 oc	---	---	---	---	---	---	---	---	---	93.53
4.70	76,690	857.80	94.39 oc	---	---	---	---	---	---	---	---	---	94.39
4.80	80,777	857.90	94.90 oc	---	---	---	---	---	---	---	---	---	94.90
4.90	84,864	858.00	94.87 oc	---	---	---	---	---	---	---	---	---	94.87
5.00	90,347	858.10	92.96 oc	---	---	---	---	---	---	---	---	---	92.96
5.10	95,829	858.20	97.89 oc	---	---	---	---	---	---	---	---	---	97.89
5.20	101,312	858.30	102.57 oc	---	---	---	---	---	---	---	---	---	102.57
5.30	106,795	858.40	107.05 oc	---	---	---	---	---	---	---	---	---	107.05
5.40	112,278	858.50	111.35 oc	---	---	---	---	---	---	---	---	---	111.35
5.50	117,760	858.60	115.49 oc	---	---	---	---	---	---	---	---	---	115.49
5.60	123,243	858.70	119.49 oc	---	---	---	---	---	---	---	---	---	119.49
5.70	128,726	858.80	123.36 oc	---	---	---	---	---	---	---	---	---	123.36
5.80	134,209	858.90	127.11 oc	---	---	---	---	---	---	---	---	---	127.11
5.90	139,692	859.00	130.76 oc	---	---	---	---	---	---	---	---	---	130.76
6.00	146,344	859.10	134.30 oc	---	---	---	---	---	---	---	---	---	134.30
6.10	152,996	859.20	137.75 oc	---	---	---	---	---	---	---	---	---	137.75
6.20	159,649	859.30	141.12 oc	---	---	---	---	---	---	---	---	---	141.12
6.30	166,301	859.40	144.41 oc	---	---	---	---	---	---	---	---	---	144.41
6.40	172,954	859.50	147.62 oc	---	---	---	---	---	---	---	---	---	147.62
6.50	179,606	859.60	150.77 oc	---	---	---	---	---	---	---	---	---	150.77
6.60	186,258	859.70	153.85 oc	---	---	---	---	---	---	---	---	---	153.85
6.70	192,911	859.80	156.88 oc	---	---	---	---	---	---	---	---	---	156.88
6.80	199,563	859.90	159.84 oc	---	---	---	---	---	---	---	---	---	159.84
6.90	206,216	860.00	162.76 oc	---	---	---	---	---	---	---	---	---	162.76
7.00	213,526	860.10	165.62 oc	---	---	---	---	---	---	---	---	---	165.62
7.10	220,836	860.20	168.43 oc	---	---	---	---	---	---	---	---	---	168.43
7.20	228,146	860.30	171.20 oc	---	---	---	---	---	---	---	---	---	171.20
7.30	235,456	860.40	173.92 oc	---	---	---	---	---	---	---	---	---	173.92
7.40	242,766	860.50	176.60 oc	---	---	---	---	---	---	---	---	---	176.60
7.50	250,076	860.60	179.24 oc	---	---	---	---	---	---	---	---	---	179.24
7.60	257,386	860.70	181.84 oc	---	---	---	---	---	---	---	---	---	181.84
7.70	264,697	860.80	184.40 oc	---	---	---	---	---	---	---	---	---	184.40
7.80	272,007	860.90	186.93 oc	---	---	---	---	---	---	---	---	---	186.93
7.90	279,317	861.00	189.43 oc	---	---	---	---	---	---	---	---	---	189.43

...End

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.514 Thursday, 03 / 16 / 2017

Pond No. 1 - Walled Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 852.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	852.50	47,003	0	0
0.50	853.00	48,279	23,817	23,817
1.50	854.00	49,398	48,833	72,650
2.50	855.00	50,343	49,865	122,515
3.50	856.00	51,255	50,793	173,308
4.50	857.00	52,205	51,724	225,032
5.50	858.00	53,176	52,685	277,717
6.50	859.00	54,341	53,752	331,469
7.50	860.00	55,910	55,118	386,587
8.50	861.00	55,910	55,904	442,491
9.50	862.00	55,910	55,904	498,396
10.50	863.00	55,910	55,904	554,300

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	6.00	66.00	0.00
Span (in)	= 96.00	6.00	66.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 852.10	852.10	854.43	0.00
Length (ft)	= 277.00	0.00	0.00	0.00
Slope (%)	= 0.26	0.00	0.00	n/a
N-Value	= .015	.015	.015	n/a
Orifice Coeff.	= 0.61	0.61	0.61	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	60.00	0.00	0.00
Crest El. (ft)	= 860.50	862.54	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	852.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.05	2,382	852.55	7.05 ic	0.21 ic	0.00	---	0.00	0.00	---	---	---	---	0.206
0.10	4,763	852.60	7.05 ic	0.31 ic	0.00	---	0.00	0.00	---	---	---	---	0.306
0.15	7,145	852.65	7.05 ic	0.37 ic	0.00	---	0.00	0.00	---	---	---	---	0.375
0.20	9,527	852.70	7.05 ic	0.43 ic	0.00	---	0.00	0.00	---	---	---	---	0.433
0.25	11,909	852.75	7.05 ic	0.48 ic	0.00	---	0.00	0.00	---	---	---	---	0.484
0.30	14,290	852.80	7.05 ic	0.53 ic	0.00	---	0.00	0.00	---	---	---	---	0.530
0.35	16,672	852.85	7.05 ic	0.57 ic	0.00	---	0.00	0.00	---	---	---	---	0.572
0.40	19,054	852.90	7.05 ic	0.61 ic	0.00	---	0.00	0.00	---	---	---	---	0.612
0.45	21,436	852.95	7.05 ic	0.65 ic	0.00	---	0.00	0.00	---	---	---	---	0.649
0.50	23,817	853.00	7.05 ic	0.68 ic	0.00	---	0.00	0.00	---	---	---	---	0.684
0.60	28,701	853.10	7.05 ic	0.75 ic	0.00	---	0.00	0.00	---	---	---	---	0.749
0.70	33,584	853.20	7.05 ic	0.81 ic	0.00	---	0.00	0.00	---	---	---	---	0.809
0.80	38,467	853.30	7.05 ic	0.87 ic	0.00	---	0.00	0.00	---	---	---	---	0.865
0.90	43,350	853.40	7.05 ic	0.92 ic	0.00	---	0.00	0.00	---	---	---	---	0.918
1.00	48,234	853.50	7.05 ic	0.97 ic	0.00	---	0.00	0.00	---	---	---	---	0.967
1.10	53,117	853.60	7.05 ic	1.01 ic	0.00	---	0.00	0.00	---	---	---	---	1.015
1.20	58,000	853.70	7.05 ic	1.06 ic	0.00	---	0.00	0.00	---	---	---	---	1.060
1.30	62,883	853.80	7.05 ic	1.10 ic	0.00	---	0.00	0.00	---	---	---	---	1.103
1.40	67,767	853.90	7.05 ic	1.14 ic	0.00	---	0.00	0.00	---	---	---	---	1.145
1.50	72,650	854.00	7.05 ic	1.18 ic	0.00	---	0.00	0.00	---	---	---	---	1.185
1.60	77,636	854.10	7.05 ic	1.22 ic	0.00	---	0.00	0.00	---	---	---	---	1.224
1.70	82,623	854.20	7.05 ic	1.26 ic	0.00	---	0.00	0.00	---	---	---	---	1.261
1.80	87,609	854.30	7.05 ic	1.30 ic	0.00	---	0.00	0.00	---	---	---	---	1.298
1.90	92,596	854.40	7.05 ic	1.33 ic	0.00	---	0.00	0.00	---	---	---	---	1.333
2.00	97,582	854.50	7.05 ic	1.37 ic	0.06 ic	---	0.00	0.00	---	---	---	---	1.428
2.10	102,569	854.60	7.05 ic	1.40 ic	0.33 ic	---	0.00	0.00	---	---	---	---	1.734
2.20	107,555	854.70	7.05 ic	1.43 ic	0.83 ic	---	0.00	0.00	---	---	---	---	2.262
2.30	112,542	854.80	7.05 ic	1.47 ic	1.54 ic	---	0.00	0.00	---	---	---	---	3.004
2.40	117,528	854.90	7.05 ic	1.50 ic	2.38 ic	---	0.00	0.00	---	---	---	---	3.883
2.50	122,515	855.00	7.05 ic	1.53 ic	3.49 ic	---	0.00	0.00	---	---	---	---	5.020

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Walled Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.60	121,975	855.10	5.31 ic	1.48 ic	3.83 ic	---	0.00	0.00	---	---	---	---	5.309
2.70	126,852	855.20	6.82 ic	1.51 ic	5.30 ic	---	0.00	0.00	---	---	---	---	6.816
2.80	131,729	855.30	8.27 ic	1.54 ic	6.73 ic	---	0.00	0.00	---	---	---	---	8.270
2.90	136,606	855.40	10.38 ic	1.57 ic	8.80 ic	---	0.00	0.00	---	---	---	---	10.38
3.00	141,482	855.50	12.33 ic	1.60 ic	10.73 ic	---	0.00	0.00	---	---	---	---	12.33
3.10	146,359	855.60	14.51 ic	1.61 ic	12.90 ic	---	0.00	0.00	---	---	---	---	14.51
3.20	151,236	855.70	16.31 ic	1.62 ic	14.69 ic	---	0.00	0.00	---	---	---	---	16.31
3.30	156,113	855.80	18.92 ic	1.63 ic	17.29 ic	---	0.00	0.00	---	---	---	---	18.92
3.40	160,990	855.90	21.78 ic	1.64 ic	20.14 ic	---	0.00	0.00	---	---	---	---	21.77
3.50	165,867	856.00	24.08 ic	1.65 ic	22.43 ic	---	0.00	0.00	---	---	---	---	24.08
3.60	170,852	856.10	27.37 ic	1.65 ic	25.72 ic	---	0.00	0.00	---	---	---	---	27.37
3.70	175,837	856.20	30.92 ic	1.66 ic	29.25 ic	---	0.00	0.00	---	---	---	---	30.91
3.80	180,822	856.30	33.71 ic	1.67 ic	32.05 ic	---	0.00	0.00	---	---	---	---	33.71
3.90	185,807	856.40	36.65 ic	1.68 ic	34.97 ic	---	0.00	0.00	---	---	---	---	36.64
4.00	190,792	856.50	40.78 ic	1.68 ic	39.10 ic	---	0.00	0.00	---	---	---	---	40.78
4.10	195,777	856.60	44.01 ic	1.69 ic	42.31 ic	---	0.00	0.00	---	---	---	---	44.00
4.20	200,762	856.70	48.52 ic	1.69 ic	46.83 ic	---	0.00	0.00	---	---	---	---	48.52
4.30	205,748	856.80	52.02 ic	1.70 ic	50.32 ic	---	0.00	0.00	---	---	---	---	52.02
4.40	210,733	856.90	55.63 ic	1.71 ic	53.91 ic	---	0.00	0.00	---	---	---	---	55.62
4.50	215,718	857.00	60.63 ic	1.71 ic	58.91 ic	---	0.00	0.00	---	---	---	---	60.62
4.60	220,814	857.10	64.46 ic	1.72 ic	62.74 ic	---	0.00	0.00	---	---	---	---	64.46
4.70	225,909	857.20	68.38 ic	1.73 ic	66.65 ic	---	0.00	0.00	---	---	---	---	68.38
4.80	231,005	857.30	73.76 ic	1.73 ic	72.02 ic	---	0.00	0.00	---	---	---	---	73.75
4.90	236,101	857.40	77.85 ic	1.74 ic	76.11 ic	---	0.00	0.00	---	---	---	---	77.85
5.00	241,196	857.50	82.01 ic	1.75 ic	80.26 ic	---	0.00	0.00	---	---	---	---	82.01
5.10	246,292	857.60	87.65 oc	1.75 ic	85.90 ic	---	0.00	0.00	---	---	---	---	87.65
5.20	251,388	857.70	91.92 oc	1.75 ic	90.16 ic	---	0.00	0.00	---	---	---	---	91.91
5.30	256,484	857.80	96.22 oc	1.76 ic	94.46 ic	---	0.00	0.00	---	---	---	---	96.22
5.40	261,579	857.90	101.98 oc	1.75 ic	100.23 ic	---	0.00	0.00	---	---	---	---	101.98
5.50	266,675	858.00	106.33 oc	1.76 ic	104.58 ic	---	0.00	0.00	---	---	---	---	106.33
5.60	271,886	858.10	112.10 oc	1.75 ic	110.34 ic	---	0.00	0.00	---	---	---	---	112.09
5.70	277,098	858.20	116.44 oc	1.76 ic	114.68 ic	---	0.00	0.00	---	---	---	---	116.44
5.80	282,309	858.30	120.78 oc	1.76 ic	119.01 ic	---	0.00	0.00	---	---	---	---	120.77
5.90	287,520	858.40	126.43 oc	1.76 ic	124.67 ic	---	0.00	0.00	---	---	---	---	126.43
6.00	292,731	858.50	131.99 oc	1.76 ic	130.23 ic	---	0.00	0.00	---	---	---	---	131.99
6.10	297,943	858.60	136.19 oc	1.76 ic	134.42 ic	---	0.00	0.00	---	---	---	---	136.18
6.20	303,154	858.70	141.55 oc	1.76 ic	139.78 ic	---	0.00	0.00	---	---	---	---	141.55
6.30	308,365	858.80	146.76 oc	1.76 ic	145.00 ic	---	0.00	0.00	---	---	---	---	146.76
6.40	313,576	858.90	150.72 oc	1.77 ic	148.95 ic	---	0.00	0.00	---	---	---	---	150.71
6.50	318,788	859.00	155.66 oc	1.77 ic	153.88 ic	---	0.00	0.00	---	---	---	---	155.65
6.60	324,128	859.10	160.39 oc	1.77 ic	158.62 ic	---	0.00	0.00	---	---	---	---	160.39
6.70	329,469	859.20	165.81 oc	1.77 ic	164.04 ic	---	0.00	0.00	---	---	---	---	165.81
6.80	334,809	859.30	170.06 oc	1.78 ic	168.28 ic	---	0.00	0.00	---	---	---	---	170.06
6.90	340,149	859.40	174.78 oc	1.78 ic	173.00 ic	---	0.00	0.00	---	---	---	---	174.78
7.00	345,490	859.50	178.50 oc	1.79 ic	176.72 ic	---	0.00	0.00	---	---	---	---	178.50
7.10	350,830	859.60	183.02 oc	1.79 ic	181.23 ic	---	0.00	0.00	---	---	---	---	183.02
7.20	356,170	859.70	186.43 oc	1.68 ic	184.75 ic	---	0.00	0.00	---	---	---	---	186.43
7.30	361,511	859.80	190.15 oc	1.69 ic	188.46 ic	---	0.00	0.00	---	---	---	---	190.15
7.40	366,851	859.90	193.29 oc	1.70 ic	191.59 ic	---	0.00	0.00	---	---	---	---	193.28
7.50	372,191	860.00	195.82 oc	1.71 ic	194.11 ic	---	0.00	0.00	---	---	---	---	195.82
7.60	377,676	860.10	199.32 oc	1.72 ic	197.60 ic	---	0.00	0.00	---	---	---	---	199.32
7.70	383,161	860.20	202.77 oc	1.72 ic	201.04 ic	---	0.00	0.00	---	---	---	---	202.77
7.80	388,646	860.30	206.15 oc	1.73 ic	204.42 ic	---	0.00	0.00	---	---	---	---	206.15
7.90	394,131	860.40	209.48 oc	1.74 ic	207.74 ic	---	0.00	0.00	---	---	---	---	209.48
8.00	399,616	860.50	212.76 oc	1.75 ic	211.01 ic	---	0.00	0.00	---	---	---	---	212.76
8.10	405,101	860.60	215.67 oc	1.75 ic	212.23 ic	---	1.68	0.00	---	---	---	---	215.67
8.20	410,586	860.70	219.27 oc	1.76 ic	212.74 ic	---	4.76	0.00	---	---	---	---	219.26
8.30	416,071	860.80	223.34 oc	1.76 ic	212.84 ic	---	8.75	0.00	---	---	---	---	223.34
8.40	421,556	860.90	227.80 oc	1.76 ic	212.57 ic	---	13.47	0.00	---	---	---	---	227.79
8.50	427,041	861.00	232.57 oc	1.75 ic	211.98 ic	---	18.84	0.00	---	---	---	---	232.57
8.60	432,683	861.10	237.60 oc	1.74 ic	211.09 ic	---	24.76	0.00	---	---	---	---	237.60
8.70	438,324	861.20	242.86 oc	1.73 ic	209.92 ic	---	31.20	0.00	---	---	---	---	242.86
8.80	443,966	861.30	248.31 oc	1.72 ic	208.47 ic	---	38.12	0.00	---	---	---	---	248.31
8.90	449,608	861.40	253.94 oc	1.71 ic	206.74 ic	---	45.48	0.00	---	---	---	---	253.94
9.00	455,250	861.50	259.72 oc	1.69 ic	204.75 ic	---	53.27	0.00	---	---	---	---	259.72
9.10	460,891	861.60	265.63 oc	1.67 ic	202.49 ic	---	61.46	0.00	---	---	---	---	265.63
9.20	466,533	861.70	271.65 oc	1.65 ic	199.97 ic	---	70.02	0.00	---	---	---	---	271.64
9.30	472,175	861.80	277.76 oc	1.63 ic	197.17 ic	---	78.96	0.00	---	---	---	---	277.76
9.40	477,817	861.90	283.96 oc	1.60 ic	194.11 ic	---	88.24	0.00	---	---	---	---	283.95
9.50	483,459	862.00	290.23 oc	1.58 ic	190.77 ic	---	97.88	0.00	---	---	---	---	290.23
9.60	489,532	862.10	296.54 oc	1.55 ic	187.16 ic	---	107.83	0.00	---	---	---	---	296.54
9.70	495,605	862.20	302.90 oc	1.51 ic	183.28 ic	---	118.10	0.00	---	---	---	---	302.89

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Walled Pond

Stage / Storage / Discharge Table

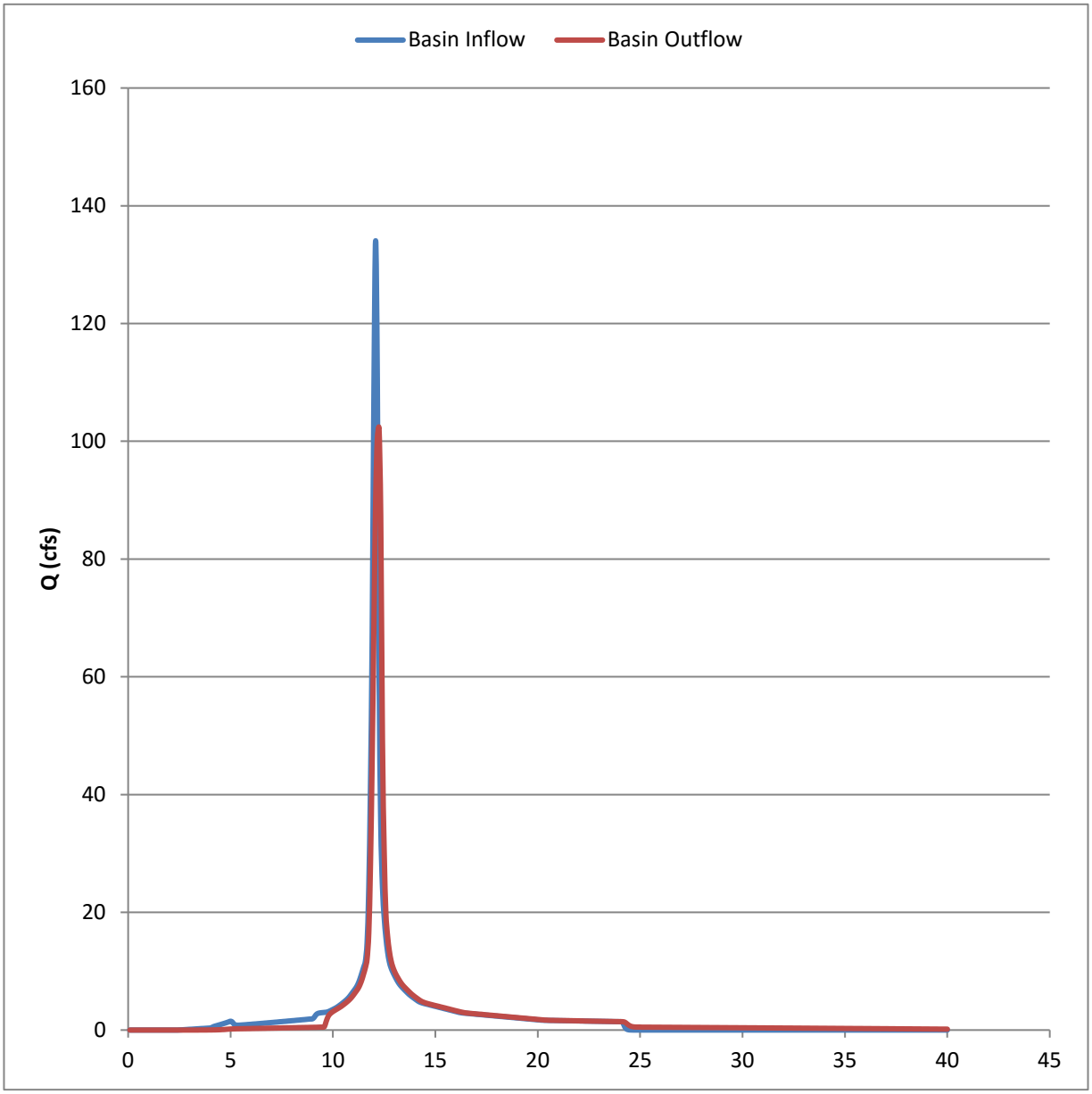
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
9.80	501,679	862.30	309.26 oc	1.48 ic	179.12 ic	---	128.66	0.00	---	---	---	---	309.26
9.90	507,752	862.40	315.65 oc	1.44 ic	174.67 ic	---	139.53	0.00	---	---	---	---	315.64
10.00	513,825	862.50	322.03 oc	1.40 ic	169.93 ic	---	150.68	0.00	---	---	---	---	322.02
10.10	519,899	862.60	321.69 oc	1.44 ic	174.38 ic	---	124.66 ic	2.29	---	---	---	---	302.77
10.20	525,972	862.70	321.37 oc	1.48 ic	178.68 ic	---	127.59 ic	9.97	---	---	---	---	317.73
10.30	532,045	862.80	321.05 oc	1.51 ic	182.89 ic	---	130.46 ic	20.66	---	---	---	---	335.52
10.40	538,119	862.90	321.21 oc	1.54 ic	186.40 ic	---	133.27 ic	33.67	---	---	---	---	354.87
10.50	544,192	863.00	324.04 oc	1.54 ic	186.47 ic	---	136.02 ic	48.67	---	---	---	---	372.71

...End

Cabelas Basin

Hydrograph Type	=	Reservoir	Peak Discharge	=	102.19
Storm Frequency	=	50 yrs	Time to Peak	=	12:10 hrs
Time Interval	=	6 min			
			Max Elevation	=	871.41
			Max Storage	=	107,120 Ft^3
			Date	=	6/2/2016

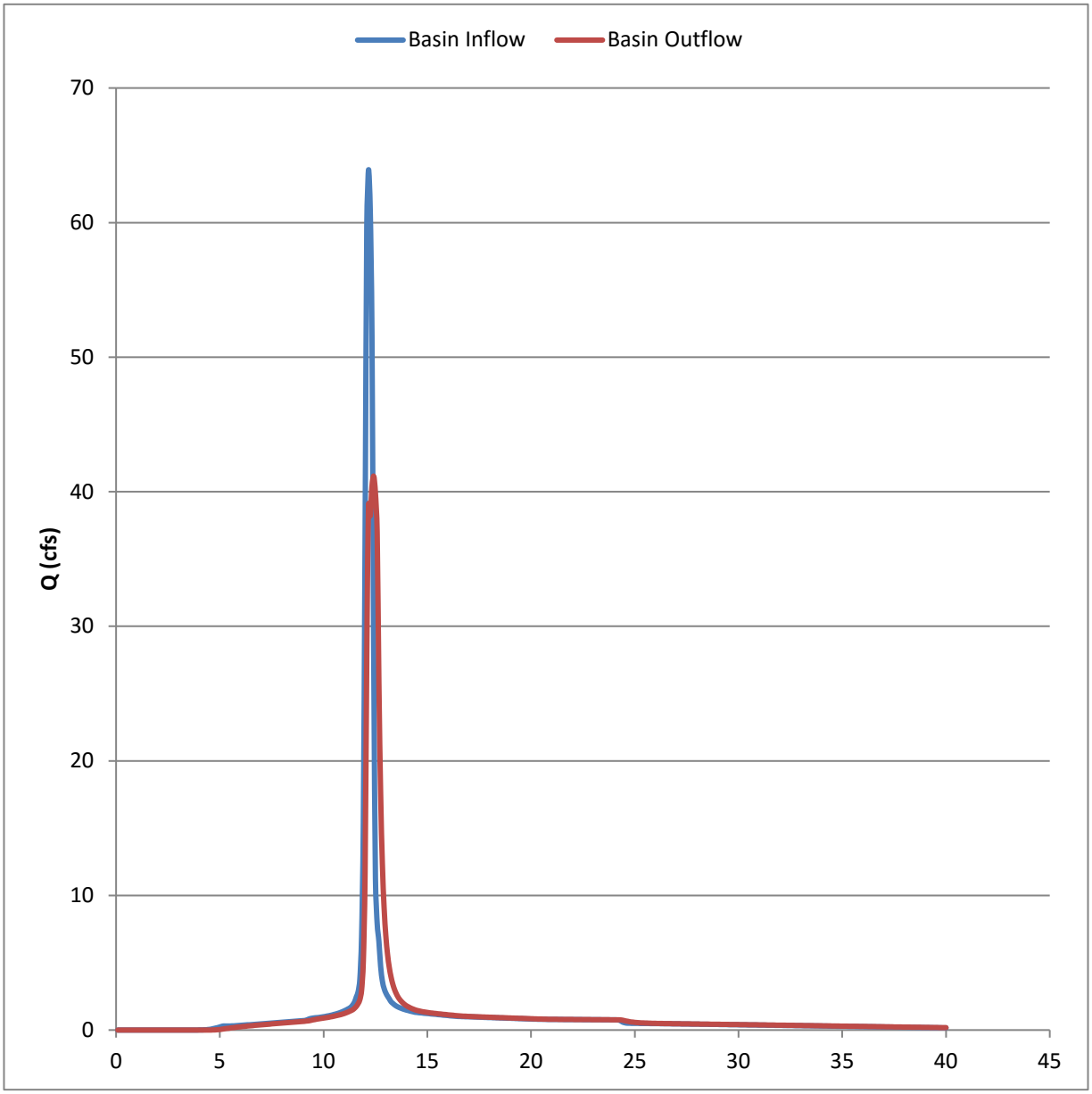
Notes:



Existing Pond

Hydrograph Type	=	Reservoir	Peak Discharge	=	41.16
Storm Frequency	=	50 yrs	Time to Peak	=	12:25 hrs
Time Interval	=	6 min			
			Max Elevation	=	866.25
			Max Storage	=	42,017 Ft^3
			Date	=	6/2/2016

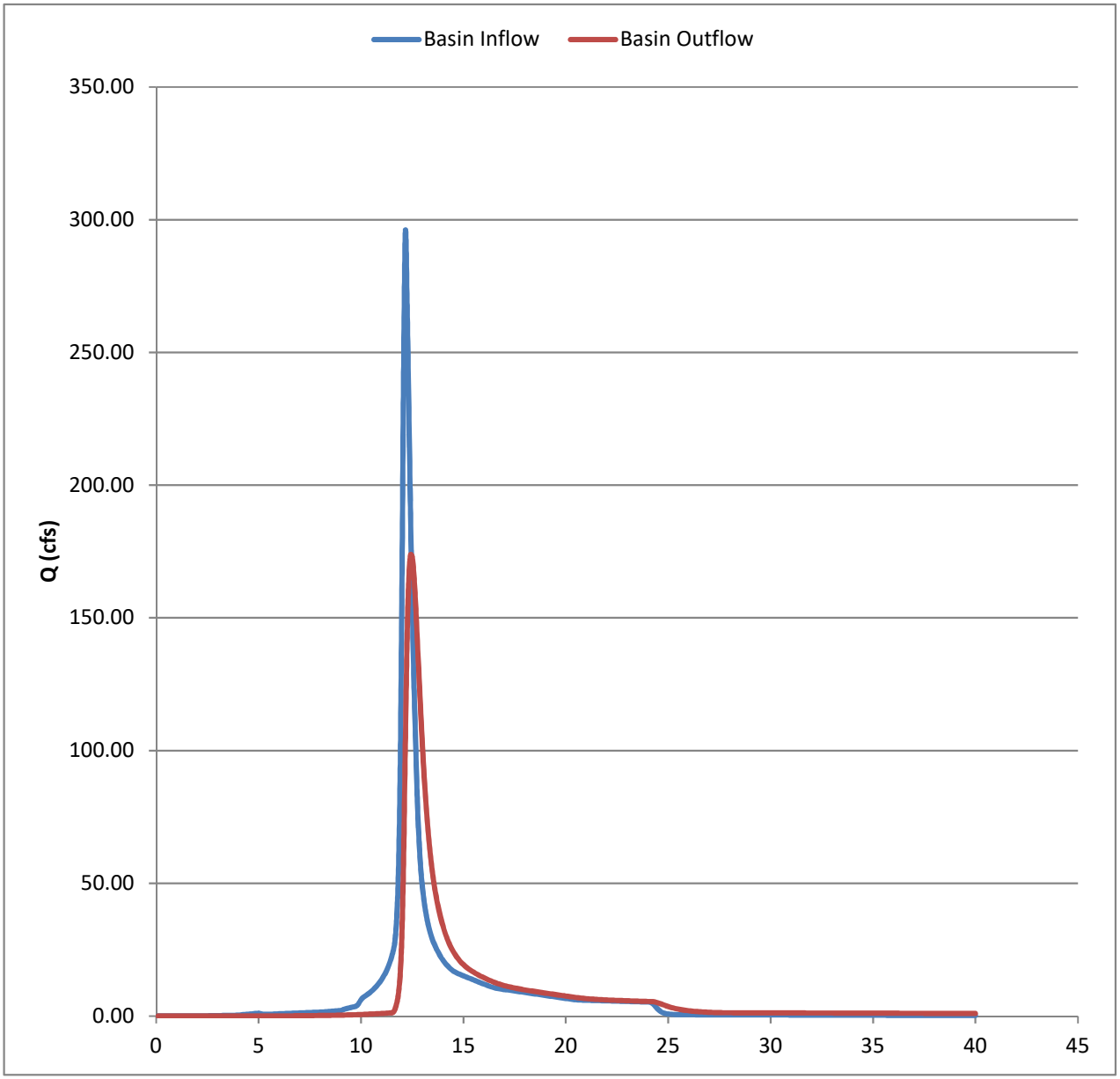
Notes:



Primary Basin

Hydrograph Type	=	Reservoir	Peak Discharge	=	173.75
Storm Frequency	=	50 yrs	Time to Peak	=	12:25 hrs
Time Interval	=	6 min			
			Max Elevation	=	859.71
			Max Storage	=	369,687 Ft^3
			Date	=	3/16/2017

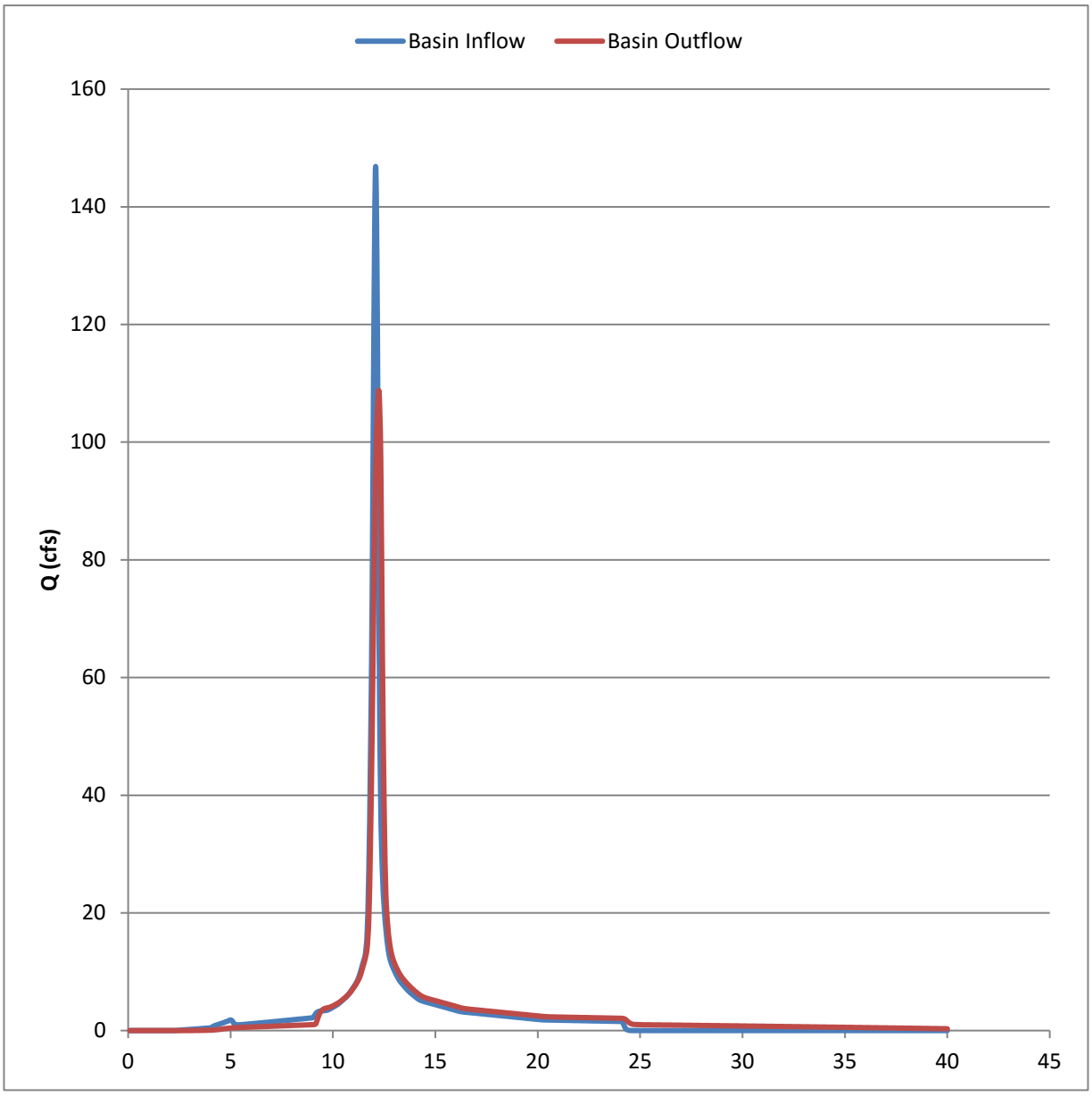
Notes: Detention Basin As-Built



Cabelas Basin

Hydrograph Type	=	Reservoir	Peak Discharge	=	108.61
Storm Frequency	=	100 yrs	Time to Peak	=	12:10 hrs
Time Interval	=	6 min			
			Max Elevation	=	871.84
			Max Storage	=	114,387 Ft^3
			Date	=	6/2/2016

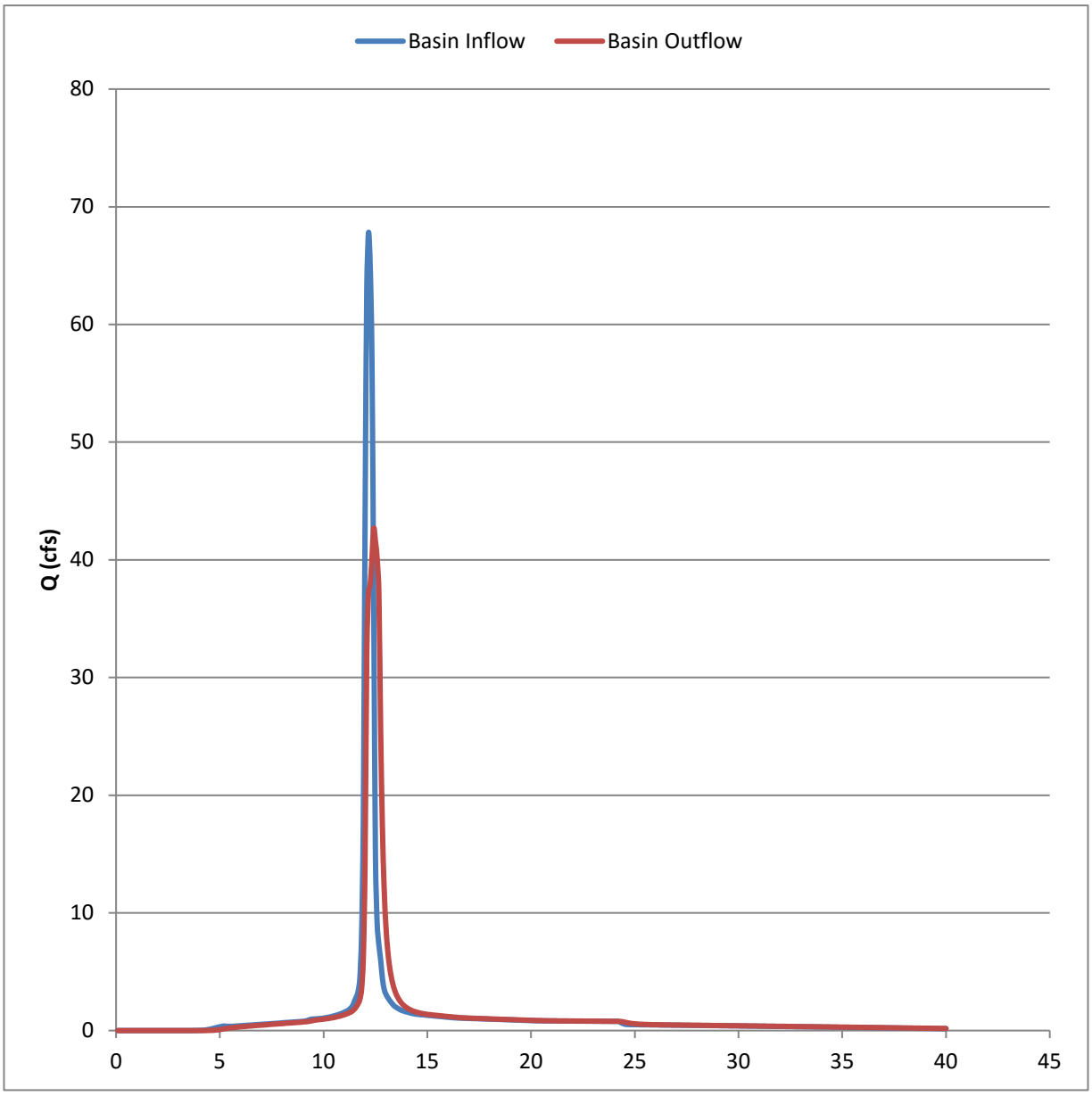
Notes:



Existing Pond

Hydrograph Type	=	Reservoir	Peak Discharge	=	42.67
Storm Frequency	=	100 yrs	Time to Peak	=	12:25 hrs
Time Interval	=	6 min			
			Max Elevation	=	866.53
			Max Storage	=	49,766 Ft^3
			Date	=	6/2/2016

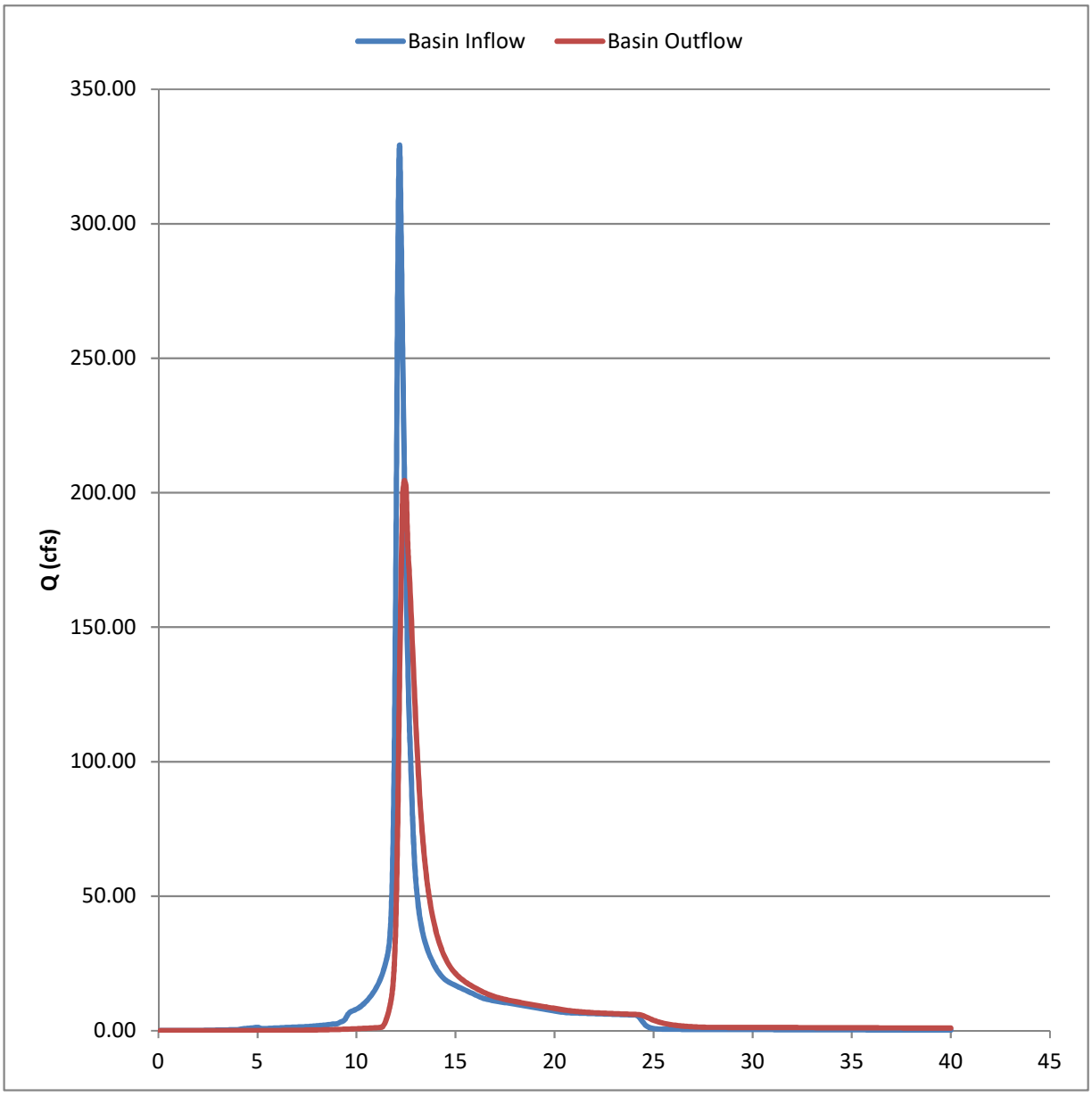
Notes:



Primary Basin

Hydrograph Type	=	Reservoir	Peak Discharge	=	204.53
Storm Frequency	=	100 yrs	Time to Peak	=	12:25 hrs
Time Interval	=	6 min			
			Max Elevation	=	860.18
			Max Storage	=	396,530 Ft^3
			Date	=	3/16/2017

Notes: Detention As-Built



HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 20.05 cfs

Design Flow: 208.15 cfs (100 yr Basin Outflow)

Maximum Flow: 329.42 cfs (100 yr Basin Inflow)

Table 1 - Summary of Culvert Flows at Crossing: Keefe Property

Headwater Elevation (ft)	Total Discharge (cfs)	4'x8' Box Discharge (cfs)	Roadway Discharge (cfs)	Iterations
853.18	20.05	20.05	0.00	1
854.04	50.99	50.99	0.00	1
854.71	81.92	81.92	0.00	1
855.29	112.86	112.86	0.00	1
855.83	143.80	143.80	0.00	1
856.36	174.74	174.74	0.00	1
856.91	205.67	205.67	0.00	1
857.02	208.15	208.15	0.00	1
858.24	267.55	267.55	0.00	1
859.40	298.48	298.48	0.00	1
860.64	329.42	329.42	0.00	1
862.54	373.32	373.32	0.00	Overtopping

Rating Curve Plot for Crossing: Keefe Property

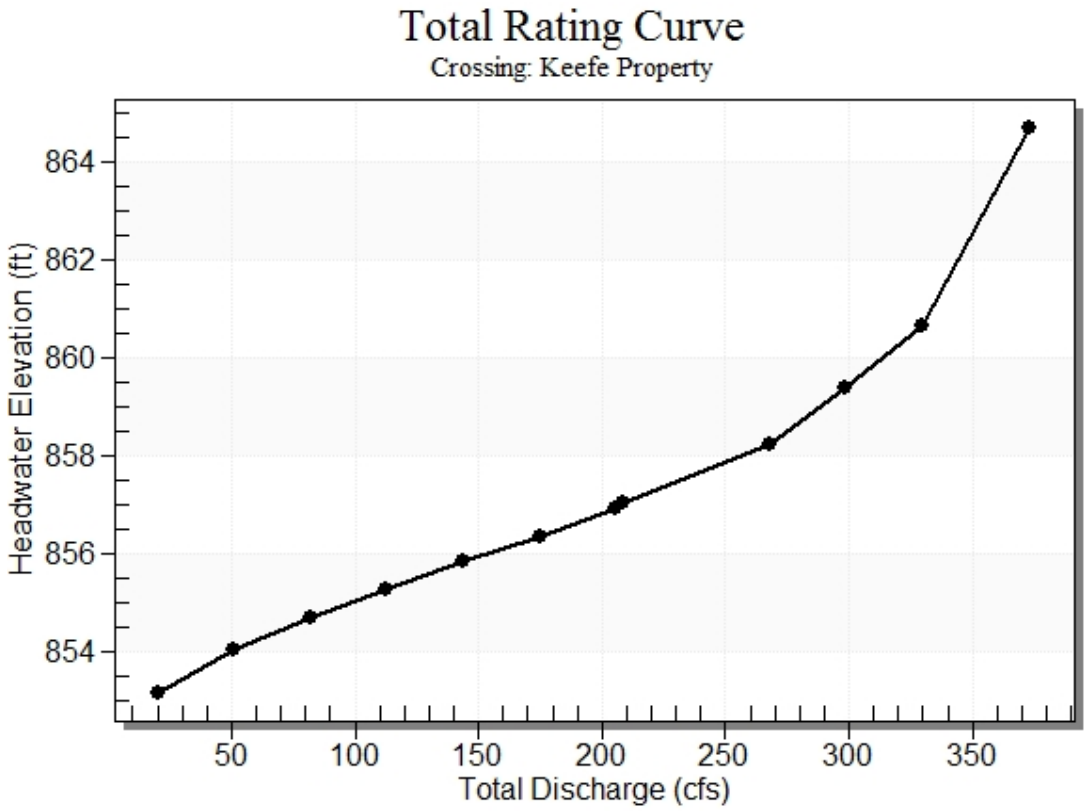


Table 2 - Culvert Summary Table: 4'x8' Box

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
20.05	20.05	853.18	0.993	0.0*	1-JS1t	0.565	0.580	0.650	0.650	3.853	7.706
50.99	50.99	854.04	1.850	0.0*	1-JS1t	1.055	1.081	1.233	1.233	5.169	10.338
81.92	81.92	854.71	2.519	0.643	1-JS1t	1.448	1.482	1.737	1.737	5.897	11.794
112.86	112.86	855.29	3.103	1.370	1-JS1t	1.799	1.835	2.207	2.207	6.393	12.786
143.80	143.80	855.83	3.644	2.160	1-S2n	2.126	2.157	2.126	2.658	8.456	13.524
174.74	174.74	856.36	4.174	3.019	5-S2n	2.437	2.456	2.437	3.098	8.962	14.103
205.67	205.67	856.91	4.718	3.952	5-S2n	2.737	2.738	2.737	3.529	9.392	14.572
208.15	208.15	857.02	4.762	4.832	7-M1t	2.761	2.760	3.563	3.563	7.303	14.606
267.55	267.55	858.24	5.924	6.046	4-FFf	3.313	3.263	4.000	4.374	8.361	15.293
298.48	298.48	859.40	6.616	7.209	4-FFf	3.592	3.510	4.000	4.790	9.328	15.578
329.42	329.42	860.64	7.379	8.451	4-FFf	4.000	3.748	4.000	5.204	10.294	15.826

* Full Flow Headwater elevation is below inlet invert.

****

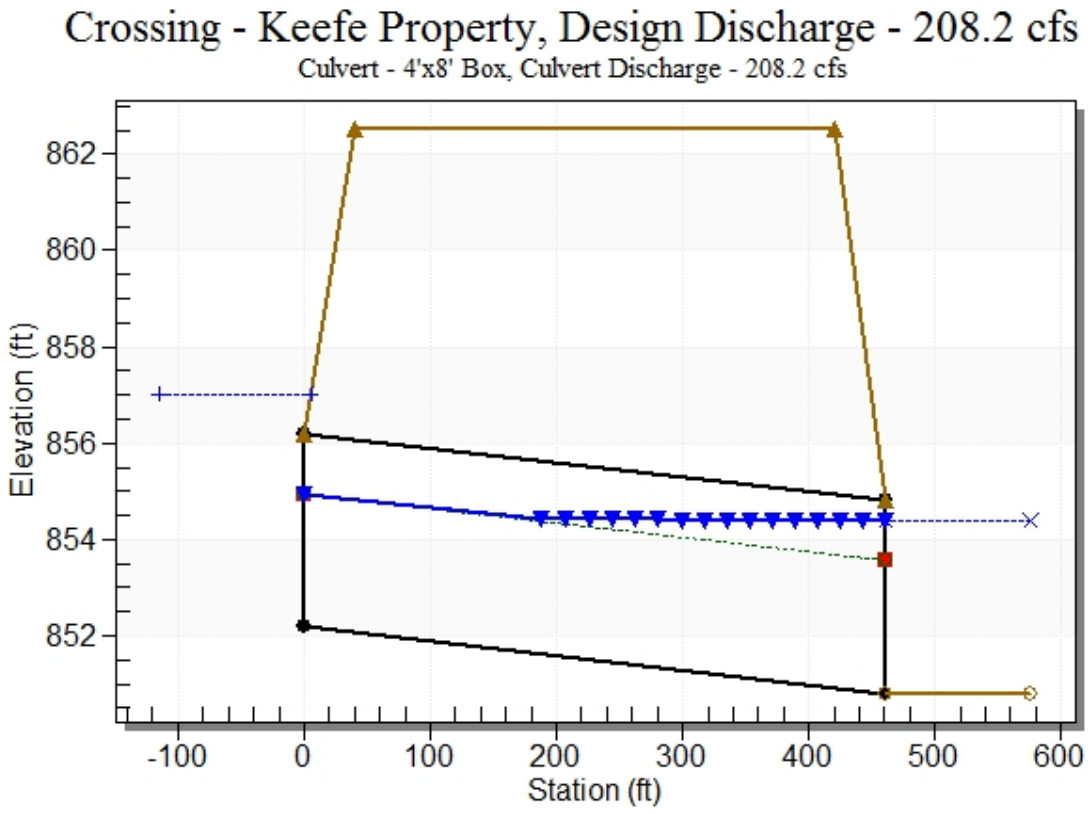
Straight Culvert

Inlet Elevation (invert): 852.19 ft, Outlet Elevation (invert): 850.81 ft

Culvert Length: 461.00 ft, Culvert Slope: 0.0030

****

Water Surface Profile Plot for Culvert: 4'x8' Box



Site Data - 4'x8' Box

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 852.19 ft

Outlet Station: 461.00 ft

Outlet Elevation: 850.81 ft

Number of Barrels: 1

Culvert Data Summary - 4'x8' Box

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall

Inlet Depression: NONE

Tailwater Channel Data - Keefe Property

Tailwater Channel Option: Rectangular Channel

Bottom Width: 4.00 ft

Channel Slope: 0.0100

Channel Manning's n: 0.0120

Channel Invert Elevation: 850.81 ft

Roadway Data for Crossing: Keefe Property

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

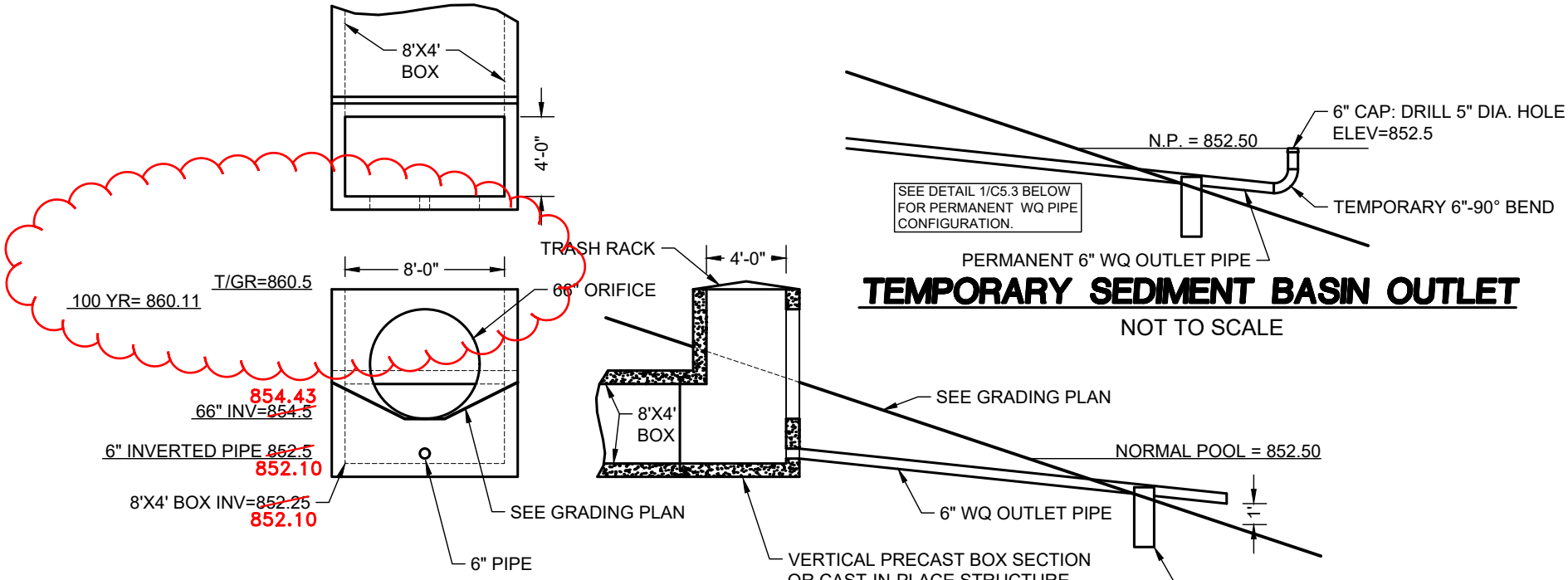
Crest Elevation: 862.54 ft

Roadway Surface: Paved

Roadway Top Width: 380.00 ft

X. SEE LANDSCAPE PLANS FOR SEED MIXTURES TO BE USED THE GRADED AREAS.

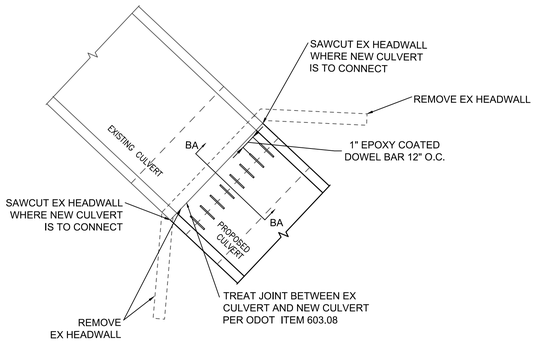
TRASH RACK: STORMRAX, PEAK SERIES OR APPROVED EQUAL.
CONTRACTOR SHALL PROVIDE SHOP DRAWING SUBMITTAL
FOR REVIEW & APPROVAL BY OWNER PRIOR TO ORDERING MATERIAL.



1
C5.3

OUTLET DETAIL
NOT TO SCALE

TEMPORARY SEDIMENT BASIN OUTLET
NOT TO SCALE



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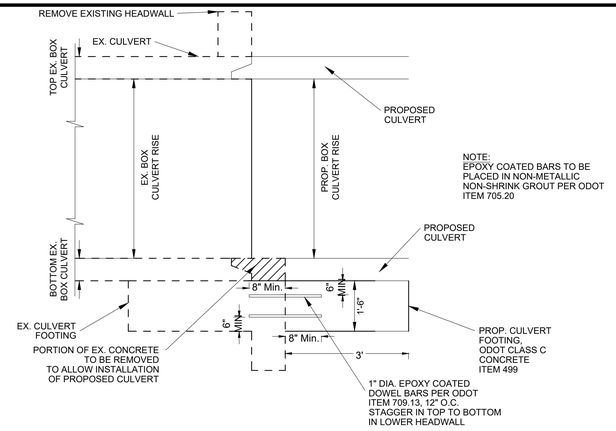
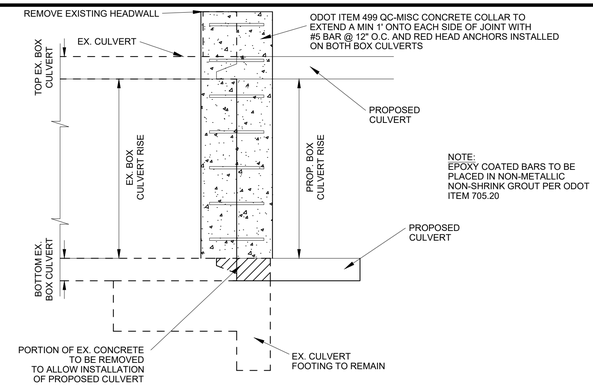
C4.3

CONNECTION DETAIL A

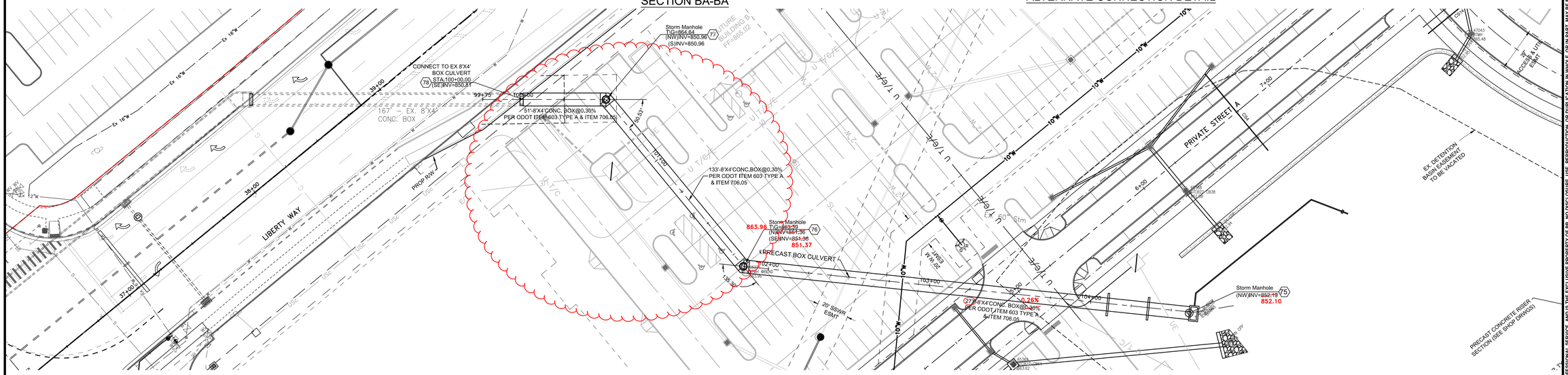
SCALE 1"=5'

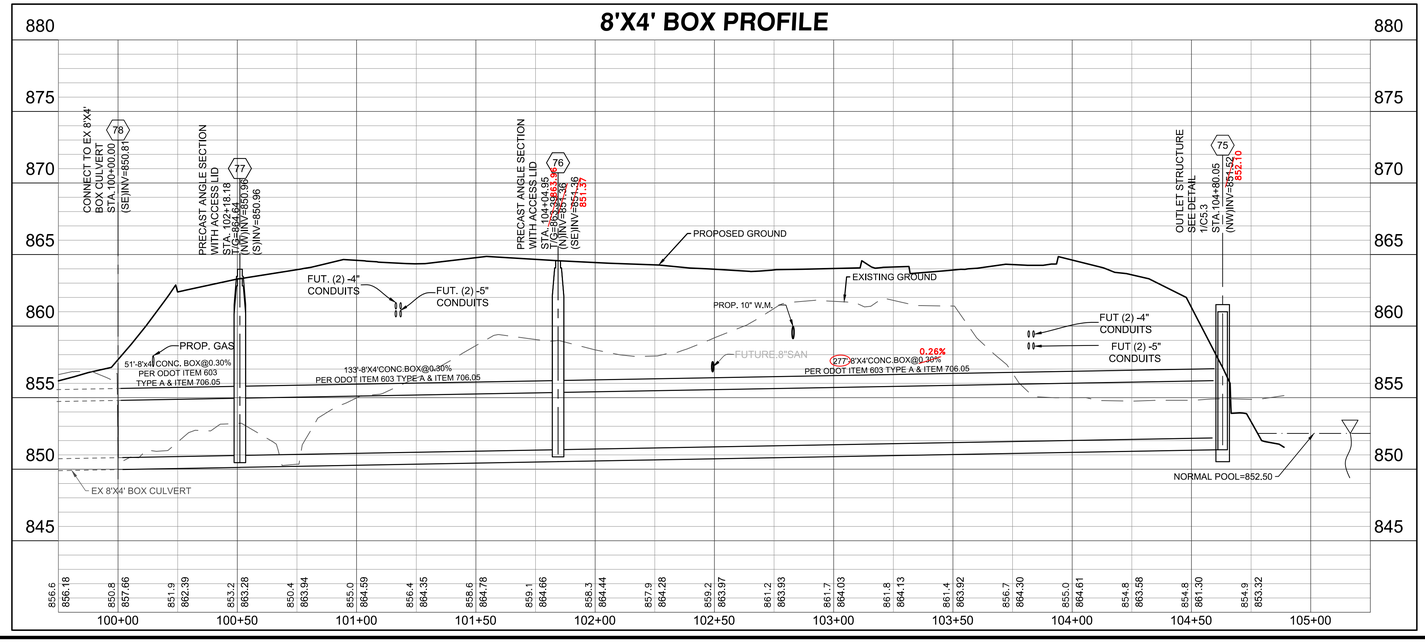


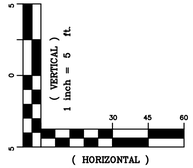


SECTION BA-BA

ALTERNATE CONNECTION DETAIL







GRAPHIC SCALE

Plot time: Mar 16, 2017 - 3:43pm
Drawing name: J:\2015\15M053-000\CV\DWG\15M053-000 Utility.dwg - Layout Tab: C4-3 Utility Profiles

Item	Revision Description	Date	Drwn:	Chk:
1	REISSUED	07-29-16	AJW	JSD
2	FINAL DEVELOPMENT PLAN SUBMITTAL	09-23-16	AJW	JSD
3	BULLETIN #2	10-14-16	AJW	JSD
4	DETENTION AS-BUILT	03-16-17	AJW	JSD

KEEFE PROPERTY SP-PUD TRACTS 2&3
ROADWAY AND MISC SITE FDP

LIBERTY WAY & TYLERS PLACE BLVD
SECTION 18, TOWN 3, RANGE 2
WEST CHESTER TOWNSHIP
BUTLER COUNTY, OHIO

UTILITY PROFILES

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Mason, OH 45040 - 513.336.6600

Drawing: 15M053-000 UTILITY
Drawn by: AJW
Checked By: JSD
Issue Date: 06-17-16
Sheet: C4.3