

PRELIMINARY STORM WATER MANAGEMENT REPORT

MAY 2, 2016

PREPARED FOR:
HEALTHCARE LOGISTICS
GATEWAY CIRCLE
GROVE CITY, OHIO

PREPARED BY:
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CRITICAL STORM CALCULATION
Health Care Logistics
Grove City Ohio
22 April 2016

$$\frac{(11,161 - 3,279)}{3,279} \times 100 = 240.4\% \text{ Increase in Runoff of Volume}$$

Therefore, the Critical Storm is the 25 year event.

TR 55 Worksheet 2: Runoff Curve Number and Runoff

Project: _____ Designed By: _____ Date: _____

Location: _____ Checked: _____ Date: _____

Circle one: Present Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (Appendix A)	Cover description (Cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ^{1/}			Area <input type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
Totals =						

^{1/} Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ Use CN =

2. Runoff

Frequency yr.

Rainfall, P (24 hour) in.

Runoff, Q in.

(Use P and CN with Table 2-1, Figure 2-1, or equations 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3

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Storm #1	Storm #2	Storm #3

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5



Legend

<u>Hyd.</u>	<u>Origin</u>	<u>Description</u>
1	SCS Runoff	HCL-Pre Dev.
2	SCS Runoff	HCL - Post Dev.
3	Reservoir	HCL Detention Routing

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Hydrograph Return Period Recap

Hydranow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	0.524	0.994	-----	1.672	2.253	3.202	4.084	5.047	HCL-Pre Dev.
2	SCS Runoff	-----	4.781	6.309	-----	8.177	9.635	11.85	13.80	15.85	HCL - Post Dev.
3	Reservoir	2	0.128	0.189	-----	0.274	0.349	0.523	1.387	2.251	HCL Detention Routing

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	0.524	2	740	3,279	-----	-----	-----	HCL-Pre Dev.	
2	SCS Runoff	4.781	2	718	11,161	-----	-----	-----	HCL - Post Dev.	
3	Reservoir	0.128	2	898	10,149	2	767.88	7,572	HCL Detention Routing	
Health Care Logistics.gpw					Return Period: 1 Year			Thursday, 04 / 21 / 2016		

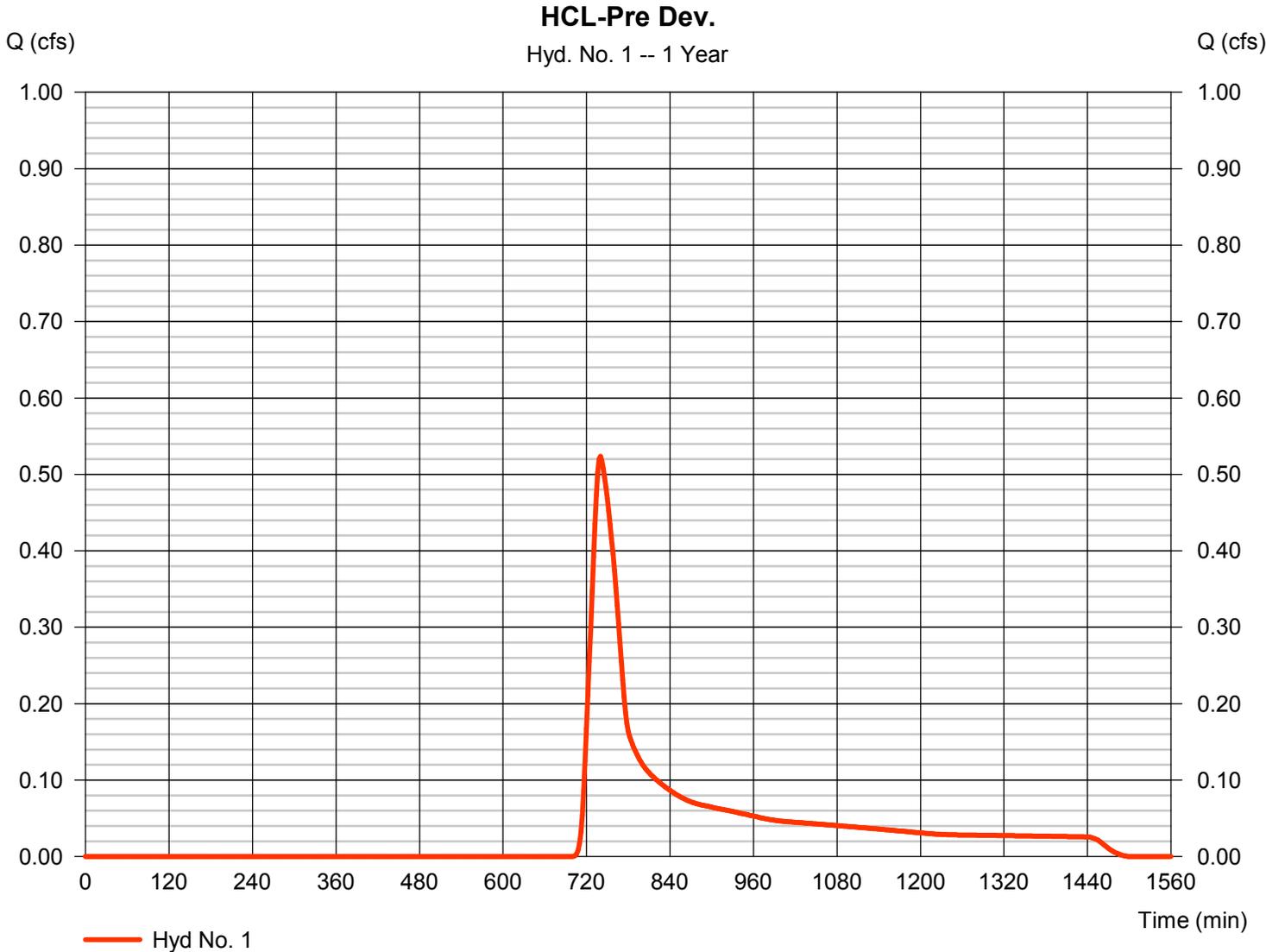
Hydrograph Report

Hyd. No. 1

HCL-Pre Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.524 cfs
Storm frequency	= 1 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 3,279 cuft
Drainage area	= 2.090 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.10 min
Total precip.	= 2.17 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.092 x 74)] / 2.090



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No. 1

HCL-Pre Dev.

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.150	0.150	0.150	
Flow length (ft)	= 35.0	220.0	65.0	
Two-year 24-hr precip. (in)	= 2.70	2.70	2.70	
Land slope (%)	= 0.63	1.36	3.08	
Travel Time (min)	= 7.31	+ 23.39	+ 6.36	= 37.06
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	0.00	
Watercourse slope (%)	= 0.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	0.00	0.00	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				37.10 min

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

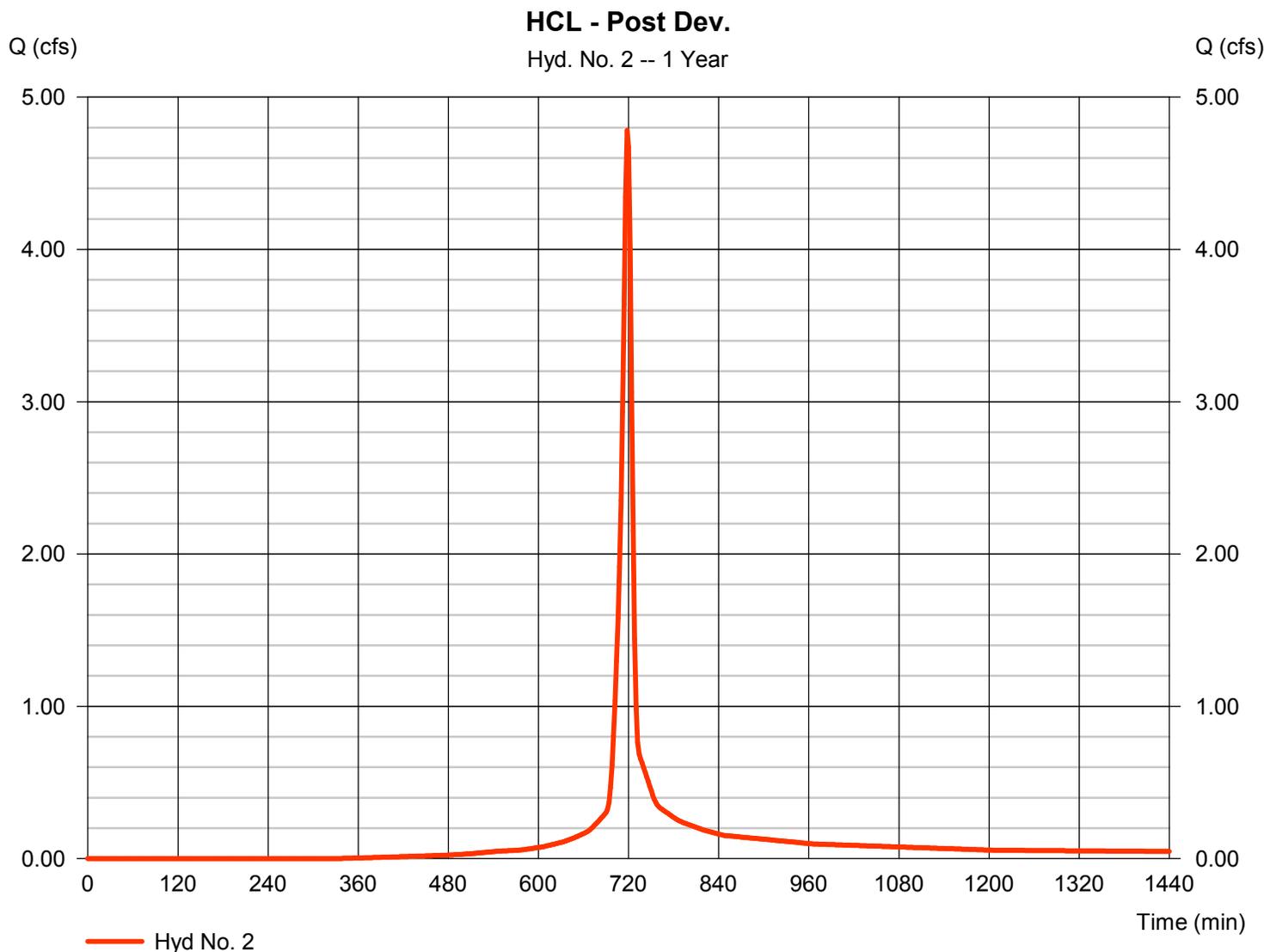
Thursday, 04 / 21 / 2016

Hyd. No. 2

HCL - Post Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 4.781 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 11,161 cuft
Drainage area	= 2.090 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 2.17 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.670 x 98) + (0.417 x 74)] / 2.090



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No. 2

HCL - Post Dev.

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>	<u>Totals</u>
Sheet Flow						
Manning's n-value	= 0.150		0.011		0.011	
Flow length (ft)	= 20.0		70.0		0.0	
Two-year 24-hr precip. (in)	= 2.70		2.70		0.00	
Land slope (%)	= 2.00		1.50		0.00	
Travel Time (min)	= 2.94	+	1.11	+	0.00	= 4.06
Shallow Concentrated Flow						
Flow length (ft)	= 0.00		0.00		0.00	
Watercourse slope (%)	= 0.00		0.00		0.00	
Surface description	= Paved		Paved		Paved	
Average velocity (ft/s)	=0.00		0.00		0.00	
Travel Time (min)	= 0.00	+	0.00	+	0.00	= 0.00
Channel Flow						
X sectional flow area (sqft)	= 0.39		0.00		0.00	
Wetted perimeter (ft)	= 1.57		0.00		0.00	
Channel slope (%)	= 0.50		0.00		0.00	
Manning's n-value	= 0.015		0.015		0.015	
Velocity (ft/s)	=2.77		0.00		0.00	
Flow length (ft)	{{0}}425.0		0.0		0.0	
Travel Time (min)	= 2.56	+	0.00	+	0.00	= 2.56
Total Travel Time, Tc						6.60 min

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

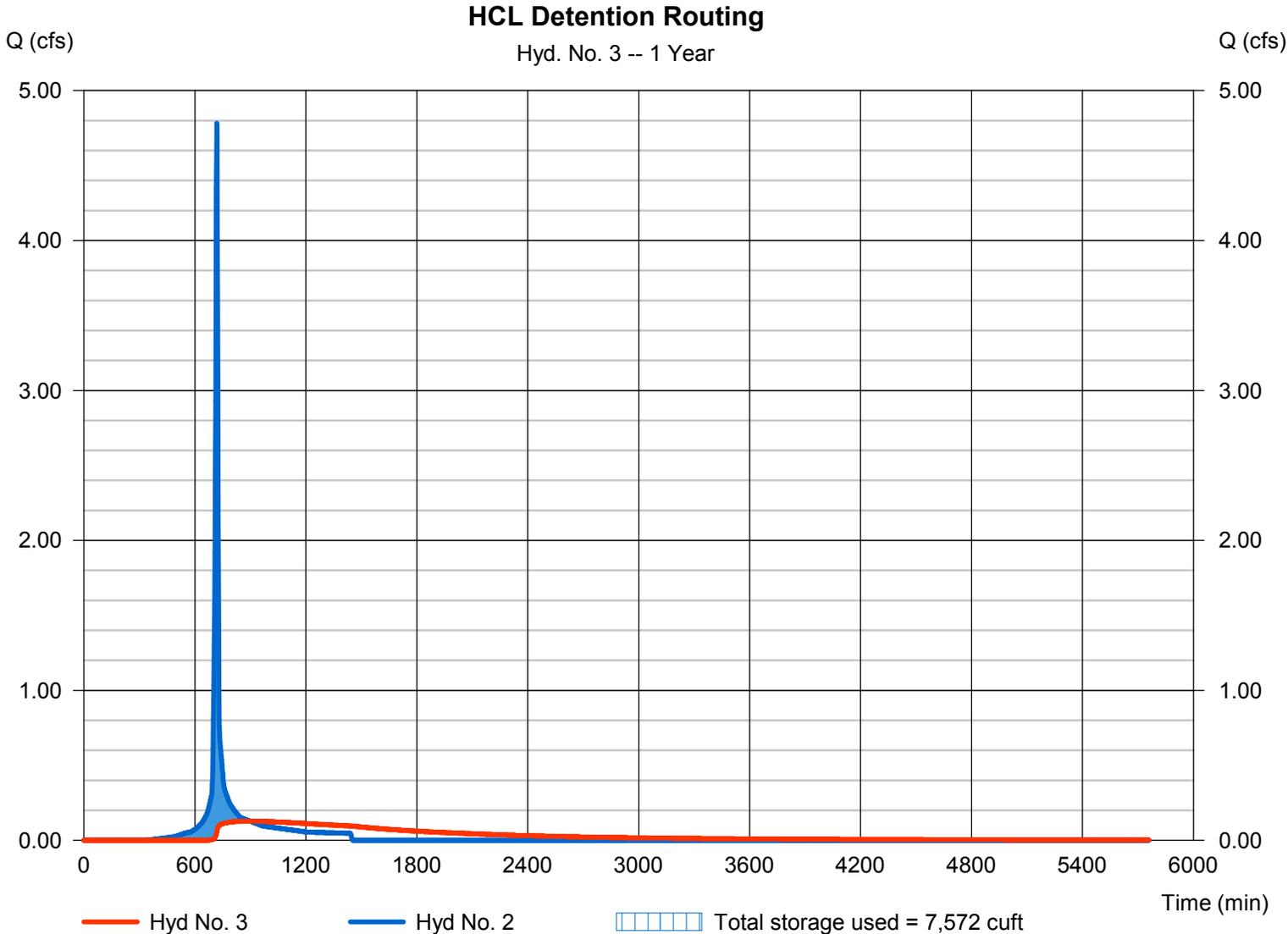
Thursday, 04 / 21 / 2016

Hyd. No. 3

HCL Detention Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.128 cfs
Storm frequency	= 1 yrs	Time to peak	= 898 min
Time interval	= 2 min	Hyd. volume	= 10,149 cuft
Inflow hyd. No.	= 2 - HCL - Post Dev.	Max. Elevation	= 767.88 ft
Reservoir name	= HCL Chambers	Max. Storage	= 7,572 cuft

Storage Indication method used.



Pond No. 1 - HCL Chambers

Pond Data

UG Chambers -Invert elev. = 766.00 ft, Rise x Span = 5.00 x 5.00 ft, Barrel Len = 125.00 ft, No. Barrels = 5, Slope = 0.25%, Headers = Yes
Encasement -Invert elev. = 765.50 ft, Width = 8.00 ft, Height = 6.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	765.50	n/a	0	0
0.68	766.18	n/a	1,207	1,207
1.36	766.86	n/a	2,236	3,443
2.04	767.54	n/a	2,699	6,143
2.72	768.22	n/a	2,901	9,044
3.41	768.91	n/a	2,971	12,015
4.09	769.59	n/a	2,932	14,947
4.77	770.27	n/a	2,768	17,715
5.45	770.95	n/a	2,410	20,125
6.13	771.63	n/a	1,664	21,789
6.81	772.31	n/a	1,537	23,326

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.63	0.00	0.50
Span (in)	= 12.00	11.25	0.00	0.50
No. Barrels	= 1	1	1	12
Invert El. (ft)	= 765.90	770.60	0.00	765.98
Length (ft)	= 30.00	0.25	0.00	1.00
Slope (%)	= 0.50	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	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	= Rect	---	---	---
Multi-Stage	= No	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	765.50	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.07	121	765.57	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.14	241	765.64	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.20	362	765.70	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.27	483	765.77	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.34	604	765.84	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.41	724	765.91	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.48	845	765.98	0.00	0.00	---	0.00	---	---	---	---	---	---	0.000
0.55	966	766.04	0.00 oc	0.00	---	0.00	---	---	---	---	---	---	0.001
0.61	1,087	766.11	0.00 ic	0.00	---	0.00	---	---	---	---	---	---	0.003
0.68	1,207	766.18	0.01 ic	0.00	---	0.00	---	---	---	---	---	---	0.005
0.75	1,431	766.25	0.01 ic	0.00	---	0.01	---	---	---	---	---	---	0.007
0.82	1,655	766.32	0.01 ic	0.00	---	0.01	---	---	---	---	---	---	0.010
0.89	1,878	766.39	0.01 ic	0.00	---	0.01	---	---	---	---	---	---	0.014
0.95	2,102	766.45	0.02 ic	0.00	---	0.02	---	---	---	---	---	---	0.017
1.02	2,325	766.52	0.02 ic	0.00	---	0.02	---	---	---	---	---	---	0.021
1.09	2,549	766.59	0.03 ic	0.00	---	0.03	---	---	---	---	---	---	0.025
1.16	2,772	766.66	0.03 ic	0.00	---	0.03	---	---	---	---	---	---	0.029
1.23	2,996	766.73	0.04 ic	0.00	---	0.03	---	---	---	---	---	---	0.033
1.29	3,220	766.79	0.04 ic	0.00	---	0.04	---	---	---	---	---	---	0.038
1.36	3,443	766.86	0.04 ic	0.00	---	0.04	---	---	---	---	---	---	0.042
1.43	3,713	766.93	0.05 ic	0.00	---	0.05	---	---	---	---	---	---	0.047
1.50	3,983	767.00	0.05 ic	0.00	---	0.05	---	---	---	---	---	---	0.052
1.57	4,253	767.07	0.06 ic	0.00	---	0.06	---	---	---	---	---	---	0.057
1.63	4,523	767.13	0.06 ic	0.00	---	0.06	---	---	---	---	---	---	0.062
1.70	4,793	767.20	0.07 ic	0.00	---	0.07	---	---	---	---	---	---	0.067
1.77	5,063	767.27	0.07 ic	0.00	---	0.07	---	---	---	---	---	---	0.073
1.84	5,333	767.34	0.08 ic	0.00	---	0.08	---	---	---	---	---	---	0.079
1.91	5,603	767.41	0.08 ic	0.00	---	0.08	---	---	---	---	---	---	0.084
1.98	5,873	767.48	0.09 ic	0.00	---	0.09	---	---	---	---	---	---	0.090
2.04	6,143	767.54	0.10 ic	0.00	---	0.10	---	---	---	---	---	---	0.096
2.11	6,433	767.61	0.11 ic	0.00	---	0.10	---	---	---	---	---	---	0.102

Continues on next page...

HCL Chambers

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
2.18	6,723	767.68	0.11 ic	0.00	---	0.11	---	---	---	---	---	---	0.109
2.25	7,013	767.75	0.11 ic	0.00	---	0.11	---	---	---	---	---	---	0.115
2.32	7,303	767.82	0.12 ic	0.00	---	0.12	---	---	---	---	---	---	0.122
2.38	7,593	767.88	0.13 ic	0.00	---	0.13	---	---	---	---	---	---	0.128
2.45	7,883	767.95	0.14 ic	0.00	---	0.14	---	---	---	---	---	---	0.135
2.52	8,173	768.02	0.15 ic	0.00	---	0.14	---	---	---	---	---	---	0.142
2.59	8,464	768.09	0.15 ic	0.00	---	0.15	---	---	---	---	---	---	0.149
2.66	8,754	768.16	0.16 ic	0.00	---	0.16	---	---	---	---	---	---	0.156
2.72	9,044	768.22	0.17 ic	0.00	---	0.16	---	---	---	---	---	---	0.163
2.79	9,341	768.29	0.18 ic	0.00	---	0.17	---	---	---	---	---	---	0.171
2.86	9,638	768.36	0.18 ic	0.00	---	0.18	---	---	---	---	---	---	0.178
2.93	9,935	768.43	0.19 ic	0.00	---	0.19	---	---	---	---	---	---	0.186
3.00	10,232	768.50	0.20 ic	0.00	---	0.19	---	---	---	---	---	---	0.193
3.07	10,529	768.57	0.20 ic	0.00	---	0.20	---	---	---	---	---	---	0.201
3.13	10,827	768.63	0.21 ic	0.00	---	0.21	---	---	---	---	---	---	0.209
3.20	11,124	768.70	0.22 ic	0.00	---	0.22	---	---	---	---	---	---	0.217
3.27	11,421	768.77	0.23 ic	0.00	---	0.23	---	---	---	---	---	---	0.225
3.34	11,718	768.84	0.24 ic	0.00	---	0.23	---	---	---	---	---	---	0.234
3.41	12,015	768.91	0.25 ic	0.00	---	0.24	---	---	---	---	---	---	0.242
3.47	12,308	768.97	0.25 ic	0.00	---	0.25	---	---	---	---	---	---	0.250
3.54	12,602	769.04	0.26 ic	0.00	---	0.26	---	---	---	---	---	---	0.259
3.61	12,895	769.11	0.28 oc	0.00	---	0.27	---	---	---	---	---	---	0.267
3.68	13,188	769.18	0.28 oc	0.00	---	0.28	---	---	---	---	---	---	0.276
3.75	13,481	769.25	0.29 oc	0.00	---	0.28	---	---	---	---	---	---	0.285
3.82	13,774	769.31	0.30 oc	0.00	---	0.29	---	---	---	---	---	---	0.293
3.88	14,068	769.38	0.31 oc	0.00	---	0.30	---	---	---	---	---	---	0.302
3.95	14,361	769.45	0.31 oc	0.00	---	0.31	---	---	---	---	---	---	0.312
4.02	14,654	769.52	0.33 oc	0.00	---	0.32	---	---	---	---	---	---	0.320
4.09	14,947	769.59	0.34 oc	0.00	---	0.33	---	---	---	---	---	---	0.329
4.16	15,224	769.66	0.34 oc	0.00	---	0.34	---	---	---	---	---	---	0.339
4.22	15,501	769.72	0.36 oc	0.00	---	0.35	---	---	---	---	---	---	0.348
4.29	15,778	769.79	0.37 oc	0.00	---	0.36	---	---	---	---	---	---	0.357
4.36	16,055	769.86	0.37 oc	0.00	---	0.37	---	---	---	---	---	---	0.367
4.43	16,331	769.93	0.38 oc	0.00	---	0.38	---	---	---	---	---	---	0.377
4.50	16,608	770.00	0.40 oc	0.00	---	0.39	---	---	---	---	---	---	0.386
4.56	16,885	770.06	0.40 oc	0.00	---	0.40	---	---	---	---	---	---	0.396
4.63	17,162	770.13	0.41 oc	0.00	---	0.41	---	---	---	---	---	---	0.406
4.70	17,438	770.20	0.43 oc	0.00	---	0.42	---	---	---	---	---	---	0.415
4.77	17,715	770.27	0.43 oc	0.00	---	0.43	---	---	---	---	---	---	0.426
4.84	17,956	770.34	0.45 oc	0.00	---	0.44	---	---	---	---	---	---	0.436
4.91	18,197	770.41	0.46 oc	0.00	---	0.45	---	---	---	---	---	---	0.445
4.97	18,438	770.47	0.46 oc	0.00	---	0.46	---	---	---	---	---	---	0.456
5.04	18,679	770.54	0.48 oc	0.00	---	0.47	---	---	---	---	---	---	0.466
5.11	18,920	770.61	0.49 oc	0.00 ic	---	0.48	---	---	---	---	---	---	0.479
5.18	19,161	770.68	0.56 oc	0.07 ic	---	0.48	---	---	---	---	---	---	0.551
5.25	19,402	770.75	0.68 oc	0.18 ic	---	0.48	---	---	---	---	---	---	0.662
5.31	19,643	770.81	0.82 oc	0.32 ic	---	0.49	---	---	---	---	---	---	0.801
5.38	19,884	770.88	0.98 oc	0.48 ic	---	0.49	---	---	---	---	---	---	0.963
5.45	20,125	770.95	1.11 oc	0.61 ic	---	0.49	---	---	---	---	---	---	1.095
5.52	20,292	771.02	1.20 oc	0.70 ic	---	0.49	---	---	---	---	---	---	1.195
5.59	20,458	771.09	1.29 oc	0.79 ic	---	0.49	---	---	---	---	---	---	1.284
5.65	20,624	771.15	1.37 oc	0.87 ic	---	0.50	---	---	---	---	---	---	1.364
5.72	20,791	771.22	1.45 oc	0.94 ic	---	0.50	---	---	---	---	---	---	1.438
5.79	20,957	771.29	1.51 oc	1.00 ic	---	0.51	---	---	---	---	---	---	1.507
5.86	21,124	771.36	1.57 oc	1.06 ic	---	0.51	---	---	---	---	---	---	1.570
5.93	21,290	771.43	1.63 oc	1.12 ic	---	0.50	---	---	---	---	---	---	1.625
5.99	21,456	771.49	1.69 oc	1.18 ic	---	0.51	---	---	---	---	---	---	1.689
6.06	21,623	771.56	1.75 oc	1.23 ic	---	0.52	---	---	---	---	---	---	1.751
6.13	21,789	771.63	1.81 oc	1.28 ic	---	0.53	---	---	---	---	---	---	1.811
6.20	21,943	771.70	1.87 oc	1.33 ic	---	0.54	---	---	---	---	---	---	1.869
6.27	22,096	771.77	1.93 oc	1.37 ic	---	0.55	---	---	---	---	---	---	1.925
6.34	22,250	771.84	1.98 oc	1.42 ic	---	0.56	---	---	---	---	---	---	1.980
6.40	22,404	771.90	2.03 oc	1.46 ic	---	0.57	---	---	---	---	---	---	2.034
6.47	22,558	771.97	2.09 oc	1.51 ic	---	0.58	---	---	---	---	---	---	2.086
6.54	22,711	772.04	2.14 oc	1.55 ic	---	0.59	---	---	---	---	---	---	2.137
6.61	22,865	772.11	2.19 oc	1.59 ic	---	0.60	---	---	---	---	---	---	2.187
6.68	23,019	772.18	2.24 oc	1.63 ic	---	0.61	---	---	---	---	---	---	2.236
6.74	23,173	772.24	2.28 oc	1.67 ic	---	0.62	---	---	---	---	---	---	2.285
6.81	23,326	772.31	2.33 oc	1.70 ic	---	0.63	---	---	---	---	---	---	2.332

...End

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	0.994	2	738	5,492	-----	-----	-----	HCL-Pre Dev.	
2	SCS Runoff	6.309	2	718	14,933	-----	-----	-----	HCL - Post Dev.	
3	Reservoir	0.189	2	858	13,898	2	768.46	10,048	HCL Detention Routing	
Health Care Logistics.gpw					Return Period: 2 Year			Thursday, 04 / 21 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

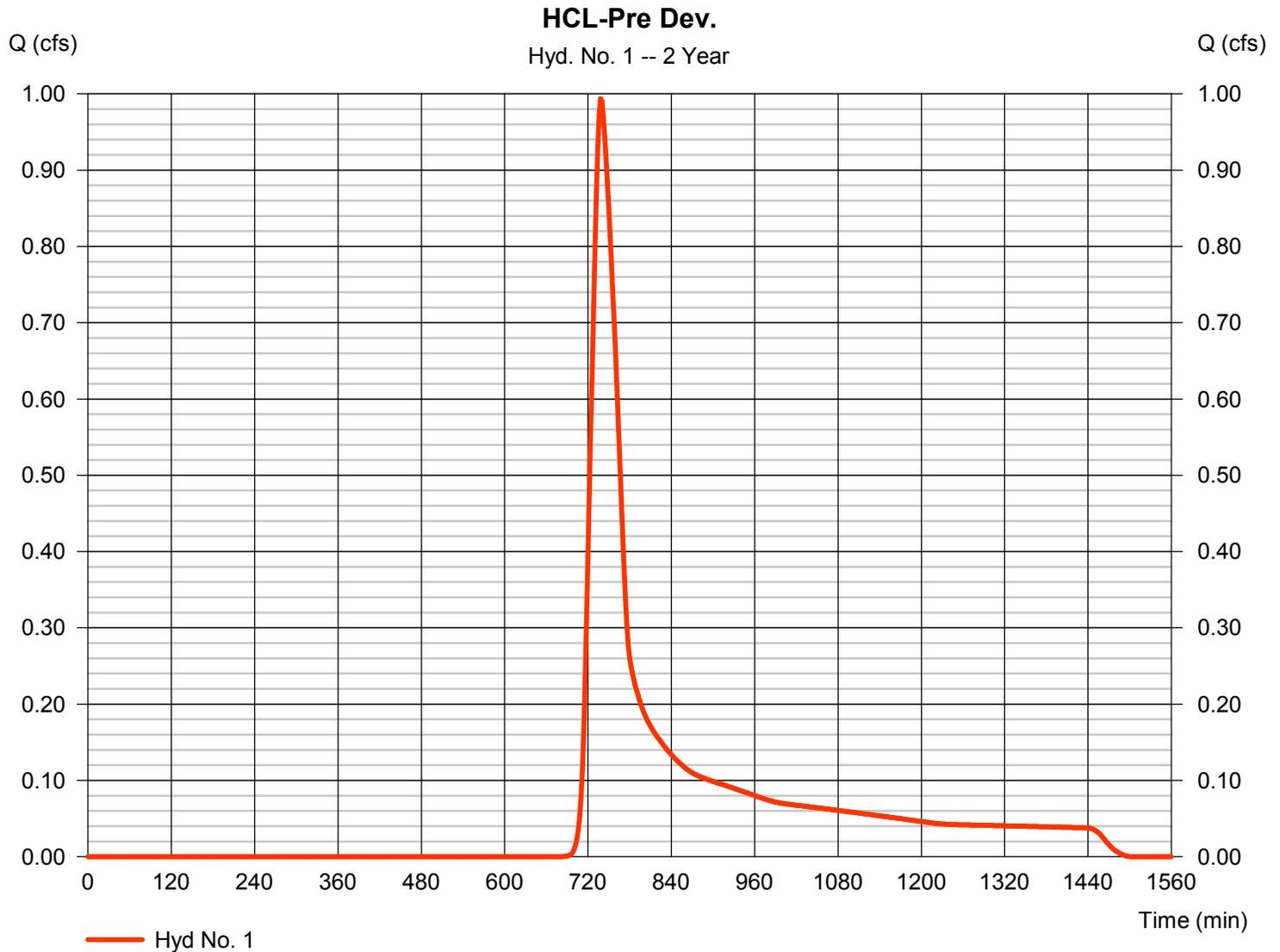
Thursday, 04 / 21 / 2016

Hyd. No. 1

HCL-Pre Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.994 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 5,492 cuft
Drainage area	= 2.090 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.10 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.092 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

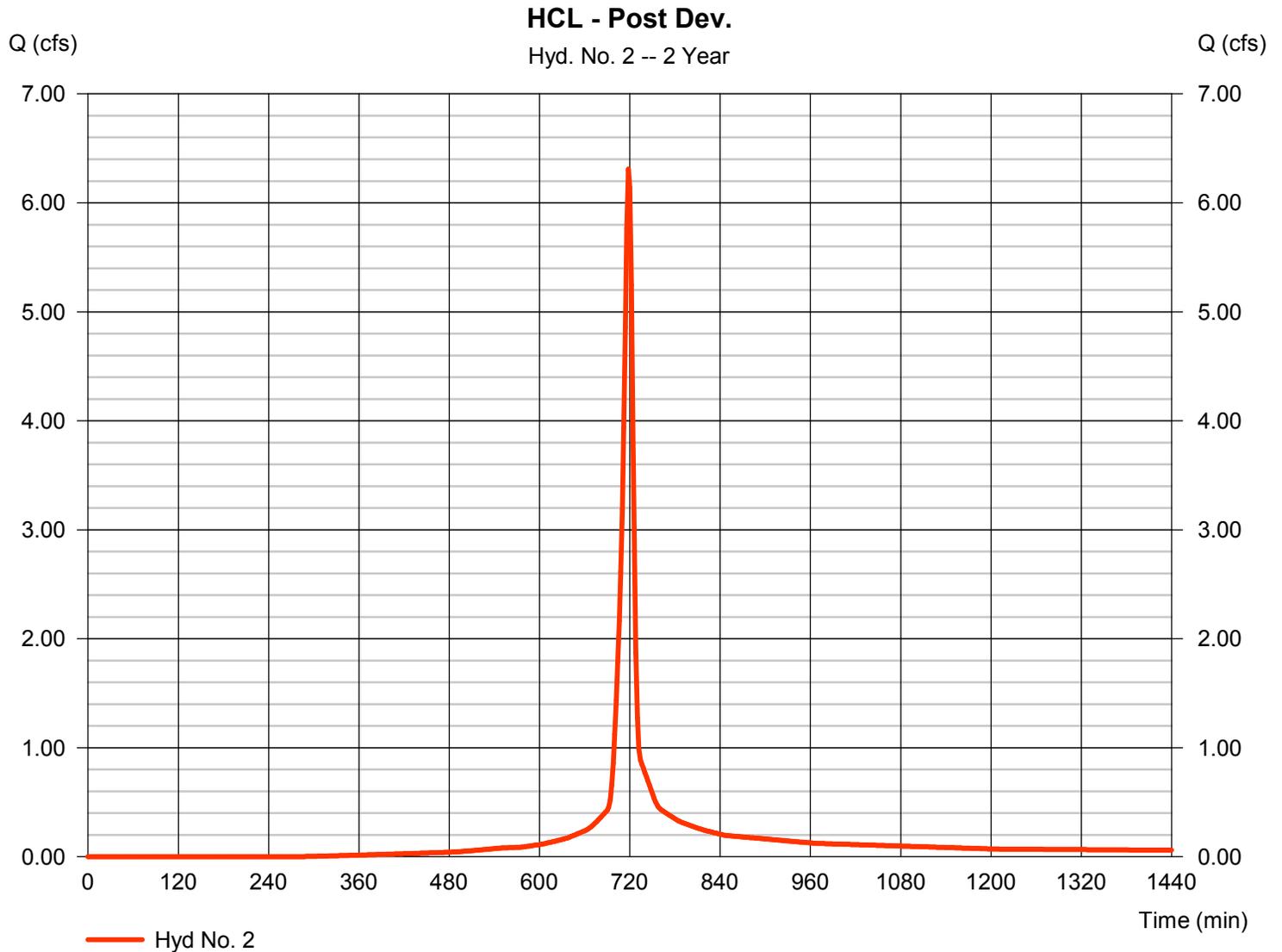
Thursday, 04 / 21 / 2016

Hyd. No. 2

HCL - Post Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 6.309 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 14,933 cuft
Drainage area	= 2.090 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.670 x 98) + (0.417 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

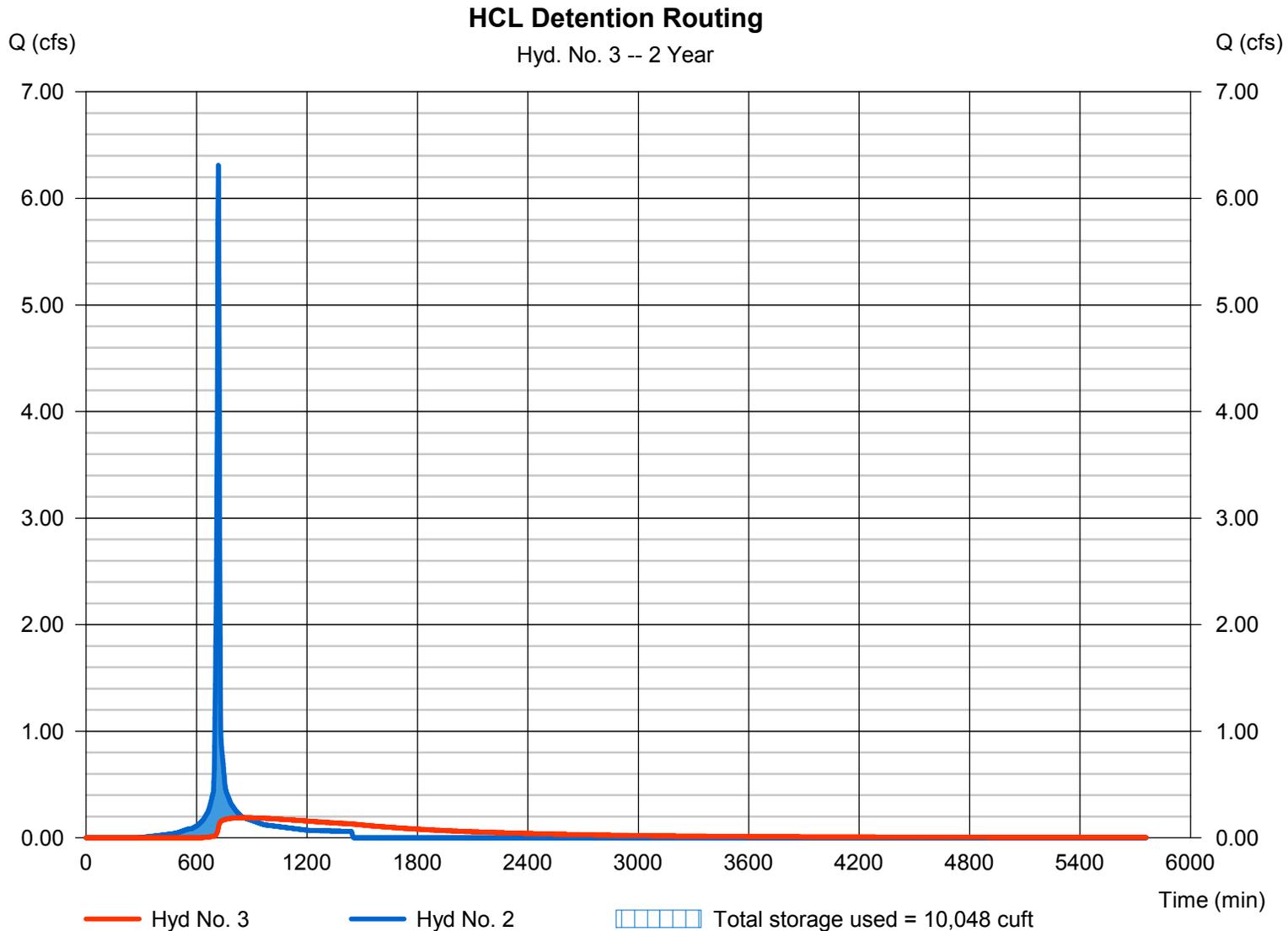
Thursday, 04 / 21 / 2016

Hyd. No. 3

HCL Detention Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.189 cfs
Storm frequency	= 2 yrs	Time to peak	= 858 min
Time interval	= 2 min	Hyd. volume	= 13,898 cuft
Inflow hyd. No.	= 2 - HCL - Post Dev.	Max. Elevation	= 768.46 ft
Reservoir name	= HCL Chambers	Max. Storage	= 10,048 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	1.672	2	738	8,630	-----	-----	-----	HCL-Pre Dev.	
2	SCS Runoff	8.177	2	718	19,650	-----	-----	-----	HCL - Post Dev.	
3	Reservoir	0.274	2	834	18,593	2	769.16	13,123	HCL Detention Routing	
Health Care Logistics.gpw					Return Period: 5 Year			Thursday, 04 / 21 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

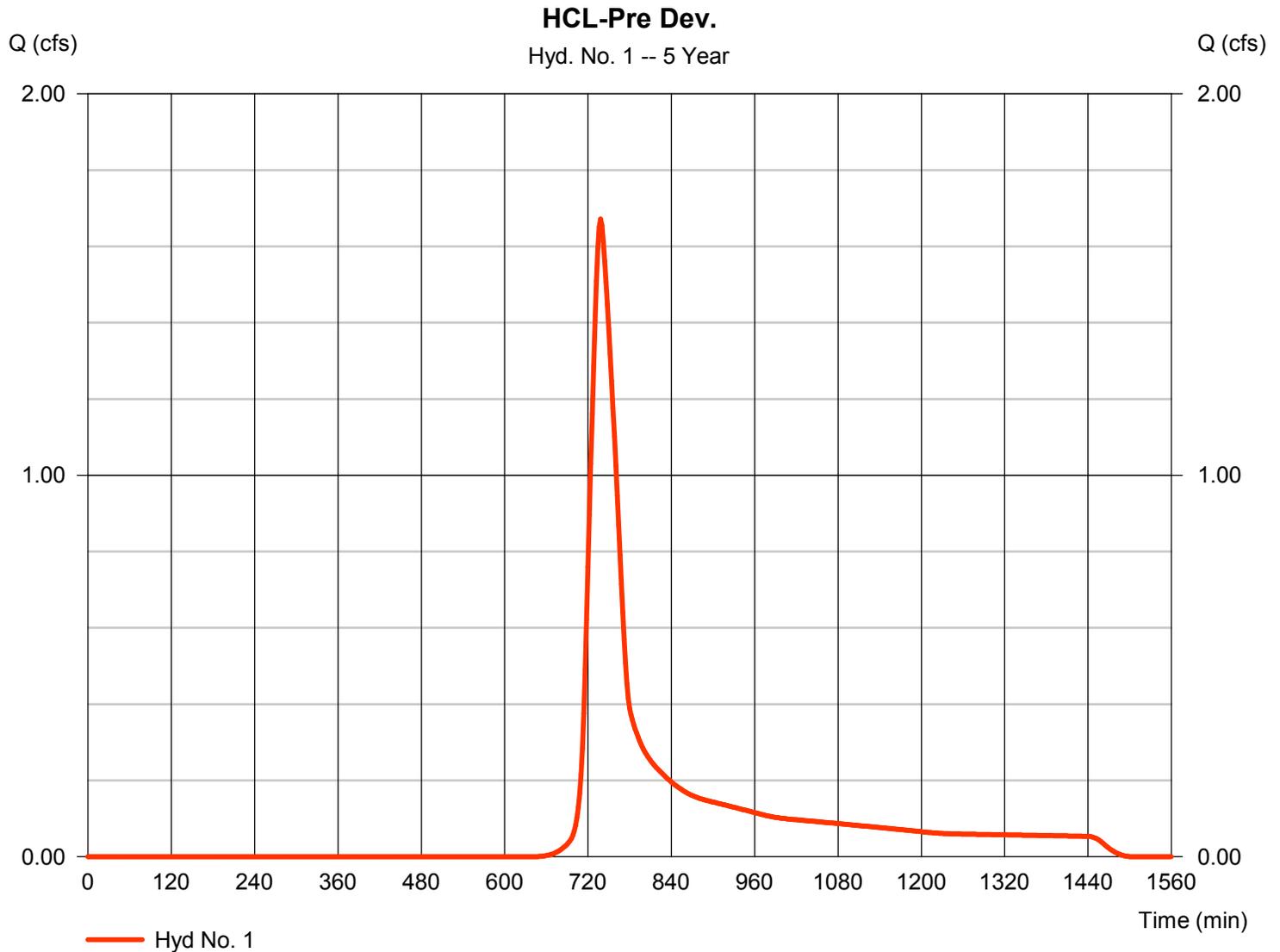
Thursday, 04 / 21 / 2016

Hyd. No. 1

HCL-Pre Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 1.672 cfs
Storm frequency	= 5 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 8,630 cuft
Drainage area	= 2.090 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.10 min
Total precip.	= 3.35 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.092 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

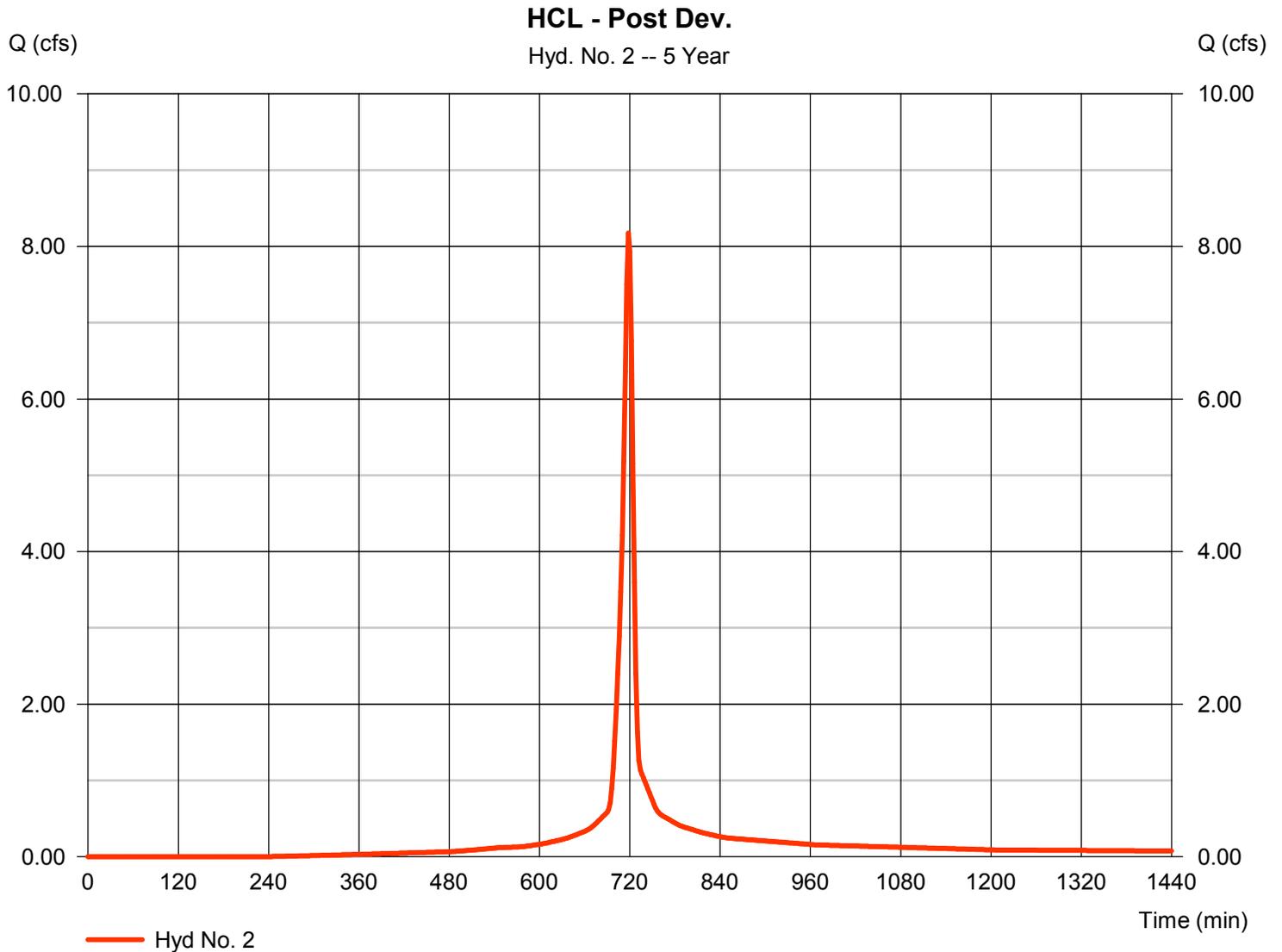
Thursday, 04 / 21 / 2016

Hyd. No. 2

HCL - Post Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 8.177 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 19,650 cuft
Drainage area	= 2.090 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 3.35 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.670 x 98) + (0.417 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

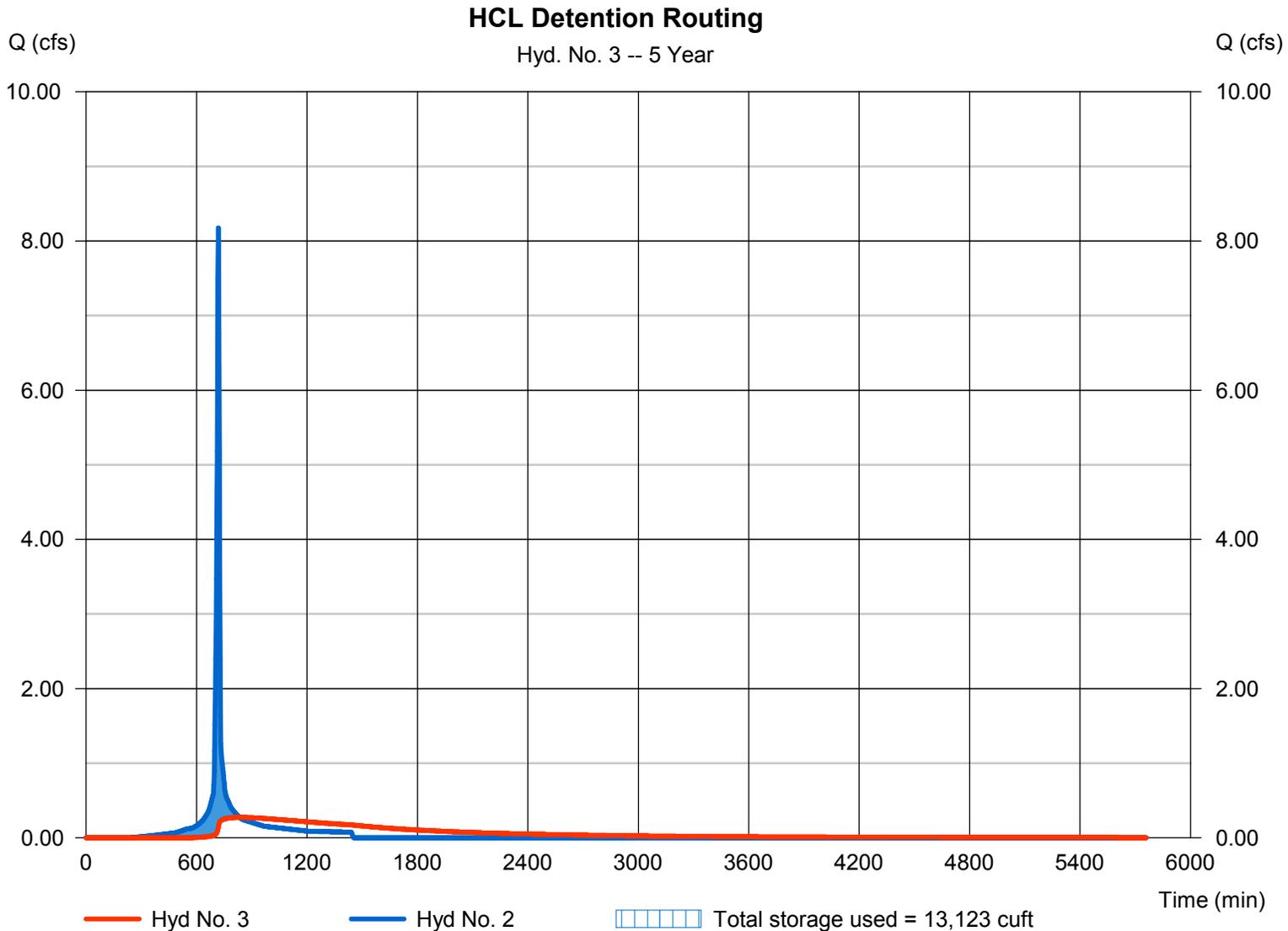
Thursday, 04 / 21 / 2016

Hyd. No. 3

HCL Detention Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.274 cfs
Storm frequency	= 5 yrs	Time to peak	= 834 min
Time interval	= 2 min	Hyd. volume	= 18,593 cuft
Inflow hyd. No.	= 2 - HCL - Post Dev.	Max. Elevation	= 769.16 ft
Reservoir name	= HCL Chambers	Max. Storage	= 13,123 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	2.253	2	738	11,337	-----	-----	-----	HCL-Pre Dev.	
2	SCS Runoff	9.635	2	718	23,395	-----	-----	-----	HCL - Post Dev.	
3	Reservoir	0.349	2	824	22,322	2	769.73	15,523	HCL Detention Routing	
Health Care Logistics.gpw					Return Period: 10 Year			Thursday, 04 / 21 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

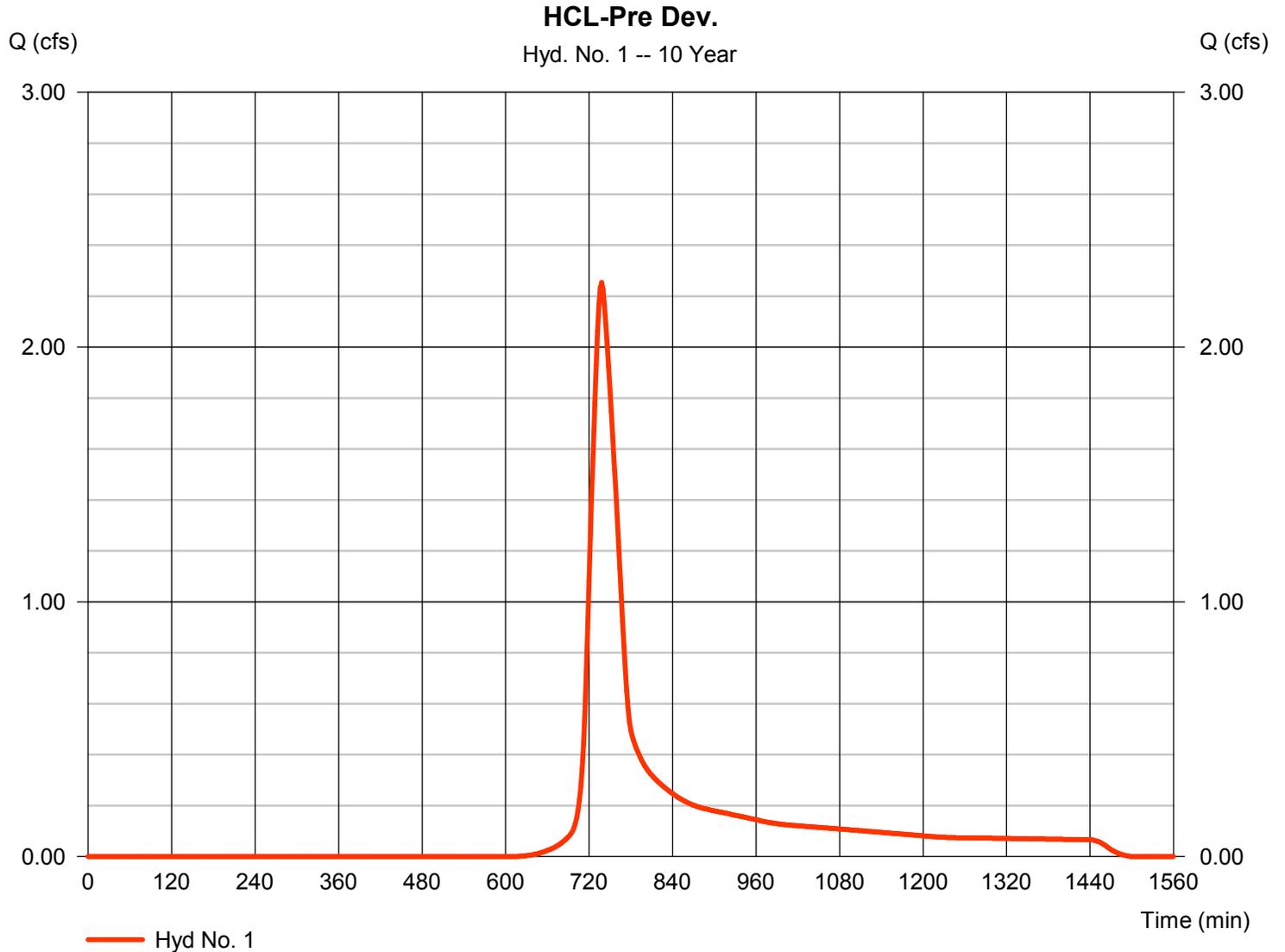
Thursday, 04 / 21 / 2016

Hyd. No. 1

HCL-Pre Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 2.253 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 11,337 cuft
Drainage area	= 2.090 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.10 min
Total precip.	= 3.86 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.092 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

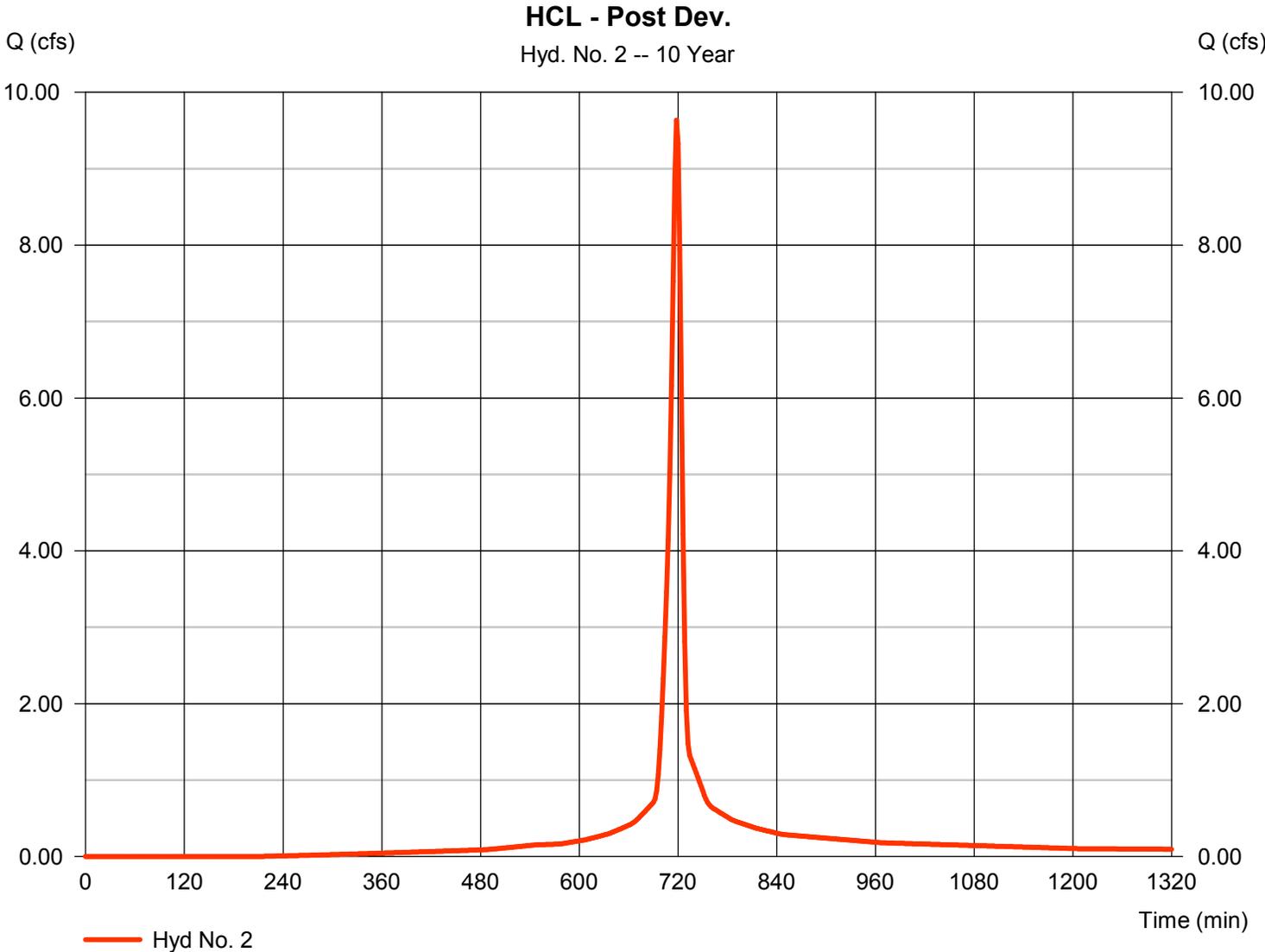
Thursday, 04 / 21 / 2016

Hyd. No. 2

HCL - Post Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 9.635 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 23,395 cuft
Drainage area	= 2.090 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 3.86 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.670 x 98) + (0.417 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

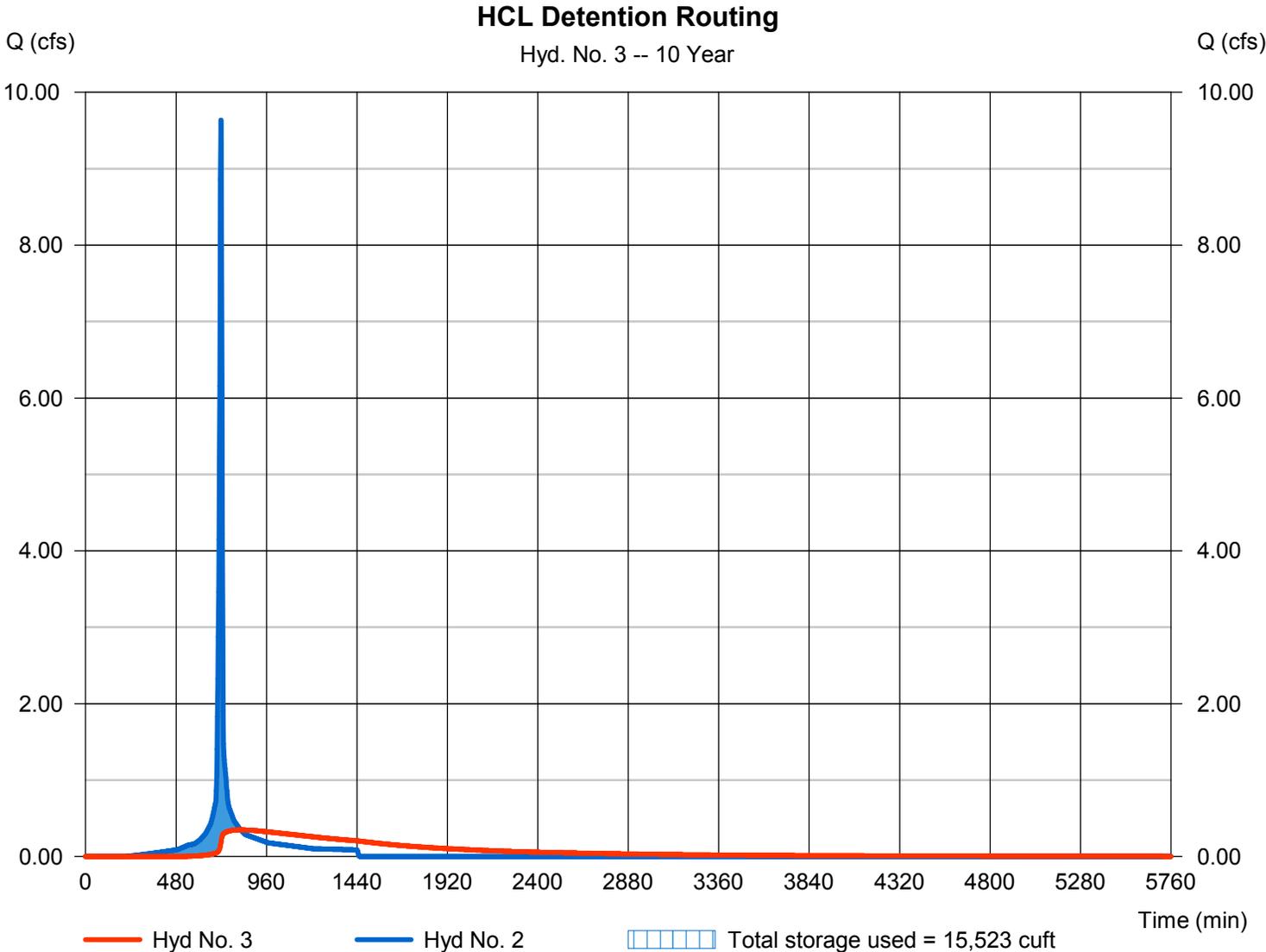
Thursday, 04 / 21 / 2016

Hyd. No. 3

HCL Detention Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.349 cfs
Storm frequency	= 10 yrs	Time to peak	= 824 min
Time interval	= 2 min	Hyd. volume	= 22,322 cuft
Inflow hyd. No.	= 2 - HCL - Post Dev.	Max. Elevation	= 769.73 ft
Reservoir name	= HCL Chambers	Max. Storage	= 15,523 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	3.202	2	738	15,785	-----	-----	-----	HCL-Pre Dev.	
2	SCS Runoff	11.85	2	718	29,170	-----	-----	-----	HCL - Post Dev.	
3	Reservoir	0.523	2	798	28,078	2	770.65	19,068	HCL Detention Routing	
Health Care Logistics.gpw					Return Period: 25 Year			Thursday, 04 / 21 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

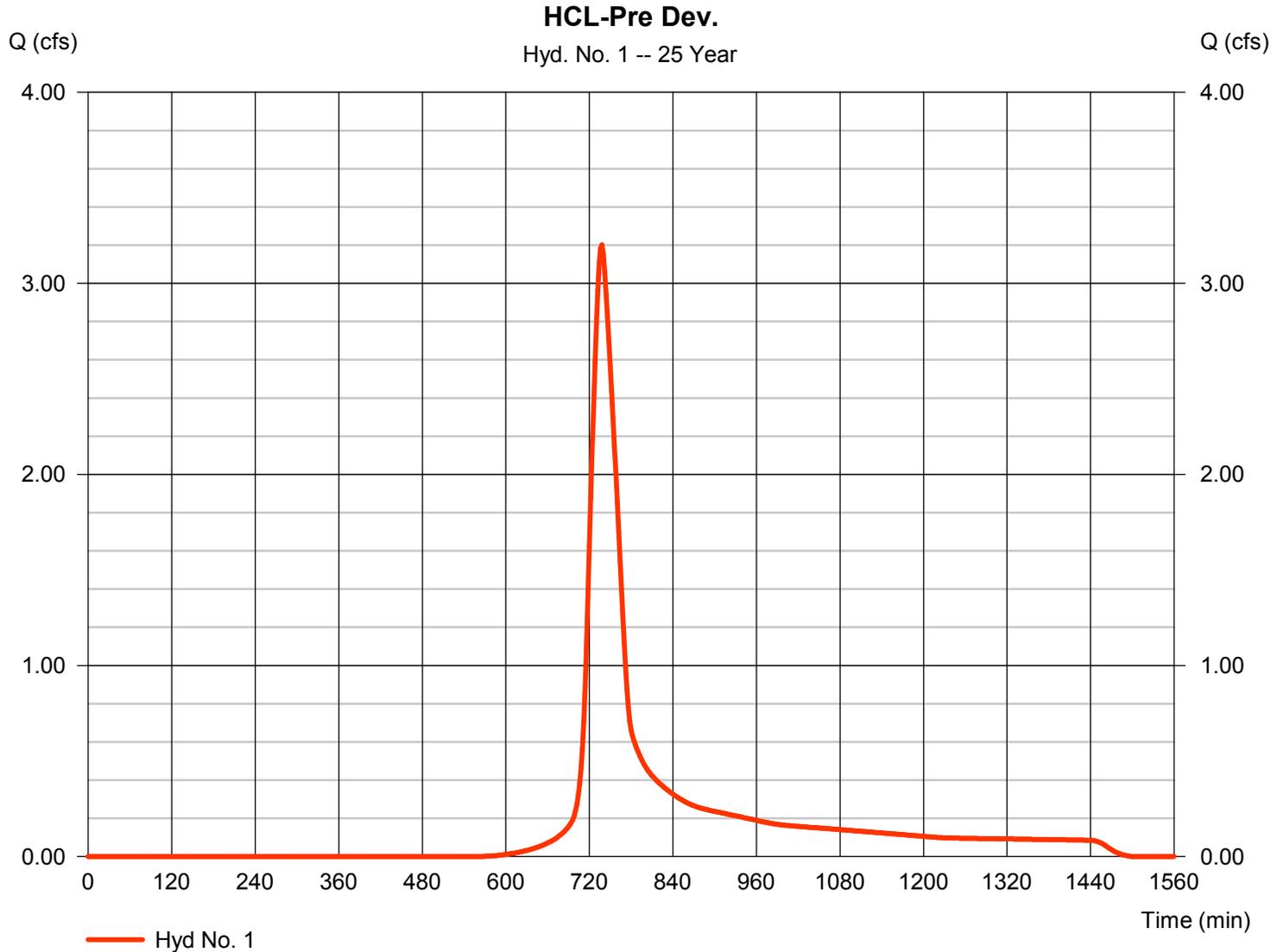
Thursday, 04 / 21 / 2016

Hyd. No. 1

HCL-Pre Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 3.202 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 15,785 cuft
Drainage area	= 2.090 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.10 min
Total precip.	= 4.64 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.092 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

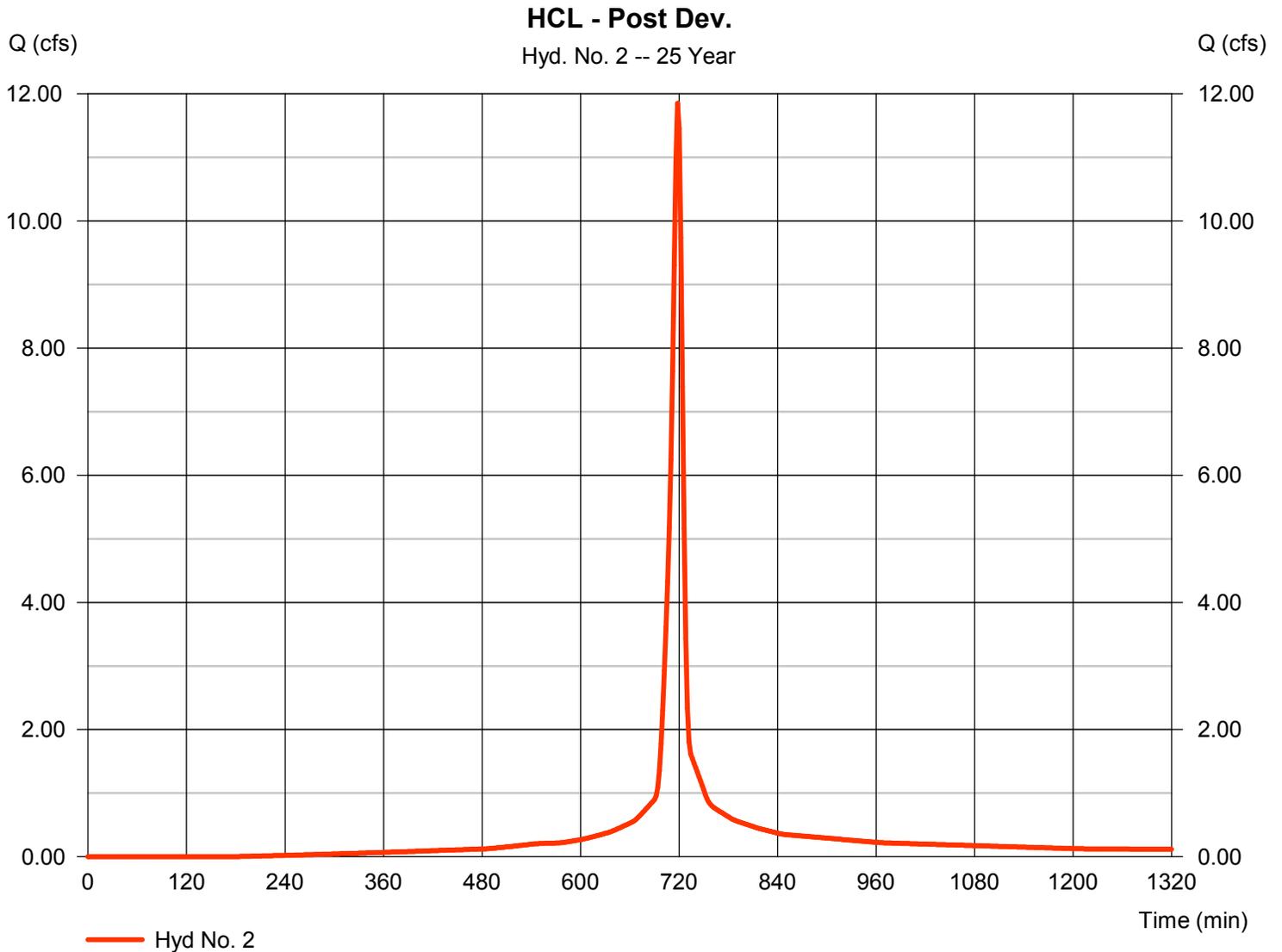
Thursday, 04 / 21 / 2016

Hyd. No. 2

HCL - Post Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 11.85 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 29,170 cuft
Drainage area	= 2.090 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 4.64 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.670 x 98) + (0.417 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

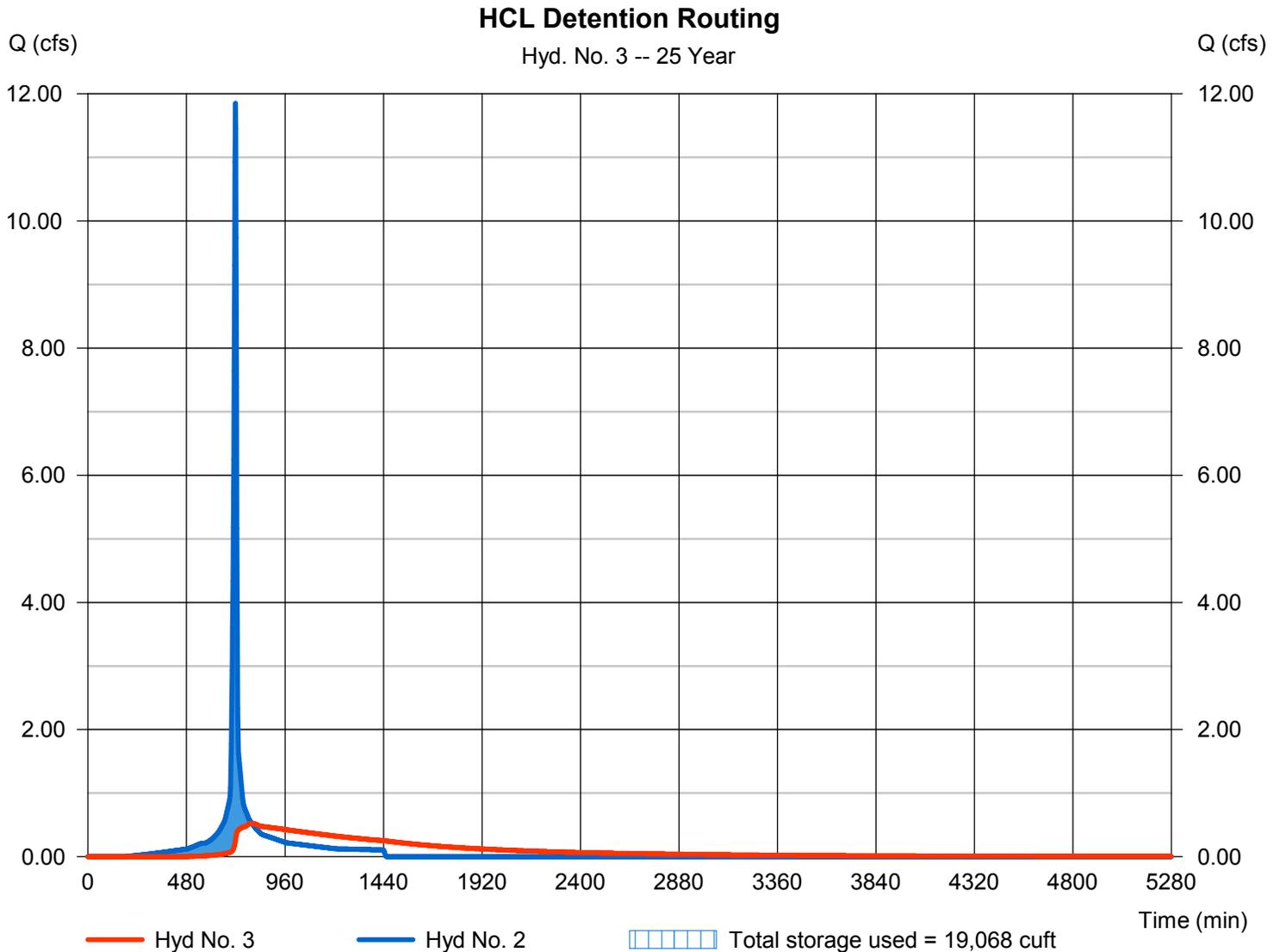
Thursday, 04 / 21 / 2016

Hyd. No. 3

HCL Detention Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.523 cfs
Storm frequency	= 25 yrs	Time to peak	= 798 min
Time interval	= 2 min	Hyd. volume	= 28,078 cuft
Inflow hyd. No.	= 2 - HCL - Post Dev.	Max. Elevation	= 770.65 ft
Reservoir name	= HCL Chambers	Max. Storage	= 19,068 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	4.084	2	738	19,954	-----	-----	-----	HCL-Pre Dev.	
2	SCS Runoff	13.80	2	718	34,309	-----	-----	-----	HCL - Post Dev.	
3	Reservoir	1.387	2	746	33,212	2	771.18	20,676	HCL Detention Routing	
Health Care Logistics.gpw					Return Period: 50 Year			Thursday, 04 / 21 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

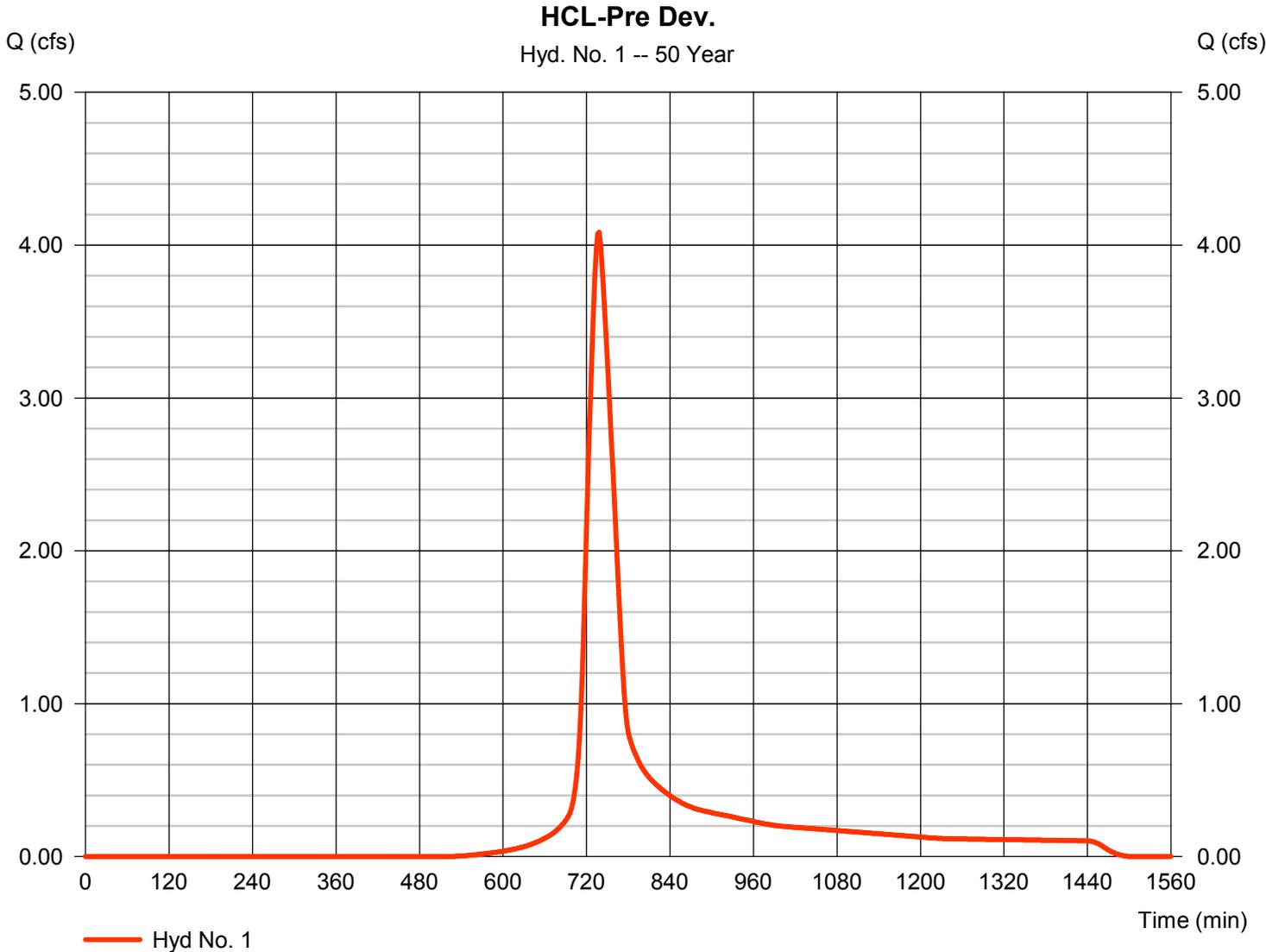
Thursday, 04 / 21 / 2016

Hyd. No. 1

HCL-Pre Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 4.084 cfs
Storm frequency	= 50 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 19,954 cuft
Drainage area	= 2.090 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.10 min
Total precip.	= 5.33 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.092 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

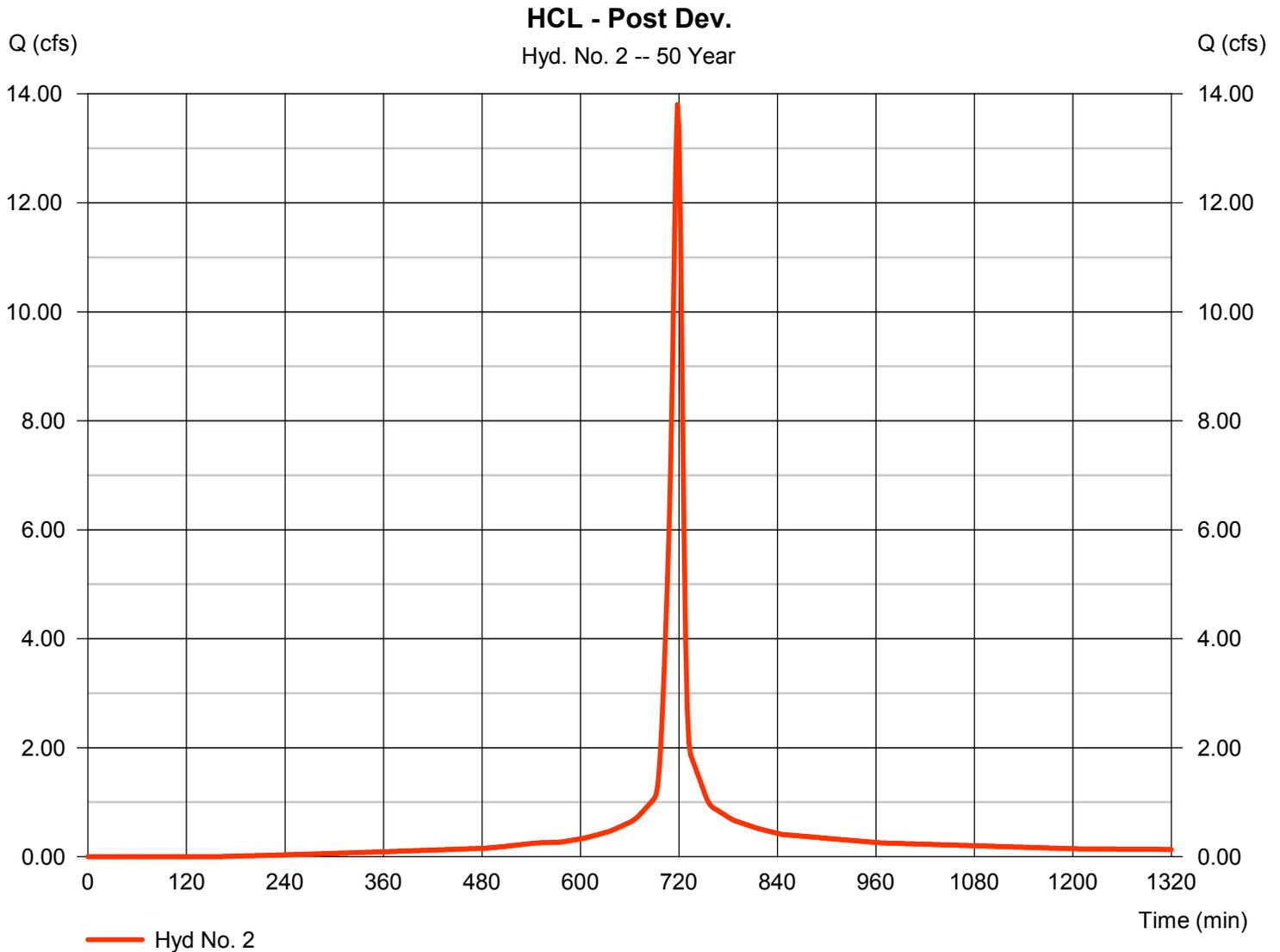
Thursday, 04 / 21 / 2016

Hyd. No. 2

HCL - Post Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 13.80 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 34,309 cuft
Drainage area	= 2.090 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 5.33 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.670 x 98) + (0.417 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

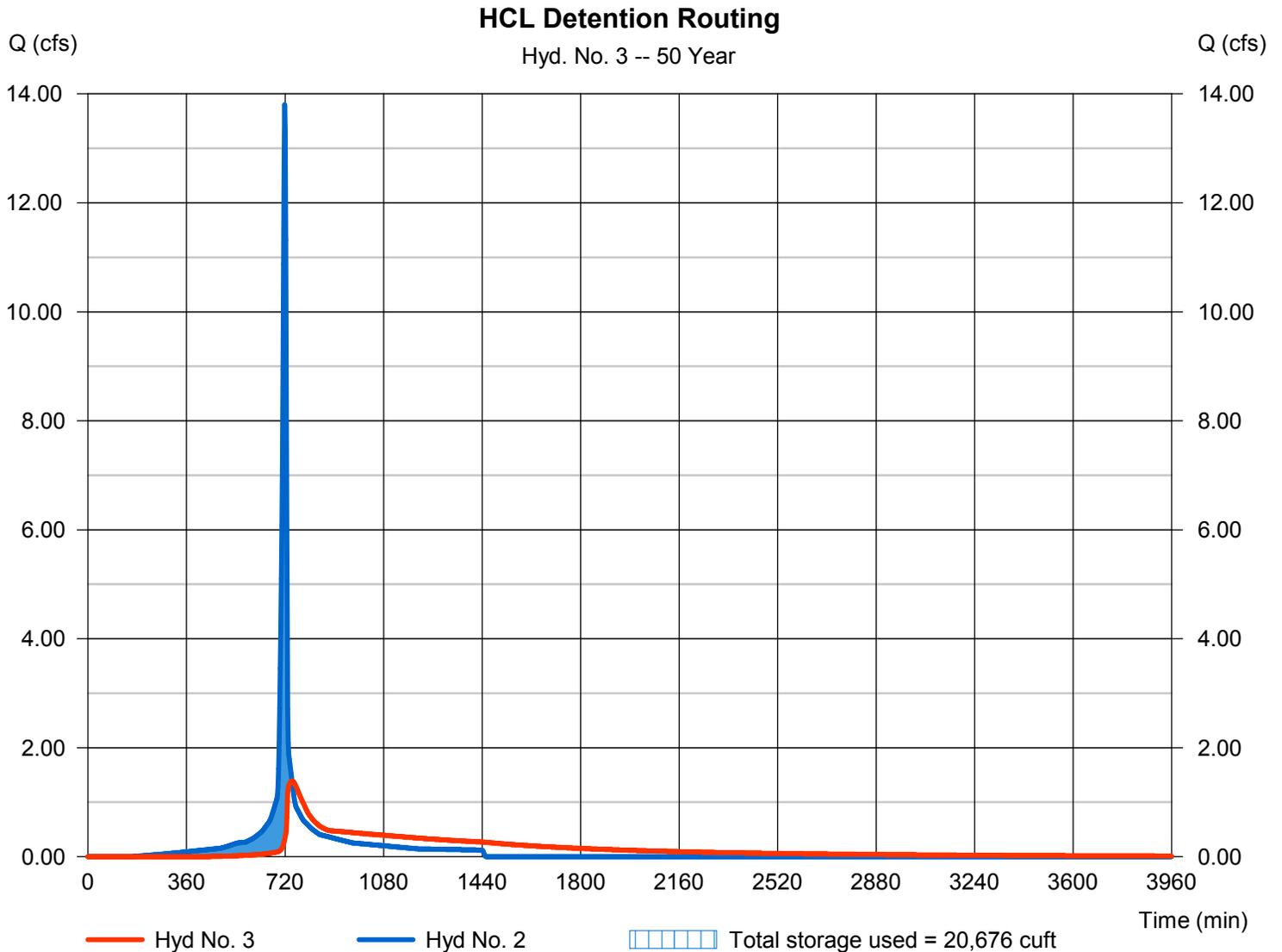
Thursday, 04 / 21 / 2016

Hyd. No. 3

HCL Detention Routing

Hydrograph type	= Reservoir	Peak discharge	= 1.387 cfs
Storm frequency	= 50 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 33,212 cuft
Inflow hyd. No.	= 2 - HCL - Post Dev.	Max. Elevation	= 771.18 ft
Reservoir name	= HCL Chambers	Max. Storage	= 20,676 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	5.047	2	738	24,546	-----	-----	-----	HCL-Pre Dev.	
2	SCS Runoff	15.85	2	718	39,768	-----	-----	-----	HCL - Post Dev.	
3	Reservoir	2.251	2	734	38,665	2	772.20	23,065	HCL Detention Routing	
Health Care Logistics.gpw					Return Period: 100 Year			Thursday, 04 / 21 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

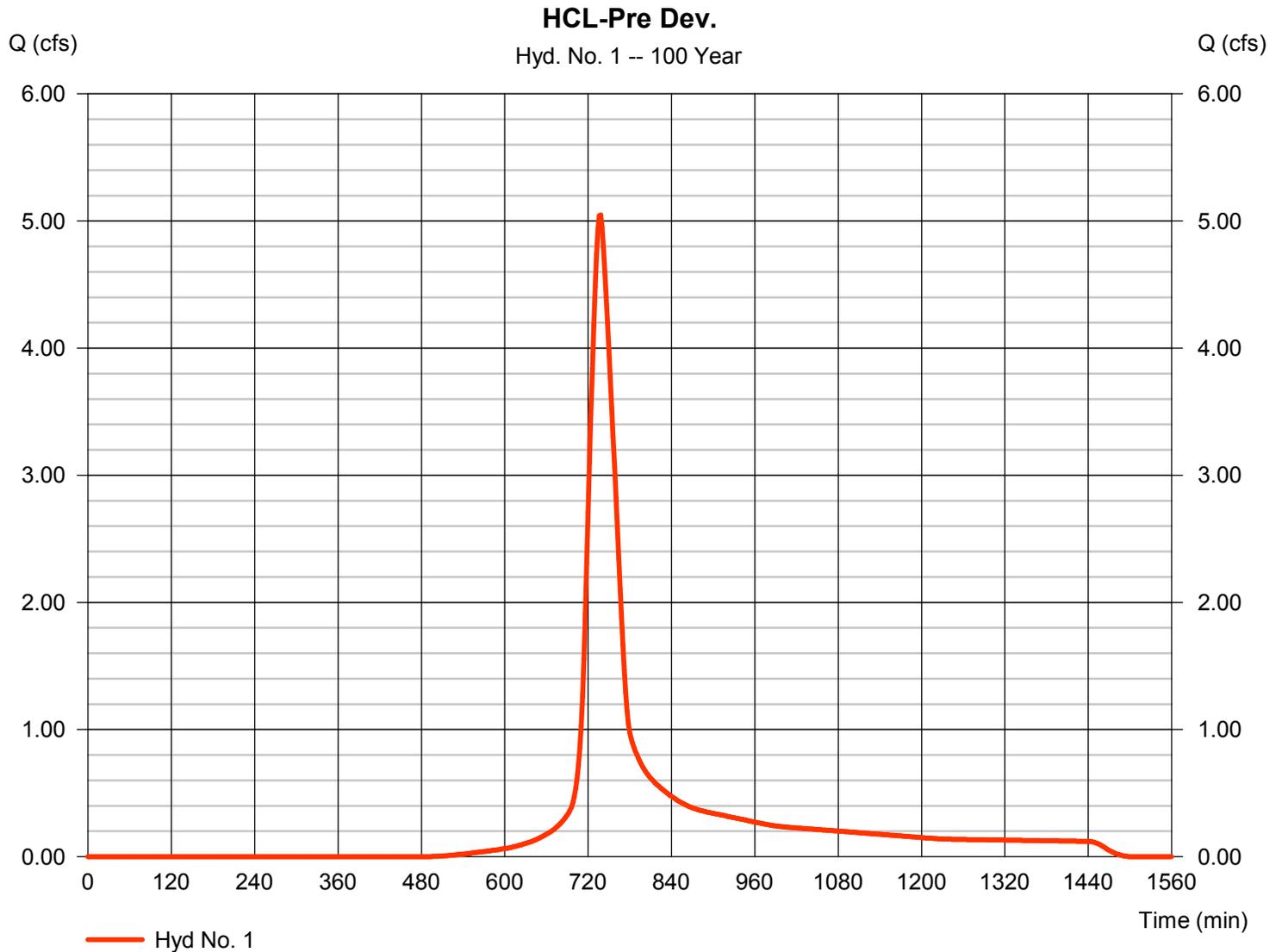
Thursday, 04 / 21 / 2016

Hyd. No. 1

HCL-Pre Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 5.047 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 24,546 cuft
Drainage area	= 2.090 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 37.10 min
Total precip.	= 6.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.092 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

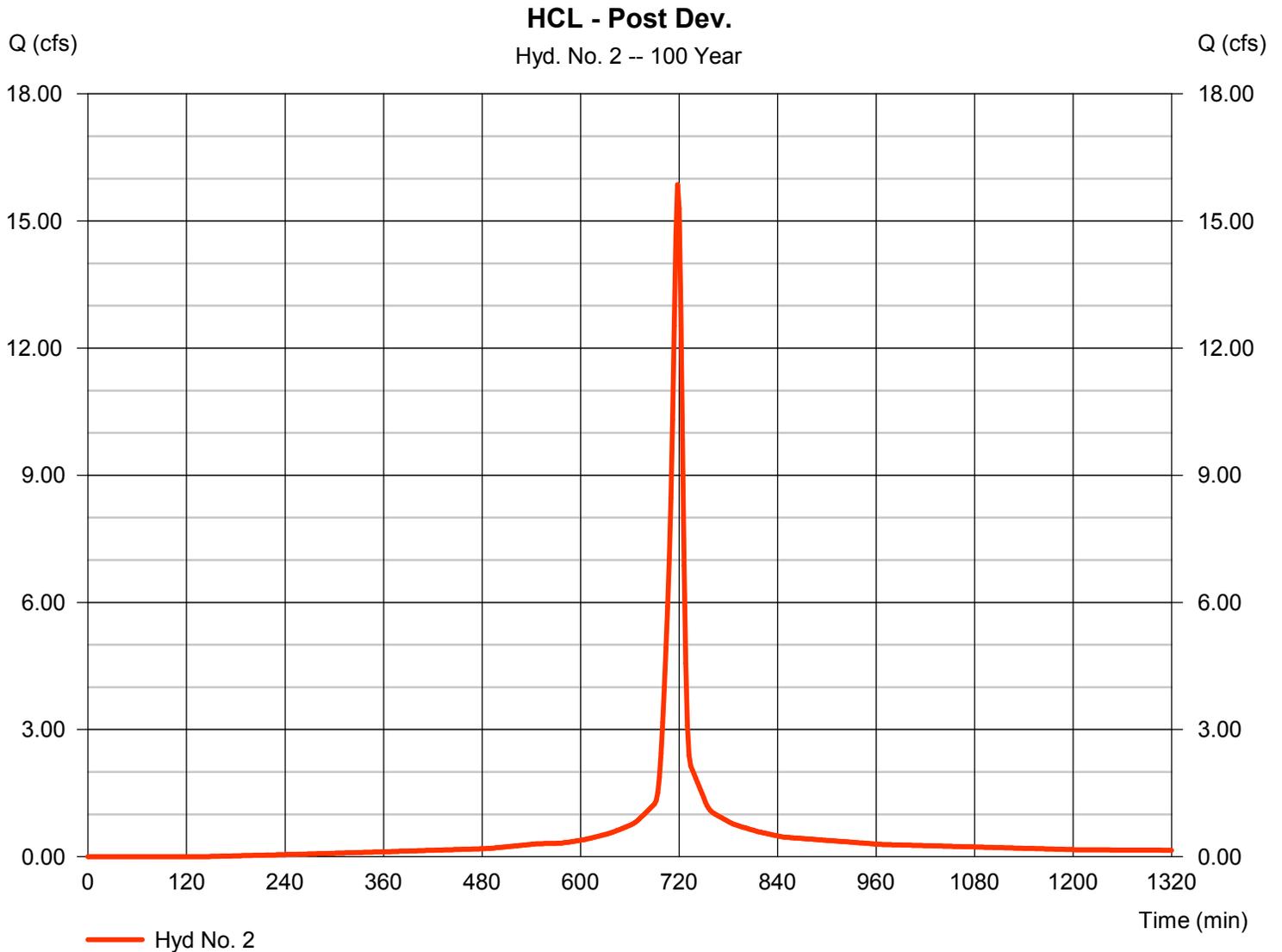
Thursday, 04 / 21 / 2016

Hyd. No. 2

HCL - Post Dev.

Hydrograph type	= SCS Runoff	Peak discharge	= 15.85 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 39,768 cuft
Drainage area	= 2.090 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 6.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.670 x 98) + (0.417 x 74)] / 2.090



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 04 / 21 / 2016

Hyd. No. 3

HCL Detention Routing

Hydrograph type	= Reservoir	Peak discharge	= 2.251 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 38,665 cuft
Inflow hyd. No.	= 2 - HCL - Post Dev.	Max. Elevation	= 772.20 ft
Reservoir name	= HCL Chambers	Max. Storage	= 23,065 cuft

Storage Indication method used.

