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Stormwater Management Report

for

Kalas Falls P. U. D.

Phase 3

Rolesville Road

Rolesville, North Carolina

Prepared For

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Kalas Falls P. U. D., Phase 3

Project Narrative

This project is located in Rolesville, North Carolina at Rolesville Road. It involves the combining of separately proposed projects known as Kalas Falls, Rogers Farm and one other tract known as the Watkins Property. It drains to tributaries of Harris Branch which is part of the Neuse River basin. It is also bounded on all sides by mostly undeveloped land. It is approximately 0.5 miles northwest of the intersection of Mitchell Mill Road and Rolesville Road in Wake County, North Carolina. The total area of the project is 283.0 acres. Some of the charts in this report contain data which applies to the entire project. This is done because the drainage portions of the report are divided by drainage basins which do not conform to phase boundaries. Most of the calculations presented pertain only to Phase 3 which is in the original Kalas Falls area. The Phase 3 area is 79.96 acres.

The majority of the property is currently wooded. The topography is gently sloped with most of the property draining to the middle western side of the property.

This site is proposed to be built with single family residential homes and townhomes not to exceed 550 units. In the design of the BMP's and drainage the following values of impervious area per lot were used:

Lot Size	Impervious Area
50'	3620 s. f.
60'	3920 s. f.
70'	4650 s. f.
80'	5400 s. f.
100'	5750 s. f.

This is in addition to impervious areas from roads, sidewalks, parking lots and townhome buildings. The total impervious area is almost 40% which is the reason for the wet ponds throughout the parcel.

The drainage is expected to be collected by having curb and gutter. These areas will be collected in catch basins and conveyed by pipes. Roof drains from the homes are to be daylighted to the curbs and then collected by the storm catch basins.

The stormwater management objectives are to control the stormwater from the developed areas. The stormwater is to be treated to remove some of the nitrogen from it. It is also to be retained to reduce the peak outflow for the one year and 10 year storm events to that of the pre-development flow rate.

It is proposed to treat and retain the flow volume for the site through 6 separate wet ponds scattered throughout Phase 3.

Existing and Proposed Drainage Area Maps

The drainage area map is an attachment to this report.

SCM Sizing Calculations

Size calculations have been performed on all of the six proposed ponds for Phase 3. The sheets in the Appendix shows the drainage area to each pond, the required treatment volume, and the flows for each storm level.

These ponds meet the DEQ requirements for the minimum surface area and storage of treatment volumes, based on the 2017 DEQ tables. Final designs for the Phase 1 through Phase 3 ponds are included in the appendix.

Impervious Area Calculations

The impervious areas are shown in the chart below

Impervious Area

(in acres)

Phase 3 - Proposed Impervious

Type	DA#3	DA#4	DA#8	Totals
Roadway/Walks in R/W	6.240	5.857	0.386	12.483
Single Family Residential	6.540	9.923	1.256	17.719
Other (Greenway Trail)	0.511			0.511
Totals	13.291	15.780	1.642	30.713

Existing impervious area is zero.

Flows Before and After Construction

The drainage areas below are for the areas as shown on the drainage maps and conform to the Points of Interest shown on those maps. All flows are shown in cfs for the appropriate storm. As can be seen all post-development flows are below the corresponding pre-development flow.

Pre-development and Post-development Flows

(in cfs)

Phase 3

Area No.	Area (ac.)	1 Year Flow		2 Year Flow		10 Year Flow	
		Pre	Post	Pre	Post	Pre	Post
3	300.88	143.71	81.55	221.41	131.95	550.27	408.39
4	63.52	35.14	34.88	57.39	49.02	153.86	107.68
8	5.11	2.16	1.23	3.96	1.63	12.09	6.55
Totals	369.51	181.01	117.66	282.76	182.60	716.22	522.62

Major Creek Crossings

There are seven locations where major storm drain crossings of proposed roadways are present. The one on Woodlyn Park Drive at the boundary with Phase 2 is to be constructed in this phase as well as Falls Bluff Drive at the boundary with Phase 1.

Both of these involve significant off-site flows which are carried through the project as well as upstream flows from Phase 2 and a portion of Phase 3. They are designed for the 100 year storm using the NCDOT Hydrologic Method using a HC of 5.5 per the statewide map. The calculations are in the Appendix.

Rip-Rap Pads

Rip-rap pads were calculated using the NYSDOT method. A copy of the chart used for determining zones and the apron lengths are shown in the Appendix. A schedule showing results is also included.

Gutter Spread Calculations

Gutter spread calculations are in the Appendix. The gutter spread calculation is from the face of curb (FOC). The allowable gutter spread is 7.5 feet (2' gutter + 5.5' one-half lane) for local streets and eleven feet (2' gutter + 9' one-half lane) for collector streets. These use a Rational $i_2 = 4.00$ in./hr.

Stormwater Runoff Velocity

The stormwater runoff calculations are in the Appendix. All flows are for the ten year storm. For Points of Interest 1 -3 these are channel flow velocities. For other POI's they are the flow velocities leaving the rip-rap at the ends of each pond outlet. These flows are calculated using the width of

flow at the end of the rip-rap, the slope of the area, a depth necessary to obtain the flow and an n value of 0.045 (rip-rap).

TSS Removal Calculations

The wet retention ponds in this project are designed using the surface area calculation from NCDEQ (2017 tables).

Soils Information

The site is shown on a part of the Rolesville USGS quadrangle and on the Wake County Soil Survey map. These are in the Appendix.

Hydraulic Grade Line Analysis

The hydraulic gradeline for the pipe systems are calculated by the Carlson software and shown on the profiles.

Erosion Control Calculations

The grading for the project will be limited to roadway grading with some minor lot grading in areas to prevent ponding water. A series of diversion ditches has been designed to intercept storm water runoff and divert the runoff to a SCM. At two areas near the falls, we have designed a sediment basin to intercept the runoff but used a location to minimize grading outside the proposed lots or roadway.

The appendix includes the summary for the sediment basin and rip-rap pads. The sediment basins outlets have been sized to obtain between 2 to 5 days by modifying the skimmer and orifice size. The Wake County criteria for sizing surface area based on Q10 x 435, basin volume of 1800 cu ft per drainage acre has been used except for temporary sediment traps where the NCDEQ criteria of 3600 c. f. per drainage acre is used.

Acknowledgement

Jack R. Harman, P. E. # 9810 performed the stormwater hydrographs for each pond and the project as presented in this report. He also calculated the pre-development and post-development flows for each area.

Appendix

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SCM Calculations

Kalas Development-Phase Three: Supplemental & Supporting Info for Hydrograph Generation
Pre & Post to POI #7 (Which Will Ultimately Contribute to POI #3)

PreDev: Total OffSite DA to DA#7 to Exist'g Culverts @ R'ville Rd:		1375264	S.F.	31.572	Ac
(Part of DA#7, Ends Up at POI #3)	Land Use				
	Impervious Roads:	Area	CN	Wtd. CN	
	Rolesville Rd	39600	98	2.82	0.91
	Traviswood Area	20000	98	1.43	0.46
	Hartland Manor	7000	98	0.50	0.16
	Mitchell Mill Rd	6000	98	0.43	0.14
	Exist'g Developed Lots:	76500	98	5.45	1.76
	Pasture "B" Soils	256480	61	11.38	5.89
	Woods "B" Soils (Fair)	0	60	0.00	0.00
	Wooded "C" Soils (Fair)	969684	73	51.47	22.26
	Wooded "D" Soils (Fair)	0	79	0.00	0.00
	Total (Check):	1375264	Composite "CN"	73.47	
	PostDev Conditions=The Same As Above				
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1000**	**15**	**7.59**	Minutes

Total PreDev OnSite DA Thru DA#7 to POI #7:		1354486	S.F.	31.095	Ac
(Part of DA#7, Ends Up at POI #3)	Land Use				
	Pasture "C" Soils	1013844	74	55.39	23.27
	Pasture D" Soils	201289	80	11.89	4.62
	Wooded "D" Soils (Fair)	139354	79	8.13	3.20
	Total (Check):	1354486	Composite "CN"	75.41	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1505**	**16**	**11.87**	Minutes

Comp. PreDev Conditions to POI #7	**Total PreDev Area to POI #7**	**2729750**	**S.F.**	**62.67**	**Ac**
	OffSiteDA & CN (from above)	1375264	73.47	37.02	31.57
	OnSite DA & CN (from above)	1354486	75.41	37.42	31.09
	Total (Check):	**2729750**	**Composite "CN"**	**74.43**	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**2500**	**32**	**16.34**	Minutes

PostDev DA to SCM #7A		403404	S.F.	9.26	Ac
	Land Use	**Area, S.F.**	**"CN"**	**Wtd'd "CN"**	
	Impervious Road & Sidewalks	41242	98	10.02	0.95
	Impervious Recreation Area	35986	98	8.74	0.83
	Impervious Lots	37200	98	9.04	0.85
	Reforested "C" soils (Rec Area)	92297	70	16.02	2.12
	Open Space (Lots) Good "C" Soils	196679	74	36.08	4.52
		403404	**Composite "CN"**	**79.89**	
		Percent Impervious		28%	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1505**	**16**	**11.87**	Minutes
	Percent Impervious		28%		
	Pond Design Depth, ft.:		3.5	(4.0' w/ 0.5' Sediment Storage)	
	SA/DA Factor:		1.00		
	Min.SCM Surface Area:		4034	S.F.	
	Note: Use this to determine Inflow to SCM #7A				

SCM #7A Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /A shelf bottom		19170	415	311.25	6883	2.74
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	9.261	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	28%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05-.009*(%Impervious)	0.31	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.24	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	10262.93				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	10263	Cu. FT			
	Volume Achieved at Elev.	371.59	Orifice Dia	1.50	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	370.5	Elev Diff, H., ft.	1.09		
	Effective Operating Head (1/3 H)	0.3597		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	77.9	Hrs., (48 Hr Min.)			

PostDev OnSite (Bypass) Upstream from Graymont Entrance		72545	S.F.	1.67	Ac
	Land Use	**Area, S.F.**	**"CN"**	**Wtd'd "CN"**	
	Impervious Road & Sidewalks	0	98	0.00	0.00
	Impervious Lots (Pebble Creek Ct.)	18600	98	25.13	0.43
	Reforested "C" soils (Pebble Ct.)	22590	70	21.80	0.52
	Reforested "D" soils (Pebble Ct)	6310	77	6.70	0.14
	Open Space (Lots) Good "D" Soils	25045	80	27.62	0.57
			Composite "CN"	**81.24**	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	

PostDev: OnSite (Bypass) DownStream of Kalas Falls to POI #7	423216	S.F.	9.72	Ac

Land Use	Area, S.F.	"CN"	Wtd'd "CN"	
Impervious Road & Sidewalks	0	98	0.00	0.00
Impervious Lots (Along Woodlyn)	51100	98	11.83	1.17
Reforested "C" soils (Good)	158810	70	26.27	3.65
Reforested "D" soils (Good)	160297	77	29.16	3.68
Open Space (Lots) Good "C" Soils	53009	74	9.27	1.22
Open Space (Lots) Good "D" Soils	0	80	0.00	0.00
	423216	**Composite "CN"**	**76.53**	
Tc (Kirpich):	**Length**	**Elev Delta**	**5.0**	
Tc, min.= 60*.000132*L^.77/S^.385	**850**	**12**	**6.86**	Minutes

PostDev: **Bypases SCM #7A (OffSite plus some Pebble Garden Lots):**		1447809	**S.F.**	**33.237**	**Ac**
(Part of DA#7, Ends Up at POI #3)					
	Impervious Roads:	Area	CN	Wtd. CN	Area, Ac.
	Rolesville Rd	39600	98	2.68	0.91
	Traviswood Area	20000	98	1.35	0.46
	Hartland Manor	7000	98	0.47	0.16
	Mitchell Mill Rd	6000	98	0.41	0.14
	Exist'g Developed Lots:	76500	98	5.18	1.76
	Pasture "B" Soils	226475	61	9.54	5.20
	Woods "B" Soils (Fair)	0	60	0.00	0.00
	Wooded "C" Soils (Fair)	999688	73	50.41	22.95
	Wooded "D" Soils (Fair)	0	79	0.00	0.00
	Impervious Lots	18600	98	1.26	0.43
	Reforested "C" soils (Pebble Ct.)	22590	70	1.09	0.52
	Reforested "D" soils (Pebble Ct)	6310	77	0.34	0.14
	Open Space (Lots) Good "D" Soils	25045	80	1.38	0.57
	Total (Check):	1447808	Composite "CN"	**70.04**	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**2500**	**32**	**16.34**	Minutes

DA # 3 Pre & Post Development

[01/04/21 Updated for Greenway Trails]

PreDev Conditions-OffSite to Proposed Graymont Dr

SubArea I.: Total OffSite DA to Graymont Dr. (Zone 3)

		2488150	**S.F.**	**57.120**	**Ac**
	Impervious Roads:	Area	CN	Wtd. CN	
	Mitchell Mill	25700	98	1.01	
	Rolesville Rd	19000	98	0.75	
	Bruna Ln+G Shepard	23400	98	0.92	
	Pasture "B" Soils	624325	61	15.31	
	Woods "B" Soils (Fair)	1155520	60	27.86	
	Wooded "C" Soils (Fair)	502079	73	14.73	
	Wooded "D" Soils (Fair)	138126	79	4.39	
	Total (Check):	2488150	Composite "CN"	**64.97**	
	PostDev Conditions=The Same As Above				
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1750**	**73**	**7.88**	

SubArea II:OffSite DA to Kalas Falls/Woodlyn Entrance @ R'ville Rd: (Zone 14 & 15)

(Part of DA#7, Ends Up at POI #3)

		1375264	**S.F.**	**31.572**	**Ac**
	Impervious Roads:	Area	CN	Wtd. CN	
	Rolesville Rd	39600	98	2.82	
	Traviswood Area	20000	98	1.43	
	Hartland Manor	7000	98	0.50	
	Mitchell Mill Rd	6000	98	0.43	
	Exist'g Developed Lots:	76500	98	5.45	
	Pasture "B" Soils	256480	61	11.38	
	Woods "B" Soils (Fair)	0	60	0.00	
	Wooded "C" Soils (Fair)	969684	73	51.47	
	Wooded "D" Soils (Fair)	0	79	0.00	
	Total (Check):	1375264	Composite "CN"	**73.47**	
	PostDev Conditions=The Same As Above				
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1000**	**15**	**7.59034**	

Sub Area III: Total PreDev OnSite DA Thru DA#7:

(Part of DA#7, Ends Up at POI #3)

		1354486	**S.F.**	**31.095**	**Ac**
	Pasture "C" Soils	1013844	74	55.39	
	Pasture D" Soils	201289	80	11.89	
	Wooded "D" Soils (Fair)	139354	79	8.13	
	Total (Check):	1354486	Composite "CN"	**75.41**	

Sub Area IV: Total OffSite DA West of Graymont Dr.

		554781	**S.F.**	**12.736**	**Ac**
	Impervious Roads:	Area	CN	Wtd. CN	
	Pasture "B" Soils	207509	61	22.82	
	Woods "B" Soils (Fair)	253622	60	27.43	
	Wooded "D" Soils (Fair)	93650	79	13.34	
	Total (Check):	554781	Composite "CN"	**63.58**	
	PostDev Conditions=The Same As Above: Add to PostDev to SCM #3A				

Sub Area V: OffSite DA from Moody Land/Amazon Dr.

		2807800	**S.F.**	**64.458**	**Ac**
		Area	CN	Wtd. CN	
	Impervious Roads: Rolesville	8000	98	0.28	
	Pasture "B" Soils	560375	61	12.17	
	Woods "B" Soils (Good)	948248	55	18.57	
	Woods "B" Soils (Fair)	73340	60	1.57	
	Pasture "C" Soils	541120	74	14.26	
	Woods "C" Soils (Fair)	107987	73	2.81	
	Wooded "D" Soils (Fair)	568730	79	16.00	
	Total (Check):	2807800	Composite "CN"	**65.67**	
	PostDev Conditions=The Same As Above				
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**2940**	**54**	**16.10742**	

Sub Area VI: Total PreDev OnSite DA to POI #3

		4525797	**S.F.**	**103.898**	**Ac**
		Area	CN	Wtd. CN	
	Woods "A" Soils (Good)	315374	30	2.09	
	Pasture "B" Soils	1548994	61	20.88	
	Woods "B" Soils (Good)	685258	55	8.33	
	Woods "B" Soils (Fair)	293638	60	3.89	
	Pasture "C" Soils	198198	74	3.24	
	Woods "C" Soils (Fair)	355450	73	5.73	
	Pasture "D" Soils	131116	80	2.32	
	Wooded "D" Soils (Fair)	984020	79	17.18	
	Total (Check):	4512048	Composite "CN"	**63.66**	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	750	11	6.14	

		2525	30	16.94	
		940	60	4.14	
			Total Tc=	**27.22**	
Ref: PreDev Total WaterShed Area to POI #3:		**13106278**	**S.F.**	**300.879**	**Ac**

Composite All DA #3 PreDev SubAreas CN to a Single CN:

	Area, Ac	CN	Wtd'd CN
Sub Area I:	57.1	64.97	12.33
Sub Area II:	31.6	73.47	7.71
Sub Area III:	31.1	75.41	7.79
Sub Area IV:	12.7	63.58	2.69
Sub Area V:	64.5	65.67	14.07
Sub Area VI:	103.9	63.66	21.98
Total Area to POI #3:	**300.9**	**Composite "CN"**	**66.58**
Total Tc PreDev to POI #3:	**23.86**	**Minutes**	

Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**
Tc, min.= 60*.000132*L^.77/S^.385	**5451**	**124**	**23.86**

PostDev: Zone 4 to SCM #3A:		1071602	**S.F.**	**24.601**	**Ac**	
		Area	CN	Wtd. CN		
Imperv. Roads & Sidewalks		221314	98	20.24	5.081	
Imperv. Single Family Lots		215050	98	19.67	4.937	
Open Space (Lawns)(Good) "B")		362086	61	20.61	8.312	
Open Space (Lawns)(Good) "C")		273152	74	18.86	6.271	
	1071602		**Composite "CN" =**	**79.38**		
		Percent Impervious		**41%**		
			Pond Design Depth, ft.:	3.5		
		SA/DA Factor:		1.40		
		Min.SCM Surface Area:		15002	S.F.	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**2250**	**34**	**14.13**	Minutes	

SCM #3A Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /Abottom		77282	829	621.75	39146	1.96
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	24.601	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	41%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.42	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.85	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	37192.30				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	37192	Cu. FT			
	Volume Achieved at Elev.	352.34	Orifice Dia	3.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	351.5	Elev Diff, H., ft.	0.84		
	Effective Operating Head (1/3 H)	0.2772		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	80.4	Hrs., (48 Hr Min.)			

PostDev: Zone 5 Onsite Bypasses SCM #3A & 3B (Graymont to Woodlyn Dr).					
		696170	**S.F.**	**15.982**	**Ac**
		Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		0	98	0.00	0.000
Imperv. Townhome & Parking		10621.5	98	1.50	0.244
Impervious, Single Family Lots		74480	98	10.48	1.710
Open Space (Lawns)(Good) "B")		95990	61	8.41	2.204
Reforested (Good) "B")		274013	55	21.65	6.290
Reforested (Good) "D")		241066	77	26.66	5.534
		696170	Composite "CN" =	68.70	
		Percent Impervious		2%	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1788**	**25**	**12.20**	Minutes

PostDev: Zone 2 to SCM #3B (w/ OffSite S of Twnhms):					
		1574096	**S.F.**	**36.136**	**Ac**
		Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		238330	98	14.84	5.471
Imperv. Single Family Lots		190950	98	11.89	4.384
Imperv Townhouse Area Roads, Parking, Roofs				0.00	0.000
Western Townhouse Area (50% Imperv)		100800	98	6.28	2.314
Eastern Townhouse Area (50% Imperv)		67200	98	4.18	1.543
Open Space Western Townhome Area "B" Soils		94439	61	3.66	2.168
Open Space Western Townhome Area "D" Soils		44727	80	2.27	1.027
Open Space Eastern Townhome Area "B" Soils		120195	61	4.66	2.759
Open Space Eastern Townhome Area "D" Soils		86823	80	4.41	1.993
Offsite Drainage(Just S of Chenson Hill)"B" Pasture		65319	61	2.53	1.500
Offsite Drainage(Just S of Chenson Hill)"B" Woods		132617	55	4.63	3.044
Open Space (Lawns)(Good) "B")		213323	61	8.27	4.897
Open Space (Lawns)(Good) "C")		173028	74	8.13	3.972
Open Space (Lawns)(Good) "D")		0	80	0.00	0.000
Reforest'n OnSite (Good) "D")		19209	77	0.94	0.441

Reforest'n OnSite (Good) "C")		27136	70	1.21	0.623	
			Composite "CN" =	**77.90**		
	1574096	**Percent Impervious**		**38%**		
	0		Pond Design Depth, ft.:	3.5		
		SA/DA Factor:		1.49		
		Min.SCM Surface Area:		23454	S.F.	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**2520**	**49**	**13.99421**		
SCM #3B Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /Abottom		127669	830	622.5	39145	3.25
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	36.136	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	38%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.39	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	1.18	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	51354.73				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	51355	Cu. FT			
	Volume Achieved at Elev.	352.82	Orifice Dia	4.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	351.5	Elev Diff, H., ft.	1.32		
	Effective Operating Head (1/3 H)	0.4356		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	49.8	Hrs., (48 Hr Min.)			

PostDev: Zone 1-OffSite Just W. of Townhome; Bypasses SCM #3A & 3B:					
		370517	**S.F.**	**8.506**	**Ac**
		Area	CN	Wtd. CN	
	Pasture "B" Soils	114371	61	18.83	2.626
	Woods "B" Soils (Good)	162496	55	24.12	3.730
	Pasture "D" Soils	93650	83	20.98	2.150
	Impervious Existing	0	98	0.00	0.000
370517			Composite "CN" =	63.93	
	Length to Merger at SCM #3A &3B Outlets				
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1529**	**42**	**8.34**	Minutes

PostDev: Zone 3-OffSite Bypass to Graymont Culverts (@ Top of Lake)		2488150	**S.F.**	**57.120**	**Ac**
	Impervious Roads:	Area	CN	Wtd. CN	
	Mitchell Mill	25700	98	1.01	0.590
	Rolesville Rd	19000	98	0.75	0.436
	Bruna Ln+G Shepard	23400	98	0.92	0.537
	Impervious Lots (South of Graymont)	27440	98	1.08	0.630
	Open Space (Lawns)(Good) "B")	36935	61	1.43	0.848
	Pasture "B" Soils	624325	61	15.31	14.333
	Woods "B" Soils (Fair)	1091145	60	26.31	25.049
	Wooded "C" Soils (Fair)	502079	73	14.73	11.526
	Wooded "D" Soils (Fair)	138126	79	4.39	3.171
	Total (Check):	2488150	Composite "CN"	**65.93**	
	L, is to Graymont Culvert				
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1200**	**26**	**7.58**	

PostDev: Zone 7 to SCM #3C:					
		347276	**S.F.**	**7.972**	**Ac**
		Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		48902	98	13.80	1.123
Imperv. Single Family Lots		59400	98	16.76	1.364
Open Space (Lawns)(Good) "B")		43525	61	7.65	0.999
Reforested "B' Soils-Good		195449	55	30.95	4.487
	347276		**Composite "CN" =**	**69.16**	
		Percent Impervious		**31%**	
			Pond Design Depth, ft.:	3.5	
		SA/DA Factor:		1.10	
		Min.SCM Surface Area:		3820	S.F.
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**0**	**0**	**5.00**	Minutes

SCM #3C Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /Abottom		26576	567	425.25	9154	2.86
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	7.972	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	31%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.33	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.22	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	9569.63				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	9570	Cu. FT			
	Volume Achieved at Elev.	341.24	Orifice Dia	2.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	340.5	Elev Diff, H., ft.	0.74		
	Effective Operating Head (1/3 H)	0.2442		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	49.6	Hrs., (48 Hr Min.)			

PostDev: Zone 8 ByPasses SCM #3C:		246190	S.F.	5.652	Ac
		Area	CN	Wtd. CN	

Imperv. Roads & Sidewalks		0	98	0.00	0.000
Greenway Trails		12250	98	4.88	0.281
Imperv. Single Family Lots		0	98	0.00	0.000
Open Space (Lawns)(Good) "B")		0	61	0.00	0.000
Open Space (Lawns)(Good) "C")		0	74	0.00	0.000
Reforested "B' Soils-Good		25400	55	5.67	0.583
Reforested "C' Soils-Good		68940	70	19.60	1.583
Reforested "D' Soils-Good		139600	77	43.66	3.205
	246190		**Composite "CN" =**	**73.81**	
		Percent Impervious		0%	
	L= Merger at SCM #3B & Zones 6, 9, & 10 Merge				
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1165**	**13**	**9.57**	Minutes

PostDev: Sub Area to SCM #3D:		245737	**S.F.**	**5.641**	**Ac**
		Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		67182	98	26.79	1.542
Imperv. Single Family Lots		55800	98	22.25	1.281
Open Space (Lawns)(Good) "B")		87000	61	21.60	1.997
Reforested "A' Soils-Good		18305	30	2.23	0.420
Reforested "B' Soils-Good		17450	55	3.91	0.401
	245737		Composite "CN" =	76.78	
		Percent Impervious		**50%**	
			Pond Design Depth, ft.:	3.5	
		SA/DA Factor:		1.65	
		Min.SCM Surface Area:		4055	S.F.
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**0**	**0**	**5.00**	Minutes

SCM #3D Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /Abottom		23643	482	361.5	7871	2.96
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	5.641	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	50%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.50	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.24	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	10247.58				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	10248	Cu. FT			
	Volume Achieved at Elev.	345.45	Orifice Dia	1.50	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	344.5	Elev Diff, H., ft.	0.95		
	Effective Operating Head (1/3 H)	0.3135		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	83.4	Hrs., (48 Hr Min.)			

PostDev: Sub Area ByPasses SCM #3D:		188522	**S.F.**	**4.328**	**Ac**
		Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		6658	98	3.46	0.153
Imperv. Single Family Lots		50960	98	26.49	1.170
Open Space (Lawns)(Good) "A")		37098	61	12.00	0.852
Open Space (Lawns)(Good) "B")		57510	74	22.57	1.320
Reforested "A' Soils-Good		22422	55	6.54	0.515
Reforested "D' Soils-Good		13874	77	5.67	0.319
	188522		**Composite "CN" =**	**76.74**	
		Percent Impervious		31%	
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**0**	**0**	**5.00**	Minutes

Composite of Bypasses of SCM 3C & 3D

	Area	CN	Wtd. CN
Bypass Area of SCM #3C	**246190**	**73.81**	**41.80**
Bypass Area of SCM #3D	**188522**	**76.74**	**33.28**
Total Area	**434712**		
Acres	**9.98**	**Composite "CN" =**	**75.08**

PostDev Zone 6 Offsite (Moody Land) to Falls Bluff Culverts					
		2789730	**S.F.**	**64.043**	**Ac**
		Area	CN	Wtd. CN	
	Impervious Roads: Rolesville	8000	98	0.28	0.184
	Pasture "B" Soils	583033	61	12.67	13.385
	Woods "B" Soils (Good)	982425	55	19.24	22.553
	Woods "B" Soils (Fair)	77933	60	1.67	1.789
	Pasture "C" Soils	437833	74	11.54	10.051
	Woods "C" Soils (Fair)	131778	73	3.43	3.025
	Wooded "D" Soils (Fair)	568730	79	16.00	13.056
	Total (Check):	2789730.5	Composite "CN"	**64.82**	
	PostDev Conditions=The Same As Above				
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**2940**	**54**	**16.10742**	Minutes

PostDev: Sub Area to SCM #3E:		**292785**	**S.F.**	**6.721**	**Ac**
		Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		32107	98	10.75	0.737

Imperv. Single Family Lots		71450	98	23.92	1.640
Open Space (Lawns)(Good) "A")		76143	61	15.86	1.748
Open Space (Lawns)(Good) "B")		62300	61	12.98	1.430
Reforested "D' Soils-Good		50785	77	13.36	1.166
		292785	**Composite "CN" =**	**76.86**	
		Percent Impervious		**35%**	
		Pond Design Depth, ft.:		3.5	
		SA/DA Factor:		1.22	
		Min.SCM Surface Area:		3572	S.F.
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**0**	**0**	**5.00**	Minutes

SCM #3E Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /Abottom		30190	428	321	9836	3.04
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	6.721	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	35%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.37	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.21	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	8986.74				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	8987	Cu. FT			
	Volume Achieved at Elev.	307.2	Orifice Dia	2.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	306.5	Elev Diff, H., ft.	0.7		
	Effective Operating Head (1/3 H)	0.231		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	47.9	Hrs., (48 Hr Min.)			

PostDev: ByPasses SCM #3E to POI #3 (includes area west of Creek):					
		544458	**S.F.**	**12.499**	**Ac**
		Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		0	98	0.00	0.000
Imperv. Single Family Lots		28250	98	5.08	0.649
Greenway Trail		10000	98	1.80	0.230
Reforested "A' Soils-Good		0	55	0.00	0.000
Reforested "D' Soils-Good East of Creek (Phase 1)		181736	77	25.70	4.172
Reforested "D' Soils-Good-West of Creek (Phase 3)		324472	77	45.89	7.449
	544458		Composite "CN" =	78.48	
		Percent Impervious		5%	
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1080**	**62**	**4.80386**	

PostDev Summary to POI #3			
DA to SCM #3A	24.6		
DA to SCM #3B	36.04		
OnSite Bypassing SCM #3A & 3B	15.52		
OffSite Bypass West of Townhouse Area	8.5		
Offsite Bypass South of Graymont Lake	57.12		
DA to SCM #3C	6.42	279655.2	
OnSite Bypassing SCM #3C	7.2	313632	
DA to SCM #3D	5.61		
OnSite Bypassing SCM #3D	4.32		
Offsite DA from Moody/Amazon Dr. Area	64.03		
DA to SCM #3E	6.72		
Onsite Bypassing SCM #3E	12.5	(Includes Area W of Creek)	
Onsite DA to SCM #7A	9.26		
Onsite (Pebble Creek Lots) Bypassing SCM #7A	1.67		
Onsite Bypassing SCM #7A (Woodlyn Rear Lots)	9.72		
Offsite Bypassing SCM #7A (East of Rolesville Rd)	31.57		
Total PostDev DA to POI #3	**300.8**		

Kalas Development-Phase Three: Supplemental & Supporting Info for Hydrograph Generation
Pre & Post to POI #4

PreDev Conditions-Total to POI #4					
Total OnSite DA to POI #4		2746663	**S.F.**	**63.055**	**Ac**
	Land Use:	Area	CN	Wtd. CN	
	Woods "A" Soils (Fair)	354247	36	4.64	
	Woods "B" Soils (Fair)	1508226	60	32.95	
	Wooded "D" Soils (Poor)	884190	79	25.43	
	Total (Check):	2746663	**Composite "CN"**	**63.02**	
	PostDev Conditions=The Same As Above				
Estimated time of Concentration:	**Sheet Flow; 300'@ 10.7%, n=**	**0.03**	**Tshallow=**	**3.18**	**minutes**
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1900**	**77**	**8.49**	
	Total Estimated Time of Concentration:			11.67	**minutes**

PreDev Area to SCM #4B Outlet	**(TO BE DEVELOPED UNDER PHASE FOUR)**	458814	**S.F.**	**10.533**	**Ac**
	Land Use:	Area	CN	Wtd. CN	
	Imperv. Roads & Sidewalks				
	Donnington	0	98	0.00	0.00
	Plumford	0	98	0.00	0.00
	Menderlyn	0	98	0.00	0.00
	Stanner Hill	0	98	0.00	0.00
	Imperv. Single Family Lots	0	98	0.00	0.00
	Woods "A" Soils (Fair)	91763	36	7.20	2.11
	Woods "B" Soils (Fair)	45881.4	60	6.00	1.05
	Wooded "D" Soils (Poor)	321170	79	55.30	7.37
	Reforested "A' Soils-Good	0	55	0.00	0.00
	Reforested "D' Soils-Good	0	77	0.00	0.00
	458814	**Composite "CN" =**		**68.50**	
		Percent Impervious		0%	
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1605**	**71**	**7.21**	Minutes

PostDev: Sub Area to SCM #4B:	**(PHASE THREE)**	403066	**S.F.**	**9.253**	**Ac**
Land Use:	**Land Use:**	Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks					
Donnington West		25625	98	6.23	0.59
Donnington East		0	98	0.00	0.00
Falls Bluff		57913	98	14.08	1.33
Harvest Hill		20345	98	4.95	0.47
Elam		12947	98	3.15	0.30
Imperv. Single Family Lots	5 80' lots; 5 70' lots; 7 65' lots;	77690	98	18.89	1.78
Open Space (Lawns)(Good) "A")		0	39	0.00	0.00
Open Space (Lawns)(Good) "B")		208548	61	31.56	4.79
Open Space (Lawns)(Good) "D")		0	80	0.00	0.00
Reforested "A' Soils-Good		0	30	0.00	0.00
Reforested "D' Soils-Good		0	77	0.00	0.00
	403067	**Composite "CN" =**		**78.86**	
		Percent Impervious		48%	
		Pond Design Depth, ft.:		3.5	
		SA/DA Factor:		1.62	
		Min.SCM Surface Area:		6530	S.F.
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1605**	**71**	**7.21**	Minutes

SCM #4B Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /Abottom		20709	413	309.75	7350	2.78
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	9.253	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	48%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.48	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.37	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	16268.33				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	16268	Cu. FT			
	Volume Achieved at Elev.	325.1	Orifice Dia	2.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	323.5	Elev Diff, H., ft.	1.6		
	Effective Operating Head (1/3 H)	0.528		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	57.4	Hrs., (48 Hr Min.)			

PostDev: Sub Area ByPasses SCM #4B:		228265	**S.F.**	**5.240**	**Ac**
Land Use:	**Land Use:**	Area	CN	Wtd. CN	
Imperv. Roads & Sidewalks		0	98	0.00	0.00
Imperv. Single Family Lots		57500	98	24.69	1.32
Open Space (Lawns)(Good) "A")		46725	39	4.52	1.07

Open Space (Lawns)(Good) "B")		58618	61	8.87	1.35
Open Space (Lawns)(Good) "D")		25300	80	5.02	0.58
Reforested "D' Soils-Good	Area along Creek Bottom	40122	77	13.53	0.92
	228265	**Composite "CN" =**		**56.63**	
		Percent Impervious		25%	
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**0**	**0**	**5.00**	Minutes

PostDev: Sub Area to SCM #4C:		487872	**S.F.**	**11.200**	**Ac**	
	Land Use:	Area	CN	Wtd. CN		
	Imperv. Roads & Sidewalks					
	Falls Bluff	25625	98	5.15	0.59	
	Donnington East	10749	98	2.16	0.25	
	Diomere	11118	98	2.23	0.26	
	Pleasant Run	10172	98	2.04	0.23	
	Imperv. Single Family Lots	148880	98	29.91	3.42	
	Open Space (Lawns)(Good) "A")	0	39	0.00	0.00	
	Open Space (Lawns)(Good) "B")	255055	61	31.89	5.86	
	Open Space (Lawns)(Good) "D")	26273	80	4.31	0.60	
	Reforested "A' Soils-Good	0	55	0.00	0.00	
	Reforested "D' Soils-Good	0	77	0.00	0.00	
	487872	**Composite "CN" =**		**77.69**		
		Percent Impervious		42%		
		Pond Design Depth, ft.:		3.5		
		SA/DA Factor:		1.43		
		Min.SCM Surface Area:		6977	S.F.	
	Tc (User):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**1700**	**80**	**7.35**	Minutes	

SCM #4C Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /Abottom		33104	666	499.5	6142	5.31
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**4.00**
Treatment Volume Requirement:						
	DA to SCM:	11.200	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	42%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.43	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.40	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	17523.61				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	17524	Cu. FT			
	Volume Achieved at Elev.	294.67	Orifice Dia	2.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	293.5	Elev Diff, H., ft.	1.17		
	Effective Operating Head (1/3 H)	0.3861		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	72.3	Hrs., (48 Hr Min.)			

PostDev: Sub Area to SCM #4E:		417985	**S.F.**	**9.596**	**Ac**	
	Land Use:	Area	CN	Wtd. CN		
	Imperv. Roads & Sidewalks					
	Falls Bluff	17132	98	4.02	0.39	
	Pleasant Run	41450	98	9.72	0.95	
	Imperv. Single Family Lots	124200	98	29.12	2.85	
	Open Space (Lawns)(Good) "B")	195953	61	28.60	4.50	
	Reforested "A' Soils-Good	0	55	0.00	0.00	
	Reforested "B' Soils-Good	39250	60	5.63	0.90	
	417985	**Composite "CN" =**		**77.09**		
		Percent Impervious		**44%**		
		Pond Design Depth, ft.:		3.5		
		SA/DA Factor:		1.48		
		Min.SCM Surface Area:		6186	S.F.	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**1470**	**83**	**6.13**	Minutes	

SCM #4E Design Elements:		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	D Avg, ft
Davg = VPP-Vshelf /A shelf bottom		34008	420	315	10628	3.17
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	9.596	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	44%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.44	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft:	0.35	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	15450.26				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	15450	Cu. FT			
	Volume Achieved at Elev.	282.1	Orifice Dia	1.50	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	280.5	Elev Diff, H., ft.	1.6		
	Effective Operating Head (1/3 H)	0.528		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	96.8	Hrs., (48 Hr Min.)			

PostDev: DA ByPasses SCM #4C, 4D, & 4E TO POI#4:		770715	**S.F.**	**17.693**	**Ac**
	Land Use:	Area	CN	Wtd. CN	

	Imperv. Roads & Sidewalks	0	98	0.00	0.00
	Imperv. Single Family Lots	13950	98	3.27	0.32
	Woods "A" Soils (Fair)	113515	36	5.30	2.61
	Woods "B" Soils (Fair)	37838.25	60	2.95	0.87
	Wooded "D" Soils (Poor)	605412	79	62.06	13.90
	770715	**Composite "CN" =**		**73.57**	
		Percent Impervious		0%	
	Tc (User):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1470**	**107**	**24.58**	Minutes

Pre & Post Dev-DA #8

PreDev: Sub Area to POI #8:		222844	S.F.	5.116	Ac
		Area	CN	Wtd. CN	Area, Ac.
Woods Soil "A" (Fair)		0	36	0.00	0.00
Woods Soil B" (Fair)		222844	60	60.00	5.12
Woods Soil "D" (Fair)		0	79	0.00	0.00
	222844	Composite "CN" =		60.00	
		Percent Impervious		0%	
	Tc (Kirpich):	Length	Elev Delta	Tc=	
	Tc, min.= 60*.000132*L^.77/S^.385	440	30	2.25	Minutes
			Use	5.0	Minutes

PostDev: Sub Area to SCM #8A:		193444	S.F.	4.441	Ac
		Area	CN	Wtd. CN	Area, Ac.
Imperv. Roads & Sidewalks					
Falls Bluff		11813	98	5.98	0.27
Stafffordshire		22194	98	11.24	0.51
Imperv. Single Family Lots		54700	98	27.71	1.26
Open Space (Lawns)(Good) "B")		93518	61	29.49	2.15
Open Space (Lawns)(Good) "D")		0	61	0.00	0.00
Reforested "B' Soils-Good		11220	55	3.19	0.26
Reforested "D' Soils-Good		0	77	0.00	0.00
	193444	Composite "CN" =		77.62	
		Percent Impervious		46%	
		Pond Design Depth, ft.:		3.5	(4.0' w/ 0.5' Sediment Storage)
		SA/DA Factor:		1.54	
		Min.SCM Surface Area:		2979	S.F.
	Tc (Kirpich):	Length	Elev Delta	Tc=	
	Tc, min.= 60*.000132*L^.77/S^.385	440	Use	5.0	Minutes

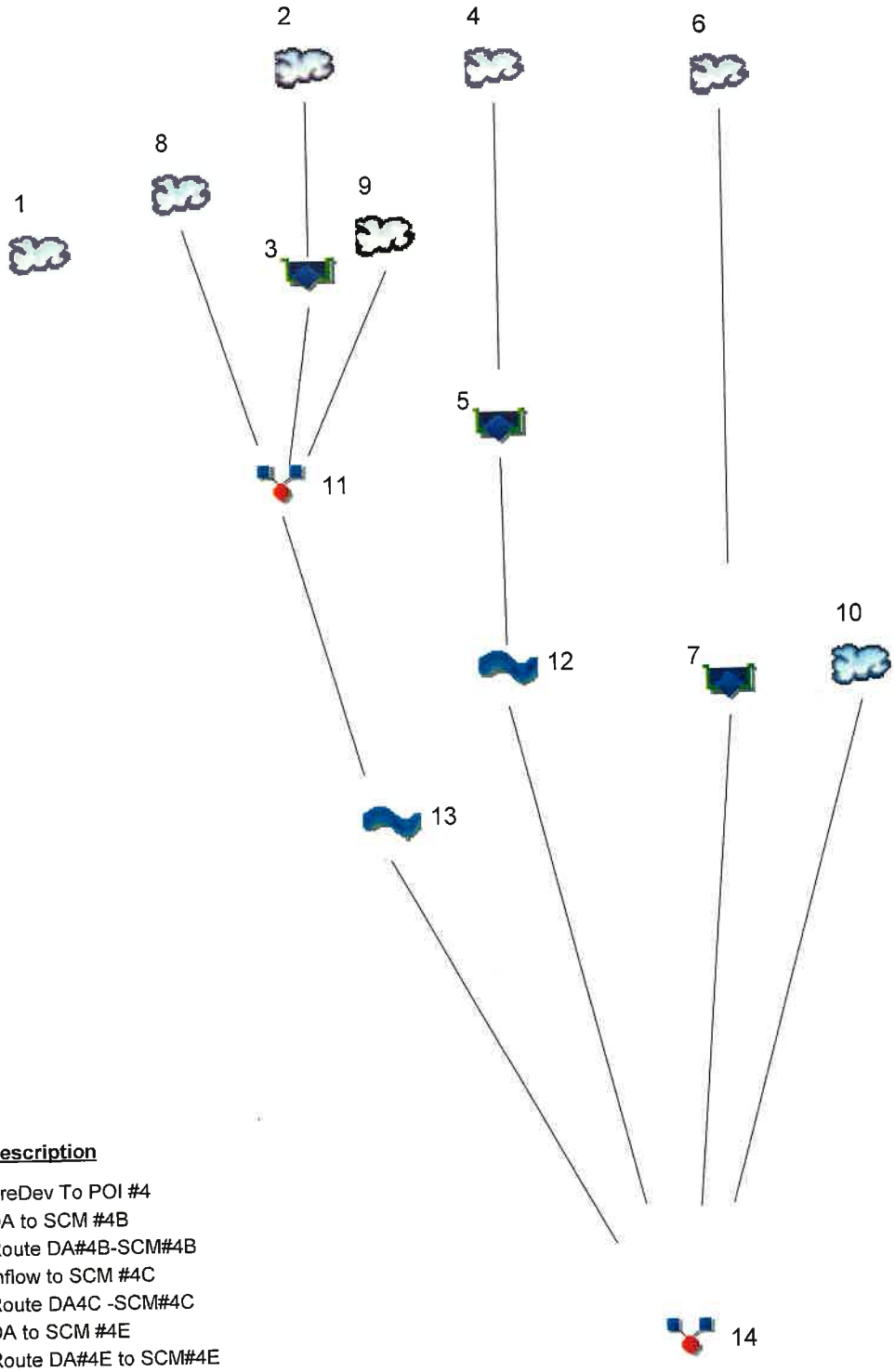
SCM #8A Design Elements:		VPP, c.f.	Perimeter, ft.	V_{shelf}, c.f.	A_{bottom}, s.f.	D Avg, ft
D_{avg} = VPP-V_{shelf} /A shelf bottom		16492	323	242.25	5375	3.02
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Treatment Volume Requirement:						
	DA to SCM:	4.441	Ac.			
Rv=0.05-.009*(%Impervious)	Composite % Impervious (Above) =	46%				
Total Runoff for 1" Event= S in Ac-Ft:	Rv=0.05+.009*(%Impervious)	0.46	inch/inch			
Treatment "S" in Cu. Ft. =	Total Runoff for 1" Event= S in Ac-Ft	0.17	S=1"*Rv*Drainage Area/12			
Treatment Volume to Be Stored:	Treatment "S" in Cu. Ft. =	7459.00				
Treatment Volume Provided, Cu.Ft.	Treatment Volume to Be Stored:	7459	Cu. FT			
	Volume Achieved at Elev.	358.53	Orifice Dia	1.50	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	357.5	Elev Diff, H., ft.	1.03		
	Effective Operating Head (1/3 H)	0.3399		Q=.62*8.02(H^0.5)*A,sq.ft.		
	Hours to Drawdown Treatm't Vol.	58.3	Hrs., (48 Hr Min.)			

PostDev: DA ByPasses SCM #8A:		29400	S.F.	0.675	Ac
		Area	CN	Wtd. CN	Area, Ac.
Imperv. Single Family Lots		11300	98	37.67	0.26
Open Space (Lawns)(Good) "B")		18100	61	37.55	0.42
		Composite "CN" =		75.22	

Hydrograph Calculations

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3



Legend

Hyd.	Origin	Description
1	SCS Runoff	PreDev To POI #4
2	SCS Runoff	DA to SCM #4B
3	Reservoir	Route DA#4B-SCM#4B
4	SCS Runoff	Inflow to SCM #4C
5	Reservoir	Route DA4C -SCM#4C
6	SCS Runoff	DA to SCM #4E
7	Reservoir	Route DA#4E to SCM#4E
8	SCS Runoff	Undeveloped DA to SCM 4B Outlet
9	SCS Runoff	PostDev Bypasses SCM #4B
10	SCS Runoff	UnDev DA & PostDev Bypasses SCM 4C,& 4E
11	Combine	Merge SCM 4A, 4B & Bypasses
12	Reach	Reach from SCM #4C to POI #4
13	Reach	Reach-Donnington to POI3$
14	Combine	Sum PostDev Flows @ POI#4

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

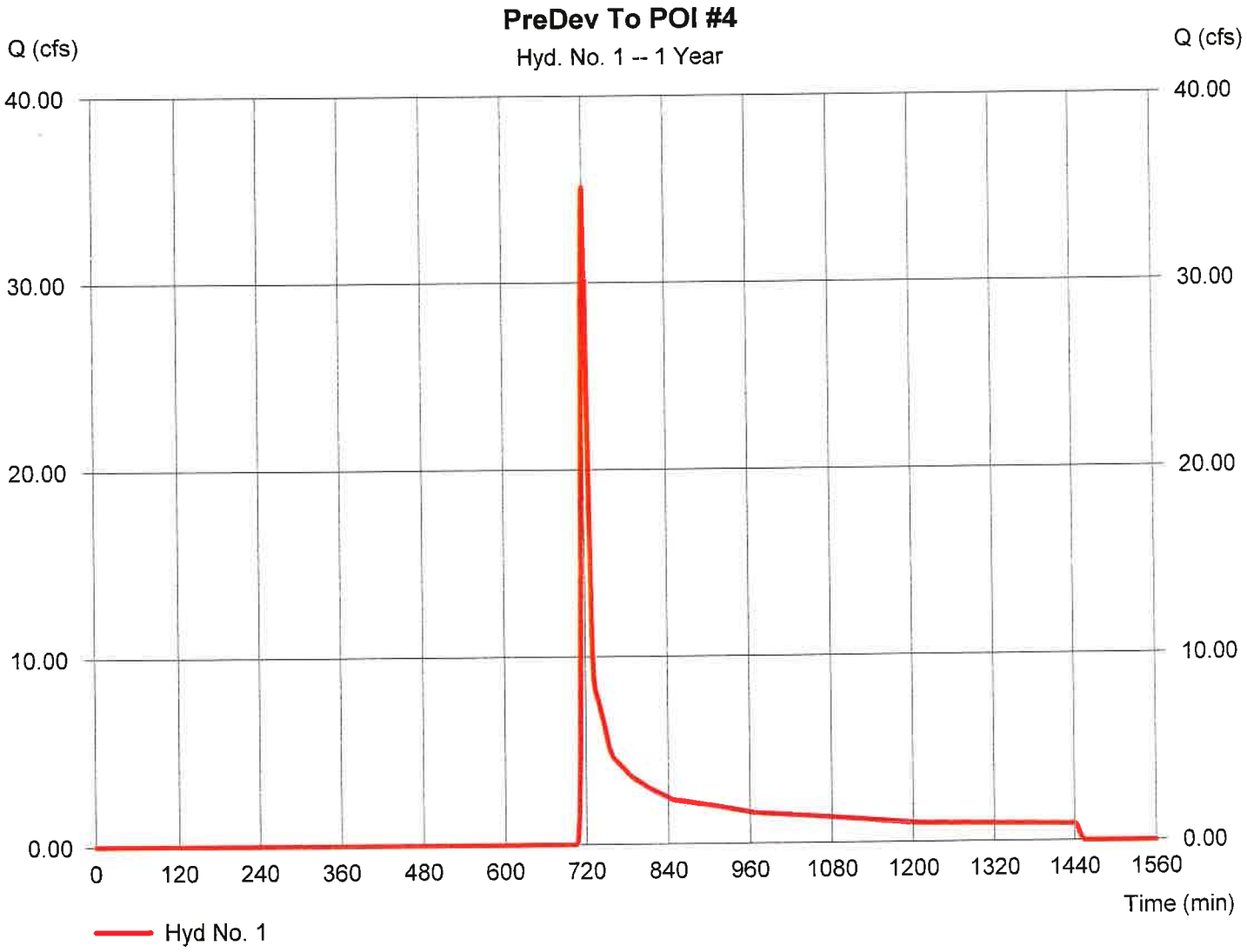
Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	35.14	57.39	-------	108.76	153.86	220.27	-------	334.43	PreDev To POI #4
2	SCS Runoff	------	17.22	22.14	-------	32.27	40.47	51.83	-------	70.17	DA to SCM #4B
3	Reservoir	2	0.229	0.712	-------	3.686	15.88	37.29	-------	64.12	Route DA#4B-SCM#4B
4	SCS Runoff	------	20.84	27.06	-------	39.89	50.46	65.17	-------	89.01	Inflow to SCM #4C
5	Reservoir	4	0.157	0.270	------	1.678	4.808	18.90	------	39.06	Route DA4C -SCM#4C
6	SCS Runoff	------	17.28	22.56	------	33.44	42.44	55.00	-------	75.40	DA to SCM #4E
7	Reservoir	6	0.152	0.173	------	1.223	3.730	15.93	------	38.81	Route DA#4E to SCM#4E
8	SCS Runoff	------	10.60	15.29	-------	25.47	34.12	46.56	------	67.57	Undeveloped DA to SCM 4B Outlet
9	SCS Runoff	------	1.078	2.542	-------	6.314	9.911	15.39	------	25.12	PostDev Bypasses SCM #4B
10	SCS Runoff	------	28.77	38.76	-------	59.78	77.19	101.72	------	141.95	UnDev DA & PostDev Bypasses SC
11	Combine	3, 8, 9	11.21	17.25	------	30.77	42.50	70.35	------	142.41	Merge SCM 4A, 4B & Bypasses
12	Reach	5	0.157	0.267	-------	1.672	4.736	16.73	------	38.09	Reach from SCM #4C to POI #4
13	Reach	11	9.030	14.14	-------	26.28	36.96	64.98	-------	127.79	Reach-Donnington to POI3$
14	Combine	7, 10, 12, 13	34.88	49.02	-------	80.58	107.68	147.18	------	293.19	Sum PostDev Flows @ POI#4

Hydrograph Report

Hyd. No. 1

PreDev To POI #4

Hydrograph type	= SCS Runoff	Peak discharge	= 35.14 cfs
Storm frequency	= 1 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 102,251 cuft
Drainage area	= 63.520 ac	Curve number	= 63.3
Basin Slope	= 4.1 %	Hydraulic length	= 1900 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.96 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

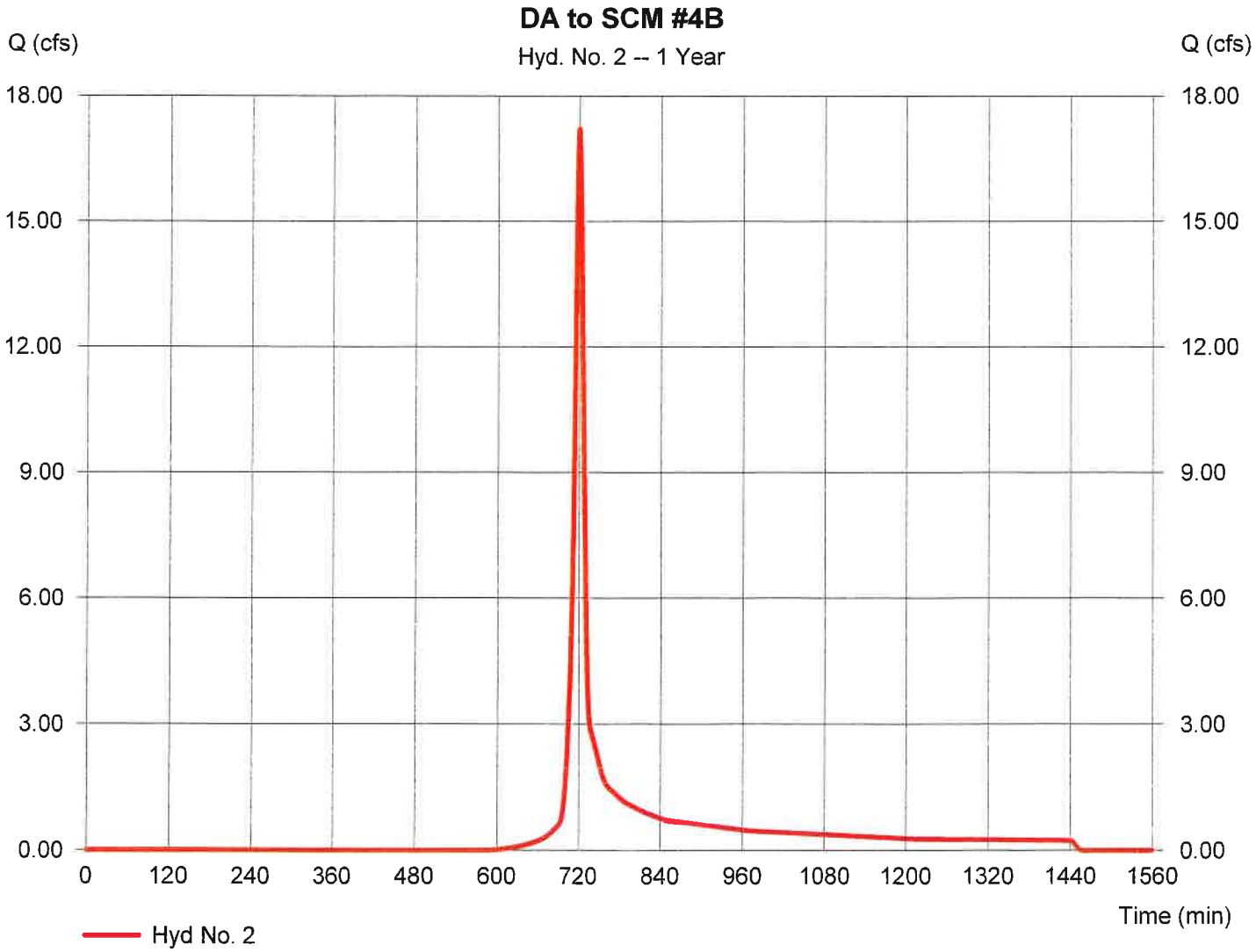


Hydrograph Report

Hyd. No. 2

DA to SCM #4B

Hydrograph type	= SCS Runoff	Peak discharge	= 17.22 cfs
Storm frequency	= 1 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 41,872 cuft
Drainage area	= 9.250 ac	Curve number	= 79.6
Basin Slope	= 4.4 %	Hydraulic length	= 1605 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



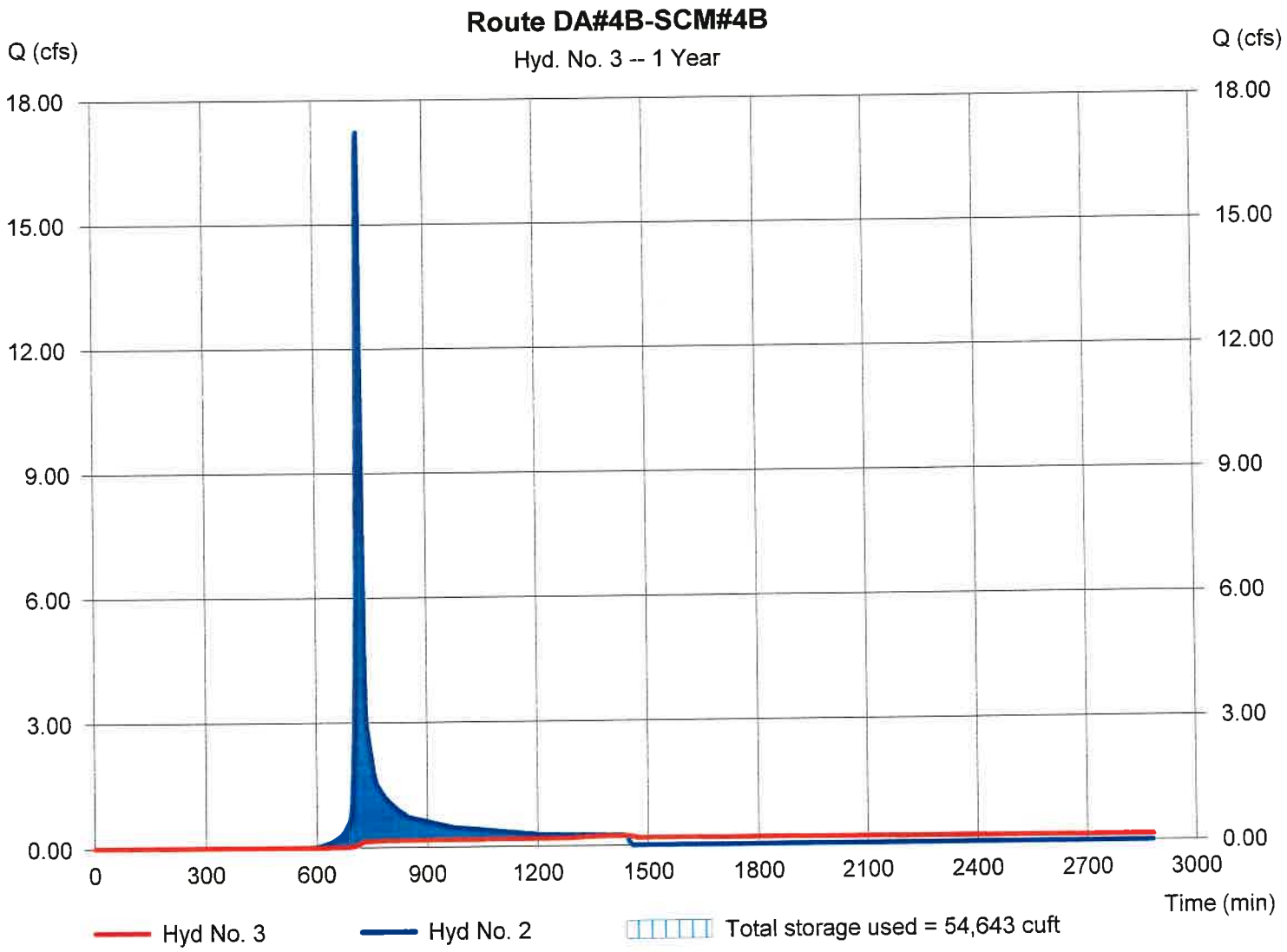
Hydrograph Report

Hyd. No. 3

Route DA#4B-SCM#4B

Hydrograph type	= Reservoir	Peak discharge	= 0.229 cfs
Storm frequency	= 1 yrs	Time to peak	= 1441 min
Time interval	= 1 min	Hyd. volume	= 21,858 cuft
Inflow hyd. No.	= 2 - DA to SCM #4B	Max. Elevation	= 326.52 ft
Reservoir name	= SCM #4B	Max. Storage	= 54,643 cuft

Storage Indication method used. Wet pond routing start elevation = 323.50 ft.

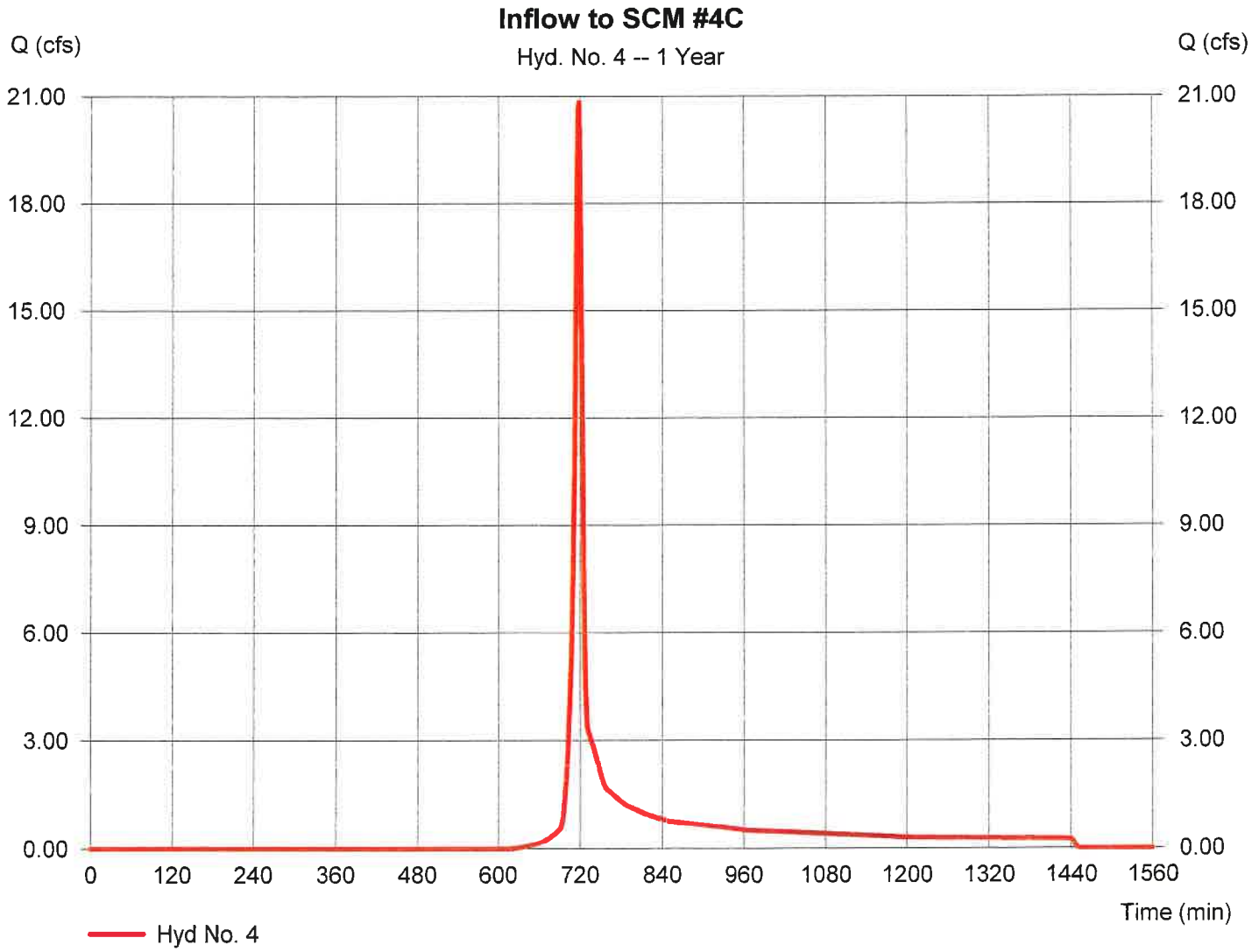


Hydrograph Report

Hyd. No. 4

Inflow to SCM #4C

Hydrograph type	= SCS Runoff	Peak discharge	= 20.84 cfs
Storm frequency	= 1 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 44,052 cuft
Drainage area	= 11.200 ac	Curve number	= 77.7
Basin Slope	= 4.7 %	Hydraulic length	= 1700 ft
Tc method	= User	Time of conc. (Tc)	= 8.30 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

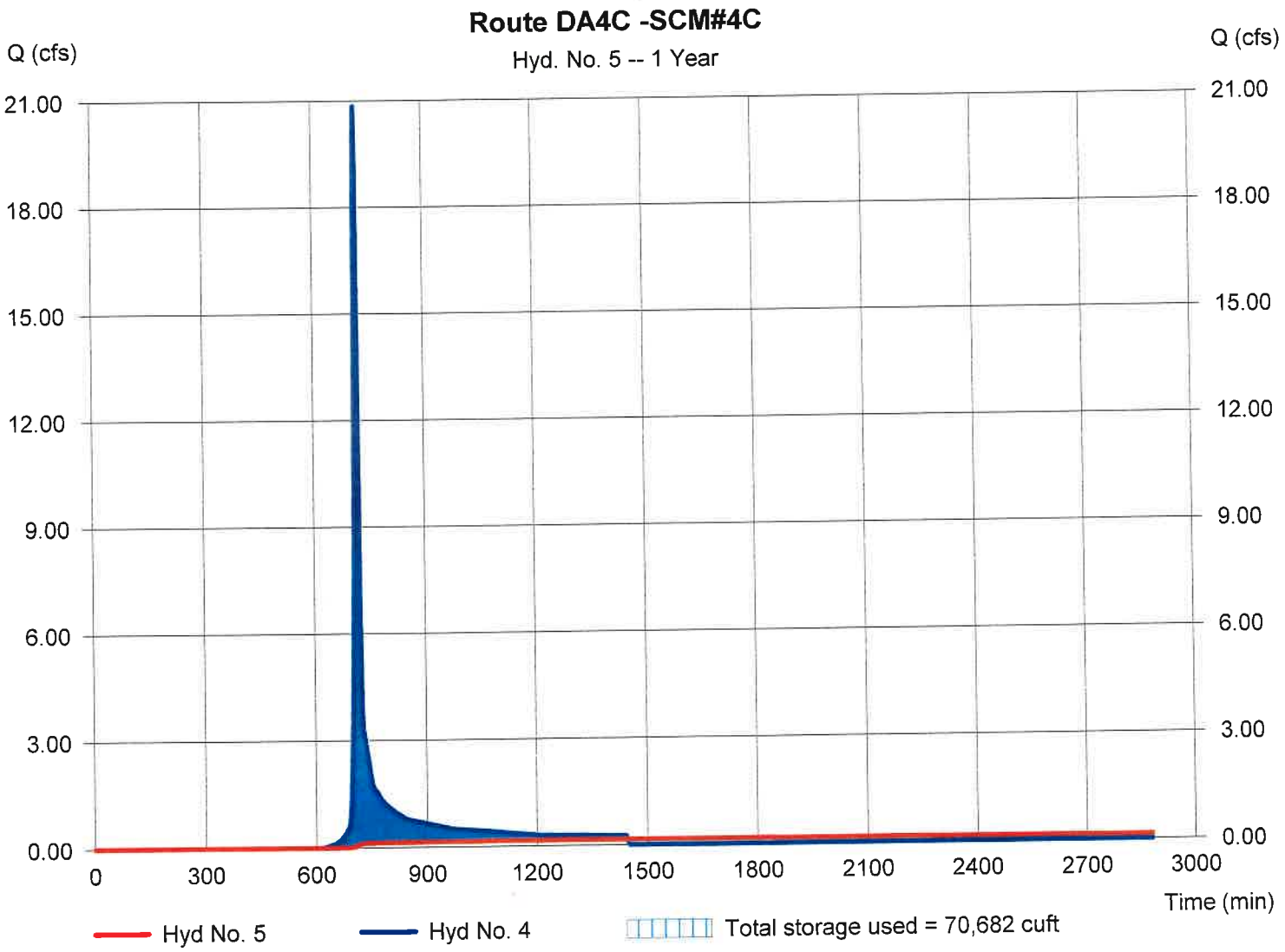
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 09 / 30 / 2020

Hyd. No. 5

Route DA4C -SCM#4C

Hydrograph type	= Reservoir	Peak discharge	= 0.157 cfs
Storm frequency	= 1 yrs	Time to peak	= 1445 min
Time interval	= 1 min	Hyd. volume	= 18,824 cuft
Inflow hyd. No.	= 4 - Inflow to SCM #4C	Max. Elevation	= 295.81 ft
Reservoir name	= SCM #4C	Max. Storage	= 70,682 cuft

Storage Indication method used. Wet pond routing start elevation = 293.50 ft.

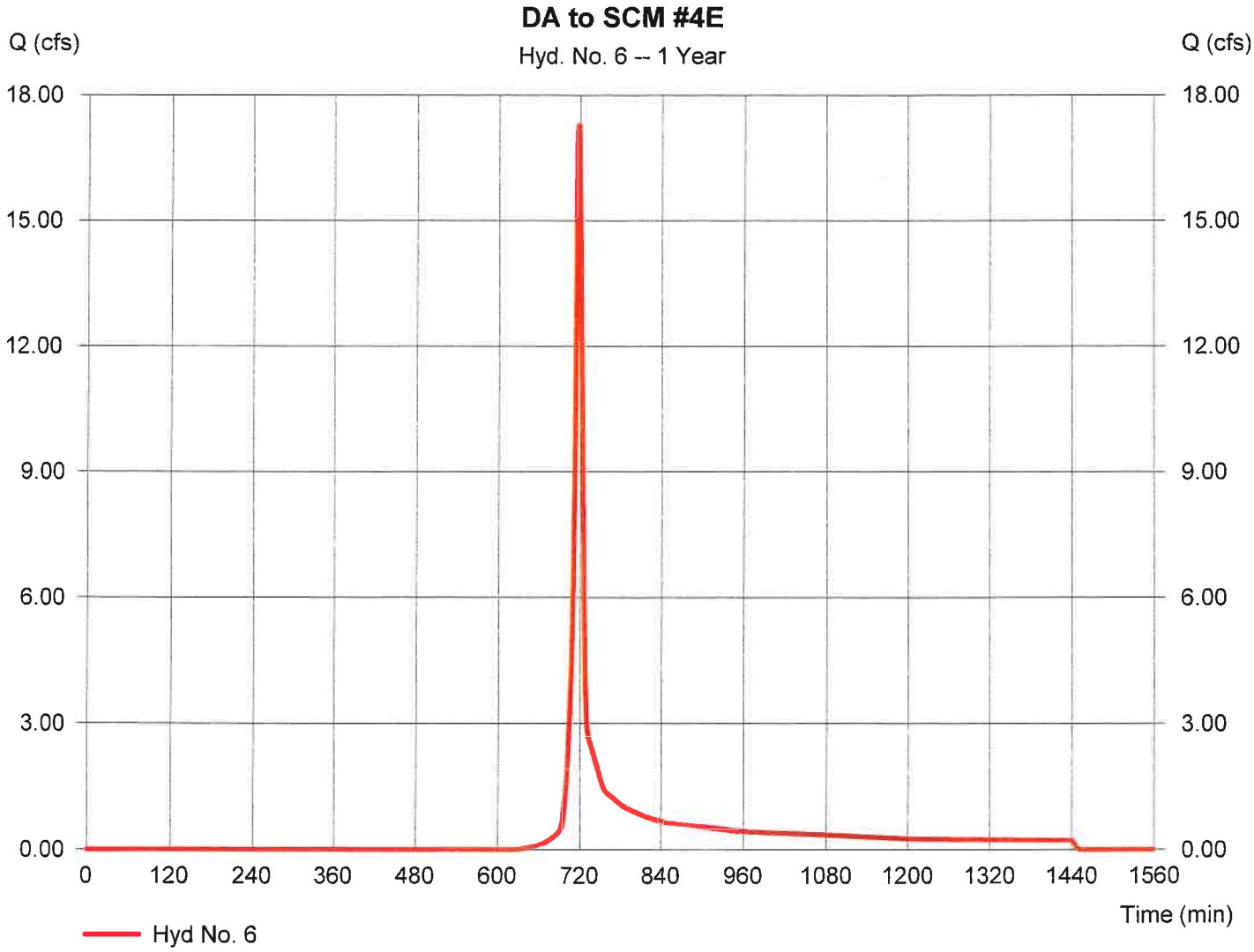


Hydrograph Report

Hyd. No. 6

DA to SCM #4E

Hydrograph type	= SCS Runoff	Peak discharge	= 17.28 cfs
Storm frequency	= 1 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 36,584 cuft
Drainage area	= 9.600 ac	Curve number	= 77.1
Basin Slope	= 5.6 %	Hydraulic length	= 1470 ft
Tc method	= User	Time of conc. (Tc)	= 8.20 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

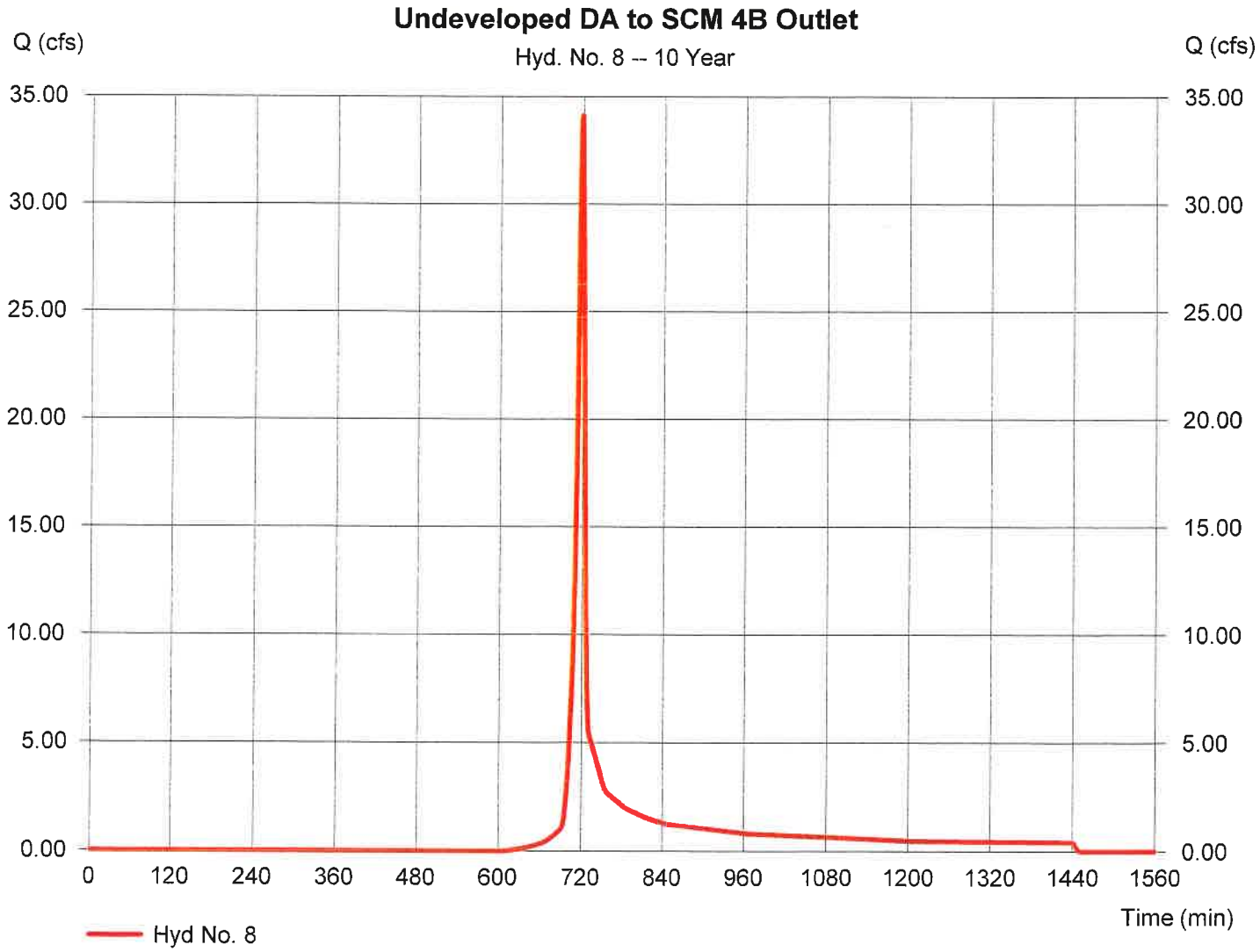


Hydrograph Report

Hyd. No. 8

Undeveloped DA to SCM 4B Outlet

Hydrograph type	= SCS Runoff	Peak discharge	= 34.12 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 72,029 cuft
Drainage area	= 10.530 ac	Curve number	= 68.5
Basin Slope	= 4.4 %	Hydraulic length	= 1605 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.62 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

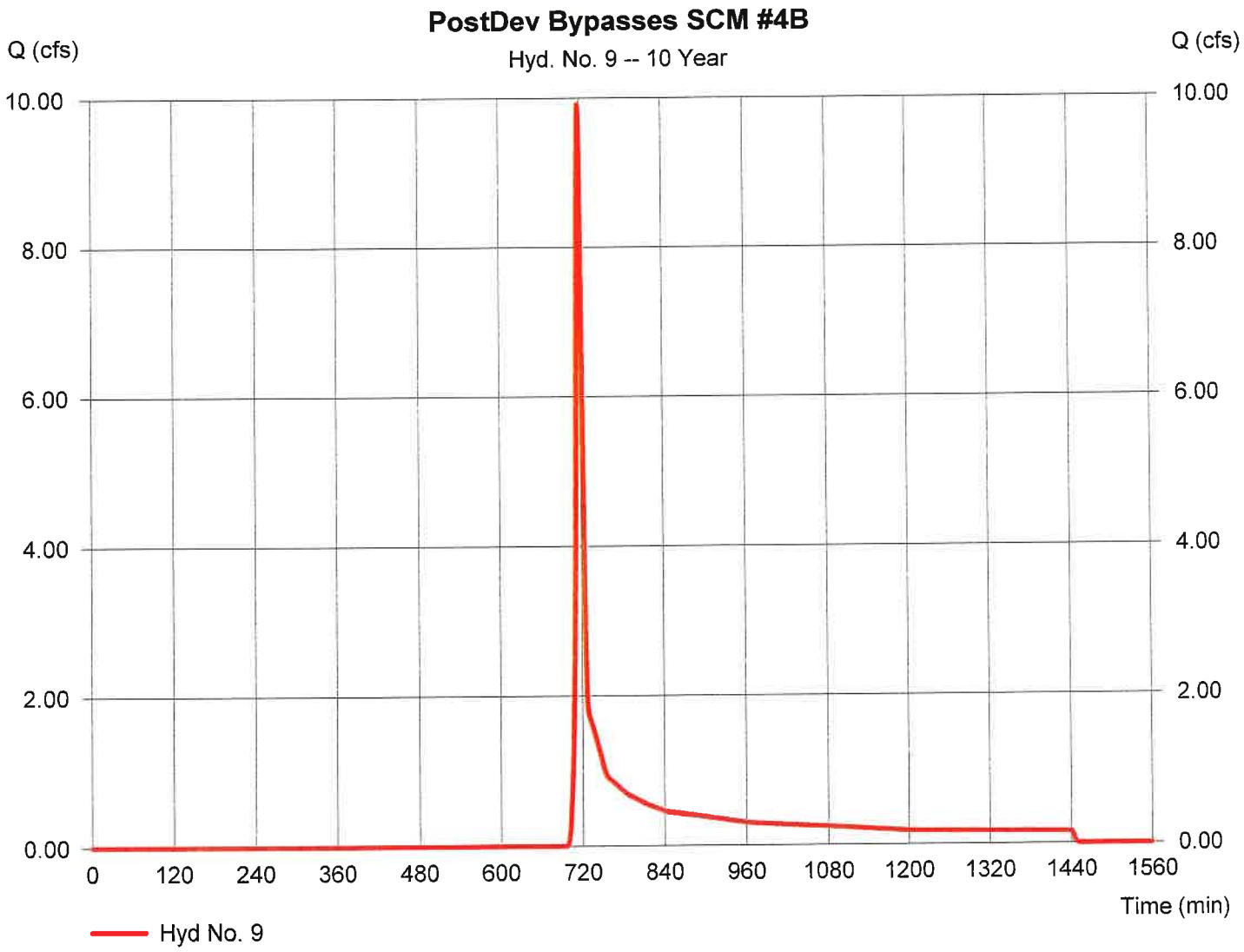


Hydrograph Report

Hyd. No. 9

PostDev Bypasses SCM #4B

Hydrograph type	= SCS Runoff	Peak discharge	= 9.911 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 21,376 cuft
Drainage area	= 5.240 ac	Curve number	= 56.6
Basin Slope	= 5.1 %	Hydraulic length	= 1220 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.84 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

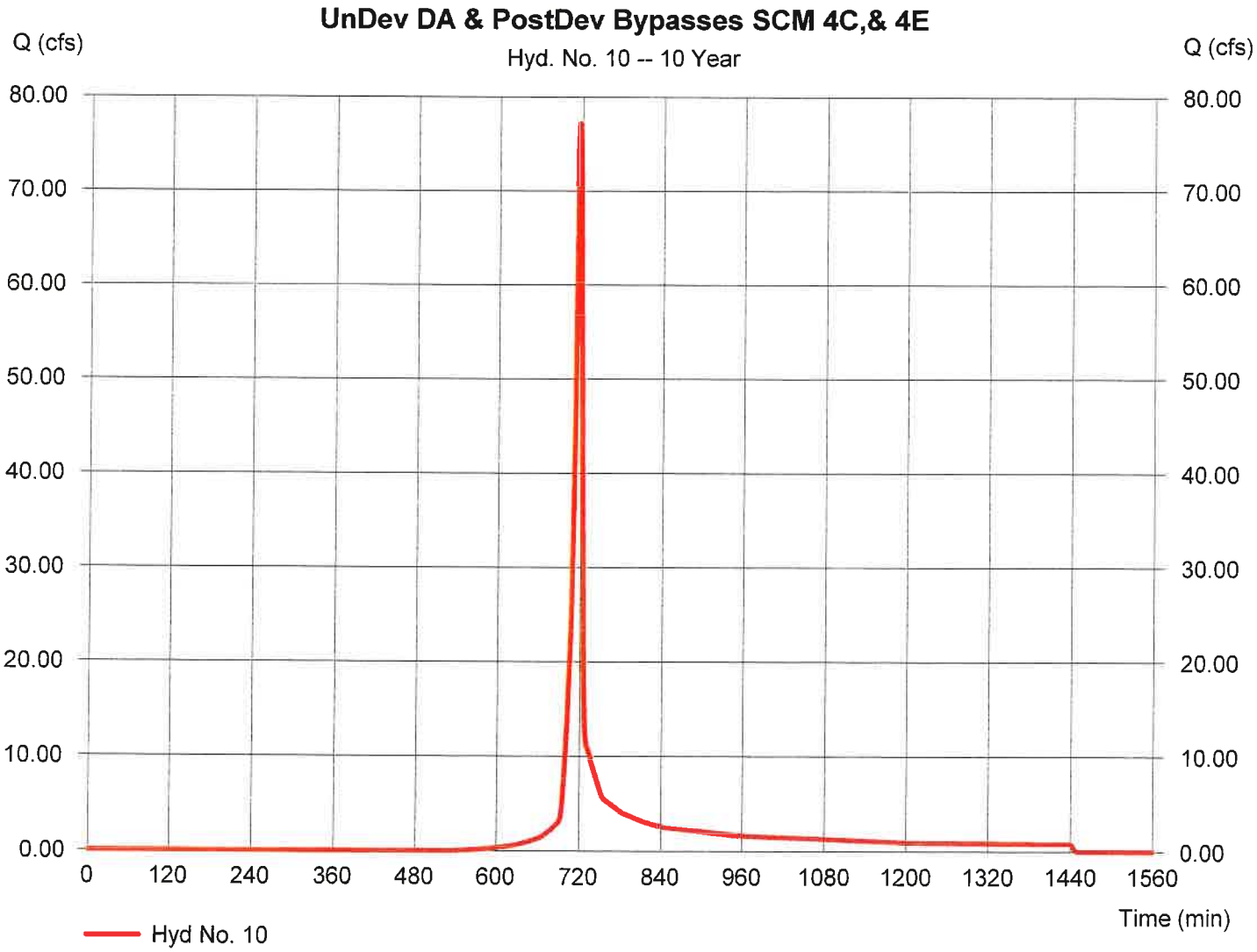


Hydrograph Report

Hyd. No. 10

UnDev DA & PostDev Bypasses SCM 4C,& 4E

Hydrograph type	= SCS Runoff	Peak discharge	= 77.19 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 155,385 cuft
Drainage area	= 17.690 ac	Curve number	= 73.6
Basin Slope	= 7.2 %	Hydraulic length	= 1470 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.90 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

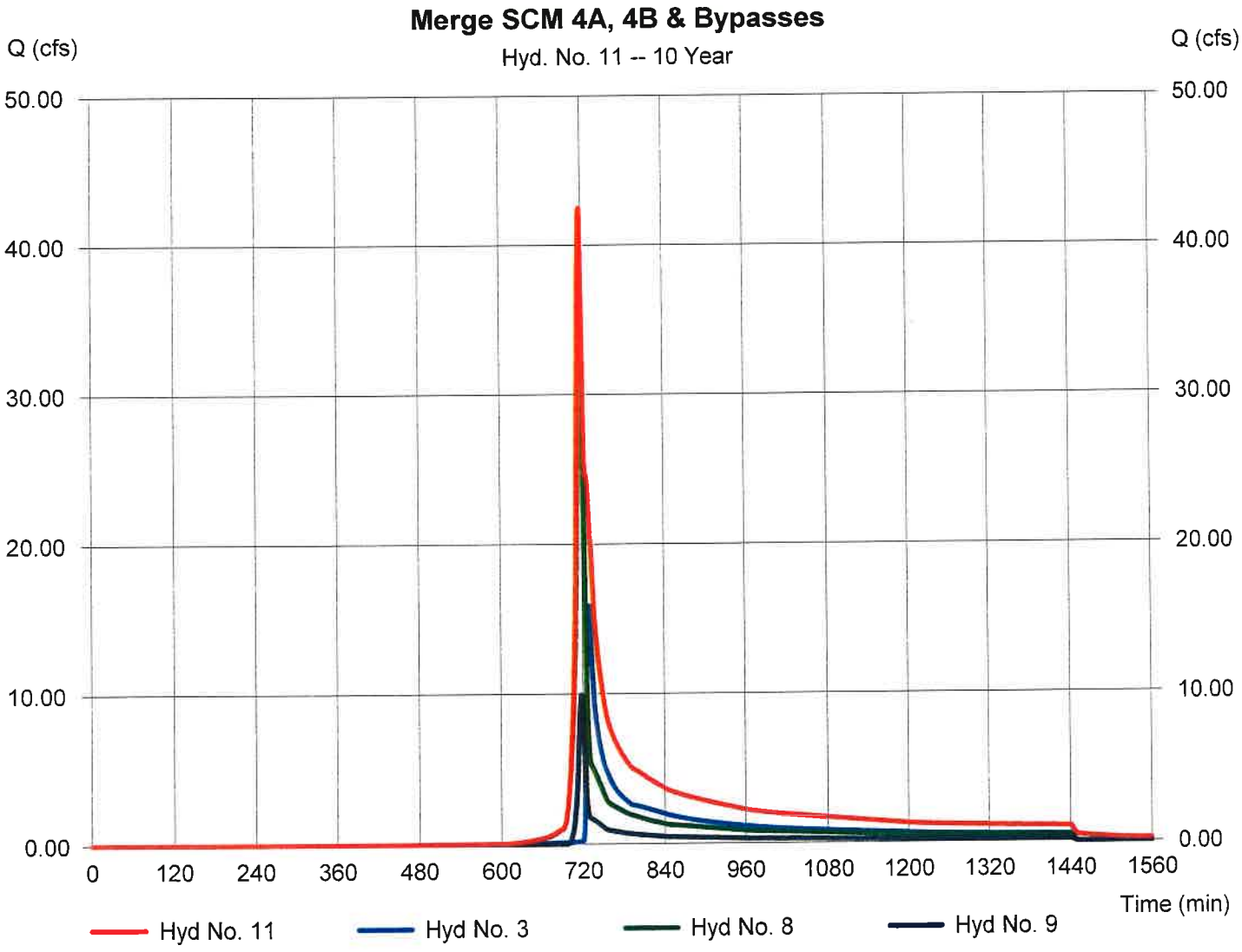


Hydrograph Report

Hyd. No. 11

Merge SCM 4A, 4B & Bypasses

Hydrograph type	= Combine	Peak discharge	= 42.50 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 167,772 cuft
Inflow hyds.	= 3, 8, 9	Contrib. drain. area	= 15.770 ac



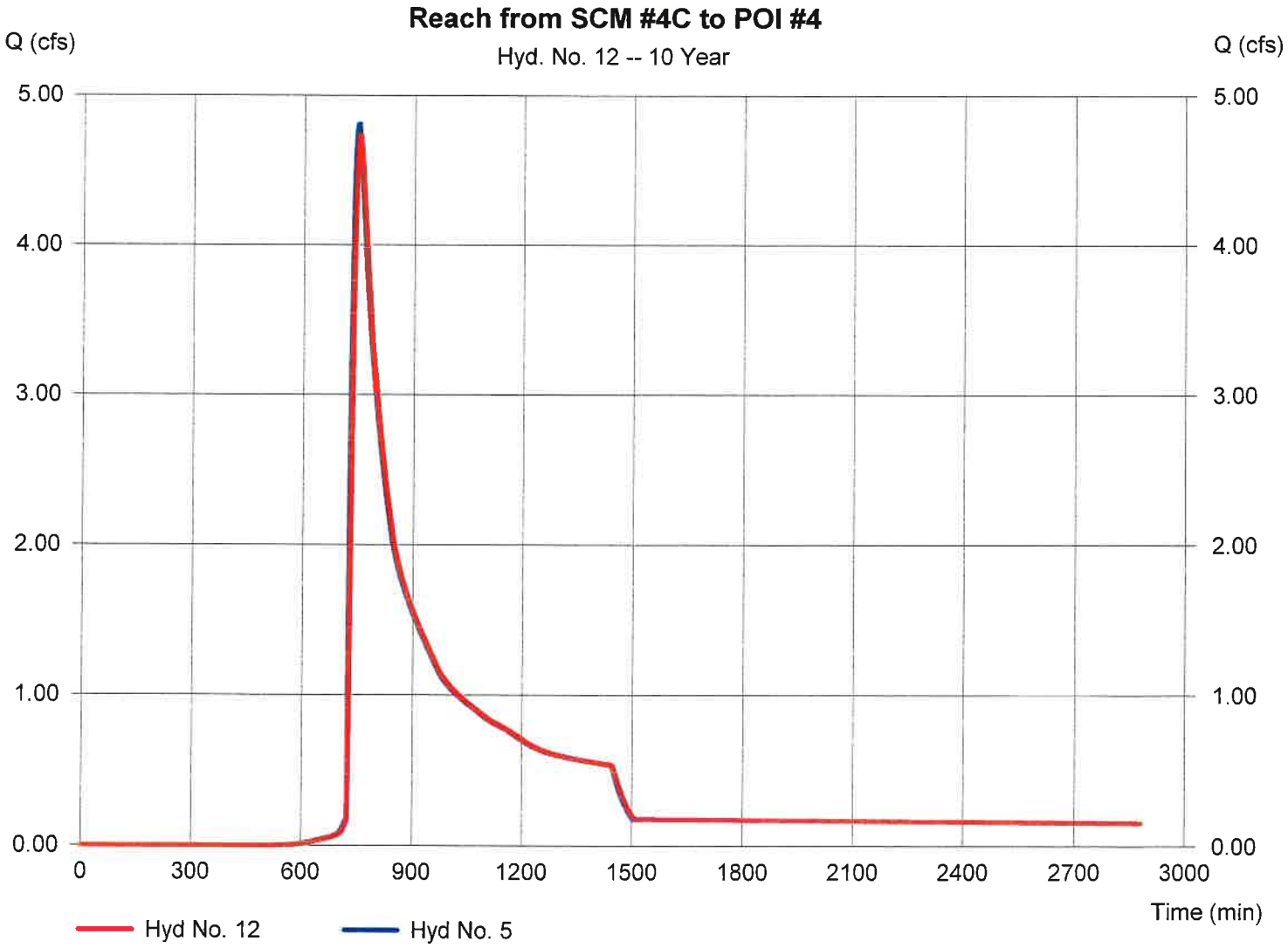
Hydrograph Report

Hyd. No. 12

Reach from SCM #4C to POI #4

Hydrograph type	= Reach	Peak discharge	= 4.736 cfs
Storm frequency	= 10 yrs	Time to peak	= 753 min
Time interval	= 1 min	Hyd. volume	= 71,504 cuft
Inflow hyd. No.	= 5 - Route DA4C -SCM#4C	Section type	= Trapezoidal
Reach length	= 900.0 ft	Channel slope	= 2.6 %
Manning's n	= 0.032	Bottom width	= 4.0 ft
Side slope	= 25.0:1	Max. depth	= 4.0 ft
Rating curve x	= 2.955	Rating curve m	= 1.189
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.2248

Modified Att-Kin routing method used.



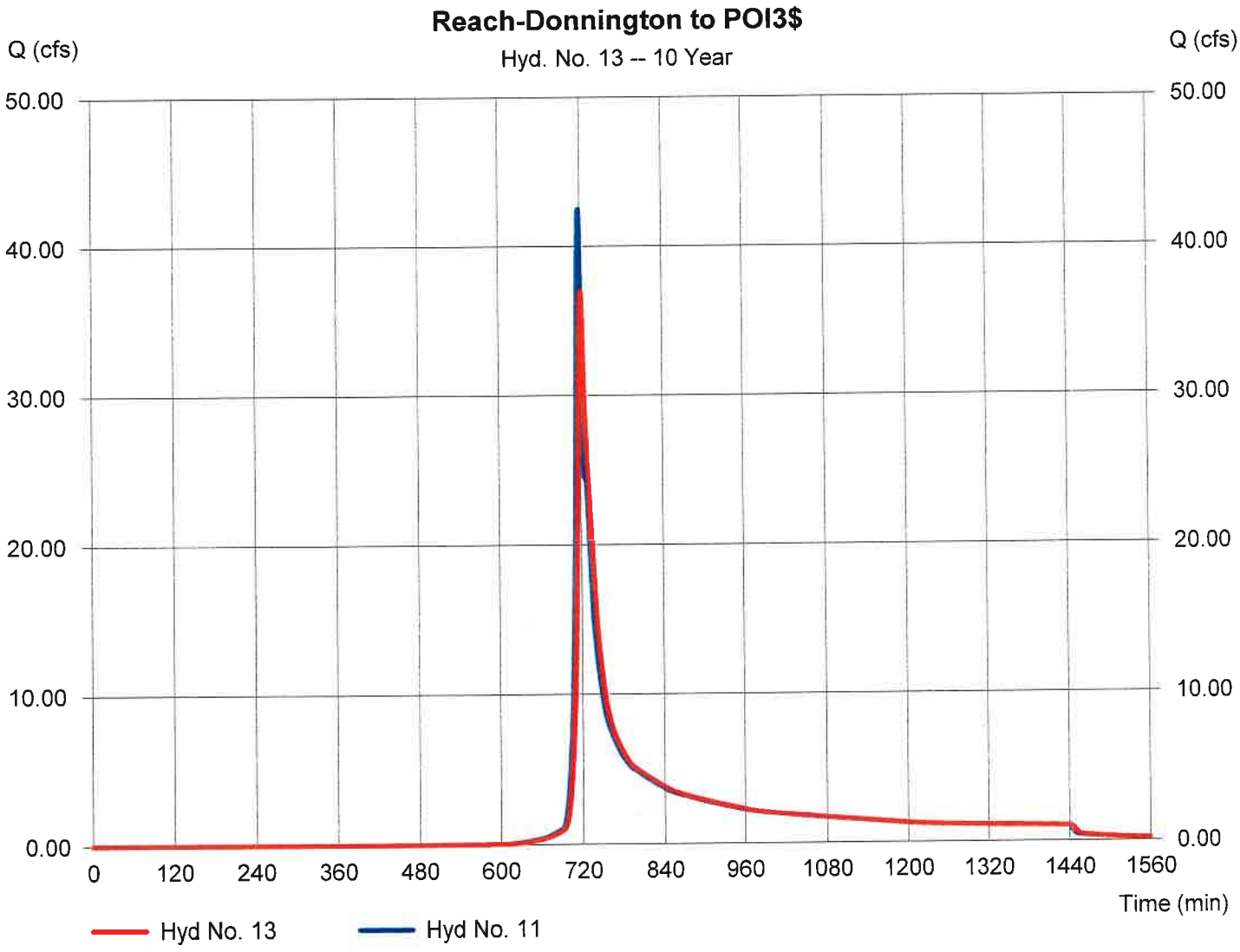
Hydrograph Report

Hyd. No. 13

Reach-Donnington to POI3$

Hydrograph type	= Reach	Peak discharge	= 36.96 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 167,738 cuft
Inflow hyd. No.	= 11 - Merge SCM 4A, 4B & Bypasses	Section type	= Trapezoidal
Reach length	= 1220.0 ft	Channel slope	= 2.9 %
Manning's n	= 0.032	Bottom width	= 4.0 ft
Side slope	= 25.0:1	Max. depth	= 5.0 ft
Rating curve x	= 3.124	Rating curve m	= 1.206
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.2527

Modified Att-Kin routing method used.

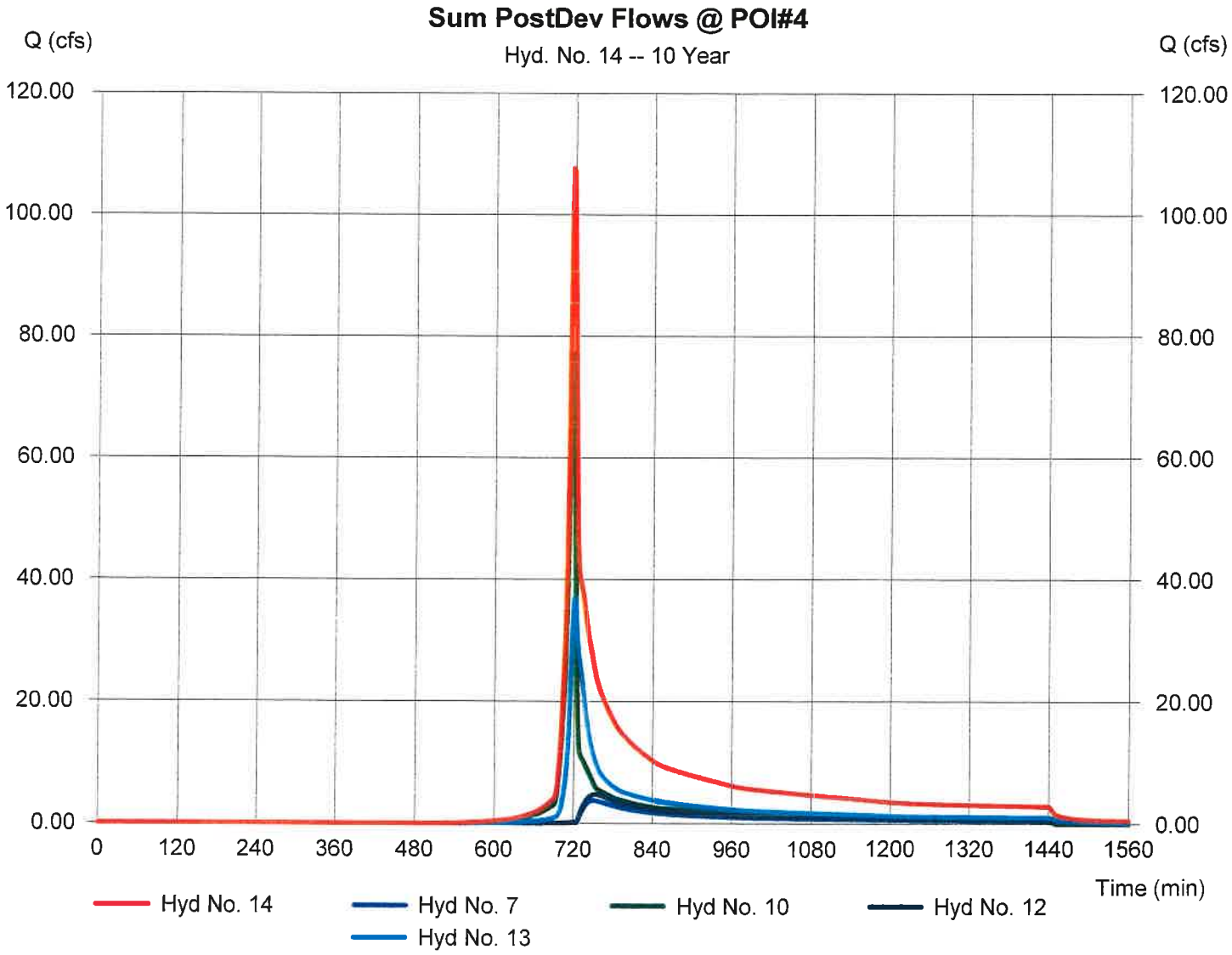


Hydrograph Report

Hyd. No. 14

Sum PostDev Flows @ POI#4

Hydrograph type	= Combine	Peak discharge	= 107.68 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 454,811 cuft
Inflow hyds.	= 7, 10, 12, 13	Contrib. drain. area	= 17.690 ac

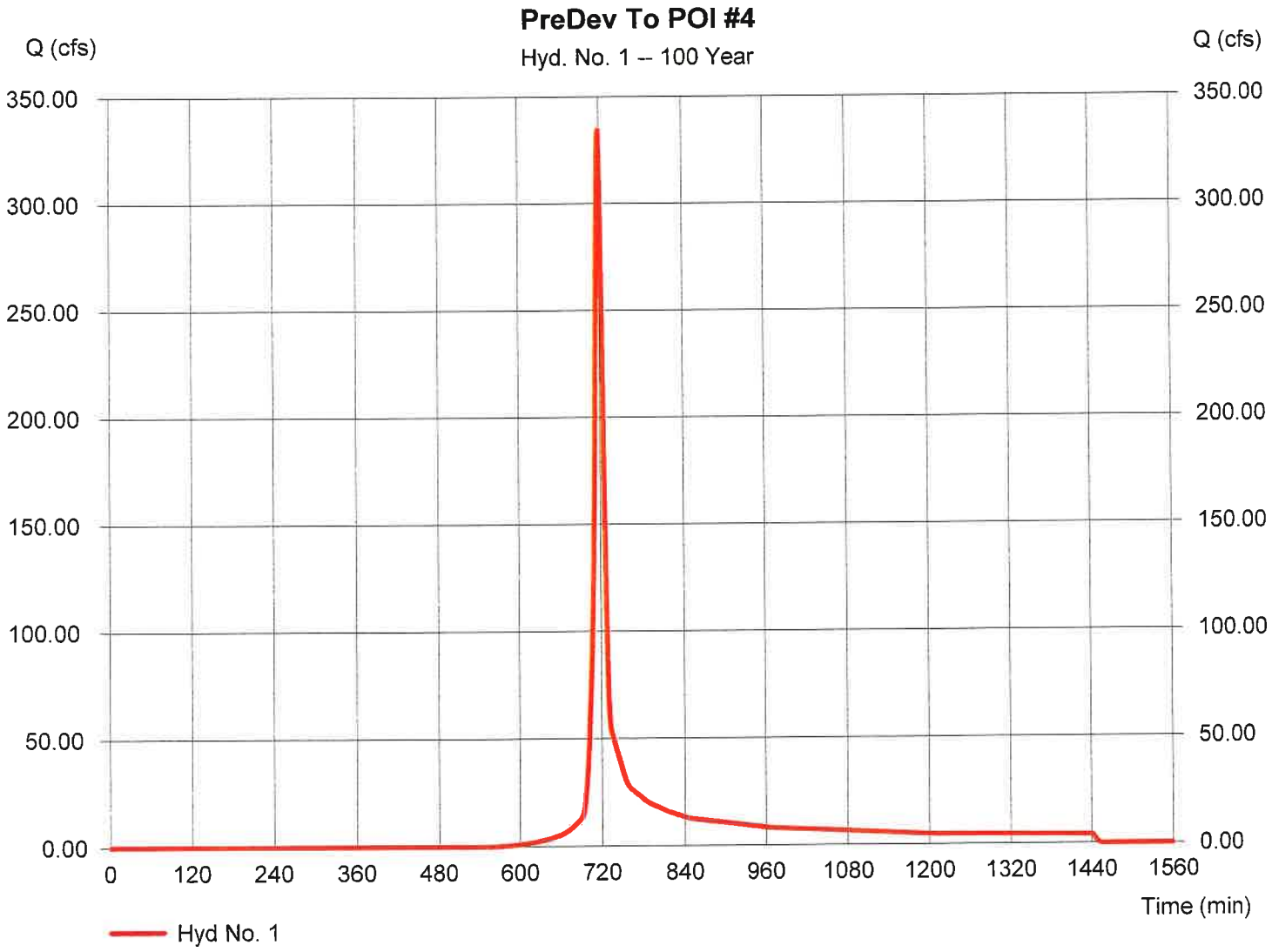


Hydrograph Report

Hyd. No. 1

PreDev To POI #4

Hydrograph type	= SCS Runoff	Peak discharge	= 334.43 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 756,550 cuft
Drainage area	= 63.520 ac	Curve number	= 63.3
Basin Slope	= 4.1 %	Hydraulic length	= 1900 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.96 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

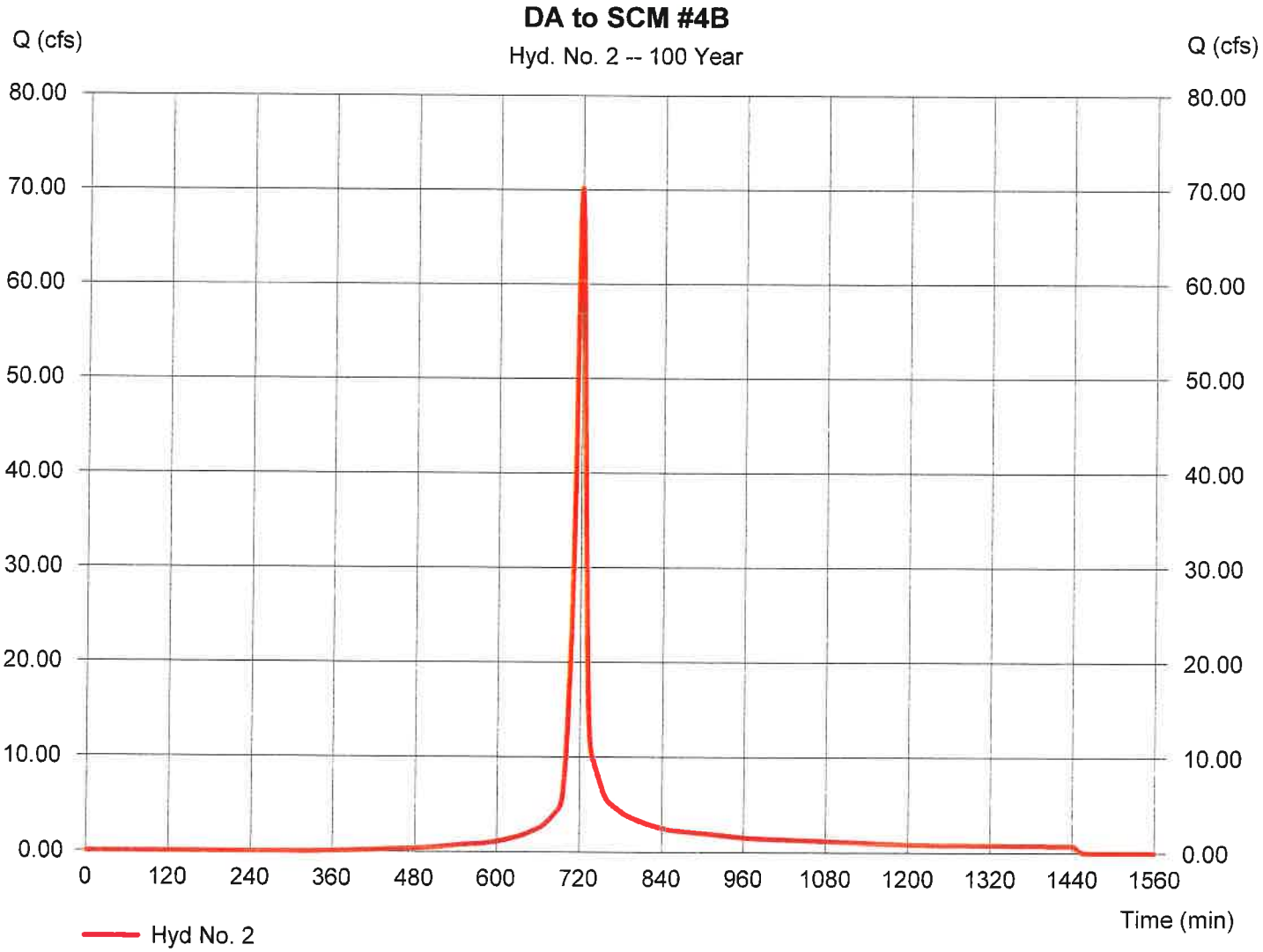


Hydrograph Report

Hyd. No. 2

DA to SCM #4B

Hydrograph type	= SCS Runoff	Peak discharge	= 70.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 173,458 cuft
Drainage area	= 9.250 ac	Curve number	= 79.6
Basin Slope	= 4.4 %	Hydraulic length	= 1605 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



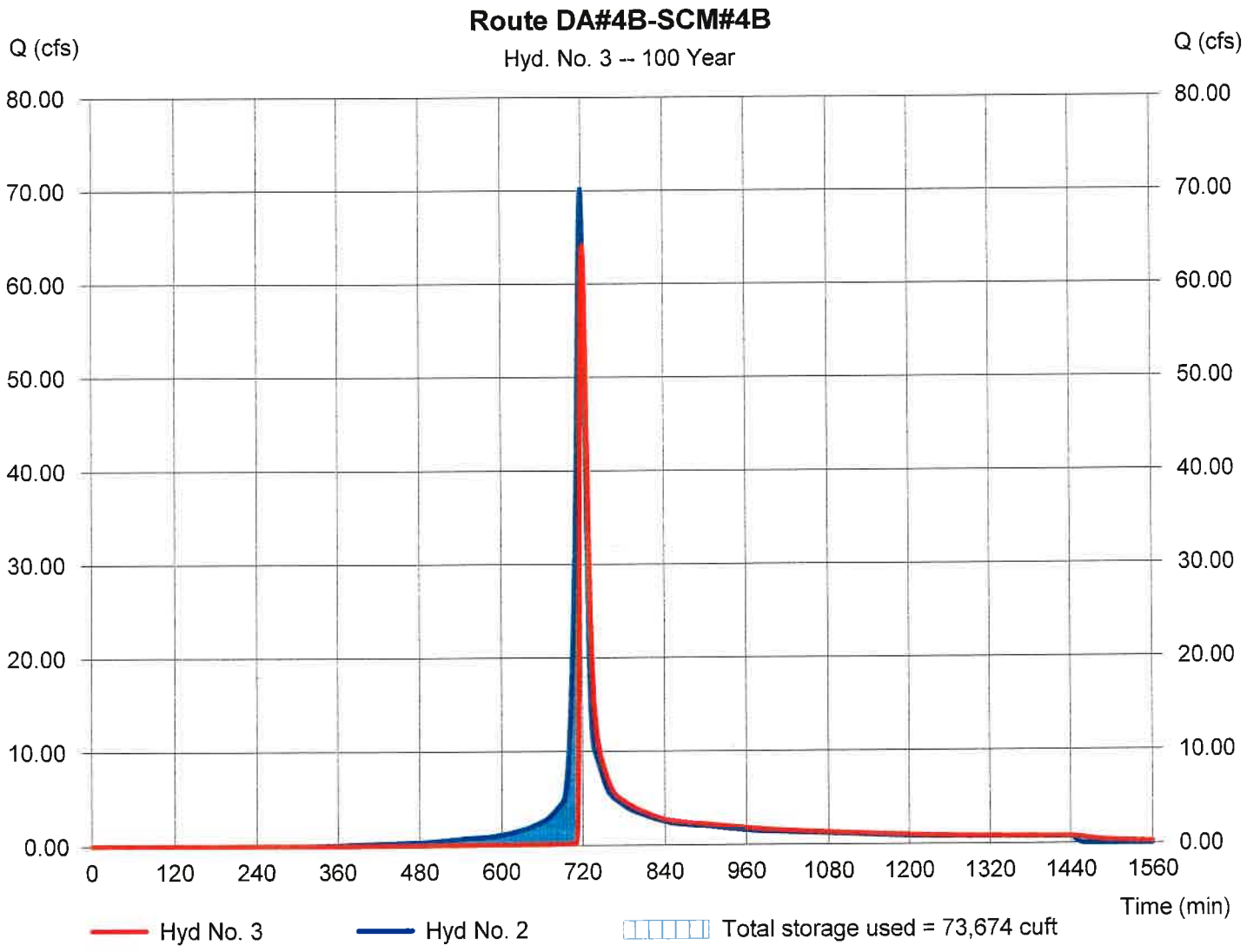
Hydrograph Report

Hyd. No. 3

Route DA#4B-SCM#4B

Hydrograph type	= Reservoir	Peak discharge	= 64.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 152,655 cuft
Inflow hyd. No.	= 2 - DA to SCM #4B	Max. Elevation	= 327.86 ft
Reservoir name	= SCM #4B	Max. Storage	= 73,674 cuft

Storage Indication method used. Wet pond routing start elevation = 323.50 ft.

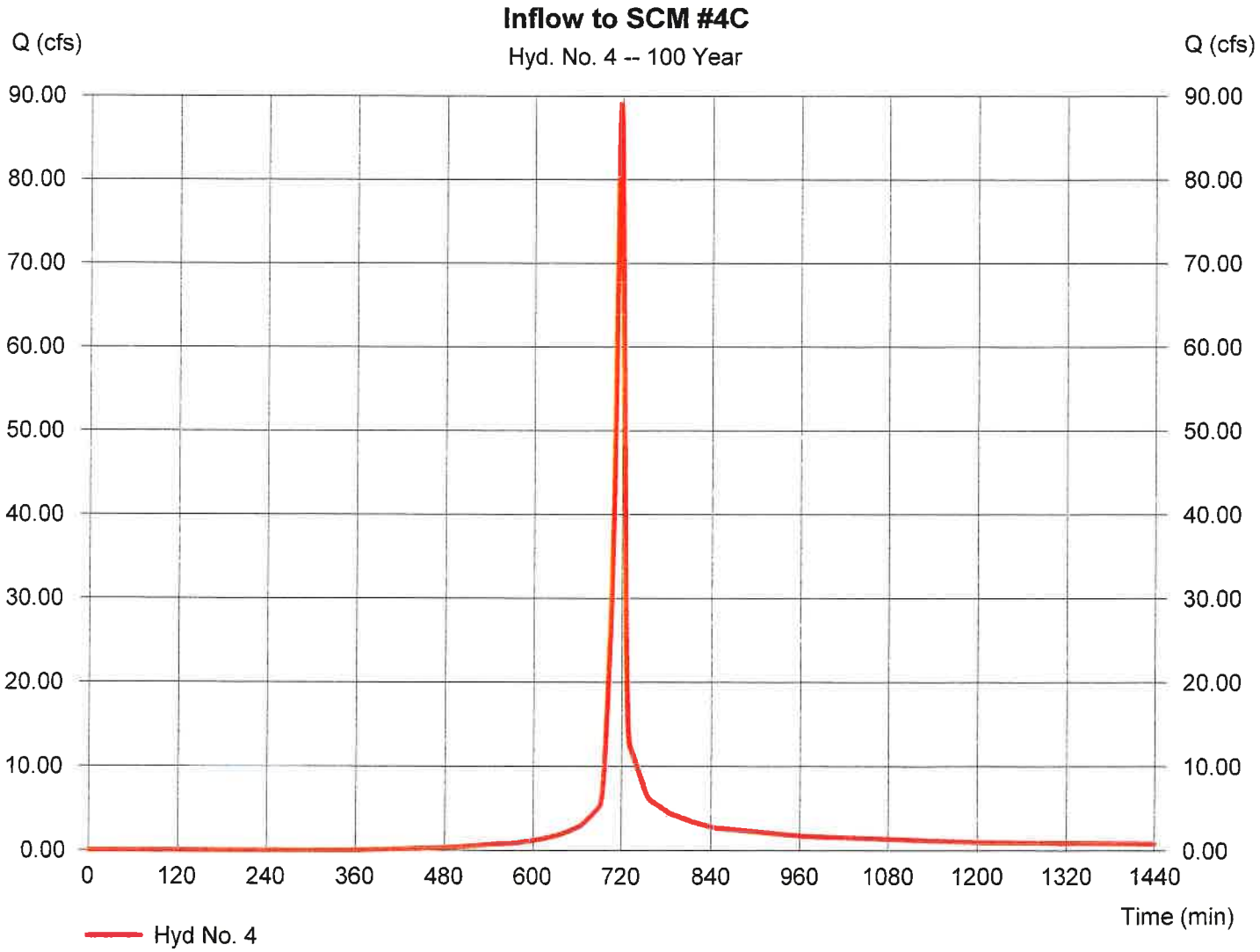


Hydrograph Report

Hyd. No. 4

Inflow to SCM #4C

Hydrograph type	= SCS Runoff	Peak discharge	= 89.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 192,660 cuft
Drainage area	= 11.200 ac	Curve number	= 77.7
Basin Slope	= 4.7 %	Hydraulic length	= 1700 ft
Tc method	= User	Time of conc. (Tc)	= 8.30 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



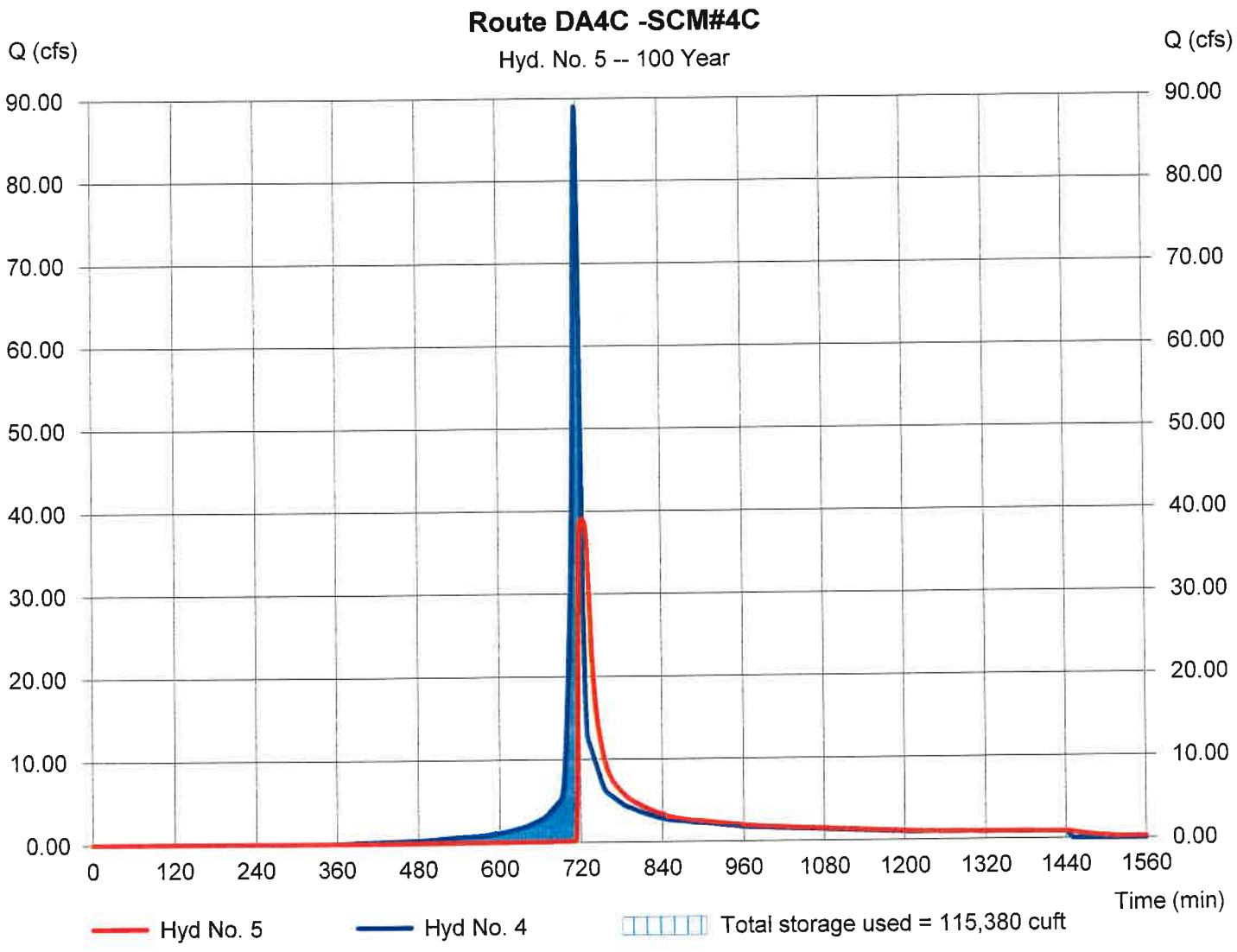
Hydrograph Report

Hyd. No. 5

Route DA4C -SCM#4C

Hydrograph type	= Reservoir	Peak discharge	= 39.06 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 156,889 cuft
Inflow hyd. No.	= 4 - Inflow to SCM #4C	Max. Elevation	= 297.93 ft
Reservoir name	= SCM #4C	Max. Storage	= 115,380 cuft

Storage Indication method used. Wet pond routing start elevation = 293.50 ft.

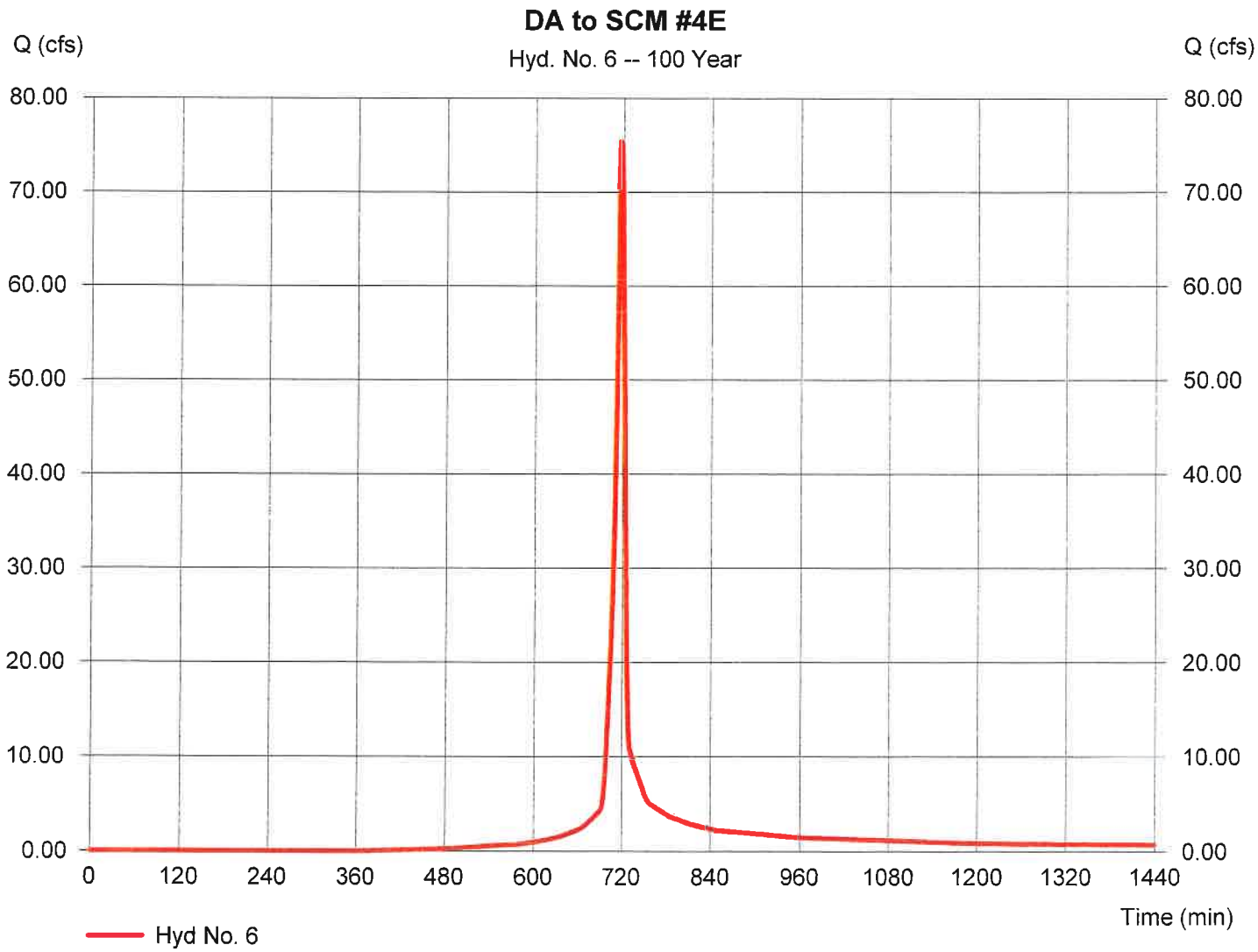


Hydrograph Report

Hyd. No. 6

DA to SCM #4E

Hydrograph type	= SCS Runoff	Peak discharge	= 75.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 162,840 cuft
Drainage area	= 9.600 ac	Curve number	= 77.1
Basin Slope	= 5.6 %	Hydraulic length	= 1470 ft
Tc method	= User	Time of conc. (Tc)	= 8.20 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

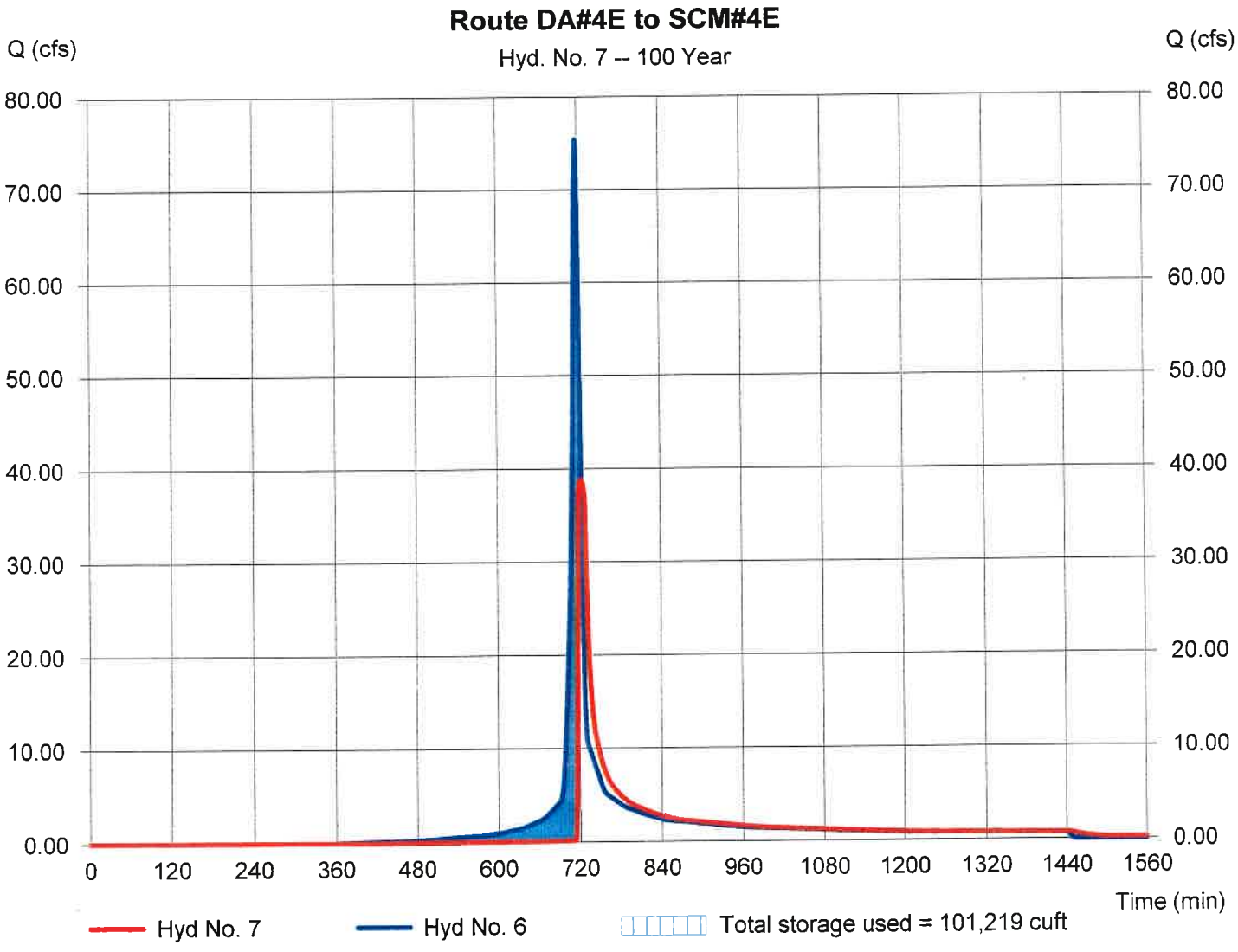
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 09 / 30 / 2020

Hyd. No. 7

Route DA#4E to SCM#4E

Hydrograph type	= Reservoir	Peak discharge	= 38.81 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 132,870 cuft
Inflow hyd. No.	= 6 - DA to SCM #4E	Max. Elevation	= 284.83 ft
Reservoir name	= SCM #4E	Max. Storage	= 101,219 cuft

Storage Indication method used. Wet pond routing start elevation = 280.50 ft.

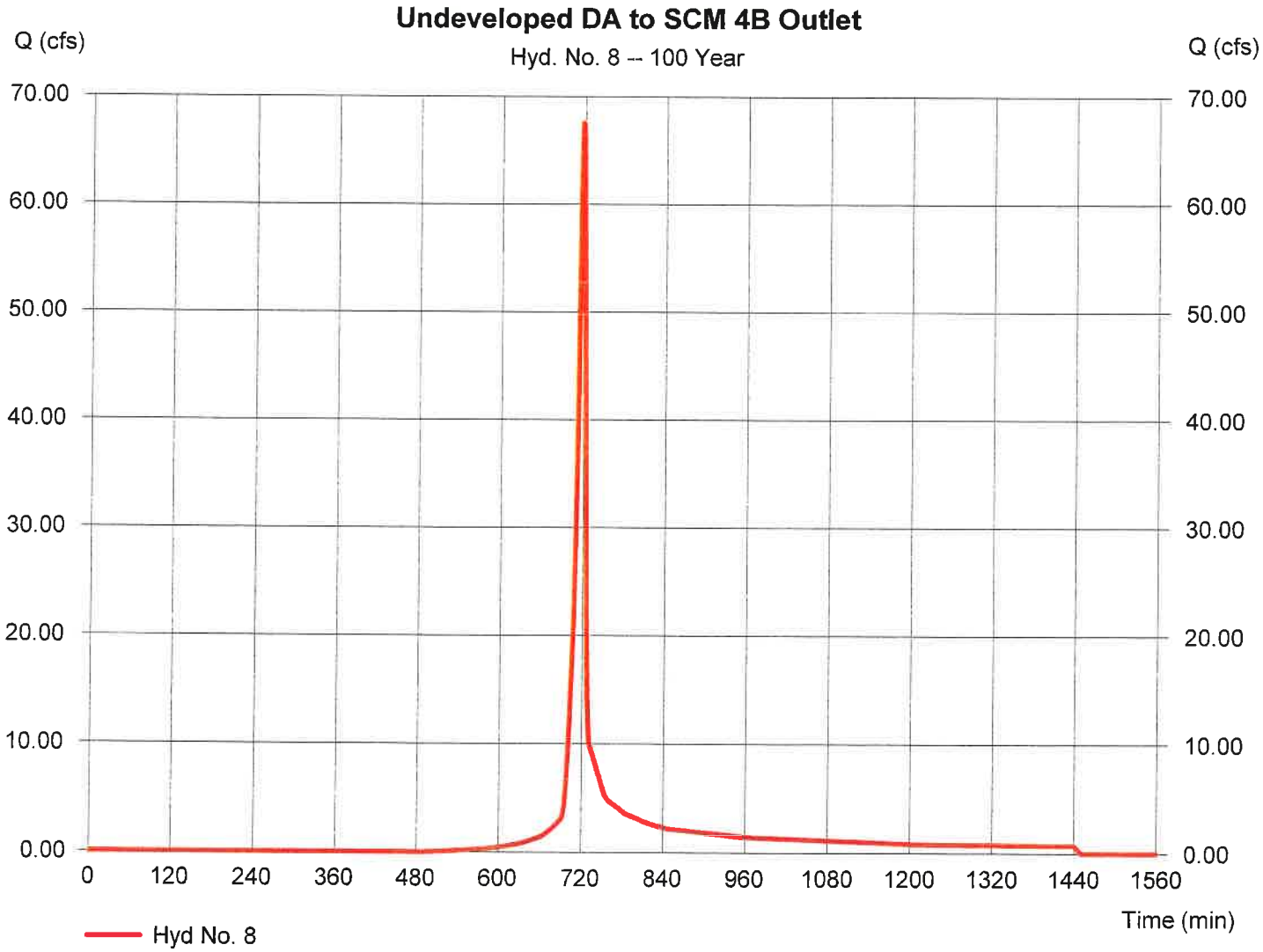


Hydrograph Report

Hyd. No. 8

Undeveloped DA to SCM 4B Outlet

Hydrograph type	= SCS Runoff	Peak discharge	= 67.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 143,118 cuft
Drainage area	= 10.530 ac	Curve number	= 68.5
Basin Slope	= 4.4 %	Hydraulic length	= 1605 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.62 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

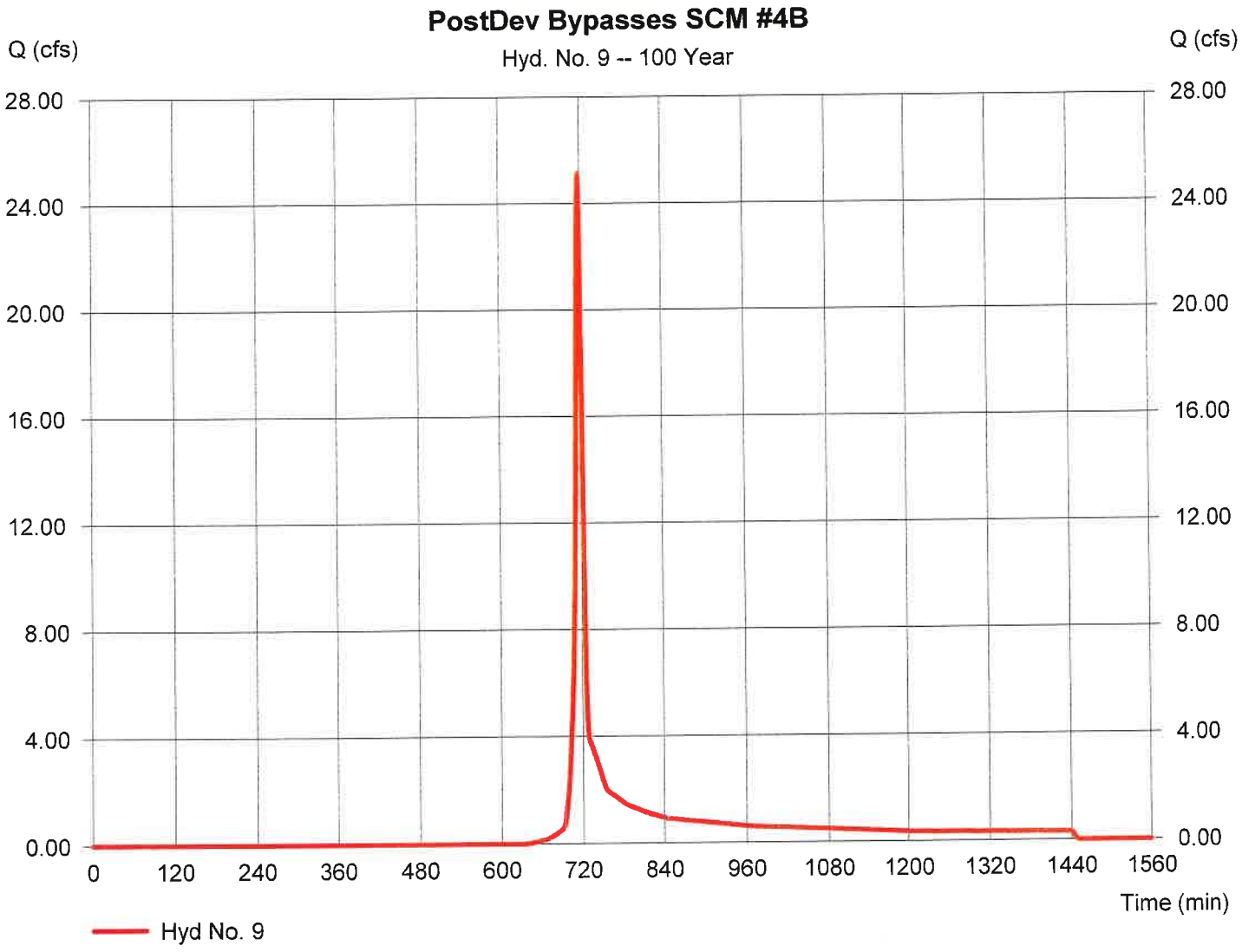


Hydrograph Report

Hyd. No. 9

PostDev Bypasses SCM #4B

Hydrograph type	= SCS Runoff	Peak discharge	= 25.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 50,679 cuft
Drainage area	= 5.240 ac	Curve number	= 56.6
Basin Slope	= 5.1 %	Hydraulic length	= 1220 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.84 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

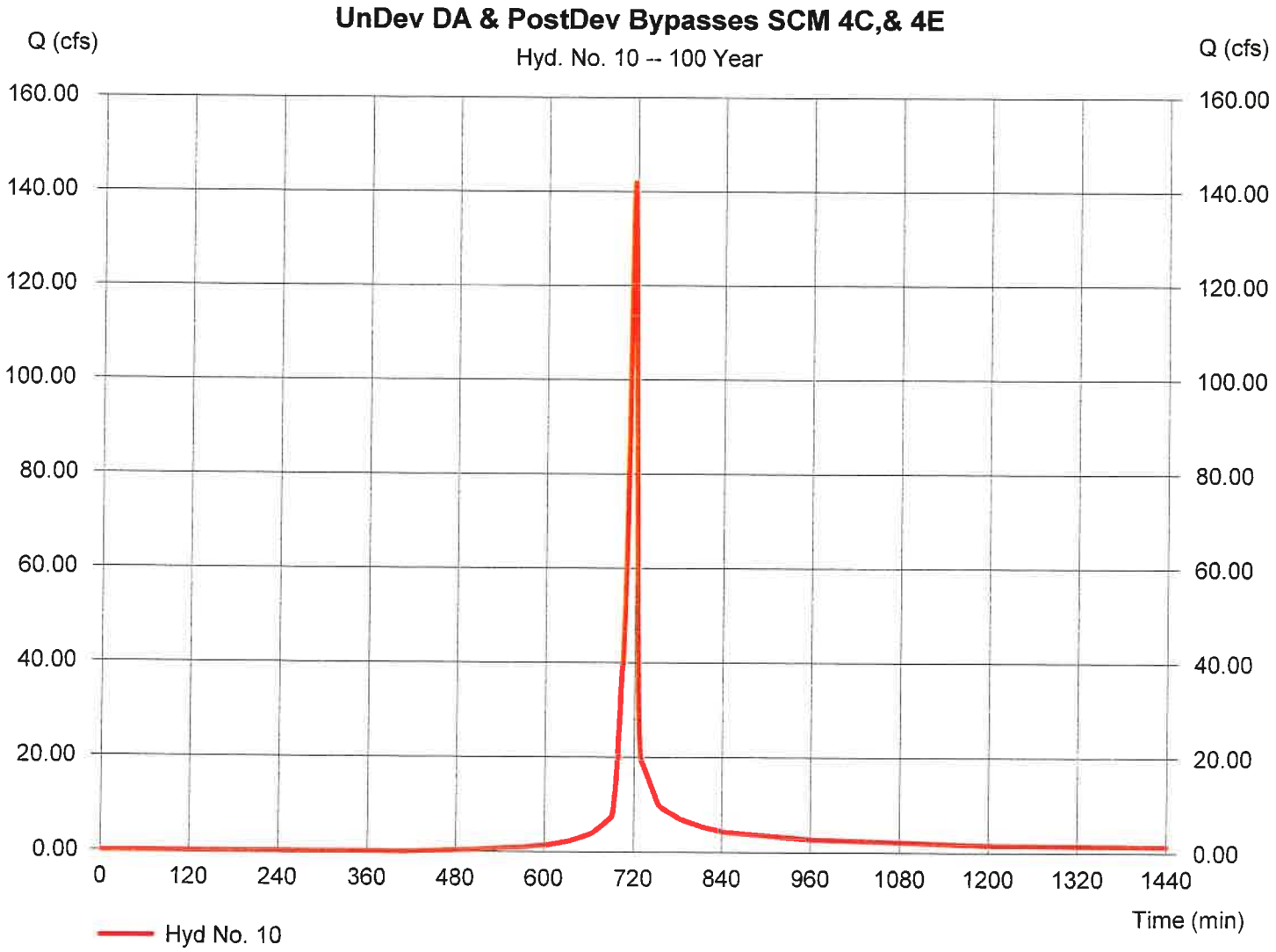


Hydrograph Report

Hyd. No. 10

UnDev DA & PostDev Bypasses SCM 4C,& 4E

Hydrograph type	= SCS Runoff	Peak discharge	= 141.95 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 291,455 cuft
Drainage area	= 17.690 ac	Curve number	= 73.6
Basin Slope	= 7.2 %	Hydraulic length	= 1470 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.90 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

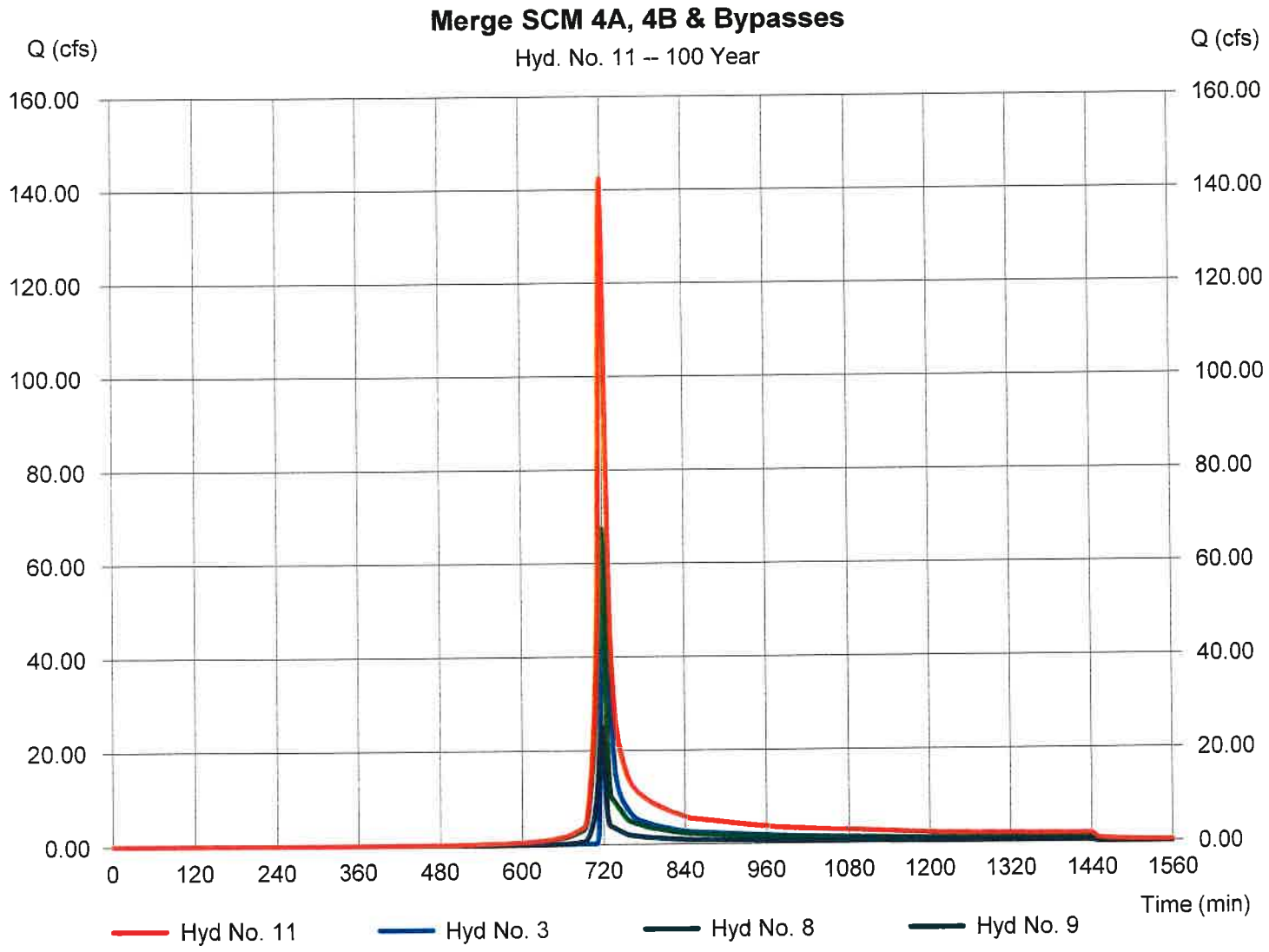


Hydrograph Report

Hyd. No. 11

Merge SCM 4A, 4B & Bypasses

Hydrograph type	= Combine	Peak discharge	= 142.41 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 339,969 cuft
Inflow hyds.	= 3, 8, 9	Contrib. drain. area	= 15.770 ac



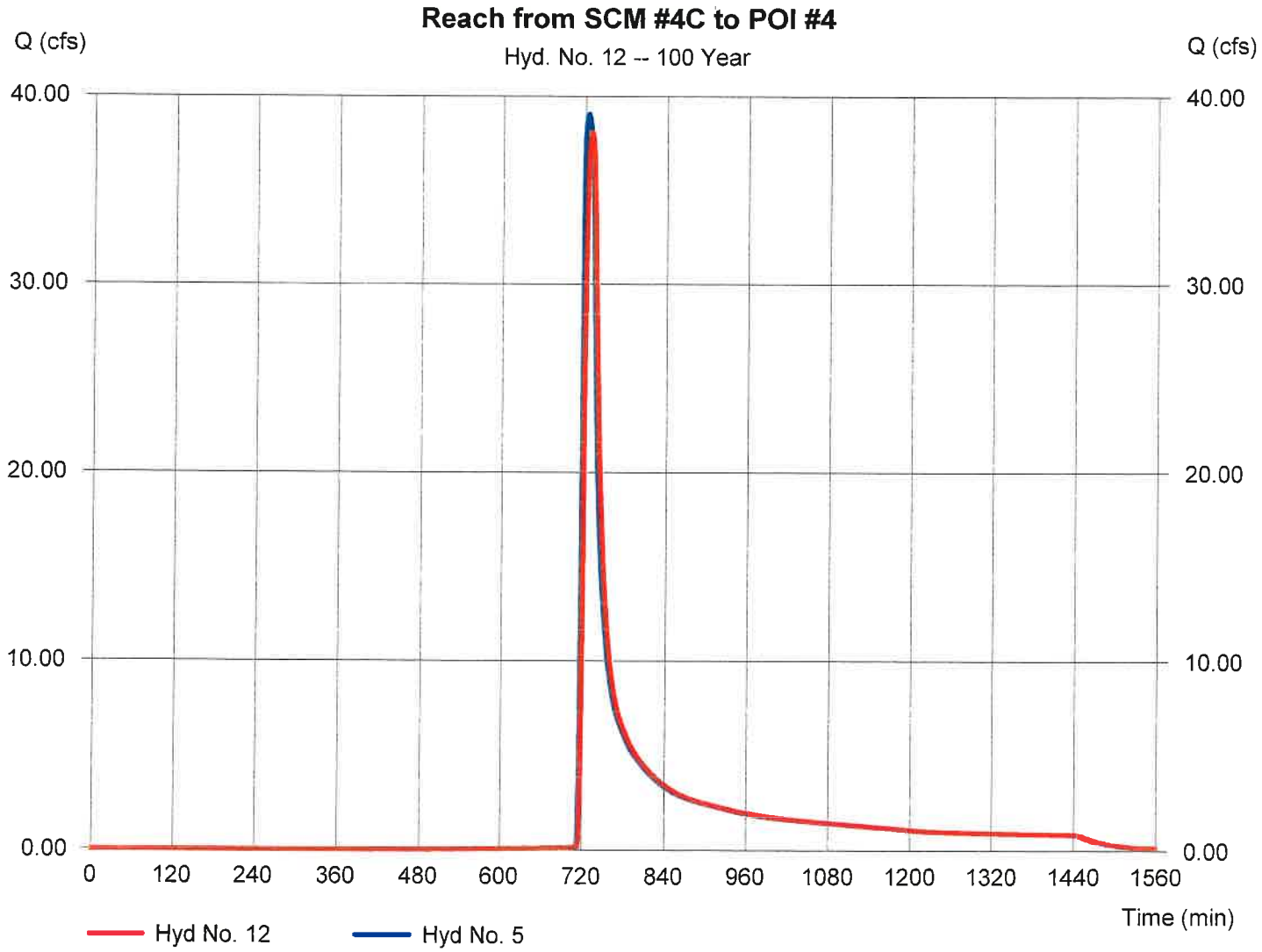
Hydrograph Report

Hyd. No. 12

Reach from SCM #4C to POI #4

Hydrograph type	= Reach	Peak discharge	= 38.09 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 156,858 cuft
Inflow hyd. No.	= 5 - Route DA4C -SCM#4C	Section type	= Trapezoidal
Reach length	= 900.0 ft	Channel slope	= 2.6 %
Manning's n	= 0.032	Bottom width	= 4.0 ft
Side slope	= 25.0:1	Max. depth	= 4.0 ft
Rating curve x	= 2.955	Rating curve m	= 1.189
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.3004

Modified Att-Kin routing method used.



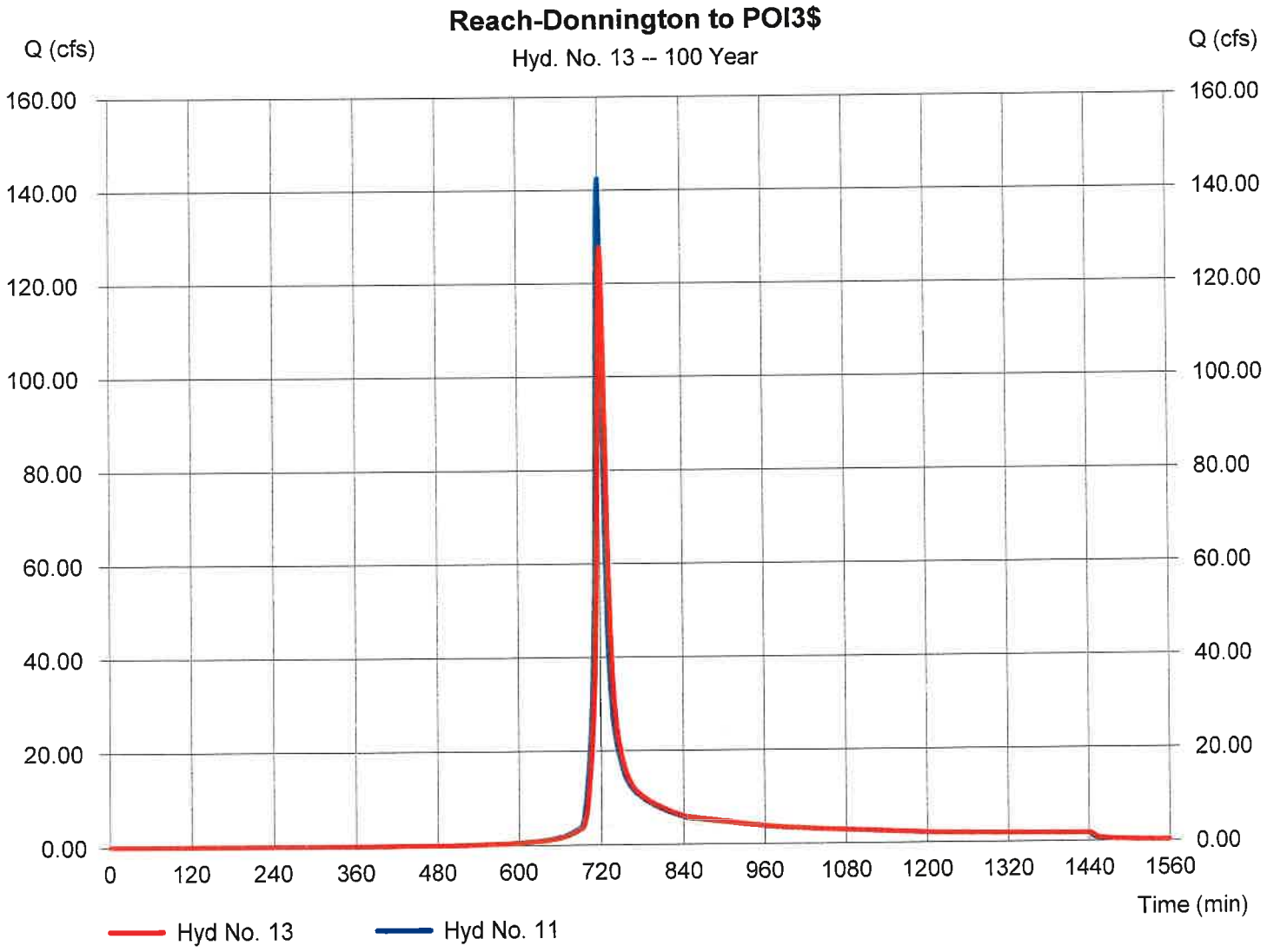
Hydrograph Report

Hyd. No. 13

Reach-Donnington to POI3$

Hydrograph type	= Reach	Peak discharge	= 127.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 339,940 cuft
Inflow hyd. No.	= 11 - Merge SCM 4A, 4B & Bypasses	Section type	= Trapezoidal
Reach length	= 1220.0 ft	Channel slope	= 2.9 %
Manning's n	= 0.032	Bottom width	= 4.0 ft
Side slope	= 25.0:1	Max. depth	= 5.0 ft
Rating curve x	= 3.124	Rating curve m	= 1.206
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.3019

Modified Att-Kin routing method used.

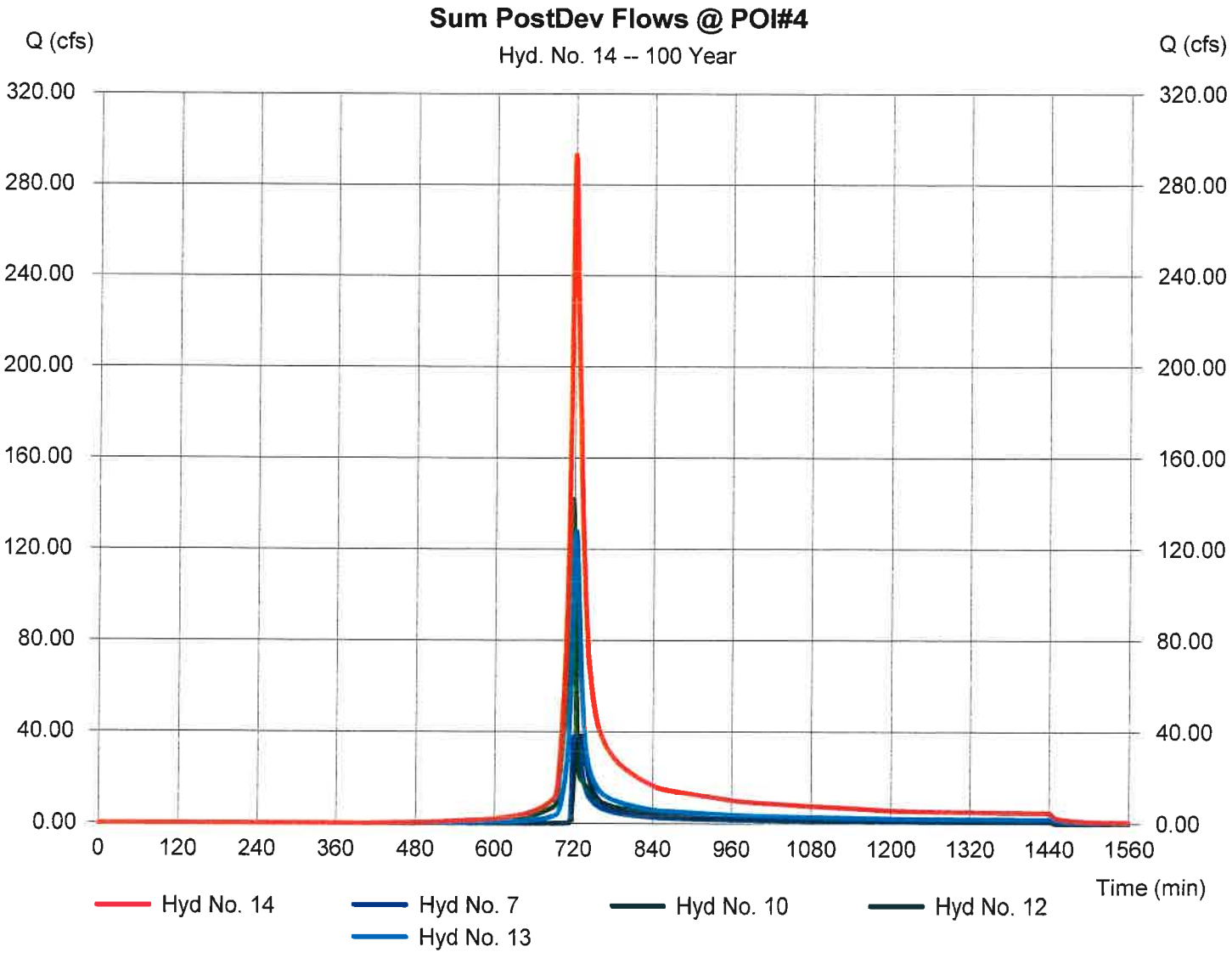


Hydrograph Report

Hyd. No. 14

Sum PostDev Flows @ POI#4

Hydrograph type	= Combine	Peak discharge	= 293.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 921,124 cuft
Inflow hyds.	= 7, 10, 12, 13	Contrib. drain. area	= 17.690 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-------
2	0.0000	0.0000	0.0000	-------
3	0.0000	0.0000	0.0000	-------
5	0.0000	0.0000	0.0000	-------
10	0.0000	0.0000	0.0000	-------
25	0.0000	0.0000	0.0000	-------
50	0.0000	0.0000	0.0000	-------
100	0.0000	0.0000	0.0000	-------

File name: SCM 1.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

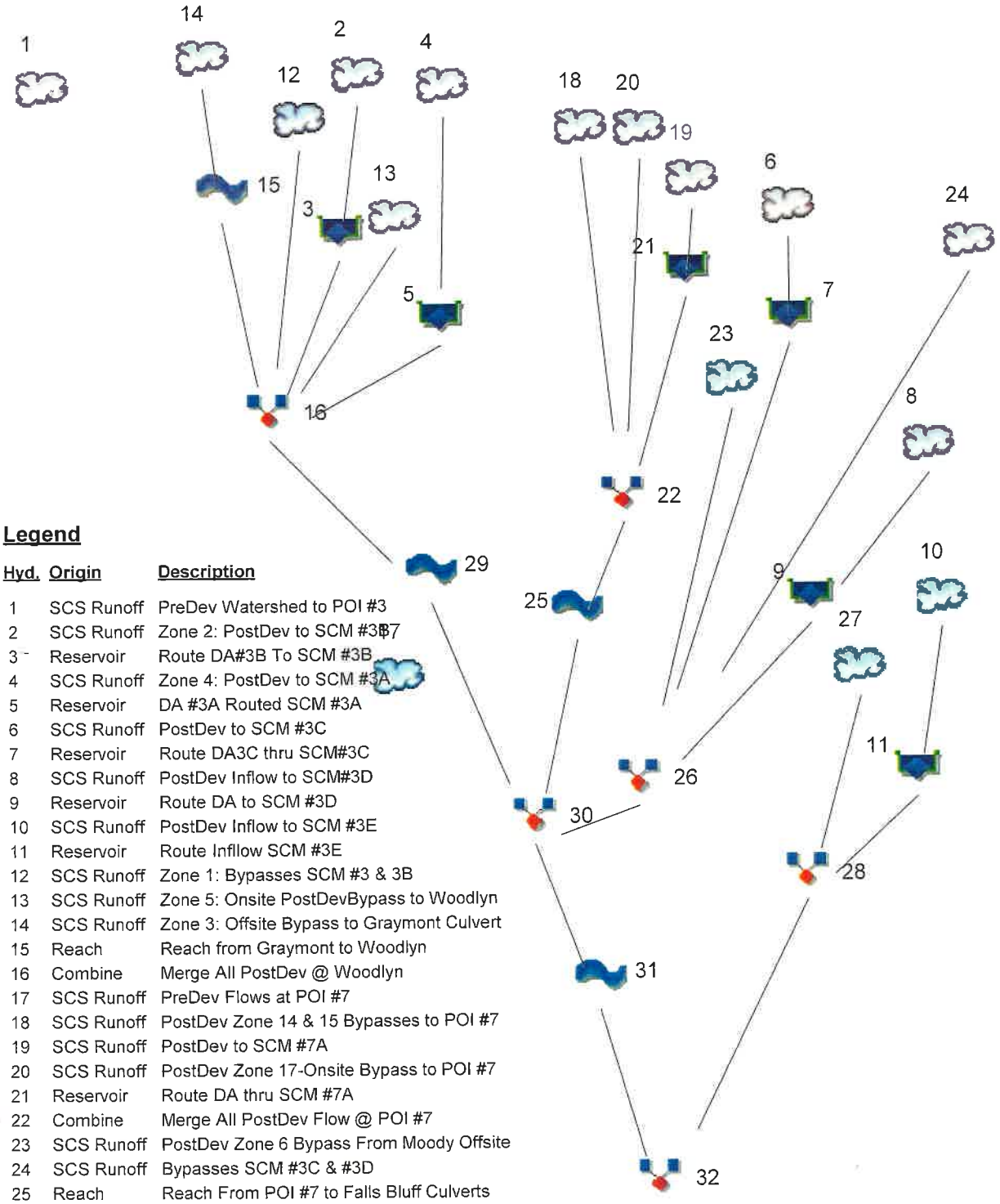
Tc = time in minutes. Values may exceed 60.

Precip. file name: F:\Kalas Assemblage\Raleigh-Wake County 24Hr Rain.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	3.00	3.45	0.00	4.33	5.02	5.96	6.80	7.46
SCS 6-Hr	2.05	2.46	0.00	3.04	3.55	0.00	0.00	5.32
Huff-1st	0.00	0.00	0.00	2.75	0.00	5.38	6.50	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	5.25	6.00	0.00

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3



Legend

Hyd.	Origin	Description
1	SCS Runoff	PreDev Watershed to POI #3
2	SCS Runoff	Zone 2: PostDev to SCM #3B & 7
3	Reservoir	Route DA#3B To SCM #3B
4	SCS Runoff	Zone 4: PostDev to SCM #3A
5	Reservoir	DA #3A Routed SCM #3A
6	SCS Runoff	PostDev to SCM #3C
7	Reservoir	Route DA3C thru SCM#3C
8	SCS Runoff	PostDev Inflow to SCM#3D
9	Reservoir	Route DA to SCM #3D
10	SCS Runoff	PostDev Inflow to SCM #3E
11	Reservoir	Route Infllow SCM #3E
12	SCS Runoff	Zone 1: Bypasses SCM #3 & 3B
13	SCS Runoff	Zone 5: Onsite PostDevBypass to Woodlyn
14	SCS Runoff	Zone 3: Offsite Bypass to Graymont Culvert
15	Reach	Reach from Graymont to Woodlyn
16	Combine	Merge All PostDev @ Woodlyn
17	SCS Runoff	PreDev Flows at POI #7
18	SCS Runoff	PostDev Zone 14 & 15 Bypasses to POI #7
19	SCS Runoff	PostDev to SCM #7A
20	SCS Runoff	PostDev Zone 17-Onsite Bypass to POI #7
21	Reservoir	Route DA thru SCM #7A
22	Combine	Merge All PostDev Flow @ POI #7
23	SCS Runoff	PostDev Zone 6 Bypass From Moody Offsite
24	SCS Runoff	Bypasses SCM #3C & #3D
25	Reach	Reach From POI #7 to Falls Bluff Culverts
26	Combine	Combine PostDev All Flows @ Falls Bluff Culverts
27	SCS Runoff	PostDev Zone 12 & 13: ByPasses SCM #3E
28	Combine	Combine All PostDev Flow to POI #3
29	Reach	Reach from Woodlyn-Falls Bluff
30	Combine	Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts
31	Reach	Reach Downstream Falls Bluff to POI#3
32	Combine	Combine All PostDev Flows at POI #3

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

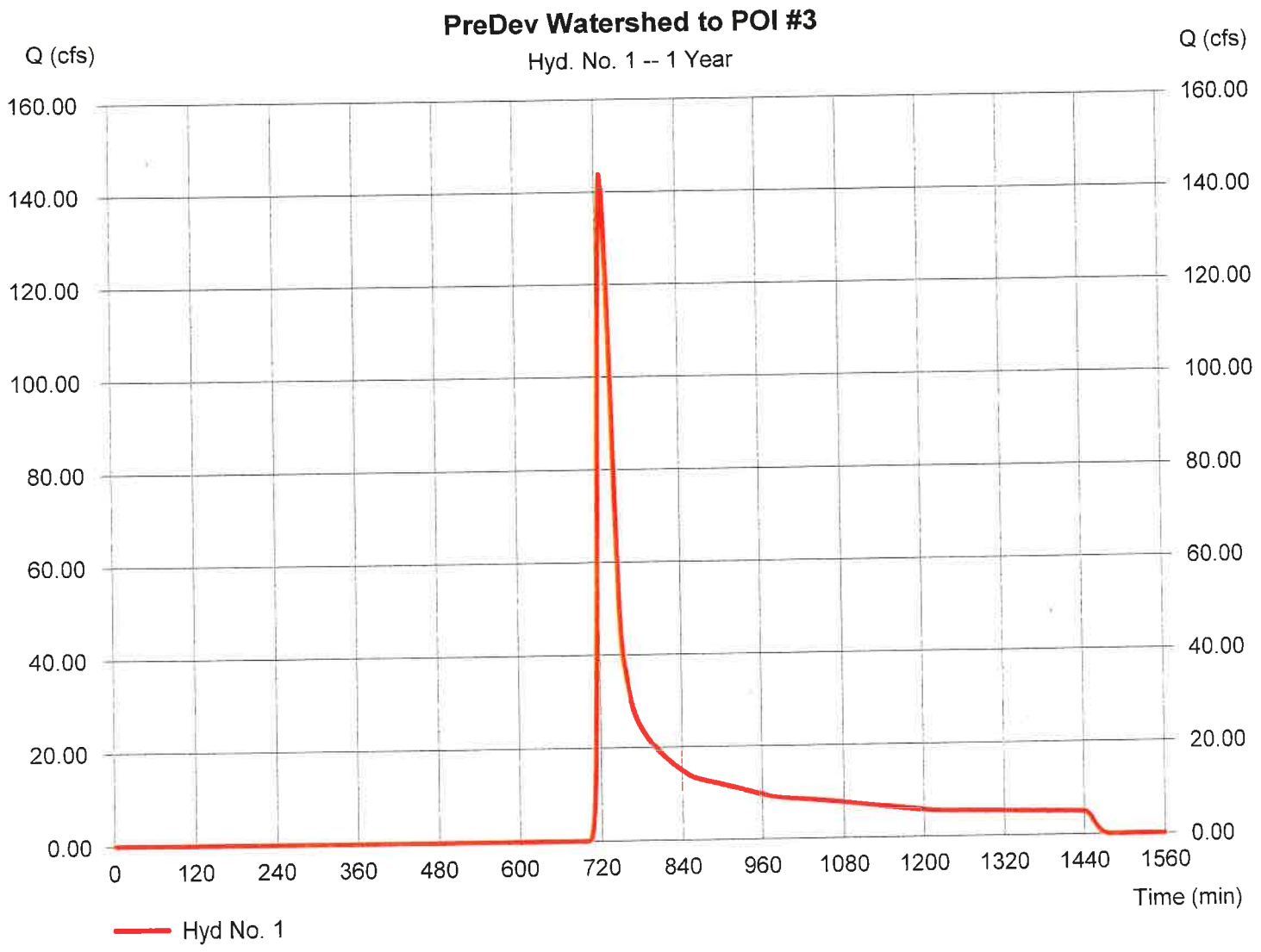
Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	143.71	221.41	-------	397.42	550.27	773.49	-------	1157.29	PreDev Watershed to POI #3
2	SCS Runoff	------	53.62	70.11	-------	104.36	132.33	171.35	-------	234.71	Zone 2: PostDev to SCM #3B
3	Reservoir	2	4.326	13.96	-------	56.98	98.09	145.11	-------	206.00	Route DA#3B To SCM #3B
4	SCS Runoff	------	39.81	51.45	-------	75.33	94.70	121.58	-------	165.03	Zone 4: PostDev to SCM #3A
5	Reservoir	4	0.938	2.822	-------	15.84	37.70	59.61	-------	95.92	DA #3A Routed SCM #3A
6	SCS Runoff	------	9.478	13.50	-------	22.18	29.53	40.06	-------	57.64	PostDev to SCM #3C
7	Reservoir	6	0.126	0.214	-------	2.336	10.05	22.56	-------	34.72	Route DA3C thru SCM#3C
8	SCS Runoff	------	11.10	14.51	-------	21.57	27.32	35.33	-------	48.44	PostDev Inflow to SCM#3D
9	Reservoir	8	0.075	0.085	-------	0.103	0.364	1.277	-------	6.352	Route DA to SCM #3D
10	SCS Runoff	------	13.38	17.46	-------	25.88	32.75	42.31	-------	57.95	PostDev Inflow to SCM #3E
11	Reservoir	10	0.129	0.146	-------	0.541	1.580	5.280	-------	20.20	Route Infllow SCM #3E
12	SCS Runoff	------	0.094	0.476	-------	3.434	7.091	13.21	-------	24.91	Zone 1: Bypasses SCM #3 & 3B
13	SCS Runoff	------	12.96	19.35	-------	33.38	45.44	63.09	-------	93.08	Zone 5: Onsite PostDevBypass to
14	SCS Runoff	------	38.47	60.12	-------	108.59	150.72	212.28	-------	317.29	Zone 3: Offsite Bypass to Graymont
15	Reach	14	36.29	57.14	-------	104.89	146.20	208.13	-------	313.79	Reach from Graymont to Woodlyn
16	Combine	3, 5, 12, 13, 15	49.92	81.19	-------	198.58	311.25	472.47	-------	704.29	Merge All PostDev @ Woodlyn
17	SCS Runoff	------	66.89	90.55	-------	140.89	182.90	242.31	-------	340.14	PreDev Flows at POI #7
18	SCS Runoff	------	25.49	36.63	-------	60.77	81.41	111.26	-------	161.32	PostDev Zone 14 & 15 Bypasses to
19	SCS Runoff	------	16.09	20.70	-------	30.13	37.75	48.32	-------	65.36	PostDev to SCM #7A
20	SCS Runoff	------	16.92	22.19	-------	33.12	42.15	54.81	-------	75.42	PostDev Zone 17-Onsite Bypass to
21	Reservoir	19	0.369	1.013	-------	8.945	22.20	36.45	-------	40.19	Route DA thru SCM #7A
22	Combine	18, 20, 21	36.91	51.95	-------	84.28	116.11	179.13	-------	253.99	Merge All PostDev Flow @ POI #7
23	SCS Runoff	------	29.14	46.76	-------	87.31	122.84	175.09	-------	265.75	PostDev Zone 6 Bypass From Moo
24	SCS Runoff	------	17.17	22.92	-------	34.97	44.90	58.85	-------	81.67	Bypasses SCM #3C & #3D
25	Reach	22	28.97	41.65	-------	69.51	102.39	152.09	-------	219.77	Reach From POI #7 to Falls Bluff C
26	Combine	7, 9, 23, 24,	35.86	56.38	-------	103.21	151.95	226.23	-------	343.15	Combine PostDev All Flows @ Falls
27	SCS Runoff	------	24.88	32.47	-------	48.15	60.92	78.71	-------	107.80	PostDev Zone 12 & 13: ByPasses S
28	Combine	11, 27	24.95	32.56	-------	48.26	61.05	78.86	-------	119.23	Combine All PostDev Flow to POI #
29	Reach	16	23.76	47.48	-------	117.90	189.06	291.48	-------	466.40	Reach from Woodlyn-Falls Bluff
30	Combine	25, 26, 29	80.65	128.68	-------	259.64	405.03	621.84	-------	977.57	Combine Upper DA 3 & DA 7 @ Fal
31	Reach	30	77.69	127.06	-------	260.86	399.76	609.43	-------	947.83	Reach Downstream Falls Bluff to P
32	Combine	28, 31	81.55	131.95	-------	267.83	408.39	627.14	-------	983.05	Combine All PostDev Flows at POI #3

Hydrograph Report

Hyd. No. 1

PreDev Watershed to POI #3

Hydrograph type	= SCS Runoff	Peak discharge	= 143.71 cfs
Storm frequency	= 1 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 619,979 cuft
Drainage area	= 300.880 ac	Curve number	= 66.7
Basin Slope	= 3.0 %	Hydraulic length	= 5451 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 22.67 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

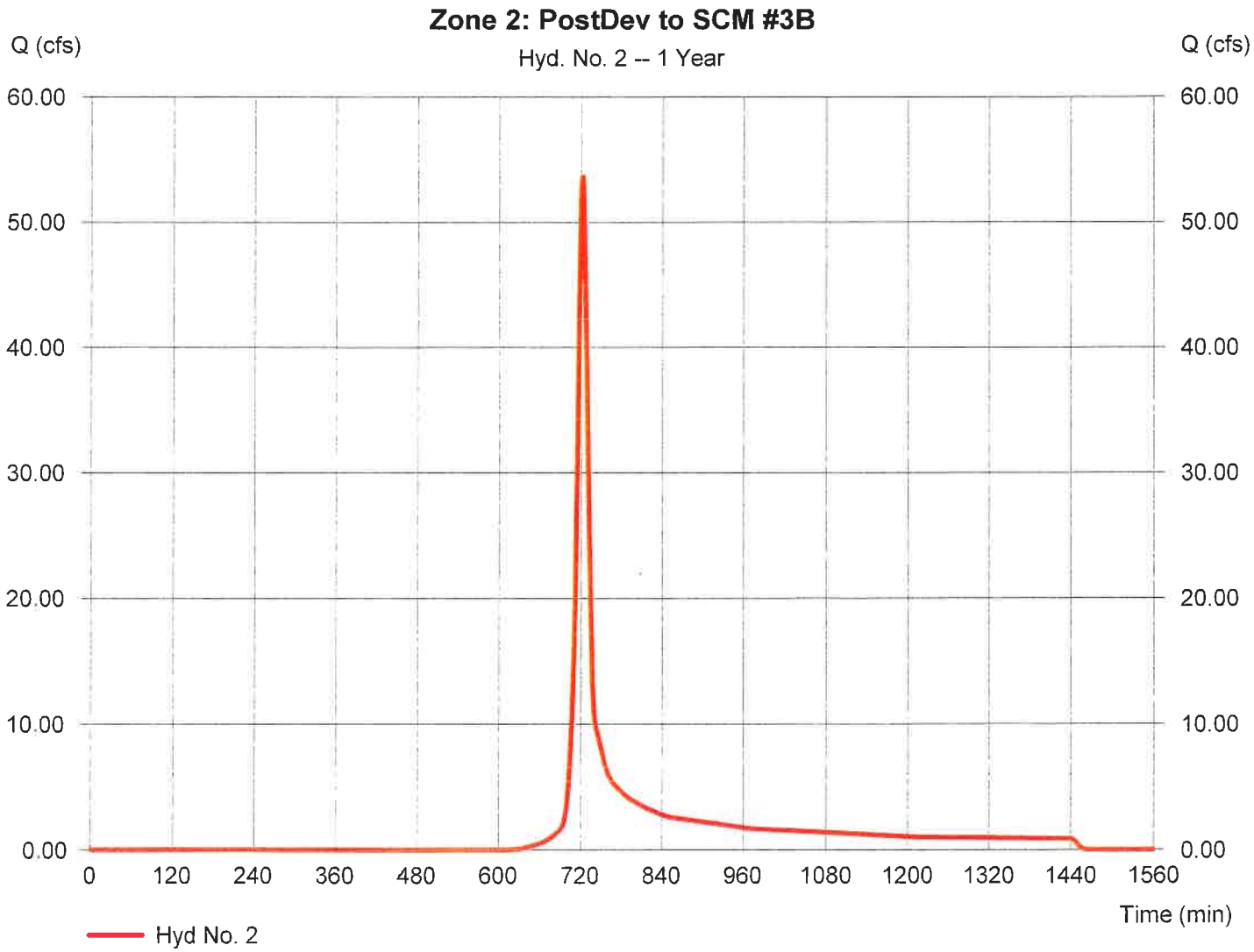


Hydrograph Report

Hyd. No. 2

Zone 2: PostDev to SCM #3B

Hydrograph type	= SCS Runoff	Peak discharge	= 53.62 cfs
Storm frequency	= 1 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 146,913 cuft
Drainage area	= 36.040 ac	Curve number	= 77.9
Basin Slope	= 1.9 %	Hydraulic length	= 2520 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.80 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



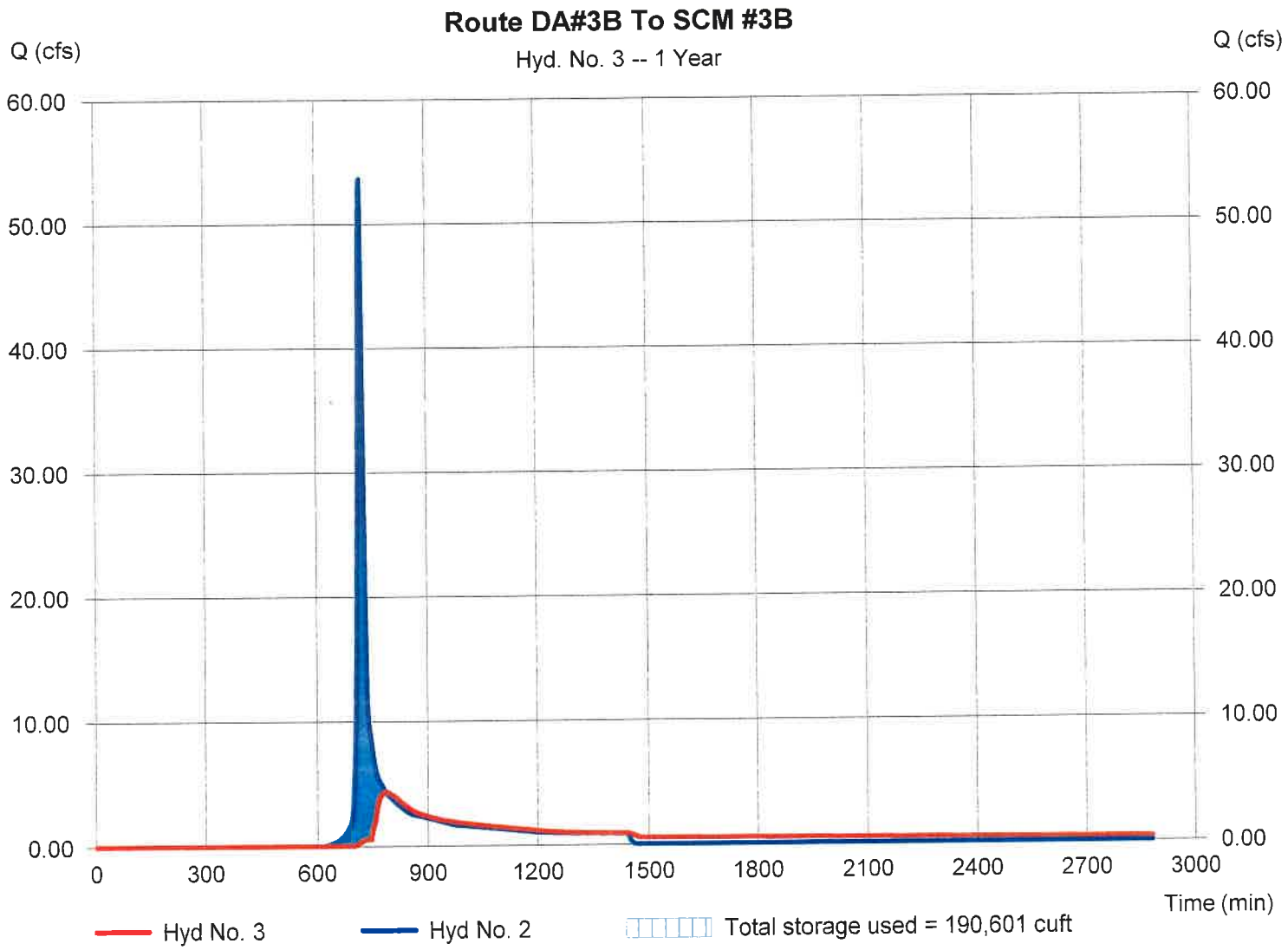
Hydrograph Report

Hyd. No. 3

Route DA#3B To SCM #3B

Hydrograph type	= Reservoir	Peak discharge	= 4.326 cfs
Storm frequency	= 1 yrs	Time to peak	= 787 min
Time interval	= 1 min	Hyd. volume	= 113,045 cuft
Inflow hyd. No.	= 2 - Zone 2: PostDev to SCM #3B	Max. Elevation	= 353.46 ft
Reservoir name	= SCM 3B-rev032620	Max. Storage	= 190,601 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

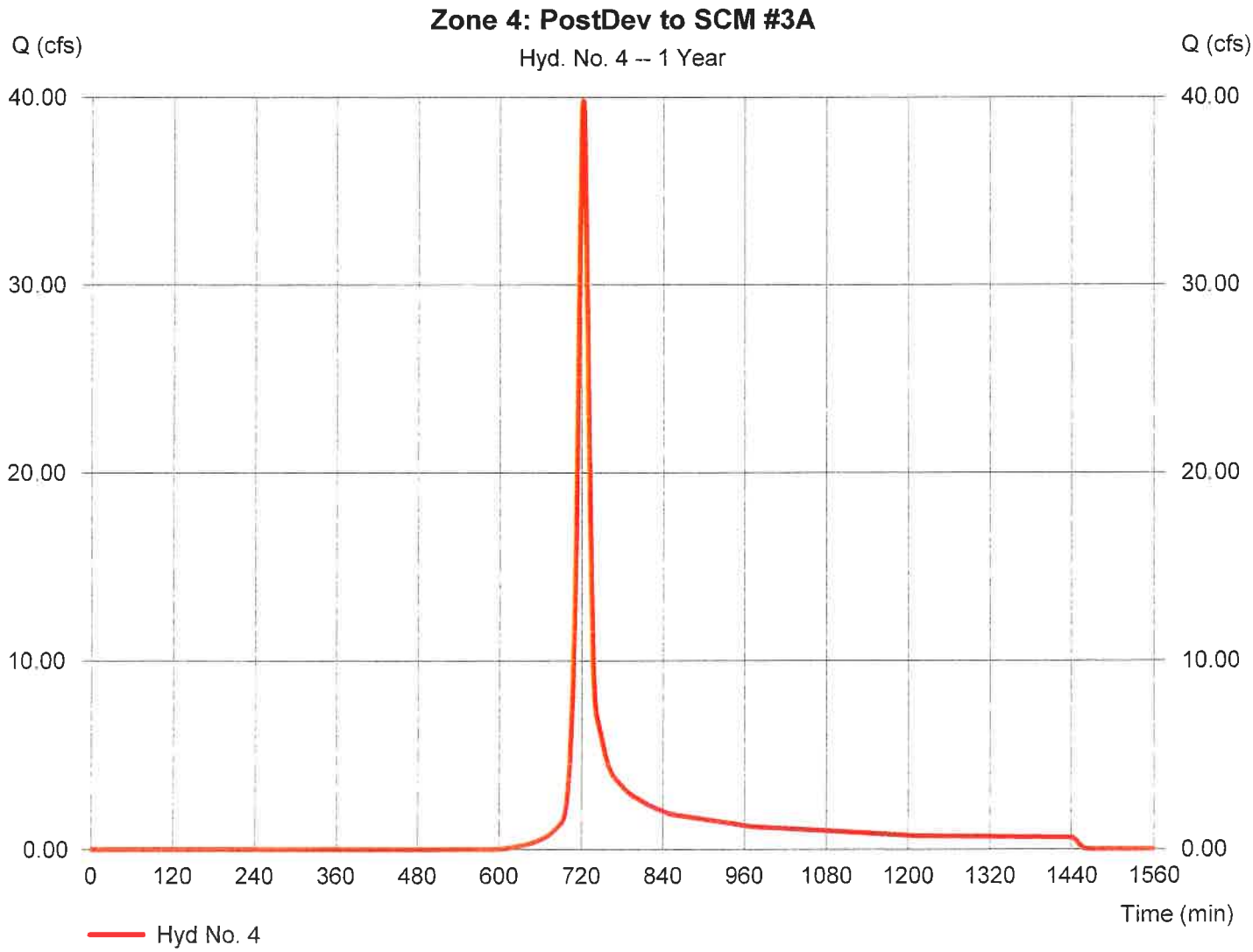


Hydrograph Report

Hyd. No. 4

Zone 4: PostDev to SCM #3A

Hydrograph type	= SCS Runoff	Peak discharge	= 39.81 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 108,305 cuft
Drainage area	= 24.600 ac	Curve number	= 79.4
Basin Slope	= 1.5 %	Hydraulic length	= 2250 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.94 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



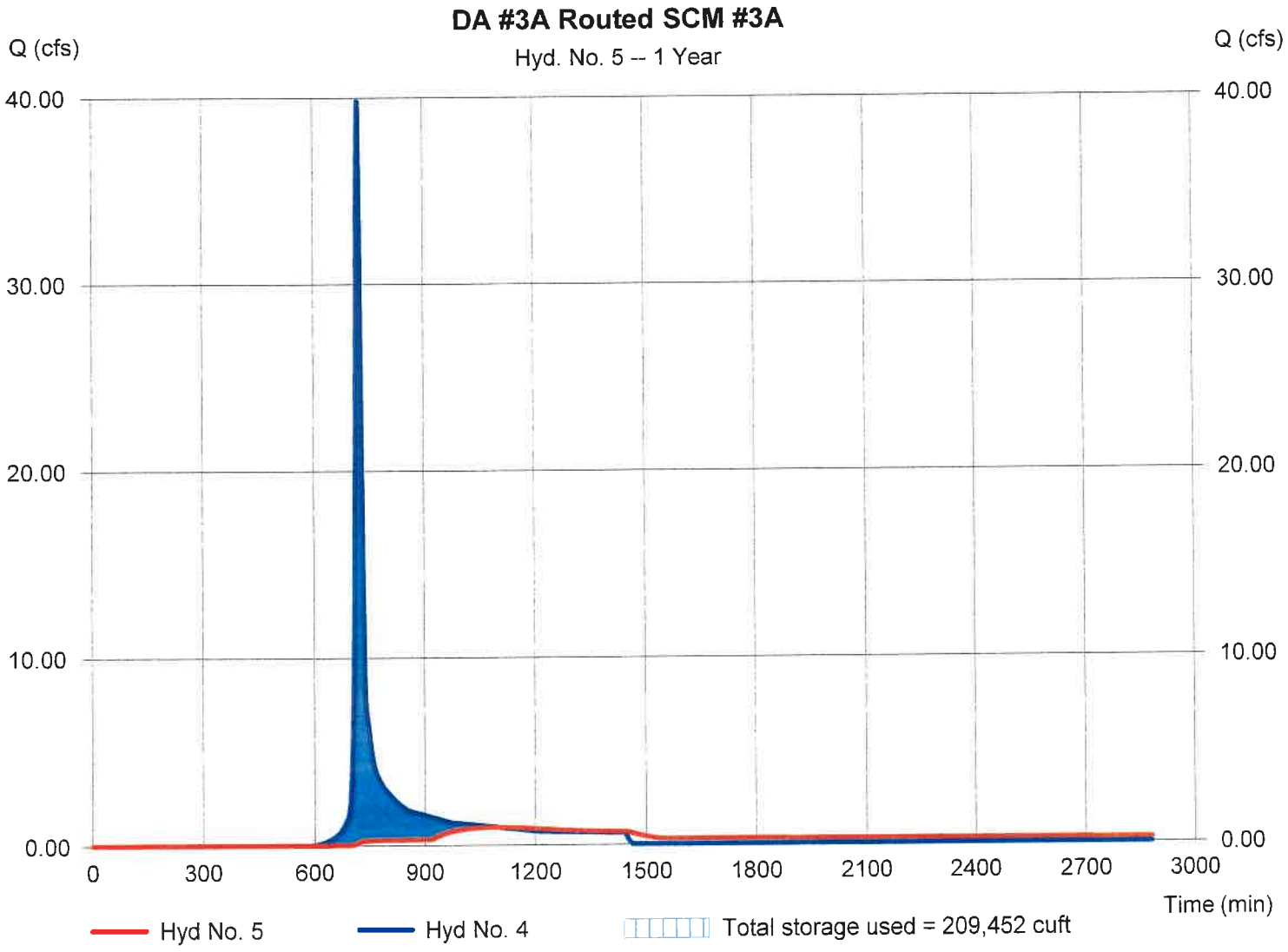
Hydrograph Report

Hyd. No. 5

DA #3A Routed SCM #3A

Hydrograph type	= Reservoir	Peak discharge	= 0.938 cfs
Storm frequency	= 1 yrs	Time to peak	= 1098 min
Time interval	= 1 min	Hyd. volume	= 52,686 cuft
Inflow hyd. No.	= 4 - Zone 4: PostDev to SCM #3A	Max. Elevation	= 353.29 ft
Reservoir name	= SCM #3A	Max. Storage	= 209,452 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

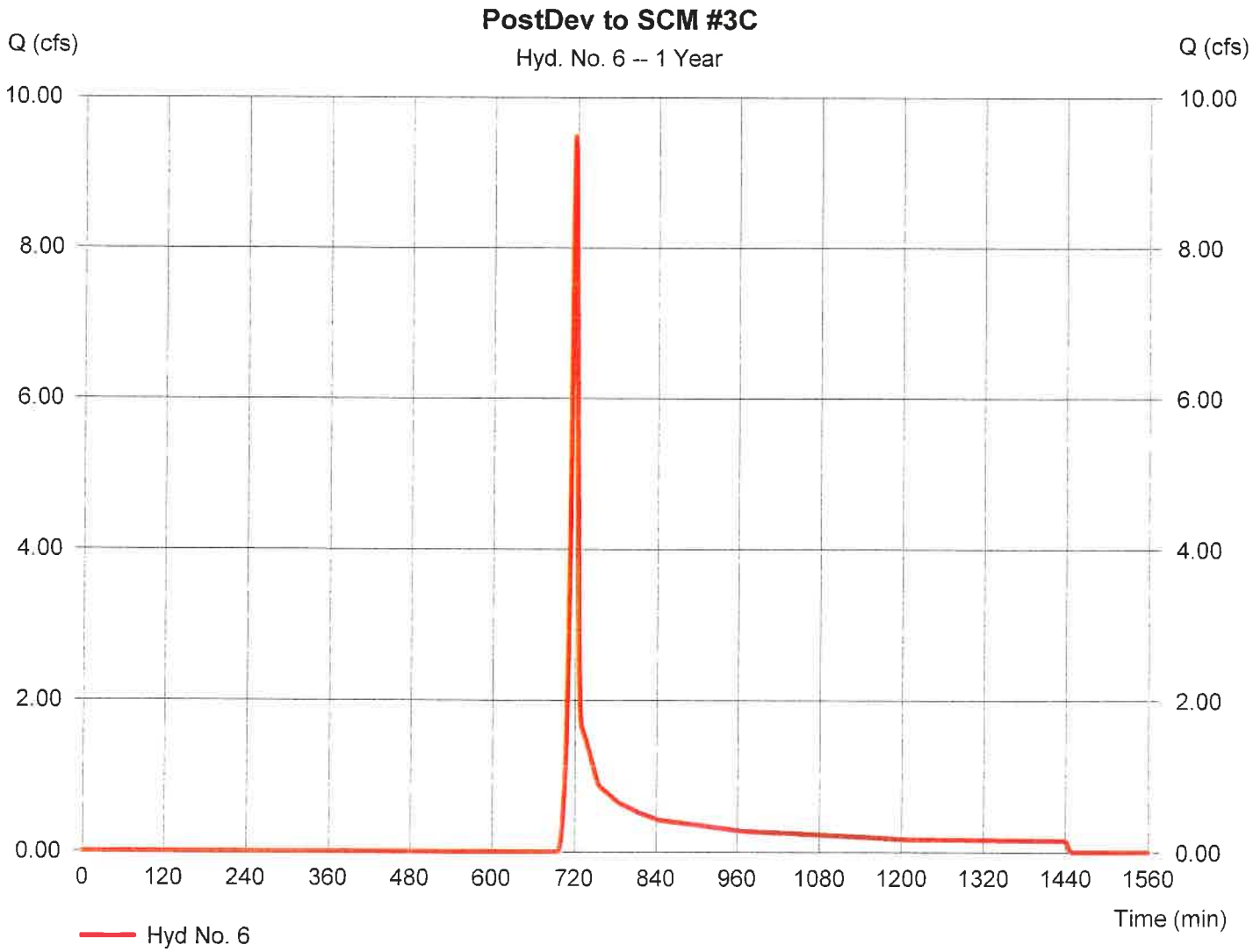


Hydrograph Report

Hyd. No. 6

PostDev to SCM #3C

Hydrograph type	= SCS Runoff	Peak discharge	= 9.478 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 20,243 cuft
Drainage area	= 7.970 ac	Curve number	= 69.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



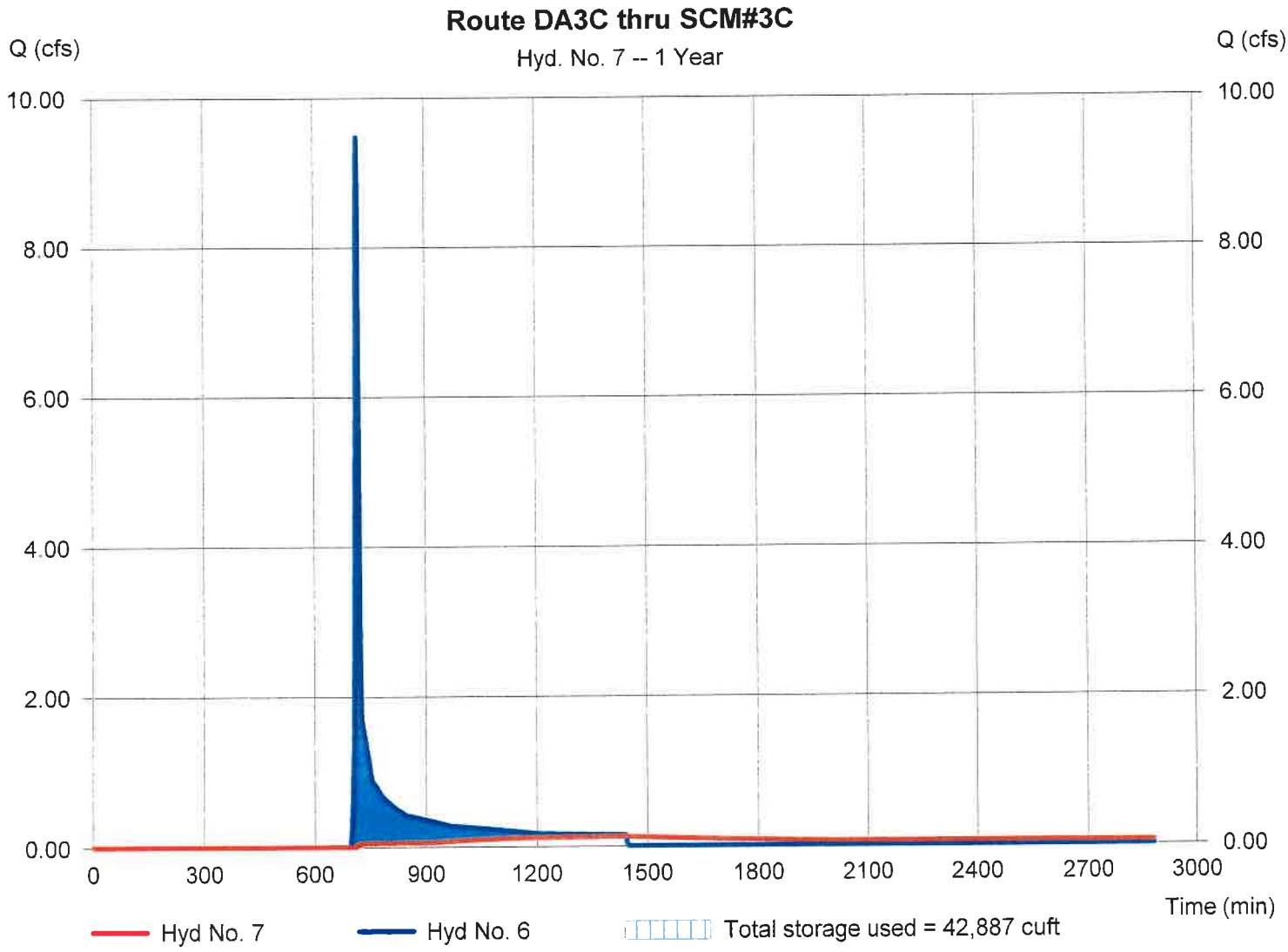
Hydrograph Report

Hyd. No. 7

Route DA3C thru SCM#3C

Hydrograph type	= Reservoir	Peak discharge	= 0.126 cfs
Storm frequency	= 1 yrs	Time to peak	= 1442 min
Time interval	= 1 min	Hyd. volume	= 9,715 cuft
Inflow hyd. No.	= 6 - PostDev to SCM #3C	Max. Elevation	= 341.71 ft
Reservoir name	= SCM #3C	Max. Storage	= 42,887 cuft

Storage Indication method used. Wet pond routing start elevation = 340.50 ft.

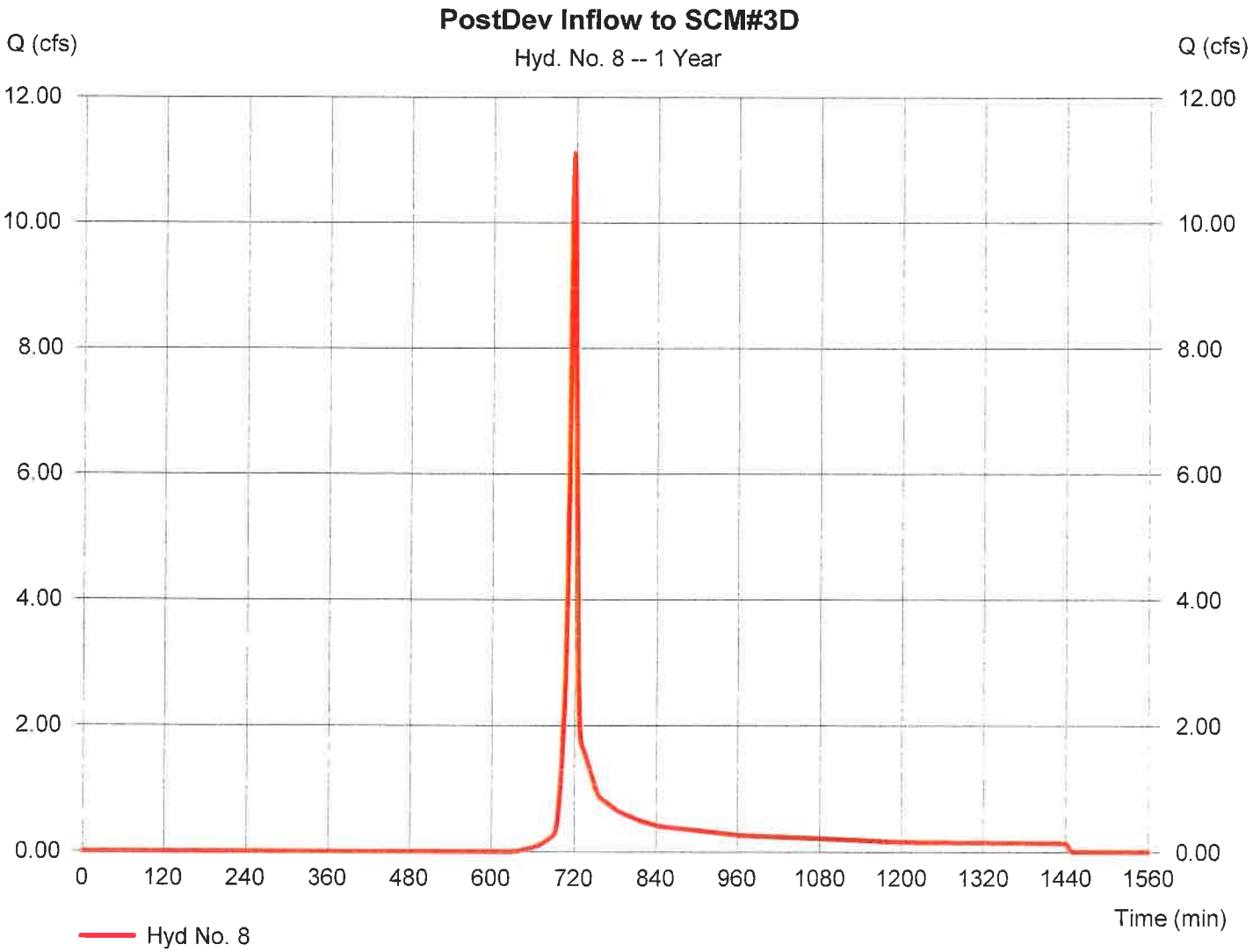


Hydrograph Report

Hyd. No. 8

PostDev Inflow to SCM#3D

Hydrograph type	= SCS Runoff	Peak discharge	= 11.10 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 22,373 cuft
Drainage area	= 5.640 ac	Curve number	= 76.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

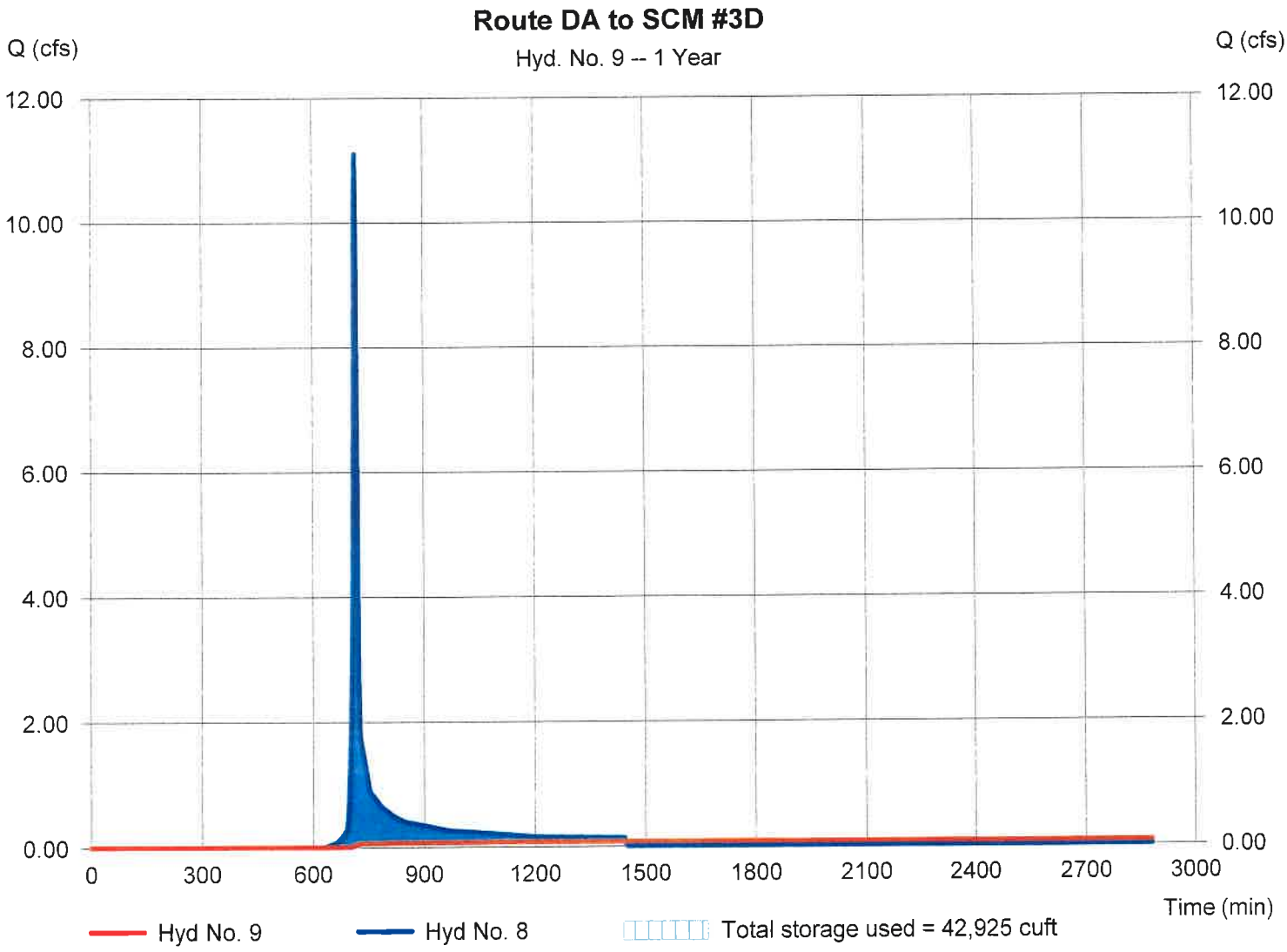
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 9

Route DA to SCM #3D

Hydrograph type	= Reservoir	Peak discharge	= 0.075 cfs
Storm frequency	= 1 yrs	Time to peak	= 1444 min
Time interval	= 1 min	Hyd. volume	= 9,063 cuft
Inflow hyd. No.	= 8 - PostDev Inflow to SCM#3D	Max. Elevation	= 346.19 ft
Reservoir name	= SCM #3D	Max. Storage	= 42,925 cuft

Storage Indication method used. Wet pond routing start elevation = 344.50 ft.

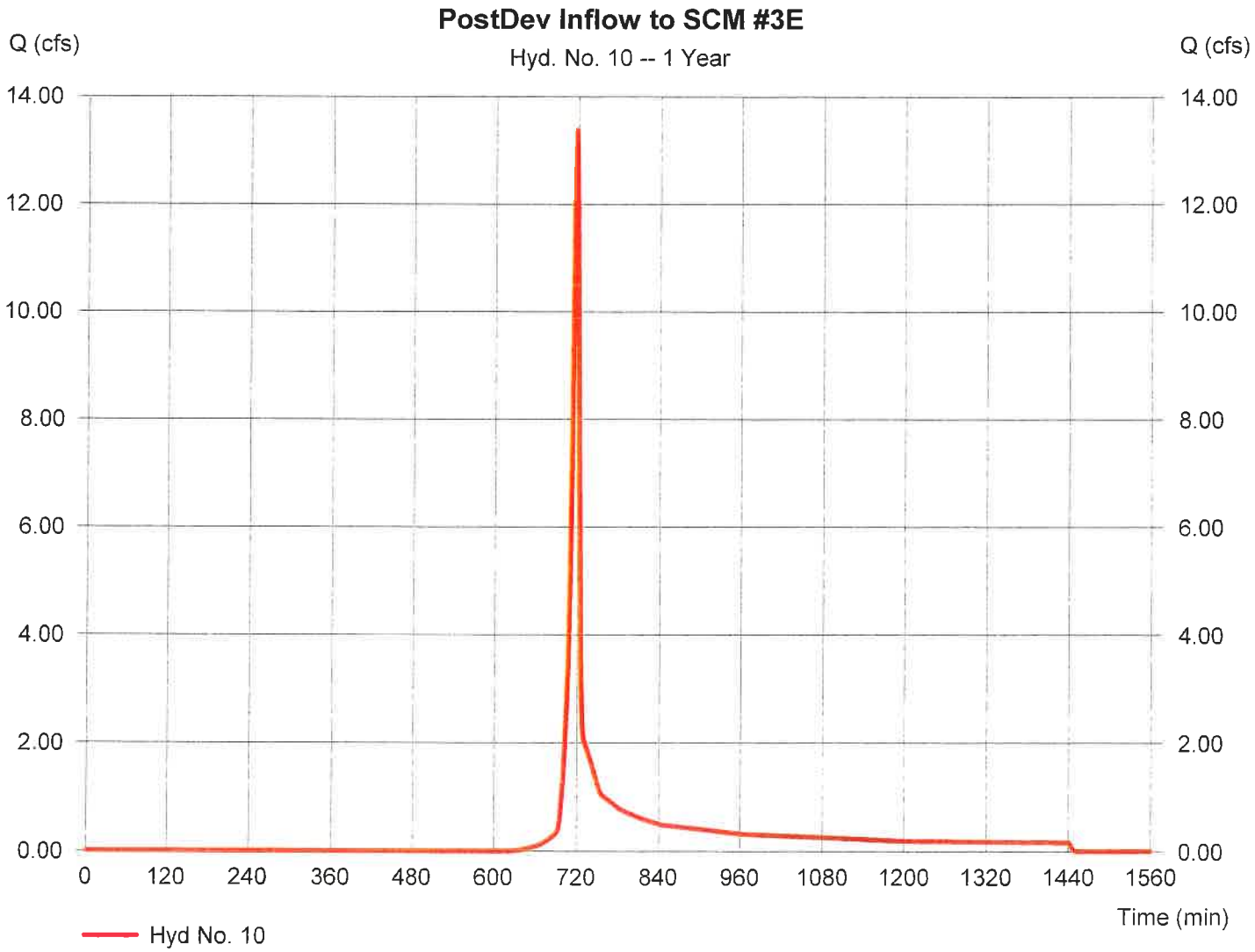


Hydrograph Report

Hyd. No. 10

PostDev Inflow to SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 13.38 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 26,943 cuft
Drainage area	= 6.720 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



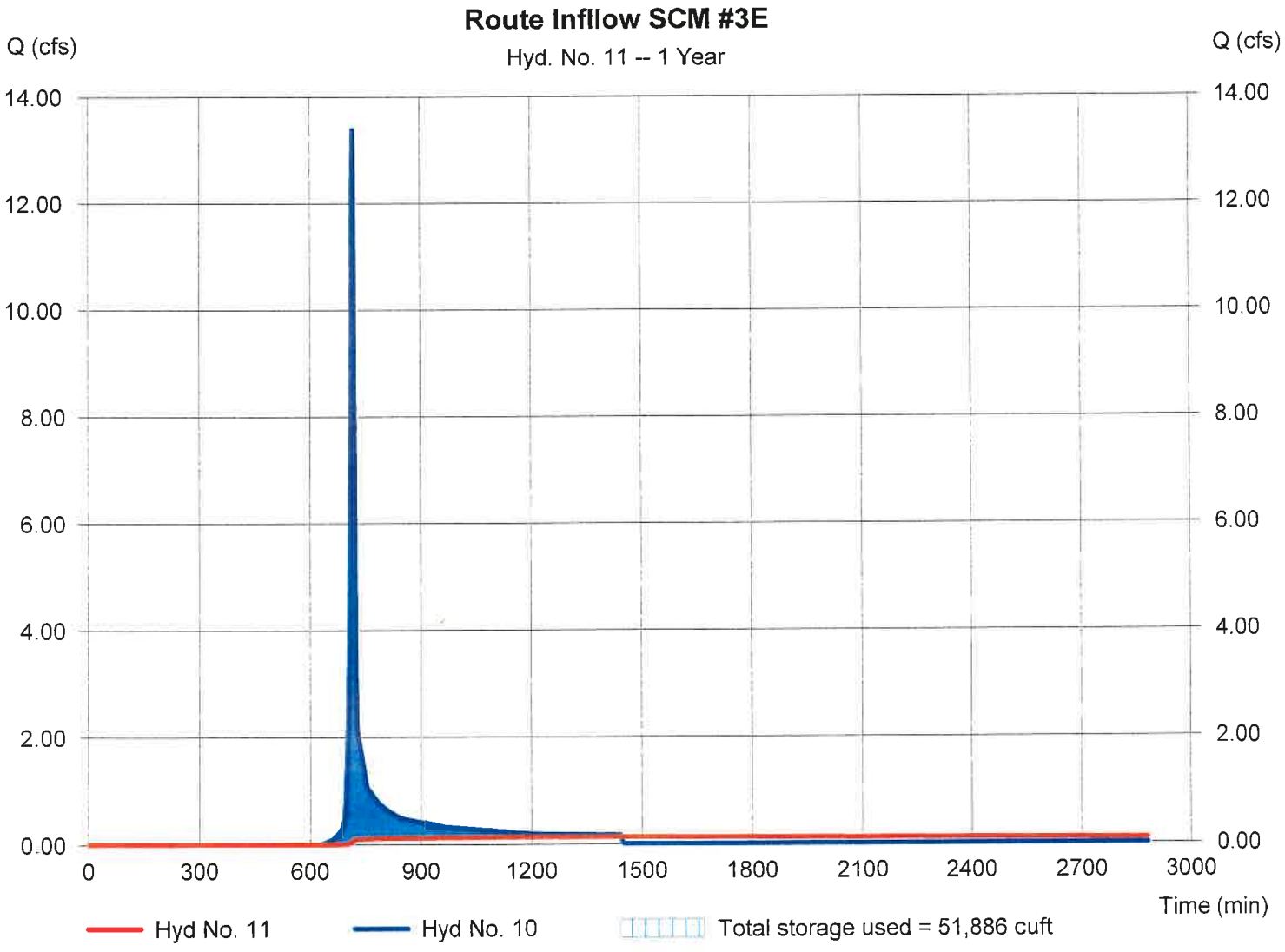
Hydrograph Report

Hyd. No. 11

Route Infllow SCM #3E

Hydrograph type	= Reservoir	Peak discharge	= 0.129 cfs
Storm frequency	= 1 yrs	Time to peak	= 1442 min
Time interval	= 1 min	Hyd. volume	= 15,032 cuft
Inflow hyd. No.	= 10 - PostDev Inflow to SCM #3E	Max. Elevation	= 308.08 ft
Reservoir name	= SCM #3E	Max. Storage	= 51,886 cuft

Storage Indication method used. Wet pond routing start elevation = 306.50 ft.

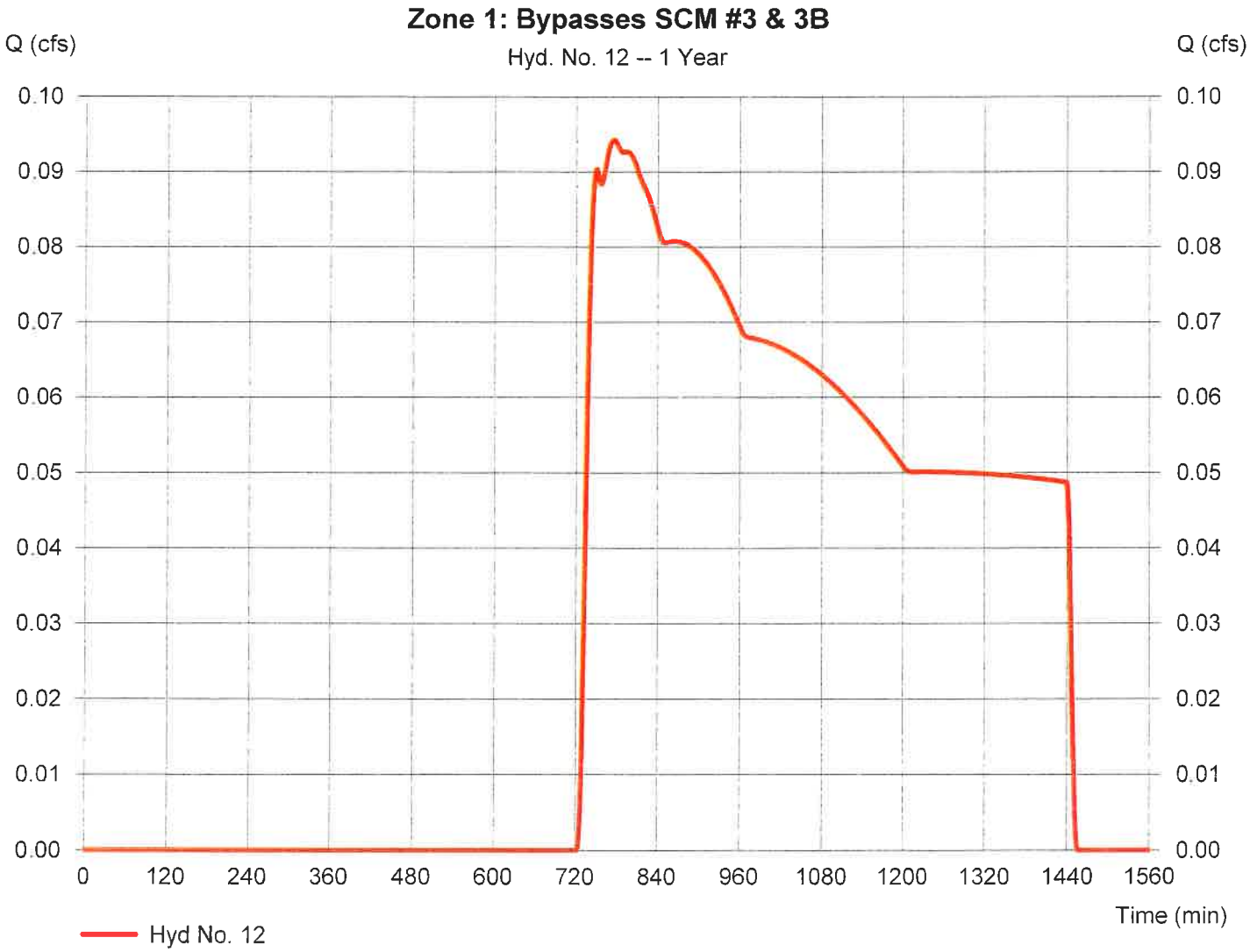


Hydrograph Report

Hyd. No. 12

Zone 1: Bypasses SCM #3 & 3B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.094 cfs
Storm frequency	= 1 yrs	Time to peak	= 776 min
Time interval	= 1 min	Hyd. volume	= 2,755 cuft
Drainage area	= 8.510 ac	Curve number	= 49.9
Basin Slope	= 2.8 %	Hydraulic length	= 1529 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

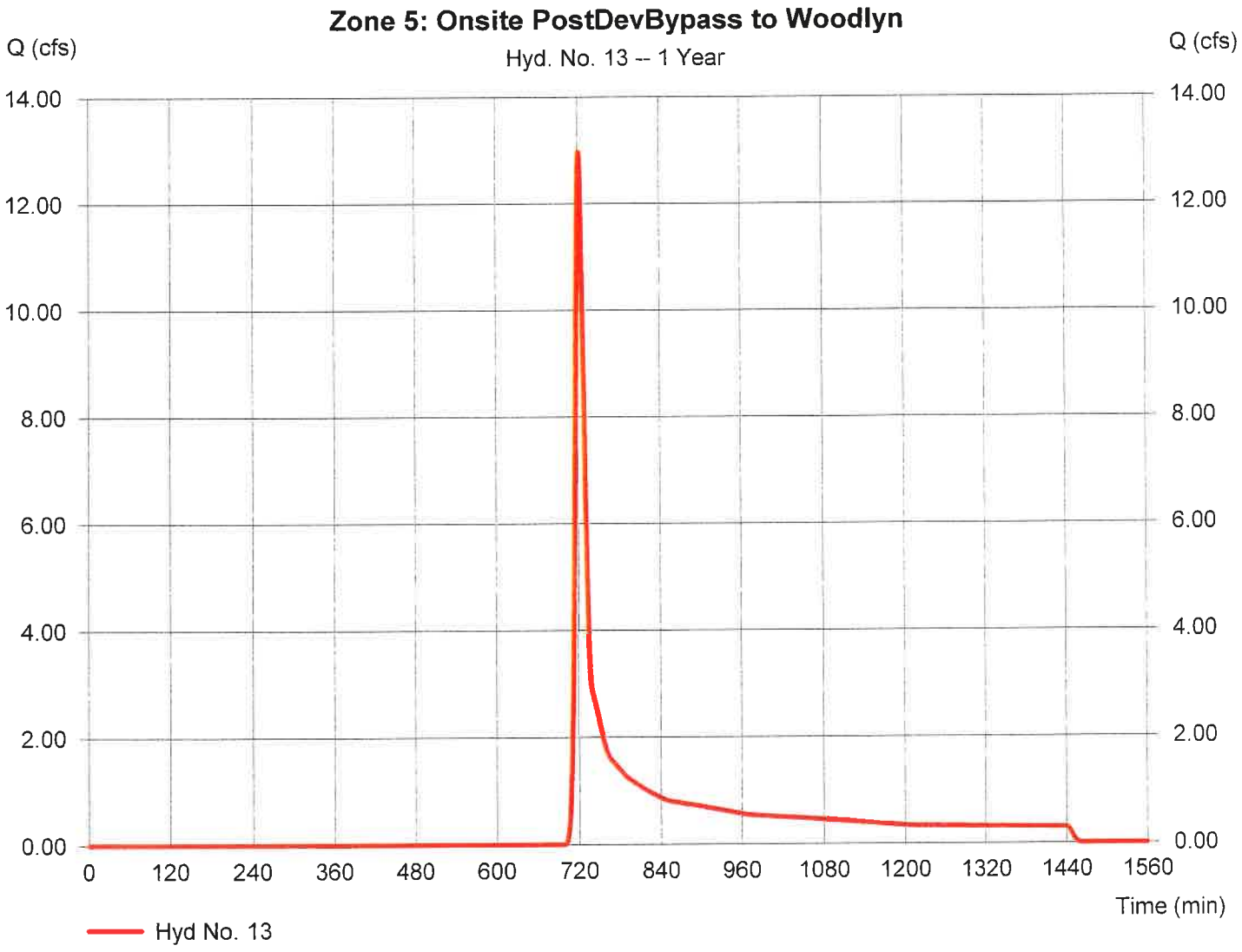


Hydrograph Report

Hyd. No. 13

Zone 5: Onsite PostDevBypass to Woodlyn

Hydrograph type	= SCS Runoff	Peak discharge	= 12.96 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 37,996 cuft
Drainage area	= 17.680 ac	Curve number	= 67.4
Basin Slope	= 1.5 %	Hydraulic length	= 1788 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.58 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

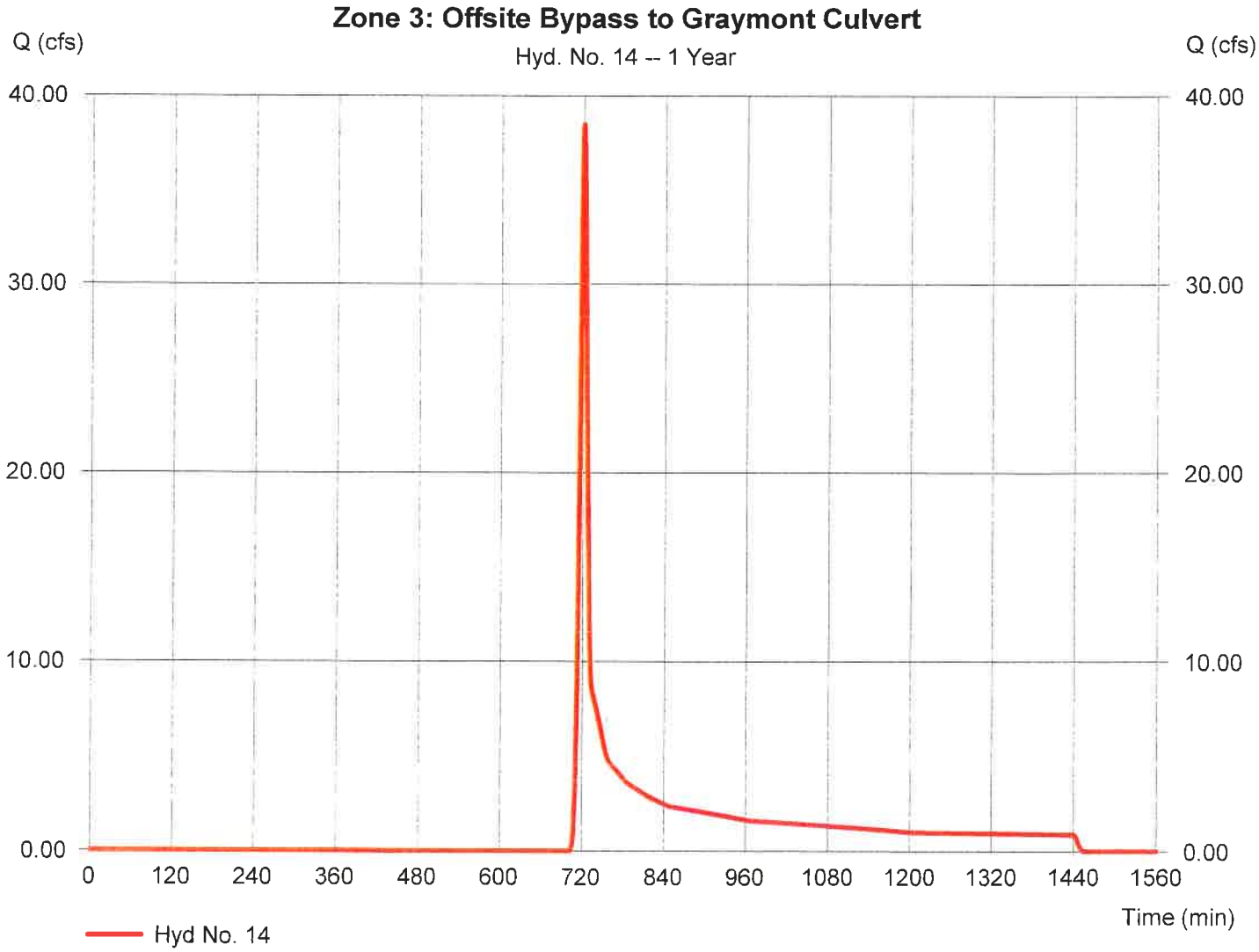


Hydrograph Report

Hyd. No. 14

Zone 3: Offsite Bypass to Graymont Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 38.47 cfs
Storm frequency	= 1 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 104,925 cuft
Drainage area	= 57.120 ac	Curve number	= 65
Basin Slope	= 1.8 %	Hydraulic length	= 1220 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hyd. No. 15

Reach from Graymont to Woodlyn

Hydrograph type	= Reach	Peak discharge	= 36.29 cfs
Storm frequency	= 1 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 104,923 cuft
Inflow hyd. No.	= 14 - Zone 3: Offsite Bypass to Graymont	Section type	= Culvert
Reach length	= 1750.0 ft	Channel slope	= Trapezoidal
Manning's n	= 0.009	Bottom width	= 1.4 %
Side slope	= 2.0:1	Max. depth	= 5.0 ft
Rating curve x	= 6.696	Rating curve m	= 1.370
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.4027

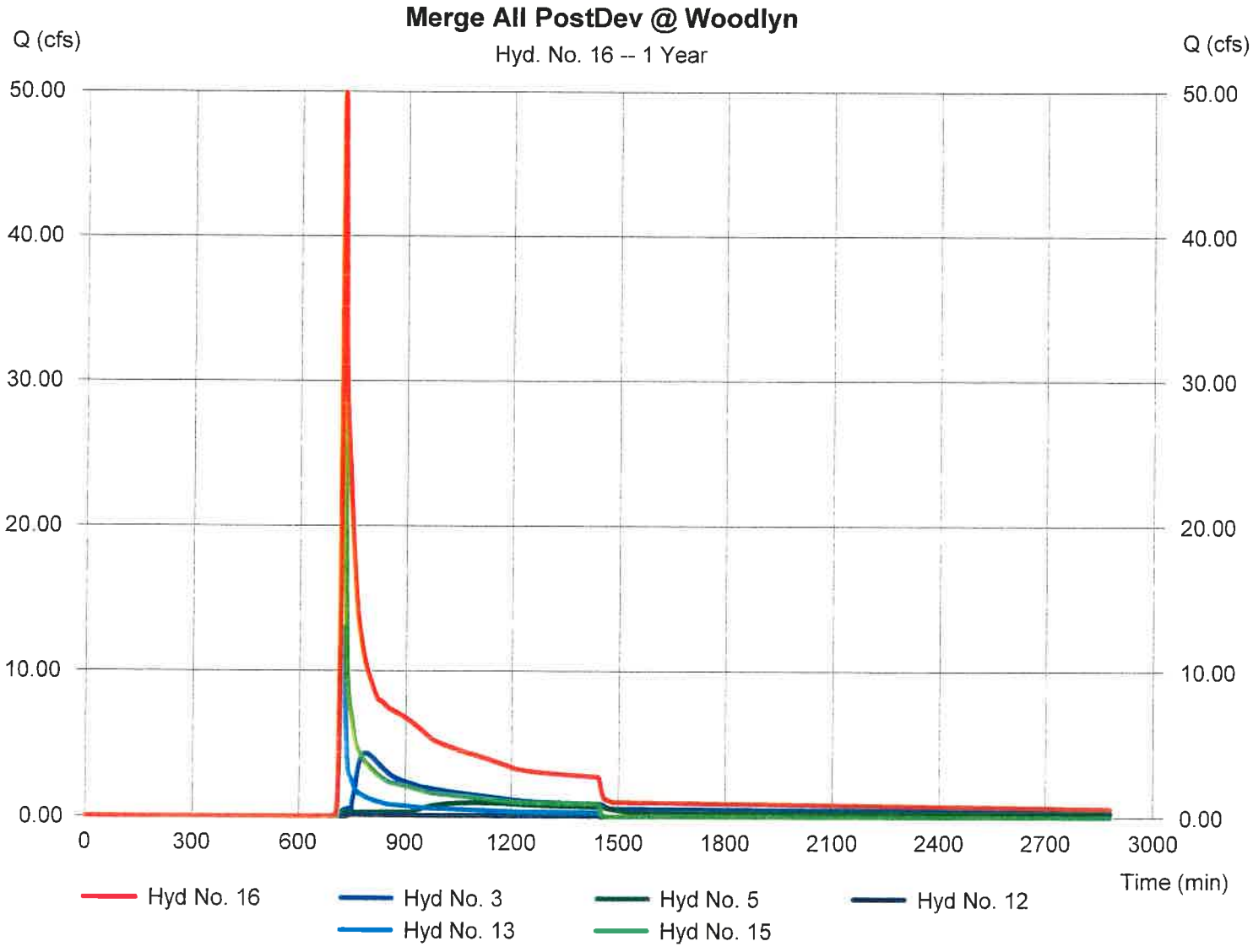
Modified Att-Kin routing method used.

Hydrograph Report

Hyd. No. 16

Merge All PostDev @ Woodlyn

Hydrograph type	= Combine	Peak discharge	= 49.92 cfs
Storm frequency	= 1 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 350,675 cuft
Inflow hyds.	= 3, 5, 12, 13, 15	Contrib. drain. area	= 26.190 ac

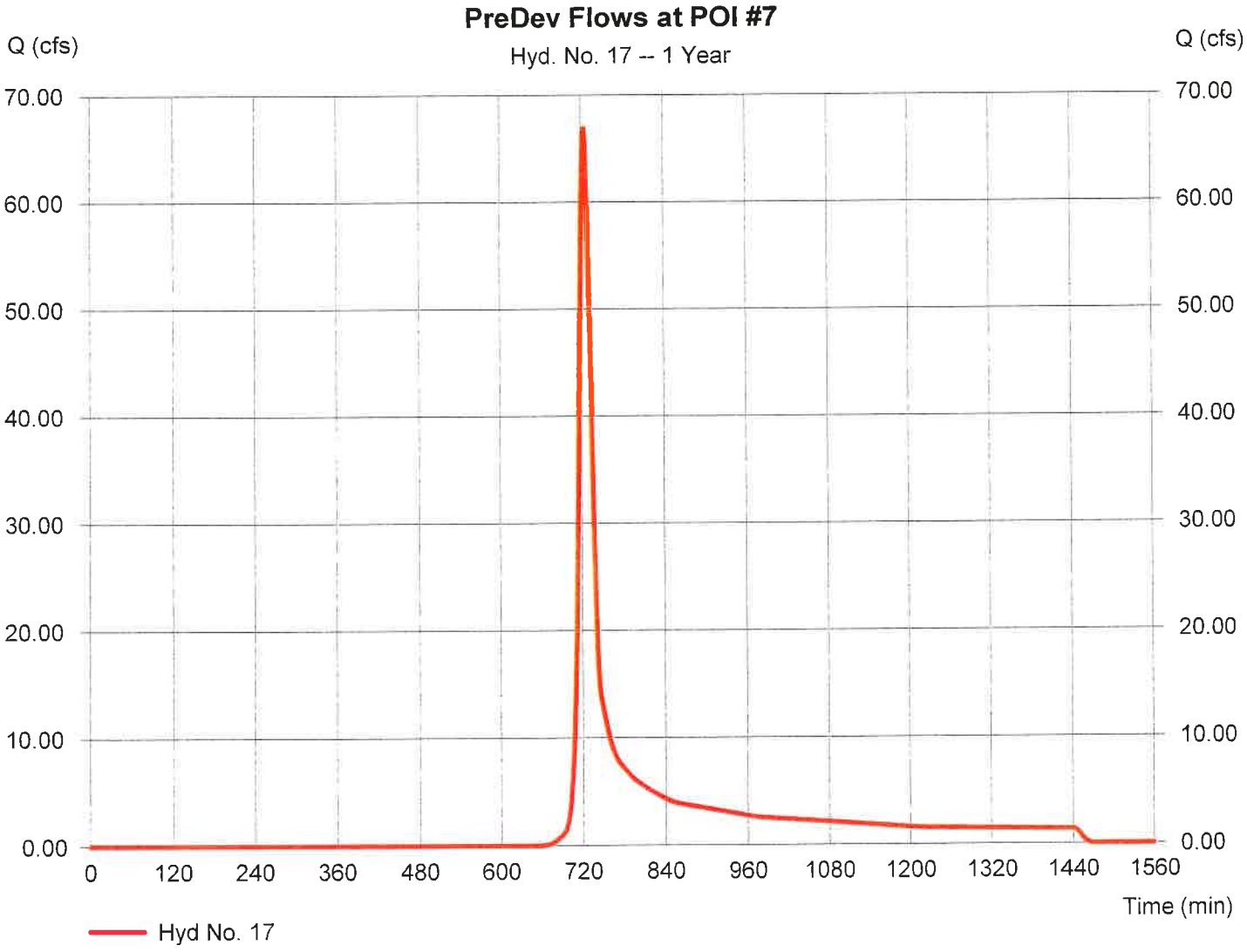


Hydrograph Report

Hyd. No. 17

PreDev Flows at POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 66.89 cfs
Storm frequency	= 1 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 208,951 cuft
Drainage area	= 62.670 ac	Curve number	= 74.4
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.43 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

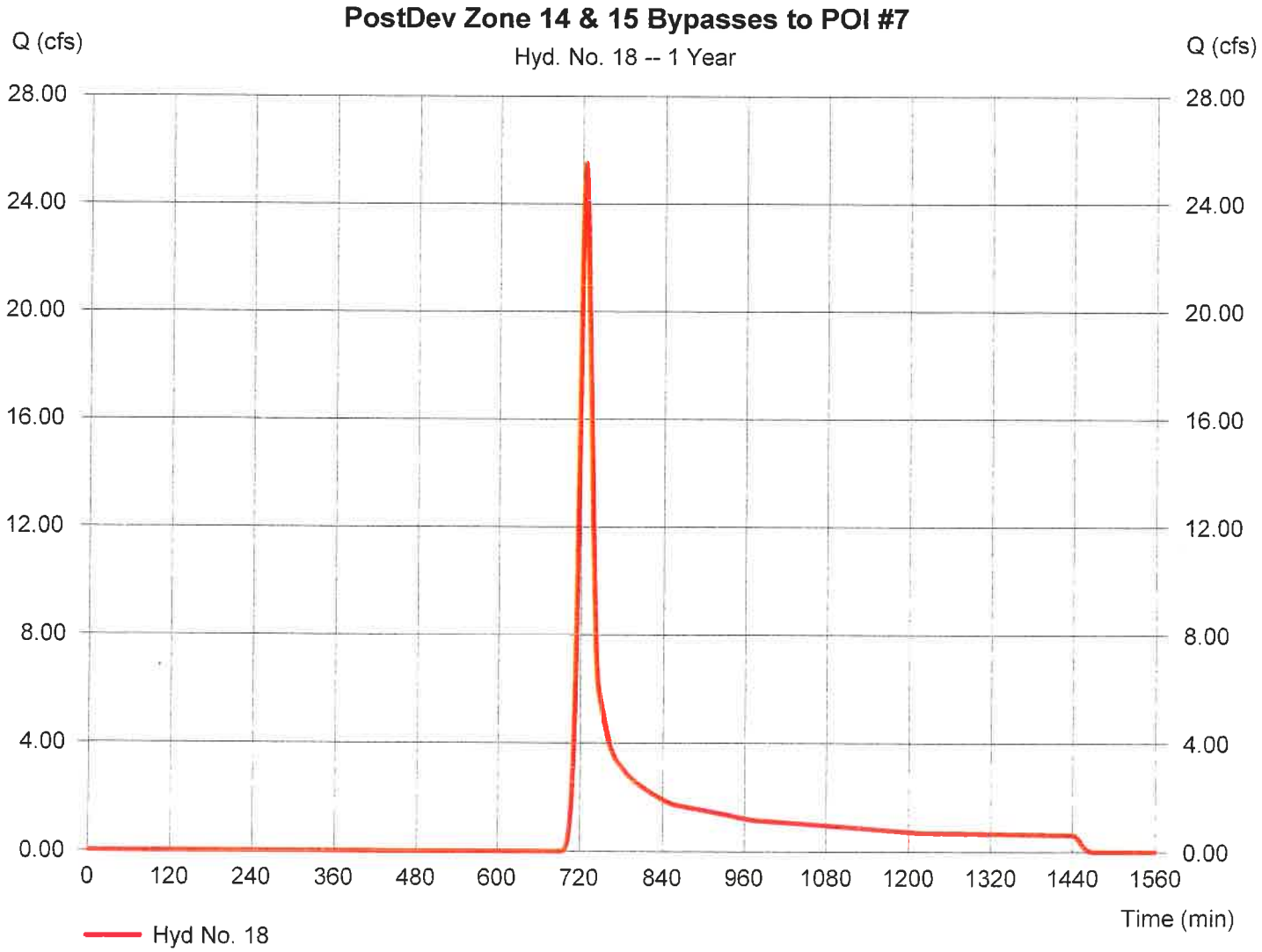


Hydrograph Report

Hyd. No. 18

PostDev Zone 14 & 15 Bypasses to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 25.49 cfs
Storm frequency	= 1 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 85,207 cuft
Drainage area	= 33.240 ac	Curve number	= 70
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.27 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

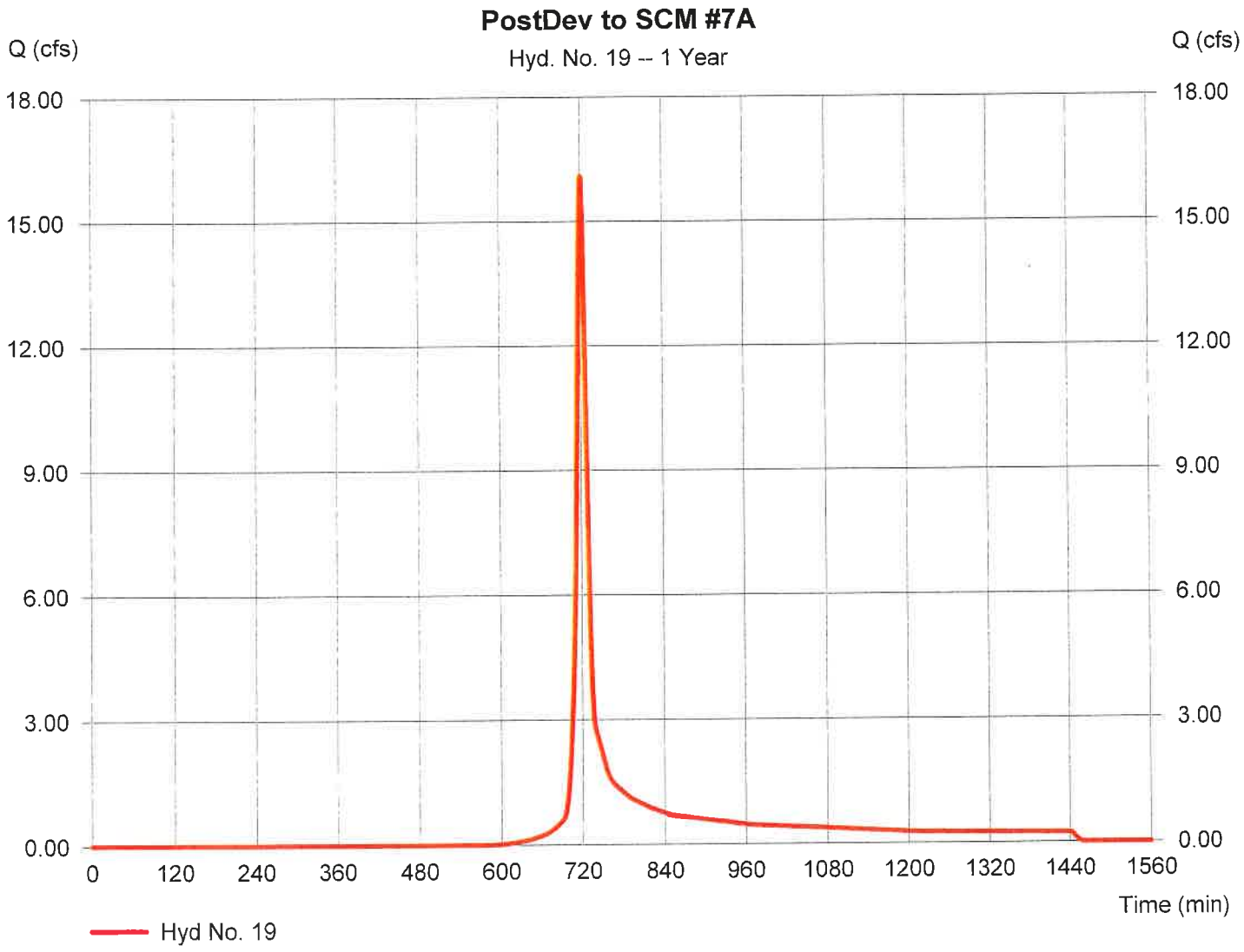


Hydrograph Report

Hyd. No. 19

PostDev to SCM #7A

Hydrograph type	= SCS Runoff	Peak discharge	= 16.09 cfs
Storm frequency	= 1 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 40,948 cuft
Drainage area	= 9.260 ac	Curve number	= 79.8
Basin Slope	= 1.1 %	Hydraulic length	= 1505 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.38 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

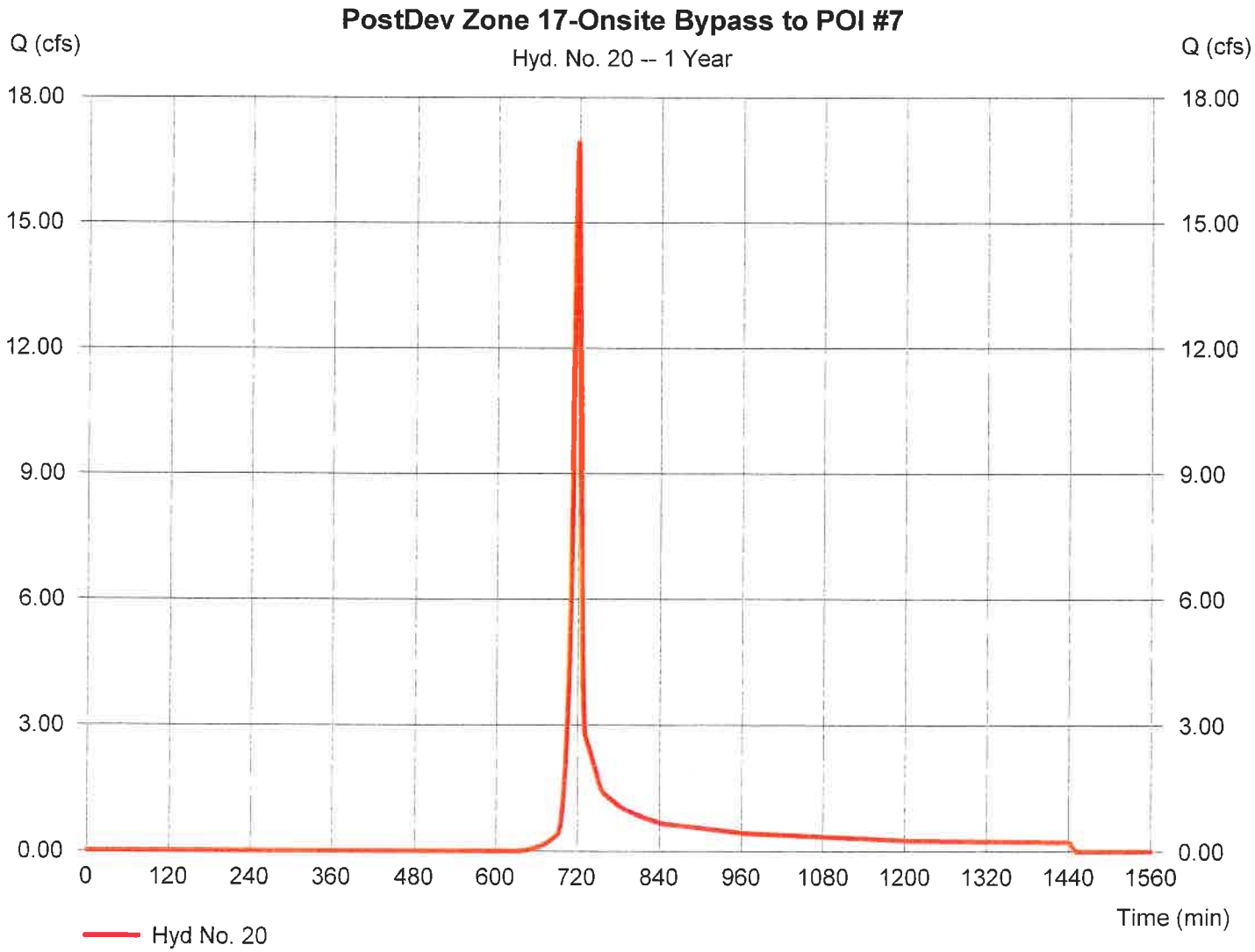


Hydrograph Report

Hyd. No. 20

PostDev Zone 17-Onsite Bypass to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 16.92 cfs
Storm frequency	= 1 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 35,874 cuft
Drainage area	= 9.720 ac	Curve number	= 76.5
Basin Slope	= 1.0 %	Hydraulic length	= 810 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.97 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



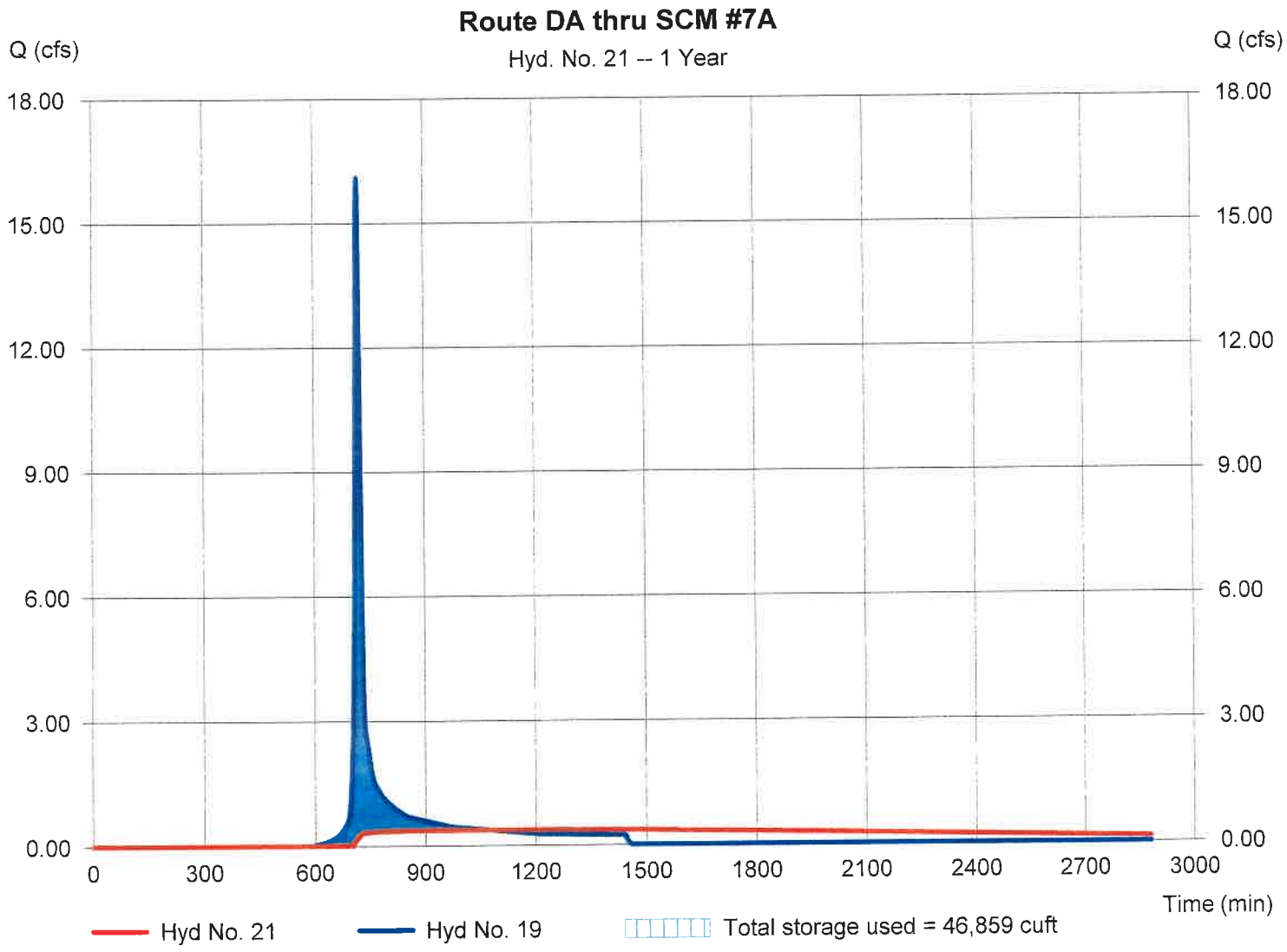
Hydrograph Report

Hyd. No. 21

Route DA thru SCM #7A

Hydrograph type	= Reservoir	Peak discharge	= 0.369 cfs
Storm frequency	= 1 yrs	Time to peak	= 1075 min
Time interval	= 1 min	Hyd. volume	= 37,084 cuft
Inflow hyd. No.	= 19 - PostDev to SCM #7A	Max. Elevation	= 373.06 ft
Reservoir name	= SCM #7A	Max. Storage	= 46,859 cuft

Storage Indication method used. Wet pond routing start elevation = 370.50 ft.

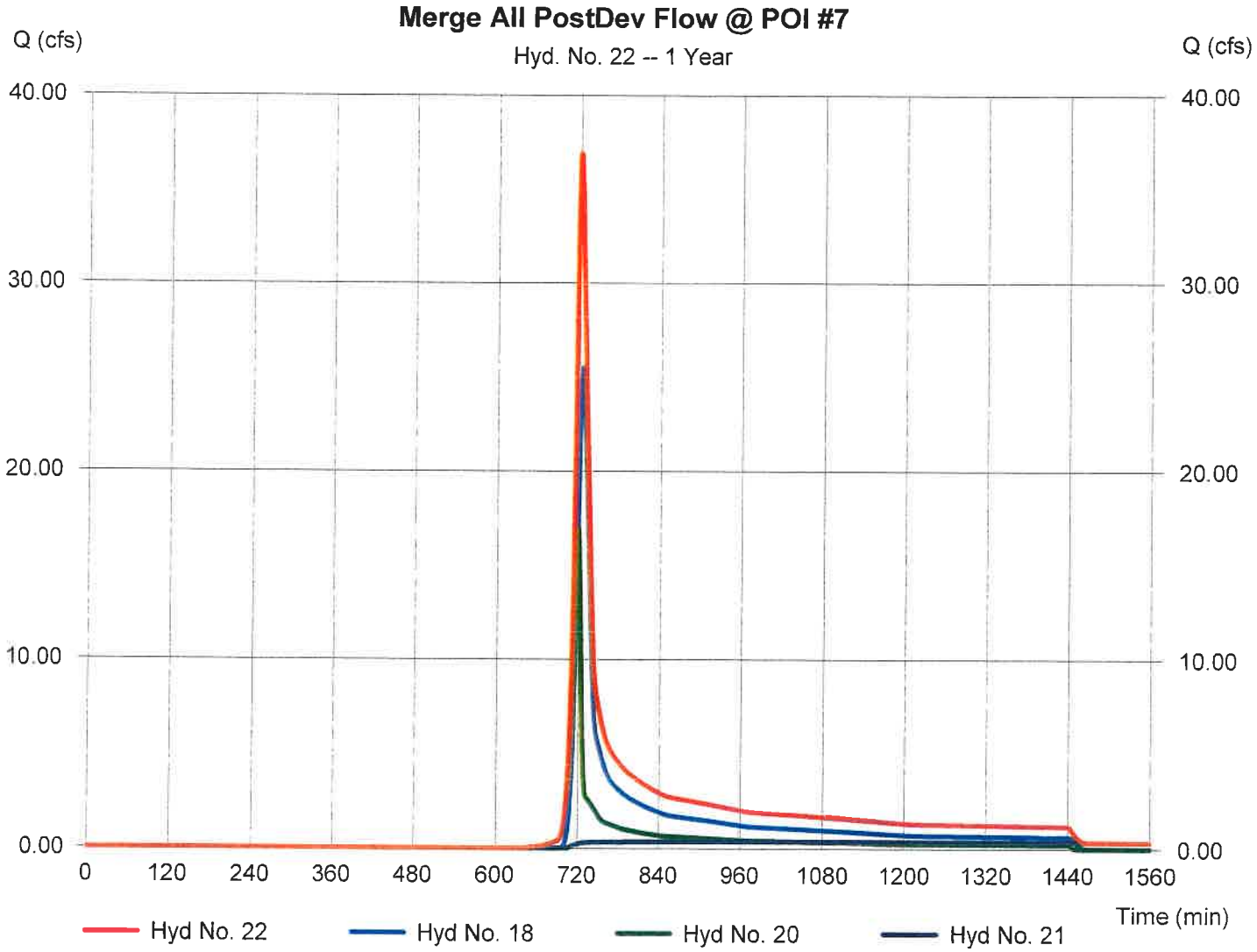


Hydrograph Report

Hyd. No. 22

Merge All PostDev Flow @ POI #7

Hydrograph type	= Combine	Peak discharge	= 36.91 cfs
Storm frequency	= 1 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 158,166 cuft
Inflow hyds.	= 18, 20, 21	Contrib. drain. area	= 42.960 ac

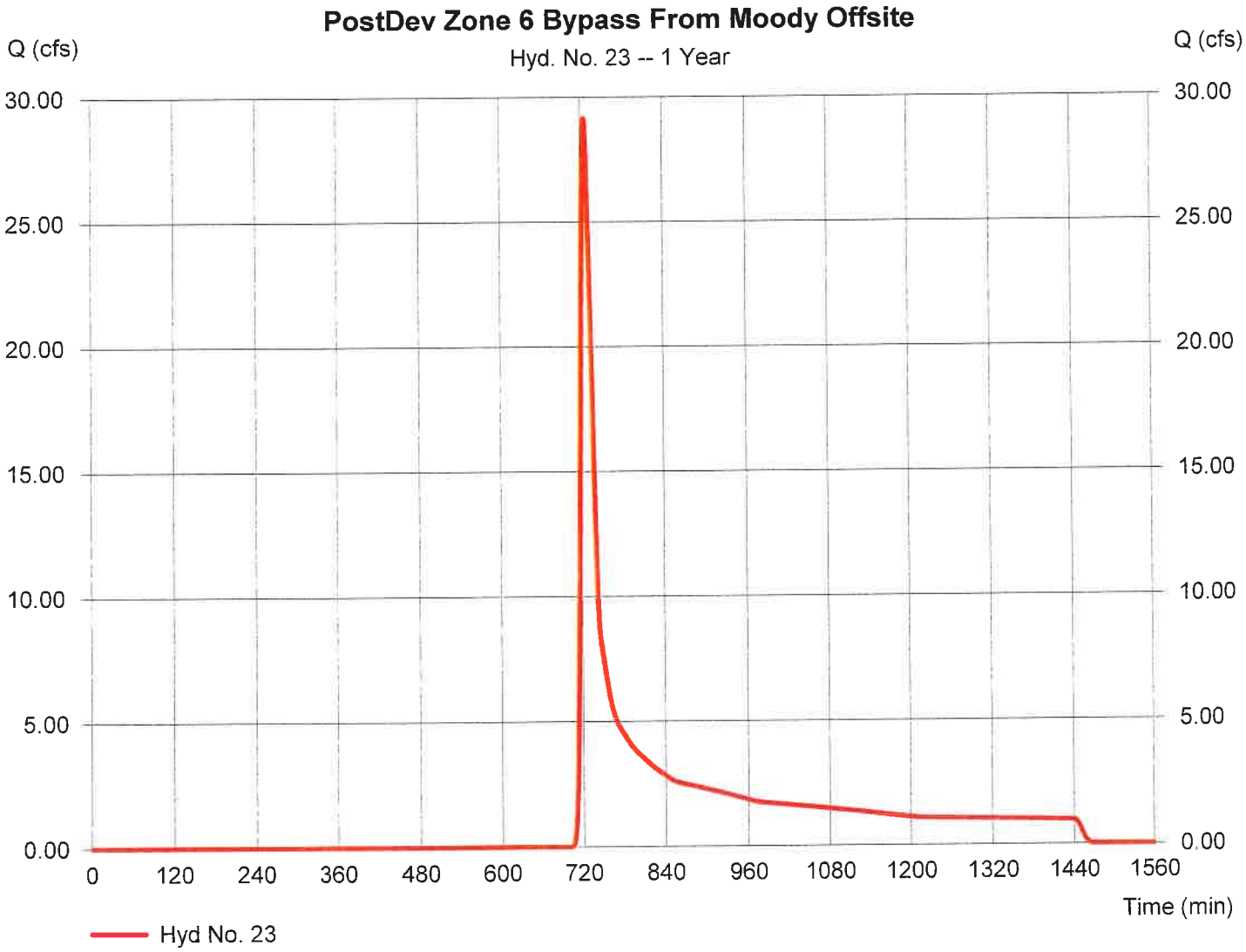


Hydrograph Report

Hyd. No. 23

PostDev Zone 6 Bypass From Moody Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 29.14 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 114,546 cuft
Drainage area	= 64.030 ac	Curve number	= 64.8
Basin Slope	= 1.8 %	Hydraulic length	= 2940 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.01 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

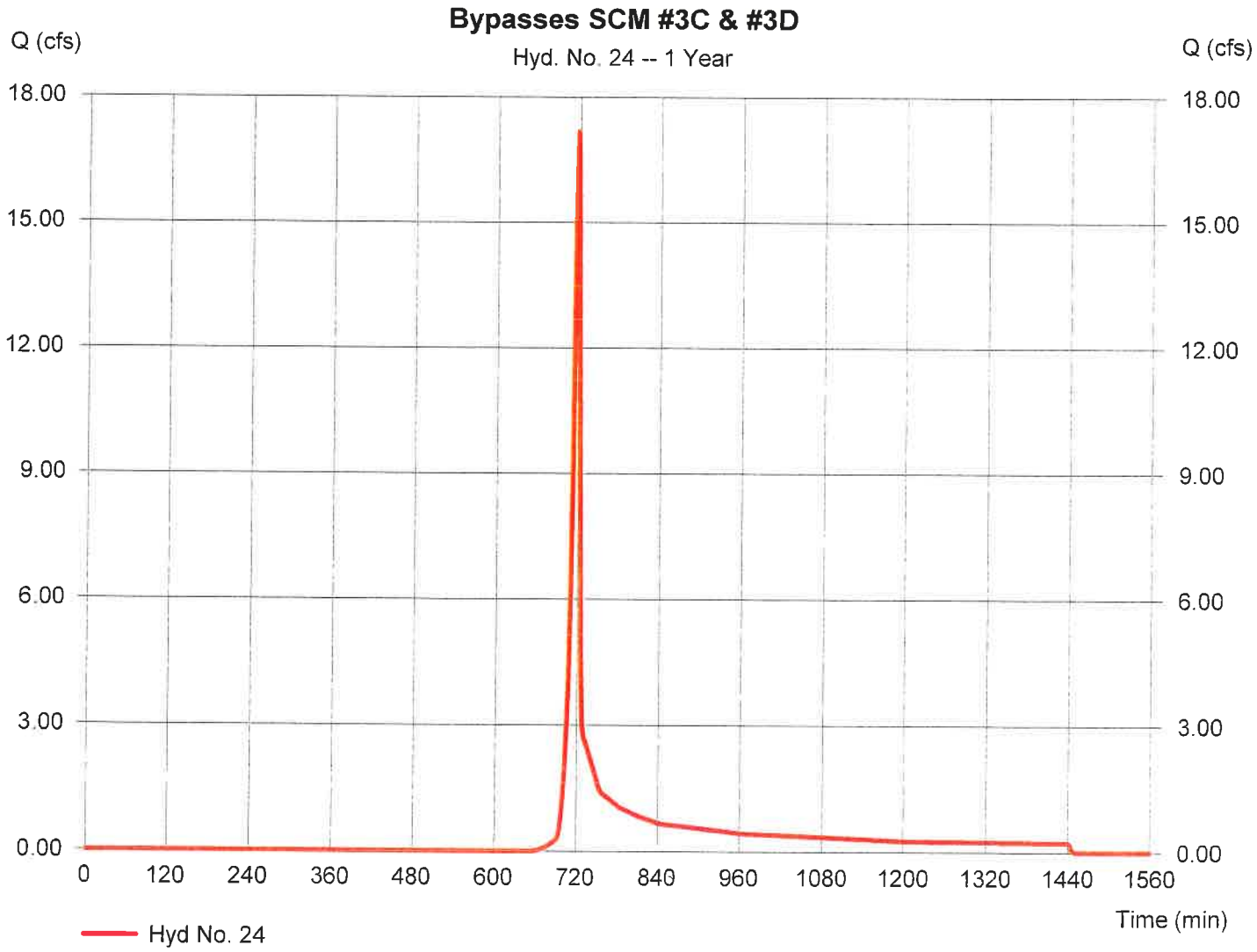


Hydrograph Report

Hyd. No. 24

Bypasses SCM #3C & #3D

Hydrograph type	= SCS Runoff	Peak discharge	= 17.17 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 34,905 cuft
Drainage area	= 9.980 ac	Curve number	= 74.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



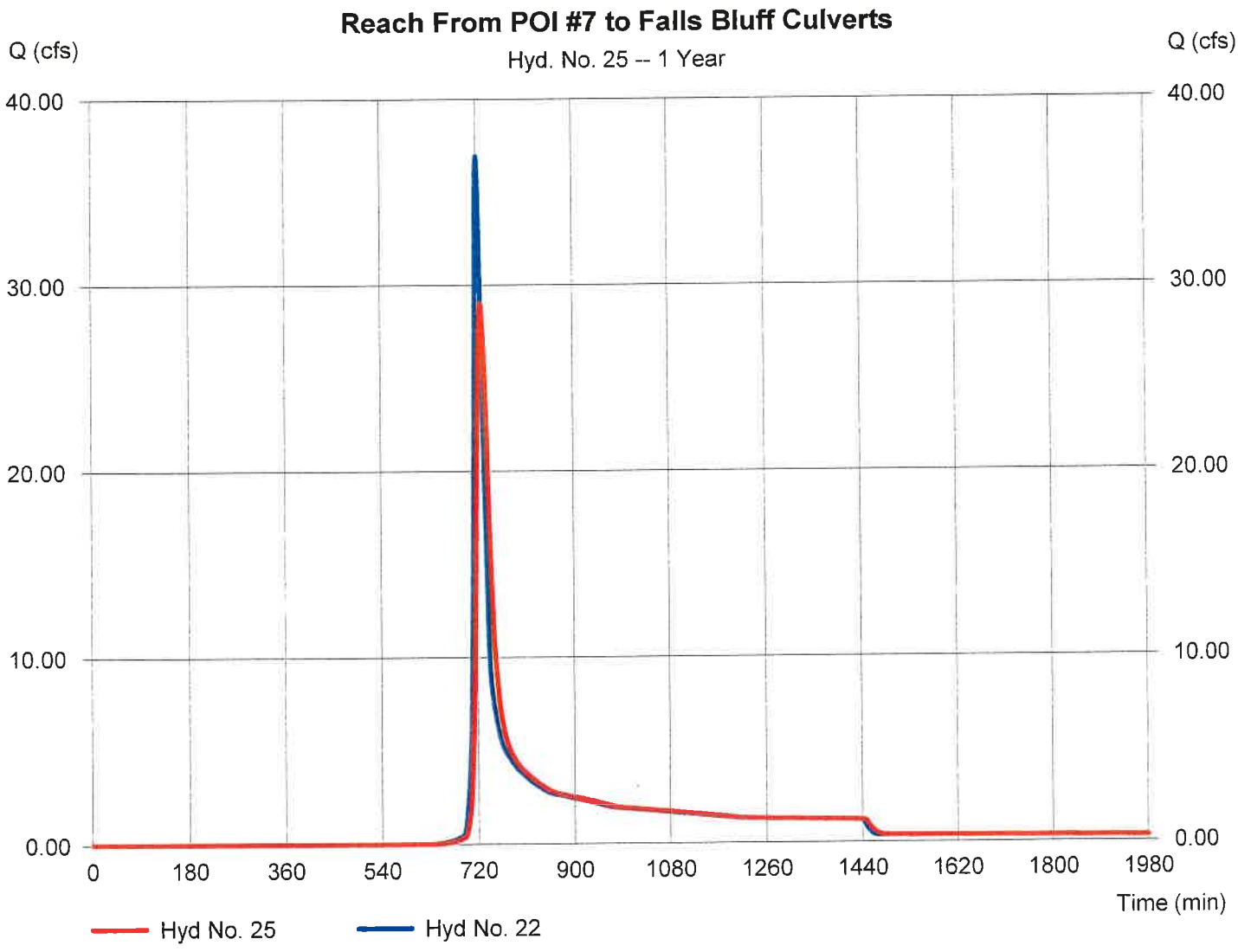
Hydrograph Report

Hyd. No. 25

Reach From POI #7 to Falls Bluff Culverts

Hydrograph type	= Reach	Peak discharge	= 28.97 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 158,104 cuft
Inflow hyd. No.	= 22 - Merge All PostDev Flow Section #7	Section type	= Trapezoidal
Reach length	= 1845.0 ft	Channel slope	= 1.4 %
Manning's n	= 0.030	Bottom width	= 4.0 ft
Side slope	= 30.0:1	Max. depth	= 4.0 ft
Rating curve x	= 2.289	Rating curve m	= 1.183
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1269

Modified Att-Kin routing method used.

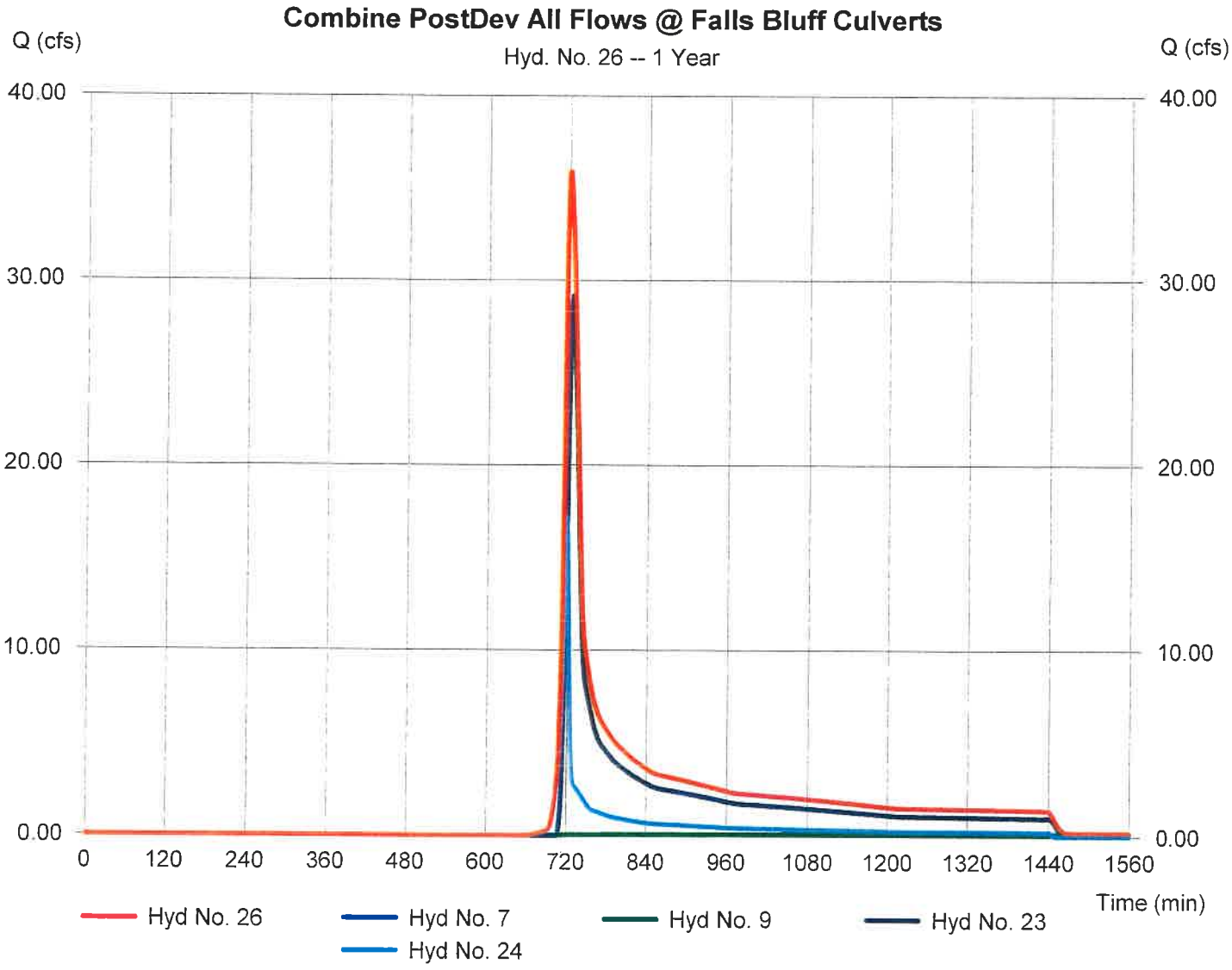


Hydrograph Report

Hyd. No. 26

Combine PostDev All Flows @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 35.86 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 168,230 cuft
Inflow hyds.	= 7, 9, 23, 24	Contrib. drain. area	= 74.010 ac

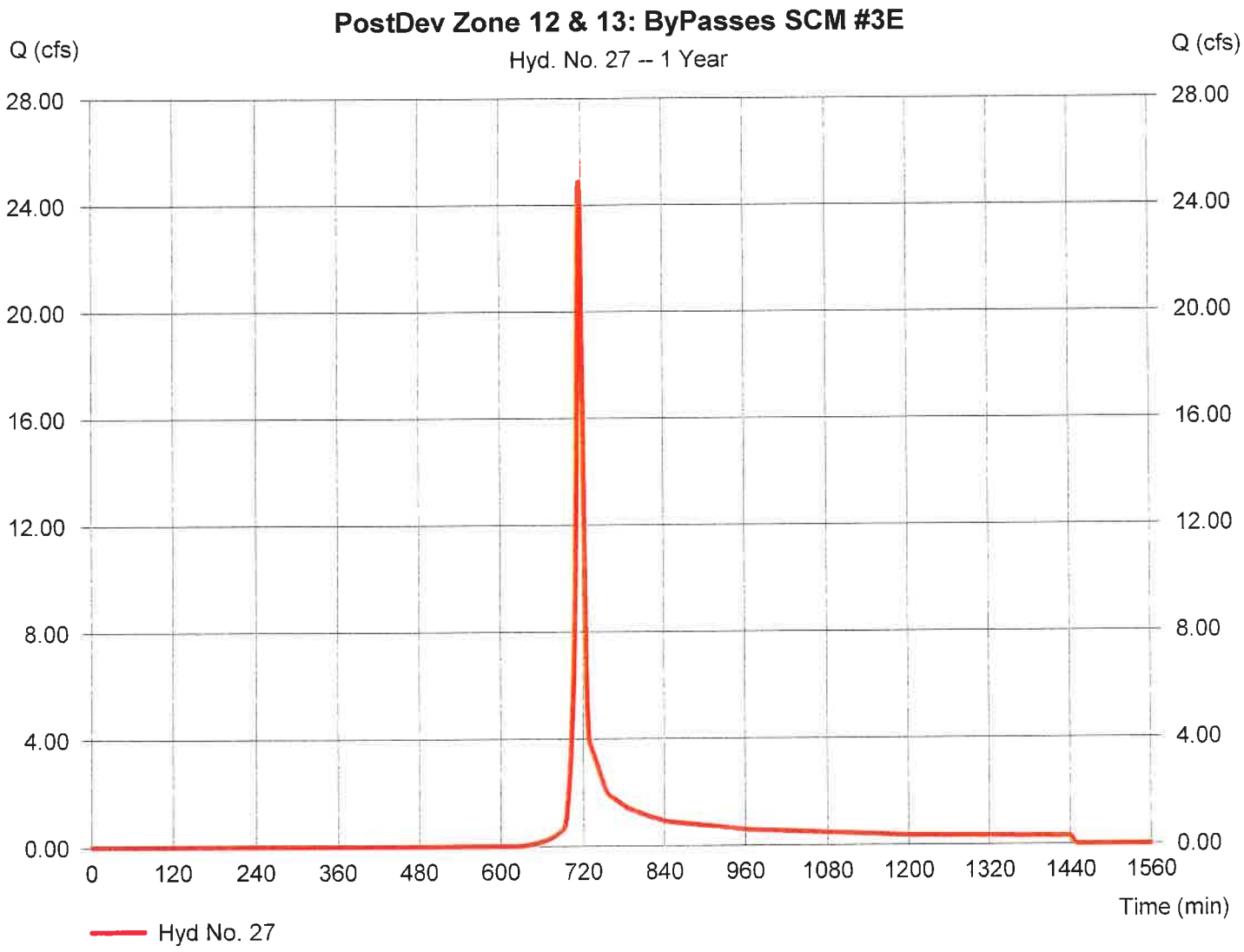


Hydrograph Report

Hyd. No. 27

PostDev Zone 12 & 13: ByPasses SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 24.88 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 50,117 cuft
Drainage area	= 12.500 ac	Curve number	= 77
Basin Slope	= 5.7 %	Hydraulic length	= 1080 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.08 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

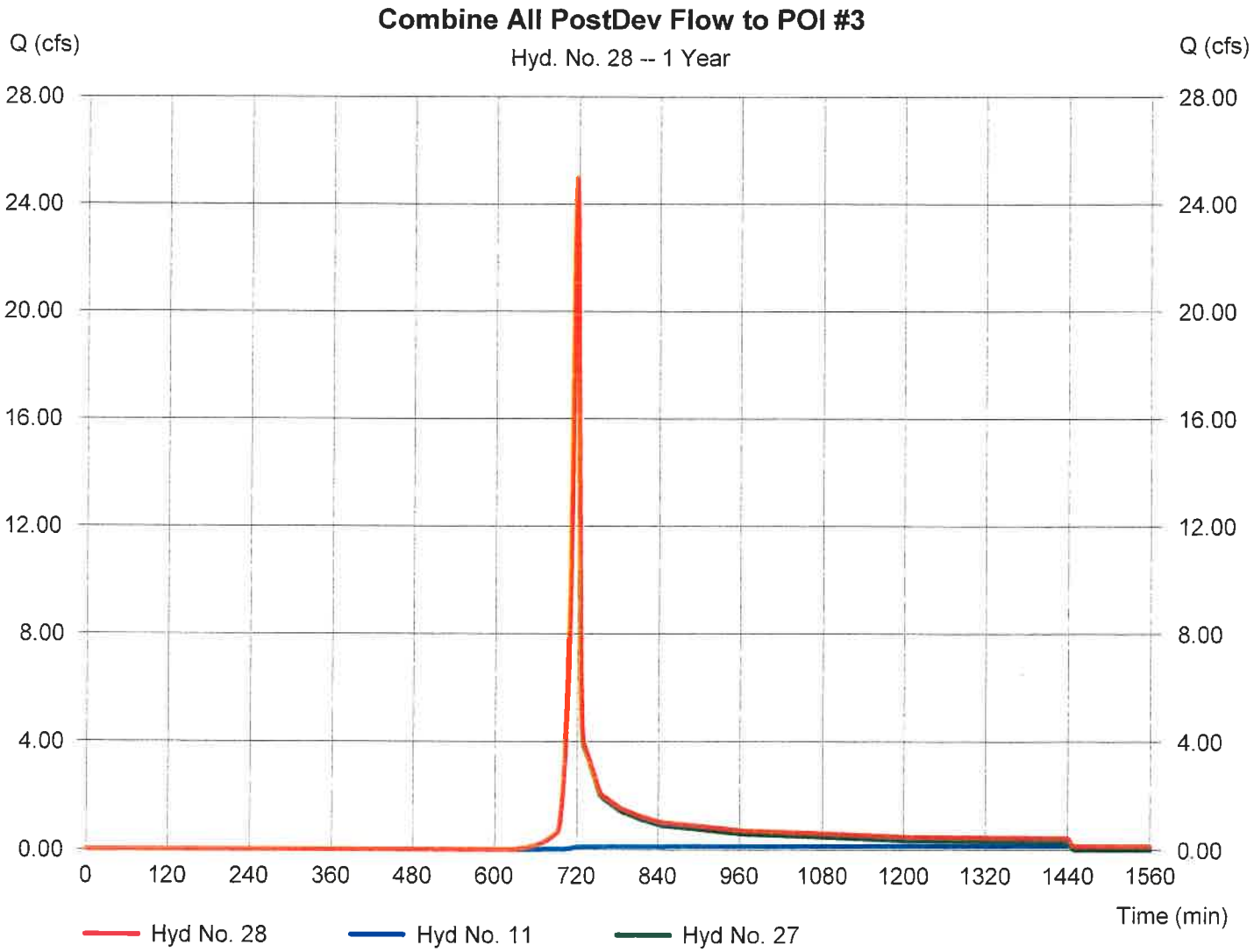


Hydrograph Report

Hyd. No. 28

Combine All PostDev Flow to POI #3

Hydrograph type	= Combine	Peak discharge	= 24.95 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 65,296 cuft
Inflow hyds.	= 11, 27	Contrib. drain. area	= 12.500 ac



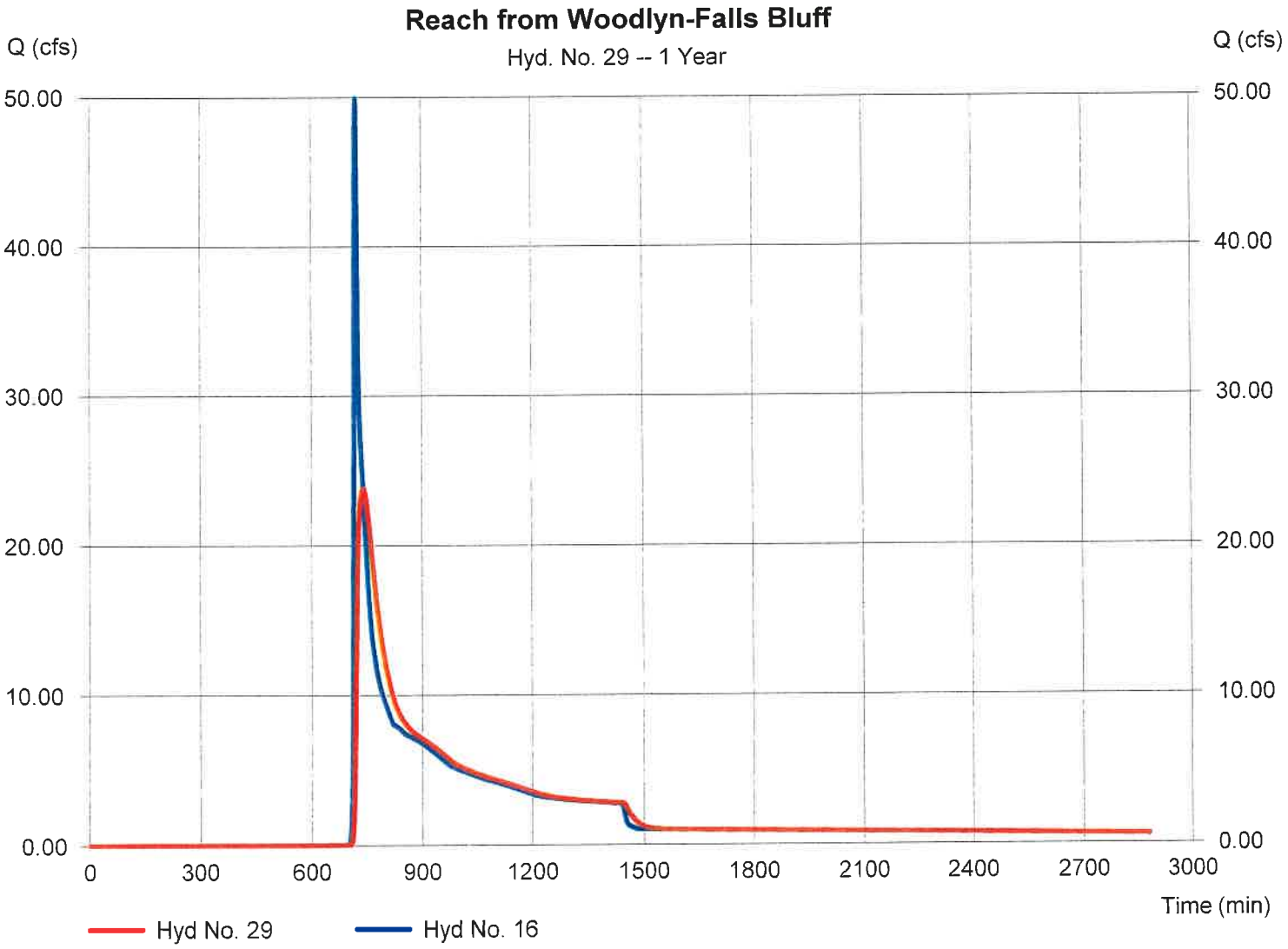
Hydrograph Report

Hyd. No. 29

Reach from Woodlyn-Falls Bluff

Hydrograph type	= Reach	Peak discharge	= 23.76 cfs
Storm frequency	= 1 yrs	Time to peak	= 742 min
Time interval	= 1 min	Hyd. volume	= 349,927 cuft
Inflow hyd. No.	= 16 - Merge All PostDev @ Woodlyn	Section type	= Trapezoidal
Reach length	= 12152.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.009	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 6.0 ft
Rating curve x	= 5.011	Rating curve m	= 1.255
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0483

Modified Att-Kin routing method used.

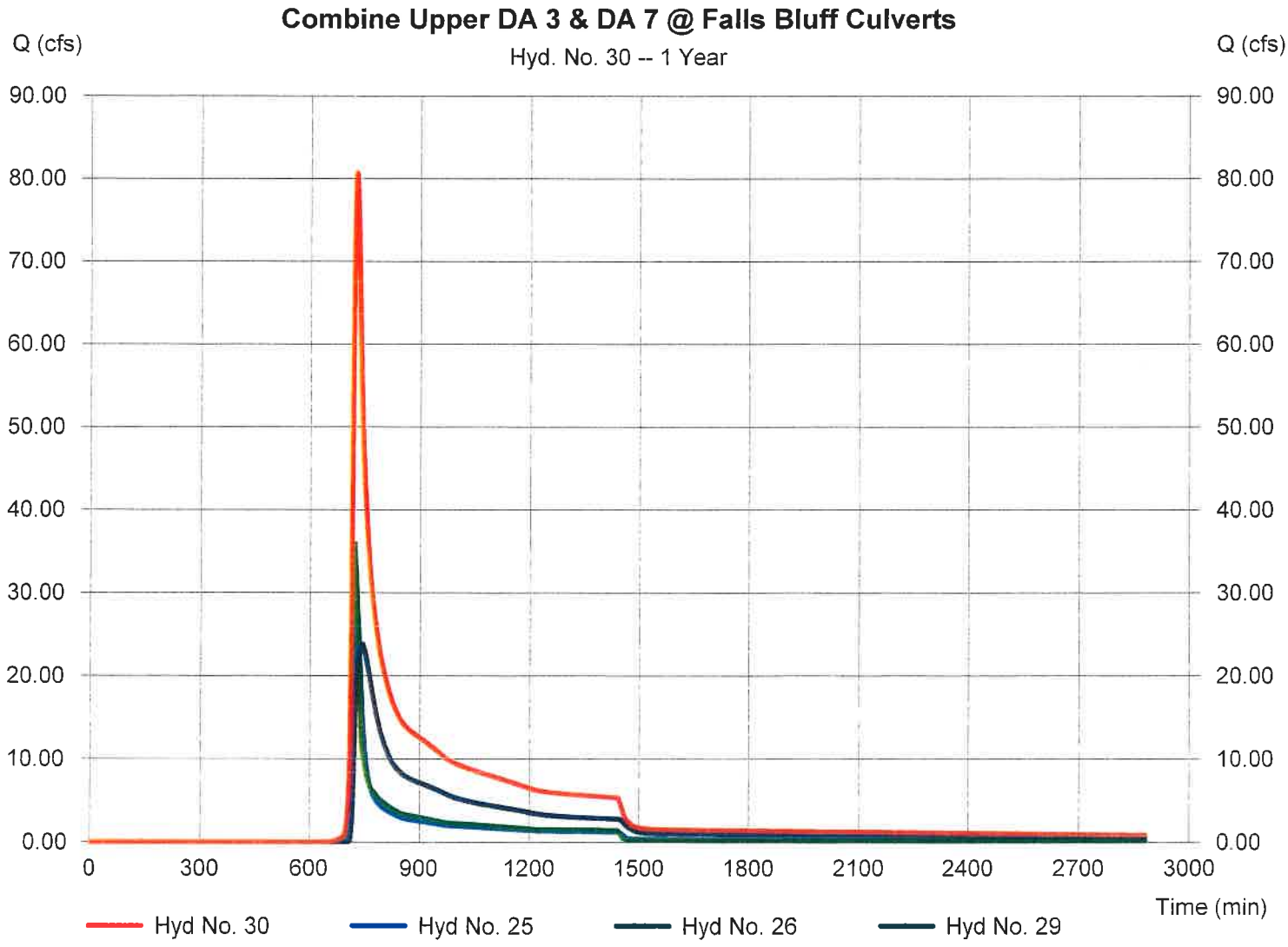


Hydrograph Report

Hyd. No. 30

Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 80.65 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 676,261 cuft
Inflow hyds.	= 25, 26, 29	Contrib. drain. area	= 0.000 ac



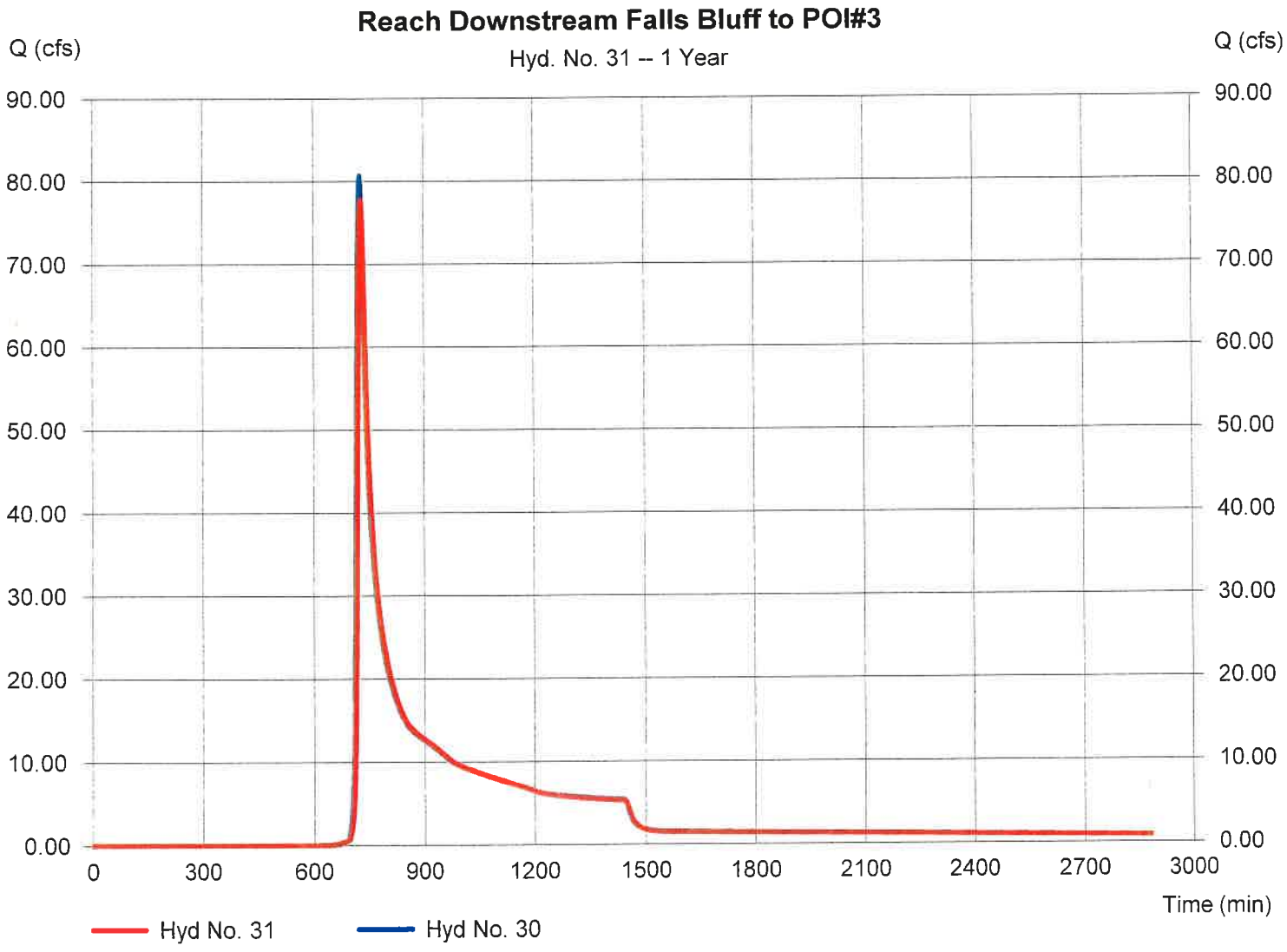
Hydrograph Report

Hyd. No. 31

Reach Downstream Falls Bluff to POI#3

Hydrograph type	= Reach	Peak discharge	= 77.69 cfs
Storm frequency	= 1 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 666,251 cuft
Inflow hyd. No.	= 30 - Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts	Section type	= Trapezoidal
Reach length	= 1200.0 ft	Channel slope	= 5.0 %
Manning's n	= 0.030	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 8.0 ft
Rating curve x	= 3.361	Rating curve m	= 1.269
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.3448

Modified Att-Kin routing method used.

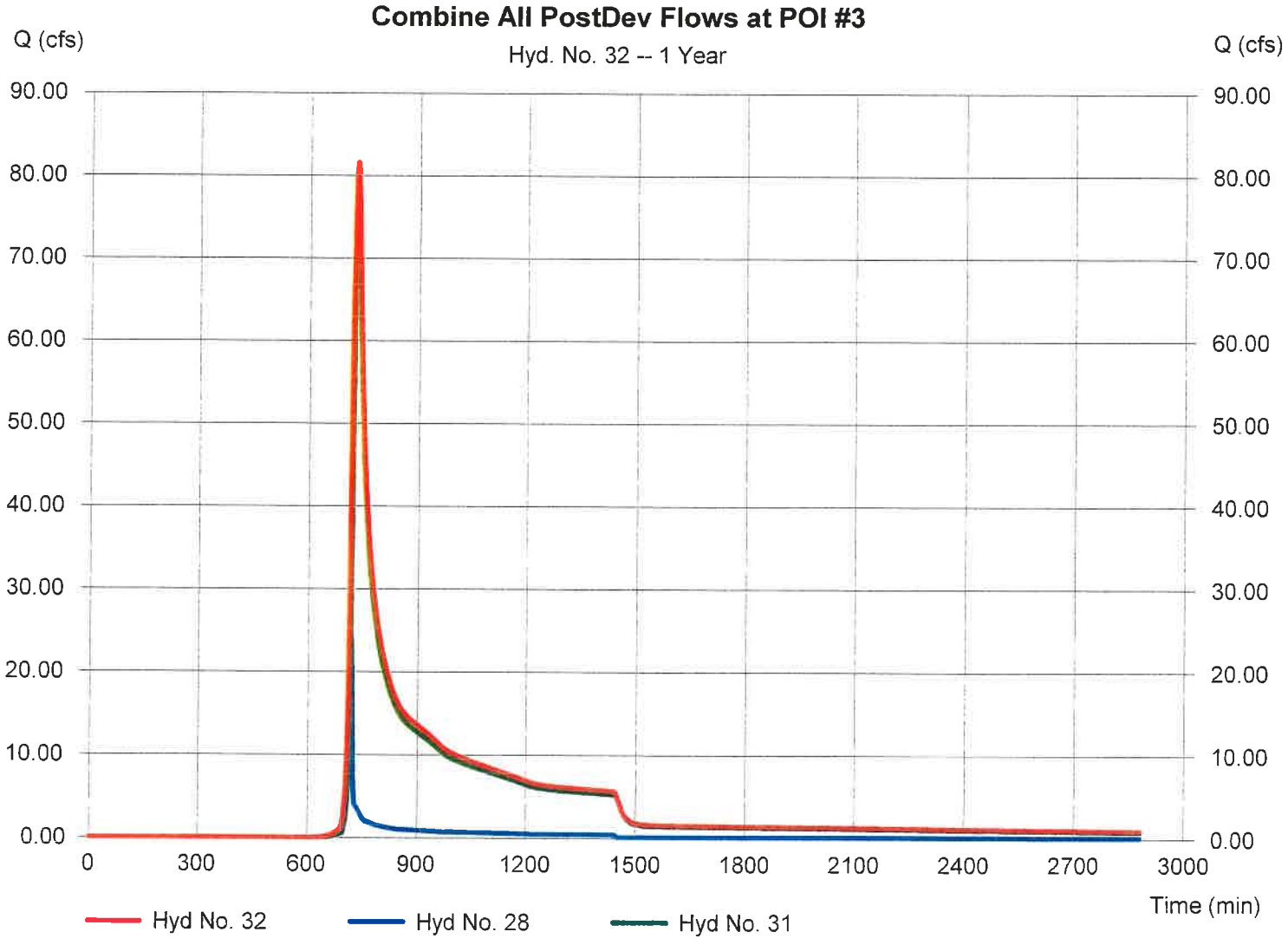


Hydrograph Report

Hyd. No. 32

Combine All PostDev Flows at POI #3

Hydrograph type	= Combine	Peak discharge	= 81.55 cfs
Storm frequency	= 1 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 731,547 cuft
Inflow hyds.	= 28, 31	Contrib. drain. area	= 0.000 ac

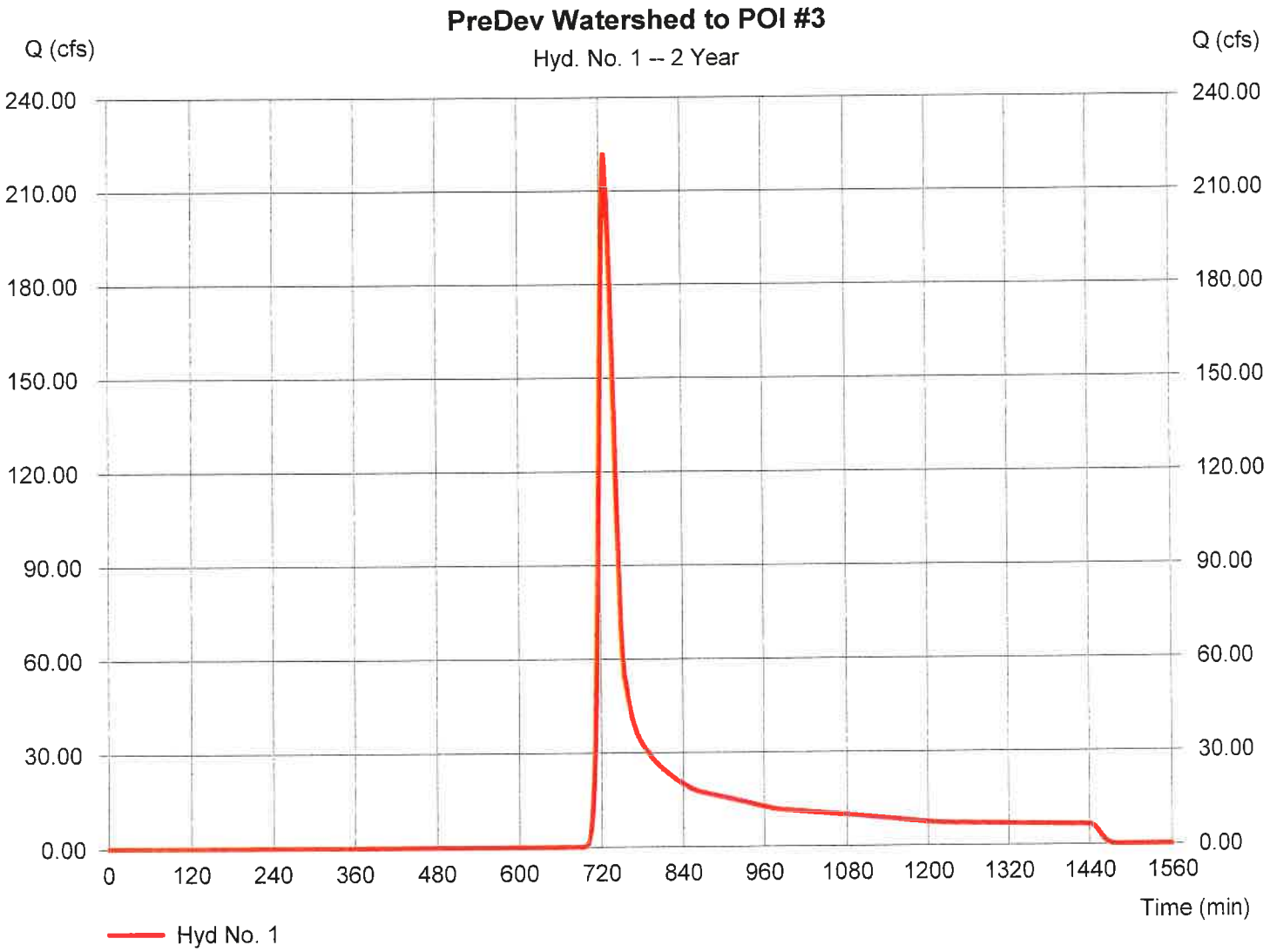


Hydrograph Report

Hyd. No. 1

PreDev Watershed to POI #3

Hydrograph type	= SCS Runoff	Peak discharge	= 221.41 cfs
Storm frequency	= 2 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 873,897 cuft
Drainage area	= 300.880 ac	Curve number	= 66.7
Basin Slope	= 3.0 %	Hydraulic length	= 5451 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 22.67 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

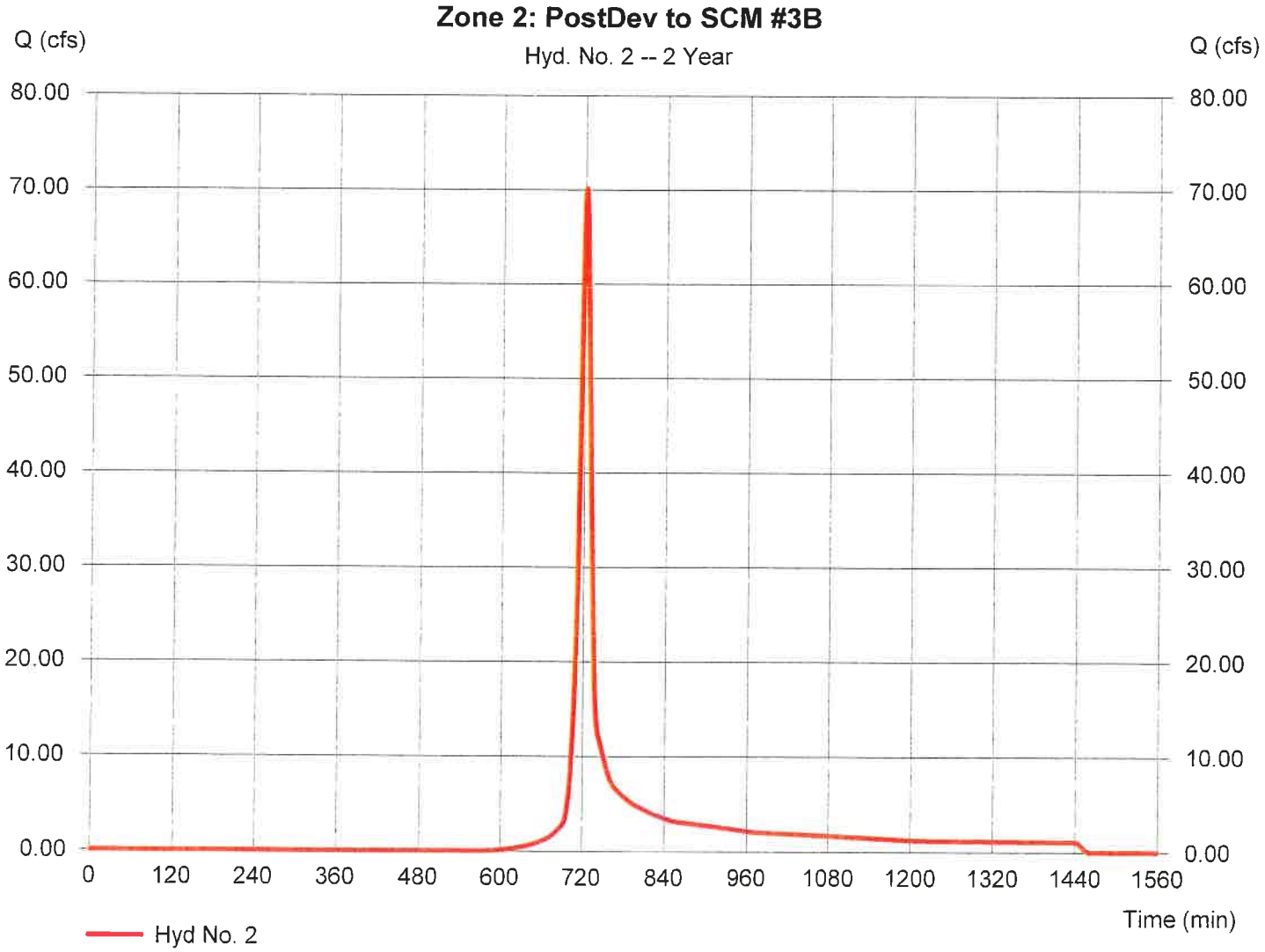


Hydrograph Report

Hyd. No. 2

Zone 2: PostDev to SCM #3B

Hydrograph type	= SCS Runoff	Peak discharge	= 70.11 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 190,063 cuft
Drainage area	= 36.040 ac	Curve number	= 77.9
Basin Slope	= 1.9 %	Hydraulic length	= 2520 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.80 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



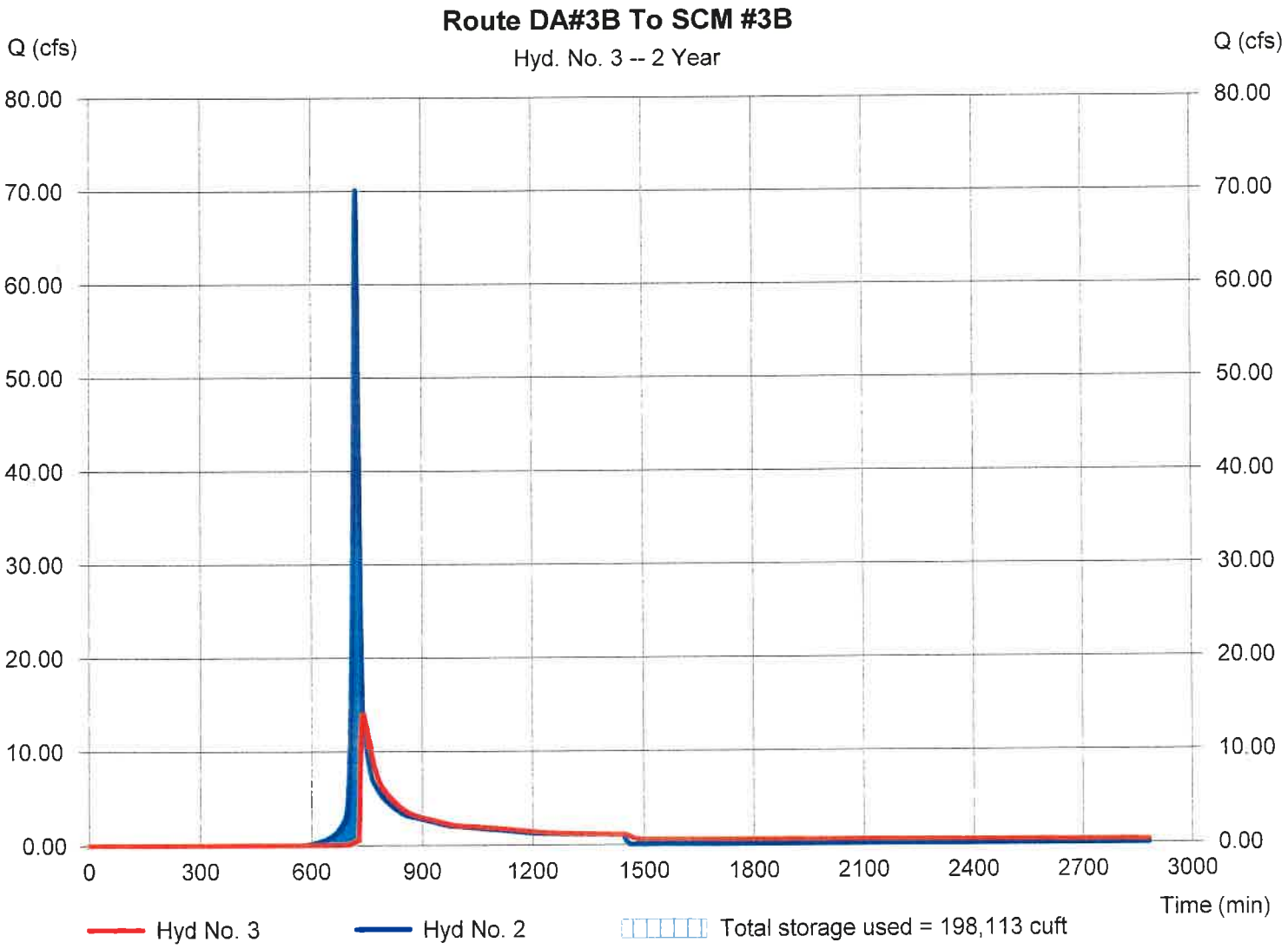
Hydrograph Report

Hyd. No. 3

Route DA#3B To SCM #3B

Hydrograph type	= Reservoir	Peak discharge	= 13.96 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 1 min	Hyd. volume	= 155,994 cuft
Inflow hyd. No.	= 2 - Zone 2: PostDev to SCM #3B	Max. Elevation	= 353.63 ft
Reservoir name	= SCM 3B-rev032620	Max. Storage	= 198,113 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

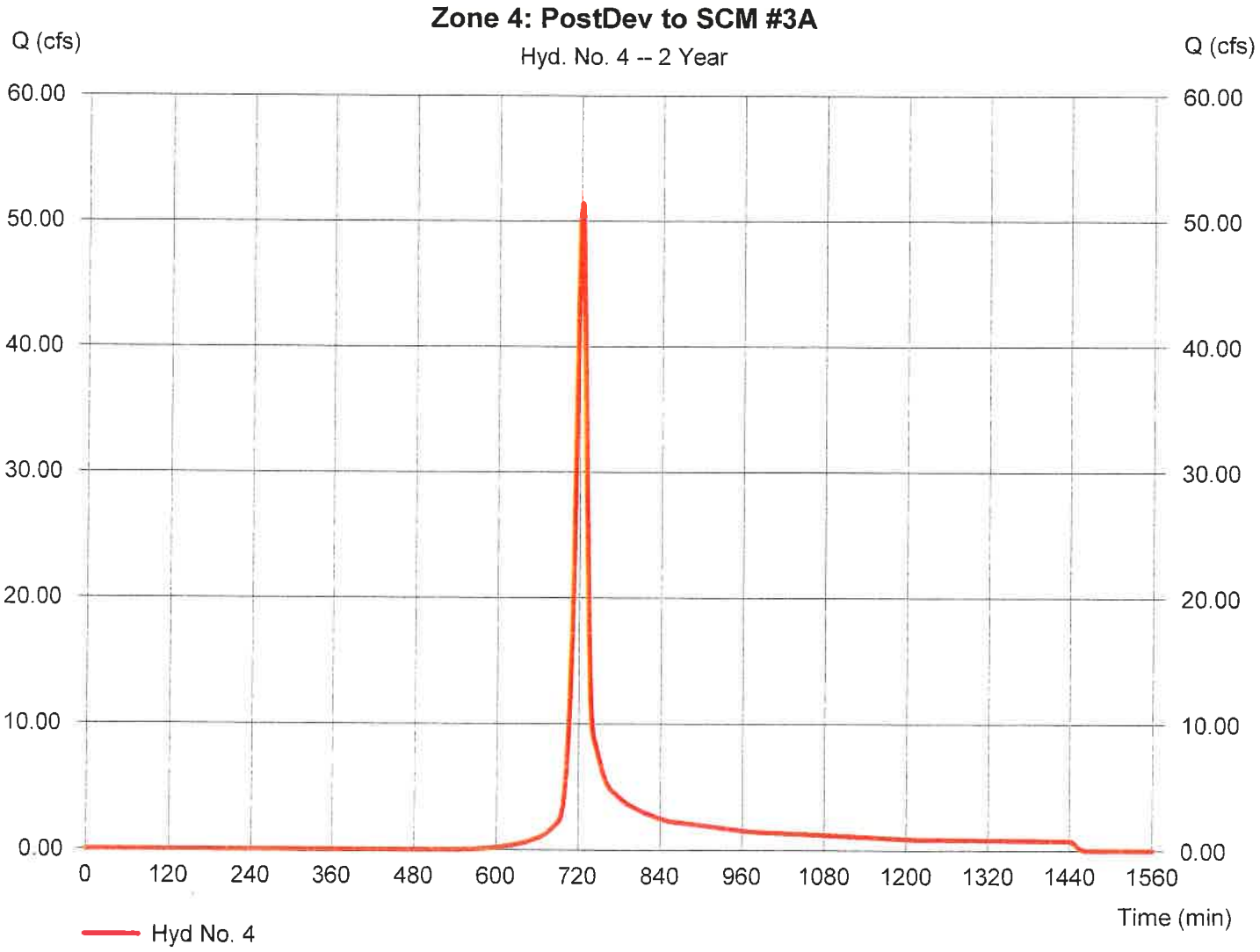


Hydrograph Report

Hyd. No. 4

Zone 4: PostDev to SCM #3A

Hydrograph type	= SCS Runoff	Peak discharge	= 51.45 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 138,845 cuft
Drainage area	= 24.600 ac	Curve number	= 79.4
Basin Slope	= 1.5 %	Hydraulic length	= 2250 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.94 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



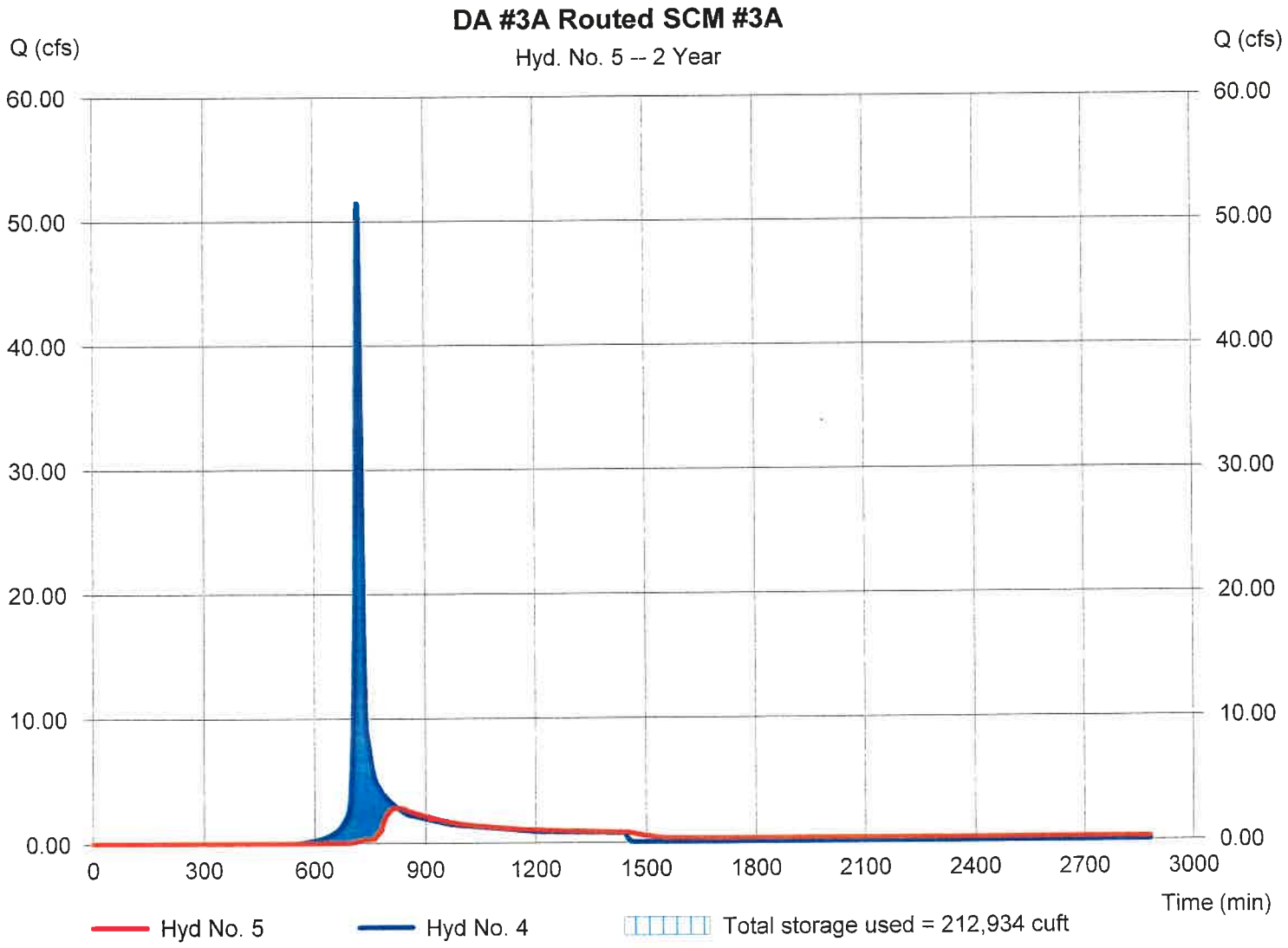
Hydrograph Report

Hyd. No. 5

DA #3A Routed SCM #3A

Hydrograph type	= Reservoir	Peak discharge	= 2.822 cfs
Storm frequency	= 2 yrs	Time to peak	= 823 min
Time interval	= 1 min	Hyd. volume	= 82,919 cuft
Inflow hyd. No.	= 4 - Zone 4: PostDev to SCM #3A	Max. Elevation	= 353.36 ft
Reservoir name	= SCM #3A	Max. Storage	= 212,934 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

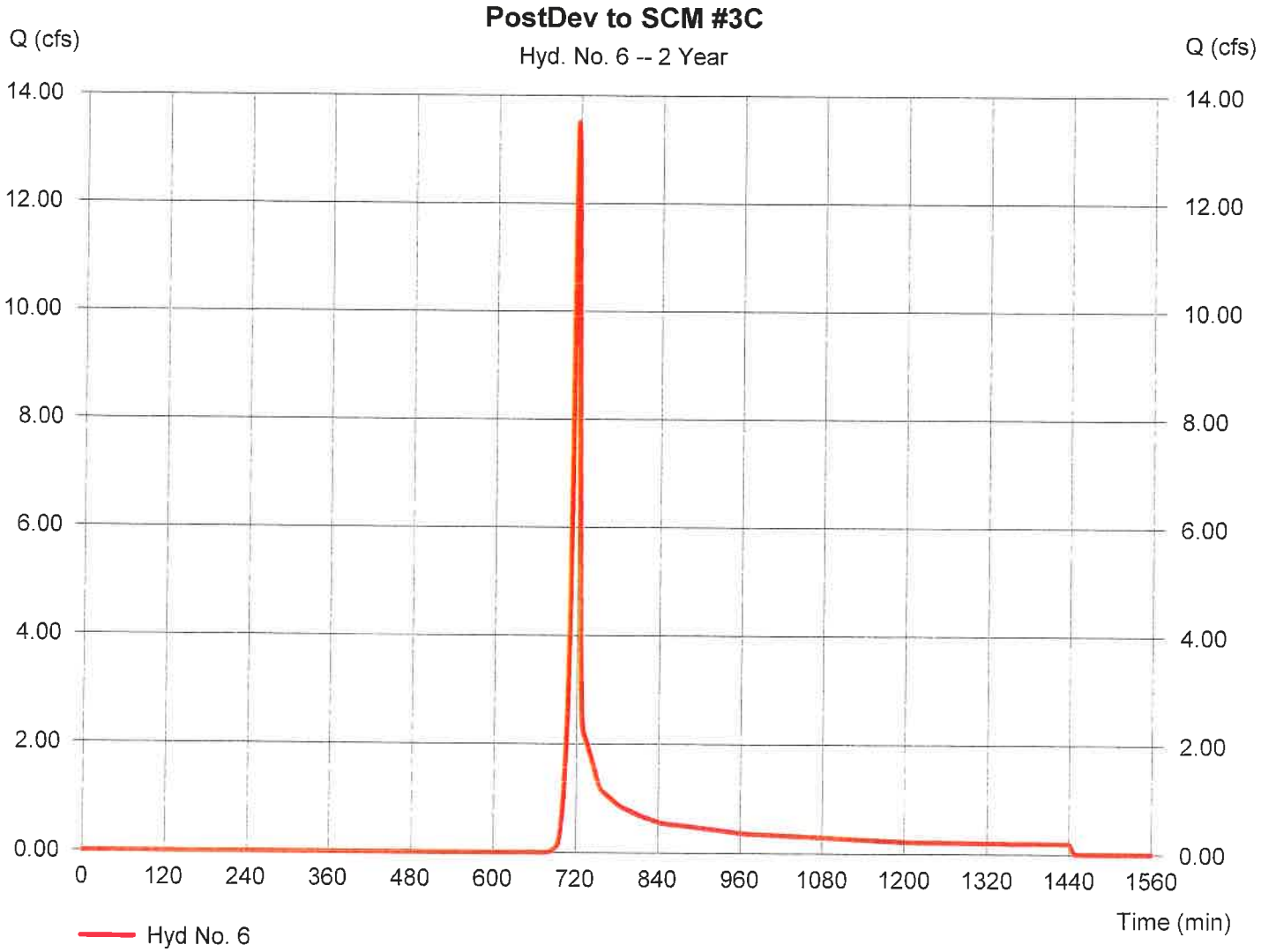


Hydrograph Report

Hyd. No. 6

PostDev to SCM #3C

Hydrograph type	= SCS Runoff	Peak discharge	= 13.50 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 27,886 cuft
Drainage area	= 7.970 ac	Curve number	= 69.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



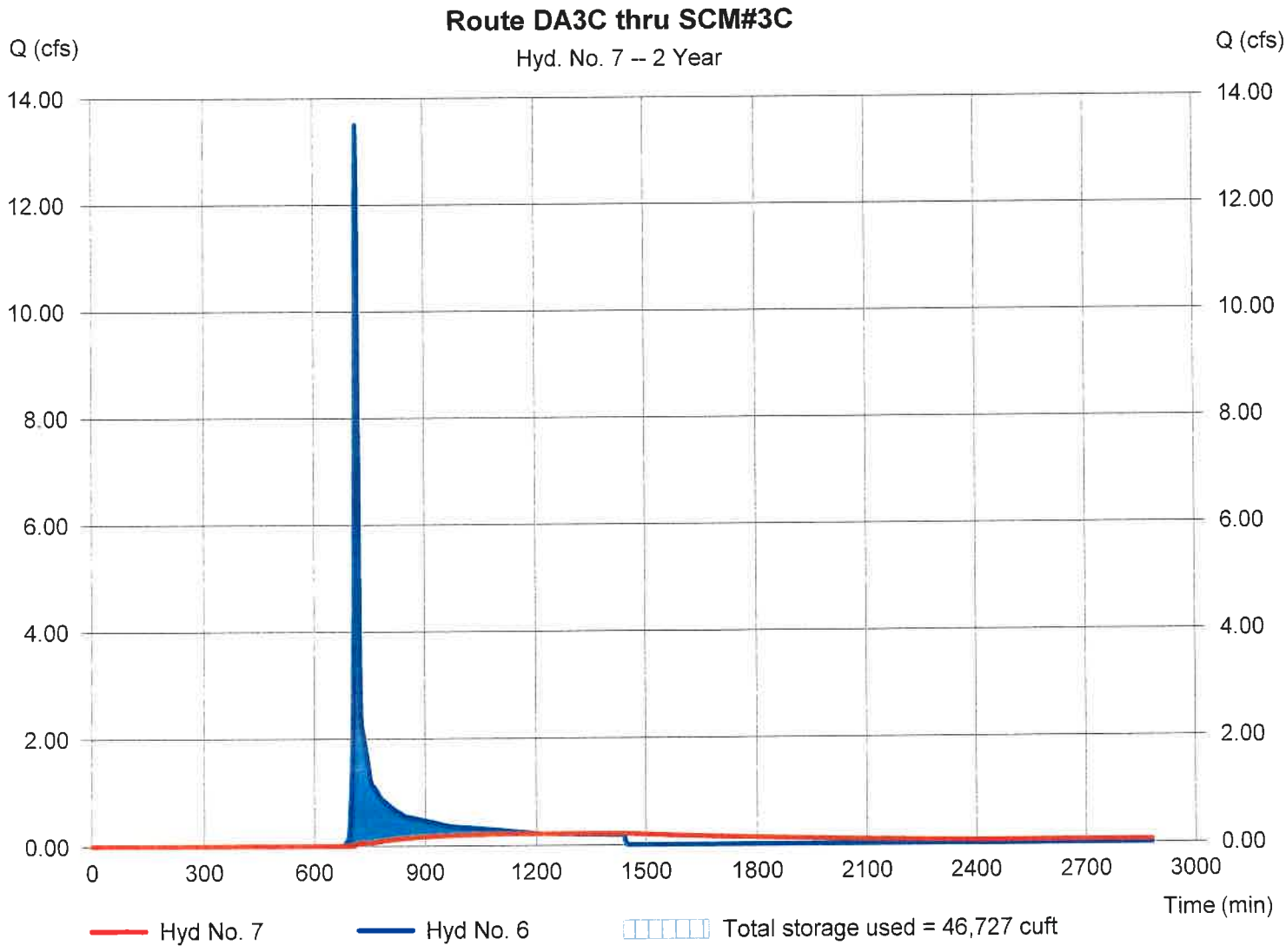
Hydrograph Report

Hyd. No. 7

Route DA3C thru SCM#3C

Hydrograph type	= Reservoir	Peak discharge	= 0.214 cfs
Storm frequency	= 2 yrs	Time to peak	= 1208 min
Time interval	= 1 min	Hyd. volume	= 16,195 cuft
Inflow hyd. No.	= 6 - PostDev to SCM #3C	Max. Elevation	= 341.97 ft
Reservoir name	= SCM #3C	Max. Storage	= 46,727 cuft

Storage Indication method used. Wet pond routing start elevation = 340.50 ft.

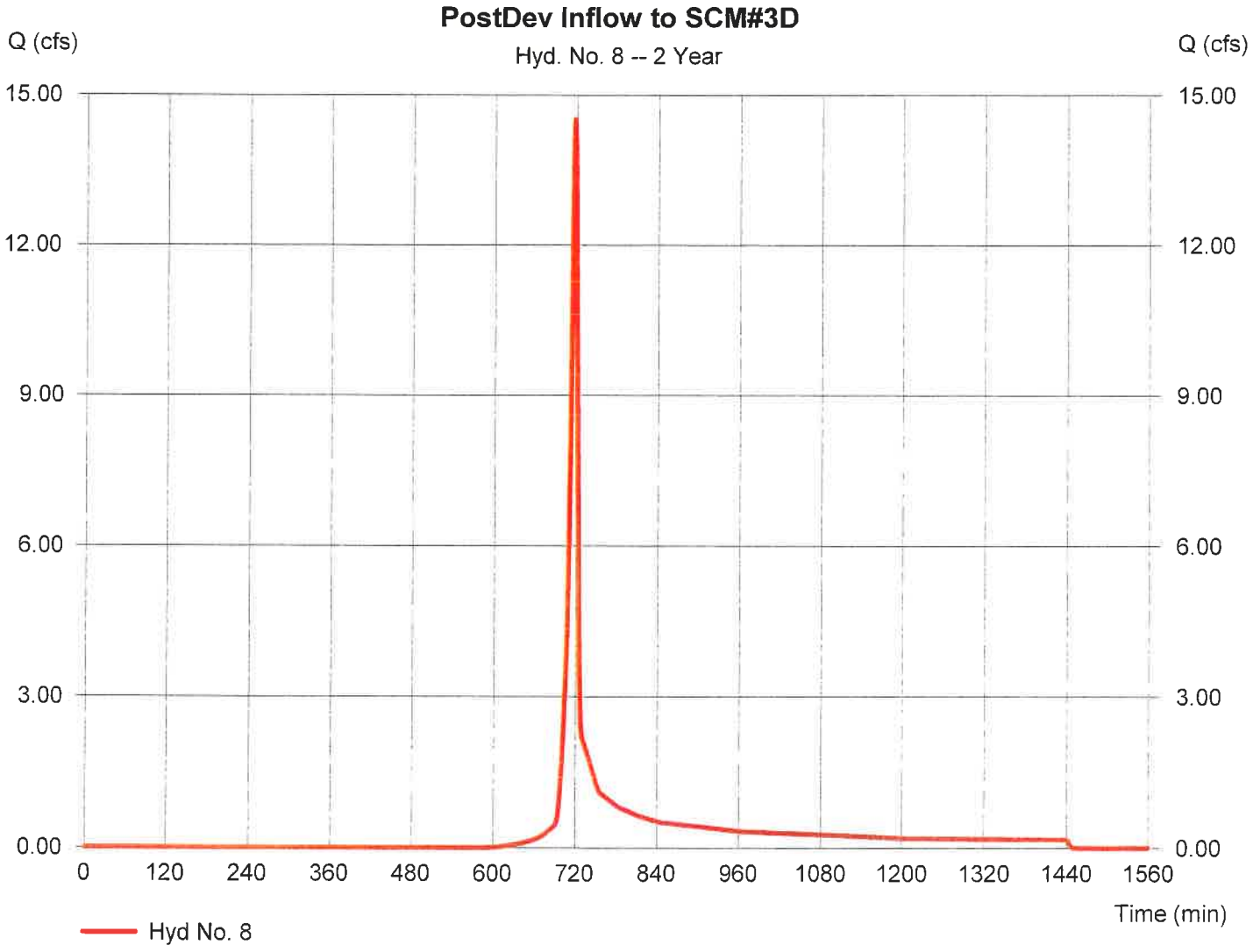


Hydrograph Report

Hyd. No. 8

PostDev Inflow to SCM#3D

Hydrograph type	= SCS Runoff	Peak discharge	= 14.51 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 29,146 cuft
Drainage area	= 5.640 ac	Curve number	= 76.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



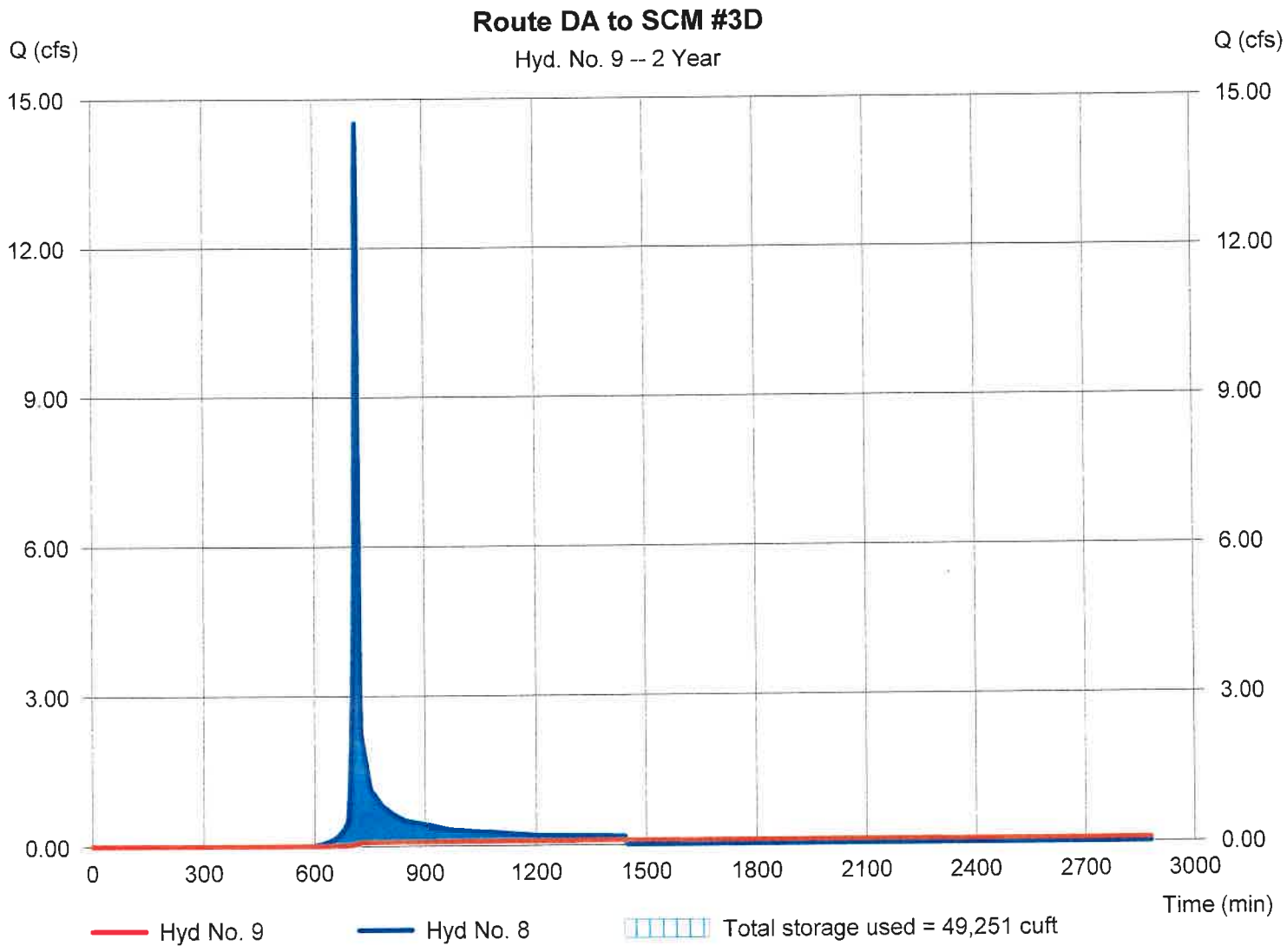
Hydrograph Report

Hyd. No. 9

Route DA to SCM #3D

Hydrograph type	= Reservoir	Peak discharge	= 0.085 cfs
Storm frequency	= 2 yrs	Time to peak	= 1444 min
Time interval	= 1 min	Hyd. volume	= 10,412 cuft
Inflow hyd. No.	= 8 - PostDev Inflow to SCM#3D	Max. Elevation	= 346.65 ft
Reservoir name	= SCM #3D	Max. Storage	= 49,251 cuft

Storage Indication method used. Wet pond routing start elevation = 344.50 ft.

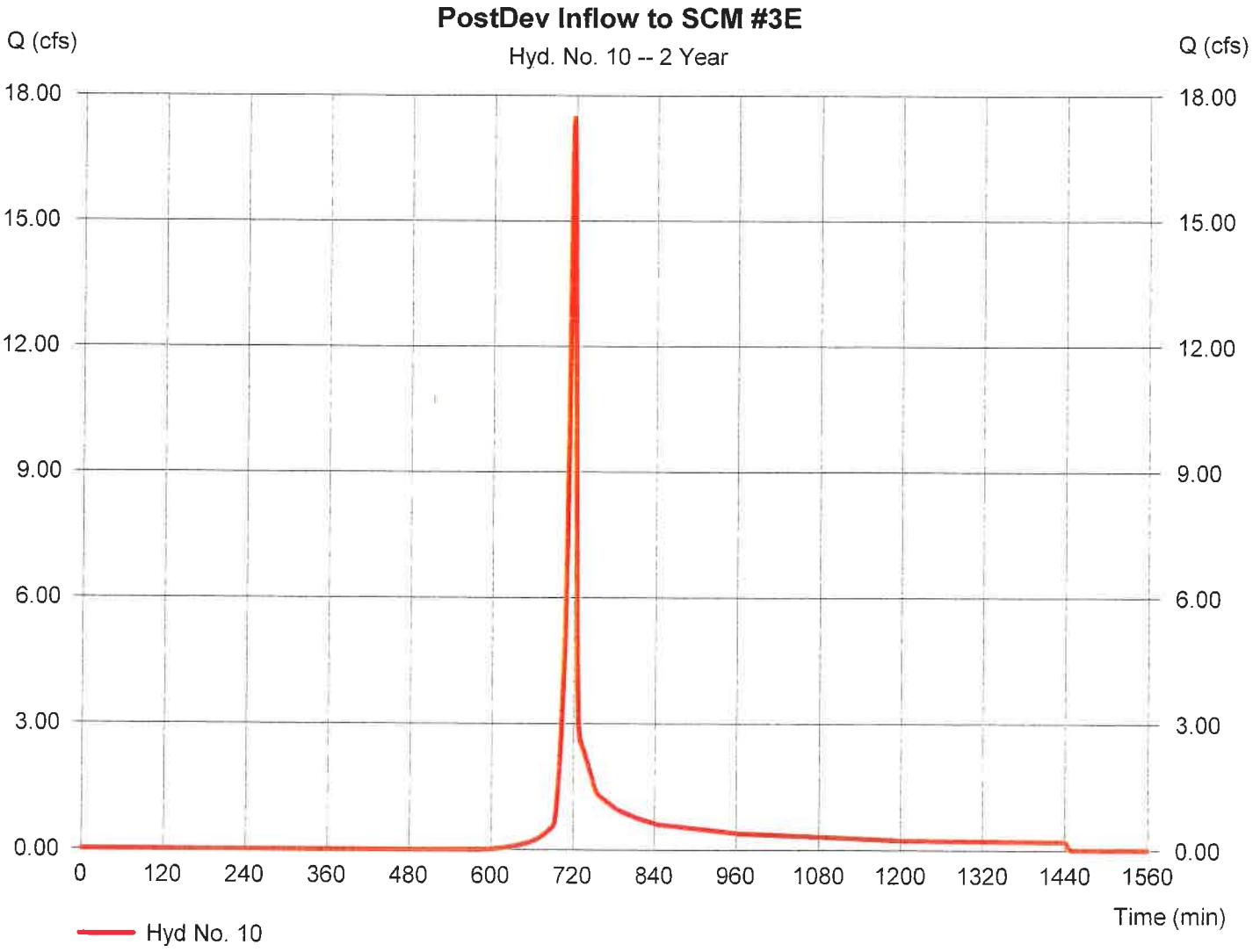


Hydrograph Report

Hyd. No. 10

PostDev Inflow to SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 17.46 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 35,054 cuft
Drainage area	= 6.720 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



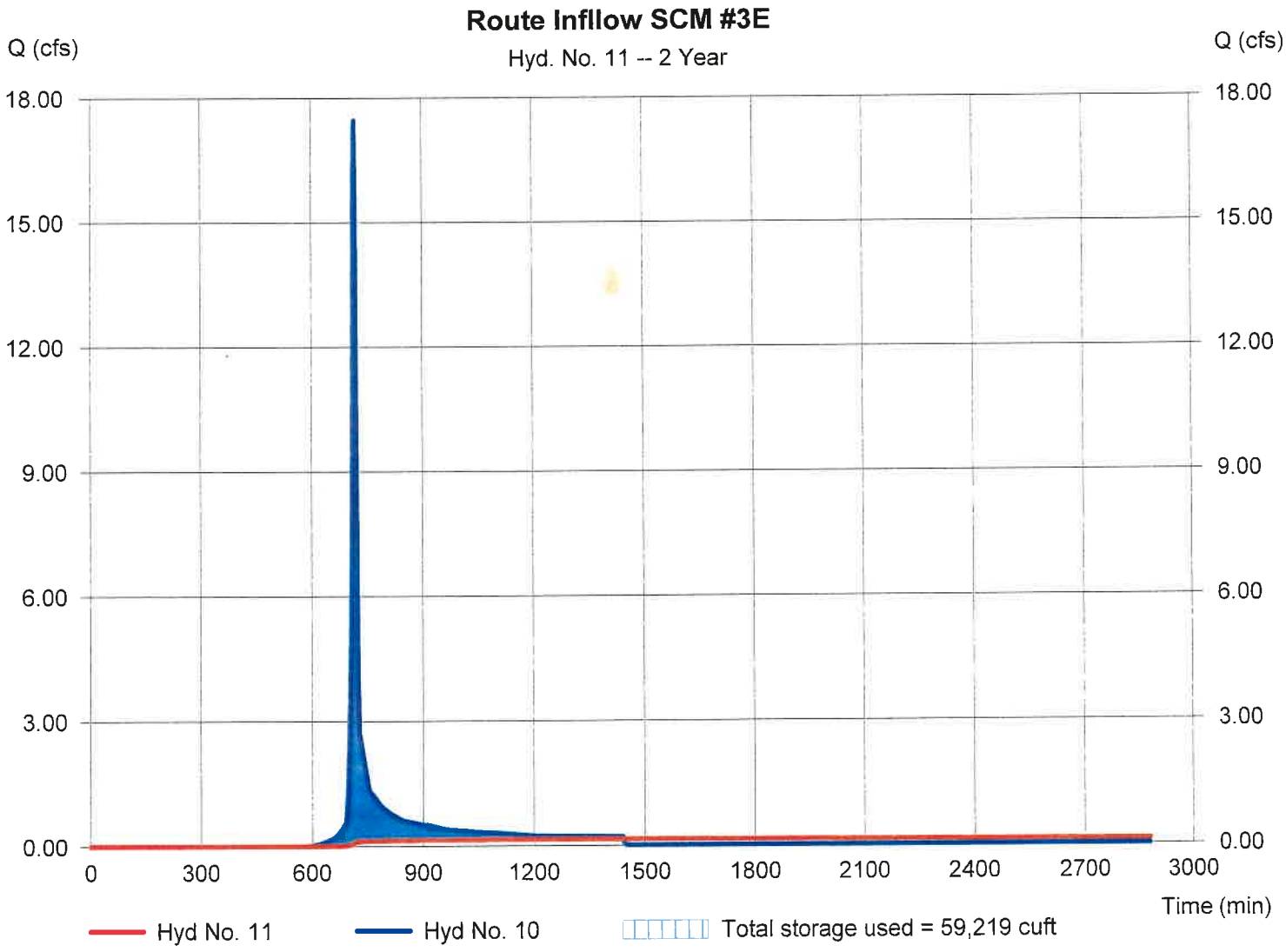
Hydrograph Report

Hyd. No. 11

Route Infllow SCM #3E

Hydrograph type	= Reservoir	Peak discharge	= 0.146 cfs
Storm frequency	= 2 yrs	Time to peak	= 1443 min
Time interval	= 1 min	Hyd. volume	= 17,473 cuft
Inflow hyd. No.	= 10 - PostDev Inflow to SCM #3E	Max. Elevation	= 308.52 ft
Reservoir name	= SCM #3E	Max. Storage	= 59,219 cuft

Storage Indication method used. Wet pond routing start elevation = 306.50 ft.

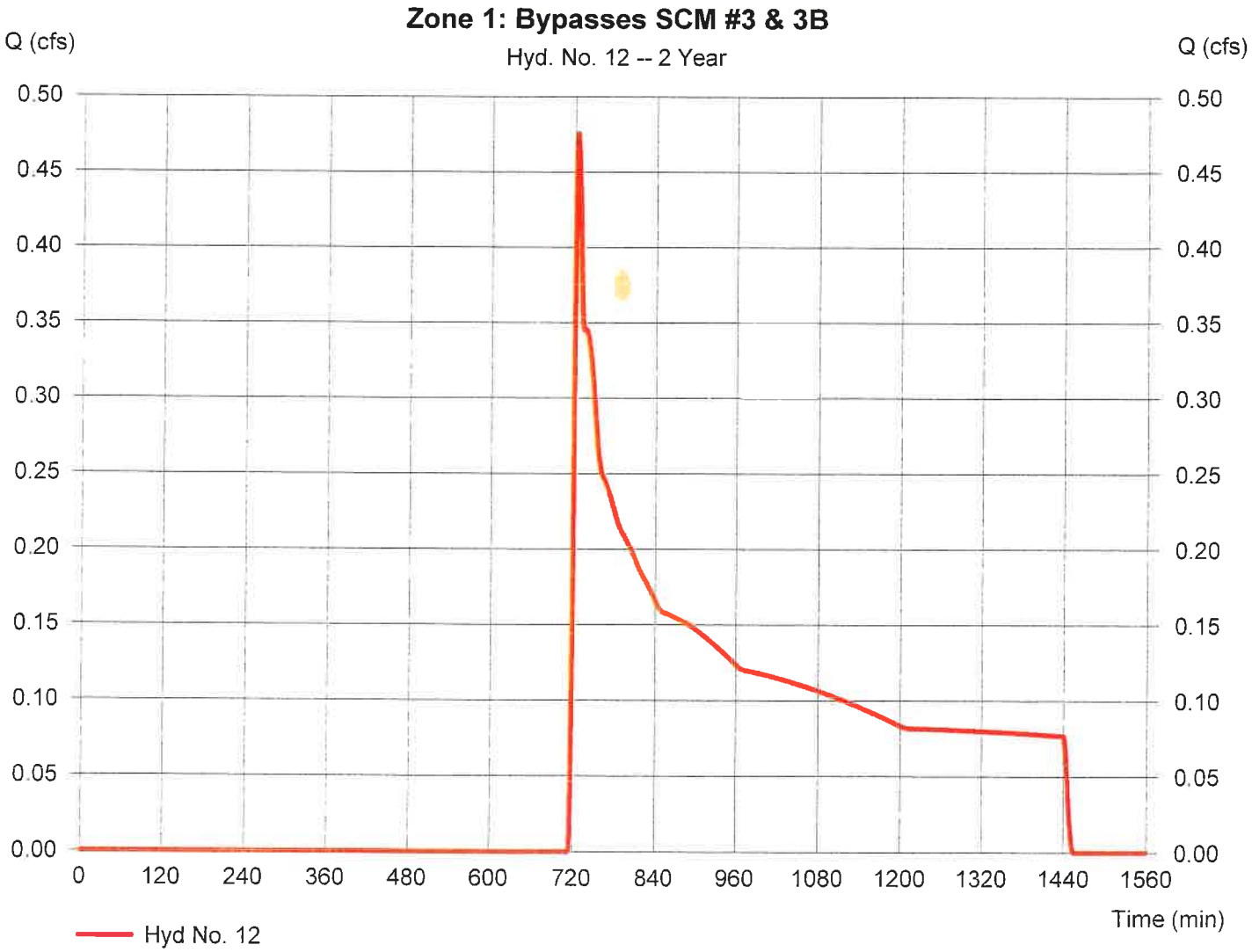


Hydrograph Report

Hyd. No. 12

Zone 1: Bypasses SCM #3 & 3B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.476 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 5,587 cuft
Drainage area	= 8.510 ac	Curve number	= 49.9
Basin Slope	= 2.8 %	Hydraulic length	= 1529 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

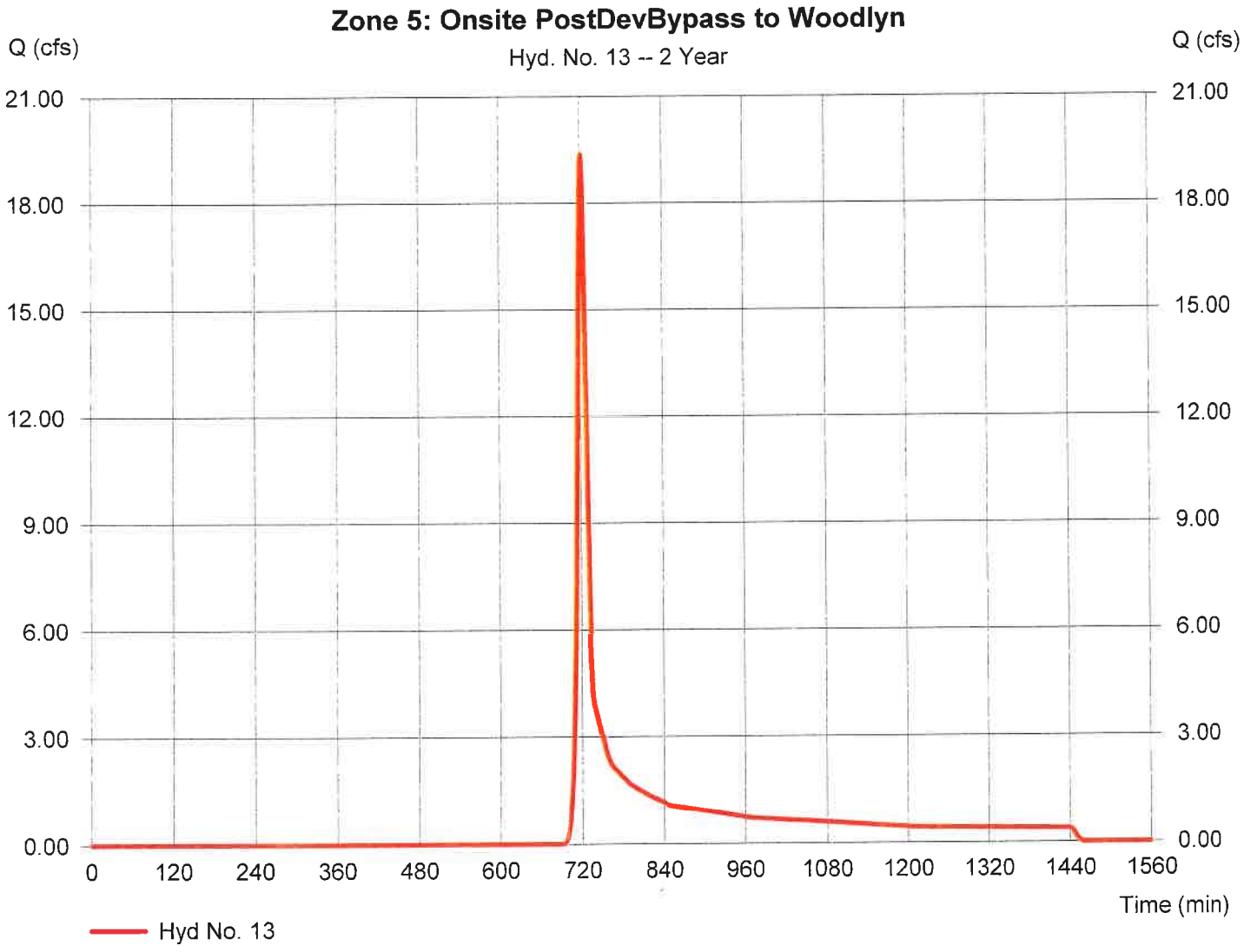


Hydrograph Report

Hyd. No. 13

Zone 5: Onsite PostDevBypass to Woodlyn

Hydrograph type	= SCS Runoff	Peak discharge	= 19.35 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 53,199 cuft
Drainage area	= 17.680 ac	Curve number	= 67.4
Basin Slope	= 1.5 %	Hydraulic length	= 1788 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.58 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

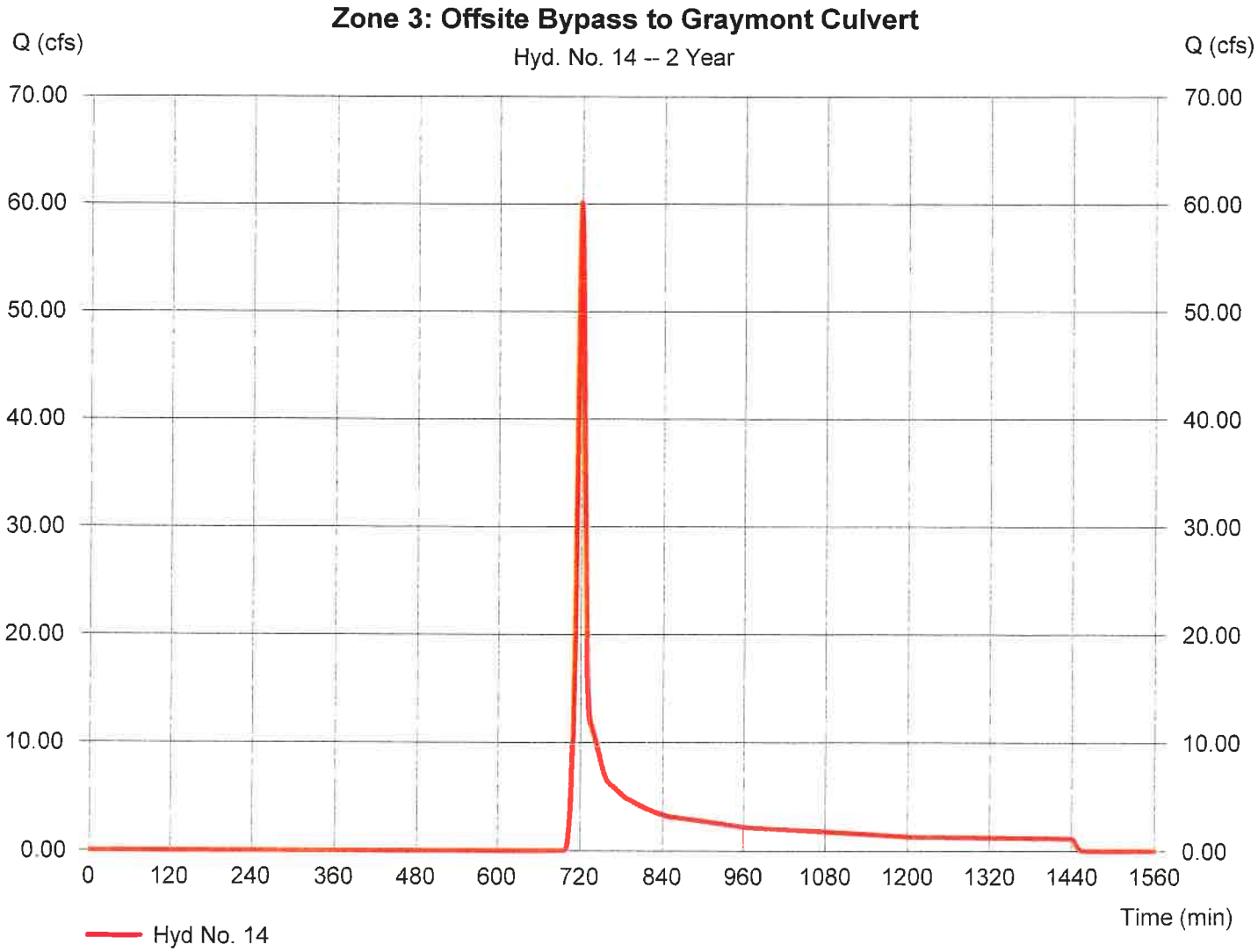


Hydrograph Report

Hyd. No. 14

Zone 3: Offsite Bypass to Graymont Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 60.12 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 150,517 cuft
Drainage area	= 57.120 ac	Curve number	= 65
Basin Slope	= 1.8 %	Hydraulic length	= 1220 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



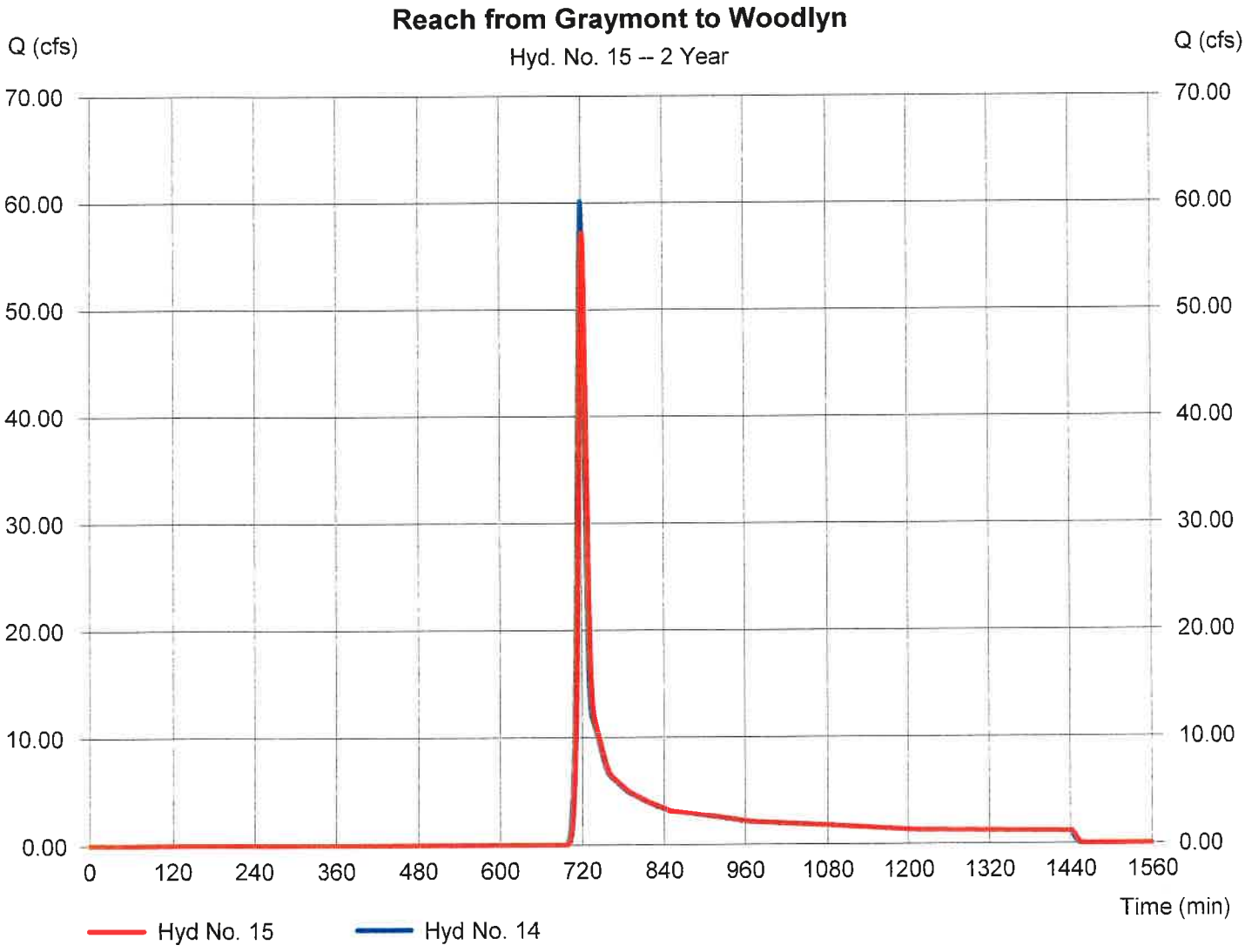
Hydrograph Report

Hyd. No. 15

Reach from Graymont to Woodlyn

Hydrograph type	= Reach	Peak discharge	= 57.14 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 150,516 cuft
Inflow hyd. No.	= 14 - Zone 3: Offsite Bypass to Graymont	Section type	= Culvert
Reach length	= 1750.0 ft	Channel slope	= Trapezoidal
Manning's n	= 0.009	Bottom width	= 1.4 %
Side slope	= 2.0:1	Max. depth	= 5.0 ft
Rating curve x	= 6.696	Rating curve m	= 1.370
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.4429

Modified Att-Kin routing method used.

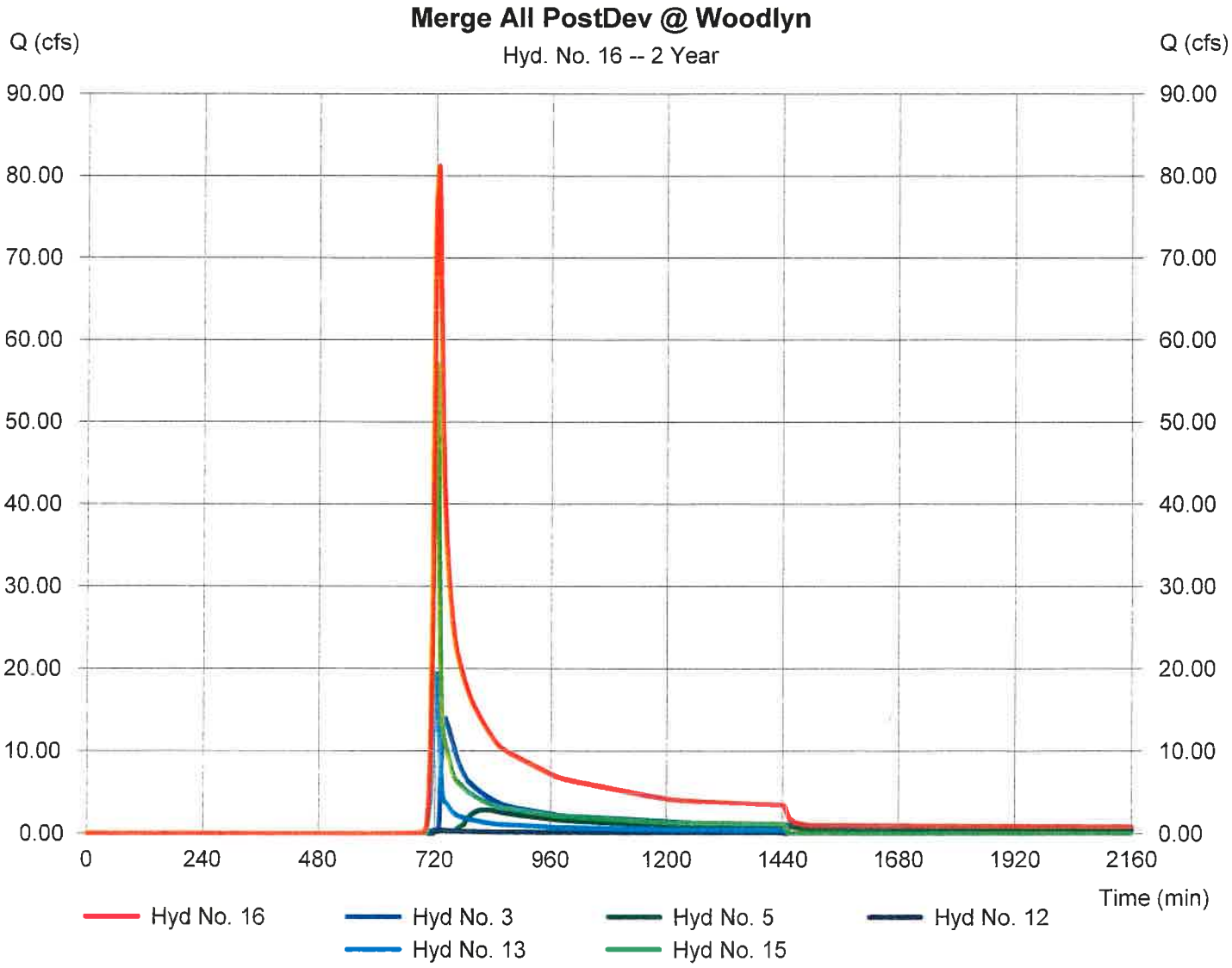


Hydrograph Report

Hyd. No. 16

Merge All PostDev @ Woodlyn

Hydrograph type	= Combine	Peak discharge	= 81.19 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 487,655 cuft
Inflow hyds.	= 3, 5, 12, 13, 15	Contrib. drain. area	= 26.190 ac

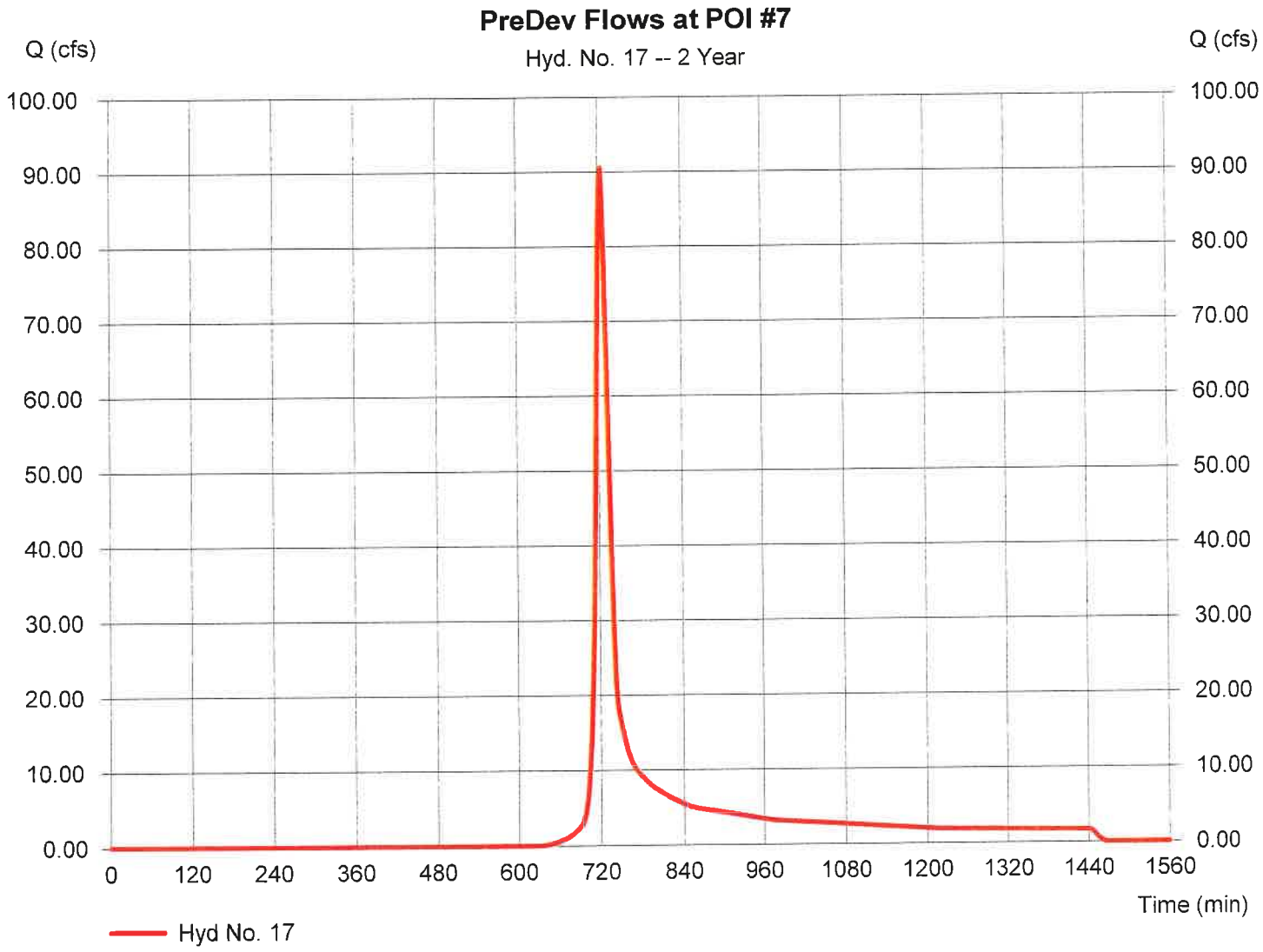


Hydrograph Report

Hyd. No. 17

PreDev Flows at POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 90.55 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 276,577 cuft
Drainage area	= 62.670 ac	Curve number	= 74.4
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.43 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

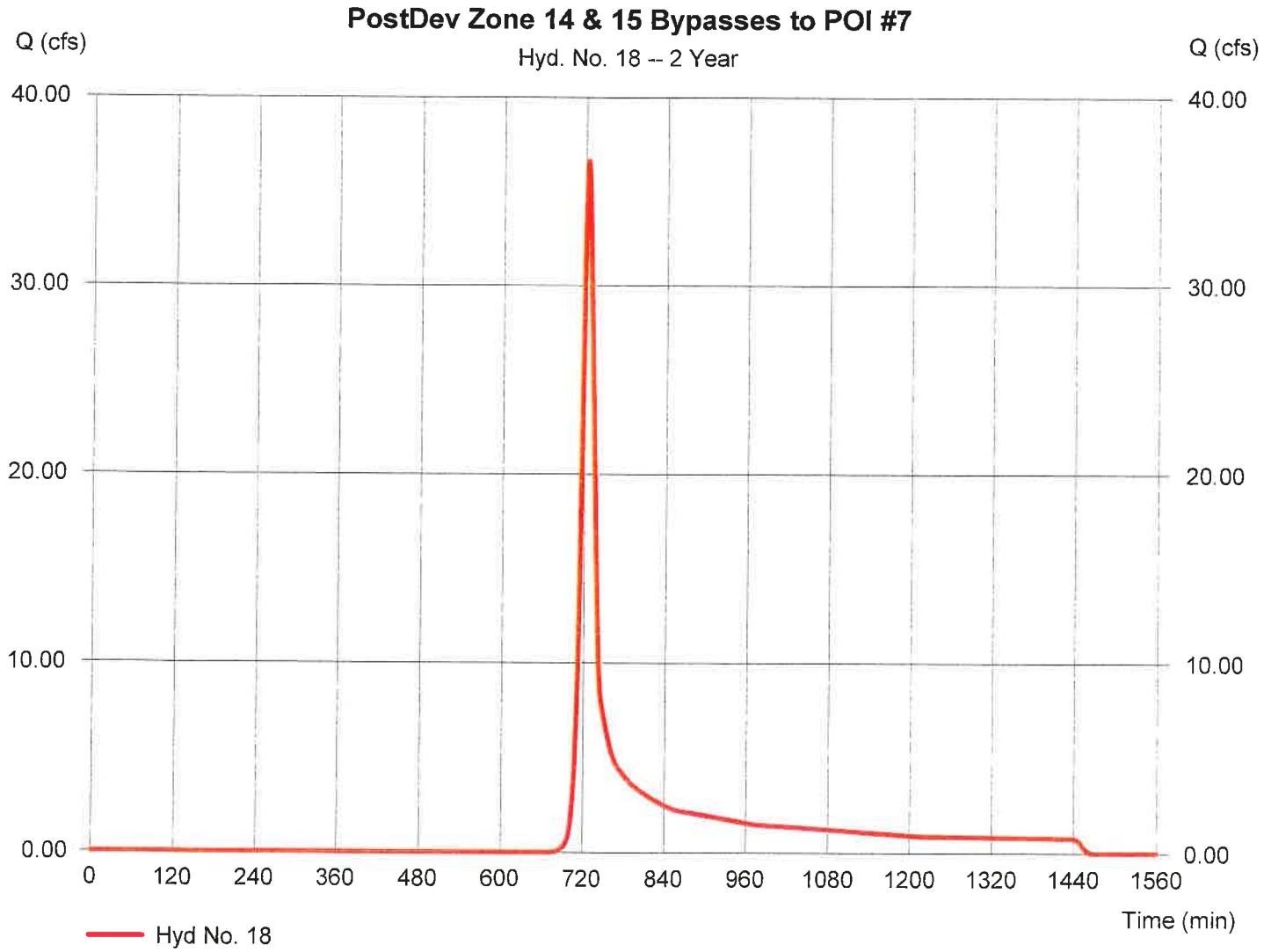


Hydrograph Report

Hyd. No. 18

PostDev Zone 14 & 15 Bypasses to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 36.63 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 116,590 cuft
Drainage area	= 33.240 ac	Curve number	= 70
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.27 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

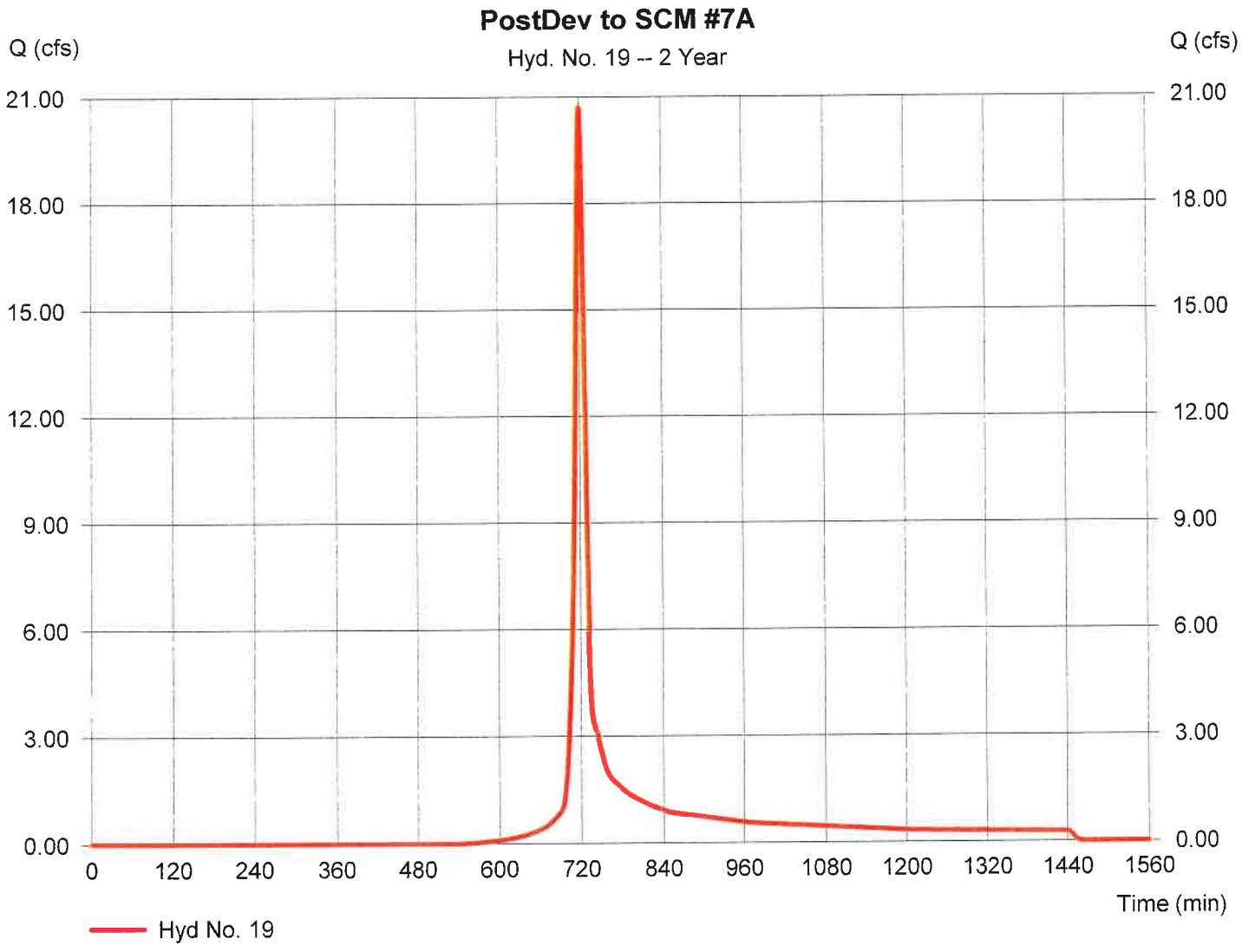


Hydrograph Report

Hyd. No. 19

PostDev to SCM #7A

Hydrograph type	= SCS Runoff	Peak discharge	= 20.70 cfs
Storm frequency	= 2 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 52,371 cuft
Drainage area	= 9.260 ac	Curve number	= 79.8
Basin Slope	= 1.1 %	Hydraulic length	= 1505 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.38 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

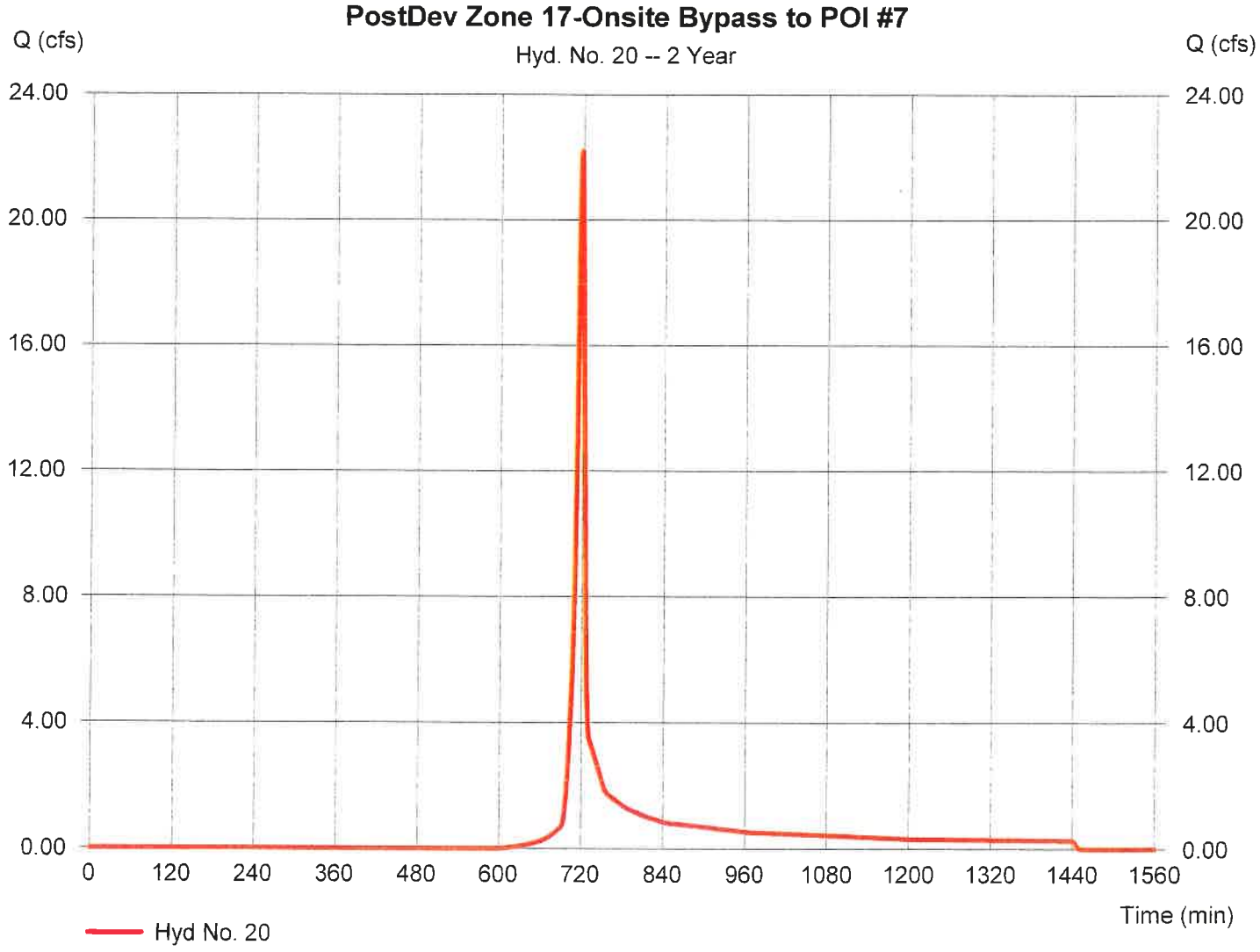


Hydrograph Report

Hyd. No. 20

PostDev Zone 17-Onsite Bypass to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 22.19 cfs
Storm frequency	= 2 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 46,824 cuft
Drainage area	= 9.720 ac	Curve number	= 76.5
Basin Slope	= 1.0 %	Hydraulic length	= 810 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.97 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



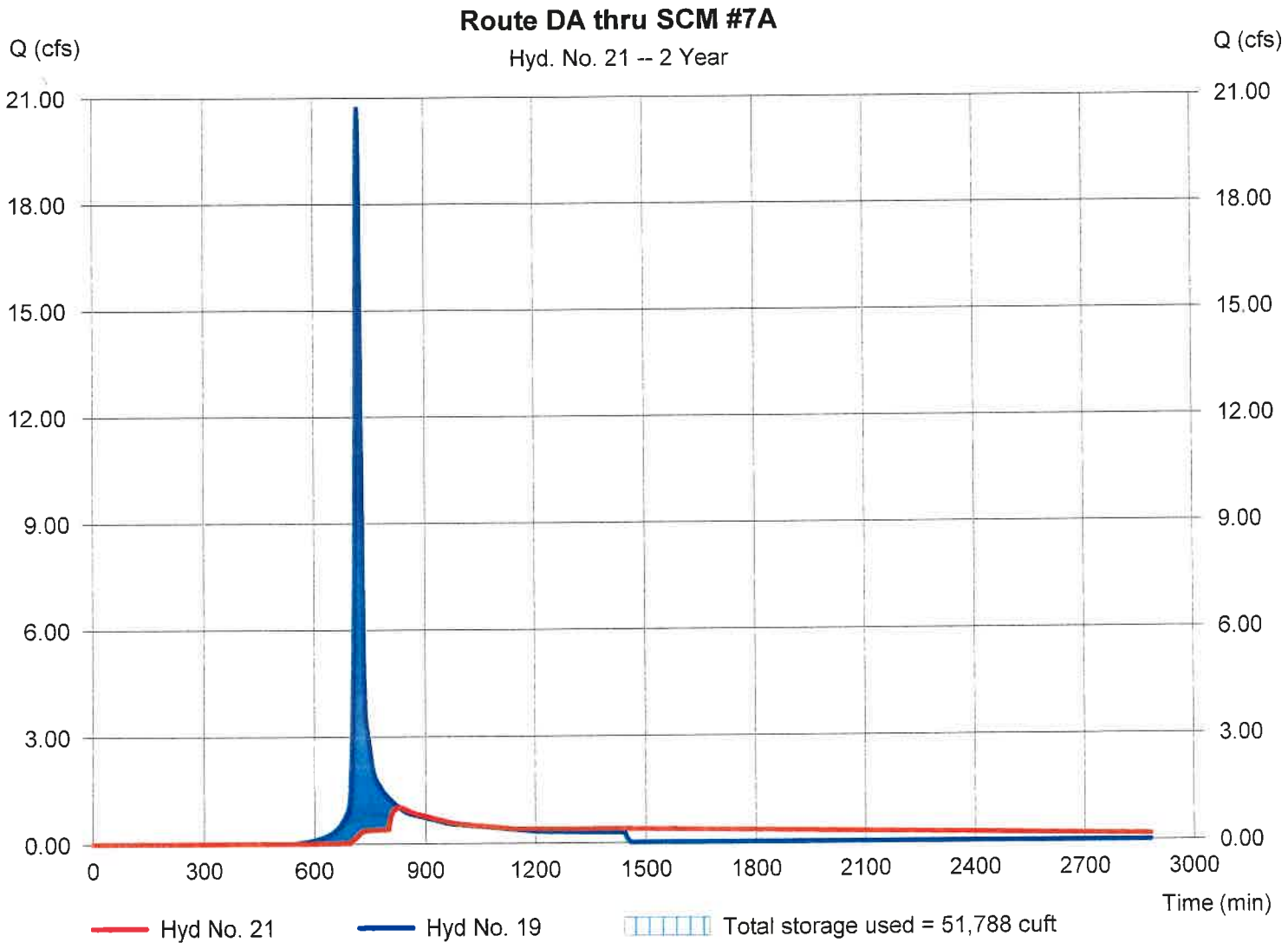
Hydrograph Report

Hyd. No. 21

Route DA thru SCM #7A

Hydrograph type	= Reservoir	Peak discharge	= 1.013 cfs
Storm frequency	= 2 yrs	Time to peak	= 827 min
Time interval	= 1 min	Hyd. volume	= 46,453 cuft
Inflow hyd. No.	= 19 - PostDev to SCM #7A	Max. Elevation	= 373.44 ft
Reservoir name	= SCM #7A	Max. Storage	= 51,788 cuft

Storage Indication method used. Wet pond routing start elevation = 370.50 ft.

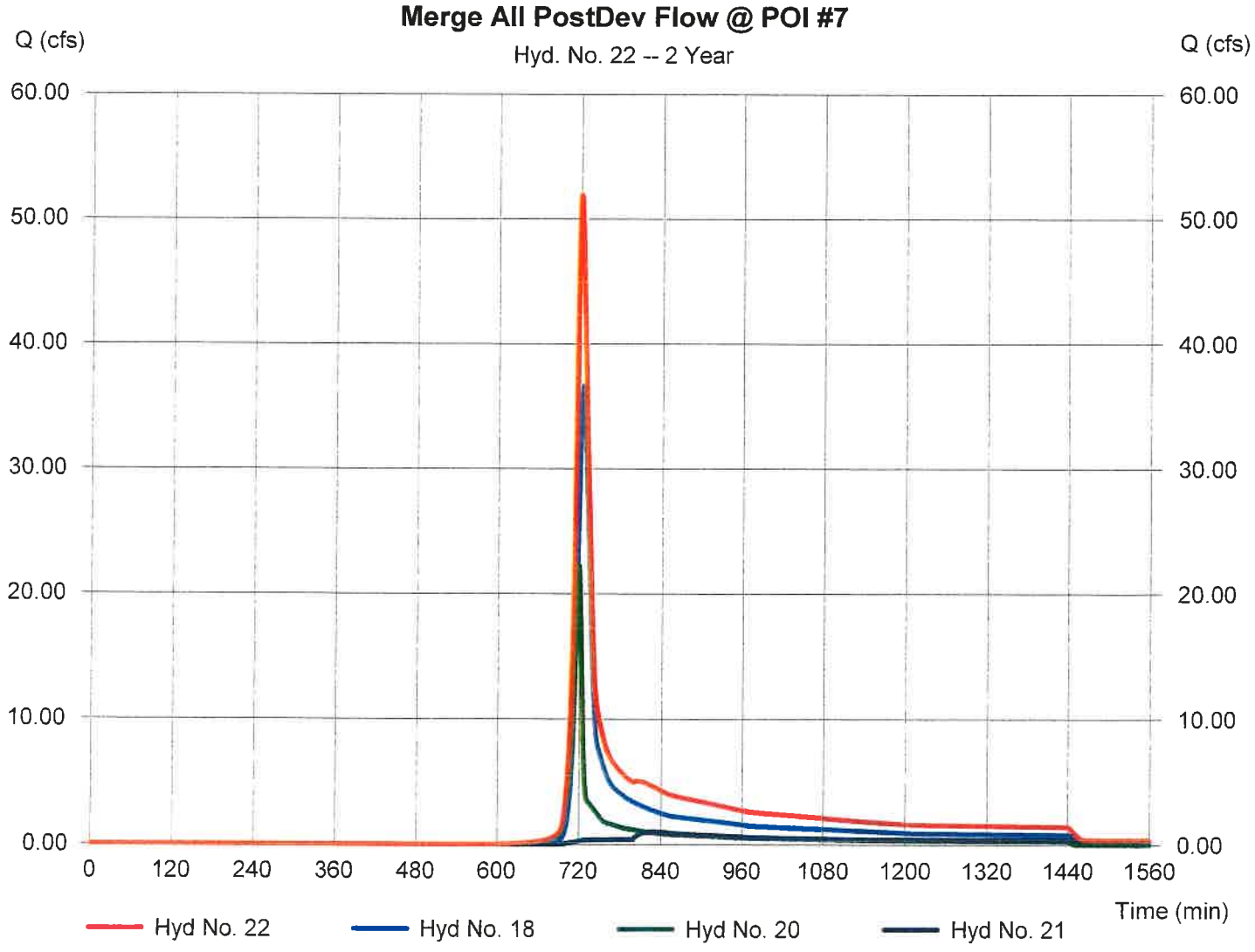


Hydrograph Report

Hyd. No. 22

Merge All PostDev Flow @ POI #7

Hydrograph type	= Combine	Peak discharge	= 51.95 cfs
Storm frequency	= 2 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 209,868 cuft
Inflow hyds.	= 18, 20, 21	Contrib. drain. area	= 42.960 ac

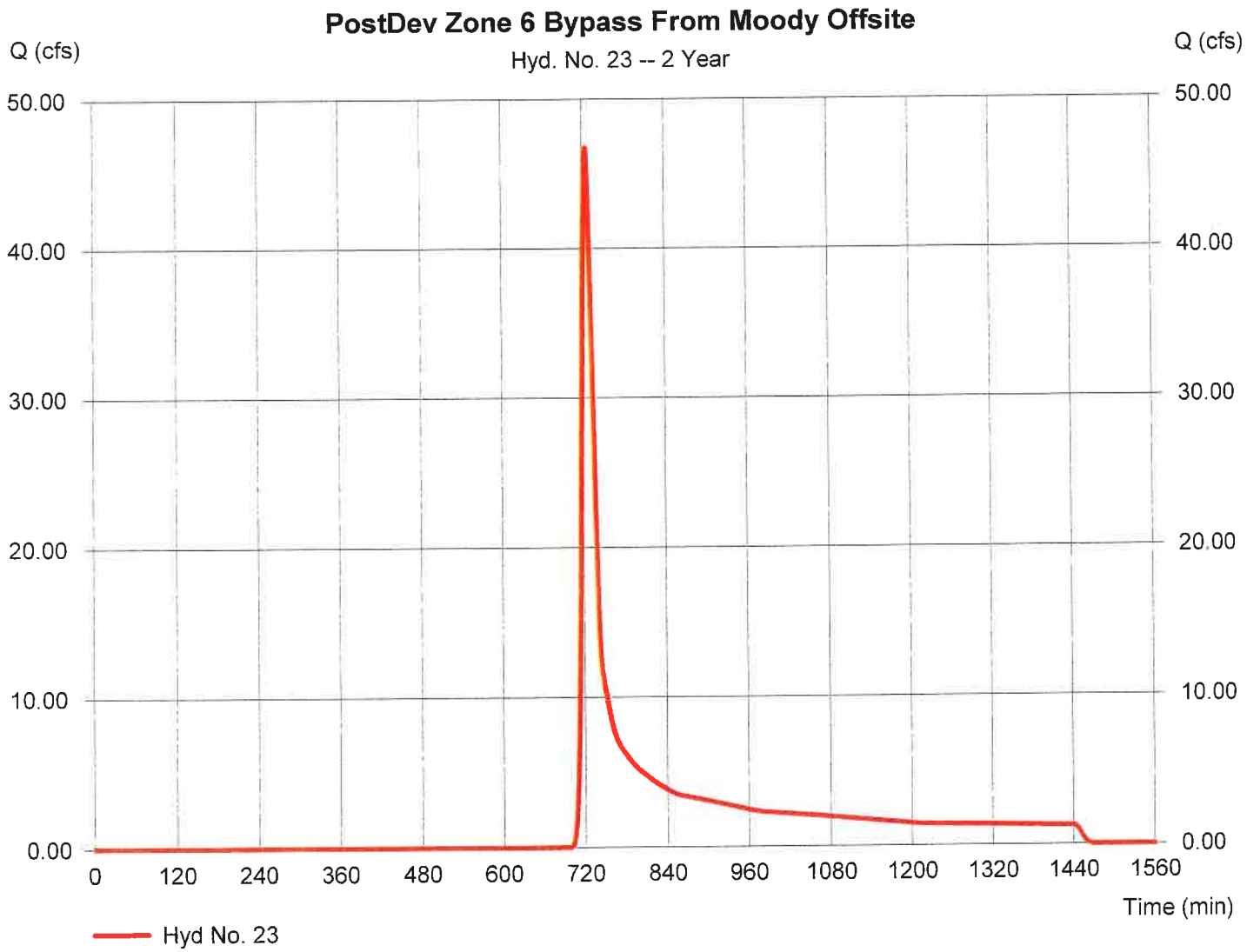


Hydrograph Report

Hyd. No. 23

PostDev Zone 6 Bypass From Moody Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 46.76 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 164,668 cuft
Drainage area	= 64.030 ac	Curve number	= 64.8
Basin Slope	= 1.8 %	Hydraulic length	= 2940 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.01 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

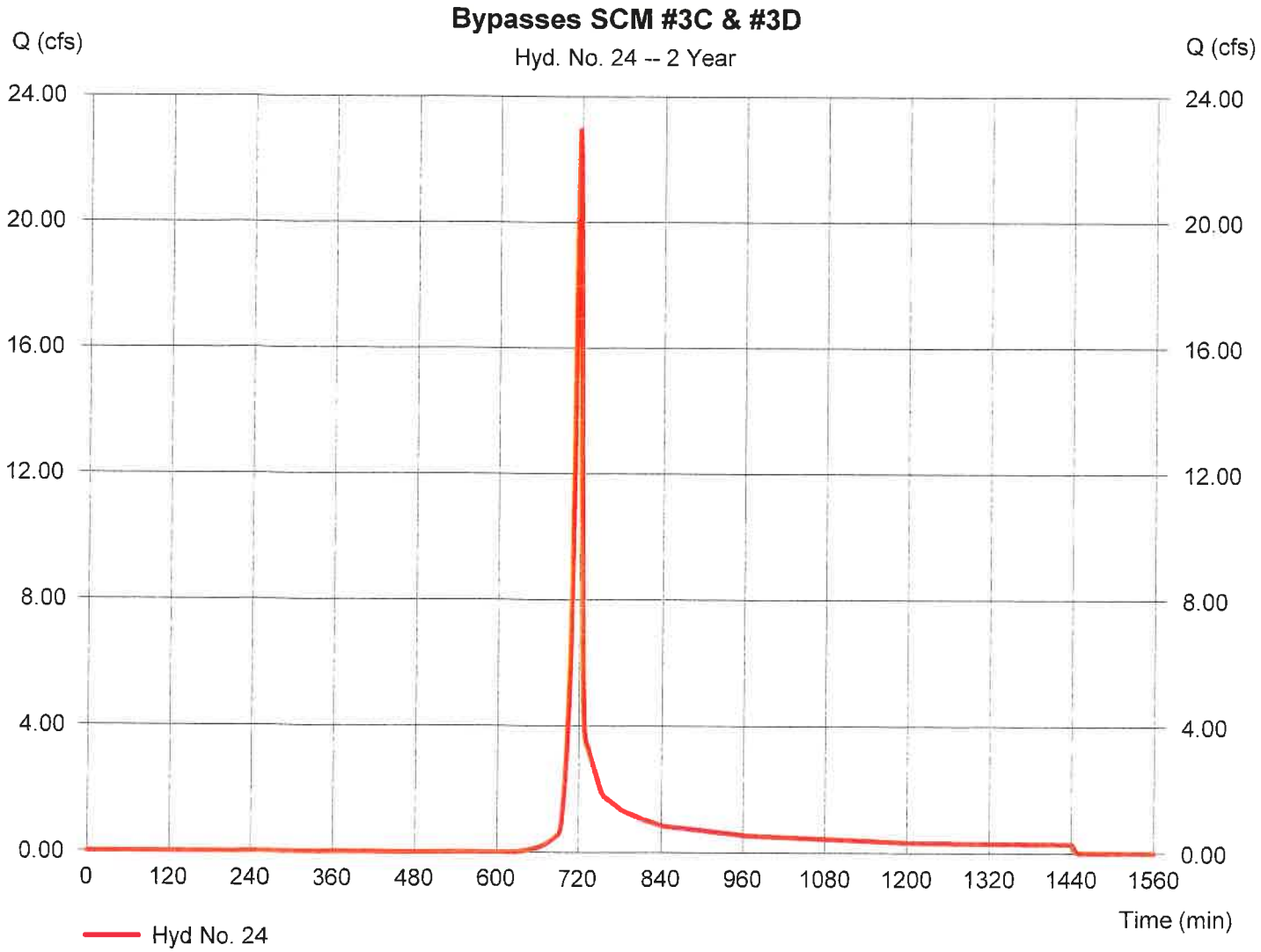


Hydrograph Report

Hyd. No. 24

Bypasses SCM #3C & #3D

Hydrograph type	= SCS Runoff	Peak discharge	= 22.92 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 46,170 cuft
Drainage area	= 9.980 ac	Curve number	= 74.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



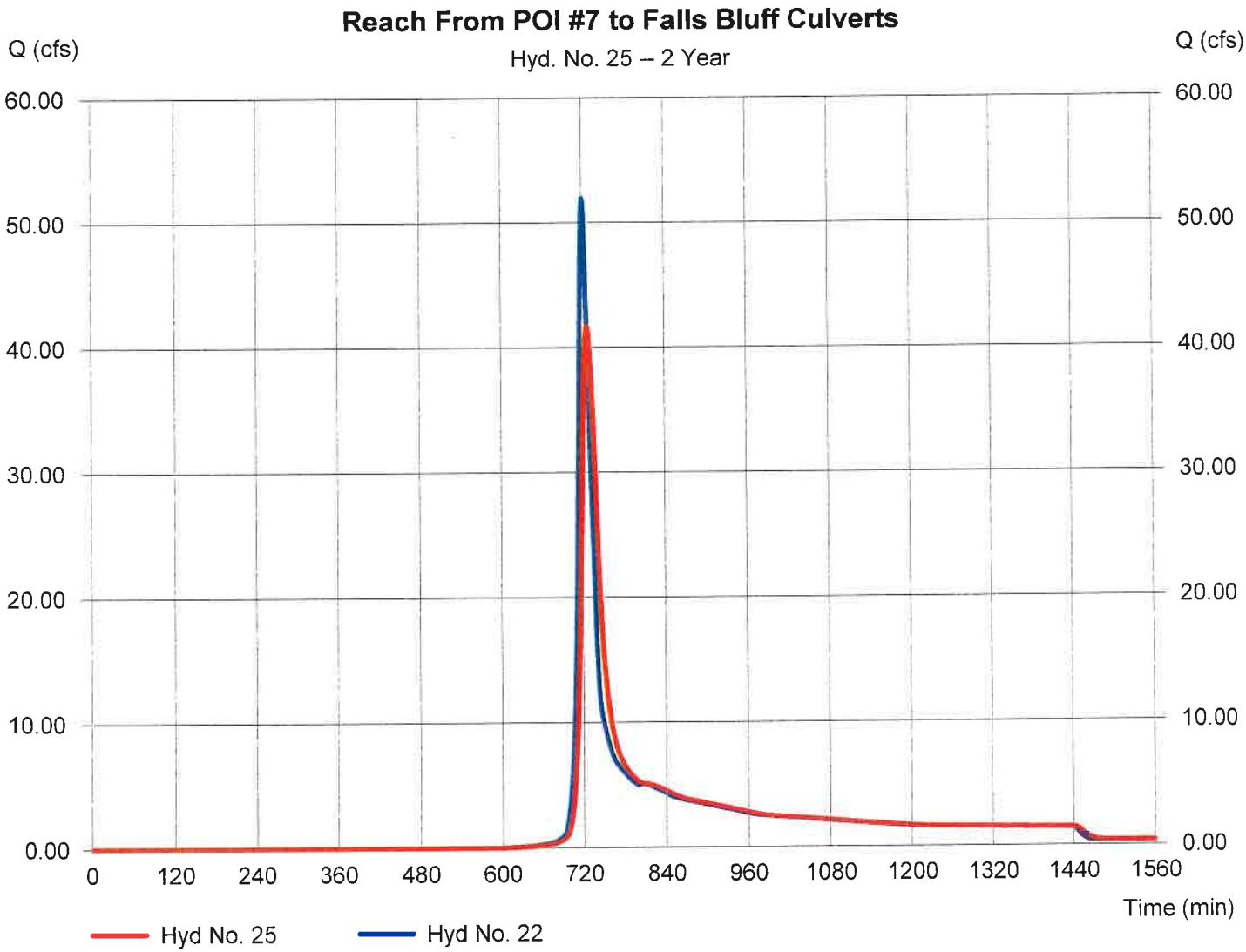
Hydrograph Report

Hyd. No. 25

Reach From POI #7 to Falls Bluff Culverts

Hydrograph type	= Reach	Peak discharge	= 41.65 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 209,791 cuft
Inflow hyd. No.	= 22 - Merge All PostDev Flow to POI #7	Section type	= Trapezoidal
Reach length	= 1845.0 ft	Channel slope	= 1.4 %
Manning's n	= 0.030	Bottom width	= 4.0 ft
Side slope	= 30.0:1	Max. depth	= 4.0 ft
Rating curve x	= 2.289	Rating curve m	= 1.183
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1334

Modified Att-Kin routing method used.



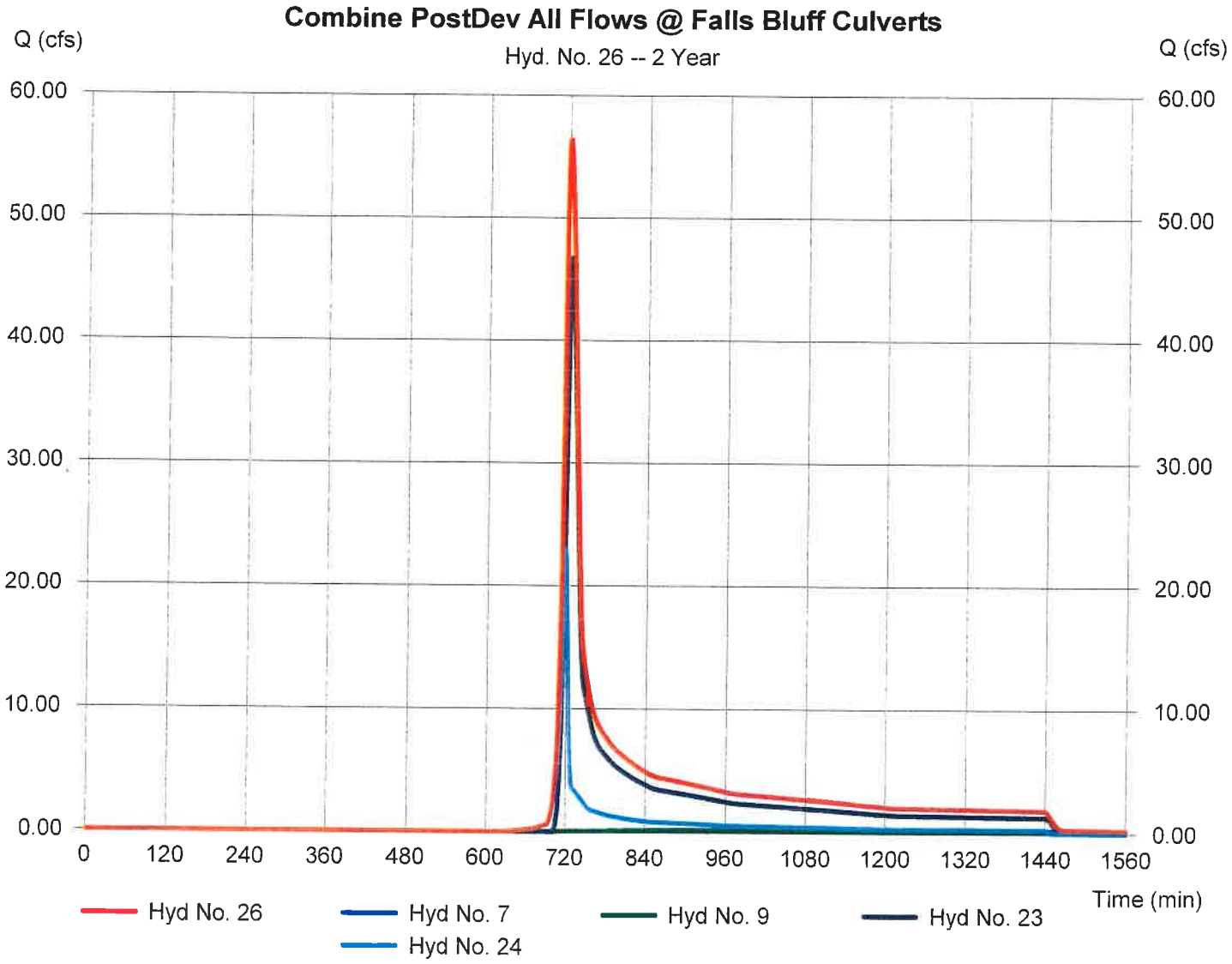
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 26

Combine PostDev All Flows @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 56.38 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 237,445 cuft
Inflow hyds.	= 7, 9, 23, 24	Contrib. drain. area	= 74.010 ac

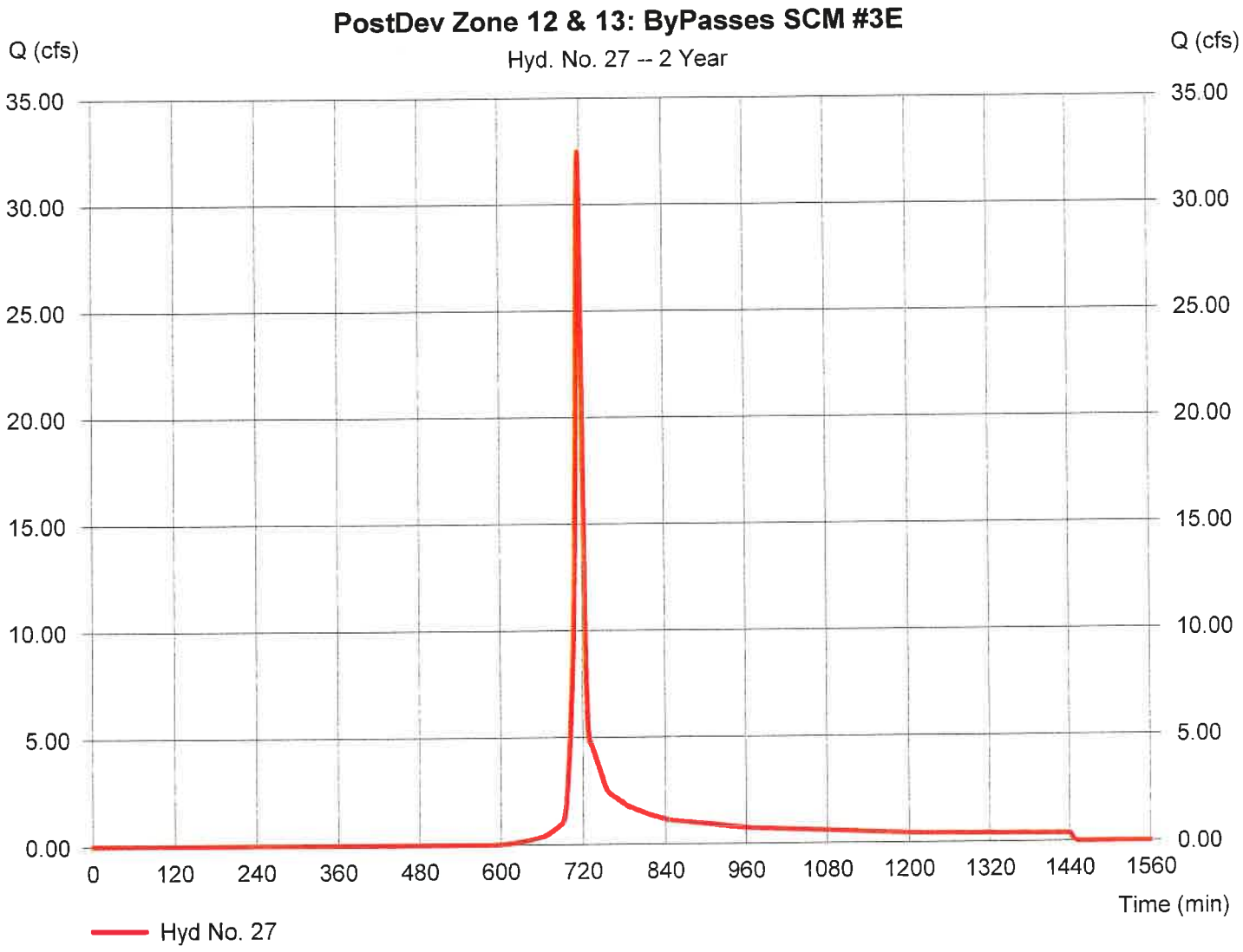


Hydrograph Report

Hyd. No. 27

PostDev Zone 12 & 13: ByPasses SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 32.47 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 65,204 cuft
Drainage area	= 12.500 ac	Curve number	= 77
Basin Slope	= 5.7 %	Hydraulic length	= 1080 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.08 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

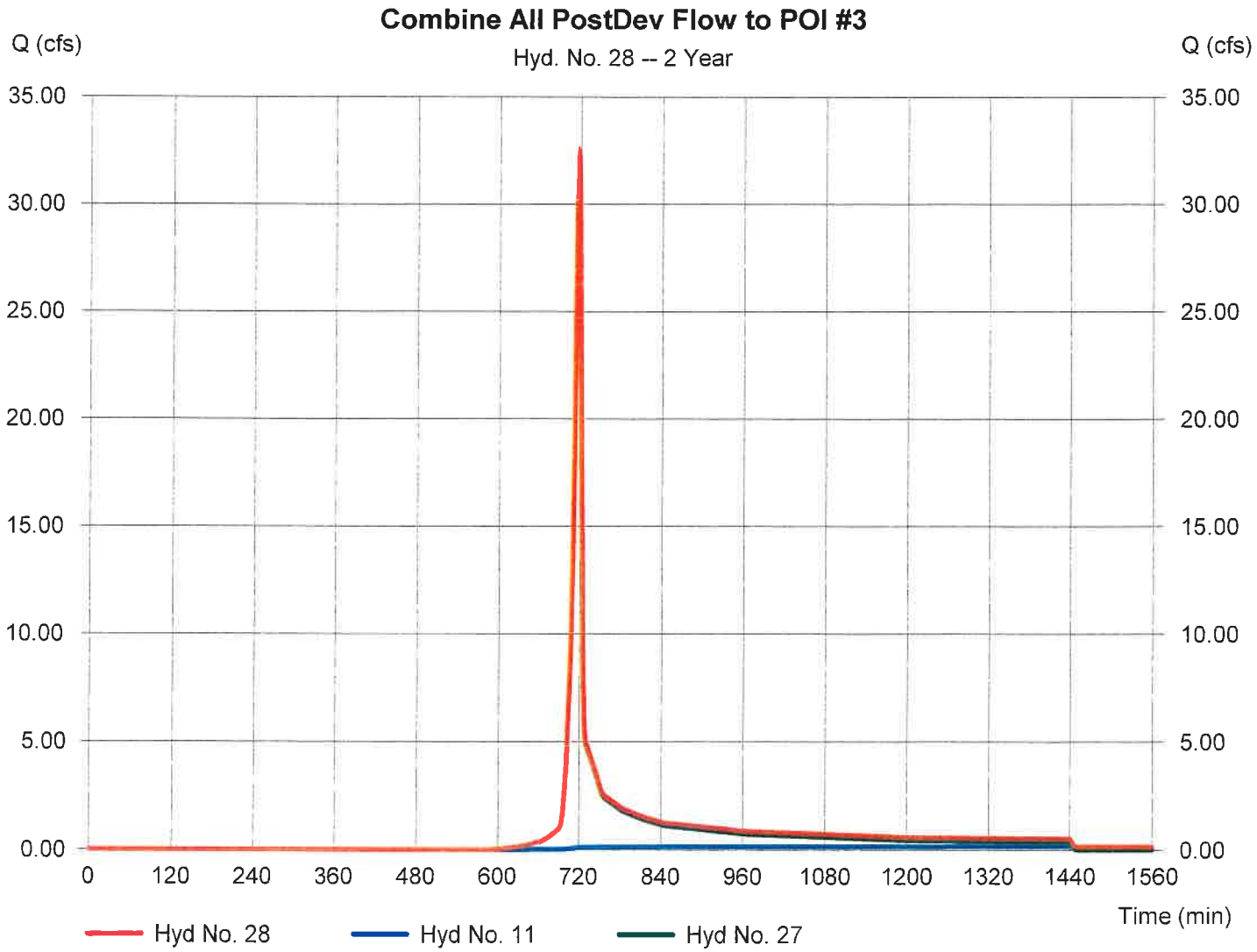


Hydrograph Report

Hyd. No. 28

Combine All PostDev Flow to POI #3

Hydrograph type	= Combine	Peak discharge	= 32.56 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 82,930 cuft
Inflow hyds.	= 11, 27	Contrib. drain. area	= 12.500 ac



Hydrograph Report

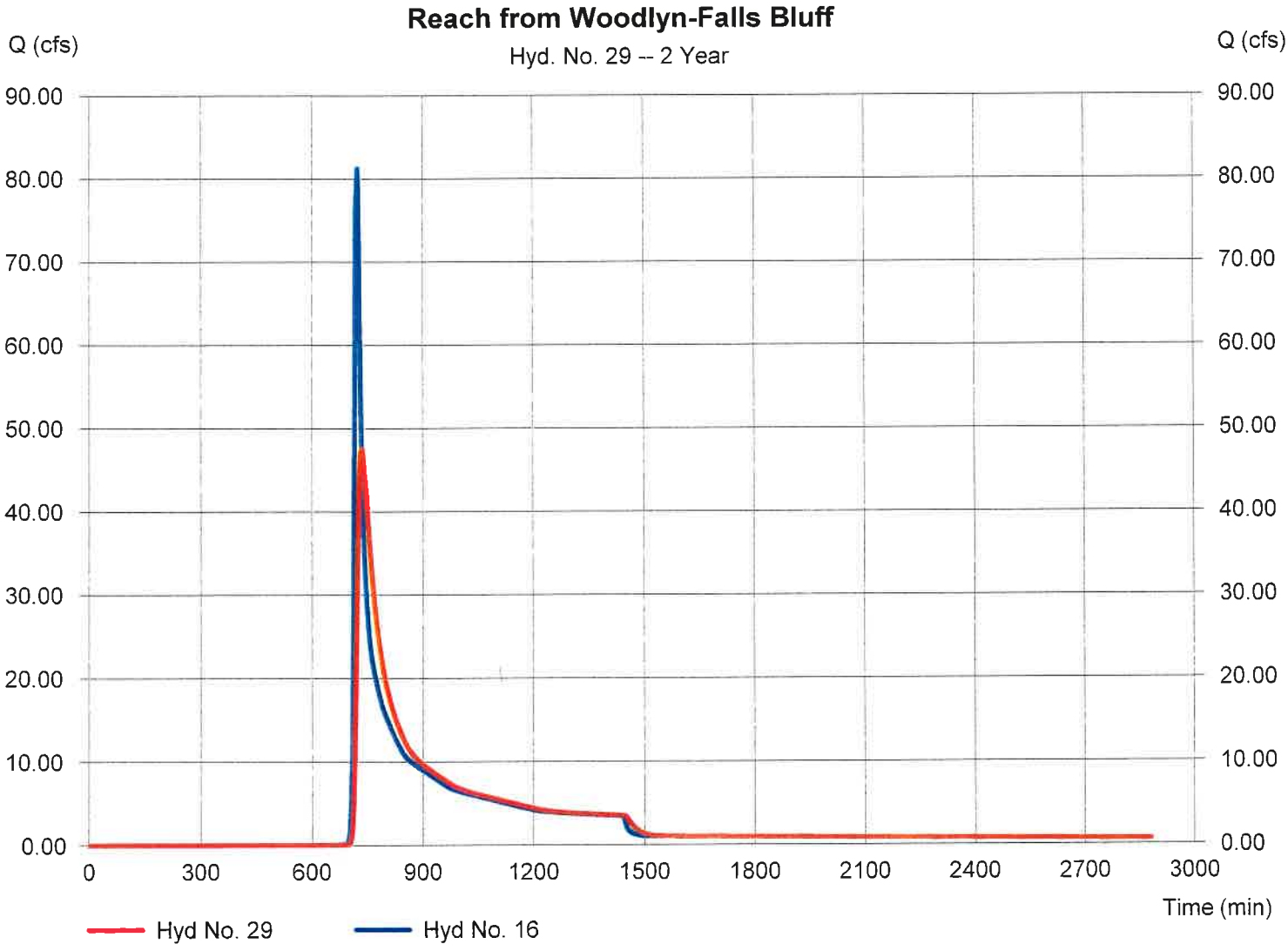
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 29

Reach from Woodlyn-Falls Bluff

Hydrograph type	= Reach	Peak discharge	= 47.48 cfs
Storm frequency	= 2 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 486,974 cuft
Inflow hyd. No.	= 16 - Merge All PostDev @ W Section	Section type	= Trapezoidal
Reach length	= 12152.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.009	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 6.0 ft
Rating curve x	= 5.011	Rating curve m	= 1.255
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0532

Modified Att-Kin routing method used.

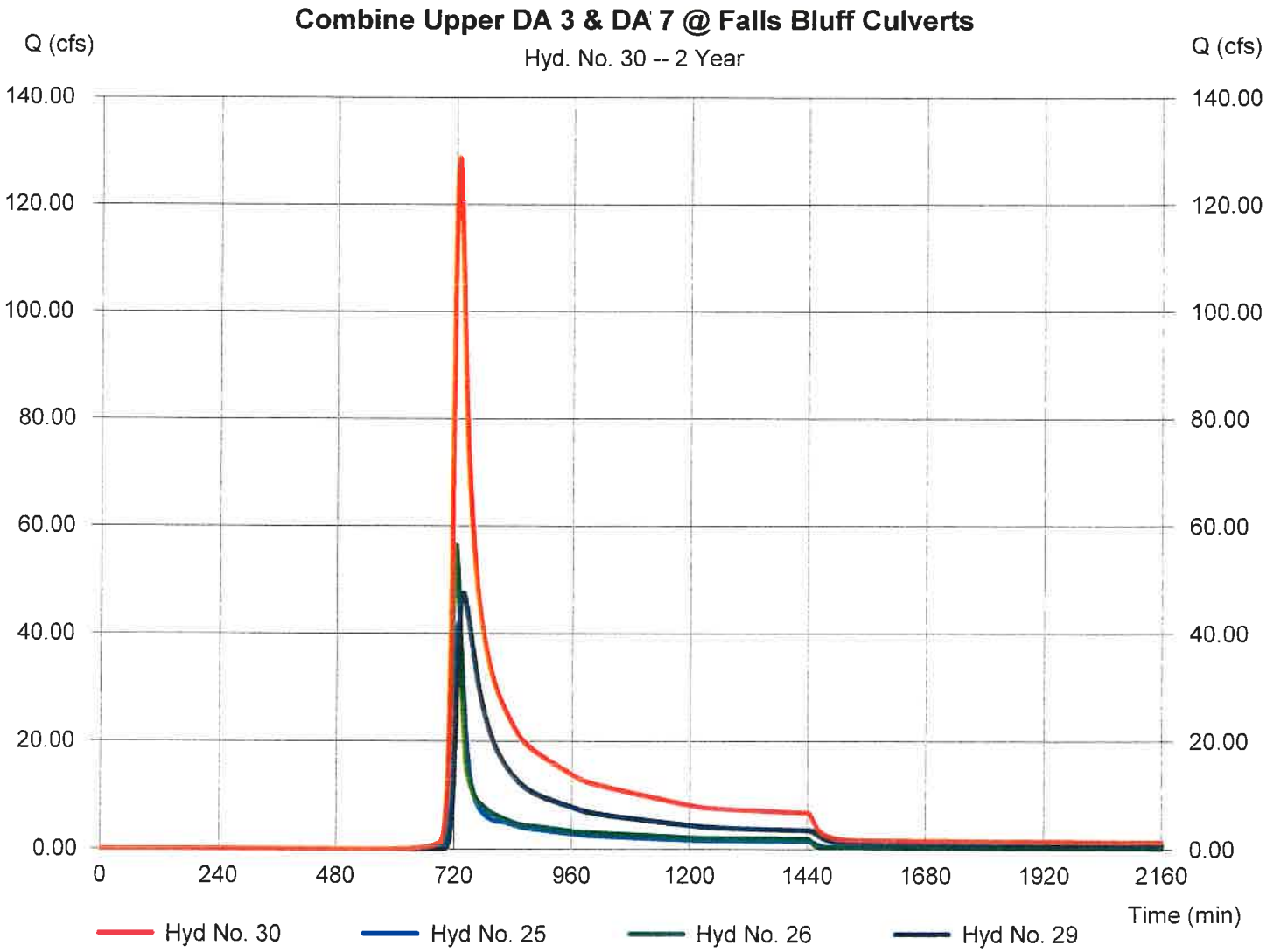


Hydrograph Report

Hyd. No. 30

Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 128.68 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 934,210 cuft
Inflow hyds.	= 25, 26, 29	Contrib. drain. area	= 0.000 ac



Hydrograph Report

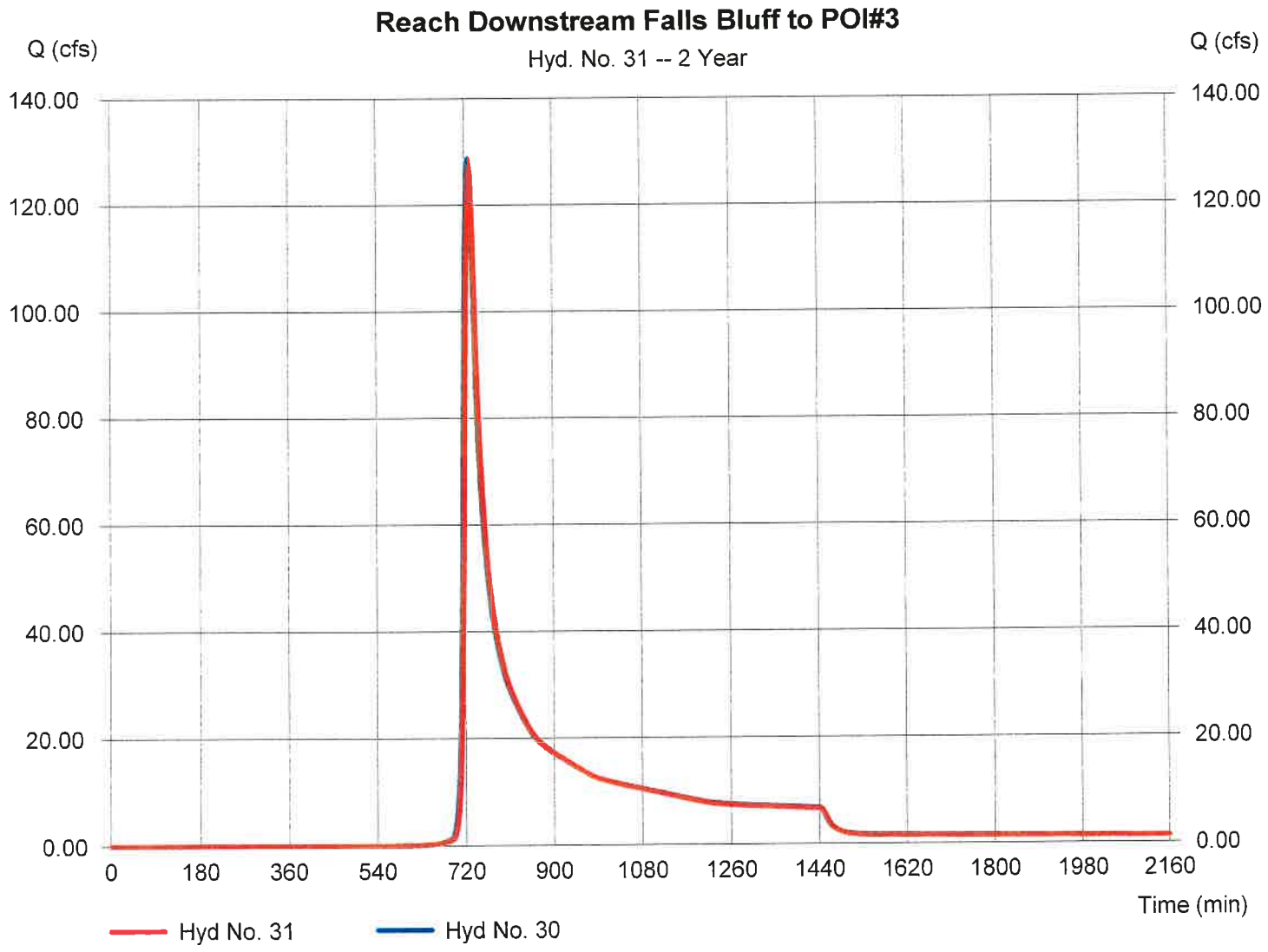
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 31

Reach Downstream Falls Bluff to POI#3

Hydrograph type	= Reach	Peak discharge	= 127.06 cfs
Storm frequency	= 2 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 918,592 cuft
Inflow hyd. No.	= 30 - Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts	Section type	= Trapezoidal
Reach length	= 1200.0 ft	Channel slope	= 5.0 %
Manning's n	= 0.030	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 8.0 ft
Rating curve x	= 3.361	Rating curve m	= 1.269
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.3750

Modified Att-Kin routing method used.

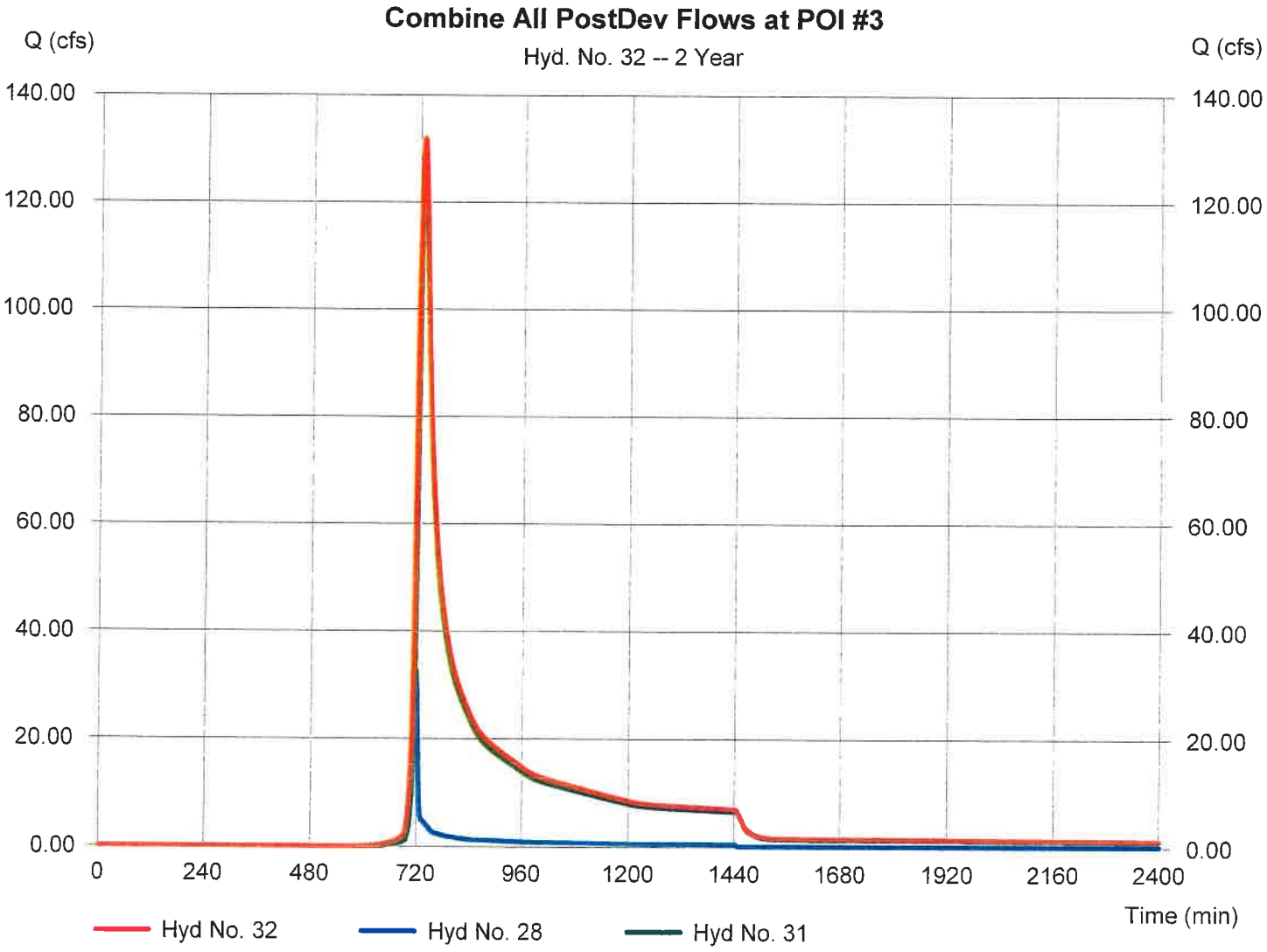


Hydrograph Report

Hyd. No. 32

Combine All PostDev Flows at POI #3

Hydrograph type	= Combine	Peak discharge	= 131.95 cfs
Storm frequency	= 2 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 1,001,523 cuft
Inflow hyds.	= 28, 31	Contrib. drain. area	= 0.000 ac

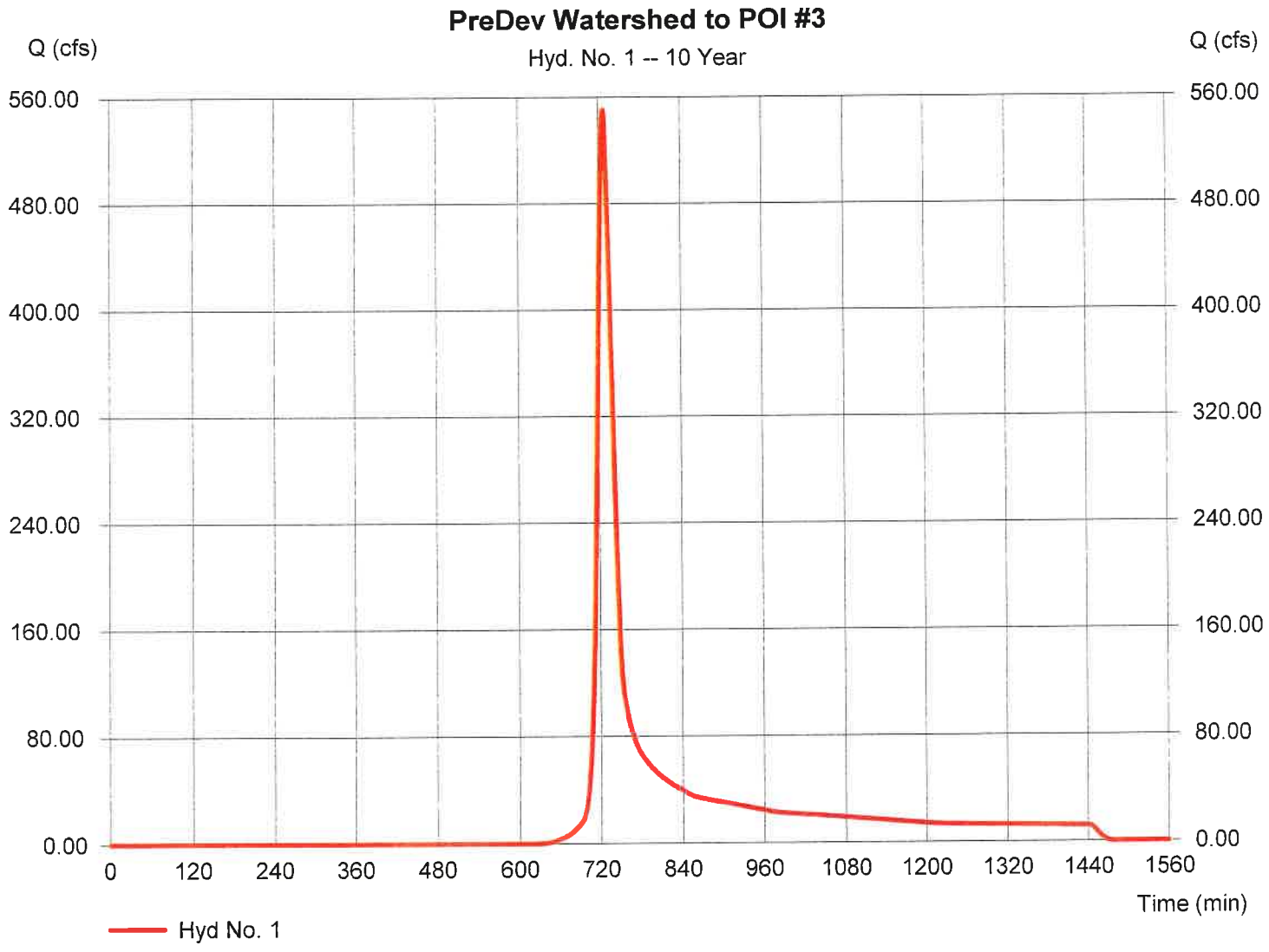


Hydrograph Report

Hyd. No. 1

PreDev Watershed to POI #3

Hydrograph type	= SCS Runoff	Peak discharge	= 550.27 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 1,942,061 cuft
Drainage area	= 300.880 ac	Curve number	= 66.7
Basin Slope	= 3.0 %	Hydraulic length	= 5451 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 22.67 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

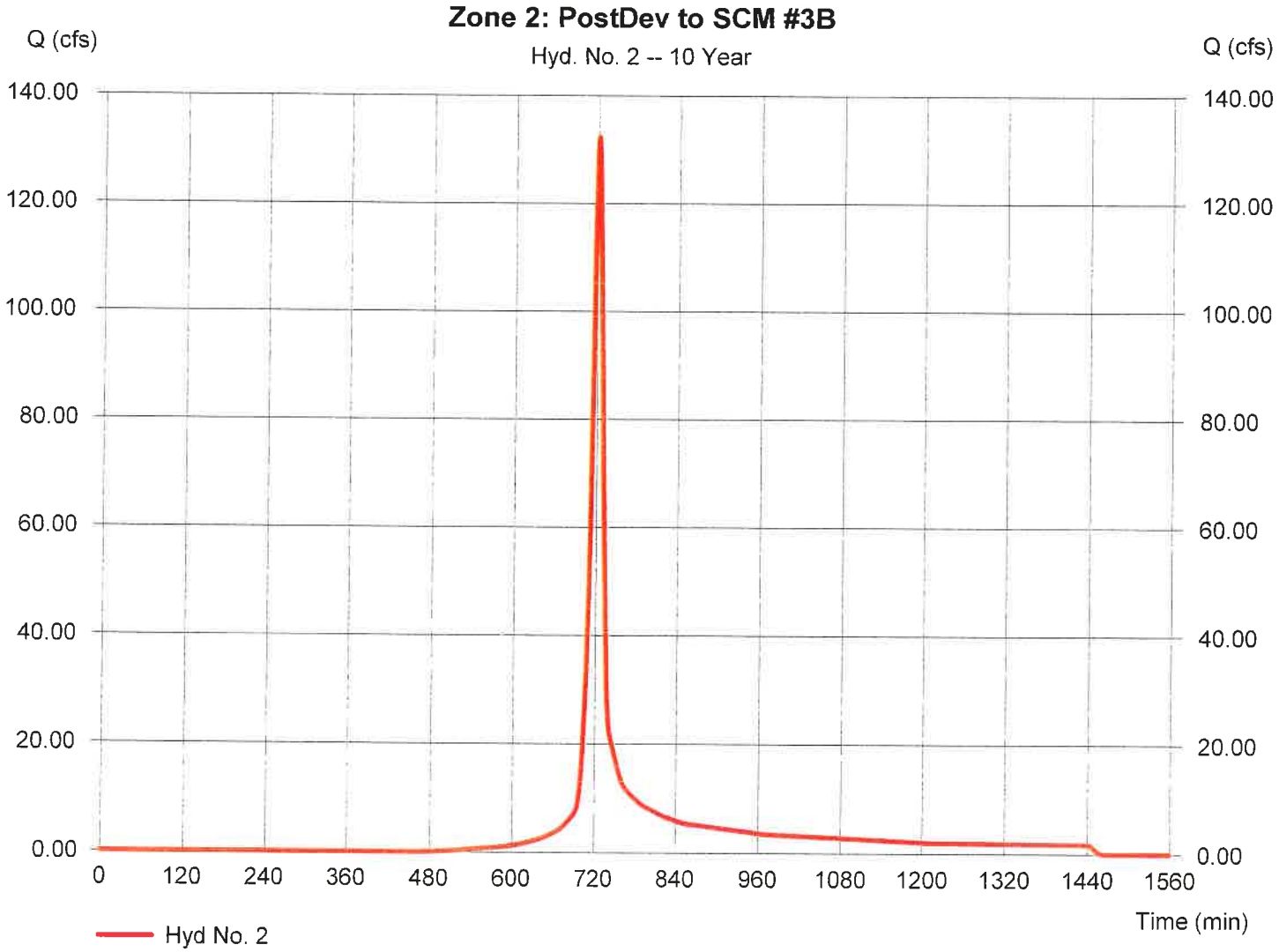


Hydrograph Report

Hyd. No. 2

Zone 2: PostDev to SCM #3B

Hydrograph type	= SCS Runoff	Peak discharge	= 132.33 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 355,810 cuft
Drainage area	= 36.040 ac	Curve number	= 77.9
Basin Slope	= 1.9 %	Hydraulic length	= 2520 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.80 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



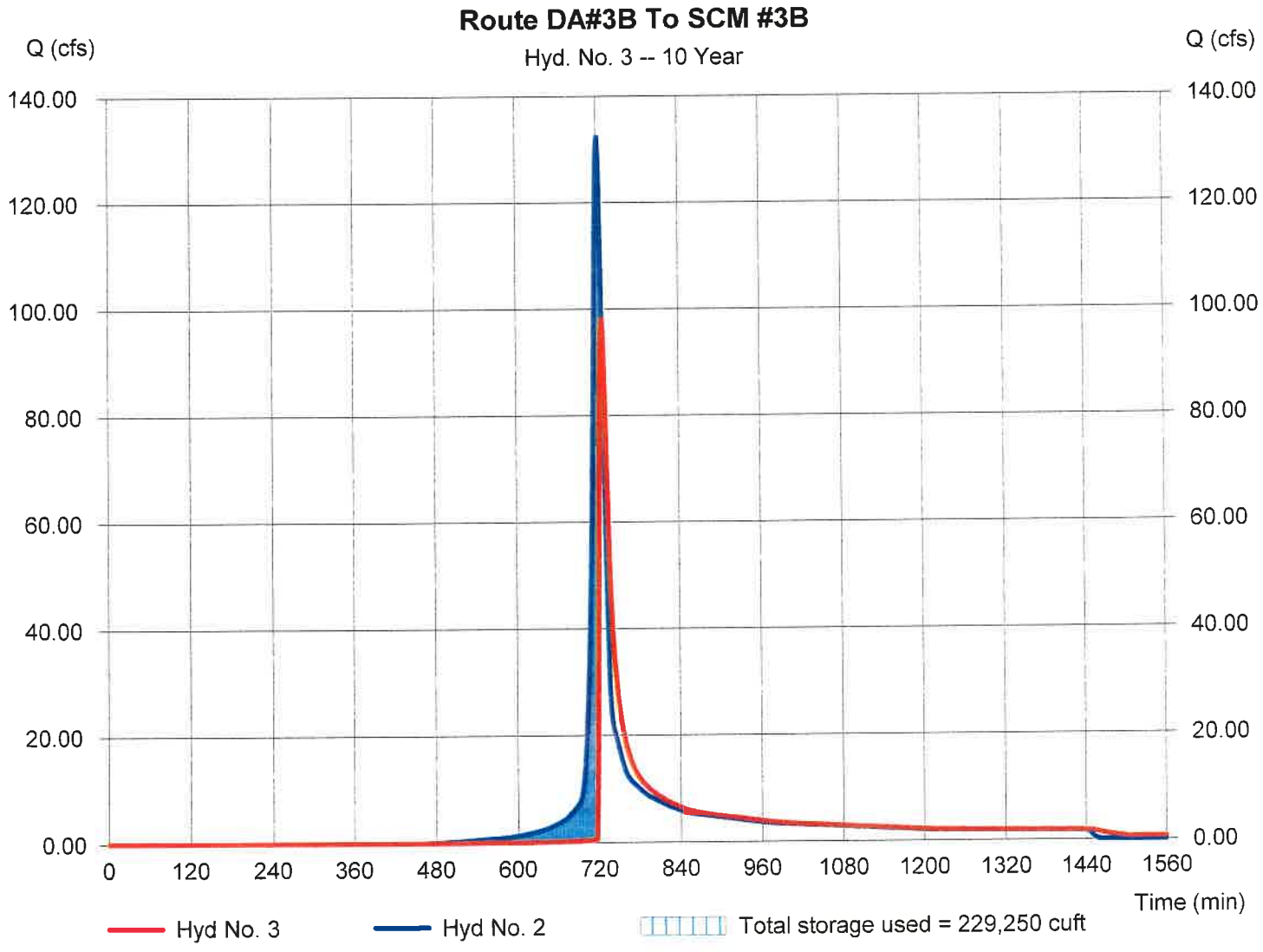
Hydrograph Report

Hyd. No. 3

Route DA#3B To SCM #3B

Hydrograph type	= Reservoir	Peak discharge	= 98.09 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 321,239 cuft
Inflow hyd. No.	= 2 - Zone 2: PostDev to SCM #3B	Max. Elevation	= 354.34 ft
Reservoir name	= SCM 3B-rev032620	Max. Storage	= 229,250 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

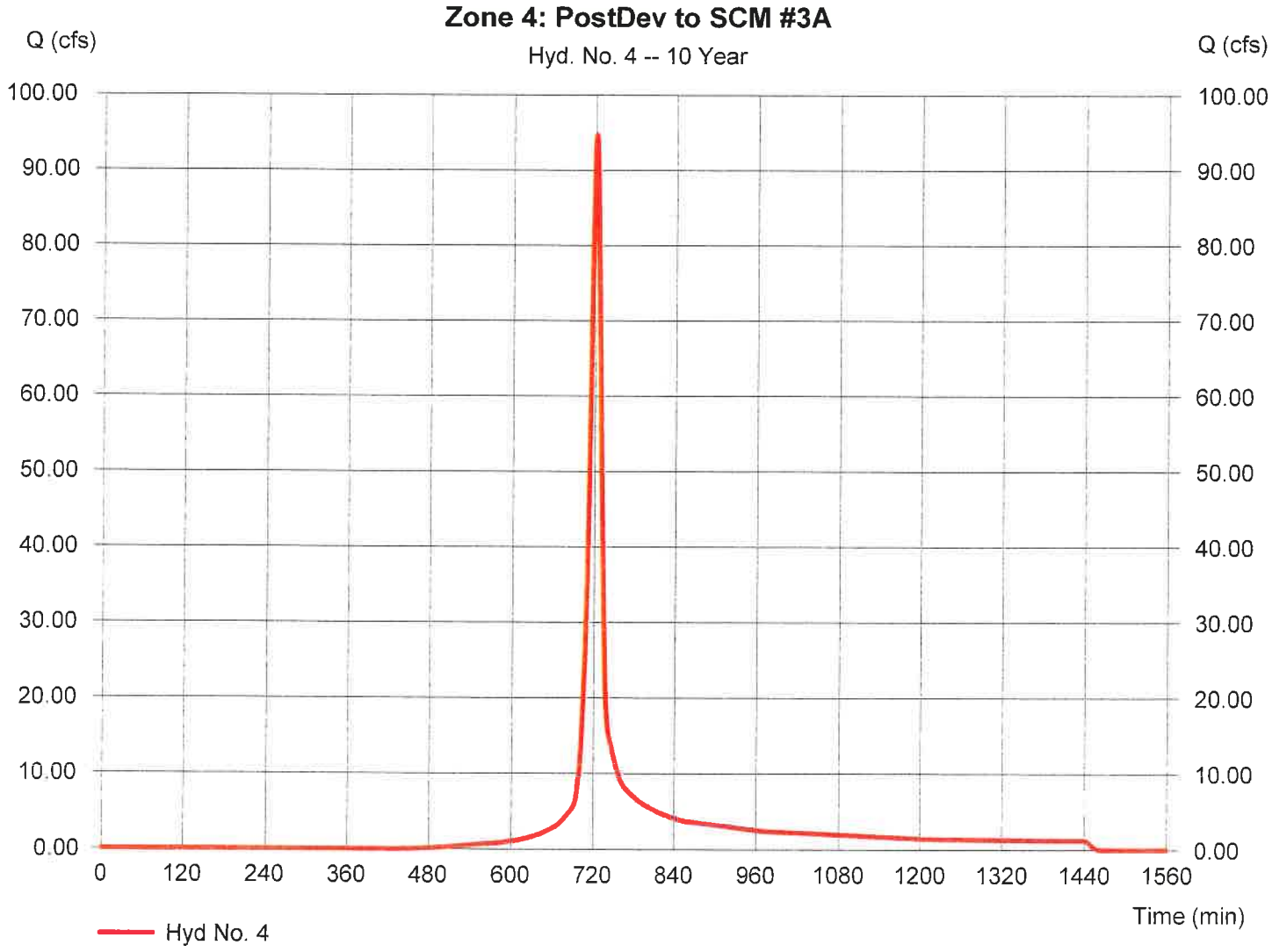


Hydrograph Report

Hyd. No. 4

Zone 4: PostDev to SCM #3A

Hydrograph type	= SCS Runoff	Peak discharge	= 94.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 254,973 cuft
Drainage area	= 24.600 ac	Curve number	= 79.4
Basin Slope	= 1.5 %	Hydraulic length	= 2250 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.94 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



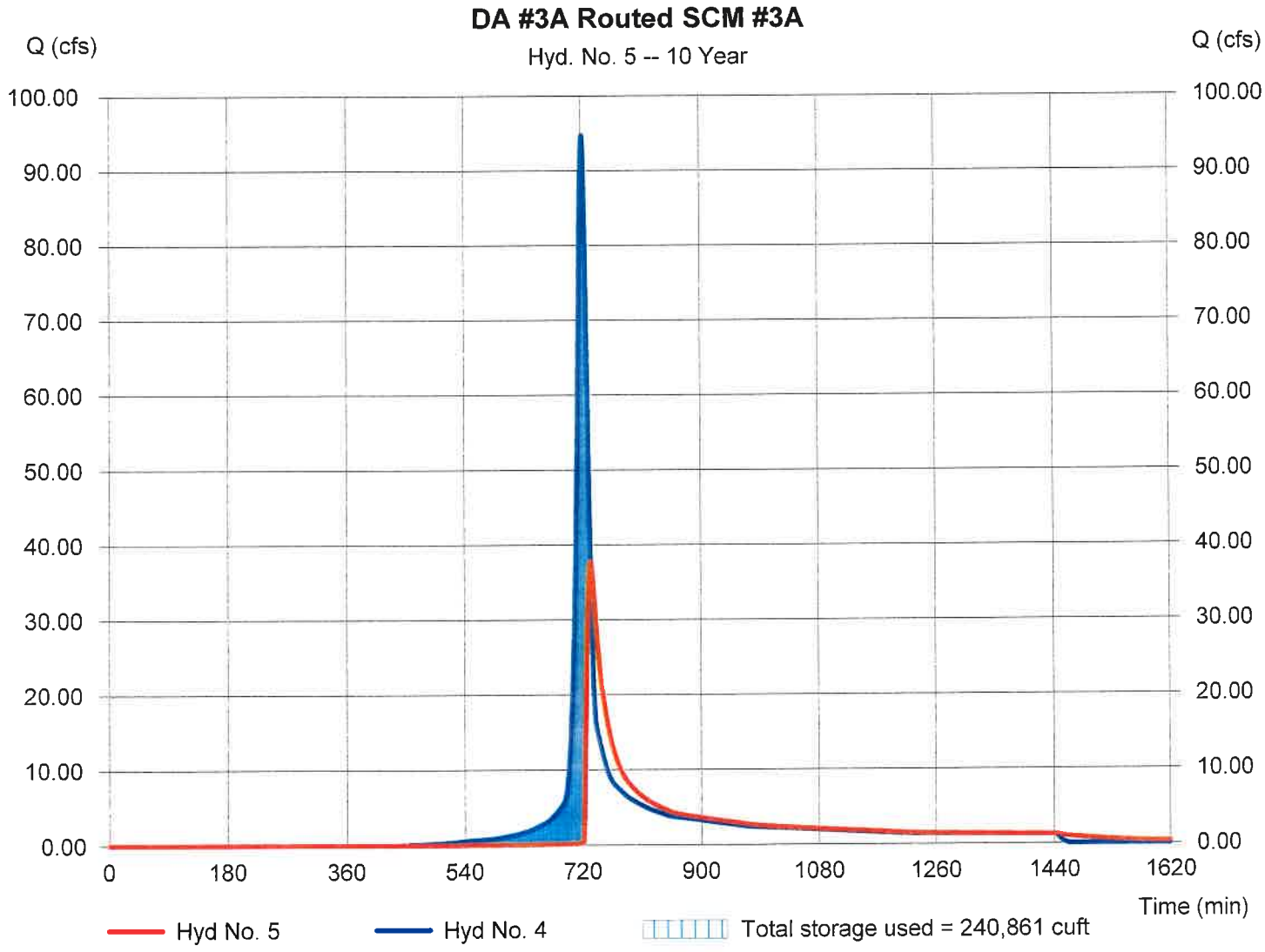
Hydrograph Report

Hyd. No. 5

DA #3A Routed SCM #3A

Hydrograph type	= Reservoir	Peak discharge	= 37.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 733 min
Time interval	= 1 min	Hyd. volume	= 198,542 cuft
Inflow hyd. No.	= 4 - Zone 4: PostDev to SCM #3A	Max. Elevation	= 353.93 ft
Reservoir name	= SCM #3A	Max. Storage	= 240,861 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

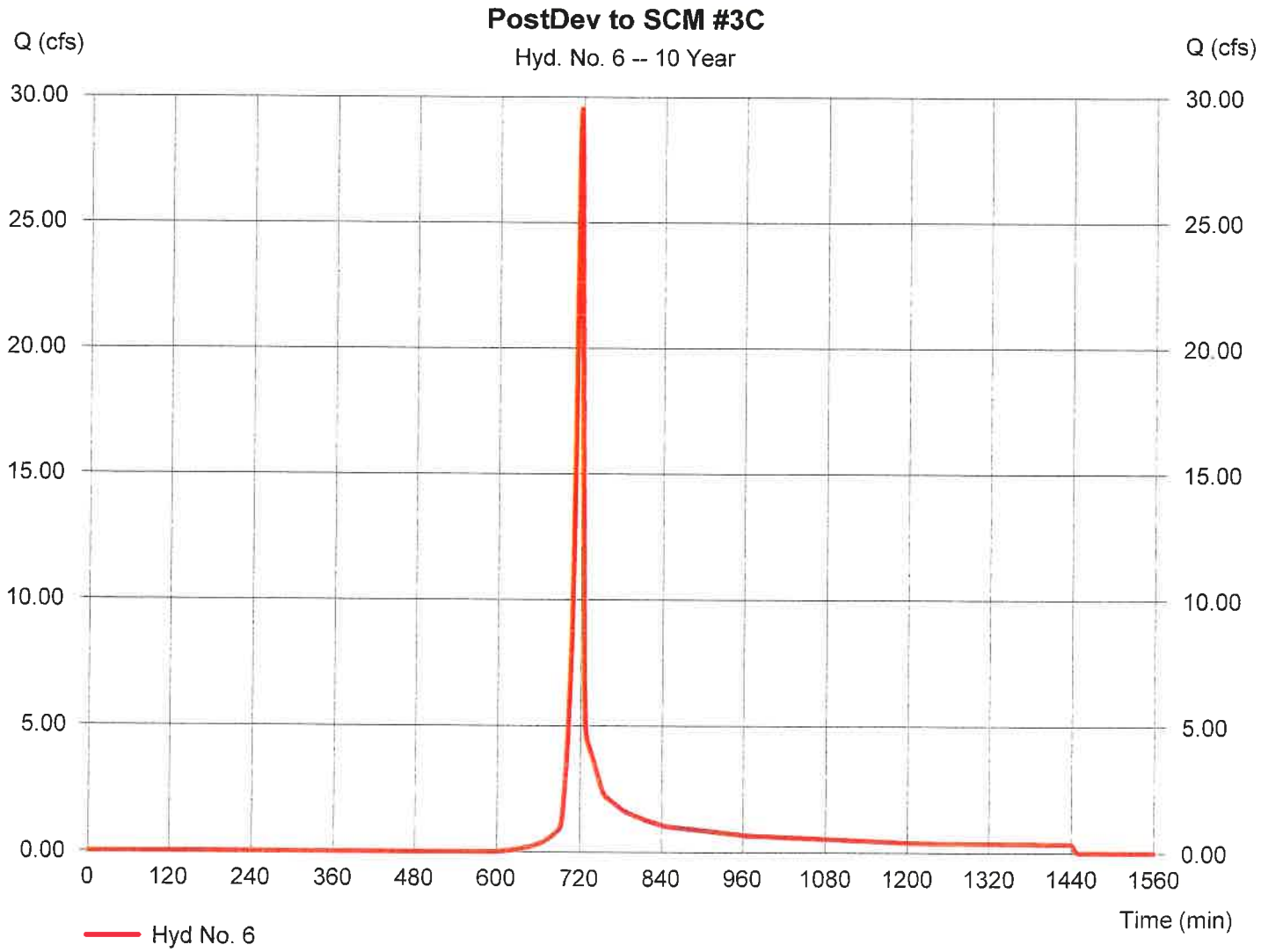


Hydrograph Report

Hyd. No. 6

PostDev to SCM #3C

Hydrograph type	= SCS Runoff	Peak discharge	= 29.53 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 59,302 cuft
Drainage area	= 7.970 ac	Curve number	= 69.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



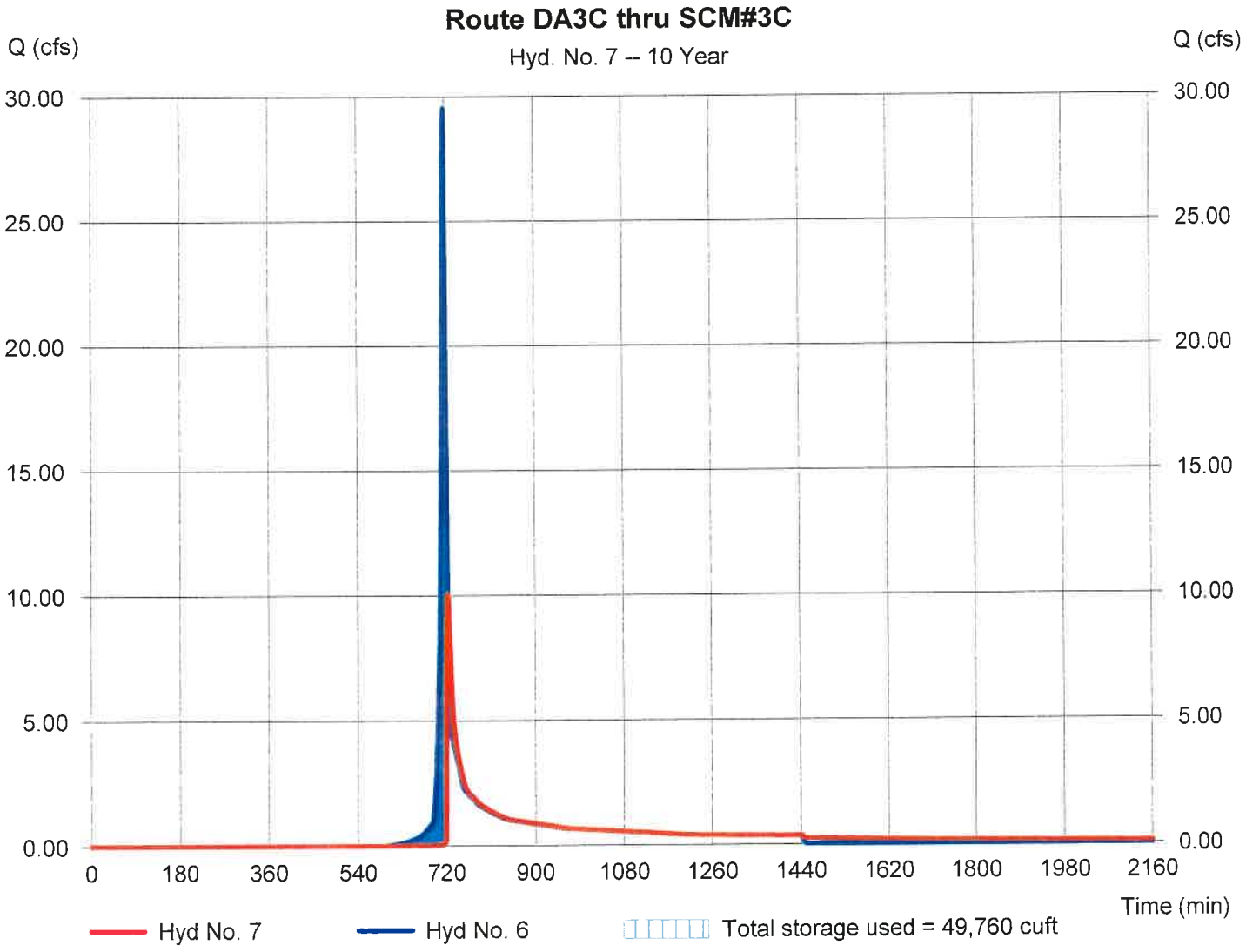
Hydrograph Report

Hyd. No. 7

Route DA3C thru SCM#3C

Hydrograph type	= Reservoir	Peak discharge	= 10.05 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 47,462 cuft
Inflow hyd. No.	= 6 - PostDev to SCM #3C	Max. Elevation	= 342.16 ft
Reservoir name	= SCM #3C	Max. Storage	= 49,760 cuft

Storage Indication method used. Wet pond routing start elevation = 340.50 ft.

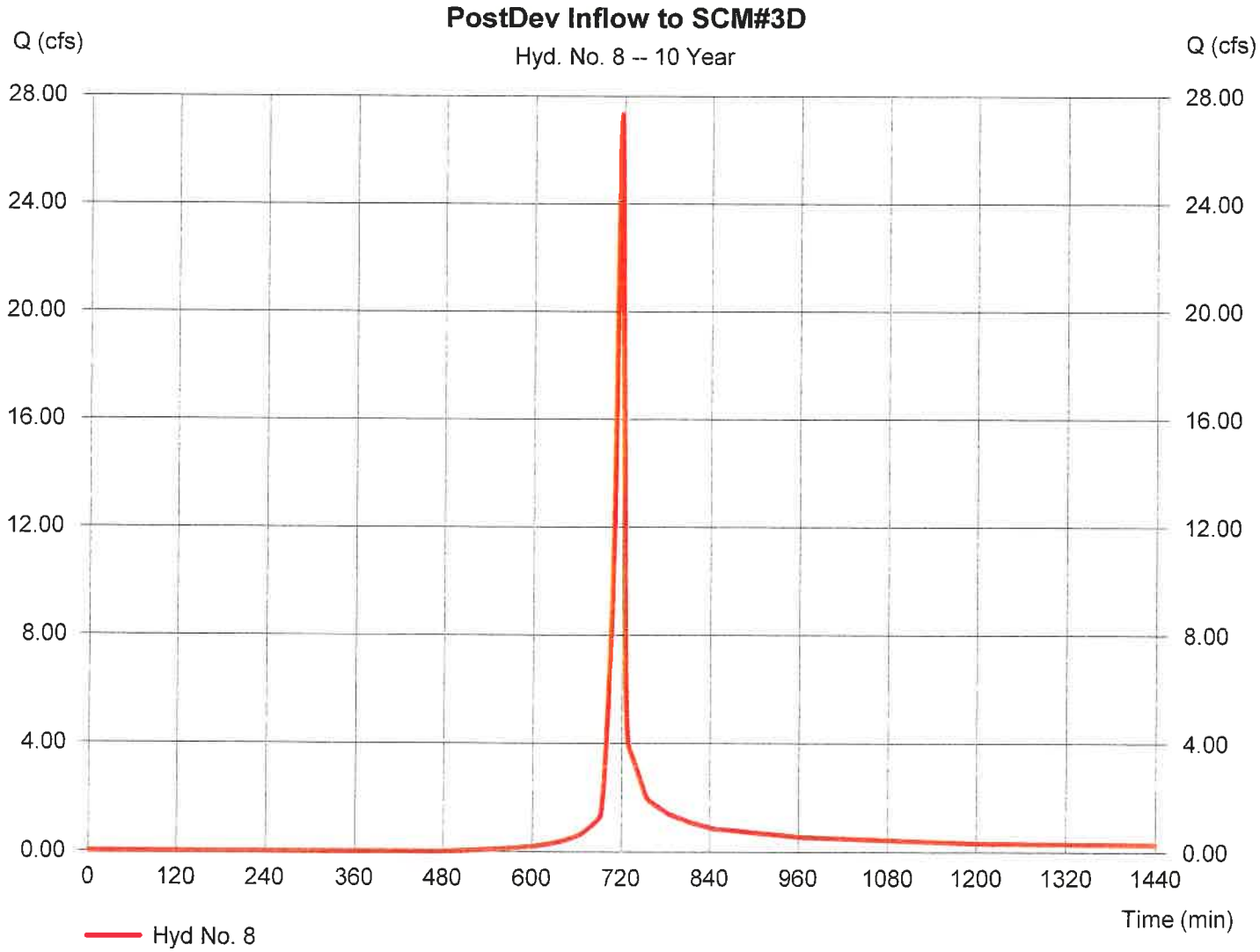


Hydrograph Report

Hyd. No. 8

PostDev Inflow to SCM#3D

Hydrograph type	= SCS Runoff	Peak discharge	= 27.32 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 55,360 cuft
Drainage area	= 5.640 ac	Curve number	= 76.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

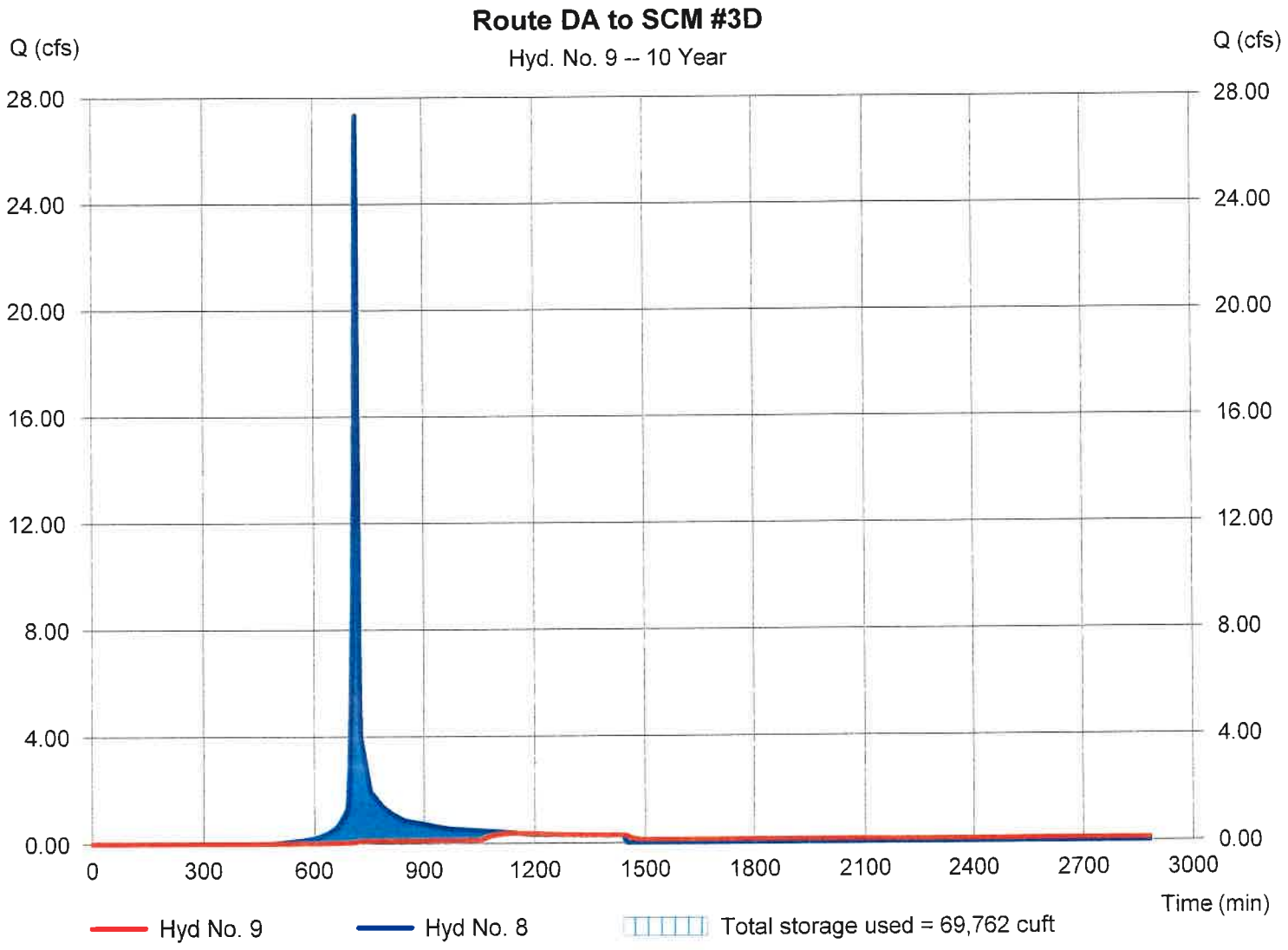
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 09 / 30 / 2020

Hyd. No. 9

Route DA to SCM #3D

Hydrograph type	= Reservoir	Peak discharge	= 0.364 cfs
Storm frequency	= 10 yrs	Time to peak	= 1155 min
Time interval	= 1 min	Hyd. volume	= 18,682 cuft
Inflow hyd. No.	= 8 - PostDev Inflow to SCM#3D	Max. Elevation	= 348.04 ft
Reservoir name	= SCM #3D	Max. Storage	= 69,762 cuft

Storage Indication method used. Wet pond routing start elevation = 344.50 ft.

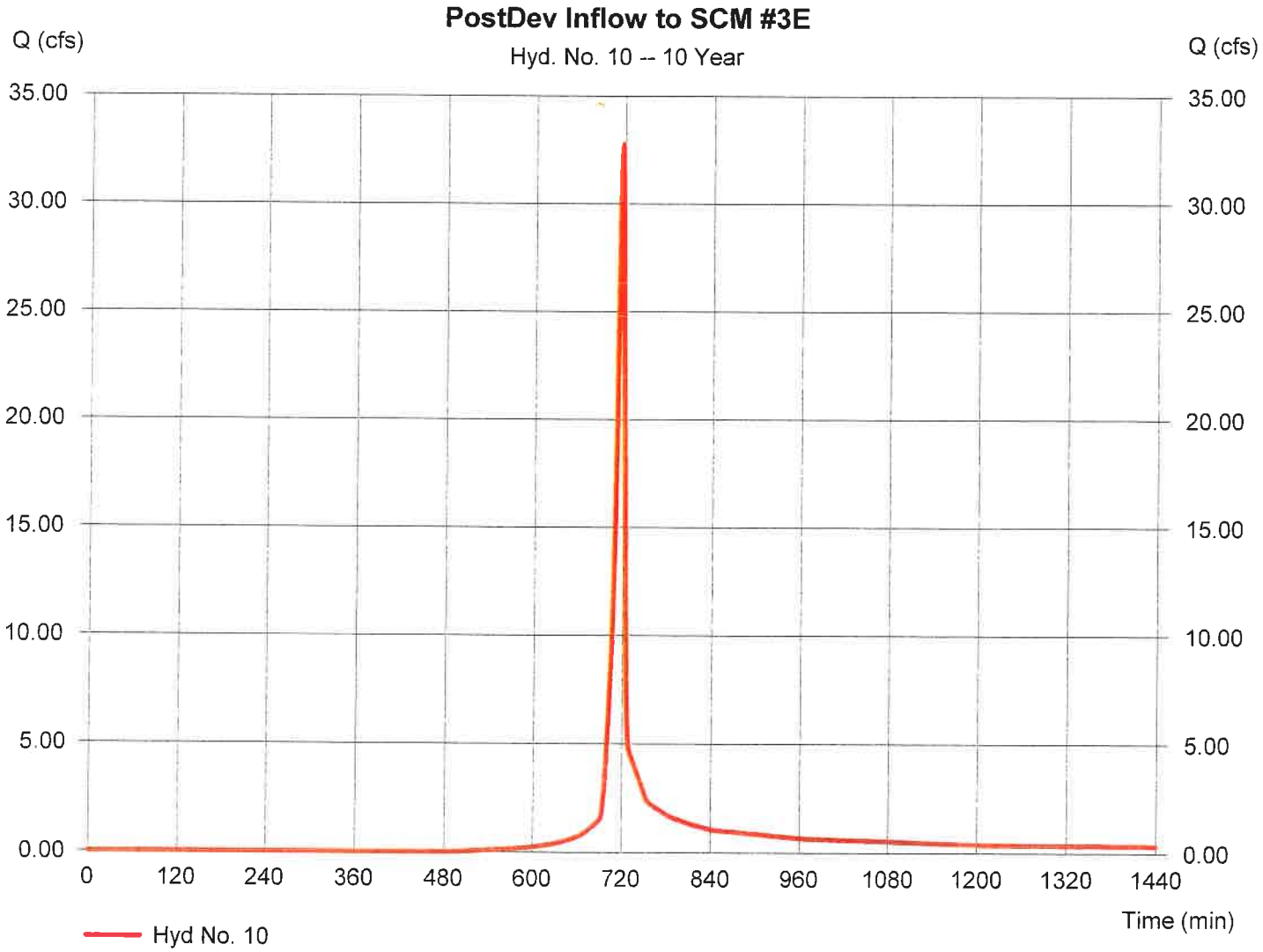


Hydrograph Report

Hyd. No. 10

PostDev Inflow to SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 32.75 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 66,405 cuft
Drainage area	= 6.720 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



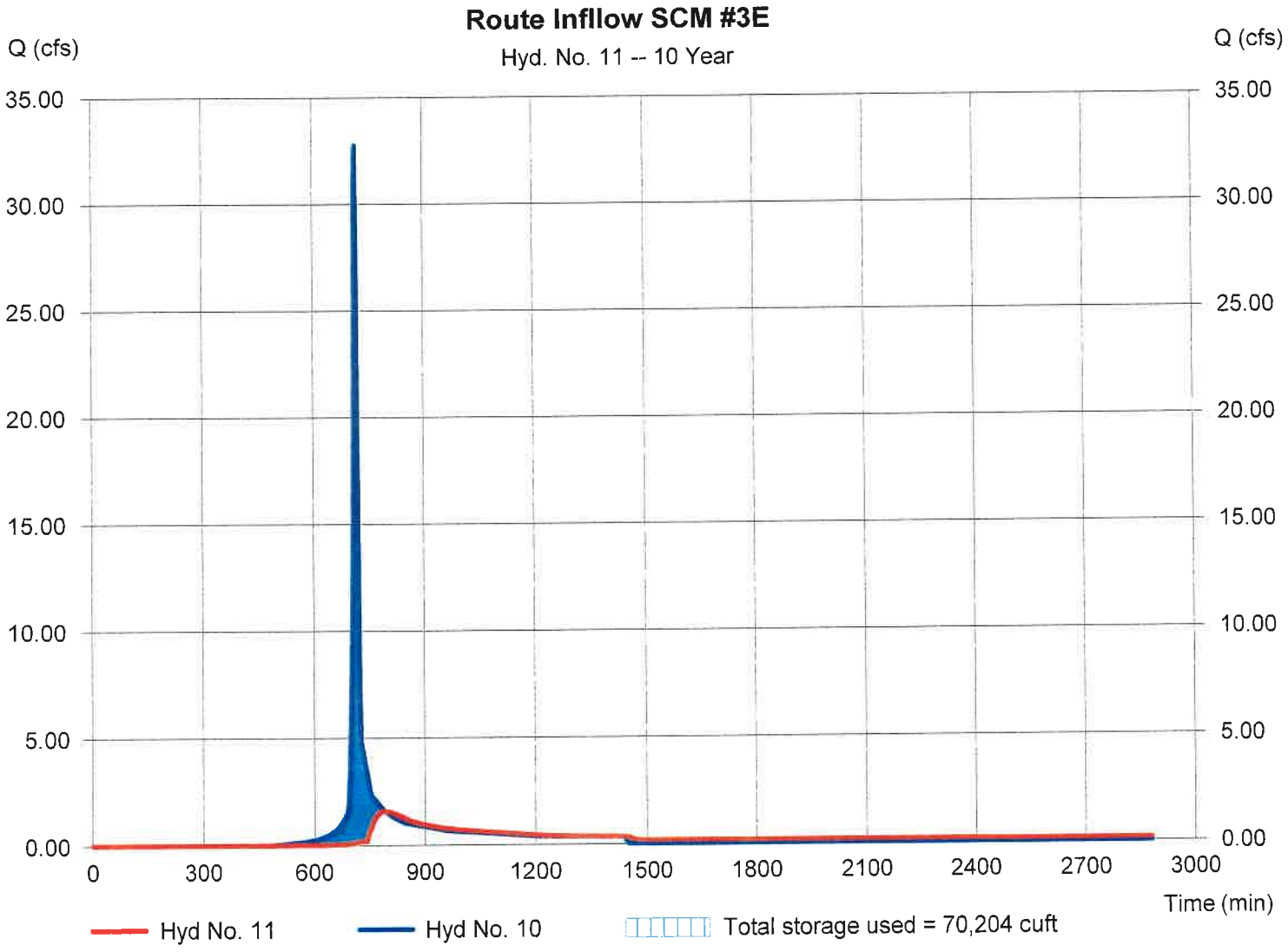
Hydrograph Report

Hyd. No. 11

Route Infllow SCM #3E

Hydrograph type	= Reservoir	Peak discharge	= 1.580 cfs
Storm frequency	= 10 yrs	Time to peak	= 791 min
Time interval	= 1 min	Hyd. volume	= 42,056 cuft
Inflow hyd. No.	= 10 - PostDev Inflow to SCM #3E	Max. Elevation	= 309.17 ft
Reservoir name	= SCM #3E	Max. Storage	= 70,204 cuft

Storage Indication method used. Wet pond routing start elevation = 306.50 ft.

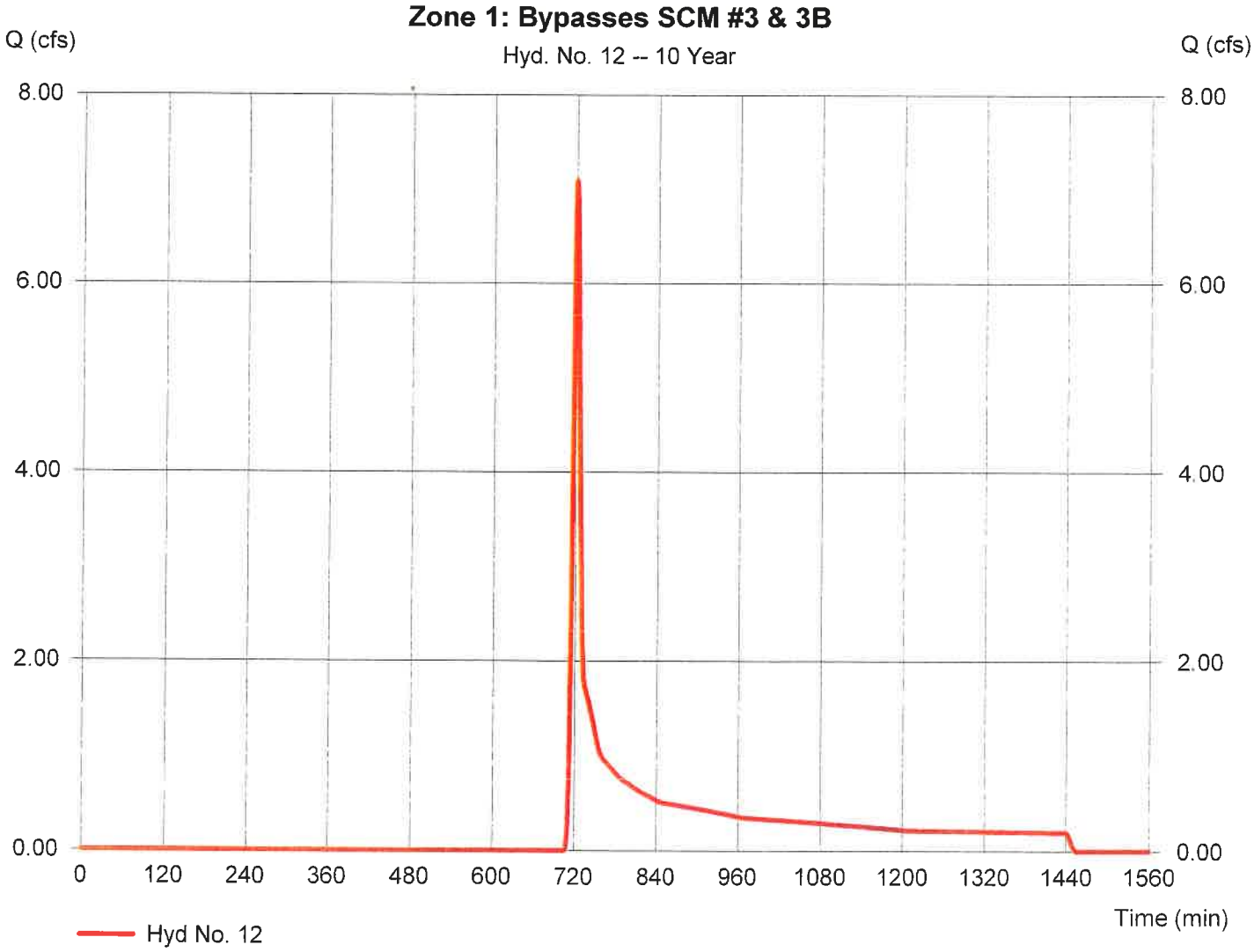


Hydrograph Report

Hyd. No. 12

Zone 1: Bypasses SCM #3 & 3B

Hydrograph type	= SCS Runoff	Peak discharge	= 7.091 cfs
Storm frequency	= 10 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 21,472 cuft
Drainage area	= 8.510 ac	Curve number	= 49.9
Basin Slope	= 2.8 %	Hydraulic length	= 1529 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

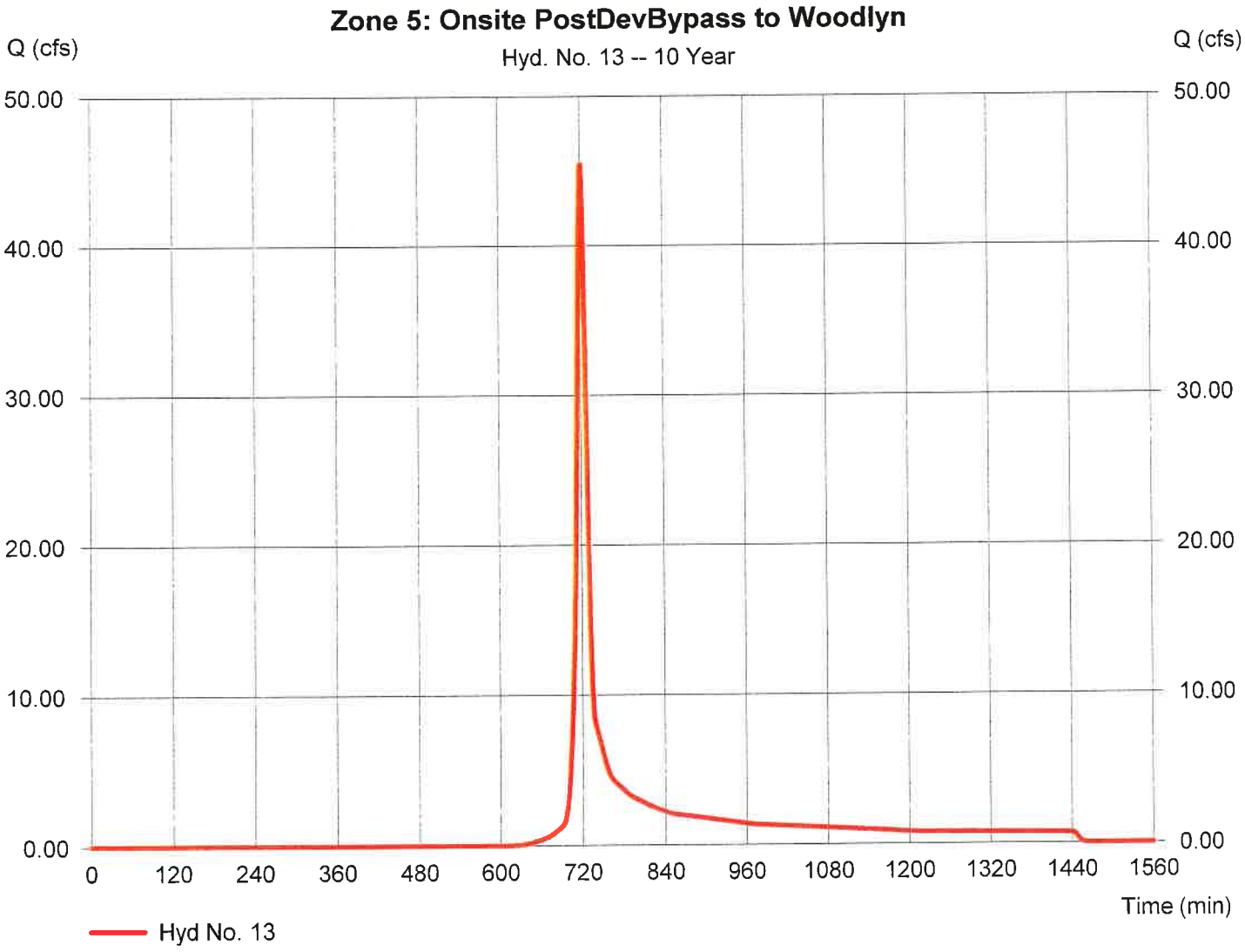


Hydrograph Report

Hyd. No. 13

Zone 5: Onsite PostDevBypass to Woodlyn

Hydrograph type	= SCS Runoff	Peak discharge	= 45.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 116,722 cuft
Drainage area	= 17.680 ac	Curve number	= 67.4
Basin Slope	= 1.5 %	Hydraulic length	= 1788 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.58 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

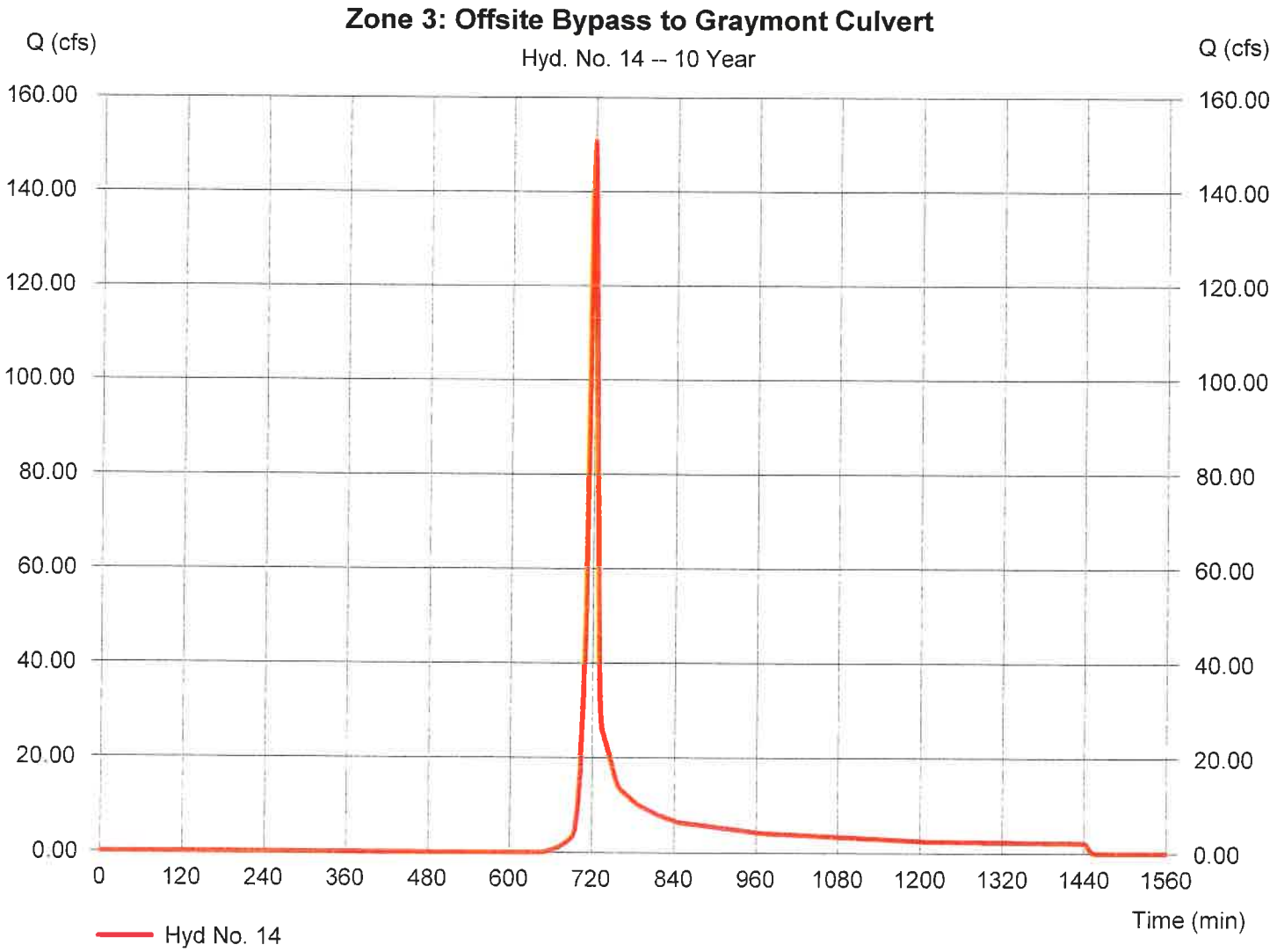


Hydrograph Report

Hyd. No. 14

Zone 3: Offsite Bypass to Graymont Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 150.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 345,614 cuft
Drainage area	= 57.120 ac	Curve number	= 65
Basin Slope	= 1.8 %	Hydraulic length	= 1220 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



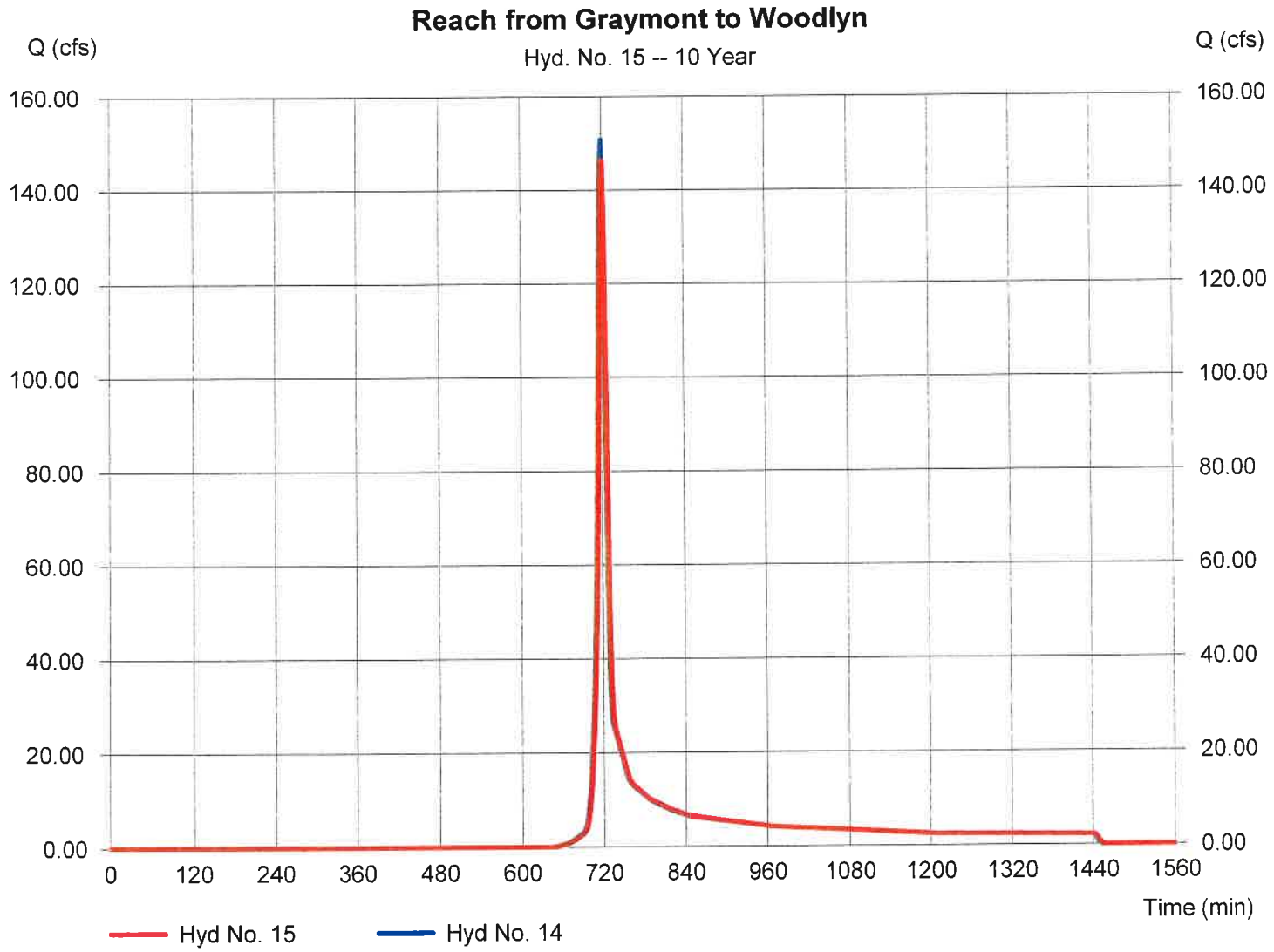
Hydrograph Report

Hyd. No. 15

Reach from Graymont to Woodlyn

Hydrograph type	= Reach	Peak discharge	= 146.20 cfs
Storm frequency	= 10 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 345,612 cuft
Inflow hyd. No.	= 14 - Zone 3: Offsite Bypass to Graymont	Section type	= Culvert
Reach length	= 1750.0 ft	Channel slope	= Trapezoidal
Manning's n	= 0.009	Bottom width	= 1.4 %
Side slope	= 2.0:1	Max. depth	= 5.0 ft
Rating curve x	= 6.696	Rating curve m	= 4.0 ft
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 1.370
			= 0.5343

Modified Att-Kin routing method used.

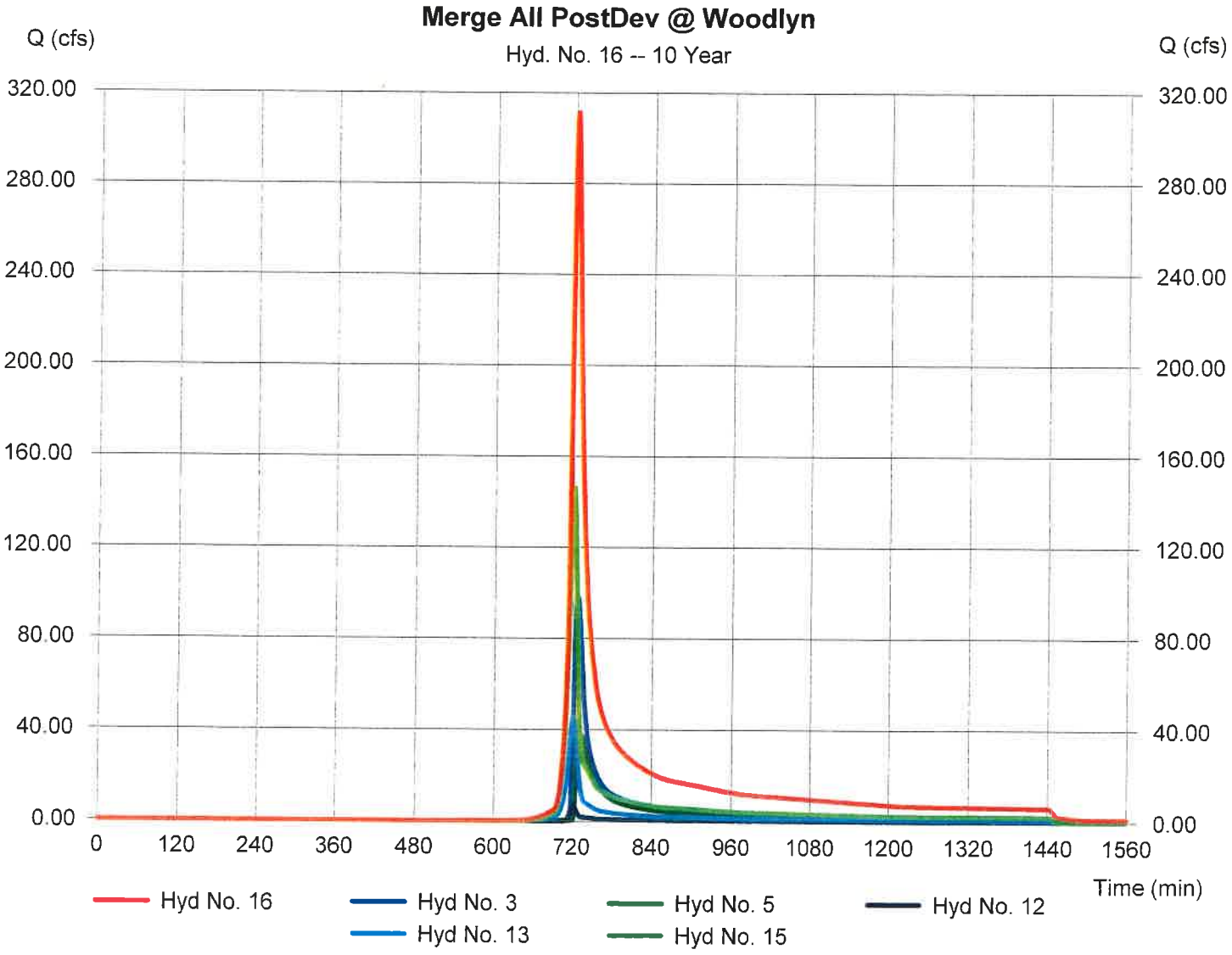


Hydrograph Report

Hyd. No. 16

Merge All PostDev @ Woodlyn

Hydrograph type	= Combine	Peak discharge	= 311.25 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 1,043,354 cuft
Inflow hyds.	= 3, 5, 12, 13, 15	Contrib. drain. area	= 26.190 ac

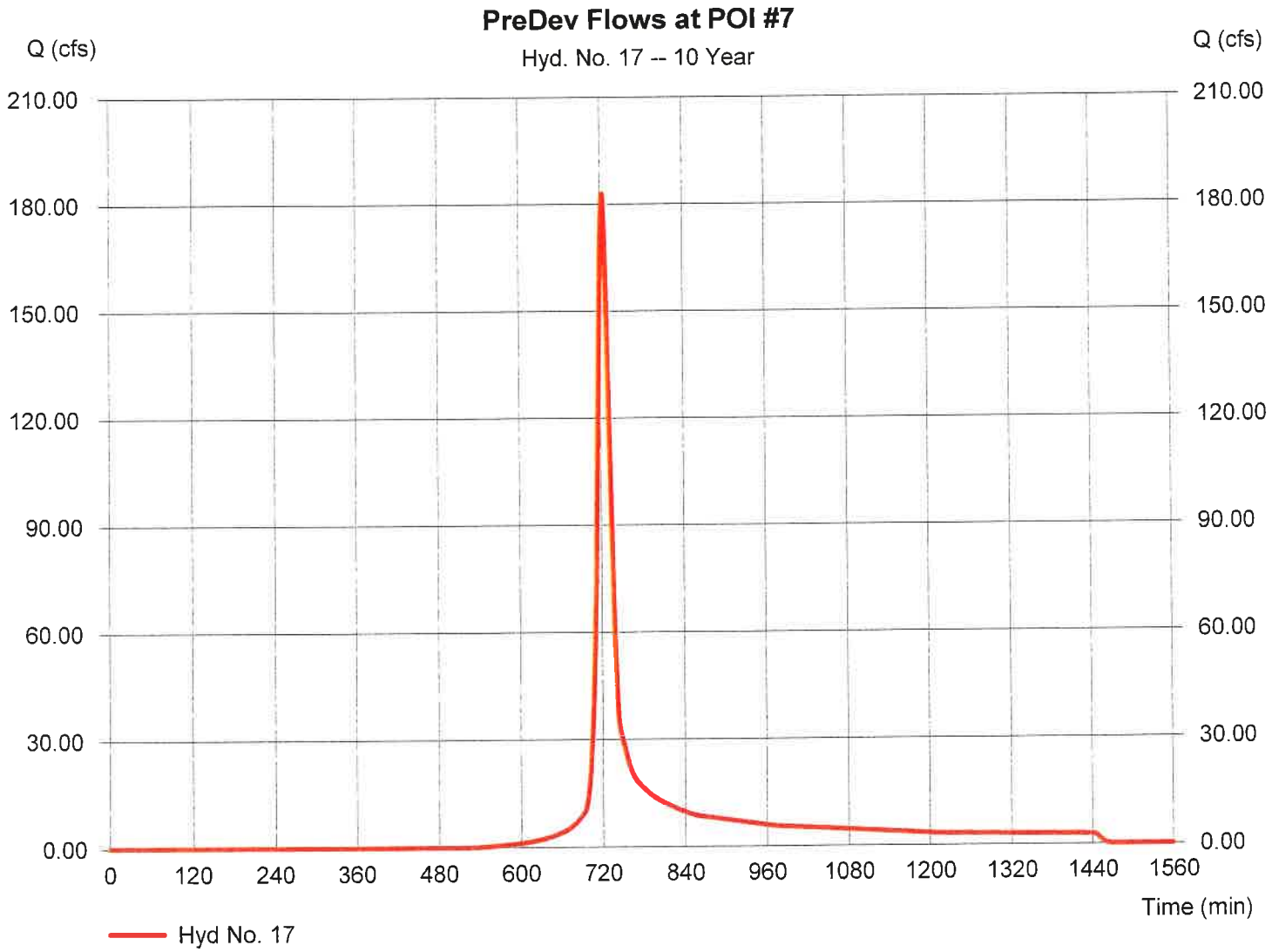


Hydrograph Report

Hyd. No. 17

PreDev Flows at POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 182.90 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 542,968 cuft
Drainage area	= 62.670 ac	Curve number	= 74.4
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.43 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

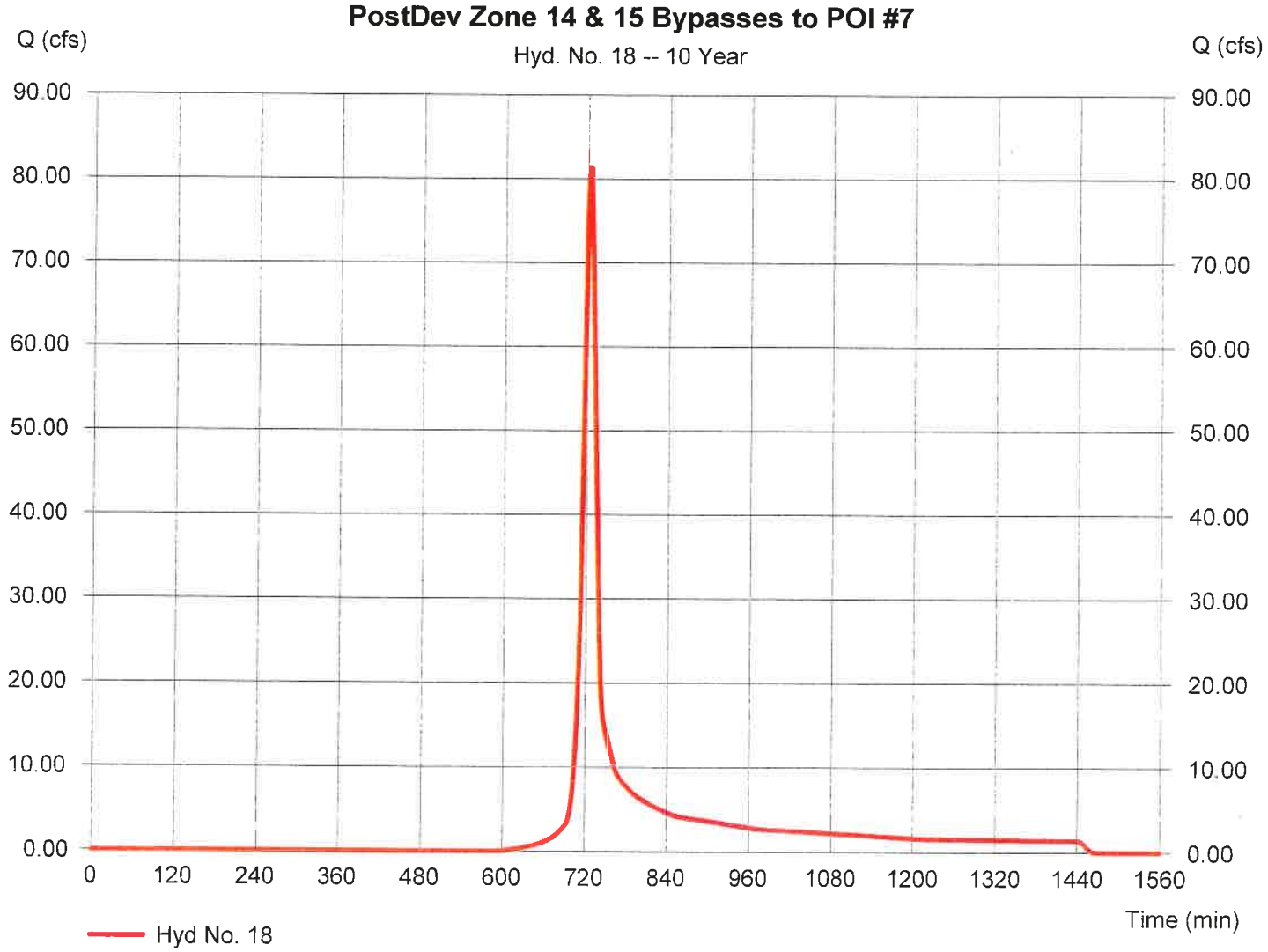


Hydrograph Report

Hyd. No. 18

PostDev Zone 14 & 15 Bypasses to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 81.41 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 244,683 cuft
Drainage area	= 33.240 ac	Curve number	= 70
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.27 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

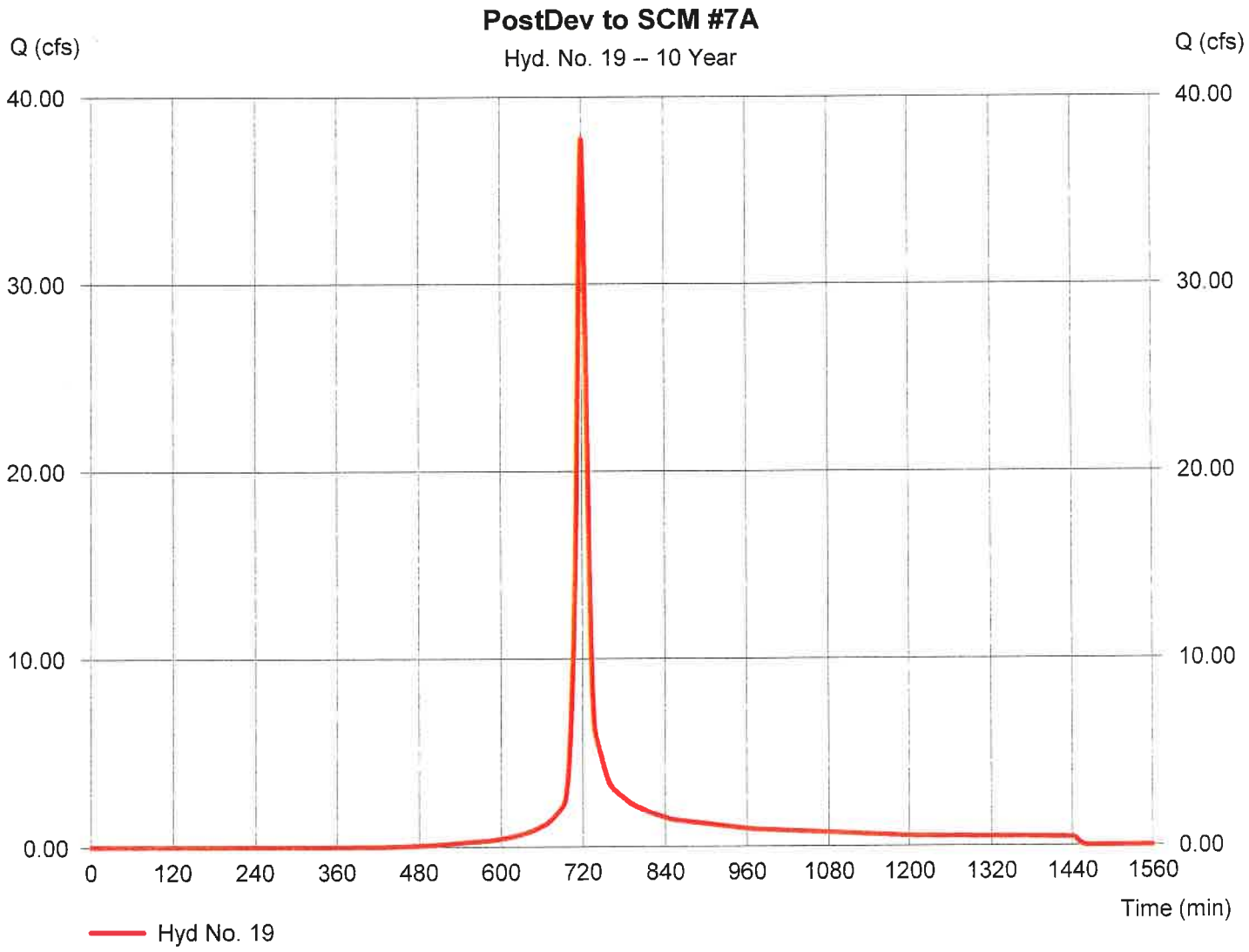


Hydrograph Report

Hyd. No. 19

PostDev to SCM #7A

Hydrograph type	= SCS Runoff	Peak discharge	= 37.75 cfs
Storm frequency	= 10 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 95,690 cuft
Drainage area	= 9.260 ac	Curve number	= 79.8
Basin Slope	= 1.1 %	Hydraulic length	= 1505 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.38 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

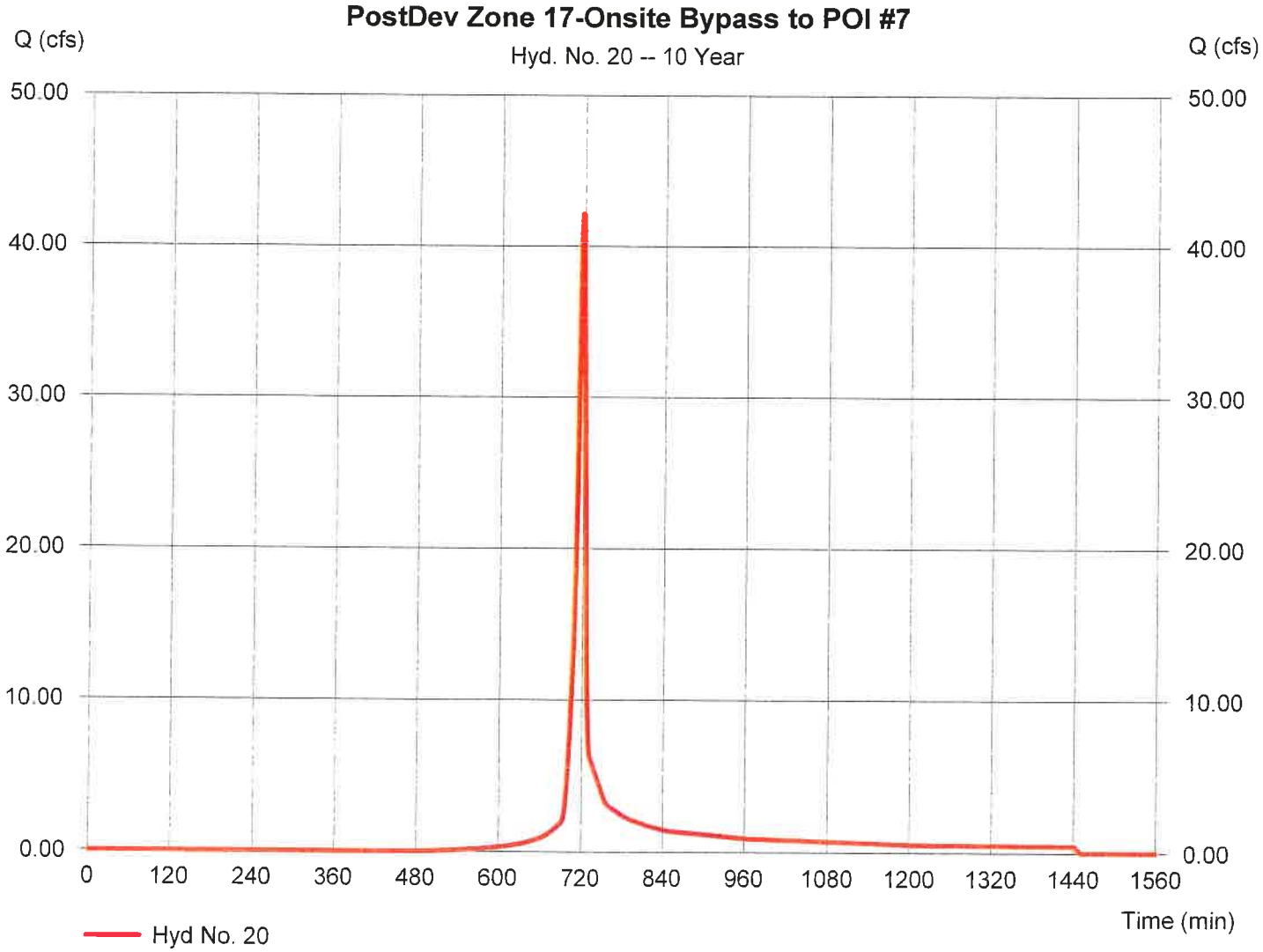


Hydrograph Report

Hyd. No. 20

PostDev Zone 17-Onsite Bypass to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 42.15 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 89,296 cuft
Drainage area	= 9.720 ac	Curve number	= 76.5
Basin Slope	= 1.0 %	Hydraulic length	= 810 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.97 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



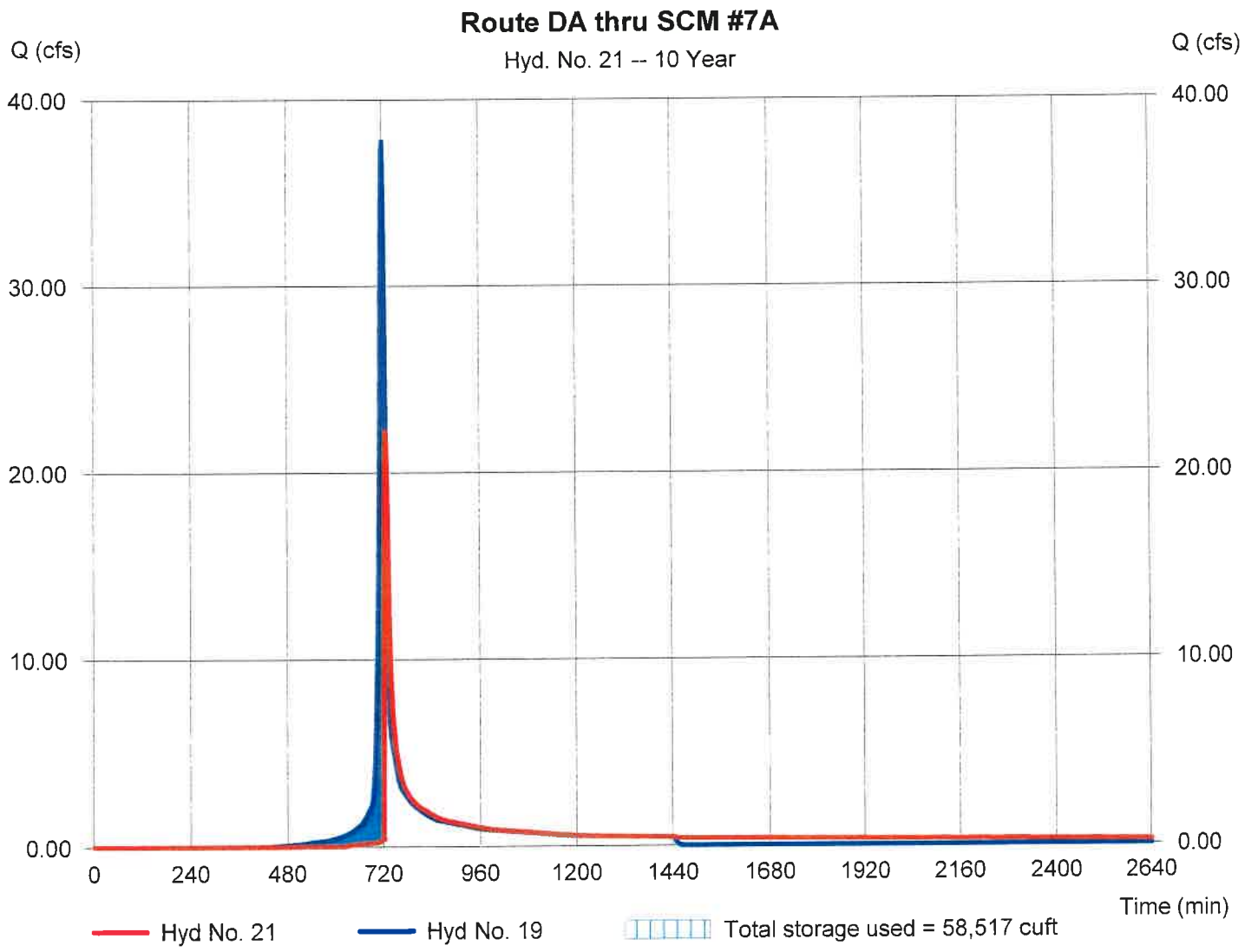
Hydrograph Report

Hyd. No. 21

Route DA thru SCM #7A

Hydrograph type	= Reservoir	Peak discharge	= 22.20 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 89,077 cuft
Inflow hyd. No.	= 19 - PostDev to SCM #7A	Max. Elevation	= 373.95 ft
Reservoir name	= SCM #7A	Max. Storage	= 58,517 cuft

Storage Indication method used. Wet pond routing start elevation = 370.50 ft.

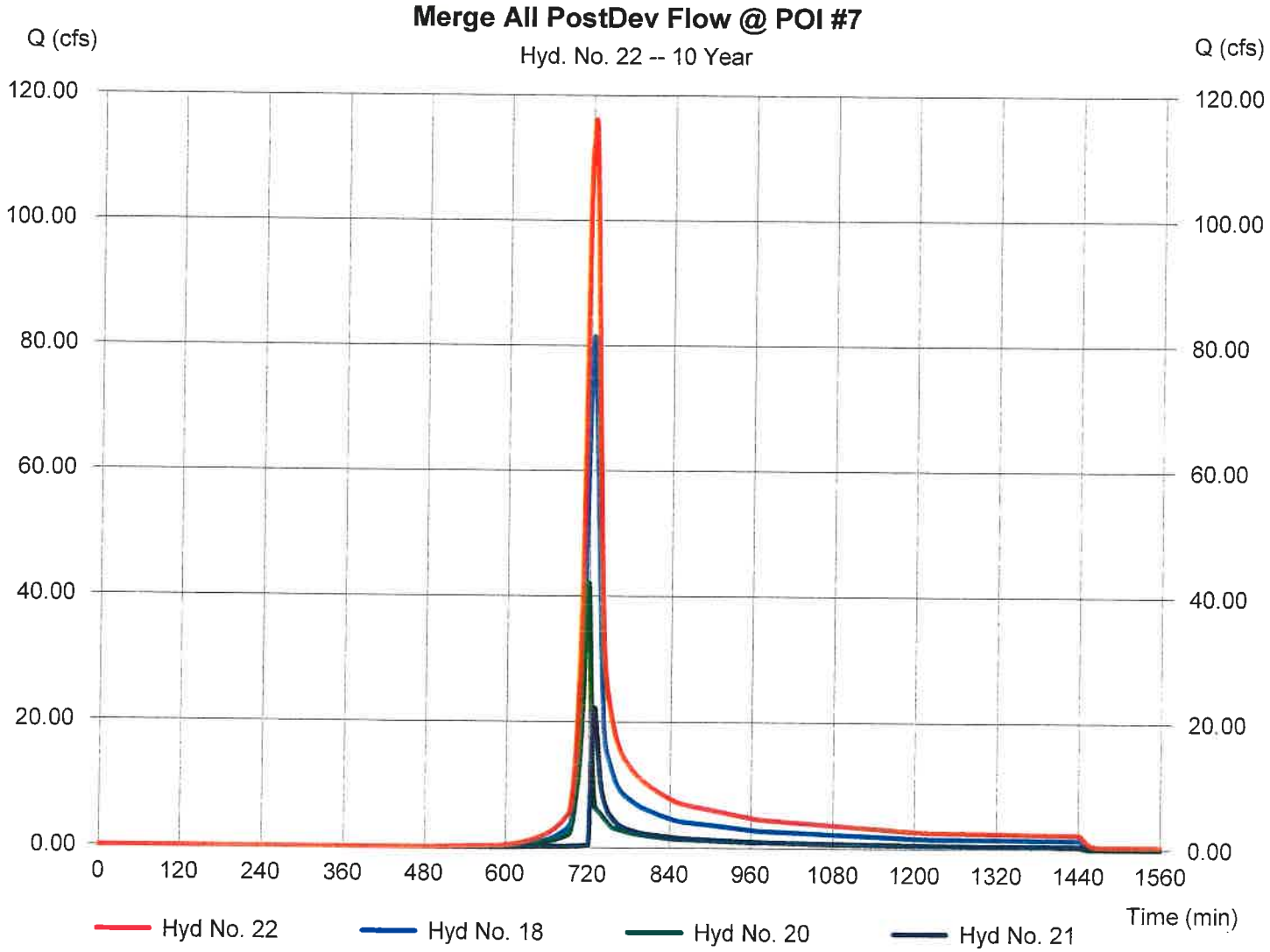


Hydrograph Report

Hyd. No. 22

Merge All PostDev Flow @ POI #7

Hydrograph type	= Combine	Peak discharge	= 116.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 423,056 cuft
Inflow hyds.	= 18, 20, 21	Contrib. drain. area	= 42.960 ac

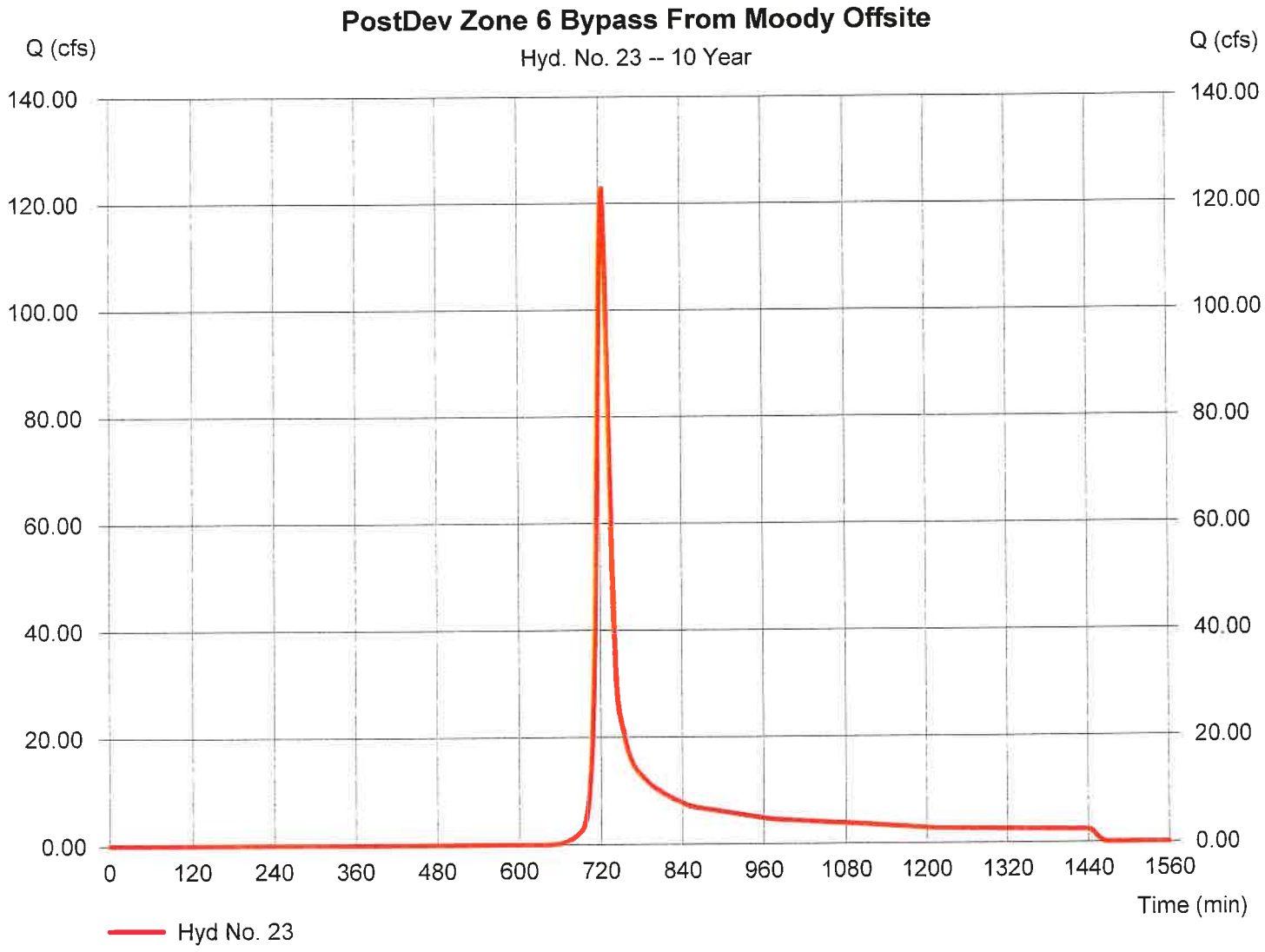


Hydrograph Report

Hyd. No. 23

PostDev Zone 6 Bypass From Moody Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 122.84 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 379,633 cuft
Drainage area	= 64.030 ac	Curve number	= 64.8
Basin Slope	= 1.8 %	Hydraulic length	= 2940 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.01 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

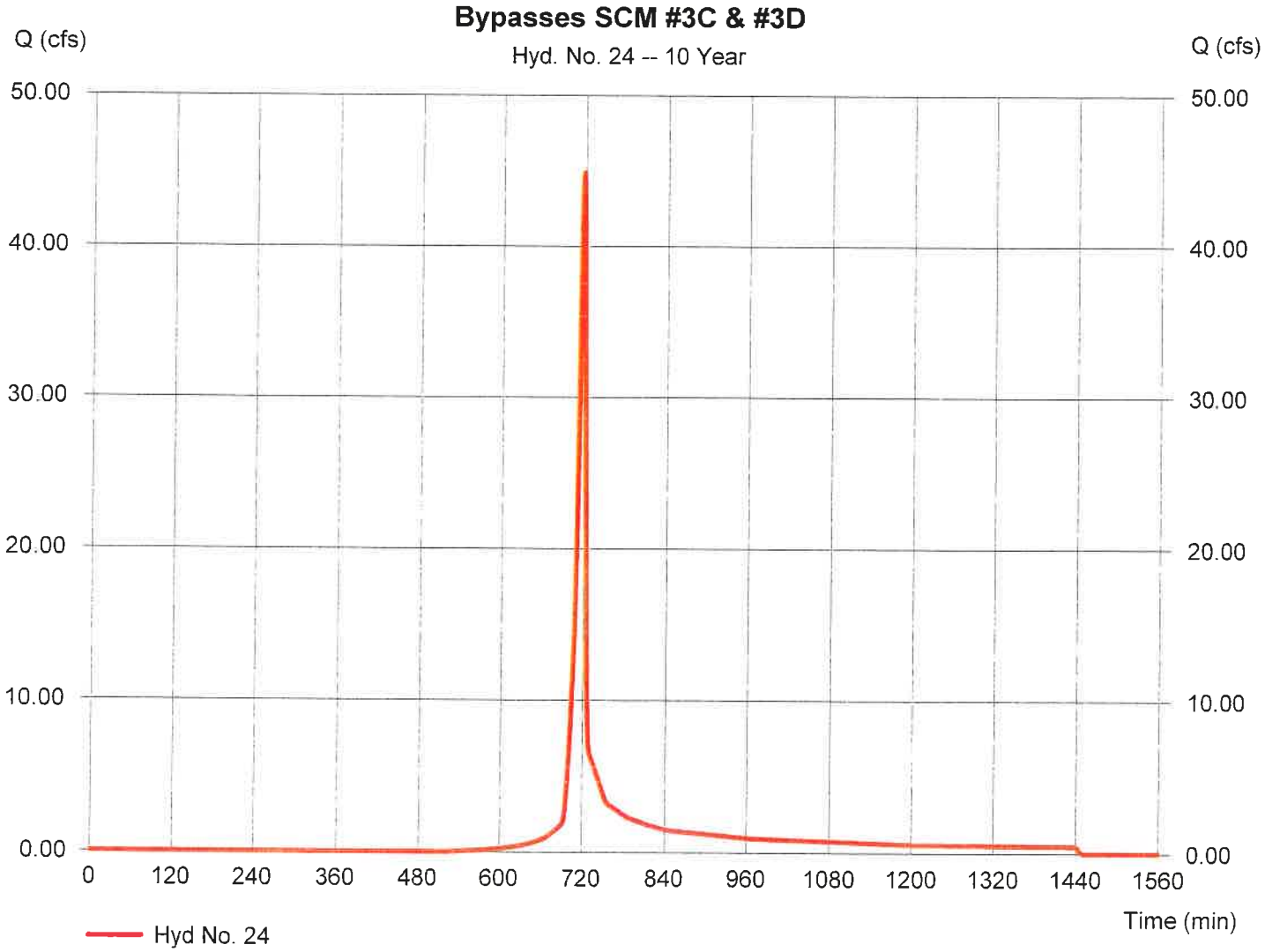


Hydrograph Report

Hyd. No. 24

Bypasses SCM #3C & #3D

Hydrograph type	= SCS Runoff	Peak discharge	= 44.90 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 90,511 cuft
Drainage area	= 9.980 ac	Curve number	= 74.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



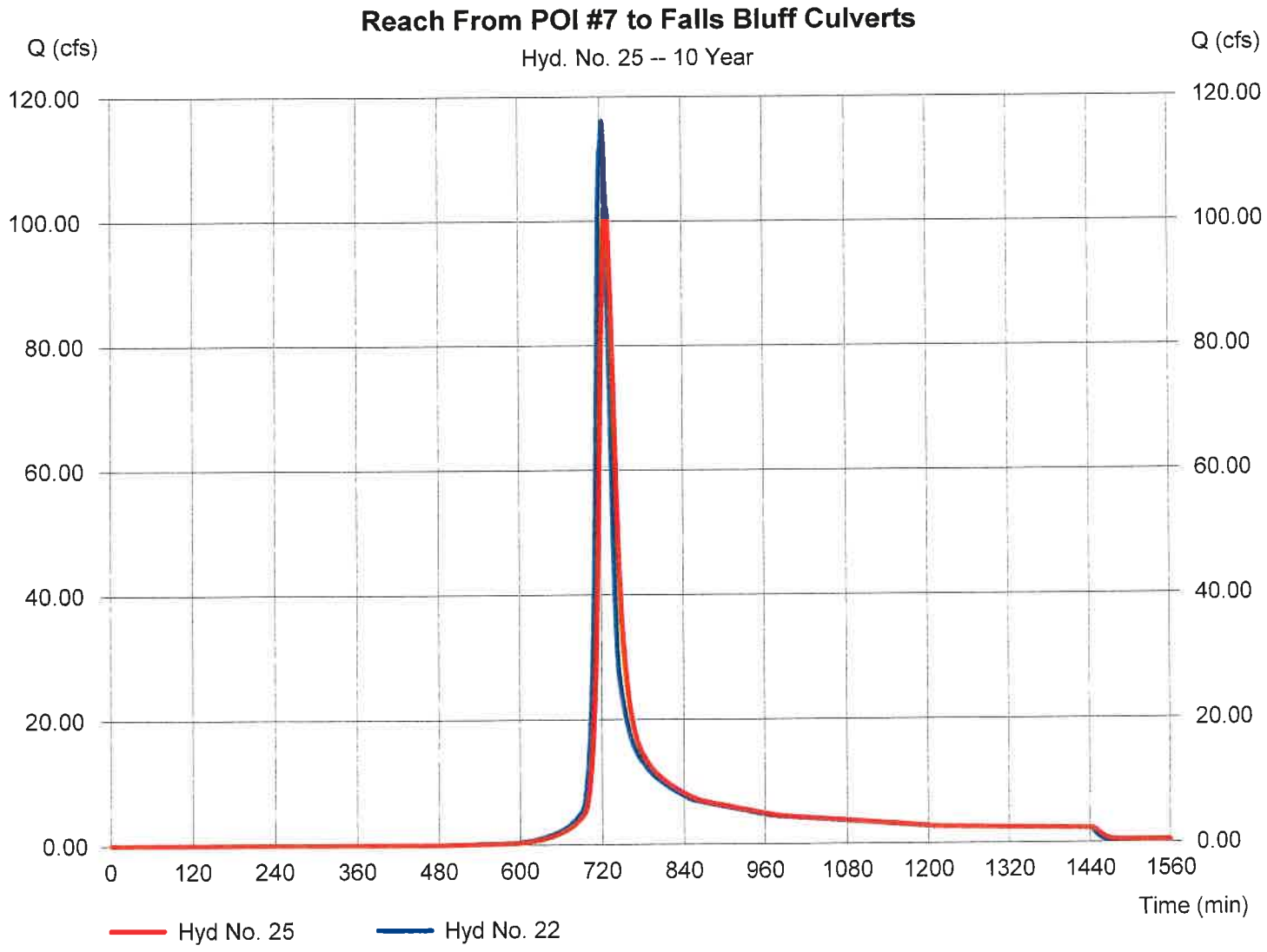
Hydrograph Report

Hyd. No. 25

Reach From POI #7 to Falls Bluff Culverts

Hydrograph type	= Reach	Peak discharge	= 102.39 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 422,984 cuft
Inflow hyd. No.	= 22 - Merge All PostDev Flow @ POI #7	Section type	= Trapezoidal
Reach length	= 1845.0 ft	Channel slope	= 1.4 %
Manning's n	= 0.030	Bottom width	= 4.0 ft
Side slope	= 30.0:1	Max. depth	= 4.0 ft
Rating curve x	= 2.289	Rating curve m	= 1.183
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1497

Modified Att-Kin routing method used.

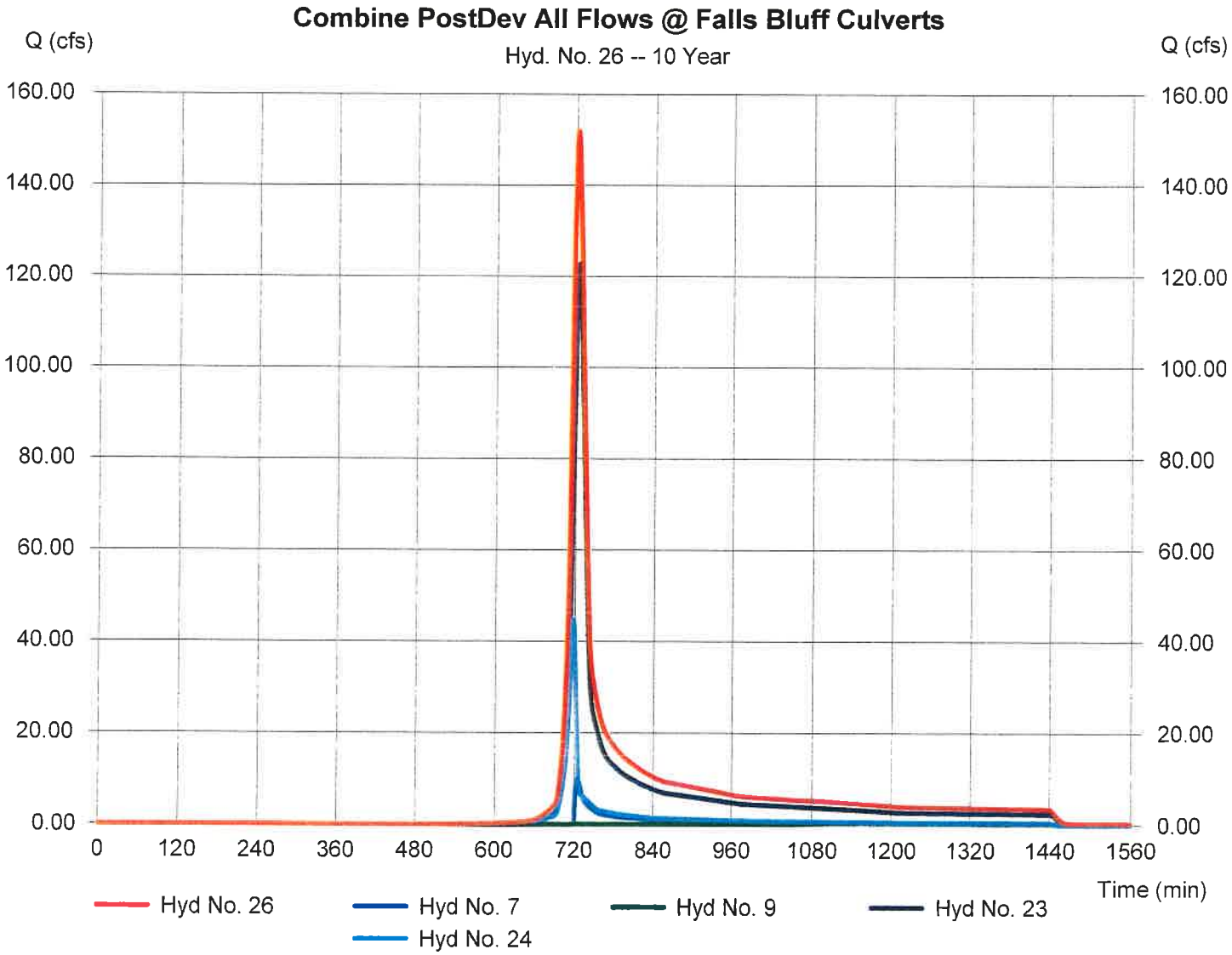


Hydrograph Report

Hyd. No. 26

Combine PostDev All Flows @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 151.95 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 536,288 cuft
Inflow hyds.	= 7, 9, 23, 24	Contrib. drain. area	= 74.010 ac

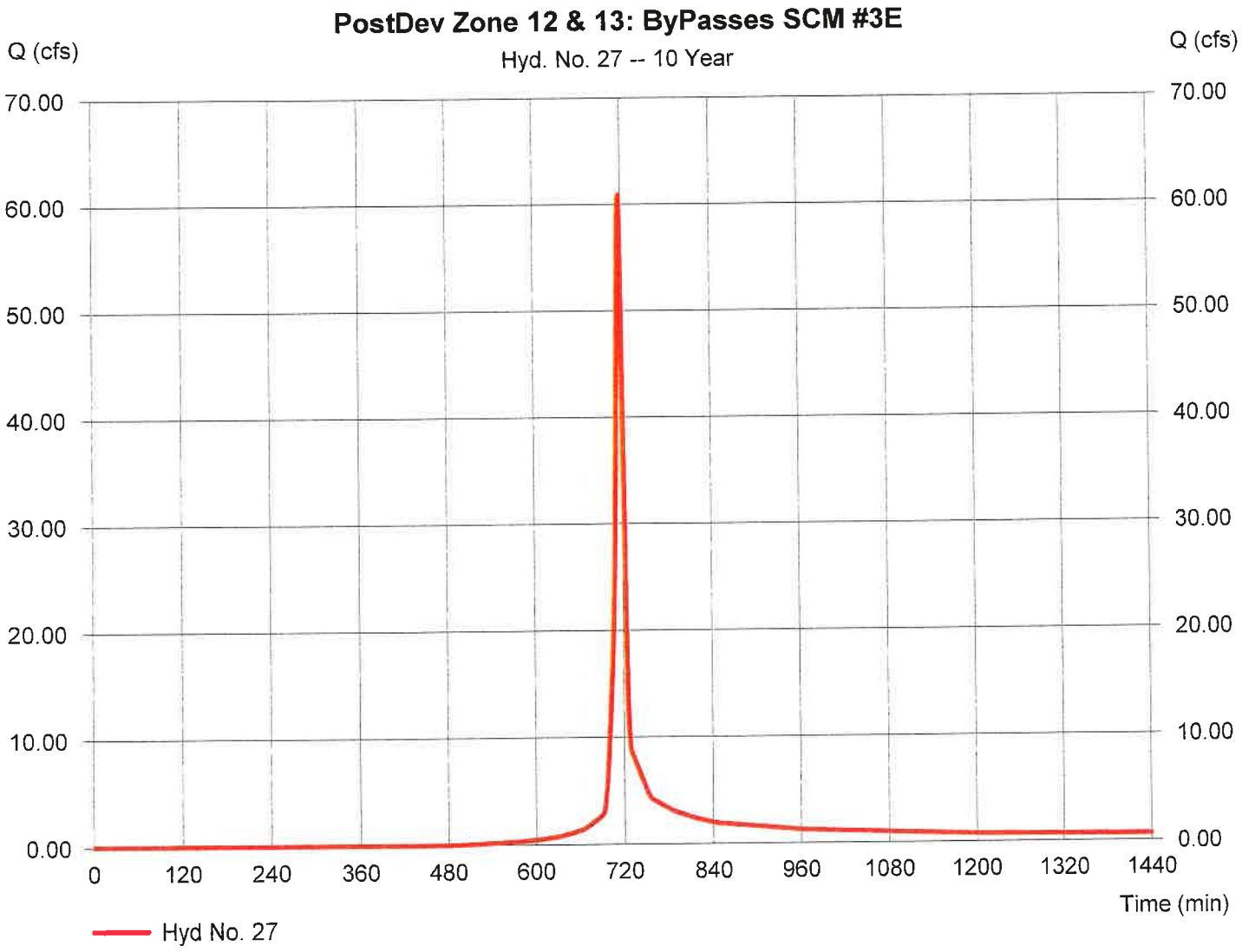


Hydrograph Report

Hyd. No. 27

PostDev Zone 12 & 13: ByPasses SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 60.92 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 123,521 cuft
Drainage area	= 12.500 ac	Curve number	= 77
Basin Slope	= 5.7 %	Hydraulic length	= 1080 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.08 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

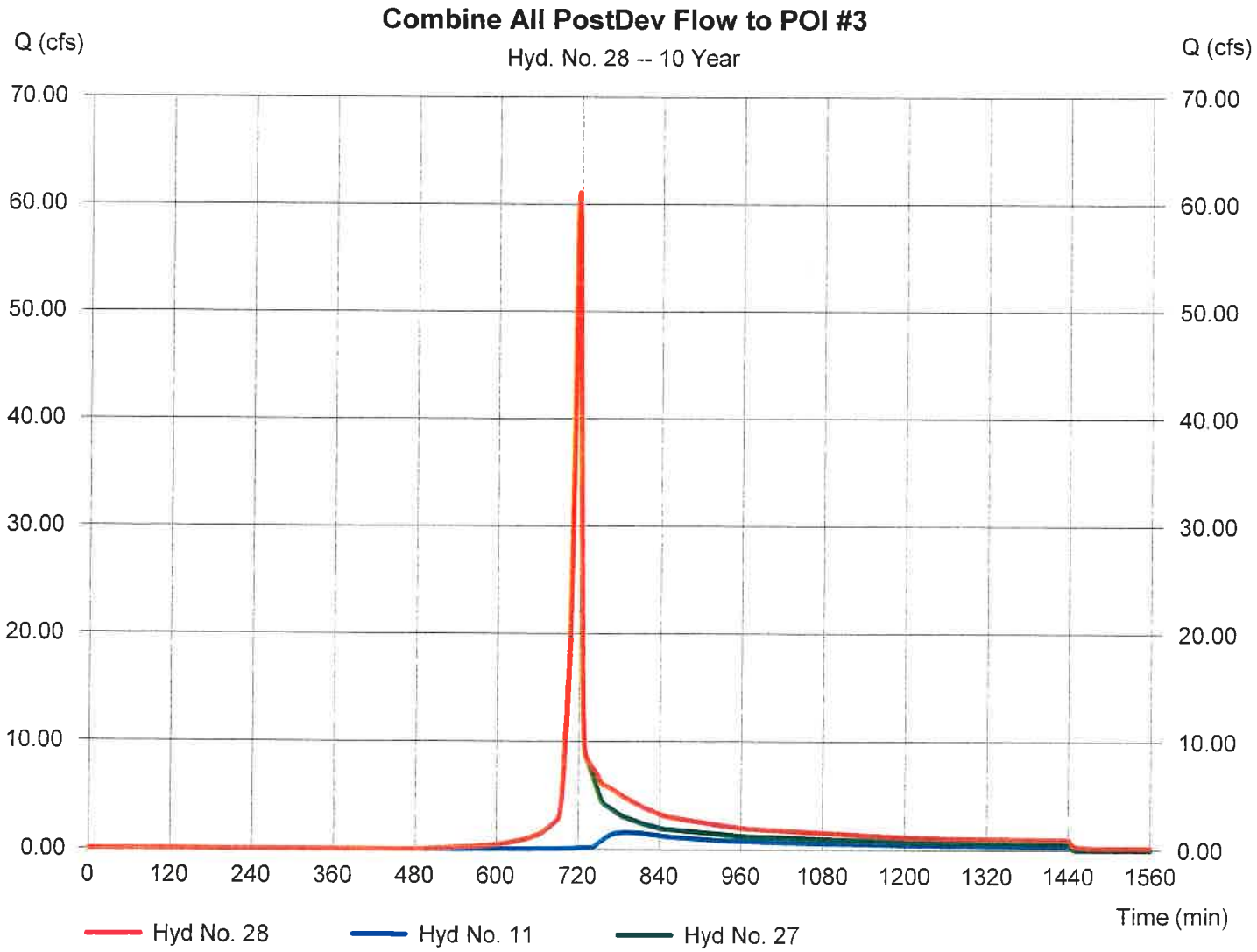


Hydrograph Report

Hyd. No. 28

Combine All PostDev Flow to POI #3

Hydrograph type	= Combine	Peak discharge	= 61.05 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 167,404 cuft
Inflow hyds.	= 11, 27	Contrib. drain. area	= 12.500 ac



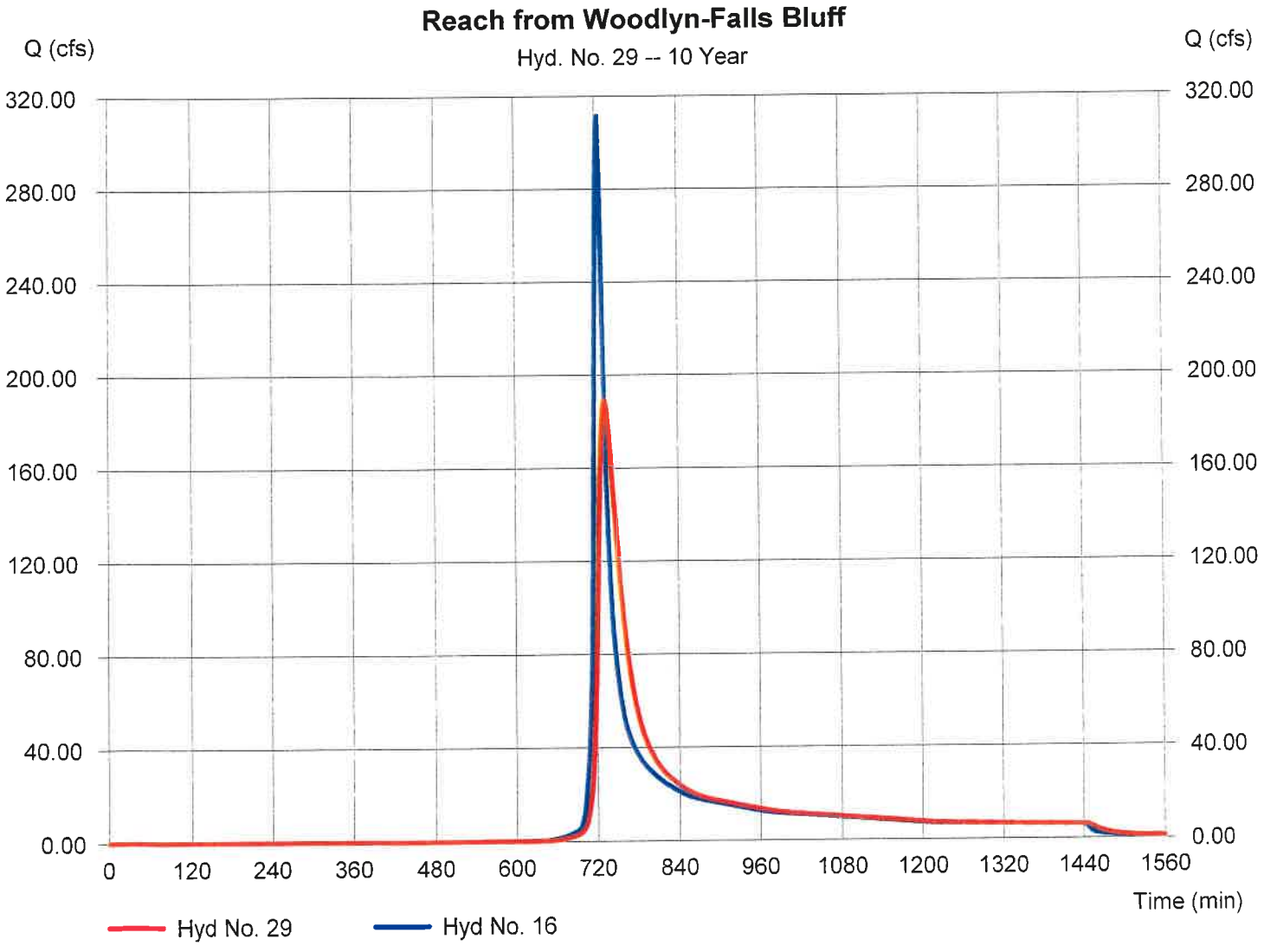
Hydrograph Report

Hyd. No. 29

Reach from Woodlyn-Falls Bluff

Hydrograph type	= Reach	Peak discharge	= 189.06 cfs
Storm frequency	= 10 yrs	Time to peak	= 733 min
Time interval	= 1 min	Hyd. volume	= 1,042,827 cuft
Inflow hyd. No.	= 16 - Merge All PostDev @ Woodlyn	Section type	= Trapezoidal
Reach length	= 12152.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.009	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 6.0 ft
Rating curve x	= 5.011	Rating curve m	= 1.255
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0693

Modified Att-Kin routing method used.

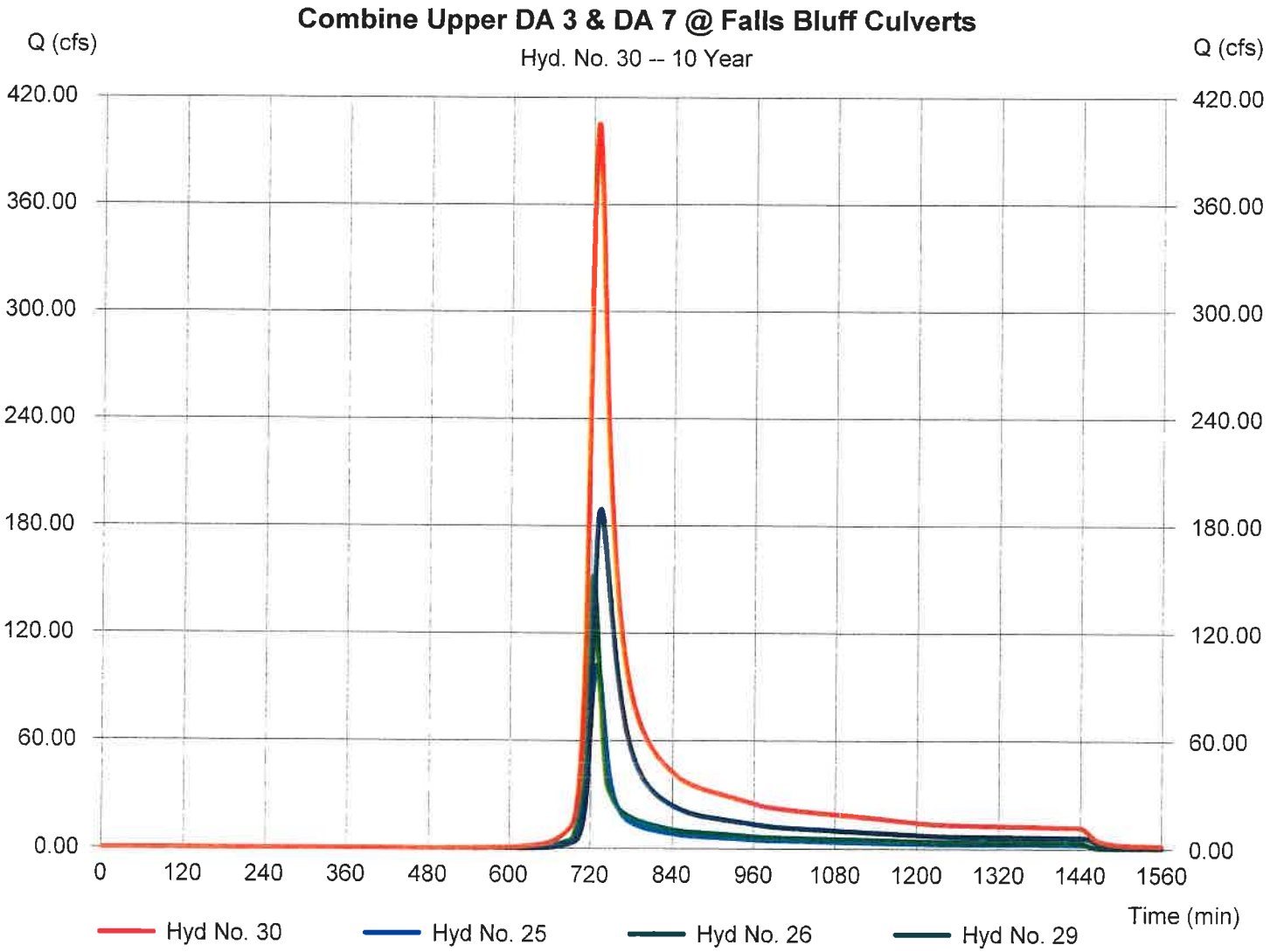


Hydrograph Report

Hyd. No. 30

Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 405.03 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 2,002,099 cuft
Inflow hyds.	= 25, 26, 29	Contrib. drain. area	= 0.000 ac



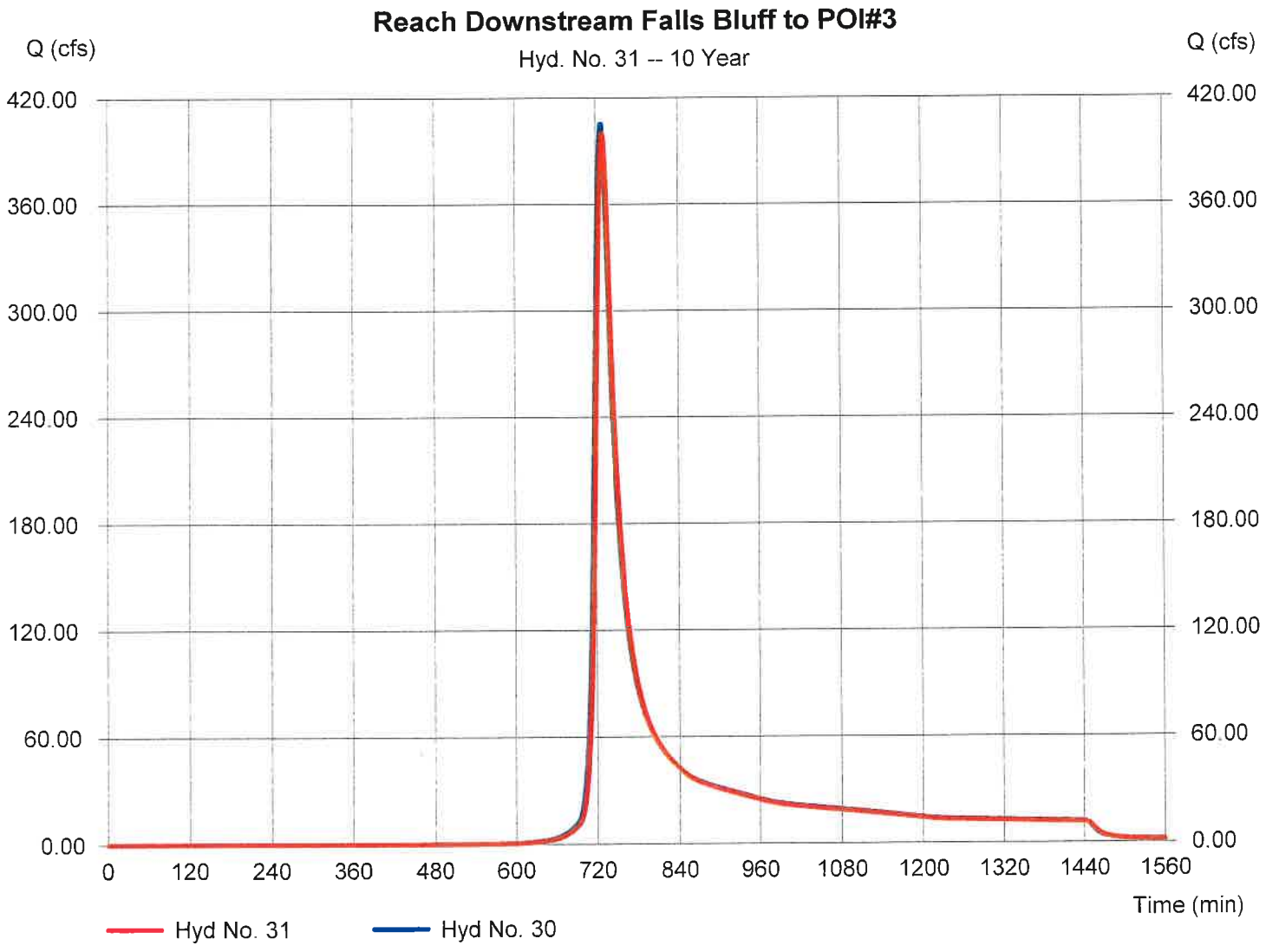
Hydrograph Report

Hyd. No. 31

Reach Downstream Falls Bluff to POI#3

Hydrograph type	= Reach	Peak discharge	= 399.76 cfs
Storm frequency	= 10 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 1,958,615 cuft
Inflow hyd. No.	= 30 - Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts	Section type	= Trapezoidal
Reach length	= 1200.0 ft	Channel slope	= 5.0 %
Manning's n	= 0.030	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 8.0 ft
Rating curve x	= 3.361	Rating curve m	= 1.269
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.4541

Modified Att-Kin routing method used.

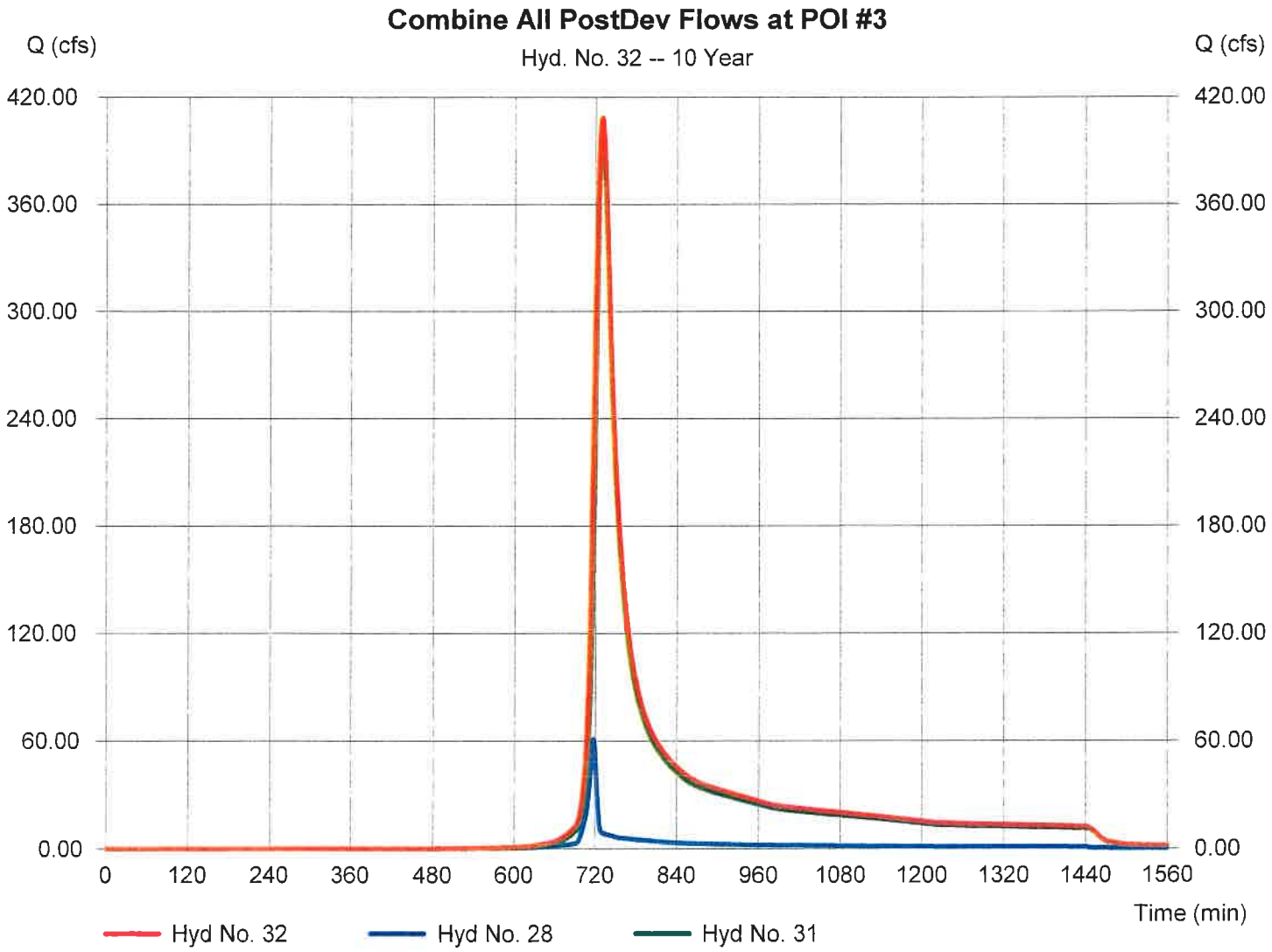


Hydrograph Report

Hyd. No. 32

Combine All PostDev Flows at POI #3

Hydrograph type	= Combine	Peak discharge	= 408.39 cfs
Storm frequency	= 10 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 2,126,018 cuft
Inflow hyds.	= 28, 31	Contrib. drain. area	= 0.000 ac



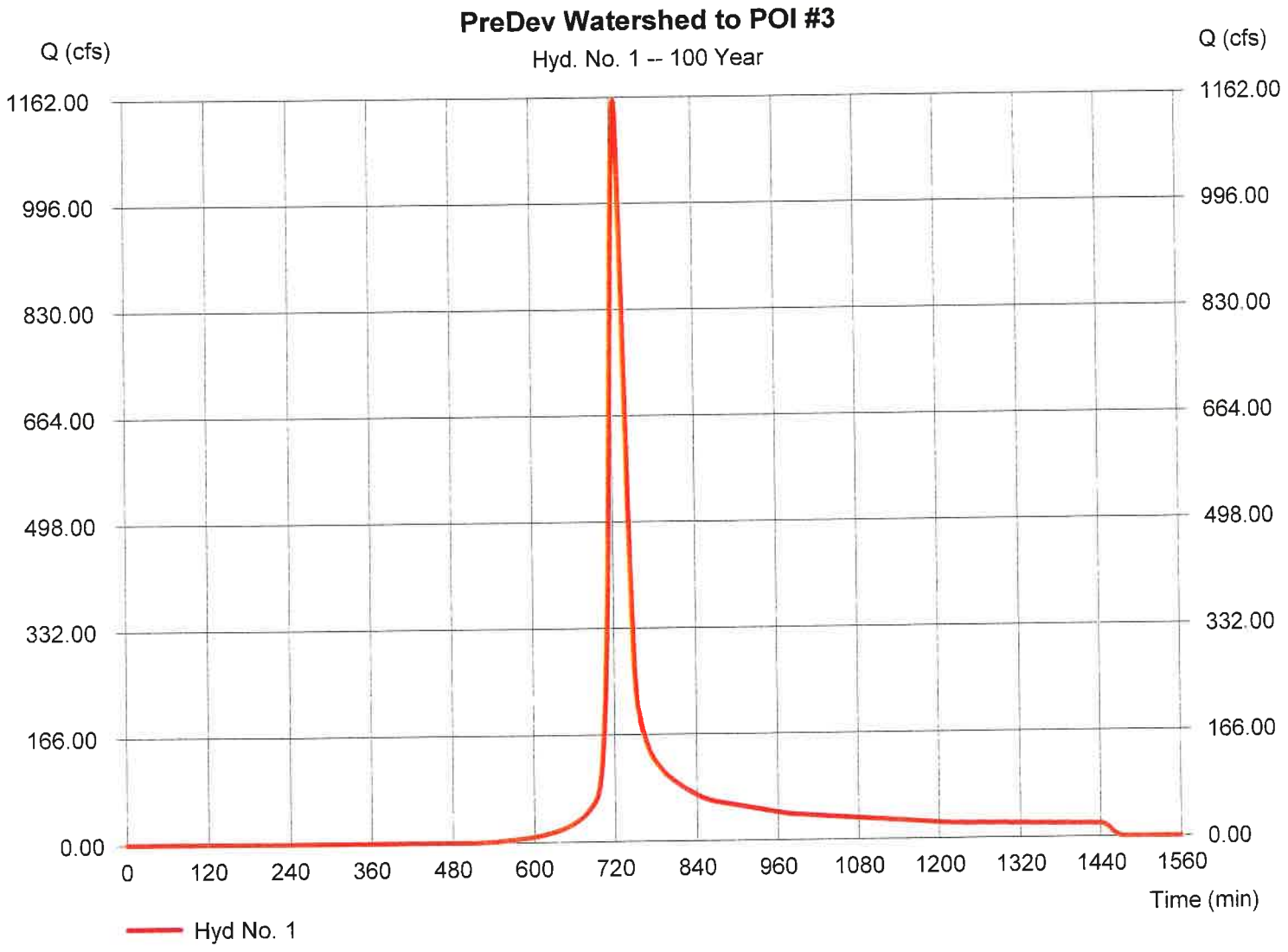
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 09 / 30 / 2020

Hyd. No. 1

PreDev Watershed to POI #3

Hydrograph type	= SCS Runoff	Peak discharge	= 1157.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 3,945,611 cuft
Drainage area	= 300.880 ac	Curve number	= 66.7
Basin Slope	= 3.0 %	Hydraulic length	= 5451 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 22.67 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

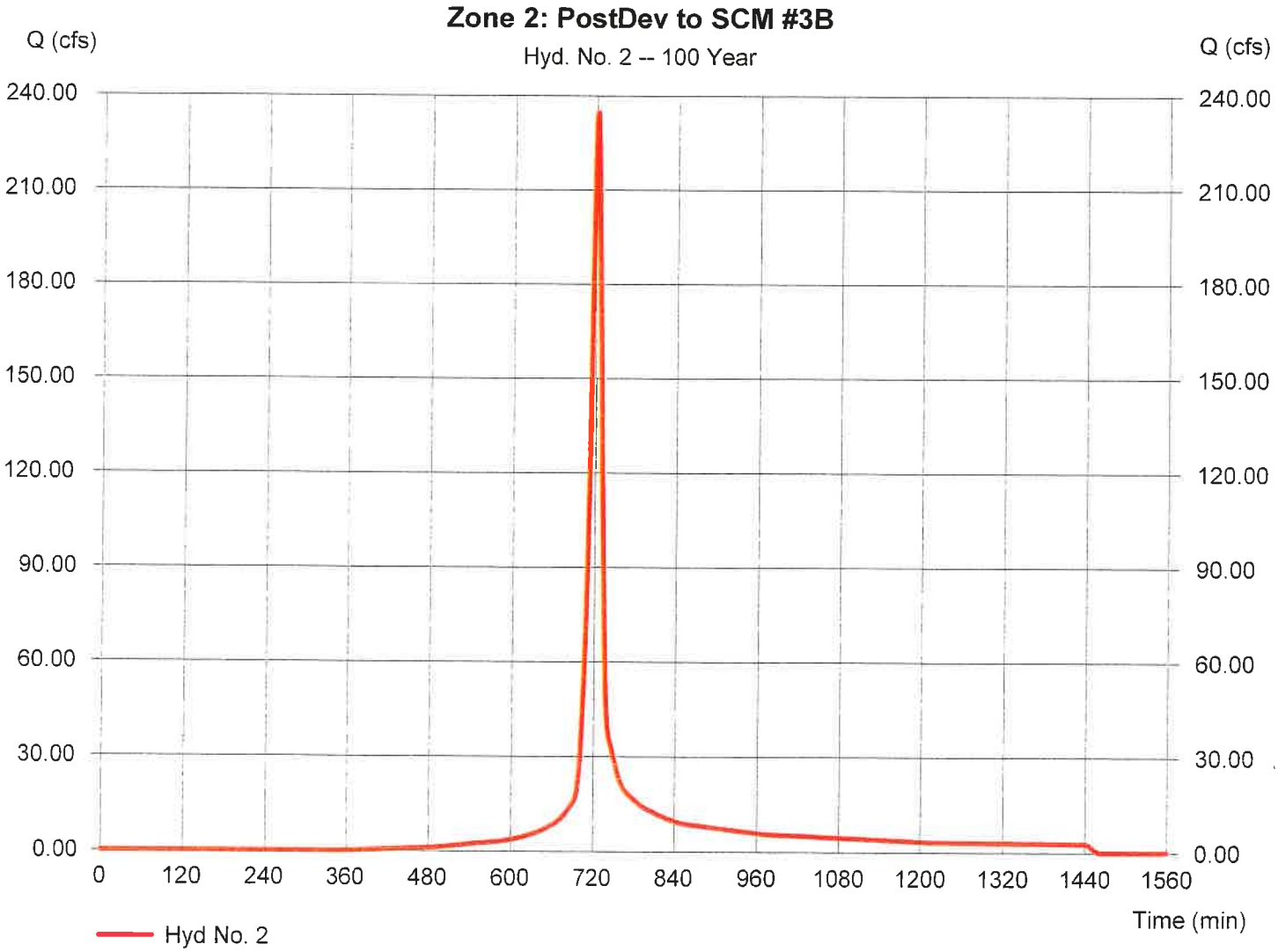


Hydrograph Report

Hyd. No. 2

Zone 2: PostDev to SCM #3B

Hydrograph type	= SCS Runoff	Peak discharge	= 234.71 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 638,799 cuft
Drainage area	= 36.040 ac	Curve number	= 77.9
Basin Slope	= 1.9 %	Hydraulic length	= 2520 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.80 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

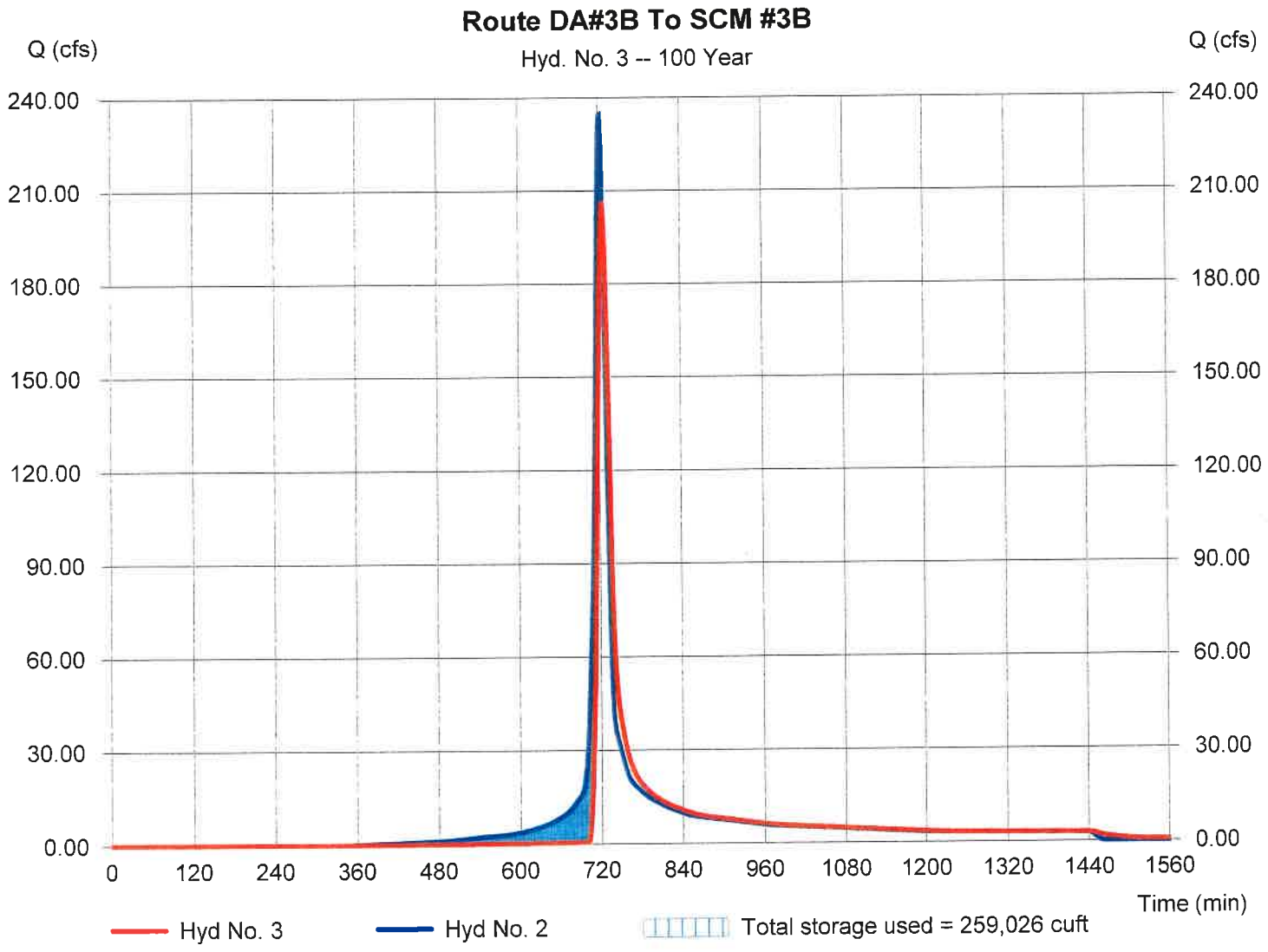
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 3

Route DA#3B To SCM #3B

Hydrograph type	= Reservoir	Peak discharge	= 206.00 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 603,959 cuft
Inflow hyd. No.	= 2 - Zone 2: PostDev to SCM #3B	Max. Elevation	= 355.00 ft
Reservoir name	= SCM 3B-rev032620	Max. Storage	= 259,026 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

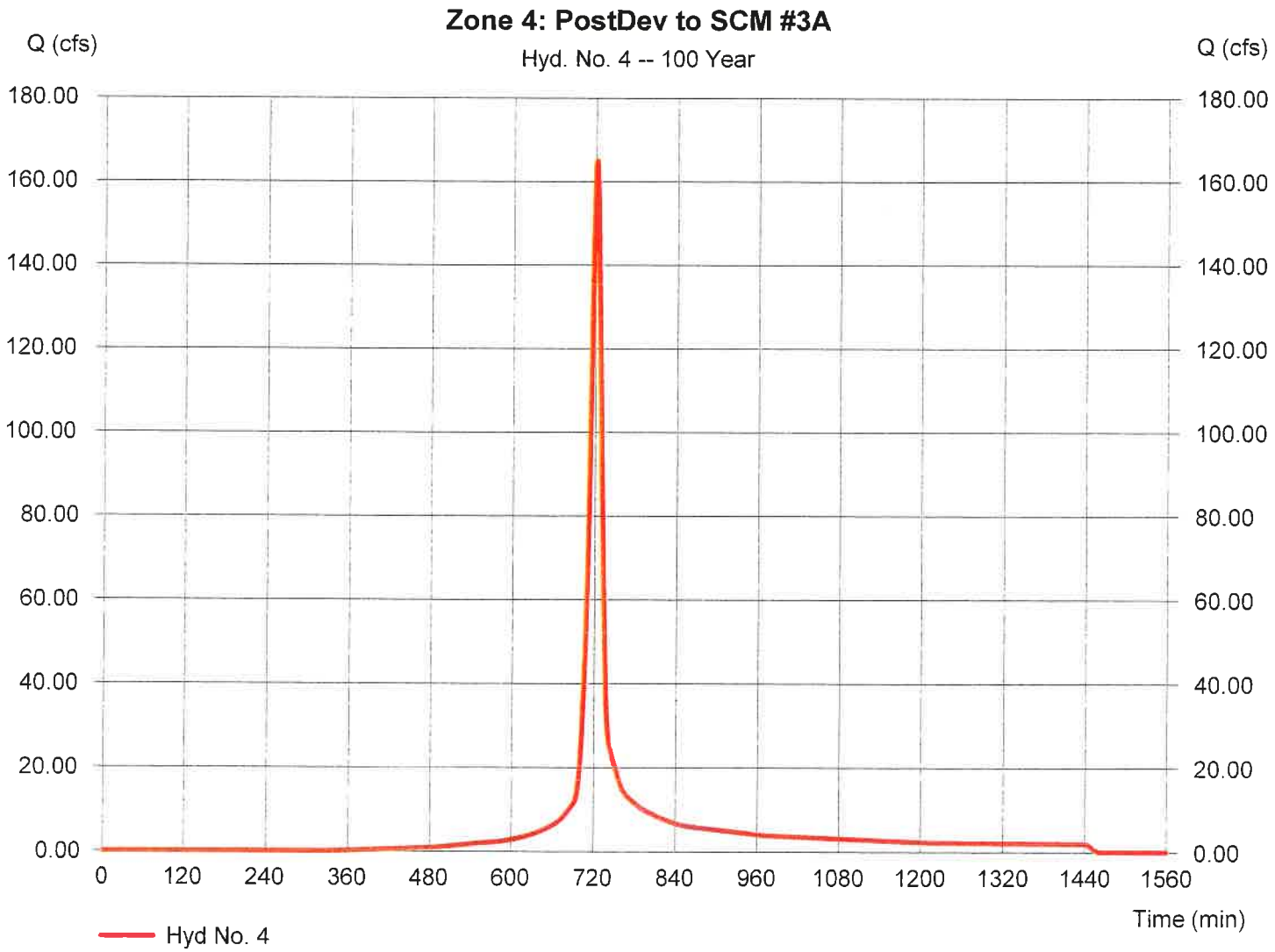


Hydrograph Report

Hyd. No. 4

Zone 4: PostDev to SCM #3A

Hydrograph type	= SCS Runoff	Peak discharge	= 165.03 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 451,183 cuft
Drainage area	= 24.600 ac	Curve number	= 79.4
Basin Slope	= 1.5 %	Hydraulic length	= 2250 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.94 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

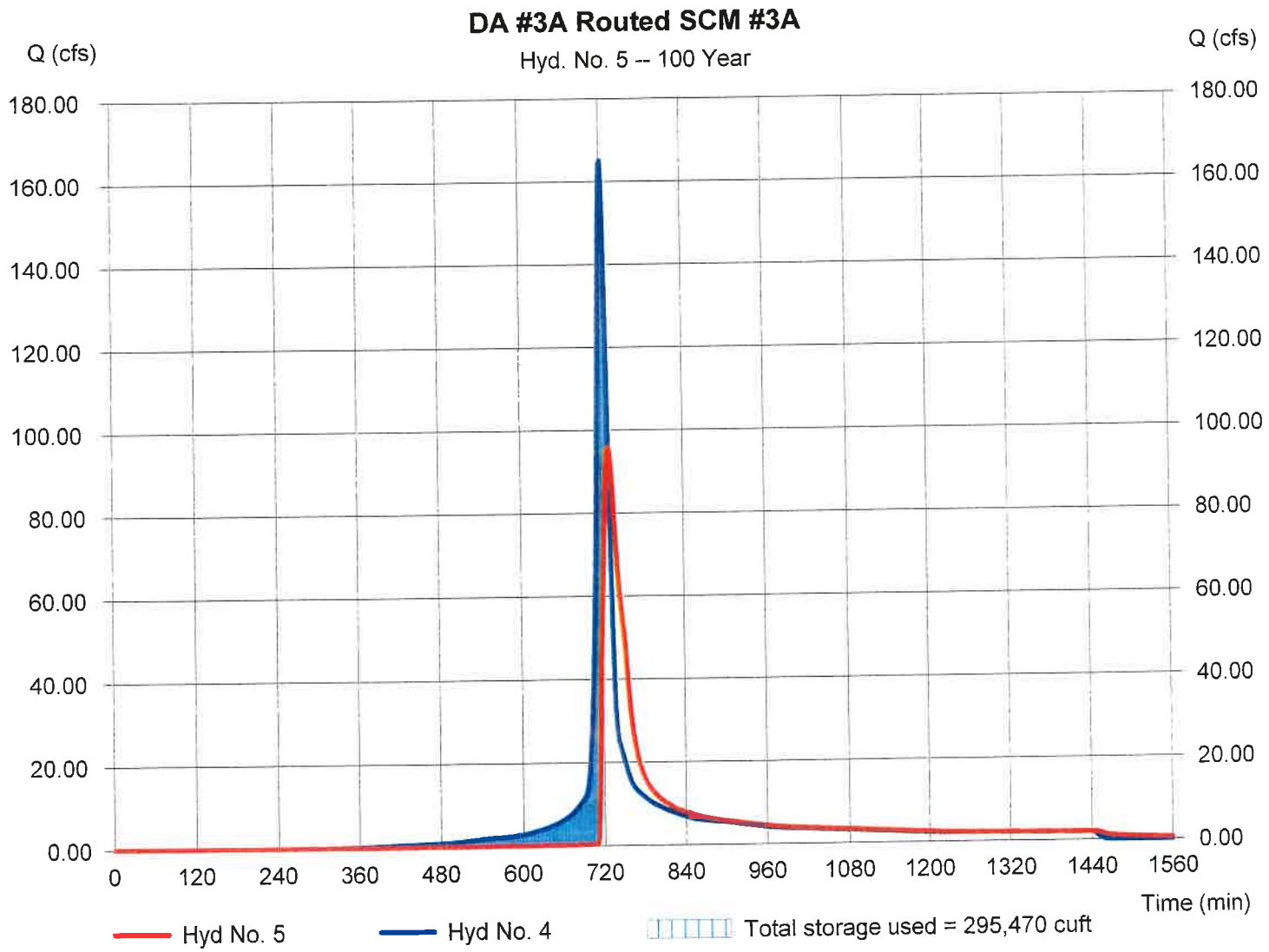
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 09 / 30 / 2020

Hyd. No. 5

DA #3A Routed SCM #3A

Hydrograph type	= Reservoir	Peak discharge	= 95.92 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 394,571 cuft
Inflow hyd. No.	= 4 - Zone 4: PostDev to SCM #3A	Max. Elevation	= 355.00 ft
Reservoir name	= SCM #3A	Max. Storage	= 295,470 cuft

Storage Indication method used. Wet pond routing start elevation = 351.50 ft.

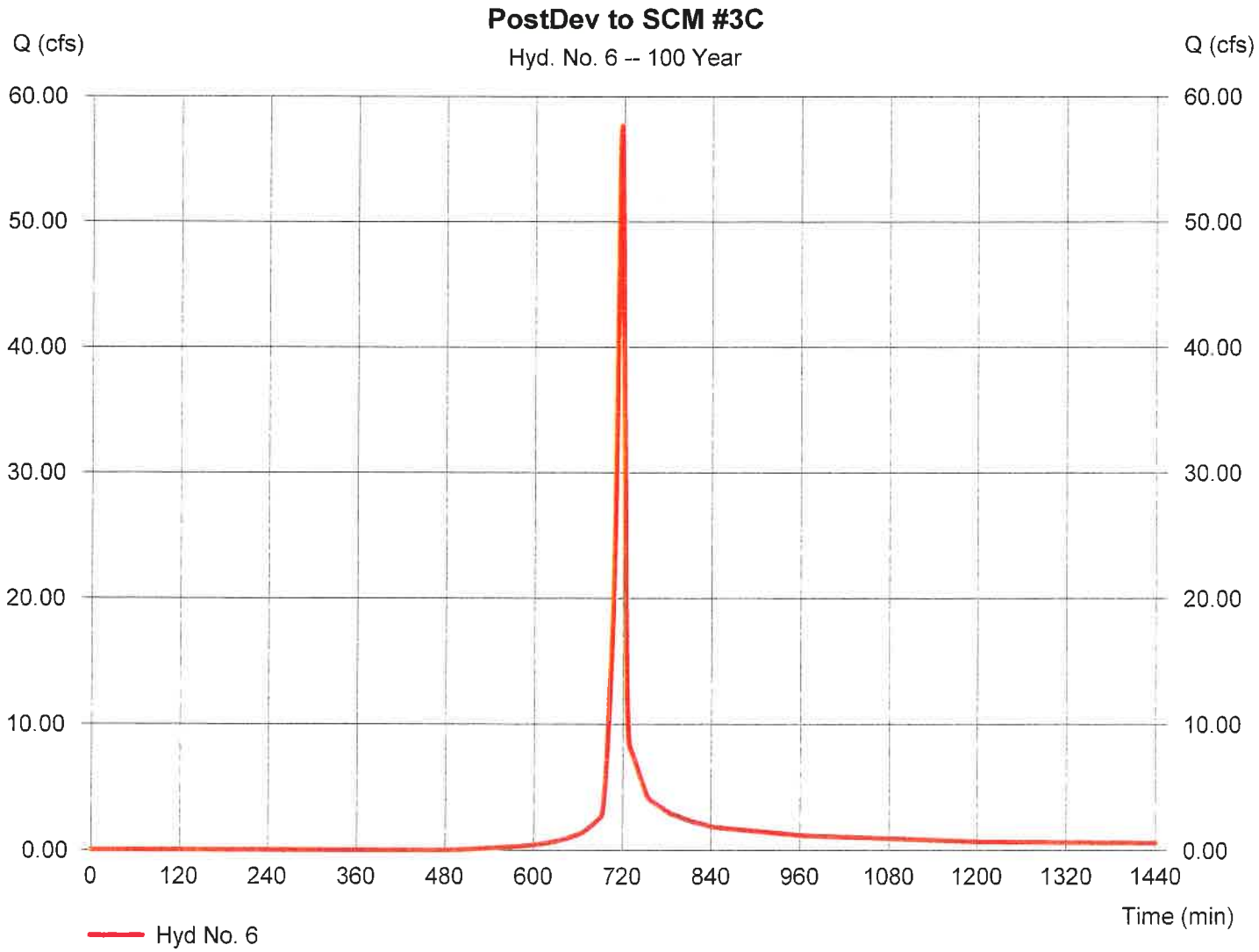


Hydrograph Report

Hyd. No. 6

PostDev to SCM #3C

Hydrograph type	= SCS Runoff	Peak discharge	= 57.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 116,850 cuft
Drainage area	= 7.970 ac	Curve number	= 69.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



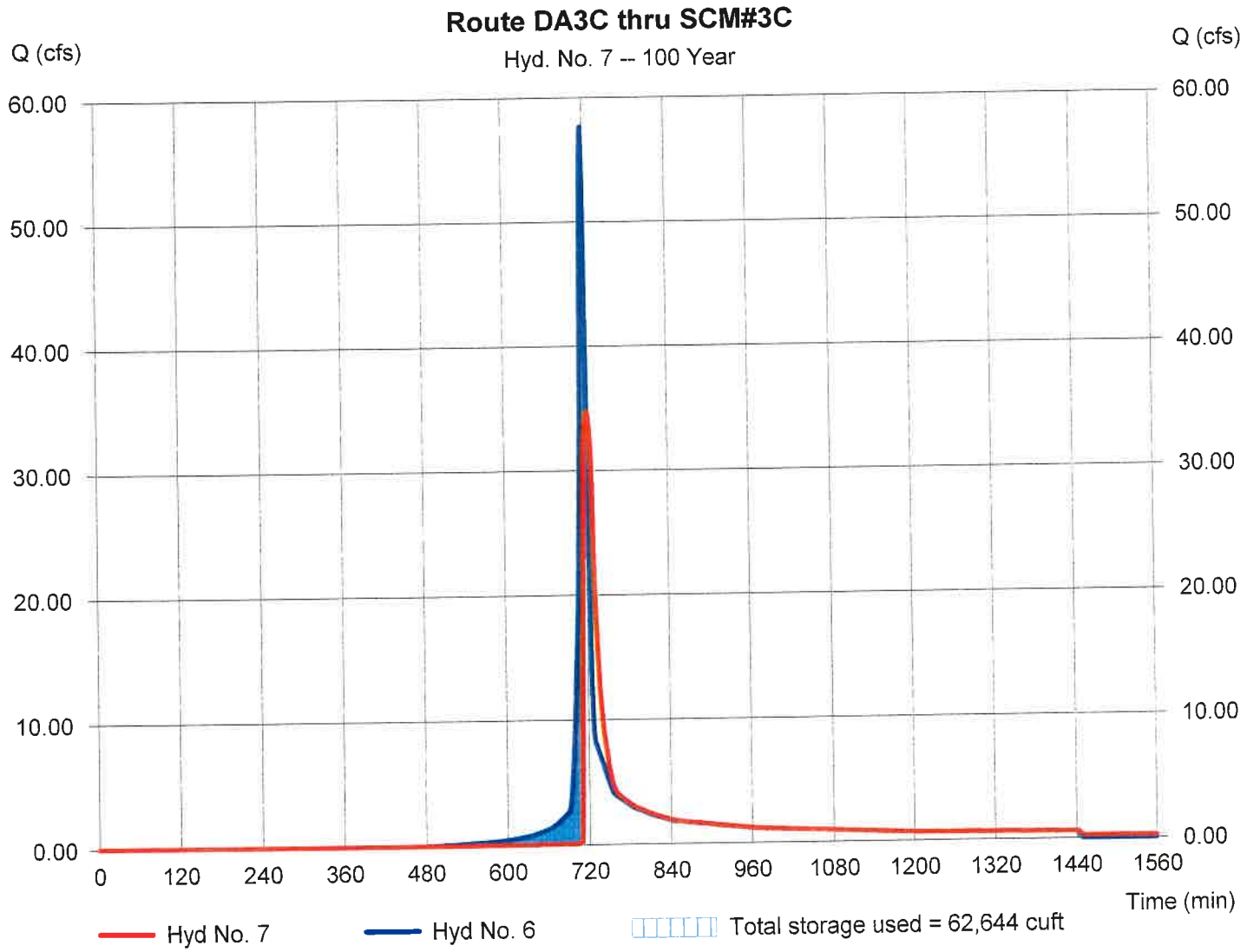
Hydrograph Report

Hyd. No. 7

Route DA3C thru SCM#3C

Hydrograph type	= Reservoir	Peak discharge	= 34.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 105,003 cuft
Inflow hyd. No.	= 6 - PostDev to SCM #3C	Max. Elevation	= 342.95 ft
Reservoir name	= SCM #3C	Max. Storage	= 62,644 cuft

Storage Indication method used. Wet pond routing start elevation = 340.50 ft.

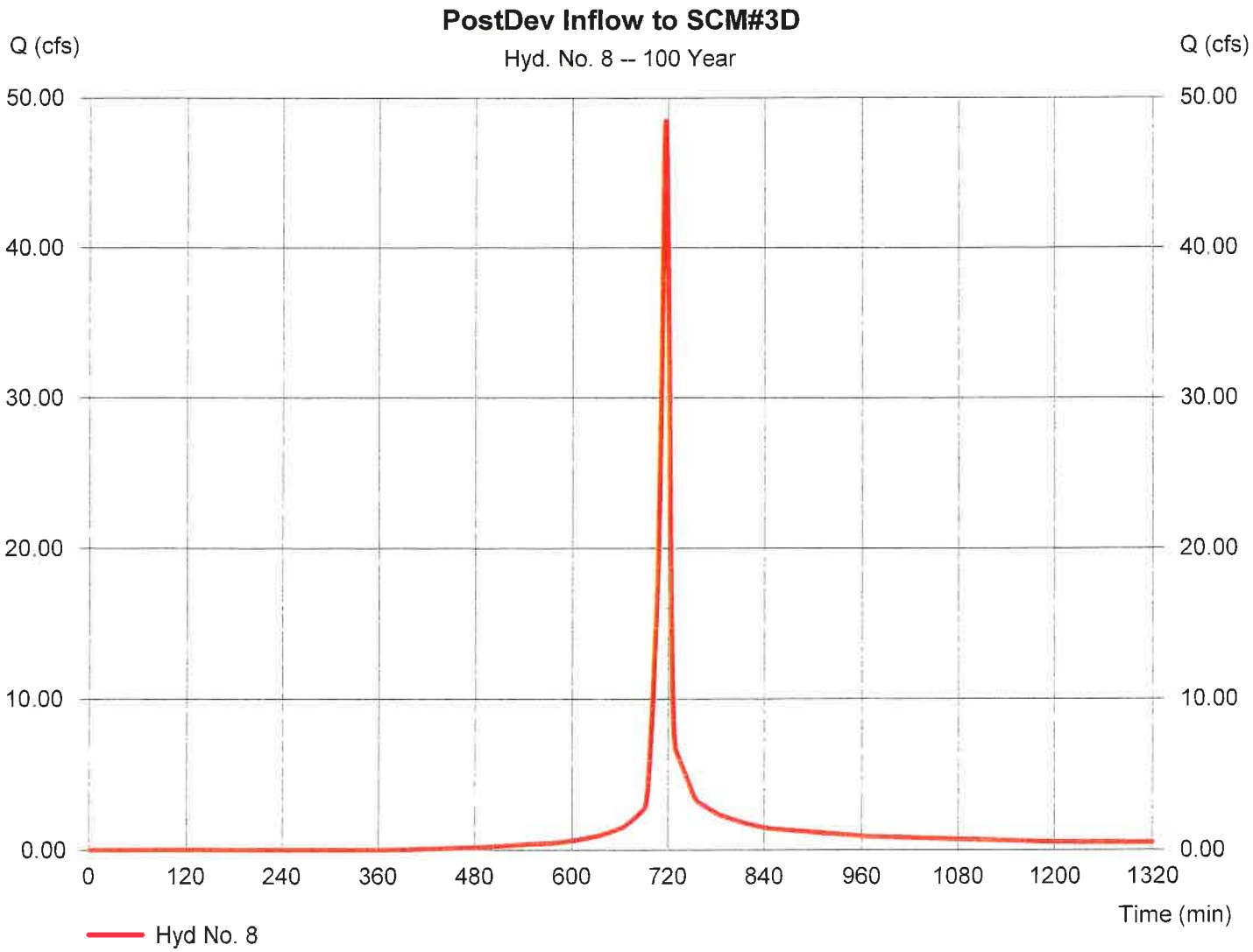


Hydrograph Report

Hyd. No. 8

PostDev Inflow to SCM#3D

Hydrograph type	= SCS Runoff	Peak discharge	= 48.44 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 100,475 cuft
Drainage area	= 5.640 ac	Curve number	= 76.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



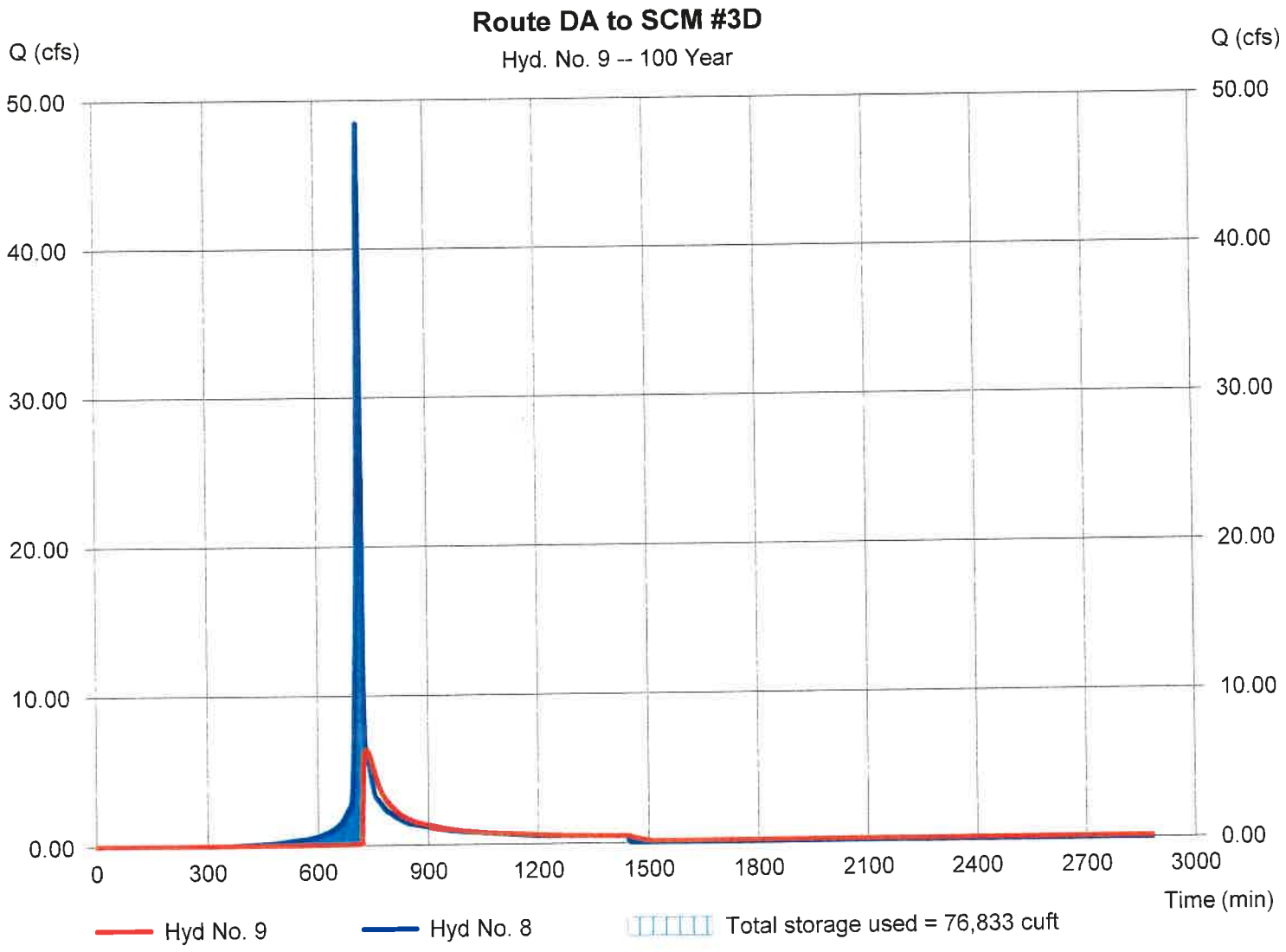
Hydrograph Report

Hyd. No. 9

Route DA to SCM #3D

Hydrograph type	= Reservoir	Peak discharge	= 6.352 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 63,670 cuft
Inflow hyd. No.	= 8 - PostDev Inflow to SCM#3D	Max. Elevation	= 348.46 ft
Reservoir name	= SCM #3D	Max. Storage	= 76,833 cuft

Storage Indication method used. Wet pond routing start elevation = 344.50 ft.



Hydrograph Report

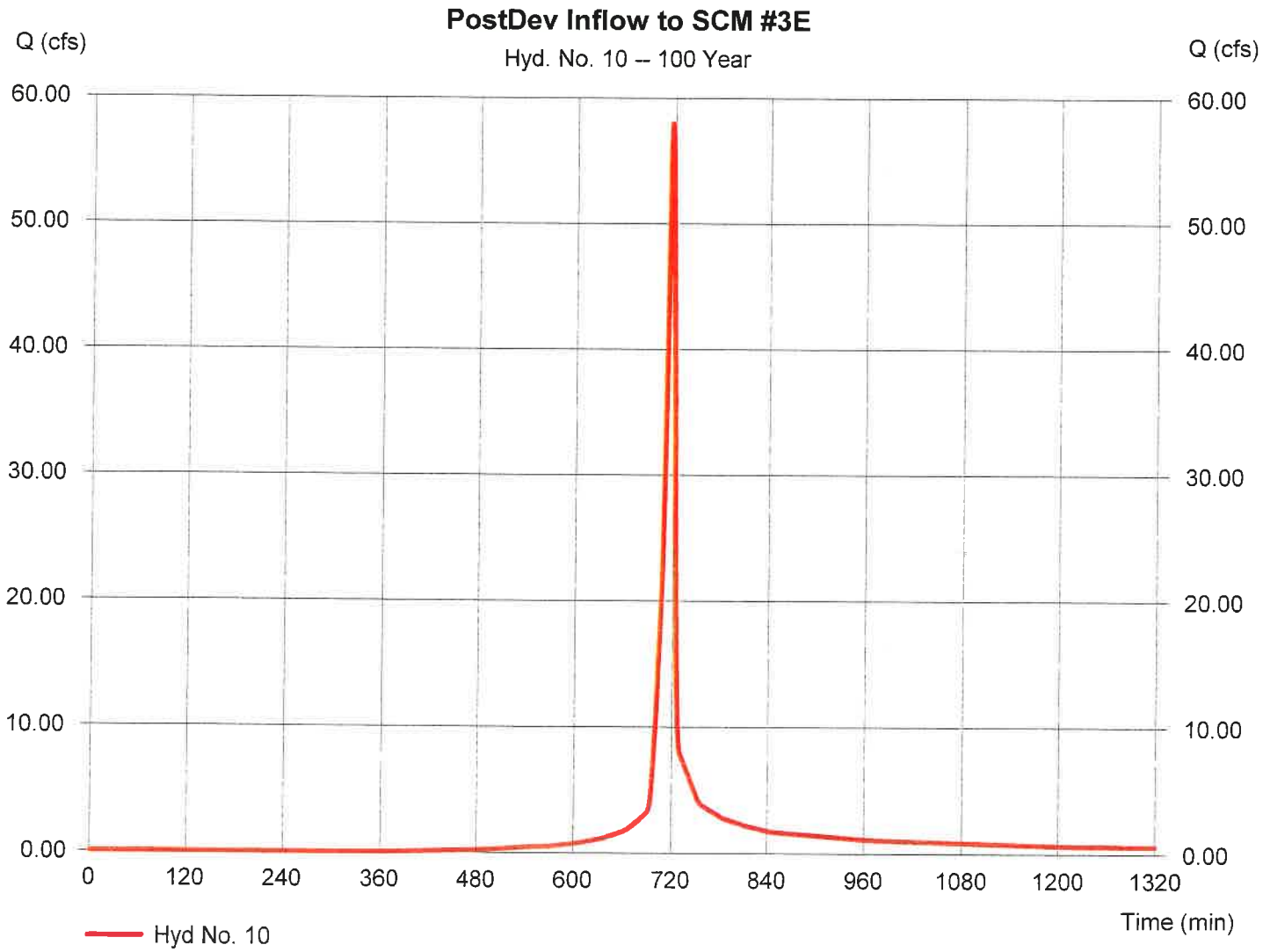
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Wednesday, 09 / 30 / 2020

Hyd. No. 10

PostDev Inflow to SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 57.95 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 120,281 cuft
Drainage area	= 6.720 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



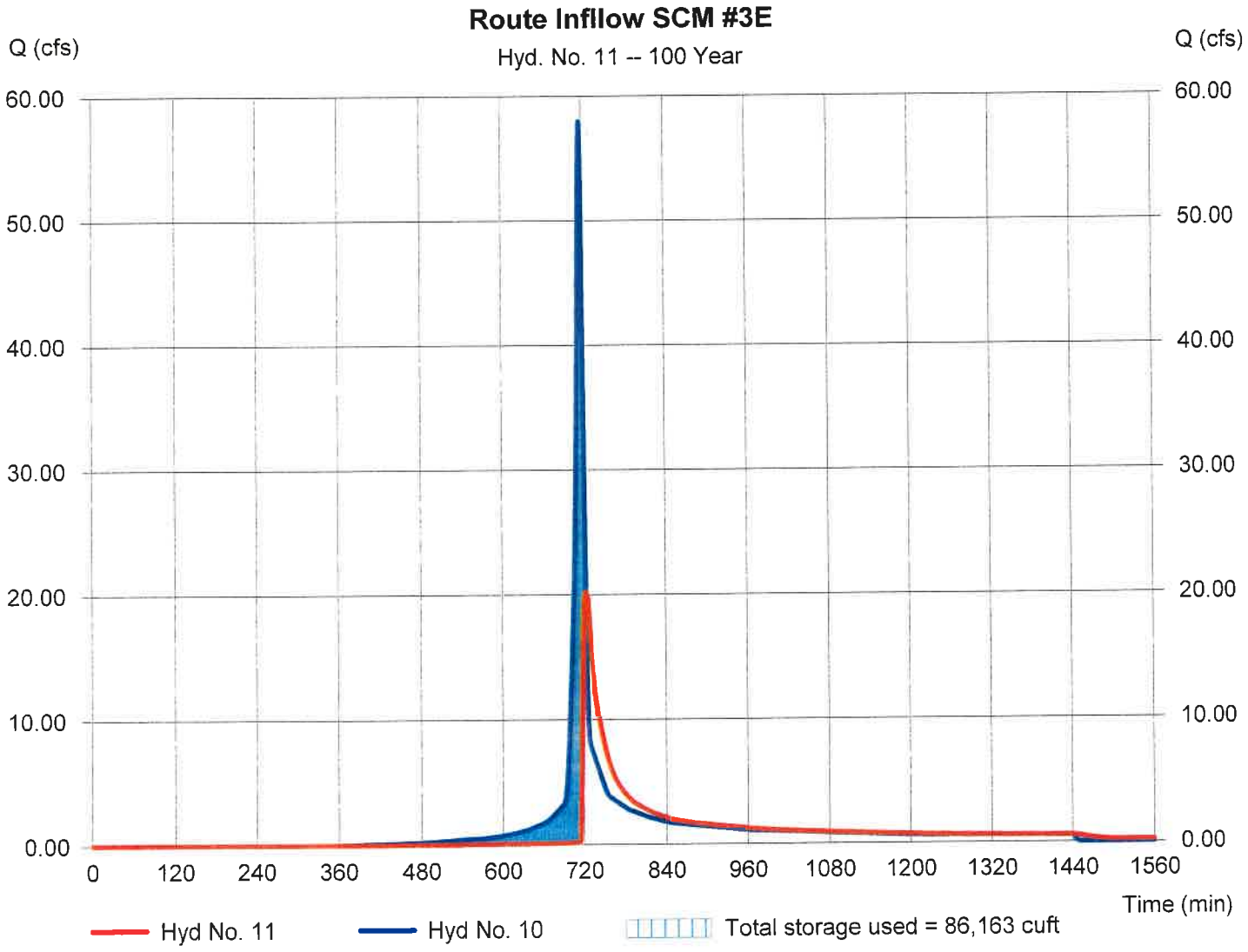
Hydrograph Report

Hyd. No. 11

Route Infllow SCM #3E

Hydrograph type	= Reservoir	Peak discharge	= 20.20 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 95,749 cuft
Inflow hyd. No.	= 10 - PostDev Inflow to SCM #3E	Max. Elevation	= 310.06 ft
Reservoir name	= SCM #3E	Max. Storage	= 86,163 cuft

Storage Indication method used. Wet pond routing start elevation = 306.50 ft.



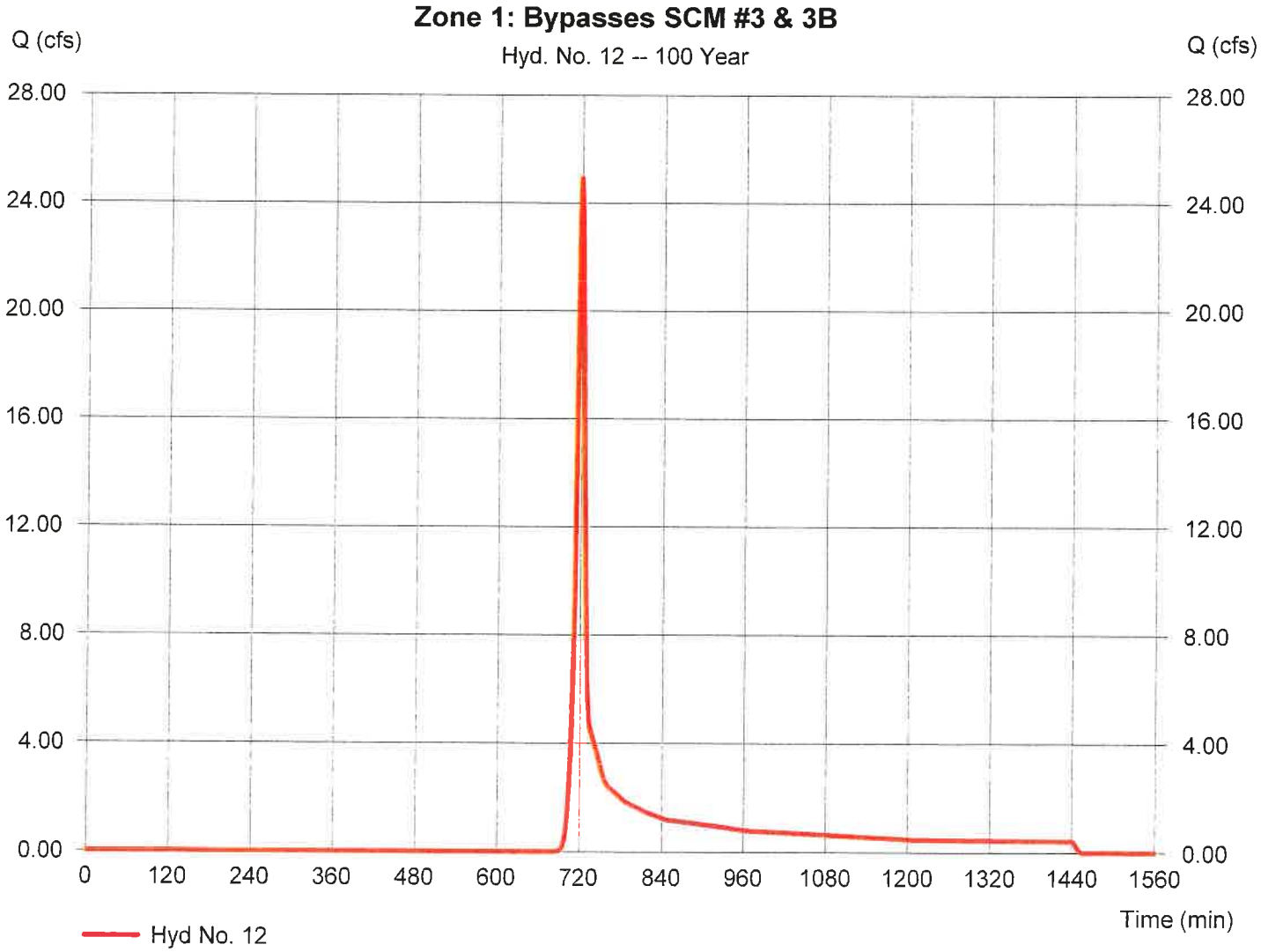
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 12

Zone 1: Bypasses SCM #3 & 3B

Hydrograph type	= SCS Runoff	Peak discharge	= 24.91 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 59,270 cuft
Drainage area	= 8.510 ac	Curve number	= 49.9
Basin Slope	= 2.8 %	Hydraulic length	= 1529 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

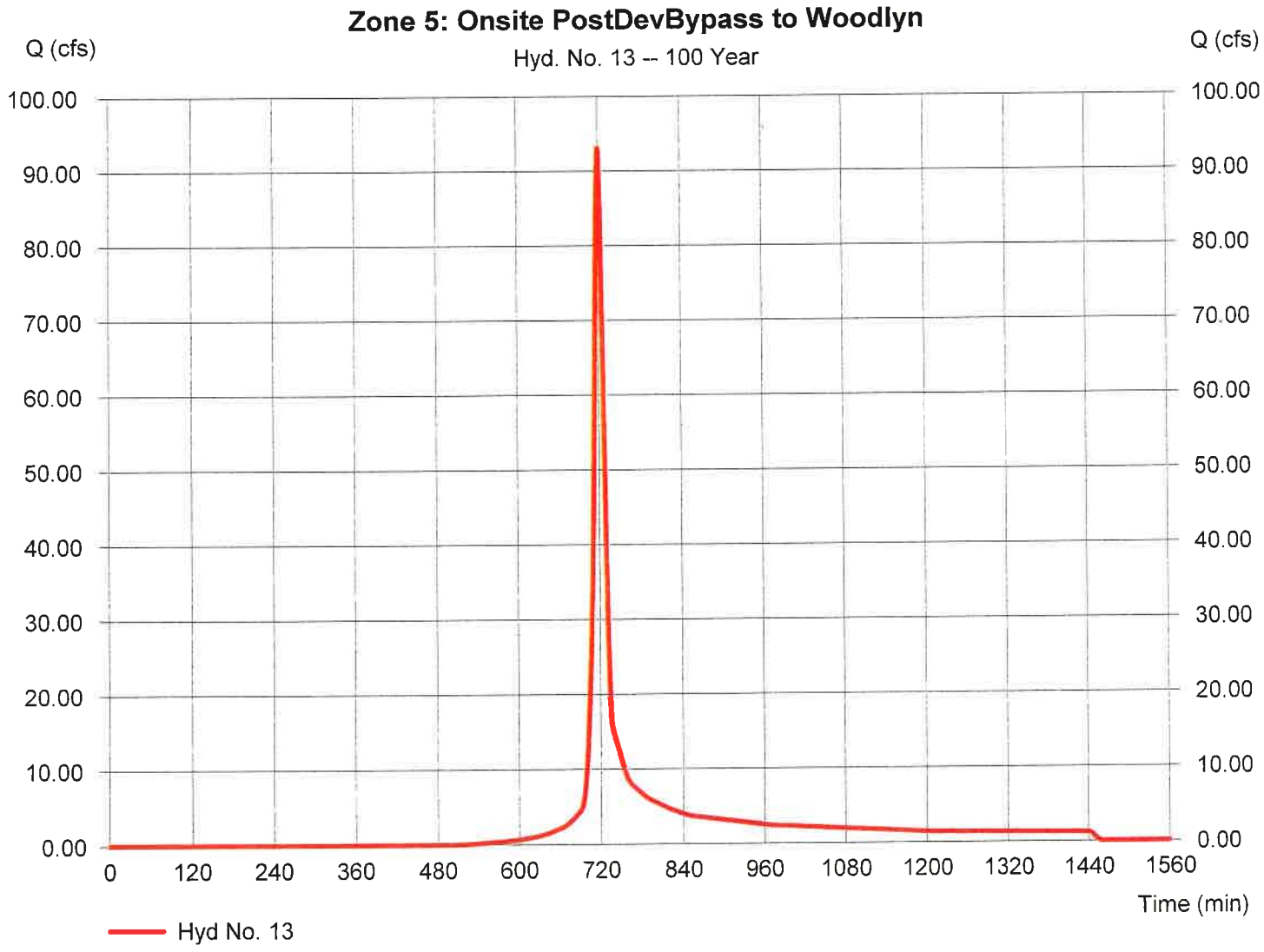


Hydrograph Report

Hyd. No. 13

Zone 5: Onsite PostDevBypass to Woodlyn

Hydrograph type	= SCS Runoff	Peak discharge	= 93.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 235,063 cuft
Drainage area	= 17.680 ac	Curve number	= 67.4
Basin Slope	= 1.5 %	Hydraulic length	= 1788 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.58 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



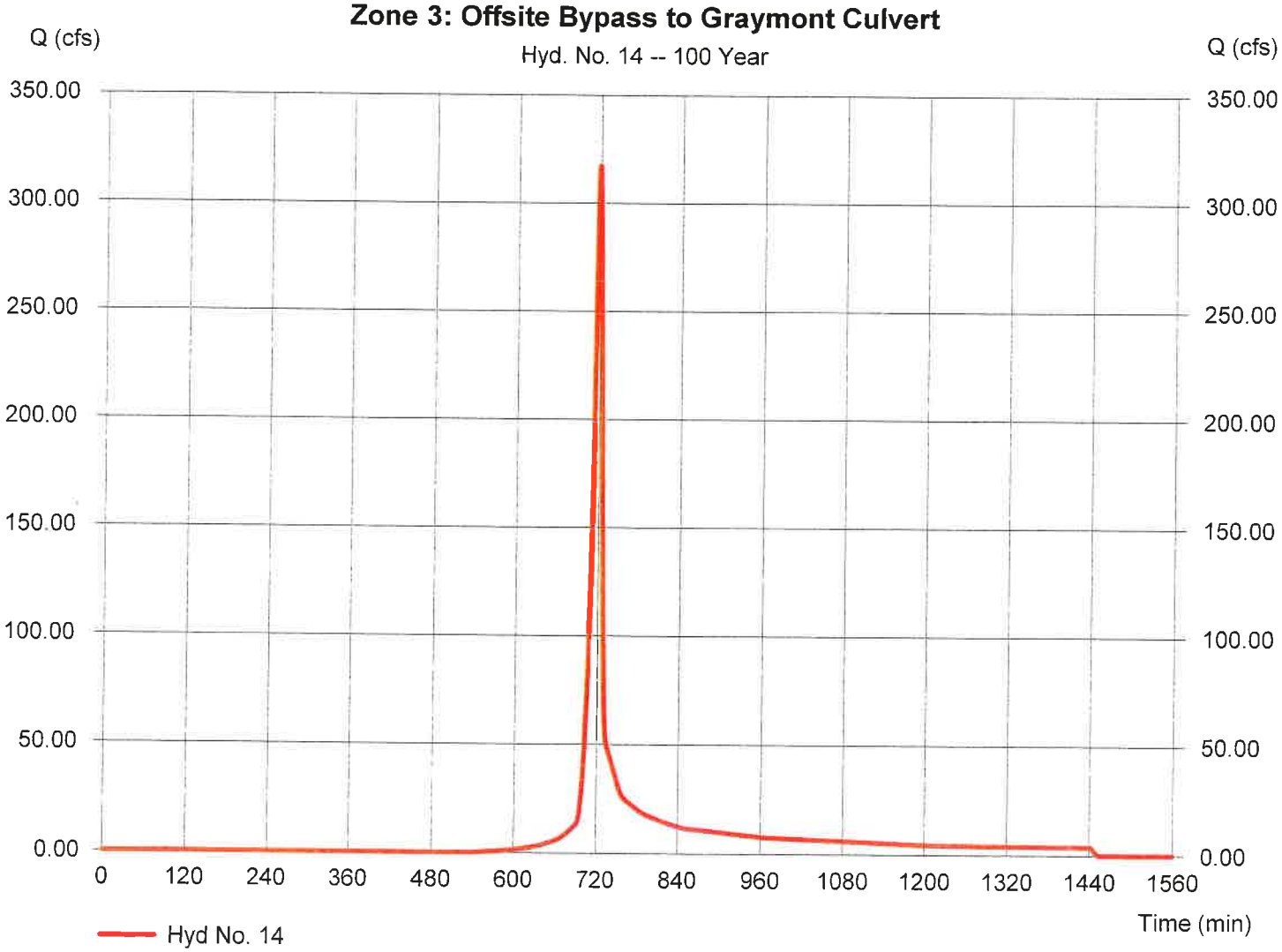
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 14

Zone 3: Offsite Bypass to Graymont Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 317.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 717,900 cuft
Drainage area	= 57.120 ac	Curve number	= 65
Basin Slope	= 1.8 %	Hydraulic length	= 1220 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.81 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

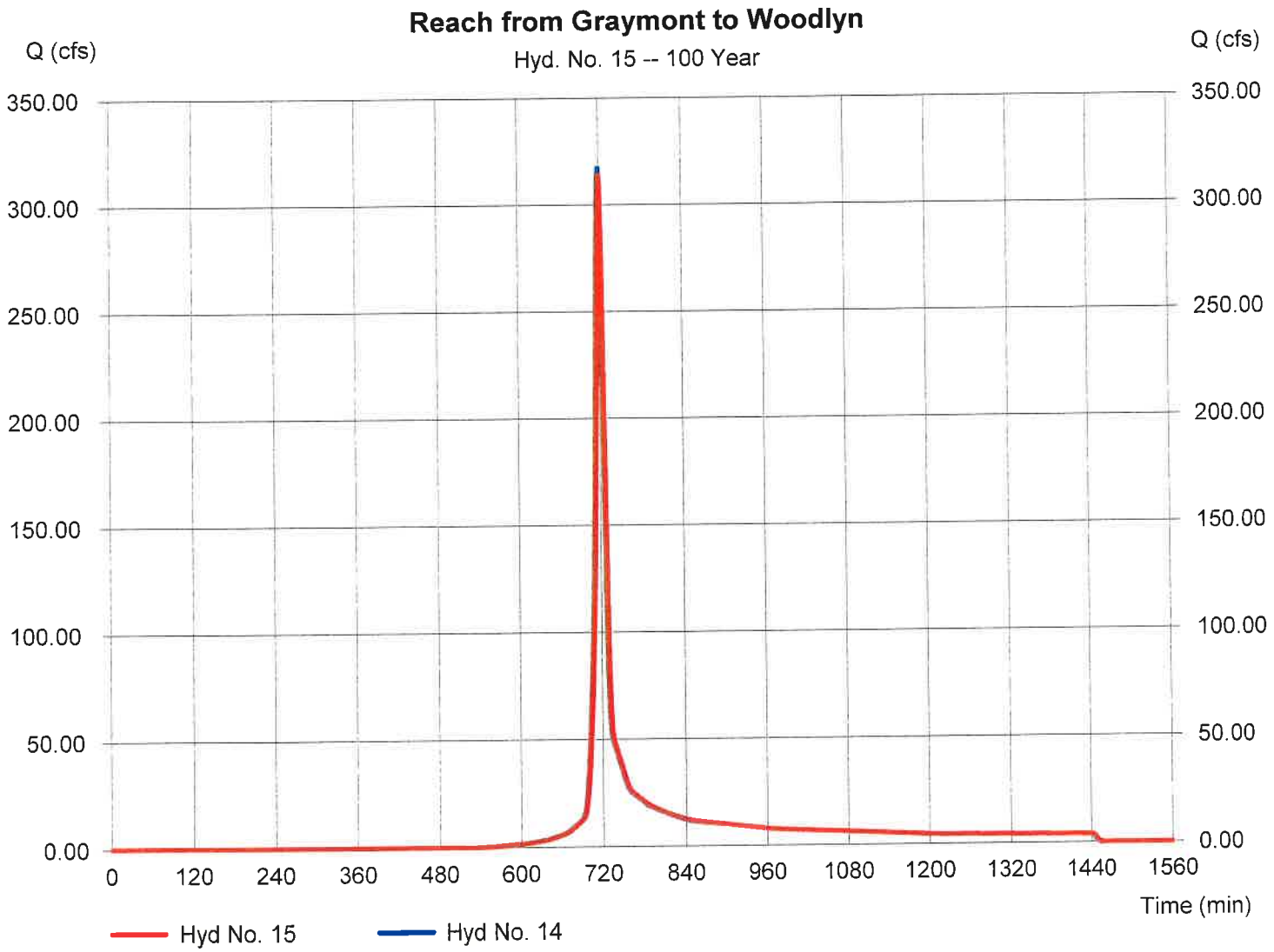
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 15

Reach from Graymont to Woodlyn

Hydrograph type	= Reach	Peak discharge	= 313.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 717,900 cuft
Inflow hyd. No.	= 14 - Zone 3: Offsite Bypass to Graymont	Section type	= Trapezoidal
Reach length	= 1750.0 ft	Channel slope	= 1.4 %
Manning's n	= 0.009	Bottom width	= 5.0 ft
Side slope	= 2.0:1	Max. depth	= 4.0 ft
Rating curve x	= 6.696	Rating curve m	= 1.370
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.6165

Modified Att-Kin routing method used.

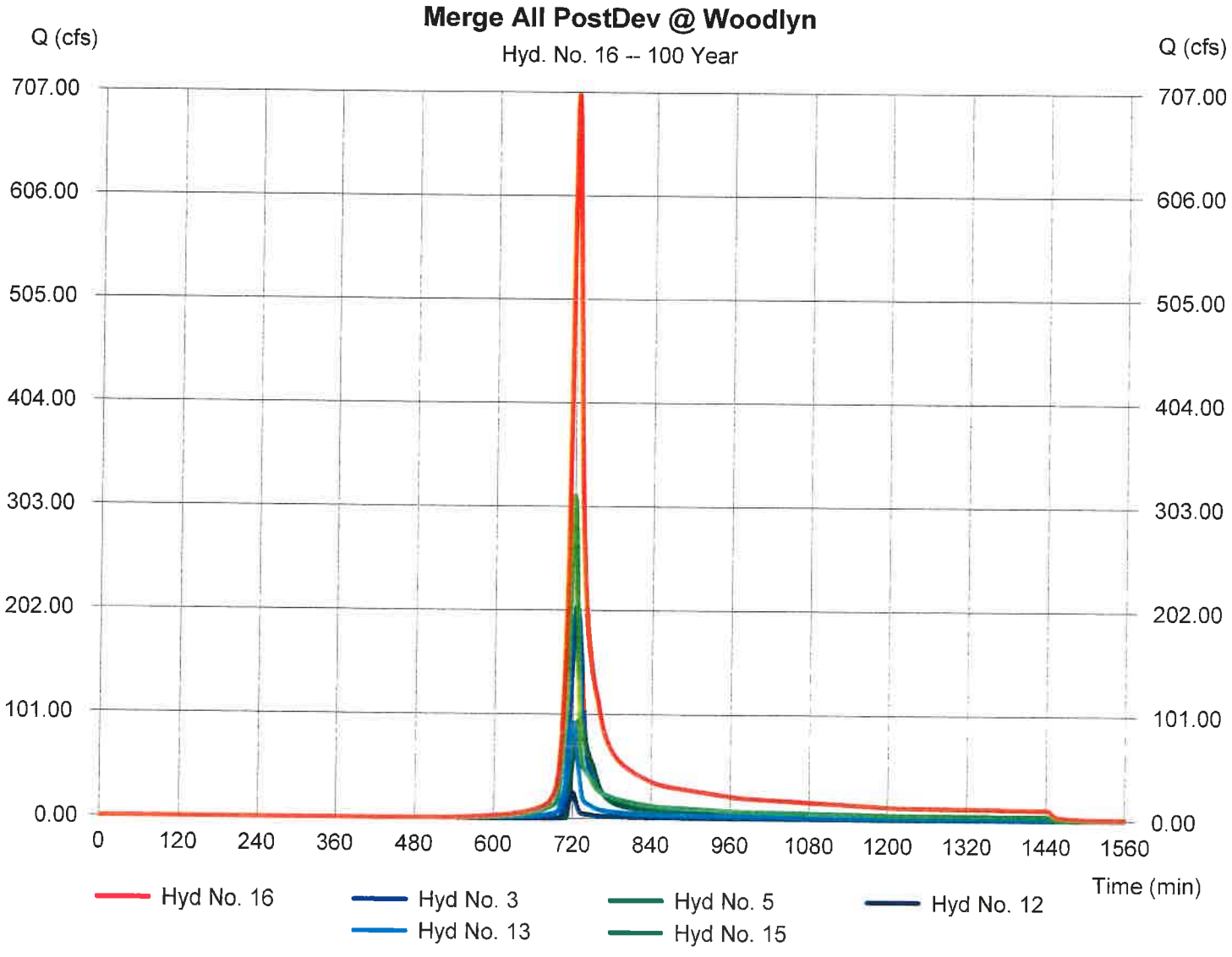


Hydrograph Report

Hyd. No. 16

Merge All PostDev @ Woodlyn

Hydrograph type	= Combine	Peak discharge	= 704.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 2,050,519 cuft
Inflow hyds.	= 3, 5, 12, 13, 15	Contrib. drain. area	= 26.190 ac

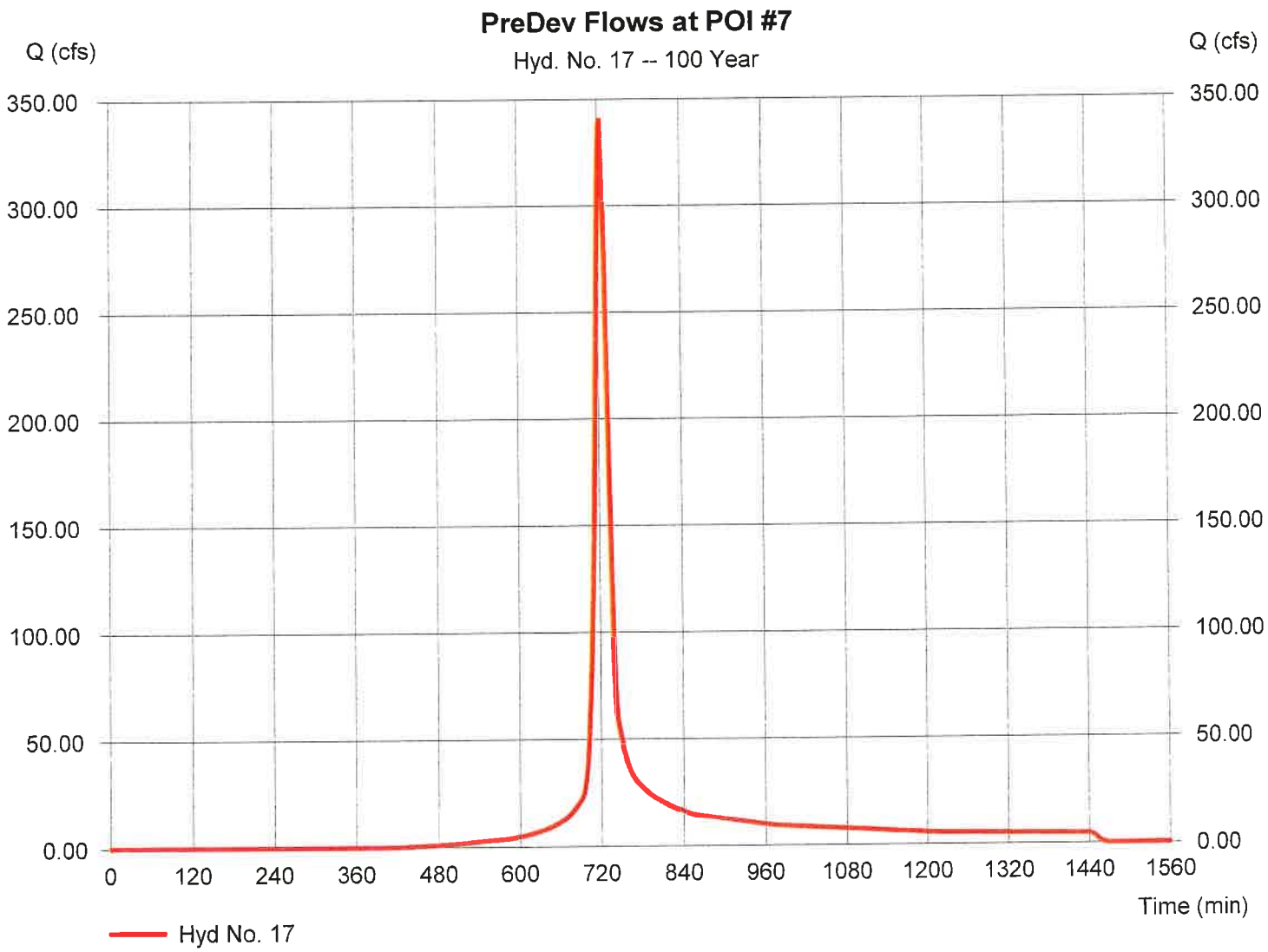


Hydrograph Report

Hyd. No. 17

PreDev Flows at POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 340.14 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 1,009,891 cuft
Drainage area	= 62.670 ac	Curve number	= 74.4
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.43 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

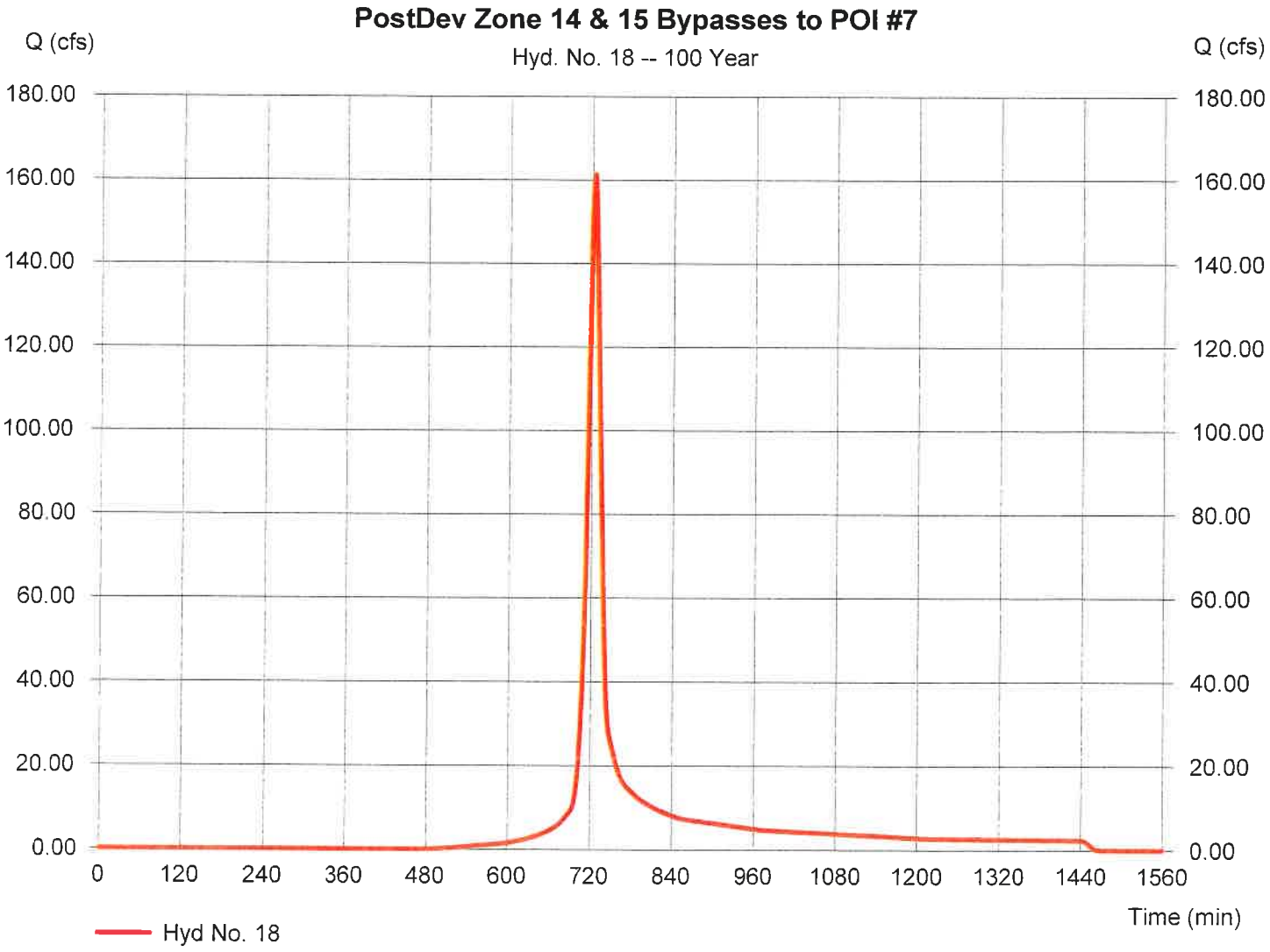


Hydrograph Report

Hyd. No. 18

PostDev Zone 14 & 15 Bypasses to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 161.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 477,636 cuft
Drainage area	= 33.240 ac	Curve number	= 70
Basin Slope	= 1.3 %	Hydraulic length	= 2500 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.27 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



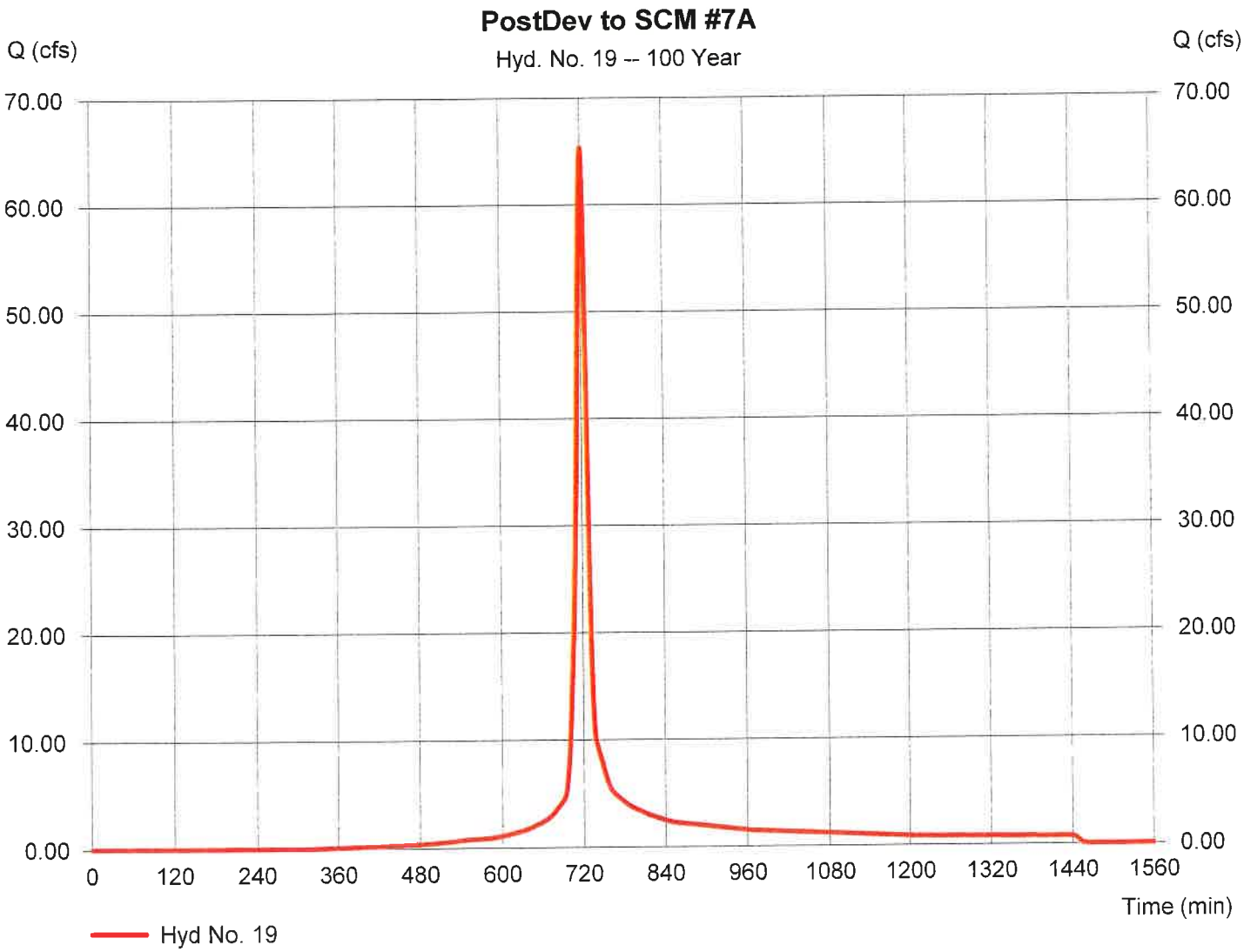
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 19

PostDev to SCM #7A

Hydrograph type	= SCS Runoff	Peak discharge	= 65.36 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 168,684 cuft
Drainage area	= 9.260 ac	Curve number	= 79.8
Basin Slope	= 1.1 %	Hydraulic length	= 1505 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.38 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

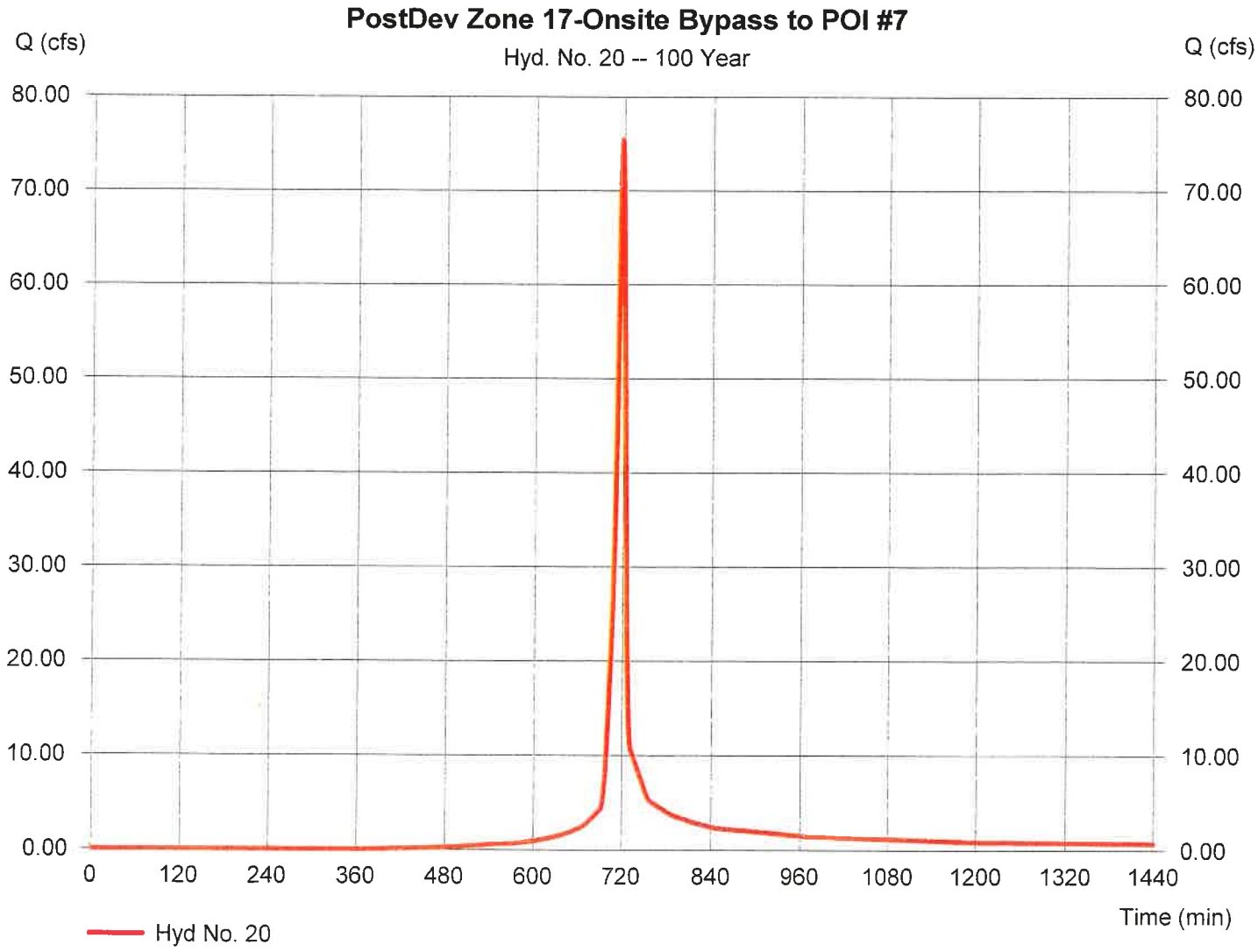


Hydrograph Report

Hyd. No. 20

PostDev Zone 17-Onsite Bypass to POI #7

Hydrograph type	= SCS Runoff	Peak discharge	= 75.42 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 162,555 cuft
Drainage area	= 9.720 ac	Curve number	= 76.5
Basin Slope	= 1.0 %	Hydraulic length	= 810 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.97 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

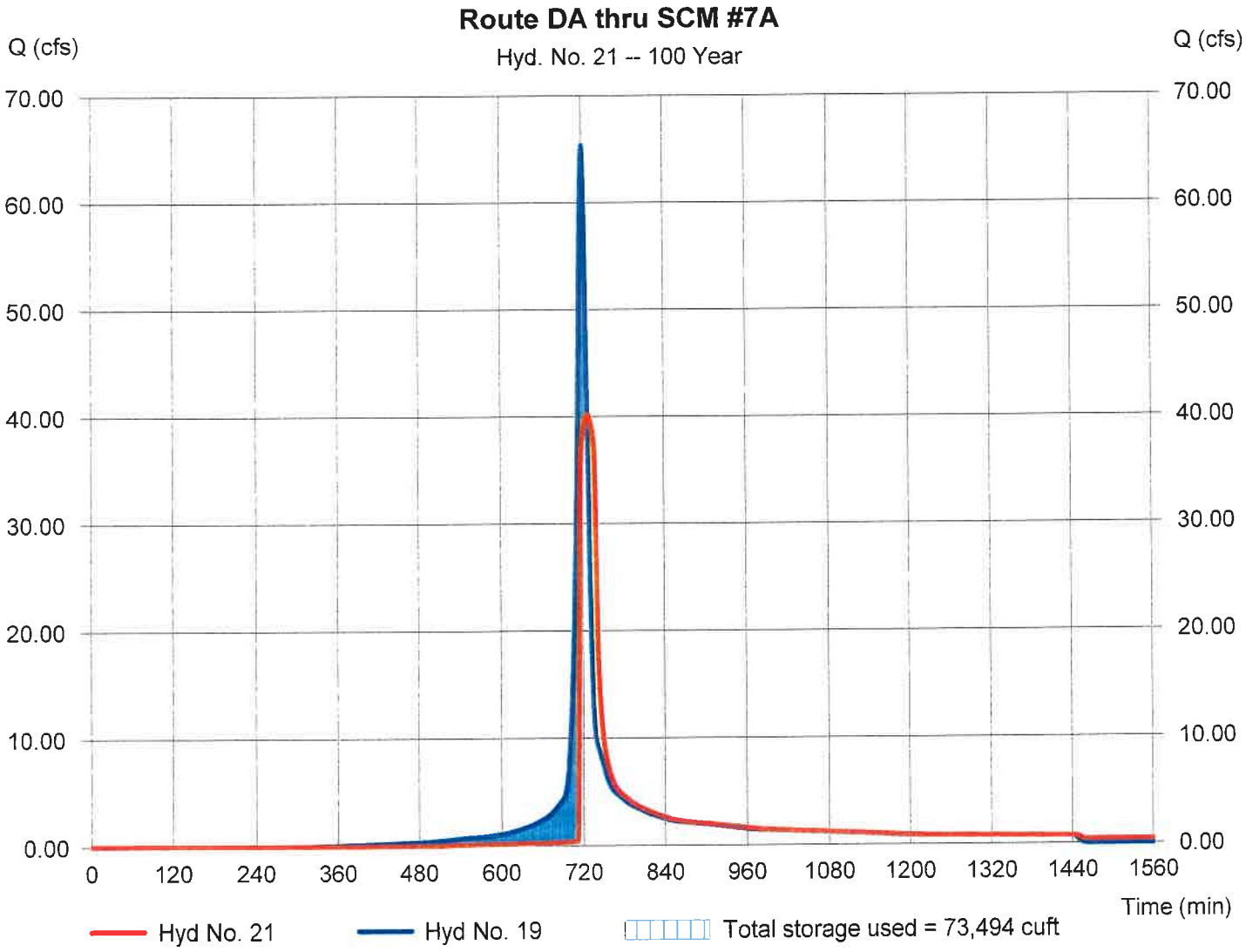
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 09 / 30 / 2020

Hyd. No. 21

Route DA thru SCM #7A

Hydrograph type	= Reservoir	Peak discharge	= 40.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 162,004 cuft
Inflow hyd. No.	= 19 - PostDev to SCM #7A	Max. Elevation	= 374.98 ft
Reservoir name	= SCM #7A	Max. Storage	= 73,494 cuft

Storage Indication method used. Wet pond routing start elevation = 370.50 ft.



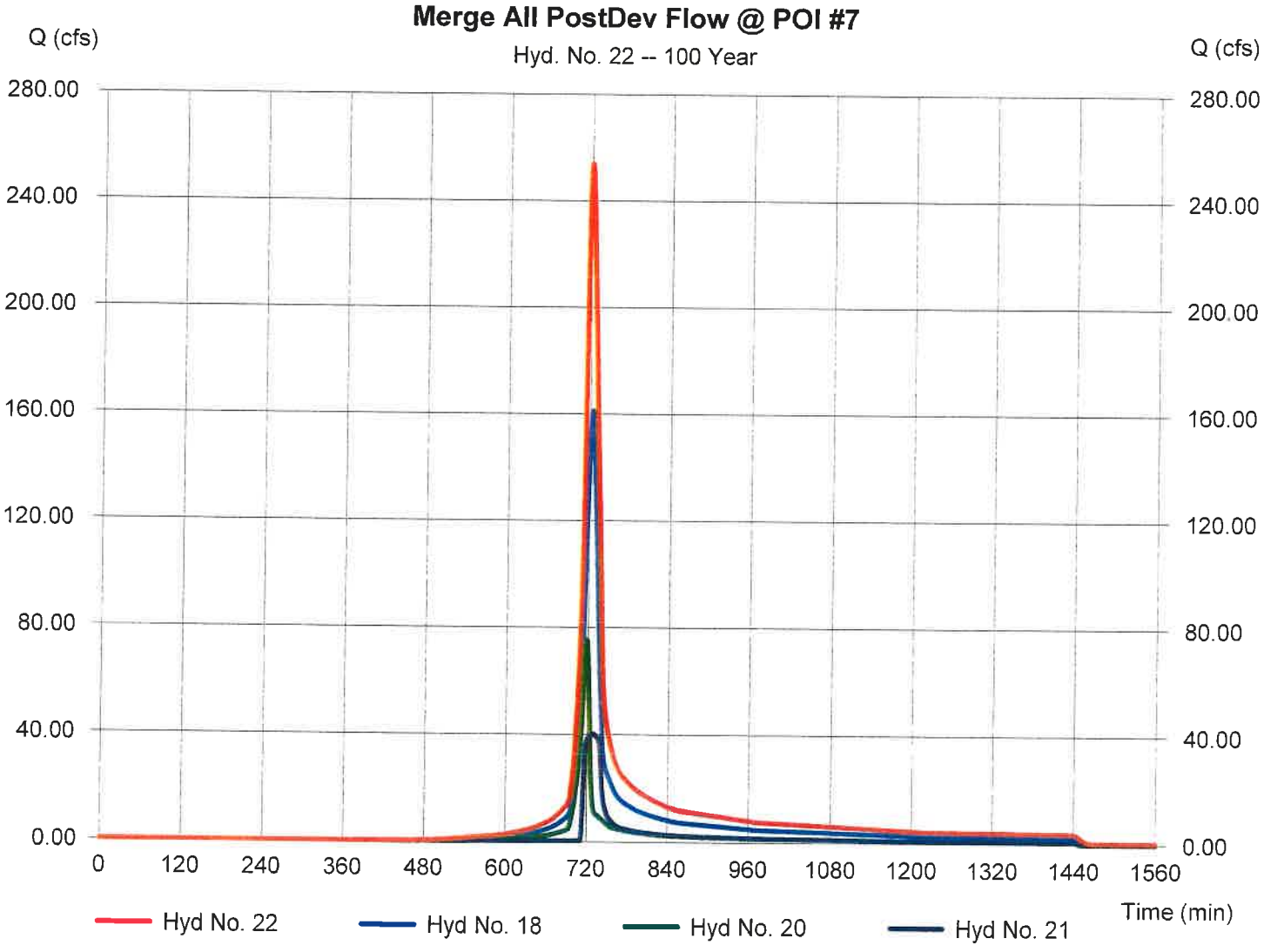
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 22

Merge All PostDev Flow @ POI #7

Hydrograph type	= Combine	Peak discharge	= 253.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 802,196 cuft
Inflow hyds.	= 18, 20, 21	Contrib. drain. area	= 42.960 ac



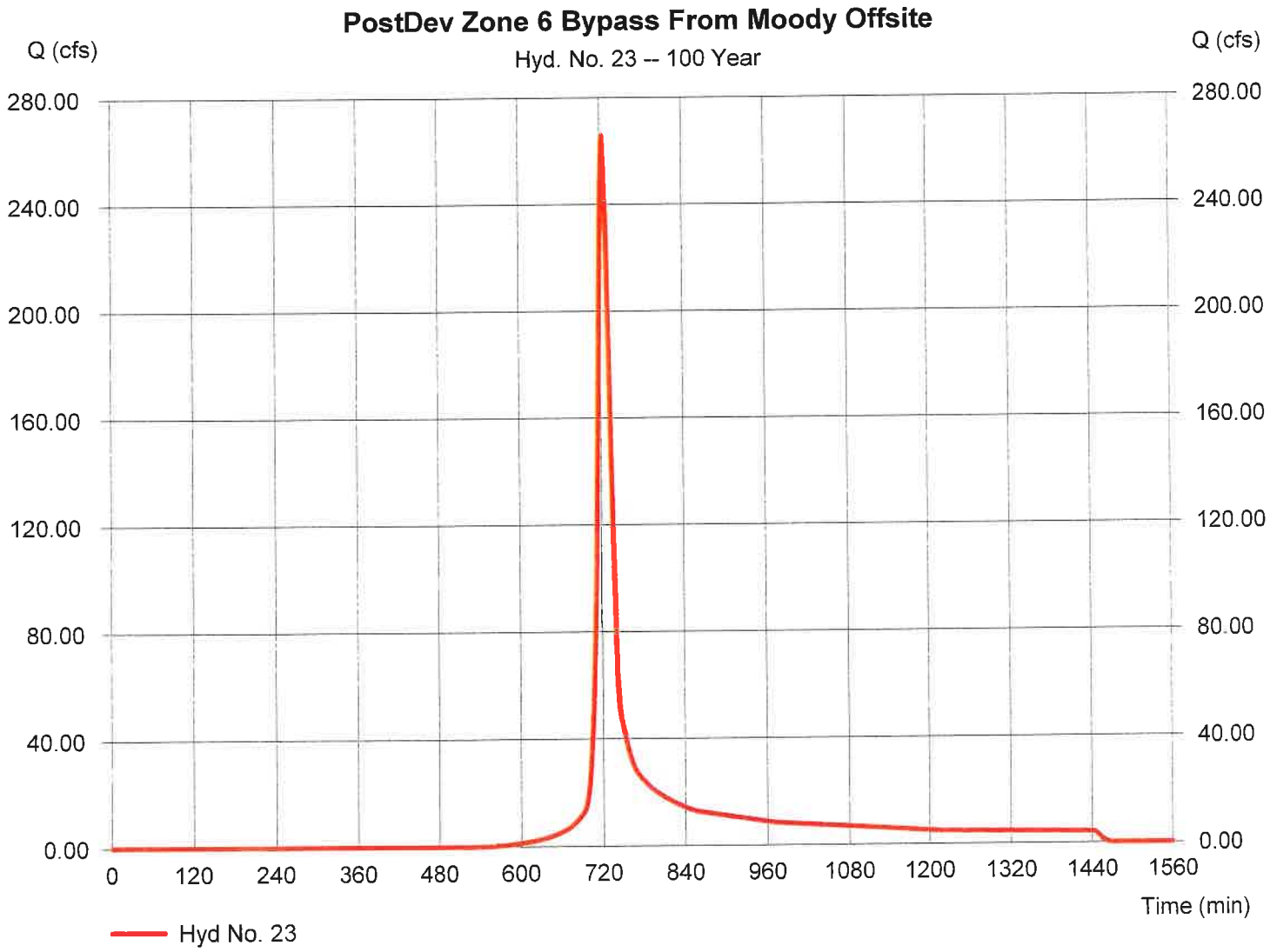
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 23

PostDev Zone 6 Bypass From Moody Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 265.75 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 790,683 cuft
Drainage area	= 64.030 ac	Curve number	= 64.8
Basin Slope	= 1.8 %	Hydraulic length	= 2940 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 17.01 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



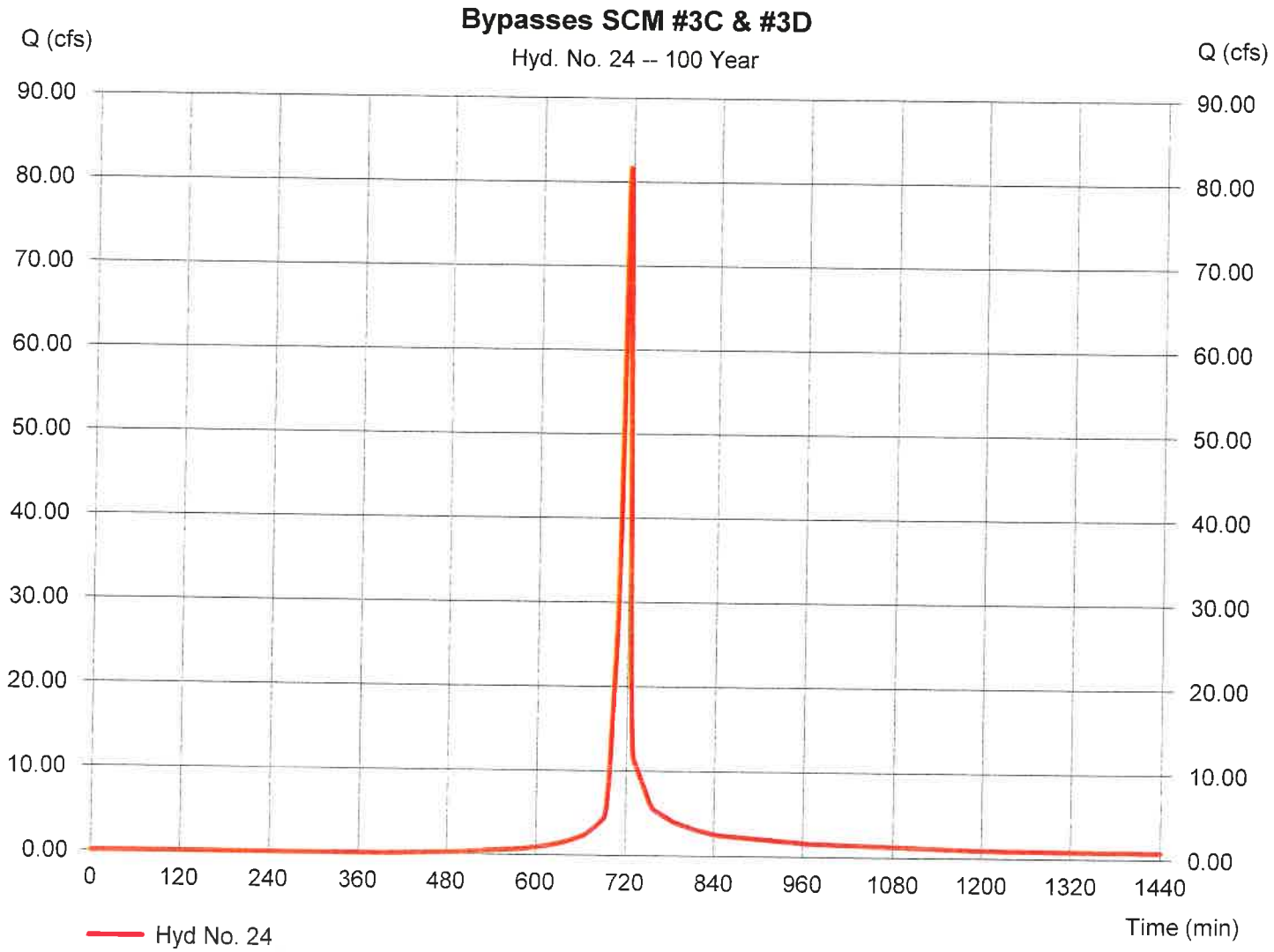
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 24

Bypasses SCM #3C & #3D

Hydrograph type	= SCS Runoff	Peak discharge	= 81.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 168,171 cuft
Drainage area	= 9.980 ac	Curve number	= 74.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

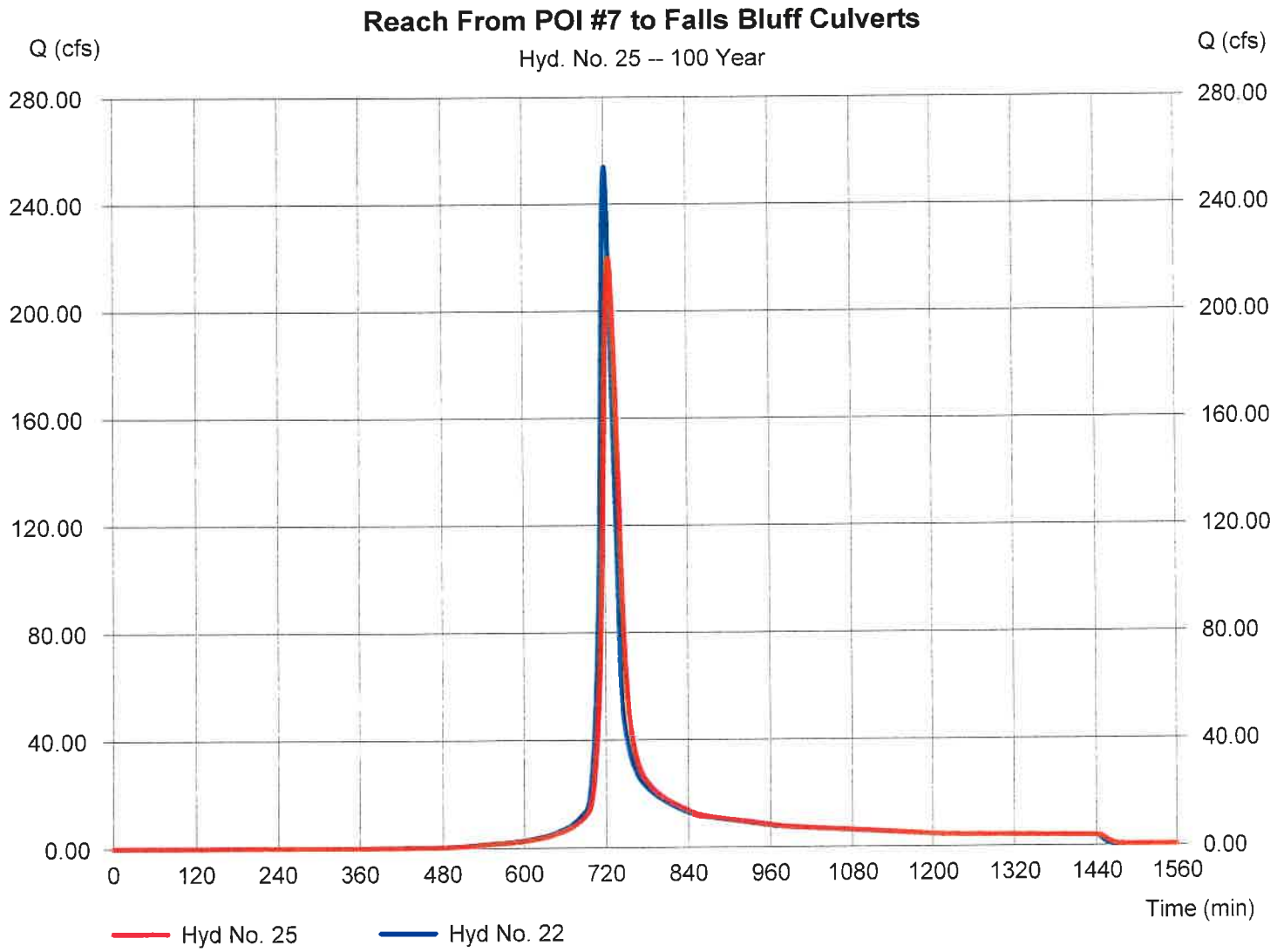
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 25

Reach From POI #7 to Falls Bluff Culverts

Hydrograph type	= Reach	Peak discharge	= 219.77 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 802,130 cuft
Inflow hyd. No.	= 22 - Merge All PostDev Flow @ POI #7	Section type	= Trapezoidal
Reach length	= 1845.0 ft	Channel slope	= 1.4 %
Manning's n	= 0.030	Bottom width	= 4.0 ft
Side slope	= 30.0:1	Max. depth	= 4.0 ft
Rating curve x	= 2.289	Rating curve m	= 1.183
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1674

Modified Att-Kin routing method used.



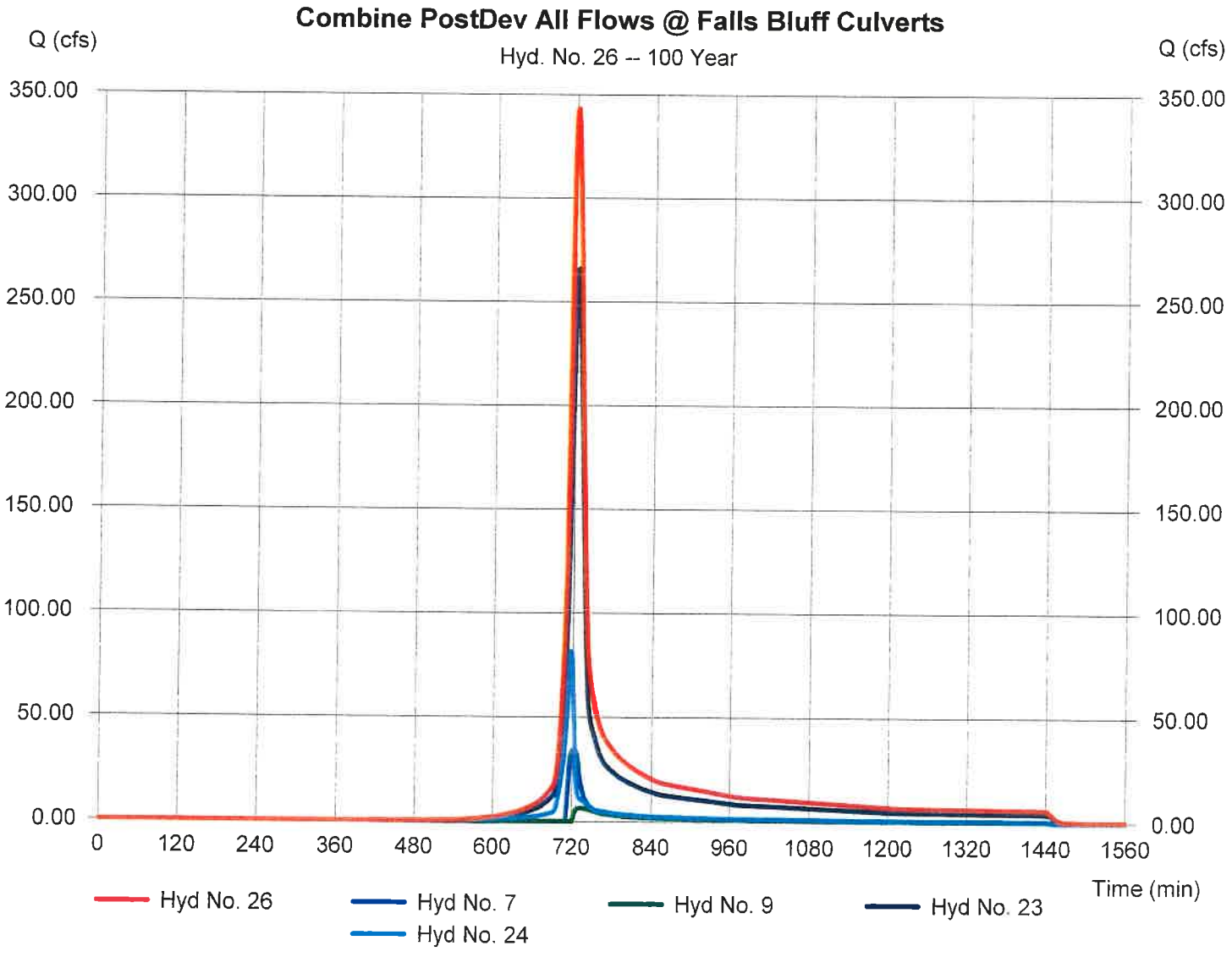
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 26

Combine PostDev All Flows @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 343.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 1,127,525 cuft
Inflow hyds.	= 7, 9, 23, 24	Contrib. drain. area	= 74.010 ac

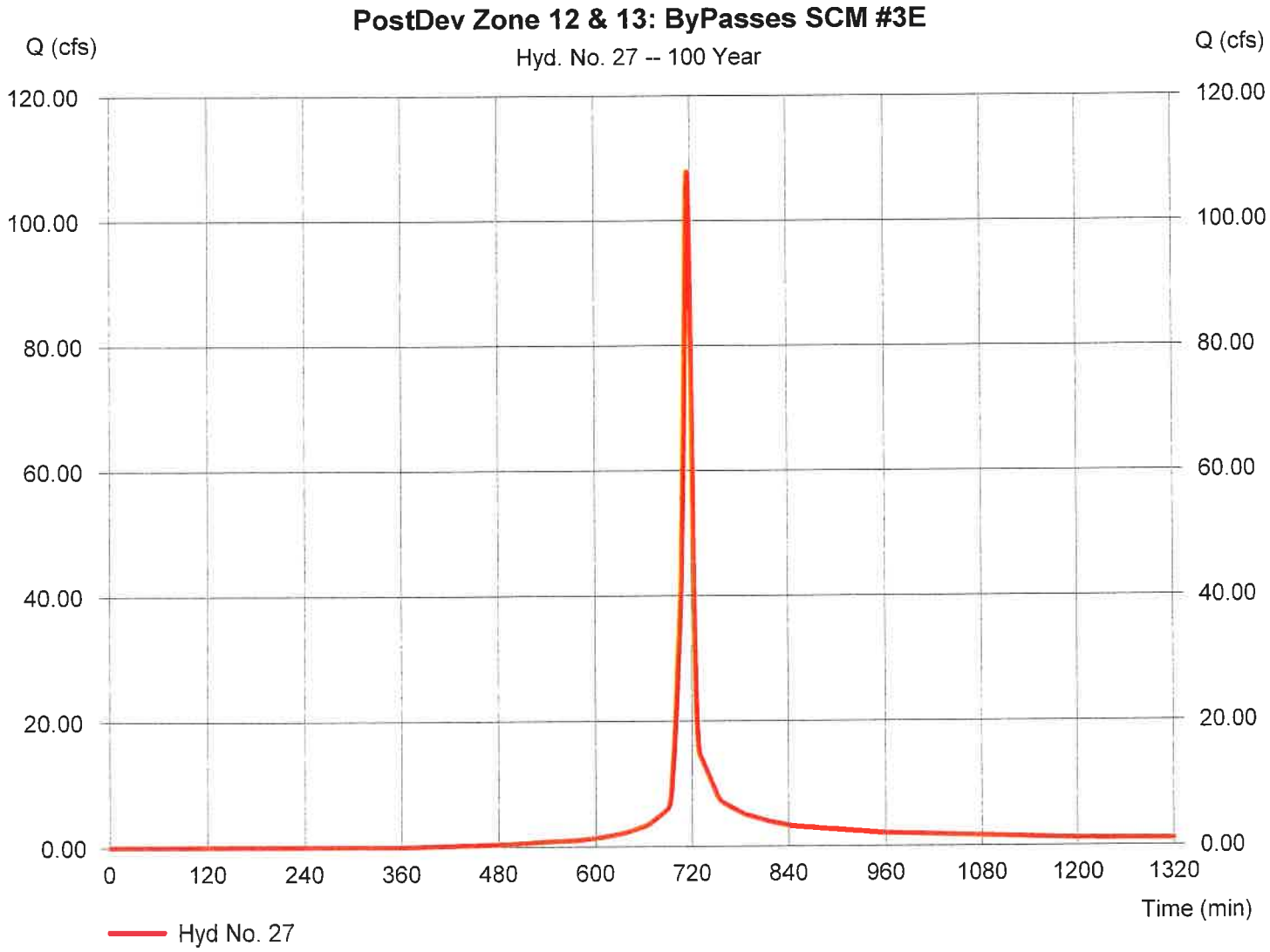


Hydrograph Report

Hyd. No. 27

PostDev Zone 12 & 13: ByPasses SCM #3E

Hydrograph type	= SCS Runoff	Peak discharge	= 107.80 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 223,737 cuft
Drainage area	= 12.500 ac	Curve number	= 77
Basin Slope	= 5.7 %	Hydraulic length	= 1080 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.08 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



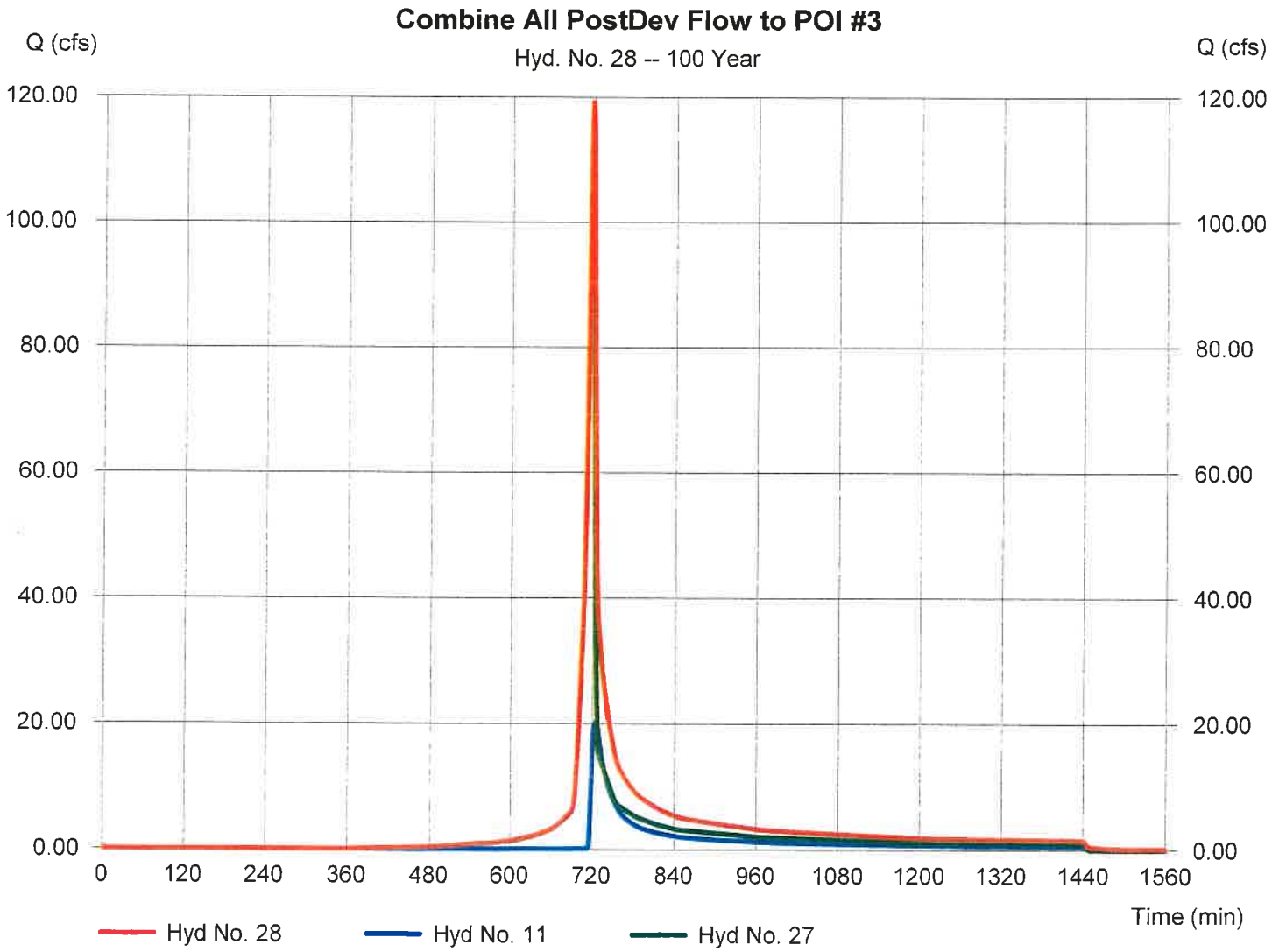
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 28

Combine All PostDev Flow to POI #3

Hydrograph type	= Combine	Peak discharge	= 119.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 321,269 cuft
Inflow hyds.	= 11, 27	Contrib. drain. area	= 12.500 ac



Hydrograph Report

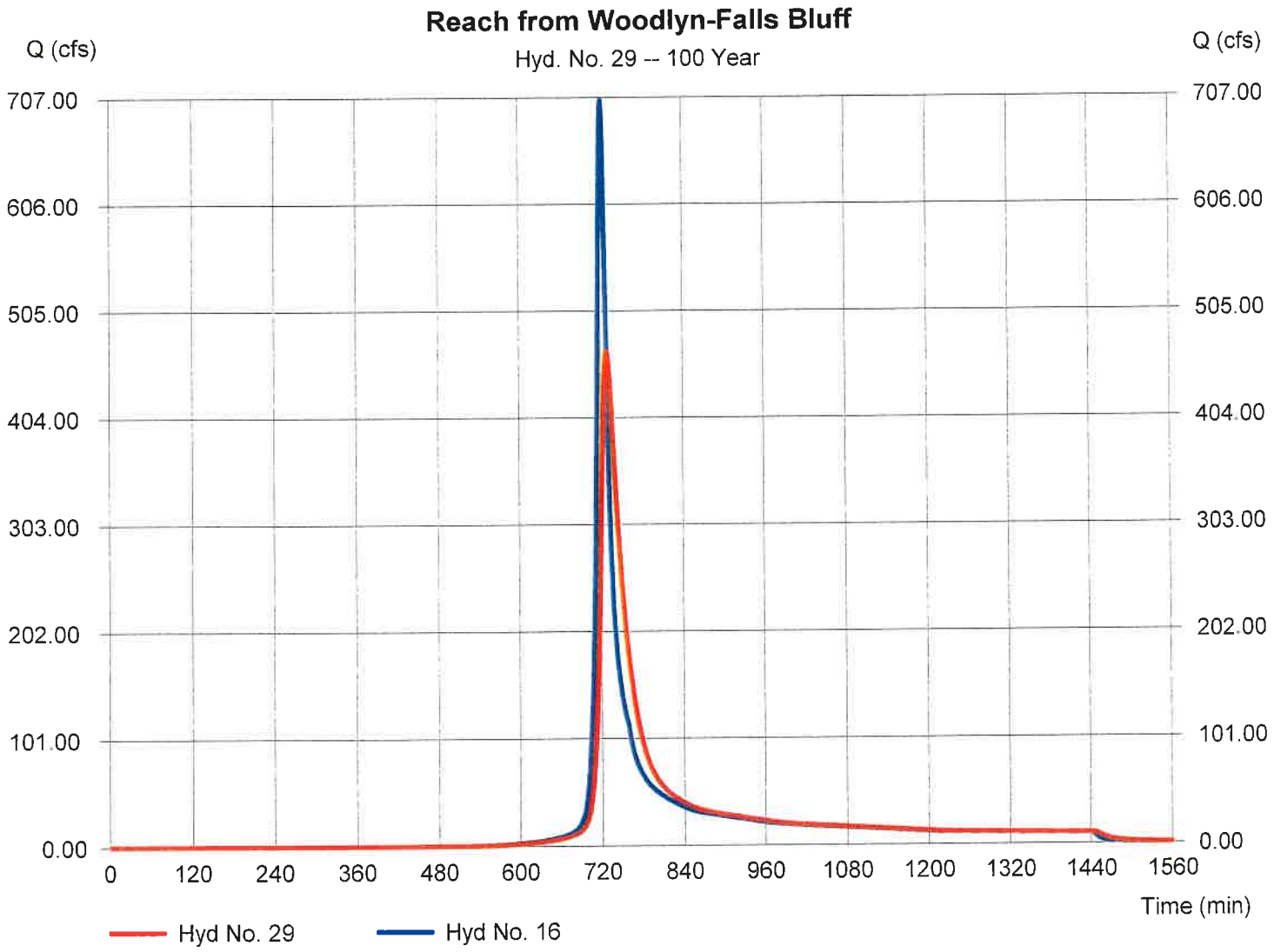
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 29

Reach from Woodlyn-Falls Bluff

Hydrograph type	= Reach	Peak discharge	= 466.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 2,050,065 cuft
Inflow hyd. No.	= 16 - Merge All PostDev @ Woodlyn	Section type	= Trapezoidal
Reach length	= 12152.0 ft	Channel slope	= 1.0 %
Manning's n	= 0.009	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 6.0 ft
Rating curve x	= 5.011	Rating curve m	= 1.255
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0813

Modified Att-Kin routing method used.



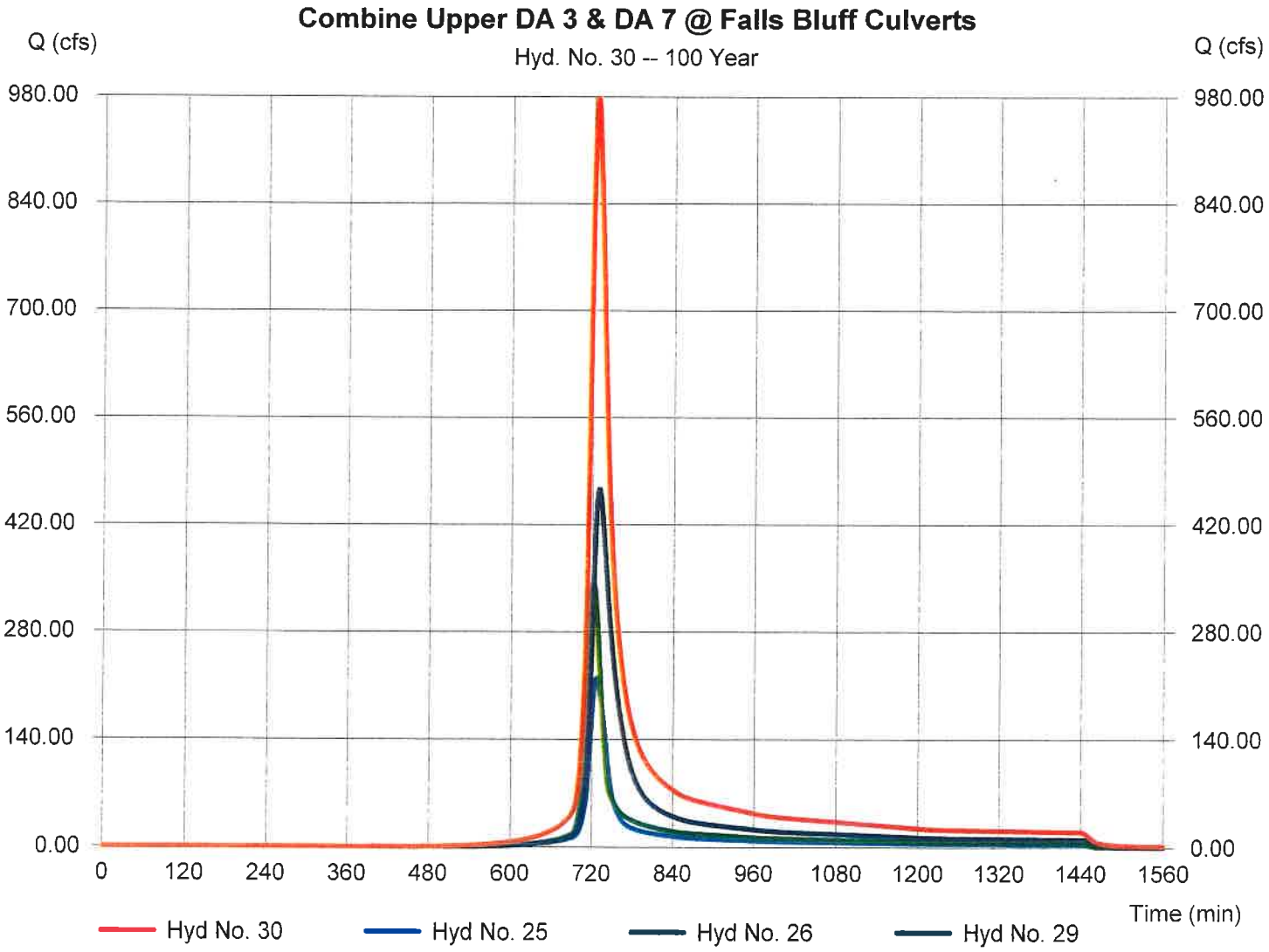
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 09 / 30 / 2020

Hyd. No. 30

Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts

Hydrograph type	= Combine	Peak discharge	= 977.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 3,979,723 cuft
Inflow hyds.	= 25, 26, 29	Contrib. drain. area	= 0.000 ac



Hydrograph Report

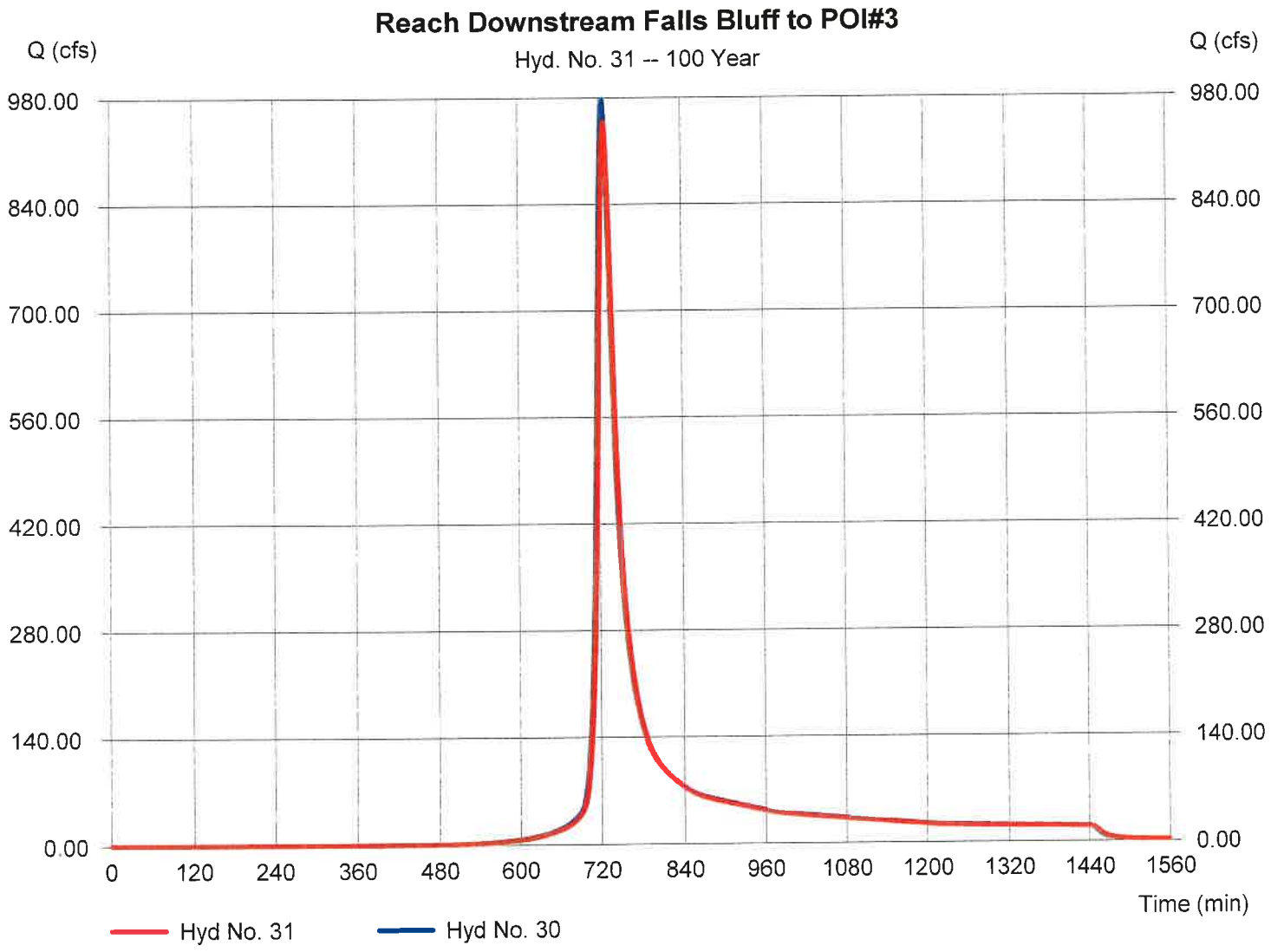
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 09 / 30 / 2020

Hyd. No. 31

Reach Downstream Falls Bluff to POI#3

Hydrograph type	= Reach	Peak discharge	= 947.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 3,884,594 cuft
Inflow hyd. No.	= 30 - Combine Upper DA 3 & DA 7 @ Falls Bluff Culverts	Section type	= Trapezoidal
Reach length	= 1200.0 ft	Channel slope	= 5.0 %
Manning's n	= 0.030	Bottom width	= 6.0 ft
Side slope	= 20.0:1	Max. depth	= 8.0 ft
Rating curve x	= 3.361	Rating curve m	= 1.269
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.5213

Modified Att-Kin routing method used.

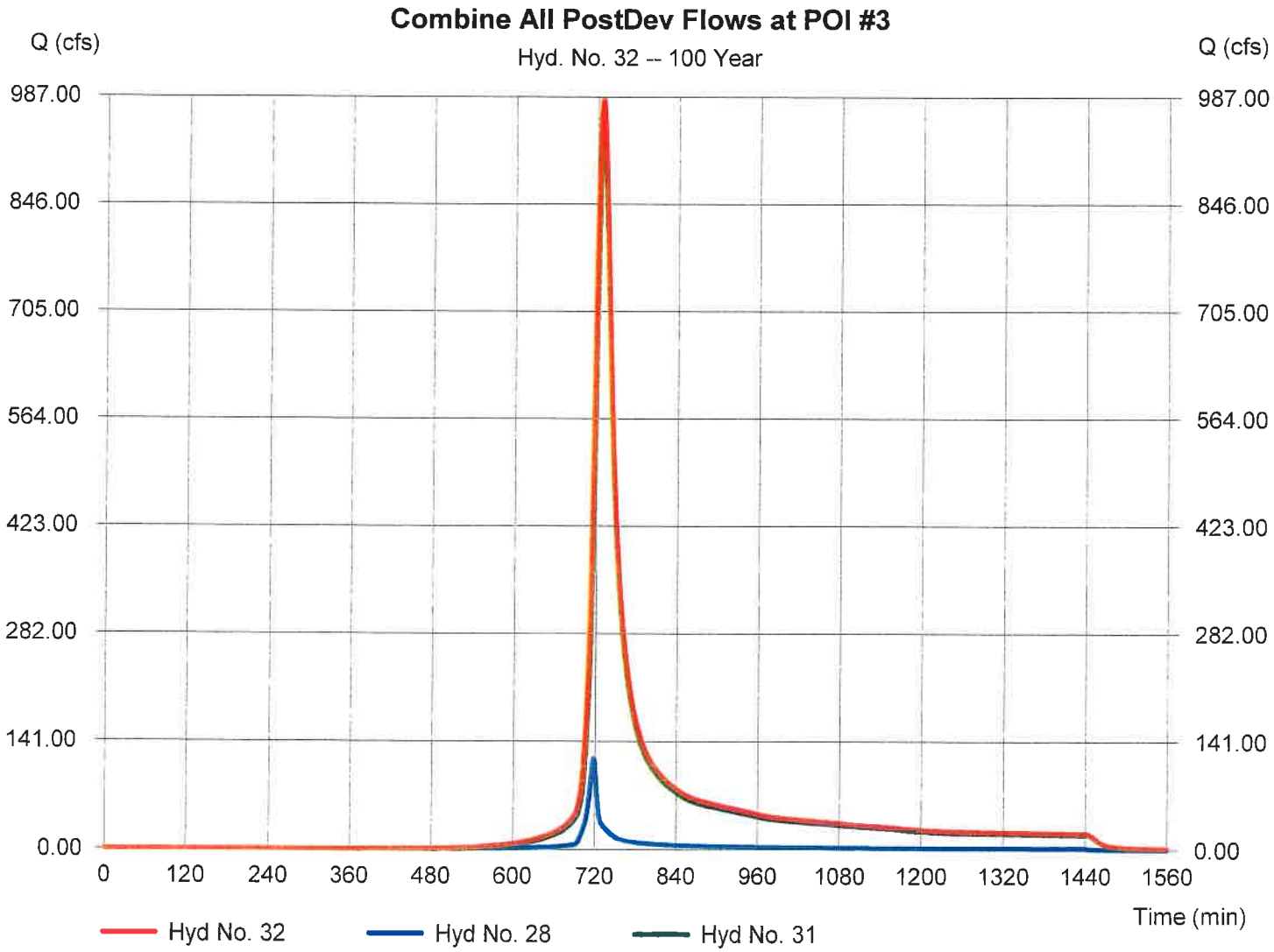


Hydrograph Report

Hyd. No. 32

Combine All PostDev Flows at POI #3

Hydrograph type	= Combine	Peak discharge	= 983.05 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 4,205,861 cuft
Inflow hyds.	= 28, 31	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	0.0000	0.0000	0.0000	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	0.0000	0.0000	0.0000	--------
25	0.0000	0.0000	0.0000	--------
50	0.0000	0.0000	0.0000	--------
100	0.0000	0.0000	0.0000	--------

File name: SCM 1.IDF

Intensity = B / (Tc + D)^E

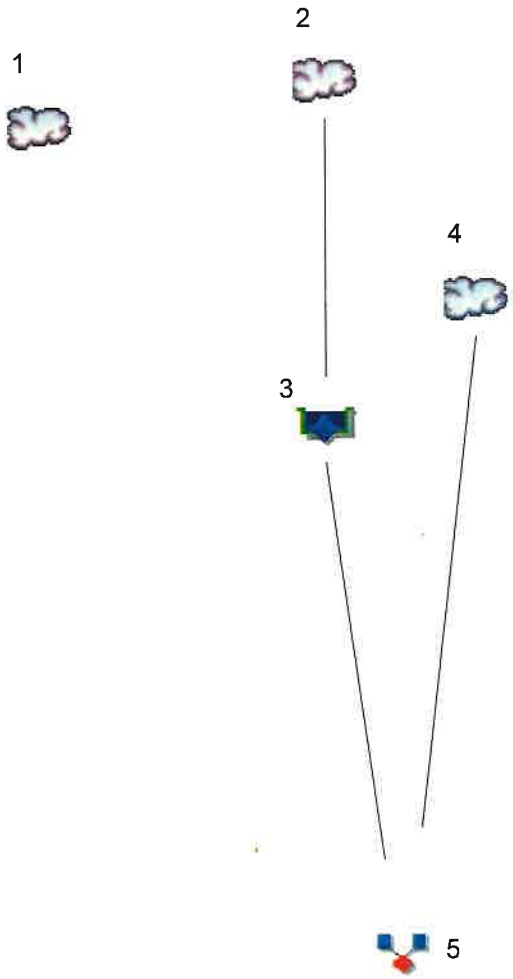
Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tc = time in minutes. Values may exceed 60.

Precip. file name: F:\Kalas Assemblage\Raleigh-Wake County 24Hr Rain.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	3.00	3.45	0.00	4.33	5.02	5.96	6.80	7.46
SCS 6-Hr	2.05	2.46	0.00	3.04	3.55	0.00	0.00	5.32
Huff-1st	0.00	0.00	0.00	2.75	0.00	5.38	6.50	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	5.25	6.00	0.00

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	PreDev DA #8
2	SCS Runoff	PostDev tp SCM $8A
3	Reservoir	Route DA #8 to SCM #8A
4	SCS Runoff	DA#8 Bypasses SCM #8A
5	Combine	PostDev to POI #8

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

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	-----	2.157	3.957	-----	8.218	12.09	17.87	-----	27.94	PreDev DA #8
2	SCS Runoff	-----	8.837	11.53	-----	17.10	21.64	27.96	-----	38.29	PostDev tp SCM $8A
3	Reservoir	2	0.079	0.198	-----	1.291	5.663	18.38	-----	31.08	Route DA #8 to SCM #8A
4	SCS Runoff	-----	1.188	1.579	-----	2.394	3.065	4.005	-----	5.543	DA#8 Bypasses SCM #8A
5	Combine	3, 4	1.234	1.633	-----	2.465	6.549	19.46	-----	33.48	PostDev to POI #8

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Friday, 10 / 2 / 2020

Pond No. 1 - SCM #8A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 354.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	354.00	3,724	0	0
1.00	355.00	4,242	3,980	3,980
2.00	356.00	4,792	4,514	8,494
3.00	357.00	5,375	5,080	13,574
3.50	357.50	6,310	2,918	16,492
4.00	358.00	7,316	3,403	19,895
5.00	359.00	8,392	7,847	27,742
6.00	360.00	9,537	8,958	36,699
7.00	361.00	10,750	10,136	46,836
8.00	362.00	12,024	11,380	58,216

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.50	0.00	0.00
Span (in)	= 18.00	1.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 354.00	357.50	0.00	0.00
Length (ft)	= 24.00	0.50	0.00	0.00
Slope (%)	= 0.50	0.50	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	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	12.00	8.00	0.00
Crest El. (ft)	= 359.75	360.00	360.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	Rect	---
Multi-Stage	= Yes	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

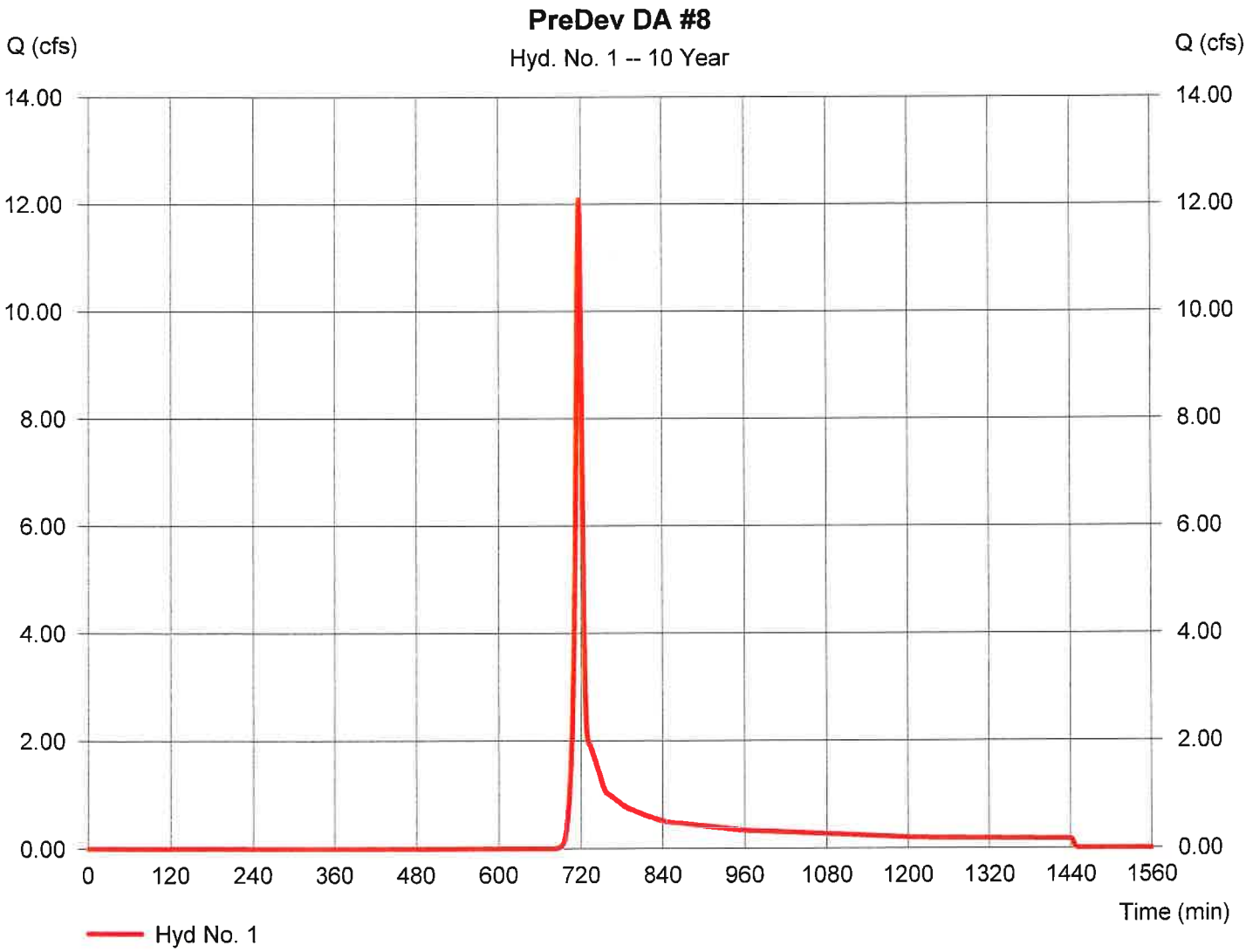
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	354.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.00	3,980	355.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
2.00	8,494	356.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
3.00	13,574	357.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
3.50	16,492	357.50	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
4.00	19,895	358.00	0.04 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.039
5.00	27,742	359.00	0.07 ic	0.07 ic	---	---	0.00	0.00	0.00	---	---	---	0.071
6.00	36,699	360.00	5.09 oc	0.09 ic	---	---	4.99	0.00	0.00	---	---	---	5.087
7.00	46,836	361.00	21.15 ic	0.02 ic	---	---	21.13 s	39.96	26.64	---	---	---	87.75
8.00	58,216	362.00	22.88 ic	0.01 ic	---	---	22.87 s	113.02	75.35	---	---	---	211.25

Hydrograph Report

Hyd. No. 1

PreDev DA #8

Hydrograph type	= SCS Runoff	Peak discharge	= 12.09 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 25,112 cuft
Drainage area	= 5.110 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

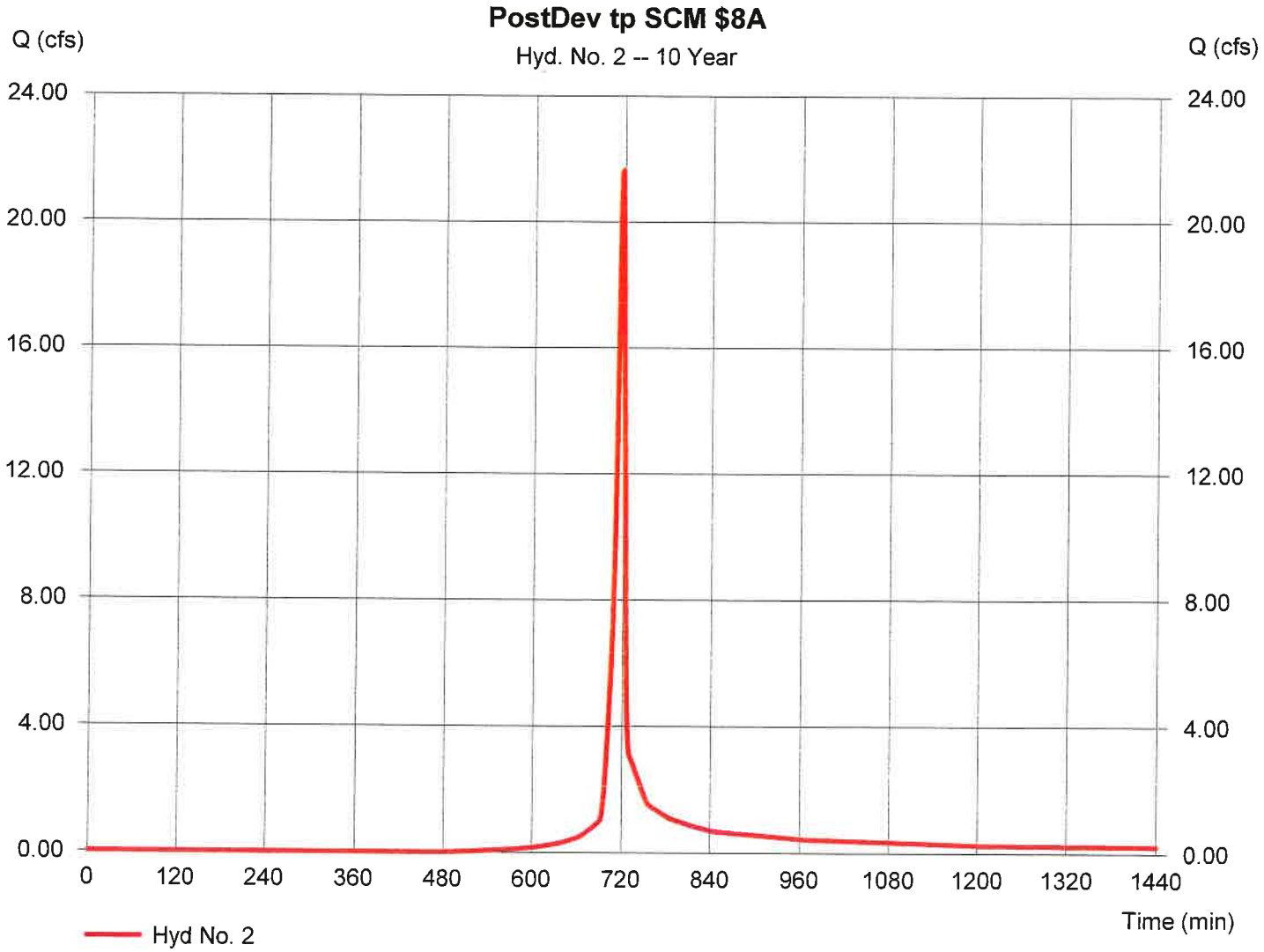


Hydrograph Report

Hyd. No. 2

PostDev tp SCM $8A

Hydrograph type	= SCS Runoff	Peak discharge	= 21.64 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 43,875 cuft
Drainage area	= 4.440 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



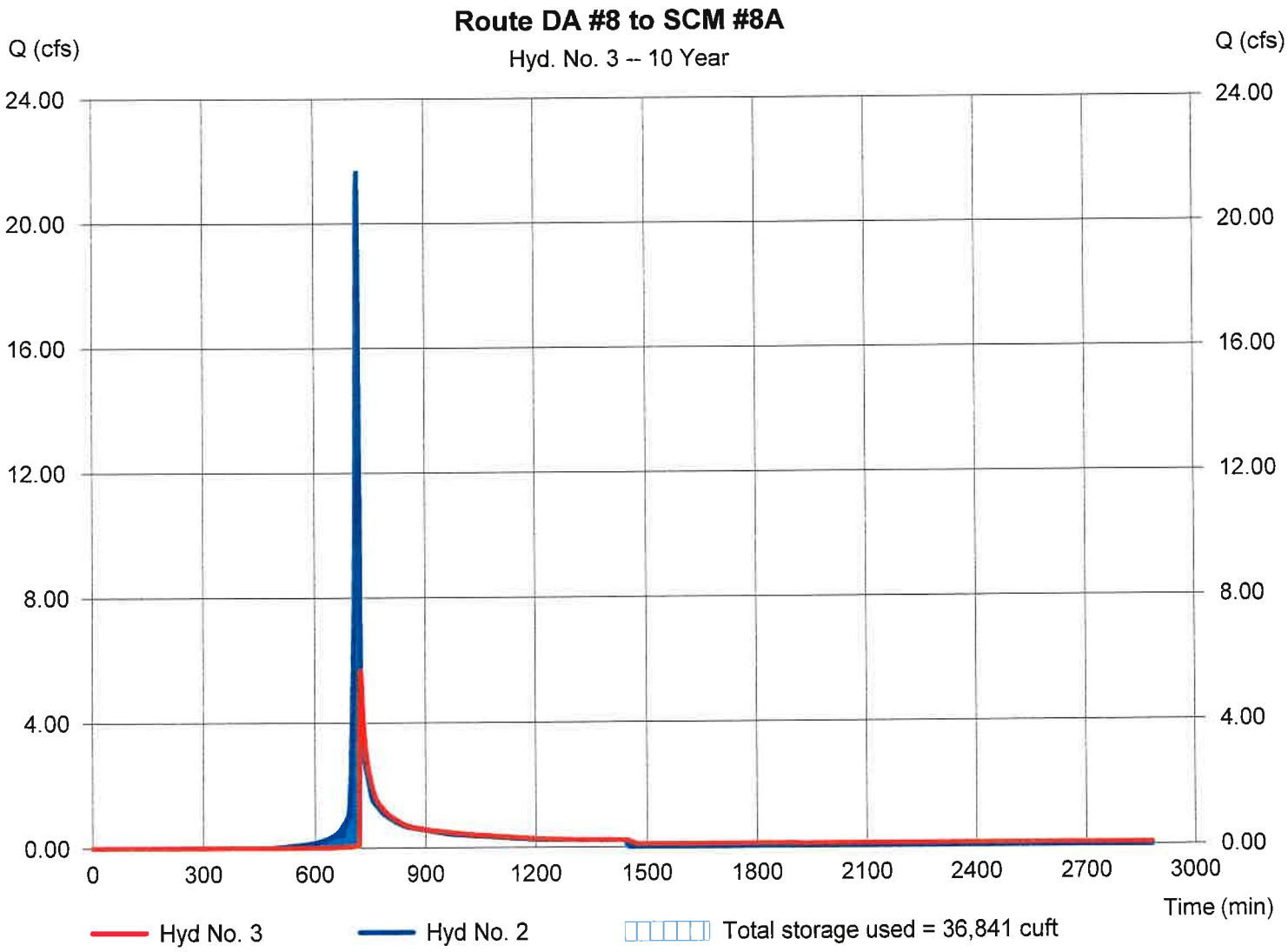
Hydrograph Report

Hyd. No. 3

Route DA #8 to SCM #8A

Hydrograph type	= Reservoir	Peak discharge	= 5.663 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 32,943 cuft
Inflow hyd. No.	= 2 - PostDev tp SCM $8A	Max. Elevation	= 360.02 ft
Reservoir name	= SCM #8A	Max. Storage	= 36,841 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Friday, 10 / 2 / 2020

Pond No. 1 - SCM #8A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 354.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	354.00	3,724	0	0
1.00	355.00	4,242	3,980	3,980
2.00	356.00	4,792	4,514	8,494
3.00	357.00	5,375	5,080	13,574
3.50	357.50	6,310	2,918	16,492
4.00	358.00	7,316	3,403	19,895
5.00	359.00	8,392	7,847	27,742
6.00	360.00	9,537	8,958	36,699
7.00	361.00	10,750	10,136	46,836
8.00	362.00	12,024	11,380	58,216

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.50	0.00	0.00
Span (in)	= 18.00	1.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 354.00	357.50	0.00	0.00
Length (ft)	= 24.00	0.50	0.00	0.00
Slope (%)	= 0.50	0.50	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	No

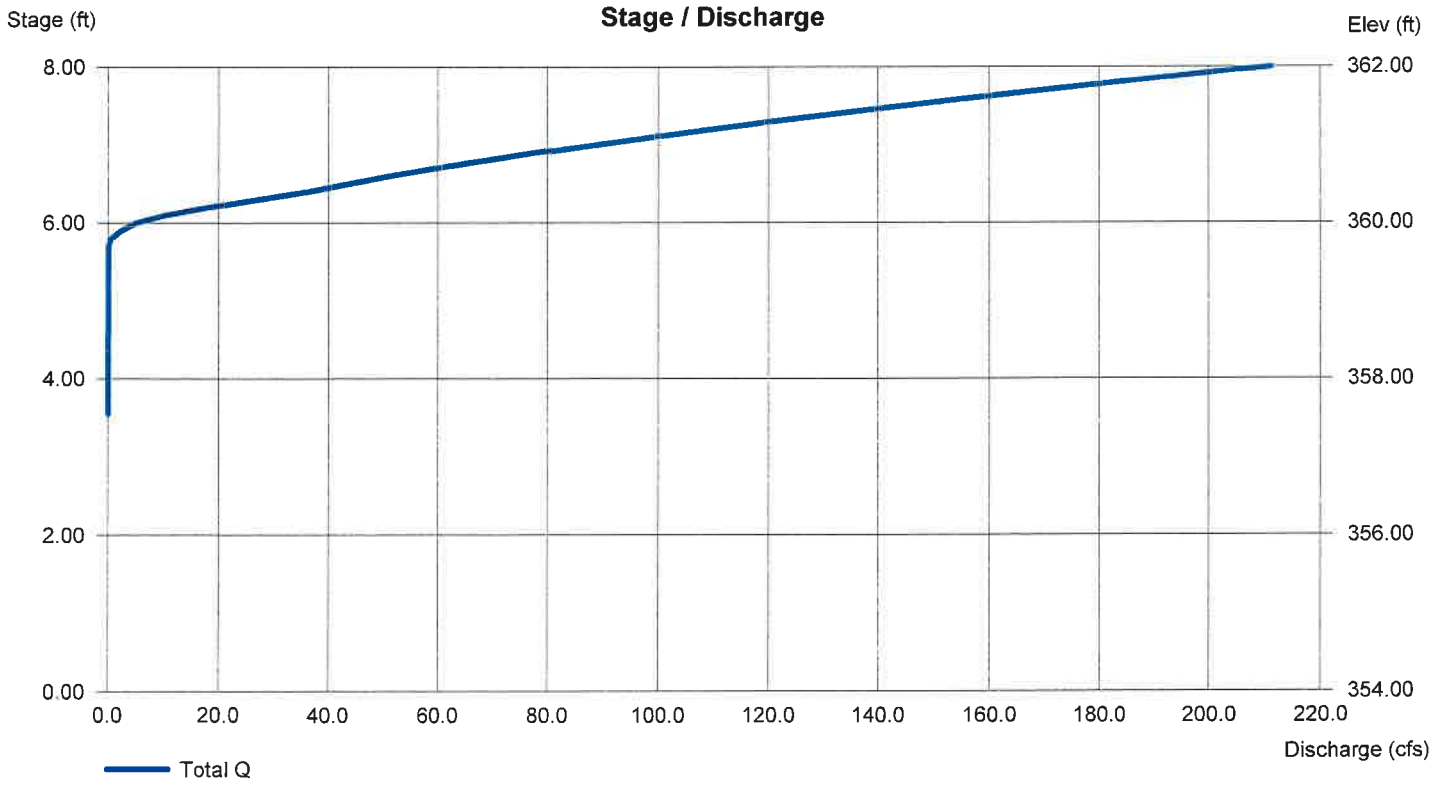
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	12.00	8.00	0.00
Crest El. (ft)	= 359.75	360.00	360.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	Rect	---
Multi-Stage	= Yes	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).

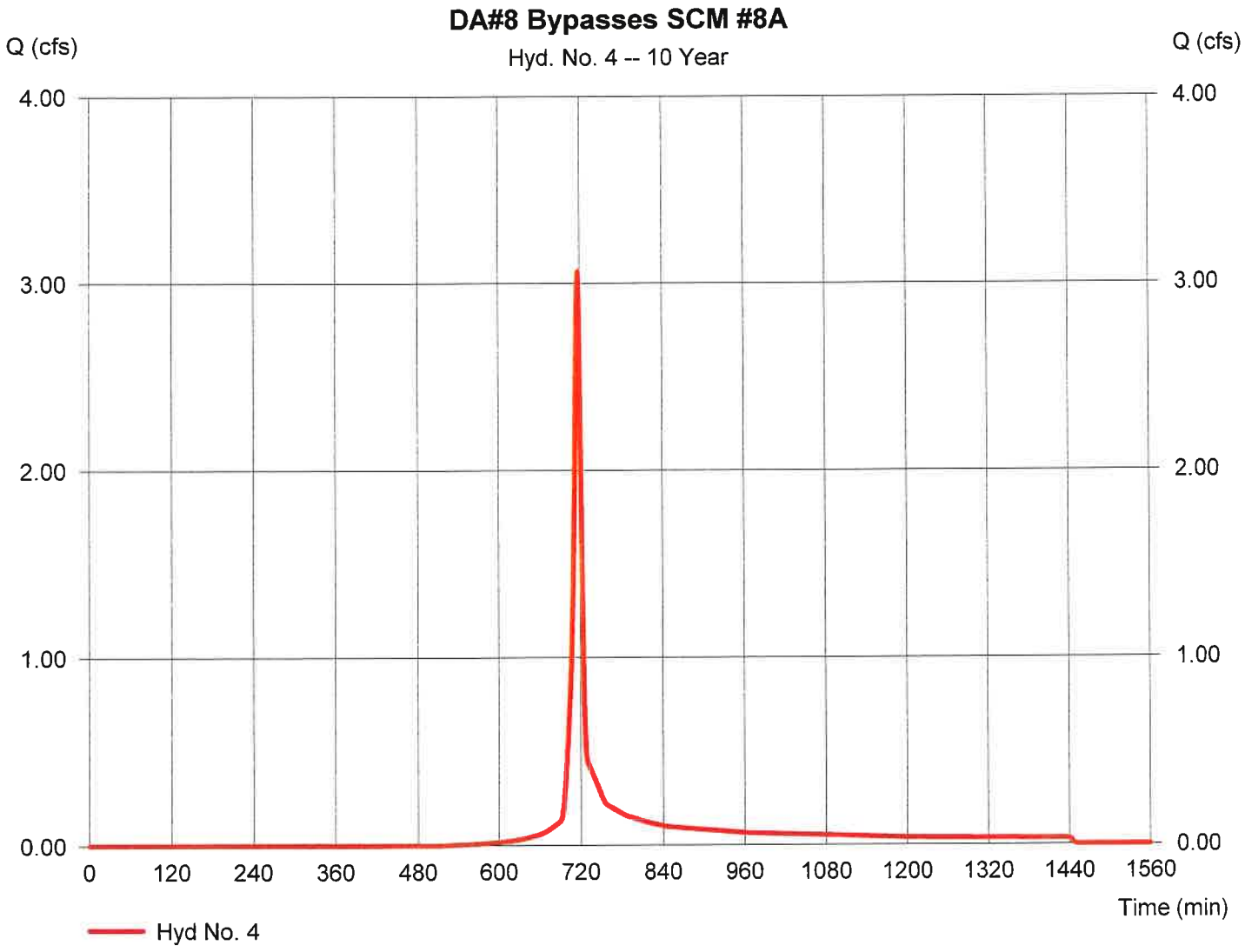


Hydrograph Report

Hyd. No. 4

DA#8 Bypasses SCM #8A

Hydrograph type	= SCS Runoff	Peak discharge	= 3.065 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 6,184 cuft
Drainage area	= 0.670 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

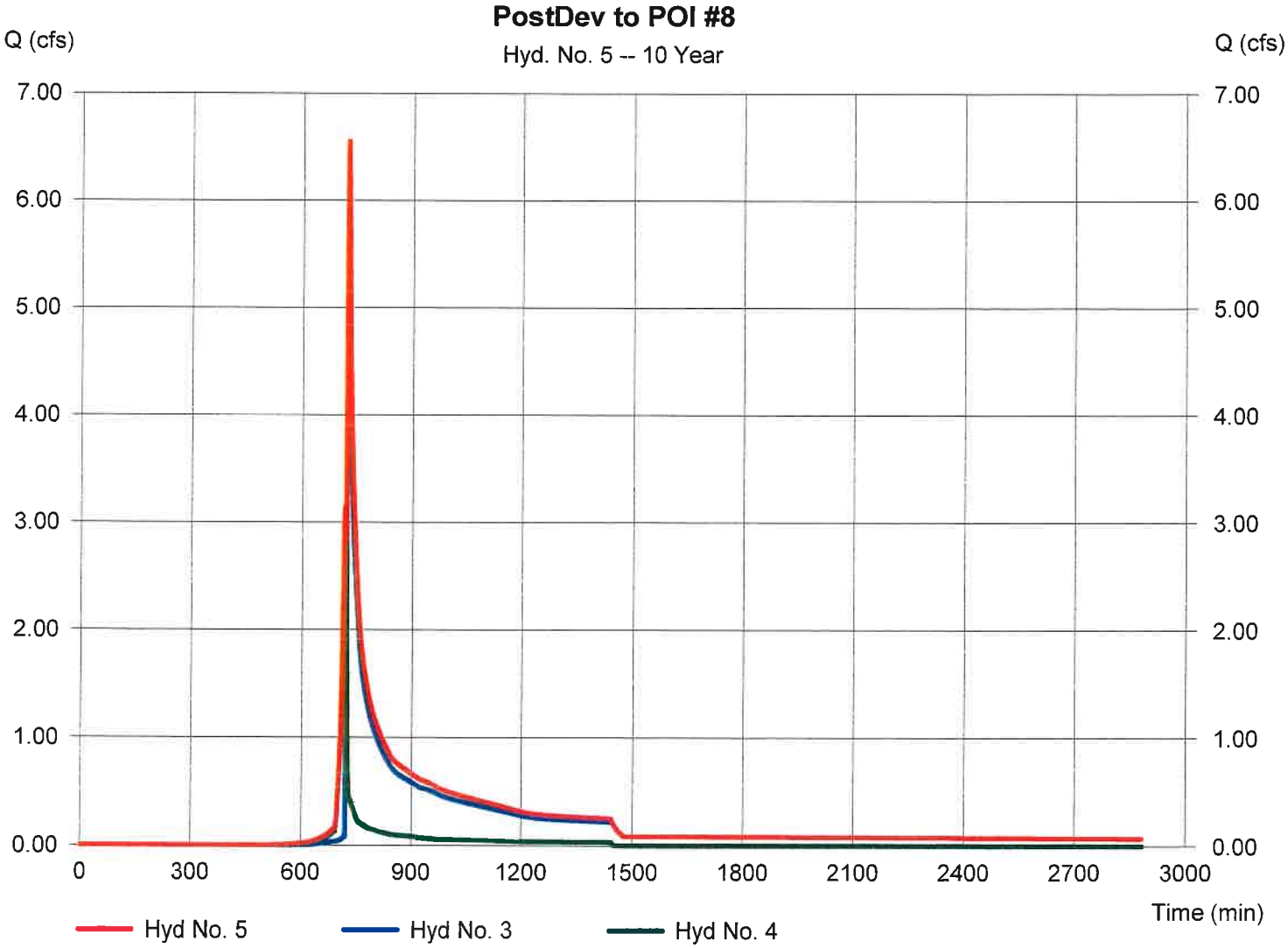


Hydrograph Report

Hyd. No. 5

PostDev to POI #8

Hydrograph type	= Combine	Peak discharge	= 6.549 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 39,127 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.670 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	0.0000	0.0000	0.0000	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	0.0000	0.0000	0.0000	--------
25	0.0000	0.0000	0.0000	--------
50	0.0000	0.0000	0.0000	--------
100	0.0000	0.0000	0.0000	--------

File name: SCM 1.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tc = time in minutes. Values may exceed 60.

Precip. file name: F:\Kalas Assemblage\Raleigh-Wake County 24Hr Rain.pcp

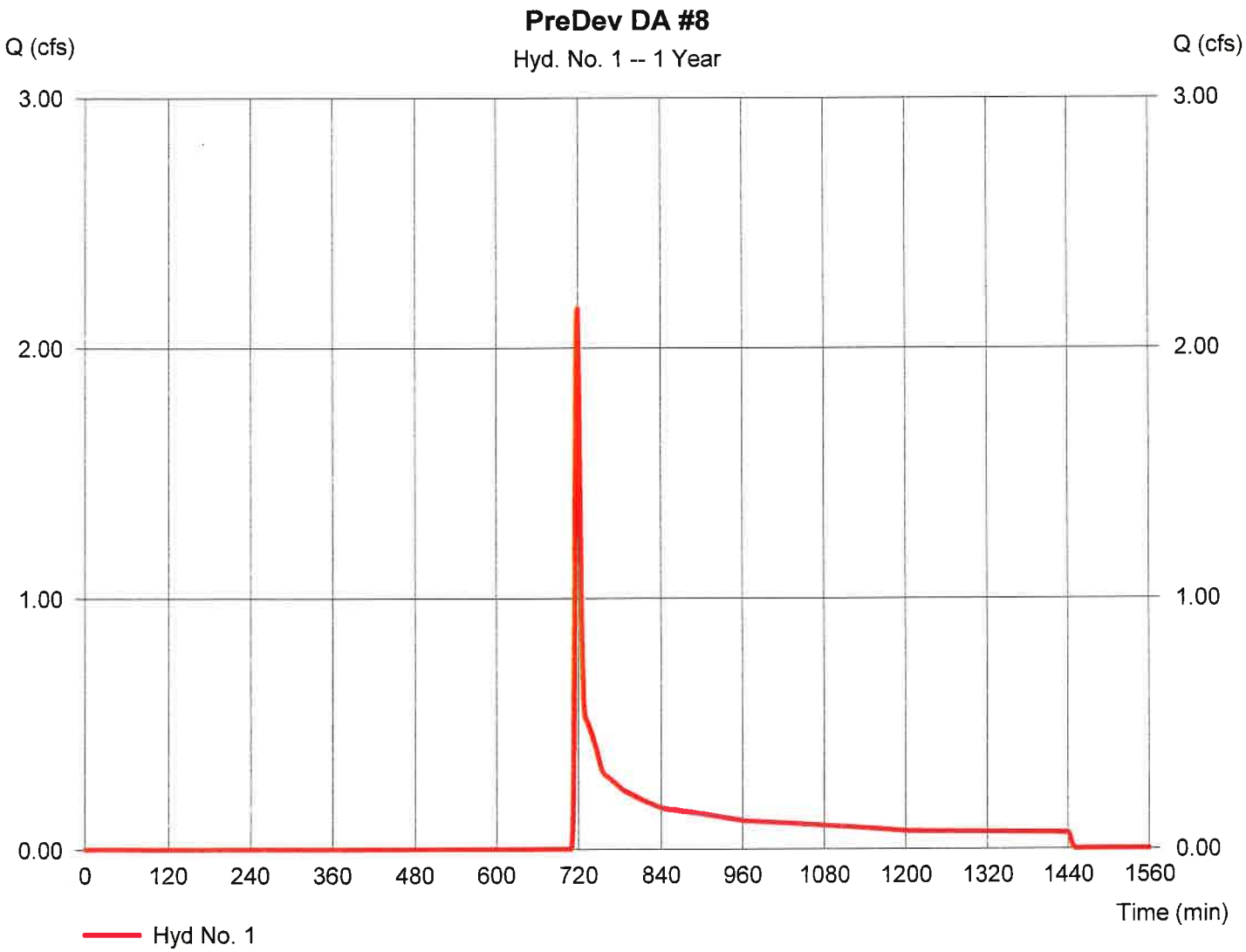
Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	3.00	3.45	0.00	4.33	5.02	5.96	6.80	7.46
SCS 6-Hr	2.05	2.46	0.00	3.04	3.55	0.00	0.00	5.32
Huff-1st	0.00	0.00	0.00	2.75	0.00	5.38	6.50	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	5.25	6.00	0.00

Hydrograph Report

Hyd. No. 1

PreDev DA #8

Hydrograph type	= SCS Runoff	Peak discharge	= 2.157 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 6,376 cuft
Drainage area	= 5.110 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

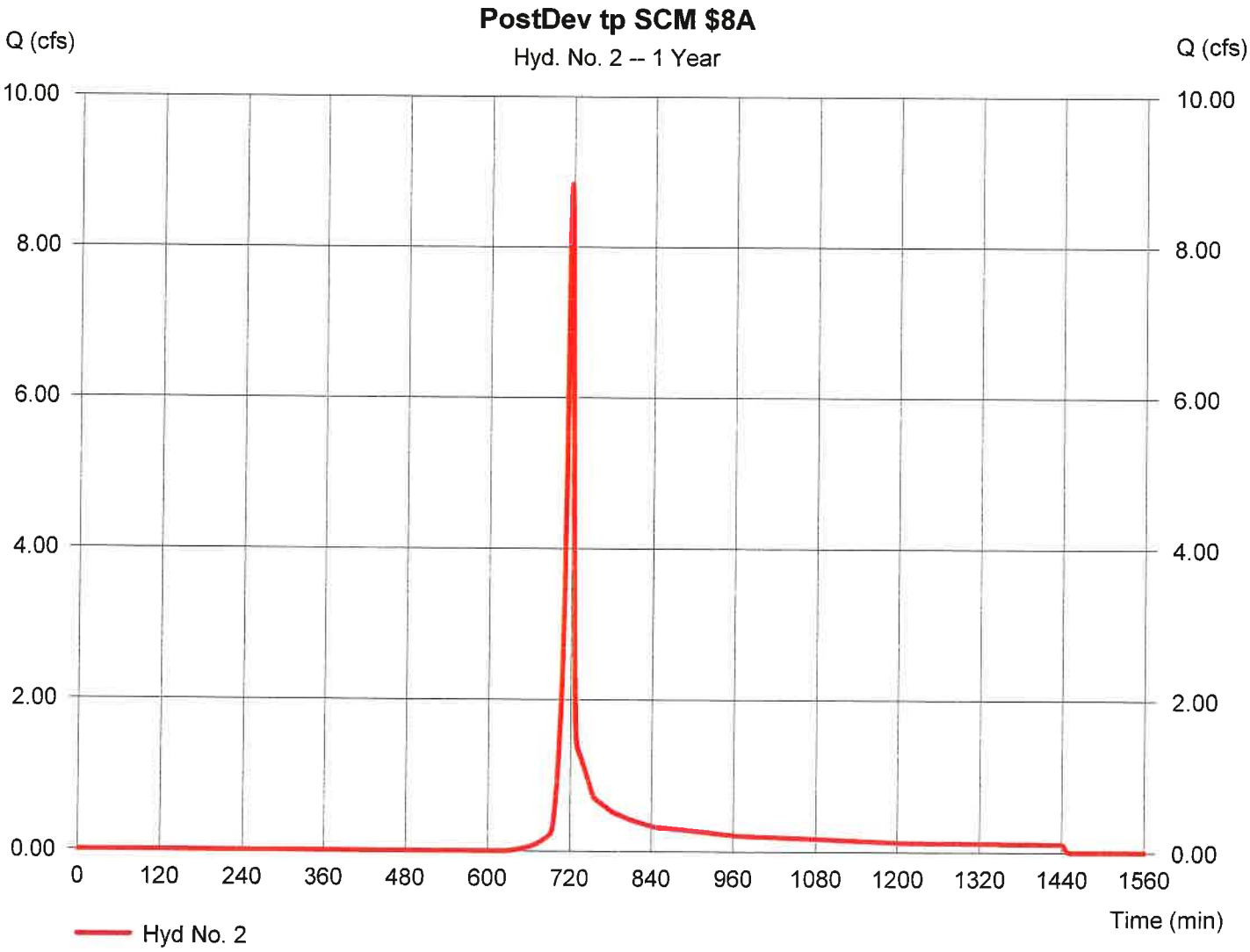


Hydrograph Report

Hyd. No. 2

PostDev tp SCM $8A

Hydrograph type	= SCS Runoff	Peak discharge	= 8.837 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 17,802 cuft
Drainage area	= 4.440 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



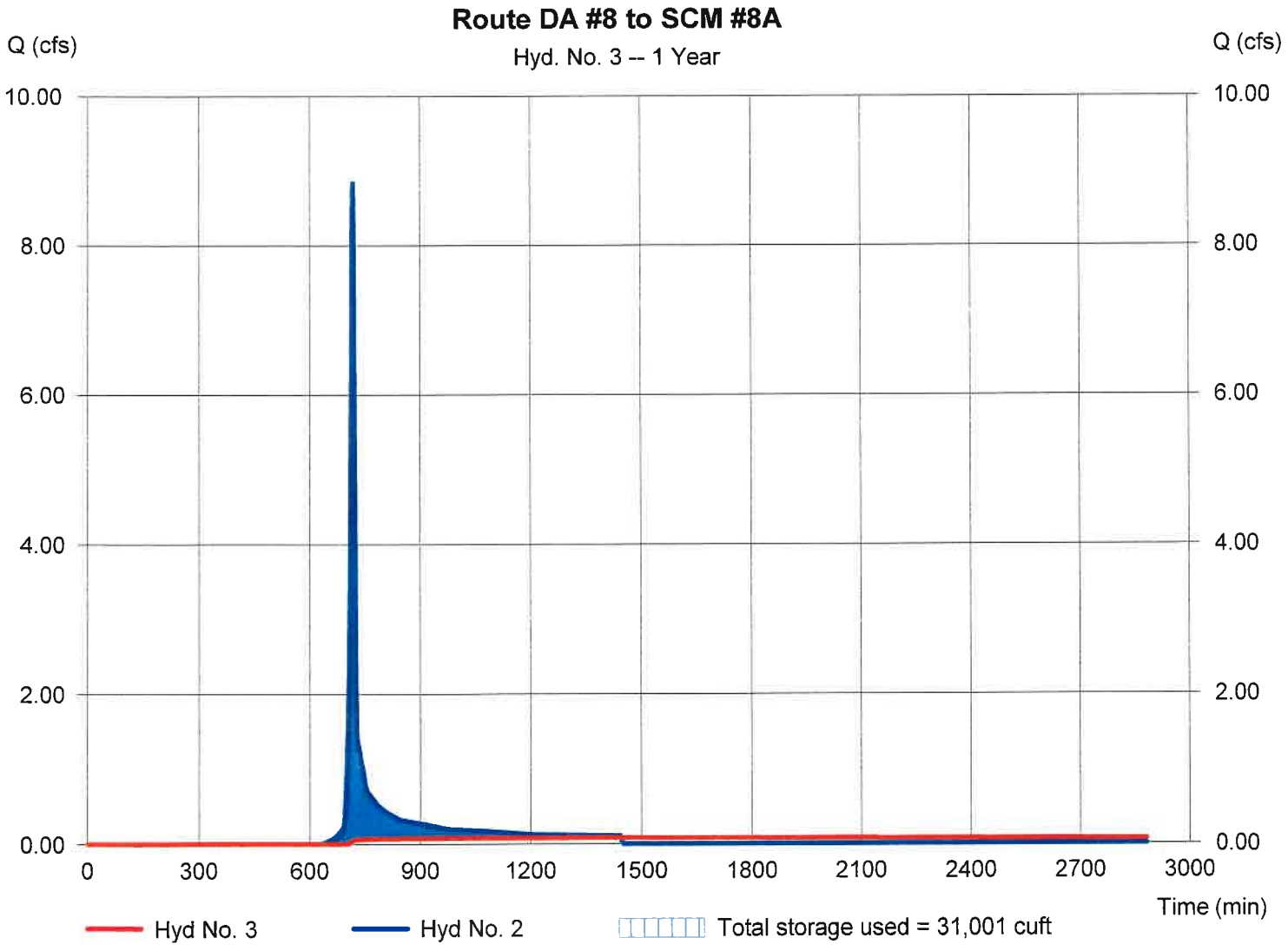
Hydrograph Report

Hyd. No. 3

Route DA #8 to SCM #8A

Hydrograph type	= Reservoir	Peak discharge	= 0.079 cfs
Storm frequency	= 1 yrs	Time to peak	= 1443 min
Time interval	= 1 min	Hyd. volume	= 9,372 cuft
Inflow hyd. No.	= 2 - PostDev tp SCM $8A	Max. Elevation	= 359.36 ft
Reservoir name	= SCM #8A	Max. Storage	= 31,001 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.

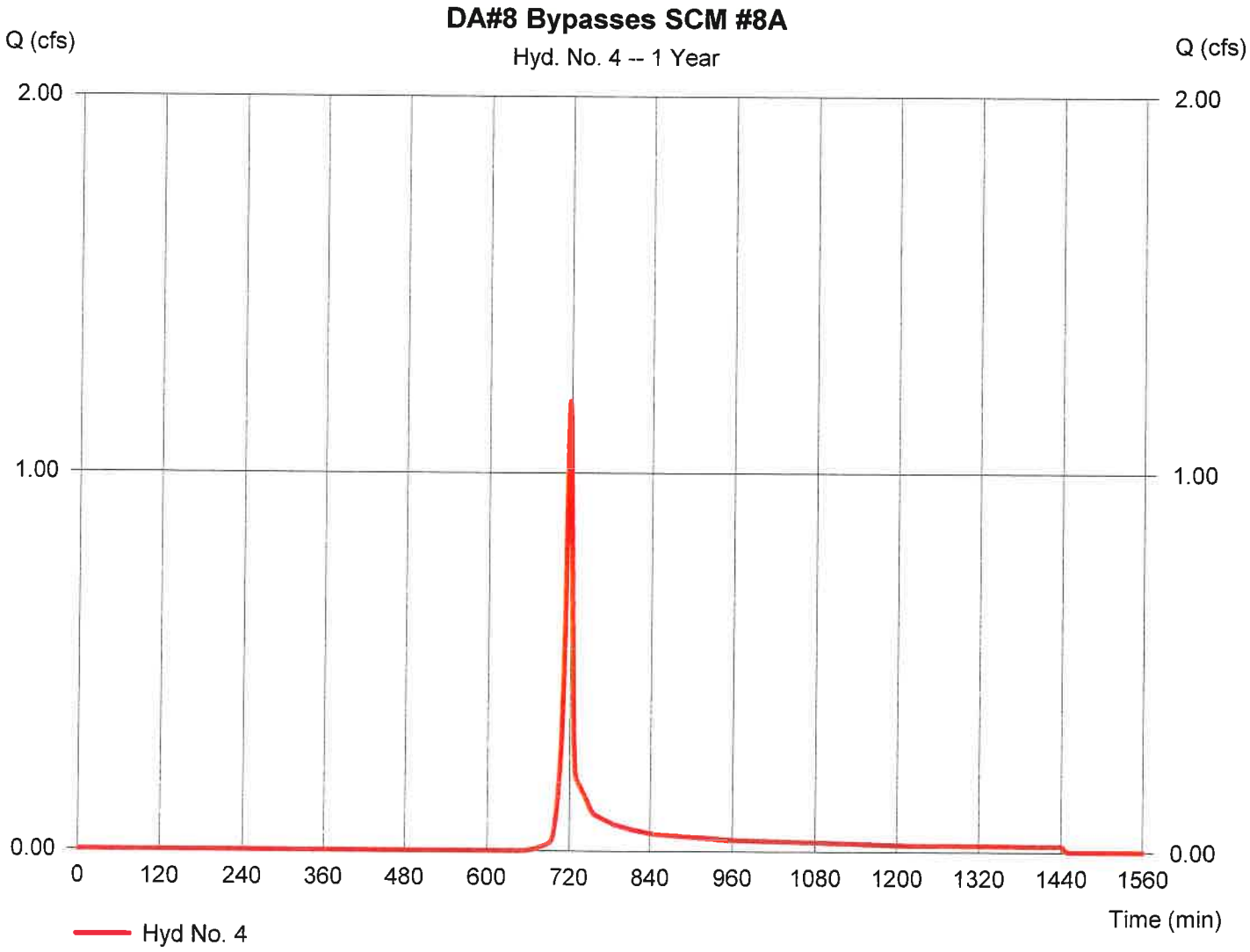


Hydrograph Report

Hyd. No. 4

DA#8 Bypasses SCM #8A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.188 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 2,410 cuft
Drainage area	= 0.670 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

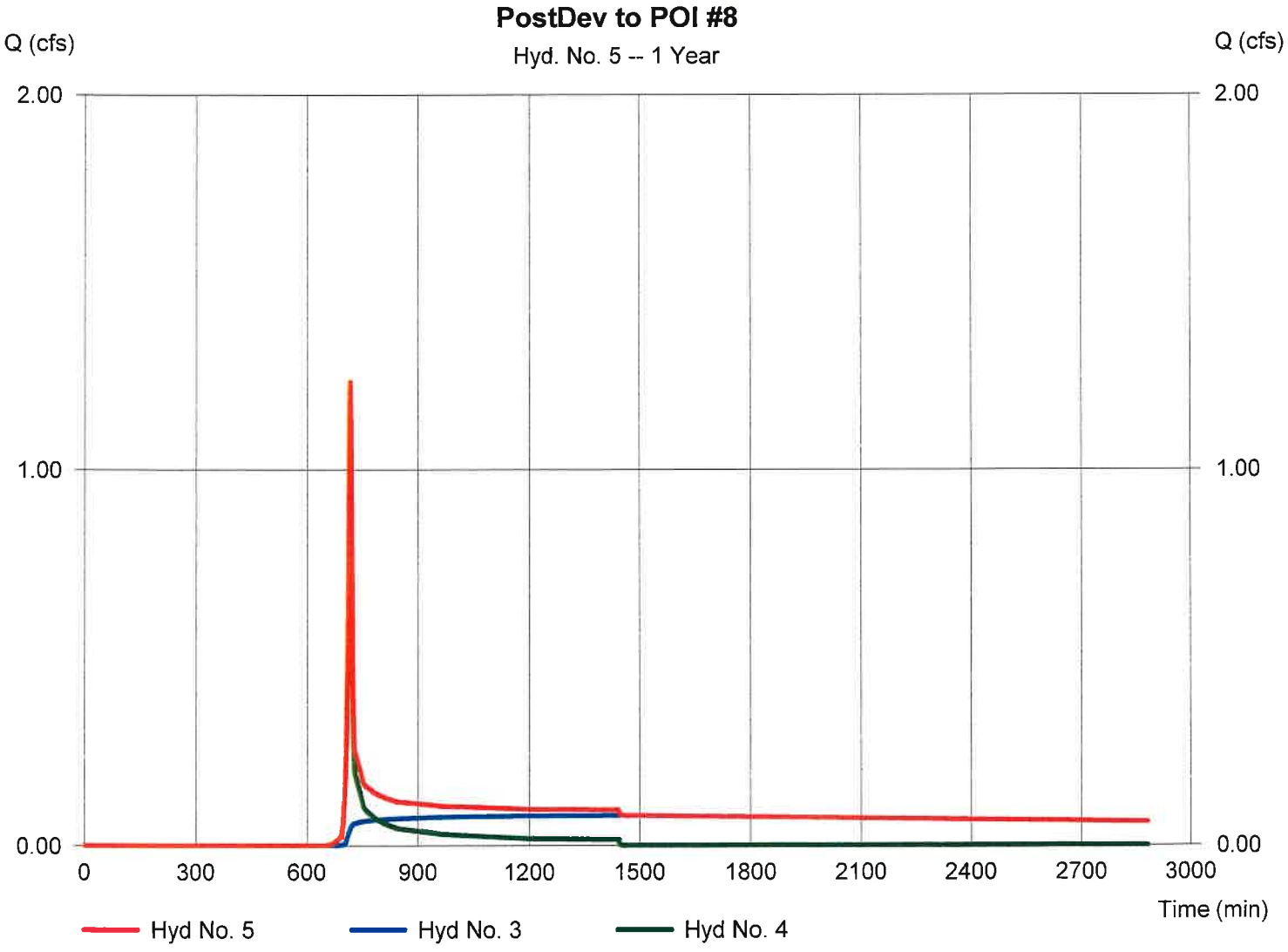


Hydrograph Report

Hyd. No. 5

PostDev to POI #8

Hydrograph type	= Combine	Peak discharge	= 1.234 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 11,782 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.670 ac

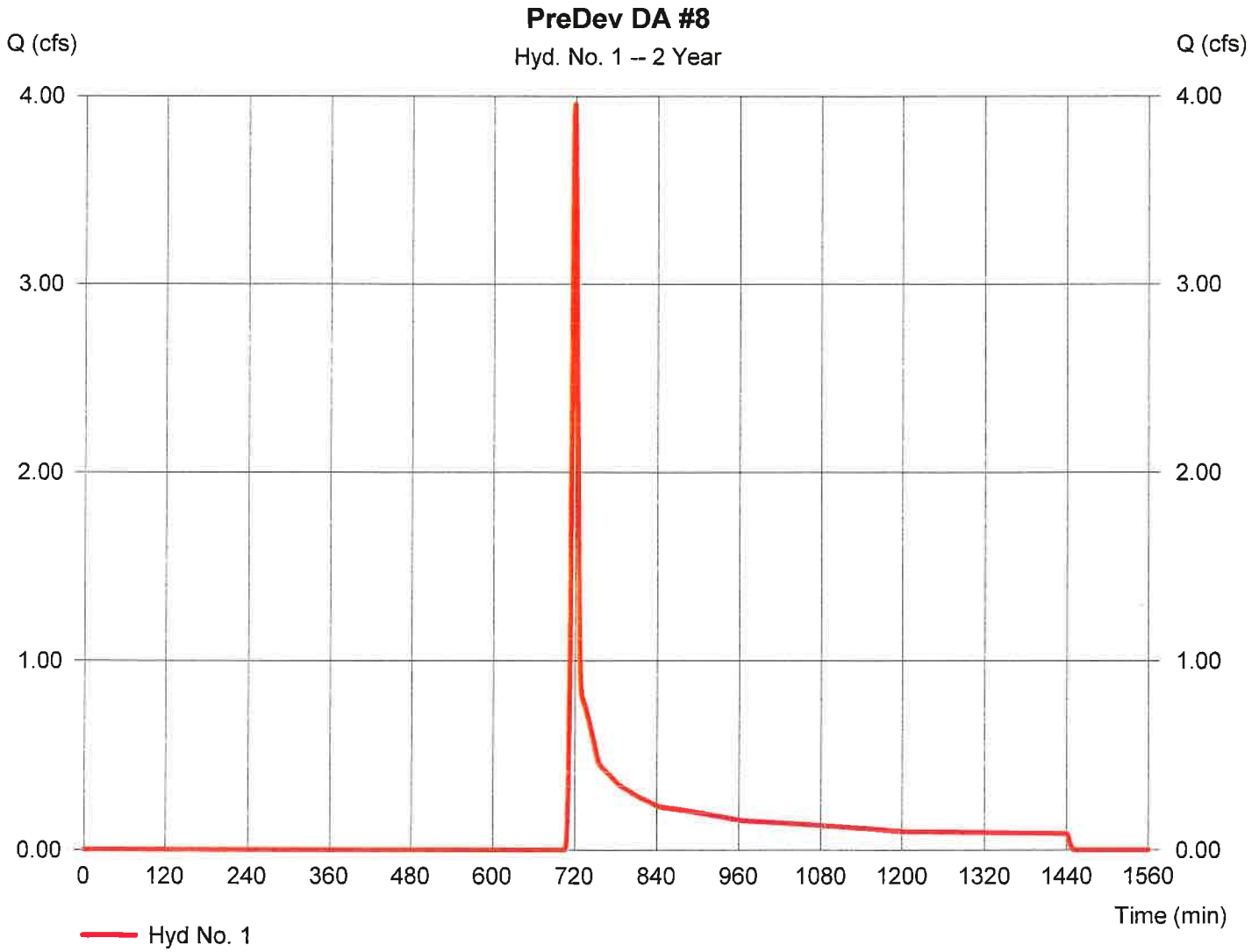


Hydrograph Report

Hyd. No. 1

PreDev DA #8

Hydrograph type	= SCS Runoff	Peak discharge	= 3.957 cfs
Storm frequency	= 2 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 9,757 cuft
Drainage area	= 5.110 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

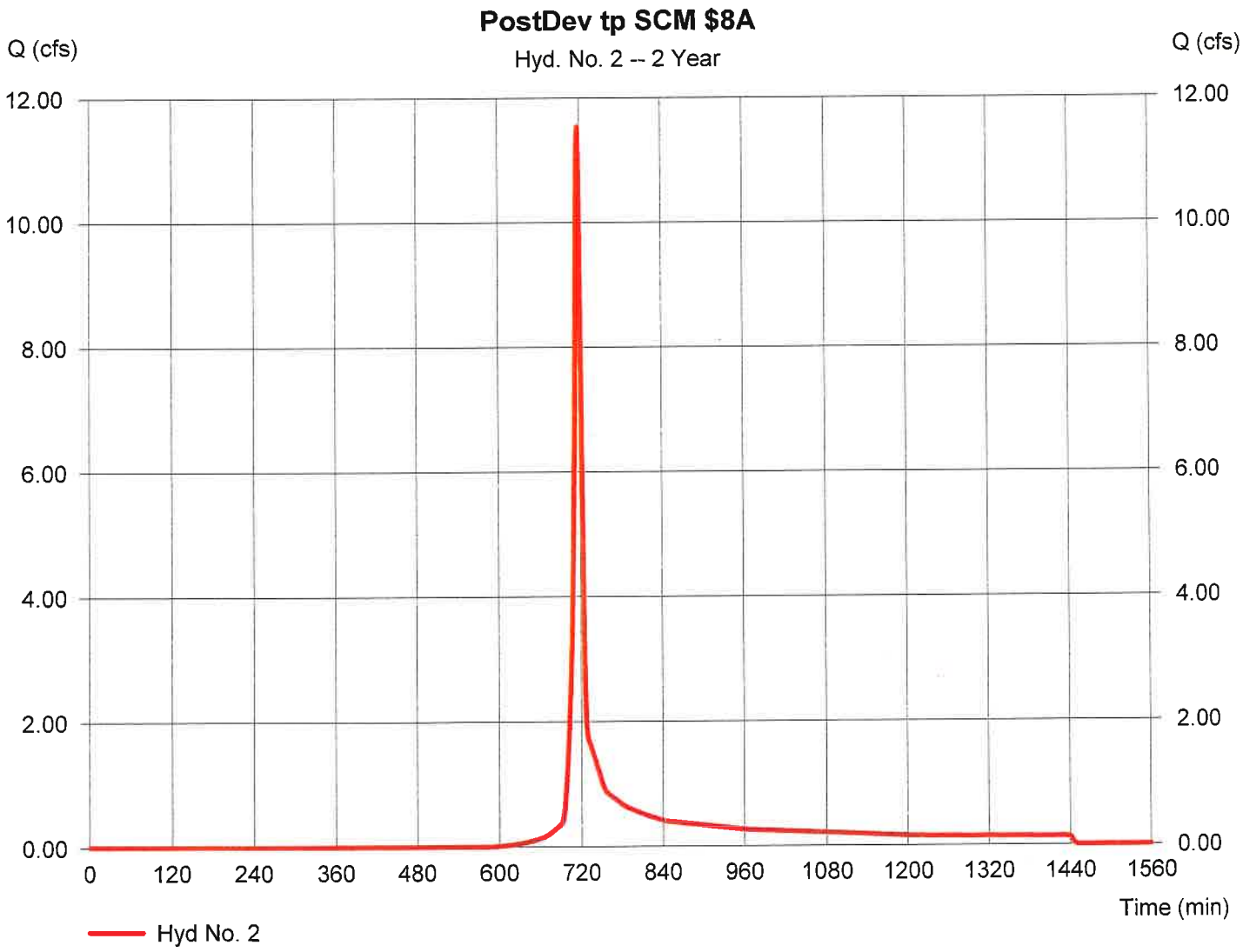


Hydrograph Report

Hyd. No. 2

PostDev tp SCM $8A

Hydrograph type	= SCS Runoff	Peak discharge	= 11.53 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 23,161 cuft
Drainage area	= 4.440 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



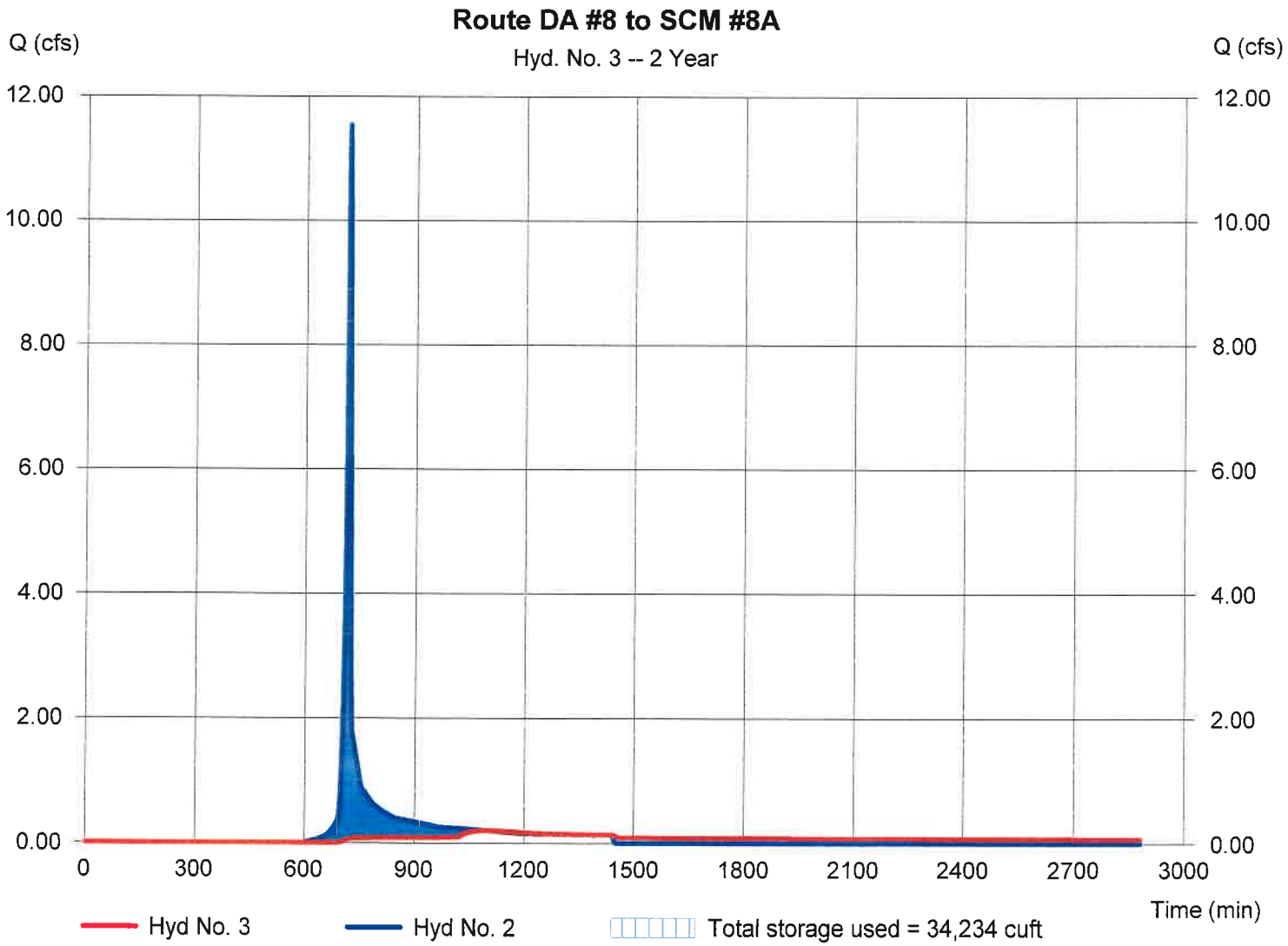
Hydrograph Report

Hyd. No. 3

Route DA #8 to SCM #8A

Hydrograph type	= Reservoir	Peak discharge	= 0.198 cfs
Storm frequency	= 2 yrs	Time to peak	= 1099 min
Time interval	= 1 min	Hyd. volume	= 12,299 cuft
Inflow hyd. No.	= 2 - PostDev tp SCM $8A	Max. Elevation	= 359.72 ft
Reservoir name	= SCM #8A	Max. Storage	= 34,234 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.

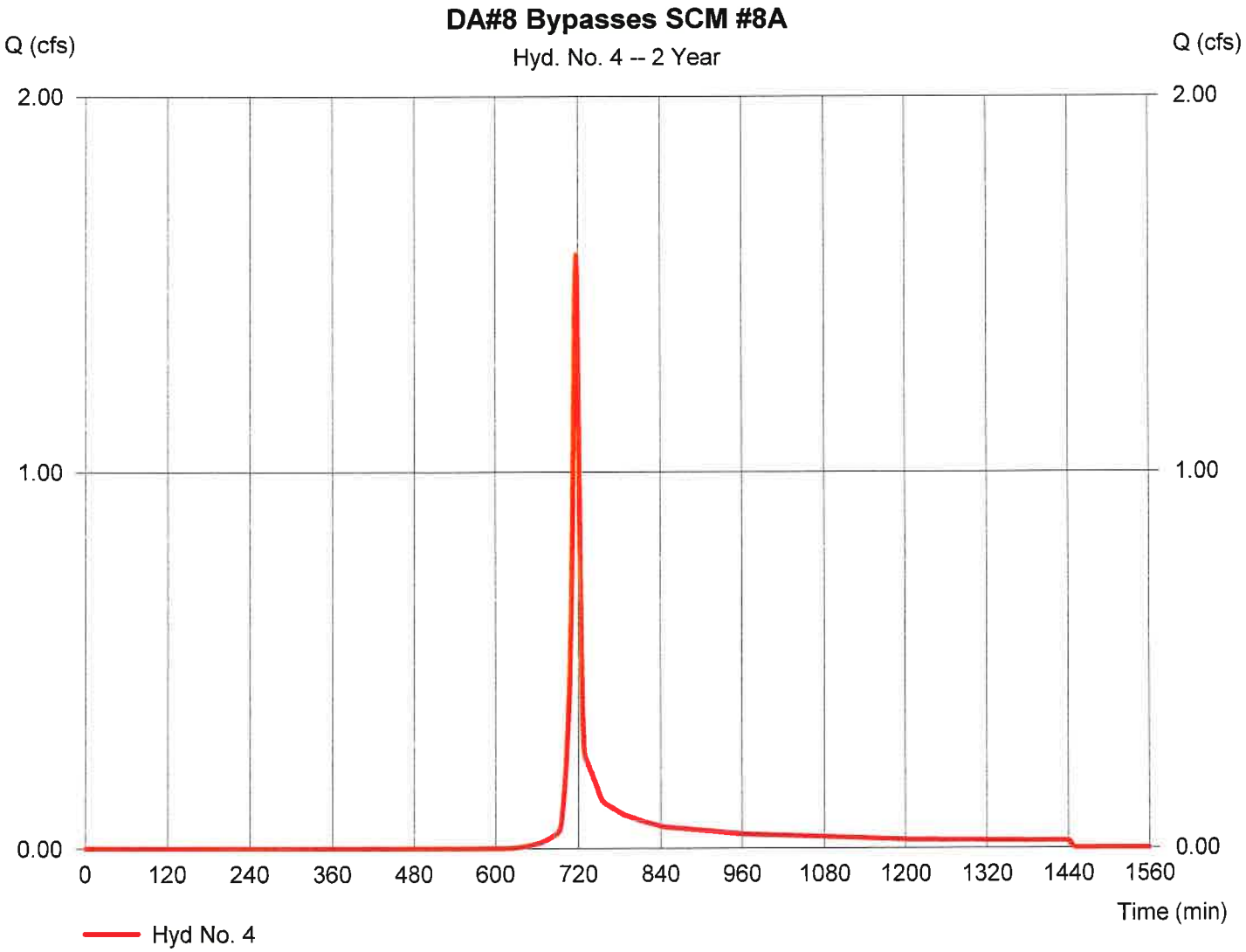


Hydrograph Report

Hyd. No. 4

DA#8 Bypasses SCM #8A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.579 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 3,177 cuft
Drainage area	= 0.670 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



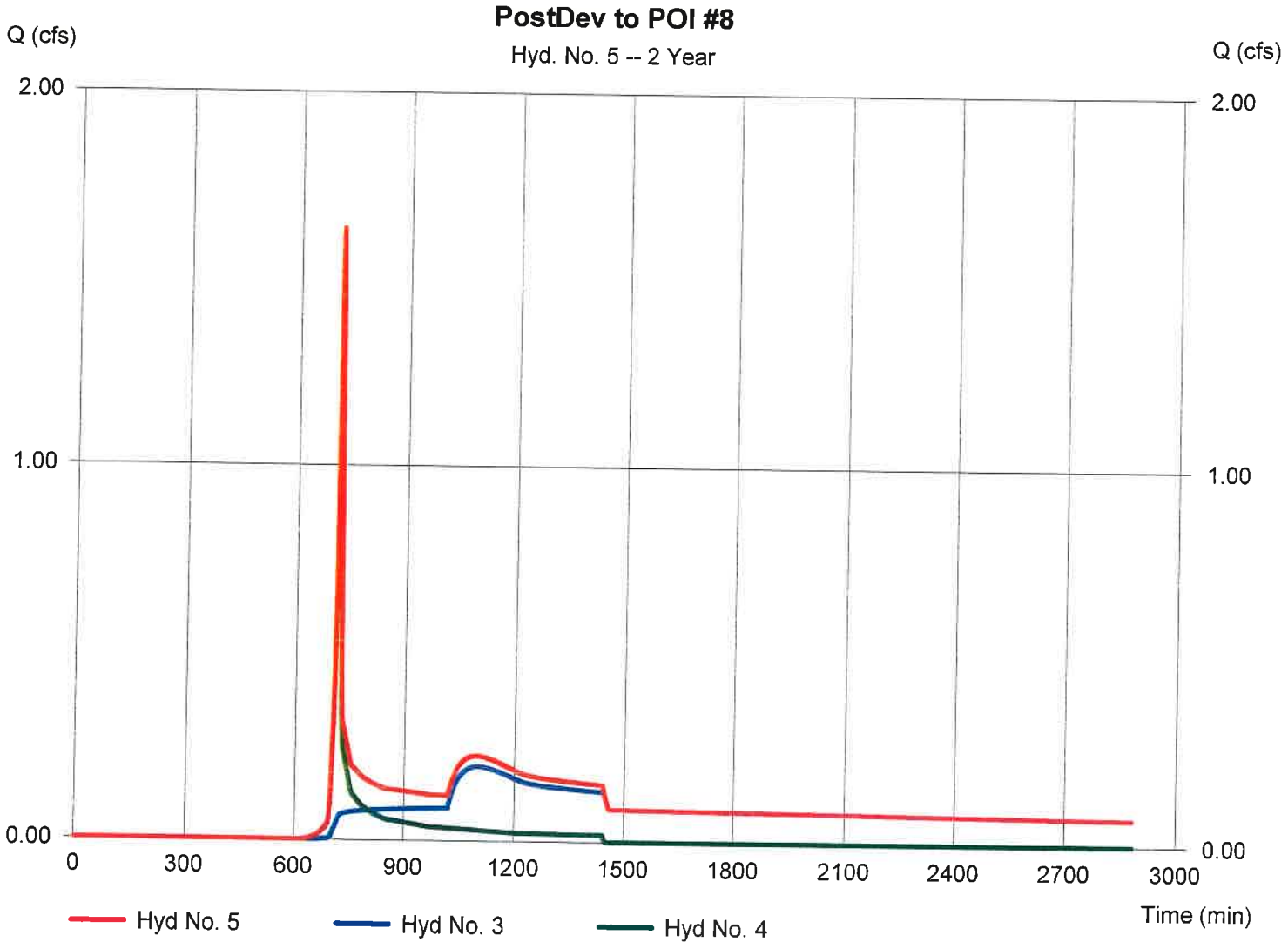
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Friday, 10 / 2 / 2020

Hyd. No. 5

PostDev to POI #8

Hydrograph type	= Combine	Peak discharge	= 1.633 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 15,476 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.670 ac

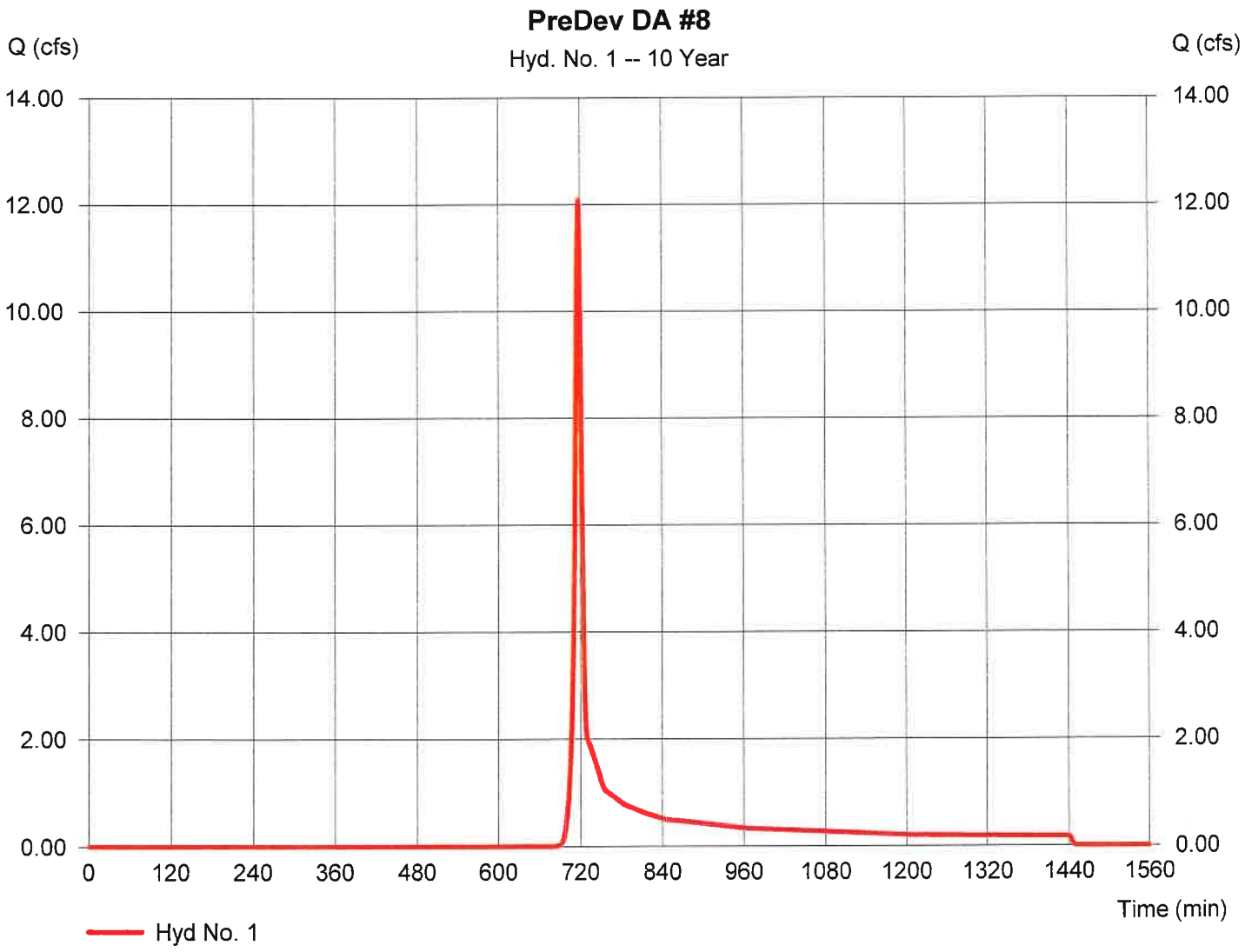


Hydrograph Report

Hyd. No. 1

PreDev DA #8

Hydrograph type	= SCS Runoff	Peak discharge	= 12.09 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 25,112 cuft
Drainage area	= 5.110 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



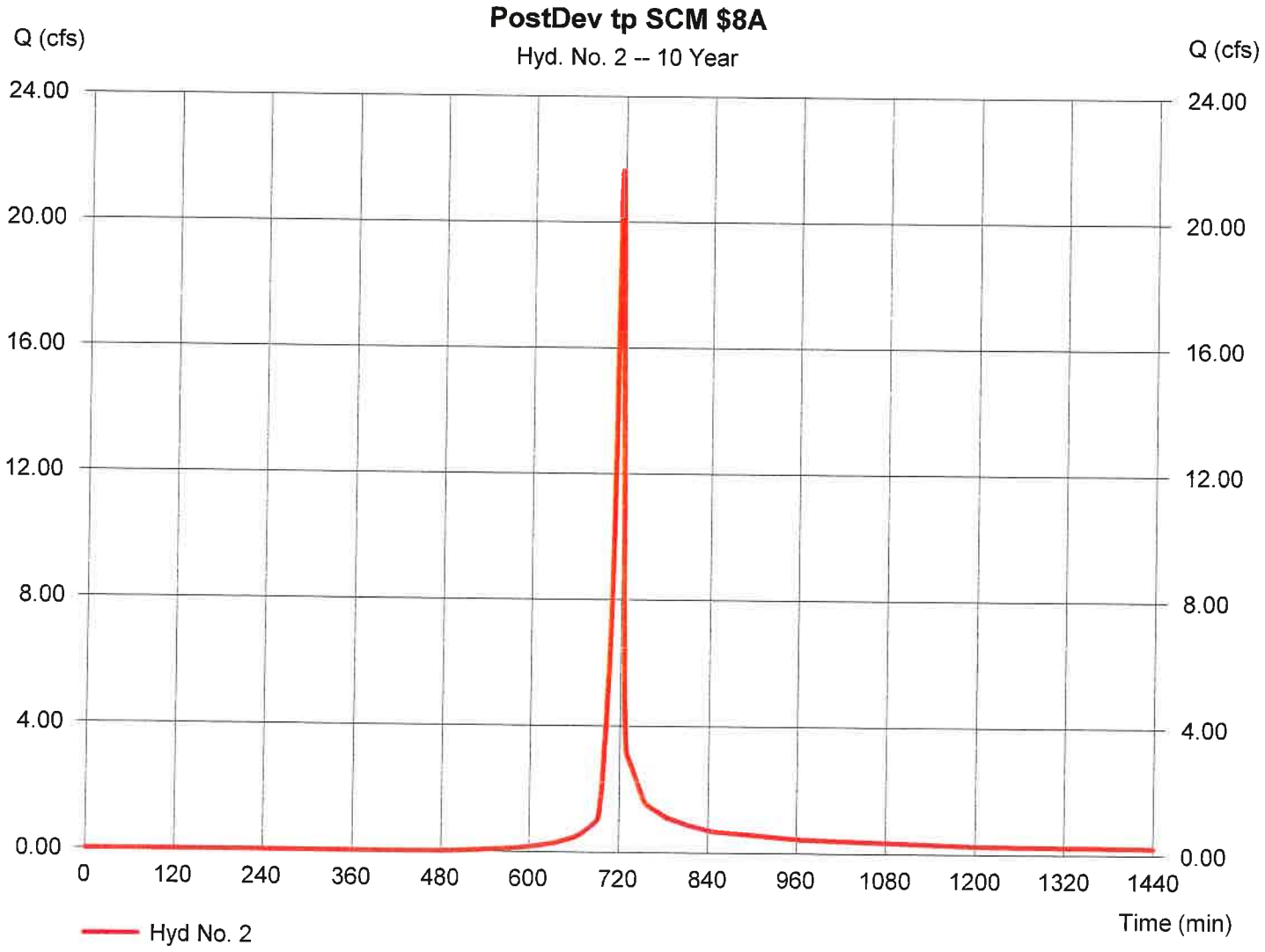
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Friday, 10 / 2 / 2020

Hyd. No. 2

PostDev tp SCM $8A

Hydrograph type	= SCS Runoff	Peak discharge	= 21.64 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 43,875 cuft
Drainage area	= 4.440 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



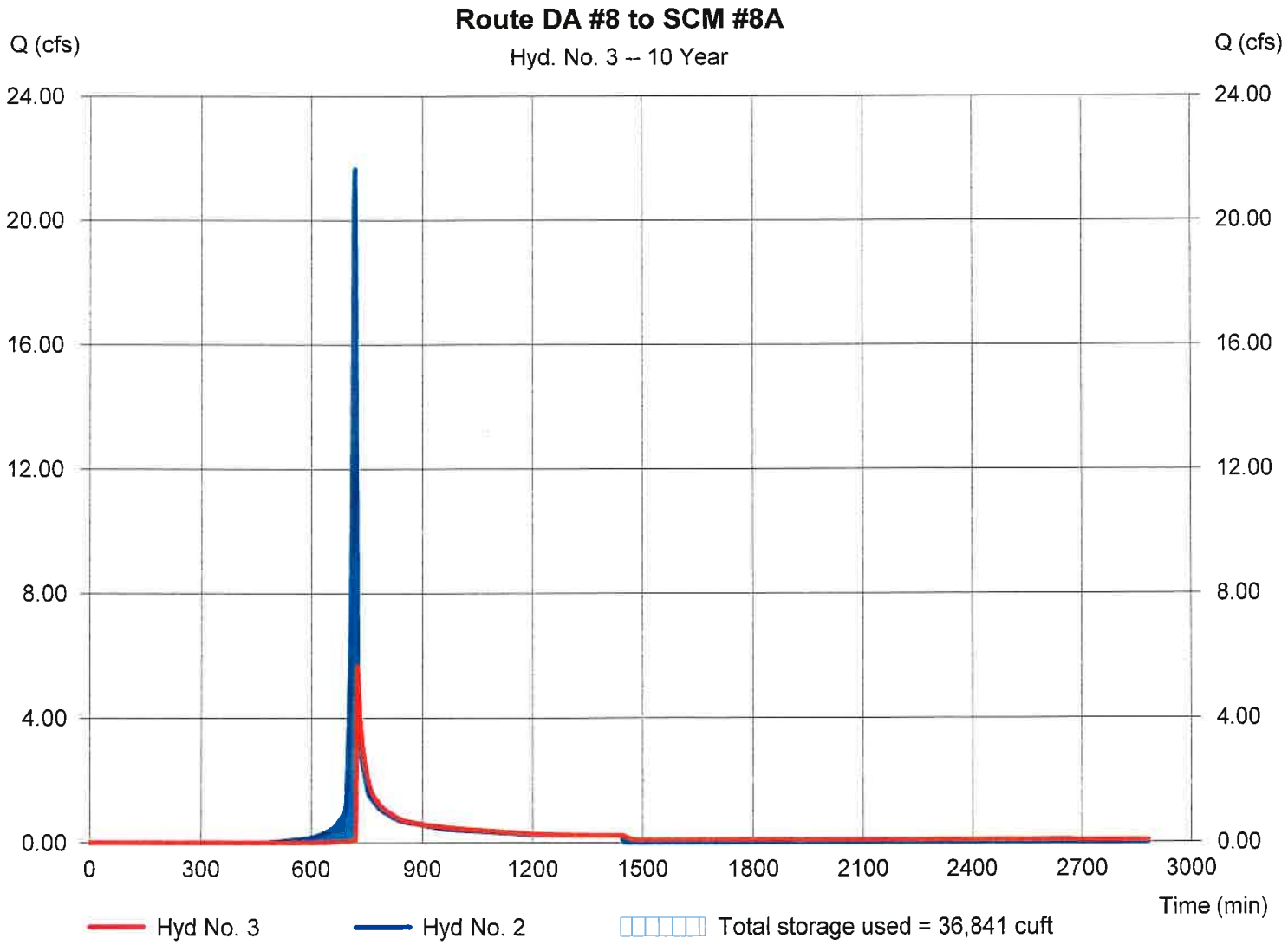
Hydrograph Report

Hyd. No. 3

Route DA #8 to SCM #8A

Hydrograph type	= Reservoir	Peak discharge	= 5.663 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 32,943 cuft
Inflow hyd. No.	= 2 - PostDev tp SCM $8A	Max. Elevation	= 360.02 ft
Reservoir name	= SCM #8A	Max. Storage	= 36,841 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.

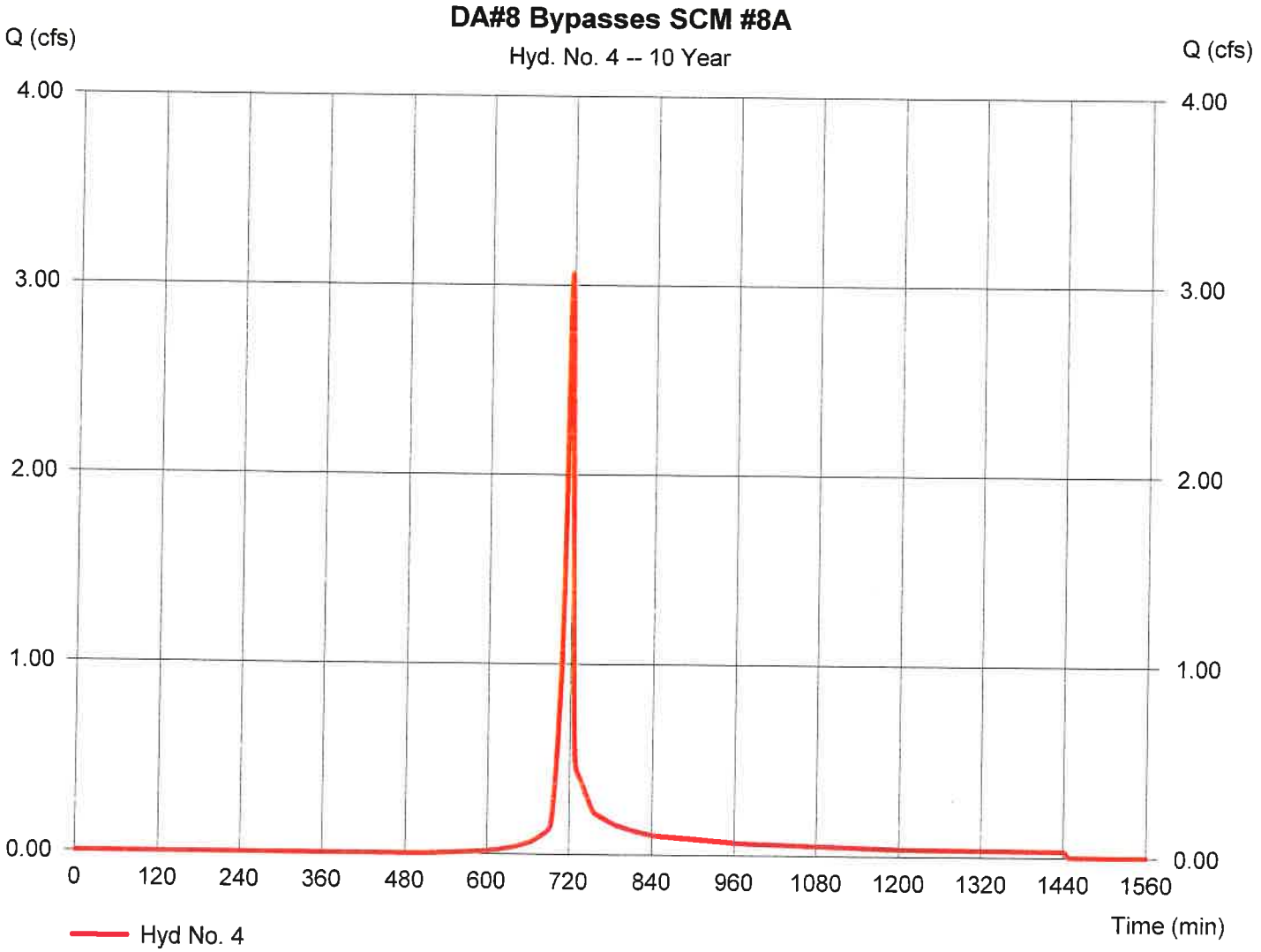


Hydrograph Report

Hyd. No. 4

DA#8 Bypasses SCM #8A

Hydrograph type	= SCS Runoff	Peak discharge	= 3.065 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 6,184 cuft
Drainage area	= 0.670 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

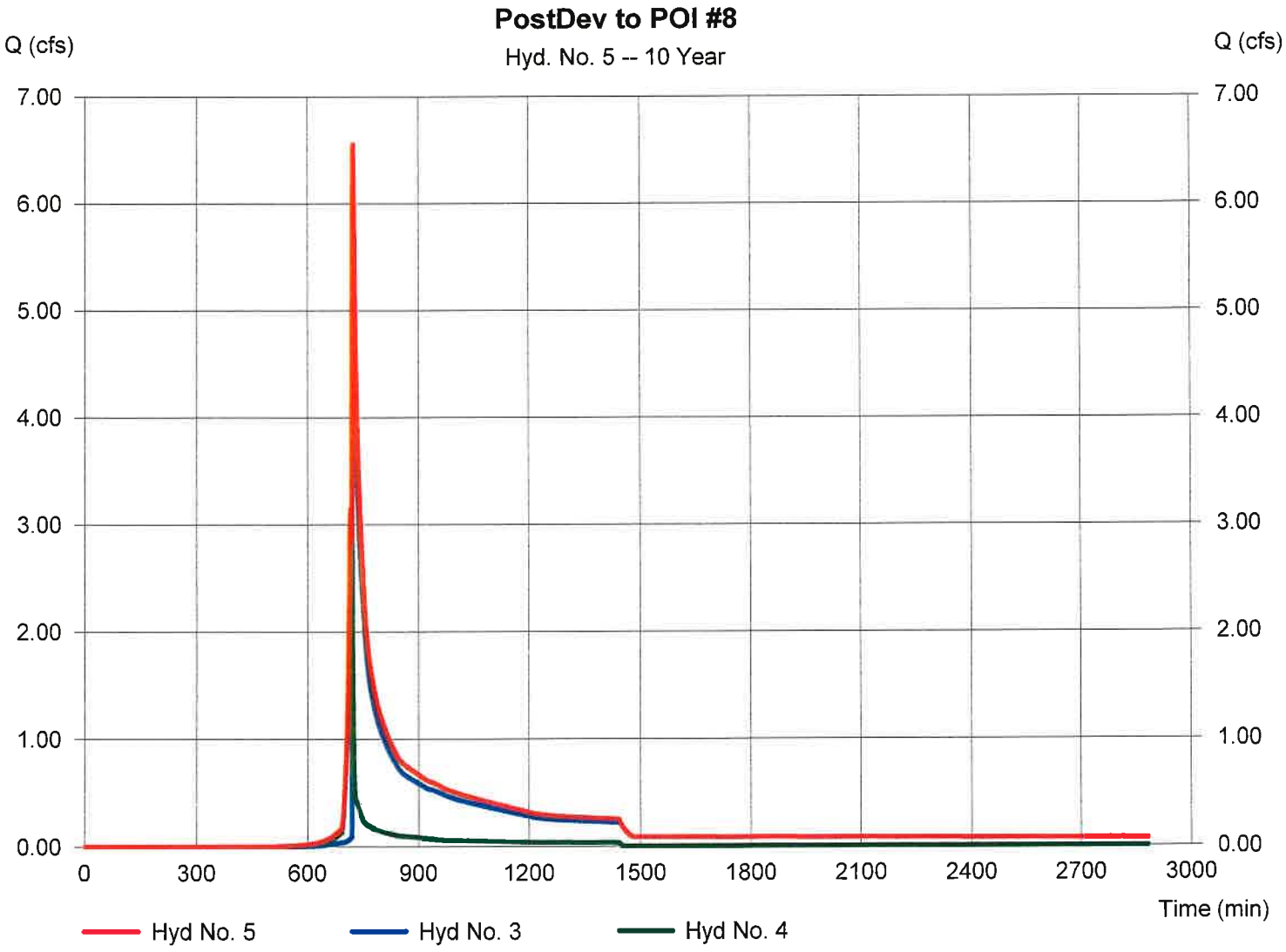


Hydrograph Report

Hyd. No. 5

PostDev to POI #8

Hydrograph type	= Combine	Peak discharge	= 6.549 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 39,127 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.670 ac

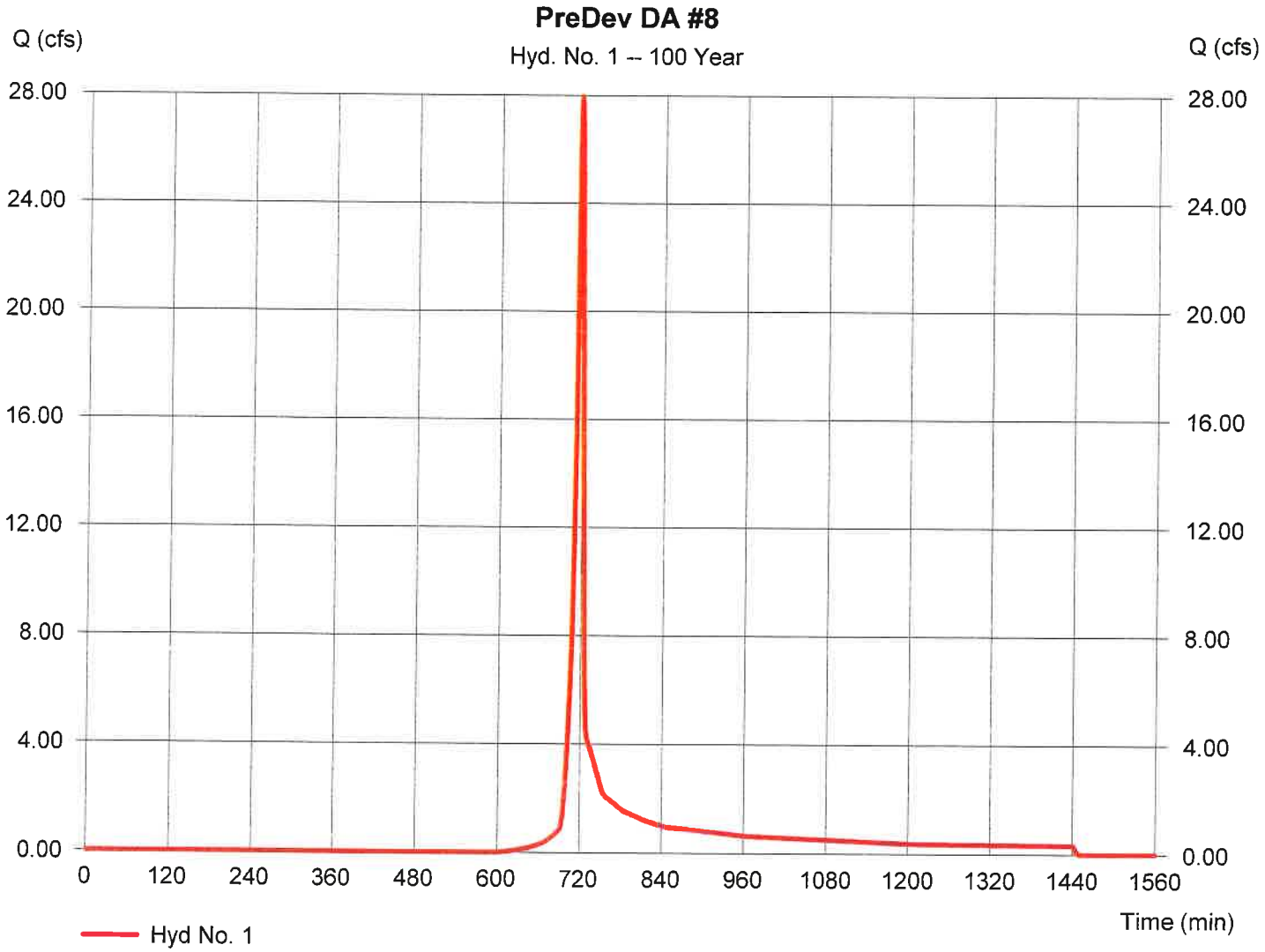


Hydrograph Report

Hyd. No. 1

PreDev DA #8

Hydrograph type	= SCS Runoff	Peak discharge	= 27.94 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 56,125 cuft
Drainage area	= 5.110 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

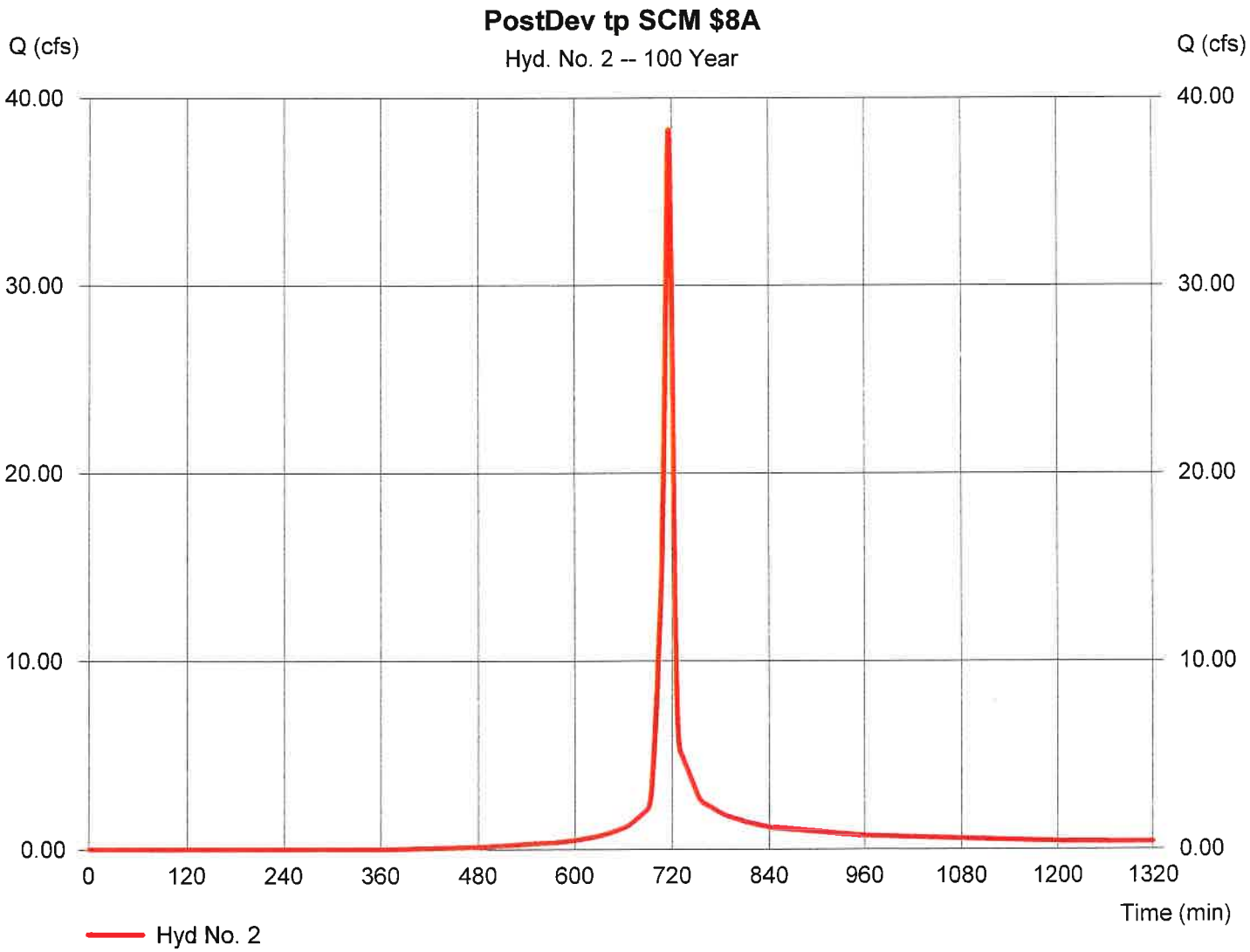


Hydrograph Report

Hyd. No. 2

PostDev tp SCM $8A

Hydrograph type	= SCS Runoff	Peak discharge	= 38.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 79,472 cuft
Drainage area	= 4.440 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

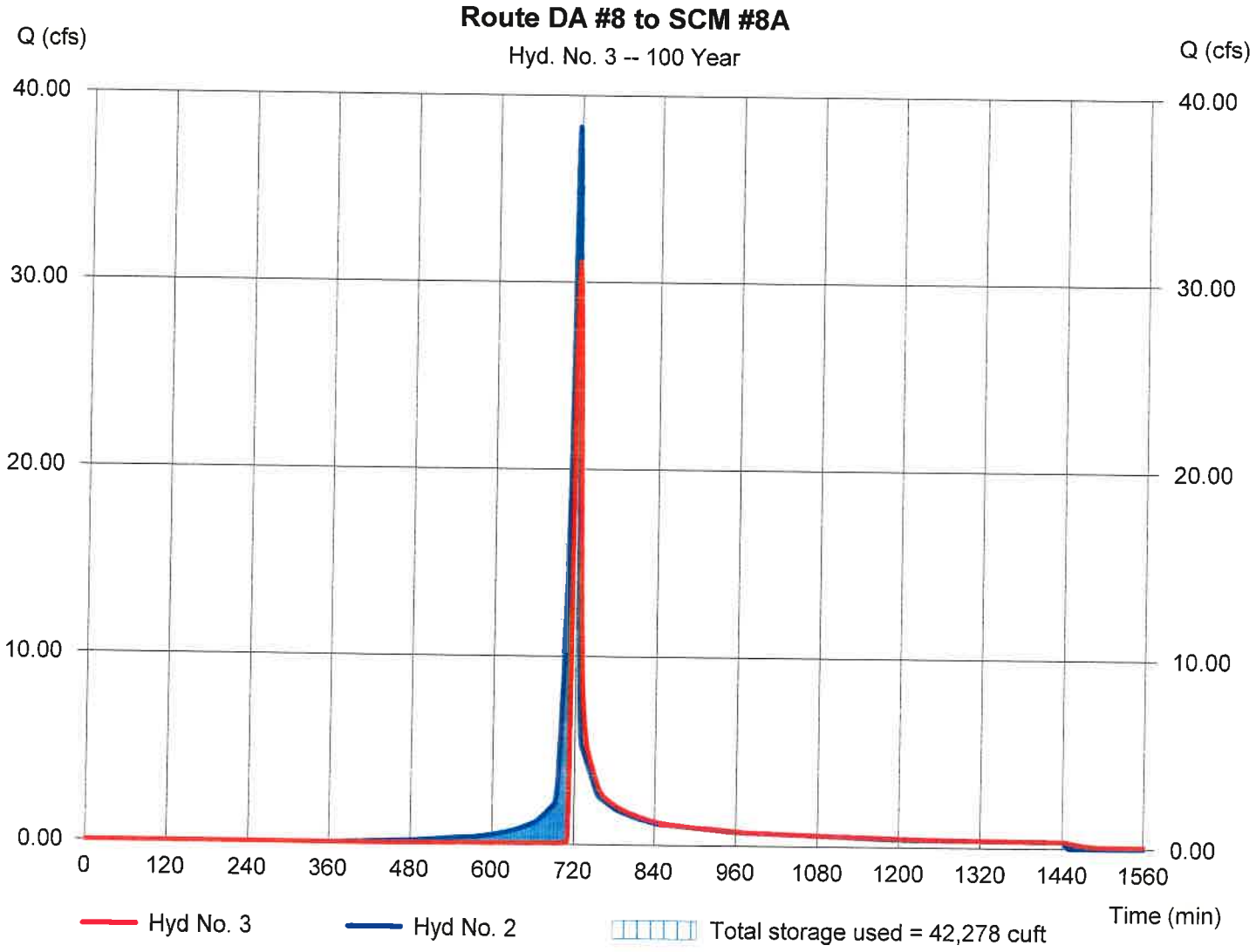
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Friday, 10 / 2 / 2020

Hyd. No. 3

Route DA #8 to SCM #8A

Hydrograph type	= Reservoir	Peak discharge	= 31.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 68,474 cuft
Inflow hyd. No.	= 2 - PostDev tp SCM $8A	Max. Elevation	= 360.56 ft
Reservoir name	= SCM #8A	Max. Storage	= 42,278 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.

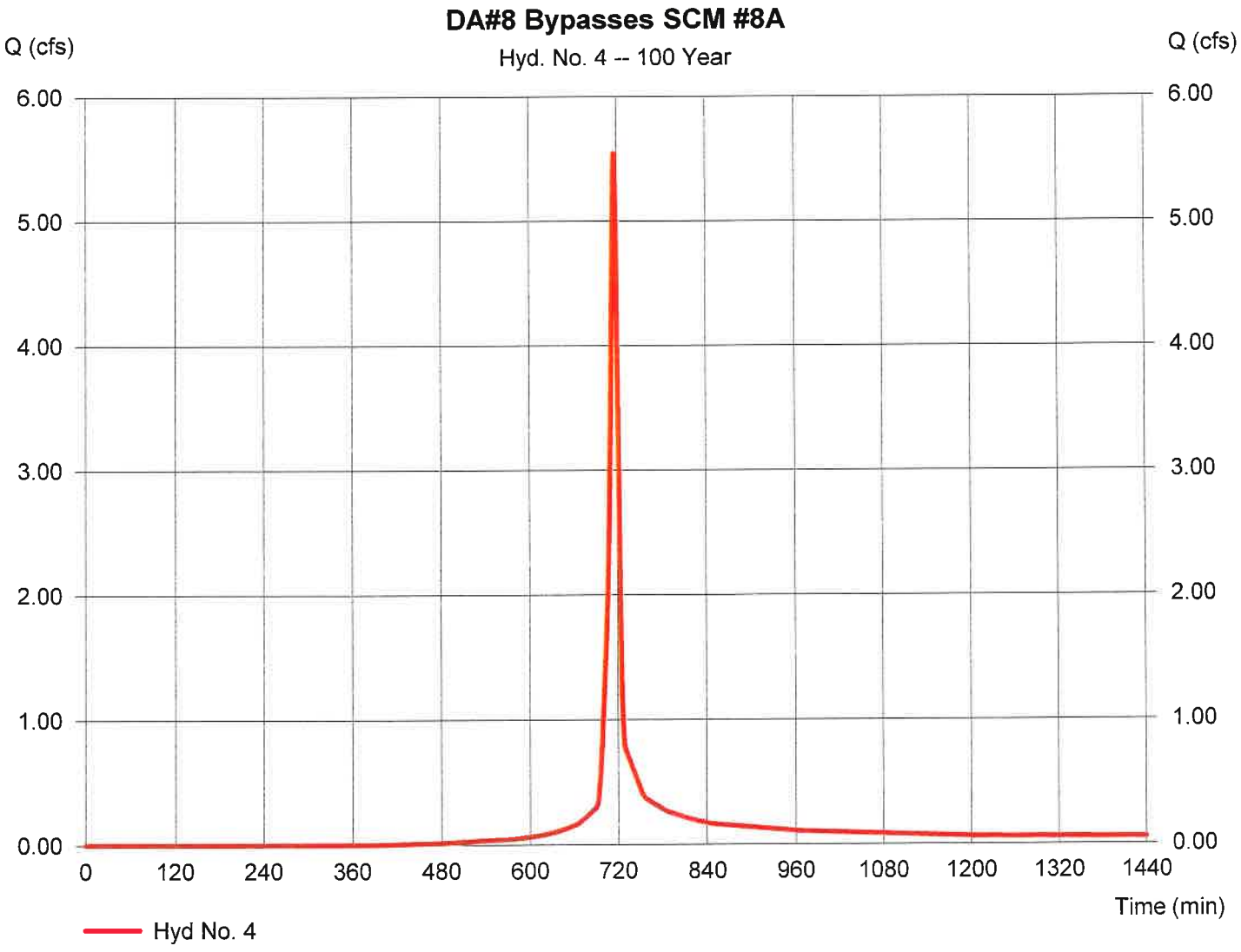


Hydrograph Report

Hyd. No. 4

DA#8 Bypasses SCM #8A

Hydrograph type	= SCS Runoff	Peak discharge	= 5.543 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 11,430 cuft
Drainage area	= 0.670 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



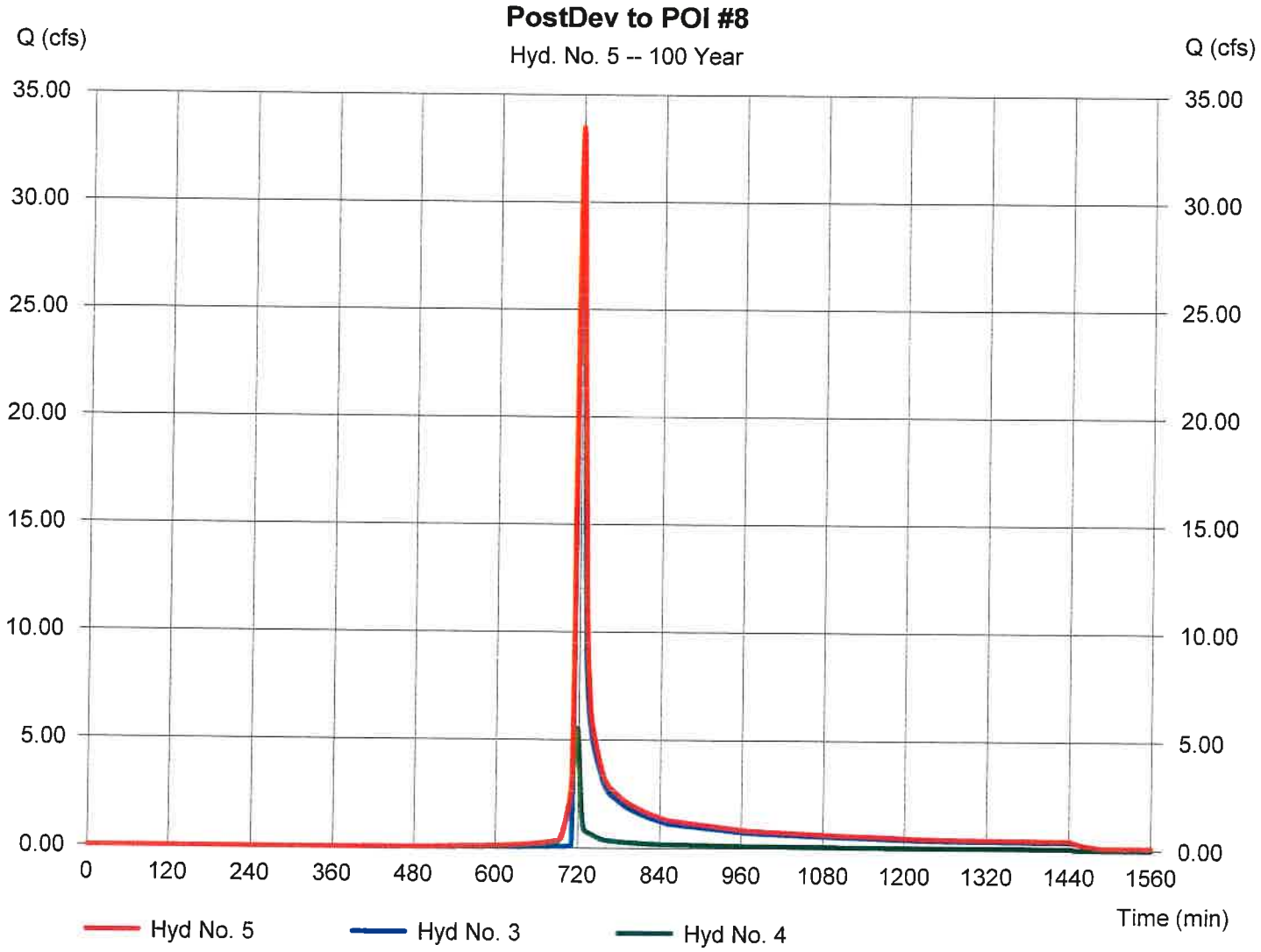
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Friday, 10 / 2 / 2020

Hyd. No. 5

PostDev to POI #8

Hydrograph type	= Combine	Peak discharge	= 33.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 79,903 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.670 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	0.0000	0.0000	0.0000	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	0.0000	0.0000	0.0000	--------
25	0.0000	0.0000	0.0000	--------
50	0.0000	0.0000	0.0000	--------
100	0.0000	0.0000	0.0000	--------

File name: SCM 1.IDF

Intensity = B / (Tc + D)^E

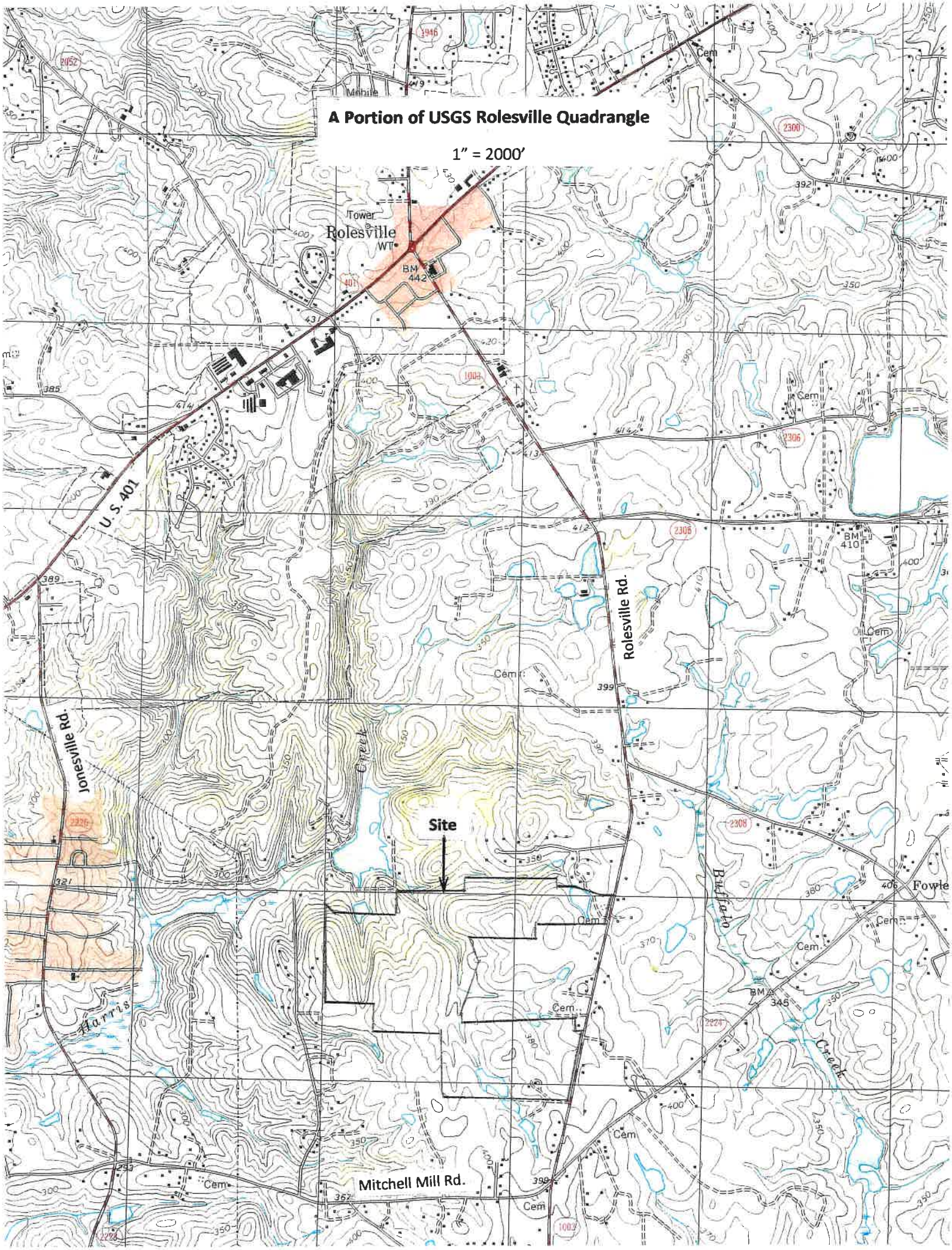
Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tc = time in minutes. Values may exceed 60.

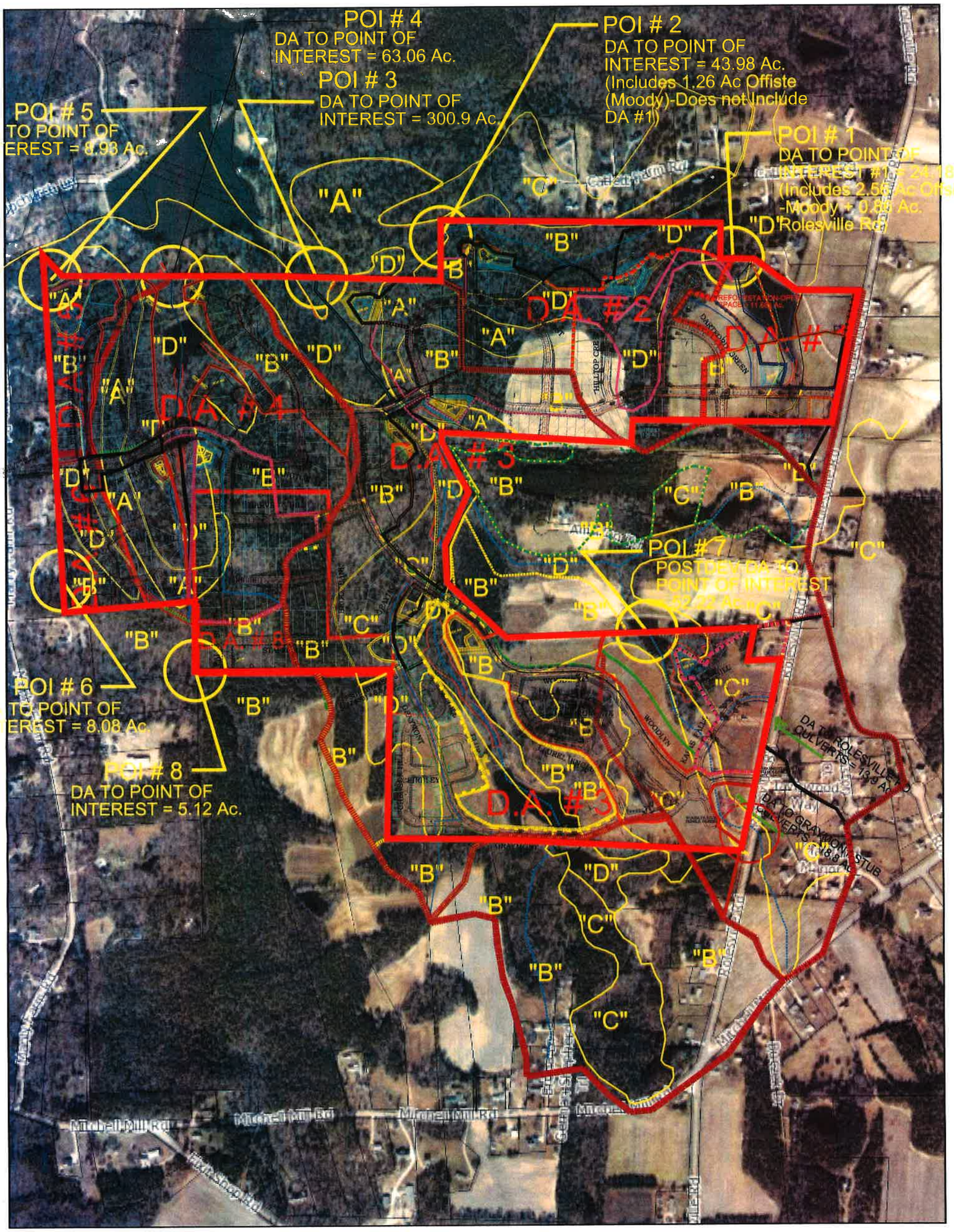
Precip. file name: F:\Kalas Assemblage\Raleigh-Wake County 24Hr Rain.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	3.00	3.45	0.00	4.33	5.02	5.96	6.80	7.46
SCS 6-Hr	2.05	2.46	0.00	3.04	3.55	0.00	0.00	5.32
Huff-1st	0.00	0.00	0.00	2.75	0.00	5.38	6.50	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	5.25	6.00	0.00

The USGS quadrangle map and the soil survey map follow this page with the site marked.


A Portion of USGS Rolesville Quadrangle
1" = 2000'
Rolesville
Tower
WT
BM 442
U.S. 401
Rolesville Rd.
Jonesville Rd.
Site
Mitchell Mill Rd.
Cem
BM 410
BM 345
Fowle
Creek


(Joins sheet 22)
(Joins sheet 23)
(Joins sheet 41)
(Joins sheet 42)
WkE
DuB
DuC
DuC2
LoB
LoC
LoD
ApB
ApB2
ApC2
LwB
LwC
LwC2
WmB
WmB2
Cn
Me
Wy



Kalas PostDevLand Coverage Map

N

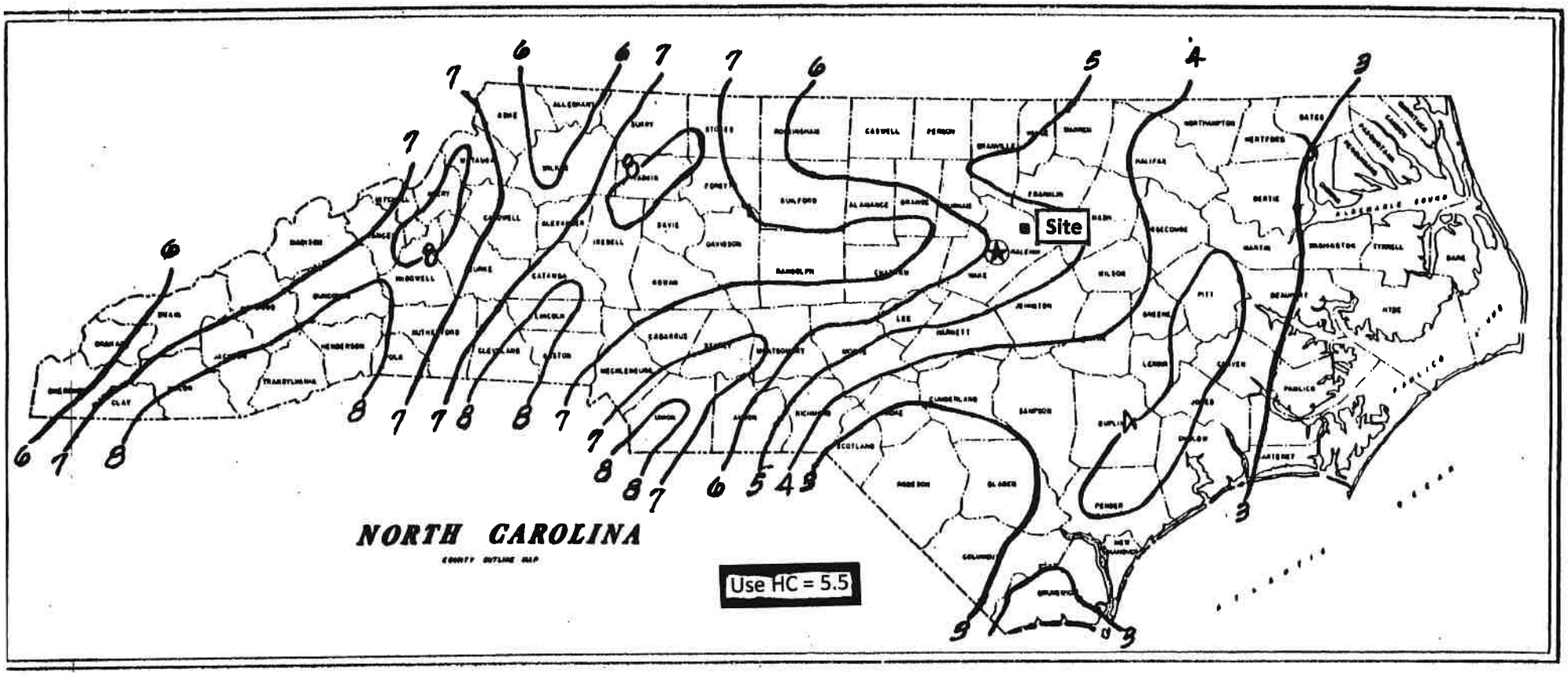
0 325 650 1,300 ft

1 inch = 600 feet

Disclaimer

iMaps makes every effort to produce and publish the most current and accurate information possible. However, the maps are produced for information purposes, and are **NOT** surveys. No warranties, expressed or implied, are provided for the data therein, its use,or its interpretation.

Major Creek Crossings

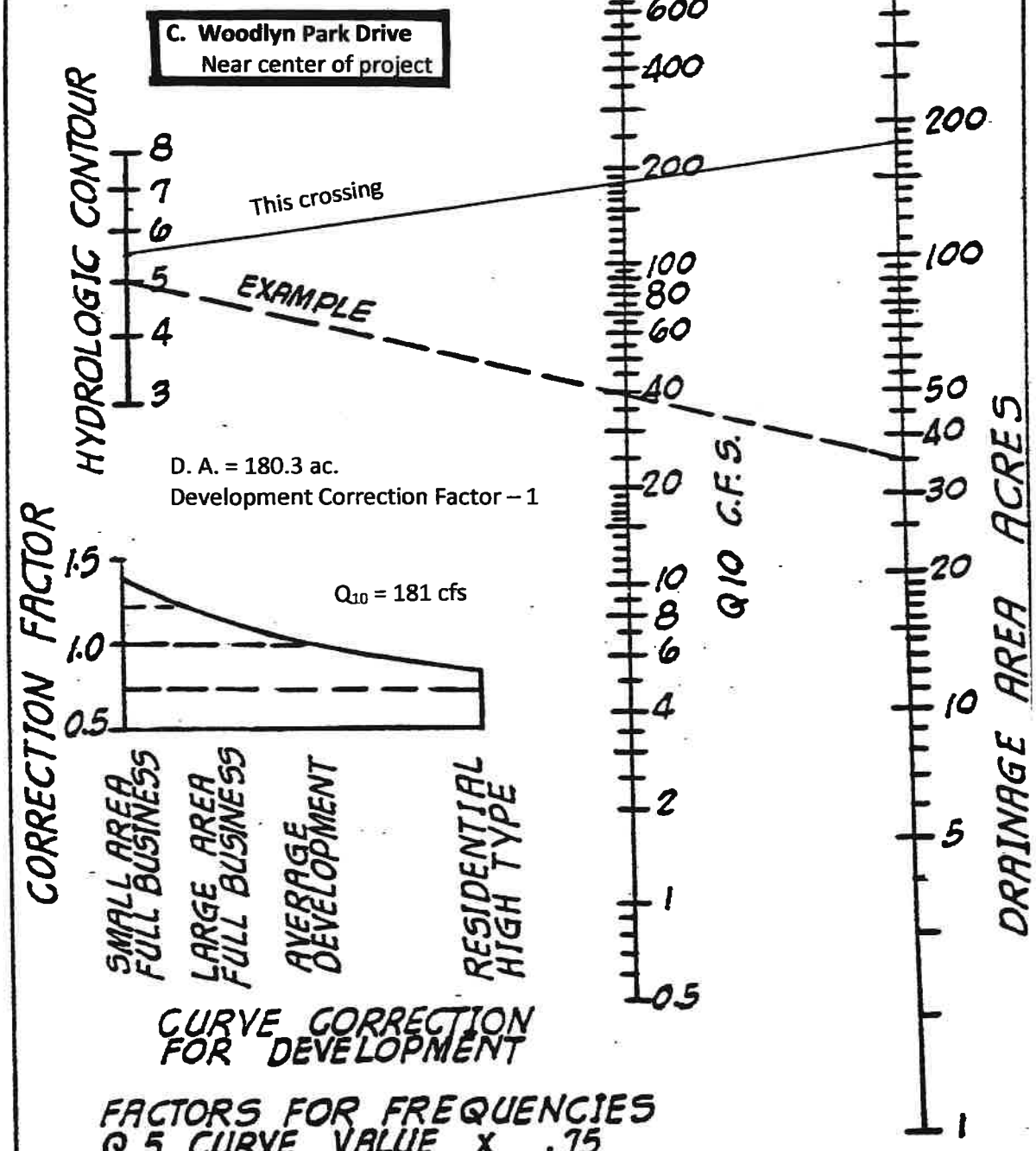


NORTH CAROLINA STATE HIGHWAY COMMISSION
HYDROGRAPHIC DEPT.
MAP OF HYDROLOGIC CONTOURS FOR USE IN DETERMINING
PROJECT DESIGN DISCHARGES

JAN. 1973

EXAMPLE
GIVEN :

HYDROLOGIC CONTOUR 5.0
DRAINAGE AREA 35 AC.
SMALL AREA FULL BUSINESS
ANSWER
Q10 = 39 x 1.4 = 54.6 C.F.S.



FACTORS FOR FREQUENCIES

Q 5	CURVE	VALUE	x	.75
Q 10	"	"	x	1.0
Q 25	"	"	x	1.35
Q 50	"	"	x	1.85
Q 100	"	"	x	2.15

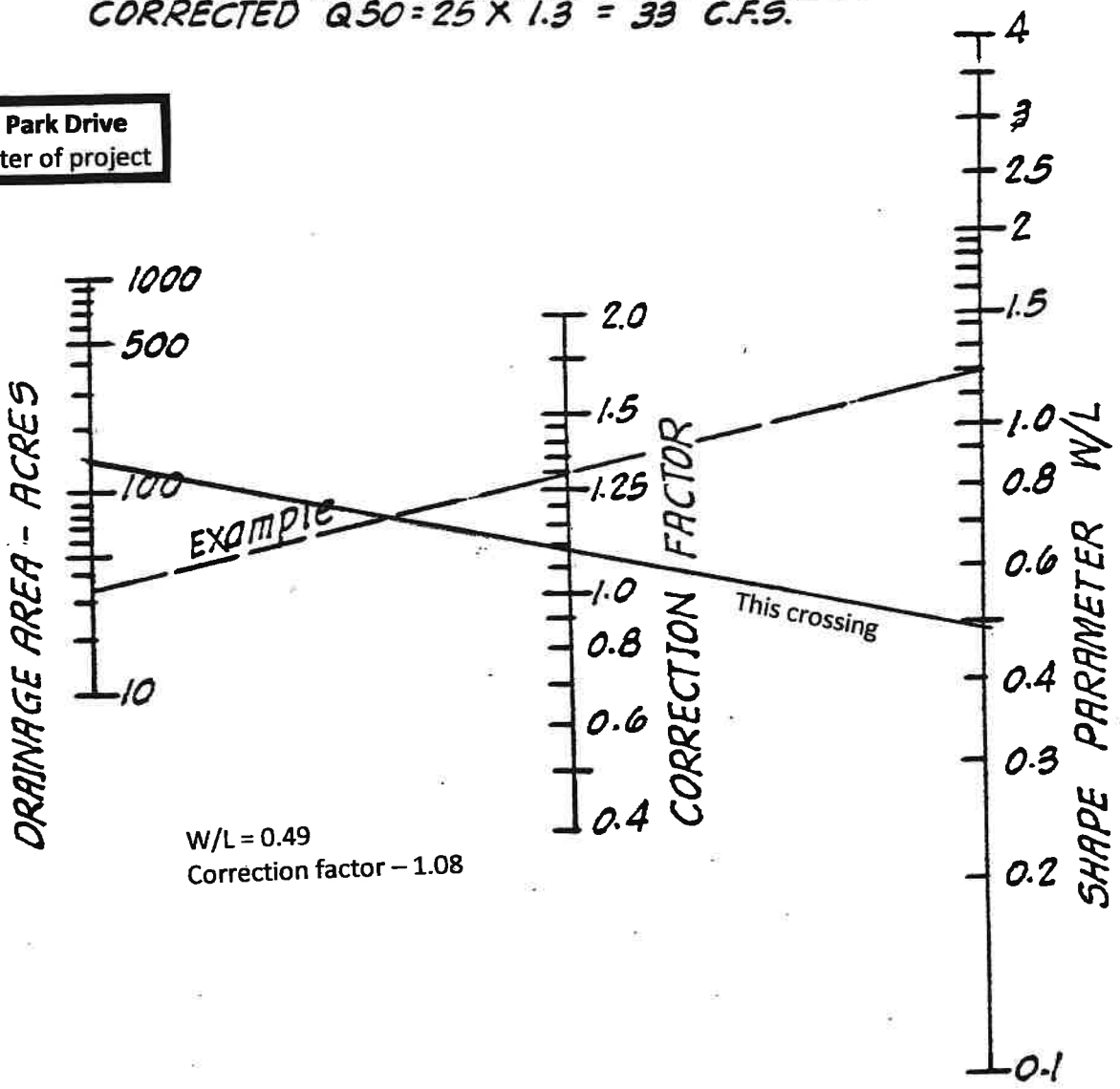
Q_{100} = 2.15 x 181 = 389.2 cfs

RUNOFF FROM URBAN AREAS

NORTH CAROLINA STATE HIGHWAY COMMISSION

EXAMPLE
GIVEN :
DRAINAGE AREA 32 ACRES RURAL
W/L = 1.2
ANSWER FROM CHART 100.2 Q50 = 25 C.F.S.
CORRECTED Q50 = 25 X 1.3 = 33 C.F.S.

C. Woodlyn Park Drive
Near center of project



W/L = 0.49
Correction factor – 1.08

Q_{100} = 389.2 x 1.08 = 420.3 cfs

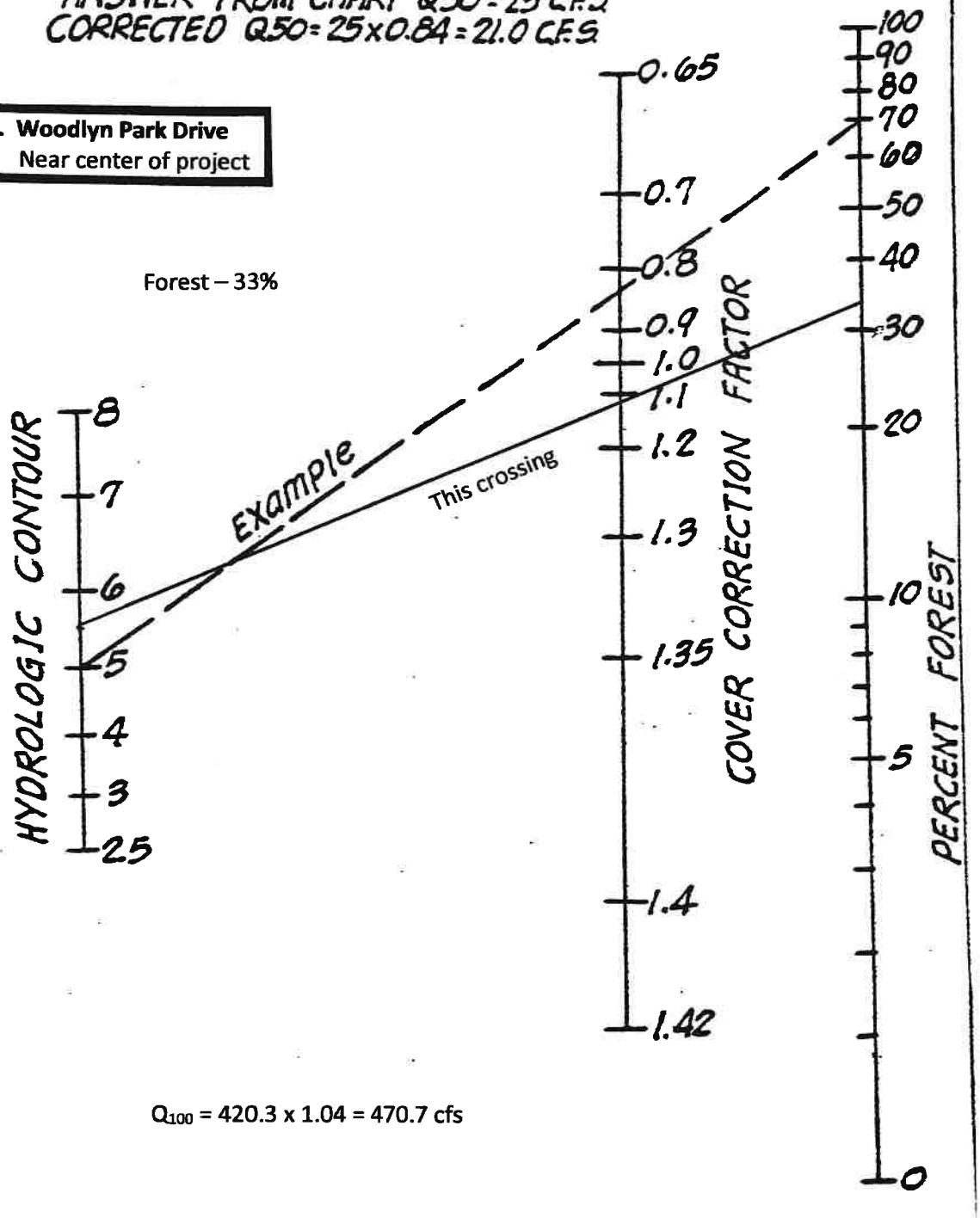
DRAINAGE AREA SHAPE PARAMETER
CORRECTION FACTORS

NORTH CAROLINA STATE HIGHWAY COMMISSION
JAN, 1973

EXAMPLE
GIVEN:
HYDROLOGIC CONTOUR 5.0
DRAINAGE AREA 35 AC.
% FOREST 70%
ANSWER FROM CHART Q50 = 25 C.F.S.
CORRECTED Q50 = 25 x 0.84 = 21.0 C.F.S.

C. Woodlyn Park Drive
Near center of project

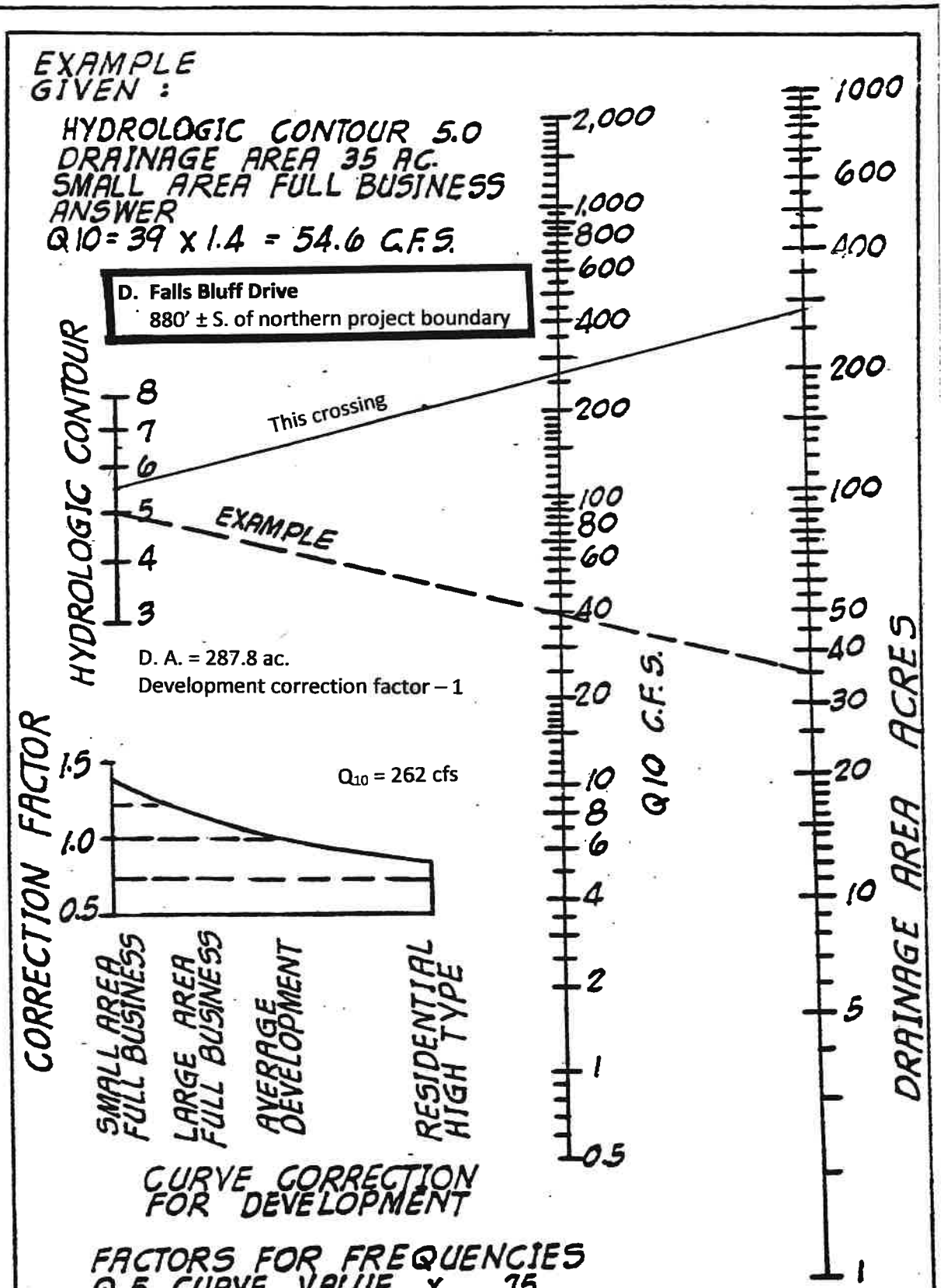
Forest – 33%



Q_{100} = 420.3 x 1.04 = 470.7 cfs

DRAINAGE AREA COVER PARAMETER CORRECTION FACTORS

NORTH CAROLINA STATE HIGHWAY COMMISSION
JAN, 1973

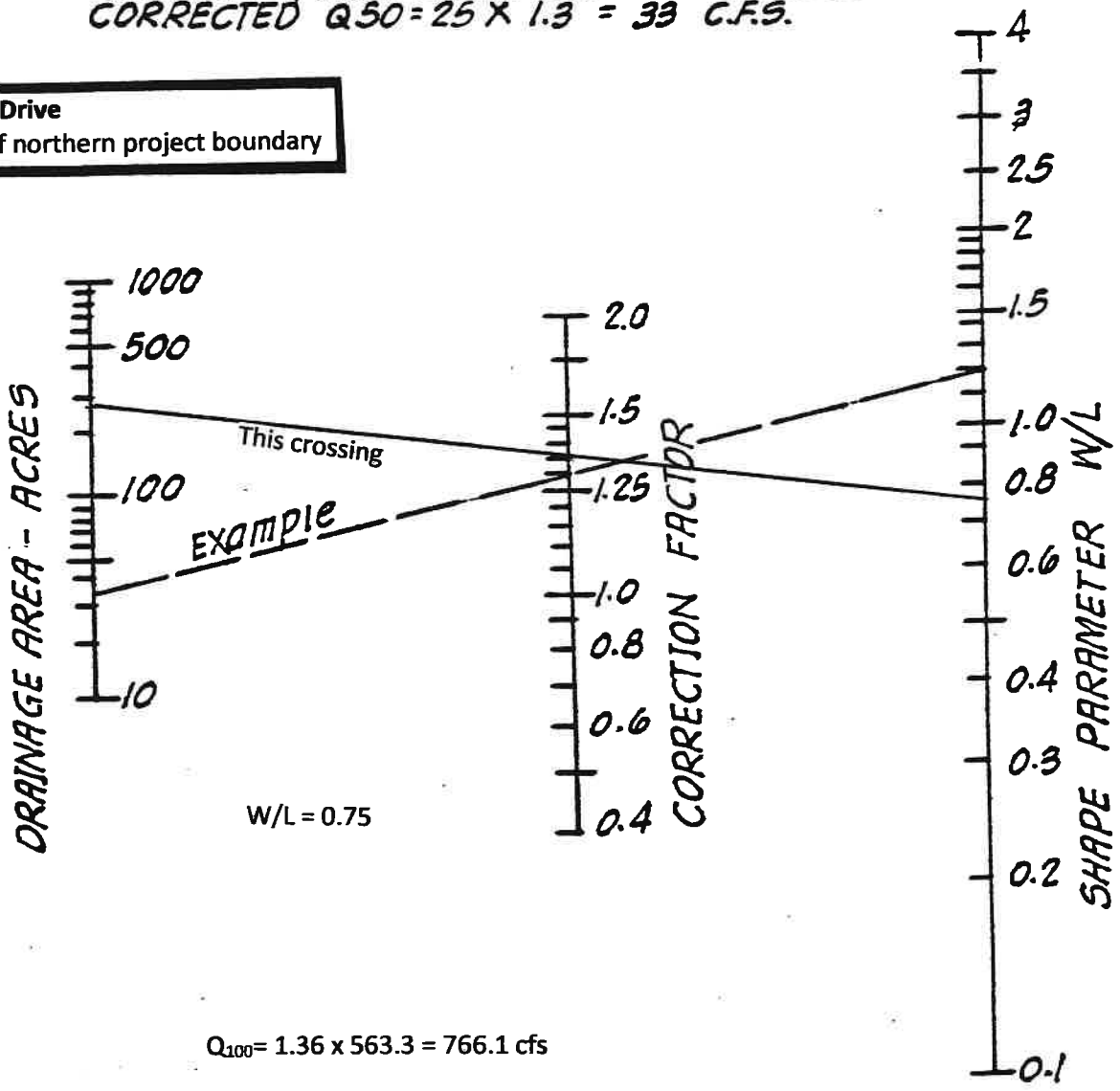


RUNOFF FROM URBAN AREAS

NORTH CAROLINA STATE HIGHWAY COMMISSION

EXAMPLE
GIVEN :
DRAINAGE AREA 32 ACRES RURAL
W/L = 1.2
ANSWER FROM CHART 100.2 Q50 = 25 C.F.S.
CORRECTED Q50 = 25 X 1.3 = 33 C.F.S.

D. Falls Bluff Drive
880' ± S. of northern project boundary



Q_{100}= 1.36 x 563.3 = 766.1 cfs

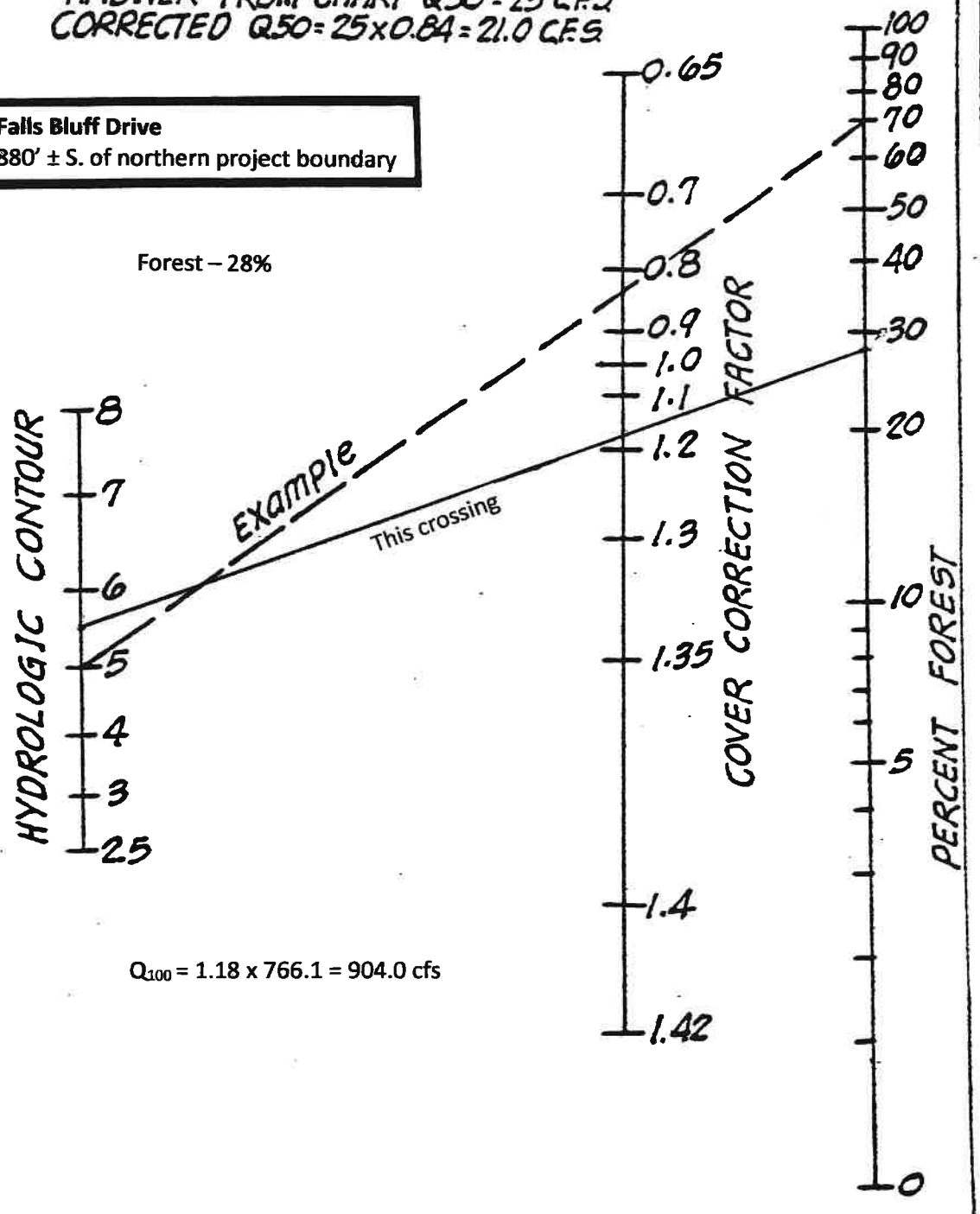
DRAINAGE AREA SHAPE PARAMETER
CORRECTION FACTORS

NORTH CAROLINA STATE HIGHWAY COMMISSION
JAN, 1973

EXAMPLE
GIVEN:
HYDROLOGIC CONTOUR 5.0
DRAINAGE AREA 35 AC.
% FOREST 70%
ANSWER FROM CHART Q50 = 25 C.F.S.
CORRECTED Q50 = 25 x 0.84 = 21.0 C.F.S.

D. Falls Bluff Drive
880' ± S. of northern project boundary

Forest – 28%



Q_{100} = 1.18 x 766.1 = 904.0 cfs

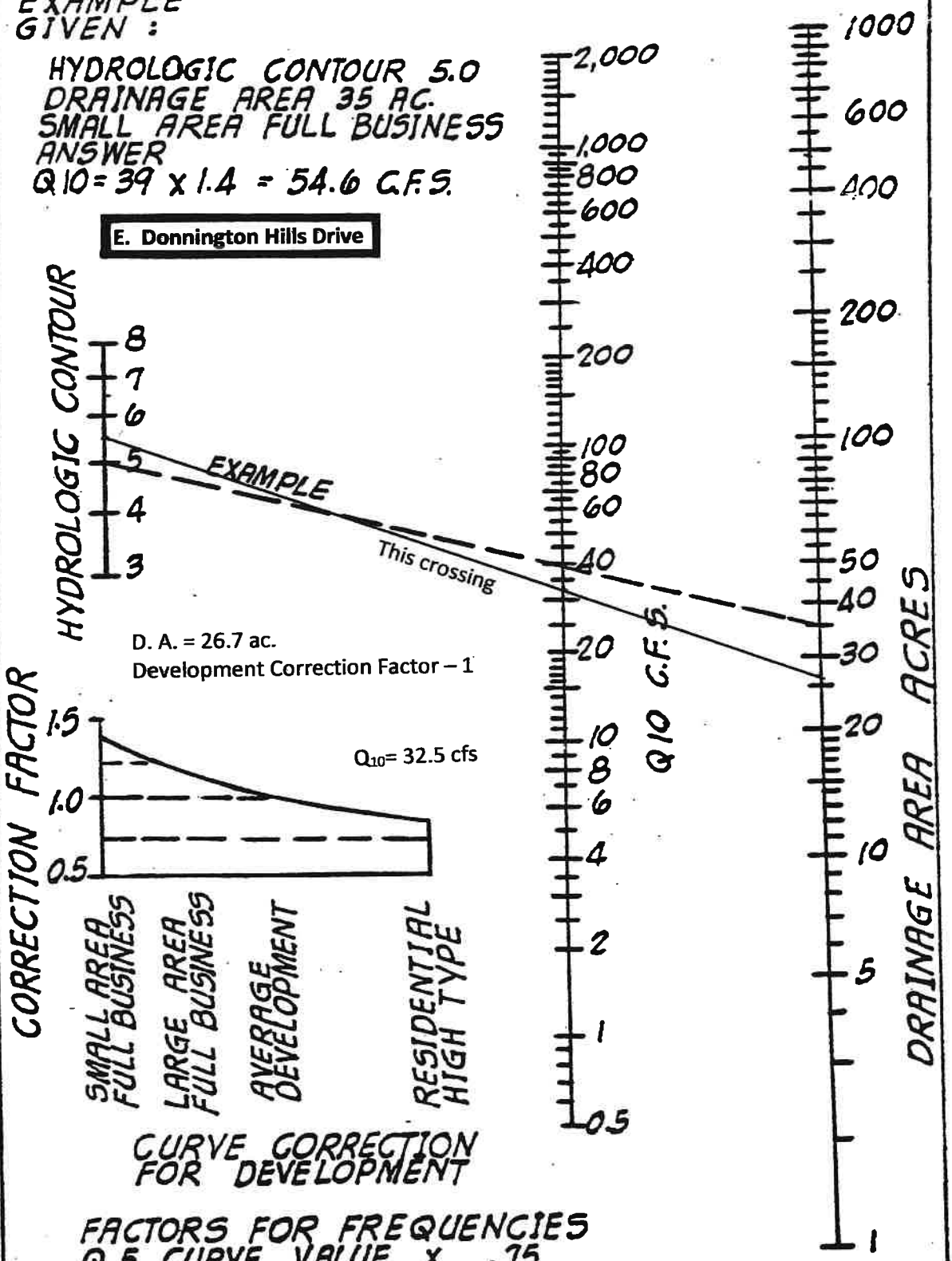
DRAINAGE AREA COVER PARAMETER CORRECTION FACTORS

NORTH CAROLINA STATE HIGHWAY COMMISSION
JAN, 1973

EXAMPLE
GIVEN :

HYDROLOGIC CONTOUR 5.0
DRAINAGE AREA 35 AC.
SMALL AREA FULL BUSINESS
ANSWER
Q 10 = 39 x 1.4 = 54.6 C.F.S.

E. Donnington Hills Drive



D. A. = 26.7 ac.
Development Correction Factor – 1

Q_{10}= 32.5 cfs

CURVE CORRECTION FOR DEVELOPMENT

FACTORS FOR FREQUENCIES

Q 5	CURVE VALUE	x	.75
Q 10	"	x	1.0
Q 25	"	x	1.35
Q 50	"	x	1.85
Q 100	"	x	2.15

Q_{100} = 2.15 x 32.5 = 69.9 cfs

RUNOFF FROM URBAN AREAS
NORTH CAROLINA STATE HIGHWAY COMMISSION

Rip-Rap Pads

Figure 8.06c: Zone Determiniation for Apron Material

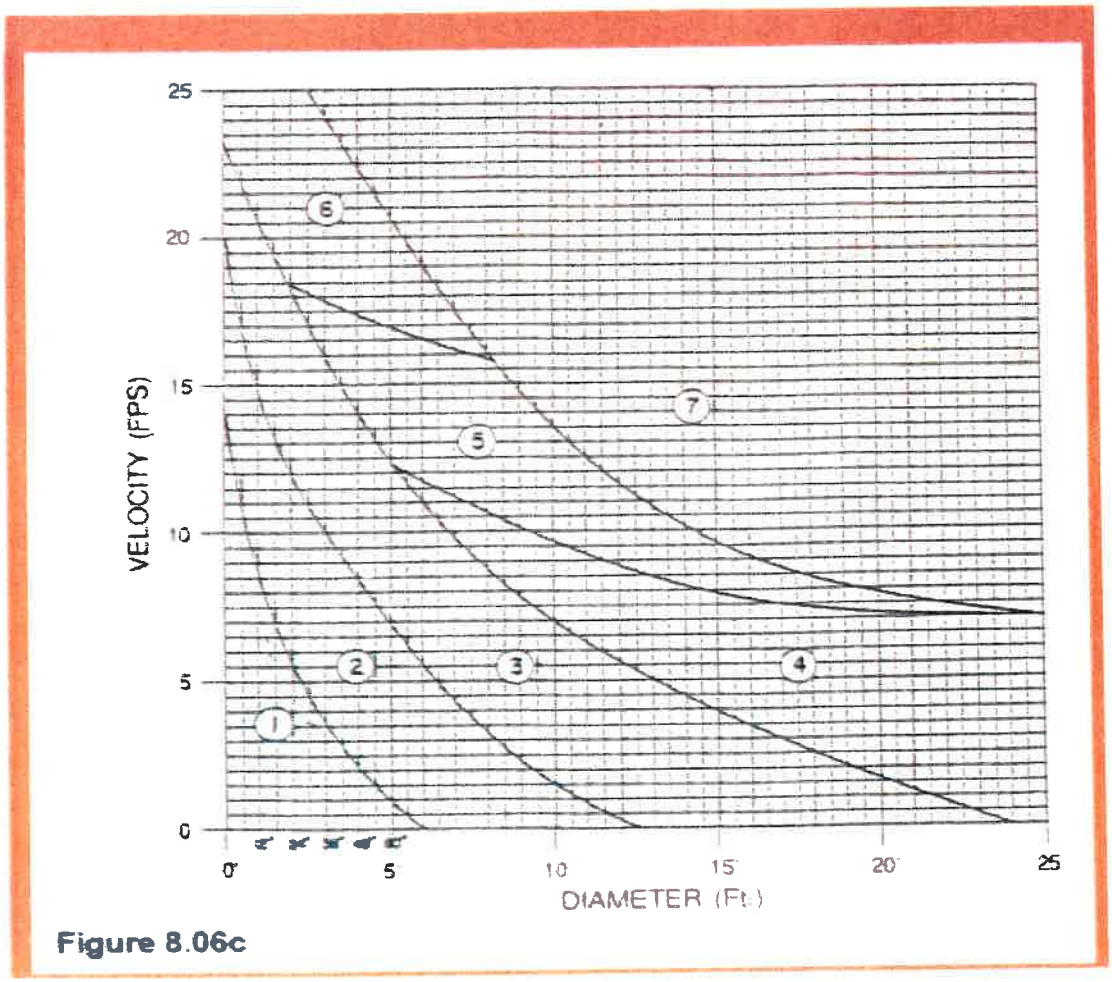


Figure 8.06c

Figure 8.06d: Length of Apron

ZONE	APRON MATERIAL	LENGTH OF APRON	
		TO PROTECT CULVERT L1	TO PREVENT SCOUR HOLE USE L2 ALWAYS L2
1	STONE FILLING (FINE) CL. A	$3 \times D_0$	$4 \times D_0$
2	STONE FILLING (LIGHT) CL. B	$3 \times D_0$	$6 \times D_0$
3	STONE FILLING (MEDIUM) CL. 1	$4 \times D_0$	$8 \times D_0$
4	STONE FILLING (HEAVY) CL. 1	$4 \times D_0$	$8 \times D_0$
5	STONE FILLING (HEAVY) CL. 2	$5 \times D_0$	$10 \times D_0$
6	STONE FILLING (HEAVY) CL. 2	$6 \times D_0$	$10 \times D_0$
7	SPECIAL STUDY REQUIRED (ENERGY DISSIPATORS. STILLING BASIN OR LARGER SIZE STONE)		

Figure 8.06d

Width = 3 times pipe dia. (mm.)

NOTE: For apron slopes equal to or greater than 10%, use next higher Zone to determine Apron Length.

RIP-RAP PADS

Date: 2/2/21 **Kalas Falls, Phase 3**

Y:\Jobs\9900\Watkins Property\Documents\Schedules\Rip-Rap Pads, Ph3.xlsx

Using NYSDOT Method

OUTLET NO.	PIPE DIA. (IN.)	VELOCITY (FPS)	ZONE	STONE SIZE	STONE CLASS	WIDTH (FT.)*	LENGTH (FT.)	DEPTH (IN.)
FES 30	24	9.36	2	6"	B	8	12	18
FES 330	18	5.53	1	3"	A	5.5	6	12
FES 338	24	6.68	2	6"	B	8	12	18
FES 349	42	8.05	2	6"	B	14	21	18
FES 392	15	4.33	1	3"	A	4.75	5	12
FES 401	24	9.06	2	6"	B	8	12	18
FES 419	30	12.98	3	13"	1	11	20	24
FES 469	36	8.99	2	6"	B	12	18	18
FES 800	18	8.59	2	6"	B	6	9	18
FES 3B	48	9.69	3	13"	1	17.5	32	24
FES 3C	18	6.54	1	3"	A	5.5	6	12
FES 4B	30	6.76	2	6"	B	10	15	18
FES 4C	18	7.06	2	6"	B	6	9	18
FES 4E	24	5.55	1	3"	A	7.5	8	12
FES 8A	18	5.01	1	3"	A	5.5	6	12
FES 17	15	7.41	1	3"	A	4.75	5	12
FES 19	15	8.34	2	6"	B	5	7.5	18
FES 21	15	4.52	1	3"	A	4.75	5	12
FES 23	18	6.95	2	6"	B	6	9	18
FES 25	18	6.73	2	6"	B	6	9	18
FES 815	15	6.13	1	3"	A	4.75	5	12

*Downstream width, use 3 x pipe diameter upstream.

Gutter Spread Calculations

KALAS-INLET REPORT/GUTTER SPREAD
UPDATED 7/31/20

PHASE 3

Y:\Jobs\9900\Watkins Property\Documents\Reports\Kalas Gutter Spread PNJ.xlsx

Structure Name	Runoff Coef.	Time to Inlet (min)	Catchment Area (Acres)	Rainfall Intensity (in/hr)	Discharge For Gutter Calc (cfs)	Pavement Long Slope (%)	Inlet Type from Carlson	Long. Slope	Flow	Cross-slope	Grate Length	Manning's n	On-grade Spread	Sag Depth	Sag Spread	Structure Name	Gutter Spread from FOC	Street Type	Allow. Spread	Spread Accept-able	Ph. No.
CB 331	0.85	10.00	0.08	4.00	0.27	1.37	Combo-Grade	0.0137	0.27	0.0208	5	0.013	3.78			CB 331	3.78	Collector	11	O. K.	3
CB 332	0.85	10.00	0.08	4.00	0.27	0.23	Combo-Sag	0.0023	0.27	0.0208	5	0.013		0.07	3.31	CB 332	3.31	Collector	11	O. K.	3
CB 332 A	0.85	10.00	0.09	4.00	0.31	0.02	Combo-Sag	0.0002	0.31	0.0208	5	0.013		0.07	3.58	CB 332 A	3.58	Collector	11	O. K.	3
CB 333	0.85	10.00	0.13	4.00	0.44	0.02	Combo-Sag	0.0002	0.44	0.0208	5	0.013		0.10	4.57	CB 333	4.57	Collector	11	O. K.	3
CB 333 A	0.85	10.00	0.12	4.00	0.41	0.23	Combo-Sag	0.0023	0.41	0.0208	5	0.013		0.09	4.34	CB 333 A	4.34	Collector	11	O. K.	3
CB 334	0.79	10.00	0.04	4.00	0.13	1.20	Combo-Grade	0.0120	0.13	0.0208	5	0.013	2.91			CB 334	2.91	Collector	11	O. K.	3
CB 335	0.62	10.00	0.04	4.00	0.10	0.68	Combo-Grade	0.0068	0.10	0.0208	5	0.013	2.95			CB 335	2.95	Collector	11	O. K.	3
CB 336	0.55	10.00	0.30	4.00	0.66	1.07	Combo-Sag	0.0107	0.66	0.0208	5	0.013		0.12	5.98	CB 336	5.98	Local	7.5	O. K.	3
CB 336 A	0.55	10.00	0.30	4.00	0.66	1.07	Combo-Sag	0.0107	0.66	0.0208	5	0.013		0.12	5.98	CB 336 A	5.98	Local	7.5	O. K.	3
CB 337	0.60	10.00	0.37	4.00	0.89	1.07	Combo-Sag	0.0107	0.89	0.0208	5	0.013		0.15	7.28	CB 337	7.28	Local	7.5	O. K.	3
CB 337 A	0.60	10.00	0.37	4.00	0.89	1.07	Combo-Sag	0.0107	0.89	0.0208	5	0.013		0.15	7.28	CB 337 A	7.28	Local	7.5	O. K.	3
CB 338 A	0.72	10.00	0.24	4.00	0.69	1.49	Combo-Sag	0.0149	0.69	0.0208	5	0.013		0.13	6.16	CB 338 A	6.16	Local	7.5	O. K.	3
CB 338 B	0.70	10.00	0.10	4.00	0.28	1.49	Combo-Sag	0.0149	0.28	0.0208	5	0.013		0.07	3.37	CB 338 B	3.37	Local	7.5	O. K.	3
CB 338 C	0.72	10.00	0.06	4.00	0.17	1.64	Combo-Grade	0.0164	0.17	0.0208	5	0.013	3.08			CB 338 C	3.08	Local	7.5	O. K.	3
CB 339	0.71	10.00	0.30	4.00	0.85	1.62	Combo-Grade	0.0162	0.85	0.0208	5	0.013	5.62			CB 339	5.62	Local	7.5	O. K.	3
CB 340	0.63	10.00	0.15	4.00	0.38	2.20	Combo-Grade	0.0220	0.38	0.0208	5	0.013	3.91			CB 340	3.91	Local	7.5	O. K.	3
CB 341	0.60	10.00	0.33	4.00	0.79	3.00	Combo-Grade	0.0300	0.79	0.0208	5	0.013	4.87			CB 341	4.87	Local	7.5	O. K.	3
CB 342	0.75	10.00	0.19	4.00	0.57	2.06	Combo-Grade	0.0206	0.57	0.0208	5	0.013	4.62			CB 342	4.62	Local	7.5	O. K.	3
CB 343	0.81	10.00	0.03	4.00	0.10	0.81	Combo-Grade	0.0081	0.10	0.0208	5	0.013	2.84			CB 343	2.84	Local	7.5	O. K.	3
CB 344	0.50	10.00	0.27	4.00	0.54	1.00	Combo-Sag	0.0100	0.54	0.0208	5	0.013		0.11	5.23	CB 344	5.23	Local	7.5	O. K.	3
CB 345	0.50	10.00	0.30	4.00	0.60	1.00	Combo-Sag	0.0100	0.60	0.0208	5	0.013		0.12	5.61	CB 345	5.61	Local	7.5	O. K.	3
CB 346	0.72	10.00	0.06	4.00	0.17	1.43	Combo-Grade	0.0143	0.17	0.0208	5	0.013	3.16			CB 346	3.16	Local	7.5	O. K.	3
CB 347	0.59	10.00	0.37	4.00	0.87	1.76	Combo-Sag	0.0176	0.87	0.0208	5	0.013		0.15	7.20	CB 347	7.20	Local	7.5	O. K.	3
CB 348	0.38	10.00	0.21	4.00	0.32	1.76	Combo-Sag	0.0176	0.32	0.0208	5	0.013		0.08	3.68	CB 348	3.68	Local	7.5	O. K.	3
CB 350	0.72	10.00	0.04	4.00	0.12	1.48	Combo-Grade	0.0148	0.12	0.0208	5	0.013	2.70			CB 350	2.70	Local	7.5	O. K.	3
CB 352	0.72	10.00	0.04	4.00	0.12	1.47	Combo-Grade	0.0147	0.12	0.0208	5	0.013	2.70			CB 352	2.70	Local	7.5	O. K.	3
CB 353	0.72	10.00	0.06	4.00	0.17	1.48	Combo-Grade	0.0148	0.17	0.0208	5	0.013	3.14			CB 353	3.14	Local	7.5	O. K.	3
CB 354	0.79	10.00	0.11	4.00	0.35	1.48	Combo-Grade	0.0148	0.35	0.0208	5	0.013	4.08			CB 354	4.08	Local	7.5	O. K.	3
CB 355	0.72	10.00	0.08	4.00	0.23	1.89	Combo-Sag	0.0189	0.23	0.0208	5	0.013		0.06	2.96	CB 355	2.96	Local	7.5	O. K.	3
CB 356	0.72	10.00	0.08	4.00	0.23	3.08	Combo-Sag	0.0308	0.23	0.0208	5	0.013		0.06	2.96	CB 356	2.96	Local	7.5	O. K.	3
CB 357	0.70	10.00	0.05	4.00	0.14	1.48	Combo-Grade	0.0148	0.14	0.0208	5	0.013	2.90			CB 357	2.90	Local	7.5	O. K.	3
CB 358	0.72	10.00	0.16	4.00	0.46	1.48	Combo-Grade	0.0148	0.46	0.0208	5	0.013	4.54			CB 358	4.54	Local	7.5	O. K.	3
CB 359	0.72	10.00	0.08	4.00	0.23	1.89	Combo-Grade	0.0189	0.23	0.0208	5	0.013	3.34			CB 359	3.34	Local	7.5	O. K.	3
CB 361	0.50	10.00	0.48	4.00	0.96	1.89	Combo-Grade	0.0189	0.96	0.0208	5	0.013	5.71			CB 361	5.71	Local	7.5	O. K.	3
CB 362	0.85	10.00	0.08	4.00	0.27	3.45	Combo-Grade	0.0345	0.27	0.0208	5	0.013	3.18			CB 362	3.18	Local	7.5	O. K.	3

CB 363	0.50	10.00	0.75	4.00	1.50	4.28	Combo-Grade	0.0428	1.50	0.0208	5	0.013	5.79			CB 363	5.79	Local	7.5	O. K.	3
CB 364	0.64	10.00	0.38	4.00	0.97	0.57	Combo-Grade	0.0057	0.97	0.0208	5	0.013	7.18			CB 364	7.18	Local	7.5	O. K.	3
CB 365	0.50	10.00	0.41	4.00	0.82	0.57	Combo-Grade	0.0057	0.82	0.0208	5	0.013	6.74			CB 365	6.74	Local	7.5	O. K.	3
CB 366	0.63	10.00	0.05	4.00	0.13	5.44	Combo-Grade	0.0544	0.13	0.0208	5	0.013	2.19			CB 366	2.19	Local	7.5	O. K.	3
CB 367	0.50	10.00	0.19	4.00	0.38	5.73	Combo-Grade	0.0573	0.38	0.0208	5	0.013	3.28			CB 367	3.28	Local	7.5	O. K.	3
CB 369	0.50	10.00	0.23	4.00	0.46	0.94	Combo-Grade	0.0094	0.46	0.0208	5	0.013	4.94			CB 369	4.94	Local	7.5	O. K.	3
CB 369 A	0.50	10.00	0.23	4.00	0.46	0.96	Combo-Grade	0.0096	0.46	0.0208	5	0.013	4.92			CB 369 A	4.92	Local	7.5	O. K.	3
CB 370	0.83	10.00	0.08	4.00	0.27	3.78	Combo-Grade	0.0378	0.27	0.0208	5	0.013	3.10			CB 370	3.10	Local	7.5	O. K.	3
CB 371	0.57	10.00	0.28	4.00	0.64	7.48	Combo-Grade	0.0748	0.64	0.0208	5	0.013	3.79			CB 371	3.79	Local	7.5	O. K.	3
CB 372	0.50	10.00	0.45	4.00	0.90	7.48	Combo-Sag	0.0748	0.90	0.0208	5	0.013		0.15	7.35	CB 372	7.35	Local	7.5	O. K.	3
CB 373	0.50	10.00	0.62	4.00	1.24	3.78	Combo-Grade	0.0378	1.24	0.0208	5	0.013	5.52			CB 373	5.52	Local	7.5	O. K.	3
CB 374	0.70	10.00	0.06	4.00	0.17	1.47	Combo-Grade	0.0147	0.17	0.0208	5	0.013	3.11			CB 374	3.11	Local	7.5	O. K.	3
CB 374 A	0.70	10.00	0.06	4.00	0.17	1.48	Combo-Grade	0.0148	0.17	0.0208	5	0.013	3.11			CB 374 A	3.11	Local	7.5	O. K.	3
CB 393	0.72	10.00	0.17	4.00	0.49	0.01	Combo-Sag	0.0001	0.49	0.0208	5	0.013		0.10	4.90	CB 393	4.90	Local	7.5	O. K.	3
CB 393 A	0.72	10.00	0.16	4.00	0.46	0.05	Combo-Sag	0.0005	0.46	0.0208	5	0.013		0.10	4.70	CB 393 A	4.70	Local	7.5	O. K.	3
CB 394	0.73	10.00	0.19	4.00	0.55	0.01	Combo-Sag	0.0001	0.55	0.0208	5	0.013		0.11	5.32	CB 394	5.32	Local	7.5	O. K.	3
CB 394 A	0.73	10.00	0.19	4.00	0.55	0.05	Combo-Sag	0.0005	0.55	0.0208	5	0.013		0.11	5.32	CB 394 A	5.32	Local	7.5	O. K.	3
CB 404	0.72	10.00	0.45	4.00	1.30	2.50	Combo-Grade	0.0250	1.30	0.0208	5	0.013	6.06			CB 404	6.06	Local	7.5	O. K.	3
CB 405	0.60	10.00	0.23	4.00	0.55	0.50	Combo-Sag	0.0050	0.55	0.0208	5	0.013		0.11	5.30	CB 405	5.30	Local	7.5	O. K.	3
CB 405 A	0.60	10.00	0.23	4.00	0.55	0.50	Combo-Sag	0.0050	0.55	0.0208	5	0.013		0.11	5.30	CB 405 A	5.30	Local	7.5	O. K.	3
CB 406	0.50	10.00	0.18	4.00	0.36	2.50	Combo-Sag	0.0250	0.36	0.0208	5	0.013		0.08	3.99	CB 406	3.99	Local	7.5	O. K.	3
CB 407	0.58	10.00	0.22	4.00	0.51	2.50	Combo-Grade	0.0250	0.51	0.0208	5	0.013	4.27			CB 407	4.27	Local	7.5	O. K.	3
CB 408	0.56	10.00	0.56	4.00	1.25	2.50	Combo-Grade	0.0250	1.25	0.0208	5	0.013	5.99			CB 408	5.99	Local	7.5	O. K.	3
CB 409	0.67	10.00	0.60	4.00	1.61	2.69	Combo-Grade	0.0269	1.61	0.0208	5	0.013	6.48			CB 409	6.48	Local	7.5	O. K.	3
CB 410	0.50	10.00	0.26	4.00	0.52	4.27	Combo-Grade	0.0427	0.52	0.0208	5	0.013	3.89			CB 410	3.89	Local	7.5	O. K.	3
CB410A	0.52	10.00	0.18	4.00	0.37	4.64	Combo-Grade	0.0464	0.37	0.0208	5	0.013	3.39			CB410A	3.39	Local	7.5	O. K.	3
CB 411	0.42	10.00	0.30	4.00	0.50	4.66	Combo-Grade	0.0466	0.50	0.0208	5	0.013	3.79			CB 411	3.79	Local	7.5	O. K.	3
CB411A	0.50	10.00	0.70	4.00	1.40	4.66	Combo-Grade	0.0466	1.40	0.0208	5	0.013	5.55			CB411A	5.55	Local	7.5	O. K.	3
CB 412	0.79	10.00	0.04	4.00	0.13	4.44	Combo-Grade	0.0444	0.13	0.0208	5	0.013	2.27			CB 412	2.27	Local	7.5	O. K.	3
CB 413	0.75	10.00	0.26	4.00	0.78	4.89	Combo-Grade	0.0489	0.78	0.0208	5	0.013	4.42			CB 413	4.42	Collector	11	O. K.	3
CB 414	0.58	10.00	0.96	4.00	2.23	4.89	Combo-Grade	0.0489	2.23	0.0208	5	0.013	6.55			CB 414	6.55	Collector	11	O. K.	3
CB 420	0.81	10.00	0.27	4.00	0.87	2.50	Combo-Sag	0.0250	0.87	0.0208	5	0.013		0.15	7.21	CB 420	7.21	Local	7.5	O. K.	3
CB 422	0.85	10.00	0.06	4.00	0.20	8.99	Combo-Grade	0.0899	0.20	0.0208	5	0.013	2.38			CB 422	2.38	Local	7.5	O. K.	3
CB 423	0.85	10.00	0.04	4.00	0.14	4.95	Combo-Grade	0.0495	0.14	0.0208	5	0.013	2.29			CB 423	2.29	Local	7.5	O. K.	3
CB 423 A	0.85	10.00	0.20	4.00	0.68	4.95	Combo-Grade	0.0495	0.68	0.0208	5	0.013	4.19			CB 423 A	4.19	Local	7.5	O. K.	3
CB 424	0.80	10.00	0.13	4.00	0.42	0.45	Combo-Grade	0.0045	0.42	0.0208	5	0.013	5.46			CB 424	5.46	Collector	11	O. K.	3
CB 425	0.71	10.00	0.24	4.00	0.68	1.41	Combo-Grade	0.0141	0.68	0.0208	5	0.013	5.30			CB 425	5.30	Collector	11	O. K.	3
CB 426	0.88	10.00	0.10	4.00	0.35	3.37	Combo-Grade	0.0337	0.35	0.0208	5	0.013	3.52			CB 426	3.52	Collector	11	O. K.	3
CB 427	0.33	10.00	0.12	4.00	0.16	2.08	Combo-Sag	0.0208	0.16	0.0208	5	0.013		0.05	2.31	CB 427	2.31	Local	7.5	O. K.	3
CB 428	0.48	10.00	0.46	4.00	0.88	2.08	Combo-Sag	0.0208	0.88	0.0208	5	0.013		0.15	7.26	CB 428	7.26	Local	7.5	O. K.	3
CB 429	0.51	10.00	0.61	4.00	1.24	3.48	Combo-Grade	0.0348	1.24	0.0208	5	0.013	5.61			CB 429	5.61	Local	7.5	O. K.	3
CB 430	0.65	10.00	0.44	4.00	1.14	2.20	Combo-Grade	0.0220	1.14	0.0208	5	0.013	5.93			CB 430	5.93	Local	7.5	O. K.	3
CB 431	0.40	10.00	0.36	4.00	0.58	2.20	Combo-Grade	0.0220	0.58	0.0208	5	0.013	4.58			CB 431	4.58	Local	7.5	O. K.	3
CB 432	0.85	10.00	0.03	4.00	0.10	1.55	Combo-Sag	0.0155	0.10	0.0208	5	0.013		0.04	1.72	CB 432	1.72	Local	7.5	O. K.	3
CB 433	0.40	10.00	0.23	4.00	0.37	1.55	Combo-Grade	0.0155	0.37	0.0208	5	0.013	4.14			CB 433	4.14	Local	7.5	O. K.	3
CB 434	0.47	10.00	0.88	4.00	1.65	1.51	Combo-Grade	0.0151	1.65	0.0208	5	0.013	7.30			CB 434	7.30	Local	7.5	O. K.	3
CB 435	0.50	10.00	0.29	4.00	0.58	1.53	Combo-Grade	0.0153	0.58	0.0208	5	0.013	4.92			CB 435	4.92	Local	7.5	O. K.	3

CB 436	0.50	10.00	0.46	4.00	0.92	1.53	Combo-Grade	0.0153	0.92	0.0208	5	0.013	5.85			CB 436	5.85	Local	7.5	O. K.	3
CB 438	0.77	10.00	0.12	4.00	0.37	2.20	Combo-Grade	0.0220	0.37	0.0208	5	0.013	3.88			CB 438	3.88	Local	7.5	O. K.	3
CB 439	0.69	10.00	0.16	4.00	0.44	0.17	Combo-Sag	0.0017	0.44	0.0208	5	0.013		0.10	4.57	CB 439	4.57	Collector	11	O. K.	3
CB 439 A	0.69	10.00	0.16	4.00	0.44	0.01	Combo-Sag	0.0001	0.44	0.0208	5	0.013		0.10	4.57	CB 439 A	4.57	Collector	11	O. K.	3
CB 439 B	0.69	10.00	0.16	4.00	0.44	0.16	Combo-Sag	0.0016	0.44	0.0208	5	0.013		0.10	4.57	CB 439 B	4.57	Collector	11	O. K.	3
CB 440	0.55	10.00	0.47	4.00	1.03	1.43	Combo-Grade	0.0143	1.03	0.0208	5	0.013	6.19			CB 440	6.19	Collector	11	O. K.	3
CB 441	0.83	10.00	0.12	4.00	0.40	4.03	Combo-Grade	0.0403	0.40	0.0208	5	0.013	3.56			CB 441	3.56	Collector	11	O. K.	3
CB 442	0.67	10.00	0.13	4.00	0.35	5.01	Combo-Grade	0.0501	0.35	0.0208	5	0.013	3.25			CB 442	3.25	Local	7.5	O. K.	3
CB 443	0.61	10.00	0.33	4.00	0.81	5.01	Combo-Sag	0.0501	0.81	0.0208	5	0.013		0.14	6.82	CB 443	6.82	Local	7.5	O. K.	3
CB443A	0.61	10.00	0.33	4.00	0.81	5.00	Combo-Sag	0.0500	0.81	0.0208	5	0.013		0.14	6.82	CB443A	6.82	Local	7.5	O. K.	3
CB 470	0.66	10.00	0.29	4.00	0.77	0.19	Combo-Sag	0.0019	0.77	0.0208	5	0.013		0.14	6.60	CB 470	6.60	Collector	11	O. K.	3
CB 470 A	0.77	10.00	0.18	4.00	0.55	0.43	Combo-Sag	0.0043	0.55	0.0208	5	0.013		0.11	5.32	CB 470 A	5.32	Collector	11	O. K.	3
CB 471	0.77	10.00	0.18	4.00	0.55	0.19	Combo-Sag	0.0019	0.55	0.0208	5	0.013		0.11	5.32	CB 471	5.32	Collector	11	O. K.	3
CB 471 A	0.77	10.00	0.18	4.00	0.55	0.38	Combo-Sag	0.0038	0.55	0.0208	5	0.013		0.11	5.32	CB 471 A	5.32	Collector	11	O. K.	3
CB 472	0.72	10.00	0.16	4.00	0.46	2.64	Combo-Grade	0.0264	0.46	0.0208	5	0.013	4.07			CB 472	4.07	Collector	11	O. K.	3
CB 473	0.66	10.00	0.45	4.00	1.19	5.74	Combo-Grade	0.0574	1.19	0.0208	5	0.013	5.02			CB 473	5.02	Collector	11	O. K.	3
CB 474	0.56	10.00	0.16	4.00	0.36	5.74	Combo-Grade	0.0574	0.36	0.0208	5	0.013	3.20			CB 474	3.20	Collector	11	O. K.	3
CB 475	0.56	10.00	0.66	4.00	1.48	5.74	Combo-Grade	0.0574	1.48	0.0208	5	0.013	5.45			CB 475	5.45	Collector	11	O. K.	3
CB 476	0.80	10.00	0.10	4.00	0.32	3.93	Combo-Grade	0.0393	0.32	0.0208	5	0.013	3.30			CB 476	3.30	Collector	11	O. K.	3
CB 477	0.60	10.00	0.22	4.00	0.53	4.78	Combo-Sag	0.0478	0.53	0.0208	5	0.013		0.11	5.15	CB 477	5.15	Local	7.5	O. K.	3
CB477A	0.60	10.00	0.22	4.00	0.53	1.07	Combo-Sag	0.0107	0.53	0.0208	5	0.013		0.11	5.15	CB477A	5.15	Local	7.5	O. K.	3
CB 478	0.58	10.00	0.35	4.00	0.81	4.78	Combo-Sag	0.0478	0.81	0.0208	5	0.013		0.14	6.86	CB 478	6.86	Local	7.5	O. K.	3
CB 478 A	0.50	10.00	0.35	4.00	0.70	4.78	Combo-Sag	0.0478	0.70	0.0208	5	0.013		0.13	6.22	CB 478 A	6.22	Local	7.5	O. K.	3
CB 479	0.44	10.00	0.93	4.00	1.64	3.76	Combo-Grade	0.0376	1.64	0.0208	5	0.013	6.13			CB 479	6.13	Local	7.5	O. K.	3
CB 480	0.63	10.00	0.47	4.00	1.18	2.09	Combo-Grade	0.0209	1.18	0.0208	5	0.013	6.06			CB 480	6.06	Local	7.5	O. K.	3
CB 481	0.44	10.00	0.93	4.00	1.64	2.51	Combo-Grade	0.0251	1.64	0.0208	5	0.013	6.61			CB 481	6.61	Collector	11	O. K.	3
CB 482	0.79	10.00	0.33	4.00	1.04	1.88	Combo-Grade	0.0188	1.04	0.0208	5	0.013	5.89			CB 482	5.89	Collector	11	O. K.	3
CB 483	0.28	10.00	0.53	4.00	0.59	1.20	Combo-Grade	0.0120	0.59	0.0208	5	0.013	5.19			CB 483	5.19	Collector	11	O. K.	3
CB 484	0.61	10.00	0.27	4.00	0.66	1.20	Combo-Grade	0.0120	0.66	0.0208	5	0.013	5.40			CB 484	5.40	Collector	11	O. K.	3
CB 484 A	0.61	10.00	0.27	4.00	0.66	1.20	Combo-Grade	0.0120	0.66	0.0208	5	0.013	5.40			CB 484 A	5.40	Collector	11	O. K.	3
CB 485	0.50	10.00	0.23	4.00	0.46	1.20	Combo-Grade	0.0120	0.46	0.0208	5	0.013	4.72			CB 485	4.72	Collector	11	O. K.	3
CB 486	0.59	10.00	0.31	4.00	0.73	6.95	Combo-Sag	0.0695	0.73	0.0208	5	0.013		0.13	6.40	CB 486	6.40	Local	7.5	O. K.	3
CB 487	0.63	10.00	0.10	4.00	0.25	6.65	Combo-Sag	0.0665	0.25	0.0208	5	0.013		0.07	3.14	CB 487	3.14	Local	7.5	O. K.	3
CB 488	0.50	10.00	0.22	4.00	0.44	6.32	Combo-Grade	0.0632	0.44	0.0208	5	0.013	3.40			CB 488	3.40	Local	7.5	O. K.	3
CB 490	0.69	10.00	0.24	4.00	0.66	1.20	Combo-Grade	0.0120	0.66	0.0208	5	0.013	5.41			CB 490	5.41	Collector	11	O. K.	3
CB 491	0.35	10.00	0.53	4.00	0.74	1.20	Combo-Grade	0.0120	0.74	0.0208	5	0.013	5.64			CB 491	5.64	Collector	11	O. K.	3
CB 801	0.89	10.00	0.10	4.00	0.36	2.75	Combo-Grade	0.0275	0.36	0.0208	5	0.013	3.67			CB 801	3.67	Collector	11	O. K.	3
CB 802	0.80	10.00	0.08	4.00	0.26	2.75	Combo-Grade	0.0275	0.26	0.0208	5	0.013	3.24			CB 802	3.24	Collector	11	O. K.	3
CB 803	0.80	10.00	0.08	4.00	0.26	2.75	Combo-Grade	0.0275	0.26	0.0208	5	0.013	3.24			CB 803	3.24	Collector	11	O. K.	3
CB 804	0.74	10.00	0.03	4.00	0.09	2.75	Combo-Grade	0.0275	0.09	0.0208	5	0.013	2.18			CB 804	2.18	Collector	11	O. K.	3
CB 805	0.80	10.00	0.02	4.00	0.06	1.22	Combo-Grade	0.0122	0.06	0.0208	5	0.013	2.24			CB 805	2.24	Collector	11	O. K.	3
CB 806	0.81	10.00	0.05	4.00	0.16	1.22	Combo-Grade	0.0122	0.16	0.0208	5	0.013	3.18			CB 806	3.18	Local	7.5	O. K.	3
CB 807	0.72	10.00	0.08	4.00	0.23	1.22	Combo-Grade	0.0122	0.23	0.0208	5	0.013	3.63			CB 807	3.63	Local	7.5	O. K.	3
CB 808	0.60	10.00	0.10	4.00	0.24	1.22	Combo-Grade	0.0122	0.24	0.0208	5	0.013	3.68			CB 808	3.68	Local	7.5	O. K.	3
CB 809	0.72	10.00	0.21	4.00	0.60	1.05	Combo-Sag	0.0105	0.60	0.0208	5	0.013		0.12	5.64	CB 809	5.64	Local	7.5	O. K.	3
CB 810	0.58	10.00	0.42	4.00	0.97	1.05	Combo-Sag	0.0105	0.97	0.0208	5	0.013		0.16	7.75	CB 810	7.75	Local	7.5	N.G.	3
CB 811	0.57	10.00	0.34	4.00	0.78	2.11	Combo-Grade	0.0211	0.78	0.0208	5	0.013	5.16			CB 811	5.16	Collector	11	O. K.	3

CB 813	0.80	10.00	0.10	4.00	0.32	2.31	Combo-Grade	0.0231	0.32	0.0208	5	0.013	3.64			CB 813	3.64	Collector	11	**O. K.**	3
CB 814	0.57	10.00	0.84	4.00	1.92	4.17	Combo-Grade	0.0417	1.92	0.0208	5	0.013	6.38			CB 814	6.38	Local	7.5	**O. K.**	3

Storm Pipe Calculations

KALAS- PHASE THREE ONLY-STORM DRAINAGE
CURRENT AS OF 06/02/20
Time of Concentration = 10.0 Min per NCDOT Inlet Design

STORMWATER PIPING SUMMARY KALAS P.U.D. -PHASE THREE

Down Stream Structure	Up Stream Structure	Area (Acres)	Runoff Coef.	Tc (min)	Q(10)I Flow (cfs)	Pipe Size (in)	Length (ft)	Slope (%)	DS Rim Elev (ft)	US Rim Elev (ft)	DS Invert (ft)	US Invert (ft)	DS Velocity (fps)
CB 331	CB 332	0.08	0.85	10.00	2.17	15	73.93	0.50	350.64	350.10	342.45	342.82	3.82
CB 331	CB 334	0.04	0.79	10.00	4.96	18	62.09	1.60	350.64	351.42	342.45	343.44	6.98
CB 332	CB 332 A	0.09	0.85	10.00	1.76	15	9.00	1.00	350.10	350.09	343.02	343.11	3.07
CB 332 A	CB 333	0.13	0.85	10.00	1.30	15	41.00	1.00	350.09	350.09	343.31	343.72	2.77
CB 333	CB 333 A	0.12	0.85	10.00	0.63	15	9.00	1.00	350.09	350.10	343.92	344.01	2.12
CB 334	CB 335	0.04	0.62	10.00	4.83	18	108.80	1.25	351.42	351.67	343.64	345.00	4.46
CB 335	CB 336	0.30	0.55	10.00	4.71	18	45.96	0.50	351.67	350.19	345.20	345.43	3.66
CB 336	CB 336 A	0.30	0.55	10.00	1.01	15	9.00	0.50	350.19	350.60	345.83	345.88	1.66
CB 336	CB 337	0.37	0.60	10.00	2.72	15	27.00	0.52	350.19	350.19	345.62	345.76	2.97
CB 337	CB 337 A	0.37	0.60	10.00	1.36	15	9.00	2.78	350.19	350.60	345.75	346.00	1.44
CB 338 A	CB 338 B	0.10	0.70	10.00	15.42	24	27.00	0.40	356.51	356.51	351.78	351.89	5.68
CB 338 B	CB 338 C	0.06	0.72	10.00	11.99	24	42.16	1.59	356.51	358.02	352.09	352.76	4.30
CB 338 B	FES 338 D	1.34	0.42	10.00	3.45	18	23.02	0.50	356.51	353.27	352.27	352.39	2.02
CB 338 C	CB 339	0.30	0.71	10.00	0.91	18	27.05	0.50	358.02	358.01	352.96	353.10	0.53
CB 338 C	CB 340	0.15	0.63	10.00	10.64	24	111.08	1.03	358.02	360.18	352.96	354.10	4.14
CB 340	CB 341	0.33	0.60	10.00	5.27	18	153.88	1.00	360.18	364.24	354.60	356.14	4.50
CB 340	YI 351	1.93	0.44	10.00	1.56	18	213.30	0.70	360.18	359.00	354.30	355.80	1.10
CB 341	CB 342	0.19	0.75	10.00	4.36	18	153.88	2.81	364.24	368.23	356.34	360.66	3.82
CB 342	CB 343	0.03	0.81	10.00	3.76	15	68.21	3.29	368.23	369.09	360.91	363.15	3.28
CB 343	CB 344	0.27	0.50	10.00	3.65	15	42.17	0.54	369.09	368.34	363.35	363.58	3.62
CB 344	CB 345	0.30	0.50	10.00	0.92	15	27.00	0.51	368.34	368.34	363.77	363.91	1.17
CB 344	CB 346	0.06	0.72	10.00	2.04	15	201.96	3.08	368.34	375.31	363.77	370.00	2.49
CB 346	CB 347	0.37	0.59	10.00	1.82	15	41.14	0.92	375.31	374.96	370.20	370.57	3.21
CB 347	CB 348	0.21	0.38	10.00	0.49	15	27.00	0.49	374.96	374.96	370.77	370.91	1.38
CB 350	CB 352	0.04	0.72	10.00	51.19	42	64.32	0.59	358.36	359.29	351.99	352.38	6.92
CB 350	FES 350 A	0.30	0.43	10.00	0.61	15	24.00	0.98	358.36	354.55	352.02	352.26	0.50
CB 352	CB 353	0.06	0.72	10.00	50.64	42	63.17	0.61	359.29	360.20	352.58	352.96	6.83
CB 352	FES 352 A	0.26	0.45	10.00	0.57	15	24.00	0.48	359.29	355.48	352.90	353.01	0.46
CB 353	CB 354	0.11	0.79	10.00	49.53	42	102.76	1.20	360.20	361.68	353.16	354.39	6.44
CB 353	FES 353 A	0.46	0.50	10.00	0.97	15	24.00	1.84	360.20	356.40	353.56	354.00	0.79
CB 354	CB 355	0.08	0.72	10.00	49.35	42	45.16	0.50	361.68	361.28	354.59	354.82	5.59
CB 355	CB 356	0.08	0.72	10.00	32.90	36	26.94	0.76	361.28	361.28	355.42	355.62	5.19
CB 355	CB 359	0.08	0.72	10.00	18.15	30	127.82	1.00	361.28	363.86	355.82	357.10	4.19
CB 356	CB 357	0.05	0.70	10.00	30.90	36	49.57	0.84	361.28	362.85	355.61	356.02	4.78
CB 356	YI 356 A	0.60	0.60	10.00	0.97	15	20.86	0.43	361.28	358.80	357.17	357.26	1.05
CB 357	CB 358	0.16	0.72	10.00	0.56	15	27.10	0.52	362.85	362.85	357.28	357.43	0.46
CB 357	CB 374	0.06	0.70	10.00	30.30	30	87.91	1.50	362.85	364.11	356.67	357.99	6.88
CB 359	CB 361	0.48	0.50	10.00	1.00	15	28.03	0.65	363.86	364.01	357.15	357.33	0.82
CB 359	CB 362	0.08	0.85	10.00	14.85	24	130.78	3.52	363.86	366.99	357.80	362.40	4.86
CB 359	YI 360	0.60	0.50	10.00	0.70	15	42.66	0.77	363.86	361.55	357.15	357.48	0.57
CB 362	CB 363	0.75	0.50	10.00	1.48	15	45.61	2.67	366.99	368.43	363.00	364.22	1.34
CB 362	CB 364	0.38	0.64	10.00	11.94	24	43.13	0.63	366.99	367.90	362.60	362.87	4.56
CB 364	CB 365	0.41	0.50	10.00	10.70	24	27.00	0.69	367.90	367.90	363.07	363.26	3.90
CB 365	CB 366	0.05	0.63	10.00	2.87	18	43.13	5.30	367.90	370.95	363.76	366.04	1.98
CB 365	CB 369	0.23	0.50	10.00	7.15	18	145.69	0.73	367.90	369.29	363.76	364.83	4.55
CB 366	CB 367	0.19	0.50	10.00	2.62	15	70.67	5.21	370.95	375.24	366.29	369.97	2.42
CB 367	YI 368	0.77	0.45	10.00	1.43	15	28.00	5.81	375.24	377.34	370.17	371.80	2.30
CB 369	CB 369 A	0.23	0.50	10.00	4.97	18	9.00	0.40	369.29	368.88	365.03	365.06	3.88

CB 369	YI 369 A	0.47	0.55	10.00	1.58	15	82.77	8.88	369.29	378.87	365.13	372.48	1.78
CB 369 A	CB 370	0.08	0.83	10.00	4.53	18	180.08	2.01	368.88	373.39	365.26	368.88	3.73
CB 370	CB 371	0.28	0.57	10.00	4.02	15	44.69	1.35	373.39	374.52	369.08	369.68	3.99
CB 371	CB 372	0.45	0.50	10.00	3.25	15	27.00	0.99	374.52	374.52	369.88	370.15	3.62
CB 372	CB 373	0.62	0.50	10.00	1.27	15	44.43	0.90	374.52	376.95	370.35	370.75	1.81
CB 374	CB 374 A	0.06	0.70	10.00	30.28	30	100.60	0.90	364.11	365.58	358.19	359.10	6.64
CB 374 A	CB 375	0.12	0.70	10.00	26.01	30	100.00	1.49	365.58	367.06	359.30	360.79	5.96
CB 404	CB 405	0.23	0.60	10.00	1.69	15	69.42	0.62	308.48	306.23	298.75	299.18	1.73
CB 404	CB 406	0.18	0.50	10.00	13.20	24	36.59	9.48	308.48	309.06	298.20	301.67	4.87
CB 405	CB 405 A	0.23	0.60	10.00	0.85	15	8.00	1.71	306.23	306.23	299.38	299.52	2.08
CB 406	CB 407	0.22	0.58	10.00	12.59	24	39.46	3.62	309.06	310.07	301.87	303.30	4.68
CB 407	CB 408	0.56	0.56	10.00	11.49	24	105.43	2.60	310.07	312.90	303.50	306.24	4.55
CB 408	CB 409	0.60	0.67	10.00	9.63	24	160.14	2.50	312.90	316.92	306.44	310.44	4.19
CB 409	CB 410	0.38	0.63	10.00	8.01	24	160.00	3.37	316.92	322.59	310.64	316.04	4.29
CB 410	CB 411	0.97	0.42	10.00	6.15	18	144.73	4.40	322.59	329.11	316.54	322.91	3.72
CB 411	CB 412	0.04	0.79	10.00	4.74	15	133.53	4.00	329.11	335.15	323.11	328.45	4.44
CB 412	CB 413	0.26	0.75	10.00	4.29	15	44.23	6.30	335.15	338.12	328.65	331.44	4.17
CB 413	CB 414	0.96	0.58	10.00	2.00	15	41.00	0.71	338.12	338.12	331.64	331.93	2.39
CB 420	JB 421	0.06	0.72	10.00	24.37	30	107.67	8.85	313.46	324.02	305.97	315.50	5.81
CB 423	CB 423 A	0.20	0.85	10.00	0.81	15	27.00	1.76	329.75	329.75	323.61	324.08	1.11
CB 423	CB 424	0.13	0.80	10.00	22.87	30	56.34	5.07	329.75	331.49	322.56	325.41	5.55
CB 424	CB 425	0.24	0.71	10.00	15.65	30	67.56	0.50	331.49	332.00	325.61	325.95	4.43
CB 424	CB 439	0.16	0.69	10.00	6.90	24	43.96	0.50	331.49	331.44	325.91	326.13	3.11
CB 425	CB 426	0.10	0.88	10.00	14.99	24	108.27	1.72	332.00	334.64	326.45	328.32	5.21
CB 426	CB 427	0.12	0.33	10.00	14.62	24	38.89	3.51	334.64	335.32	328.52	329.88	5.14
CB 427	CB 428	0.46	0.48	10.00	14.44	24	27.00	2.33	335.32	335.41	330.08	330.71	5.13
CB 428	CB 429	0.61	0.51	10.00	12.62	24	62.00	2.00	335.41	337.33	330.91	332.15	4.33
CB 429	CB 430	0.44	0.65	10.00	10.97	24	70.00	2.00	337.33	339.38	332.35	333.75	4.91
CB 430	CB 431	0.36	0.40	10.00	9.74	18	50.10	1.40	339.38	340.49	334.25	334.95	6.32
CB 431	CB 432	0.03	0.85	10.00	8.63	18	63.60	0.85	340.49	340.40	335.15	335.69	5.15
CB 431	CB 438	0.12	0.77	10.00	0.47	15	27.03	1.73	340.49	340.49	335.50	335.97	0.58
CB 432	CB 433	0.23	0.40	10.00	8.43	18	47.32	1.15	340.40	340.80	335.89	336.44	4.81
CB 433	CB 434	0.88	0.47	10.00	6.99	18	29.17	1.01	340.80	341.38	336.64	336.93	4.17
CB 434	CB 435	0.29	0.50	10.00	5.39	18	46.09	1.50	341.38	342.29	337.13	337.82	3.95
CB 435	CB 436	0.46	0.50	10.00	4.34	15	63.82	1.18	342.29	343.23	338.02	338.78	4.30
CB 436	YI 437	1.14	0.50	10.00	2.83	15	145.44	6.78	343.23	353.50	338.98	348.84	2.92
CB 439	CB 439 A	0.16	0.69	10.00	6.26	24	9.00	0.50	331.44	331.44	326.33	326.38	3.38
CB 439 A	CB 439 B	0.16	0.69	10.00	5.62	24	9.00	0.56	331.44	331.44	326.57	326.62	3.46
CB 439 B	CB 440	0.47	0.55	10.00	4.49	15	67.25	0.51	331.44	332.02	327.37	327.71	4.99
CB 440	CB 441	0.12	0.83	10.00	3.48	15	136.53	2.10	332.02	336.00	327.91	330.77	3.33
CB 441	CB 442	0.13	0.67	10.00	2.93	15	49.19	3.10	336.00	337.93	330.97	332.50	3.07
CB 442	CB 443	0.33	0.61	10.00	2.47	15	27.00	1.02	337.93	337.93	332.70	332.97	3.28
CB 443	CB 443 A	0.33	0.61	10.00	1.23	15	5.00	1.00	337.93	338.18	333.17	333.22	2.13
CB 470	CB 470 A	0.18	0.77	10.00	0.85	15	9.01	0.47	331.49	331.52	325.67	325.72	2.89
CB 470	CB 471	0.18	0.77	10.00	1.70	15	41.00	1.75	331.49	331.49	324.75	325.47	5.44
CB 470	CB 472	0.16	0.72	10.00	24.42	36	96.87	2.50	331.49	332.75	324.65	327.07	12.15
CB 471	CB 471 A	0.18	0.77	10.00	0.85	15	9.00	0.50	331.49	331.51	325.67	325.72	2.16
CB 472	CB 473	0.45	0.66	10.00	23.48	36	129.39	4.84	332.75	340.76	327.47	333.74	3.38
CB 473	CB 474	0.16	0.56	10.00	22.43	36	42.58	2.00	340.76	341.33	333.94	334.79	5.31
CB 474	CB 475	0.66	0.56	10.00	21.45	36	103.49	6.00	341.33	347.65	334.99	341.20	4.53
CB 475	CB 476	0.10	0.80	10.00	20.30	30	260.35	5.39	347.65	361.52	341.70	355.72	4.14
CB 476	CB 477	0.22	0.60	10.00	20.01	30	45.96	3.00	361.52	362.41	355.92	357.30	4.74
CB 477	CB 477 A	0.22	0.60	10.00	0.81	15	5.02	1.00	362.41	362.42	358.55	358.60	1.00
CB 477	CB 478	0.35	0.58	10.00	18.59	30	27.00	1.00	362.41	362.41	357.50	357.77	4.51
CB 478	CB 478 A	0.35	0.50	10.00	5.12	15	5.00	1.00	362.41	362.42	358.50	358.55	4.19
CB 478	CB 481	0.93	0.44	10.00	11.60	24	45.86	0.50	362.41	364.47	358.27	358.50	4.65

CB 478 A	CB 479	0.93	0.44	10.00	3.25	18	136.00	3.38	362.42	368.46	359.02	363.61	3.16
CB 479	CB 480	0.47	0.63	10.00	1.18	15	150.00	2.43	368.46	372.96	363.91	367.56	2.69
CB 481	CB 482	0.33	0.79	10.00	1.07	18	60.25	0.17	364.47	365.42	359.03	359.13	0.78
CB 481	CB 483	0.53	0.28	10.00	8.75	24	139.49	1.46	364.47	366.70	358.70	360.74	3.48
CB 483	CB 484	0.27	0.61	10.00	7.92	18	80.00	1.00	366.70	367.65	361.24	362.04	6.54
CB 484	CB 484 A	0.27	0.61	10.00	6.97	18	9.00	0.50	367.65	367.76	362.24	362.29	5.17
CB 484 A	CB 485	0.23	0.50	10.00	6.20	18	72.90	0.67	367.76	368.63	362.58	363.06	4.79
CB 485	CB 486	0.31	0.59	10.00	5.71	18	46.17	1.00	368.63	368.33	363.26	363.72	4.17
CB 486	CB 487	0.10	0.63	10.00	4.66	18	27.00	0.49	368.33	368.33	363.92	364.06	3.35
CB 487	CB 488	0.22	0.50	10.00	2.20	15	131.96	6.00	368.33	377.49	364.31	372.22	2.51
CB 487	CB 490	0.24	0.69	10.00	1.87	15	46.06	1.01	368.33	369.73	364.31	364.77	2.16
CB 488	YI 489	0.54	0.50	10.00	1.66	15	95.32	5.00	377.49	383.28	372.42	377.19	2.85
CB 490	CB 491	0.53	0.35	10.00	0.81	15	32.00	1.00	369.73	370.12	364.97	365.29	2.08
CB 801	CB 802	0.08	0.80	10.00	0.72	15	127.12	0.56	366.71	363.22	358.40	359.11	0.59
CB 801	CB 804	0.03	0.74	10.00	1.14	15	41.00	1.60	366.71	366.71	358.45	359.11	0.93
CB 801	CB 809	0.21	0.72	10.00	6.55	18	45.96	7.18	366.71	367.02	359.70	363.00	4.20
CB 802	CB 803	0.08	0.80	10.00	0.35	15	41.00	0.50	363.22	363.22	359.31	359.52	0.63
CB 804	CB 805	0.02	0.80	10.00	1.02	15	45.96	0.50	366.71	367.02	359.31	359.53	1.77
CB 805	CB 806	0.05	0.81	10.00	0.23	15	27.00	0.48	367.02	367.02	360.95	361.09	2.02
CB 805	CB 807	0.08	0.72	10.00	0.67	15	141.83	0.50	367.02	365.31	359.73	360.44	2.71
CB 807	CB 808	0.10	0.60	10.00	0.32	15	27.00	0.50	365.31	365.31	360.64	360.78	2.22
CB 809	CB 810	0.42	0.58	10.00	5.71	18	27.00	1.44	367.02	367.02	363.40	363.79	6.98
CB 810	CB 811	0.34	0.57	10.00	1.27	15	45.96	0.50	367.02	369.20	364.04	364.27	1.74
CB 810	CB 814	0.84	0.57	10.00	1.77	15	143.21	3.65	367.02	372.99	364.04	369.26	2.39
CB 811	CB 813	0.10	0.80	10.00	0.42	15	41.00	0.50	369.20	369.20	364.47	364.67	1.47
FES 30	JB 31	0.00	0.50	10.00	28.23	24	165.27	1.00	353.64	365.21	353.00	354.65	9.36
FES 330	CB 331	0.08	0.85	10.00	7.42	18	43.46	0.50	342.52	350.64	340.50	340.72	5.58
FES 338	CB 338 A	0.24	0.72	10.00	16.32	24	20.97	0.40	353.45	356.51	351.50	351.58	6.66
FES 349	CB 350	0.04	0.72	10.00	51.78	42	58.98	0.50	353.71	358.36	351.50	351.79	8.08
FES 392	JB 392 A	0.00	0.90	10.00	3.13	15	22.66	0.40	352.50	356.41	351.03	351.12	4.33
FES 401	YI 402	2.40	0.40	10.00	21.60	24	40.03	1.25	291.61	292.94	280.50	281.00	9.06
FES 419	JB 419 A	0.00	0.50	10.00	25.37	30	39.07	0.77	297.26	299.00	293.50	293.80	7.95
FES 469	JB 469A	0.00	0.50	10.00	27.73	36	31.22	1.00	320.35	317.97	314.50	314.81	9.02
FES 800	CB 801	0.10	0.89	10.00	8.36	18	35.14	1.99	363.30	366.71	357.50	358.20	8.66
FES SCM 3B	OS SCM 3B	0.00	0.50	10.00	98.00	48	54.00	0.54	348.94	351.17	347.71	348.00	9.69
FES SCM 3C	OS SCM 3C	0.00	0.50	10.00	13.70	18	64.00	0.50	338.99	345.00	336.68	337.00	8.08
FES SCM 4B	OS SCM 4B	0.00	0.50	10.00	28.10	30	34.00	1.47	316.56	323.62	310.50	311.00	10.46
FES SCM 4E	OS SCM 4E	0.00	0.50	10.00	24.90	24	96.00	1.00	278.00	284.39	276.00	276.96	8.51
JB 31	YI 32	9.21	0.50	10.00	28.23	24	75.53	0.50	365.21	359.19	354.85	355.23	8.99
JB 392 A	CB 393	0.17	0.72	10.00	3.13	15	127.25	0.40	356.41	355.69	351.22	351.73	3.15
JB 419 A	CB 420	0.27	0.81	10.00	25.37	30	148.33	7.80	299.00	313.46	294.20	305.77	6.55
JB 421	CB 422	0.06	0.85	10.00	0.30	15	36.92	1.01	324.02	322.99	316.75	317.12	0.40
JB 421	CB 423	0.04	0.85	10.00	24.02	30	86.12	7.73	324.02	329.75	315.70	322.36	5.73
JB 469A	CB 470	0.29	0.66	10.00	27.73	36	37.36	9.21	317.97	331.49	315.21	318.65	5.96
YI 402	YI 403	0.00	0.50	10.00	16.50	24	132.83	9.49	292.94	304.09	281.75	294.35	5.77
YI 403	CB 404	0.45	0.72	10.00	15.67	24	48.00	7.19	304.09	308.48	294.55	298.00	5.78

Anti Floatation Calculations

Concrete Riser Anti-flotation Block

Project: Kalas Falls Riser: SCM#3B Date: 2/3/21

Side 1: 6 ft.
Side 2: 6 ft.

Wall thickness = 6 in.
X-Sect. Area = 49.00 s. f.

Top of Riser Elev.	353.33
Bottom Elev.	348.00
Height	5.33

Volume of Water Displaced 261.17 c. f. Weight of Water Displaced 16304.84 lbs.

Assume:
Concrete weighs 150#/c. f. and water weighs 62.43#/c. f.

Weight above bottom (no slots or weirs cut in) 10393.50 lbs.

Deduct for 1st slot or weir	ft. long		ft. high	0.00 lbs.
Deduct for 2nd slot or weir	ft. long		ft. high	0.00 lbs.
Deduct for 3rd slot or weir	ft. long		ft. high	0.00 lbs.

Total Weight above bottom 10393.50 lbs.

Net weight of concrete bottom is 5911.34 lbs.

Volume of concrete block required is 67.50 c. f.

Bottom thickness required is 1.3776 ft. = 16.5316 in.

Use 17 in. thick

Concrete Riser Anti-flotation Block

Project: Kalas Falls Riser: SCM#3C Date: 2/3/21

Side 1: 4 ft.
Side 2: 4 ft.

Wall thickness = 6 in.
X-Sect. Area = 25.00 s. f.

Top of Riser Elev.	342.00
Bottom Elev.	337.00
Height	5.00

Volume of Water Displaced 125.00 c. f. Weight of Water Displaced 7803.75 lbs.

Assume:
Concrete weighs 150#/c. f. and water weighs 62.43#/c. f.

Weight above bottom (no slots or weirs cut in) 6750.00 lbs.

Deduct for 1st slot or weir	6.00	ft. long	0.5 ft. high	-225.00 lbs.
Deduct for 2nd slot or weir		ft. long	ft. high	0.00 lbs.
Deduct for 3rd slot or weir		ft. long	ft. high	0.00 lbs.

Total Weight above bottom 6525.00 lbs.

Net weight of concrete bottom is 1278.75 lbs.

Volume of concrete block required is 14.60 c. f.

Bottom thickness required is 0.5841 ft. = 7.0092 in.

Use 7.5 in. thick

Concrete Riser Anti-flotation Block

Project: Kalas Falls Riser: SCM#4B Date: 2/3/21

Side 1: 5 ft.
Side 2: 5 ft.

Wall thickness = 6 in.
X-Sect. Area = 36.00 s. f.

Top of Riser Elev.	326.50
Bottom Elev.	310.50
Height	16.00

Volume of Water Displaced 576.00 c. f. Weight of Water Displaced 35959.68 lbs.

Assume:
Concrete weighs 150#/c. f. and water weighs 62.43#/c. f.

Weight above bottom (no slots or weirs cut in) 26400.00 lbs.

Deduct for 1st slot or weir	2.00 ft. long	0.5 ft. high	-75.00 lbs.
Deduct for 2nd slot or weir	ft. long	ft. high	0.00 lbs.
Deduct for 3rd slot or weir	ft. long	ft. high	0.00 lbs.

Total Weight above bottom 26325.00 lbs.

Net weight of concrete bottom is 9634.68 lbs.

Volume of concrete block required is 110.02 c. f.

Bottom thickness required is 3.0562 ft. = 36.6742 in.

Use 37 in. thick

Concrete Riser Anti-flotation Block

Project: Kalas Falls Riser: SCM#4C Date: 2/3/21

Side 1: 4 ft.
Side 2: 4 ft.

Wall thickness = 6 in.
X-Sect. Area = 25.00 s. f.

Top of Riser Elev.	296.90
Bottom Elev.	290.00
Height	6.90

Volume of Water Displaced 172.50 c. f. Weight of Water Displaced 10769.18 lbs.

Assume:
Concrete weighs 150#/c. f. and water weighs 62.43#/c. f.

Weight above bottom (no slots or weirs cut in) 9315.00 lbs.

Deduct for 1st slot or weir	4.00	ft. long	0.5 ft. high	-150.00 lbs.
Deduct for 2nd slot or weir		ft. long	ft. high	0.00 lbs.
Deduct for 3rd slot or weir		ft. long	ft. high	0.00 lbs.

Total Weight above bottom 9165.00 lbs.

Net weight of concrete bottom is 1604.18 lbs.

Volume of concrete block required is 18.32 c. f.

Bottom thickness required is 0.7328 ft. = 8.7930 in.

Use 9 in. thick

Concrete Riser Anti-flotation Block

Project: Kalas Falls Riser: SCM#4E Date: 2/3/21

Side 1: 6 ft.
Side 2: 6 ft.

Wall thickness = 6 in.
X-Sect. Area = 49.00 s. f.

Top of Riser Elev.	284.00
Bottom Elev.	277.00
Height	7.00

Volume of Water Displaced 343.00 c. f. Weight of Water Displaced 21413.49 lbs.

Assume:
Concrete weighs 150#/c. f. and water weighs 62.43#/c. f.

Weight above bottom (no slots or weirs cut in) 13650.00 lbs.

Deduct for 1st slot or weir	6.75	ft. long	0.5 ft. high	-253.13 lbs.
Deduct for 2nd slot or weir		ft. long	ft. high	0.00 lbs.
Deduct for 3rd slot or weir		ft. long	ft. high	0.00 lbs.

Total Weight above bottom 13396.88 lbs.

Net weight of concrete bottom is 8016.62 lbs.

Volume of concrete block required is 91.55 c. f.

Bottom thickness required is 1.8683 ft. = 22.4192 in.

Use 22.5 in. thick

Concrete Riser Anti-flotation Block

Project: Kalas Falls Riser: SCM#8A Date: 2/3/21

Side 1: 3 ft.
Side 2: 3 ft.

Wall thickness = 6 in.
X-Sect. Area = 16.00 s. f.

Top of Riser Elev.	360.50
Bottom Elev.	354.00
Height	6.50

Volume of Water Displaced 104.00 c. f. Weight of Water Displaced 6492.72 lbs.

Assume:
Concrete weighs 150#/c. f. and water weighs 62.43#/c. f.

Weight above bottom (no slots or weirs cut in) 6825.00 lbs.

Deduct for 1st slot or weir	ft. long		ft. high	0.00 lbs.
Deduct for 2nd slot or weir	ft. long		ft. high	0.00 lbs.
Deduct for 3rd slot or weir	ft. long		ft. high	0.00 lbs.

Total Weight above bottom 6825.00 lbs.

Net weight of concrete bottom is -332.28 lbs.

Volume of concrete block required is -3.79 c. f.

Bottom thickness required is -0.2372 ft. = -2.8458 in.

Use 8 in. thick

Erosion Control Calculations

SEDIMENT BASINS AND TRAPS

Project: Kalas Falls, Phase 3
Date: 2/8/21
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BASIN No.	TYPE	DRAIN AREA (ac.)	DIST. AREA (AC.)	REQ'D VOL. (c.f.)	REQ'D S. A. (s. f.)	SIZE (W' X L' X D') SCM's show equivalents					WEIR LENGTH (ft.)	VOL. Provided (c. f.)	VOL. GOOD
		0.00	0.00	0	0		x		x	3.5		0	NO
SCM#3B	2	18.31	6.81	12258	17913	133	x	266	x	6	24	212268	YES
SCM#3C	2	7.54	3.27	5889	5440	73	x	150	x	5.5	12	60225	YES
SCM#4B	2	9.65	4.91	8838	10506	69	x	142	x	7.5	24	73485	YES
		0.00	0.00	0	0		x		x	3.5		0	NO
SB#403	2	0.61	0.34	611	509	15	x	34	x	3.5	10	1785	YES
SB#404	2	5.72	3.27	5881	4820	49	x	99	x	3.5	12	16978.5	YES
SCM#4C	2	14.89	4.45	8019	16084	87	x	175	x	8.5	12	129413	YES
		0.00	0.00	0	0		x		x	3.5		0	NO
SB#406	2	2.10	0.57	1030	1609	28	x	58	x	3.5	10	5684	YES
SCM#4E	2	14.46	7.12	12811	11217	78	x	158	x	8	12	98592	YES
SCM#8A	2	4.49	2.12	3823	6169	57	x	118	x	7	12	47082	YES
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO
		0.00	0.00	0	0		x		x	3.5		0	NO

Type:
1 Temporary Sediment Trap (Storage = 3600 c. f./disturbed acre)
2 Skimmer Sediment Basin (Storage = 1800 c. f./disturbed acre)
3 Temporary Sediment Basin (Storage = 1800 c. f./disturbed acre)

Project: Kalas Falls, Phase 3

Date: 2/8/21

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Basin	Begin Construction			End Construction			Governing		
No.	Square Feet		C	Square Feet		C			
	D. A.	Disturbed	Factor	D. A.	Disturbed	Factor	D. A.	Disturbed	C
0			0.300			0.300	0	0	0.300
SCM#3B			0.300	797635	296641	0.340	797635	296641	0.340
SCM#3C	328455	142508	0.255			0.300	328455	142508	0.255
SCM#4B			0.300	420226	213875	0.363	420226	213875	0.363
0			0.300			0.300	0	0	0.300
SB#403	26438	14788	0.265			0.300	26438	14788	0.265
SB#404	249271	142310	0.266			0.300	249271	142310	0.266
SCM#4C	588590	216785	0.249	648393	194054	0.346	648393	194054	0.346
0			0.300			0.300	0	0	0.300
SB#406	91444	24931	0.242			0.300	91444	24931	0.242
SCM#4E	629743	310019	0.259			0.300	629743	310019	0.259
SCM#8A			0.300	195538	92525	0.434	195538	92525	0.434
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300
0			0.300			0.300	0	0	0.300

Project: Kalas Falls, Phase 3

Date: 2/8/21

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Basin	Kirpich Equation				C	I10	Q10	S.A. Req'd
No.	H1	H2	L	Tc	Factor			(s. f.)
0	1			5.00	0.300	7.22	0.00	0
SCM#3B	397.5	347	1500	8.04	0.340	6.56	41.18	17913
SCM#3C	389.1	346	1500	8.55	0.255	6.45	12.50	5440
SCM#4B	397.7	320	1490	6.76	0.363	6.84	24.15	10506
0	1			5.00	0.300	7.22	0.00	0
SB#403	390	359	480	5.00	0.265	7.22	1.17	509
SB#404	397.5	353	590	5.00	0.266	7.22	11.08	4820
SCM#4C	386.5	290	1335	5.48	0.346	7.12	36.97	16084
0	1			5.00	0.300	7.22	0.00	0
SB#406	377.2	309	975	5.00	0.242	7.22	3.70	1609
SCM#4E	376.8	277	1630	6.81	0.259	6.83	25.79	11217
SCM#8A	395.3	354	590	5.00	0.434	7.22	14.18	6169
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0
0	1			5.00	0.300	7.22	0.00	0

Kirpich Equation $Tc = \{[L^3/H\}^{0.385}\}/128$

Sediment Basin/Sediment Trap Schedule

Basin No.	Bottom Elev.	Top of Dam Elev.	Top of Riser Elev.	Spillway Elev.	Weir Length	Riser/ Barrel Size	Basin Dimensions			Skimmer Size	Skimmer Hole Size	Anti-Flotation Size*
							At Top of Dam	At Emerg. Spillway	At Bott. of Basin			
SCM#3B	348.00	356.00	353.33	354.00	24'	6'x6'	**	**	**	8"	6"	7'x7'x17"
SCM#3C	337.00	344.00	342.00	342.50	12'	4'x4'	**	**	**	6"	4"	5'x5'x7.5"
SCM#4B	320.00	329.00	326.50	327.50	24'	5'x5'	**	**	**	6"	4.5"	6'x6'x37"
SB#403	356.00	361.00	N/A	359.50	10'	N/A	21'x40'	15'x34'	1'x20'	1.5"	0.5"	N/A
SB#404	347.00	352.00	N/A	350.50	12'	N/A	53'x105'	49'x99'	35'x84'	2.5"	2"	N/A
SCM#4C	290.00	300.00	296.90	298.50	12'	4'x4'	**	**	**	8"	6"	5'x5'x9"
SB#406	308.00	313.00	N/A	311.50	10'	N/A	34'x64'	28'x58'	14'x44'	2"	1.25"	N/A
SCM#4E	277.00	286.00	284.00	285.00	12'	6'x6'	**	**	**	6"	5"	7'x7'x22.5"
SCM#8A	354.00	362.00	360.50	361.00	12'	3'x3'	**	**	**	4"	3"	4'x4'x8"

*Side x side x depth **Irregular, see plans

SCM#3B
2/8/21

Selection of Sediment Control Measure

18.31	Total Drainage Area
Do Not Use	Temporary Sediment Trap
Do Not Use	Rock Dam,
Do Not Use	Skimmer Sediment Basin
Okay	Temporary Sediment Basin
6.81	Disturbed Area (Acres)
41.18	Peak Flow from 10-year Storm (cfs)

User entry

Calculated Value

TGH and BRB/11/25/2008

SCM#3B
2/8/21

Temporary Sediment Basin

Okay

6.81	Disturbed Area (Acres)
41.18	Peak Flow from 10-year Storm (cfs)
12258	Required Volume ft^3
17938	Required Surface Area ft^2
94.7	Suggested Width ft
189.4	Suggested Length ft
133	Trial Top Width at Spillway Invert ft
266	Trial Top Length at Spillway Invert ft
2	Trial Side Slope Ratio Z:1
6	Trial Depth ft (2 to 13 feet above grade)
109	Bottom Width ft
242	Bottom Length ft
26378	Bottom Area ft^2
184692	Actual Volume ft^3 **Okay**
35378	Actual Surface Area ft^2 **Okay**

Use Spillway Capacity Sheet to Size Primary and Emergency Spillways

8	Skimmer Size (inches)
0.5	Head on Skimmer (feet)
6	Orifice Size (1/4 inch increments)
3.14	Dewatering Time (days)
	Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Note: Width and Length shown here give same surface area as actual surface area. The basin is of irregular shape.

SCM#3C
2/3/21

Selection of Sediment Control Measure

7.54	Total Drainage Area

User entry

Calculated Value

Do Not Use	Temporary Sediment Trap
Okay	Rock Dam,
Okay	Skimmer Sediment Basin
Okay	Temporary Sediment Basin

3.27	Disturbed Area (Acres)
12.5	Peak Flow from 10-year Storm (cfs)

TGH and BRB/11/25/2008

SCM#3C

2/3/21

Skimmer Basin

Okay

0.34	Disturbed Area (Acres)
12.5	Peak Flow from 10-year Storm (cfs)
612	Required Volume ft^3
4063	Required Surface Area ft^2
45.1	Suggested Width ft
90.1	Suggested Length ft
90	Trial Top Width at Spillway Invert ft
181	Trial Top Length at Spillway Invert ft
2	Trial Side Slope Ratio Z:1
5.5	Trial Depth ft (2 to 3.5 feet above grade)
68	Bottom Width ft
159.1	Bottom Length ft
10818.8	Bottom Area ft^2
74130	Actual Volume ft^3 **Okay**
16299	Actual Surface Area ft^2 **Okay**
12	Trial Weir Length ft
0.5	Trial Depth of Flow ft
12.7	Spillway Capacity cfs **Okay**
6	Skimmer Size (inches)
0.417	Head on Skimmer (feet)
4	Orifice Size (1/4 inch increments)
3.11	Dewatering Time (days)
	Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Note: Width and Length shown here give same surface area as actual surface area. The basin is of irregular shape.

SCM#4B
2/3/21

Selection of Sediment Control Measure

9.65	Total Drainage Area

	User entry
	Calculated Value

Do Not Use	Temporary Sediment Trap
Okay	Rock Dam,
Okay	Skimmer Sediment Basin
Okay	Temporary Sediment Basin

4.91	Disturbed Area (Acres)
24.15	Peak Flow from 10-year Storm (cfs)

TGH and BRB/11/25/2008

SCM#4B

2/3/21

Skimmer Basin

Okay

0.34	Disturbed Area (Acres)
24.15	Peak Flow from 10-year Storm (cfs)
612	Required Volume ft^3
7849	Required Surface Area ft^2
62.6	Suggested Width ft
125.3	Suggested Length ft
87	Trial Top Width at Spillway Invert ft
176	Trial Top Length at Spillway Invert ft
2	Trial Side Slope Ratio Z:1
7.5	Trial Depth ft (2 to 3.5 feet above grade)
57	Bottom Width ft
145.5	Bottom Length ft
8293.5	Bottom Area ft^2
87233	Actual Volume ft^3 **Okay**
15268.5	Actual Surface Area ft^2 **Okay**
24	Trial Weir Length ft
0.5	Trial Depth of Flow ft
25.5	Spillway Capacity cfs **Okay**
6	Skimmer Size (inches)
0.417	Head on Skimmer (feet)
4.5	Orifice Size (1/4 inch increments)
2.89	Dewatering Time (days)
	Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Note: Width and Length shown here give same surface area as actual surface area. The basin is of irregular shape.

SB#403
1/18/21

Selection of Sediment Control Measure

0.61	Total Drainage Area
Okay	Temporary Sediment Trap
Okay	Rock Dam,
Okay	Skimmer Sediment Basin
Okay	Temporary Sediment Basin
0.34	Disturbed Area (Acres)
1.17	Peak Flow from 10-year Storm (cfs)

User entry

Calculated Value

TGH and BRB/11/25/2008

SB#403

1/18/21

Skimmer Basin

Okay

0.34	Disturbed Area (Acres)
1.17	Peak Flow from 10-year Storm (cfs)
612	Required Volume ft^3
380	Required Surface Area ft^2
13.8	Suggested Width ft
27.6	Suggested Length ft
15	Trial Top Width at Spillway Invert ft
34	Trial Top Length at Spillway Invert ft
2	Trial Side Slope Ratio Z:1
3.5	Trial Depth ft (2 to 3.5 feet above grade)
1	Bottom Width ft
20	Bottom Length ft
20	Bottom Area ft^2
813	Actual Volume ft^3 **Okay**
510	Actual Surface Area ft^2 **Okay**
10	Trial Weir Length ft
0.5	Trial Depth of Flow ft
10.6	Spillway Capacity cfs **Okay**
1.5	Skimmer Size (inches)
0.125	Head on Skimmer (feet)
0.5	Orifice Size (1/4 inch increments)
3.98	Dewatering Time (days)
	Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

SB#404
1/18/21

Selection of Sediment Control Measure

5.72	Total Drainage Area

User entry

Calculated Value

Do Not Use	Temporary Sediment Trap
Okay	Rock Dam,
Okay	Skimmer Sediment Basin
Okay	Temporary Sediment Basin

3.27	Disturbed Area (Acres)
11.08	Peak Flow from 10-year Storm (cfs)

TGH and BRB/11/25/2008

SB#404

1/18/21

Skimmer Basin

Okay

3.27	Disturbed Area (Acres)
11.08	Peak Flow from 10-year Storm (cfs)
5886	Required Volume ft^3
3601	Required Surface Area ft^2
42.4	Suggested Width ft
84.9	Suggested Length ft
49	Trial Top Width at Spillway Invert ft
99	Trial Top Length at Spillway Invert ft
2	Trial Side Slope Ratio Z:1
3.5	Trial Depth ft (2 to 3.5 feet above grade)
35	Bottom Width ft
85	Bottom Length ft
2975	Bottom Area ft^2
13581	Actual Volume ft^3 **Okay**
4851	Actual Surface Area ft^2 **Okay**
12	Trial Weir Length ft
0.5	Trial Depth of Flow ft
12.7	Spillway Capacity cfs **Okay**
2.5	Skimmer Size (inches)
0.208	Head on Skimmer (feet)
2	Orifice Size (1/4 inch increments)
3.22	Dewatering Time (days)

Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

SCM#4C
2/3/21

Selection of Sediment Control Measure

14.89	Total Drainage Area
Do Not Use	Temporary Sediment Trap
Do Not Use	Rock Dam,
Do Not Use	Skimmer Sediment Basin
Okay	Temporary Sediment Basin
4.45	Disturbed Area (Acres)
36.97	Peak Flow from 10-year Storm (cfs)

User entry

Calculated Value

TGH and BRB/11/25/2008

SCM#4C
2/3/21

Temporary Sediment Basin

Okay

4.45	Disturbed Area (Acres)
36.97	Peak Flow from 10-year Storm (cfs)

8010	Required Volume ft^3
16104	Required Surface Area ft^2
89.7	Suggested Width ft
179.5	Suggested Length ft

111	Trial Top Width at Spillway Invert ft	
226	Trial Top Length at Spillway Invert ft	
2	Trial Side Slope Ratio Z:1	
8.5	Trial Depth ft (2 to 13 feet above grade)	
77	Bottom Width ft	
191.8	Bottom Length ft	
14768.6	Bottom Area ft^2	
167650	Actual Volume ft^3	**Okay**
25063.8	Actual Surface Area ft^2	**Okay**

Use Spillway Capacity Sheet to Size Primary and Emergency Spillways

8	Skimmer Size (inches)
0.5	Head on Skimmer (feet)
6	Orifice Size (1/4 inch increments)
2.85	Dewatering Time (days)
	Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Note: Width and Length shown here give same surface area as actual surface area. The basin is of irregular shape.

SB#406
1/18/21

Selection of Sediment Control Measure

2.1	Total Drainage Area
Okay	Temporary Sediment Trap
Okay	Rock Dam,
Okay	Skimmer Sediment Basin
Okay	Temporary Sediment Basin
0.57	Disturbed Area (Acres)
3.7	Peak Flow from 10-year Storm (cfs)

User entry

Calculated Value

TGH and BRB/11/25/2008

SB#406

1/18/21

Skimmer Basin

Okay

0.57	Disturbed Area (Acres)
3.7	Peak Flow from 10-year Storm (cfs)
1026	Required Volume ft^3
1203	Required Surface Area ft^2
24.5	Suggested Width ft
49.0	Suggested Length ft
28	Trial Top Width at Spillway Invert ft
58	Trial Top Length at Spillway Invert ft
2	Trial Side Slope Ratio Z:1
3.5	Trial Depth ft (2 to 3.5 feet above grade)
14	Bottom Width ft
44	Bottom Length ft
616	Bottom Area ft^2
3806	Actual Volume ft^3 **Okay**
1624	Actual Surface Area ft^2 **Okay**
10	Trial Weir Length ft
0.5	Trial Depth of Flow ft
10.6	Spillway Capacity cfs **Okay**
2	Skimmer Size (inches)
0.167	Head on Skimmer (feet)
1.25	Orifice Size (1/4 inch increments)
2.58	Dewatering Time (days)

Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

SCM#8A
2/8/21

Selection of Sediment Control Measure

4.49	Total Drainage Area
Okay	Temporary Sediment Trap
Okay	Rock Dam,
Okay	Skimmer Sediment Basin
Okay	Temporary Sediment Basin
2.12	Disturbed Area (Acres)
14.18	Peak Flow from 10-year Storm (cfs)

User entry

Calculated Value

TGH and BRB/11/25/2008

SCM#8A

2/8/21

Skimmer Basin

Okay

2.12	Disturbed Area (Acres)
14.18	Peak Flow from 10-year Storm (cfs)
3816	Required Volume ft^3
4609	Required Surface Area ft^2
48.0	Suggested Width ft
96.0	Suggested Length ft
57	Trial Top Width at Spillway Invert ft
118	Trial Top Length at Spillway Invert ft
2	Trial Side Slope Ratio Z:1
7	Trial Depth ft (2 to 3.5 feet above grade)
29	Bottom Width ft
90	Bottom Length ft
2610	Bottom Area ft^2
31761	Actual Volume ft^3 **Okay**
6726	Actual Surface Area ft^2 **Okay**
12	Trial Weir Length ft
0.55	Trial Depth of Flow ft
14.7	Spillway Capacity cfs **Okay**
4	Skimmer Size (inches)
0.333	Head on Skimmer (feet)
3	Orifice Size (1/4 inch increments)
2.65	Dewatering Time (days)
	Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Note: Width and Length shown here give same surface area as actual surface area. The basin is of irregular shape.

Stormwater Runoff Velocity

Using Manning's formula

$V = (1.486/n)*R^{2/3}*S^{1/2}$ $Q = V*A$ $R = A/WP$

A – cross-sectional flow area Q – flow R – Hydraulic radius S – Slope in ft./ft.
WP – Wetted Perimeter

Summary

POI#	Q_{10}	Slope	Bottom Width	Side Slopes	Depth	Velocity
1	36.99	0.0143	5'	15:1	0.710'	3.33
2	73.16	0.0043	4'	2:1	2.205'	3.94
3	511.16	0.0100	5'	2:1	4.262'	8.87
4	107.68	0.0220	10'	25:1	0.799'	4.50
5	1.17					
6	26.52					
7	116.11	0.0020	5'	9:1	2.049'	2.42
8	6.55	0.0800	5.5'	0:1	0.303'	3.93

Calculations on next page

Trapezoidal Channel Flow

Project: Kalas Falls Subdivision

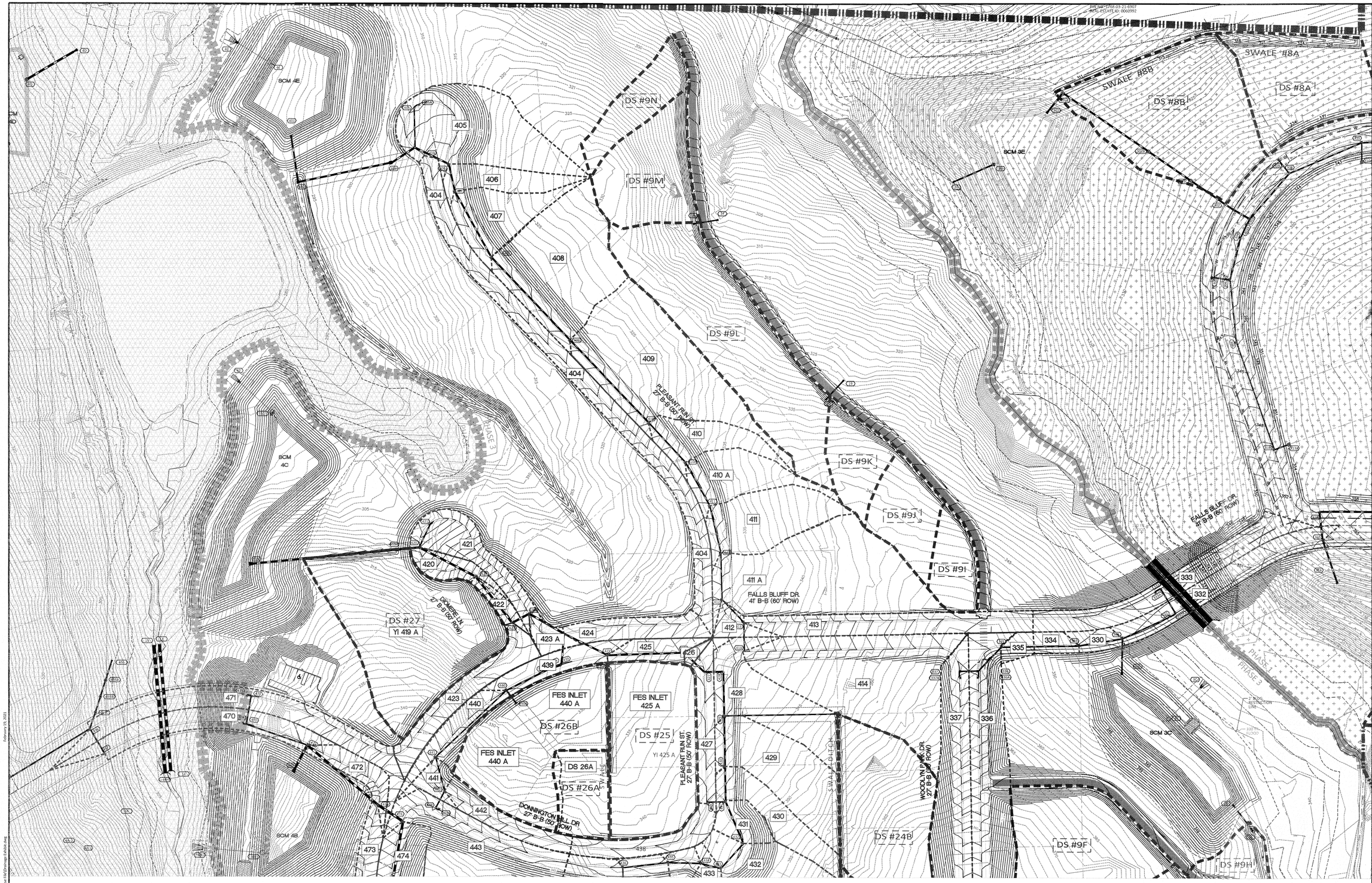
Date: 2/3/21

Y:\Jobs\9900\Watkins Property\Documents\Reports\Flow Velocity.xlsx

Channel Segment	Channel Slope (ft./ft.)	Depth (ft.)	Manning's n	Bottom Width (ft.)	Side Slope x:1	Top Width	Area (s. f.)	WP* (ft.)	R** (s. f.)	V (fps)	Q (cfs)
POI#1	0.0143	0.710	0.030	5.00	15.00	26.29	11.11	26.34	0.42	3.33	36.99
						0.00	0.00	0.00	0.00	0.00	0.00
POI#2	0.0043	2.205	0.030	4.00	2.00	12.82	18.55	13.86	1.34	3.94	73.16
						0.00	0.00	0.00	0.00	0.00	0.00
POI#3	0.0100	4.262	0.030	5.00	2.00	22.05	57.64	24.06	2.40	8.87	511.16
						0.00	0.00	0.00	0.00	0.00	0.00
POI#4	0.0220	0.799	0.030	10.00	25.00	49.94	23.94	49.97	0.48	4.50	107.68
						0.00	0.00	0.00	0.00	0.00	0.00
POI#5						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
POI#6						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
POI#7	0.0020	2.049	0.030	5.00	9.00	41.88	48.02	42.10	1.14	2.42	116.11
						0.00	0.00	0.00	0.00	0.00	0.00
POI#8	0.0800	0.303	0.045	5.50	0.00	5.50	1.67	6.11	0.27	3.93	6.55
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00
						0.00	0.00	0.00	0.00	0.00	0.00

*Wetted Perimeter

**Hydraulic Radius



GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)

1 inch = ft 60

LEGEND

- SWALE BOUNDARY AREA
- STRUCTURE BOUNDARY AREA

CITY OF RALEIGH - PLANS AUTHORIZED FOR CONSTRUCTION

Electronic Approval: This approval is being issued electronically. This approval is valid only upon the signature of a City of Raleigh Review Officer below. The City will retain a copy of the approved plans. Any work authorized by this approval must proceed in accordance with the plans kept on file with the City. This electronic approval may not be edited once issued. Any modification to this approval once issued will invalidate this approval.

City of Raleigh Development Approval _____

Raleigh Water Review Officer

North Carolina 811 www.nc811.org

*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4700 Homewood Boulevard, Suite 400
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA
PROFESSIONAL
SEAL
9810
ENGINEER
JOHN R. HAMLIN

NO.	DATE	REVISION

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3

1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	
DRAWN BY:	
DATE:	FEB 18, 2021

SHEET TITLE:

DRAINAGE AREA EXHIBIT PHASE 3

SHEET NO.:

EXHIBIT L

February 19, 2021

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AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

NO.	DATE	REVISION:

STIPULATION FOR REUSE

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KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	
DRAWN BY:	
DATE:	FEB 18, 2021

SHEET TITLE:
DRAINAGE AREA EXHIBIT PHASE 3

SHEET NO.:
EXHIBIT M

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = ft 60

LEGEND

- SWALE BOUNDARY AREA
- STRUCTURE BOUNDARY AREA

CITY OF RALEIGH - PLANS AUTHORIZED FOR CONSTRUCTION

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City of Raleigh Development Approval _____

Raleigh Water Review Officer

North Carolina 811 www.nc811.org
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

February 19, 2021
Z:\Jobs\9900\Division Property\Dwg_Working Dwg\Base File\Drainage Exhibit.dwg

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450 919-469-1101
Raleigh, NC 27607

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HAMM

NO.	DATE	REVISION:

STIPULATION FOR REUSE

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KALAS FALLS PHASE 3

1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	
DRAWN BY:	
DATE:	FEB 18, 2021

SHEET TITLE:

DRAINAGE AREA EXHIBIT PHASE 3

SHEET NO.:

EXHIBIT N

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = ft 60

LEGEND

- SWALE BOUNDARY AREA
- STRUCTURE BOUNDARY AREA

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City of Raleigh Development Approval _____

Raleigh Water Review Officer

North Carolina 811 www.nc811.org

*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

February 15, 2021

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GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)

1 inch = ft 60

LEGEND

- SWALE BOUNDARY AREA
- STRUCTURE BOUNDARY AREA

CITY OF RALEIGH - PLANS AUTHORIZED FOR CONSTRUCTION

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City of Raleigh Development Approval _____

Raleigh Water Review Officer

North Carolina 811 nc811.org

*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
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AMERICAN Engineering
American Engineering Associates Southeast, P.A.
4201 Wake Forest Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA
PROFESSIONAL
SEAL
9810
ENGINEER
JOHN R. HARMAN

NO.	DATE	REVISION

STIPULATION FOR REUSE

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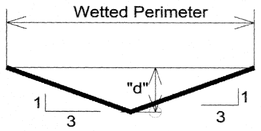
KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY:
DRAWN BY:
DATE: FEB 18, 2021

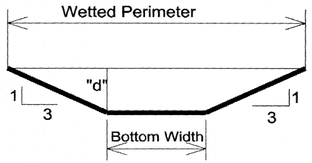
SHEET TITLE:
DRAINAGE AREA EXHIBIT PHASE 3

SHEET NO.:
EXHIBIT O

February 19, 2021
J:\Jobs\9900\Kalas Property\Engr_Working Dwgs\Base File\Drainage Exhibit.dwg



Ditch Section (For Bottom Width = 0)
(Not To Scale)



Trapezoidal Ditch / Swale Section
(Not To Scale)

TRAPEZOIDAL SWALE DRAINAGE CHART-PHASE THREE

Ditch I.D.	D.A., Ac.	C	i_{10}, in/hr	Q_{10}, cfs	Left Side Slope, Z Z:1	Right Side Slope, Z Z:1	Avg. Ditch Slope, %	Bottom Width	Ditch Lining	Manning, n *	Q_{10} Flow Depth, ft	Flow Velocity V10, fps	Calc.Shear Stress, psf	Area, Sq Ft	Wetted P	R	Q	Velocity	Depth, d
DS 9A	1.60	0.35	7.22	4.04	3.00	3.00	2.0	1.00	Reinforced Mesh(Grass)	0.022	0.44	**3.95**	0.55	1.02	3.786691	0.270167	4.040034	3.949057	0.515054
DS 9B	2.39	0.34	7.22	5.87	3.00	3.00	1.7	1.00	Reinforced Mesh(Grass)	0.022	0.54	**4.10**	0.58	1.43	4.438872	0.322305	5.869822	4.102844	0.610548
DS 9C	0.68	0.35	7.22	1.72	3.00	3.00	1.0	0.00	Reinforced Mesh(Grass)	0.022	0.48	**2.49**	0.30	0.69	3.036417	0.227731	1.719977	2.48736	0.425541
DS 9D	0.15	0.34	7.22	0.37	3.00	3.00	2.3	0.00	Reinforced Mesh(Grass)	0.022	0.23	**2.28**	0.33	0.16	1.469804	0.110235	0.369901	2.283	0.20513
DS 9E	0.78	0.32	7.22	1.80	3.00	3.00	1.5	0.00	Reinforced Mesh(Grass)	0.022	0.45	**2.93**	0.42	0.61	2.863147	0.214736	1.799938	2.927581	0.40149
DS 9F	0.54	0.34	7.22	1.33	3.00	3.00	1.0	0.00	Reinforced Mesh(Grass)	0.022	0.44	**2.33**	0.27	0.57	2.758271	0.20687	1.329923	2.330726	0.38608
DS 9G	1.16	0.34	7.22	2.85	3.00	3.00	12.0	0.00	RipRap	0.037	0.44	**4.85**	3.31	0.59	2.799423	0.209957	2.850069	4.849054	0.392213
DS 9H	4.33	0.34	7.22	10.63	3.00	3.00	1.3	2.00	RipRap	0.037	0.82	**2.93**	0.68	3.63	7.15823	0.506651	10.62951	2.930883	0.970862
DS 9I	0.26	0.34	7.22	0.64	3.00	3.00	6.6	0.00	Reinforced Mesh(Grass)	0.022	0.23	**3.92**	0.96	0.16	1.474926	0.110619	0.639457	3.91931	0.206054
DS 9J	0.50	0.34	7.22	1.23	3.00	3.00	2.0	0.00	Reinforced Mesh(Grass)	0.022	0.37	**2.96**	0.46	0.42	2.353651	0.176524	1.230013	2.960496	0.329382
DS 9K	0.83	0.34	7.22	2.04	3.00	3.00	8.4	0.00	RipRap	0.037	0.42	**3.90**	2.19	0.52	2.640591	0.198044	2.039369	3.89971	0.36987
DS 9L	0.81	0.34	7.22	1.99	3.00	3.00	8.3	0.00	RipRap	0.037	0.42	**3.86**	2.15	0.52	2.626975	0.197023	1.999332	3.862885	0.367326
DS 9M	0.65	0.34	7.22	1.60	3.00	3.00	8.3	0.00	RipRap	0.037	0.38	**3.65**	1.98	0.44	2.417187	0.181289	1.60001	3.651246	0.33823
DS 9N	0.80	0.34	7.22	1.96	3.00	3.00	9.5	0.00	RipRap	0.037	0.40	**4.03**	2.37	0.48	2.527491	0.189562	1.928964	4.026092	0.356478
DS 10	1.25	0.48	7.22	4.33	3.00	3.00	5.2	1.00	RipRap	0.037	0.46	**3.90**	1.51	1.11	3.935645	0.282169	4.330183	3.899249	0.536968
DS 11	0.95	0.45	7.22	3.09	3.00	3.00	0.8	2.00	Reinforced Mesh(Grass)	0.022	0.39	**2.53**	0.19	1.23	4.45062	0.275326	3.099929	2.529791	0.552709

February 10, 2021

STORMWATER PIPING SUMMARY KALAS P.U.D. -PHASE THREE

Down Stream Structure	Up Stream Structure	Pipe Size (in)	Length (ft)	Slope (%)	DS Rim Elev (ft)	US Rim Elev (ft)	DS Invert (ft)	US Invert (ft)
CB 331	CB 332	15	73.93	0.50	350.64	350.10	342.45	342.82
CB 331	CB 334	18	62.09	1.60	350.64	351.42	342.45	343.44
CB 332	CB 332 A	15	9.00	1.00	350.10	350.09	343.02	343.11
CB 332 A	CB 333	15	41.00	1.00	350.09	350.09	343.31	343.72
CB 333	CB 333 A	15	9.00	1.00	350.09	350.10	343.92	344.01
CB 334	CB 335	18	108.80	1.25	351.42	351.67	343.64	345.00
CB 335	CB 336	18	45.96	0.50	351.67	350.19	345.20	345.43
CB 336	CB 336 A	15	9.00	0.50	350.19	350.60	345.83	345.88
CB 336	CB 337	15	27.00	0.52	350.19	350.19	345.62	345.76
CB 337	CB 337 A	15	9.00	2.78	350.19	350.60	345.75	346.00
CB 338 A	CB 338 B	24	27.00	0.40	356.51	356.51	351.78	351.89
CB 338 B	CB 338 C	24	42.16	1.59	356.51	358.02	352.09	352.76
CB 338 B	FES 338 D	18	23.02	0.50	356.51	353.27	352.27	352.39
CB 338 C	CB 339	18	27.05	0.50	358.02	358.01	352.96	353.10
CB 338 C	CB 340	24	111.08	1.03	358.02	360.18	352.96	354.10
CB 340	CB 341	18	153.88	1.00	360.18	364.24	354.60	356.14
CB 340	YI 351	18	213.30	0.70	360.18	361.01	354.30	355.80
CB 341	CB 342	18	153.88	2.81	364.24	368.23	356.34	360.66
CB 342	CB 343	15	68.21	3.29	368.23	369.09	360.91	363.15
CB 343	CB 344	15	42.17	0.54	369.09	368.34	363.35	363.58
CB 344	CB 345	15	27.00	0.51	368.34	368.34	363.77	363.91
CB 344	CB 346	15	201.96	3.08	368.34	375.31	363.77	370.00
CB 346	CB 347	15	41.14	0.92	375.31	374.96	370.20	370.57
CB 347	CB 348	15	27.00	0.49	374.96	374.96	370.77	370.91
CB 350	CB 352	42	64.32	0.59	358.36	359.29	351.99	352.38
CB 350	FES 350 A	15	24.00	0.98	358.36	354.55	352.02	352.26
CB 352	CB 353	42	63.17	0.61	359.29	360.19	352.58	352.96
CB 352	FES 352 A	15	24.00	0.48	359.29	355.48	352.90	353.01
CB 353	CB 354	42	102.76	1.20	360.19	361.68	353.16	354.39
CB 353	FES 353 A	15	24.00	1.84	360.19	356.39	353.56	354.00
CB 354	CB 355	42	45.16	0.50	361.68	361.28	354.59	354.82
CB 355	CB 356	36	26.94	0.76	361.28	361.28	355.42	355.62
CB 355	CB 359	30	127.82	1.00	361.28	363.86	355.82	357.10
CB 356	CB 357	36	49.57	0.84	361.28	362.85	355.61	356.03
CB 356	FES INLET 356 A	15	20.86	1.00	361.28	359.08	357.37	357.59
CB 357	CB 358	15	27.10	0.52	362.85	362.85	357.28	357.43
CB 357	CB 374	30	87.91	1.50	362.85	364.11	356.67	357.99
CB 359	CB 361	15	28.03	0.65	363.86	364.01	357.15	357.33
CB 359	CB 362	24	130.78	3.52	363.86	366.99	357.80	362.40
CB 359	YI 360	15	42.66	0.77	363.86	361.55	357.15	357.48
CB 362	CB 363	15	45.61	2.67	366.99	368.43	363.00	364.22
CB 362	CB 364	24	43.13	0.63	366.99	367.90	362.60	362.87
CB 364	CB 365	24	27.00	0.69	367.90	367.90	363.07	363.26
CB 365	CB 366	18	43.13	5.30	367.90	370.95	363.76	366.04
CB 365	CB 369	18	145.69	0.73	367.90	369.29	363.76	364.83
CB 366	CB 367	15	70.67	5.21	370.95	375.24	366.29	369.97
CB 367	YI 368	15	28.00	5.81	375.24	375.30	370.17	371.80
CB 369	CB 369 A	18	9.00	0.40	369.29	368.88	365.03	365.06
CB 369	YI 369 A	15	82.77	8.88	369.29	377.00	365.13	372.48
CB 369 A	CB 370	18	180.08	2.01	368.88	373.39	365.26	368.88
CB 370	CB 371	15	44.69	1.35	373.39	374.52	369.08	369.68
CB 371	CB 372	15	27.00	0.99	374.52	374.52	369.88	370.15
CB 372	CB 373	15	44.43	0.90	374.52	376.95	370.35	370.75
CB 374	CB 374 A	30	100.60	0.90	364.11	365.58	358.19	359.10
CB 374 A	CB 375	30	100.00	1.49	365.58	367.06	359.30	360.79
CB 374 A	FES 374 B	24	70.90	0.34	365.58	361.44	359.40	359.64
CB 393	CB 393 A	15	7.91	0.50	355.69	355.69	351.83	351.87
CB 393	CB 394	15	27.00	0.50	355.69	355.69	351.83	351.97
CB 394	CB 394 A	15	7.91	0.44	355.69	355.69	352.17	352.20
CB 404	CB 405	15	57.26	0.75	307.96	306.23	298.75	299.18
FES 401	YI 402	24	60.28	0.83	291.90	292.94	280.50	281.00
YI 402	YI 403	24	132.83	9.49	292.94	304.09	281.75	294.35
YI 403	CB 404	24	38.88	8.87	304.09	307.96	294.55	298.00
CB 404	CB 406	24	53.56	6.48	307.96	309.06	298.20	301.67
CB 405	CB 405 A	15	8.00	1.71	306.23	306.23	299.38	299.52
CB 406	CB 407	24	39.46	3.62	309.06	310.07	301.87	303.30
CB 407	CB 408	24	105.43	2.60	310.07	312.90	303.50	306.24
CB 408	CB 409	24	160.14	2.50	312.90	316.92	306.44	310.44
CB 409	CB 410	24	160.00	3.37	316.92	322.42	310.64	316.04
CB 410	CB 410 A	18	76.13	4.23	322.42	325.70	316.54	319.76
CB 410 A	CB 411	18	69.57	4.24	325.70	328.63	319.96	322.91
CB 411	CB 411 A	15	68.03	3.79	328.63	331.49	323.16	325.74
CB 411 A	CB 412	15	66.18	3.79	331.49	334.39	325.94	328.45
CB 412	CB 413	15	44.23	6.30	334.39	338.12	328.65	331.44
CB 413	CB 414	15	41.00	0.71	338.12	338.12	331.64	331.93
CB 420	CB 421	15	38.65	4.58	315.51	313.46	304.00	305.77
CB 420	CB 422	30	88.97	4.99	315.51	322.99	305.63	310.07
CB 422	CB 423	30	83.20	5.00	322.99	329.75	316.23	320.39
CB 423	CB 423 A	30	27.00	0.49	329.75	329.75	322.25	322.38
CB 423 A	CB 424	30	56.34	5.02	329.75	331.49	322.58	325.41
CB 424	CB 425	24	67.56	0.50	331.49	332.00	325.91	326.25
CB 424	CB 439	24	43.96	0.50	331.49	331.44	325.91	326.13
CB 425	CB 426	24	108.27	1.72	332.00	334.64	326.45	328.32
CB 425	FES INLET 425 A	15	15.55	5.00	332.00	330.25	327.20	327.98
CB 426	CB 427	24	38.89	3.51	334.64	336.48	328.52	329.88
CB 427	CB 428	24	27.00	2.33	336.48	336.62	330.08	330.71
CB 428	CB 429	24	62.00	1.00	336.62	337.88	330.91	331.53
CB 429	CB 430	24	70.00	1.00	337.88	339.38	331.73	332.43
CB 429	YI 429 A	15	159.50	4.55	337.88	348.37	332.28	339.53
CB 430	CB 431	24	50.10	1.50	339.38	340.49	332.63	333.38
CB 431	CB 432	24	63.60	1.50	340.49	340.40	333.58	334.53
CB 431	CB 438	15	27.03	1.75	340.49	340.49	334.13	334.60
CB 432	CB 433	18	47.32	0.70	340.40	340.80	335.03	335.36
CB 433	CB 434	18	29.17	4.70	340.80	341.38	335.56	336.93
CB 434	CB 435	18	46.09	1.50	341.38	342.29	337.13	337.82
CB 435	CB 436	15	63.82	1.18	342.29	343.23	338.02	338.78
CB 436	YI 437	15	145.44	6.78	343.23	355.57	338.98	348.84
CB 439	CB 439 A	24	9.00	0.50	331.44	331.44	326.33	326.38

STORMWATER PIPING SUMMARY KALAS P.U.D. -PHASE THREE

Down Stream Structure	Up Stream Structure	Pipe Size (in)	Length (ft)	Slope (%)	DS Rim Elev (ft)	US Rim Elev (ft)	DS Invert (ft)	US Invert (ft)
CB 439 A	CB 439 B	24	9.00	0.56	331.44	331.44	326.57	326.62
CB 439 B	CB 440	18	67.25	0.51	331.44	332.02	327.12	327.46
CB 440	CB 441	15	136.53	2.25	332.02	336.00	327.71	330.77
CB 440	S INLET 440	18	25.53	0.50	332.02	329.10	327.46	327.58
CB 441	CB 442	15	49.19	3.10	336.00	337.93	330.97	332.50
CB 442	CB 443	15	27.00	1.02	337.93	337.93	332.70	332.97
CB 443	CB 443 A	15	5.00	1.00	337.93	338.18	333.17	333.22
CB 470	CB 470 A	15	5.00	1.00	331.48	331.48	326.90	326.95
CB 470	CB 471	15	41.00	1.00	331.48	331.48	326.89	327.30
CB 471	CB 471 A	15	5.73	1.00	331.48	331.48	327.50	327.56
CB 472	CB 470	15	90.41	1.21	332.75	331.48	325.60	326.69
CB 472	CB 473	36	129.39	1.75	332.75	340.76	326.75	329.01
CB 473	CB 474	36	42.58	1.99	340.76	341.33	333.94	334.79
CB 474	CB 475	36	103.49	6.00	341.33	347.65	334.99	341.20
CB 475	CB 476	30	260.35	5.33	347.65	361.52	341.85	355.72
CB 476	CB 477	30	45.96	3.00	361.52	362.41	355.92	357.30
CB 477	CB 477 A	15	5.02	1.02	362.41	362.42	358.55	358.60
CB 477	CB 478	30	27.00	1.00	362.41	362.34	357.50	357.77
CB 478	CB 478 A	18	5.00	1.00	362.41	362.42	358.77	358.82
CB 478	CB 481	24	45.86	0.50	362.41	364.47	358.27	358.50
CB 478 A	CB 479	18	136.00	3.38	362.42	368.46	359.02	363.61
CB 479	CB 480	15	150.00	2.43	368.46	372.96	363.91	367.56
CB 481	CB 482	18	60.25	1.00	364.47	365.42	359.03	359.63
CB 481	CB 483	24	139.49	1.46	364.47	366.70	358.70	360.74
CB 483	CB 484	18	80.00	1.00	366.70	367.65	361.24	362.04
CB 484	CB 484 A	18	9.00	0.50	367.65	367.76	362.24	362.29
CB 484 A	CB 485	18	72.90	0.67	367.76	368.63	362.58	363.06
CB 485	CB 486	18	46.17	1.00	368.63	368.33	363.26	363.72
CB 486	CB 487	18	27.00	0.49	368.33	368.33	363.92	364.06
CB 487	CB 488	15	131.96	6.00	368.33	377.49	364.31	372.22
CB 487	CB 490	15	46.06	1.01	368.33	369.73	364.31	364.77
CB 488	YI 489	15	95.32	5.00	377.49	381.25	372.42	377.19
CB 490	CB 491	15	32.00	1.00	369.73	370.12	364.97	365.29
CB 801	CB 802	15	127.12	0.56	366.71	363.22	358.40	359.11
CB 801	CB 804	15	41.00	1.60	366.71	366.71	358.45	359.11
CB 801	CB 809	18	45.96	7.18	366.71	367.02	359.70	363.00
CB 802	CB 803	15	41.00	0.50	363.22	363.22	359.31	359.52
CB 804	CB 805	15	45.96	0.50	366.71	367.02	359.31	359.53
CB 805	CB 806	15	27.00	0.48	367.02	367.02	360.95	361.09
CB 805	CB 807	15	141.83	0.50	367.02	365.31	359.73	360.44
CB 807	CB 808	15	27.00	0.50	365.31	365.31	360.64	360.78
CB 809	CB 810	18	27.00	1.44	367.02	367.02	363.40	363.79
CB 810	CB 811	15	45.96	0.50	367.02	369.20	364.04	364.27
CB 810	CB 814	15	143.21	3.65	367.02	372.95	364.04	369.26
CB 811	CB 813	15	41.00	0.50	369.20	369.20	364.47	364.67
FES 815	ES INLET 81	15	66.55	1.50	359.00	360.00	357.50	358.50
FES 17	ES INLET 18	15	24.39	4.10	306.50	308.50	305.00	306.00
FES 19	ES INLET 20	15	26.23	5.72	326.50	328.50	325.00	326.50
FES 21	ES INLET 22	15	24.00	1.04	344.75	346.07	343.25	343.50
FES 23	ES INLET 24	18	38.42	0.65	345.33	345.71	343.00	343.25
FES 25	ES INLET 26	18	36.43	1.00	342.00	344.78	340.50	340.86
FES 30	JB 31	30	75.53	0.50	365.21	359.19	354.85	355.23
FES 330	CB 331	18	43.46	0.50	342.52	350.64	340.50	340.72
FES 338	CB 338 A	24	20.97	0.40	353.44	356.51	351.50	351.58
FES 349	CB 350	42	58.98	0.50	353.71	358.36	351.50	351.79
FES 392	JB 392 A	15	22.66	0.40	352.50	356.41	351.03	351.12
FES 419	YI 419 A	30	200.79	2.50	311.00	309.00	293.50	298.52
FES 469	CB 472	36	34.39	1.02	331.68	332.75	323.50	323.85
FES 800	CB 801	18	35.14	1.99	363.30	366.71	357.50	358.20
FES SCM 3B	OS SCM 3B	48	54.00	0.54	348.94	351.17	347.71	348.00
FES SCM 3C	OS SCM 3C	18	64.01	0.50	338.81	344.82	336.68	337.00
FES SCM 4B	OS SCM 4B	30	75.17	0.67	312.93	326.50	310.00	310.50
FES SCM 4C	OS SCM 4C	18	59.15	1.69	290.50	294.72	289.00	290.00
FES SCM 4E	OS SCM 4E	24	49.13	1.02	279.00	284.00	276.50	277.00
JB SCM 8A	OS SCM 8A	18	29.12	0.52	361.00	359.75	353.85	354.00
FES SCM 8A	JB SCM 8A	18	155.99	0.52	357.00	361.00	352.94	353.75
JB 31	YI 32	30	75.53	0.50	365.21	359.19	354.85	355.23
JB 392 A	CB 393	15	127.25	0.40	356.41	355.69	351.22	351.73
YI 419 A	CB 420	30	31.74	4.50	309.00	315.51	302.20	303.63

CITY OF RALEIGH - PLANS AUTHORIZED FOR CONSTRUCTION

Electronic Approval: This approval is being issued electronically. This approval is valid only upon the signature of a City of Raleigh Review Officer below. The City will retain a copy of the approved plans. Any work authorized by this approval must proceed in accordance with the plans kept on file with the City. This electronic approval may not be edited once issued. Any modification to this approval once issued will invalidate this approval.

City of Raleigh Development Approval _____

Raleigh Water Review Officer

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-388 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

NO.	DATE	REVISION:

STIPULATION FOR REUSE

KALAS FALLS PHASE 3

1832 ROLESVILLE ROAD
WAKE COUNTY, NC

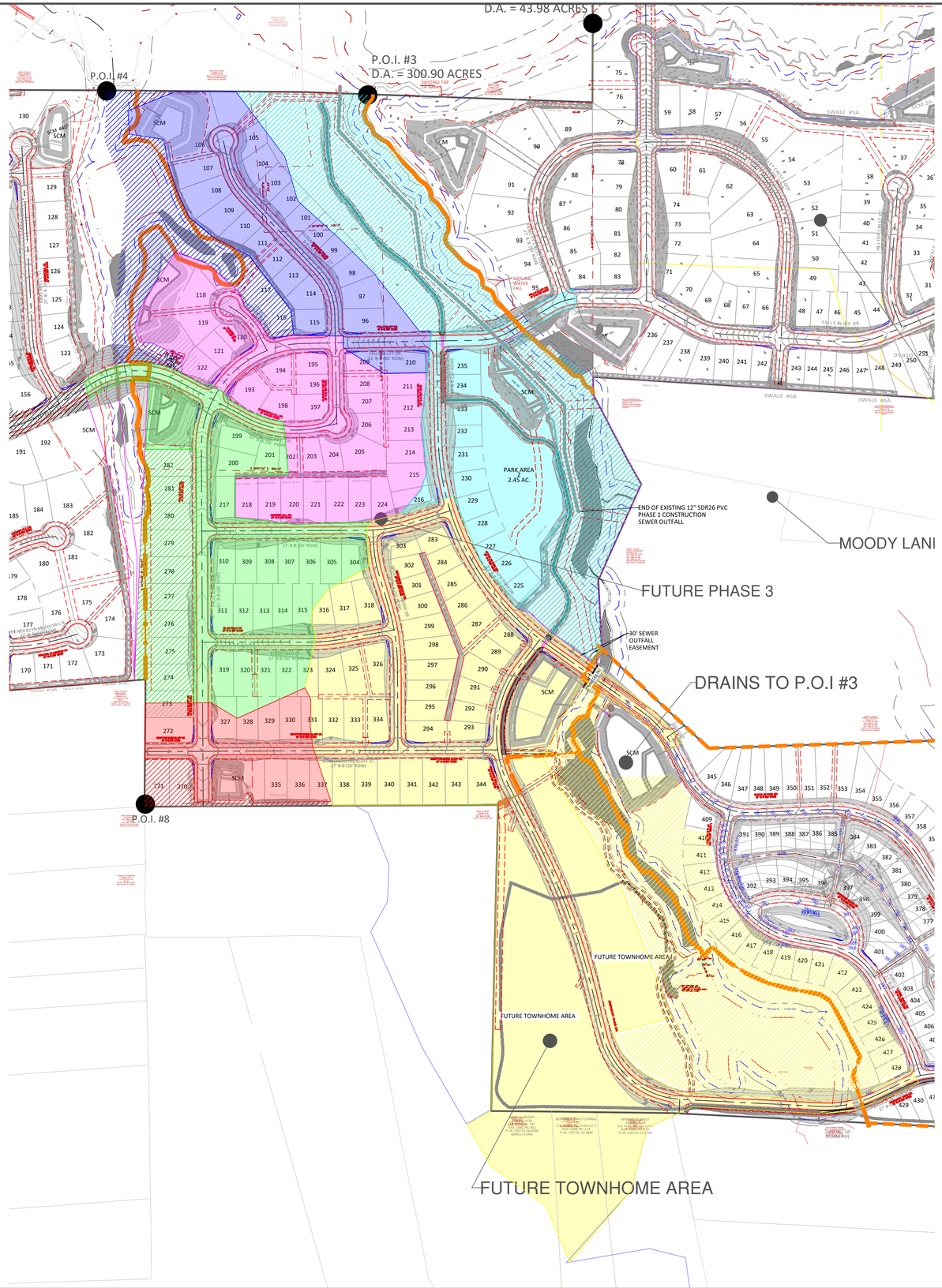
JOB NUMBER: 9900
CHECKED BY:
DRAWN BY:
DATE: FEB 18, 2021

SHEET TITLE:

DRAINAGE AREA EXHIBIT PHASE 3

SHEET NO.:

EXHIBIT P



LEGEND:

- SCM 8A BYPASS
- SCM 4B BYPASS
- SCM 4E BYPASS
- SCM 3C BYPASS
- SCM 3C BYPASS
- SCM 8A DRAINAGE AREA
- SCM 4B DRAINAGE AREA
- SCM 4E DRAINAGE AREA
- SCM 3C DRAINAGE AREA
- SCM 3C DRAINAGE AREA
- SCM 4C DRAINAGE AREA

PHASELINE

LOT IMPERVIOUS AREAS

LOT SIZE:	IMPERVIOUS AREA:	LOT NUMBERS:
50'-59'	3,620 S.F.	N/A
60'-69'	3,920 S.F.	201-206, 288-293, 304-310
70'-79'	4,650 S.F.	116-122, 195-197, 207-209, 294-303, 311-318
80'-99'	5,400 S.F.	96-115, 210-235, 270-271, 283-287, 319-344
100'/+	5,750 S.F.	193-194, 198-200, 272-282

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch =200

CITY OF RALEIGH - PLANS AUTHORIZED FOR CONSTRUCTION

Electronic Approval: This approval is being issued electronically. This approval is valid only upon the signature of a City of Raleigh Review Officer below. The City will retain a copy of the approved plans. Any work authorized by this approval must proceed in accordance with the plans kept on file with the City. This electronic approval may not be edited once issued. Any modification to this approval once issued will invalidate this approval.

City of Raleigh Development Approval _____

Raleigh Water Review Officer

North Carolina 811

*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450 919-469-1101
Raleigh, NC 27607

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA
PROFESSIONAL SEAL 9810 ENGINEER
JOHN R. HARMAN

NO.	DATE:	REVISION:

STIPULATION FOR REUSE

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY:
DRAWN BY:
DATE: FEB 5, 2021

SHEET TITLE:

SHEET NO.:
EXHIBIT A

February 1, 2021

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