

DRAINAGE PLAN
WEST HIGH 2ND
ADDITION

TO
WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY



19 November 2013



DRAINAGE PLAN NORTH HIGH 2ND ADDITON

FINAL REPORT

Prepared by Baughman Company, P.A.
November 21, 2013

By Patrick S. Baer, PE

REPORT CONTENTS

City of Wichita Checklist

- Project Narrative
 - Existing Conditions
 - Proposed Conditions
 - Offsite Conditions

- Existing Conditions Runoff Calculations
 - Drainage Methods & Standards
 - Site Characteristics
 - Existing Conditions Hydrologic Analysis
 - Downstream Drainage Capacity

- Post-Development Hydrologic Analysis
 - Drainage Methods & Standards
 - Developed Conditions Hydrologic Analysis
 - Discharge Points Summary
 - Water Quality
 - Downstream Channel Protection
 - Potential Upstream/Downstream Impacts

- Floodplain Submittal
 - Source of Floodplain Information

- Federal, State, & Local Permitting
 - US Army Corps of Engineers
 - Kansas Dept of Agriculture – DWR Permitting
 - FEMA
 - Kansas Dept of Transportation
 - Sedgwick County ROW

- Exhibits
 - Exhibit 1: Plat -- Half Scale
 - Exhibit 2: Drainage Plan – Half Scale
 - Exhibit 3: Floodplain Location (FIRM)

- Appendices: Supporting Calculations
 - Appendix A: HydraFlow Hydrographs

- Plan Sheets
 - Drainage & Grading Plan 1: 80 Scale

EXISTING CONDITIONS

The site is located just south of the existing West High School adjacent to the Arkansas River. The site is currently unplatted and developed as an athletic field with an infiltration basin. The area relatively flat and ultimately infiltrates into sandy soil draining into the river. There is storm water sewer in the area and drains directly into this area with a overflow drainage box allowing excess to drain into the Arkansas River.

The property lies within a FEMA SFHA Zone X-Shaded as of this report. The drainage patterns as defined above can be seen on the Drainage Plan (Exhibit 2).

PROPOSED CONDITIONS

The property is being platted as one large lot and final site plan may include a future Concession Stand and possible Clinic at the northwest corner of the plat.

The site is expected to drain, generally, as the existing site does today. There is storm water sewer located along the north and south which will continue to convey runoff directly to the river. We expect sheet flow across the sports fields and then in the generally direction of the storm water sewer. Since the site will be re-graded and the existing pavement removed, we expect more infiltration and less runoff. This would be apparent in only the curve number selection and would be represented as pervious areas.

For a half-scale copy of the Plat, see Exhibit 1.

OFFSITE CONDITIONS

The area is generally flat, draining into a infiltration Basin located in the Drainage Easement and the adjacent Railroad Right of Way. The area east of the Site is a City Facility site, west is a Residential Area and Sedgwick County Facility. North is West High School and South is a Railroad Line. The storm sewer system in Osage and Walker Drains into the Railroad Ditch, draining east to an existing Infiltration basin on site. During large rain events, an existing 2'x2' RCB located north of the Railroad, under McLean will route runoff east into the Arkansas River. Prior to the water ponding high enough to discharge to the RCB, the water will pond in the drainage easement and In Osage.

The overall site location and drainage patterns can be seen with the site location plotted as Exhibit 2.

EXISTING CONDITIONS RUNOFF CALCULATIONS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in calculating the existing conditions runoff values.

- STORM SERIES
 - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 100-yr Storm Events Modeled
 - 2-yr Rainfall Depth = 3.5 in
 - 10-yr Rainfall Depth = 5.3 in
 - 100-yr Rainfall Depth = 7.9 in

- FLOW DATA
 - Areas per LIDAR data, USGS Quadrangle Sheet, Aerial Photos, and Site Visits
 - SCS Curve Number used for Existing Flows (composite computed using %)
 - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site is currently unplatted and is developed for use as Athletic fields. The area is relatively flat and runoff collects in the existing infiltration area, draining into the soil which drains directly into the Little Arkansas River. The existing site characteristics can be seen from the aerial exhibit (Exhibit 2).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The existing site was analyzed for existing runoff peak flows as well as existing impervious areas. Based on aerial images, it appears that the existing site is covered with a mixture of impervious areas, which have been approximated in the Hydrologic analysis. These impervious areas include structures, patios, driveways, and roads. Based on this impervious cover, a composite Curve Number of 87 was used, west of the site, 91 east of the site and 82 for this site. This was due to the above as well as the site lying in Type B soils. The entire site drains, ultimately, to the east (subsurface) and into the Little Arkansas River.

DOWNSTREAM DRAINAGE CAPACITY

The site drains to the Arkansas River to the west of the property. The river is controlled upstream for peak flow and is not expected to rise above its banks throughout the storm series. Since the flow is controlled upstream, and this property has been developed for many years, we expect the current FEMA study to be accurate for this reach.

The surrounding streets, which accept sheet flow and convey runoff to the storm water sewers, appears to be flat and may stand water. The storm water sewer currently serving the area consists of a 12" RCP on the west and an 33" along the south. Historic rain events show there is inadequate overflow to the river, the calculated detention during a 100 year event has been calculated and illustrated in Exhibit 2.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in developing the drainage and grading plans.

- STORM SERIES
 - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr Storm Events Modeled
 - Hydrograph Method utilized for Developed Flows
 - CN = 82 (Soil Type B – Disturbed Pervious Area)
 - Time of Concentration; Lag Method, minimum Tc = 15min

- GRADING CONSTRAINTS TO BE OBSERVED AT SITE PLAN
 - Grading will be provided at site plan
 - Match all existing perimeter grades
 - Onsite detention Volume will be maintained within the Permanent Drainage Easement.

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The current plan is to maintain the athletic fields, add an accessory Concession Building, and a Clinic at the Northwest corner of the site. With the completion of 0143PPD (607861), this site removed approximately 17,000 sq. feet of impervious area and increased the onsite infiltration basin volume and surface area. This improvement will provide capacity for a future Concession and Clinic site plans. These plans have not been finalized and are subject to change. A baseline for analysis for this drainage plan has been assumed.

A conservative curve number of 82 were used based on disturbed pervious areas in type B soils. Currently we have noted two areas are Temporary Detention Easements. These two Temporary Detention Easements will be terminated upon completion of a Private Project Drainage. This project will excavate an additional 230 cubic yards of soil within the existing Drainage Easement to provide the calculated detention capacity of water detention within the temporary drainage easement.

DISCHARGE POINTS SUMMARY

The site will continue to discharge to the east by the RCB, infiltration within the existing Basin; all of which eventually drains to the Arkansas River. The site will continue to utilize the storm water sewer systems along the east and south of the property.

WATER QUALITY

The site, upon development of the Concession Stand and Clinic, will provide water quality treatment due by the use of the existing Infiltration Basin. According to the City ordinance, the water quality treatment is met with the use of the Infiltration Basin.

DOWNSTREAM CHANNEL PROTECTION

No downstream channel protection will be required on this site. Downstream channel protection has been accounted for with the Improvements completed by the City of Wichita along this section of the Arkansas River.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

Recent improvements to the Athletic Field in 2013, with 0143PPD, has increased the detention volume and infiltration surface area for the basin located on site.

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X - Shaded. The location of the property, on FEMA FIRM Panel 365 of 700 for Sedgwick County, Kansas, effective February 2, 2007, is attached as Exhibit 3.

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS

There does not appear to be any jurisdictional waters of the US on this site.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING

There does not appear to be any DWR permitting needed on the proposed site at this time.

FEMA

There is no mapped floodplain located upon the proposed site. Therefore, no FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION

No ROW permit is expected with this development.

SEDGWICK COUNTY PERMITTING

There does not appear to be any Sedgwick County permitting needed at this time.

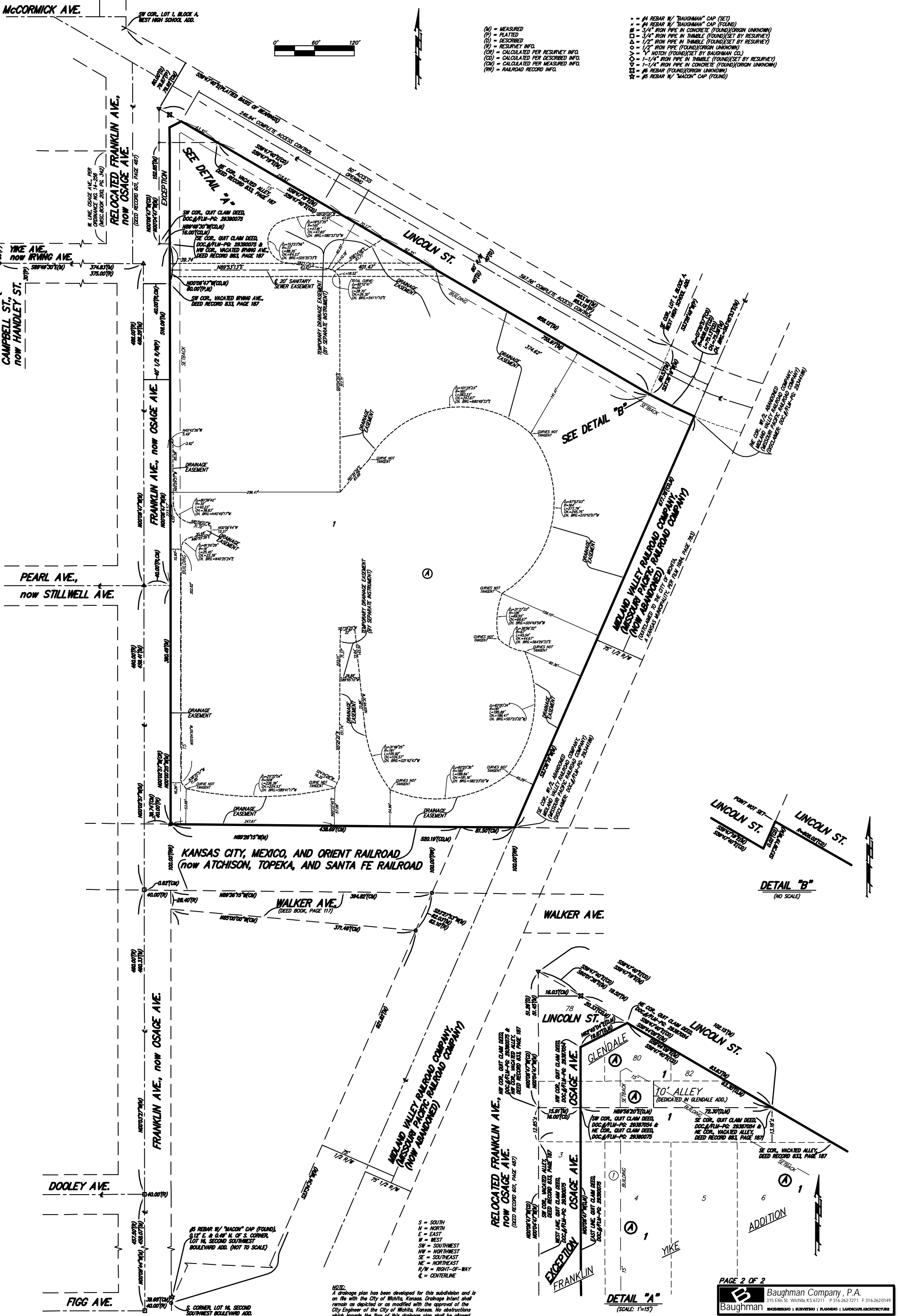
EXHIBIT 1: Plat – Half Scale

EXHIBIT 2: Drainage Plan – Half Scale

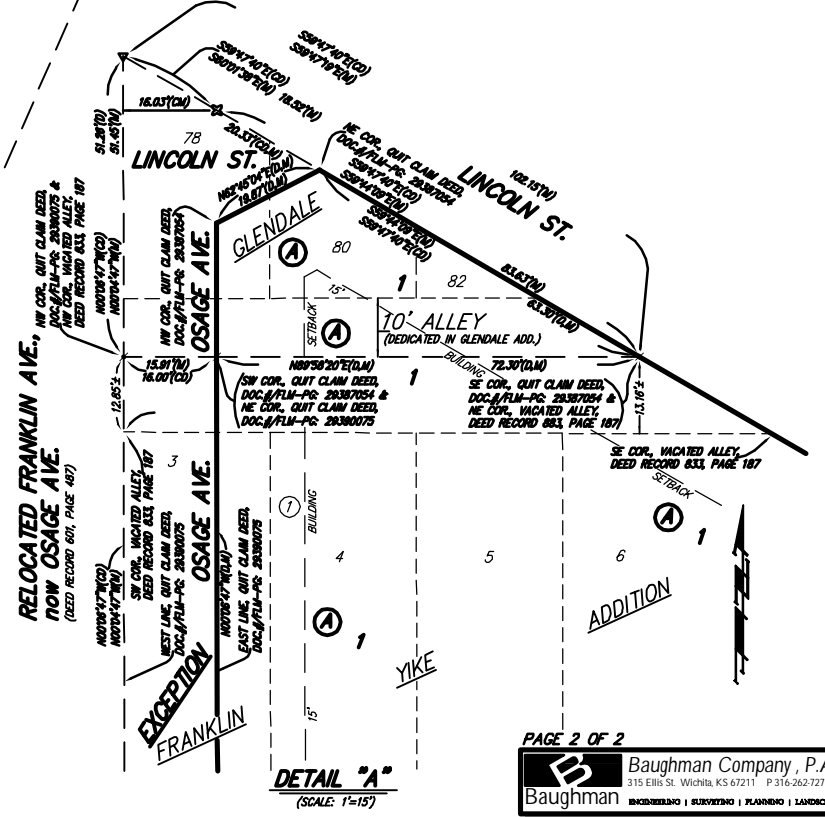
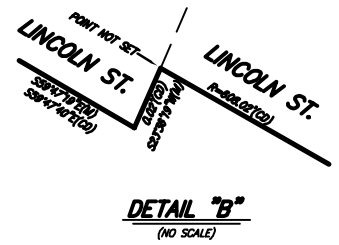
EXHIBIT 3: Floodplain Location (FIRM)

WEST HIGH SCHOOL 2ND ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



- (M) = MEASURED
 - (P) = PLATTED
 - (D) = DESCRIBED
 - (R) = RESURVEY INFO.
 - (CR) = CALCULATED PER RESURVEY INFO.
 - (CD) = CALCULATED PER DESCRIBED INFO.
 - (CM) = CALCULATED PER MEASURED INFO.
 - (RR) = RAILROAD RECORD INFO.
- = #4 REBAR W/ "BAUGHMAN" CAP (SET)
 - = #4 REBAR W/ "BAUGHMAN" CAP (FOUND)
 - = 3/4" IRON PIPE IN CONCRETE (FOUND)(ORIGIN UNKNOWN)
 - = 3/4" IRON PIPE IN THIMBLE (FOUND)(SET BY RESURVEY)
 - = 1/2" IRON PIPE IN THIMBLE (FOUND)(SET BY RESURVEY)
 - = 1/2" IRON PIPE (FOUND)(ORIGIN UNKNOWN)
 - = 1" NOTCH (FOUND)(SET BY BAUGHMAN CO.)
 - = 1-1/4" IRON PIPE IN THIMBLE (FOUND)(SET BY RESURVEY)
 - = 1-1/4" IRON PIPE IN CONCRETE (FOUND)(ORIGIN UNKNOWN)
 - = #6 REBAR (FOUND)(ORIGIN UNKNOWN)
 - = #6 REBAR W/ "MASON" CAP (FOUND)

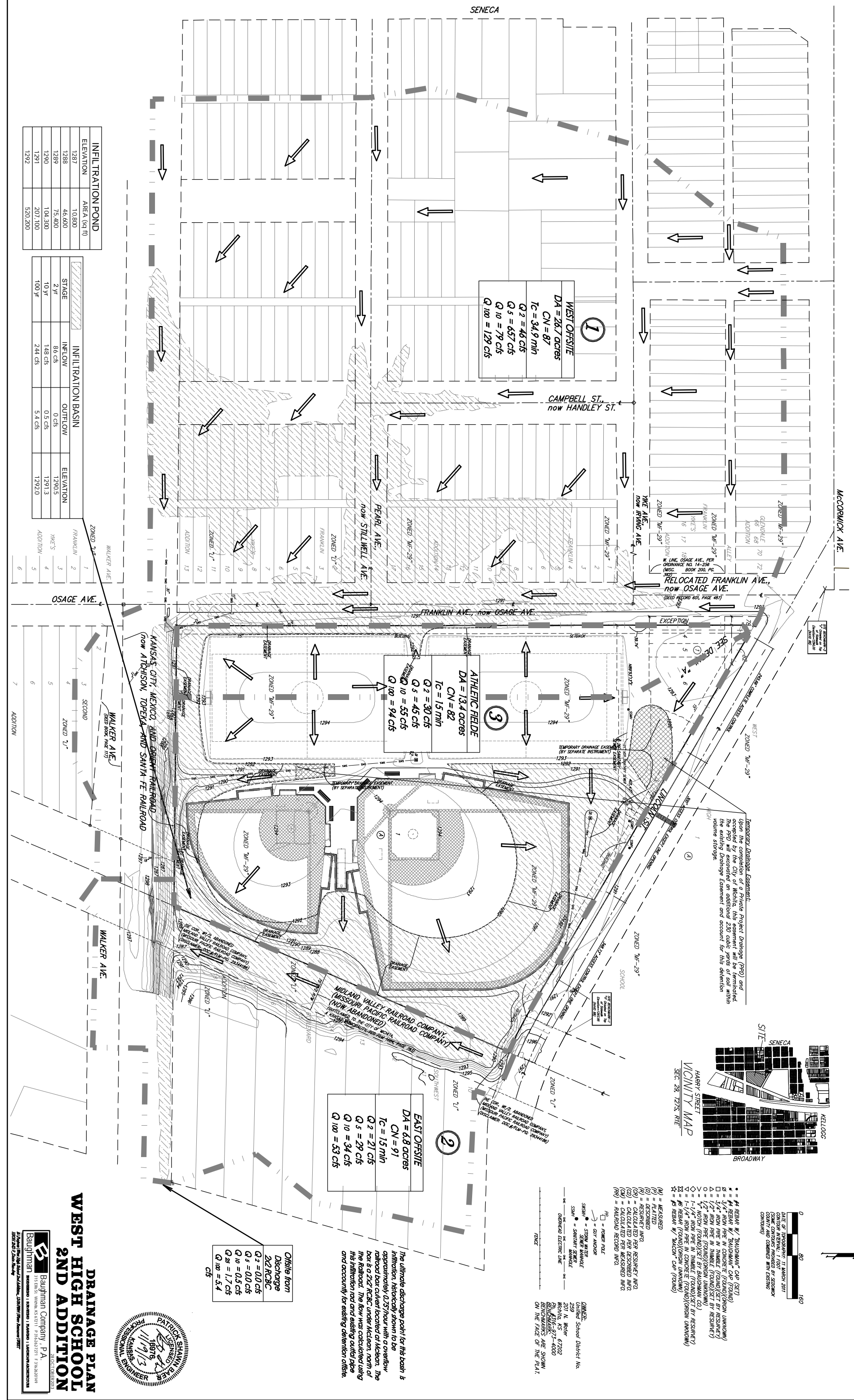


NOTE:
A drainage plan has been developed for this subdivision and is on file with the City of Wichita, Kansas. Drainage intent shall remain as depicted or as modified with the approval of the City Engineer of the City of Wichita, Kansas. No obstructions which impede the flow of this drainage plan shall be allowed.

DRAINAGE CONCEPT

WEST HIGH SCHOOL 2ND ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



INFILTRATION POND	
ELEVATION	AREA (sq ft)
1287	10,800
1288	46,600
1289	75,400
1290	104,300
1291	207,100
1292	520,200

INFILTRATION BASIN			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 YR	86 cfs	0.5 cfs	1290.5
10 YR	148 cfs	0.5 cfs	1291.3
100 YR	244 cfs	5.4 cfs	1292.0

WEST OFFSITE
 DA = 28.7 acres
 CN = 87
 Tc = 34.9 min
 Q 2 = 46 cfs
 Q 5 = 657 cfs
 Q 10 = 79 cfs
 Q 100 = 129 cfs

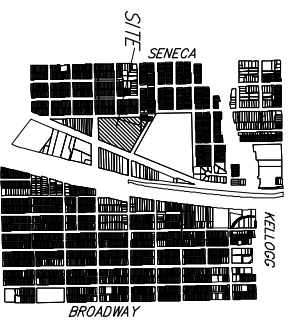
ATHLETIC FIELDS
 DA = 13.4 acres
 CN = 82
 Tc = 15 min
 Q 2 = 30 cfs
 Q 5 = 45 cfs
 Q 10 = 55 cfs
 Q 100 = 94 cfs

EAST OFFSITE
 DA = 4.8 acres
 CN = 91
 Tc = 15 min
 Q 2 = 21 cfs
 Q 5 = 29 cfs
 Q 10 = 34 cfs
 Q 100 = 53 cfs

Offsite from
 Discharge
 2x2 RCB
 Q 2 = 0.0 cfs
 Q 5 = 0.0 cfs
 Q 10 = 0.5 cfs
 Q 25 = 1.7 cfs
 Q 100 = 5.4 cfs

The ultimate discharge point for the basin is approximately 0.75/hour with a coverflow railroad box culvert located at Hickson. The box is a 24x RCB under Hickson, north of the railroad. The flow was calculated using this infiltration road and existing outfall pipe and accordingly for existing detention offsite.

Temporary Drainage Easement:
 Upon the completion of a Private Project Drainage (PPD) and accepted by the City of Wichita, this easement will be terminated. The PPD will excavate an additional 250 cubic yards of soil within the existing Drainage Easement and account for this deflation volume storage.



VICINITY MAP
 SEC. 29, 1235, R1E

- #1 REBAR W/ "BUSHMAN" CAP (SET)
- #1 REBAR W/ "BUSHMAN" CAP (FOUND)
- #1 REBAR W/ "BUSHMAN" CAP (FOUND) UNKNOW
- 3/4" ROW PIPE IN THIMBLE (FOUND) SET BY RESURFER
- 1/2" ROW PIPE (FOUND) (ORION UNKNOWN)
- 1/2" ROW PIPE (FOUND) (ORION UNKNOWN)
- 1/4" ROW PIPE IN THIMBLE (FOUND) SET BY RESURFER
- 1/4" ROW PIPE IN THIMBLE (FOUND) (ORION UNKNOWN)
- 1/4" ROW PIPE (FOUND) (ORION UNKNOWN)
- #5 REBAR W/ "MADON" CAP (FOUND)
- #5 REBAR W/ "MADON" CAP (FOUND)
- (M) = MEASURED
- (P) = PLATTED
- (R) = REBAR INFO
- (S) = CALCULATED PER RESURFER INFO
- (CO) = CALCULATED PER DESCRIBED INFO
- (CM) = CALCULATED PER MEASURED INFO
- (RO) = RAILROAD RECORD INFO

OWNER:
 United School District No. 259
 239 N. W. 4th
 Wichita, KS 67202
 PHONE: 313-873-4000
 FAX: 313-873-4000
 DESIGNER:
 BAUTMAN COMPANY, P.A.
 315 E. W. 5th
 Wichita, KS 67201
 PHONE: 313-873-4000
 FAX: 313-873-4000
 ON THE FACE OF THE P.L.A.T.



DRAINAGE PLAN
WEST HIGH SCHOOL
2ND ADDITION

BAUTMAN COMPANY, P.A.
 315 E. W. 5th
 WICHITA, KS 67201
 PHONE: 313-873-4000
 FAX: 313-873-4000
 DATE: 10/15/13

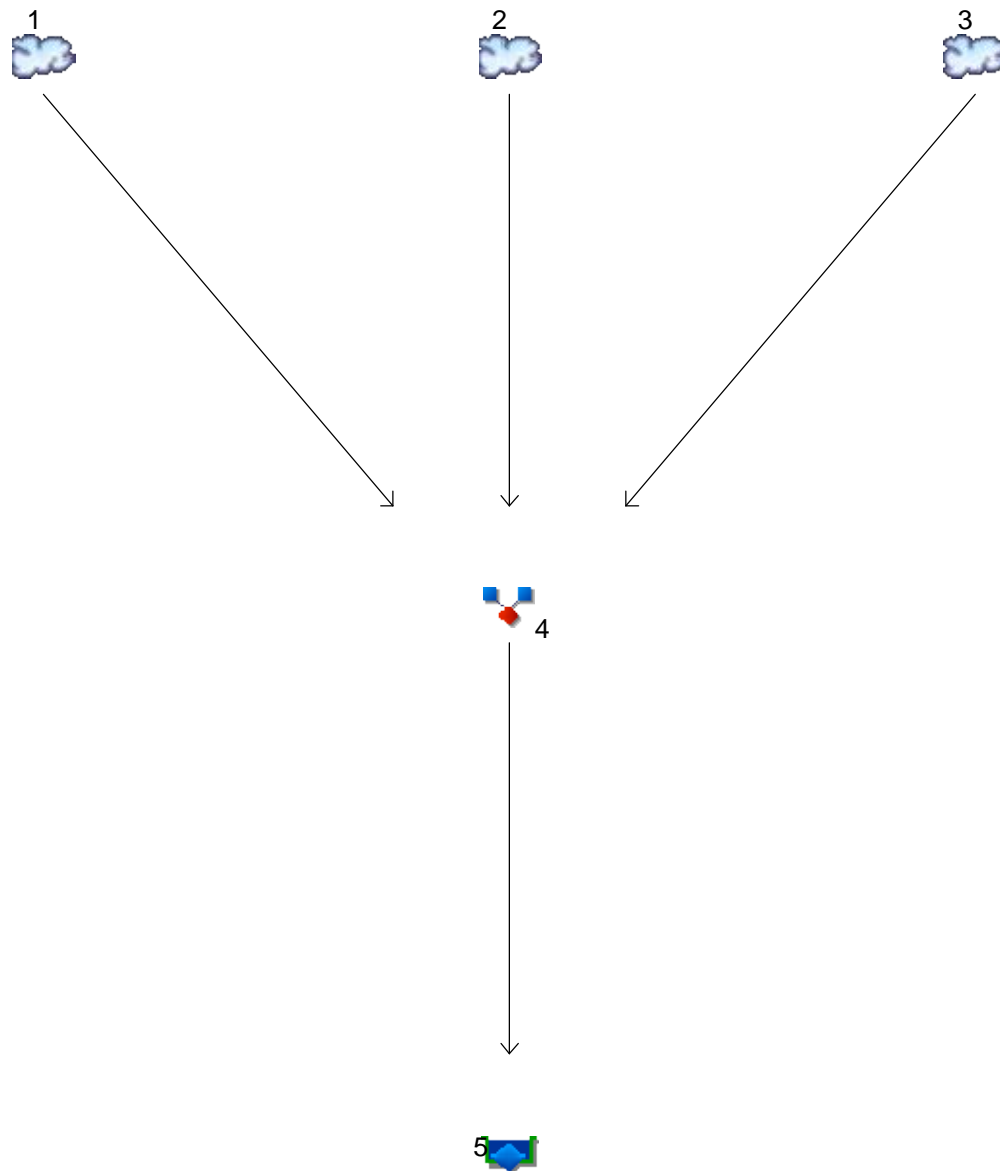
APPENDIX A : HydraFlow Hydrographs
 Site Flow

HydraFlow Hydrographs

Site Flow

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10



Legend

<u>Hyd. Origin</u>	<u>Description</u>
1	SCS Runoff West offsite
2	SCS Runoff East Offsite
3	SCS Runoff West High Athletics
4	Combine to Sed basin
5	Reservoir Sediment Basin Outfall

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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	-----	33.08	46.17	6.432	65.24	78.68	95.96	111.30	128.50	West offsite
2	SCS Runoff	-----	15.99	21.30	4.278	28.86	34.13	40.86	46.82	53.49	East Offsite
3	SCS Runoff	-----	20.52	30.14	2.519	44.54	54.85	68.23	80.17	93.62	West High Athletics
4	Combine	1, 2, 3	60.56	85.35	11.06	121.74	147.52	180.78	210.35	243.56	to Sed basin
5	Reservoir	4	0.000	0.000	0.000	0.054	0.510	1.691	3.217	5.376	Sediment Basin Outfall

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

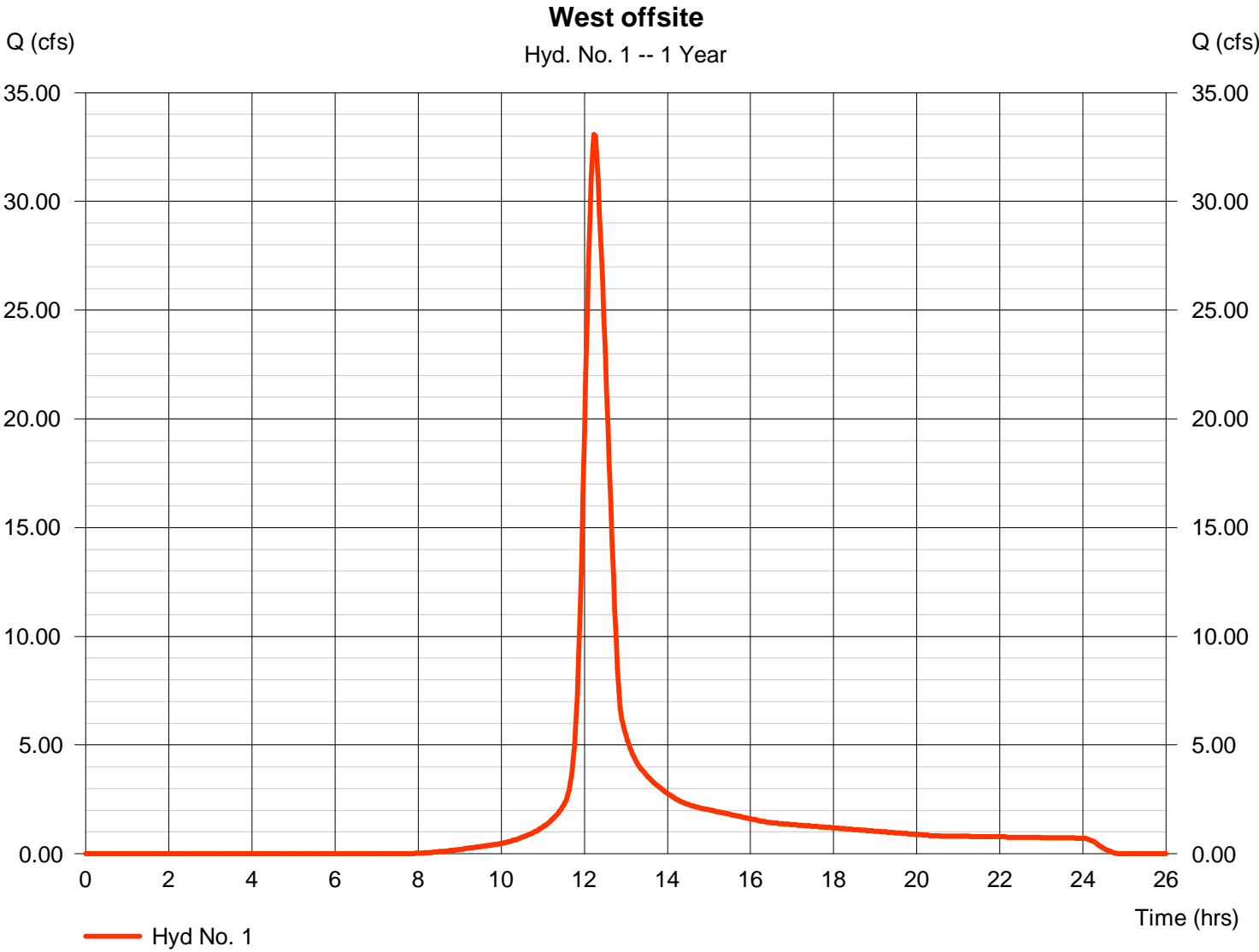
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	33.08	2	734	150,028	-----	-----	-----	West offsite	
2	SCS Runoff	15.99	2	722	45,380	-----	-----	-----	East Offsite	
3	SCS Runoff	20.52	2	722	58,024	-----	-----	-----	West High Athletics	
4	Combine	60.56	2	724	253,432	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	0.000	2	1008	0	4	1290.03	180,447	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 1 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 33.08 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 150,028 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No. 1

West offsite

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.050	0.011	0.011	
Flow length (ft)	= 250.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.50	0.00	0.00	
Land slope (%)	= 0.40	0.00	0.00	
Travel Time (min)	= 15.41	+ 0.00	+ 0.00	= 15.41
Shallow Concentrated Flow				
Flow length (ft)	= 1500.00	0.00	0.00	
Watercourse slope (%)	= 0.40	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=1.29	0.00	0.00	
Travel Time (min)	= 19.45	+ 0.00	+ 0.00	= 19.45
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				34.90 min

Hydrograph Report

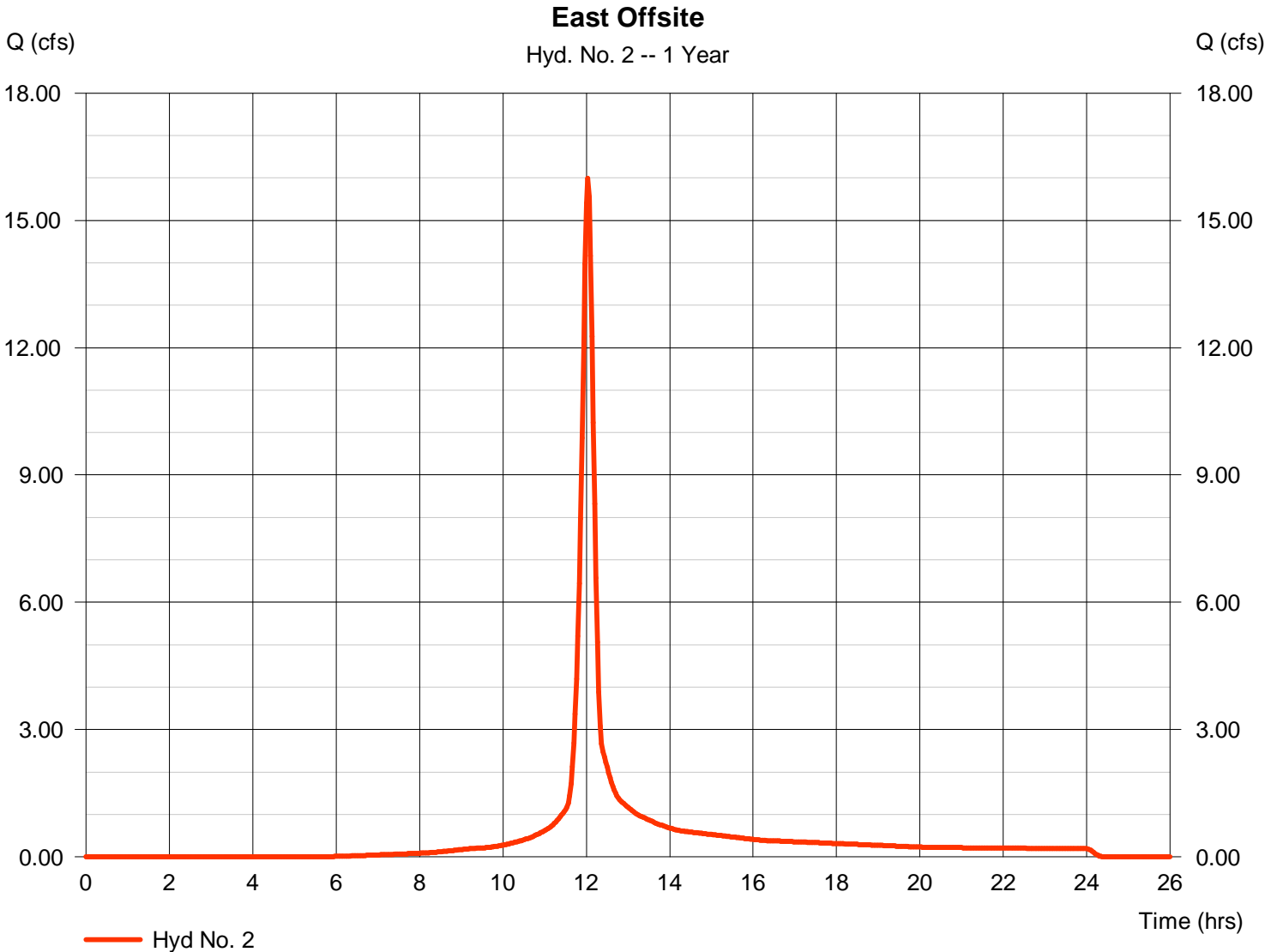
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 15.99 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 45,380 cuft
Drainage area	= 6.800 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

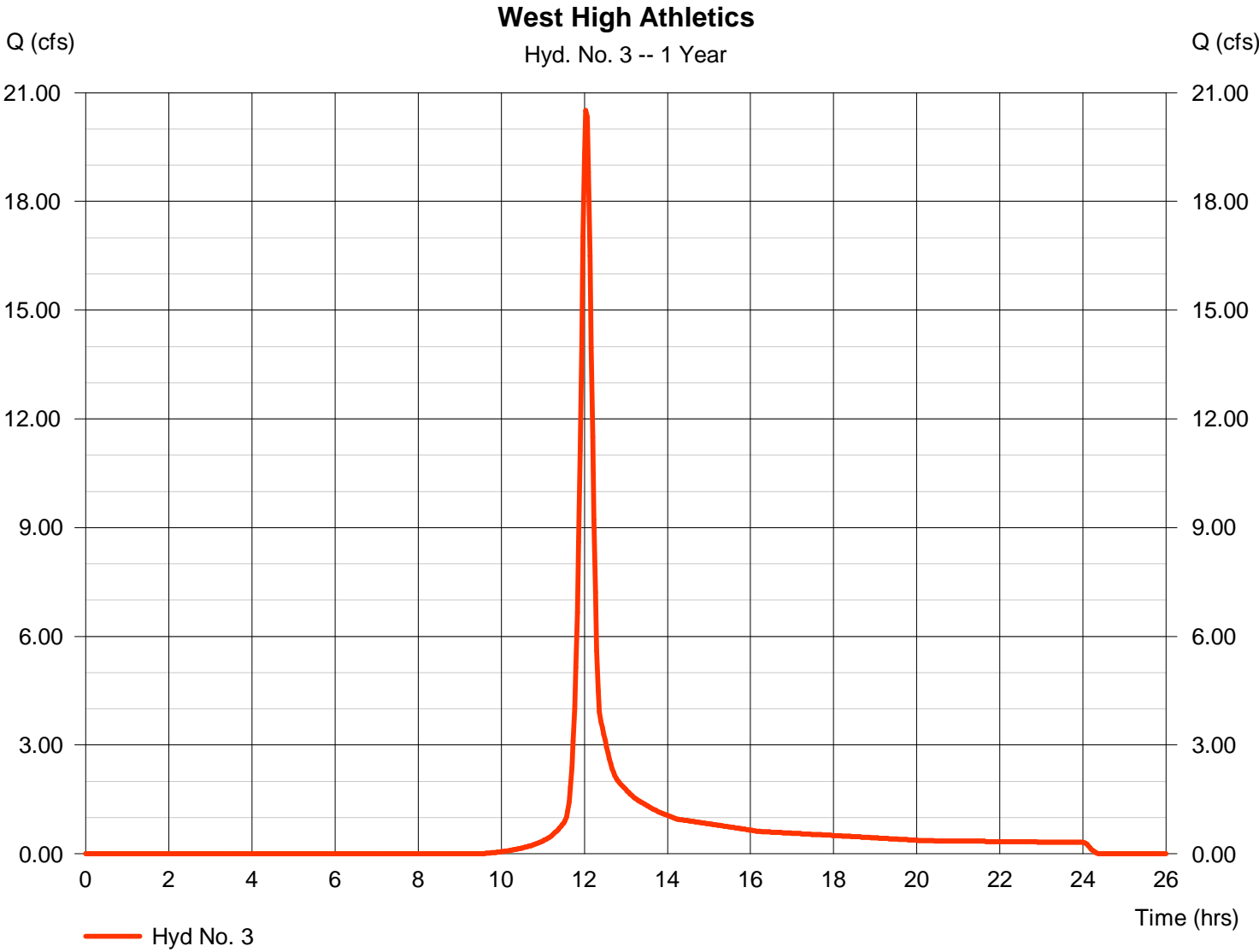
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type	= SCS Runoff	Peak discharge	= 20.52 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 58,024 cuft
Drainage area	= 13.400 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

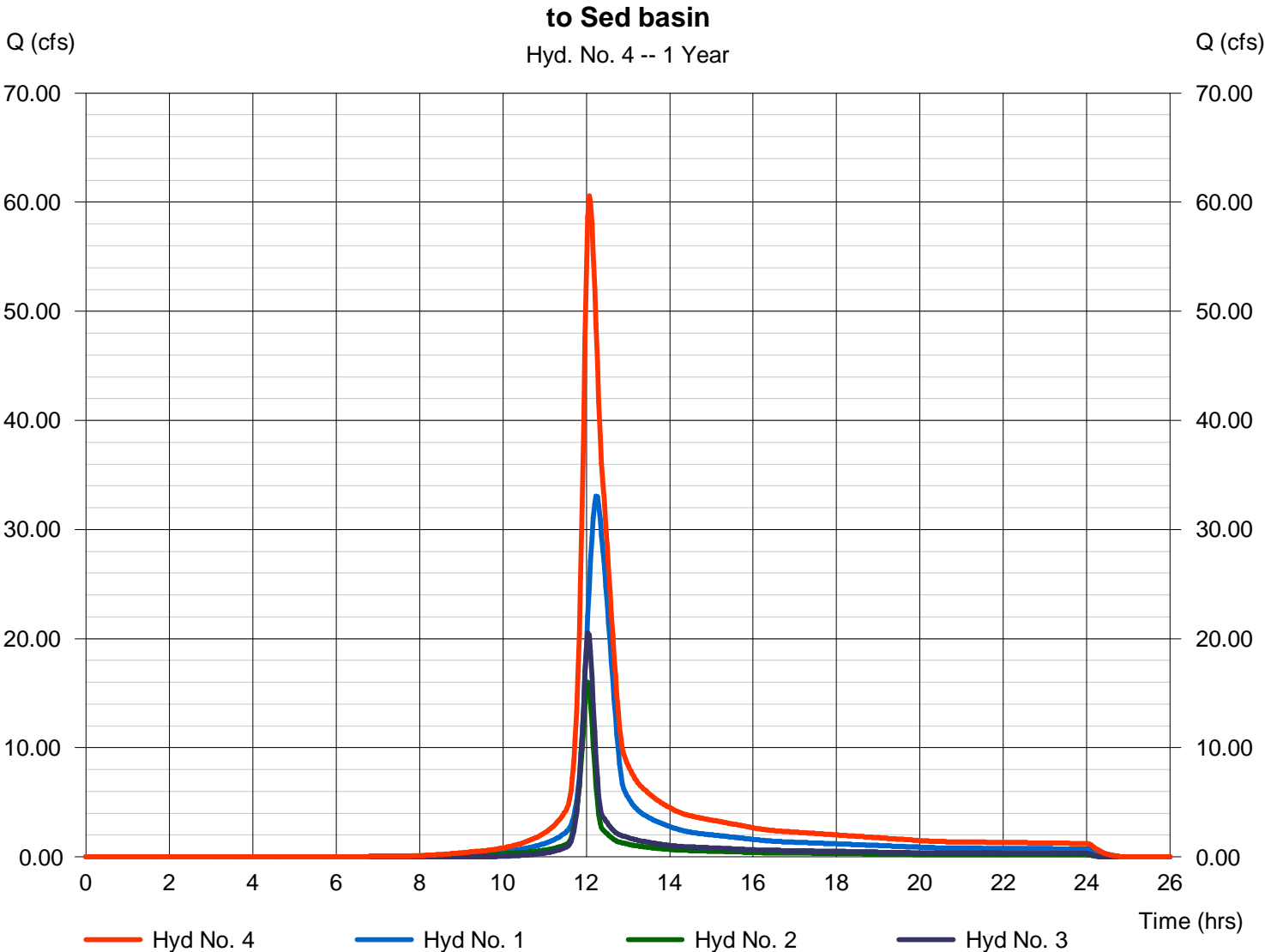
Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyds. = 1, 2, 3

Peak discharge = 60.56 cfs
Time to peak = 12.07 hrs
Hyd. volume = 253,432 cuft
Contrib. drain. area = 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

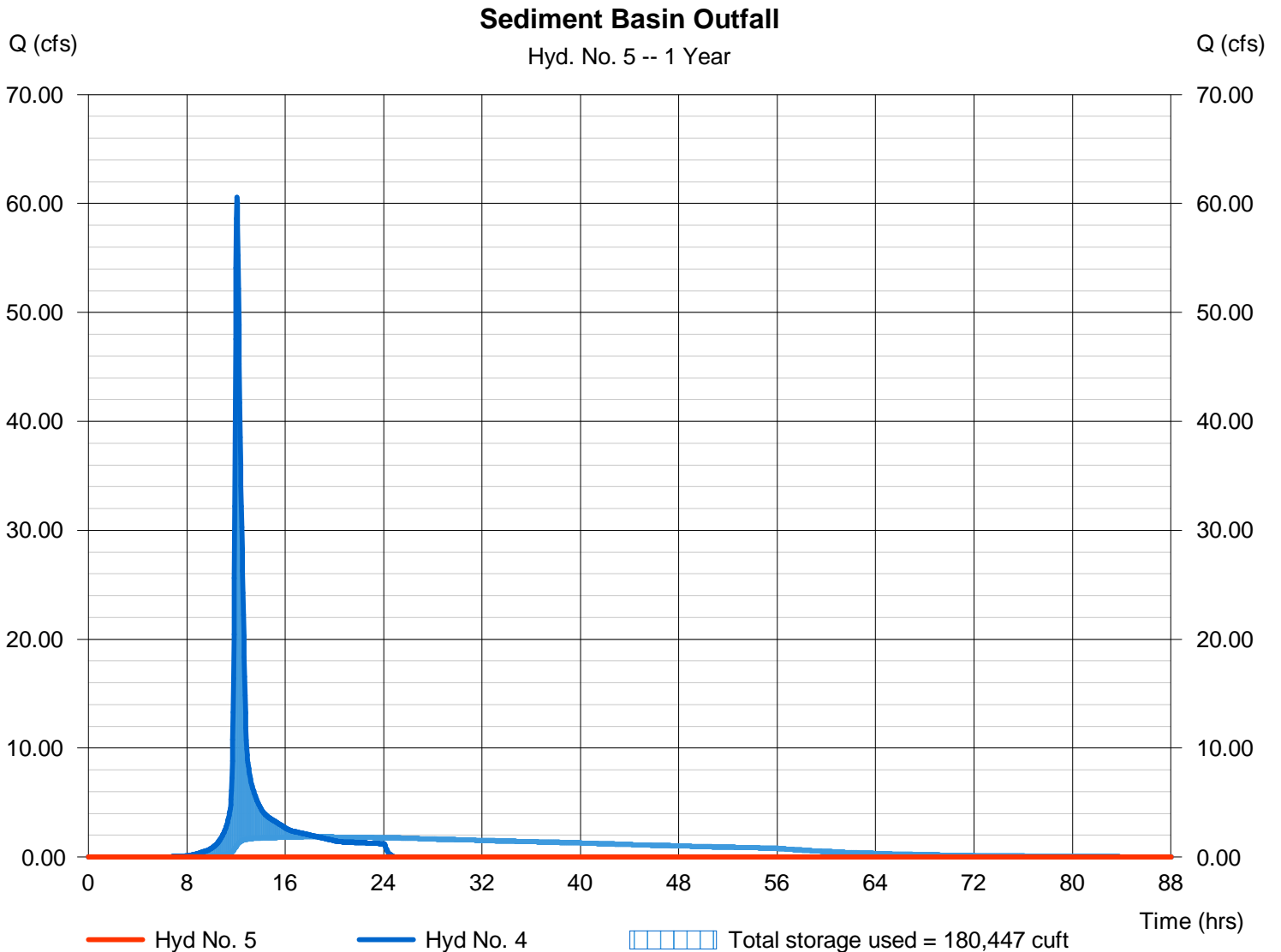
Wednesday, 11 / 13 / 2013

Hyd. No. 5

Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 16.80 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1290.03 ft
Reservoir name	= Sediment Basin	Max. Storage	= 180,447 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 1 - Sediment Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1287.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1287.00	10,800	0	0
1.00	1288.00	46,630	26,621	26,621
2.00	1289.00	75,350	60,412	87,033
3.00	1290.00	104,300	89,425	176,458
4.00	1291.00	207,060	152,757	329,215
5.00	1292.00	520,160	351,766	680,981
6.00	1293.00	900,000	701,387	1,382,368

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1291.00	0.00	0.00	0.00
Length (ft)	= 110.00	0.00	0.00	0.00
Slope (%)	= 0.90	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 1289.25	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.750 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ 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	1287.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	26,621	1288.00	0.00	---	---	---	0.00	---	---	---	0.810	---	0.810
2.00	87,033	1289.00	0.00	---	---	---	0.00	---	---	---	1.308	---	1.308
3.00	176,458	1290.00	0.00	---	---	---	0.00	---	---	---	1.811	---	1.811
4.00	329,215	1291.00	0.00	---	---	---	0.00	---	---	---	3.595	---	3.595
5.00	680,981	1292.00	5.36 ic	---	---	---	0.00	---	---	---	9.030	---	14.39
6.00	1,382,368	1293.00	14.84 oc	---	---	---	0.00	---	---	---	15.625	---	30.47

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	46.17	2	734	209,119	-----	-----	-----	West offsite	
2	SCS Runoff	21.30	2	722	61,157	-----	-----	-----	East Offsite	
3	SCS Runoff	30.14	2	722	84,542	-----	-----	-----	West High Athletics	
4	Combine	85.35	2	724	354,818	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	0.000	2	762	0	4	1290.50	252,997	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 2 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

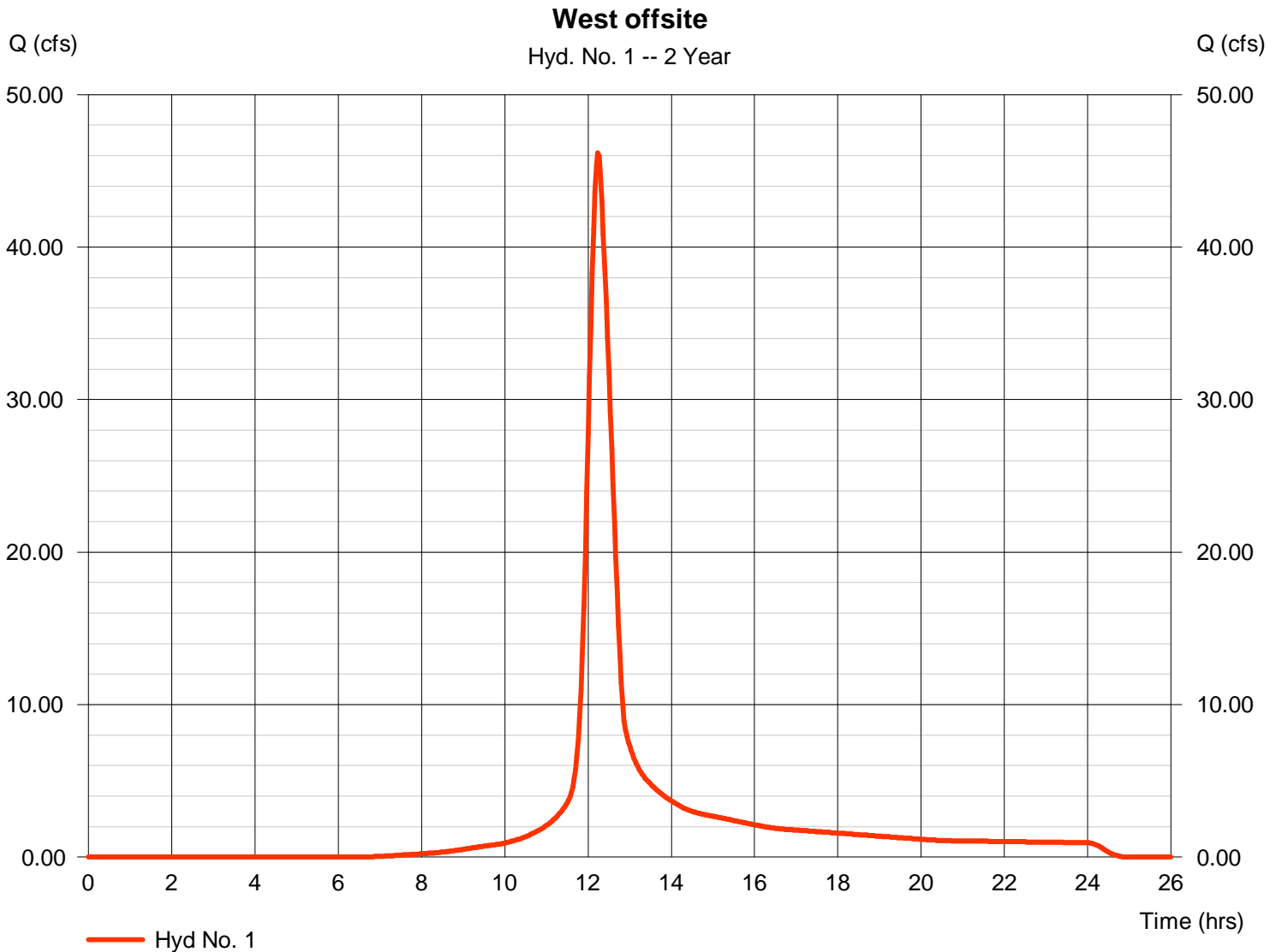
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 46.17 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 209,119 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

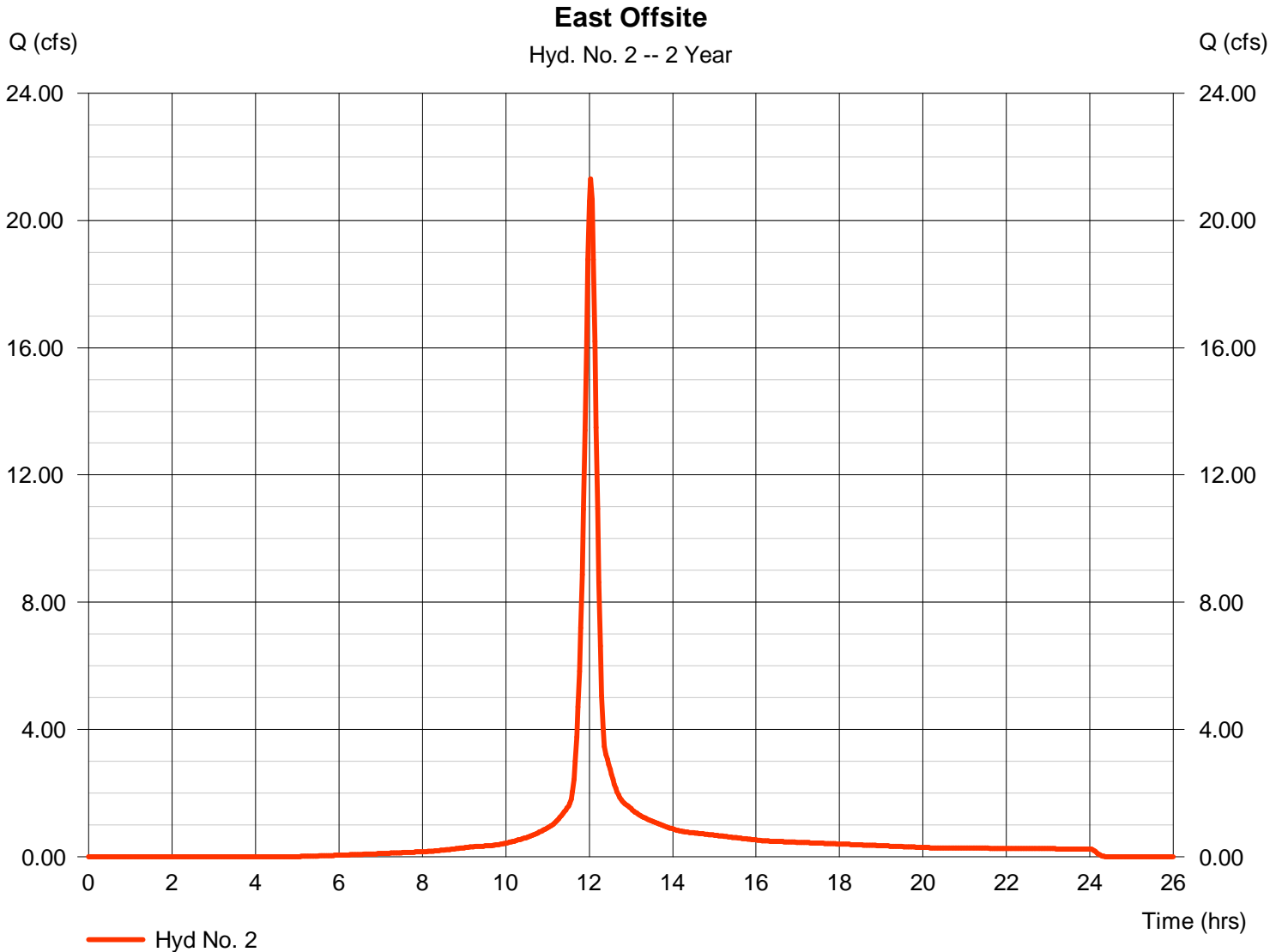
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 21.30 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 61,157 cuft
Drainage area	= 6.800 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

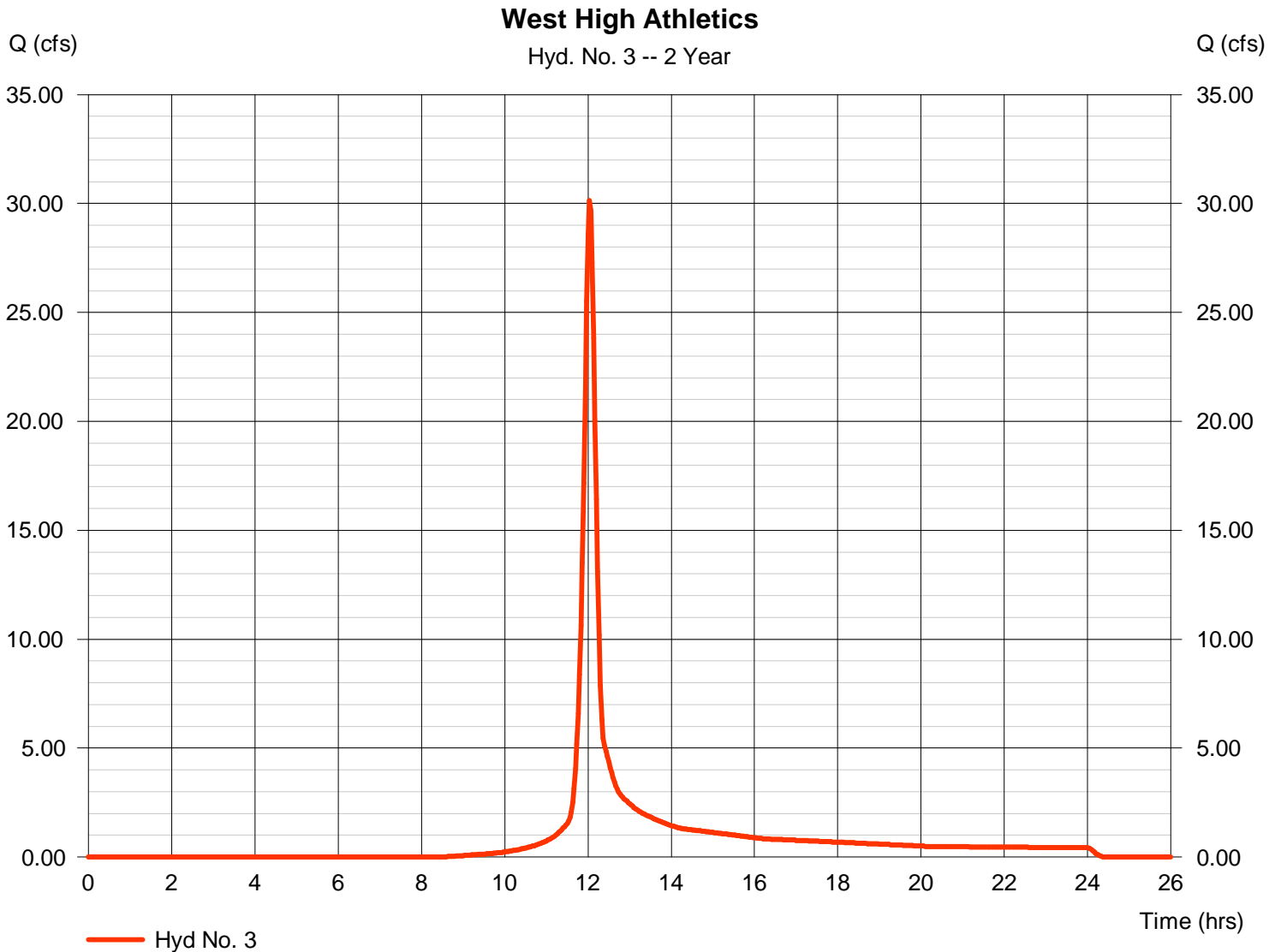
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type	= SCS Runoff	Peak discharge	= 30.14 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 84,542 cuft
Drainage area	= 13.400 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

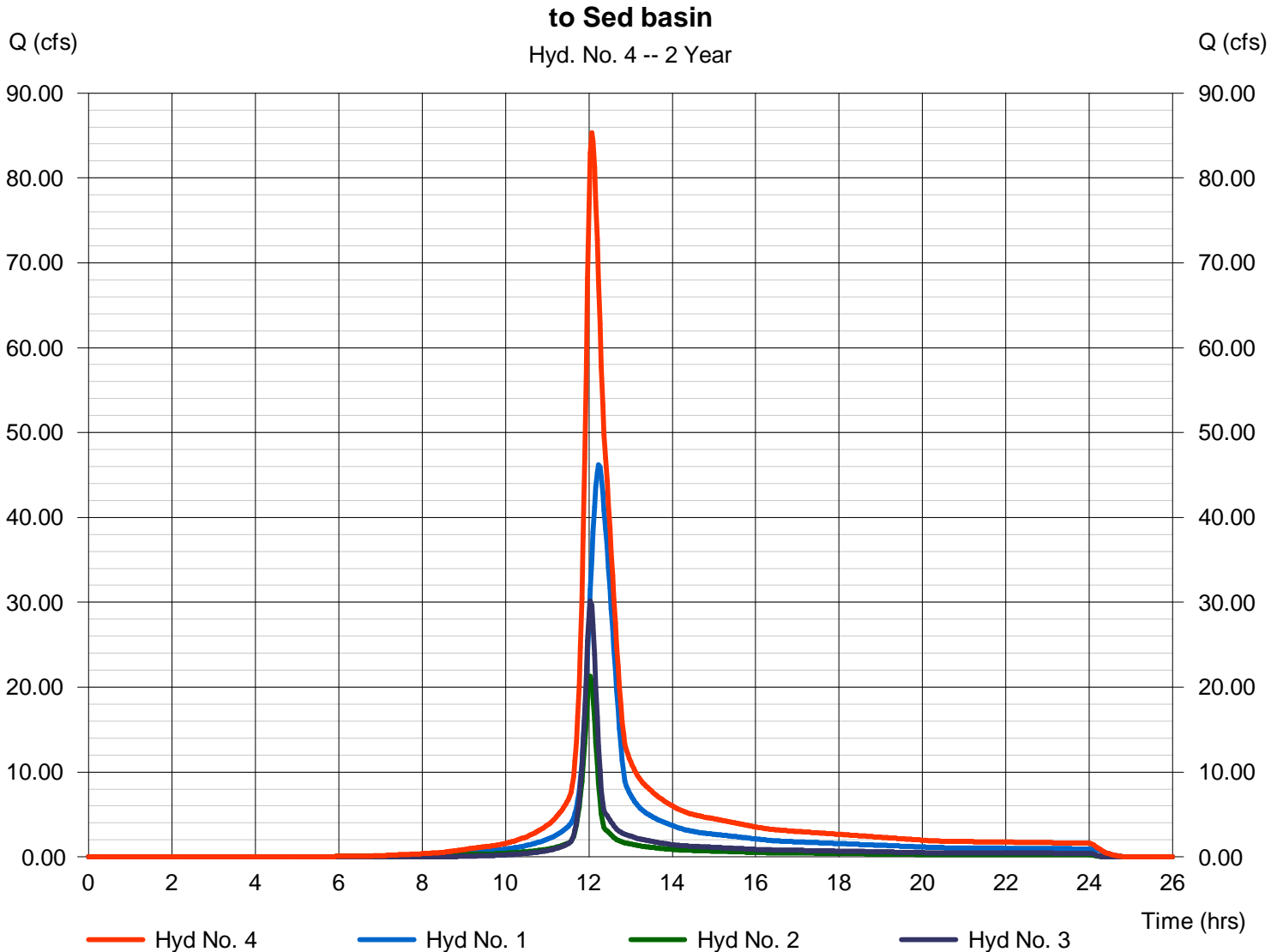
Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 1, 2, 3

Peak discharge = 85.35 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 354,818 cuft
 Contrib. drain. area = 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

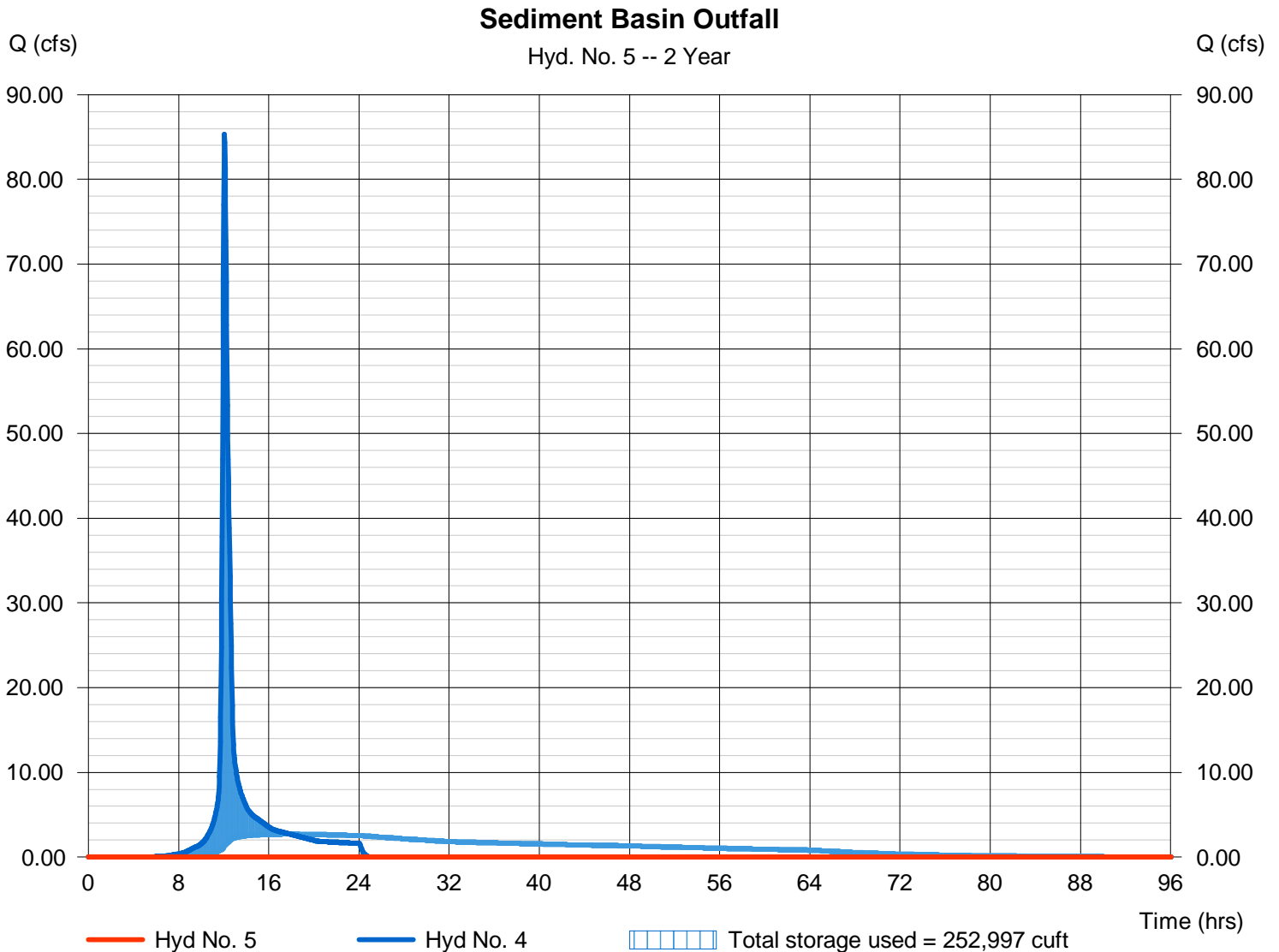
Wednesday, 11 / 13 / 2013

Hyd. No. 5

Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1290.50 ft
Reservoir name	= Sediment Basin	Max. Storage	= 252,997 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	6.432	2	736	32,484	-----	-----	-----	West offsite	
2	SCS Runoff	4.278	2	722	12,140	-----	-----	-----	East Offsite	
3	SCS Runoff	2.519	2	724	9,288	-----	-----	-----	West High Athletics	
4	Combine	11.06	2	726	53,911	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	0.000	2	956	0	4	1288.04	28,739	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 3 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

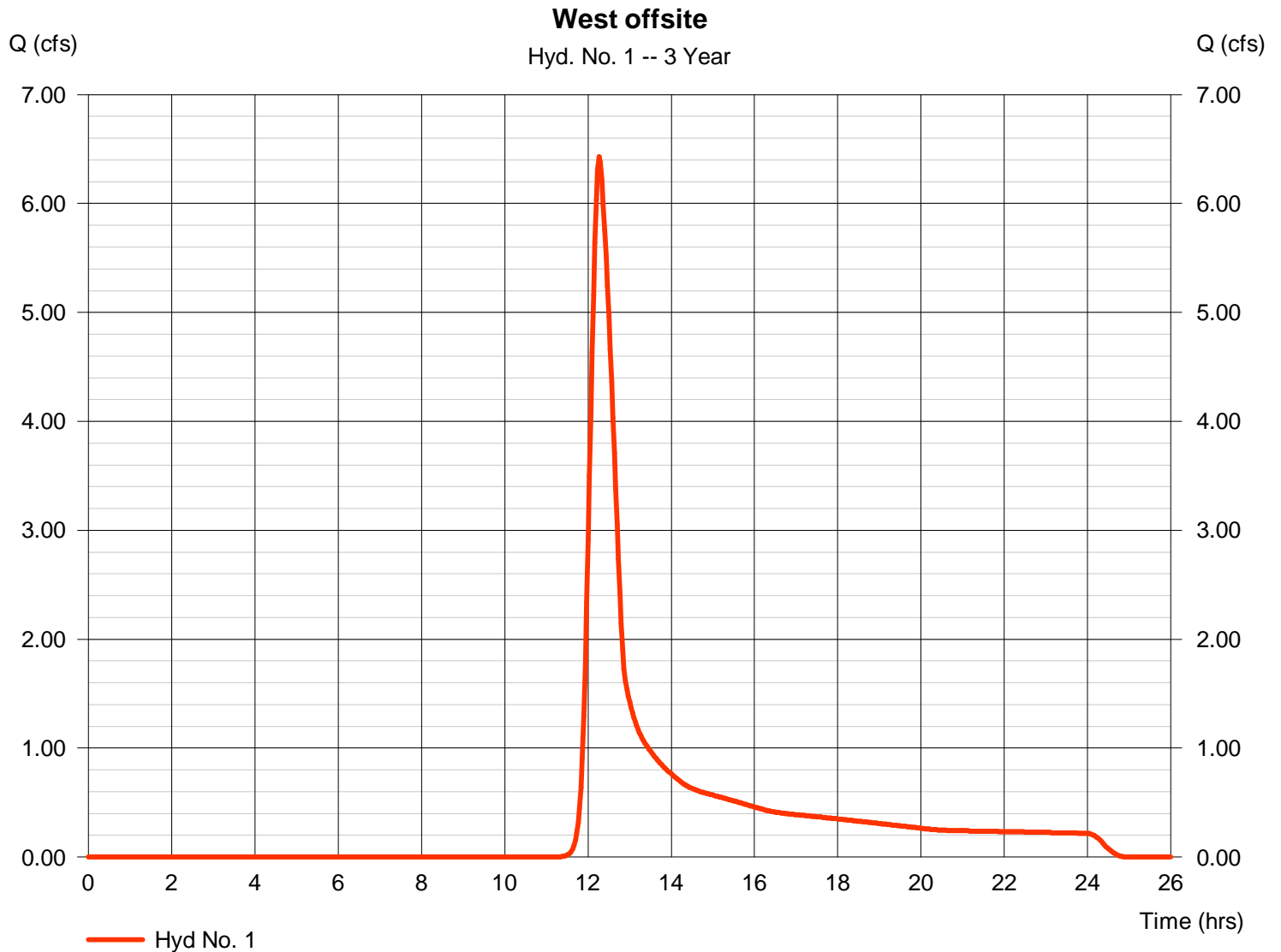
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 6.432 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 32,484 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

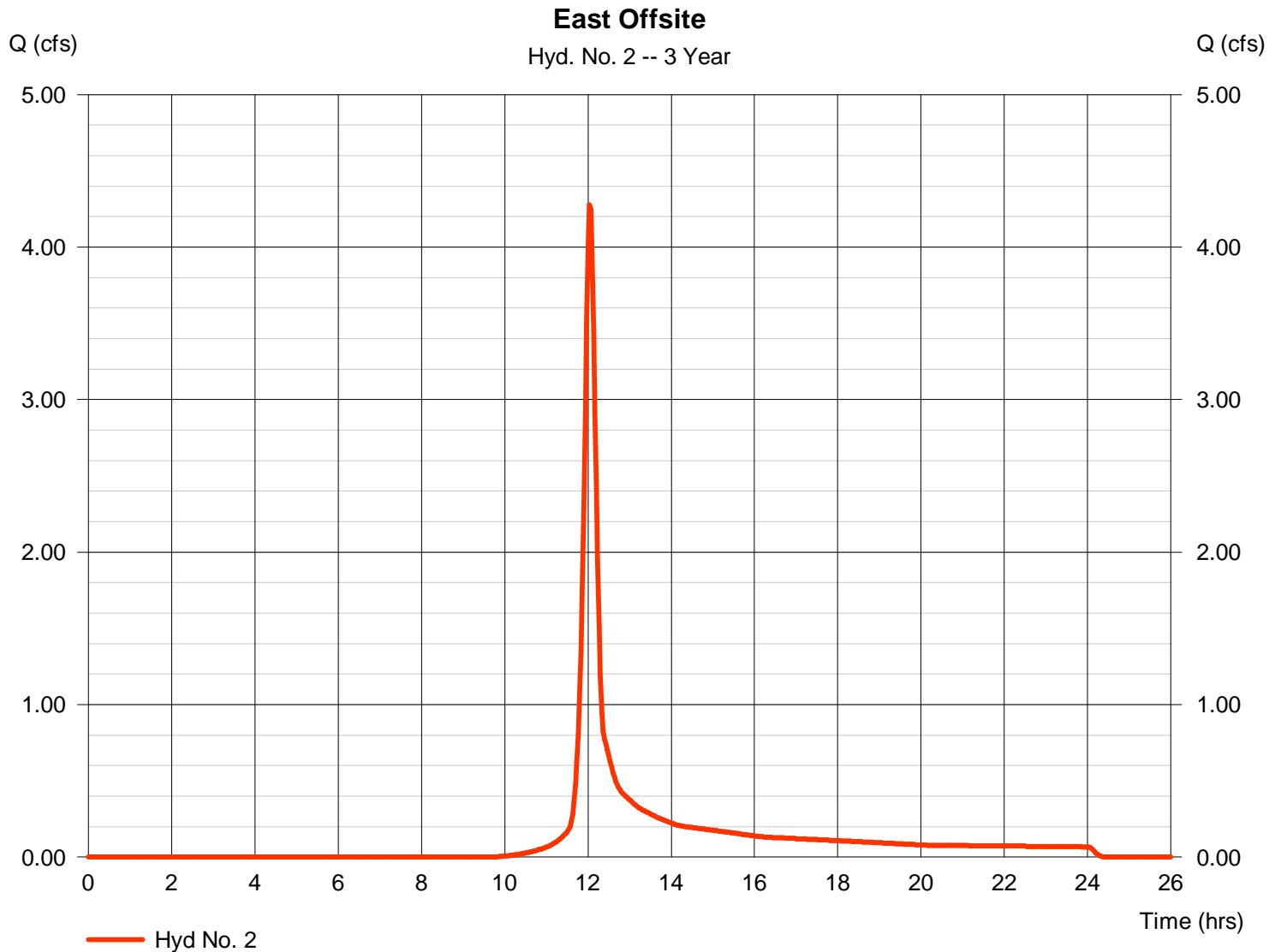
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 4.278 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 12,140 cuft
Drainage area	= 6.800 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

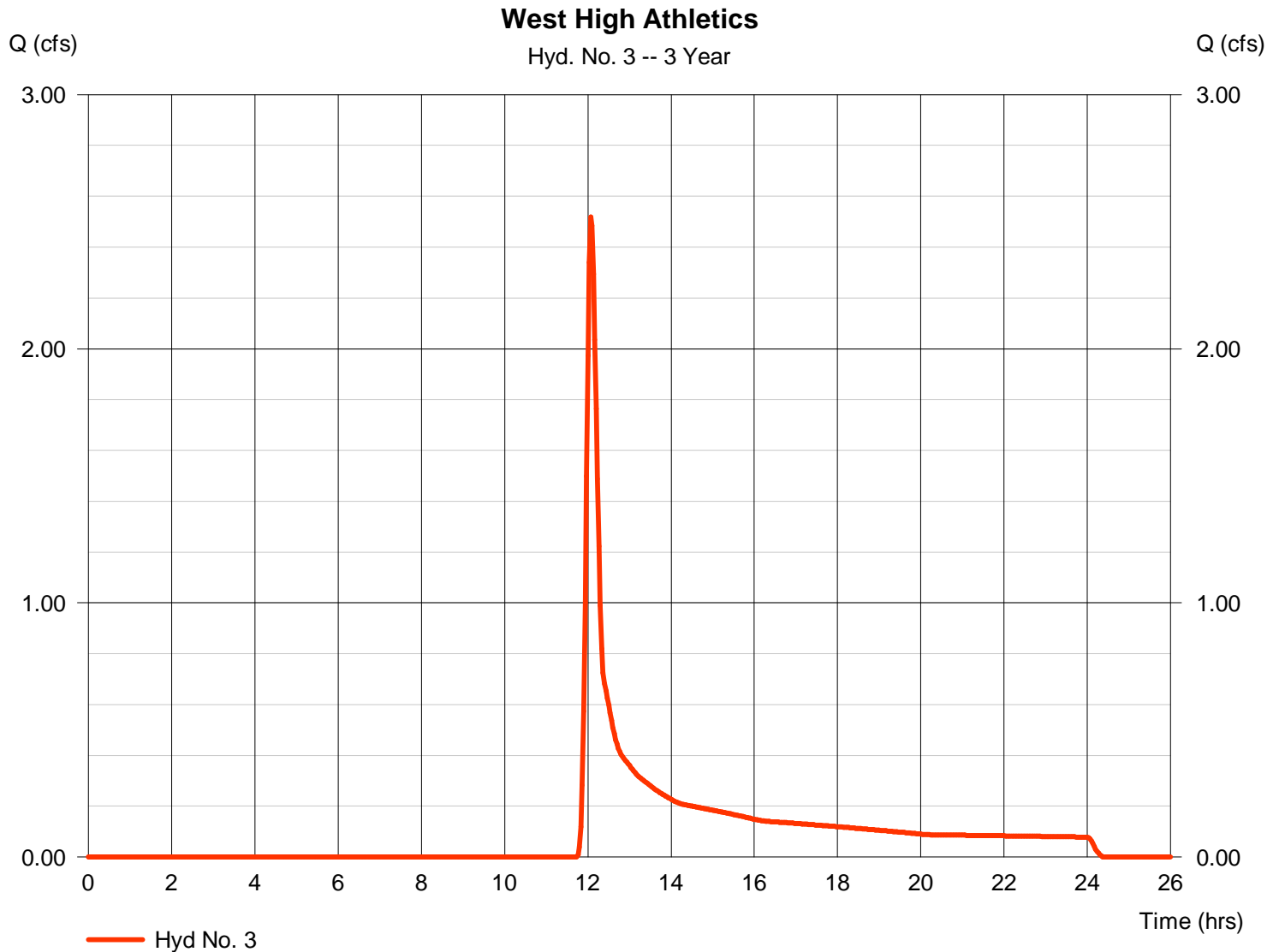
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type	= SCS Runoff	Peak discharge	= 2.519 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,288 cuft
Drainage area	= 13.400 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

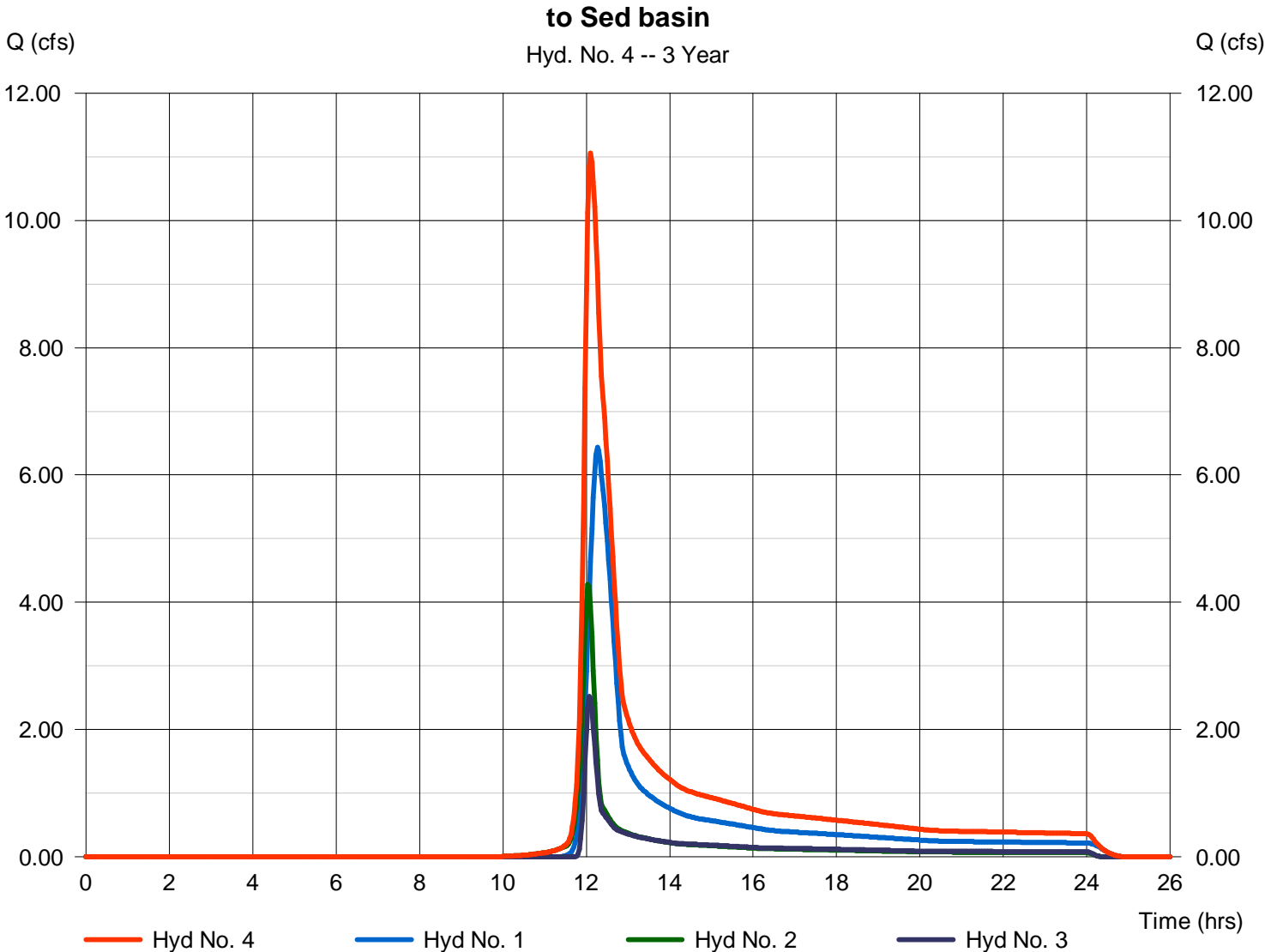
Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type = Combine
Storm frequency = 3 yrs
Time interval = 2 min
Inflow hyds. = 1, 2, 3

Peak discharge = 11.06 cfs
Time to peak = 12.10 hrs
Hyd. volume = 53,911 cuft
Contrib. drain. area = 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

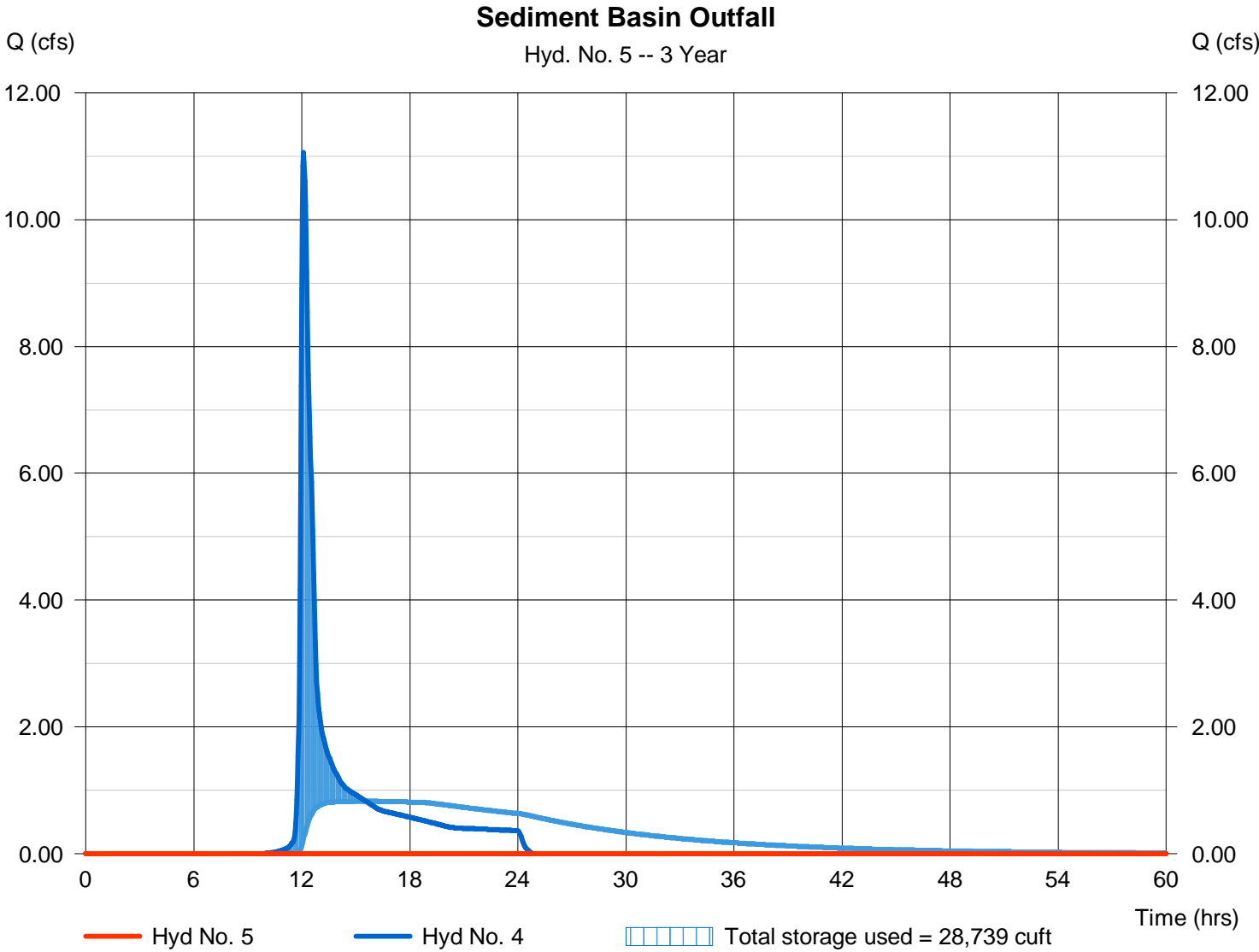
Wednesday, 11 / 13 / 2013

Hyd. No. 5

Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 15.93 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1288.04 ft
Reservoir name	= Sediment Basin	Max. Storage	= 28,739 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	65.24	2	734	296,938	-----	-----	-----	West offsite	
2	SCS Runoff	28.86	2	722	84,187	-----	-----	-----	East Offsite	
3	SCS Runoff	44.54	2	722	125,018	-----	-----	-----	West High Athletics	
4	Combine	121.74	2	724	506,144	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	0.054	2	1010	1,375	4	1291.09	359,255	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 5 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

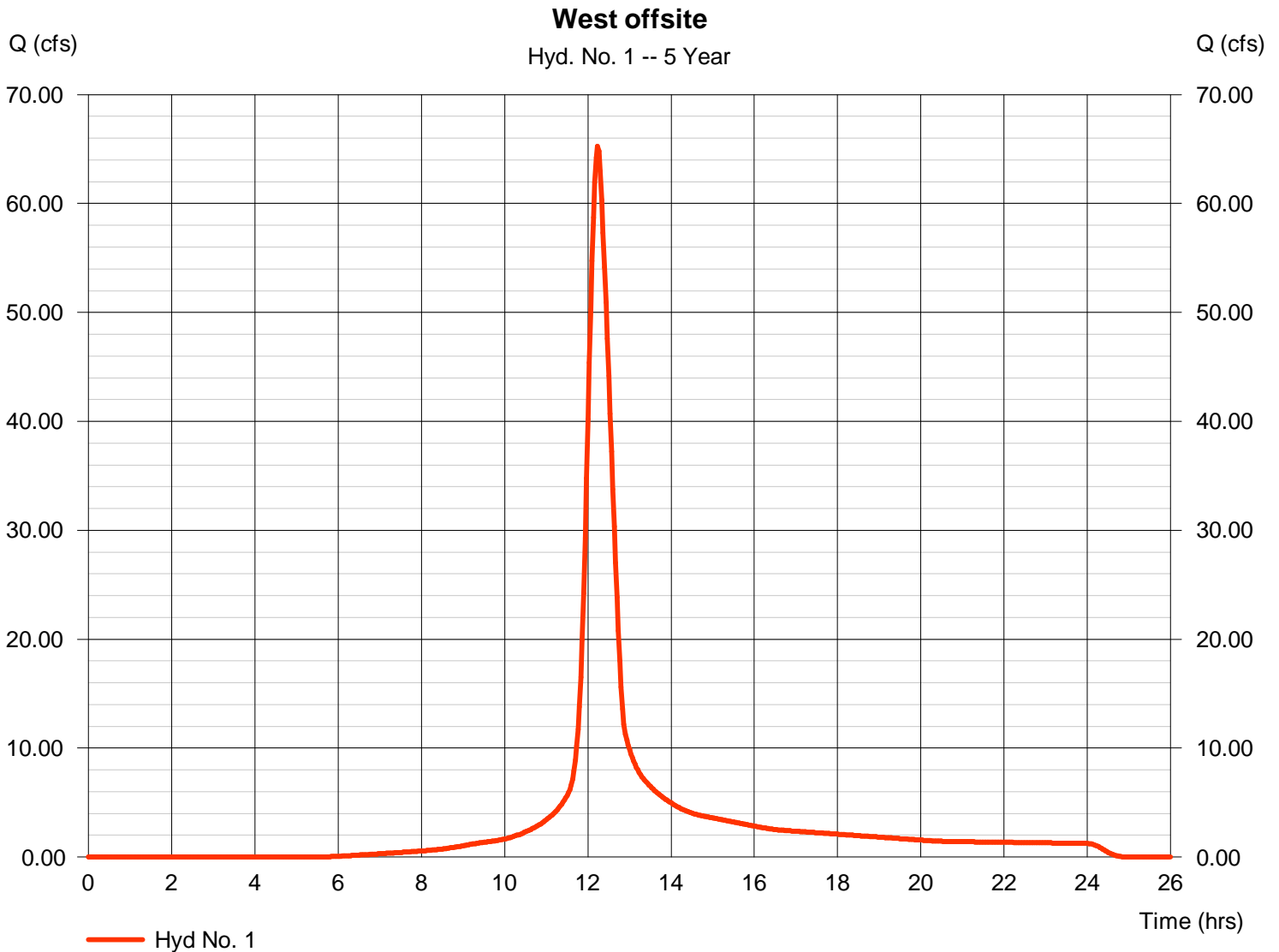
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 65.24 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 296,938 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

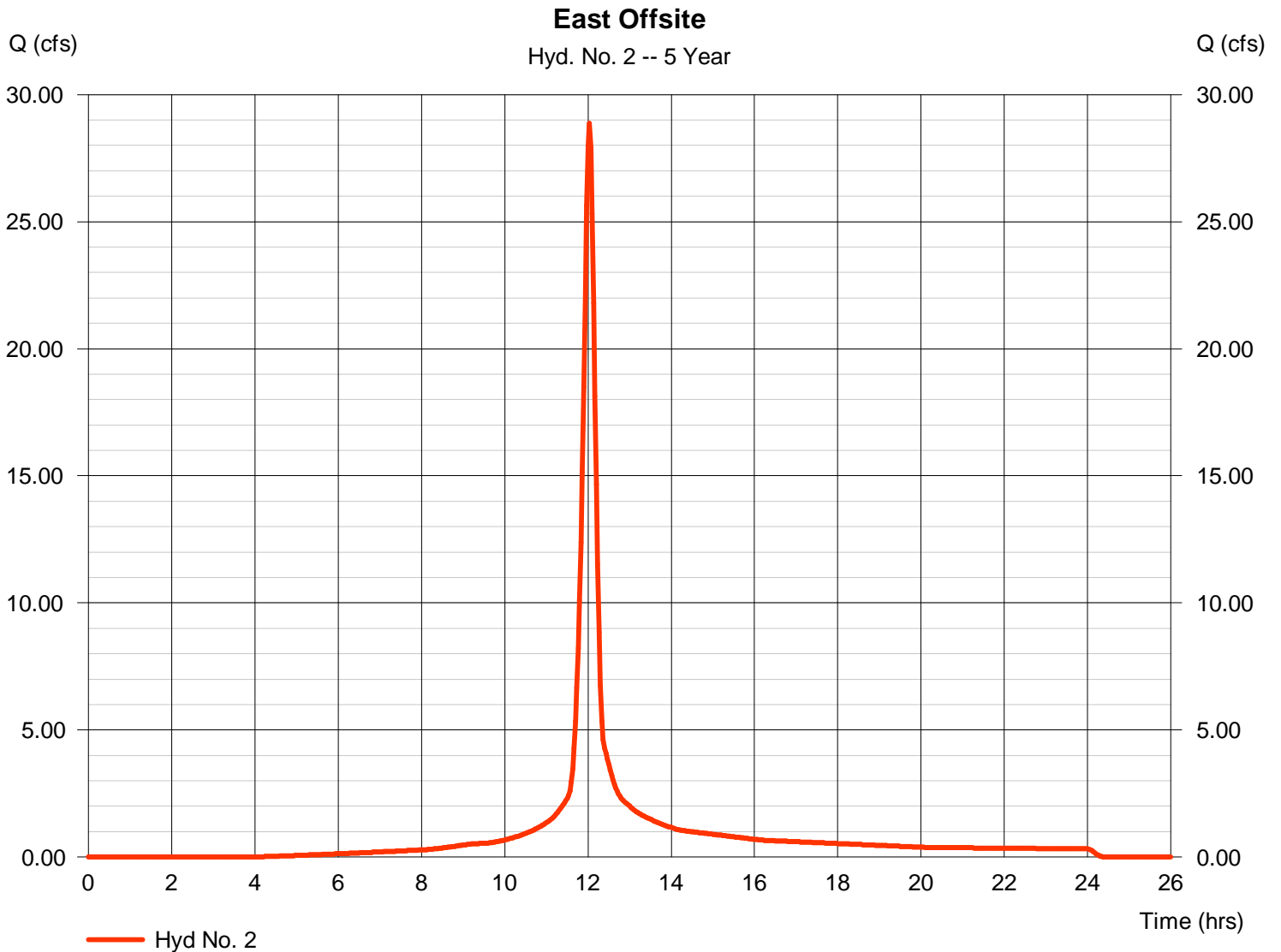
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 28.86 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 84,187 cuft
Drainage area	= 6.800 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

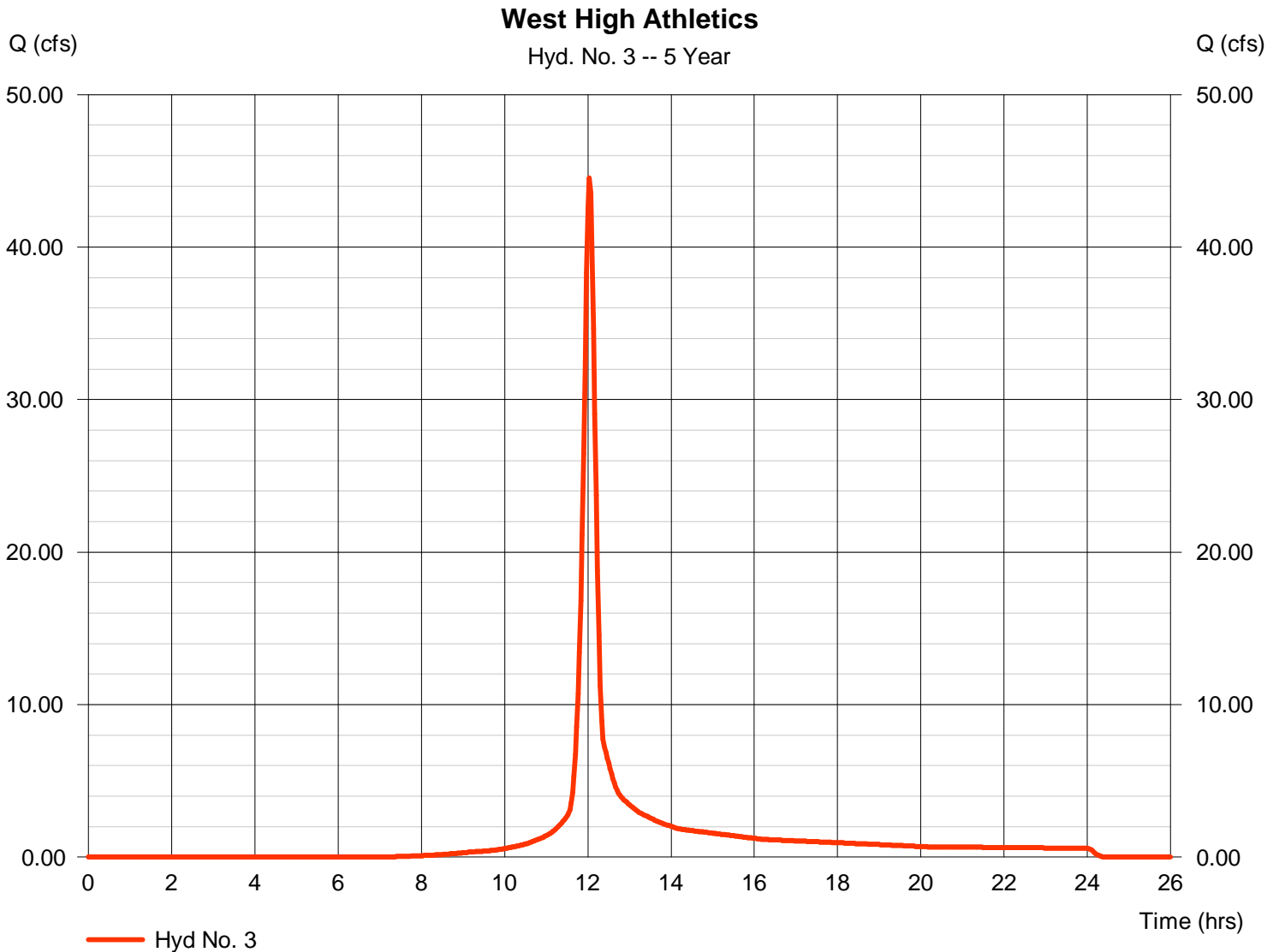
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type	= SCS Runoff	Peak discharge	= 44.54 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 125,018 cuft
Drainage area	= 13.400 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

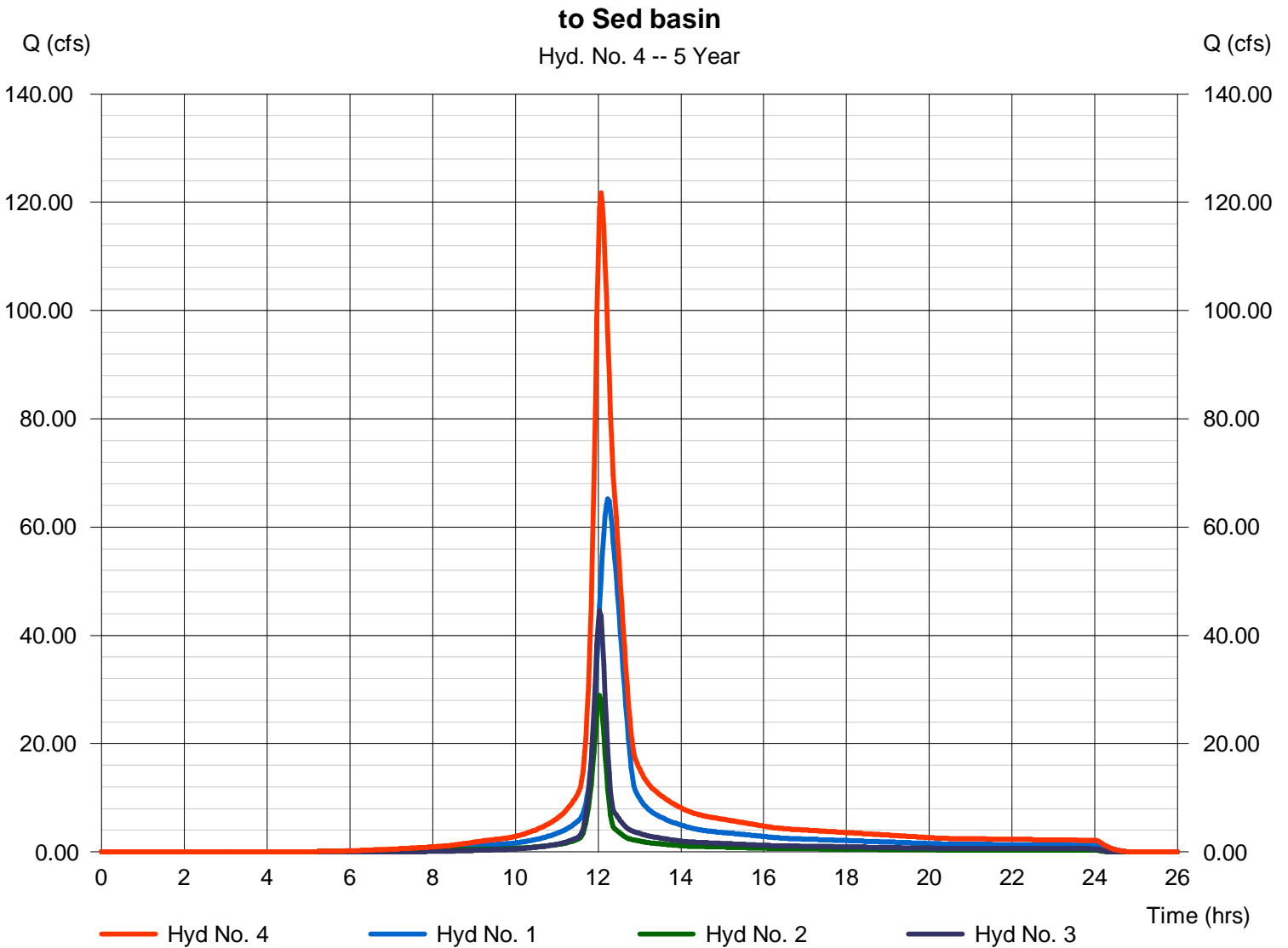
Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 1, 2, 3

Peak discharge = 121.74 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 506,144 cuft
 Contrib. drain. area = 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

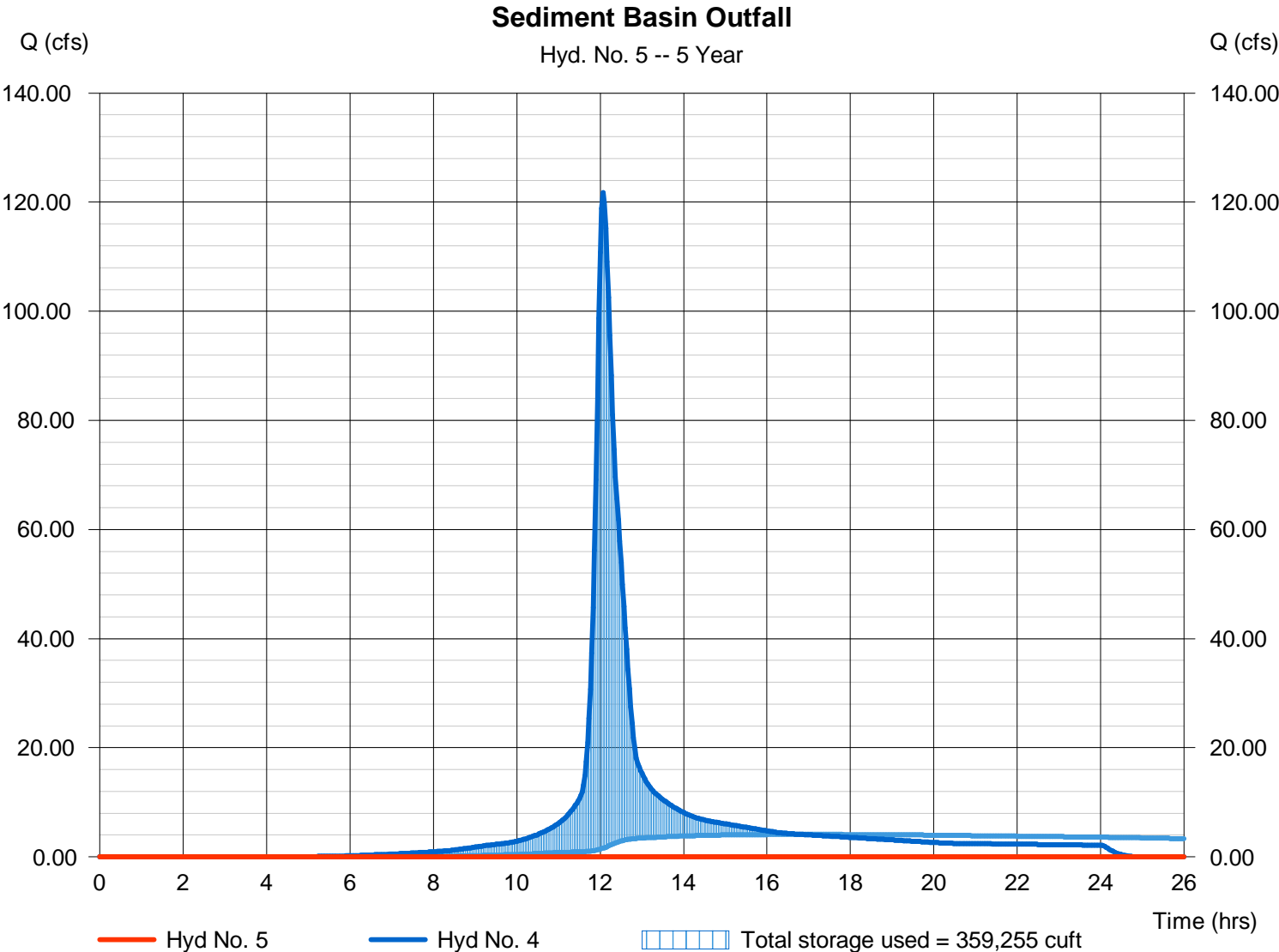
Wednesday, 11 / 13 / 2013

Hyd. No. 5

Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 0.054 cfs
Storm frequency	= 5 yrs	Time to peak	= 16.83 hrs
Time interval	= 2 min	Hyd. volume	= 1,375 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1291.09 ft
Reservoir name	= Sediment Basin	Max. Storage	= 359,255 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	78.68	2	734	359,901	-----	-----	-----	West offsite	
2	SCS Runoff	34.13	2	722	100,514	-----	-----	-----	East Offsite	
3	SCS Runoff	54.85	2	722	154,540	-----	-----	-----	West High Athletics	
4	Combine	147.52	2	724	614,955	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	0.510	2	958	15,451	4	1291.29	429,728	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 10 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

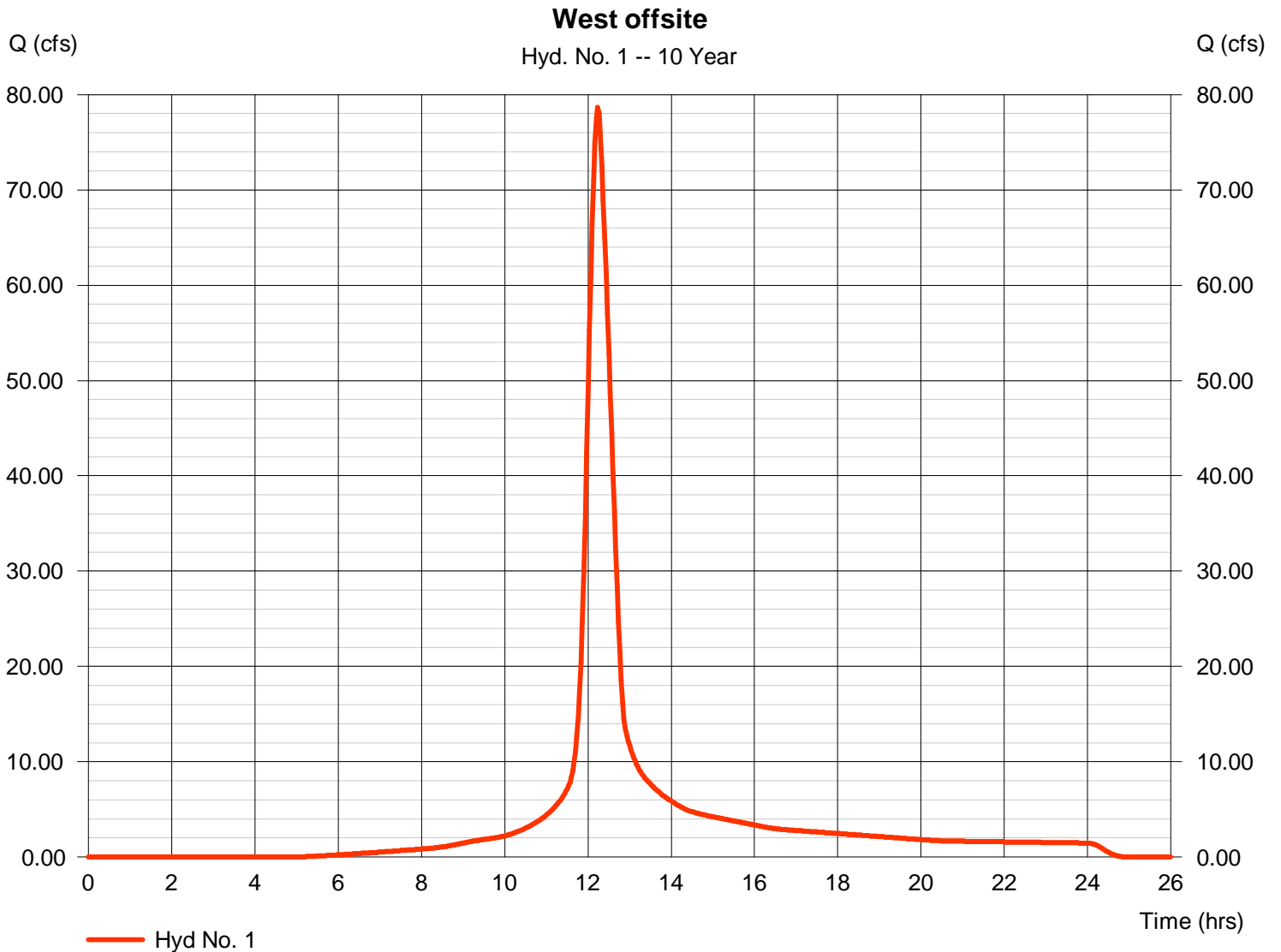
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 78.68 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 359,901 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

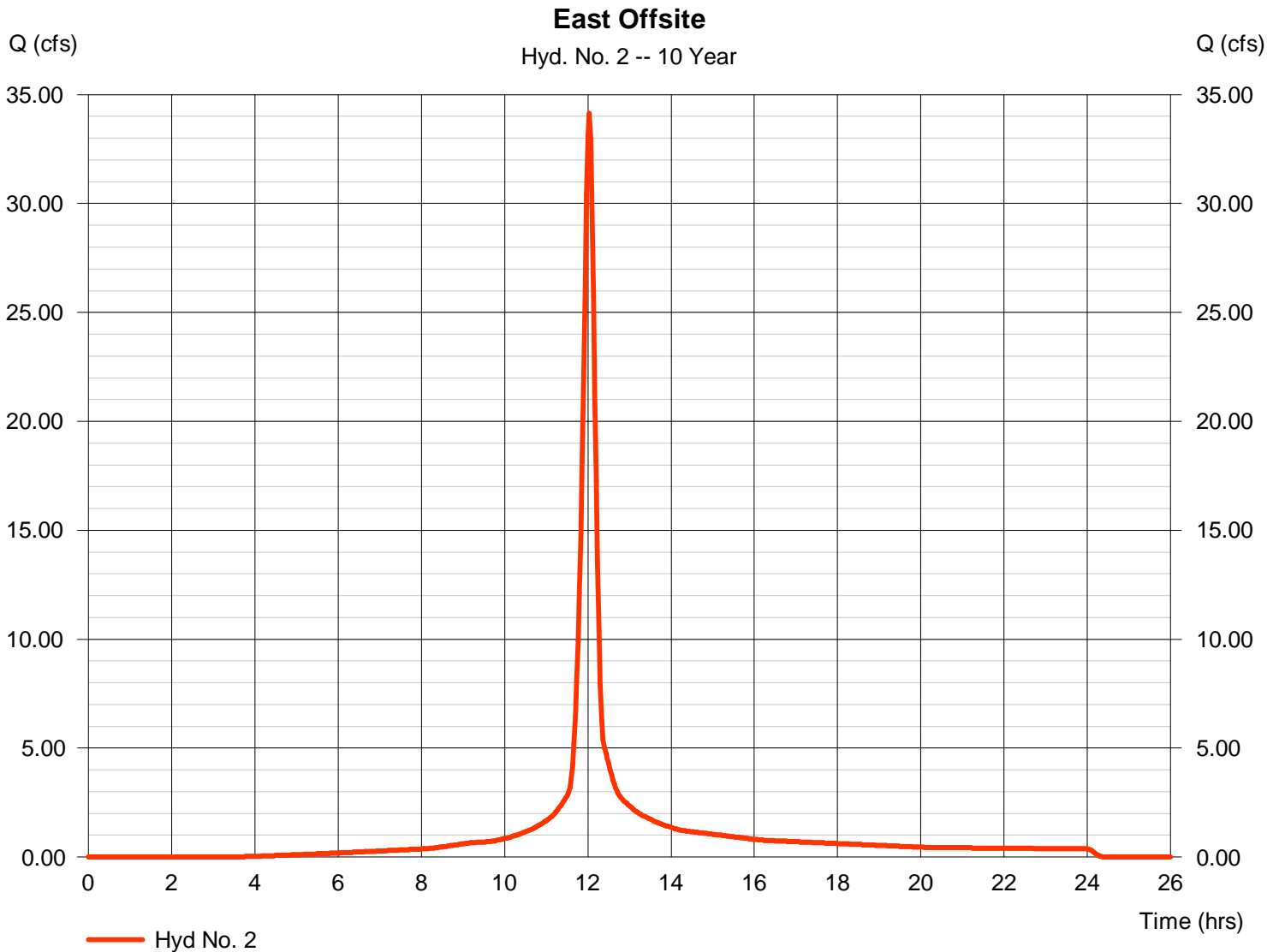
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 34.13 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 100,514 cuft
Drainage area	= 6.800 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

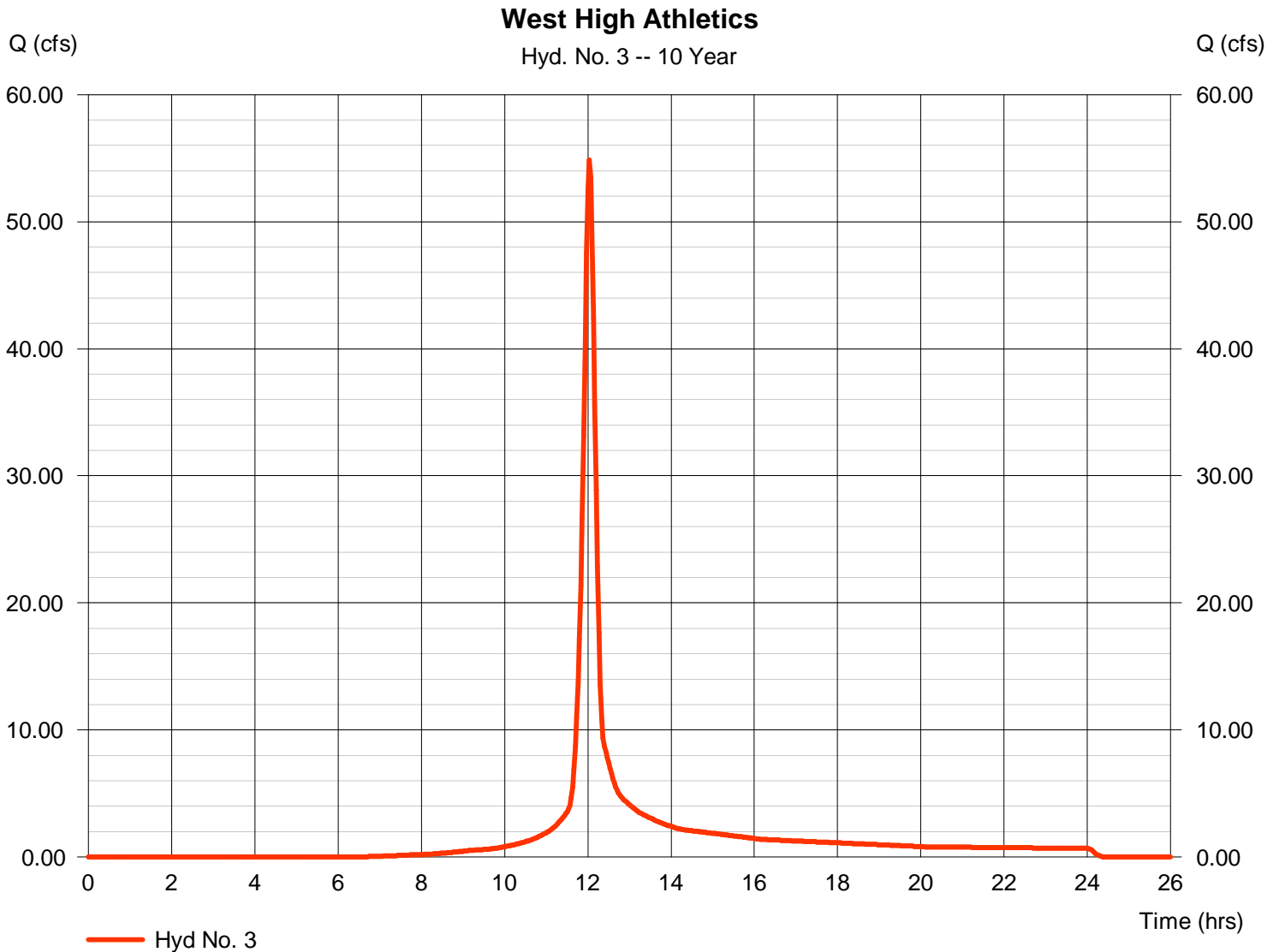
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type	= SCS Runoff	Peak discharge	= 54.85 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 154,540 cuft
Drainage area	= 13.400 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

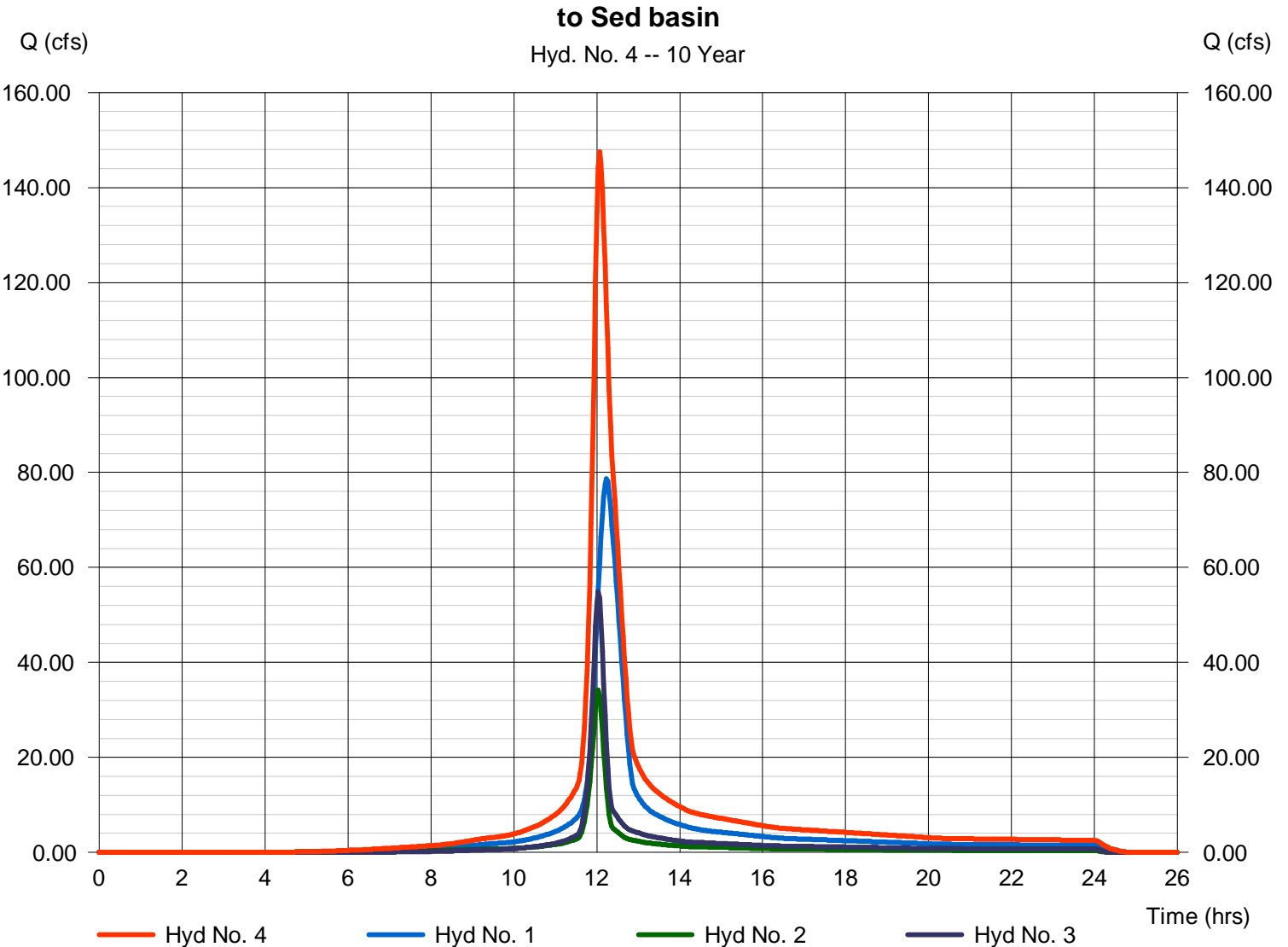
Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 1, 2, 3

Peak discharge = 147.52 cfs
Time to peak = 12.07 hrs
Hyd. volume = 614,955 cuft
Contrib. drain. area = 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 5

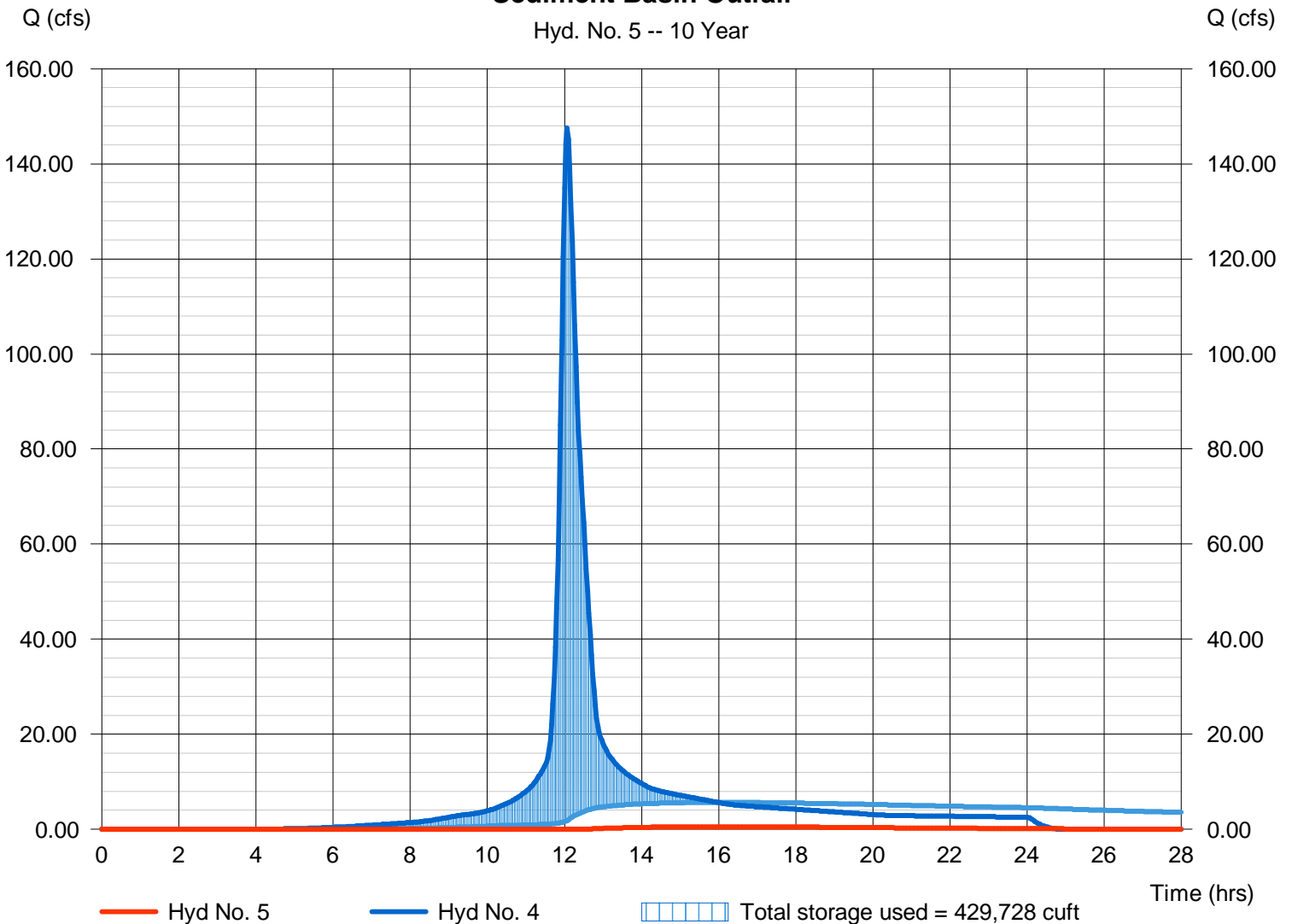
Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 0.510 cfs
Storm frequency	= 10 yrs	Time to peak	= 15.97 hrs
Time interval	= 2 min	Hyd. volume	= 15,451 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1291.29 ft
Reservoir name	= Sediment Basin	Max. Storage	= 429,728 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Sediment Basin Outfall

Hyd. No. 5 -- 10 Year



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	95.96	2	734	442,011	-----	-----	-----	West offsite	
2	SCS Runoff	40.86	2	722	121,661	-----	-----	-----	East Offsite	
3	SCS Runoff	68.23	2	722	193,460	-----	-----	-----	West High Athletics	
4	Combine	180.78	2	724	757,133	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	1.691	2	912	54,750	4	1291.53	517,260	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 25 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

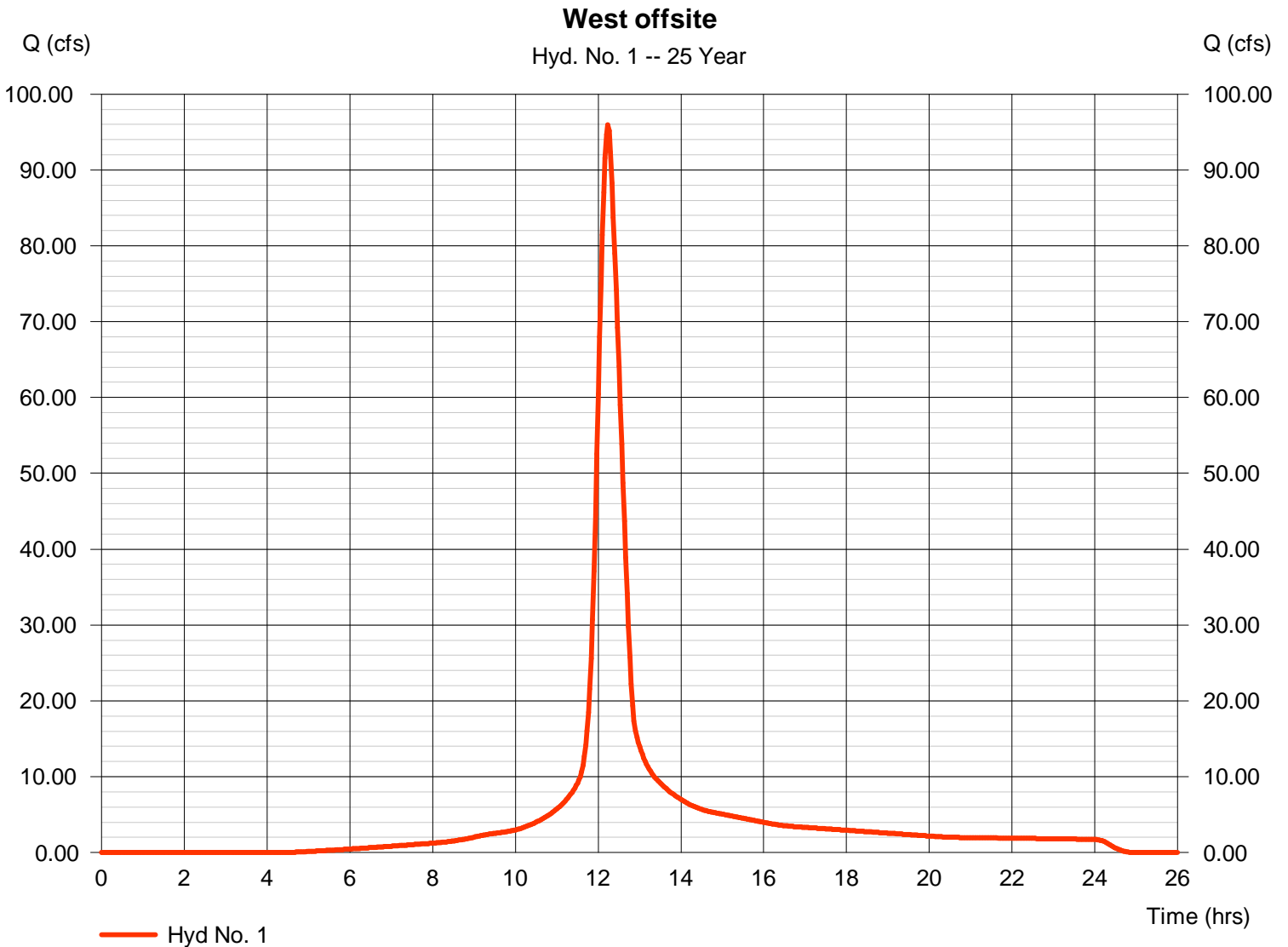
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 95.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 442,011 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

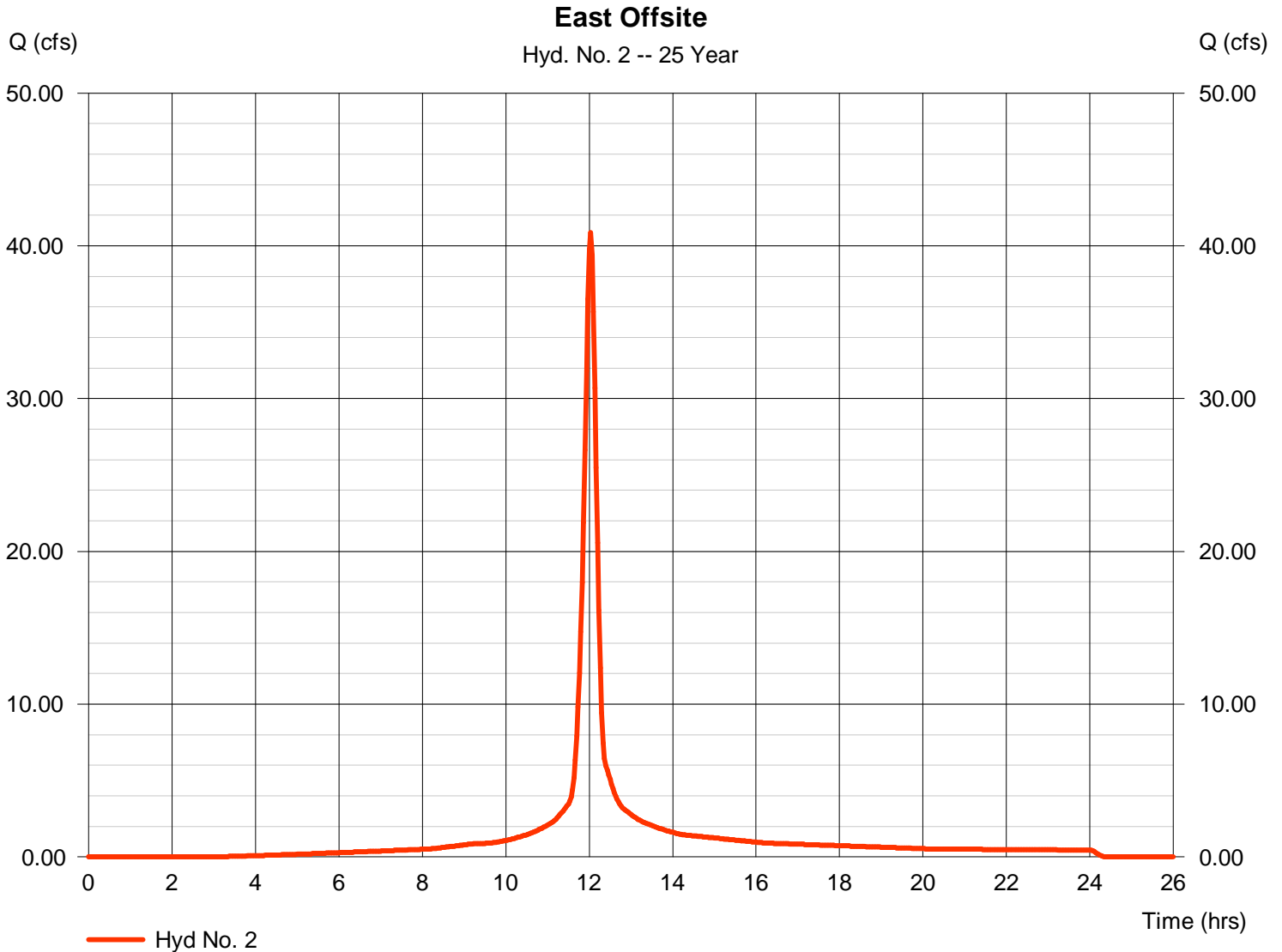
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 40.86 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 121,661 cuft
Drainage area	= 6.800 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

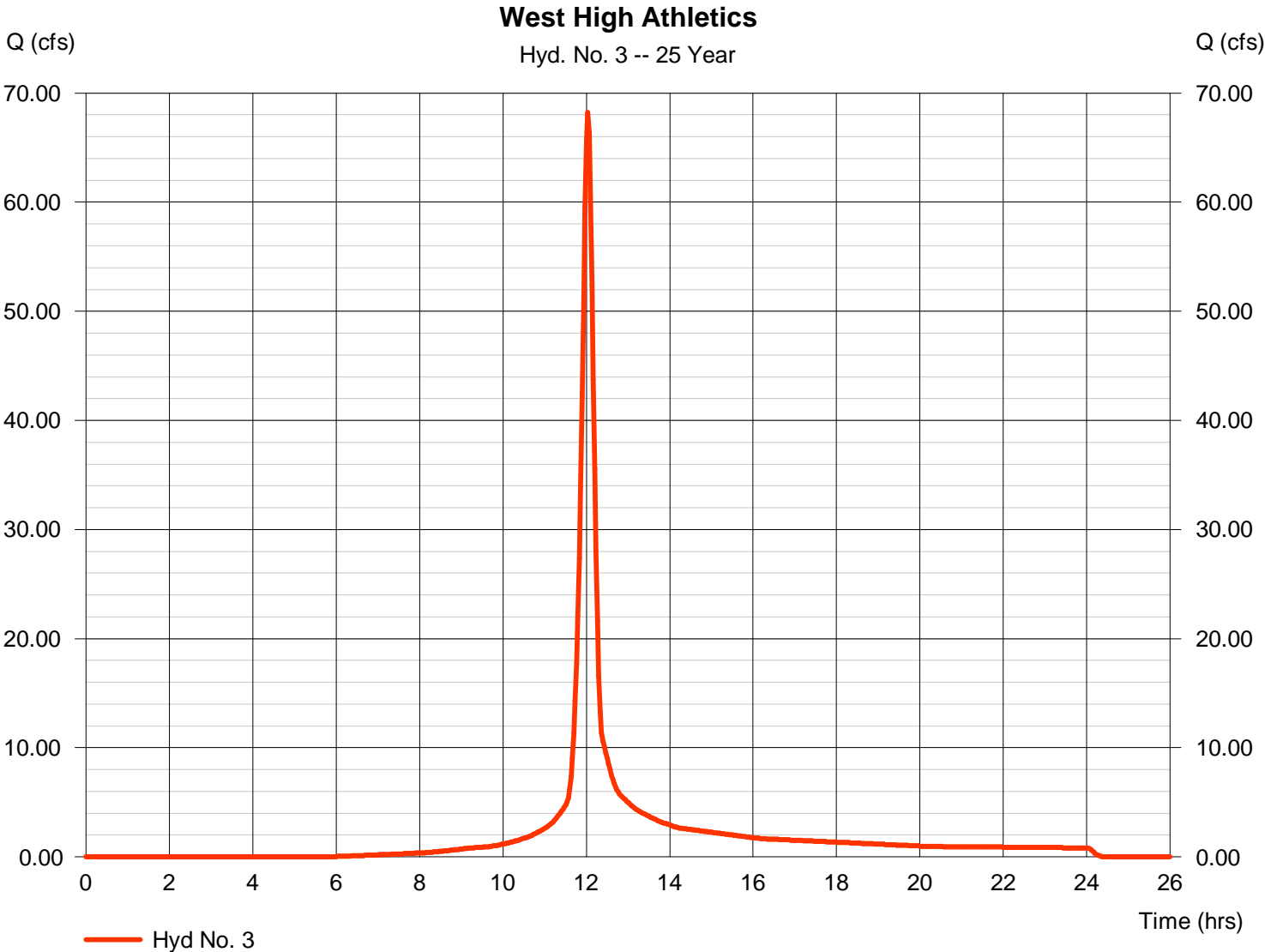
Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 13.400 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.10 in
Storm duration = 24 hrs

Peak discharge = 68.23 cfs
Time to peak = 12.03 hrs
Hyd. volume = 193,460 cuft
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

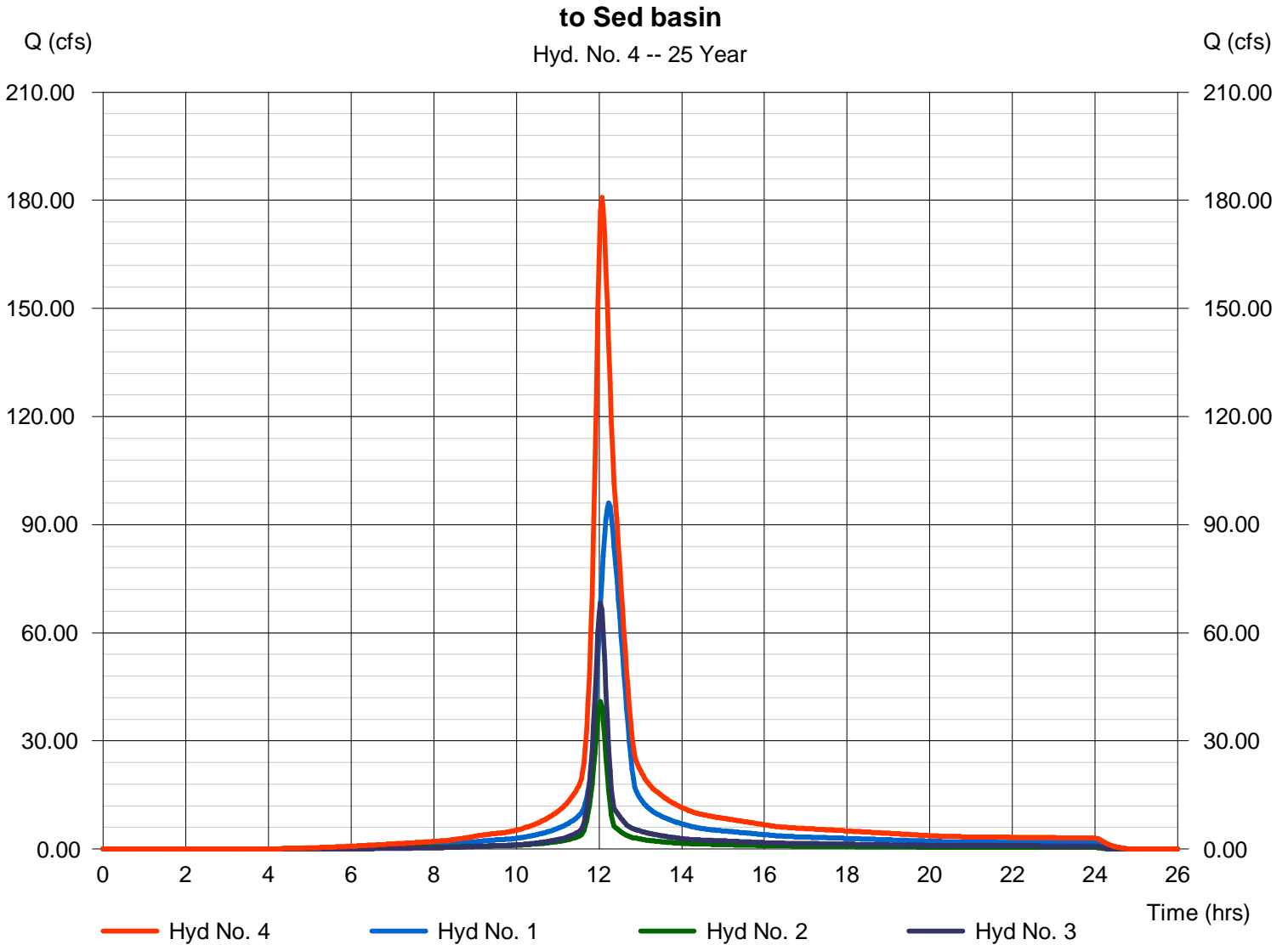
Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type = Combine
 Storm frequency = 25 yrs
 Time interval = 2 min
 Inflow hyds. = 1, 2, 3

Peak discharge = 180.78 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 757,133 cuft
 Contrib. drain. area = 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

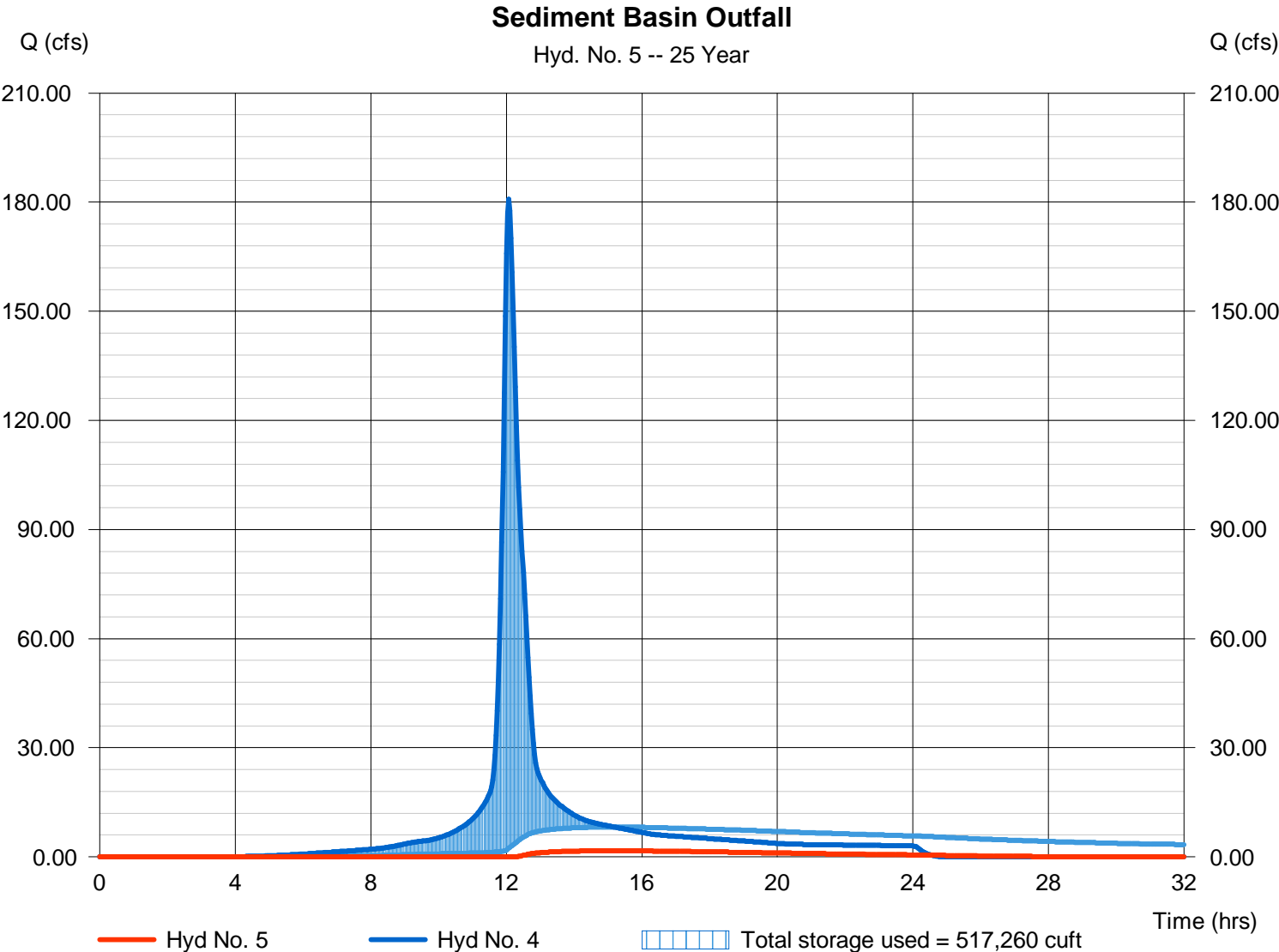
Wednesday, 11 / 13 / 2013

Hyd. No. 5

Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 1.691 cfs
Storm frequency	= 25 yrs	Time to peak	= 15.20 hrs
Time interval	= 2 min	Hyd. volume	= 54,750 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1291.53 ft
Reservoir name	= Sediment Basin	Max. Storage	= 517,260 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	111.30	2	734	515,769	-----	-----	-----	West offsite	
2	SCS Runoff	46.82	2	722	140,560	-----	-----	-----	East Offsite	
3	SCS Runoff	80.17	2	722	228,713	-----	-----	-----	West High Athletics	
4	Combine	210.35	2	724	885,041	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	3.217	2	872	104,026	4	1291.75	594,580	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 50 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

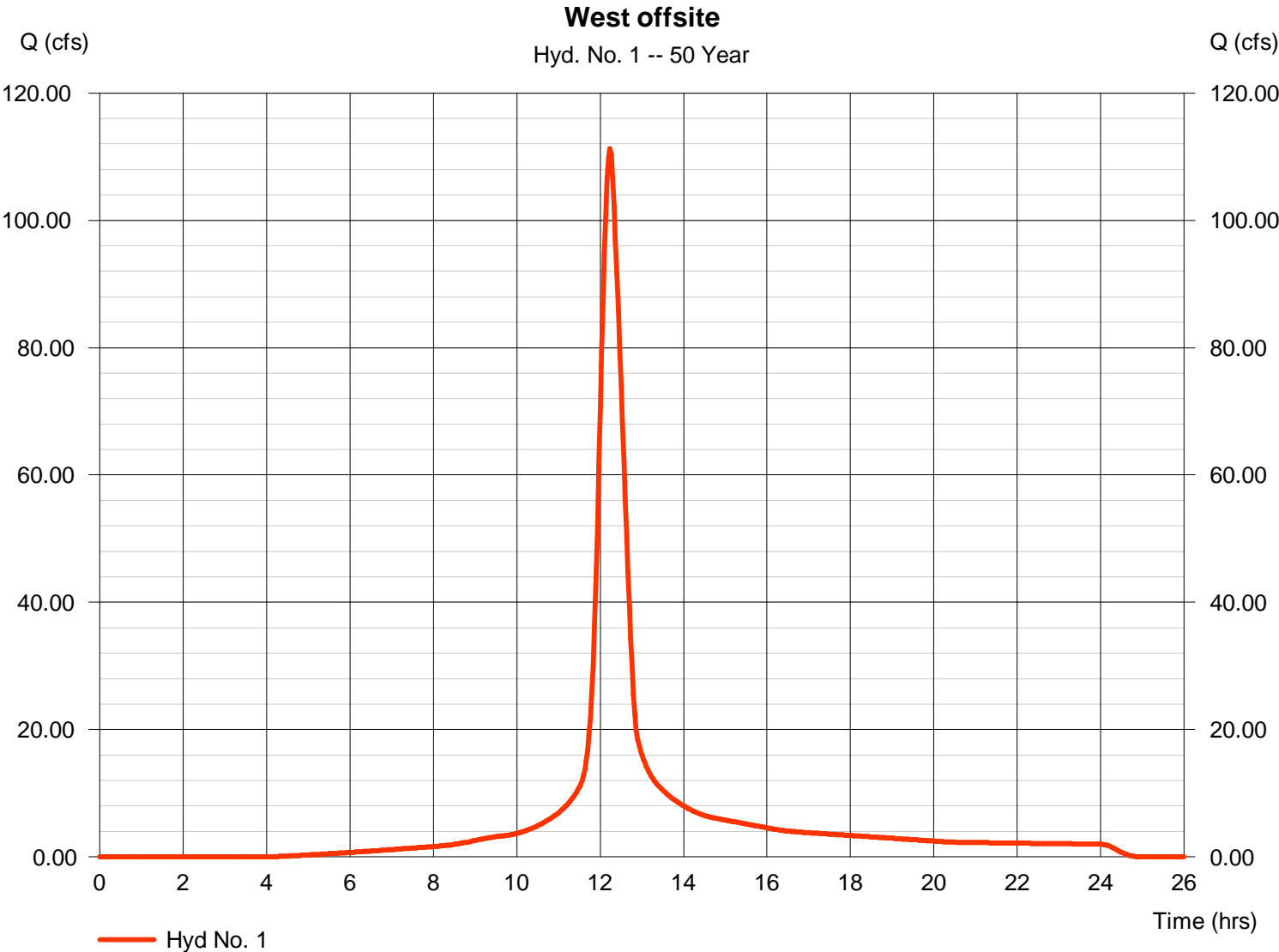
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 111.30 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 515,769 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

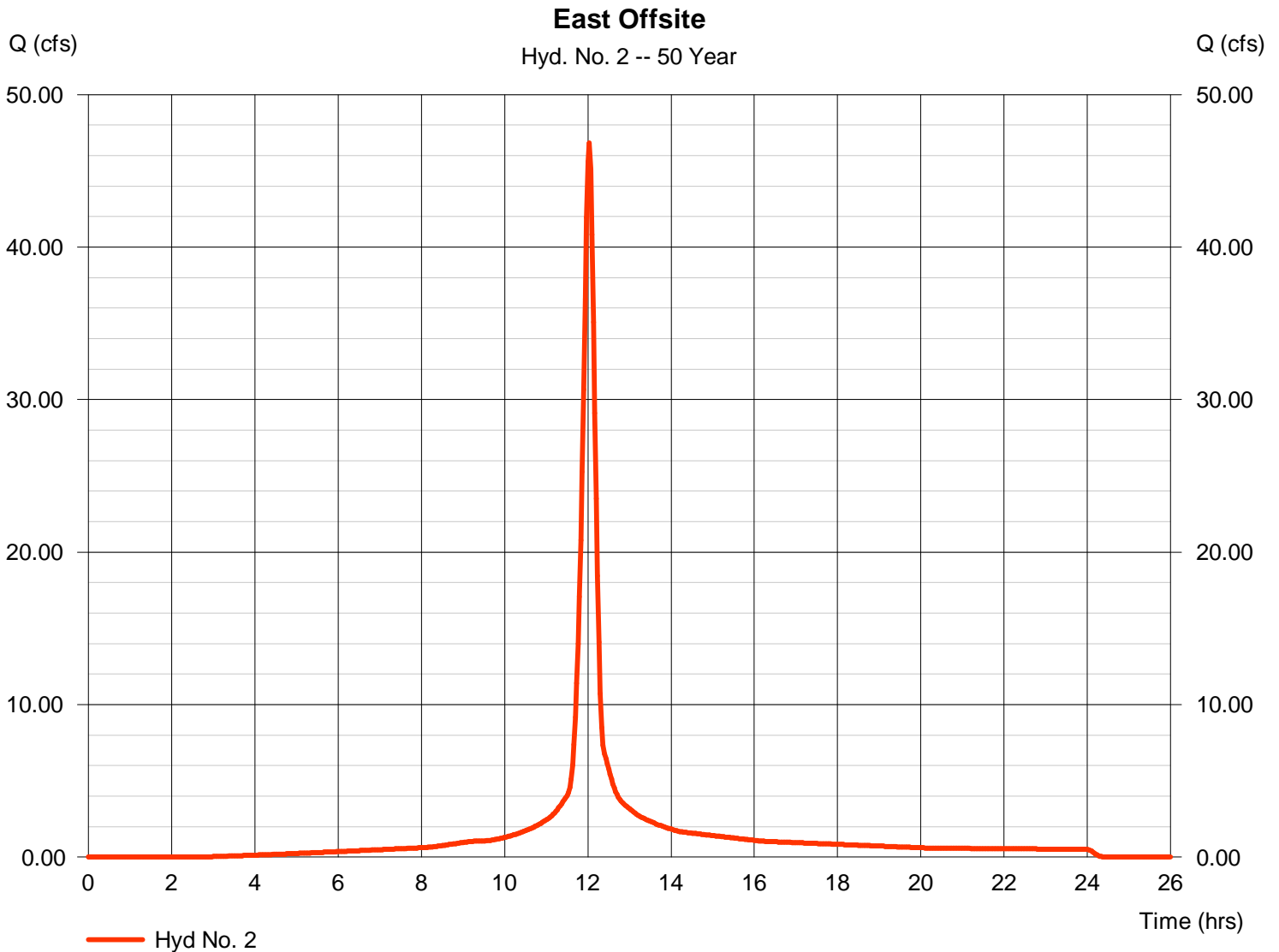
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 46.82 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 140,560 cuft
Drainage area	= 6.800 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

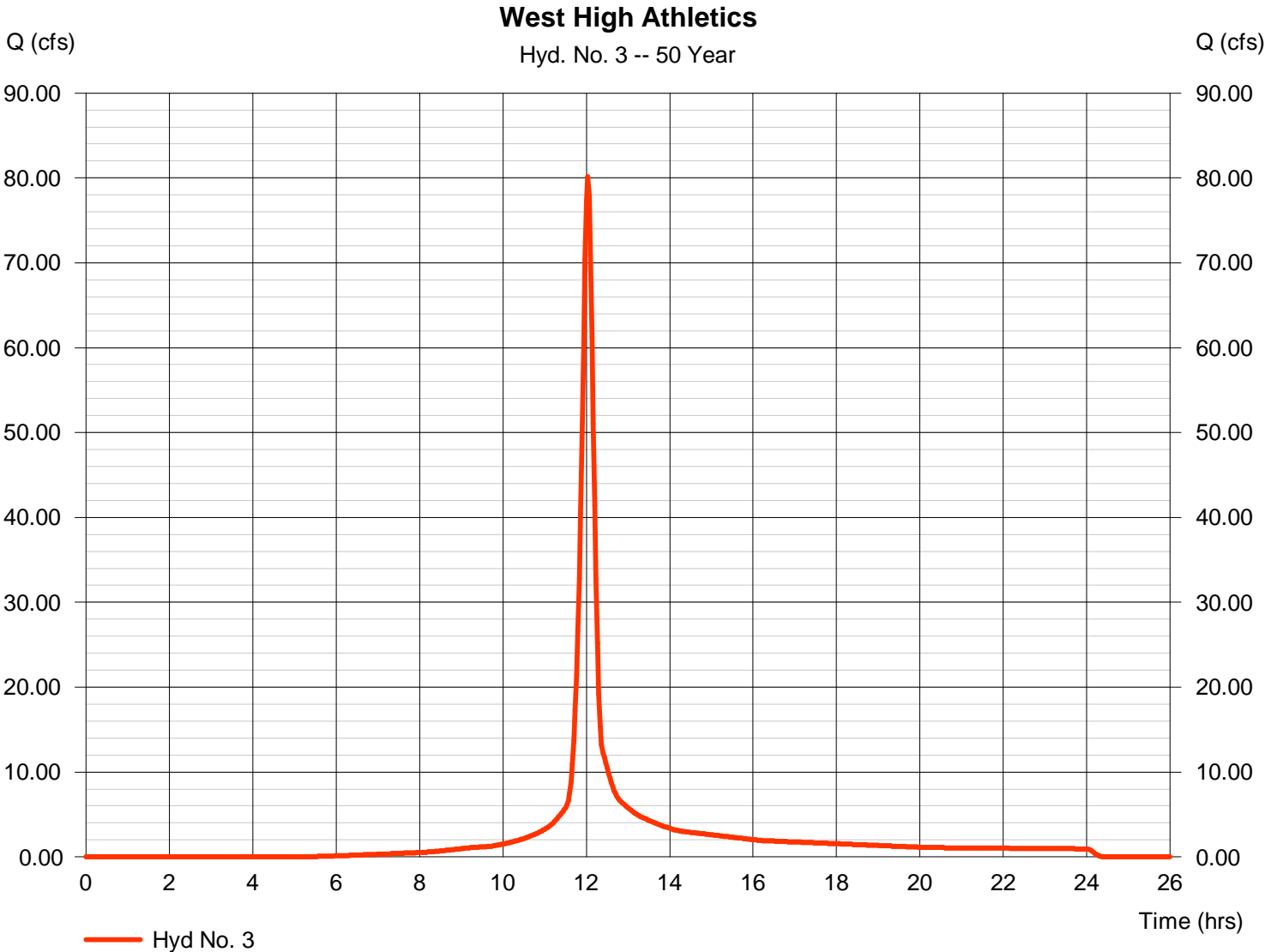
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type	= SCS Runoff	Peak discharge	= 80.17 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 228,713 cuft
Drainage area	= 13.400 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

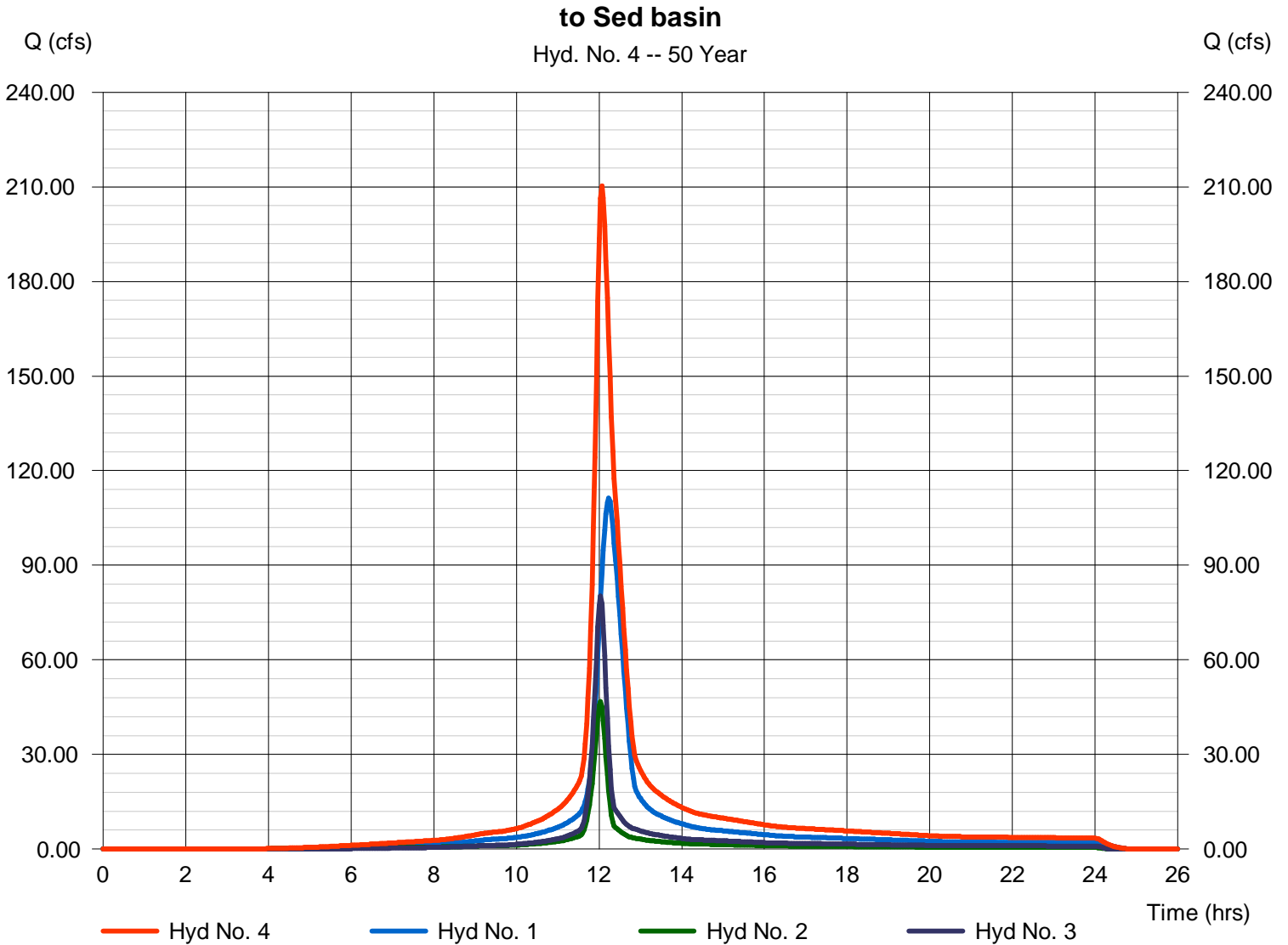
Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type = Combine
 Storm frequency = 50 yrs
 Time interval = 2 min
 Inflow hyds. = 1, 2, 3

Peak discharge = 210.35 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 885,041 cuft
 Contrib. drain. area = 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 5

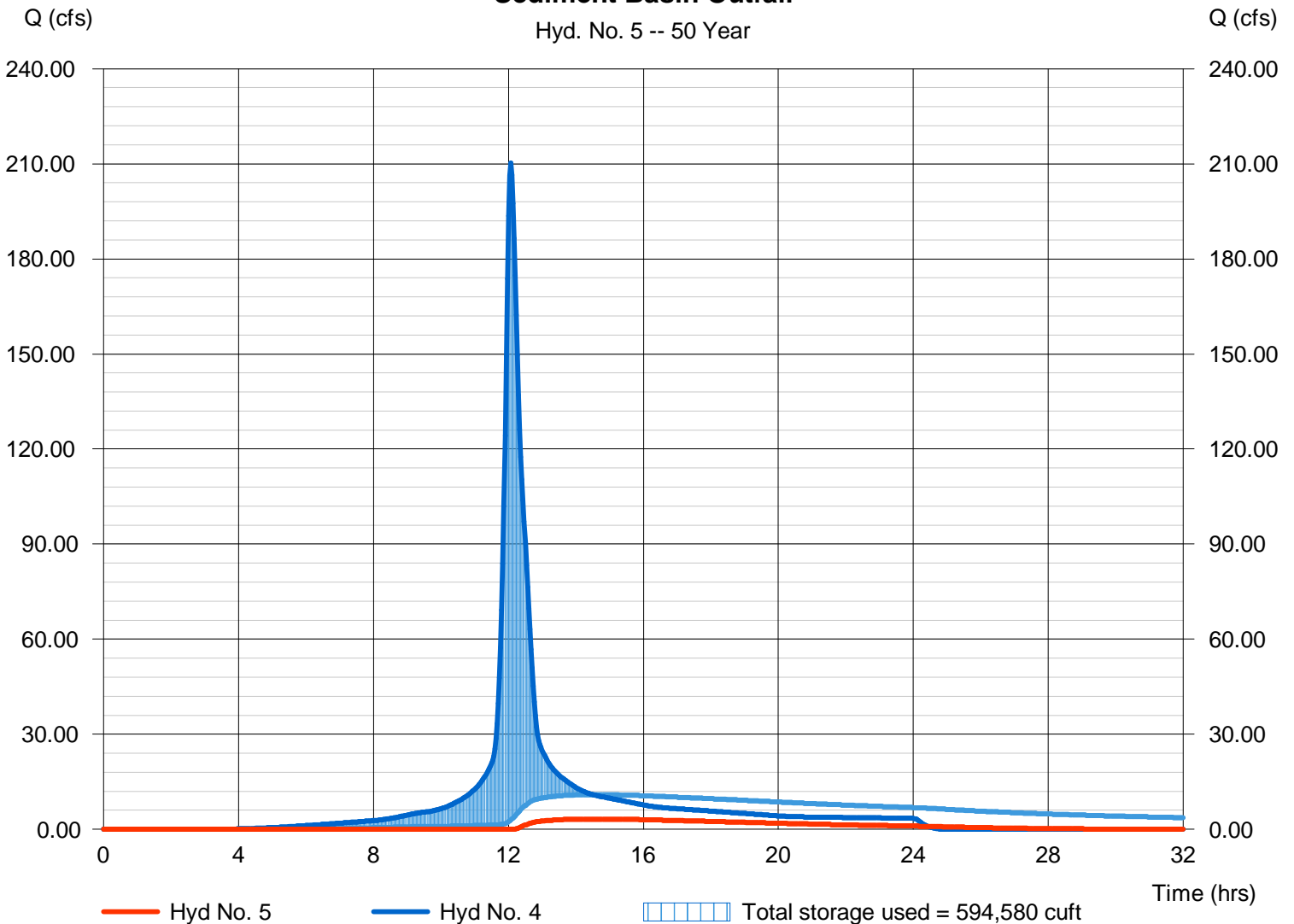
Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 3.217 cfs
Storm frequency	= 50 yrs	Time to peak	= 14.53 hrs
Time interval	= 2 min	Hyd. volume	= 104,026 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1291.75 ft
Reservoir name	= Sediment Basin	Max. Storage	= 594,580 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Sediment Basin Outfall

Hyd. No. 5 -- 50 Year



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	128.50	2	734	599,362	-----	-----	-----	West offsite	
2	SCS Runoff	53.49	2	722	161,899	-----	-----	-----	East Offsite	
3	SCS Runoff	93.62	2	722	268,910	-----	-----	-----	West High Athletics	
4	Combine	243.56	2	724	1,030,170	1, 2, 3	-----	-----	to Sed basin	
5	Reservoir	5.376	2	846	170,539	4	1292.00	682,241	Sediment Basin Outfall	
West High Athletics Field.gpw					Return Period: 100 Year			Wednesday, 11 / 13 / 2013		

Hydrograph Report

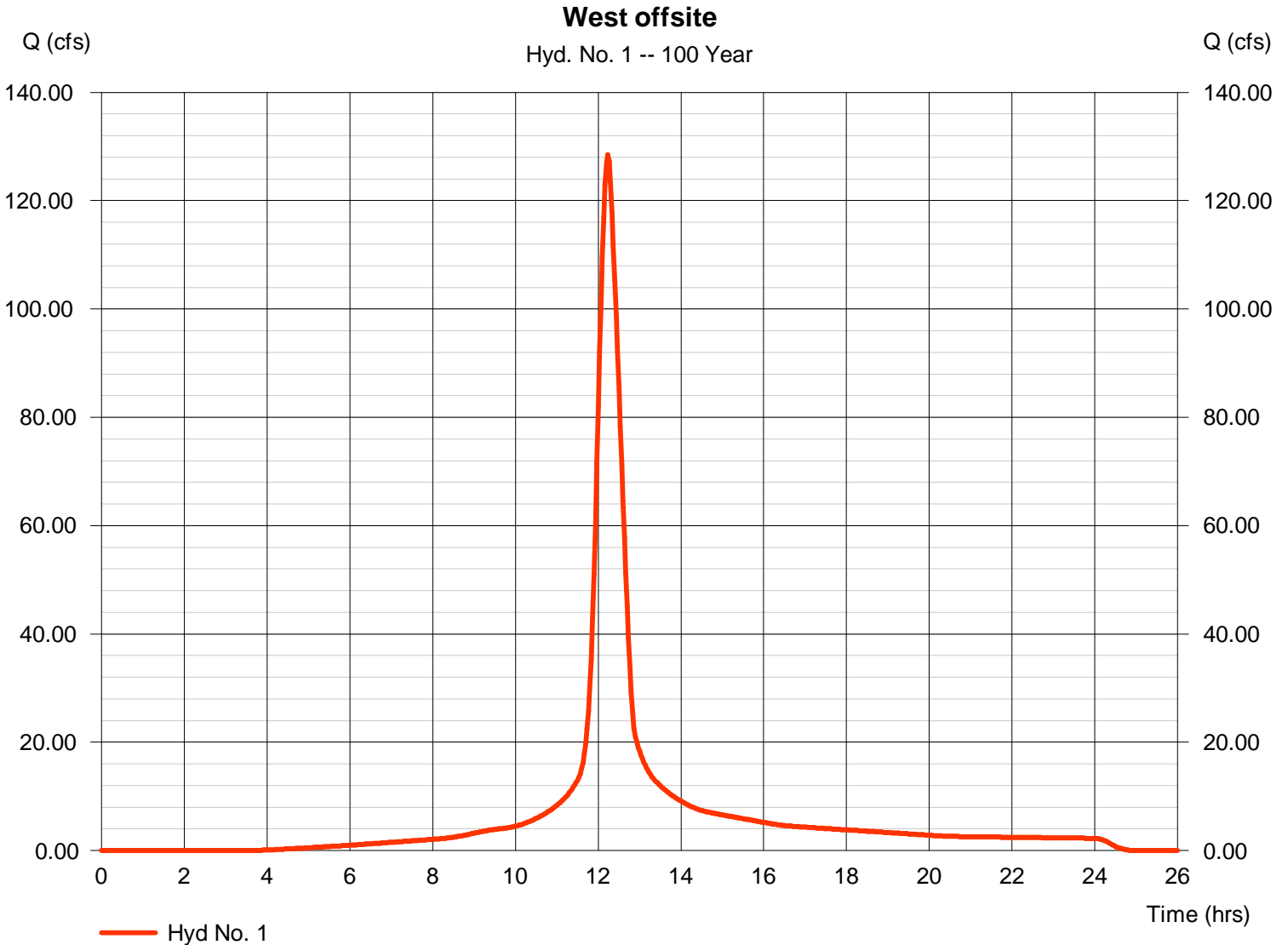
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 1

West offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 128.50 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 599,362 cuft
Drainage area	= 26.700 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.90 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

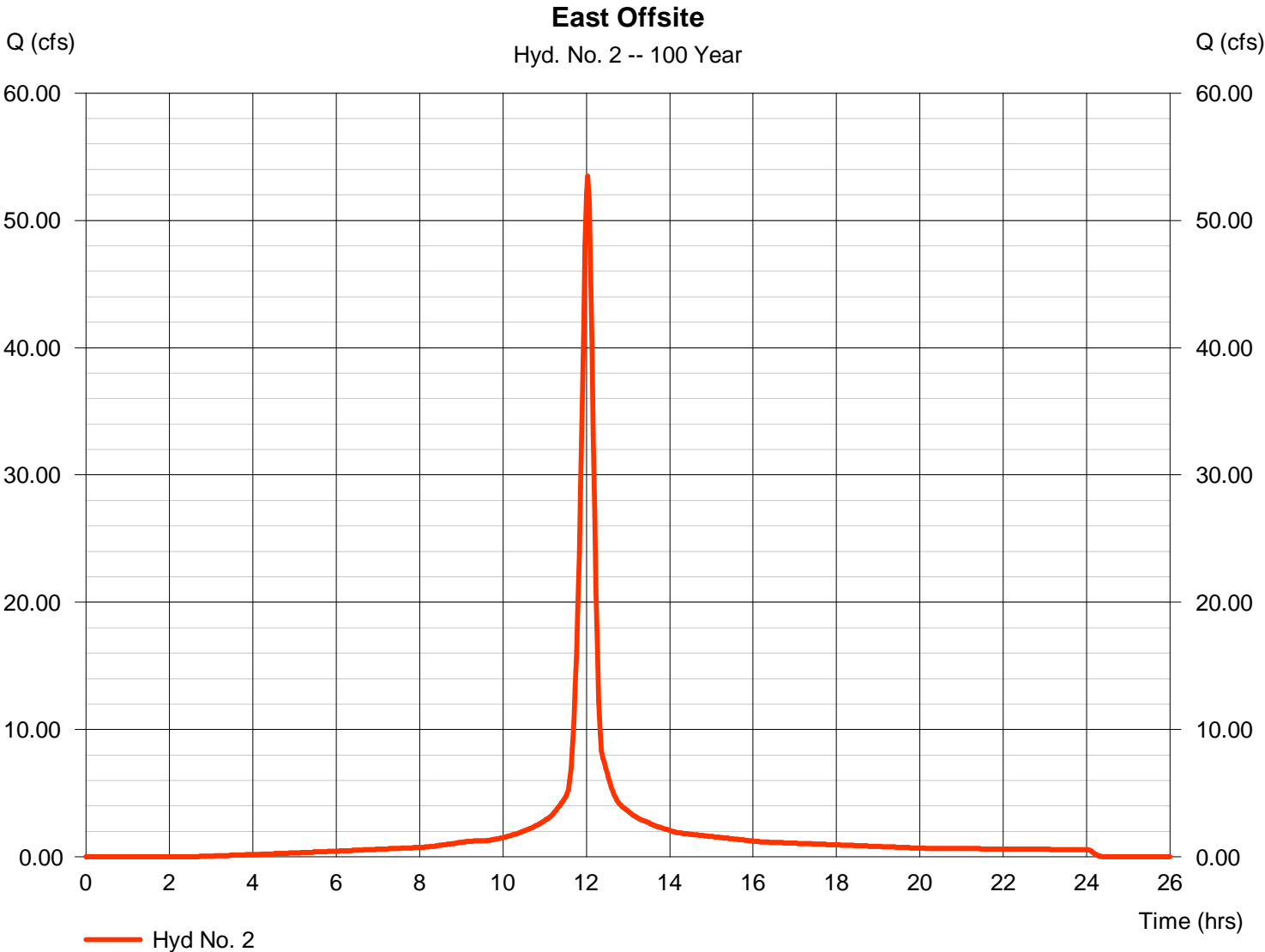
Wednesday, 11 / 13 / 2013

Hyd. No. 2

East Offsite

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 6.800 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 53.49 cfs
Time to peak = 12.03 hrs
Hyd. volume = 161,899 cuft
Curve number = 91
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

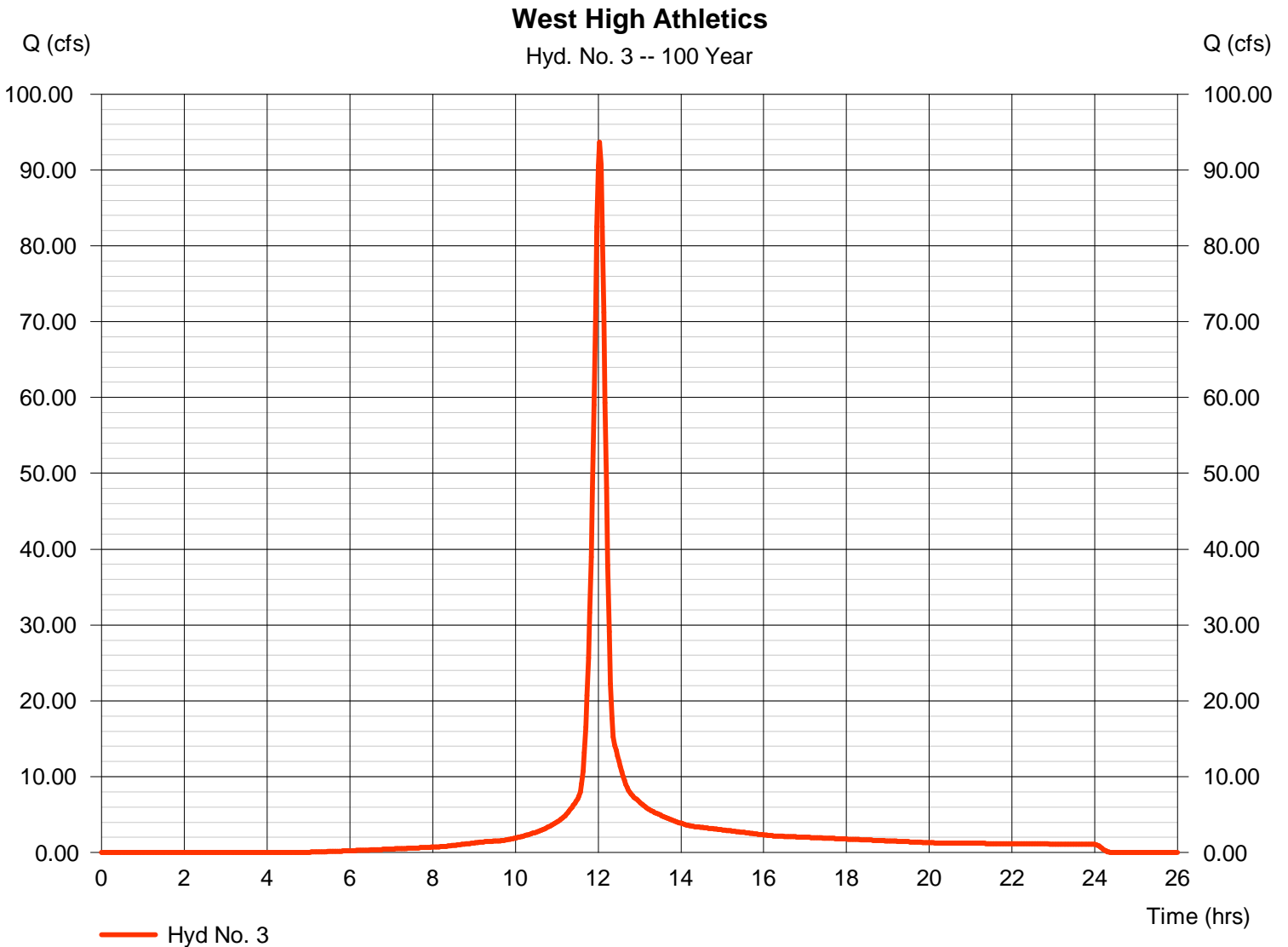
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 3

West High Athletics

Hydrograph type	= SCS Runoff	Peak discharge	= 93.62 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 268,910 cuft
Drainage area	= 13.400 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

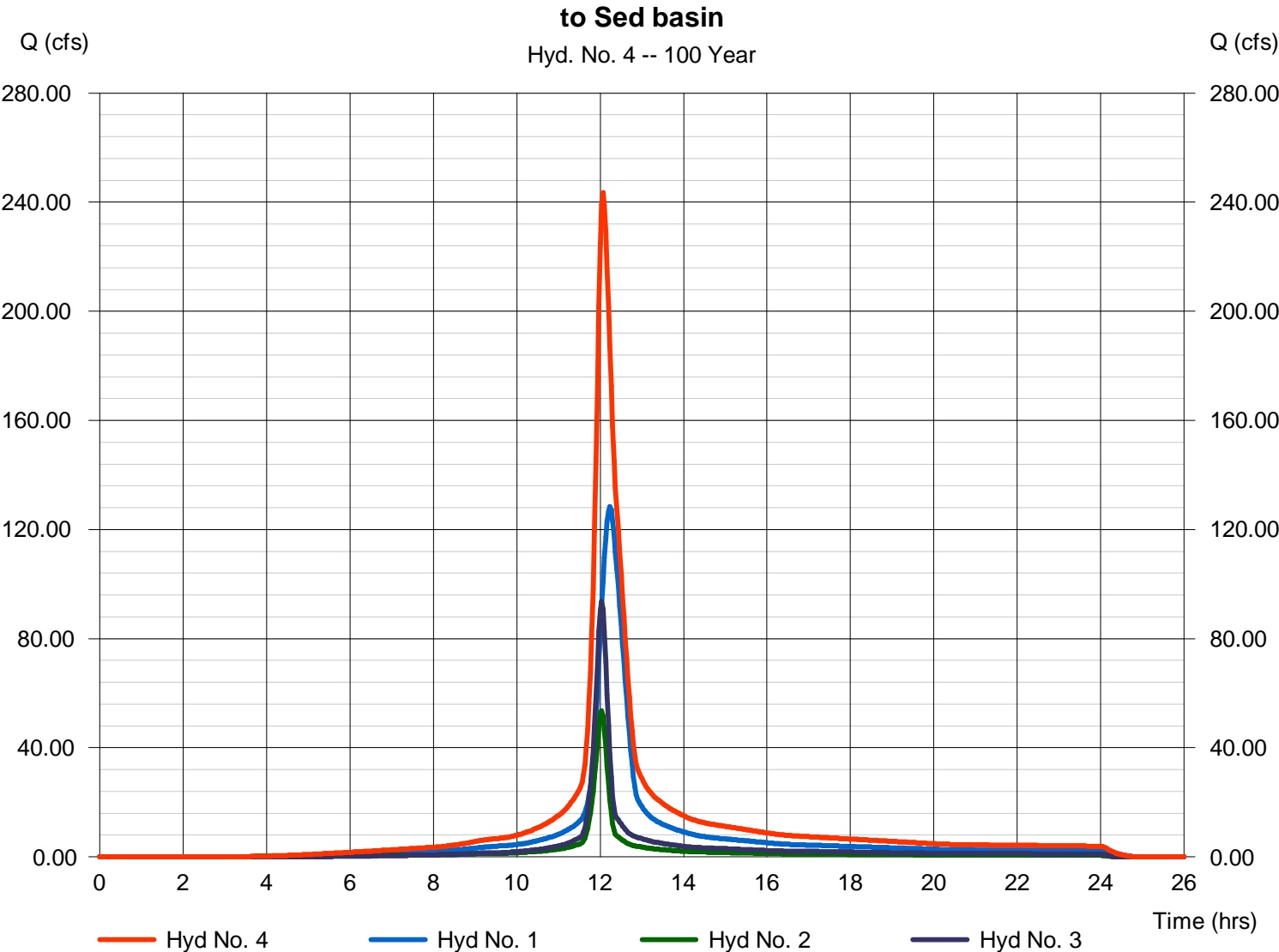
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 4

to Sed basin

Hydrograph type	= Combine	Peak discharge	= 243.56 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,030,170 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 46.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Wednesday, 11 / 13 / 2013

Hyd. No. 5

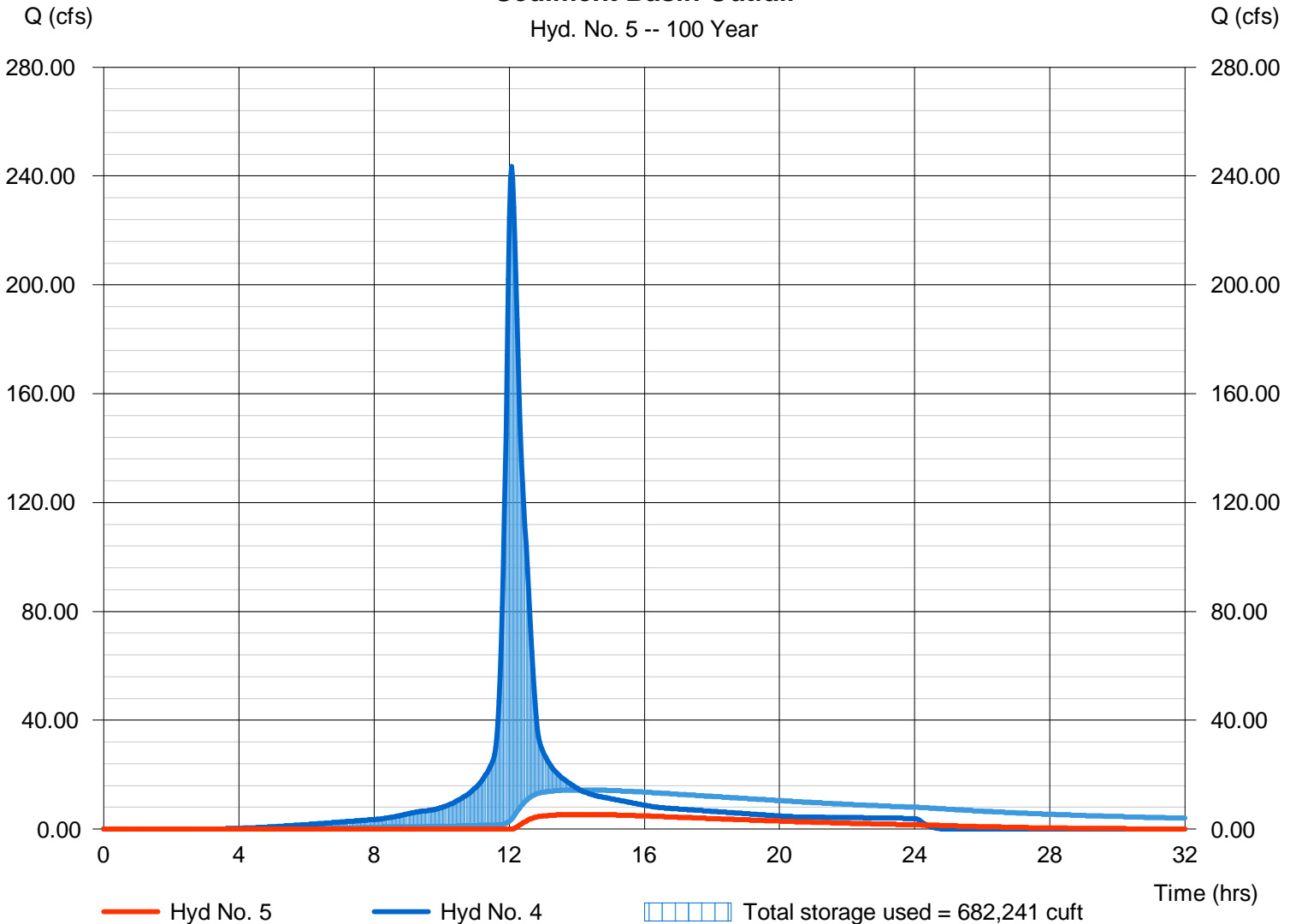
Sediment Basin Outfall

Hydrograph type	= Reservoir	Peak discharge	= 5.376 cfs
Storm frequency	= 100 yrs	Time to peak	= 14.10 hrs
Time interval	= 2 min	Hyd. volume	= 170,539 cuft
Inflow hyd. No.	= 4 - to Sed basin	Max. Elevation	= 1292.00 ft
Reservoir name	= Sediment Basin	Max. Storage	= 682,241 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Sediment Basin Outfall

Hyd. No. 5 -- 100 Year



Watershed Model Schematic	1
Hydrograph Return Period Recap	2
1 - Year	
Summary Report.....	3
Hydrograph Reports.....	4
Hydrograph No. 1, SCS Runoff, West offsite.....	4
TR-55 Tc Worksheet.....	5
Hydrograph No. 2, SCS Runoff, East Offsite.....	6
Hydrograph No. 3, SCS Runoff, West High Athletics.....	7
Hydrograph No. 4, Combine, to Sed basin.....	8
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	9
Pond Report - Sediment Basin.....	10
2 - Year	
Summary Report.....	11
Hydrograph Reports.....	12
Hydrograph No. 1, SCS Runoff, West offsite.....	12
Hydrograph No. 2, SCS Runoff, East Offsite.....	13
Hydrograph No. 3, SCS Runoff, West High Athletics.....	14
Hydrograph No. 4, Combine, to Sed basin.....	15
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	16
3 - Year	
Summary Report.....	17
Hydrograph Reports.....	18
Hydrograph No. 1, SCS Runoff, West offsite.....	18
Hydrograph No. 2, SCS Runoff, East Offsite.....	19
Hydrograph No. 3, SCS Runoff, West High Athletics.....	20
Hydrograph No. 4, Combine, to Sed basin.....	21
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	22
5 - Year	
Summary Report.....	23
Hydrograph Reports.....	24
Hydrograph No. 1, SCS Runoff, West offsite.....	24
Hydrograph No. 2, SCS Runoff, East Offsite.....	25
Hydrograph No. 3, SCS Runoff, West High Athletics.....	26
Hydrograph No. 4, Combine, to Sed basin.....	27
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	28
10 - Year	
Summary Report.....	29
Hydrograph Reports.....	30
Hydrograph No. 1, SCS Runoff, West offsite.....	30
Hydrograph No. 2, SCS Runoff, East Offsite.....	31
Hydrograph No. 3, SCS Runoff, West High Athletics.....	32

Hydrograph No. 4, Combine, to Sed basin.....	33
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	34

25 - Year

Summary Report.....	35
Hydrograph Reports.....	36
Hydrograph No. 1, SCS Runoff, West offsite.....	36
Hydrograph No. 2, SCS Runoff, East Offsite.....	37
Hydrograph No. 3, SCS Runoff, West High Athletics.....	38
Hydrograph No. 4, Combine, to Sed basin.....	39
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	40

50 - Year

Summary Report.....	41
Hydrograph Reports.....	42
Hydrograph No. 1, SCS Runoff, West offsite.....	42
Hydrograph No. 2, SCS Runoff, East Offsite.....	43
Hydrograph No. 3, SCS Runoff, West High Athletics.....	44
Hydrograph No. 4, Combine, to Sed basin.....	45
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	46

100 - Year

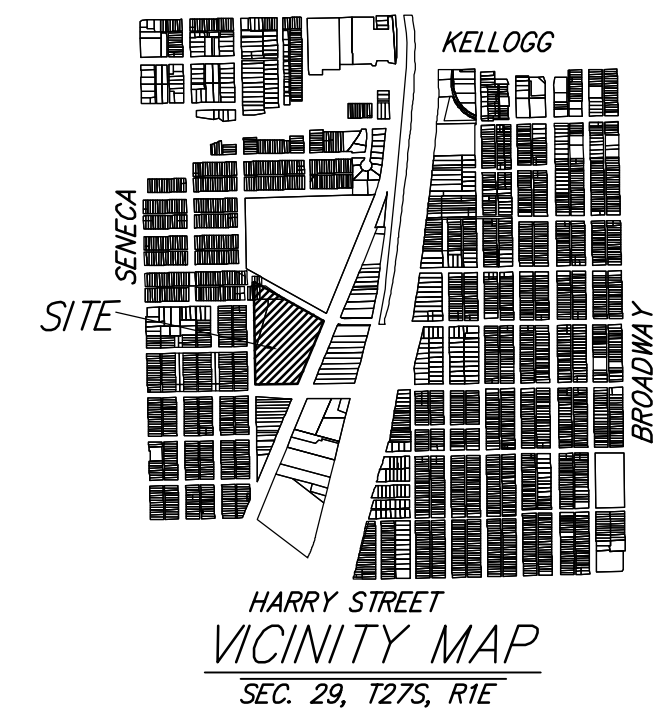
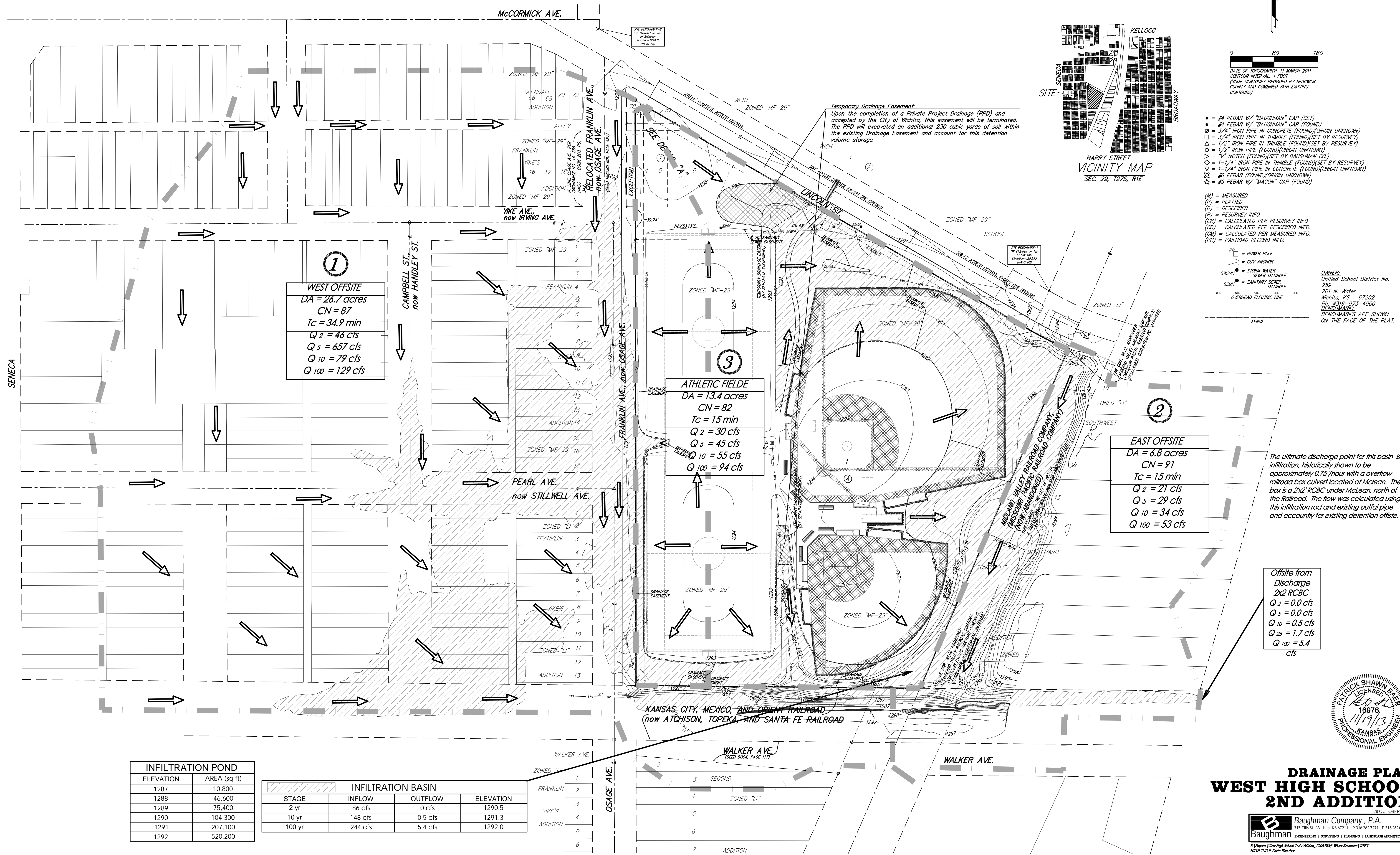
Summary Report.....	47
Hydrograph Reports.....	48
Hydrograph No. 1, SCS Runoff, West offsite.....	48
Hydrograph No. 2, SCS Runoff, East Offsite.....	49
Hydrograph No. 3, SCS Runoff, West High Athletics.....	50
Hydrograph No. 4, Combine, to Sed basin.....	51
Hydrograph No. 5, Reservoir, Sediment Basin Outfall.....	52

Drainage Plan
1:80 Scale

DRAINAGE CONCEPT

WEST HIGH SCHOOL 2ND ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



- 0 80 160
- DATE OF TOPOGRAPHY: 11 MARCH 2011
CONTOUR INTERVAL: 1 FOOT
(SOME CONTOURS PROVIDED BY SEDGWICK COUNTY AND COMBINED WITH EXISTING CONTOURS)
- = #4 REBAR W/ "BAUGHMAN" CAP (SET)
 - = #4 REBAR W/ "BAUGHMAN" CAP (FOUND)
 - ⊗ = 3/4" IRON PIPE IN CONCRETE (FOUND)(ORIGIN UNKNOWN)
 - ⊠ = 3/4" IRON PIPE IN THIMBLE (FOUND)(SET BY RESURVEY)
 - △ = 1/2" IRON PIPE IN THIMBLE (FOUND)(SET BY RESURVEY)
 - = 1/2" IRON PIPE (FOUND)(ORIGIN UNKNOWN)
 - ∨ = "V" NOTCH (FOUND)(SET BY BAUGHMAN CO.)
 - ◇ = 1-1/4" IRON PIPE IN THIMBLE (FOUND)(SET BY RESURVEY)
 - ▽ = 1-1/4" IRON PIPE IN CONCRETE (FOUND)(ORIGIN UNKNOWN)
 - ⊙ = #6 REBAR (FOUND)(ORIGIN UNKNOWN)
 - ☆ = #5 REBAR W/ "MACON" CAP (FOUND)
- (M) = MEASURED
(P) = PLATTED
(D) = DESCRIBED
(R) = RESURVEY INFO.
(CR) = CALCULATED PER RESURVEY INFO.
(CD) = CALCULATED PER DESCRIBED INFO.
(CM) = CALCULATED PER MEASURED INFO.
(RR) = RAILROAD RECORD INFO.
- = POWER POLE
— = GUY ANCHOR
- SWHM = STORM WATER SCEPT MANHOLE
SSM = SANITARY SEWER MANHOLE
- — — — — OVERHEAD ELECTRIC LINE
- — — — — FENCE
- OWNER:
Unified School District No. 259
201 N. Water
Wichita, KS 67202
Ph. #316-973-4000
- BENCHMARKS ARE SHOWN ON THE FACE OF THE PLAT.

WEST OFFSITE
DA = 26.7 acres
CN = 87
Tc = 34.9 min
Q₂ = 46 cfs
Q₅ = 657 cfs
Q₁₀ = 79 cfs
Q₁₀₀ = 129 cfs

ATHLETIC FIELDS
DA = 13.4 acres
CN = 82
Tc = 15 min
Q₂ = 30 cfs
Q₅ = 45 cfs
Q₁₀ = 55 cfs
Q₁₀₀ = 94 cfs

EAST OFFSITE
DA = 6.8 acres
CN = 91
Tc = 15 min
Q₂ = 21 cfs
Q₅ = 29 cfs
Q₁₀ = 34 cfs
Q₁₀₀ = 53 cfs

Offsite from Discharge
2x2 RCBC
Q₂ = 0.0 cfs
Q₅ = 0.0 cfs
Q₁₀ = 0.5 cfs
Q₂₅ = 1.7 cfs
Q₁₀₀ = 5.4 cfs

The ultimate discharge point for this basin is infiltration, historically shown to be approximately 0.757 hour with an overflow railroad box culvert located at McLean, north of the Railroad. The flow was calculated using this infiltration rad and existing outfall pipe and accountory for existing detention offsite.

INFILTRATION POND	
ELEVATION	AREA (sq ft)
1287	10,800
1288	46,600
1289	75,400
1290	104,300
1291	207,100
1292	520,200

INFILTRATION BASIN			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	86 cfs	0 cfs	1290.5
10 yr	148 cfs	0.5 cfs	1291.3
100 yr	244 cfs	5.4 cfs	1292.0



DRAINAGE PLAN
WEST HIGH SCHOOL
2ND ADDITION

28 OCTOBER 2013

Baughman Company, P.A.
315 E. 10th St. Wichita, KS 67211 P 316.262.7271 F 316.262.0149

Baughman ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

Prepared: West High School 2nd Addition, 2/28/13; Water Resources | 9/25/13
RHC 2ND P Drain Plan.dwg