DRAINAGE PLAN

SKYWAY WEST 3RD ADDITION

TO

WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY

Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

28 OCTOBER 2011

ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

DRAINAGE PLAN
SKYWAY WEST 3RD ADDITON

FINAL REPORT

Prepared by Baughman Company, P.A.
28 October 2011

By Trevor R. Kurth, P.E., CFM
N. Brent Wooten, P.E., L.S.

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EXISTING CONDITIONS

The site is located at the northwest corner of Maize Road and 31st Street South. The property is adjacent north to Skyway West Addition and to the northeast of Skyway West 2nd Addition. The site encompasses approximately 50 acres and is currently terraced farmland.

The property ultimately drains to the east into an apparent swale on this property. The site is terraced which does alter the flow of the runoff.

There is no FEMA SFHA located on this property as of this report. The drainage patterns as defined above can be seen on the Existing Conditions Exhibit.

PROPOSED CONDITIONS

The property is being platted into one large industrial lot with 2 reserves for onsite and offsite runoff. The site will be further defined at site development. The detention facilities will all be dry due to the area of influence near the airport. We expect portions of the site to be paved with asphalt/concrete or with gravel upon development. The site will likely be graded to minimum grades to account for large industrial users and will likely drain via ditches/swales and overland flow. For a half-scale copy of the Plat, see Exhibit 3.

OFFSITE CONDITIONS

The proposed site drains to the northeast corner of the property. The site tends to grade to the east – not including the terracing which diverts flow to the north.

There is offsite runoff encroaching this property from the west as well as from the southeast corner of the property via a RCBC.

The runoff from the west flows onto this property primarily via sheet flow over a wide path along the entire property line. This offsite area drains approximately 37.3 acres of current agricultural farmland.

The other offsite runoff drains onto this property at the southeast corner. The offsite area drains to this point via a 3'x5' RCBC. This area is currently platted as Skyway West Addition. The approved Drainage Plan for that addition provides detention for the developed runoff to this point.

The entire flow from the proposed site, as well as the two points of offsite runoff, flows to the northeast corner of the property and goes north offsite. There is a farmed channel which conveys the runoff onto the adjacent agricultural land.

The USGS Quadrangle Sheet can be seen with the site location plotted as Exhibit 1. The Aerial for this area can be viewed 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 (CN = 88)
  - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site consists of approximately 50 acres of currently agricultural farmland. The area drains to the east and offsite at the northeast corner.
The existing site characteristics can be seen from the aerial exhibit (Exhibit 2).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The site was analyzed for pre-development conditions using the SCS Curve Number method for the entire storm event series. A Curve Number (CN) of 88 was used for existing conditions due to row crops in a Type C soil condition. A Time of Concentration of 15 minutes was used as is the minimum Tc in the City of Wichita.

DOWNSTREAM DRAINAGE CAPACITY

The site flows to the northeast corner of the property. The downstream farmland consists of an agricultural field with a channel section to convey the runoff. Approximately 250' to the north, the channel drains under Maize Road via a large celled RCBC.

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
  - 1.2" Water Quality Flow modeled as '3-yr event' in HydraFlow
  - Hydrograph Method utilized for Developed Flows
  - CN = 91 (Soil Type C – Industrial Cover)
  - Time of Concentration; Lag Method, minimum Tc = 15min

- GRADING CONSTRAINTS
  - One foot freeboard between 100-yr WSE and adjacent lot corner
  - Match all existing perimeter grades

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is proposed to be platted into a one lot industrial development. There is proposed to be 3 separate detention ponds to detain developed runoff to the existing runoff peak flows. A Curve Number of 91 was used for Industrial Lots in a Soil Type C. No specific grading or lot configuration is known at the time of this plat, which will be done during the site development process.

Please be aware, that the storm listed as the '3-yr event' in the Hydraflow model is actually the 1.2" rainfall water quality event. This is due to the constraints of the programs naming conventions. All the other storm events correspond to their respective years. The Channel Protection volume is generated using the 1-year event.

DETENTION FACILITIES

There are 3 detention facilities proposed for this plat. Each facility will be dry detention due to the proximity to Wichita's Mid-Continent Airport. These facilities can achieve only 60% of the water quality for the proposed site in each of their respective basins according to the Storm Water Manual design for extended dry detention ponds. Each facility is detailed further below.

- Reserve B – West Detention Area

  This pond is located at the northwest corner of the property and will accept all the offsite runoff from the west as well as portion of developed runoff from this property. The pond will drain via a 24" RCP with a 4" orifice located at the bottom of the detention. The 24" pipe will have a weir riser structure as well as an emergency overflow weir. These outfalls will drain to a ditch/channel section along the entire north line of the property. This pond, utilizing the orifice and riser outfall system, will provide WQ and CP requirements. This pond will provide the full 24 hour detention for WQ, and will provide over 12 hours of CP volume extended detention.

- Reserve B – East Detention Area

The dry detention located in Reserve B will detain provide detention throughout the storm series as well as provide CP and WQ volumes. The pond will discharge via a 4" orifice and 48" pipe section with a weir riser outfall configuration. There will also be an emergency overflow weir. This system will provide the full 24 hours for WQ extended detention as well as over 14 hours of CP volume extended detention. Since this detention is in direct connection to the aforementioned detention, they will provide approximately 26 hours of extended detention to meet the current requirements.

- Reserve A

  The detention area in Reserve A will accept and treat only the developed runoff from this site. The offsite runoff will be accepted into this Reserve via a channel section, with the detention pond located immediately west. This detention area will also be dry and will drain to the north via the orifice / overflow configuration. This outfall will feature a 24" pipe and a 4" orifice along with a 6' emergency overflow weir. This detention area will also provide the WQ and CP volumes needed for the developed site.

DISCHARGE POINTS SUMMARY

The site will continue to the northeast corner of the property. The downstream farmland consists of an agricultural field with a channel section to convey the runoff. Approximately 250' to the north, the channel drains under Maize Road via a large celled RCBC. The same elevation and the same channel will be utilized that is currently on the offsite property. At the time of development, the site will be graded to remove the terraced areas and will convey the runoff to the ditch and dry detention areas.

WATER QUALITY

Preliminary water quality calculations have been provided for the basins and detention facilities. The proposed detention facilities in Reserves A and B will provide 60% of the needed water quality volume. Since the site plan and cover is not available at this time, additional locations are not provided at this time.
A waiver of the additional 20% water quality may be applied for due to this property not being able to use wet detention facilities due to the airport restrictions. If a waiver is granted, no additional WQ volume will be required. If the waiver is rejected, WQ can ne met onsite at the time of site development or included in the ditch section as a vegetated swale or enhanced swale.

DOWNSTREAM CHANNEL PROTECTION

The downstream channel protection volume will be met in the detention systems located in the Reserves. The two dry detention areas in Reserve B will provide over 26 hours of extended detention together, while the detention area in Reserve A will provide CP volume in its capacity. These volumes will be achieved with the use of orifices and riser structures.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

Due to the construction of dry detention ponds, and the utilization of the existing outfall elevation, we do not anticipate any downstream impacts with this development.

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X - Unshaded. The location of the property, on FEMA FIRM Panel 340 of 700 for Sedgwick County, Kansas, effective February 2, 2007, is attached as Exhibit 6.

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. The areas of discharge do not account for more than 240 acres.

FEMA

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

KANSAS DEPT OF TRANSPORTATION

There does not appear to be any KDOT permitting needed on the proposed project.

SEDGWICK COUNTY PERMITTING

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

EXHIBIT 1: Site Location Map

EXHIBIT 2: Aerial Photo Exhibit with Lidar Topography

EXHIBIT 3: Plat – Half Scale

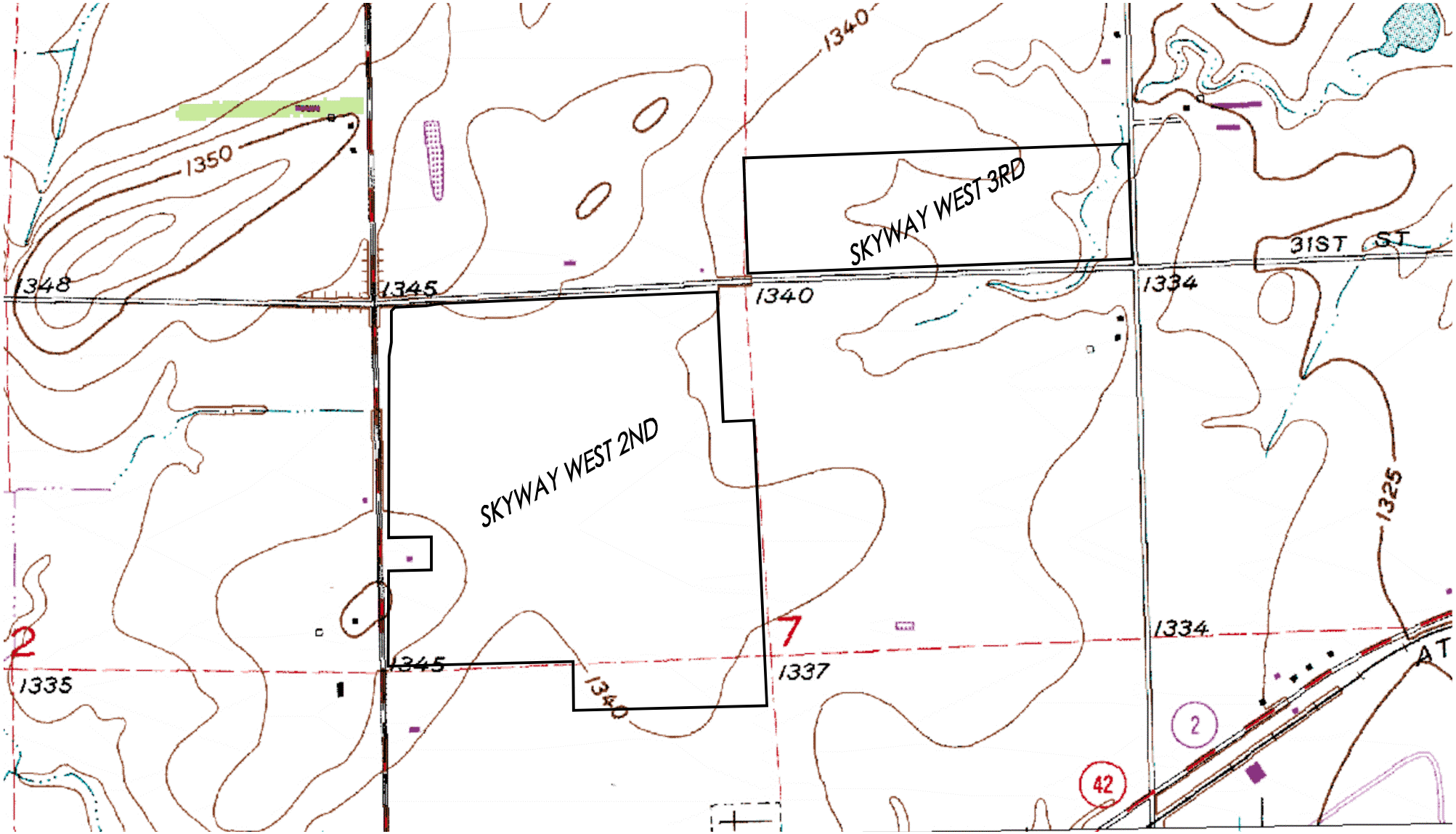
EXHIBIT 4: Drainage Plan – Half Scale

EXHIBIT 5: Floodplain Location (FIRM)

SITE LOCATION EXHIBIT

SKYWAY WEST 2ND & 3RD ADDITIONS

WICHITA, SEDGWICK COUNTY, KANSAS



0 500 1000

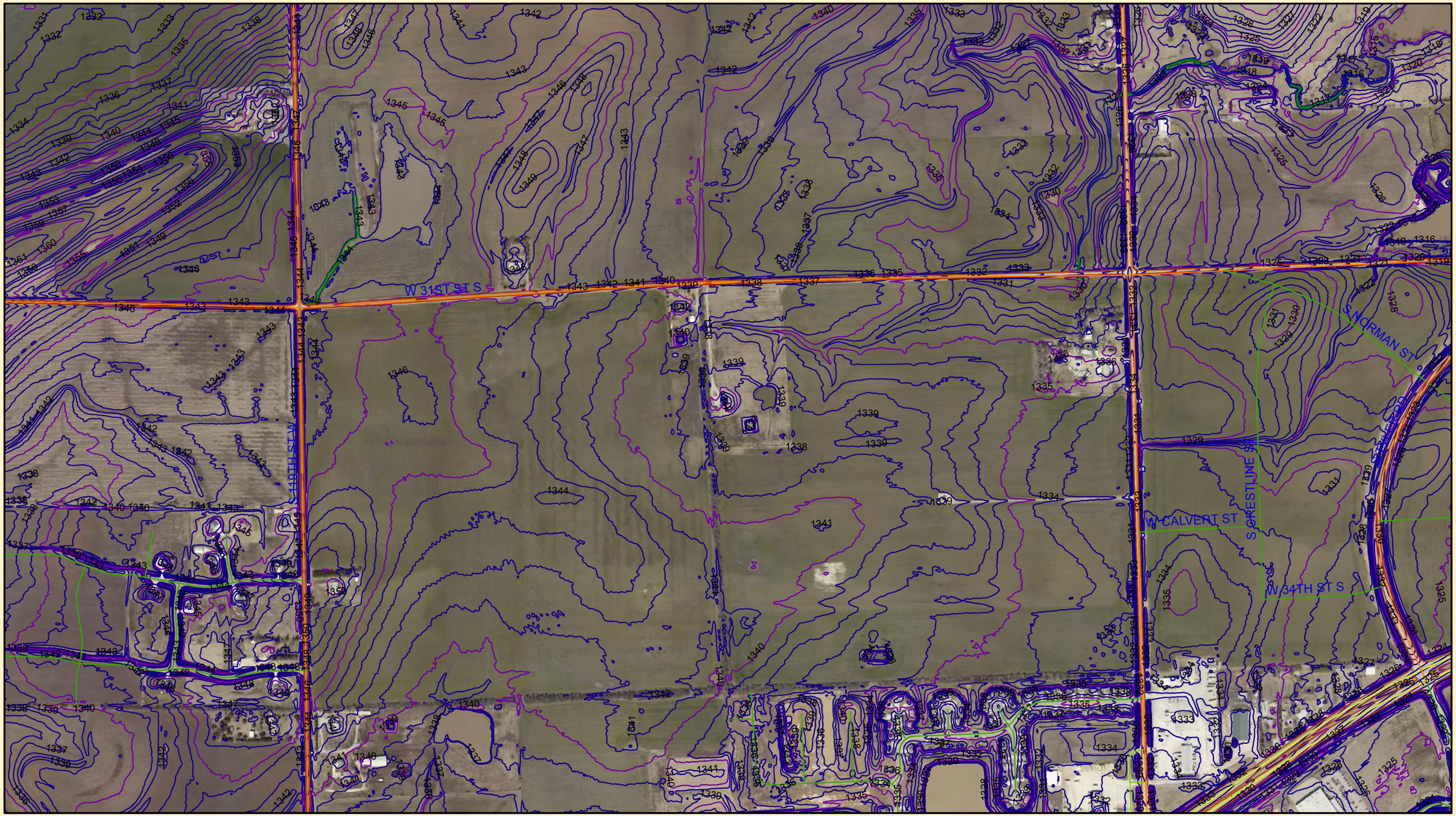
CONTOUR INTERVALS = 10 FOOT

EXHIBIT 1

SKYWAY WEST 2ND & 3RD ADDITIONS

1 NOV 11

Baughman Company , P.A.
315 Ellis St. Wichita, KS 67211 P 316.262.7271 F 316.262.0149
Baughman ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE



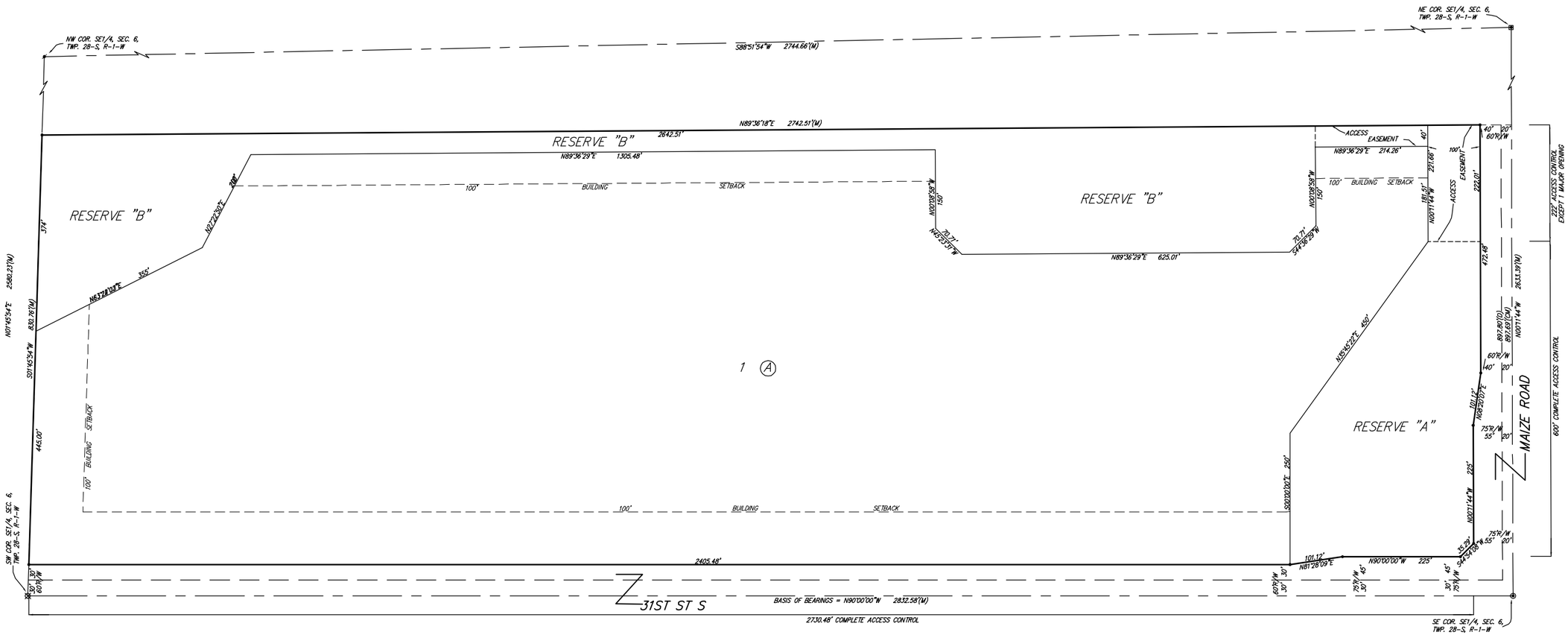
AERIAL EXHIBIT

SKYWAY WEST 2ND & 3RD ADDITIONS

0 300 600 1,200 Feet

Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

SKYWAY WEST 3RD ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS



0 100 200

DATE OF PREPARATION: 24 OCTOBER 2011

● = #4 REBAR W/ "BAUGHMAN" CAP (SET)
⊠ = 3/4" IRON (FOUND)
○ = 1" IRON (FOUND)
□ = 1" IRON PIPE IN THIMBLE (FOUND)

(M) = MEASURED
(D) = DESCRIBED
(P) = PLATTED

MINIMUM BUILDING PAD ELEVATIONS FOR LOWEST OPENING TO THE STRUCTURES		
LOT	BLOCK	ELEVATION NAVD88
EAST HALF, LOT 1	A	1334.0
WEST HALF, LOT 1	A	1339.0

BENCHMARK:
MAIZE ROAD & 31ST SOUTH-CITY OF WICHITA
BENCHMARK DISC. 200'± WEST OF INTERSECTION, SOUTHEAST CORNER OF HUBGUARD OF R.C.B.C.
ELEV. = 1331.82 NGVD88

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.

● = #4 REBAR (FOUND)
• = #4 REBAR W/ "BAUGHMAN" CAP (SET)
⊗ = #4 REBAR W/ "SEDGWICK COUNTY" CAP (FOUND)
⊠ = 1" IRON (FOUND)
⊞ = #4 REBAR (FOUND)

(M) = MEASURED
(D) = DESCRIBED
(P) = PLATTED
(C) = CALCULATED

State of Kansas)
Sedgwick County) SS

We, Baughman Company, P.A., Surveyors in aforesaid county and state do hereby certify that we have surveyed and platted "SKYWAY WEST 3RD ADDITION", Wichita, Sedgwick County, Kansas and that the accompanying plat is a true and correct exhibit of the property surveyed, described as Beginning at a point on the East line of Section 6, Township 28 South, Range 1 West of the Sixth Principal Meridian, Sedgwick County, Kansas, a distance of 30 feet north of the Southeast corner of said Section; thence going northerly along the East line of the Section, a distance of 867.8 feet; thence turning left and going westerly to the Half Section line at a point 880.6 feet north of the South Quarter corner of the Section; thence turning left and going southerly, a distance of 850.6 feet; thence turning left and going easterly parallel to the South Section line to the point of beginning.

Existing public easements and dedications being vacated by virtue of K.S.A. 12-512(b).

Baughman Company, P.A.

_____, Surveyor
Michael G. Conrey

Know all men by these presents that we, the undersigned, have caused the land in the surveyors certificate to be platted into a Lot, a Block, Streets, and Reserves to be known as "SKYWAY WEST 3RD ADDITION", Wichita, Sedgwick County, Kansas. The utility easements are hereby granted as indicated for the construction and maintenance of all public utilities. The drainage and utility easements are hereby granted as indicated for drainage purposes and for the construction and maintenance of all public utilities. The drainage easements are hereby granted as indicated for drainage purposes. The streets are hereby dedicated to and for the use of the public. Reserve "A" is reserved for open space, landscaping, berms, entry monuments, signs, lakes, private drives, access purposes, drainage purposes, and utilities as confined to easements. Reserve "B" is reserved for open space, landscaping, berms, signs, lakes, private drives, access purposes, drainage purposes, and utilities as confined to easements. Reserves "A", and "B" shall be owned and maintained by the owner/owners of Lot 1. Access controls shall be as depicted on the face of the plat and are hereby granted to the City of Wichita, Kansas. The permitted opening locations shall be as determined by the City Engineer of the City of Wichita, Kansas. The Minimum Building Pad Elevations for the lowest opening to the structures shall be as indicated on the face of the plat.

John E. Dugan Family Partnership, L.P.

_____, Partner
John E. Dugan

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this_____day of _____, 2011, by John E. Dugan, Partner of the John E. Dugan Family Partnership, L.P., on behalf of the limited partnership.

_____ Notary Public

My App't. Exp. _____

This plat of "SKYWAY WEST 2ND ADDITION", Wichita, Sedgwick County, Kansas has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this _____ day of _____, 2011.
Wichita-Sedgwick County Metropolitan Area Planning Commission

_____, Chair
Shawn Farney

_____, Secretary
John L. Schlegel

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this _____ day of _____, 2011.

_____, Mayor
Carl Brewer

_____, City Clerk
Karen Sublett

Reviewed in accordance with K.S.A. 58-2005 on this_____day of _____, 2011.

_____
Tricia L. Robello, L.S. #1246
Deputy County Surveyor
Sedgwick County, Kansas

Entered on transfer record this_____day of _____, 2011.

_____, County Clerk
Kelly B. Arnold

State of Kansas)
Sedgwick County) SS

This is to certify that this plat has been filed for record in the office of the Register of Deeds, this_____day of _____, 2011 at _____o'clock __M; and is duly recorded.

_____, Register of Deeds
Bill Meek

_____, Deputy
Tonya Buckingham

SKYWAY WEST 3RD ADDITION
24 OCTOBER 2011

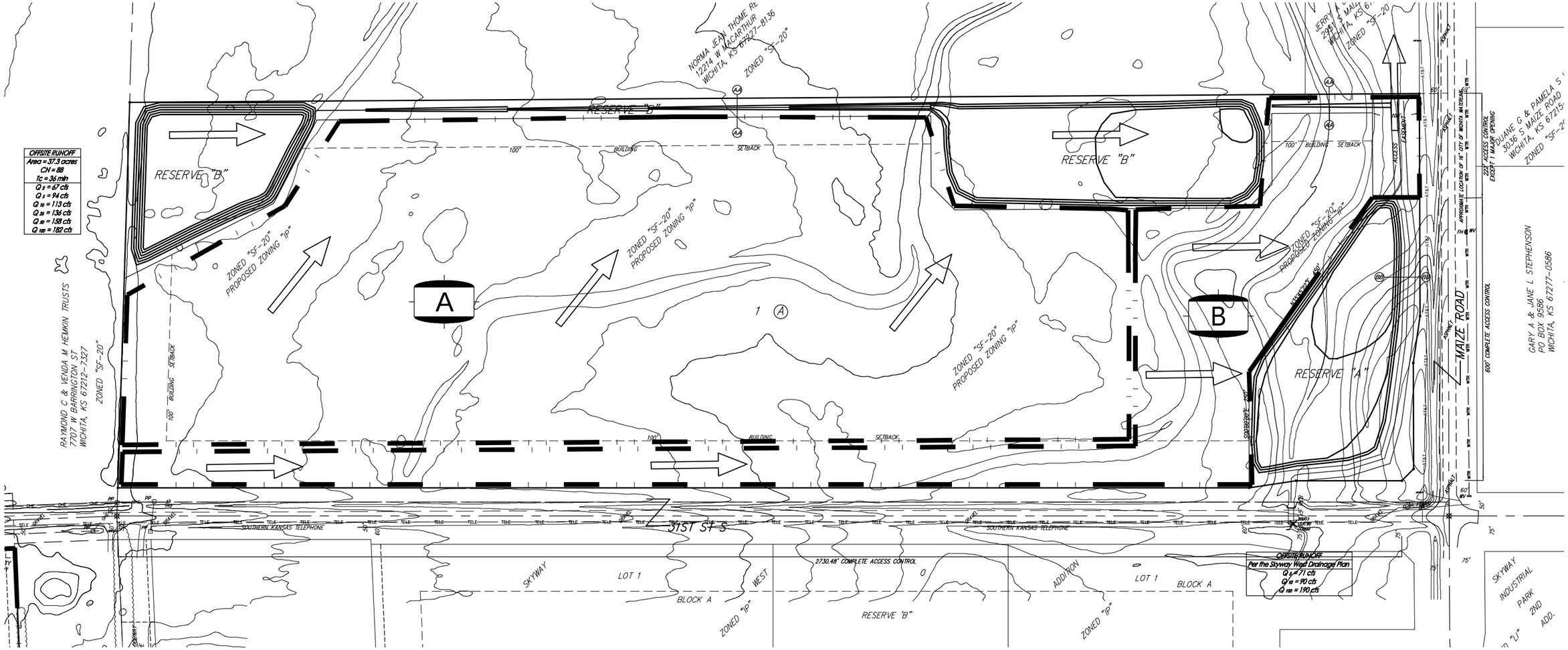
Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

E:/PROJECTS/SKYWAYWEST2ND/SKYWAY2NDAND3RD_F.DWG-RKR

DRAINAGE PLAN

SKYWAY WEST 3RD ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



A

Developed Basin A
Area = 30 acres
CN = 91
Tc = 39 min
Q 2 = 57 cfs
Q 5 = 77 cfs
Q 10 = 91 cfs
Q 25 = 110 cfs
Q 100 = 144 cfs

B

Developed Basin B
Area = 12 acres
CN = 91
Tc = 15 min
Q 2 = 38 cfs
Q 5 = 51 cfs
Q 10 = 60 cfs
Q 25 = 72 cfs
Q 100 = 94 cfs

RESERVE B West Detention (Bottom = 1334.0)

STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	67 cfs	12 cfs	1336.3
5 yr	94 cfs	29 cfs	1337.0
10 yr	113 cfs	45 cfs	1337.4
25 yr	140cfs	65 cfs	1337.9
100 yr	182 cfs	103 cfs	1338.5

PROPOSED POND

ELEVATION	AREA (sq ft)
1334	64000
1335	69000
1336	75000
1337	81000
1338	87000
1339	93000

RESERVE B East Detention (Bottom = 1327.0)

STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	60 cfs	20 cfs	1329.3
5 yr	85 cfs	33 cfs	1329.9
10 yr	103 cfs	47 cfs	1330.4
25 yr	137 cfs	65 cfs	1330.9
100 yr	205 cfs	119 cfs	1331.7

PROPOSED POND

ELEVATION	AREA (sq ft)
1327	4000
1328	61000
1329	126000
1330	139000
1331	143000
1332	152000

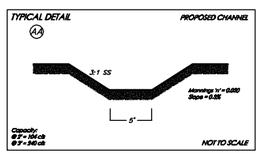
RESERVE A Detention (Bottom = 1327.0)

STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	38 cfs	1.1 cfs	1328.1
5 yr	51 cfs	2.9 cfs	1328.3
10 yr	60 cfs	4.6 cfs	1328.4
25 yr	72 cfs	6.2 cfs	1328.6
100 yr	94 cfs	8.3 cfs	1329.1

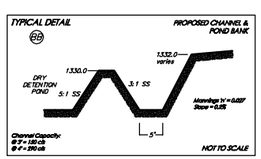
PROPOSED POND

ELEVATION	AREA (sq ft)
1327	37000
1328	98000
1329	113000
1330	120000
1331	145000

TYPICAL DETAIL (AA) — PROPOSED CHANNEL



TYPICAL DETAIL (BB) — PROPOSED CHANNEL & POND BANK



Total Site Existing
Area = 51 acres
CN =88
Tc = 82 min
Q 2 = 51 cfs
Q 5 = 72 cfs
Q 10 = 87 cfs
Q 25 = 105 cfs
Q 100 = 141 cfs

VICINITY MAP

SEC. 6, T28S, R1W
SEC. 7, T28S, R1W

FH = Fire Hydrant
GP = Guy Pole
Guy = Guy Anchor
MB = Mail Box
PM = Pipeline Marker
PP = Power Pole
Sign = Sign
SSMH = Sanitary Sewer Manhole
ATT Ped = ATT Pedestal
MM = Water Meter
WV = Water Valve

WATER LINE
SOUTHWESTERN BELL
GAS LINE
CABLE TV
FENCE
OVERHEAD ELECTRIC LINE
SANITARY SEWER
UNDERGROUND ELECTRIC LINE
PIPELINE

0 100 200

DATE OF PREPARATION: 28 FEBRUARY 2011
DATE OF TOPOGRAPHY: 15 DECEMBER 2010
CONTOUR INTERVALS = 1 FOOT(PROVIDED BY SEDGWICK COUNTY)

OWNER:
JOHN E. DUGAN FAMILY PARTNERSHIP, L.P.
ATTN: JOHN DUGAN
2416 MORNING DEW
WICHITA, KS 67205
316-721-2416

LEGAL DESCRIPTION:
BEGINNING AT A POINT ON THE EAST LINE OF SECTION 6, TOWNSHIP 28 SOUTH, RANGE 1 WEST OF THE SIXTH PRINCIPAL MERIDIAN, SEDGWICK COUNTY, KANSAS, A DISTANCE OF 30 FEET NORTH OF THE SOUTHEAST CORNER OF SAID SECTION; THENCE GOING NORTHERLY ALONG THE EAST LINE OF THE SECTION, A DISTANCE OF 862.8 FEET; THENCE TURNING LEFT AND GOING WESTERLY TO THE HALF SECTION LINE AT A POINT 880.6 FEET NORTH OF THE SOUTH QUARTER CORNER OF THE SECTION; THENCE TURNING LEFT AND GOING SOUTHERLY 850.6 FEET; THENCE TURNING LEFT AND EASTERLY PARALLEL TO THE SOUTH SECTION LINE TO THE POINT OF BEGINNING.

BENCHMARK:
MAIZE ROAD & 31ST SOUTH-CITY OF WICHITA BENCHMARK DISC. 200'± WEST OF INTERSECTION, SOUTHEAST CORNER OF HUBGUARD OF R.C.B.C.
ELEV. = 1331.82 NGVD88

RESERVE "A" IS RESERVED FOR OPEN SPACE, BERMS, LANDSCAPING, ENTRY MONUMENTS, SIGNS, LAKES, PRIVATE DRIVES, ACCESS PURPOSES, AND DRAINAGE PURPOSES.

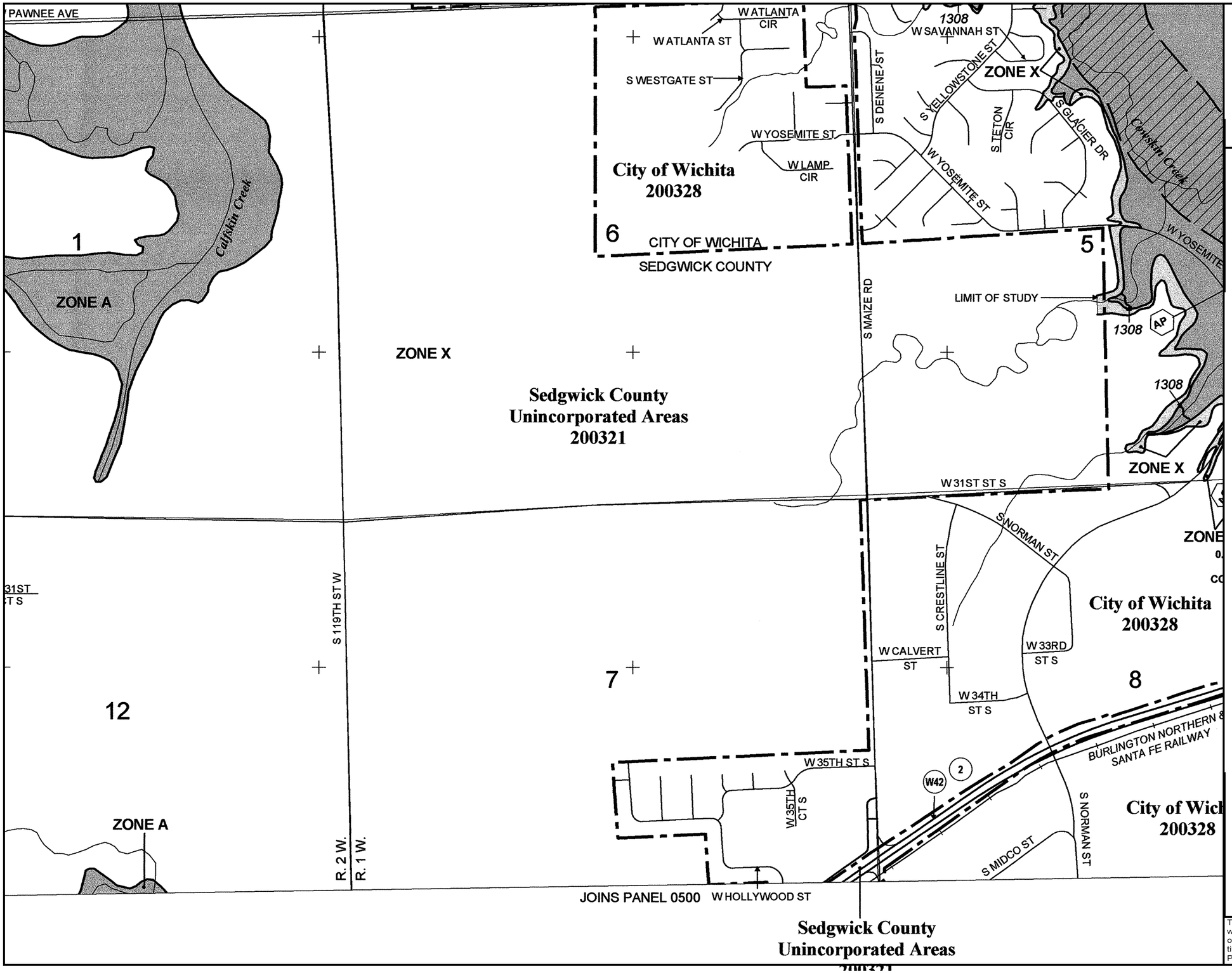
RESERVE "B" IS RESERVED FOR OPEN SPACE, BERMS, LANDSCAPING, LAKES, AND DRAINAGE PURPOSES.

DRAINAGE PLAN
SKYWAY WEST 3RD ADDITION

25 OCT 11

Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

E:/PROJECTS/SKYWAYWEST2ND/SKYWAY2NDAND3RD_P.DWG-RKR



MAP SCALE 1" = 1000'

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0340E

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS
AND INCORPORATED AREAS

PANEL 340 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0340	E
WICHITA, CITY OF	200328	0340	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
20173C0340E

EFFECTIVE DATE
FEBRUARY 2, 2007
Federal Emergency Management Agency

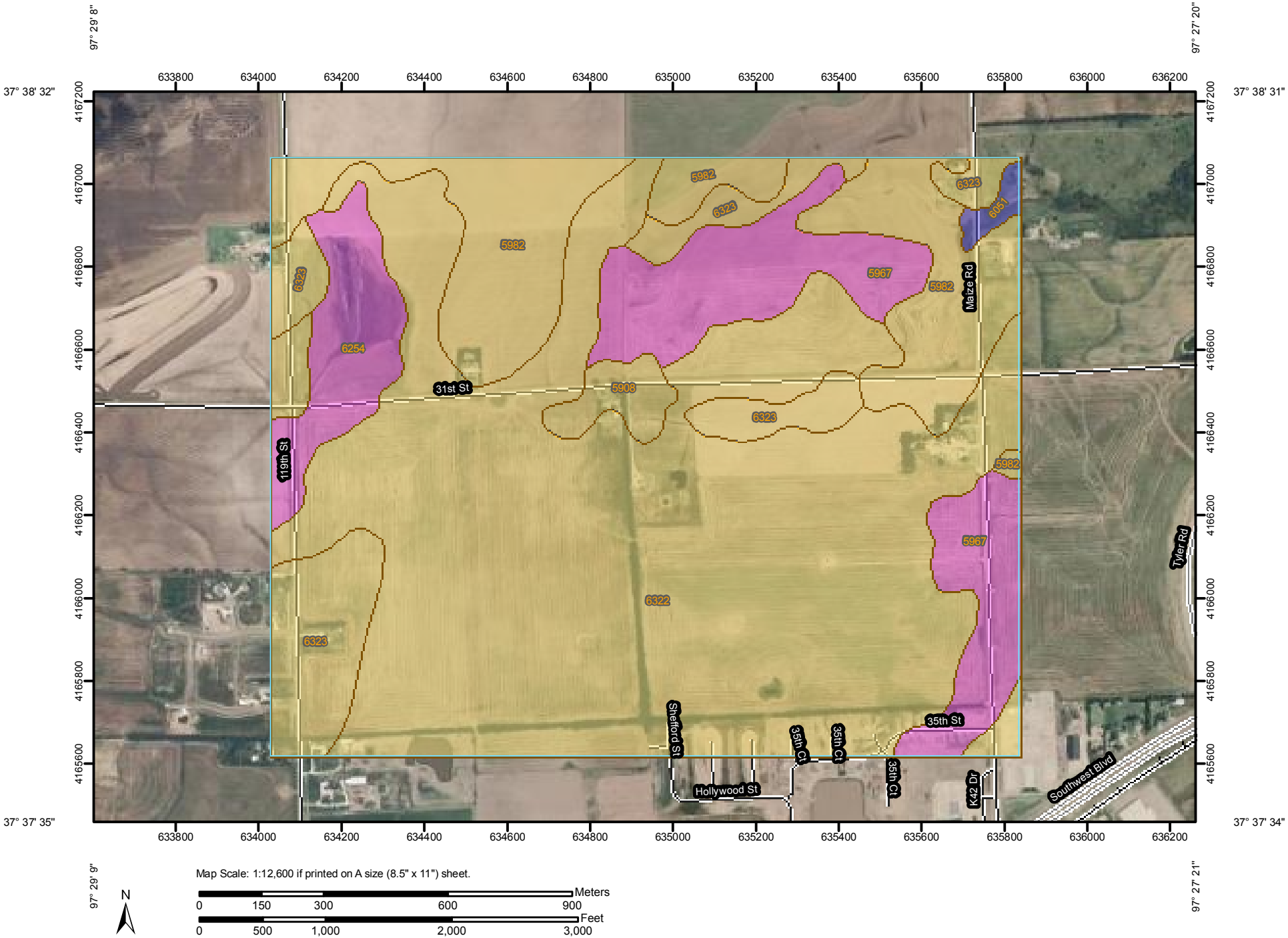
APPENDIX A: USGS Soils Survey

APPENDIX B : HydraFlow Hydrographs
Site Flow and Pond Routing

APPENDIX C : HydraFlow Express
Channel Sections AA & BB

USGS Soils Survey

Hydrologic Soil Group—Sedgwick County, Kansas
(Skyway West)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:12,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 14N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 7, Nov 30, 2010

Date(s) aerial images were photographed: 6/30/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas (KS173)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
5908	Nalim loam, 0 to 1 percent slopes	C	9.9	1.5%
5967	Tabler silty clay loam, 0 to 1 percent slopes	D	70.5	10.9%
5982	Nalim loam, 1 to 3 percent slopes	C	95.7	14.8%
6051	Elandco silt loam, frequently flooded	B	3.4	0.5%
6254	Waurika silt loam, 0 to 1 percent slopes	D	30.6	4.7%
6322	Blanket silt loam, 0 to 1 percent slopes	C	378.2	58.7%
6323	Blanket silt loam, 1 to 3 percent slopes	C	56.3	8.7%
Totals for Area of Interest			**644.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

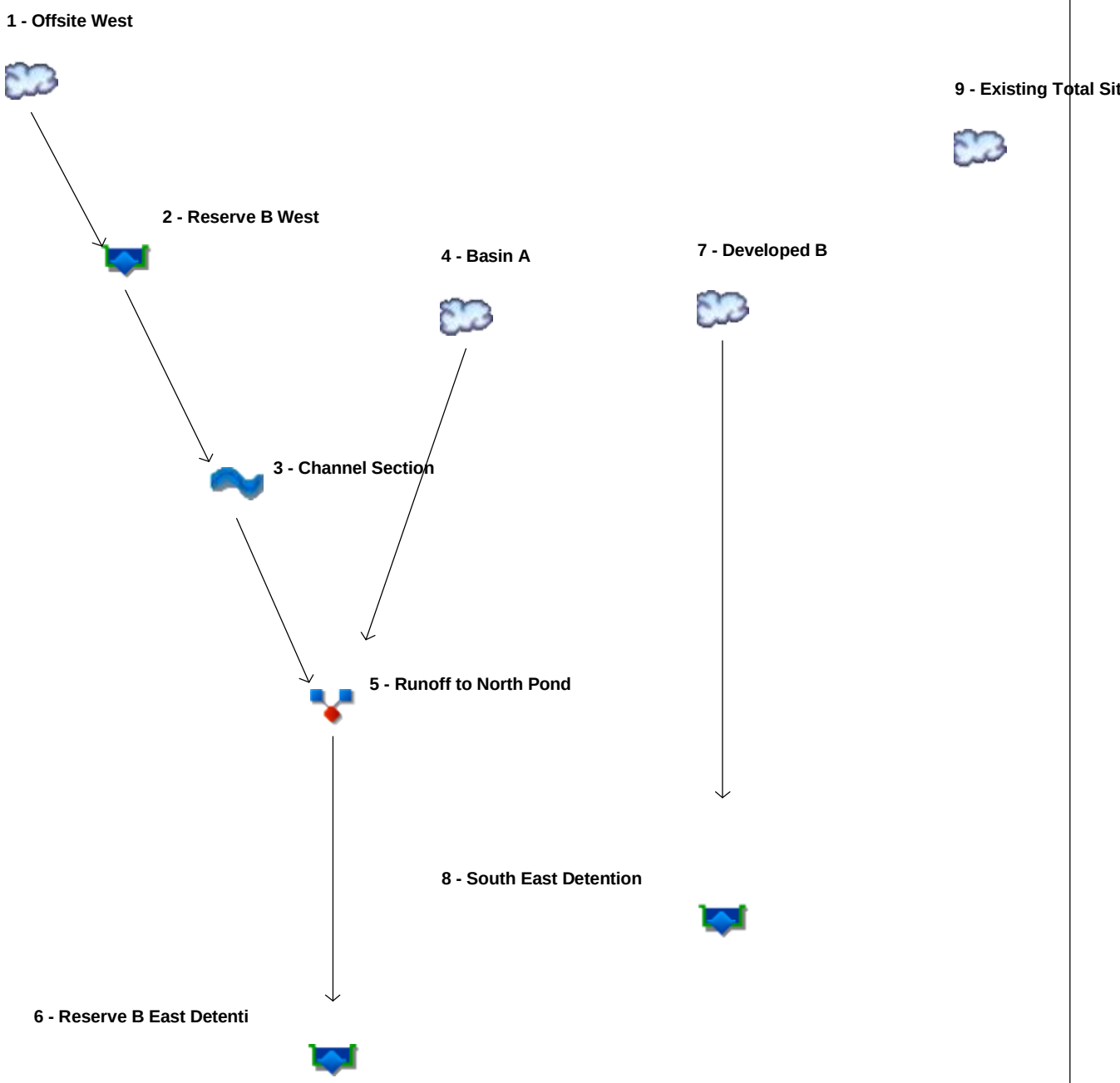
Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

HydraFlow Hydrographs

Site Flow & Pond Routing

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Offsite West
2	Reservoir	Reserve B West
3	Reach	Channel Section
4	SCS Runoff	Basin A
5	Combine	Runoff to North Pond
6	Reservoir	Reserve B East Detenti
7	SCS Runoff	Developed B
8	Reservoir	South East Detention
9	SCS Runoff	Existing Total Site

Hydrograph Return Period Recap

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	------	48.51	66.97	10.24	93.71	112.50	136.62	158.00	181.96	Offsite West
2	Reservoir	1	7.746	12.36	0.264	29.48	44.72	65.24	83.08	102.62	Reserve B West
3	Reach	2	7.701	12.22	0.264	28.66	43.69	64.02	81.79	101.13	Channel Section
4	SCS Runoff	------	42.26	56.56	11.05	77.01	91.26	109.51	125.64	143.72	Basin A
5	Combine	3, 4	42.56	59.63	11.07	84.62	103.27	136.77	169.15	205.22	Runoff to North Pond
6	Reservoir	5	13.12	19.67	0.422	33.47	46.83	65.06	89.75	118.51	Reserve B East Detenti
7	SCS Runoff	------	28.21	37.58	7.548	50.93	60.22	72.11	82.62	94.39	Developed B
8	Reservoir	7	0.379	1.077	0.123	2.932	4.632	6.171	7.182	8.217	South East Detention
9	SCS Runoff	------	37.05	51.29	7.621	71.98	86.55	105.33	121.98	140.67	Existing Total Site

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

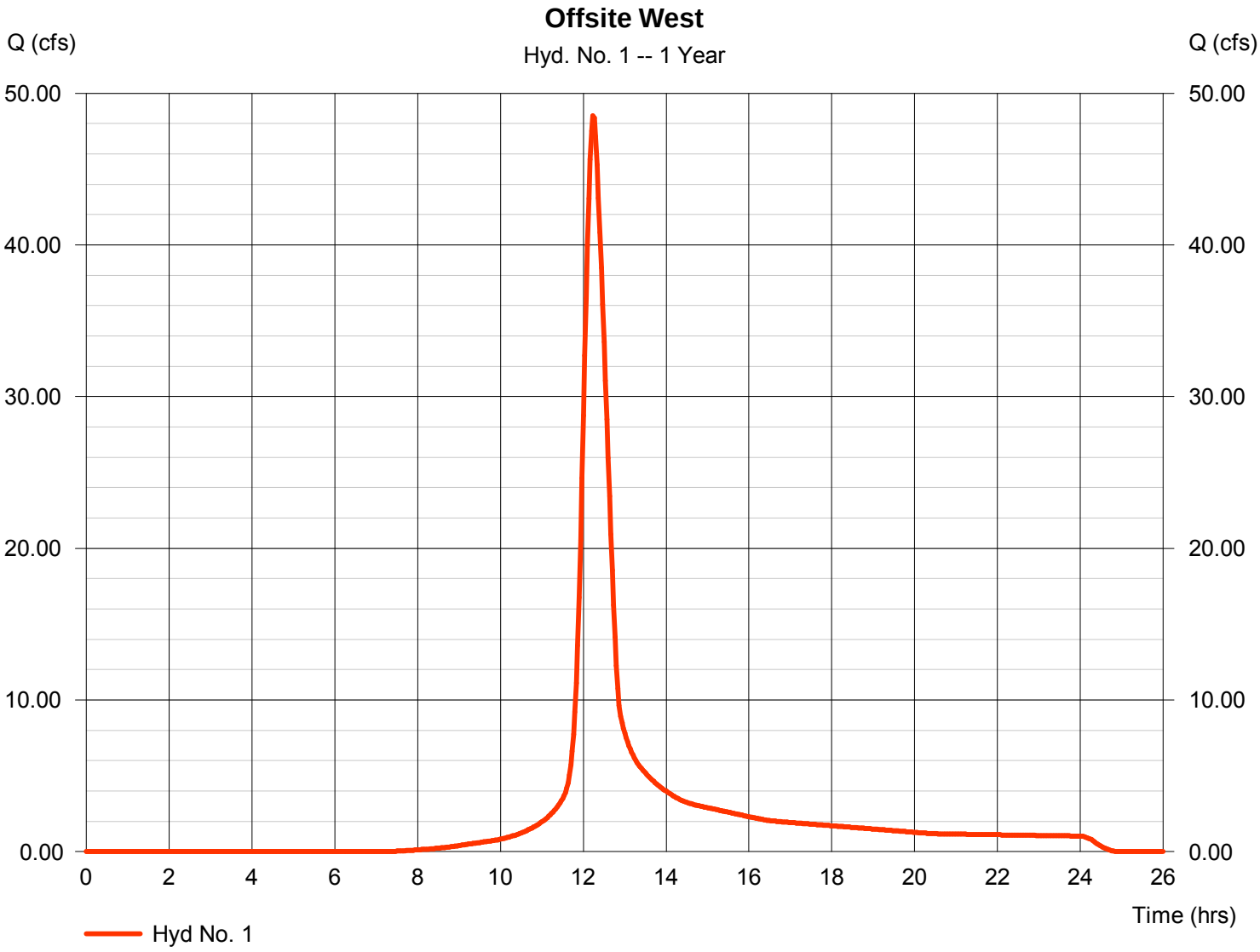
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	48.51	2	734	219,738	------	------	------	Offsite West
2	Reservoir	7.746	2	780	206,926	1	1335.74	119,921	Reserve B West
3	Reach	7.701	2	794	206,888	2	------	------	Channel Section
4	SCS Runoff	42.26	2	736	205,337	------	------	------	Basin A
5	Combine	42.56	2	736	412,225	3, 4	------	------	Runoff to North Pond
6	Reservoir	13.12	2	798	389,764	5	1329.04	123,174	Reserve B East Detenti
7	SCS Runoff	28.21	2	722	80,082	------	------	------	Developed B
8	Reservoir	0.379	2	1272	69,601	7	1327.98	63,931	South East Detention
9	SCS Runoff	37.05	2	764	305,419	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 48.51 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 219,738 cuft
Drainage area	= 37.300 ac	Curve number	= 88
Basin Slope	= 0.7 %	Hydraulic length	= 1300 ft
Tc method	= LAG	Time of conc. (Tc)	= 35.60 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



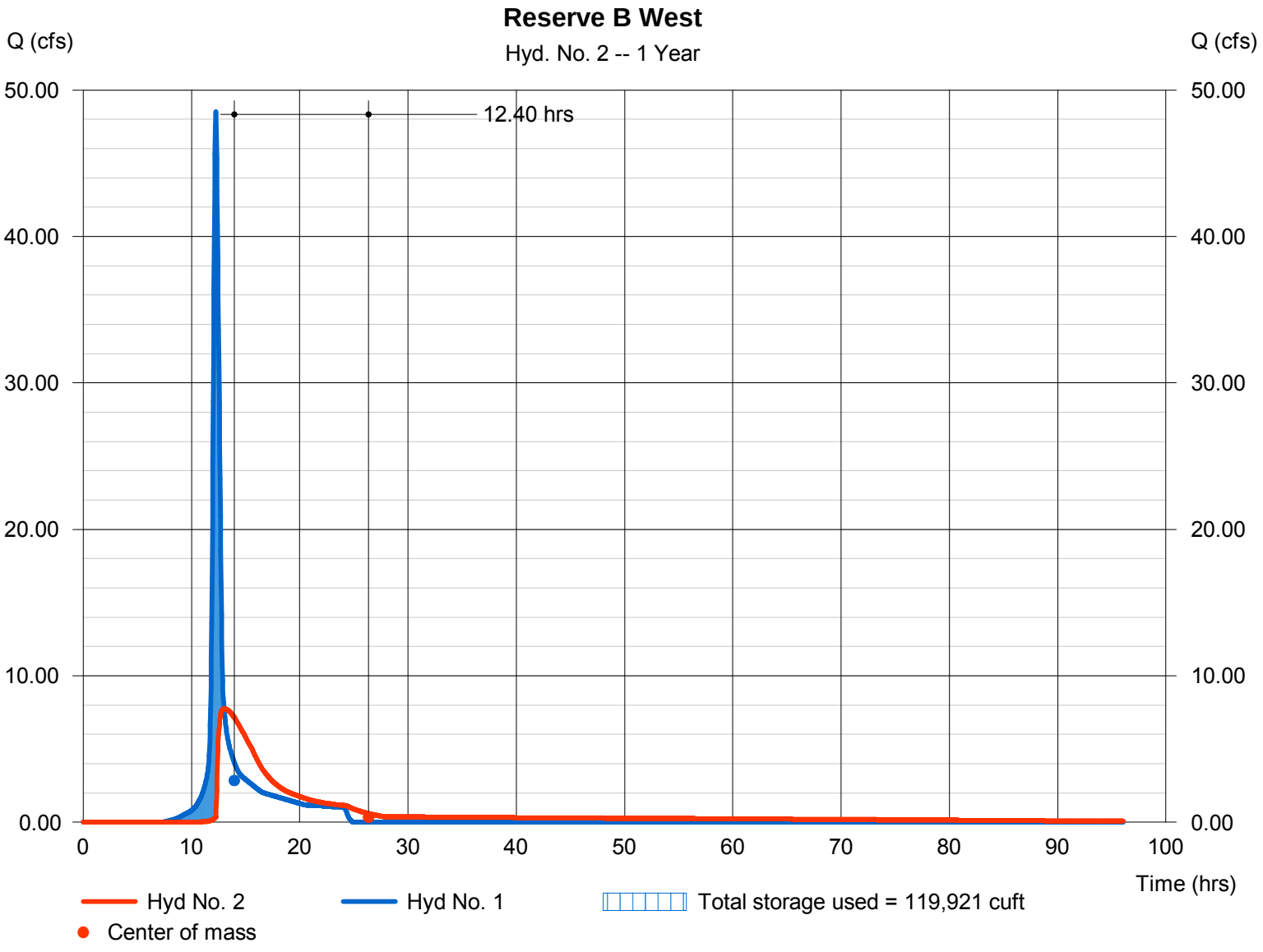
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	= Reservoir	Peak discharge	= 7.746 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.00 hrs
Time interval	= 2 min	Hyd. volume	= 206,926 cuft
Inflow hyd. No.	= 1 - Offsite West	Max. Elevation	= 1335.74 ft
Reservoir name	= Reserve B West Detention	Max. Storage	= 119,921 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Reserve B West Detention

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1334.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1334.00	64,000	0	0
1.00	1335.00	69,000	66,478	66,478
2.00	1336.00	75,000	71,972	138,450
3.00	1337.00	81,000	77,973	216,423
4.00	1338.00	87,000	83,974	300,396
5.00	1339.00	93,000	89,974	390,371

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	4.00	0.00	0.00
Span (in)	= 24.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1334.00	1334.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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	Yes	No	No

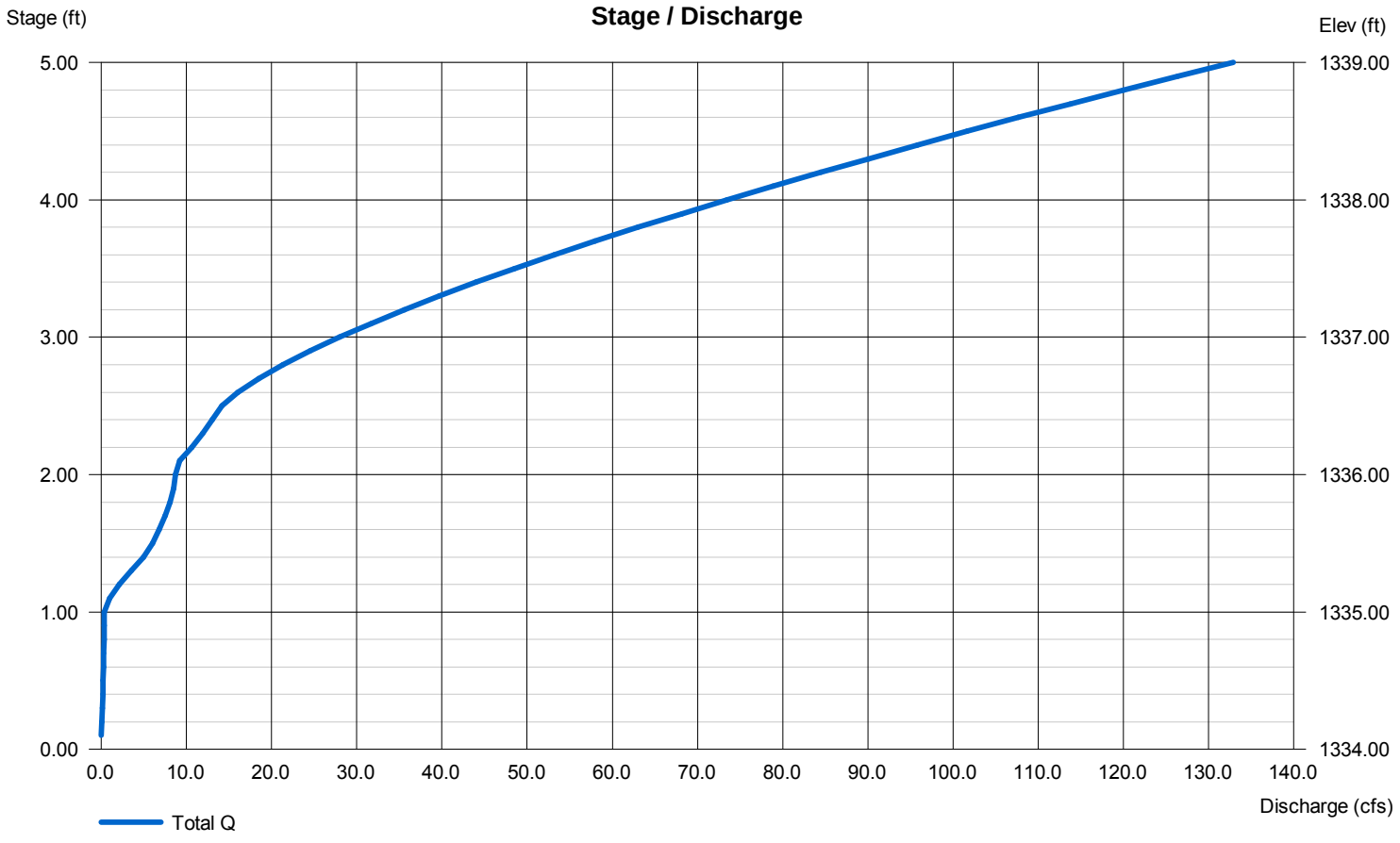
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	10.00	0.00	0.00
Crest El. (ft)	= 1335.00	1336.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

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



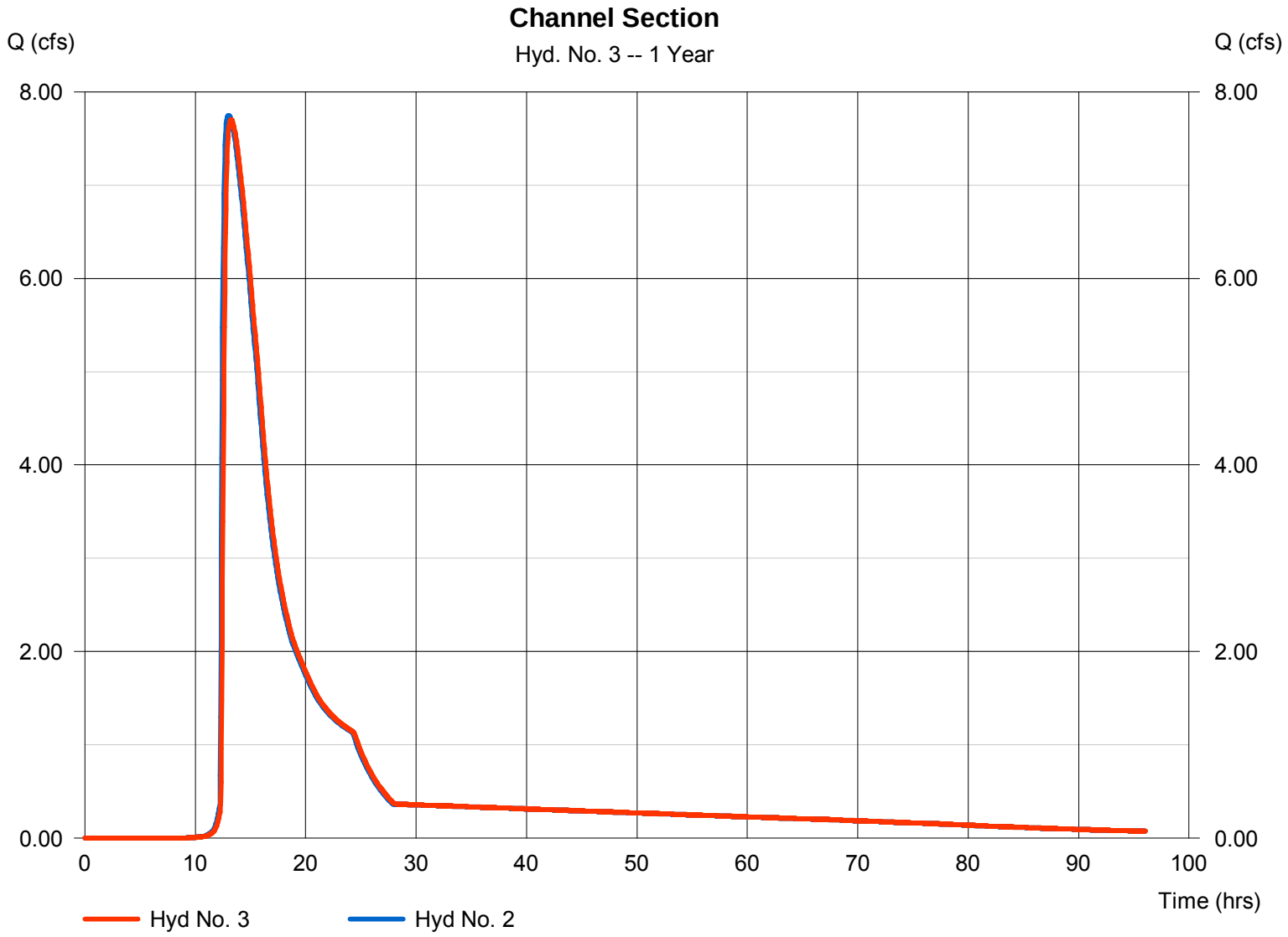
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	= Reach	Peak discharge	= 7.701 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.23 hrs
Time interval	= 2 min	Hyd. volume	= 206,888 cuft
Inflow hyd. No.	= 2 - Reserve B West	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.020	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 5.0 ft
Rating curve x	= 1.395	Rating curve m	= 1.341
Ave. velocity	= 2.16 ft/s	Routing coeff.	= 0.2356

Modified Att-Kin routing method used.

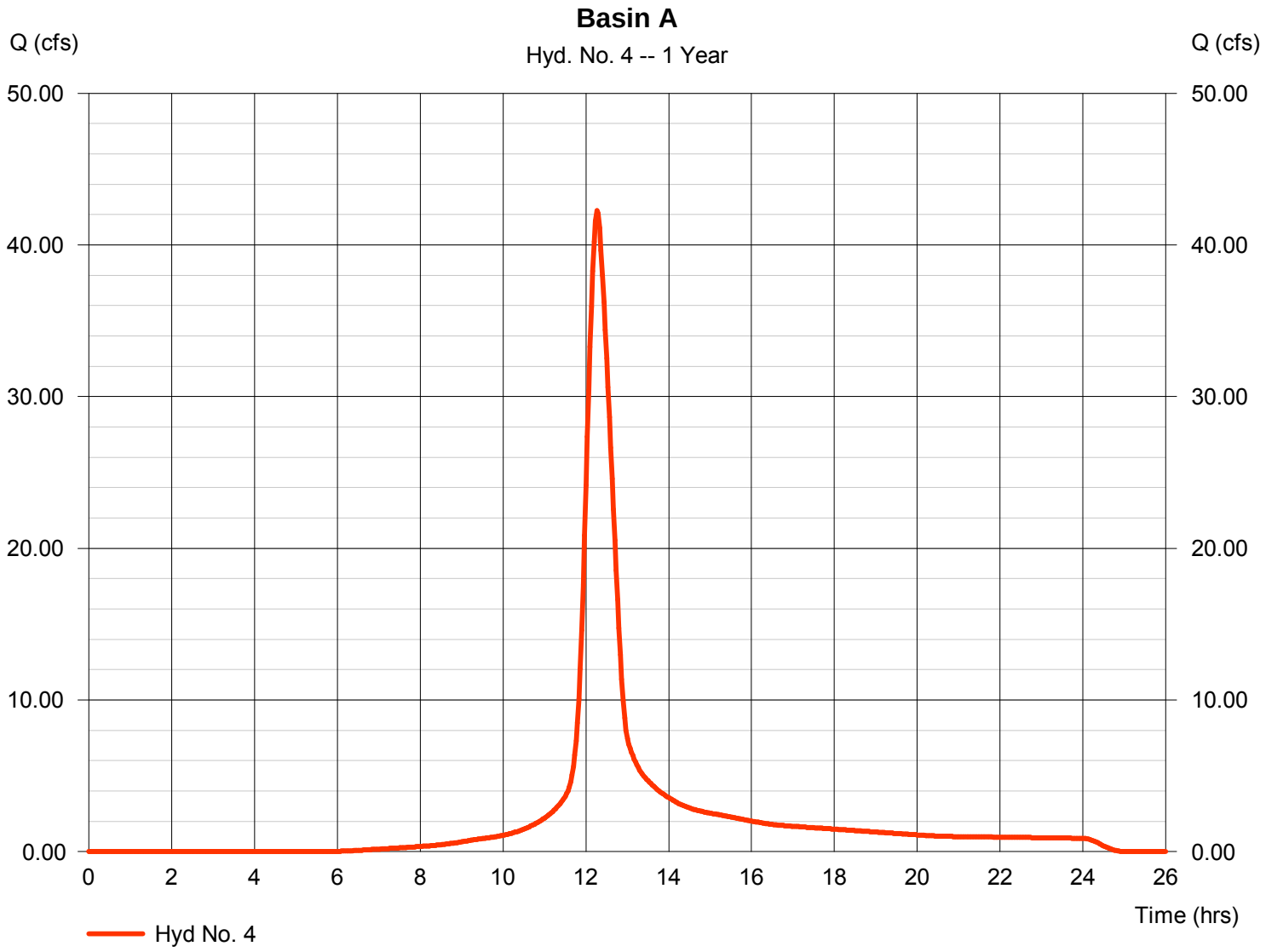


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 42.26 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 205,337 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

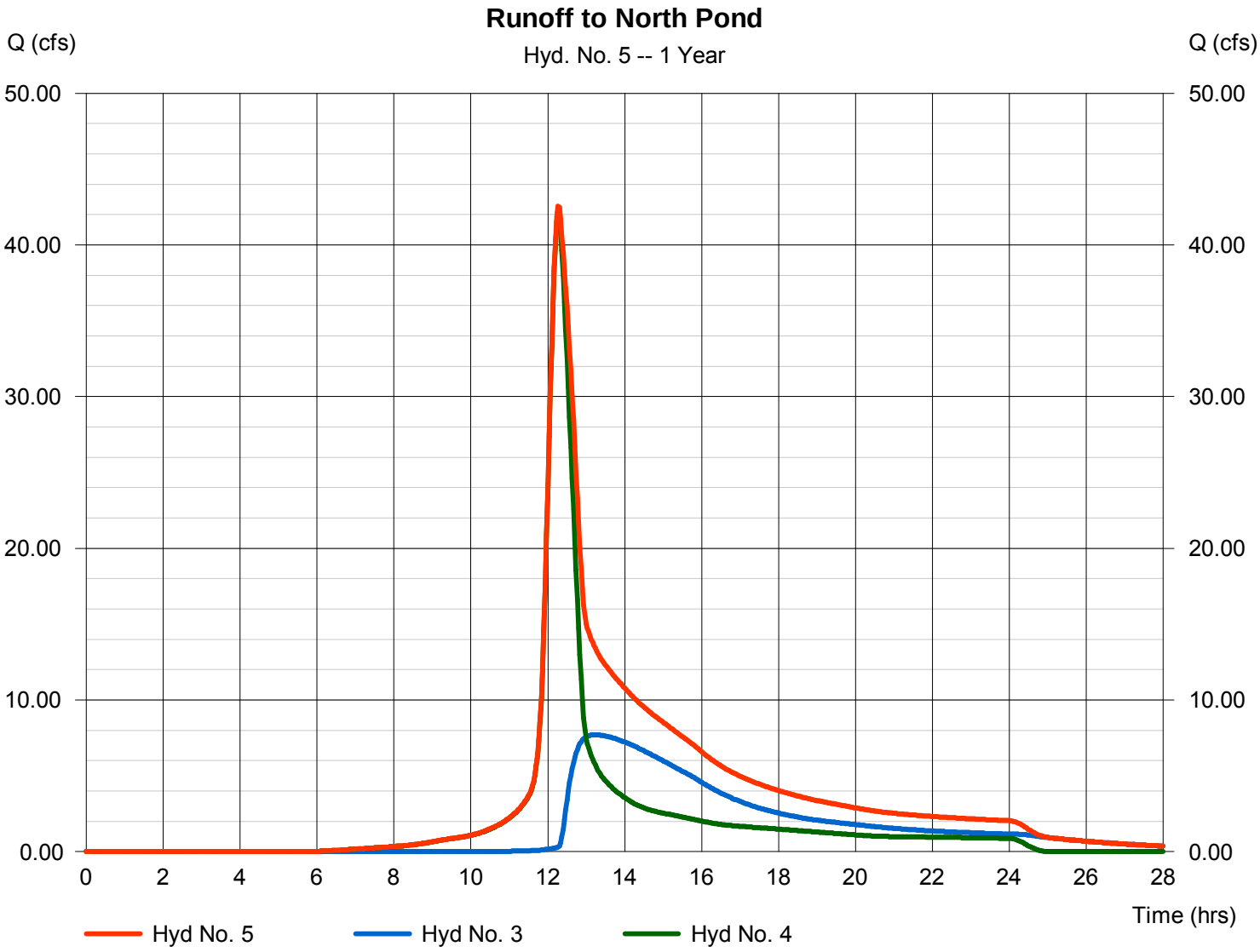


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 42.56 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 412,225 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



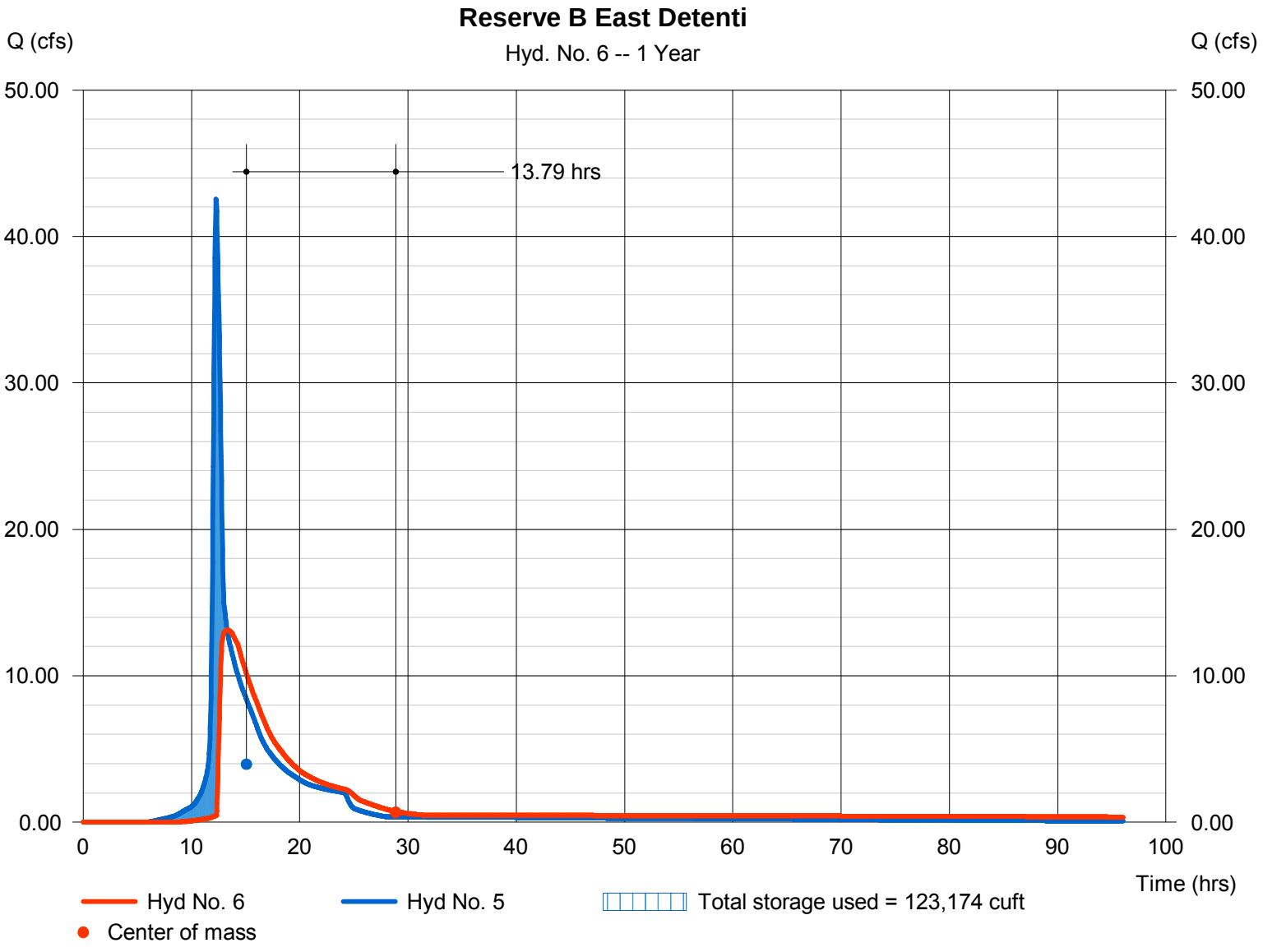
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	= Reservoir	Peak discharge	= 13.12 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.30 hrs
Time interval	= 2 min	Hyd. volume	= 389,764 cuft
Inflow hyd. No.	= 5 - Runoff to North Pond	Max. Elevation	= 1329.04 ft
Reservoir name	= Reserve B East Detention	Max. Storage	= 123,174 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Reserve B East Detention

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1327.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1327.00	4,000	0	0
1.00	1328.00	61,000	26,871	26,871
2.00	1329.00	126,000	91,547	118,418
3.00	1330.00	135,000	130,461	248,879
4.00	1331.00	143,000	138,967	387,846
5.00	1332.00	152,000	147,462	535,309

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	4.00	0.00	0.00
Span (in)	= 48.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1327.00	1327.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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	Yes	No	No

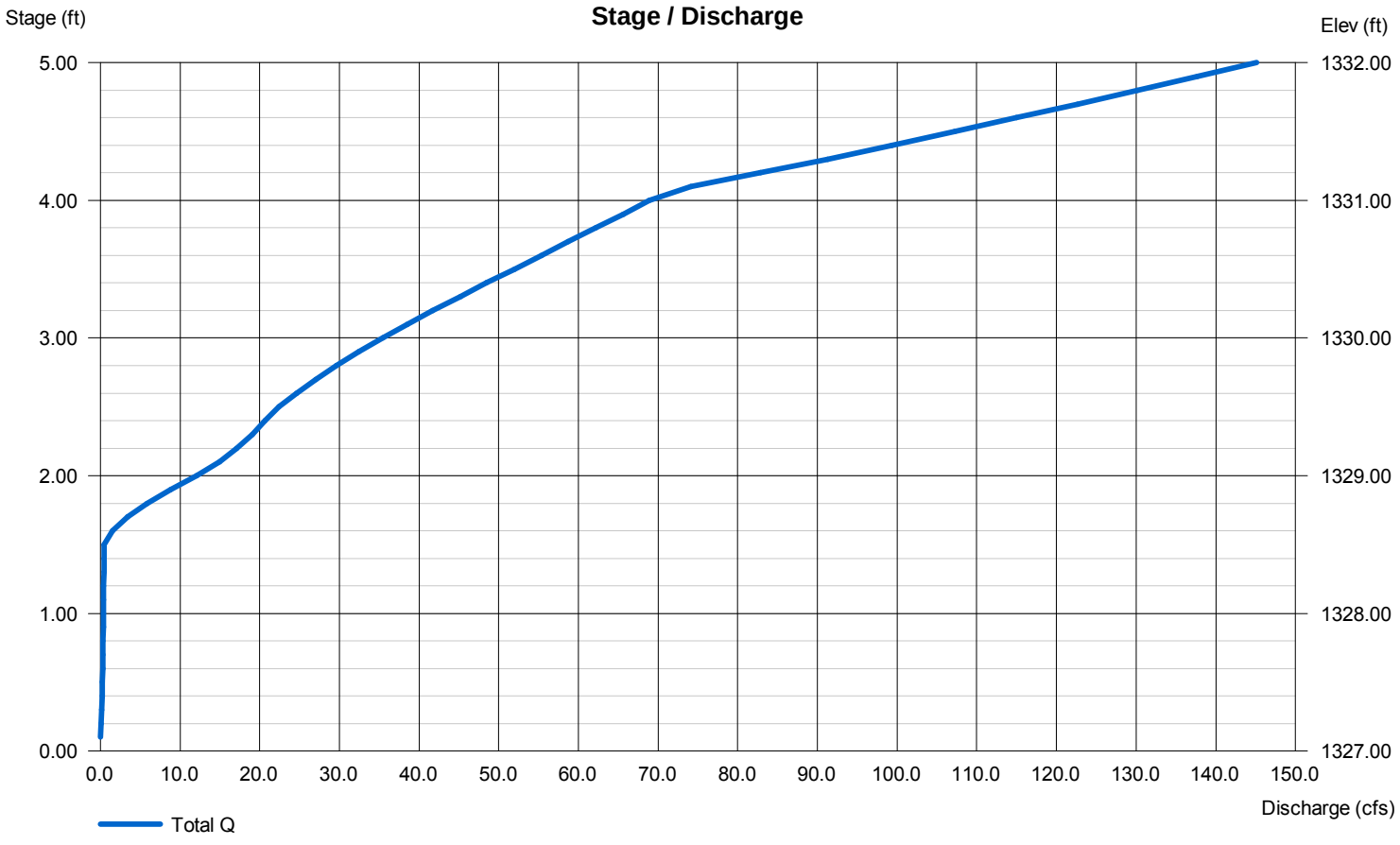
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	5.00	0.00	0.00
Crest El. (ft)	= 1328.50	1329.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	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).

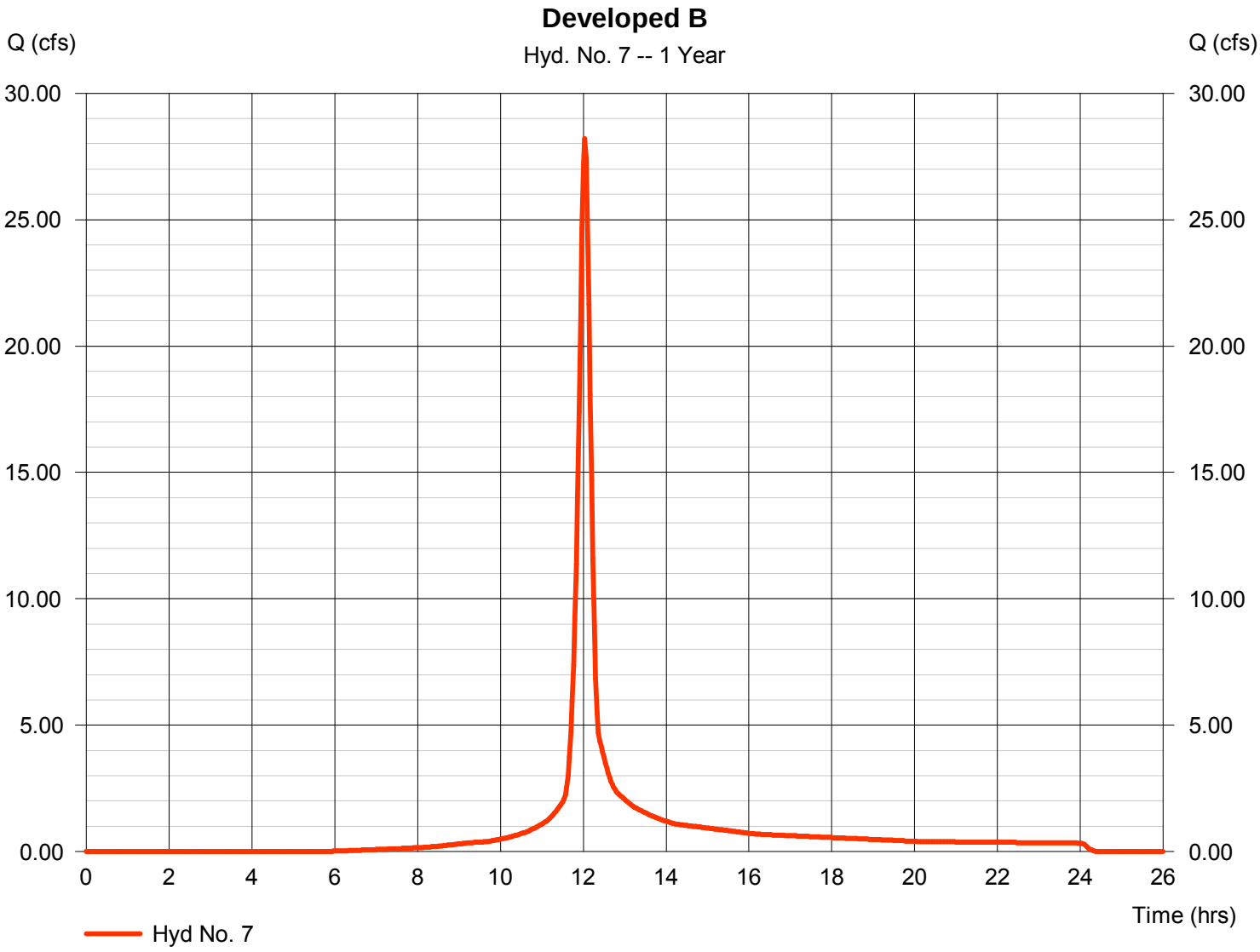


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 28.21 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 80,082 cuft
Drainage area	= 12.000 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



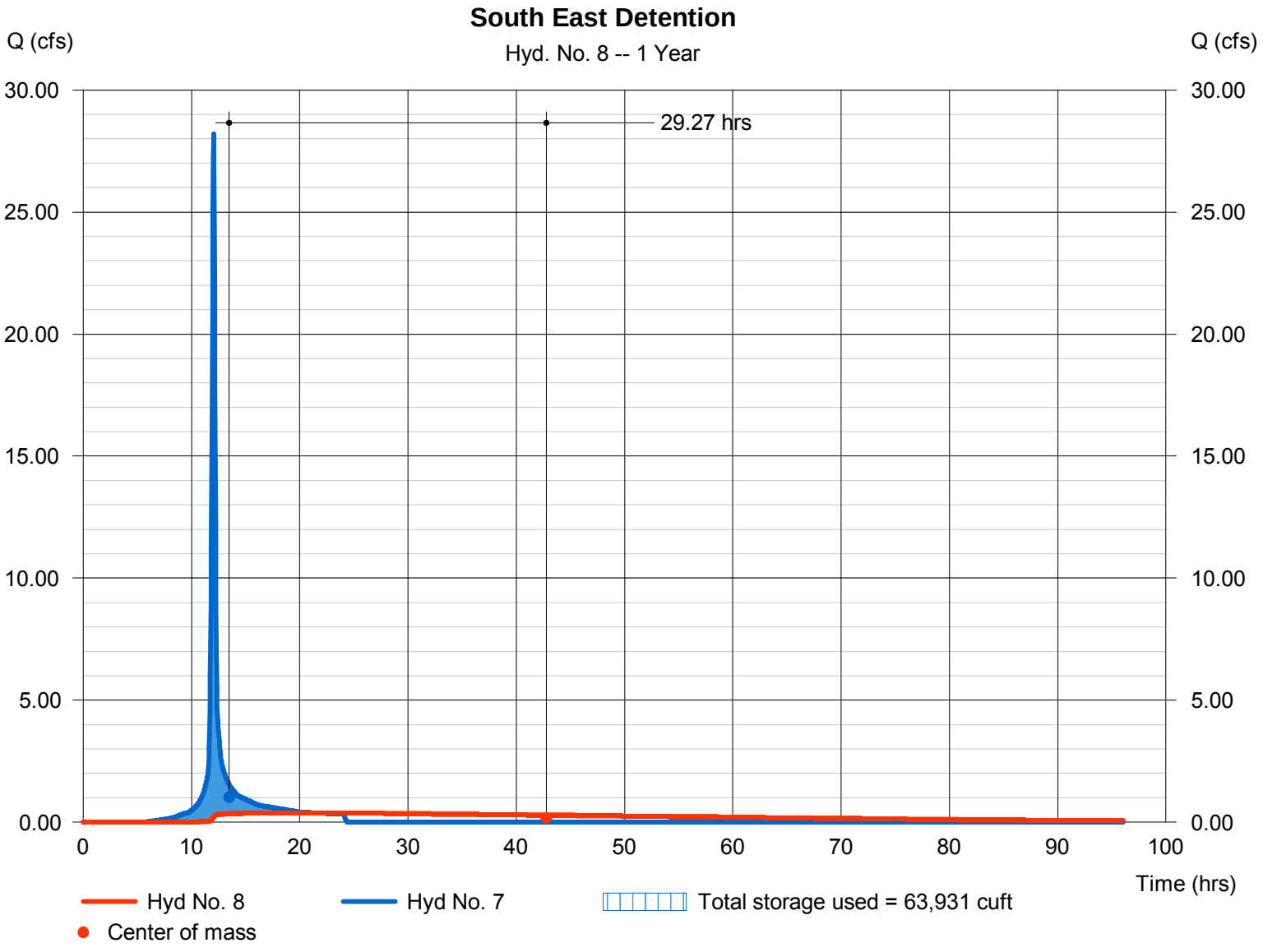
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	= Reservoir	Peak discharge	= 0.379 cfs
Storm frequency	= 1 yrs	Time to peak	= 21.20 hrs
Time interval	= 2 min	Hyd. volume	= 69,601 cuft
Inflow hyd. No.	= 7 - Developed B	Max. Elevation	= 1327.98 ft
Reservoir name	= Reserve A Detention	Max. Storage	= 63,931 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Reserve A Detention

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1327.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1327.00	37,000	0	0
1.00	1328.00	98,000	65,066	65,066
2.00	1329.00	113,000	105,401	170,466
3.00	1330.00	120,000	116,471	286,937
4.00	1331.00	145,000	132,290	419,227

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	4.00	0.00	0.00
Span (in)	= 24.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1327.00	1327.00	0.00	0.00
Length (ft)	= 30.00	0.00	0.00	0.00
Slope (%)	= 0.50	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

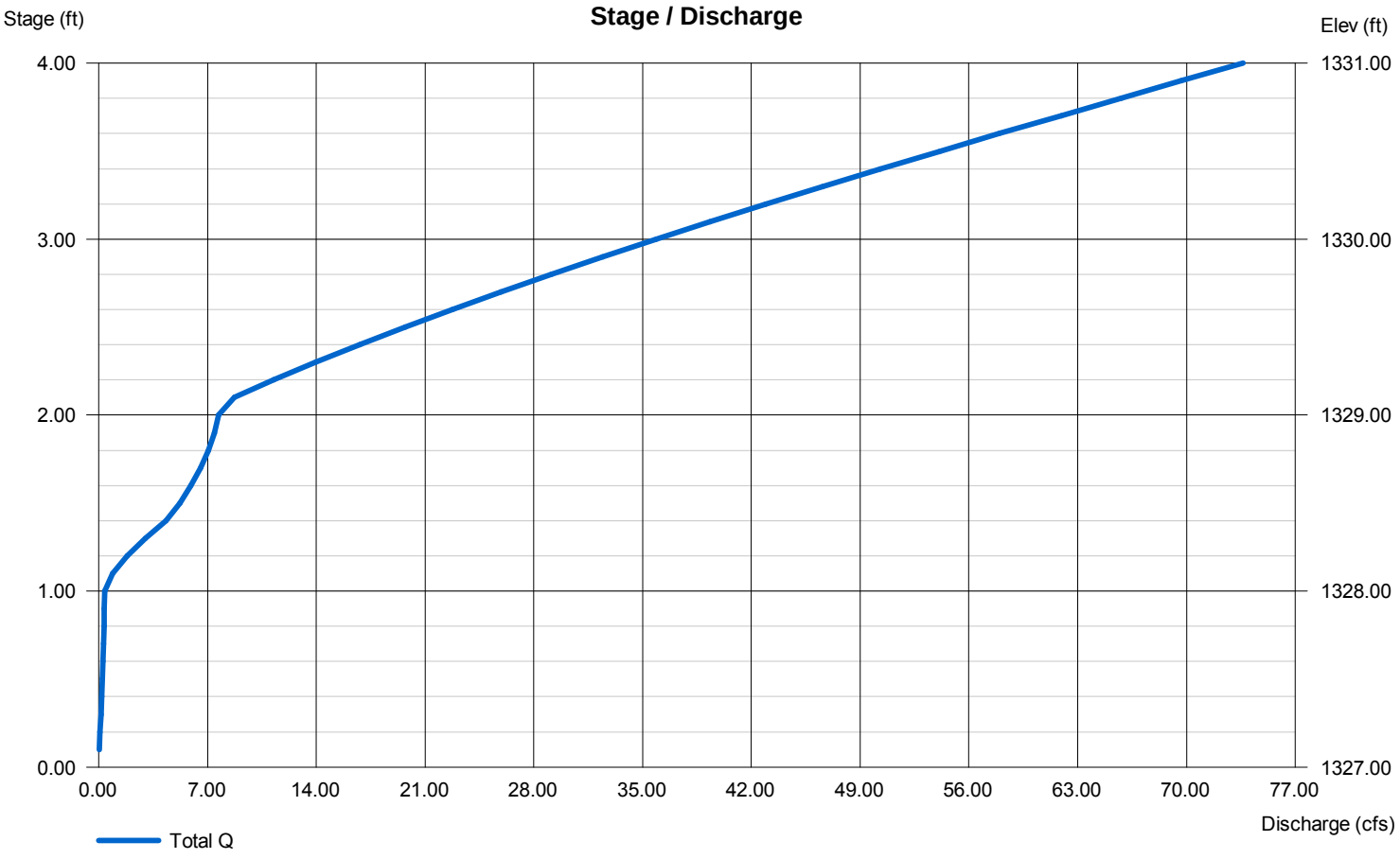
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	5.00	0.00	0.00
Crest El. (ft)	= 1328.00	1329.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	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).

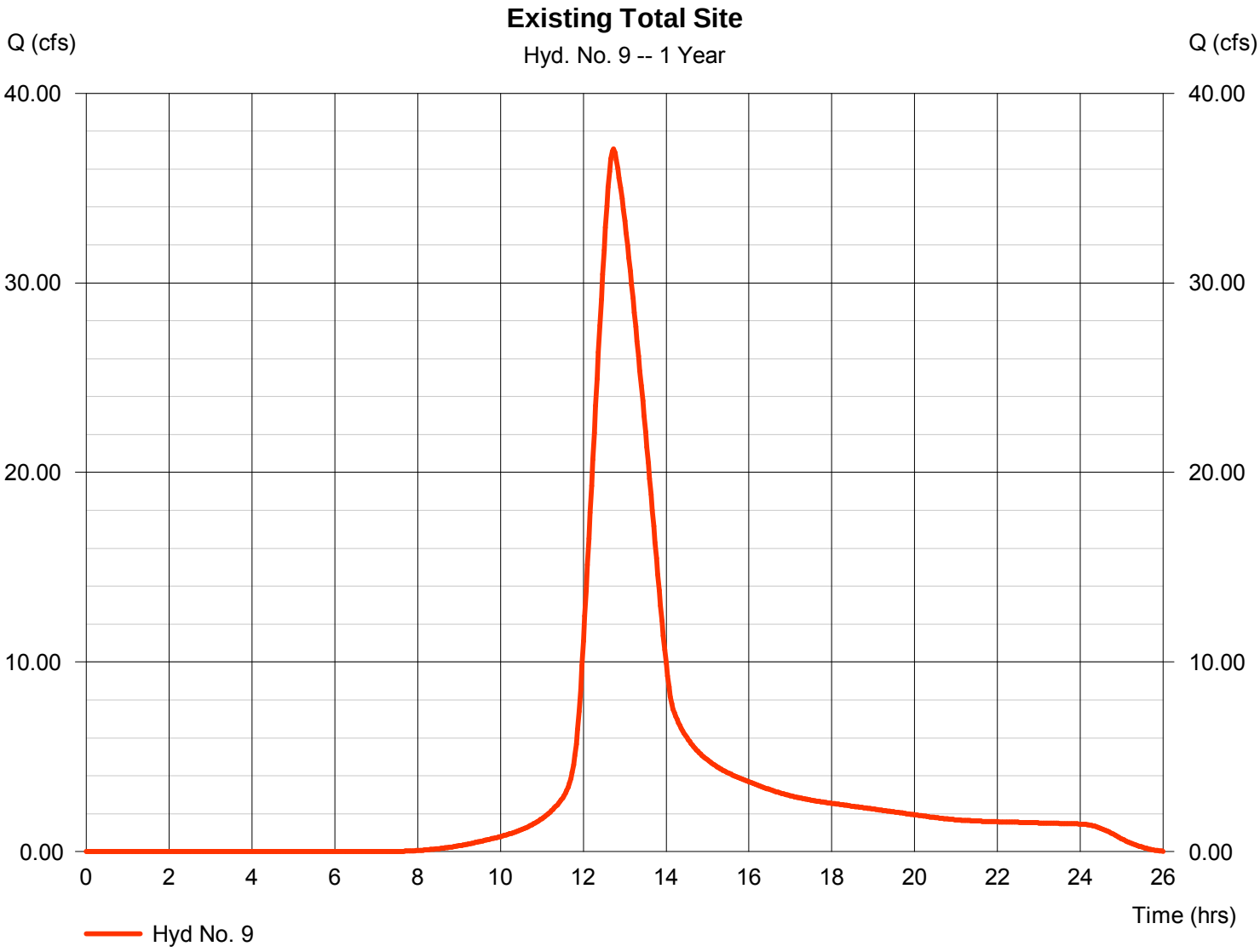


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	= SCS Runoff	Peak discharge	= 37.05 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 305,419 cuft
Drainage area	= 51.000 ac	Curve number	= 88
Basin Slope	= 0.4 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 82.10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

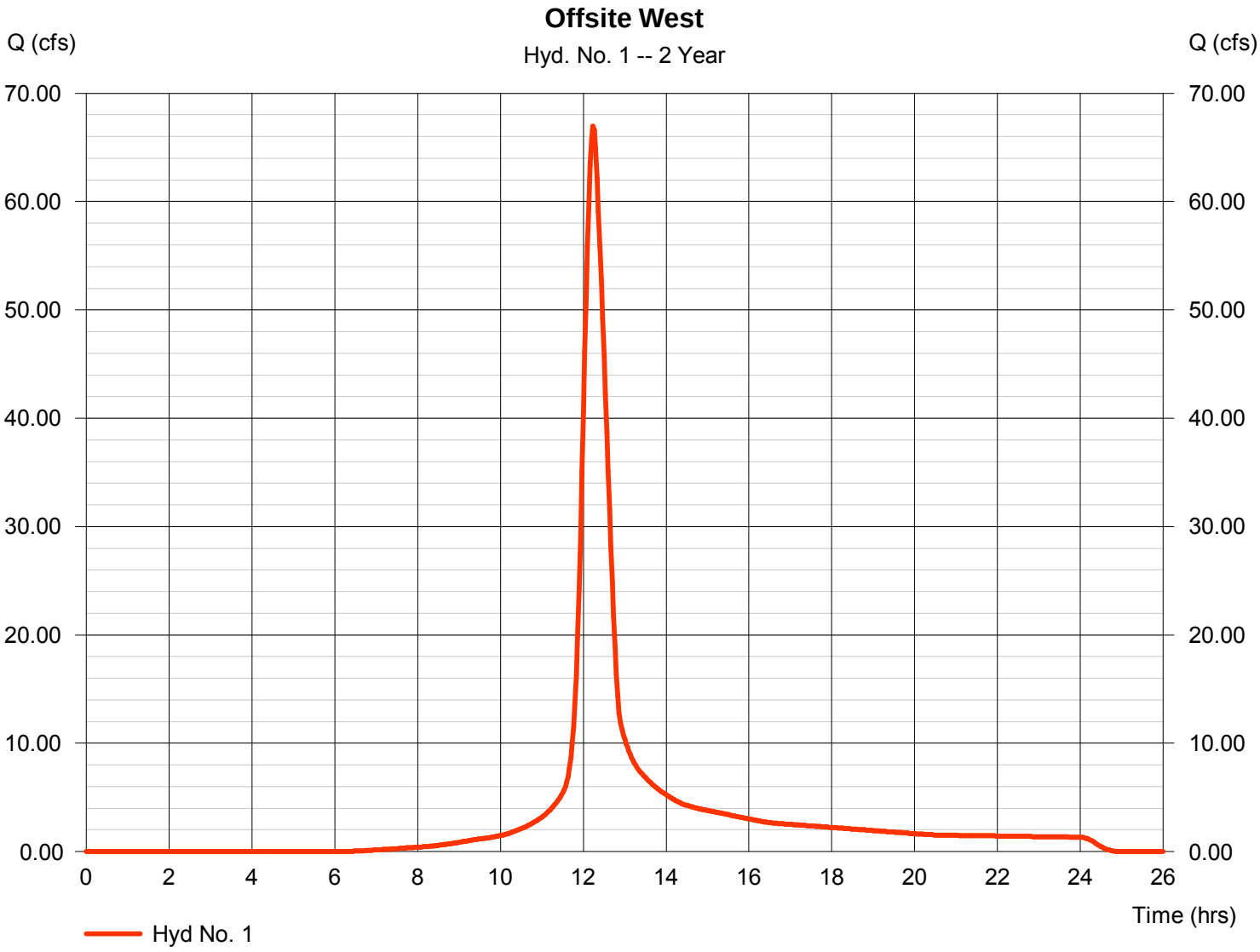
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	66.97	2	734	303,686	------	------	------	Offsite West
2	Reservoir	12.36	2	772	290,744	1	1336.34	165,043	Reserve B West
3	Reach	12.22	2	784	290,709	2	------	------	Channel Section
4	SCS Runoff	56.56	2	736	276,729	------	------	------	Basin A
5	Combine	59.63	2	738	567,438	3, 4	------	------	Runoff to North Pond
6	Reservoir	19.67	2	792	544,518	5	1329.34	162,385	Reserve B East Detenti
7	SCS Runoff	37.58	2	722	107,924	------	------	------	Developed B
8	Reservoir	1.077	2	928	96,542	7	1328.12	77,643	South East Detention
9	SCS Runoff	51.29	2	764	422,100	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	=	SCS Runoff	Peak discharge	=	66.97 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	303,686 cuft
Drainage area	=	37.300 ac	Curve number	=	88
Basin Slope	=	0.7 %	Hydraulic length	=	1300 ft
Tc method	=	LAG	Time of conc. (Tc)	=	35.60 min
Total precip.	=	3.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



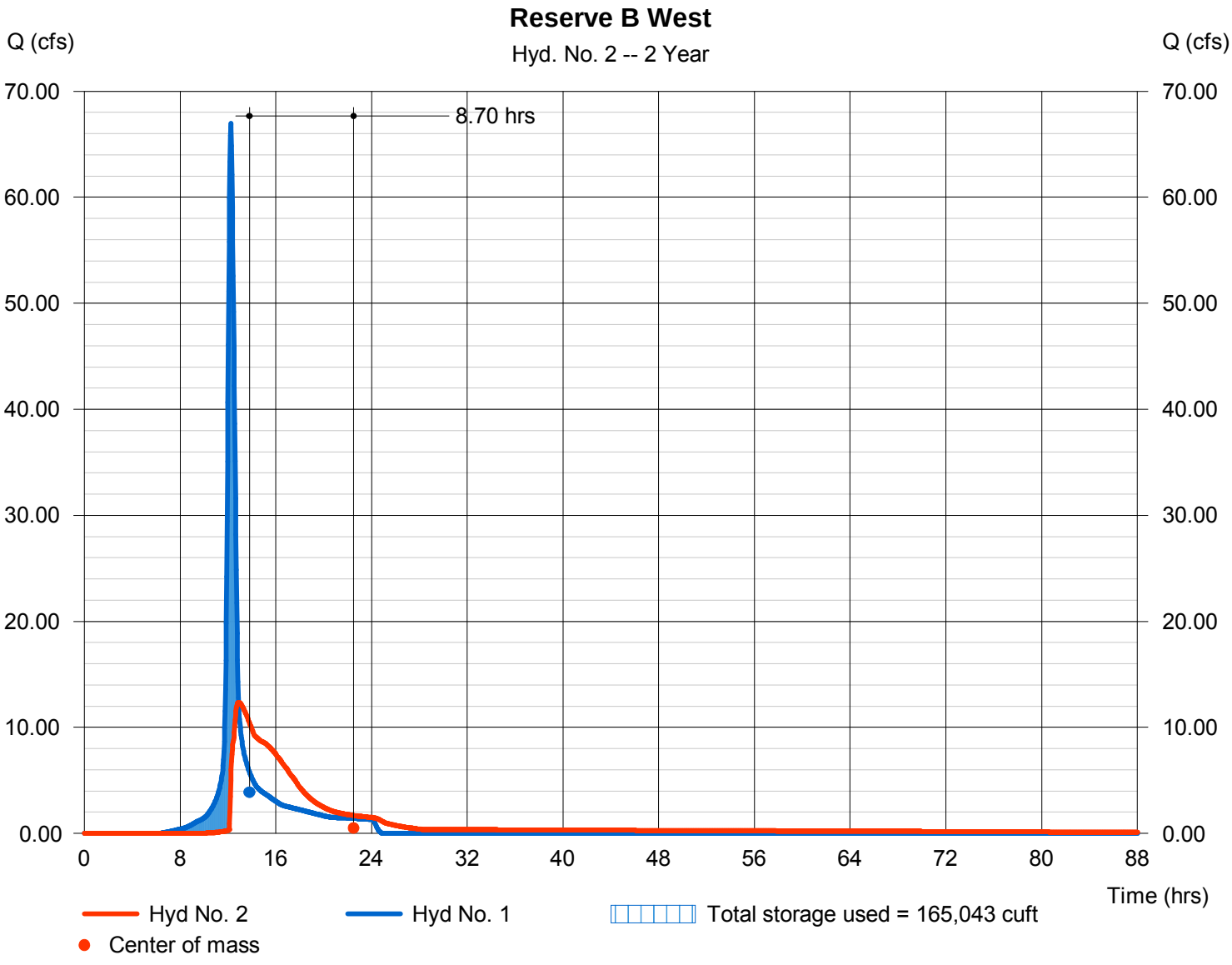
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	= Reservoir	Peak discharge	= 12.36 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 290,744 cuft
Inflow hyd. No.	= 1 - Offsite West	Max. Elevation	= 1336.34 ft
Reservoir name	= Reserve B West Detention	Max. Storage	= 165,043 cuft

Storage Indication method used.



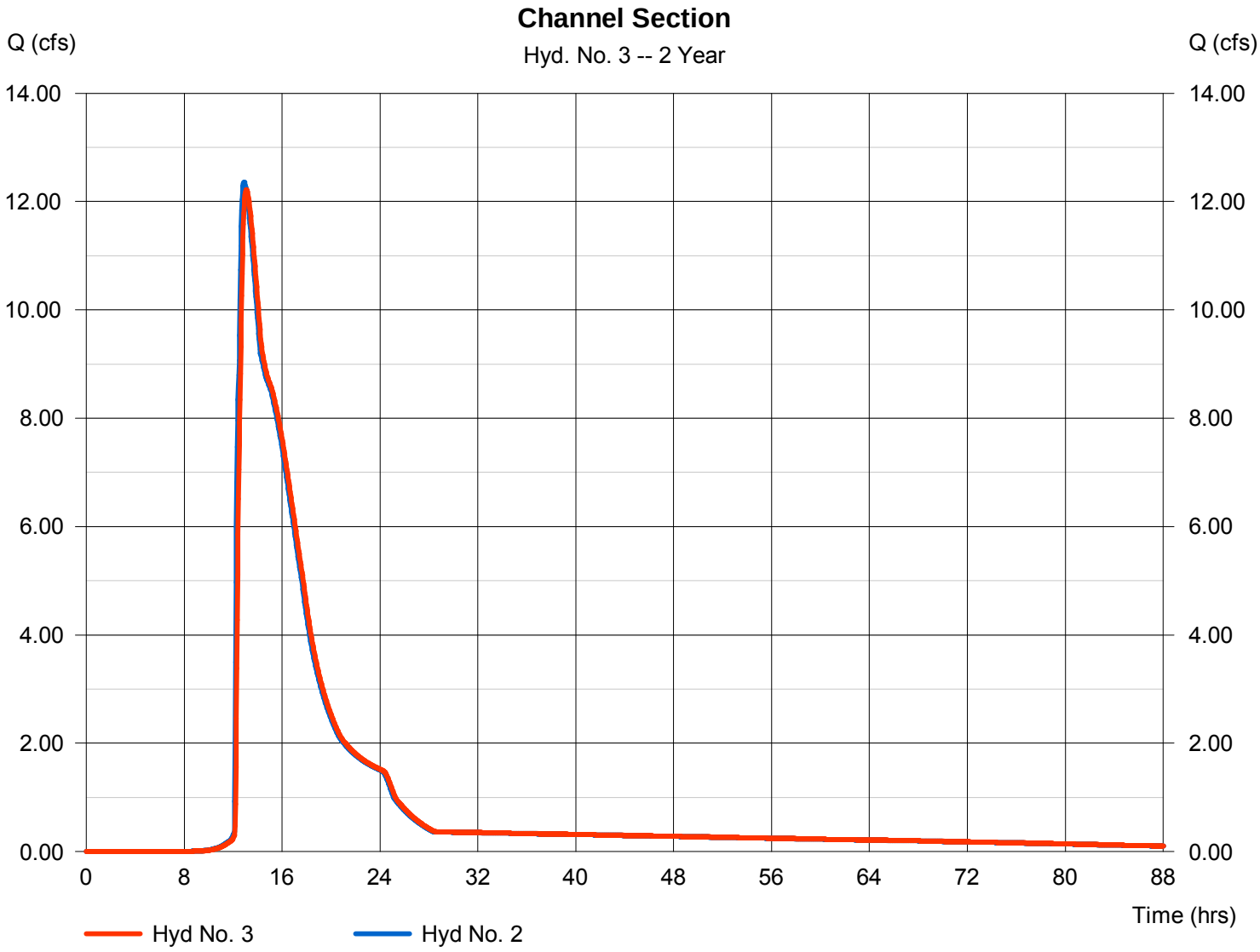
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	= Reach	Peak discharge	= 12.22 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.07 hrs
Time interval	= 2 min	Hyd. volume	= 290,709 cuft
Inflow hyd. No.	= 2 - Reserve B West	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.020	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 5.0 ft
Rating curve x	= 1.395	Rating curve m	= 1.341
Ave. velocity	= 2.43 ft/s	Routing coeff.	= 0.2614

Modified Att-Kin routing method used.

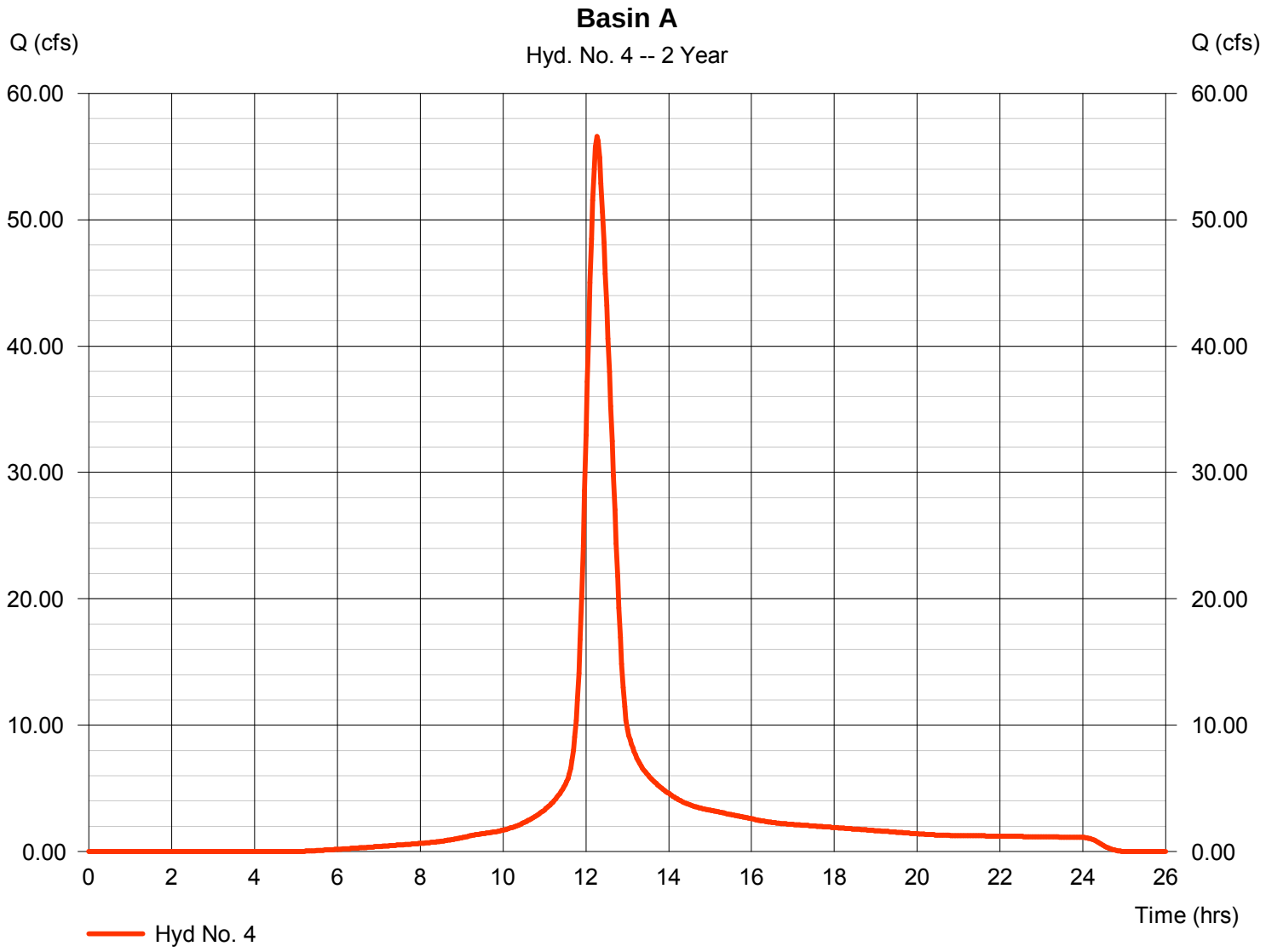


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 56.56 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 276,729 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

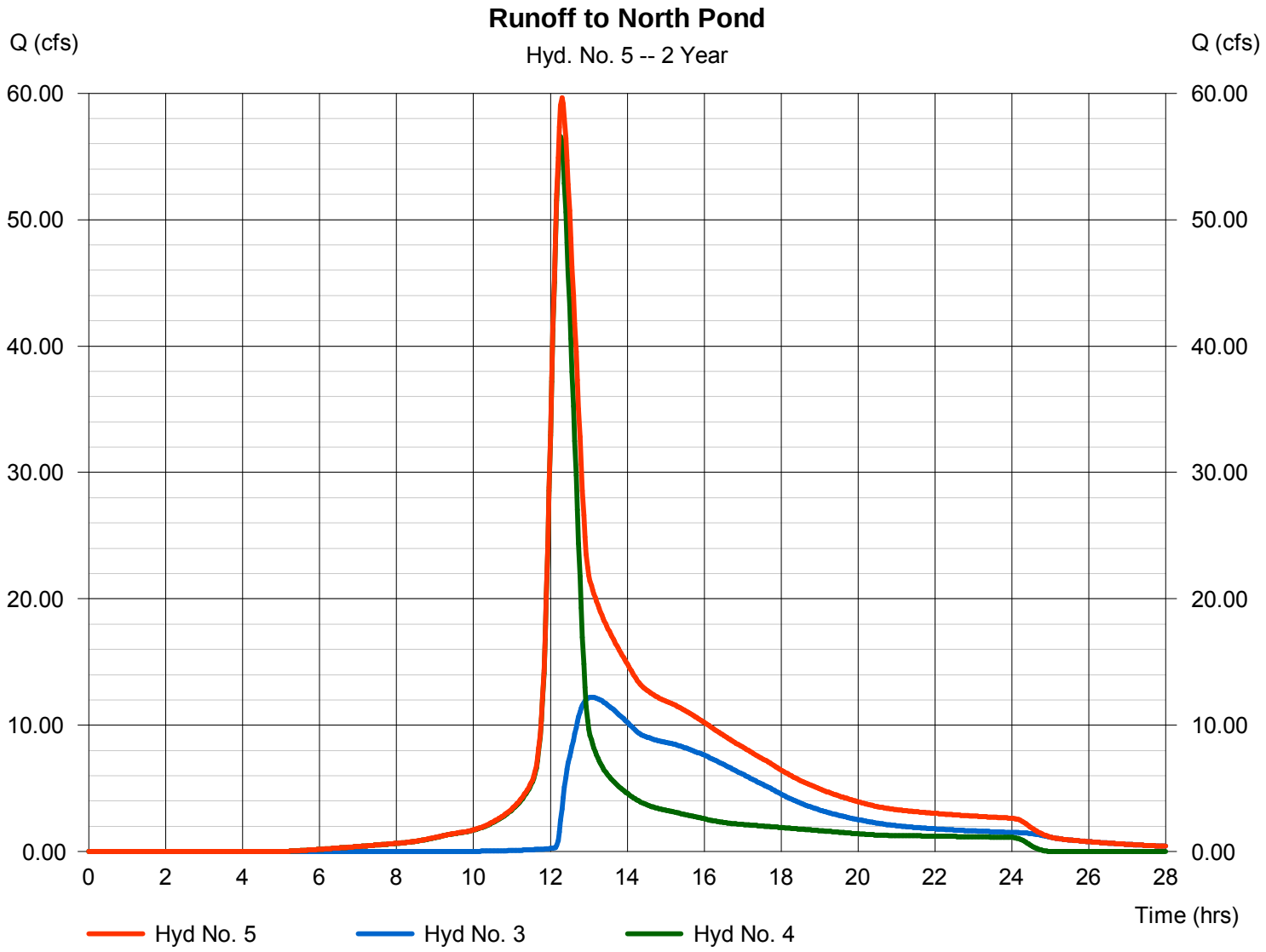


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 59.63 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 567,438 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



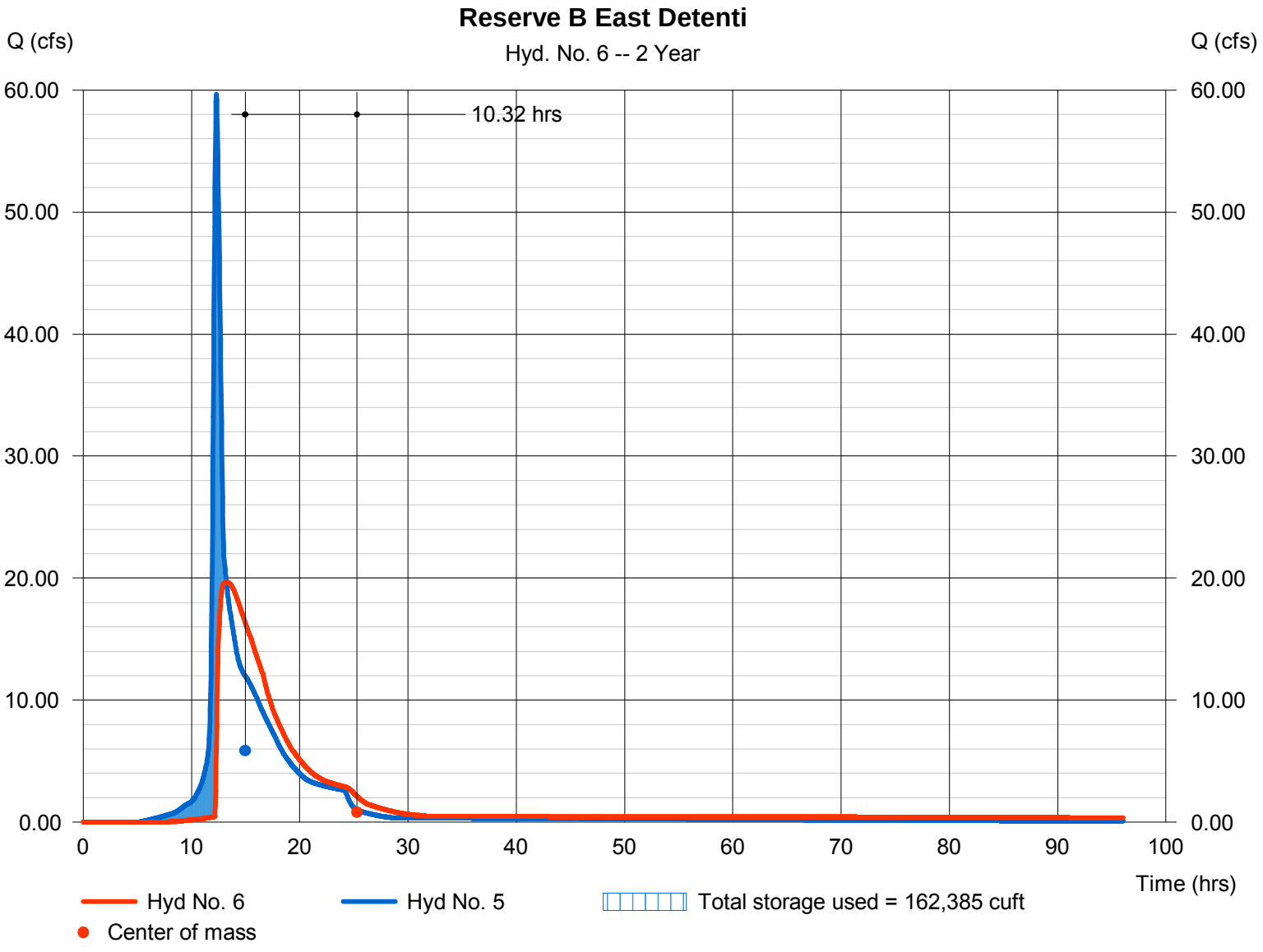
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	= Reservoir	Peak discharge	= 19.67 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.20 hrs
Time interval	= 2 min	Hyd. volume	= 544,518 cuft
Inflow hyd. No.	= 5 - Runoff to North Pond	Max. Elevation	= 1329.34 ft
Reservoir name	= Reserve B East Detention	Max. Storage	= 162,385 cuft

Storage Indication method used.

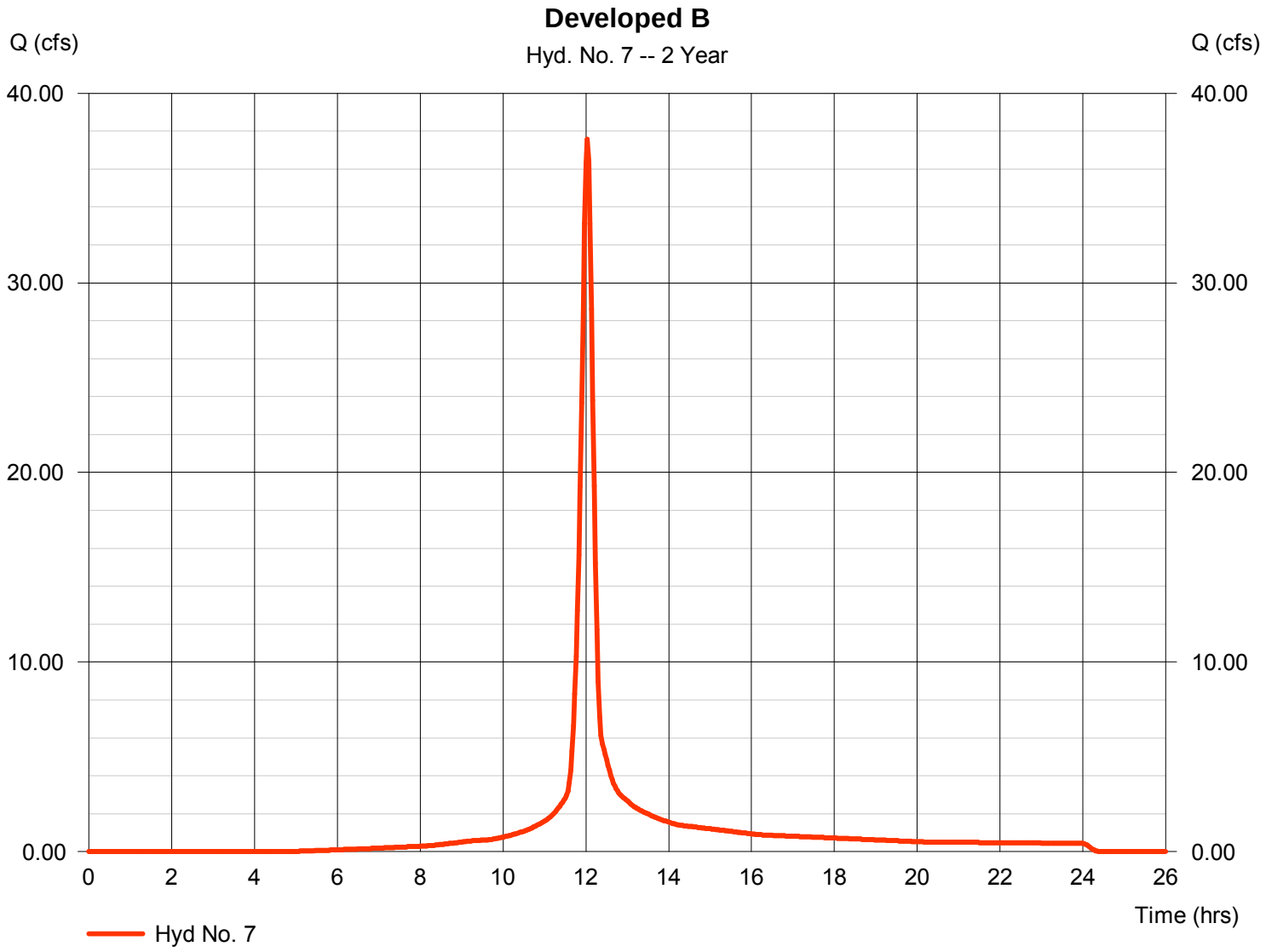


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 37.58 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 107,924 cuft
Drainage area	= 12.000 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



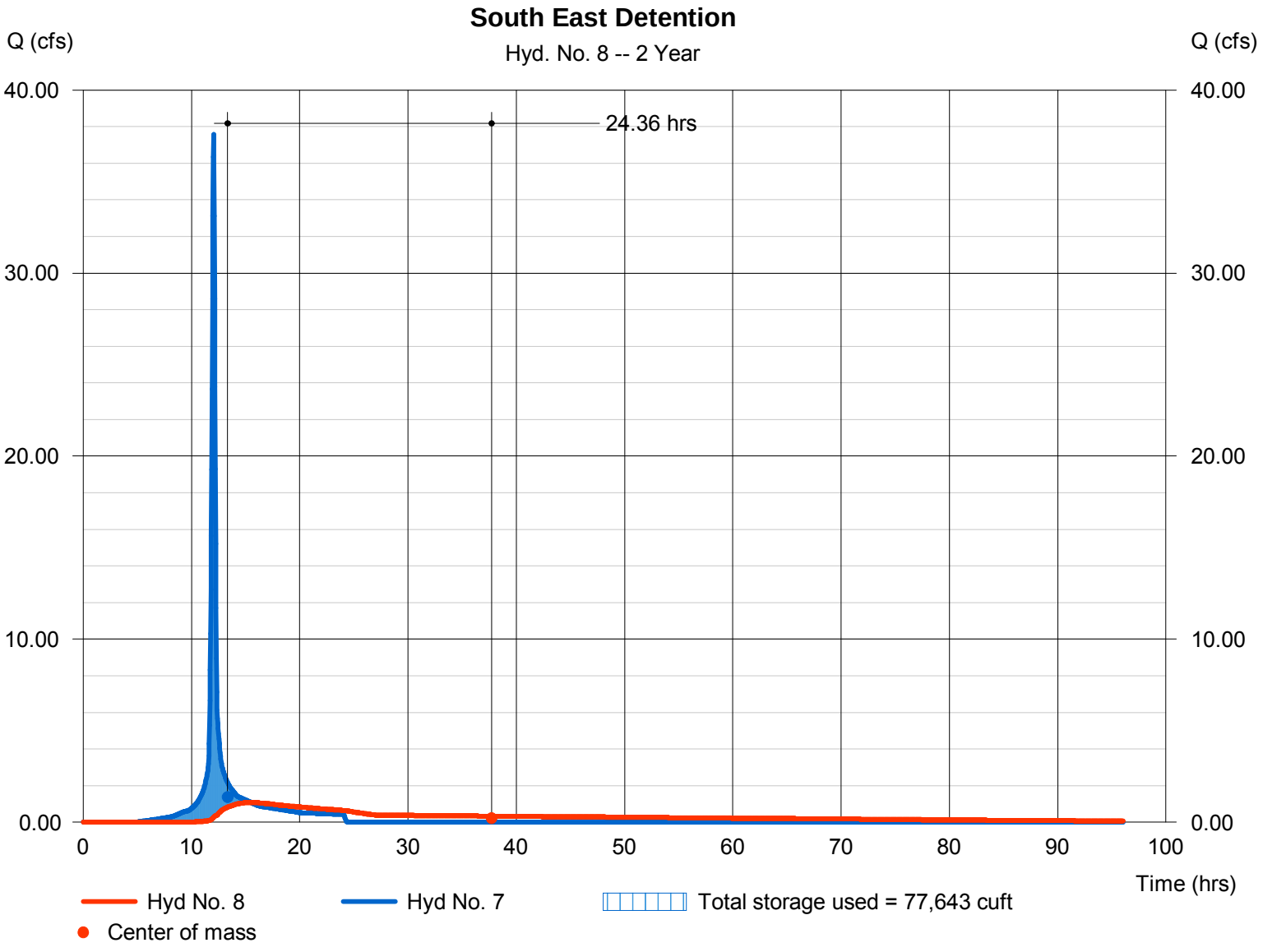
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	= Reservoir	Peak discharge	= 1.077 cfs
Storm frequency	= 2 yrs	Time to peak	= 15.47 hrs
Time interval	= 2 min	Hyd. volume	= 96,542 cuft
Inflow hyd. No.	= 7 - Developed B	Max. Elevation	= 1328.12 ft
Reservoir name	= Reserve A Detention	Max. Storage	= 77,643 cuft

Storage Indication method used.

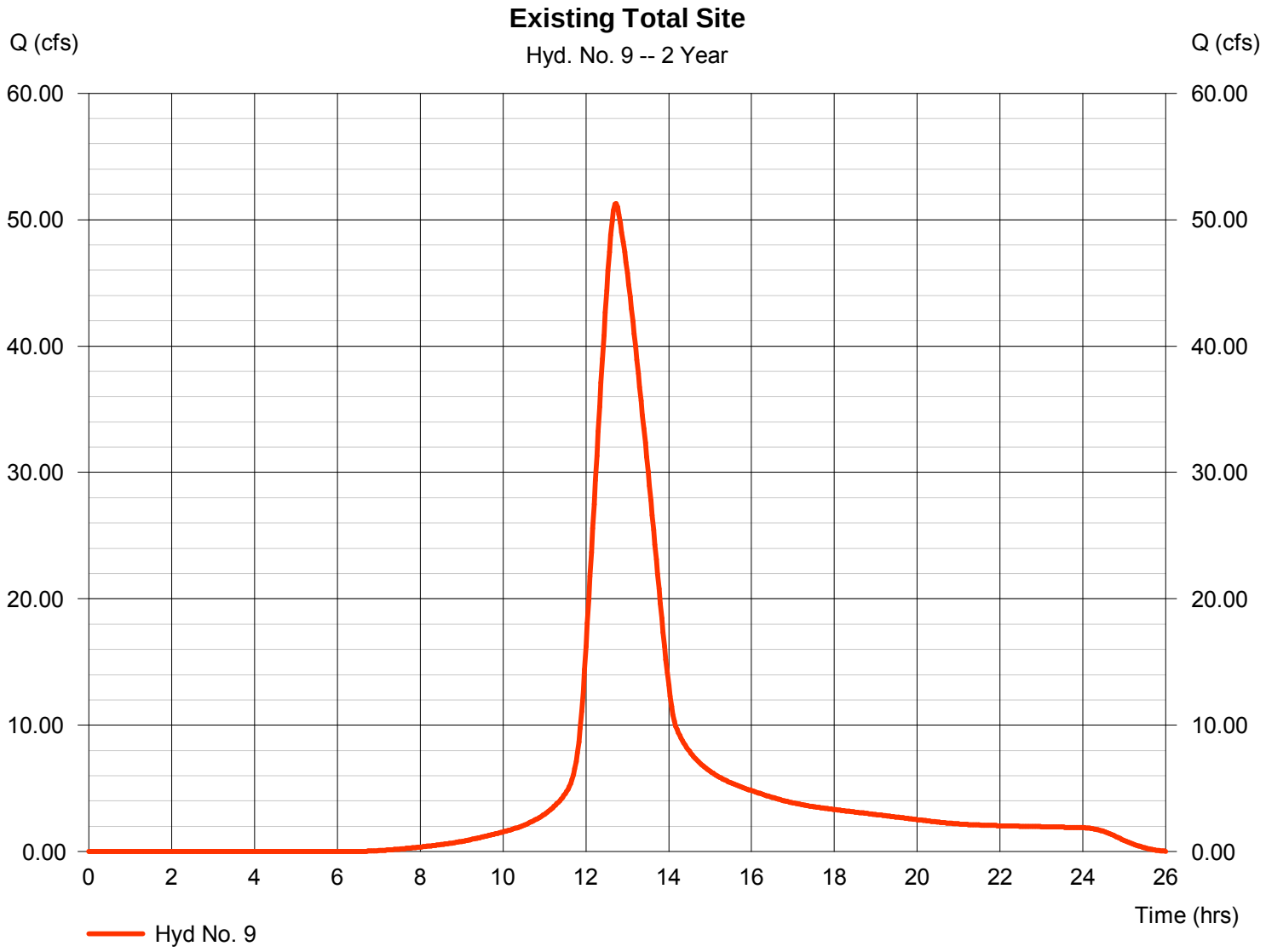


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	= SCS Runoff	Peak discharge	= 51.29 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 422,100 cuft
Drainage area	= 51.000 ac	Curve number	= 88
Basin Slope	= 0.4 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 82.10 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

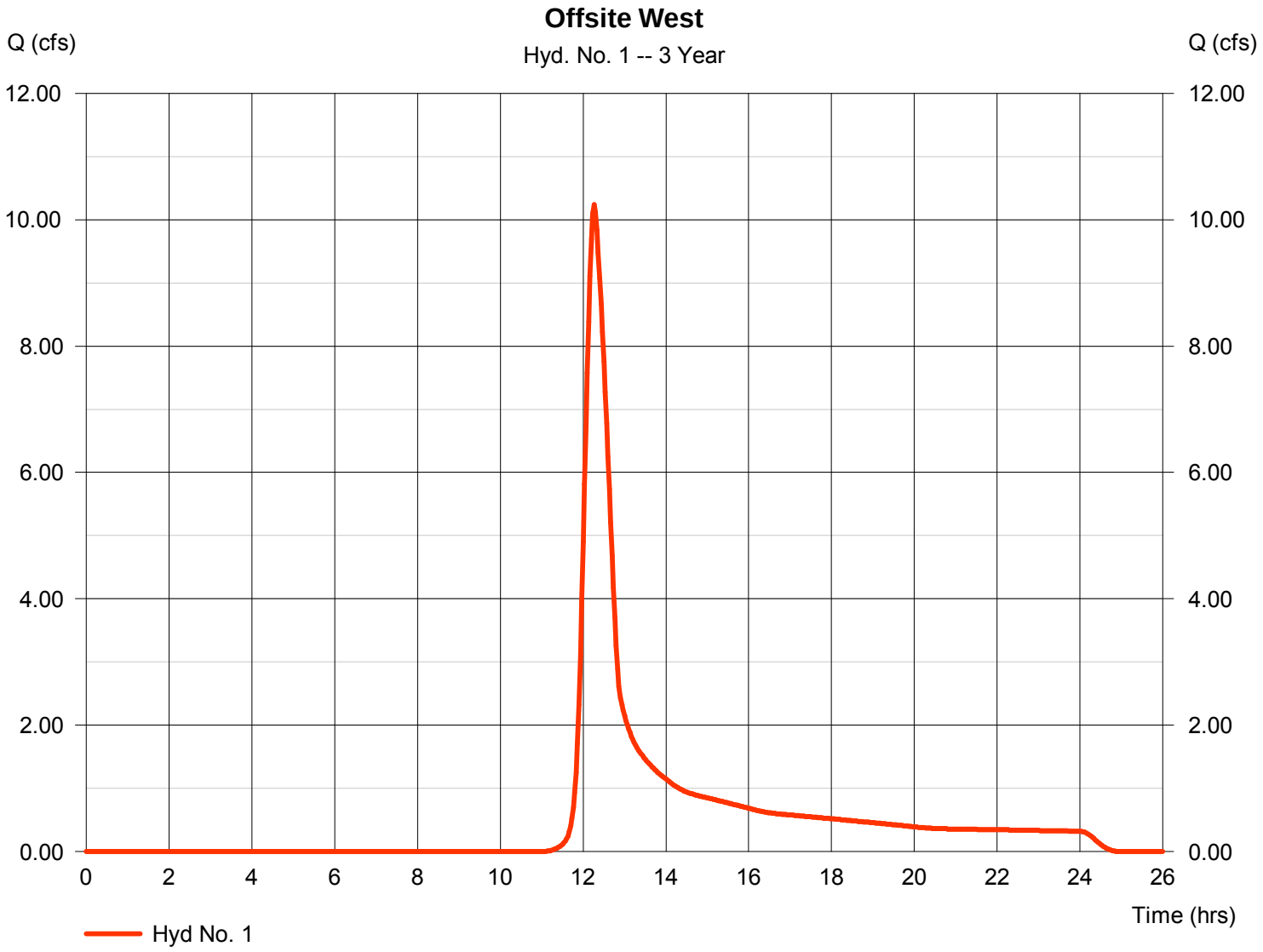
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.24	2	736	50,241	------	------	------	Offsite West
2	Reservoir	0.264	2	1454	42,390	1	1334.60	39,614	Reserve B West
3	Reach	0.264	2	1466	42,353	2	------	------	Channel Section
4	SCS Runoff	11.05	2	738	54,931	------	------	------	Basin A
5	Combine	11.07	2	738	97,284	3, 4	------	------	Runoff to North Pond
6	Reservoir	0.422	2	1466	92,455	5	1328.22	47,138	Reserve B East Detenti
7	SCS Runoff	7.548	2	722	21,423	------	------	------	Developed B
8	Reservoir	0.123	2	1384	16,665	7	1327.26	16,619	South East Detention
9	SCS Runoff	7.621	2	766	69,831	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 10.24 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 50,241 cuft
Drainage area	= 37.300 ac	Curve number	= 88
Basin Slope	= 0.7 %	Hydraulic length	= 1300 ft
Tc method	= LAG	Time of conc. (Tc)	= 35.60 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



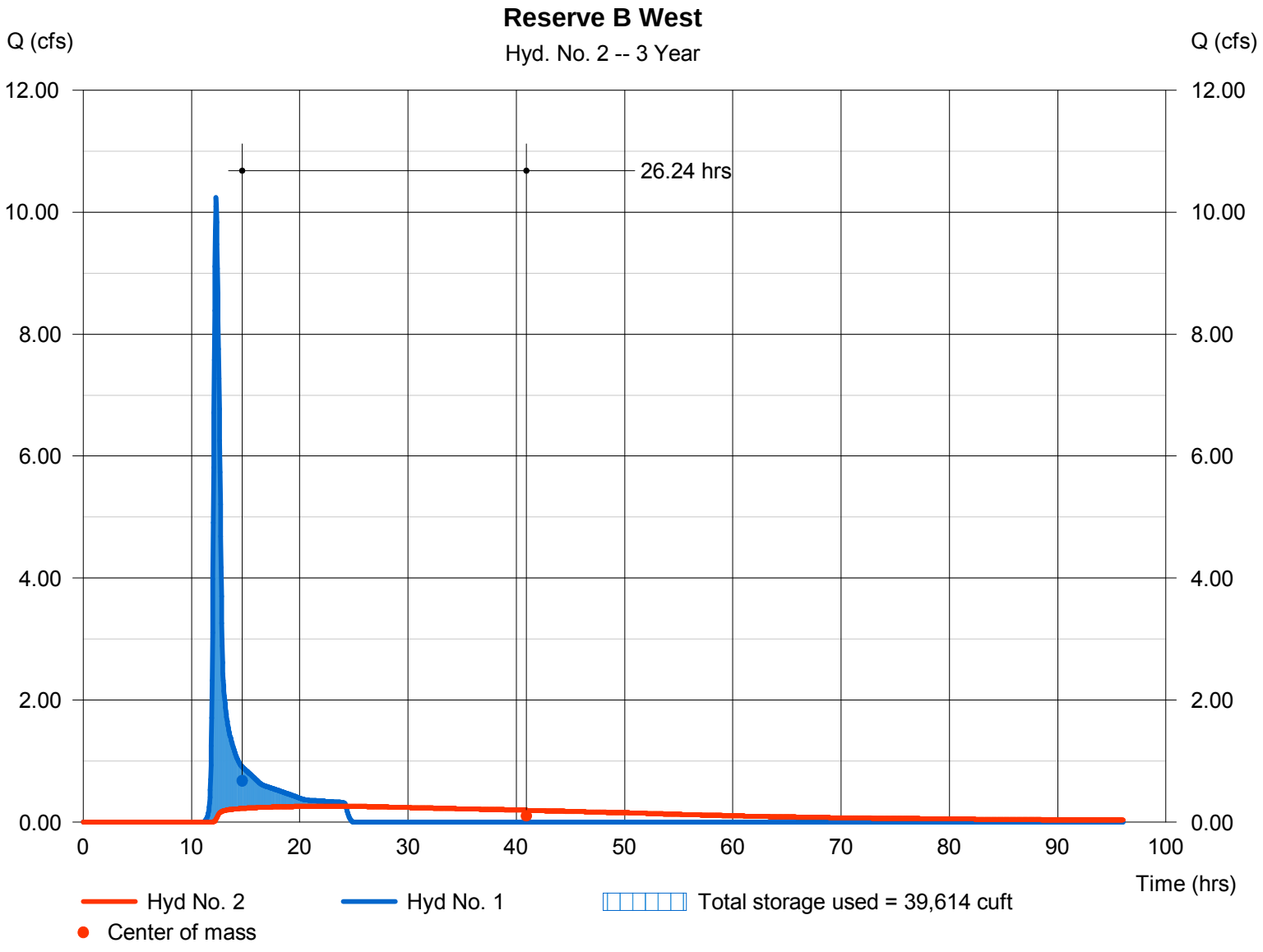
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	= Reservoir	Peak discharge	= 0.264 cfs
Storm frequency	= 3 yrs	Time to peak	= 24.23 hrs
Time interval	= 2 min	Hyd. volume	= 42,390 cuft
Inflow hyd. No.	= 1 - Offsite West	Max. Elevation	= 1334.60 ft
Reservoir name	= Reserve B West Detention	Max. Storage	= 39,614 cuft

Storage Indication method used.



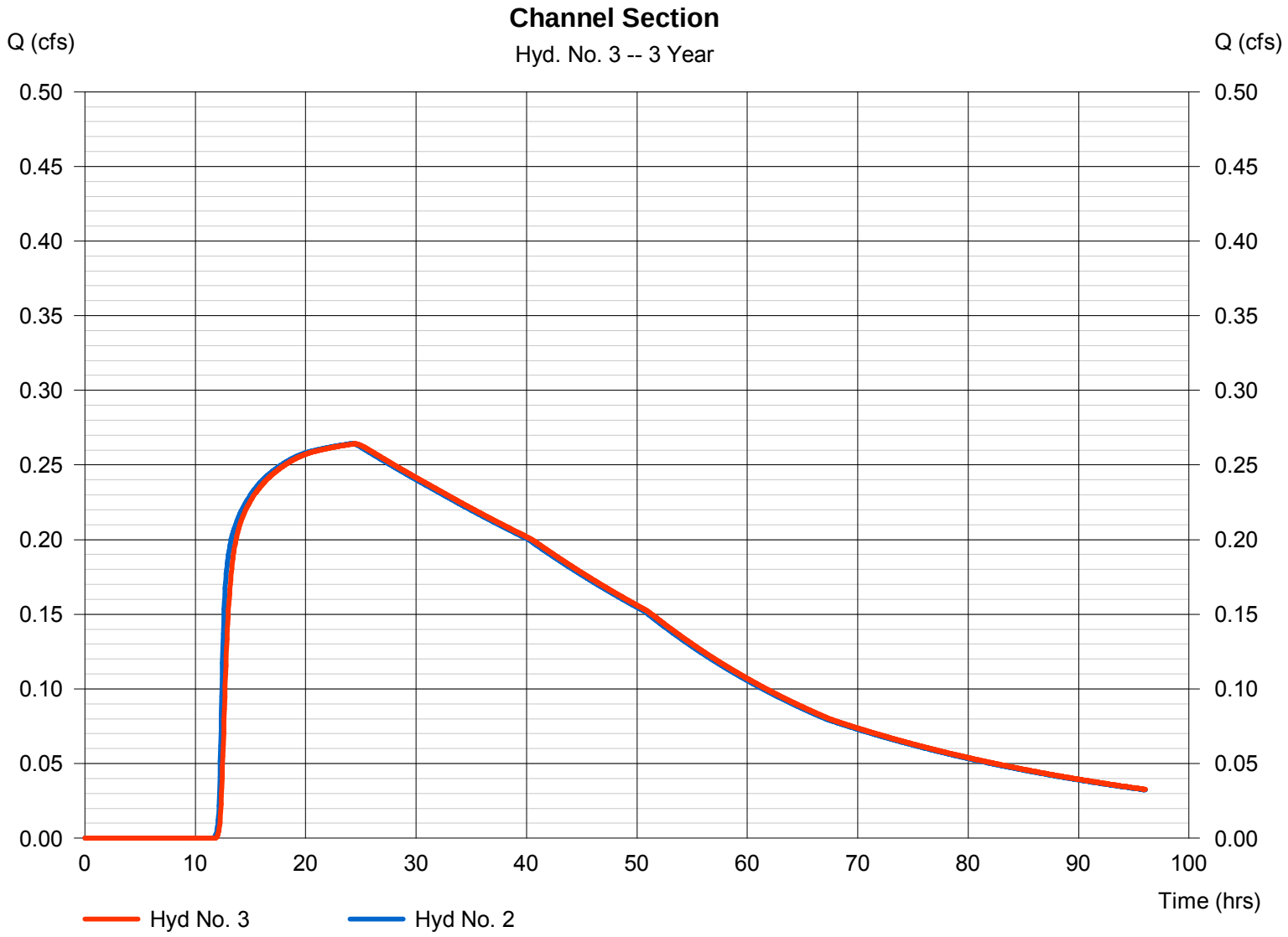
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	= Reach	Peak discharge	= 0.264 cfs
Storm frequency	= 3 yrs	Time to peak	= 24.43 hrs
Time interval	= 2 min	Hyd. volume	= 42,353 cuft
Inflow hyd. No.	= 2 - Reserve B West	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.020	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 5.0 ft
Rating curve x	= 1.395	Rating curve m	= 1.341
Ave. velocity	= 0.91 ft/s	Routing coeff.	= 0.1070

Modified Att-Kin routing method used.

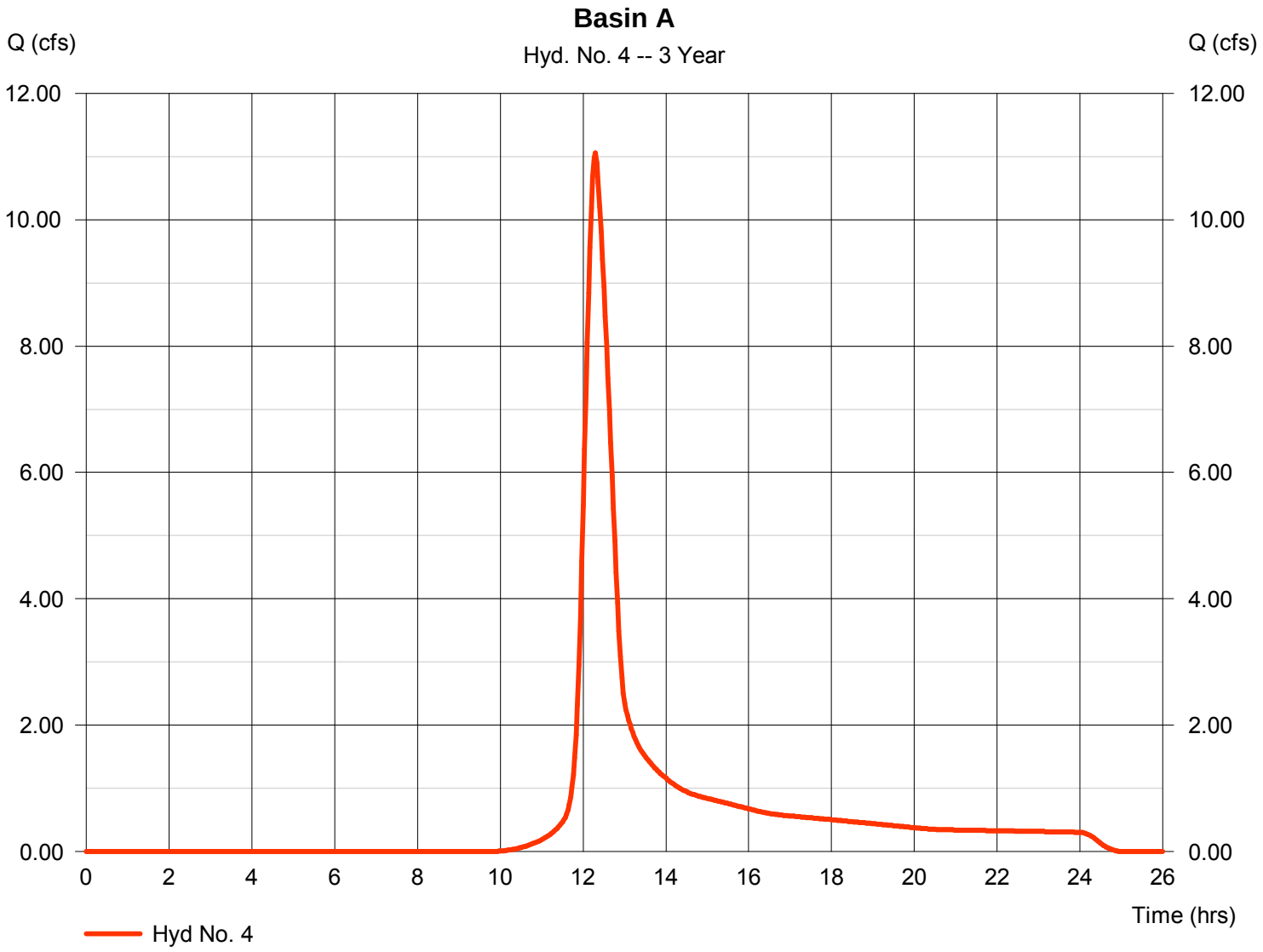


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 11.05 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 54,931 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

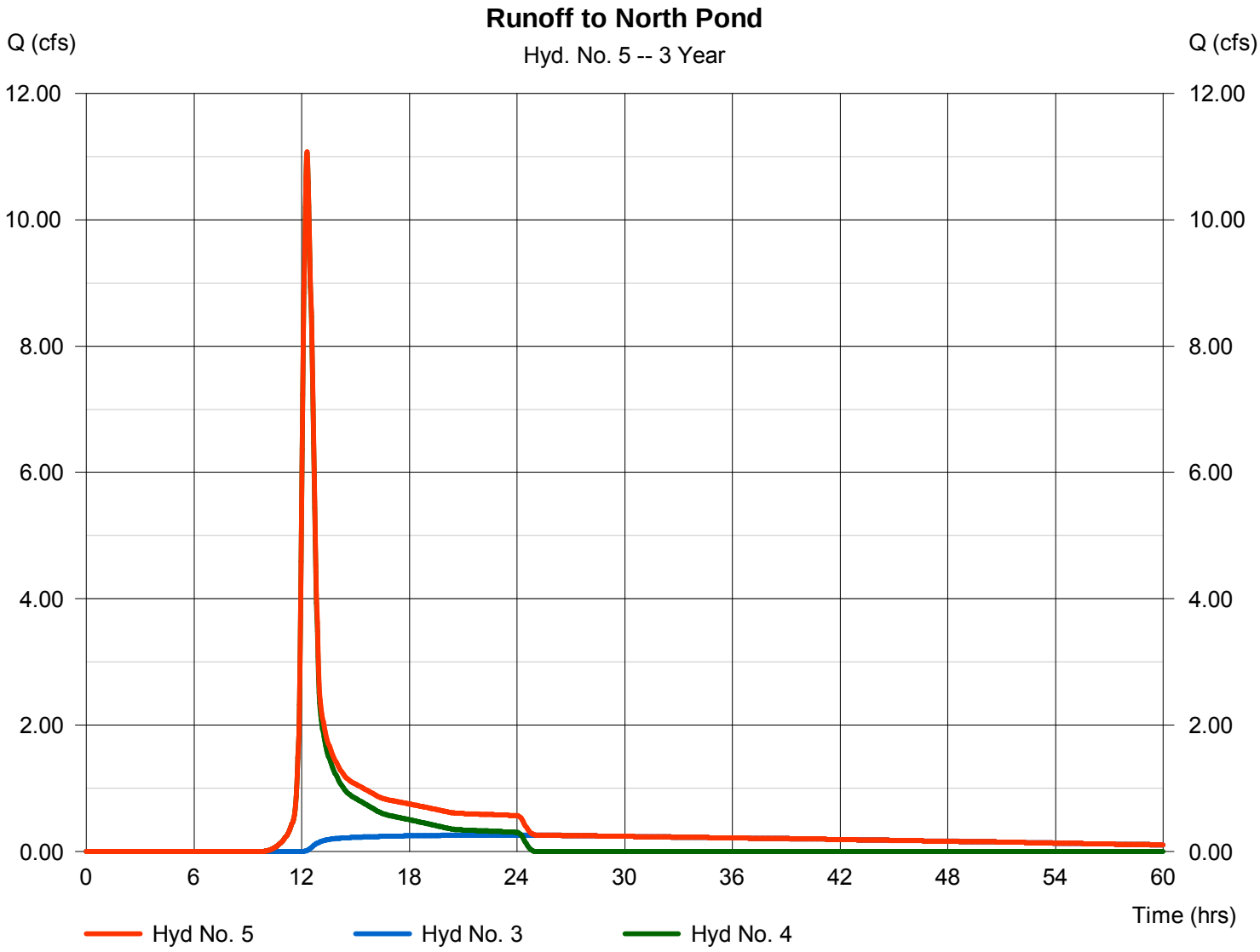


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 11.07 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 97,284 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



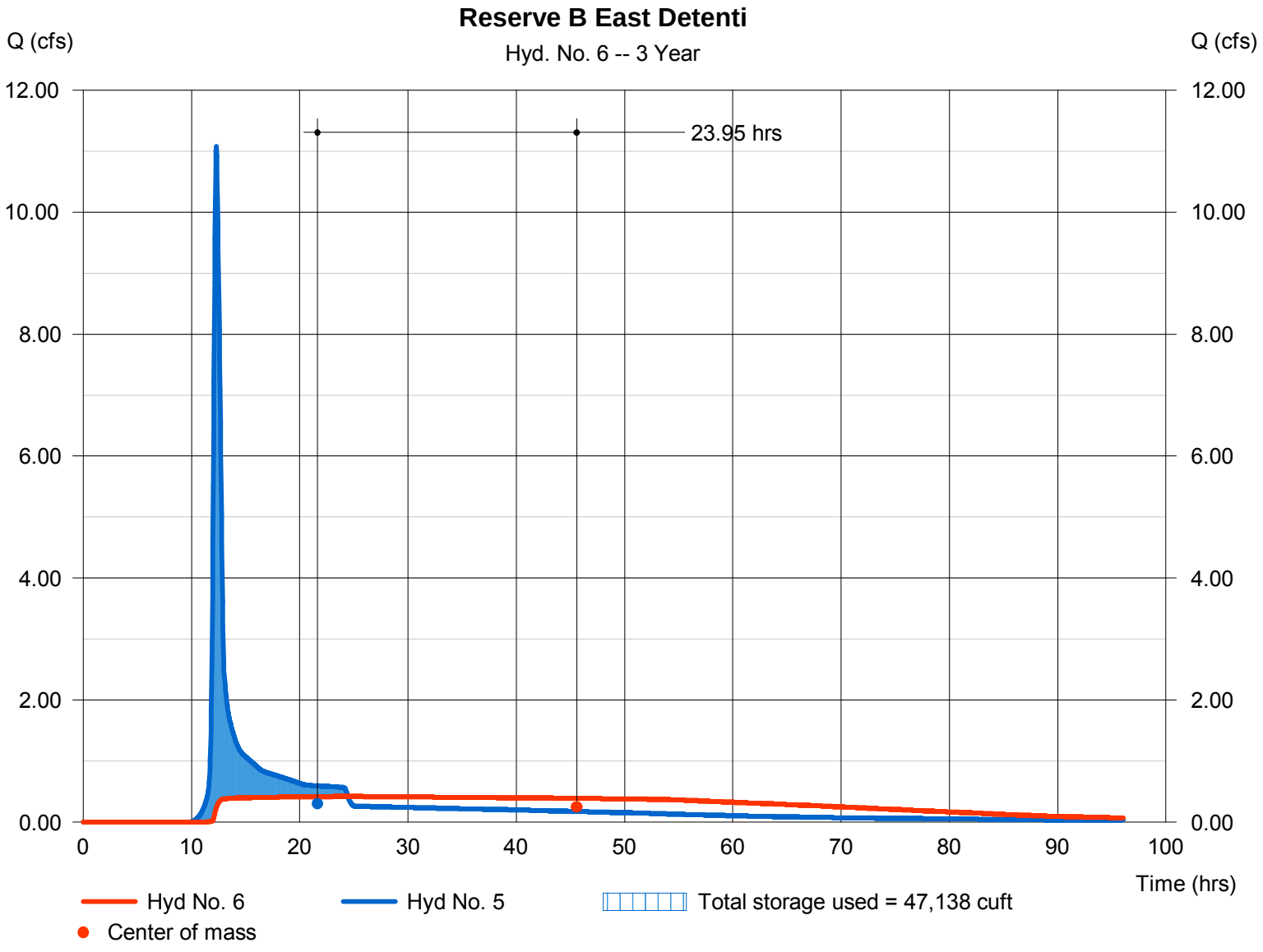
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	=	Reservoir	Peak discharge	=	0.422 cfs
Storm frequency	=	3 yrs	Time to peak	=	24.43 hrs
Time interval	=	2 min	Hyd. volume	=	92,455 cuft
Inflow hyd. No.	=	5 - Runoff to North Pond	Max. Elevation	=	1328.22 ft
Reservoir name	=	Reserve B East Detention	Max. Storage	=	47,138 cuft

Storage Indication method used.

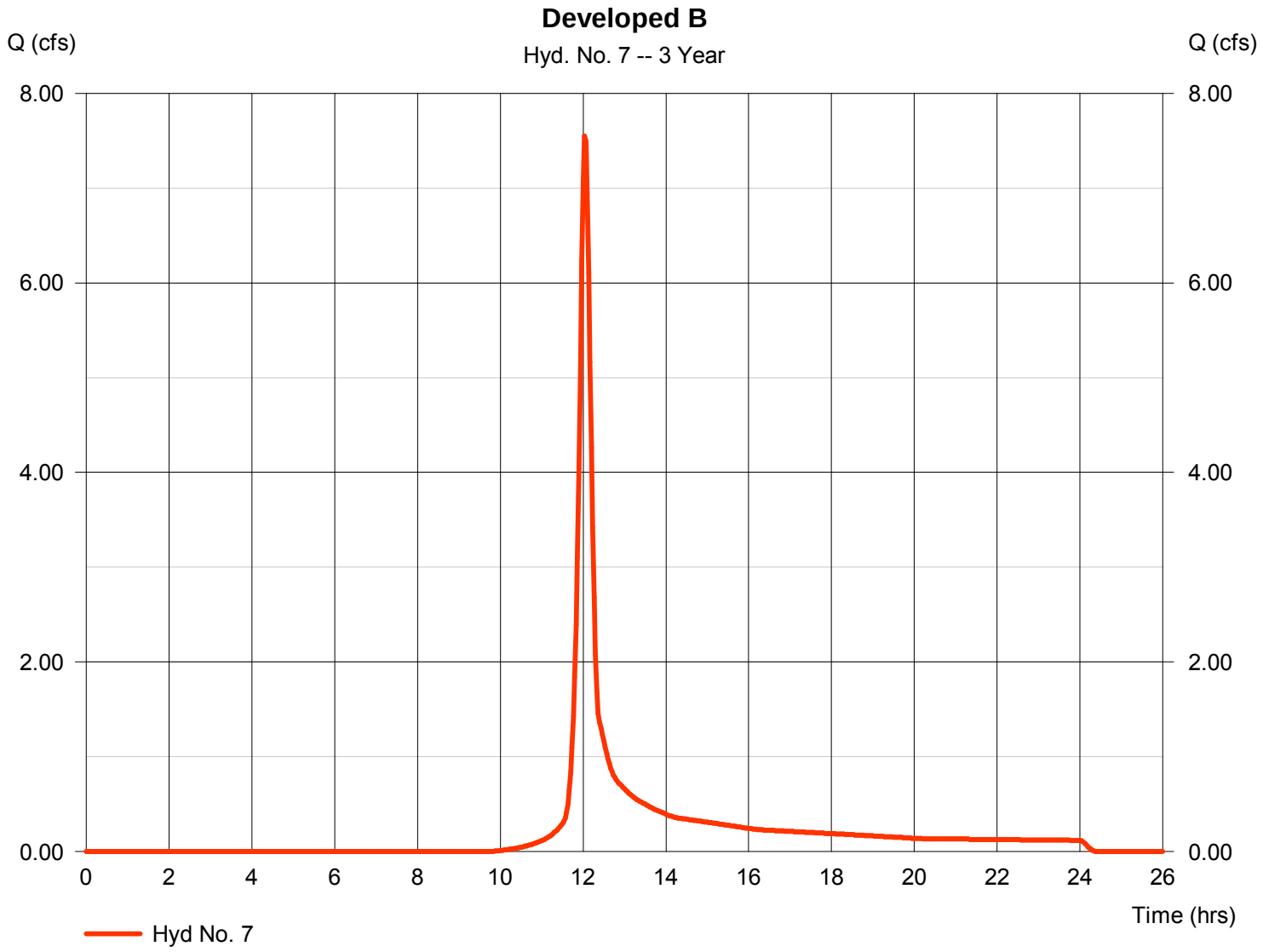


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 7.548 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 21,423 cuft
Drainage area	= 12.000 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



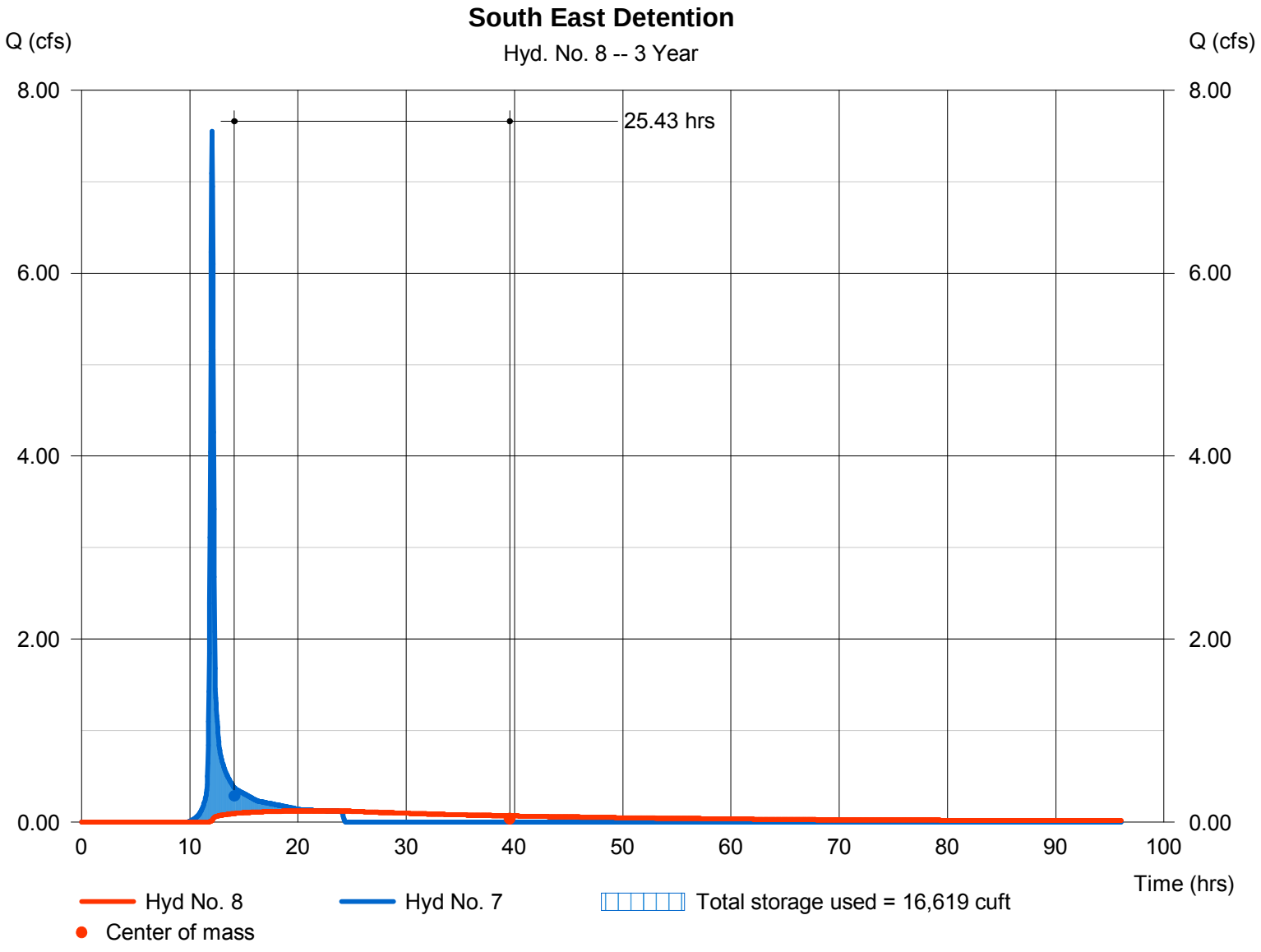
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	=	Reservoir	Peak discharge	=	0.123 cfs
Storm frequency	=	3 yrs	Time to peak	=	23.07 hrs
Time interval	=	2 min	Hyd. volume	=	16,665 cuft
Inflow hyd. No.	=	7 - Developed B	Max. Elevation	=	1327.26 ft
Reservoir name	=	Reserve A Detention	Max. Storage	=	16,619 cuft

Storage Indication method used.

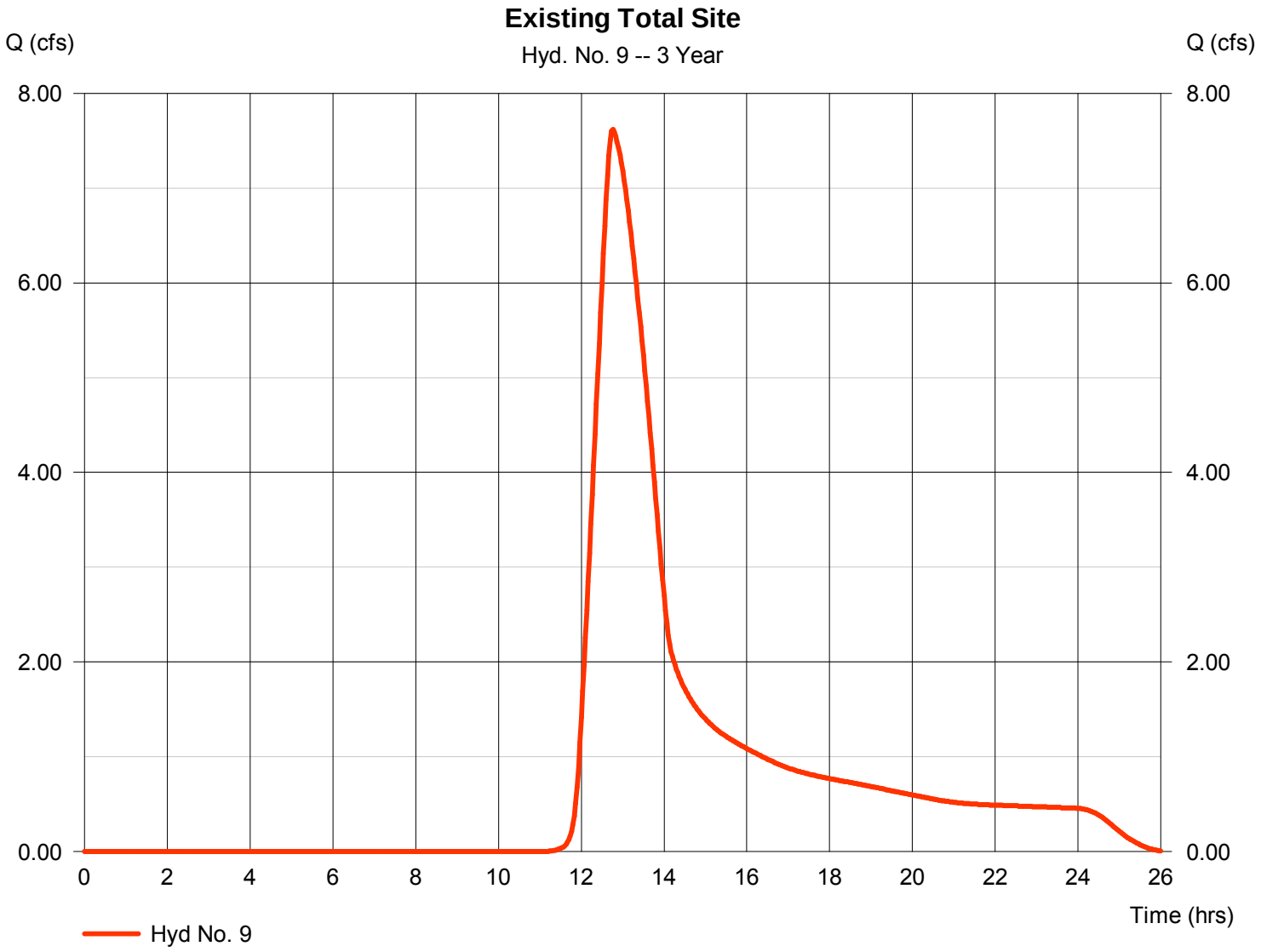


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	= SCS Runoff	Peak discharge	= 7.621 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.77 hrs
Time interval	= 2 min	Hyd. volume	= 69,831 cuft
Drainage area	= 51.000 ac	Curve number	= 88
Basin Slope	= 0.4 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 82.10 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

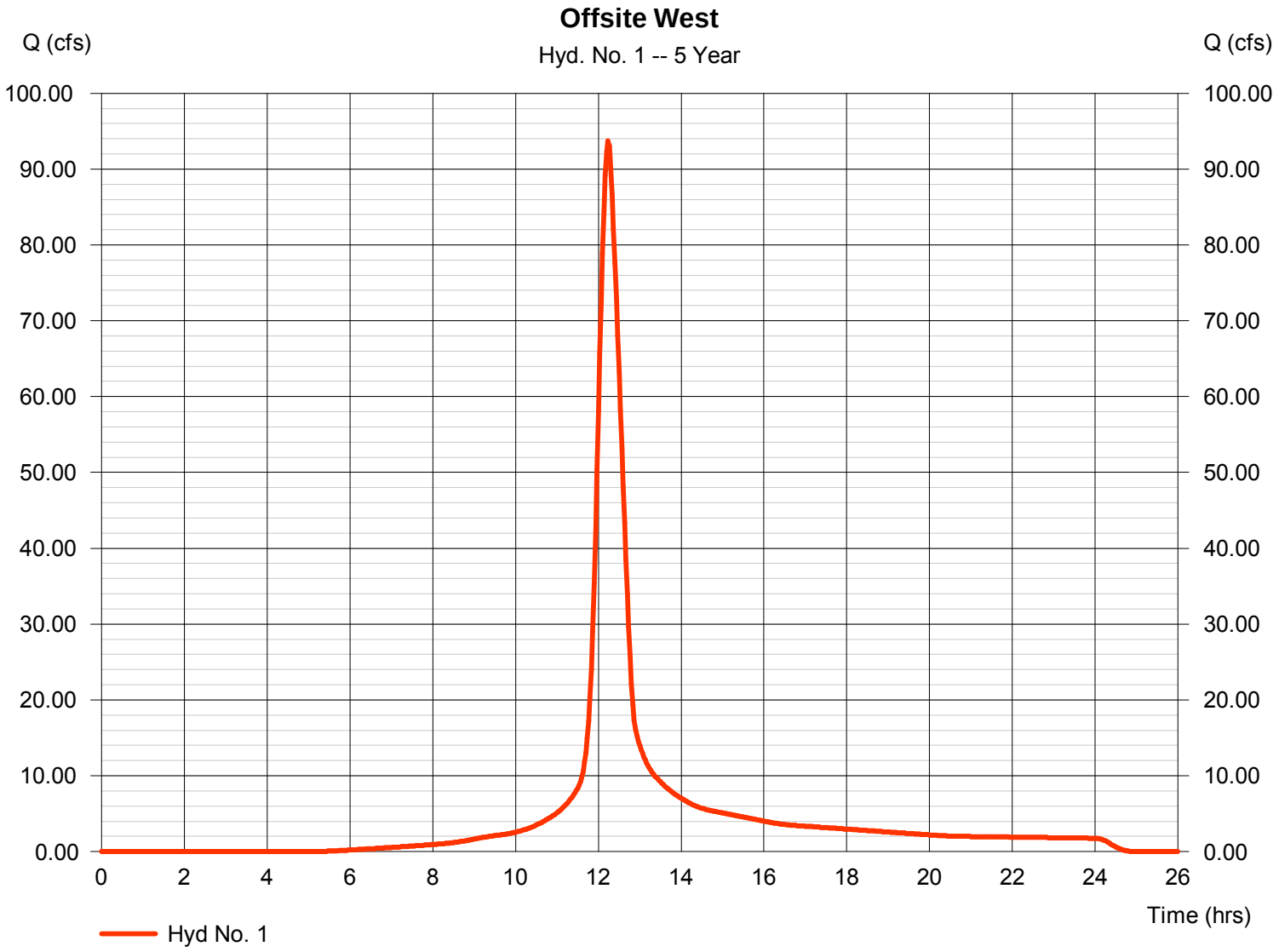
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	93.71	2	734	427,849	------	------	------	Offsite West
2	Reservoir	29.48	2	764	414,771	1	1337.04	219,867	Reserve B West
3	Reach	28.66	2	772	414,741	2	------	------	Channel Section
4	SCS Runoff	77.01	2	736	380,938	------	------	------	Basin A
5	Combine	84.62	2	738	795,680	3, 4	------	------	Runoff to North Pond
6	Reservoir	33.47	2	794	772,297	5	1329.94	240,398	Reserve B East Detenti
7	SCS Runoff	50.93	2	722	148,566	------	------	------	Developed B
8	Reservoir	2.932	2	798	136,835	7	1328.29	95,999	South East Detention
9	SCS Runoff	71.98	2	764	594,677	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 93.71 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 427,849 cuft
Drainage area	= 37.300 ac	Curve number	= 88
Basin Slope	= 0.7 %	Hydraulic length	= 1300 ft
Tc method	= LAG	Time of conc. (Tc)	= 35.60 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



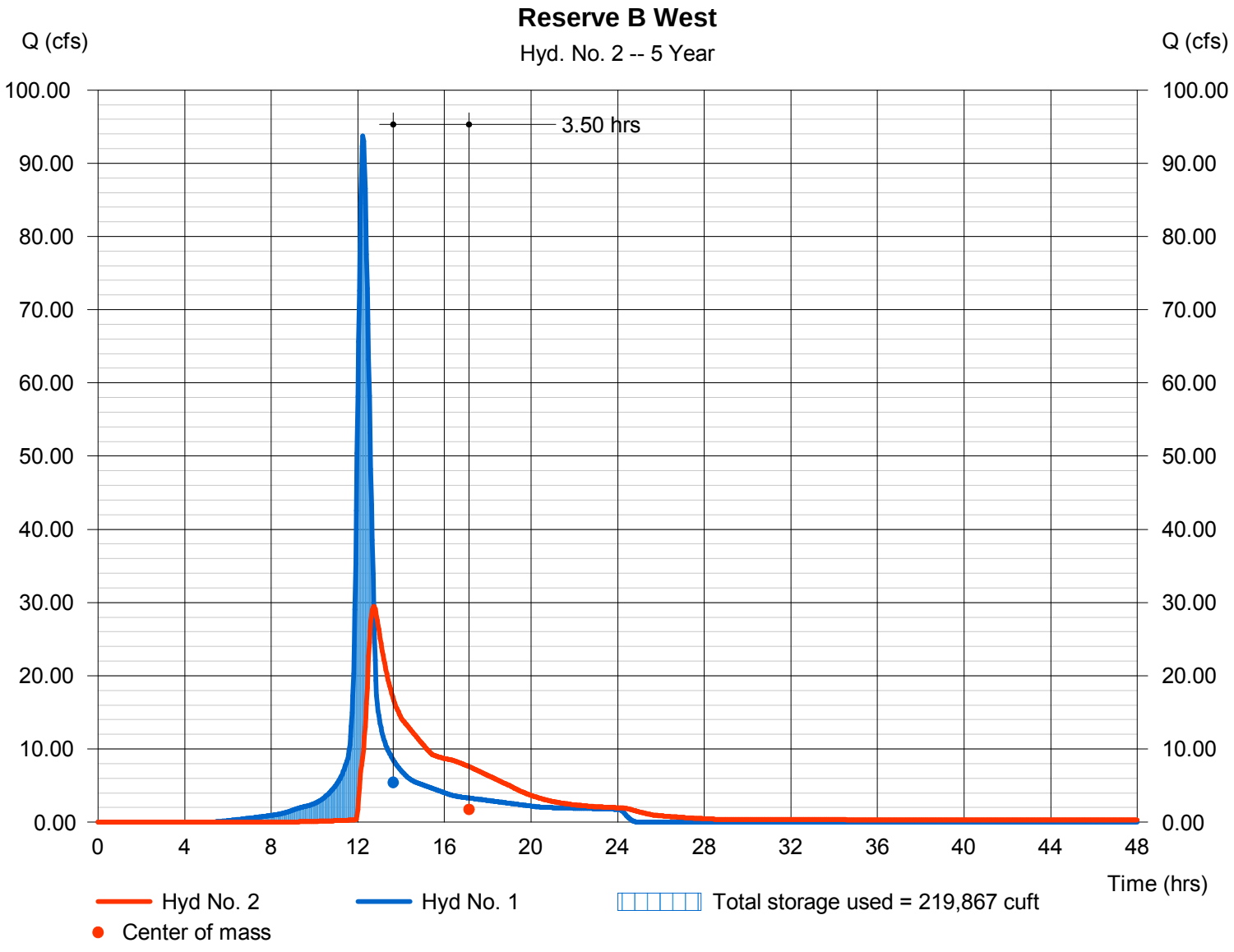
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	=	Reservoir	Peak discharge	=	29.48 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.73 hrs
Time interval	=	2 min	Hyd. volume	=	414,771 cuft
Inflow hyd. No.	=	1 - Offsite West	Max. Elevation	=	1337.04 ft
Reservoir name	=	Reserve B West Detention	Max. Storage	=	219,867 cuft

Storage Indication method used.



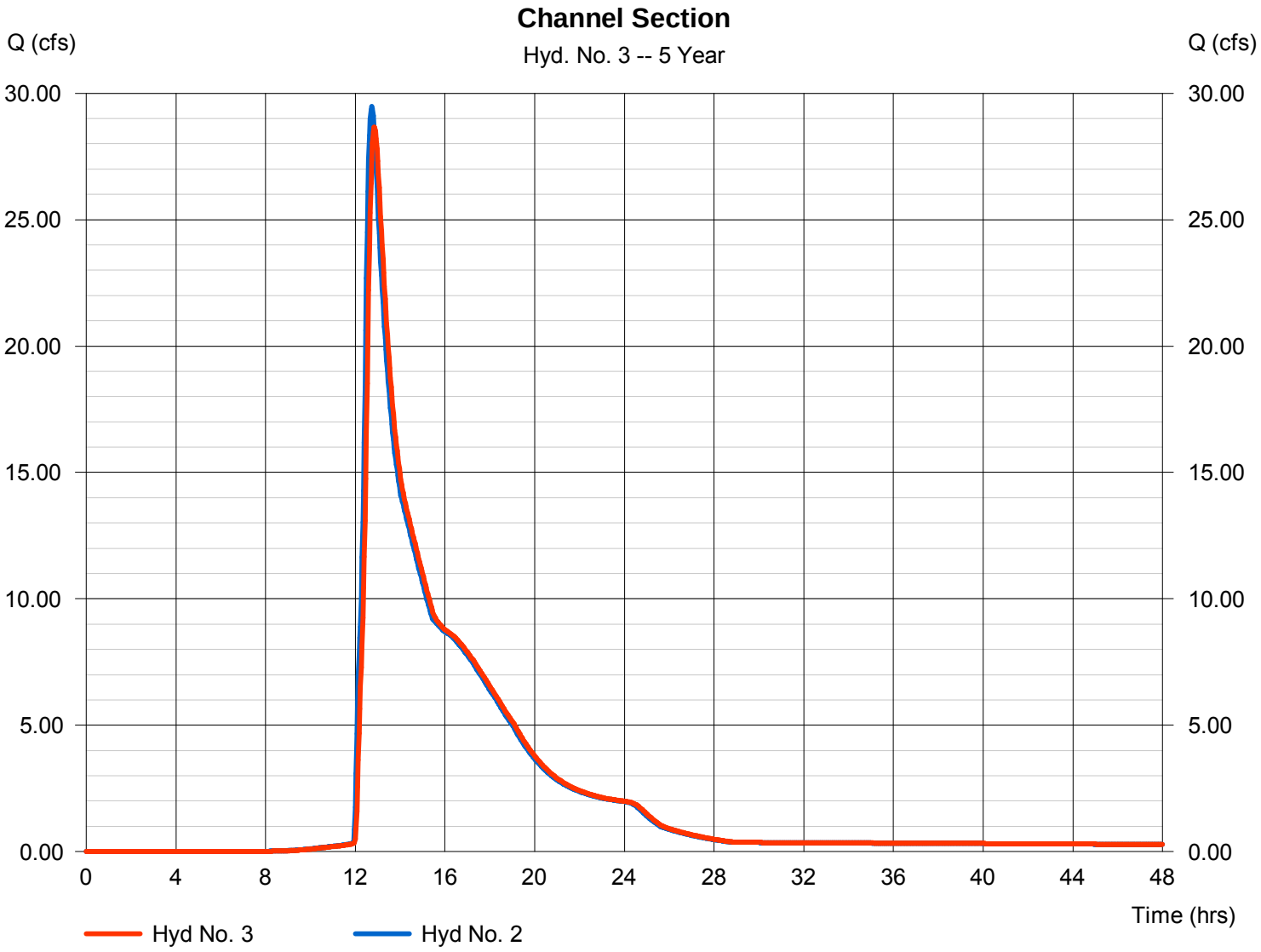
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	=	Reach	Peak discharge	=	28.66 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.87 hrs
Time interval	=	2 min	Hyd. volume	=	414,741 cuft
Inflow hyd. No.	=	2 - Reserve B West	Section type	=	Trapezoidal
Reach length	=	1300.0 ft	Channel slope	=	0.3 %
Manning's n	=	0.020	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	5.0 ft
Rating curve x	=	1.395	Rating curve m	=	1.341
Ave. velocity	=	3.03 ft/s	Routing coeff.	=	0.3159

Modified Att-Kin routing method used.

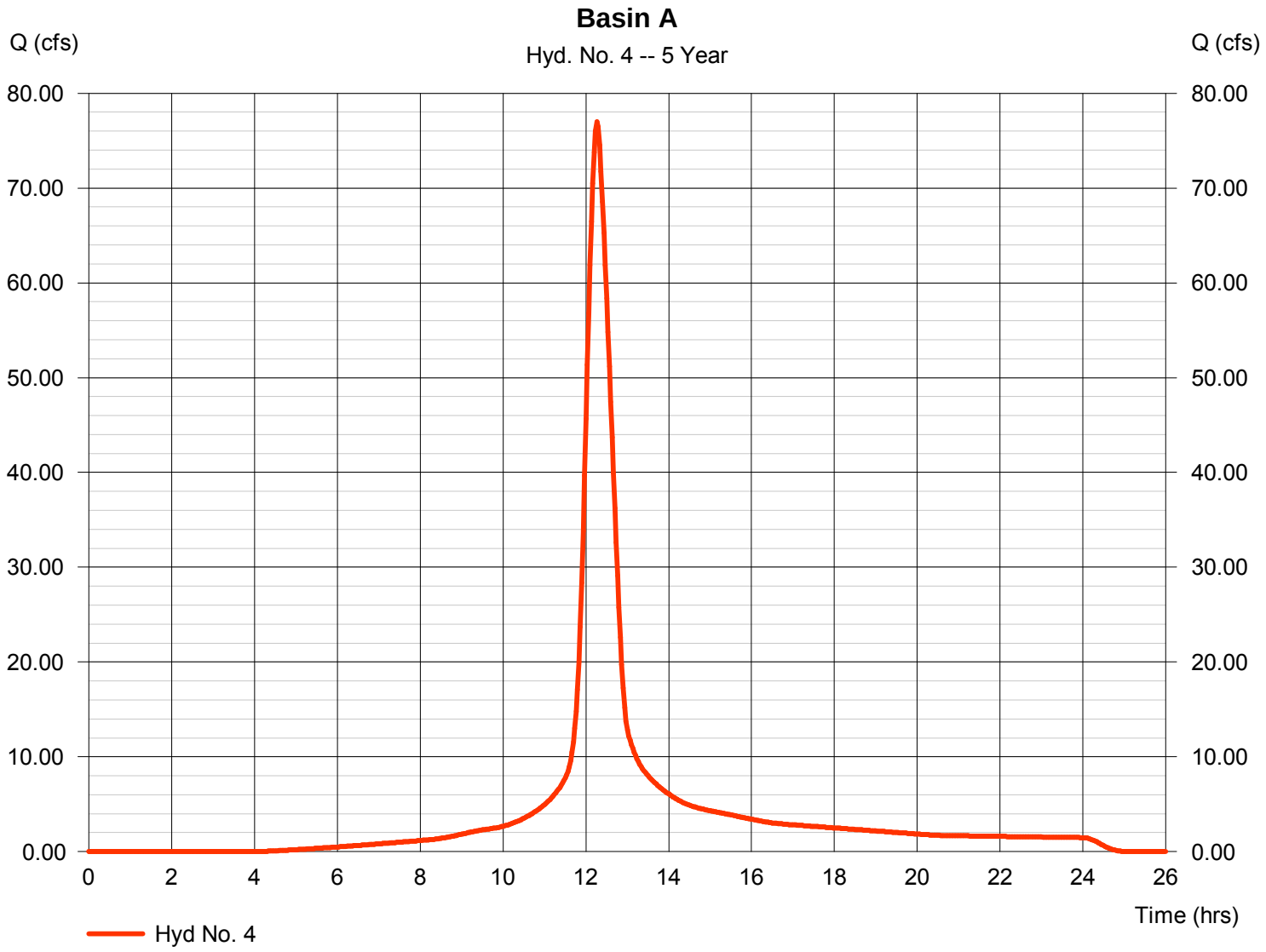


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 77.01 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 380,938 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

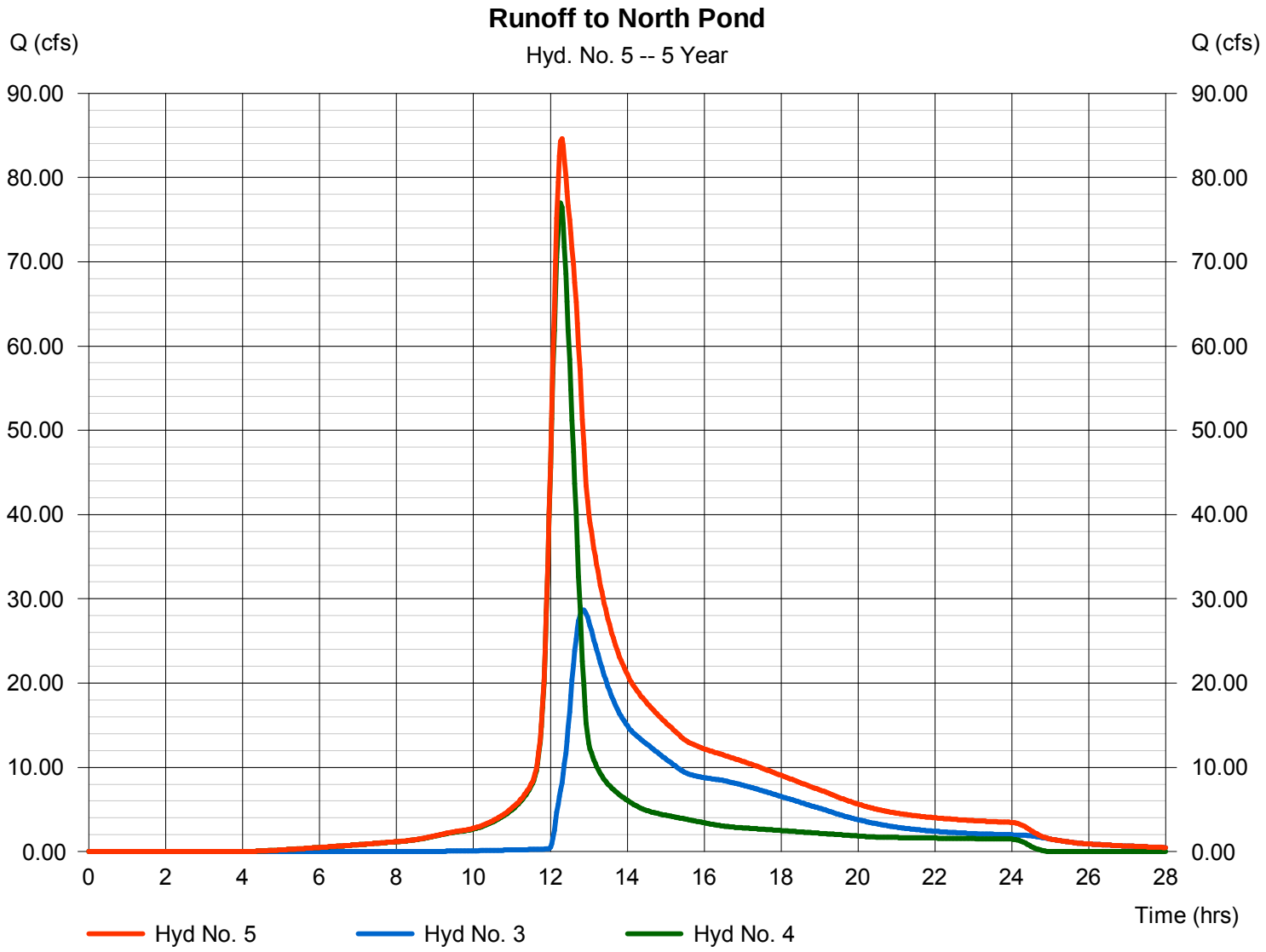


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 84.62 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 795,680 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



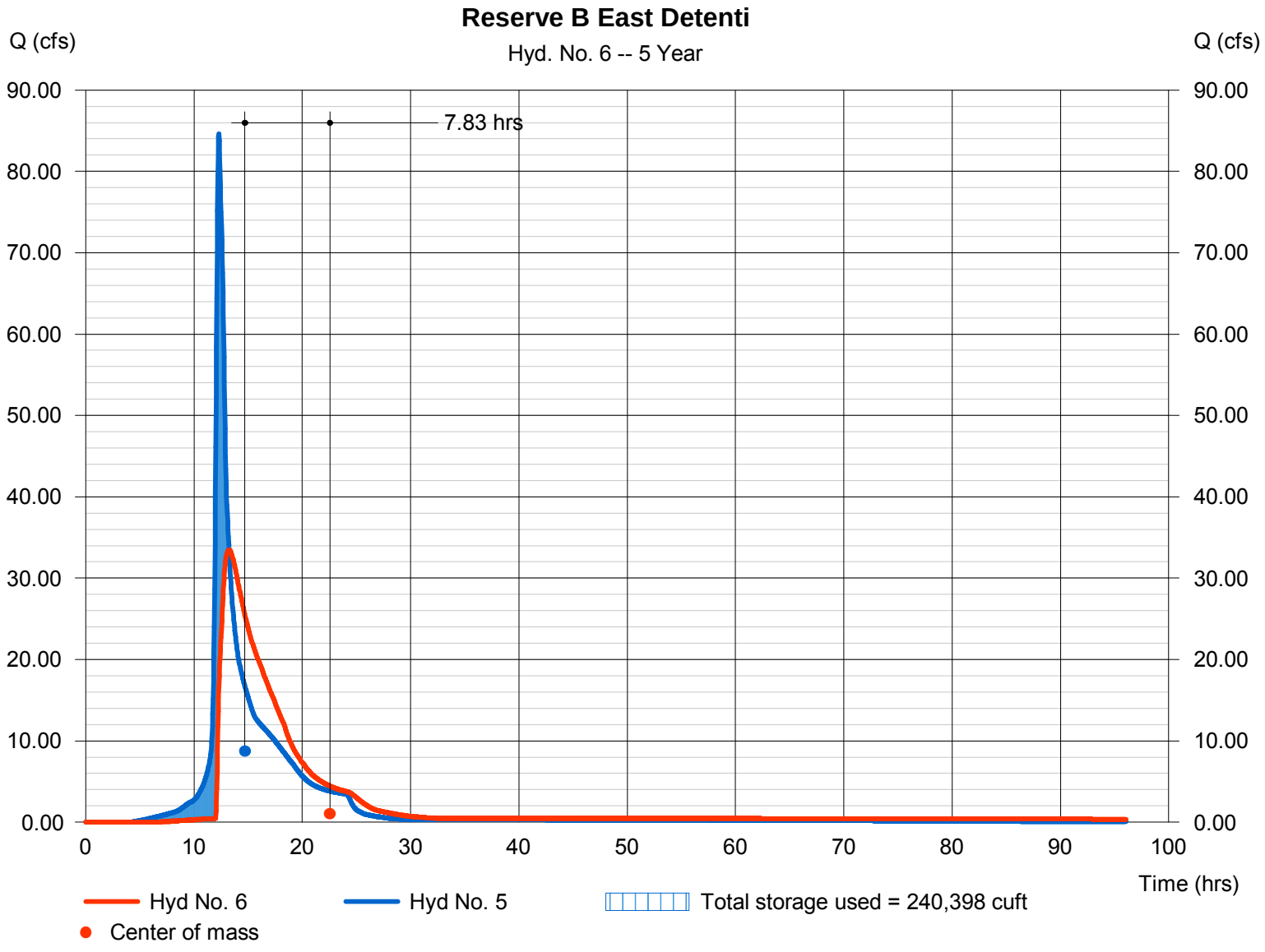
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	=	Reservoir	Peak discharge	=	33.47 cfs
Storm frequency	=	5 yrs	Time to peak	=	13.23 hrs
Time interval	=	2 min	Hyd. volume	=	772,297 cuft
Inflow hyd. No.	=	5 - Runoff to North Pond	Max. Elevation	=	1329.94 ft
Reservoir name	=	Reserve B East Detention	Max. Storage	=	240,398 cuft

Storage Indication method used.

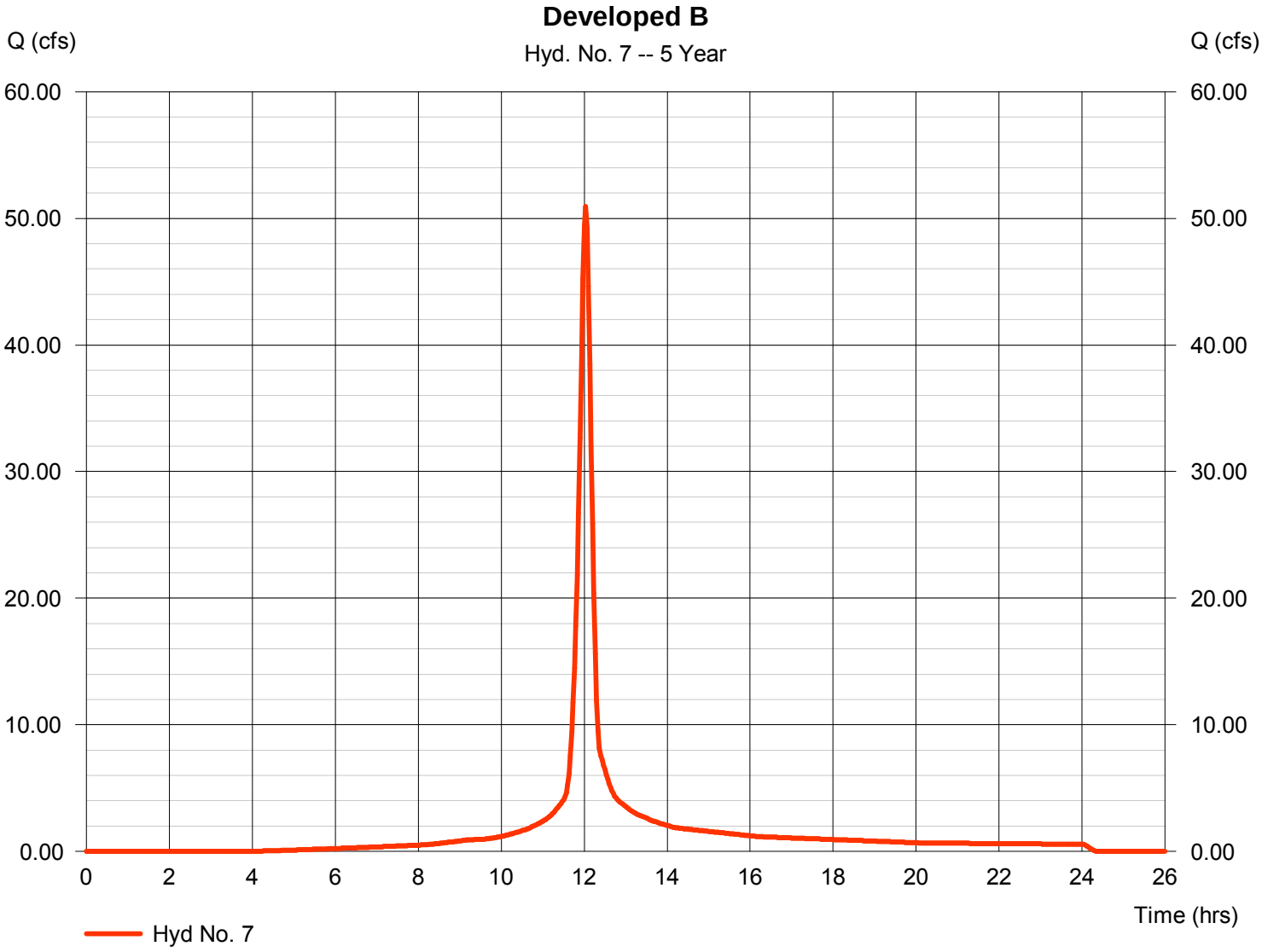


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 50.93 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 148,566 cuft
Drainage area	= 12.000 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



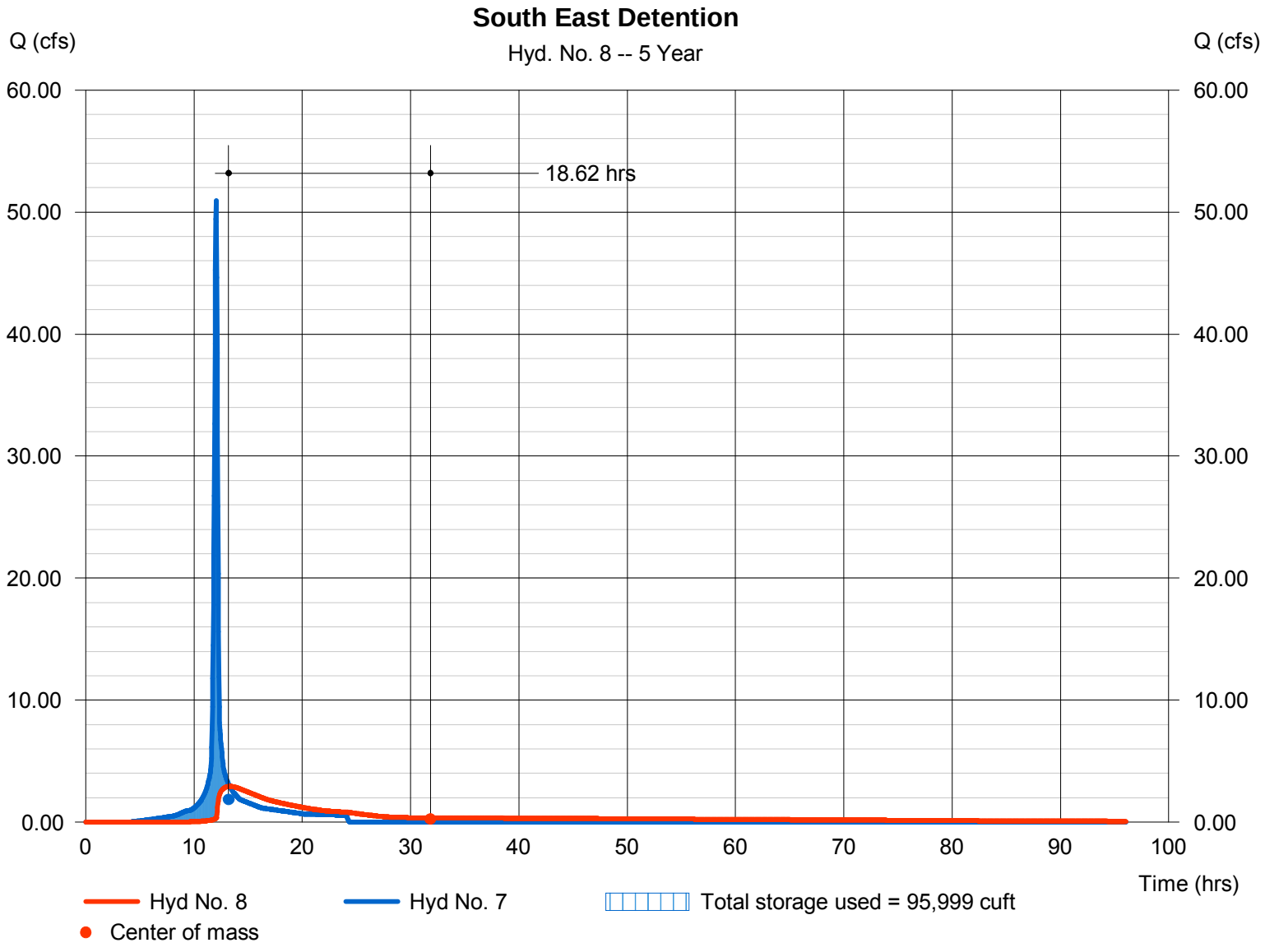
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	=	Reservoir	Peak discharge	=	2.932 cfs
Storm frequency	=	5 yrs	Time to peak	=	13.30 hrs
Time interval	=	2 min	Hyd. volume	=	136,835 cuft
Inflow hyd. No.	=	7 - Developed B	Max. Elevation	=	1328.29 ft
Reservoir name	=	Reserve A Detention	Max. Storage	=	95,999 cuft

Storage Indication method used.

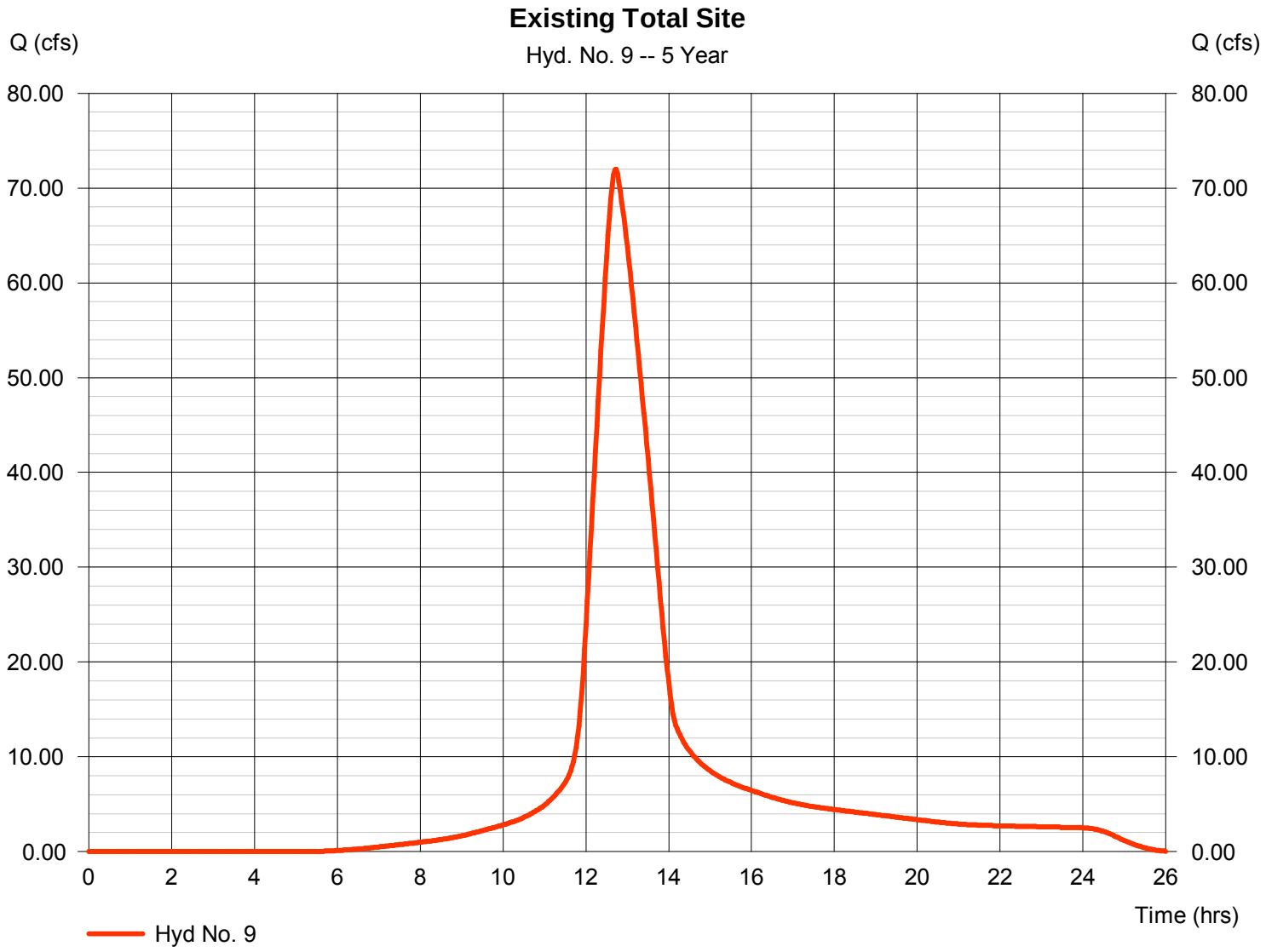


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	= SCS Runoff	Peak discharge	= 71.98 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 594,677 cuft
Drainage area	= 51.000 ac	Curve number	= 88
Basin Slope	= 0.4 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 82.10 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

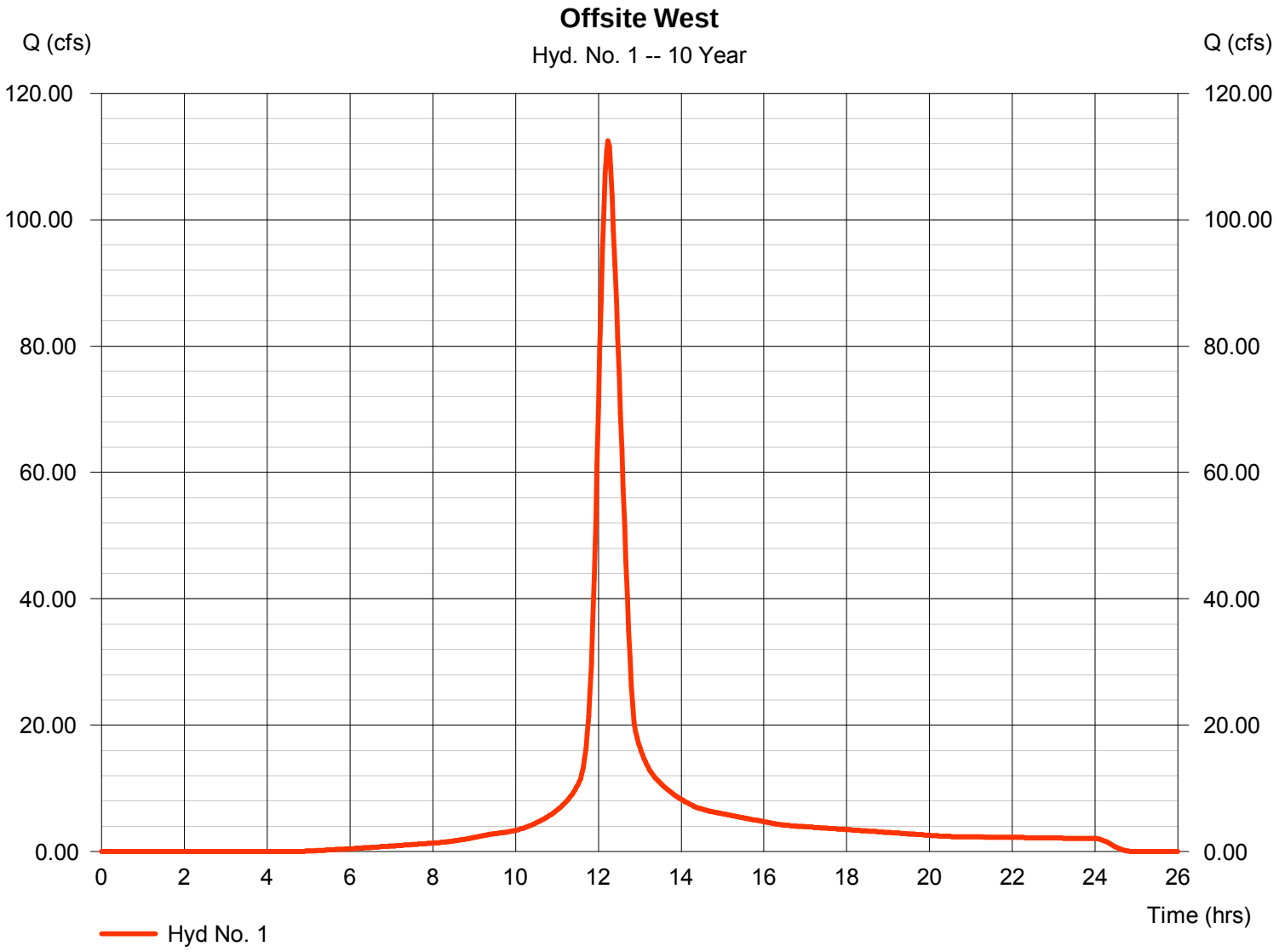
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	112.50	2	734	516,597	------	------	------	Offsite West
2	Reservoir	44.72	2	760	503,452	1	1337.42	251,353	Reserve B West
3	Reach	43.69	2	766	503,425	2	------	------	Channel Section
4	SCS Runoff	91.26	2	736	454,816	------	------	------	Basin A
5	Combine	103.27	2	740	958,241	3, 4	------	------	Runoff to North Pond
6	Reservoir	46.83	2	788	934,630	5	1330.35	297,606	Reserve B East Detenti
7	SCS Runoff	60.22	2	722	177,378	------	------	------	Developed B
8	Reservoir	4.632	2	770	165,503	7	1328.43	110,641	South East Detention
9	SCS Runoff	86.55	2	762	718,031	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	=	SCS Runoff	Peak discharge	=	112.50 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	516,597 cuft
Drainage area	=	37.300 ac	Curve number	=	88
Basin Slope	=	0.7 %	Hydraulic length	=	1300 ft
Tc method	=	LAG	Time of conc. (Tc)	=	35.60 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



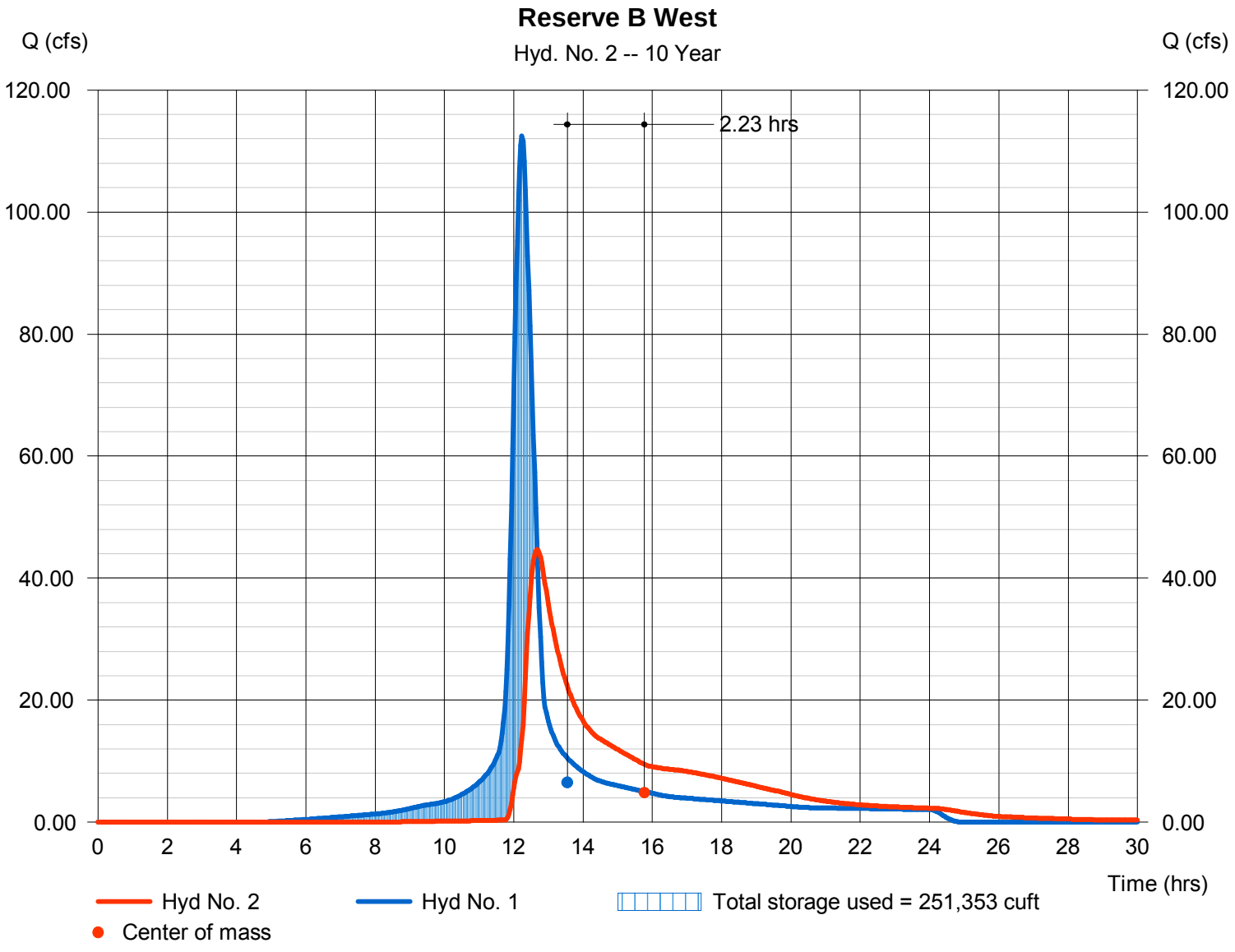
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	= Reservoir	Peak discharge	= 44.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 503,452 cuft
Inflow hyd. No.	= 1 - Offsite West	Max. Elevation	= 1337.42 ft
Reservoir name	= Reserve B West Detention	Max. Storage	= 251,353 cuft

Storage Indication method used.



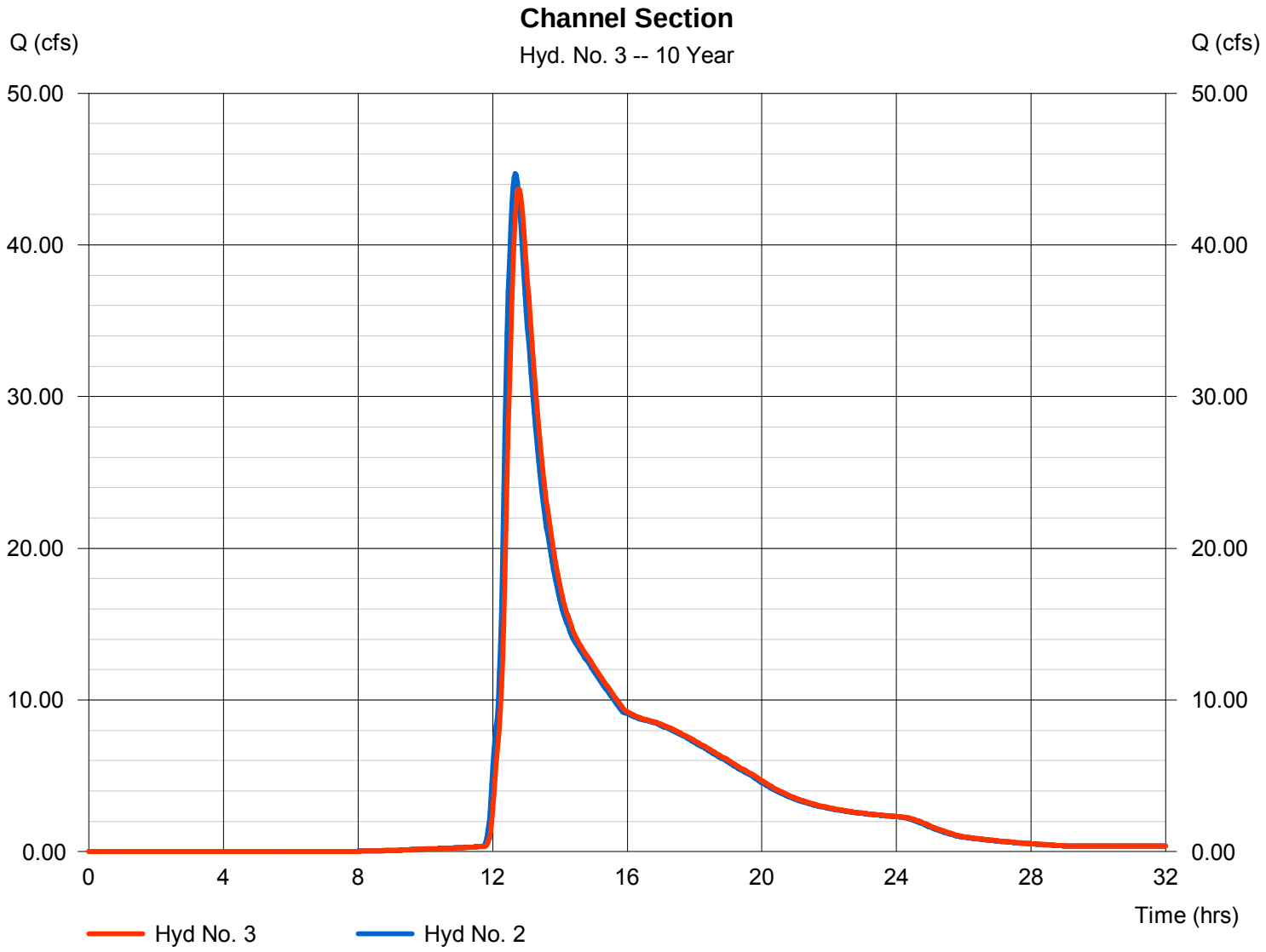
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	= Reach	Peak discharge	= 43.69 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.77 hrs
Time interval	= 2 min	Hyd. volume	= 503,425 cuft
Inflow hyd. No.	= 2 - Reserve B West	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.020	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 5.0 ft
Rating curve x	= 1.395	Rating curve m	= 1.341
Ave. velocity	= 3.37 ft/s	Routing coeff.	= 0.3451

Modified Att-Kin routing method used.

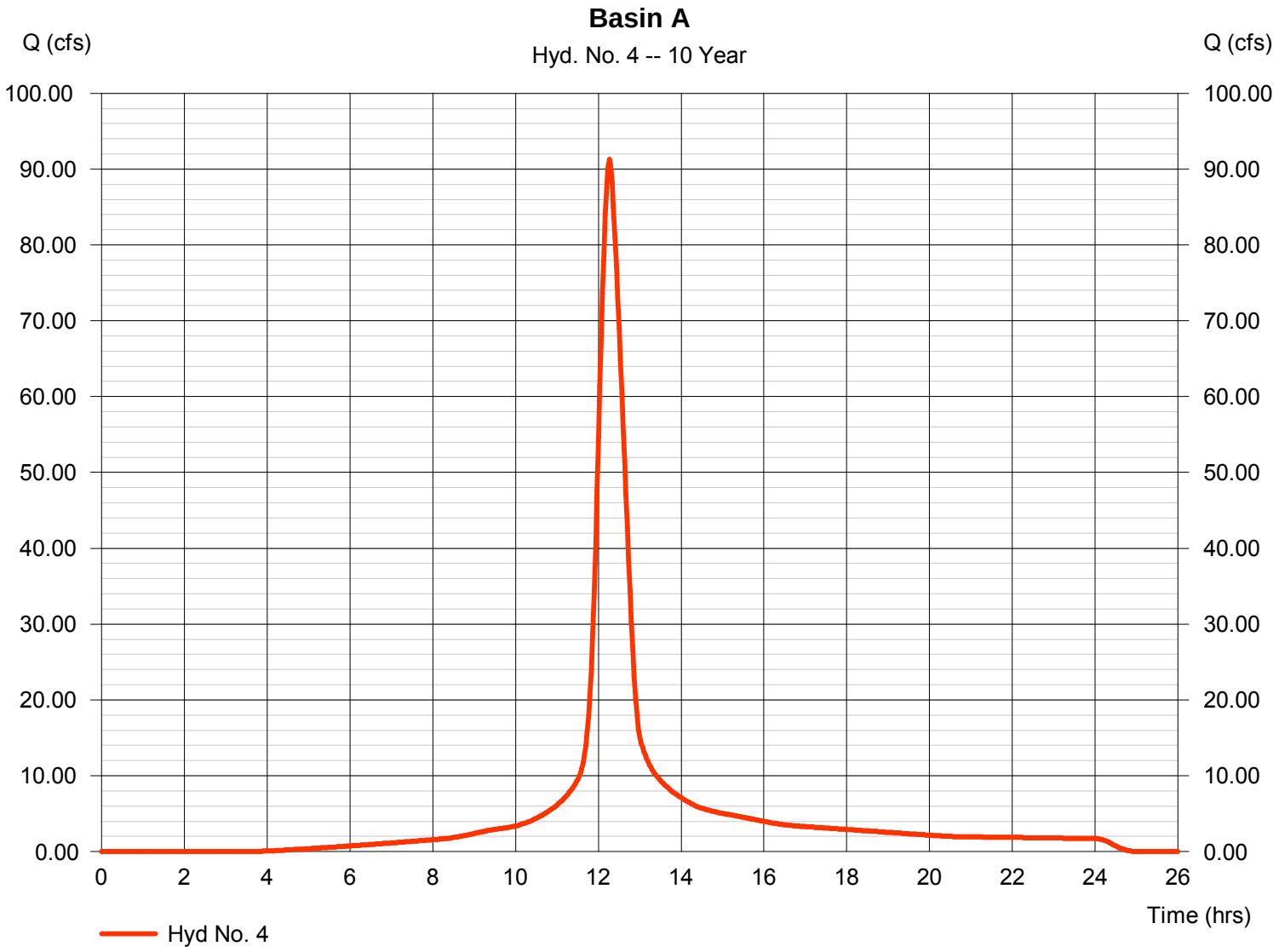


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 91.26 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 454,816 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

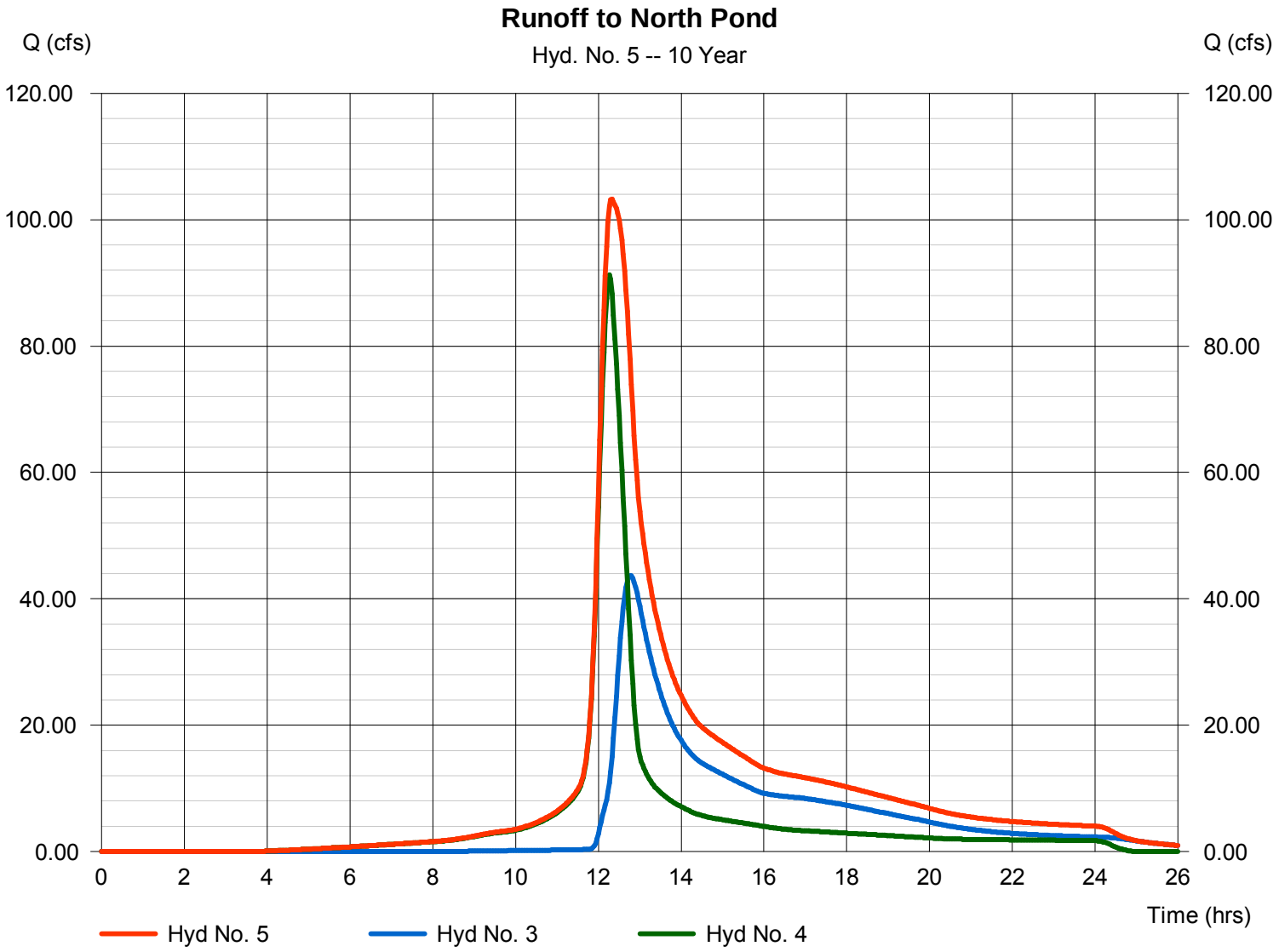


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 103.27 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 958,241 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



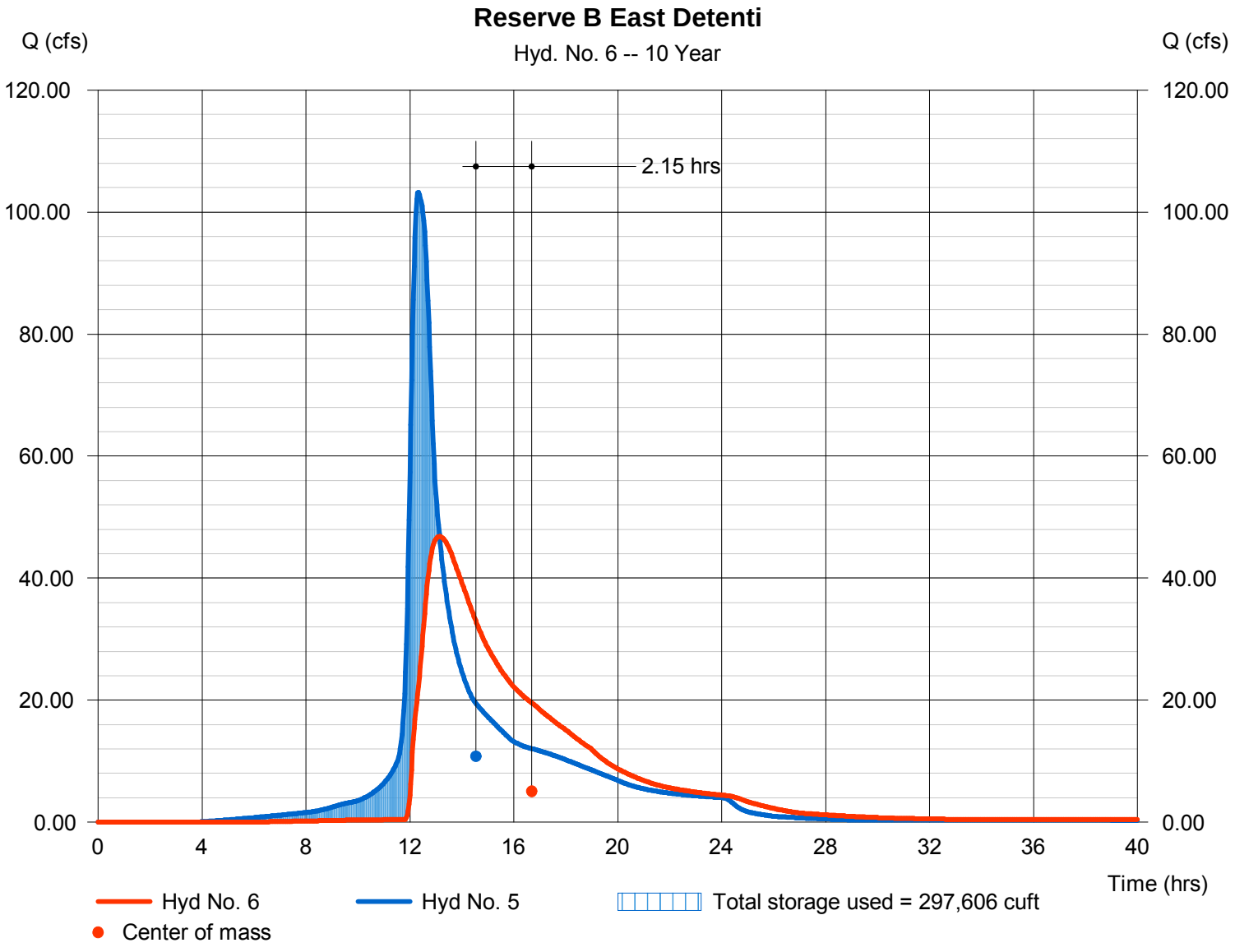
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	= Reservoir	Peak discharge	= 46.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.13 hrs
Time interval	= 2 min	Hyd. volume	= 934,630 cuft
Inflow hyd. No.	= 5 - Runoff to North Pond	Max. Elevation	= 1330.35 ft
Reservoir name	= Reserve B East Detention	Max. Storage	= 297,606 cuft

Storage Indication method used.

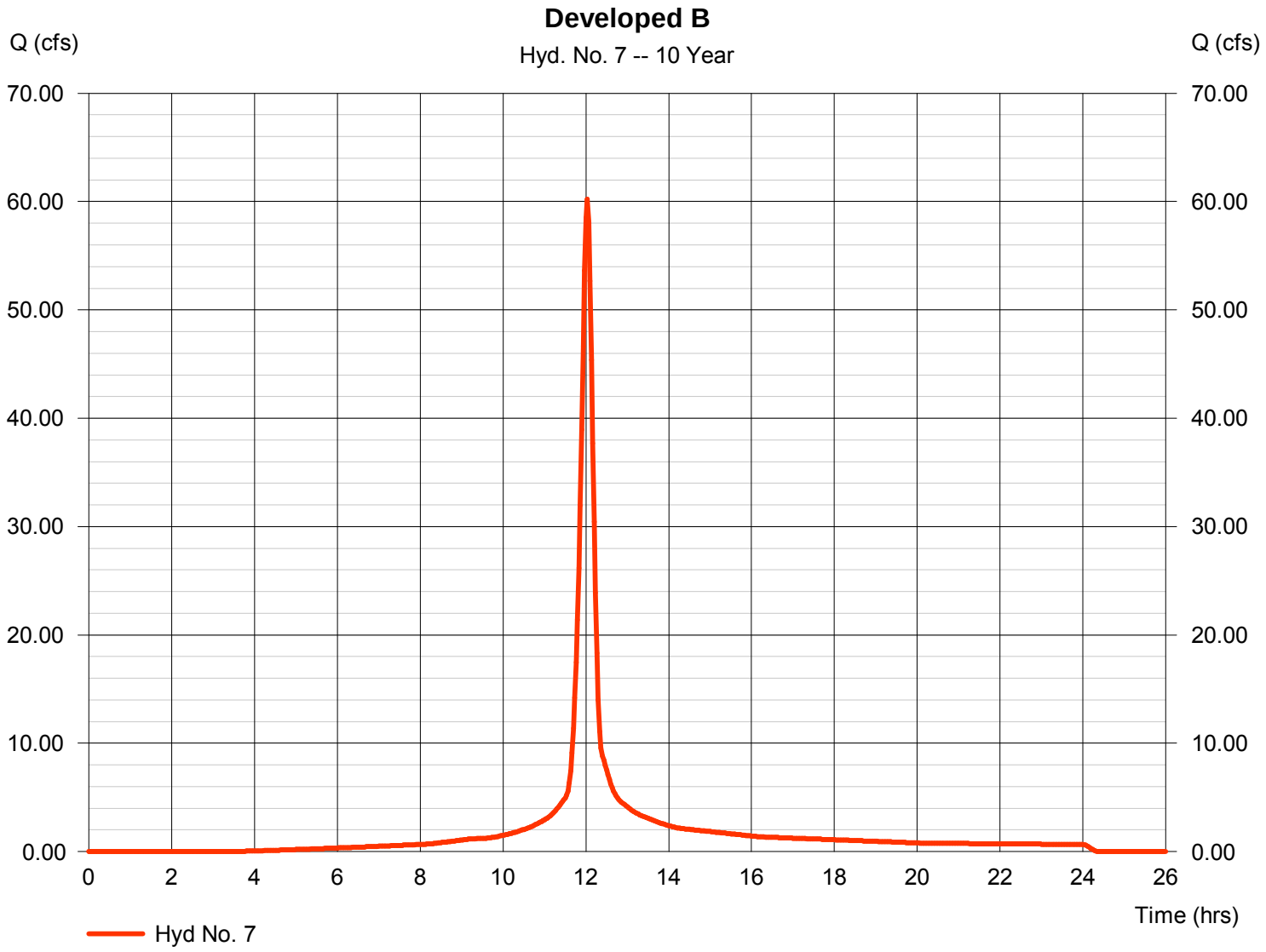


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 60.22 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 177,378 cuft
Drainage area	= 12.000 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



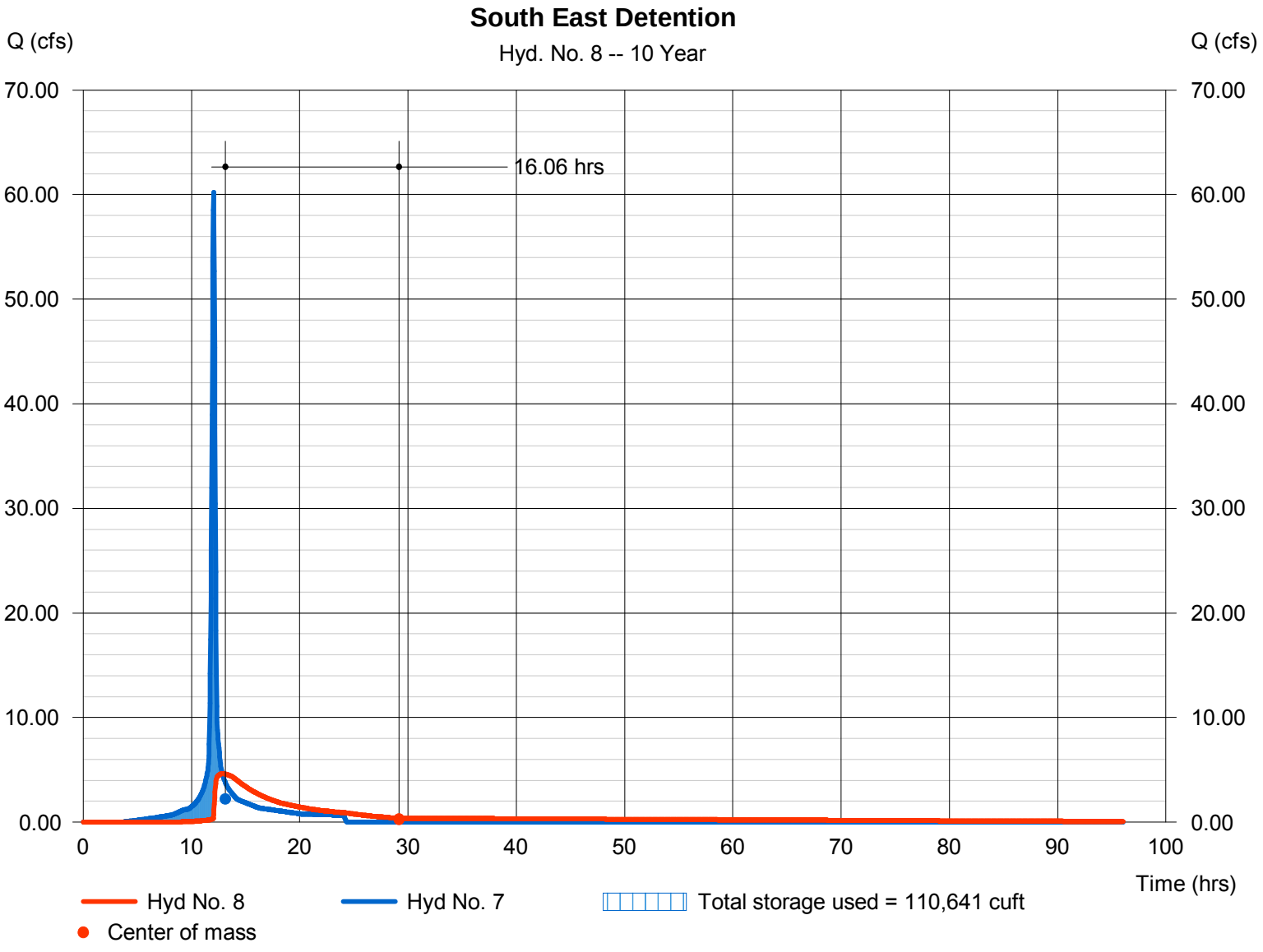
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	=	Reservoir	Peak discharge	=	4.632 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.83 hrs
Time interval	=	2 min	Hyd. volume	=	165,503 cuft
Inflow hyd. No.	=	7 - Developed B	Max. Elevation	=	1328.43 ft
Reservoir name	=	Reserve A Detention	Max. Storage	=	110,641 cuft

Storage Indication method used.

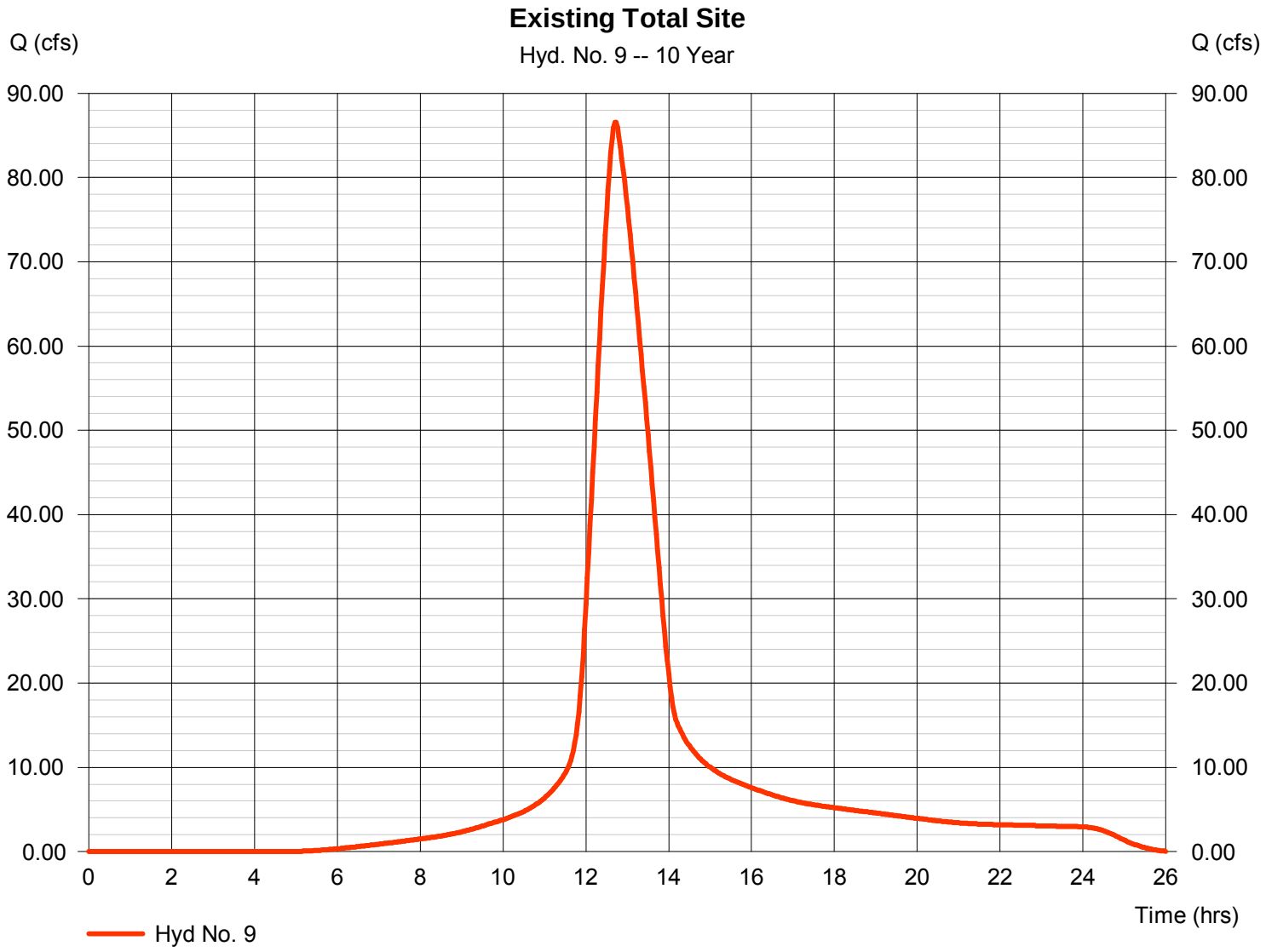


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	= SCS Runoff	Peak discharge	= 86.55 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 718,031 cuft
Drainage area	= 51.000 ac	Curve number	= 88
Basin Slope	= 0.4 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 82.10 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

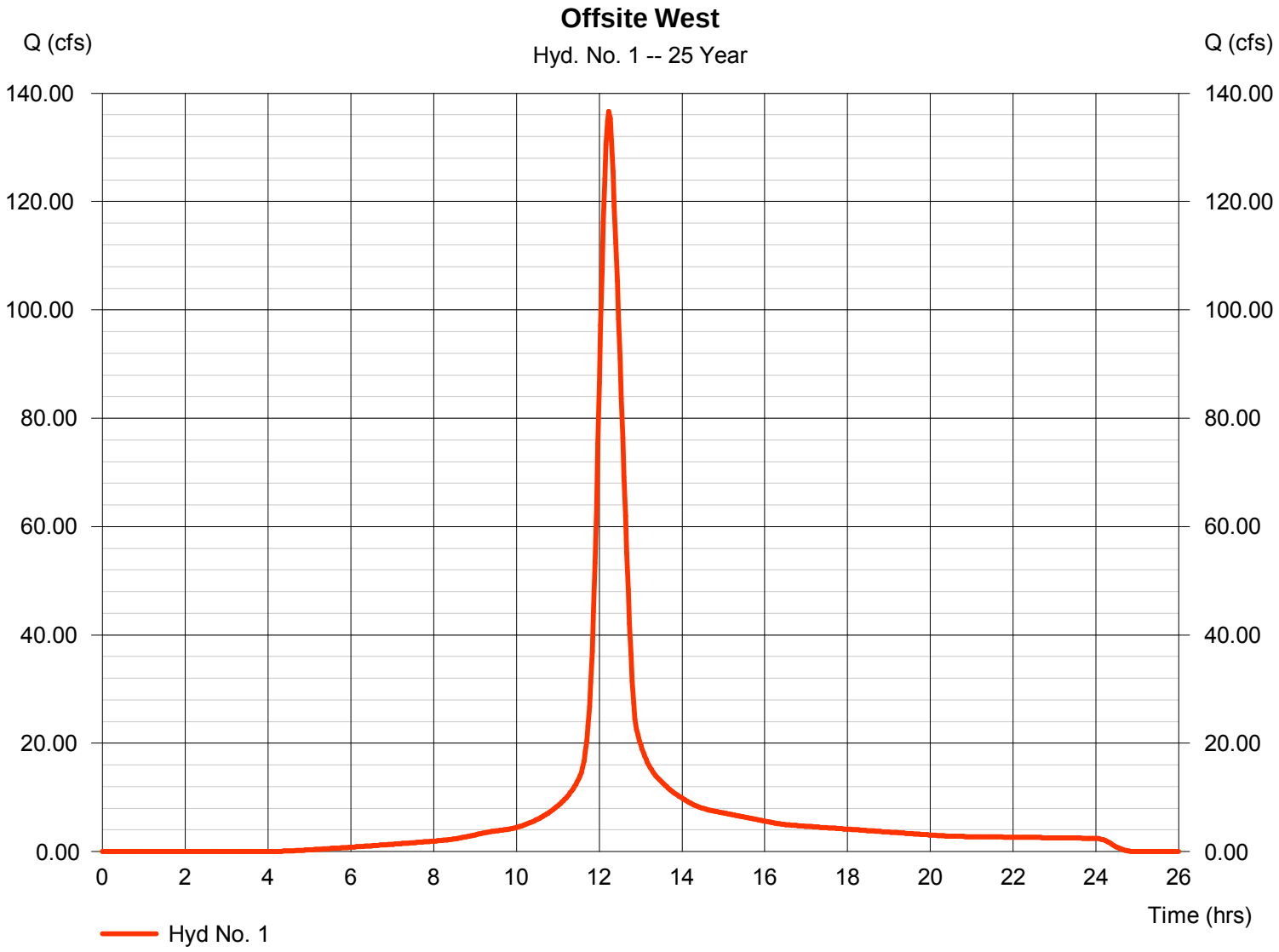
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	136.62	2	734	632,119	------	------	------	Offsite West
2	Reservoir	65.24	2	758	618,905	1	1337.85	287,267	Reserve B West
3	Reach	64.02	2	762	618,880	2	------	------	Channel Section
4	SCS Runoff	109.51	2	736	550,503	------	------	------	Basin A
5	Combine	136.77	2	746	1,169,382	3, 4	------	------	Runoff to North Pond
6	Reservoir	65.06	2	784	1,145,531	5	1330.88	371,717	Reserve B East Detenti
7	SCS Runoff	72.11	2	722	214,696	------	------	------	Developed B
8	Reservoir	6.171	2	764	202,672	7	1328.64	132,375	South East Detention
9	SCS Runoff	105.33	2	762	878,598	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	=	SCS Runoff	Peak discharge	=	136.62 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	632,119 cuft
Drainage area	=	37.300 ac	Curve number	=	88
Basin Slope	=	0.7 %	Hydraulic length	=	1300 ft
Tc method	=	LAG	Time of conc. (Tc)	=	35.60 min
Total precip.	=	6.10 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



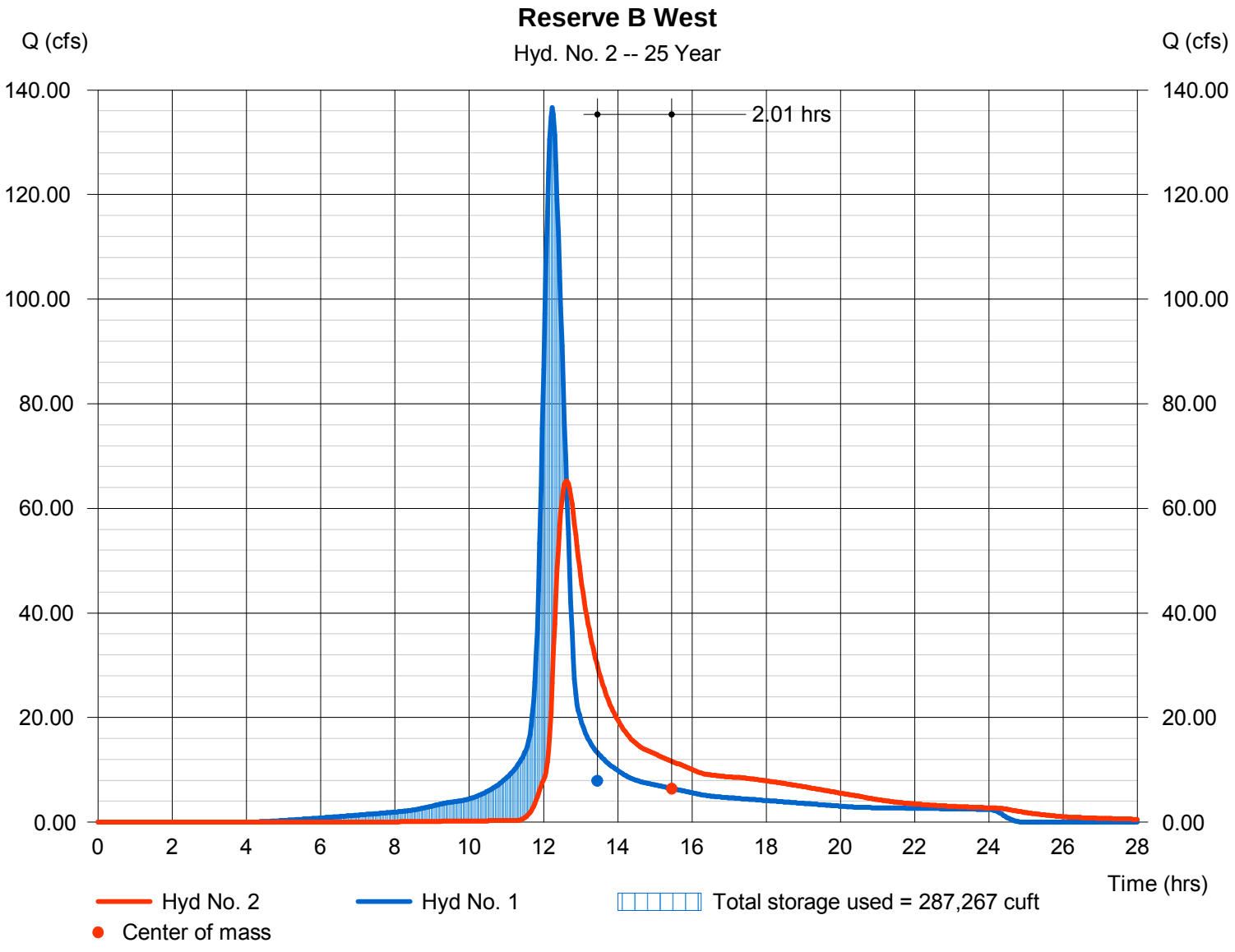
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	= Reservoir	Peak discharge	= 65.24 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 618,905 cuft
Inflow hyd. No.	= 1 - Offsite West	Max. Elevation	= 1337.85 ft
Reservoir name	= Reserve B West Detention	Max. Storage	= 287,267 cuft

Storage Indication method used.



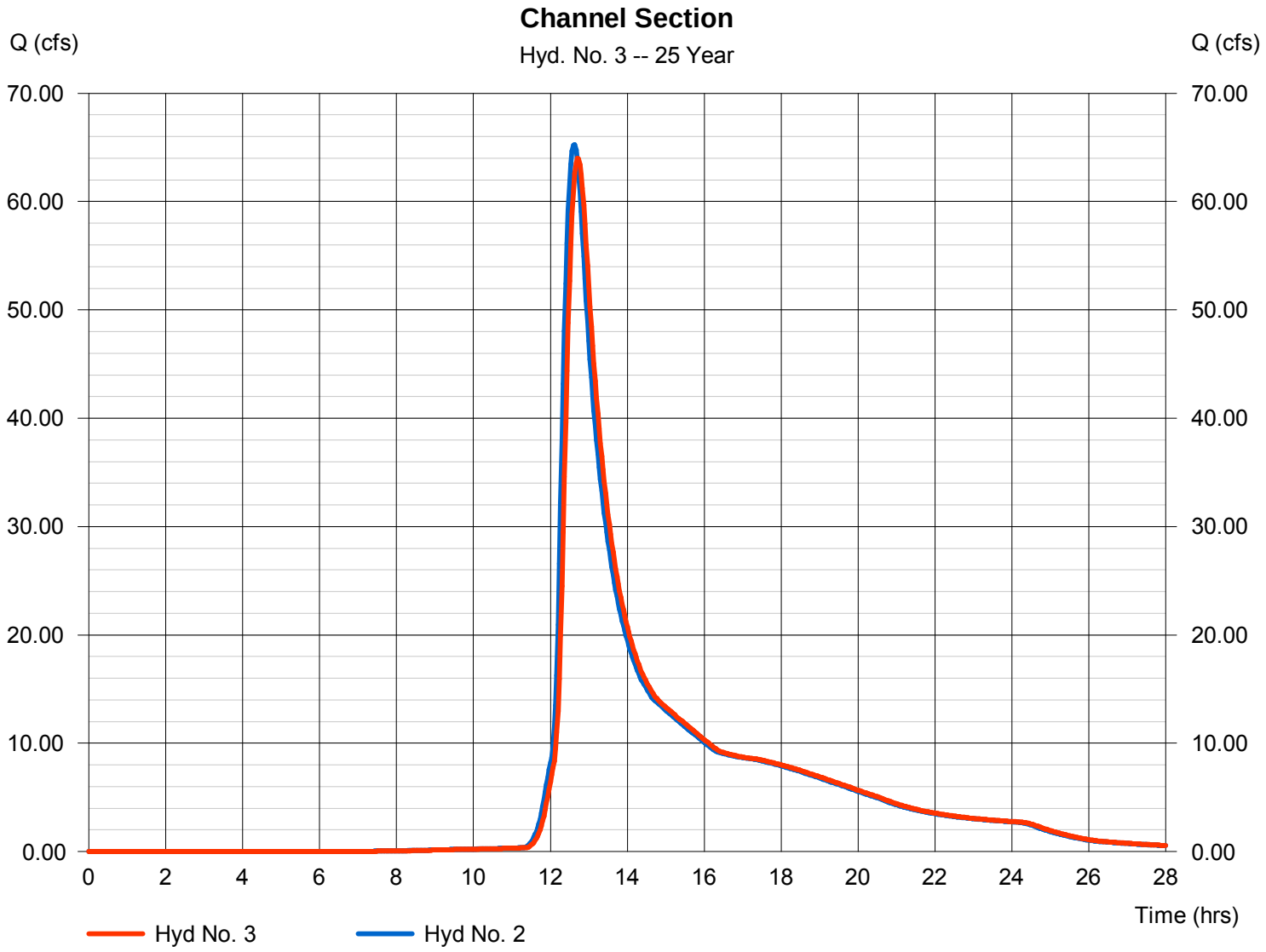
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	= Reach	Peak discharge	= 64.02 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 618,880 cuft
Inflow hyd. No.	= 2 - Reserve B West	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.020	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 5.0 ft
Rating curve x	= 1.395	Rating curve m	= 1.341
Ave. velocity	= 3.71 ft/s	Routing coeff.	= 0.3735

Modified Att-Kin routing method used.

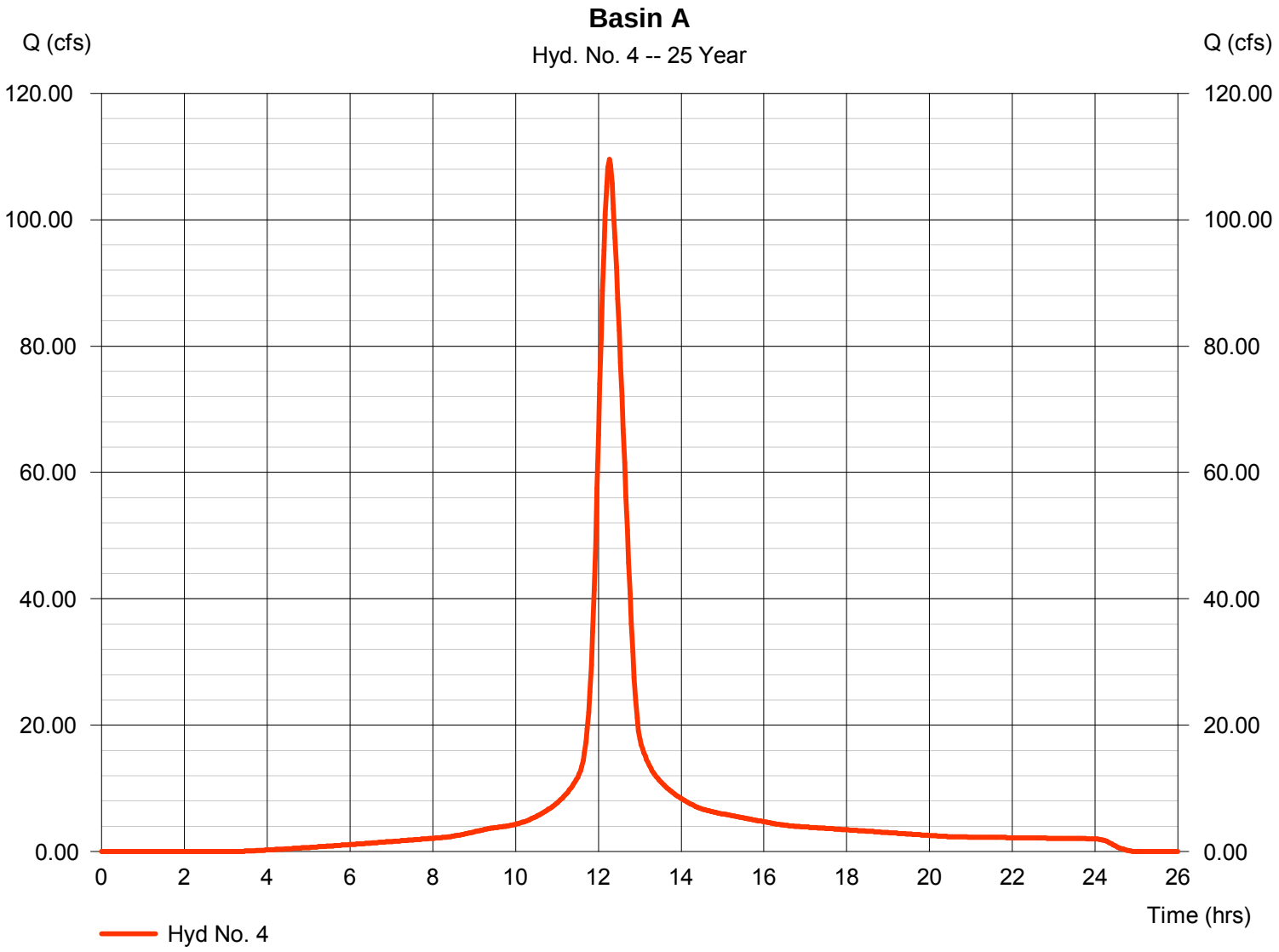


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 109.51 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 550,503 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

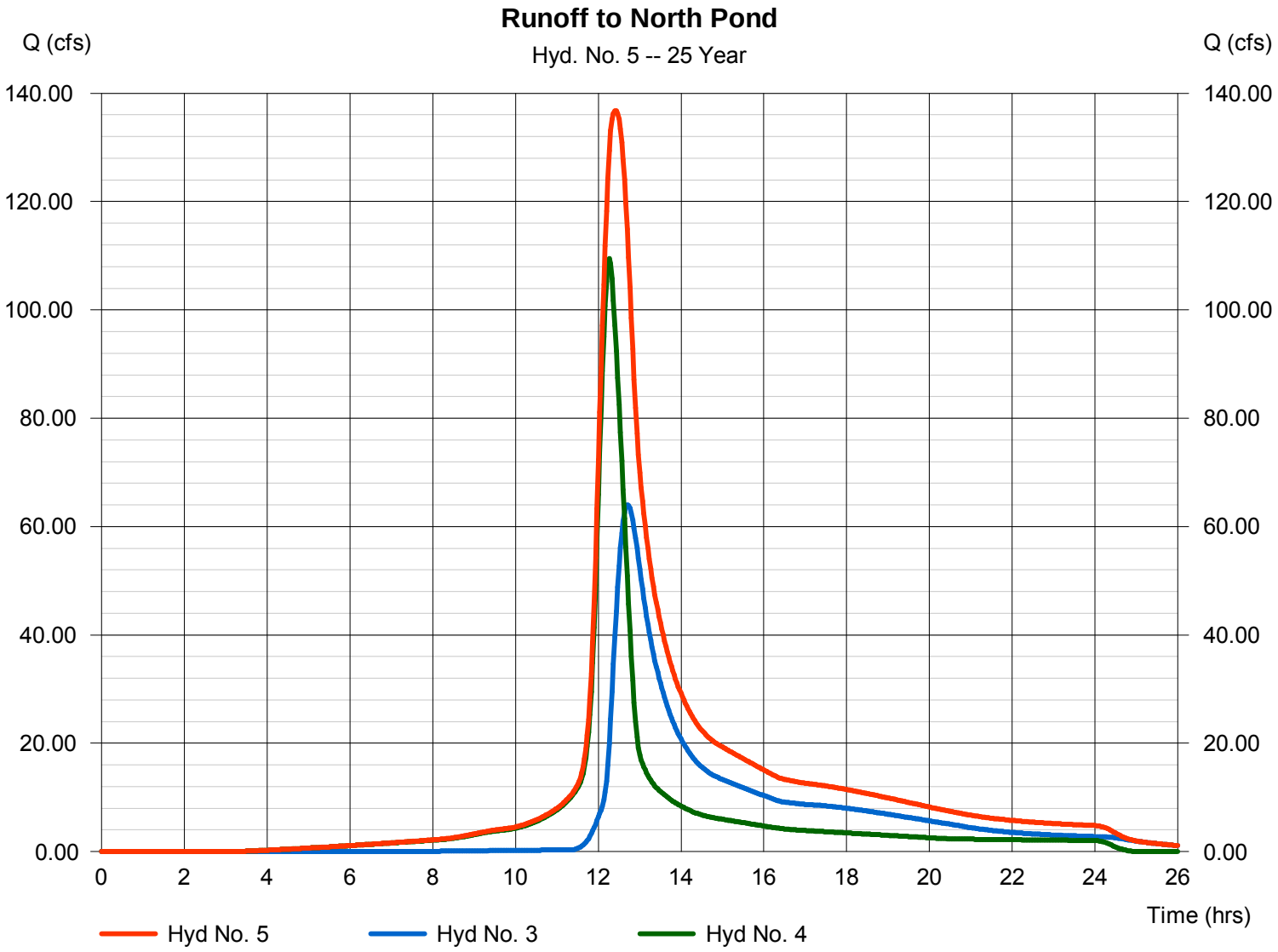


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 136.77 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,169,382 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



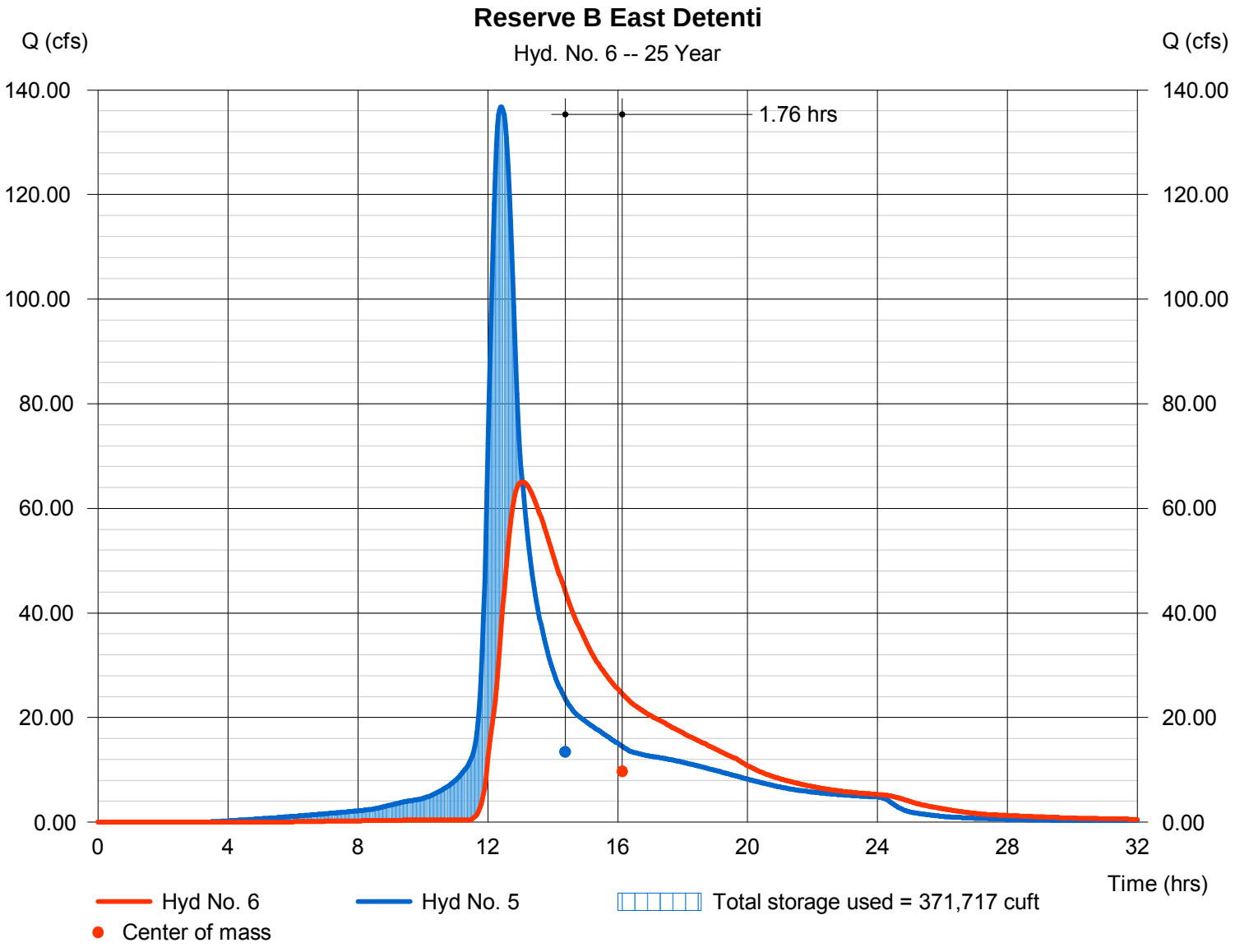
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	=	Reservoir	Peak discharge	=	65.06 cfs
Storm frequency	=	25 yrs	Time to peak	=	13.07 hrs
Time interval	=	2 min	Hyd. volume	=	1,145,531 cuft
Inflow hyd. No.	=	5 - Runoff to North Pond	Max. Elevation	=	1330.88 ft
Reservoir name	=	Reserve B East Detention	Max. Storage	=	371,717 cuft

Storage Indication method used.

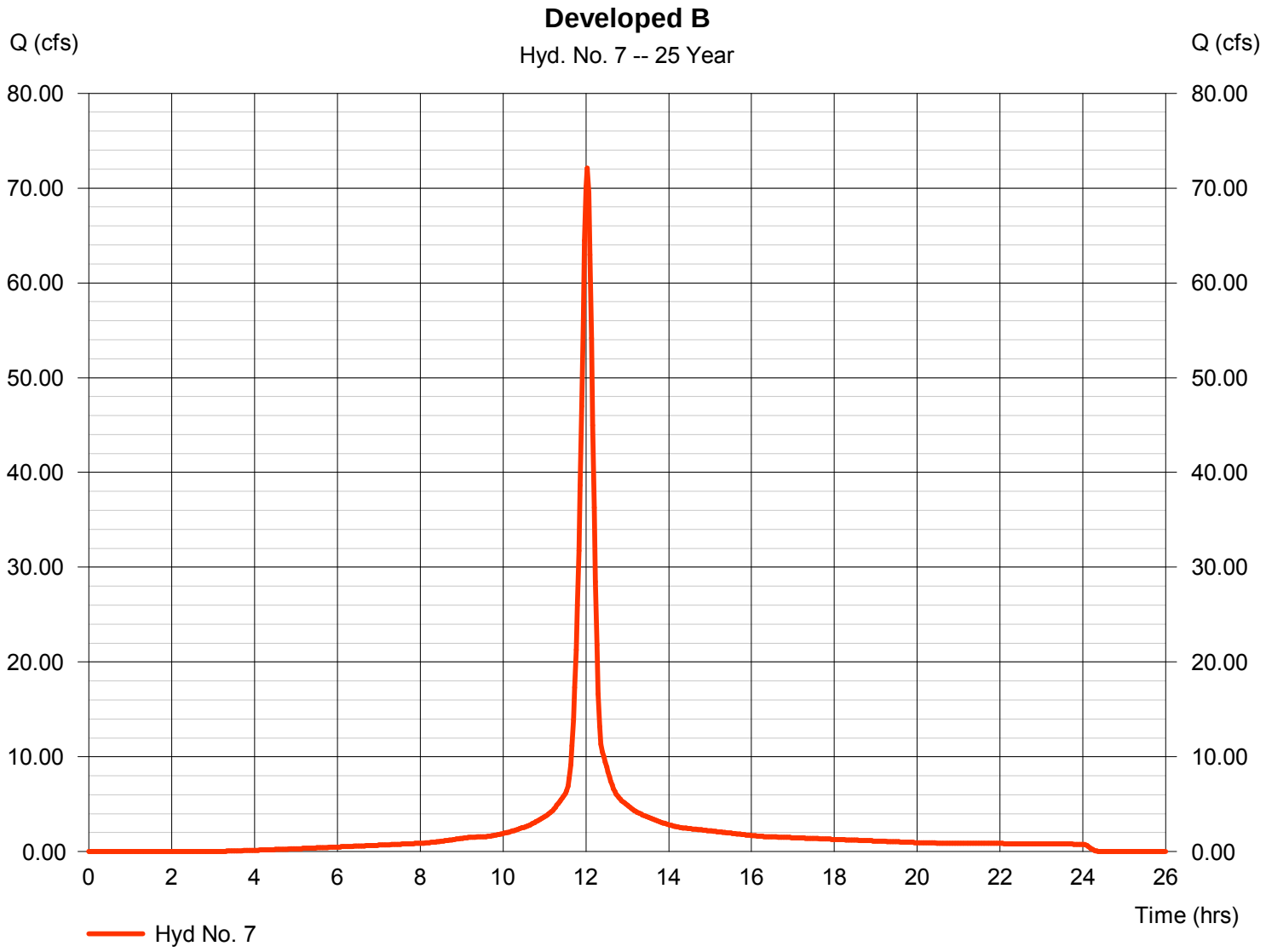


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 72.11 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 214,696 cuft
Drainage area	= 12.000 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



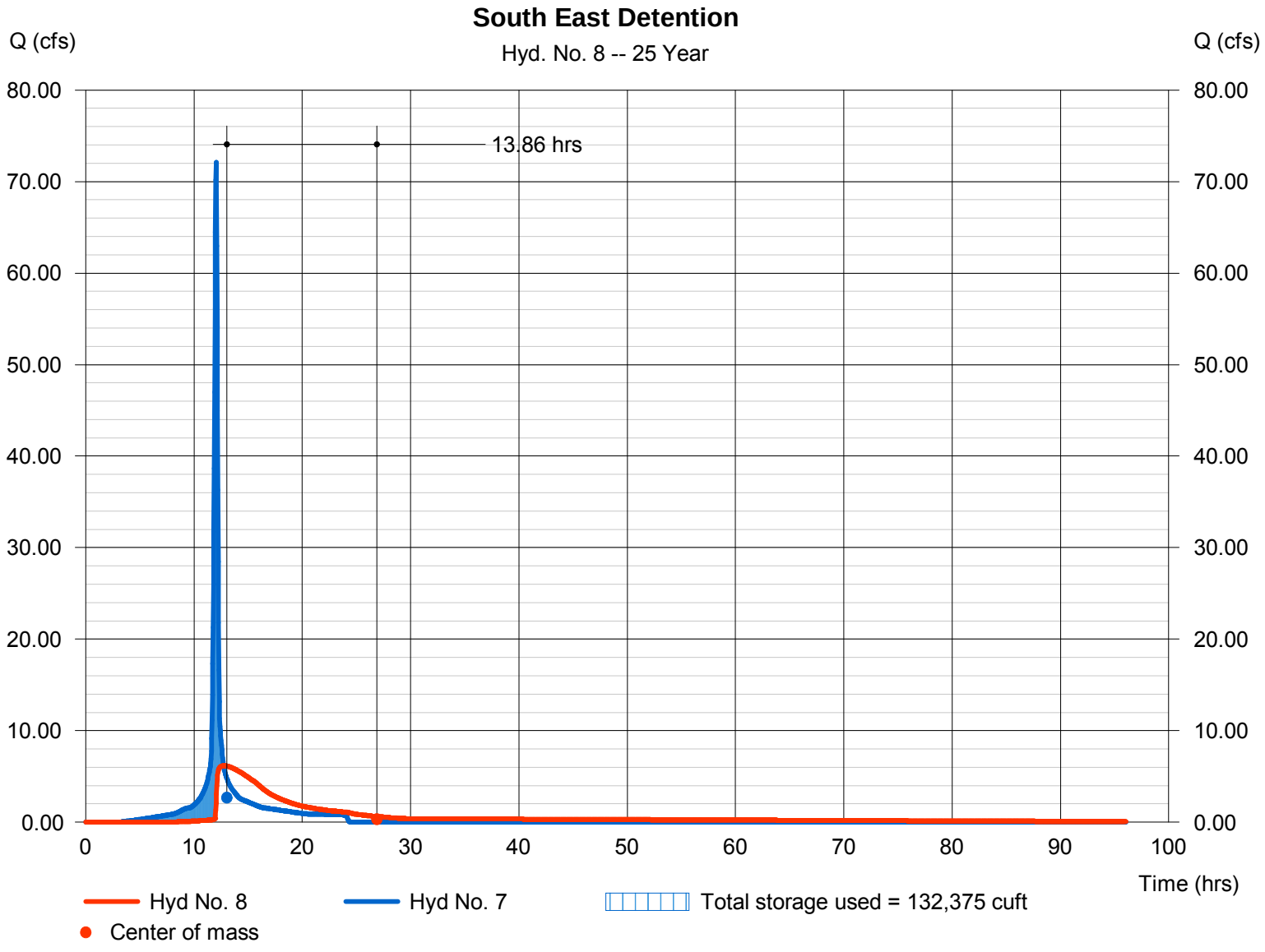
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	=	Reservoir	Peak discharge	=	6.171 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.73 hrs
Time interval	=	2 min	Hyd. volume	=	202,672 cuft
Inflow hyd. No.	=	7 - Developed B	Max. Elevation	=	1328.64 ft
Reservoir name	=	Reserve A Detention	Max. Storage	=	132,375 cuft

Storage Indication method used.

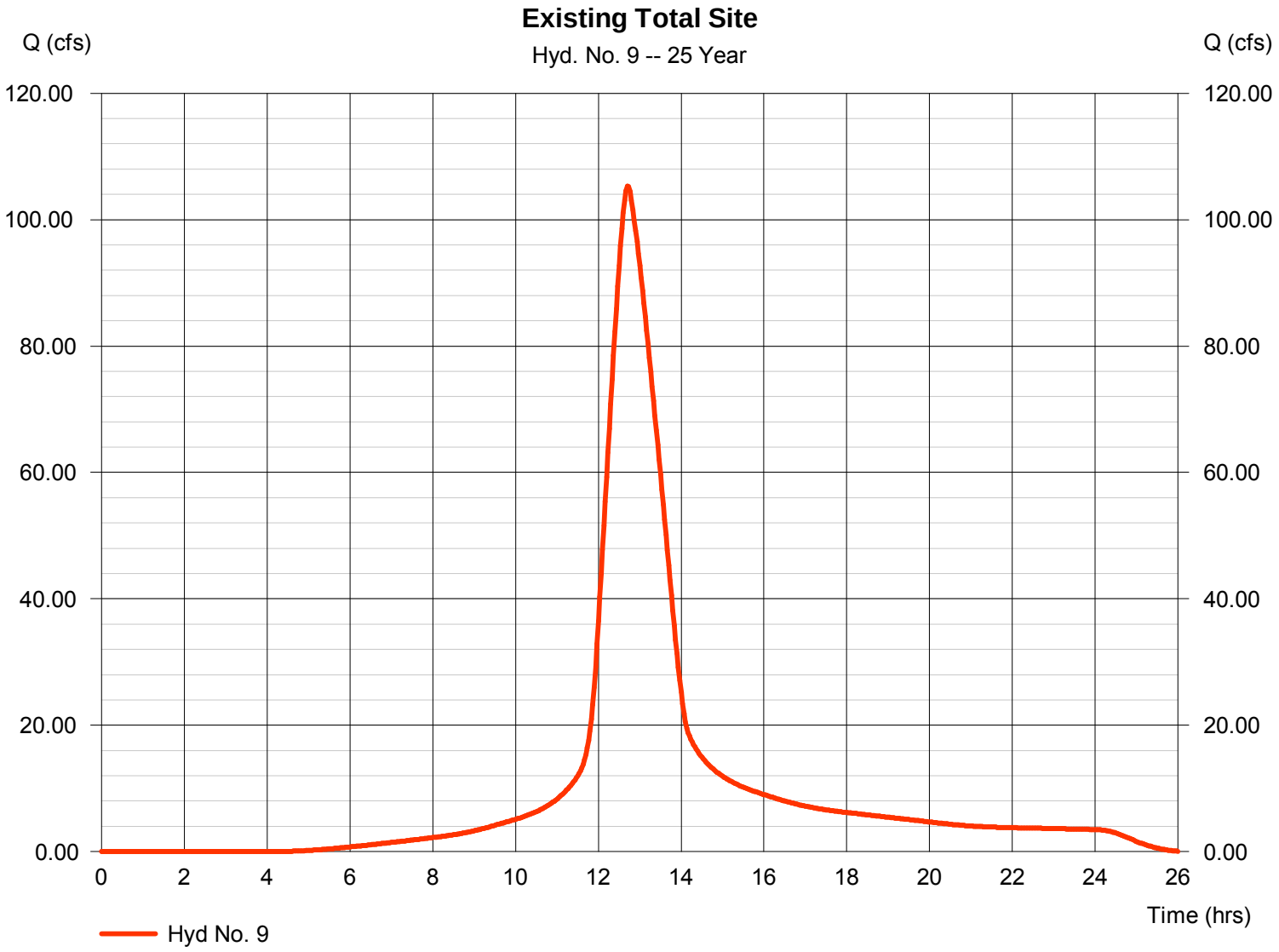


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	= SCS Runoff	Peak discharge	= 105.33 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 878,598 cuft
Drainage area	= 51.000 ac	Curve number	= 88
Basin Slope	= 0.4 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 82.10 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

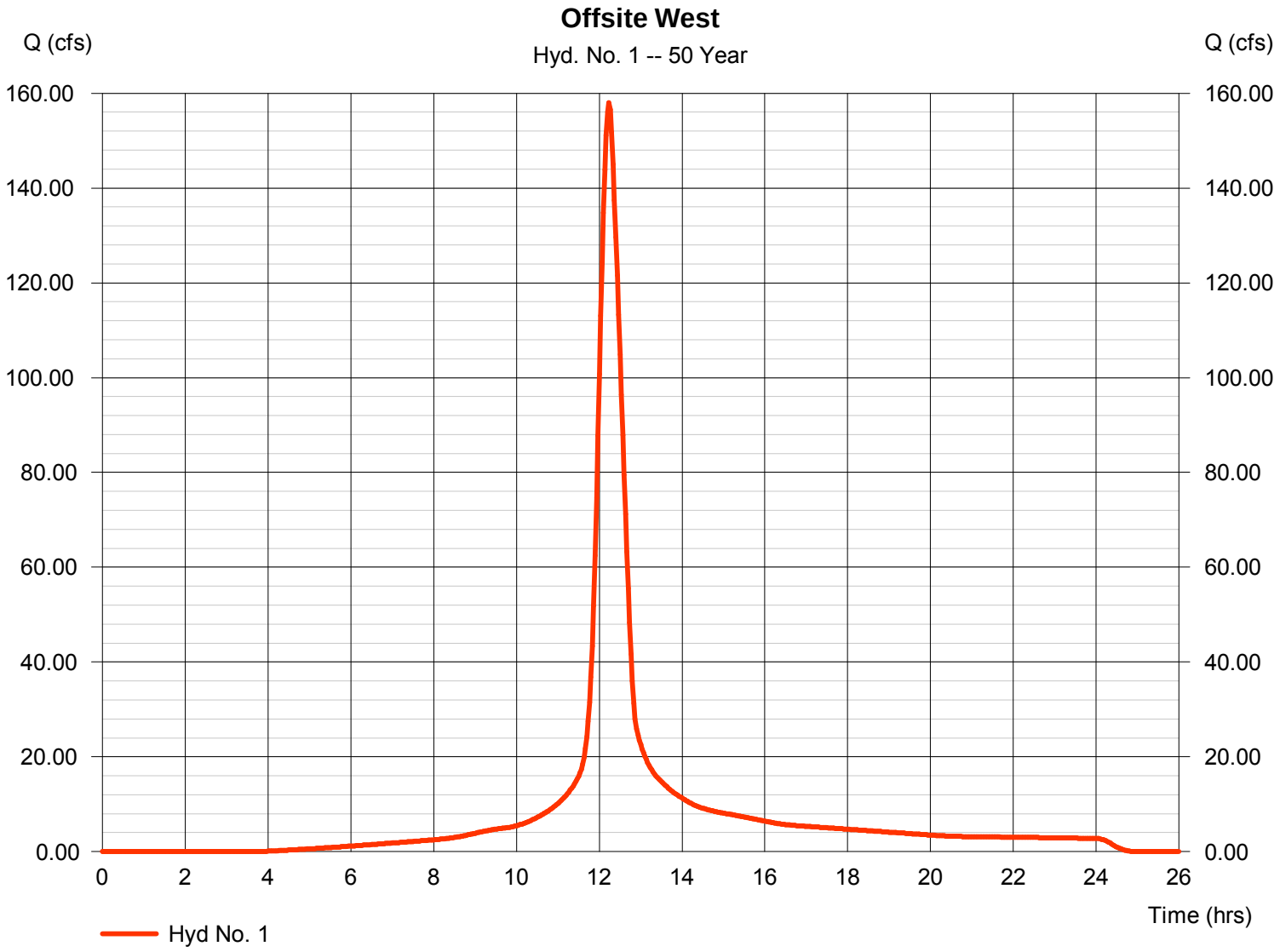
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	158.00	2	734	735,742	------	------	------	Offsite West
2	Reservoir	83.08	2	756	722,474	1	1338.18	316,161	Reserve B West
3	Reach	81.79	2	760	722,449	2	------	------	Channel Section
4	SCS Runoff	125.64	2	736	636,016	------	------	------	Basin A
5	Combine	169.15	2	746	1,358,464	3, 4	------	------	Runoff to North Pond
6	Reservoir	89.75	2	778	1,334,426	5	1331.28	429,435	Reserve B East Detenti
7	SCS Runoff	82.62	2	722	248,046	------	------	------	Developed B
8	Reservoir	7.182	2	762	235,901	7	1328.83	152,760	South East Detention
9	SCS Runoff	121.98	2	762	1,022,625	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 158.00 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 735,742 cuft
Drainage area	= 37.300 ac	Curve number	= 88
Basin Slope	= 0.7 %	Hydraulic length	= 1300 ft
Tc method	= LAG	Time of conc. (Tc)	= 35.60 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



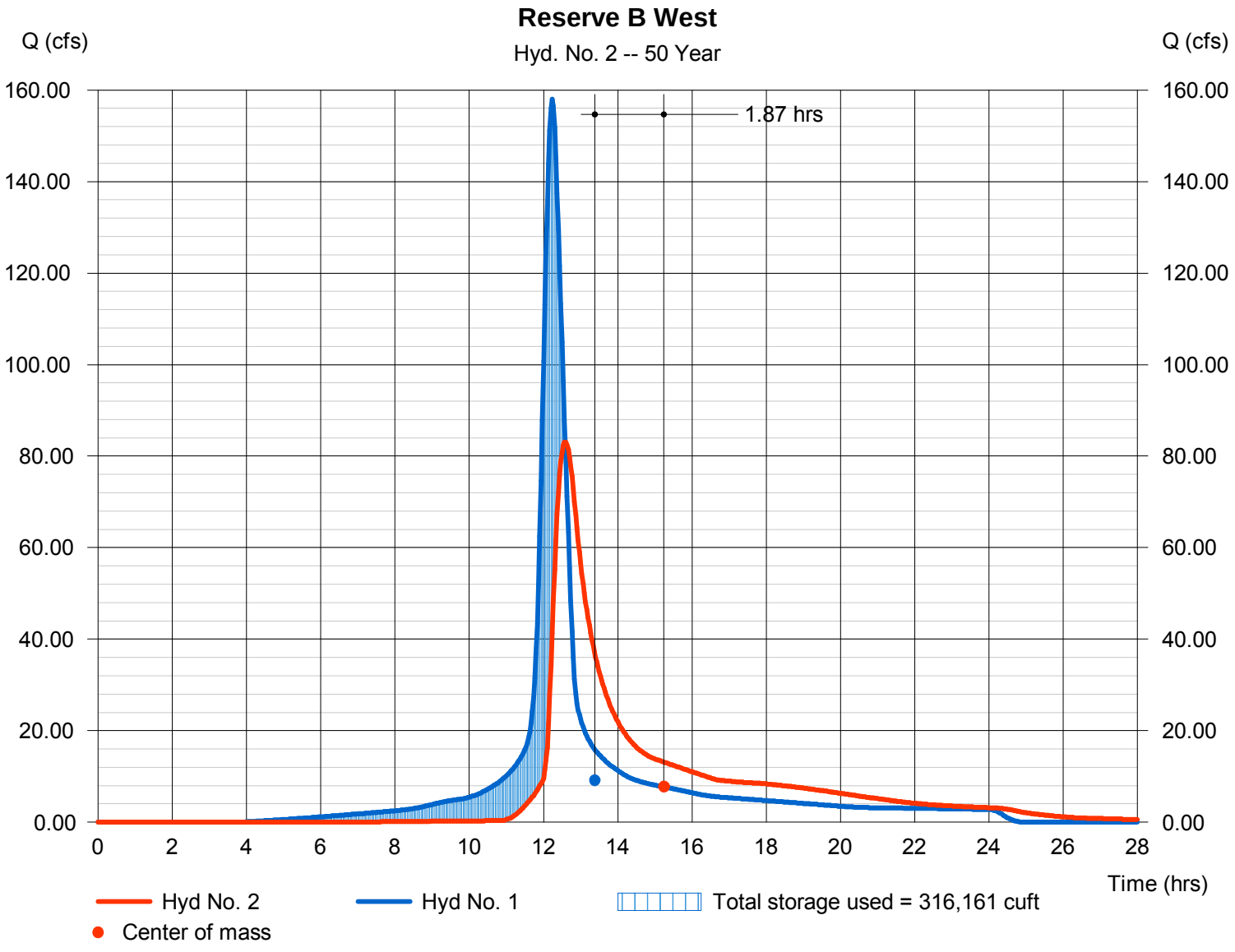
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	=	Reservoir	Peak discharge	=	83.08 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.60 hrs
Time interval	=	2 min	Hyd. volume	=	722,474 cuft
Inflow hyd. No.	=	1 - Offsite West	Max. Elevation	=	1338.18 ft
Reservoir name	=	Reserve B West Detention	Max. Storage	=	316,161 cuft

Storage Indication method used.



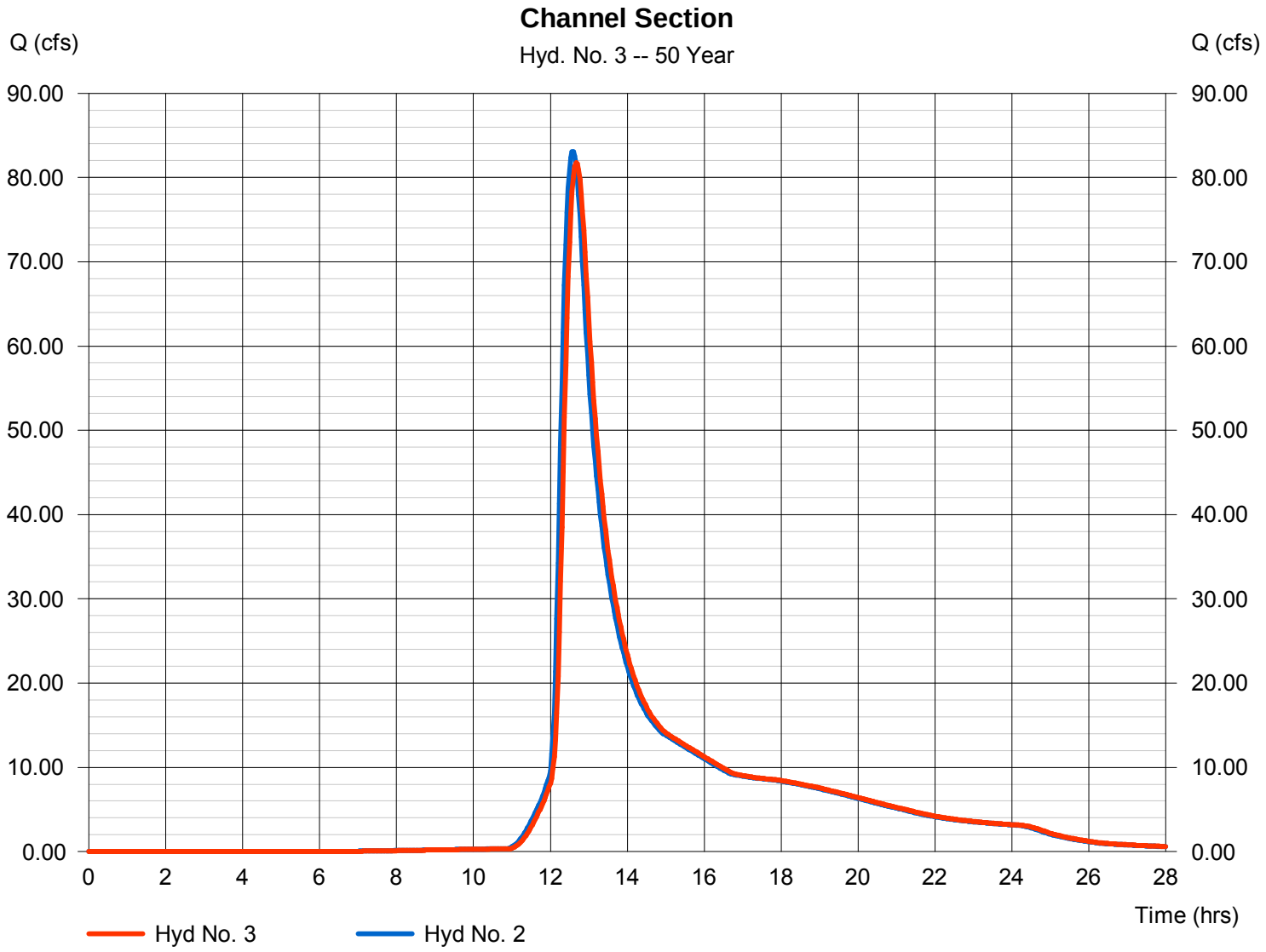
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	= Reach	Peak discharge	= 81.79 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 722,449 cuft
Inflow hyd. No.	= 2 - Reserve B West	Section type	= Trapezoidal
Reach length	= 1300.0 ft	Channel slope	= 0.3 %
Manning's n	= 0.020	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 5.0 ft
Rating curve x	= 1.395	Rating curve m	= 1.341
Ave. velocity	= 3.94 ft/s	Routing coeff.	= 0.3925

Modified Att-Kin routing method used.

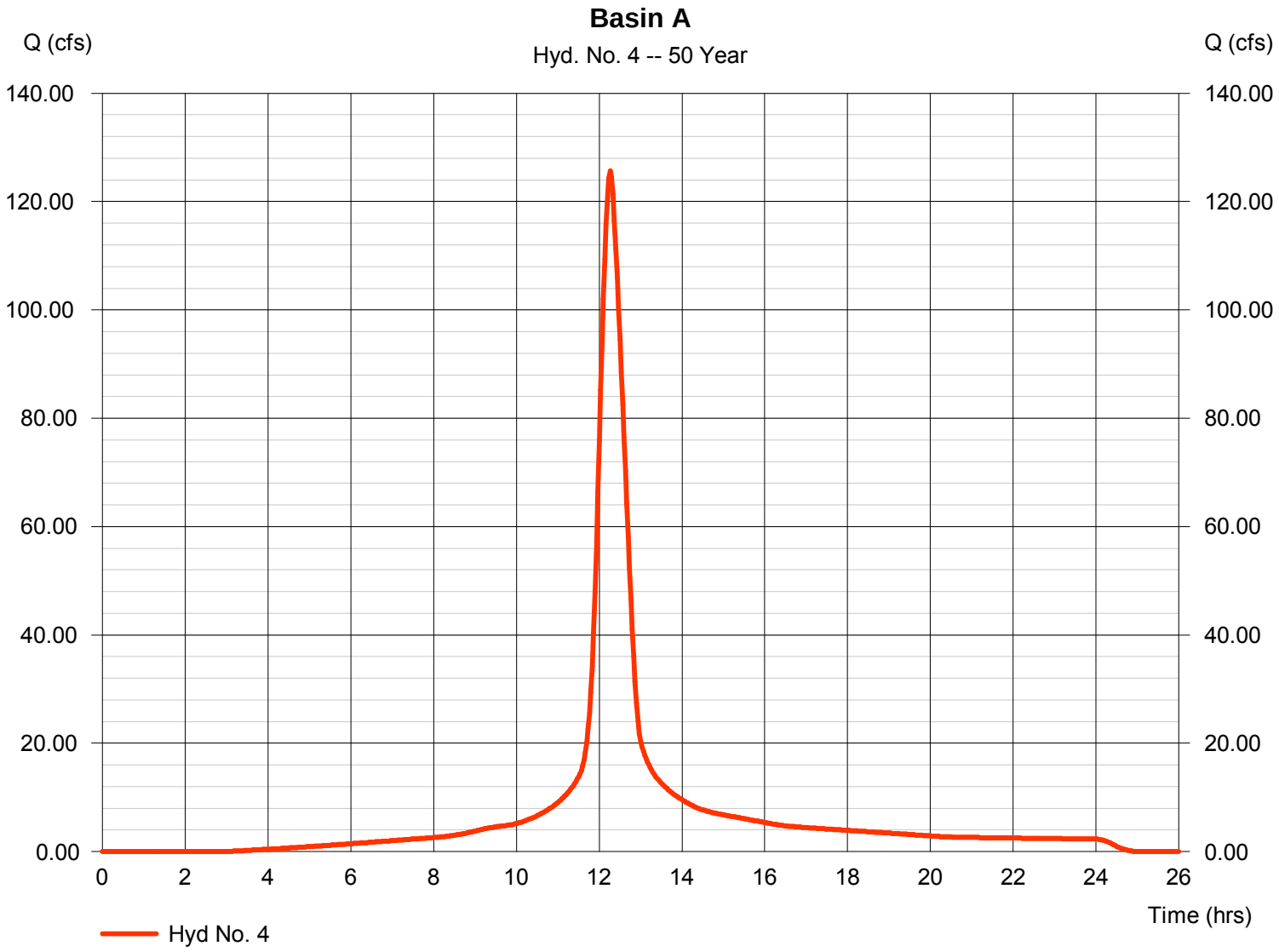


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 125.64 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 636,016 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

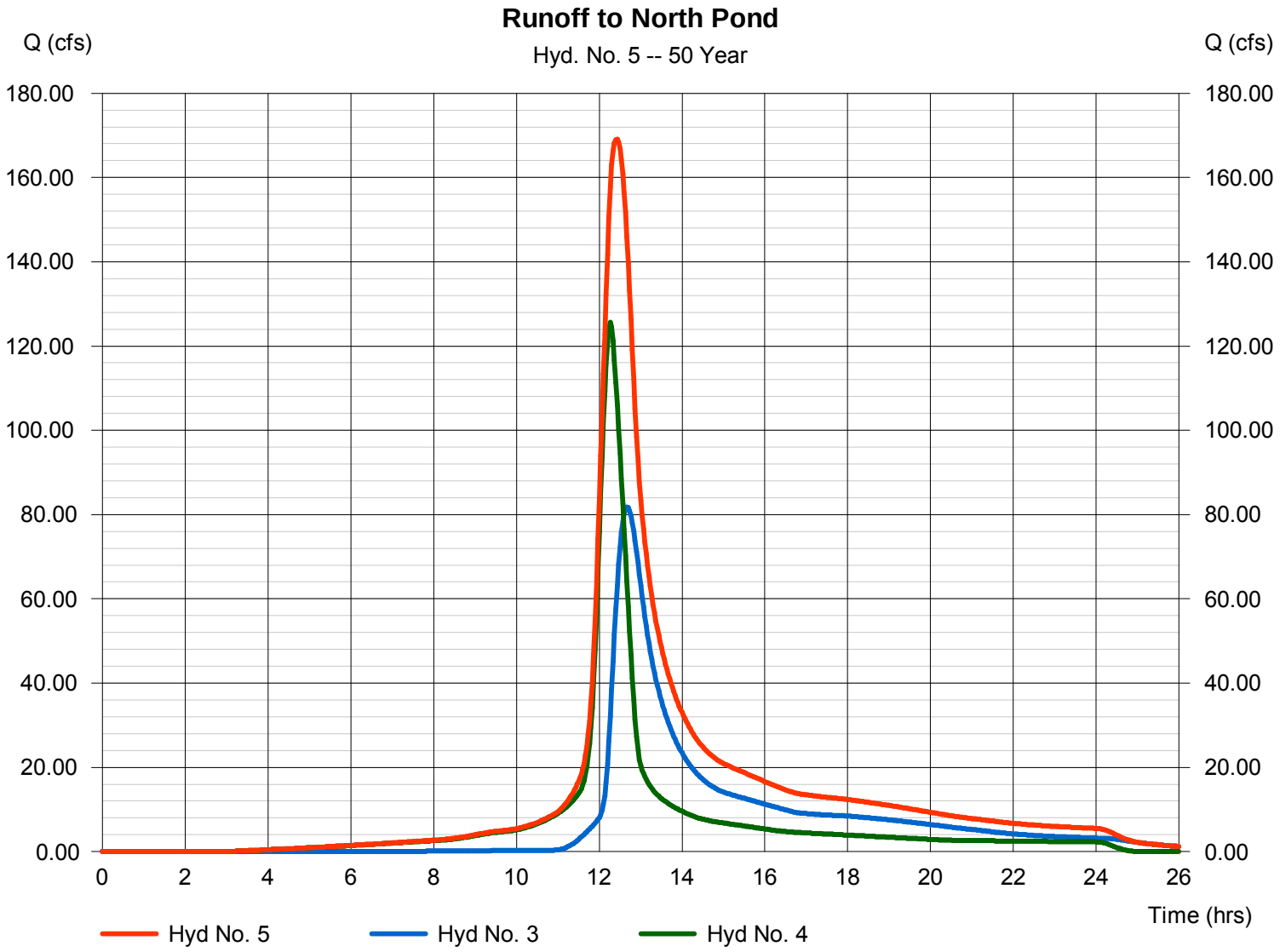


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 169.15 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,358,464 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



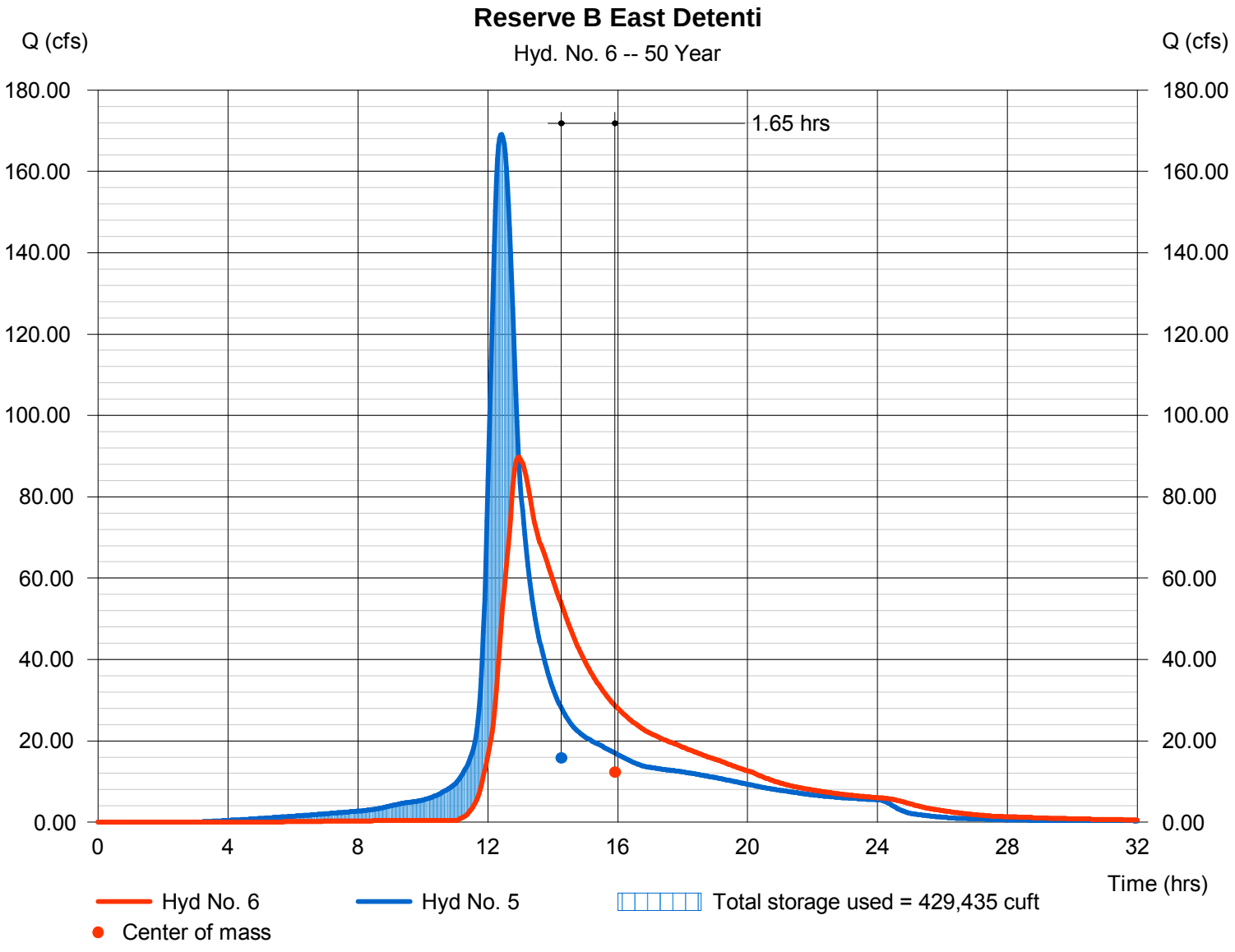
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	=	Reservoir	Peak discharge	=	89.75 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.97 hrs
Time interval	=	2 min	Hyd. volume	=	1,334,426 cuft
Inflow hyd. No.	=	5 - Runoff to North Pond	Max. Elevation	=	1331.28 ft
Reservoir name	=	Reserve B East Detention	Max. Storage	=	429,435 cuft

Storage Indication method used.

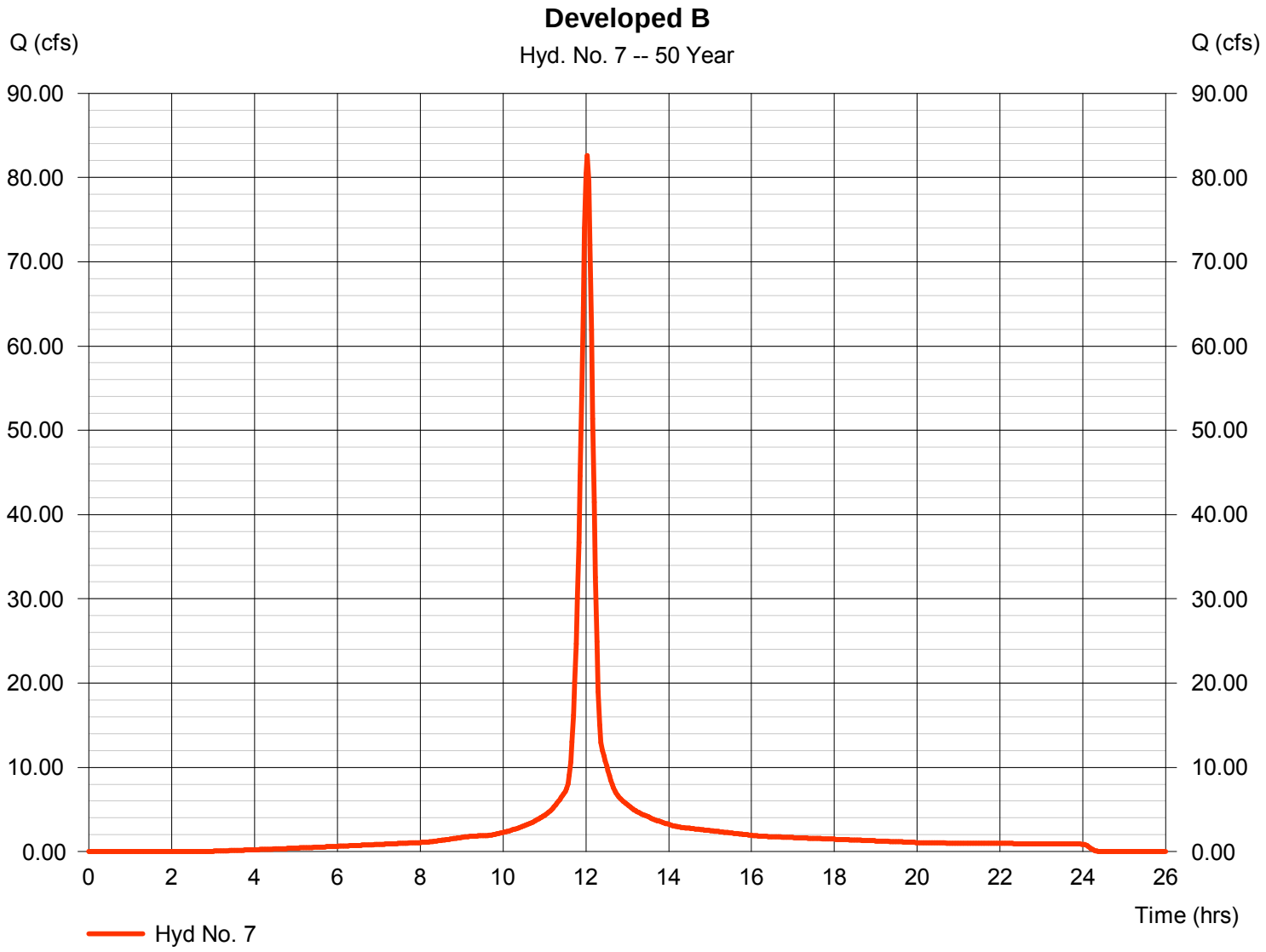


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 82.62 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 248,046 cuft
Drainage area	= 12.000 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



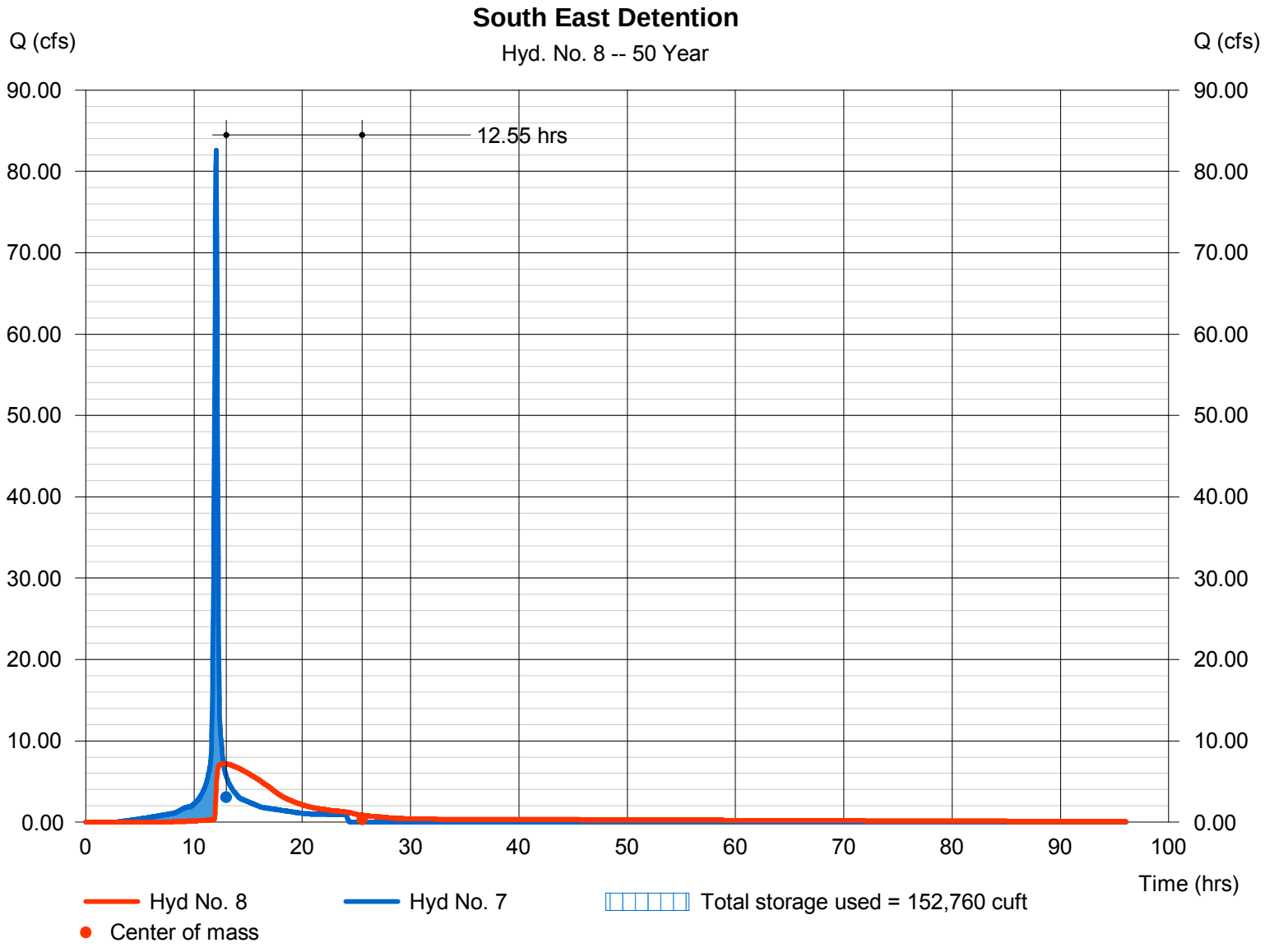
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	= Reservoir	Peak discharge	= 7.182 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 235,901 cuft
Inflow hyd. No.	= 7 - Developed B	Max. Elevation	= 1328.83 ft
Reservoir name	= Reserve A Detention	Max. Storage	= 152,760 cuft

Storage Indication method used.

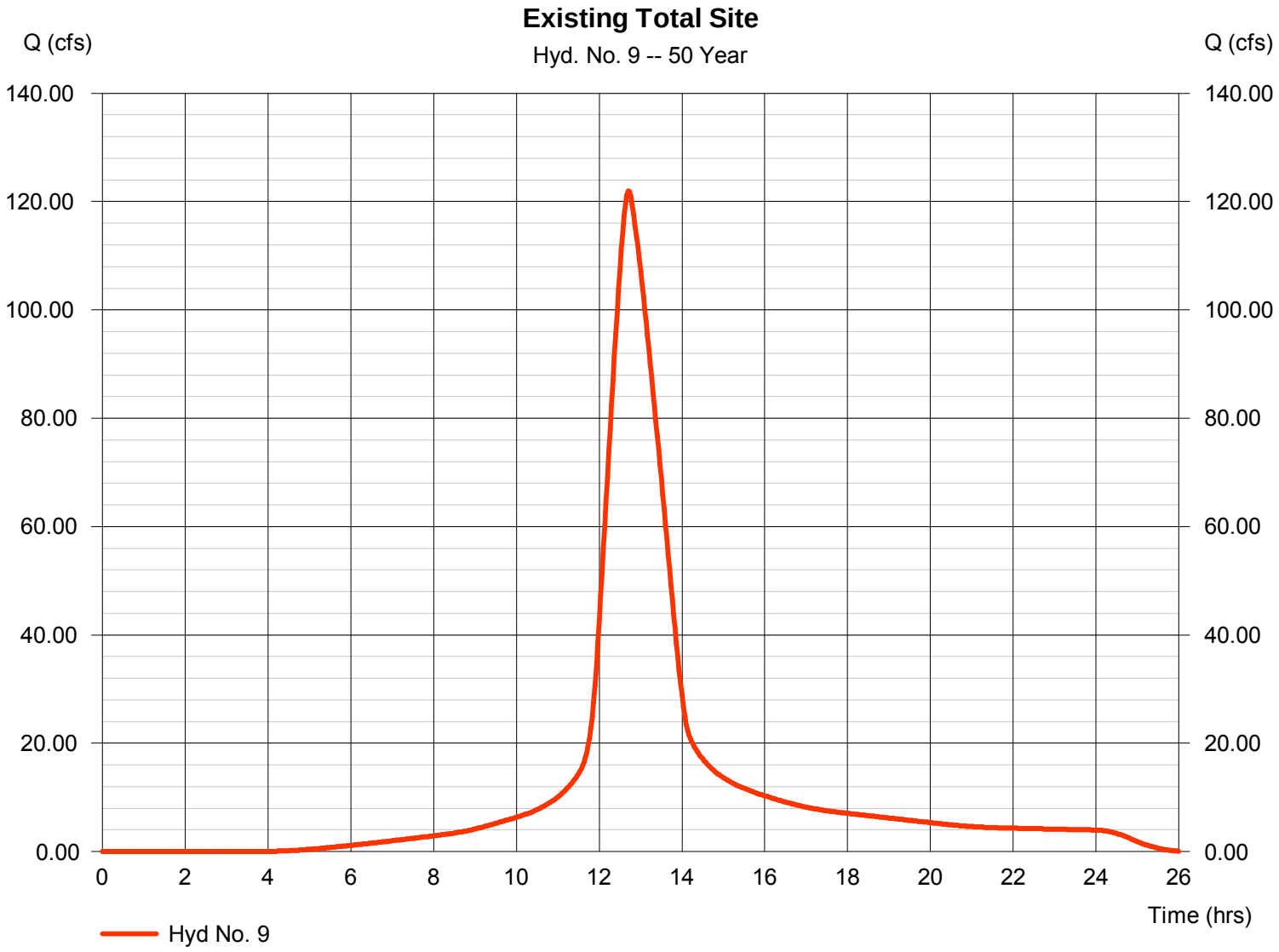


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	= SCS Runoff	Peak discharge	= 121.98 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 1,022,625 cuft
Drainage area	= 51.000 ac	Curve number	= 88
Basin Slope	= 0.4 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 82.10 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

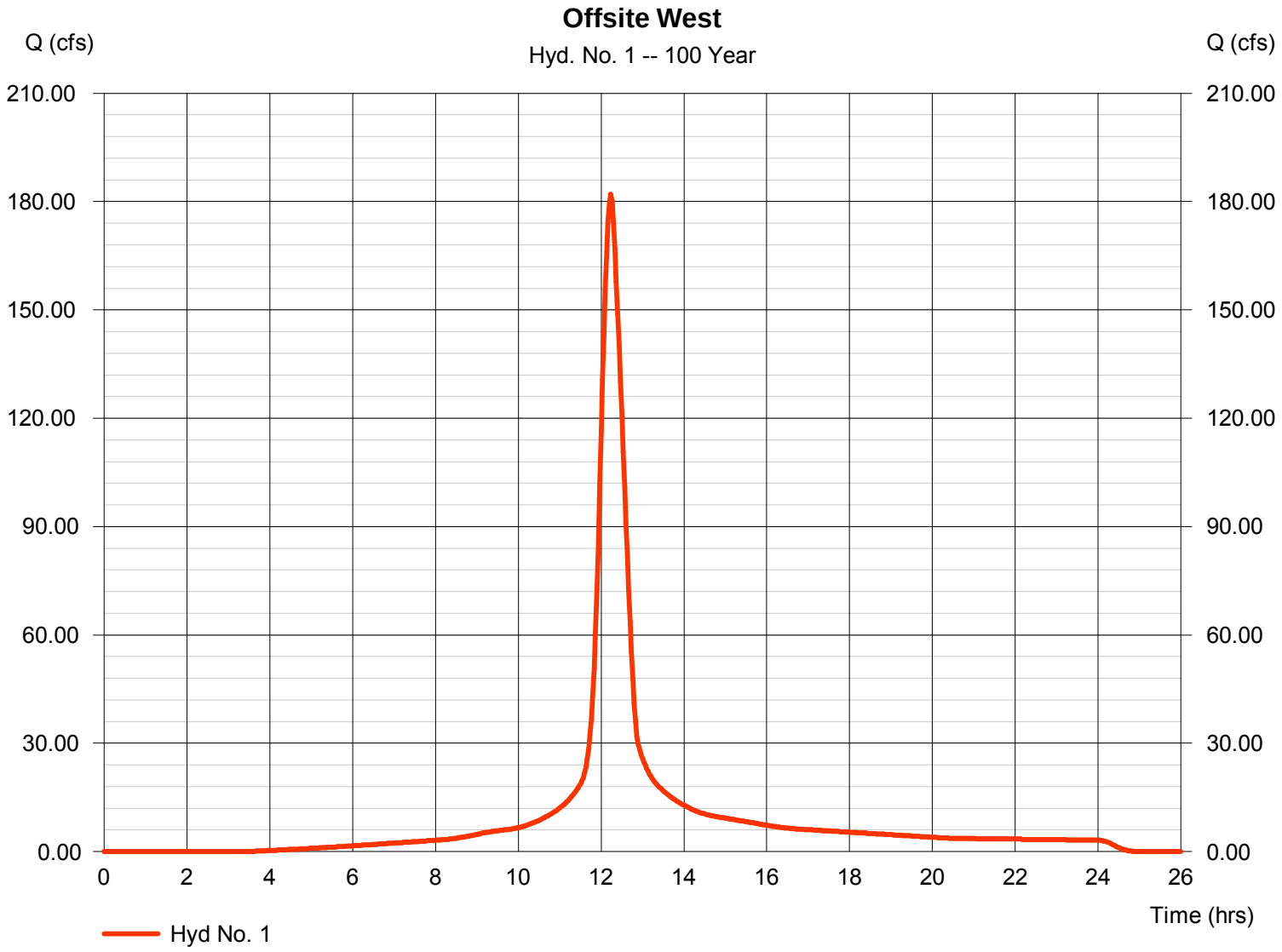
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	181.96	2	734	853,064	------	------	------	Offsite West
2	Reservoir	102.62	2	754	839,738	1	1338.52	346,851	Reserve B West
3	Reach	101.13	2	758	839,715	2	------	------	Channel Section
4	SCS Runoff	143.72	2	736	732,575	------	------	------	Basin A
5	Combine	205.22	2	744	1,572,290	3, 4	------	------	Runoff to North Pond
6	Reservoir	118.51	2	774	1,548,055	5	1331.65	483,148	Reserve B East Detenti
7	SCS Runoff	94.39	2	722	285,704	------	------	------	Developed B
8	Reservoir	8.217	2	762	273,430	7	1329.05	176,345	South East Detention
9	SCS Runoff	140.67	2	762	1,185,692	------	------	------	Existing Total Site

Hydrograph Report

Hyd. No. 1

Offsite West

Hydrograph type	=	SCS Runoff	Peak discharge	=	181.96 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	853,064 cuft
Drainage area	=	37.300 ac	Curve number	=	88
Basin Slope	=	0.7 %	Hydraulic length	=	1300 ft
Tc method	=	LAG	Time of conc. (Tc)	=	35.60 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



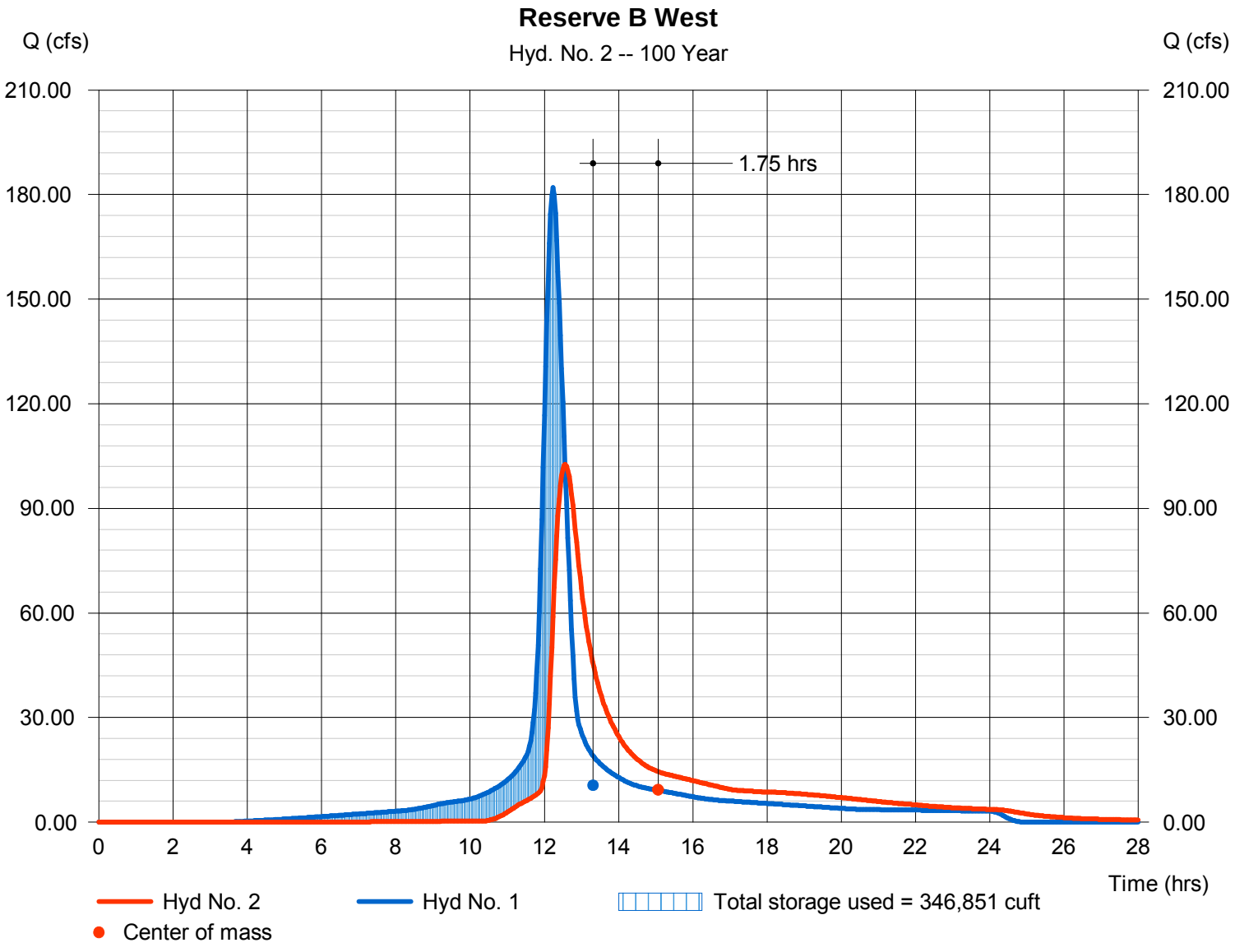
Hydrograph Report

Hyd. No. 2

Reserve B West

Hydrograph type	= Reservoir	Peak discharge	= 102.62 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.57 hrs
Time interval	= 2 min	Hyd. volume	= 839,738 cuft
Inflow hyd. No.	= 1 - Offsite West	Max. Elevation	= 1338.52 ft
Reservoir name	= Reserve B West Detention	Max. Storage	= 346,851 cuft

Storage Indication method used.



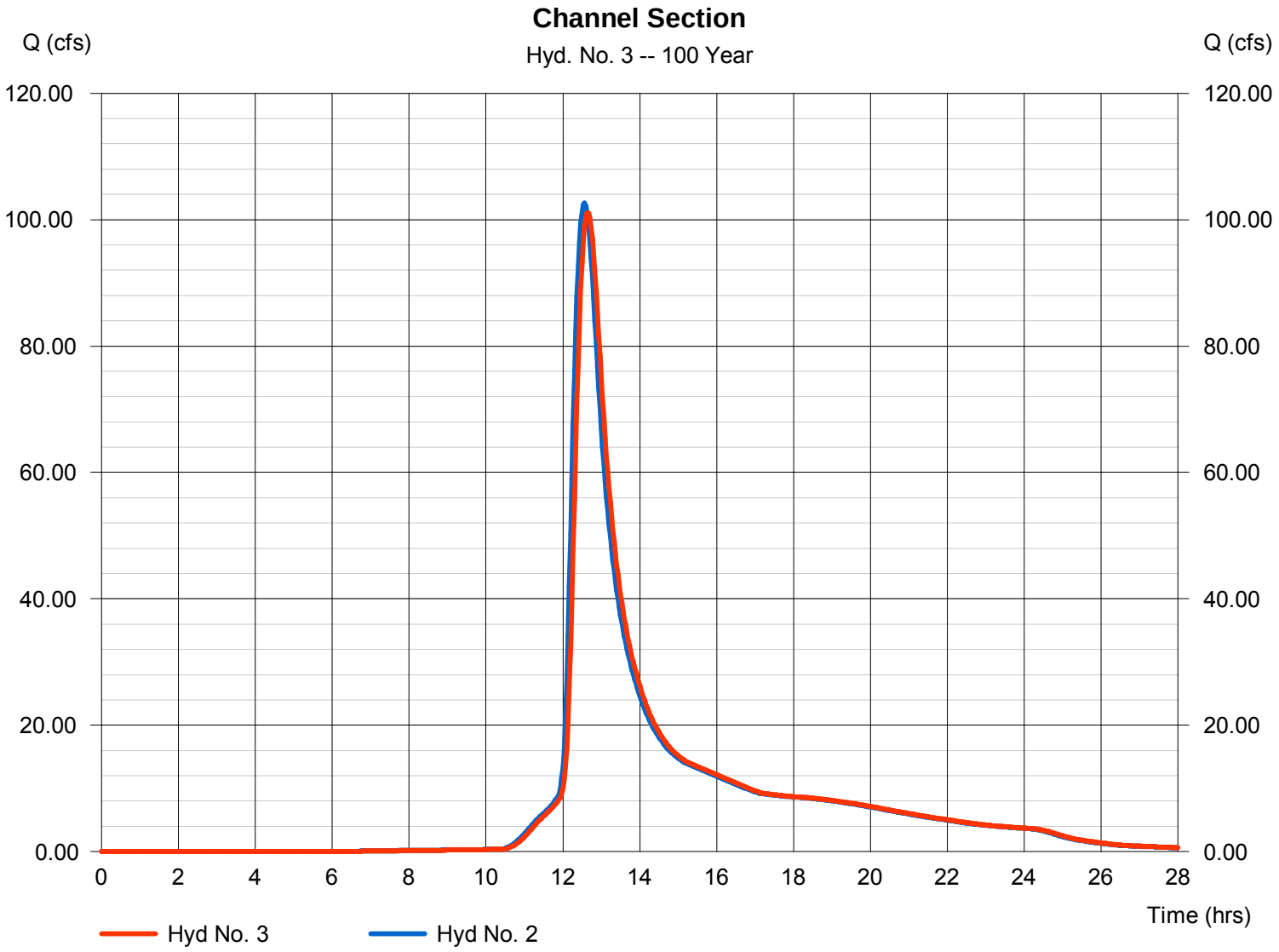
Hydrograph Report

Hyd. No. 3

Channel Section

Hydrograph type	=	Reach	Peak discharge	=	101.13 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.63 hrs
Time interval	=	2 min	Hyd. volume	=	839,715 cuft
Inflow hyd. No.	=	2 - Reserve B West	Section type	=	Trapezoidal
Reach length	=	1300.0 ft	Channel slope	=	0.3 %
Manning's n	=	0.020	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	5.0 ft
Rating curve x	=	1.395	Rating curve m	=	1.341
Ave. velocity	=	4.16 ft/s	Routing coeff.	=	0.4097

Modified Att-Kin routing method used.

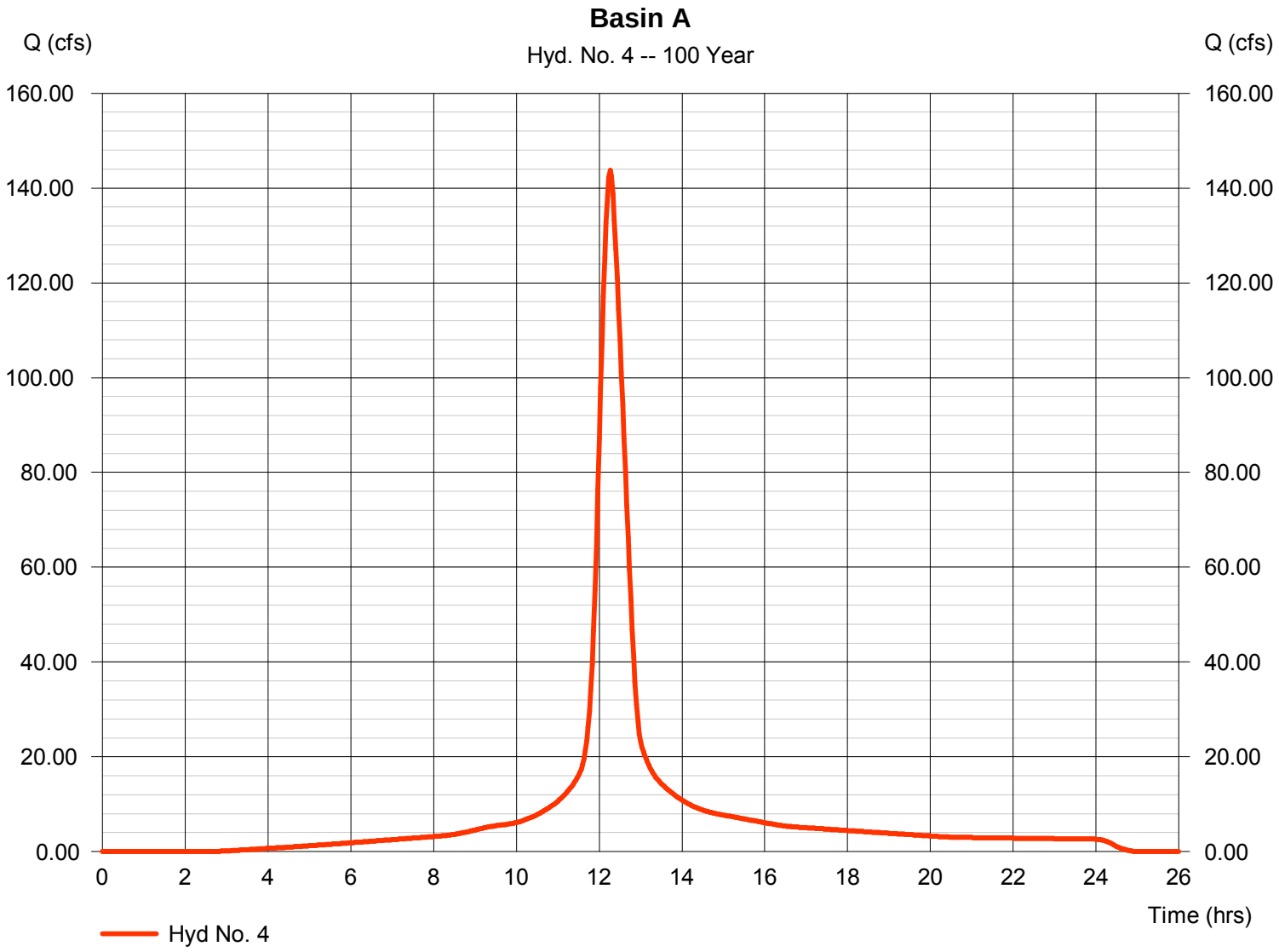


Hydrograph Report

Hyd. No. 4

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 143.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 732,575 cuft
Drainage area	= 30.000 ac	Curve number	= 91
Basin Slope	= 0.4 %	Hydraulic length	= 1200 ft
Tc method	= LAG	Time of conc. (Tc)	= 39.20 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

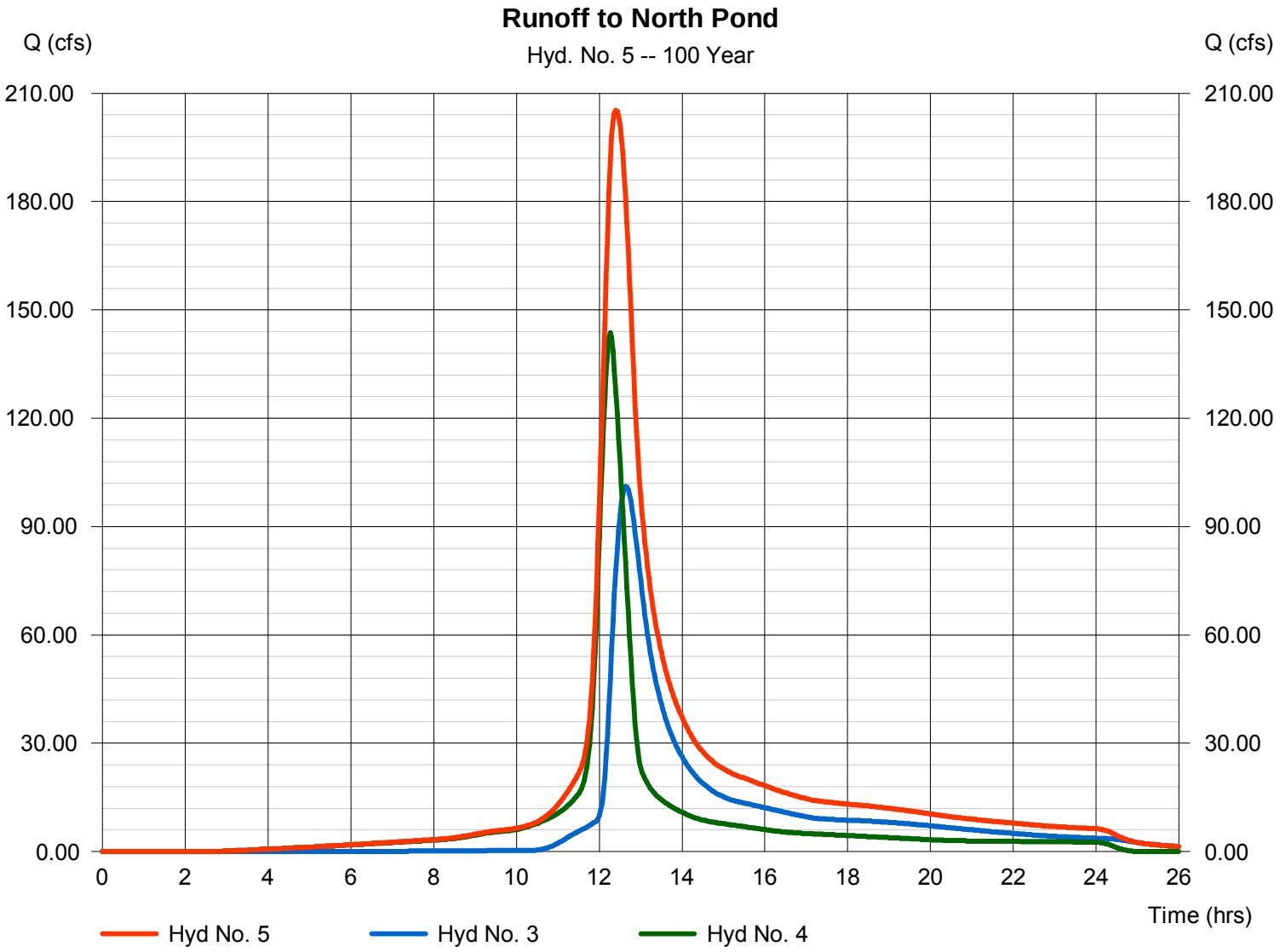


Hydrograph Report

Hyd. No. 5

Runoff to North Pond

Hydrograph type	= Combine	Peak discharge	= 205.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 1,572,290 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 30.000 ac



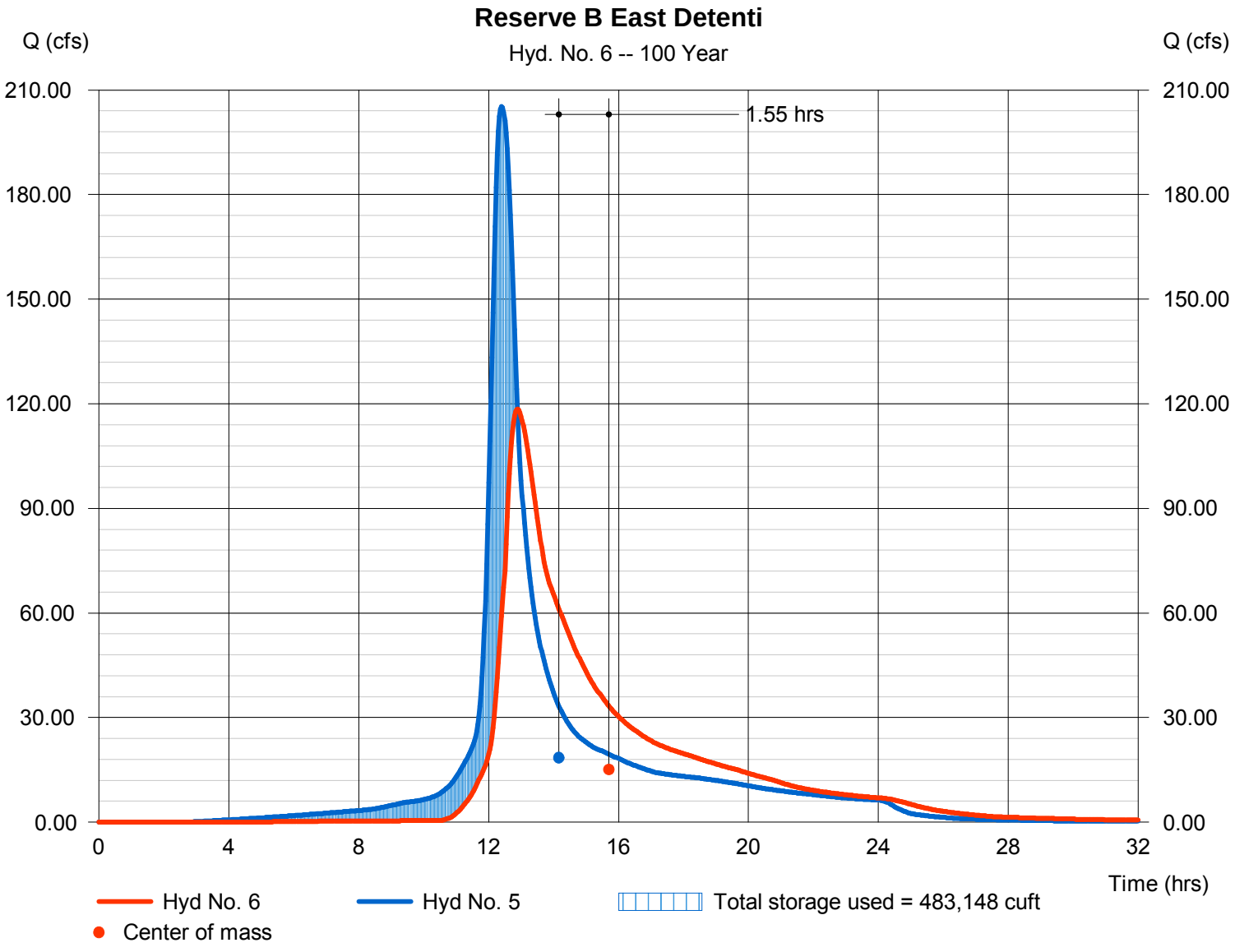
Hydrograph Report

Hyd. No. 6

Reserve B East Detenti

Hydrograph type	= Reservoir	Peak discharge	= 118.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.90 hrs
Time interval	= 2 min	Hyd. volume	= 1,548,055 cuft
Inflow hyd. No.	= 5 - Runoff to North Pond	Max. Elevation	= 1331.65 ft
Reservoir name	= Reserve B East Detention	Max. Storage	= 483,148 cuft

Storage Indication method used.

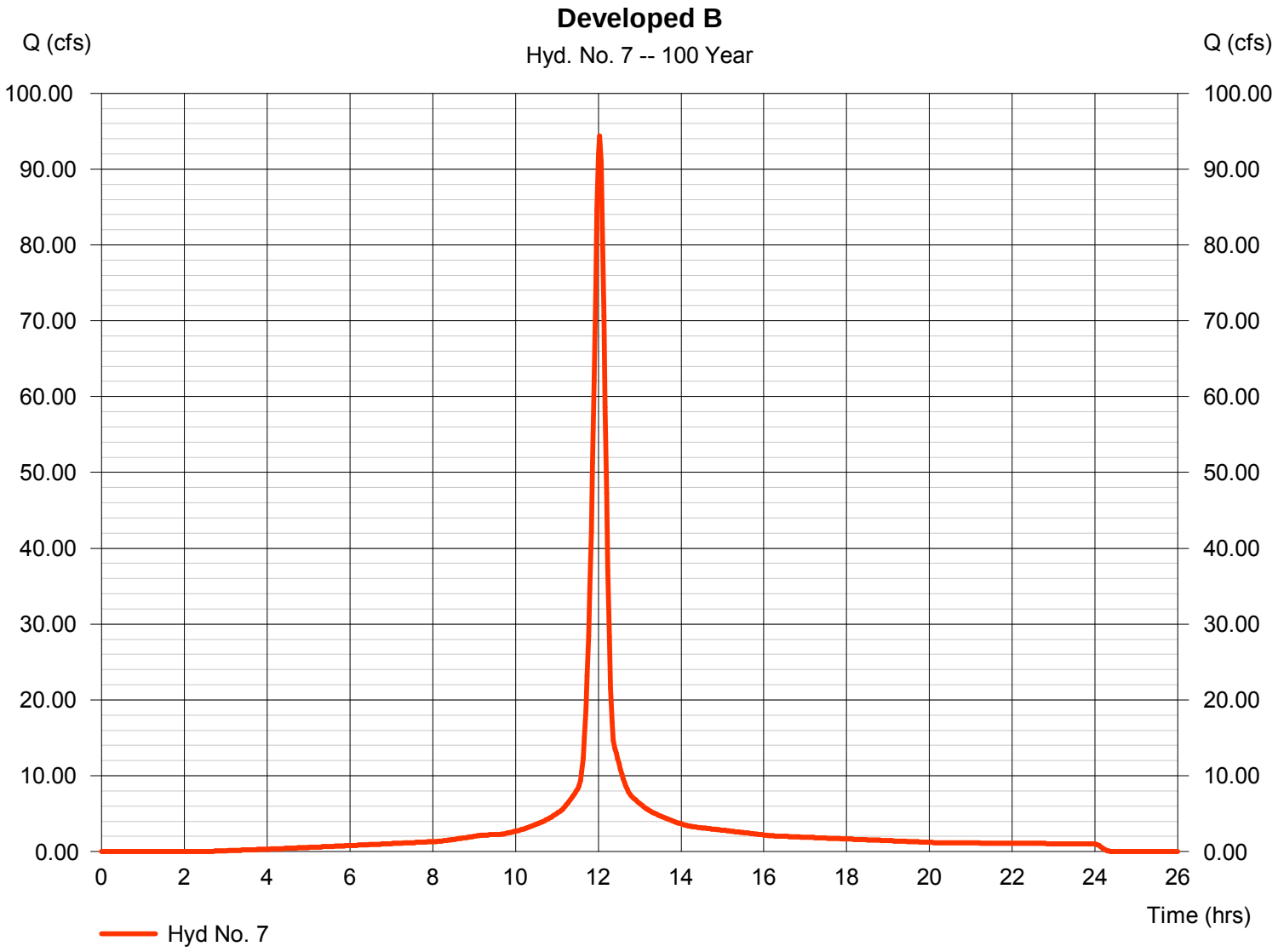


Hydrograph Report

Hyd. No. 7

Developed B

Hydrograph type	= SCS Runoff	Peak discharge	= 94.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 285,704 cuft
Drainage area	= 12.000 ac	Curve number	= 91
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



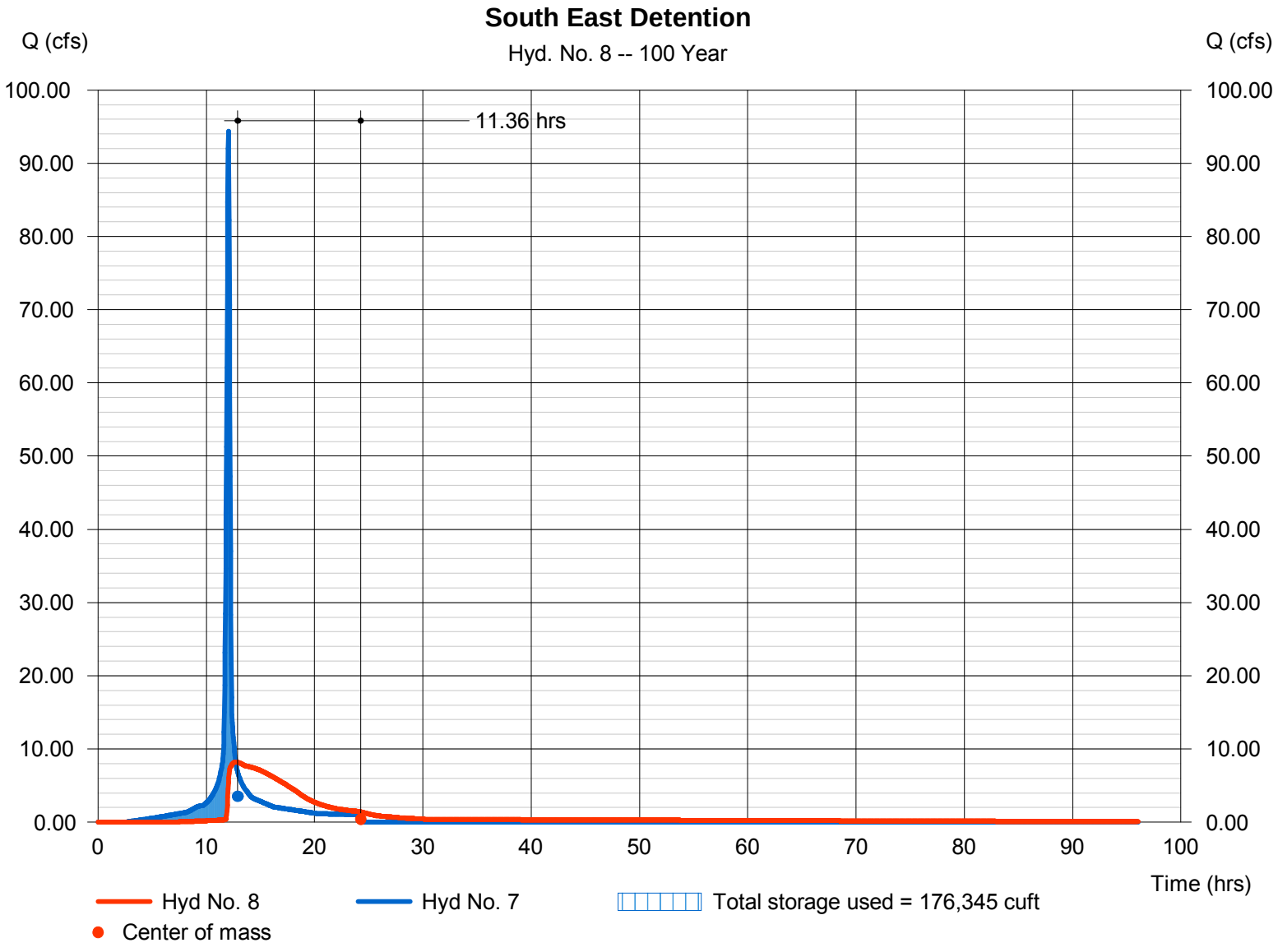
Hydrograph Report

Hyd. No. 8

South East Detention

Hydrograph type	=	Reservoir	Peak discharge	=	8.217 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.70 hrs
Time interval	=	2 min	Hyd. volume	=	273,430 cuft
Inflow hyd. No.	=	7 - Developed B	Max. Elevation	=	1329.05 ft
Reservoir name	=	Reserve A Detention	Max. Storage	=	176,345 cuft

Storage Indication method used.

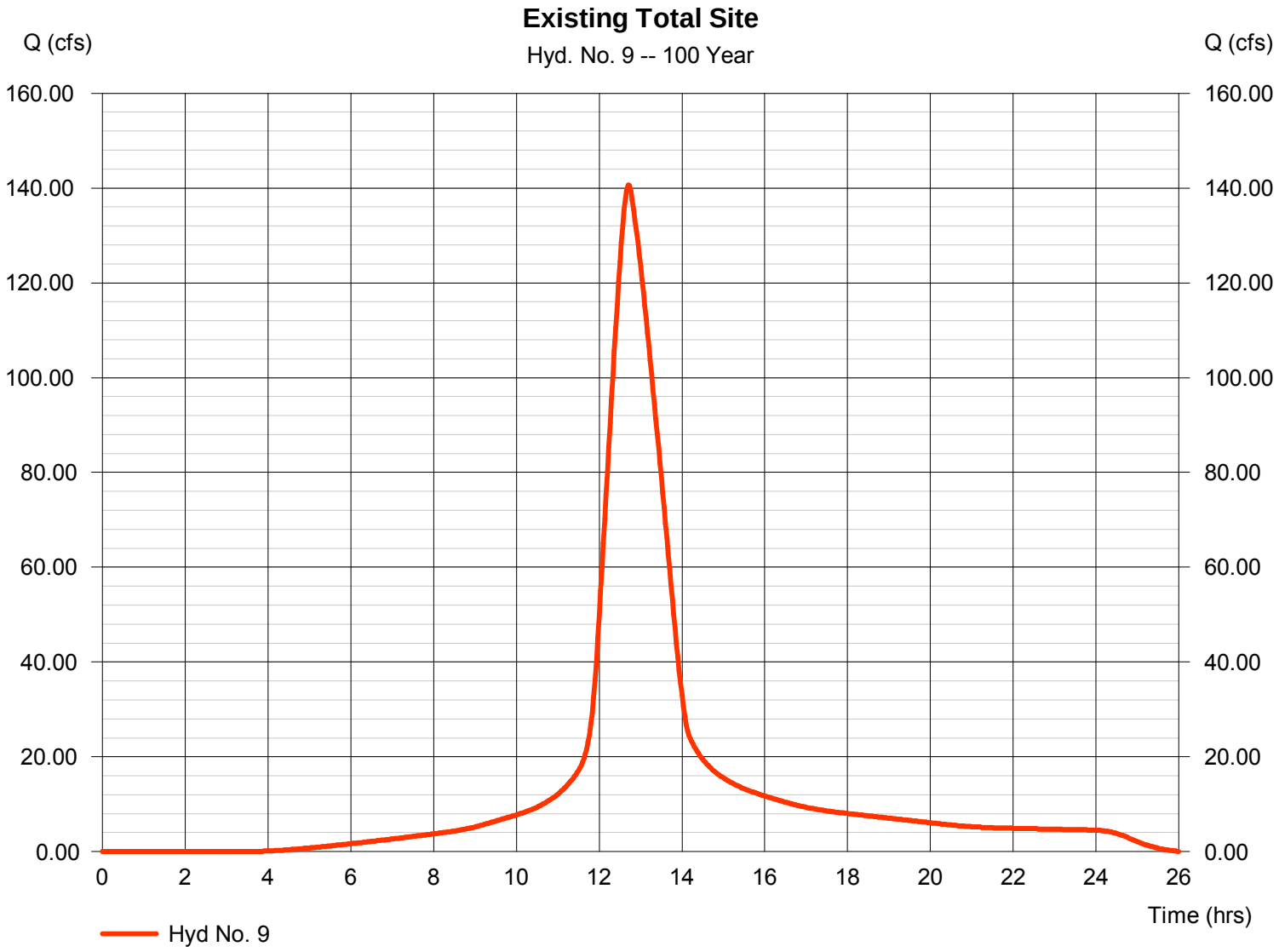


Hydrograph Report

Hyd. No. 9

Existing Total Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	140.67 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.70 hrs
Time interval	=	2 min	Hyd. volume	=	1,185,692 cuft
Drainage area	=	51.000 ac	Curve number	=	88
Basin Slope	=	0.4 %	Hydraulic length	=	2600 ft
Tc method	=	LAG	Time of conc. (Tc)	=	82.10 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	27.8967	9.8000	0.7047	--------
2	76.3137	14.3000	0.8844	--------
3	1.2000	0.1000	0.0000	--------
5	52.6224	11.2000	0.7497	--------
10	55.1841	11.1000	0.7229	--------
25	60.7012	11.1000	0.7068	--------
50	66.9222	11.3000	0.7004	--------
100	62.2794	10.1000	0.6624	--------

File name: wich_IDF.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	4.18	3.40	2.90	2.55	2.29	2.08	1.91	1.78	1.66	1.56	1.48	1.40
2	5.57	4.54	3.85	3.35	2.97	2.67	2.43	2.23	2.06	1.92	1.80	1.69
3	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
5	6.52	5.33	4.55	3.99	3.57	3.24	2.97	2.75	2.57	2.41	2.27	2.15
10	7.40	6.09	5.22	4.60	4.13	3.76	3.46	3.21	3.00	2.82	2.67	2.53
25	8.51	7.03	6.05	5.35	4.81	4.39	4.05	3.76	3.52	3.32	3.14	2.98
50	9.47	7.86	6.78	6.00	5.41	4.94	4.56	4.24	3.98	3.75	3.55	3.37
100	10.31	8.53	7.37	6.53	5.90	5.40	5.00	4.66	4.37	4.13	3.92	3.73

Tc = time in minutes. Values may exceed 60.

Precip. file name: wich_24hr.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	2.80	3.50	1.20	4.50	5.20	6.10	6.90	7.80
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
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	1.75	0.00	2.80	3.90	5.25	6.00	7.10

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HydraFlow Express

Channel Sections AA & BB

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Tuesday, Nov 1 2011

<Name>

Trapezoidal

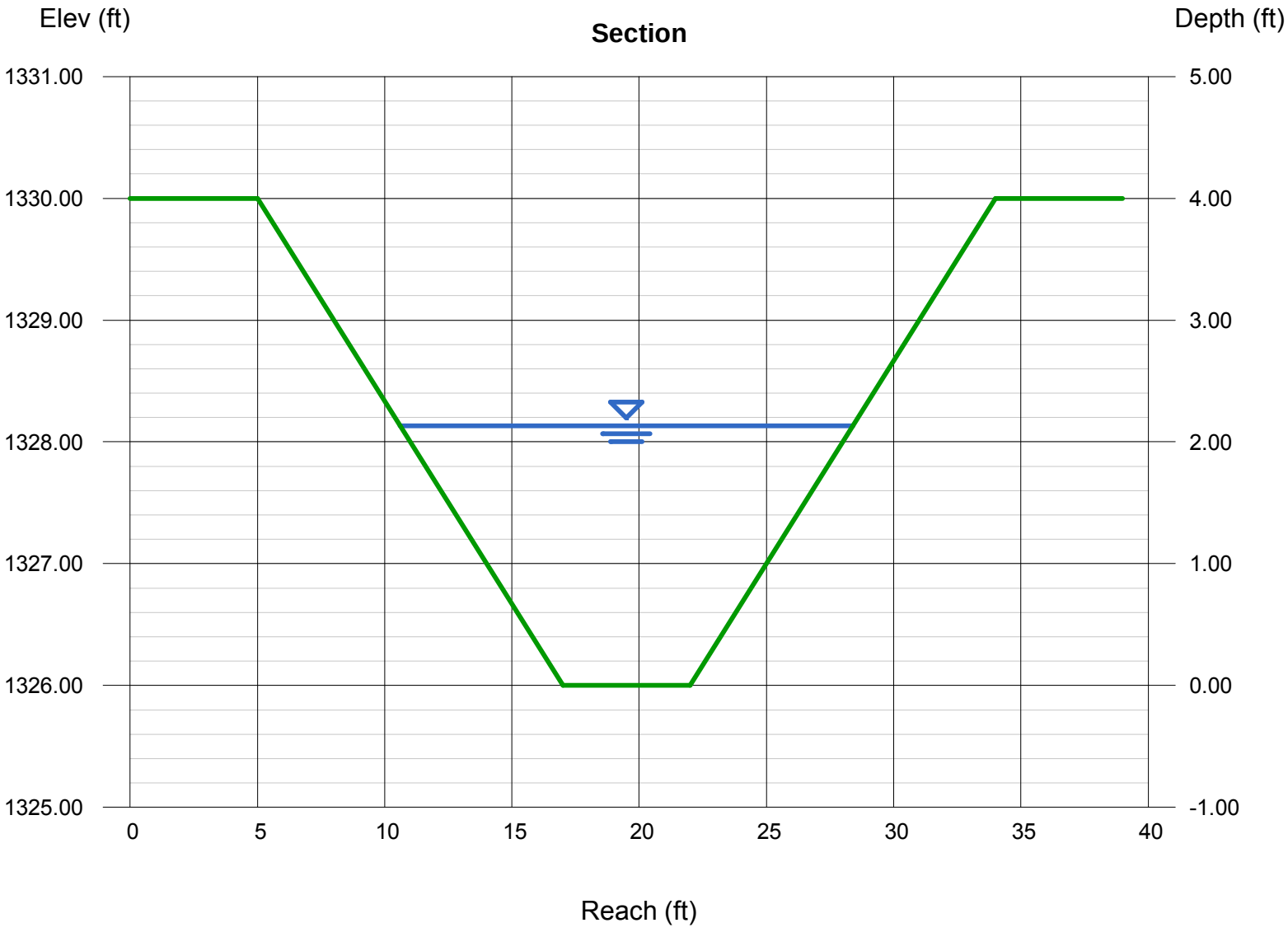
Bottom Width (ft)	= 5.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1326.00
Slope (%)	= 0.30
N-Value	= 0.020

Calculations

Compute by:	Q vs Depth
No. Increments	= 15

Highlighted

Depth (ft)	= 2.13
Q (cfs)	= 118.81
Area (sqft)	= 24.32
Velocity (ft/s)	= 4.89
Wetted Perim (ft)	= 18.49
Crit Depth, Yc (ft)	= 1.58
Top Width (ft)	= 17.80
EGL (ft)	= 2.50



Channel Report

Channel BB

Trapezoidal

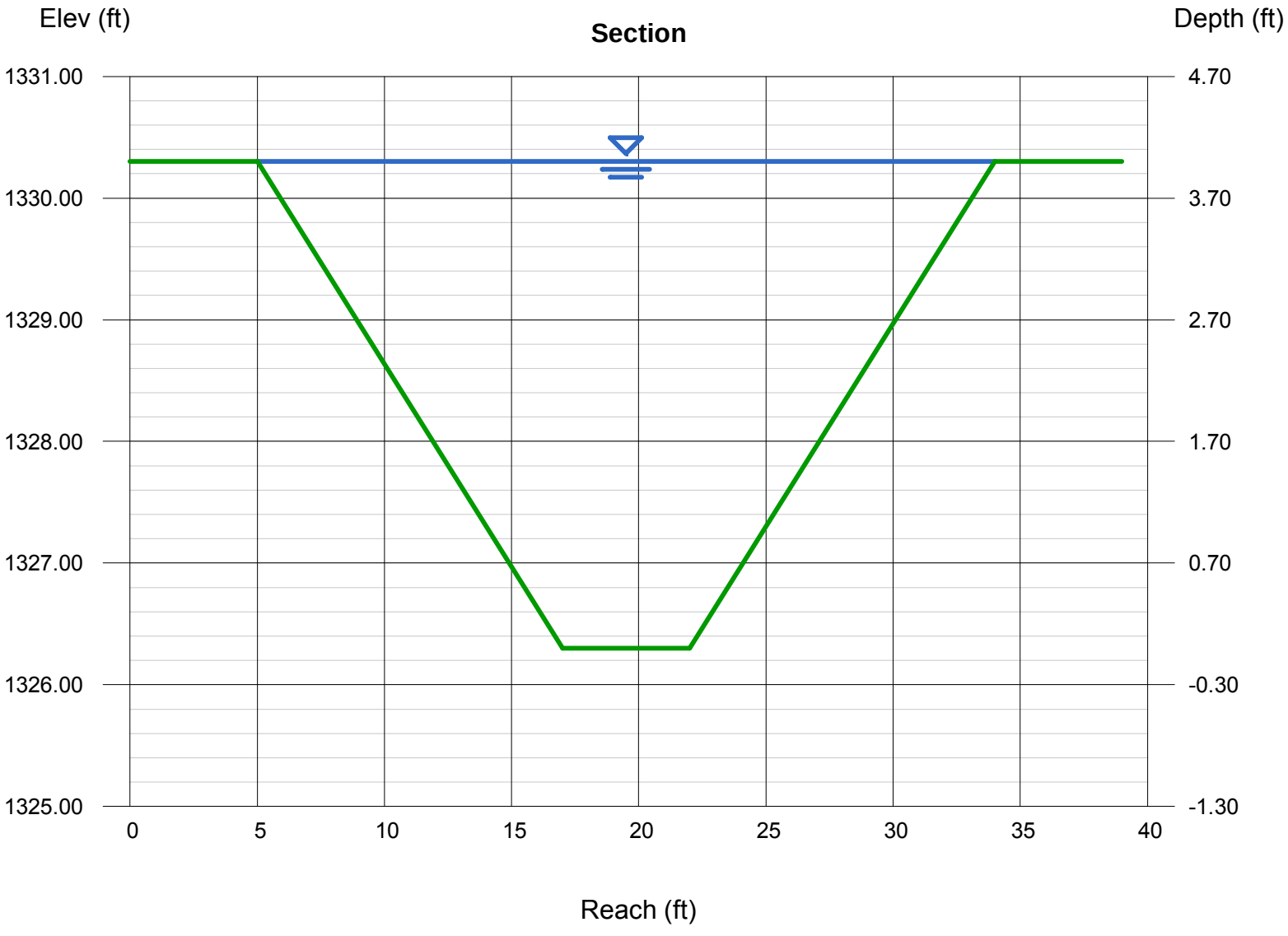
Bottom Width (ft)	= 5.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1326.30
Slope (%)	= 0.20
N-Value	= 0.027

Calculations

Compute by:	Q vs Depth
No. Increments	= 15

Highlighted

Depth (ft)	= 4.00
Q (cfs)	= 286.98
Area (sqft)	= 68.00
Velocity (ft/s)	= 4.22
Wetted Perim (ft)	= 30.30
Crit Depth, Yc (ft)	= 2.63
Top Width (ft)	= 29.00
EGL (ft)	= 4.28



Drainage Plan

1:100 Scale