

DRAINAGE PLAN
THE RANCH
TO
WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY



18 JUNE 2013



DRAINAGE PLAN THE RANCH

FINAL REPORT

Prepared by Baughman Company, P.A.
18 June 2013

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

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PROJECT NARRATIVE

EXISTING CONDITIONS

The site is located at the south west corner of 21st Street North and 159th Street East in eastern Wichita. The site is currently a private ranch type residence with horse barns, ponds, and open space. There is a berm along 159th Street East and also a berm located along the commercial property at the intersection. The total site area is approximately 66 acres. There is offsite flow from the north and from the west that crosses this property and drains to the south. This entire property ultimately drains to the south and under the abandoned railroad property. There is no FEMA SFHA located on this property as of this report. The drainage patterns as defined above can be seen on the Aerial (Exhibit 2).

PROPOSED CONDITIONS

The property is being platted as a residential subdivision with large estate lots. The site will contain a private street, public water, sewer, and storm sewer, and detention facilities for the site's runoff. The lots will generally drain to the center of the property into the detention ponds and then south and through the existing RCBC under the abandoned railroad. The detention facilities proposed will serve the property for detention of the storm water across all storm events as well as meet the City of Wichita's water quality and channel protection requirements. For a half-scale copy of the Plat, see Exhibit 3.

OFFSITE CONDITIONS

The site currently accepts runoff from the north through a 3x4 RCBC under 21st Street. This box drains approximately 57 acres which is currently partially developed and planned for residential and commercial developments. Due to upstream ponds and channels, the capacity of the box structure before overtopping the adjacent roadway has been used for the peak flow analysis for the proposed site. There is also offsite runoff entering the property along the west line approximately 500 feet north of the south property line. Based on site visits, there does not appear to be any flow from the west entering the property (primarily due to the elevated tree row on the property line) besides the one described above.

The site, and offsite runoff, flows to the south line of the property and is conveyed offsite through a 10x10 RCBC under the abandoned roadway. This area is heavily treed and channelized at this point. There is no mapped FEMA floodplain on this property or within ½ mile of the site as of this report.

The overall site location and hydrogeodatabase can be seen with the site location plotted as Exhibit 1.

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 for Existing Flows (84 – Pre-developed or undisturbed).
 - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site is currently undeveloped and consists of ponds, berms, trees, internal gravel roads, and horse barns and associated sheds. The site generally drains to the mid-section of the property to the ponds and then to the south and offsite to the adjacent south property. There is a ditch section from the north which drains offsite runoff from the north.

The existing site characteristics can be seen from the aerial exhibit (Exhibit 2).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The site was analyzed for pre-developed conditions using the SCS Curve Number Method for the entire range of storm events. A Curve Number of 84 was used based on undisturbed area in Type D soils. Offsite areas had a CN of 80 based on varying soil types and large drainage areas. There is detention located to the north in a develop area which was not accounted for in this analysis (full undeveloped flow was assumed for this property as well as upstream box culvert capacities). The site was modeled using the existing ponds and their detention value as well as incorporating all offsite runoff to these respective areas. Times of concentration were figured for each basin with a minimum of 15 minutes used for the smaller basins with shorter times.

There is offsite runoff from the north that encroaches this site which enters under 21st Street in a new 3'x4' RCBC. For the purpose of this plan, the RCBC was maxed out for capacity before overtopping the roadway. This was done due to the conflicting data from north offsite platted properties' drainage plans as well as the design for the RCBC. There are currently pond systems and ditch sections in the northern partially developed properties.

There is offsite runoff from the west which encroaches this property currently. This area appears to follow the west line (the tree row is elevated separating the

properties) until the runoff encroaches the subject property approximately 500' north of the south line. The runoff currently does not flow into the south, instead bypassing it just to the south of the outfall and into the channel and then through the railroad box culvert. The pond system was routed without this flow in the existing conditions, and the peak flow was then added in for the ultimate discharge at the south discharge point.

DOWNSTREAM DRAINAGE CAPACITY

The existing site drains to the south (through the center of this site in a series of ponds) to an existing 10'x10' RCBC under the former railroad ROW. There appears to be a defined channel on the adjacent property to the south as well as another detention pond within ½ mile downstream. There is no development within a ½ mile of the south property line as it pertains to the drainage pattern. We are not aware of any drainage problems in the downstream vicinity of this property.

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 = varies (Soil Type D – varies based on disturbance/impervious)
 - 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
 - Minimum 2% cross lot grading – Developer requirements

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is proposed to be developed into a multiple lot residential subdivision with large (5+ acres) estate lots on the east side and ¾ acre lots to the west of the ponds. The site will have all onsite utilities, curb and gutter streets, water, sewer, and detention facilities. There are currently 3 separate surface water ponds (low areas) that hold water on the site. These areas will be cleaned and over-excavated for storage of developed flows as well as for onsite amenities. The pond systems will also serve the site for water quality and channel protection requirements.

Curve Numbers were used based on the Storm Water Manual. The estates lots utilized a CN of an 84 which would correspond to undisturbed areas. These areas, although they will have a structure, will be left untouched during the mass grading process and the structure will account for less than 10% of the lot area. The smaller lots to the west have a CN of 87 based on a composite of disturbed areas on the lot and undisturbed areas on the lot. These lots are larger than typical residential lots and we expect approximately 20-25% impervious coverage.

Onsite storm water sewer will be extended to the rear of some lots with private storm sewer extended to the majority of the lots along the west line. These lots will be sized and installed by the owner to obtain the developer mandated 2% rear yard cross lot grading.

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. All detention ponds are proposed to be wet surface ponds and will be used for amenities as well as

quantity and quality controls to meet current City of Wichita requirements. Each facility is detailed further below.

➤ North Pond

The northernmost pond will expand on the current pond and will directly accept offsite runoff from the north. This pond will have a static water surface elevation at a 1356.5 and a corresponding 100-year peak elevation at a 1360.1. This pond will discharge to the middle pond via 2-24" pipes at static elevation and a 5' concrete weir at elevation 1358.2.

➤ Middle Pond

The middle pond will primarily be the same dimensions of the existing pond in this location, except will deepen the pool and re-work the banks to manageable slopes. The pond will accept developed runoff from the surrounding residential lots as well as discharge from the upper north pond. This detention facility will have a static water surface elevation of a 1354.0 and a corresponding 100-year water surface of a 1356.6. This pond will be designed and built around existing trees and hedge rows. This pond will replace existing undersized outfall pipe with a 36" RCP with an inlet drop structure at static elevation. The outfall will consist of a KDOT style inlet and grate at static with the pipe flowline 4' lower at a 1350.0. This pond will overflow the entrance road in emergency situations before entering any structures along the east and west banks.

➤ South Pond

The south pond will primarily stay as it is existing. Minor re-grading and expansion is expected along the east bank and where the middle ponds outfall will discharge. The pond will have a static water surface elevation at 1348.6 and a 100-year design water surface at elevation 1351.9. This pond will also accept and detain the runoff from the offsite west agricultural property as well as onsite developed runoff. The pond will discharge via the existing 24" RCP with drop inlet. However, a 5" orifice will be cut into the side of the existing drop structure at elevation 1348.6 (or will be installed separately with as a PVC pipe). The top of the inlet/riser structure will remain at elevation 1349.14. A 16' concrete weir will also be used for larger storm events and will be at elevation 1350.2. The orifice and drop structure have been sized for the channel protection volume as well as the wide range of detention for all the storm events.

DISCHARGE POINTS SUMMARY

The site will discharge to the existing channel section just downstream of the south pond. This area will remain as existing as possible due to the already formed channel and location of the existing trees. The railroad box culvert is located just off the south property line and approximately 400' south of the southern pond. After re-configuration of the pond system, this site will detain more and discharge less than the site currently does throughout the storm series.

WATER QUALITY

Water calculations have been performed and are included. The site will treat the developed runoff within the static pool surface of the 3 ponds. The 3 pond system will provide almost 25 ac-ft of storage. The site, when fully developed, will produce only 3 ac-ft of water quality runoff needed for treatment. The pond outfalls are located at the extreme ends from the inlets and therefore should not short circuit and allow sediment to settle.

The WQ calculations can be found in the Appendix.

DOWNSTREAM CHANNEL PROTECTION

Downstream channel protection is difficult to calculate in a multiple pond system especially with offsite runoff encroaching the system. Since this issue is not directly addressed in the Manual, we have calculated the orifice using the simplified method and only using the local flow – not the offsite flows (since these, in theory, should also be utilizing the extended detention once developed). For accomplishing this, we calculated the amount of channel protection volume needed using Hydraflow by subtracting the existing channel protection events volume from the developed conditions. From here, we came up with a flow rate based on the 24 hour and 48 hour time frames. The orifice equation was used to size a pipe for each time interval using the corresponding flow rate that was needed. We feel this is a conservative approach to this as the upper ponds will display some channel protection extended detention whereas the calculations do not account for any. As was stated previously, this particular pond series is not discussed in the manual so we have hand calculated an orifice size to best fit the system and to limit the change in volume over the 24-48 hour time interval.

The CP calculations can be found in the Appendix.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

Due to the construction of detention ponds, and the utilization of the existing outfall elevations, we do not anticipate any downstream impacts with this development. The site will accept all offsite runoff; therefore, no upstream impacts are expected. The site will also treat the required runoff for water quality purposes and provide extended detention for the channel protection storm.

FLOODPLAIN SUBMITTAL

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X - Unshaded. The location of the property, on FEMA FIRM Panel 385 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 640 acres (1 square mile).

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 associated with this project.

SEDGWICK COUNTY PERMITTING

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

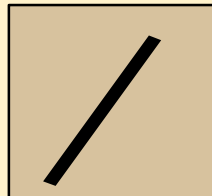
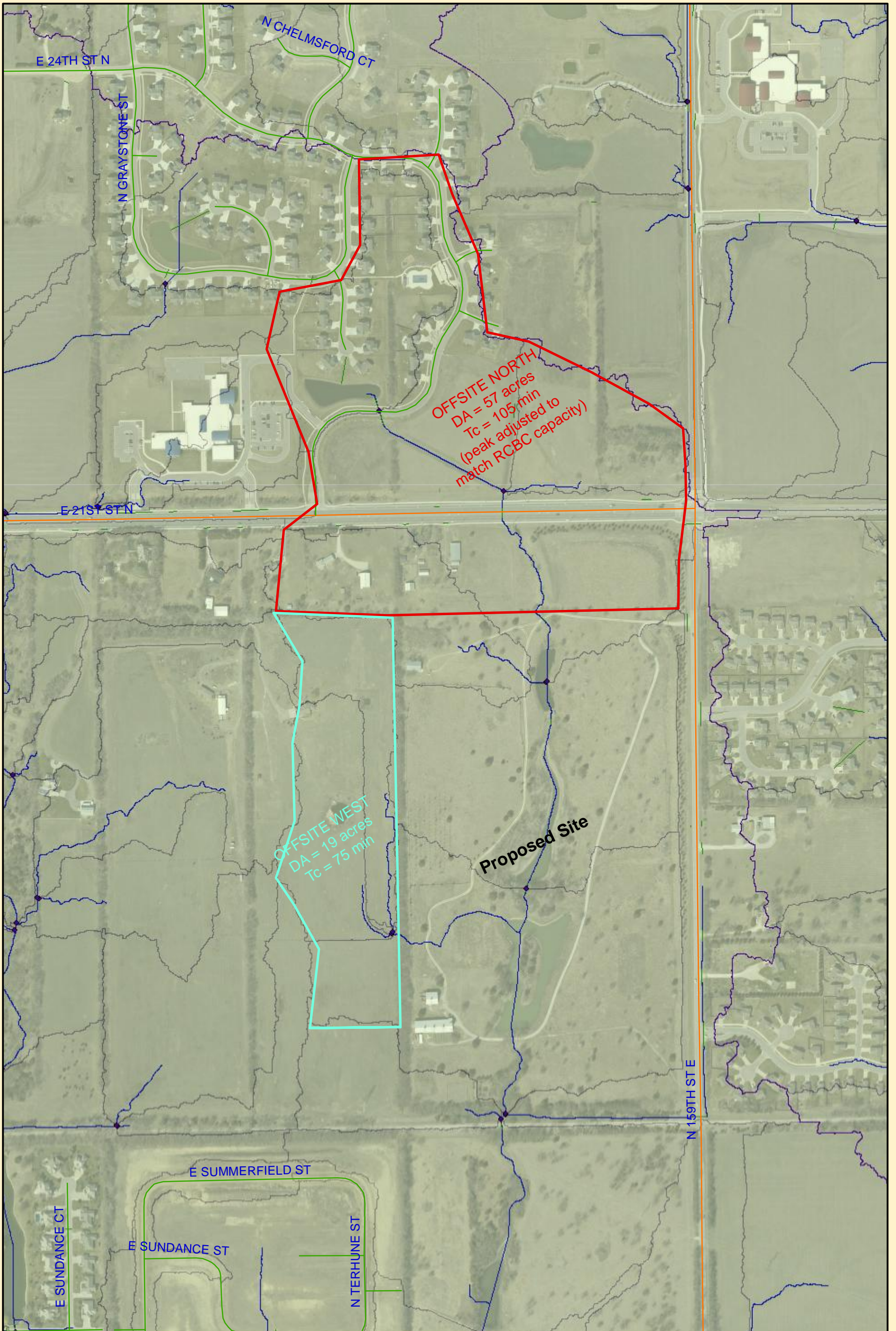
EXHIBIT 1: Site Location Map

EXHIBIT 2: Aerial Photo Exhibit with Lidar Topography

EXHIBIT 3: Plat – Half Scale

EXHIBIT 4: Drainage Plan – Half Scale

EXHIBIT 5: Floodplain Location (FIRM)



THE RANCH





THE RANCH



THE RANCH

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

- #4 REBAR W/ "BAUGHMAN" CAP (SET)
- #4 REBAR (FOUND) (ORIGIN UNKNOWN)
- △ #4 REBAR W/ "PEC" CAP (FOUND)
- SEDGWICK COUNTY METAL CAP (FOUND)
- ◇ 5/8" IRON PIPE IN THIMBLE (FOUND)
- ▽ 3/4" IRON PIPE (FOUND)

- (M) = MEASURED
- (P) = PLATTED
- (C) = CALCULATED
- (D) = DESCRIBED
- (CM) = CALCULATED PER MEASURED INFO.
- (CD) = CALCULATED PER DESCRIBED INFO.
- (QM) = QUARTER SECTION MEASUREMENT

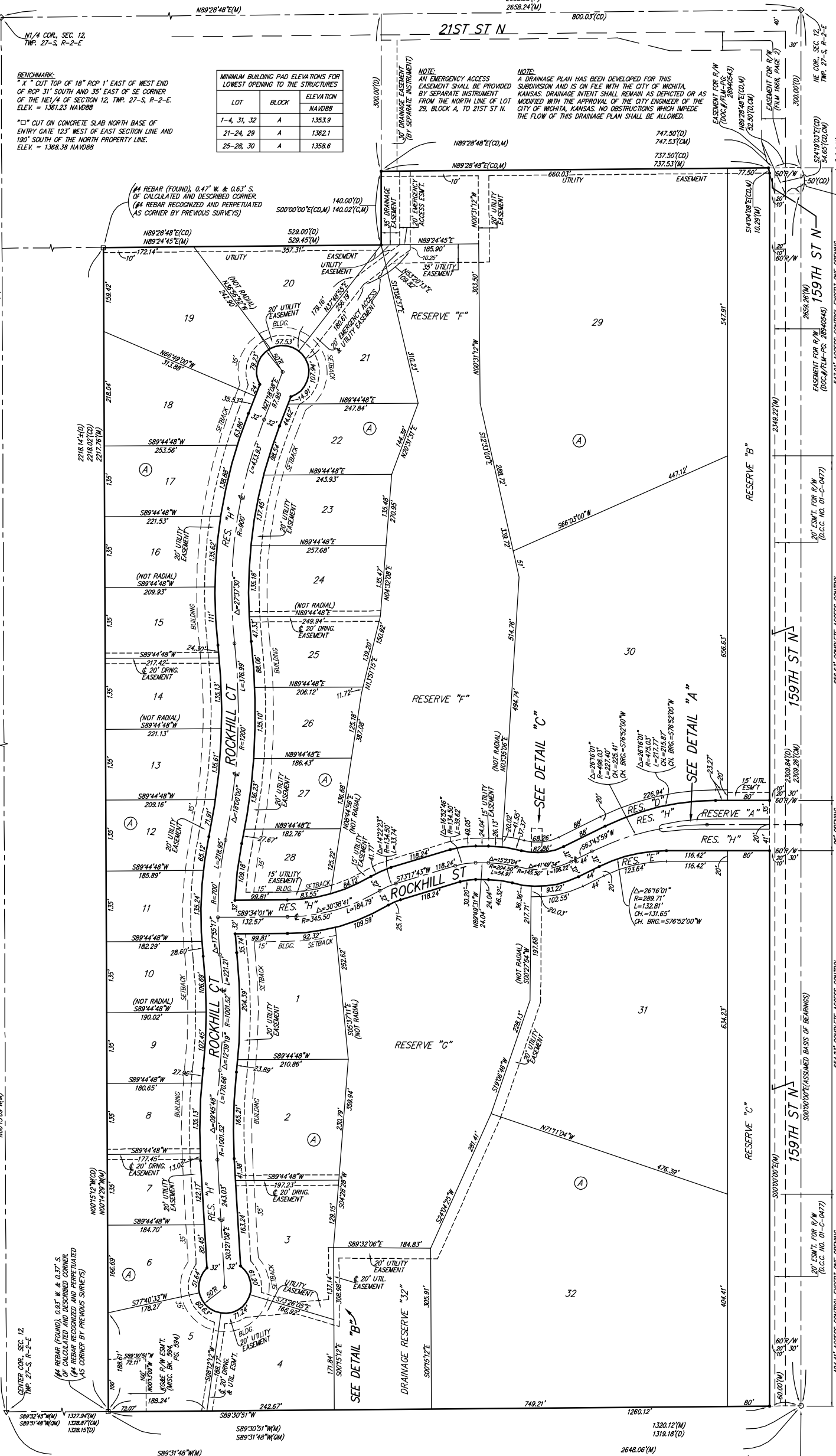
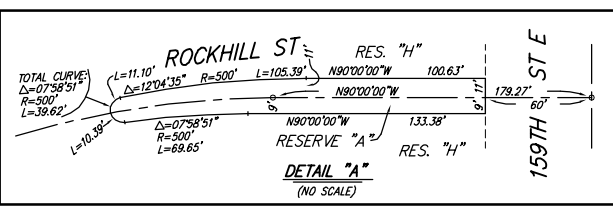
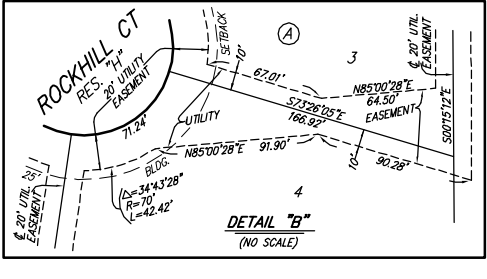
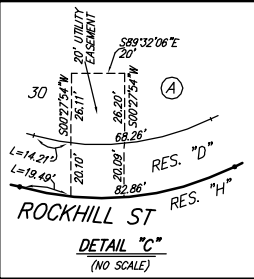
State of Kansas) SS We, Baughman Company, P.A., Surveyors in aforesaid Sedgwick County) county and state do hereby certify that we have surveyed and platted "THE RANCH", an Addition to Wichita, Sedgwick County, Kansas and that the accompanying plat is a true and correct exhibit of the property surveyed, described as follows: Commencing at the northeast corner of Section 12, Township 27 South, Range 2 East of the Sixth Principal Meridian, Sedgwick County, Kansas; thence along the east line of said Section 12 a distance of 300.00 feet; thence west, parallel with the north line of said Northeast Quarter, a distance of 52.50 feet to a point on the westerly right-of-way line of 159th Street East as described in Film 1668, Page 2, Sedgwick County Register of Deeds Office, said point being the point of beginning; thence west, parallel with the north line of said Northeast Quarter, a distance of 747.50 feet to a point 800.00 feet west of the east line of said Northeast Quarter; thence south, parallel with said east line, a distance of

140.00 feet to a point 440.00 feet south of the north line of said Northeast Quarter; thence west, parallel with said north line a distance of 529.00 feet; thence south deflecting left 89°44'00", a distance of 2218.14 feet to the south line of said Northeast Quarter; thence east, a distance of 1319.18 feet to the southeast corner of said Northeast Quarter; thence north 2309.84 feet to a point 350.00 feet south of the northeast corner of said Northeast Quarter; thence west, parallel with the north line of said Northeast Quarter, a distance of 30.00 feet; thence northwest along the westerly right-of-way line of said Film 1668, Page 2 to the point of beginning.

All being situated in Northeast Quarter of Section 12, Township 27 South, Range 2 East of the Sixth Principal Meridian, Sedgwick County, Kansas.

Existing public easements and dedications being vacated by virtue of K.S.A. 12-512b, as amended.

Baughman Company, P.A.



LOT	BLOCK	ELEVATION NAVD88
1-4, 31, 32	A	1,353.9
21-24, 29	A	1,362.1
25-28, 30	A	1,358.6

BENCHMARK:
 * X CUT TOP OF 18" ROP 1" EAST OF WEST END OF ROP 31" SOUTH AND 35" EAST OF SE CORNER OF THE NE 1/4 OF SECTION 12, TWP. 27-S, R-2-E. ELEV. = 1361.23 NAVD88
 * C CUT ON CONCRETE SLAB NORTH BASE OF ENTRY GATE 123" WEST OF EAST SECTION LINE AND 190" SOUTH OF THE NORTH PROPERTY LINE. ELEV. = 1368.38 NAVD88

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.

Know all men by these presents that we, the undersigned, have caused the land in the surveyors certificate to be platted into Lots, a Block, a Street, and Reserves to be known as "THE RANCH", an Addition to Wichita, Sedgwick County, Kansas. The utility easements are hereby granted as indicated for the construction and maintenance of all public utilities. The emergency access and utility easement is hereby granted as indicated for emergency access purposes and for the construction and maintenance of all public utilities and no fences or any other obstructions shall be constructed or placed on or within this easement. All utilities installed or constructed within the emergency access and utility easement shall be installed or constructed at or below finished grade. The street is hereby dedicated to and for the use of the public. Reserve "A" is hereby reserved for open space, landscaping, private streets, berms, drainage purposes, sidewalks, entry monuments, and utilities. Reserve "B" is hereby reserved for open space, sidewalks, landscaping, berms, drainage purposes, entry monuments, utilities as confined to easements, and one access corridor over and across the north 548 feet of said Reserve "B" for access purposes to or from 159th Street North for the exclusive benefit of Lot 29, Block A. Reserve "C" is hereby reserved for open space, sidewalks, landscaping, berms, drainage purposes, entry monuments, utilities as confined to easements, and one access corridor over and across the south 404 feet of said Reserve "C" for access purposes to or from 159th Street North for the exclusive benefit of Lot 32, Block A. Reserve "D" is hereby reserved for open space, landscaping, berms, drainage purposes, utilities as confined to easements, and one access corridor over and across said Reserve "D" for access purposes to or from Reserve "H" for the exclusive benefit of Lot 30, Block A. Reserve "E" is hereby reserved for open space, sidewalks, landscaping, berms, drainage purposes, utilities as confined to easements, and one access corridor over and across said Reserve "E" for access purposes to or from Reserve "H" for the exclusive benefit of Lot 31, Block A. Reserves "F" and "G" are hereby reserved for open space, landscaping, berms, sidewalks, gazebos, lakes, drainage purposes, and utilities as confined to easements. Reserve "H" is hereby reserved for open space, entry gates and related appurtenances, landscaping, berms, drainage purposes, sidewalks, utilities, and private streets. Drainage Reserve "32" is hereby reserved for open space, landscaping, and drainage purposes. Drainage Reserve "32" shall be owned and maintained by the owner of Lot 32, Block A. Reserves "A", "B", "C", "D", "E", "F", "G", and "H" shall be owned and maintained by the homeowners association for the addition provided, however, that the undersigned, or the homeowners association, as the undersigned's successor in interest, may, in their discretion, deed a parcel of a Reserve to an owner or owners of an adjacent Lot, subject to the obligation to maintain such deeded parcel of a Reserve in compliance with the provisions hereof and in compliance with the maintenance covenants of any applicable restrictive covenants and/or regulations. Access controls shall be as depicted on the face of the plat and are hereby granted to 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.

Ritchie Associates, Inc.

Kevin M. Mullen, President

State of Kansas) SS The foregoing instrument acknowledged before me, this _____ day of _____, 2013, by Kevin M. Mullen, President of Ritchie Associates, Inc., on behalf of the corporation.

My App't. Exp. _____, Notary Public

We, the undersigned holders of a mortgage on the above described property, do hereby consent to this plat of "THE RANCH", an Addition to Wichita, Sedgwick County, Kansas.

INTRUST Bank, N.A.

State of Kansas) SS The foregoing instrument acknowledged before me, this _____ day of _____, 2013, by _____, Notary Public

My App't. Exp. _____

This plat of "THE RANCH", an Addition to 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 _____, 2013.

Wichita-Sedgwick County Metropolitan Area Planning Commission

David Dennis, Chair
 John L. Schlegel, Secretary

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this _____ day of _____, 2013.

Carl Brewer, Mayor
 Karen Sublett, City Clerk

Reviewed in accordance with K.S.A. 58-2005 on this _____ day of _____, 2013.

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

Entered on transfer record this _____ day of _____, 2013.
 Kelly B. Arnold, County Clerk

State of Kansas) SS This is to certify that this plat has been filed for record in the office of the Register of Deeds, this _____ day of _____, 2013 at _____ o'clock _____ M. and is duly recorded.

Bill Meek, Register of Deeds
 Tonya Buckingham, Deputy



DRAINAGE PLAN

THE RANCH

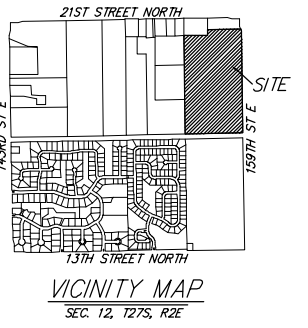
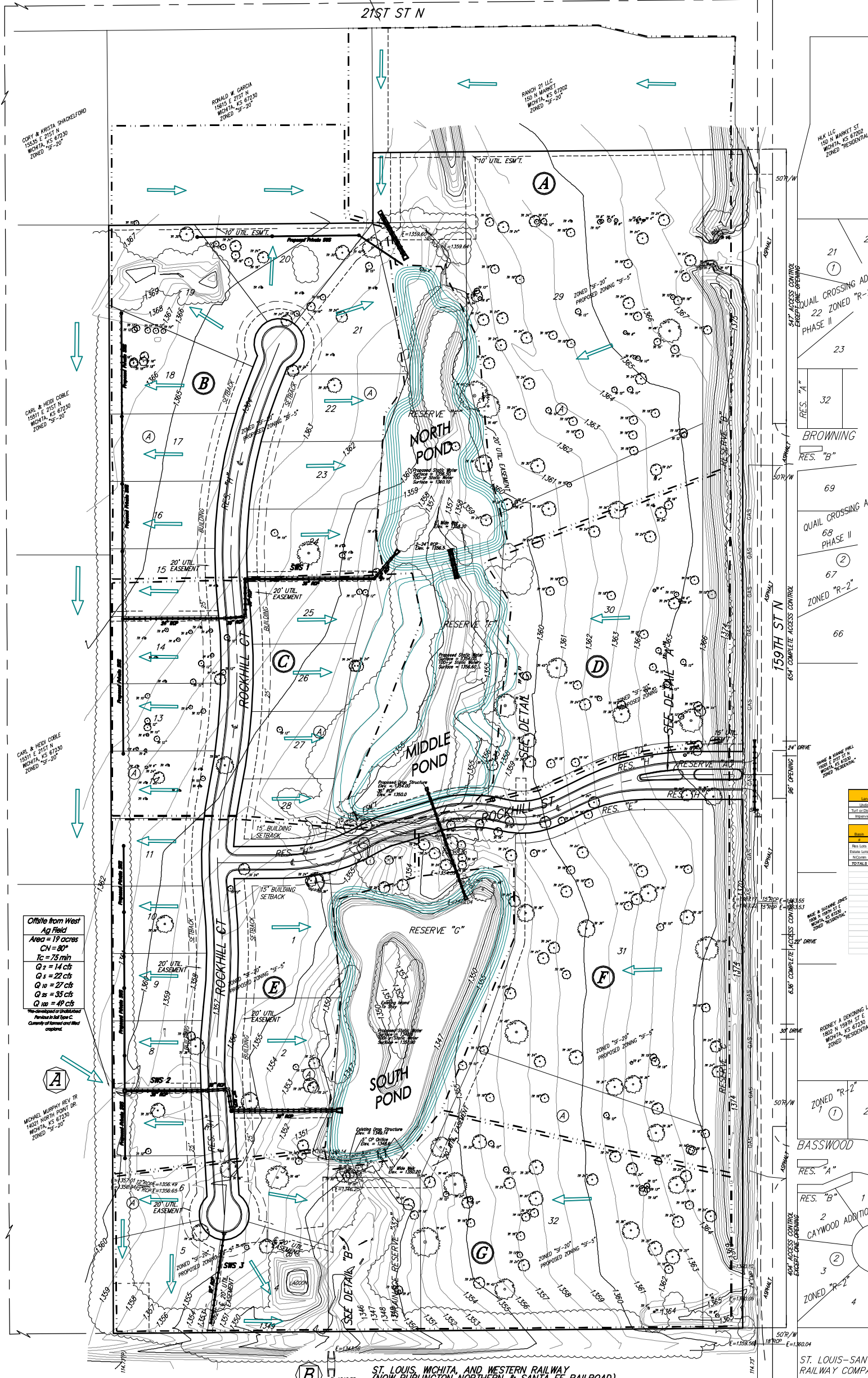
AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

Offsite from North
3/4 RCBC
Area = 57 acres
CN = 72
Tc = 103 min
Q₂ = 22 cfs
Q₅ = 37 cfs
Q₁₀ = 49 cfs
Q₂₅ = 65 cfs
Q₁₀₀ = 97 cfs

LEGEND

- Proposed SWS
- Drainage Basin Boundary
- Proposed Flow Direction
- A Proposed Drainage Basin

DATE OF PREPARATION: 8 OCTOBER 2012
DATE OF TOPOGRAPHY: 27 SEPTEMBER 2012
CONTOUR INTERVALS = 1 FOOT



NORTH POND (Static = 1356.5)

STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	155 cfs	20 cfs	1357.9
10 yr	118 cfs	46 cfs	1359.0
100 yr	202 cfs	92 cfs	1360.1

NORTH POND

ELEVATION	AREA (sq ft)
1356.5	77500
1357	85400
1358	97000
1359	110310
1360	124000
1361	130000

MIDDLE POND (Static = 1354.0)

STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	35 cfs	21 cfs	1354.5
10 yr	67 cfs	47 cfs	1355.0
100 yr	121 cfs	76 cfs	1356.6

MIDDLE POND

ELEVATION	AREA (sq ft)
1354	62300
1355	80000
1356	105900
1357	136100
1358	161500
1359	170000

SOUTH POND (Static = 1349.0)

STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	56 cfs	23 cfs	1350.1
10 yr	108 cfs	56 cfs	1351.1
100 yr	190 cfs	104 cfs	1351.9

SOUTH POND

ELEVATION	AREA (sq ft)
1349	134000
1350	143700
1351	153700
1352	164000
1353	174400
1354	180000

Whiteland Watershed Point Cost (Area: 4247)

Point	Area	Cost	Notes
1	1000	1000	...
2	1500	1500	...
3	1700	1700	...
4	1000	1000	...
TOTALS	5200	5200	

Offsite from West
Ag Field
Area = 19 acres
CN = 80
Tc = 75 min
Q₂ = 14 cfs
Q₅ = 22 cfs
Q₁₀ = 27 cfs
Q₂₅ = 33 cfs
Q₁₀₀ = 49 cfs

A Offsite flow from the west enters the property and will be conveyed through SWS to the southern pond. The offsite flow will be detained and then released to the south channel section.

B The ultimate discharge point for this basin (including this site and offsite areas) is a railroad box culvert located at point B. The box is a 12x10 RCBC under the former elevated railroad. The proposed flow was calculated using the three upstream ponds detained flows and the undetained adjacent residential lots from the east and west.

Editing Flow at Point B	Proposed Flow at Point B
Q ₂ = 44 cfs	Q ₂ = 53 cfs
Q ₅ = 63 cfs	Q ₅ = 75 cfs
Q ₁₀ = 75 cfs	Q ₁₀ = 84 cfs
Q ₂₅ = 97 cfs	Q ₂₅ = 108 cfs

NOTES: There is no FEMA SFHA located on this property as of this date per FEMA Form 385 of 700, for Wichita, Sedgwick County, Kansas; effective February 2, 2007.

The internal Storm Water Sewer will drain the developed lots/streets into the proposed pond system. On-site private SWS will serve individual lots and tie into the public SWS system as shown.

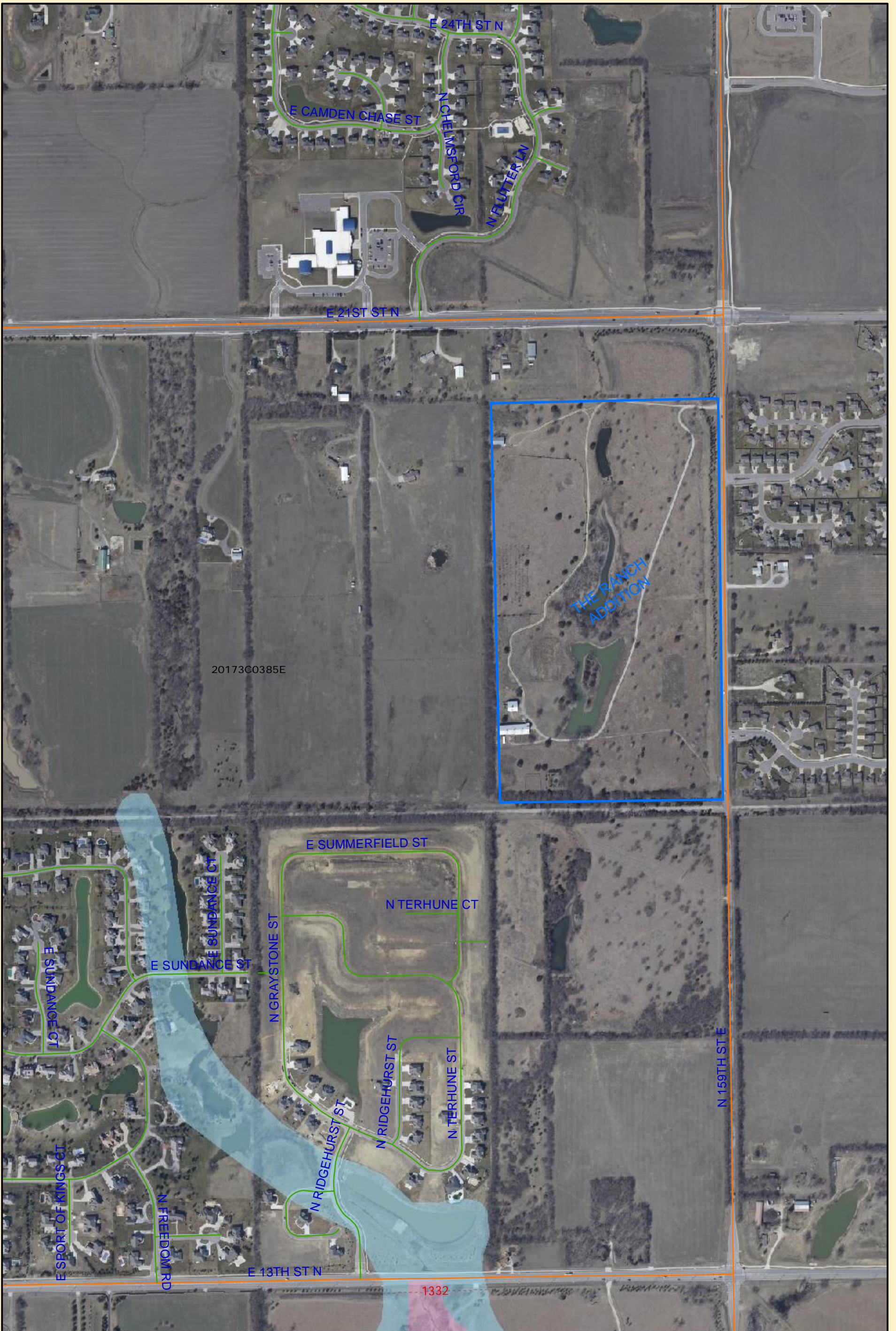
Basin	Description	Area (acres)	CN	Tc (min)	Q ₂ (cfs)	Q ₅ (cfs)	Q ₁₀ (cfs)	Q ₂₅ (cfs)	Q ₁₀₀ (cfs)
A	N Estate Lot & N Comm	13.5	84	15	33	48	58	72	97
B	W Dev to N Pond	10.3	87	15	28	40	48	58	77
C	W Dev to Middle Pond	6.0	87	15	16	23	28	34	45
D	Estate Lot to Mid Pond	5.2	84	15	13	18	22	28	38
E	SW Dev to South Pond	7.0	87	15	19	27	32	40	53
F	S Estate to South Pond	8.8	84	15	22	31	38	47	63
G	S Undetained	10.0	86	15	26	37	45	55	74

DRAINAGE PLAN

THE RANCH

18 JUNE 2013

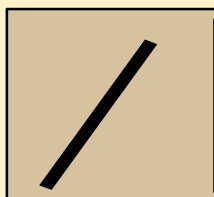
Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
www.baughman.com



20173C0385E

THE RANCH
ADDITION

1332



THE RANCH



SUPPORTING CALCULATIONS

APPENDIX A: Soil Borings

APPENDIX B : HydraFlow Hydrographs
Existing Conditions & Existing Pond Routing
Developed Conditions & Pond Routing

APPENDIX C : HydraFlow SWS
System 1
System 2
System 3

APPENDIX D : Water Quality & Channel Protection

Soil Borings

March 26, 2013

Mr. Trevor Kurth, P.E.
Baughman Company
315 Ellis
Wichita, KS 67211

SUBJECT: Geotechnical Exploration
Baughman Pond Site 1
East 21st Street North & 159th Street East
Wichita, Kansas
GSI Job No. 137062

Dear Mr. Kurth:

This letter presents the results of the geotechnical exploration and testing services performed by GSI Engineering, LLC (GSI) at the above referenced site.

Our understanding of this project is based on upon a telephone call between you and Mr. David Edwards of GSI. The proposed project will be located on the southwest corner of East 21st Street North and 159th Street East. We understand the development addressed in this letter will comprise a retention pond with a compacted clay liner.

Field Exploration

We drilled three borings for this geotechnical exploration on February 20 and 28, 2013 with a CME 55 truck-mounted drilling rig using 6-inch diameter continuous flight augers. We drilled the borings within the pond footprint to a depth of approximately 30 feet below the site grade at the time of our exploration.

The boring locations were selected and staked in the field by representatives of Baughman Company. The locations of the borings in relation to existing and proposed features are indicated on the boring location plan included with this letter. The location of the borings should be considered accurate only to the degree implied by the methods used in their determination.

Our drill crew obtained soil samples at the intervals shown on the boring logs included with this letter. Recovered samples were sealed in plastic containers, labeled, and protected for transportation to the laboratory for further examination, testing, and classification.

We obtained split-barrel samples (designated "Split Spoon" or "S" samples) while performing Standard Penetration Tests (SPT) with a 1-3/8 inch I.D. thick-walled sampler, driven using an

automatic hammer in general accordance with ASTM D1586, "*Penetration Test and Split-Barrel Sampling of Soils*." The "N" value, reported in blows per foot (bpf), equals the number of blows required to drive the sampler through the last 12 inches of the 18-inch sample interval using a 140-pound hammer falling 30 inches.

Our drilling personnel prepared field boring logs during drilling operations. These field logs report drilling and sampling methods, sampling intervals, groundwater measurements and the subsurface conditions we encountered. At the conclusion of drilling, our drill crew made groundwater measurements and backfilled the borings in accordance with Kansas state regulations.

Laboratory Testing

Our engineering staff reviewed the field boring logs to outline the depth, thickness and extent of the soil strata. The samples taken from the borings were examined in our laboratory and visually classified in general accordance with ASTM D2488, "*Description and Identification of Soils (Visual-Manual Procedure)*." We established a testing program to evaluate the engineering properties of the recovered samples. A GSI technician performed laboratory testing in general accordance with the following current ASTM test methods:

- Moisture Content (ASTM D2216, "*Laboratory Determination of Water (Moisture) Content of Soil and Rock*")
- Atterberg Limits (ASTM D4318, "*Liquid Limit, Plastic Limit, and Plasticity Index of Soils*")

Laboratory test results are presented on the boring logs included with this letter.

Moisture content tests were used to evaluate the existing moisture condition of the soils. The Atterberg limits tests were used to help classify the soils under the Unified Soils Classification System and to evaluate the plasticity characteristics of the soils.

Based on the results of this testing program, we reviewed and supplemented the field logs to arrive at the final logs as presented with this letter. The final logs represent our interpretation of the field logs and reflect the additional information obtained from the laboratory testing. Stratification boundaries indicated on the boring logs were based on observations made during drilling, an extrapolation of information obtained by evaluating samples from the borings, and comparisons of similar engineering characteristics. Locations of these boundaries are approximate and the transitions between soil types may be gradual rather than clearly defined.

Subsurface Conditions

We developed a general soil profile based on our exploration, although we observed some variability in subsurface conditions. The soil we encountered within the depths of exploration generally comprised lean to fat clay overlying shale bedrock.

We encountered lean to fat clay extending from the current ground surface to depths ranging from 2.5 to 8.5 feet below site grade at the time of our exploration. These materials, the upper portion of which was appeared to comprise fill materials in boring B-1, were generally described as dark brown to olive gray and slightly moist to moist. We measured Standard Penetration Test (SPT) N-values between 11 and 18 blows per foot (bpf), indicating the lean and fat clays are in a stiff to very stiff condition.

We encountered shale bedrock underlying the surficial clays, extending to the termination depth of our borings at 30 feet below current site grade. The shale we observed is generally described as decomposed, very soft, olive gray or light greenish gray rock. We observed SPT blow counts in this material between 12 and 70 bpf.

Ground Water Conditions

Our drill crew made ground water observations during drilling and after completion of the borings to evaluate ground water conditions. We did not encounter groundwater in any of our soil borings. The slow percolation rate of the on-site fat clay and shale can cause water to pond or become perched for extended time periods. In addition, the clay and shale in this vicinity can contain thin sand lenses or desiccation cracks that can transport water laterally.

Suitability of On-Site Material for Liner Material

The lean to fat clay in the upper 8.5 feet of the site, as well as the shale we encountered in our soil borings at the pond location are generally suitable for reuse as liner material if properly placed and compacted. Existing fill or other soils containing rubble, organic matter, or other deleterious materials should not be reused as part of a liner system.

The shale is expected to excavate in a blocky manner and is expected to require additional earthwork to reduce the blocky shale into material of an inch or less in size which can be used to construct a liner. The use of soil pulverizing equipment, a recycling unit, disc harrows or other similar equipment may be required to reduce the shale to a size capable of being used as soil liner material.

The layered nature of the shale in this area frequently results in rapid horizontal movement of fluid through the shale. A clay liner will be required over the shale to retain water.

We appreciate this opportunity to be of service in the geotechnical exploration phase of this project and are prepared to assist you as the project progresses. Please contact us if you have any questions concerning this report or any of our other consulting or testing services.

Respectfully submitted,
GSI Engineering, LLC



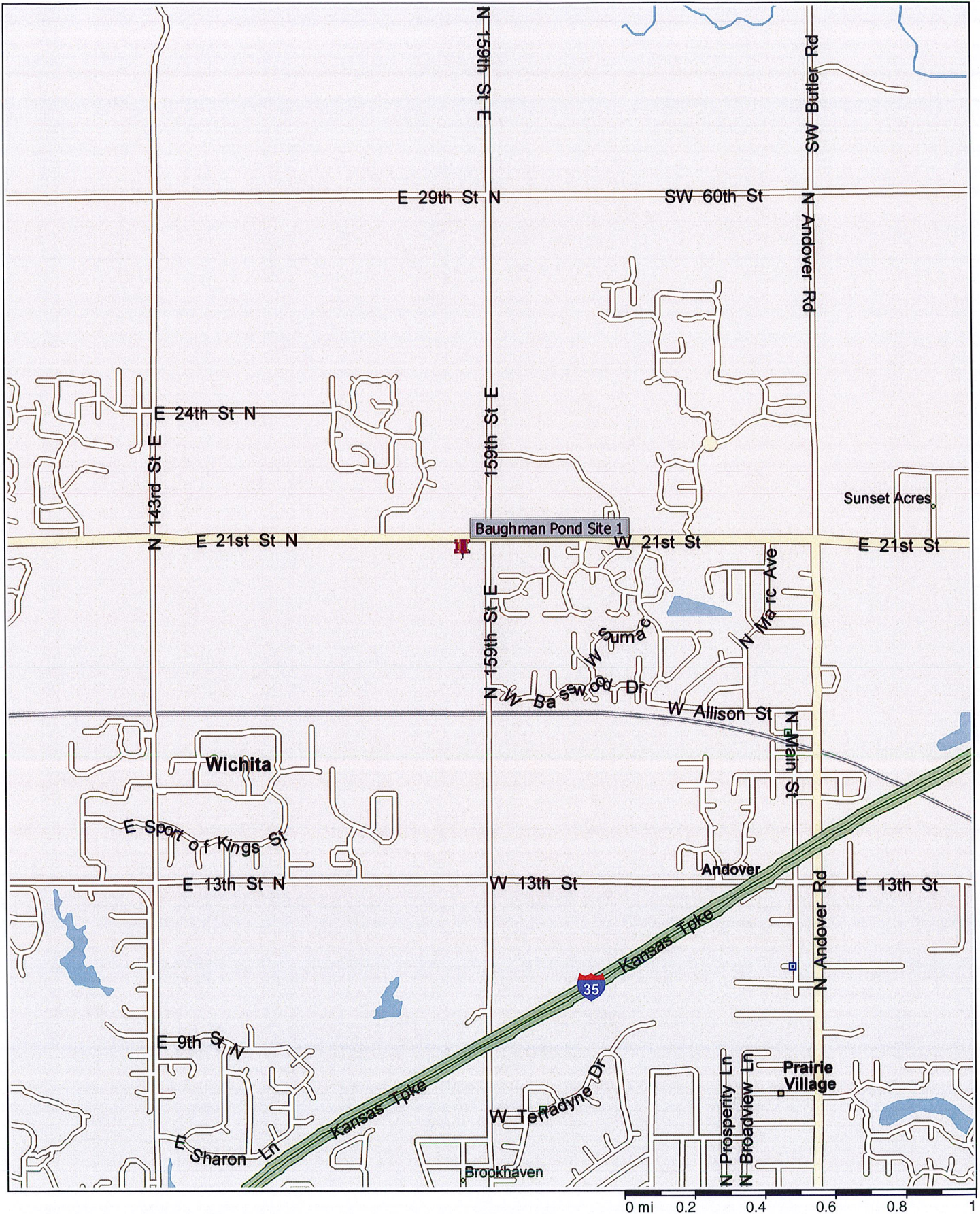
Thomas C. Kettler, Jr., P.E.
Project Engineer



David A. Edwards, P.E.
Principal Engineer/Vice President

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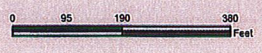
General Vicinity Map



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159th East & 21st North
(Site 1)



BORING LOG No. B-1

BORING NO.	LOCATION OF BORING	ELEVATION	DATUM	DRILLER	LOGGER
B-1	At Staked Location			S. Gensler	A. Wood
WATER LEVEL OBSERVATIONS			TYPE OF SURFACE		DRILL RIG
			Field		CME 55
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	DRILLING METHOD		TOTAL DEPTH
N.E.	N.E.	Boring Plugged After Drilling	6 in. Continuous Flight Augers		30 ft.

DEP. FT.	SAMPLE DATA			SOIL DESCRIPTION		LABORATORY DATA			ELEV. FT.	
	SAMPLE NO. & TYPE	"N" BLOWS (FT)	% REC.	COLOR, CONSISTENCY, MOISTURE		USCS CLASS.	MC %	Dry Dens. pcf		q _u ksf
				GEOLOGIC DESCRIPTION & OTHER REMARKS						
				✓✓✓✓✓	6" TOPSOIL	0.5'				
	S-1	16	100	XXXXX	FILL (FAT CLAY)- dark brown, slightly moist, stiff, root hairs, rust stains, calcium nodules					
	S-2	10	100		SHALE- olive yellow, decomposed, very soft rock, slightly moist, rust stains LL=59; PL=22; PI=37	2.5'	26.8			
5	S-3	12	100		- light greenish gray, iron stains, else as above		29.0			
	S-4	14	100		- some calcareous material, else as above		31.8			
10										
	S-5	19	100		- as above		26.0			
15										
	S-6	31	100		- as above					
20										
	S-7	50/5"	35		- light gray, else as above					
25										
	S-8	50/3"	25		- as above					
30										
					Bottom of Boring @ 30'	30.0'				
35										
40										



4503 East 47th Street South
Wichita, KS 67210
316-554-0725

PROJECT: Baughman Pond Site 1
LOCATION: Wichita, Kansas
JOB NO.: 137062
DATE: February 28, 2012

BORING LOG No. B-2

BORING NO.	LOCATION OF BORING	ELEVATION	DATUM	DRILLER	LOGGER
B-2	30 ft. East Of Staked Location			S. Gensler	A. Wood
WATER LEVEL OBSERVATIONS			TYPE OF SURFACE		DRILL RIG
			Field		CME 55
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING		DRILLING METHOD	TOTAL DEPTH
N.E.	N.E.	Boring Plugged After Drilling		6" Continuous Flight Augers	30 ft.

DEP. FT.	SAMPLE DATA			SOIL DESCRIPTION		LABORATORY DATA			ELEV. FT.	
	SAMPLE NO. & TYPE	"N" BLOWS (FT)	% REC.	COLOR, CONSISTENCY, MOISTURE	USCS CLASS.	MC %	Dry Dens. pcf	q _u ksf		
				GEOLOGIC DESCRIPTION & OTHER REMARKS						
				v v v v v	6" TOPSOIL	0.5'				
	S-1	16	100	/ / / / /	LEAN CLAY- grayish brown, slightly moist, stiff, some sand, calcium nodules, root hairs	0.5'				
	S-2	13	100	/ / / / /	FAT CLAY- olive gray, moist, stiff, calcium nodules, rust stains, trace iron, some reworked shale	2.5'	21.0			
5				/ / / / /	- root hairs, else as above					
	S-3	11	100	/ / / / /	LL=69; PL=21; PI=48		17.0			
	S-4	14	100	/ / / / /	SHALE- light greenish gray, decomposed, very soft rock, trace iron and rust stains, trace calcium	8.5'	31.8			
10				/ / / / /	- as above					
	S-5	17	100	/ / / / /	- as above		29.0			
15				/ / / / /	- greenish gray, else as above					
	S-6	24	100	/ / / / /	- as above					
20				/ / / / /	- as above					
	S-7	35	100	/ / / / /	- as above					
25				/ / / / /	- as above					
	S-8	65	100	/ / / / /	- as above					
30				/ / / / /	- as above					
					Bottom of Boring @ 30'	30.0'				
35										
40										



4503 East 47th Street South
Wichita, KS 67210
316-554-0725

PROJECT: Baughman Pond Site 1
LOCATION: Wichita, Kansas
JOB NO.: 137062
DATE: February 28, 2013

BORING LOG No. B-3

BORING NO.	LOCATION OF BORING	ELEVATION	DATUM	DRILLER	LOGGER
B-3	At Staked Location			S. Gensler	A. Wood
WATER LEVEL OBSERVATIONS			TYPE OF SURFACE		DRILL RIG
			Grass		CME 55
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	AFTER DRILLING	DRILLING METHOD	
N.E.	N.E.	Boring Plugged After Drilling		6 in. Continuous Flight Augers	
				TOTAL DEPTH	
				30 ft.	

DEP. FT.	SAMPLE DATA			SOIL DESCRIPTION			LABORATORY DATA			ELEV. FT.
	SAMPLE NO. & TYPE	"N" BLOWS (FT)	% REC.	COLOR, CONSISTENCY, MOISTURE		USCS CLASS.	MC %	Dry Dens. pcf	q _u ksf	
				GEOLOGIC DESCRIPTION & OTHER REMARKS						
				✓✓✓✓✓	6" TOPSOIL	0.5'				
	S-1	18	100		LEAN CLAY - dark brown, slightly moist, very stiff	0.5'				
	S-2	18	100		- light greenish gray, rust stains, trace iron, calcium seams		CL	19.3		
5										
	S-3	12	100		SHALE- olive gray, decomposed, very soft rock, trace iron, rust stains	5.0'		23.3		
	S-4	13	100		- as above			31.7		
10					LL=66; PL=23; PI=43					
	S-5	16	100		- as above			26.7		
15										
	S-6	28	100		- dark greenish gray, else as above					
20										
	S-7	60	100		- light gray, else as above					
25										
	S-8	70	100		- olive gray, else as above					
30										
					Bottom of Boring @ 30'	30.0'				
35										
40										



4503 East 47th Street South
Wichita, KS 67210
316-554-0725

PROJECT: Baughman Pond Site 1
LOCATION: Wichita, Kansas
JOB NO.: 137062
DATE: February 20, 2013

KEY TO SYMBOLS

Symbol Description

Strata symbols



Topsoil



Fill



Shale



Low plasticity
clay



High plasticity
clay

Notes:

1. The exploratory borings were drilled on February 20 & 28, 2013 using 6-inch diameter continuous flight augers.
2. These logs are subject to the limitations, conclusions, and recommendations in this report.
3. Results of tests conducted on samples recovered are reported on the logs.

Boring Log Legend and Nomenclature

Items shown on boring logs refer to the following:

1. **Depth** - Depth below ground surface or drilling platform
2. **Sample** -Types designated by letter:
 - A - Disturbed sample, obtained from auger cuttings or wash water.
 - S - Split barrel sample, obtained by driving a 2-inch split-barrel sampler unless otherwise noted.
 - C - California liner sample, obtained using a thick-walled liner sampler containing 2-inch-diameter liner tubes.
 - U - Undisturbed sample, obtained using a thin-walled tube, 3-inch-diameter, or as noted, and open sampling head.

Recovery - Recovery is expressed as a percentage of the length recovered to the total length pushed, driven or cored.

Resistance - Resistance is designated as follows:

 - P - Sample pushed in one continuous movement by hydraulic rig action.
 - 12 - The Standard Penetration Resistance is the number of blows for the last 12 inches of penetration of split spoon sampler, driven by a 140-pound hammer falling 30 inches.
 - 50/4" - Number of blows to drive sampler distance shown.
3. **Soil Description** - Description of material according to the Unified Soil Classification: word description giving soil constituents, consistency or density, and other appropriate classification characteristics. Geologic name or type of deposit and other pertinent information, where appropriate, is shown under Geologic Description or other Remarks. A solid line indicates the approximate location of stratigraphic change.
4. **Lab Data** – Laboratory test data.
5. **Legend**

A.D. — After drilling	N.A. — Not Applicable
A.T.D. — At time of drilling	N.D. — Not detectable due to drilling method
C.F.A. — Continuous flight auger	N.E. — None encountered
D.W.L. — Drill water loss	N.R. — Not recorded
D.W.R. — Drill water return	R.Q.D. — Rock quality designation
E.D. — End of drilling	R.W.B. — Rotary wash boring
H.B. — Hole backfilled	
6. **Limitations** - The lines between materials shown on the boring logs represent approximate boundaries between material types and the changes may be gradual. Water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water levels may occur with time. The boring logs in this report are subject to the limitations, explanations and conclusions of this report.

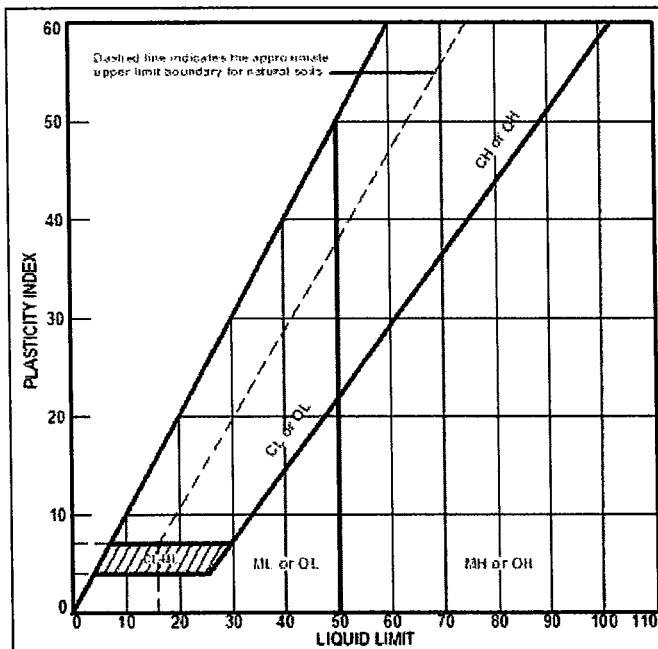
UNITED SOIL CLASSIFICATION SYSTEM

GROUP NAME	GROUP SYMBOL	SOIL DESCRIPTION	COMMENTS
Peat	Pt	Highly Organic Soils	50% or More Is Smaller than No. 200 Sieve
Fat Clay	CH	Clay - Liquid Limit \Rightarrow 50*	
Elastic Silt	MH	Silt - Liquid Limit \Rightarrow 50*	
Lean Clay	CL	Clay - Liquid Limit $<$ 50*	
Silt	ML	Silt - Liquid Limit $<$ 50*	
Silty Clay	CL-ML	Silty Clay*	
Clayey Sand	SC	Sands with 12 to 50 Percent Smaller than No. 200 Sieve	More than 50% Is Larger than No. 200 Sieve and % Sand $>$ % Gravel
Silty Sand	SM		
Poorly-Graded Sand with Clay	SP-SC		
Poorly-Graded Sand with Silt	SP-SM	Sands with 5 to 12 Percent Smaller than No. 200 Sieve	
Well-Graded Sand with Clay	SW-SC		
Well-Graded Sand with Silt	SW-SM		
Poorly-Graded Sand	SP	Sands with Less than 5 Percent Smaller than No.	More than 50% Is Larger than No. 200 Sieve and % Gravel $>$ % Sand
Well-Graded Sand	SW		
Clayey Gravel	GC	Gravels with 12 to 50 Percent Smaller than No.	
Silty Gravel	GM		
Poorly-Graded Gravel with Clay	GP-GC		
Poorly-Graded Gravel with Silt	GP-GM	Gravels with 5 to 12 Percent Smaller than No. 200 Sieve	
Well-Graded Gravel with Clay	GW-GC		
Well-Graded Gravel with Silt	GW-GP		
Poorly-Graded Gravel	GP	Gravels with Less than 5 Percent Smaller than No.	
Well-Graded Gravel	GW		

*See Plasticity Chart for definition of silts and clays. If organic, use OL or OH.

**See definition of well-graded

PLASTICITY CHART



LEGEND OF TERMS

MOISTURE CONDITIONS

Dry, Slightly Moist, Moist, Very Moist, Wet (Saturated)

SOIL CONSISTENCY

Fine-Grained Soils

Description	SPT (N)	UCS (q_u , tsf)
Very Soft	0-2	0-0.25
Soft	2-4	0.25-0.50
Medium Stiff	4-8	0.50-1.0
Stiff	8-16	1.0-2.0
Very Stiff	16-32	2.0-4.0
Hard	$>$ 32	$>$ 4.0

Coarse-Grained Soils

Description	SPT (N)
Very Loose	0-4
Loose	4-10
Medium Loose	10-30
Dense	30-50
Very Dense	$>$ 50

CLASSIFICATION OF SANDS & GRAVELS

Boulders	Cobbles	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines (Silt or Clay)
	10"	3"	3/4"	#4	#10	#40	#200

Well-Graded Sands (SW): $C_u \geq 6$ and $1 \leq C_c \leq 3$

Well-Graded Gravels (GW): $C_u \geq 4$ and $1 \leq C_c \leq 3$





ROCK DESCRIPTORS

DEGREE OF WEATHERING

Descriptor	Definition
Unweathered	No evidence of any chemical or mechanical alteration
Slightly Weathered	Slight discoloration on surface, slight alteration along discontinuities, less than 10% of the rock volume altered
Moderately Weathered	Discoloring evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering "halos" evident, 10% to 50% of the rock altered
Highly Weathered	Entire mass discolored, alteration pervading nearly all of the rock with some pockets of slightly weathered rock noticeable, some minerals leached away
Decomposed	Rock reduced to a soil with relict rock texture, generally molded and crumbled by hand

HARDNESS

Descriptor	Definition
Very Soft	Can be deformed by hand
Soft	Can be scratched with a fingernail
Moderately Hard	Can be scratched easily with a knife
Hard	Can be scratched with difficulty with a knife
Very Hard	Cannot be scratched with a knife

TEXTURE*

Texture	Grain Diameter	Particle Name	Rock Name
*	80 mm	Cobble	Conglomerate
*	5 - 80 mm	Gravel	
Coarse Grained	2 - 5 mm		Sandstone
Medium Grained	0.4 - 2 mm	Sand	
Fine Grained	0.1 - 0.4 mm		
Very Fine Grained	0.1 mm	Clay, silt	Shale, Claystone, Siltstone

* Sedimentary Rocks

ROCK STRUCTURE

Descriptor	Definition
Massive	3 feet thick or greater
Thick Bedded	Beds from 1 foot to 3 feet thick
Medium Bedded	Beds from 4 in. to 1 foot thick
Thin Bedded	4 inches thick or less

DISCONTINUITIES

Joints


- 1.) Type: Type of joint if it can be readily determined (i.e., bedding, cleavage, foliation, schistosity, or extension.)
- 2.) Degree of joint wall weathering:
 - (i) Unweathered: No visible signs are noted of weathering; joint wall rock is fresh, crystal bright.
 - (ii) Slightly weathered joints: Discontinuities are stained or discolored and may contain a thin coating of altered material. Discoloration may extend into the rock from the discontinuity surfaces to a distance of up to 20% of the discontinuity spacing.
 - (iii) Moderately weathered joints: Slight discoloration extends from discontinuity planes for greater than 20% of the discontinuity spacing. Discontinuities may contain filling of altered material. Partial opening of grain boundaries may be observed.
 - (iv) Highly weathered joints: Entire mass discolored, alteration pervading nearly all of the rock with some pockets of slightly weathered rock noticeable, some minerals leached away.
 - (v) Completely weathered joints: Rock reduced to a soil with relict rock texture, generally molded and crumbled by hand.

From EM 1110-1-2908

Boring No.	Sample No.	Sample Depth (ft)	Sample Type	Sample Diameter (in)	Sample Length (in)	Moisture Content (%)	Wet Unit Weight (lb/ft ³)	Dry Unit Weight (lb/ft ³)	Unconfined Compressive Strength (kips/ft ²)	Atterberg Limits			Percent Passing No. 200 Sieve	Blow Counts SPT 'N' (blows/ft)	USCS Soil Classification
										Liquid Limit	Plastic Limit	Plasticity Index			
B-1	S-1	0.5-2.0	Split Spoon										16	FILL (CH)	
	S-2	2.5-4.0	Split Spoon			26.8				59	22	37	10	Shale	
	S-3	5.0-6.5	Split Spoon			29.0							12	Shale	
	S-4	8.5-10.0	Split Spoon			31.8							14	Shale	
	S-5	13.5-15.0	Split Spoon			26.0							19	Shale	
	S-6	18.5-20.0	Split Spoon										31	Shale	
	S-7	23.5-25.0	Split Spoon										50/5"	Shale	
	S-8	28.5-30.0	Split Spoon										50/3"	Shale	
B-2	S-1	0.5-2.5	Split Spoon										16	CL	
	S-2	2.5-4.0	Split Spoon			21.0							13	CH	
	S-3	5.0-6.5	Split Spoon			17.0				69	21	48	11	CH	
	S-4	8.5-10.0	Split Spoon			31.8							14	Shale	
	S-5	13.5-15.0	Split Spoon			29.0							17	Shale	
	S-6	18.5-20.0	Split Spoon										24	Shale	
	S-7	23.5-25.0	Split Spoon										35	Shale	
	S-8	28.5-30.0	Split Spoon										65	Shale	
B-3	S-1	0.5-2.5	Split Spoon										18	CL	
	S-2	2.5-4.0	Split Spoon			19.3							18	CL	
	S-3	5.0-6.5	Split Spoon			23.3							12	Shale	
	S-4	8.5-10.0	Split Spoon			31.7				66	23	43	13	Shale	
	S-5	13.5-15.0	Split Spoon			26.7							16	Shale	
	S-6	18.5-20.0	Split Spoon										28	Shale	
	S-7	23.5-25.0	Split Spoon										60	Shale	
	S-8	28.5-30.0	Split Spoon										70	Shale	

Project: **Baughman Pond Site 1**
Location: **Wichita, Kansas**
Job Number: **137062** Date: **3/26/2013**

SUMMARY OF FIELD AND LABORATORY TEST RESULTS

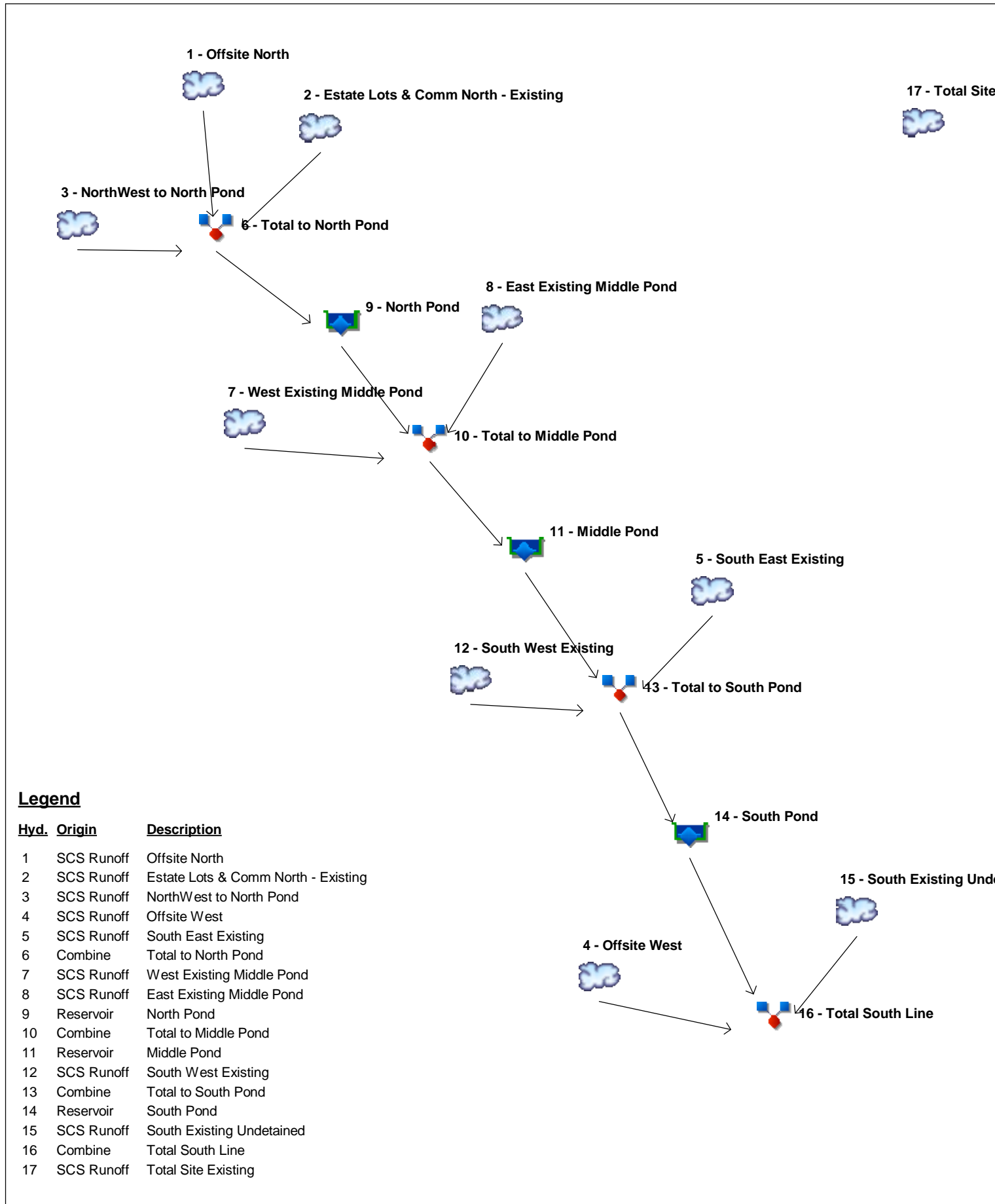

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HydraFlow Hydrographs
Existing Conditions & Existing Pond Routing
Developed Conditions & Pond Routing

Watershed Model Schematic

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



Legend

Hyd. Origin	Description
1	SCS Runoff Offsite North
2	SCS Runoff Estate Lots & Comm North - Existing
3	SCS Runoff NorthWest to North Pond
4	SCS Runoff Offsite West
5	SCS Runoff South East Existing
6	Combine Total to North Pond
7	SCS Runoff West Existing Middle Pond
8	SCS Runoff East Existing Middle Pond
9	Reservoir North Pond
10	Combine Total to Middle Pond
11	Reservoir Middle Pond
12	SCS Runoff South West Existing
13	Combine Total to South Pond
14	Reservoir South Pond
15	SCS Runoff South Existing Undetained
16	Combine Total South Line
17	SCS Runoff Total Site Existing

Hydrograph Return Period Recap

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

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	-----	12.29	21.68	0.289	37.26	49.11	65.14	79.90	96.91	Offsite North
2	SCS Runoff	-----	18.75	26.89	2.918	38.92	47.46	58.49	68.30	79.33	Estate Lots & Comm North - Existing
3	SCS Runoff	-----	12.27	17.60	1.910	25.47	31.06	38.28	44.71	51.92	NorthWest to North Pond
4	SCS Runoff	-----	9.387	14.33	0.832	21.90	27.40	34.61	41.10	48.45	Offsite West
5	SCS Runoff	-----	18.75	26.89	2.918	38.92	47.46	58.49	68.30	79.33	South East Existing
6	Combine	1, 2, 3,	32.76	48.29	4.828	72.49	90.22	113.53	134.57	158.48	Total to North Pond
7	SCS Runoff	-----	17.05	24.45	2.652	35.38	43.14	53.17	62.09	72.12	West Existing Middle Pond
8	SCS Runoff	-----	16.02	22.98	2.493	33.26	40.56	49.98	58.37	67.79	East Existing Middle Pond
9	Reservoir	6	29.57	44.76	3.247	67.25	84.44	107.17	127.66	148.39	North Pond
10	Combine	7, 8, 9	60.79	89.85	7.620	132.32	163.85	205.36	242.72	280.99	Total to Middle Pond
11	Reservoir	10	5.843	7.173	0.458	23.78	41.54	63.64	82.91	104.10	Middle Pond
12	SCS Runoff	-----	14.49	20.78	2.255	30.07	36.67	45.20	52.78	61.30	South West Existing
13	Combine	5, 11, 12	34.39	50.02	5.185	73.26	89.47	109.95	127.92	148.07	Total to South Pond
14	Reservoir	13	11.62	17.17	0.906	20.84	27.31	35.25	63.17	91.96	South Pond
15	SCS Runoff	-----	15.68	22.49	2.440	32.55	39.69	48.92	57.13	66.35	South Existing Undetained
16	Combine	4, 14, 15	25.87	40.23	3.022	58.30	69.45	83.39	95.52	109.04	Total South Line
17	SCS Runoff	-----	46.63	67.44	6.651	98.35	120.42	149.13	174.74	203.57	Total Site Existing

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	21.68	2	778	232,863	-----	-----	-----	Offsite North
2	SCS Runoff	26.89	2	722	75,390	-----	-----	-----	Estate Lots & Comm North - Existing
3	SCS Runoff	17.60	2	722	49,346	-----	-----	-----	NorthWest to North Pond
4	SCS Runoff	14.33	2	760	112,247	-----	-----	-----	Offsite West
5	SCS Runoff	26.89	2	722	75,390	-----	-----	-----	South East Existing
6	Combine	48.29	2	722	357,600	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	24.45	2	722	68,536	-----	-----	-----	West Existing Middle Pond
8	SCS Runoff	22.98	2	722	64,424	-----	-----	-----	East Existing Middle Pond
9	Reservoir	44.76	2	726	357,599	6	1357.00	13,921	North Pond
10	Combine	89.85	2	724	490,559	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	7.173	2	940	485,571	10	1357.67	274,188	Middle Pond
12	SCS Runoff	20.78	2	722	58,256	-----	-----	-----	South West Existing
13	Combine	50.02	2	722	619,217	5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	17.17	2	738	619,082	13	1349.52	52,922	South Pond
15	SCS Runoff	22.49	2	722	63,054	-----	-----	-----	South Existing Undetained
16	Combine	40.23	2	726	794,382	4, 14, 15	-----	-----	Total South Line
17	SCS Runoff	67.44	2	750	435,822	-----	-----	-----	Total Site Existing
The Ranch Existing.gpw					Return Period: 2 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

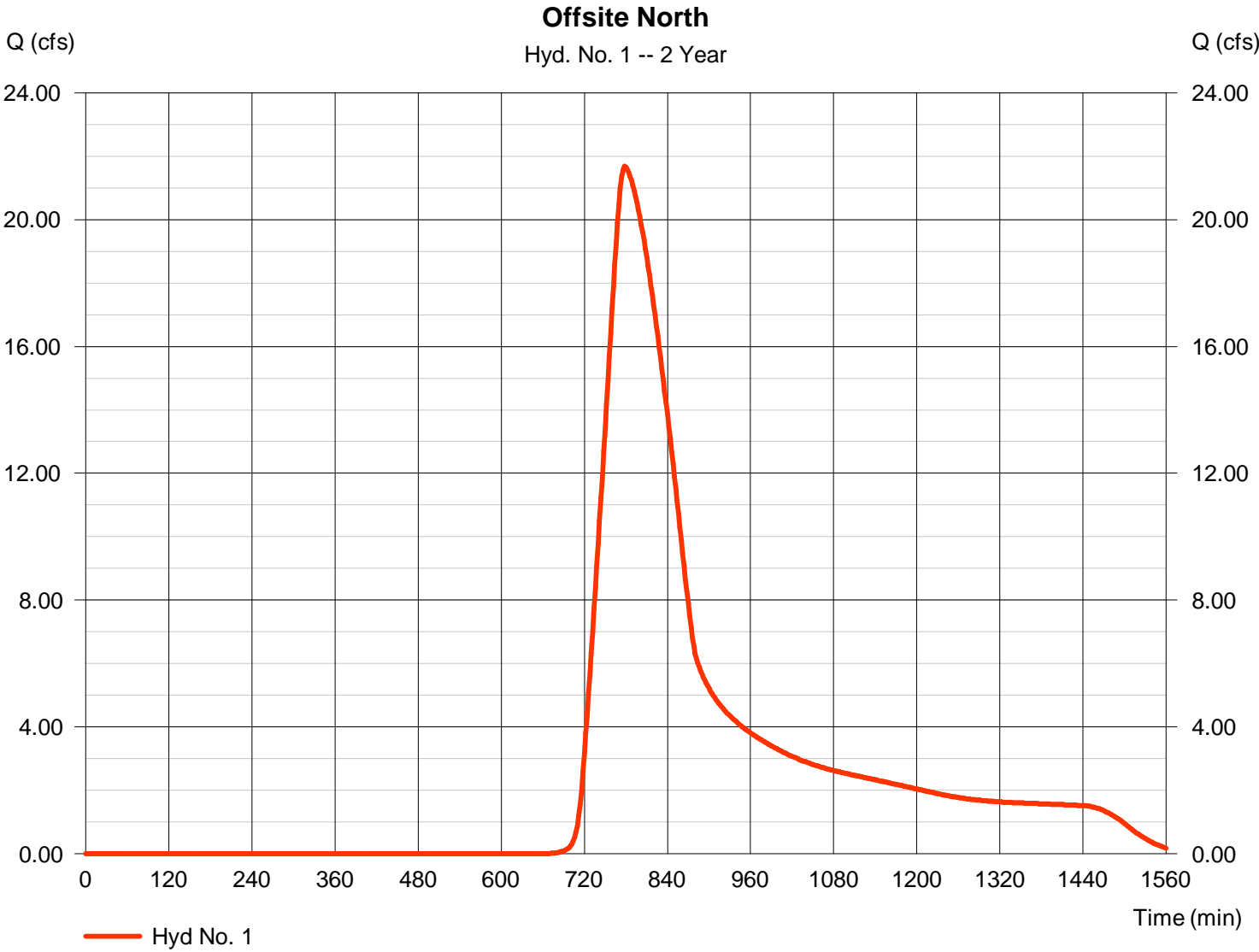
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 21.68 cfs
Storm frequency	= 2 yrs	Time to peak	= 778 min
Time interval	= 2 min	Hyd. volume	= 232,863 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

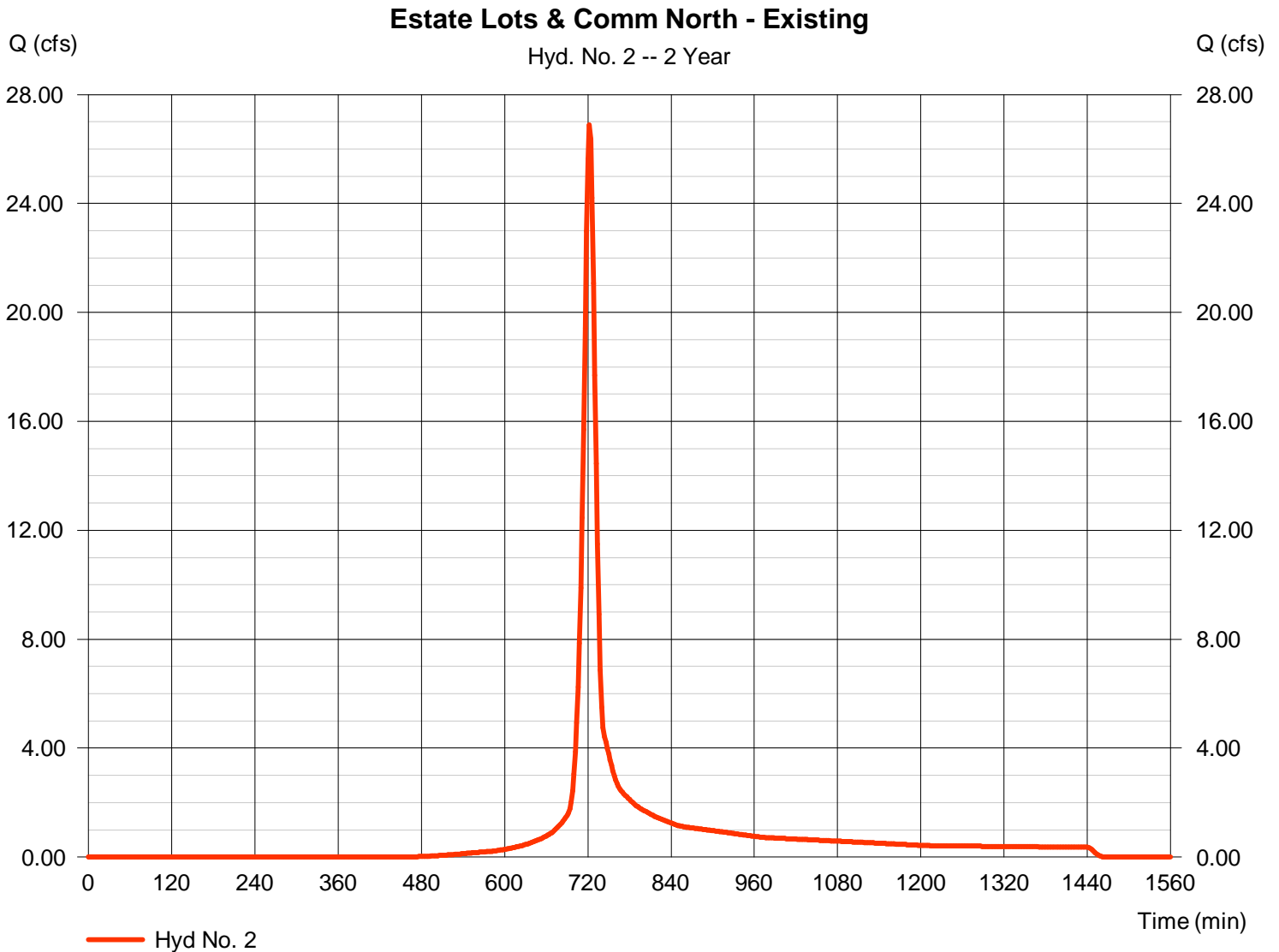
Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots & Comm North - Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 26.89 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 75,390 cuft
Drainage area	= 11.000 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(7.000 x 84) + (4.000 x 98)] / 11.000



Hydrograph Report

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

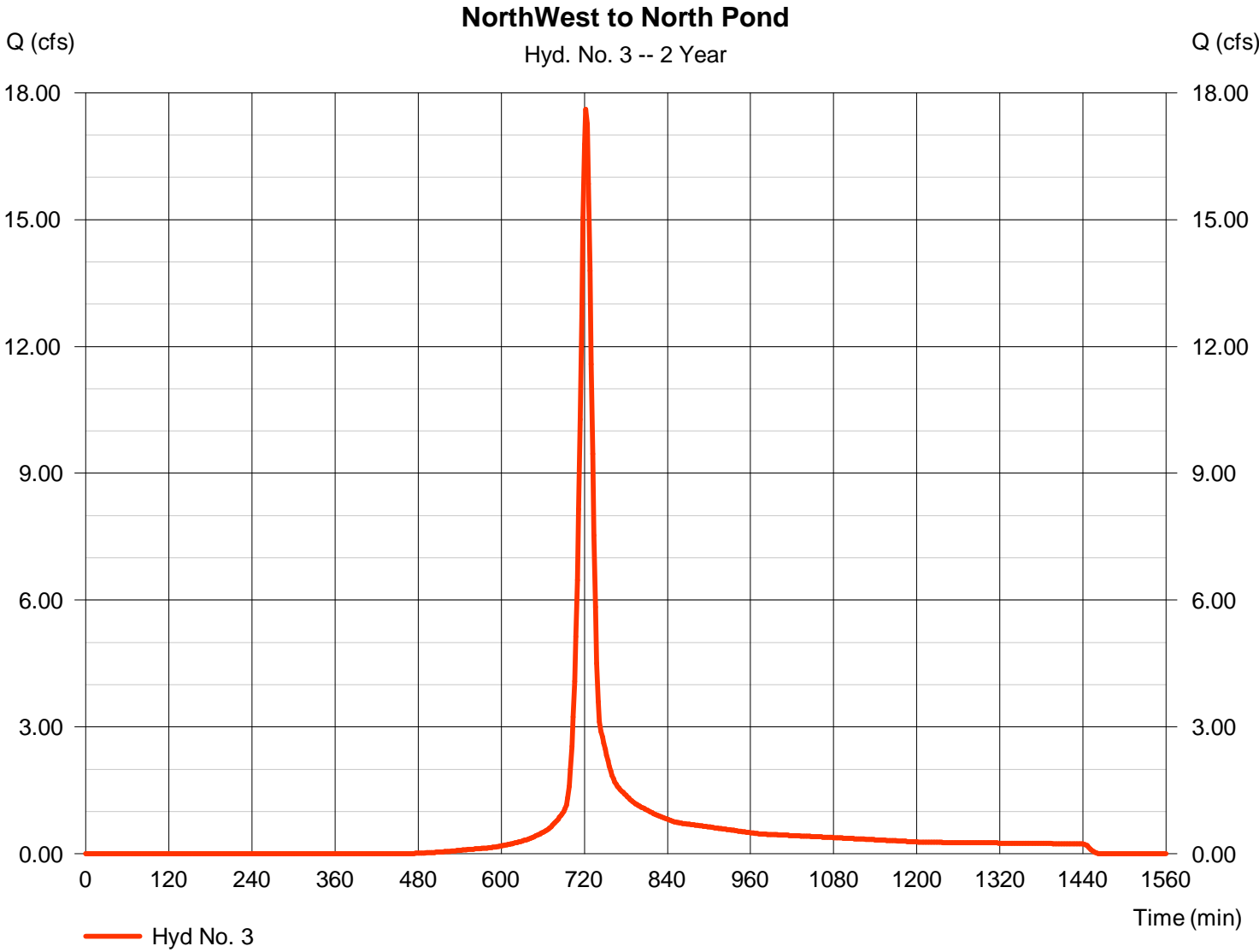
Tuesday, Jun 18, 2013

Hyd. No. 3

NorthWest to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 17.60 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 49,346 cuft
Drainage area	= 7.200 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 7.200

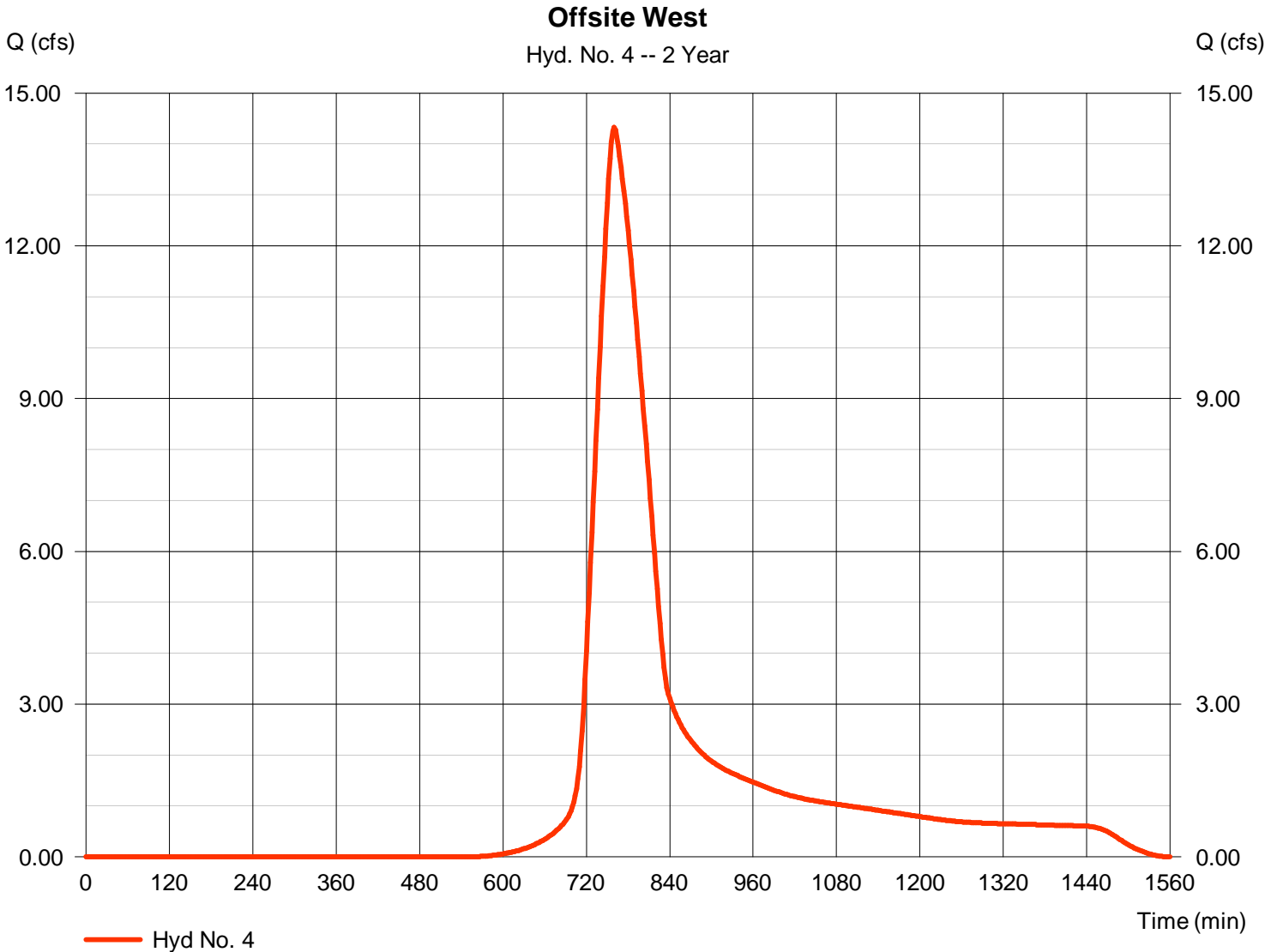


Hydrograph Report

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 14.33 cfs
Storm frequency	= 2 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 112,247 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

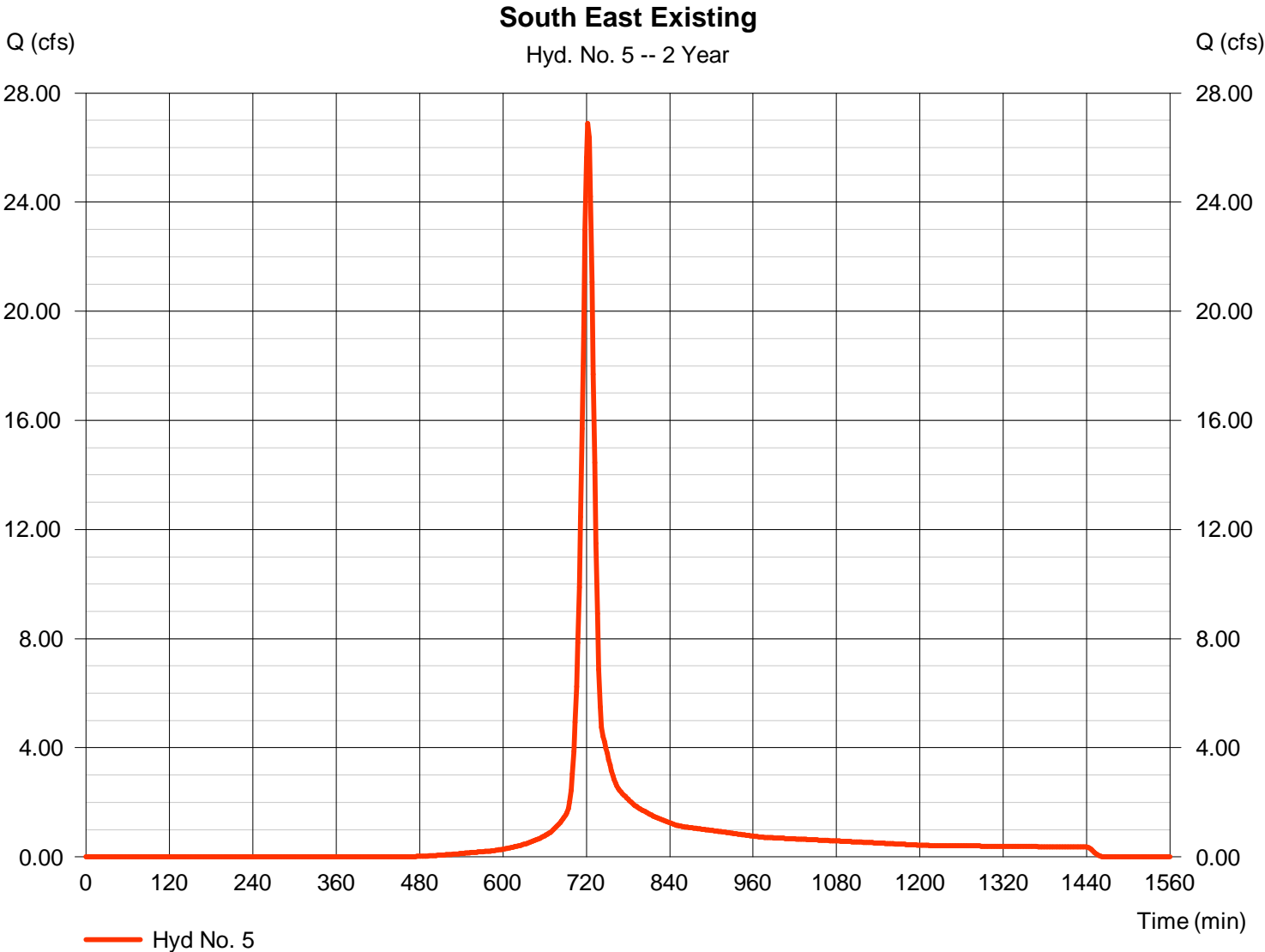
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Tuesday, Jun 18, 2013

Hyd. No. 5

South East Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 26.89 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 75,390 cuft
Drainage area	= 11.000 ac	Curve number	= 84
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

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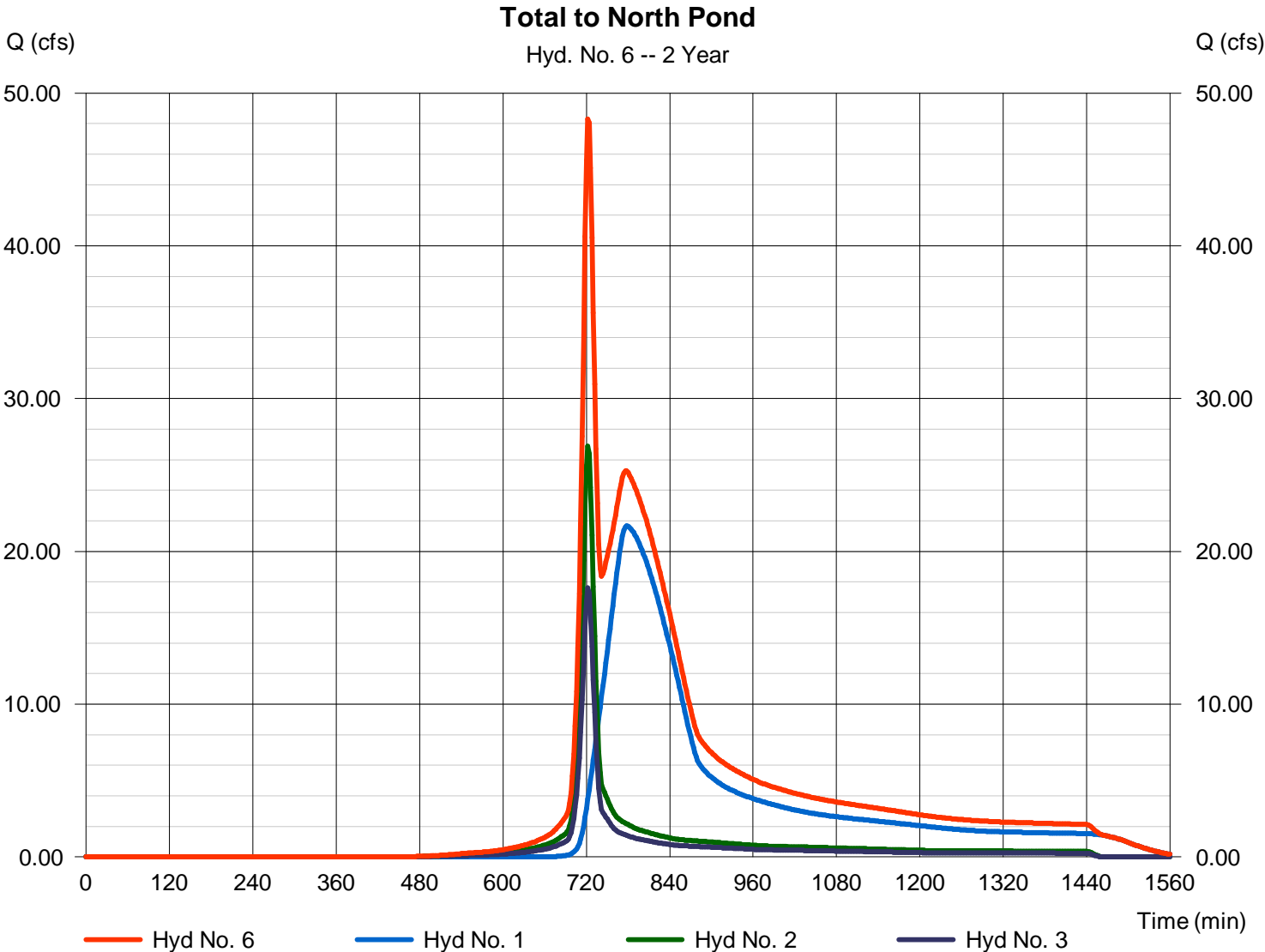
Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

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

Peak discharge = 48.29 cfs
Time to peak = 722 min
Hyd. volume = 357,600 cuft
Contrib. drain. area = 75.200 ac



Hydrograph Report

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

Tuesday, Jun 18, 2013

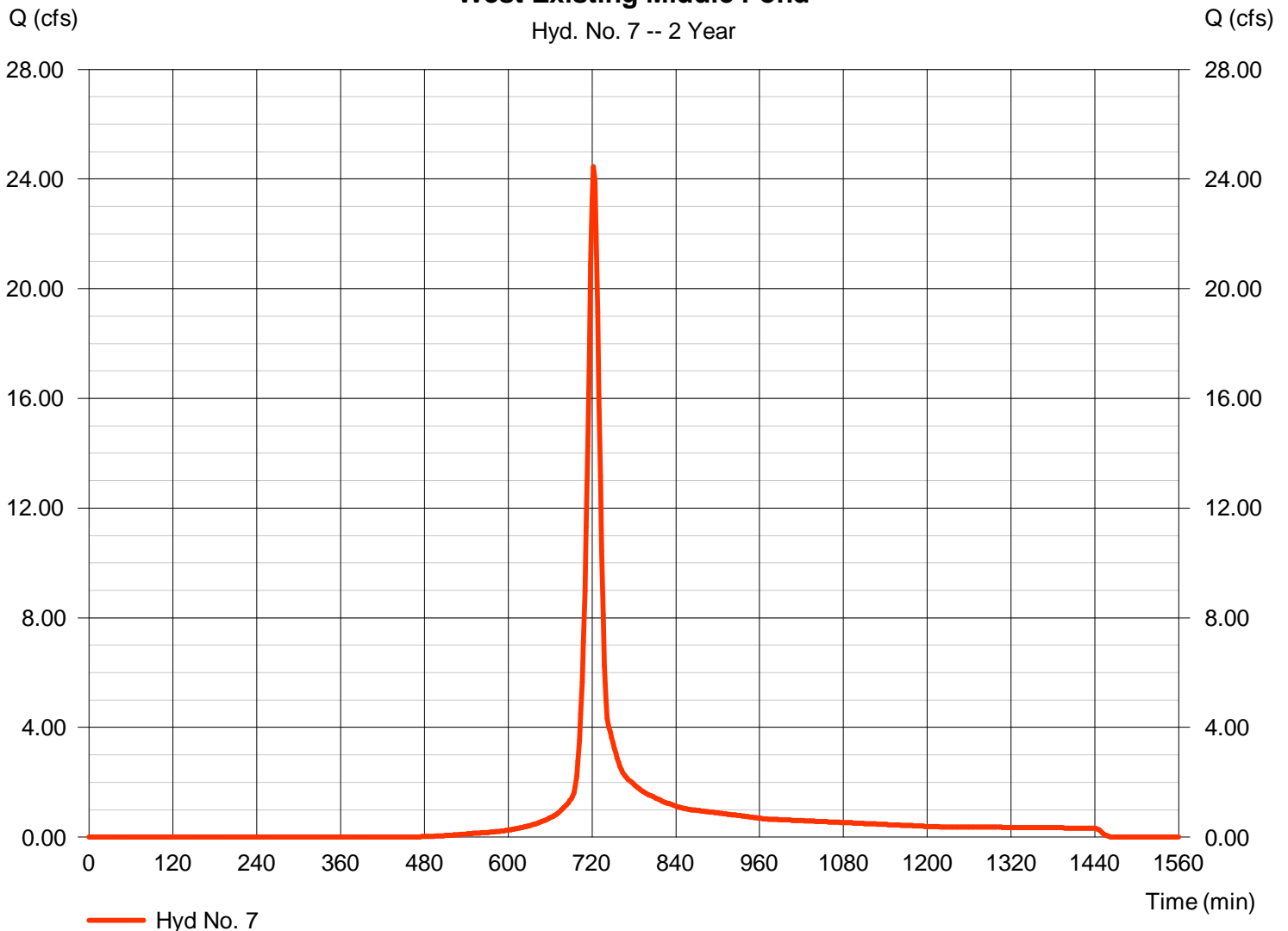
Hyd. No. 7

West Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 24.45 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 68,536 cuft
Drainage area	= 10.000 ac	Curve number	= 84
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

West Existing Middle Pond

Hyd. No. 7 -- 2 Year



Hydrograph Report

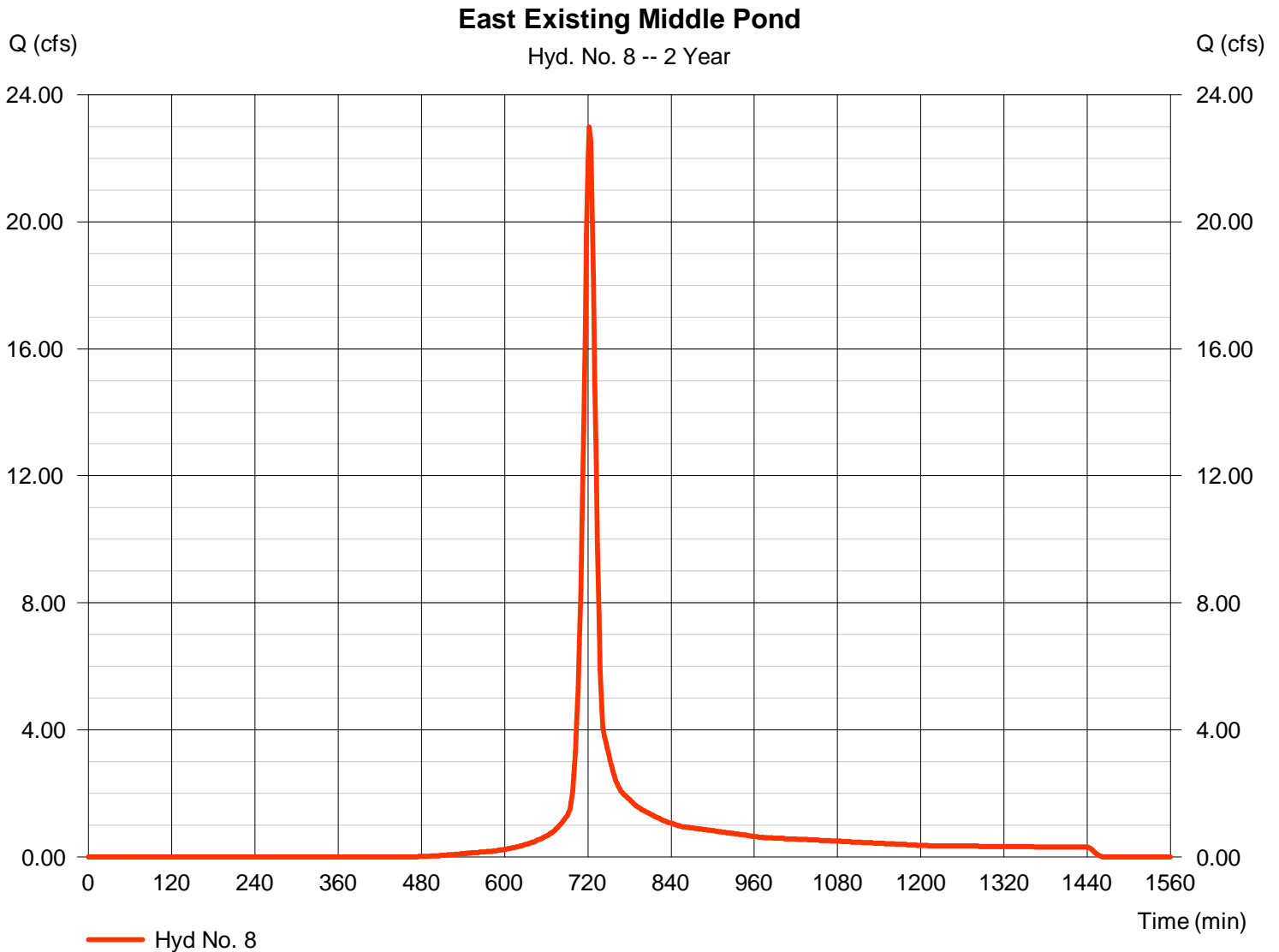
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

East Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 22.98 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 64,424 cuft
Drainage area	= 9.400 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

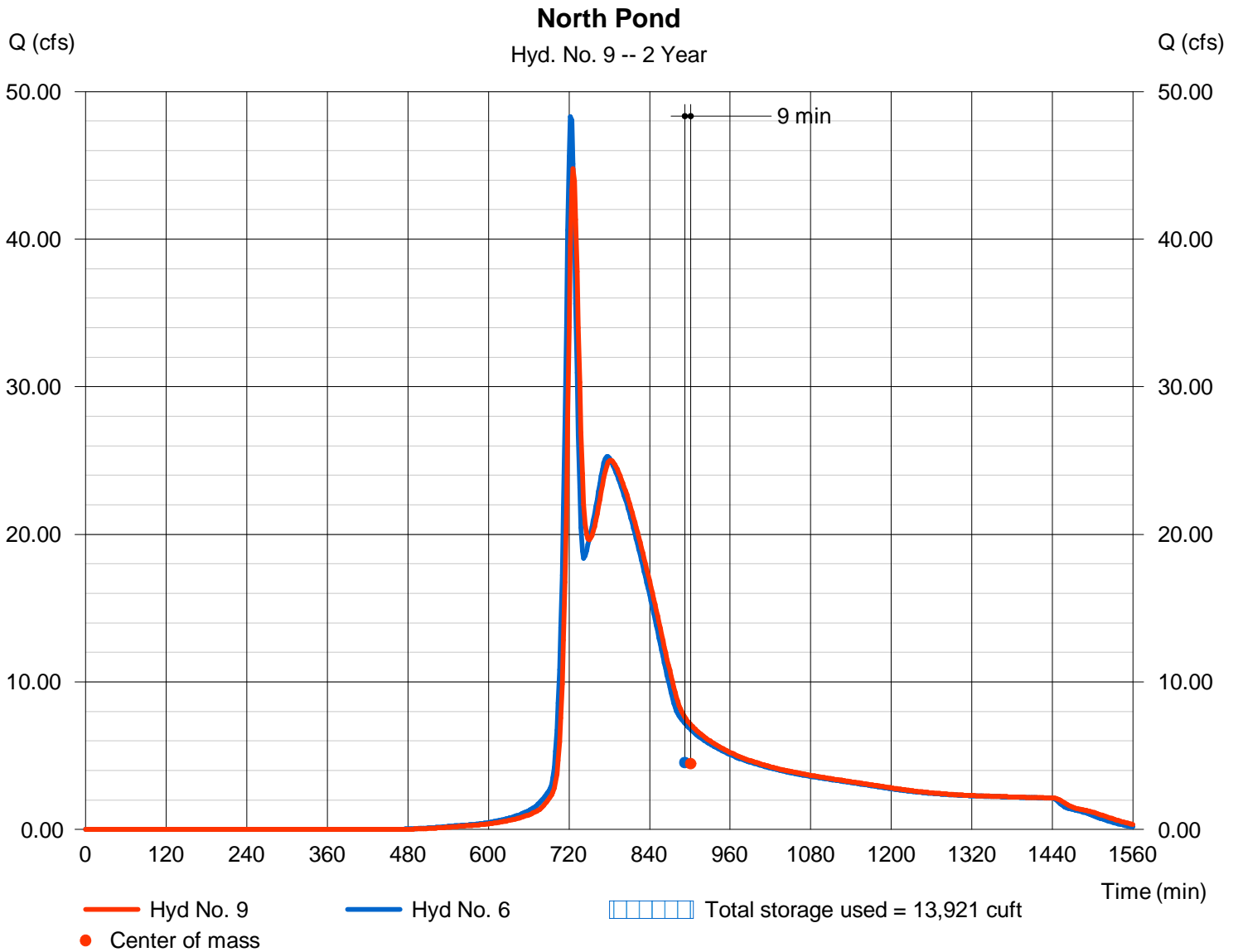
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 44.76 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 357,599 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1357.00 ft
Reservoir name	= North Pond	Max. Storage	= 13,921 cuft

Storage Indication method used.



Pond No. 1 - North Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1356.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1356.00	12,500	0	0
1.00	1357.00	15,500	13,972	13,972
2.00	1358.00	18,750	17,098	31,069
3.00	1359.00	30,000	24,153	55,223

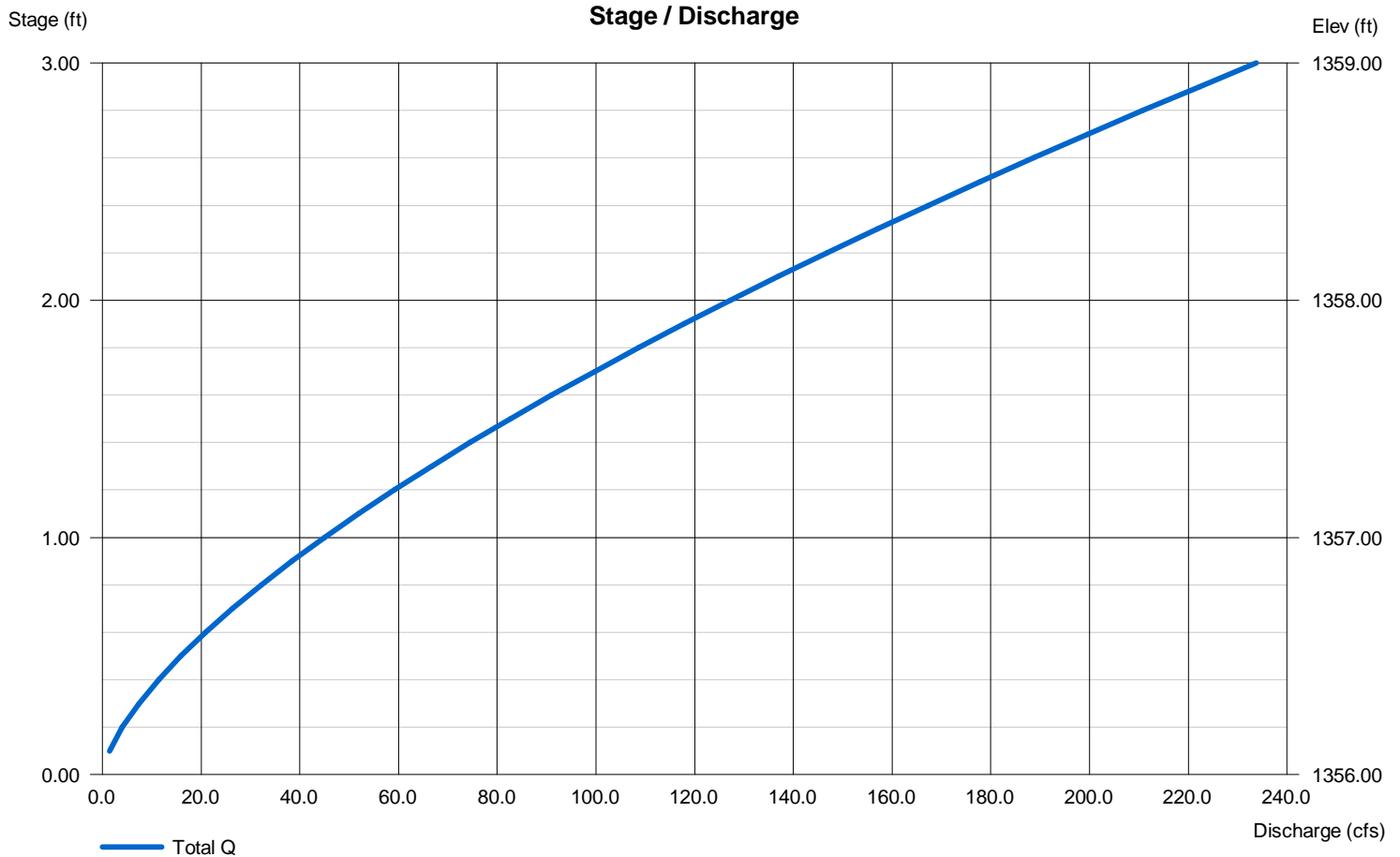
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	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)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 1356.00	0.00	0.00	0.00
Weir Coeff.	= 3.00	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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



Hydrograph Report

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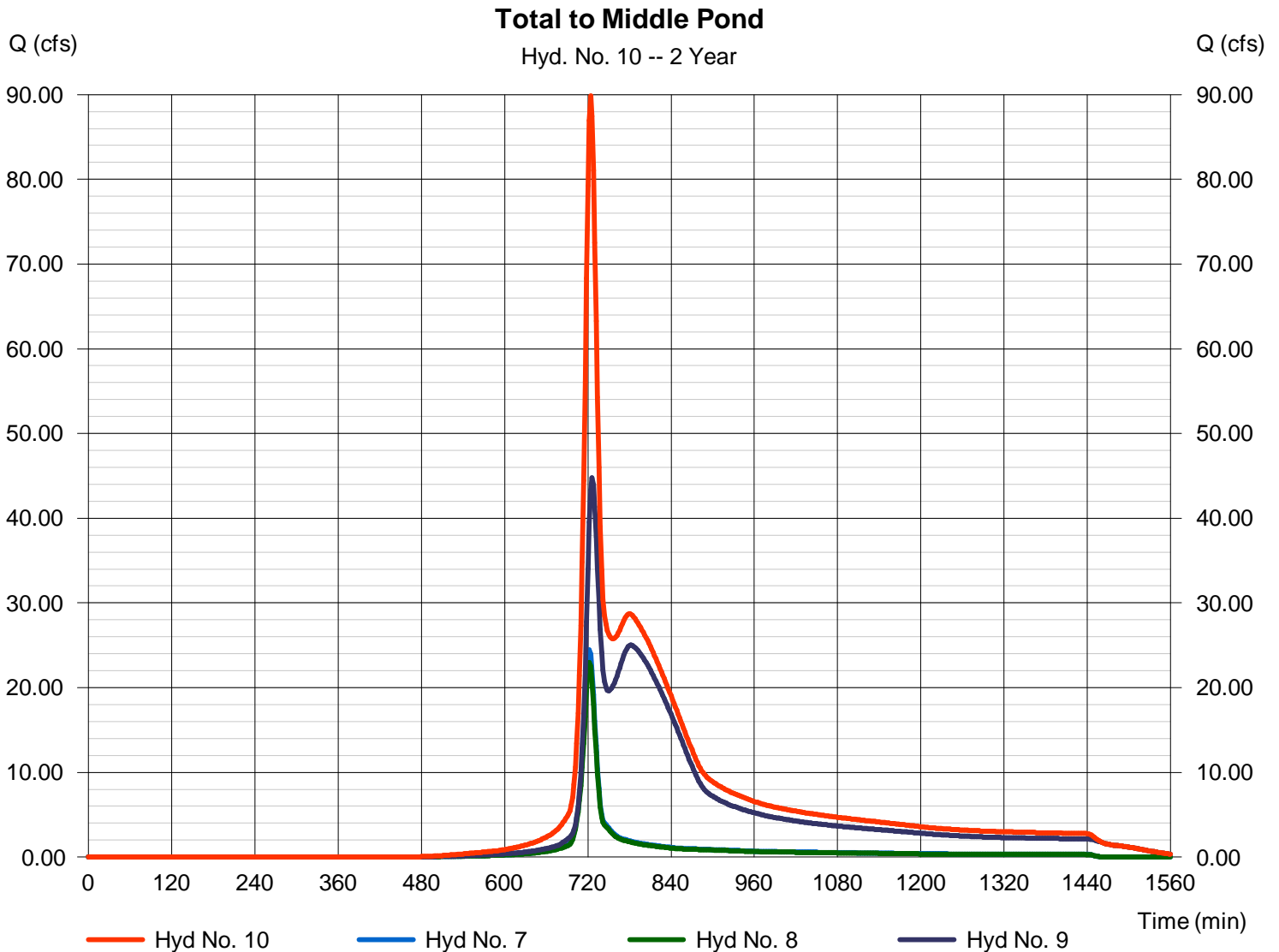
Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 7, 8, 9

Peak discharge = 89.85 cfs
Time to peak = 724 min
Hyd. volume = 490,559 cuft
Contrib. drain. area = 19.400 ac



Hydrograph Report

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

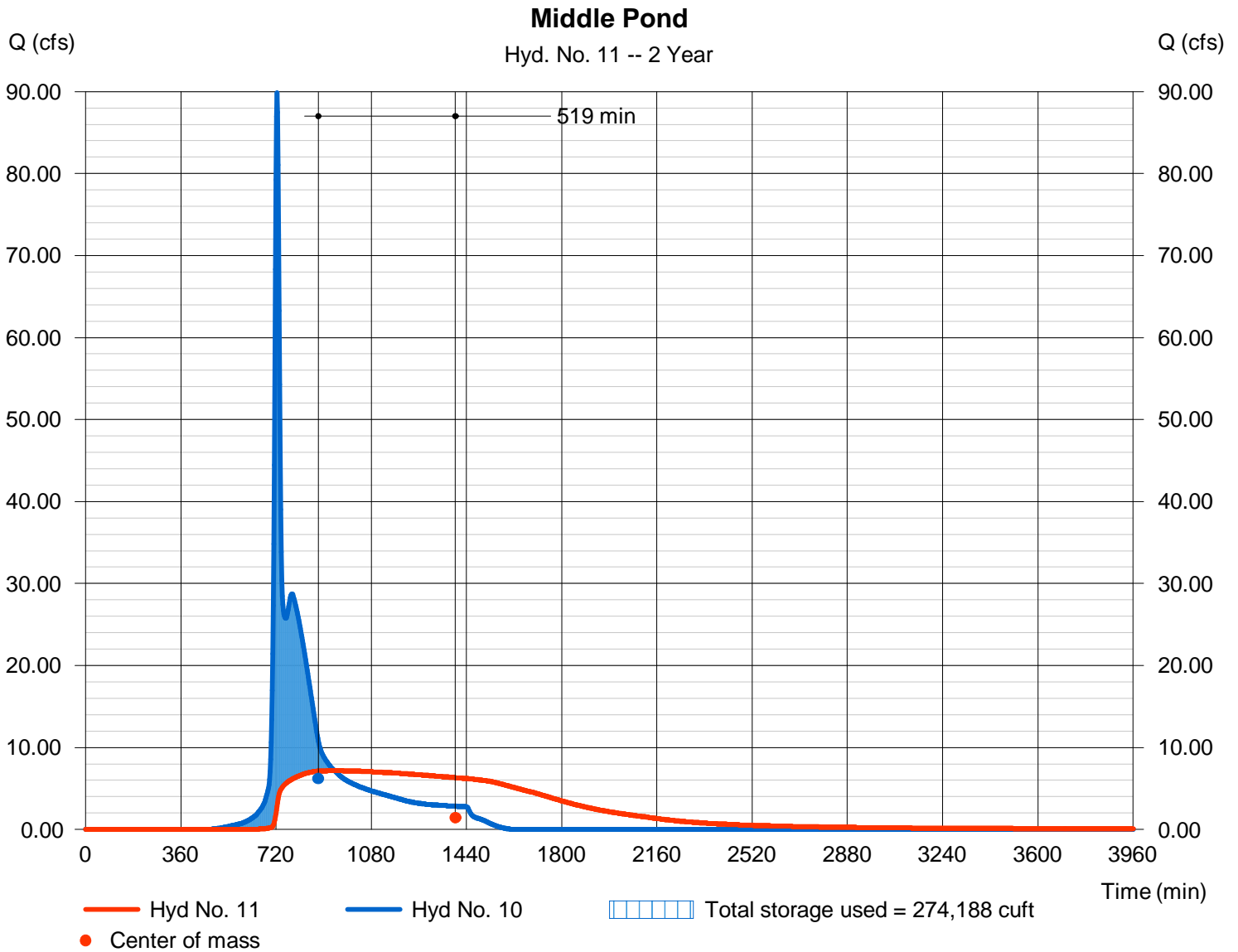
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 7.173 cfs
Storm frequency	= 2 yrs	Time to peak	= 940 min
Time interval	= 2 min	Hyd. volume	= 485,571 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1357.67 ft
Reservoir name	= Middle Pond	Max. Storage	= 274,188 cuft

Storage Indication method used.



Pond No. 3 - Middle Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1355.40 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1355.40	62,500	0	0
0.60	1356.00	97,100	47,496	47,496
1.60	1357.00	139,900	117,839	165,335
2.60	1358.00	187,200	162,961	328,295
3.60	1359.00	200,000	193,545	521,841
4.60	1360.00	210,000	204,959	726,800

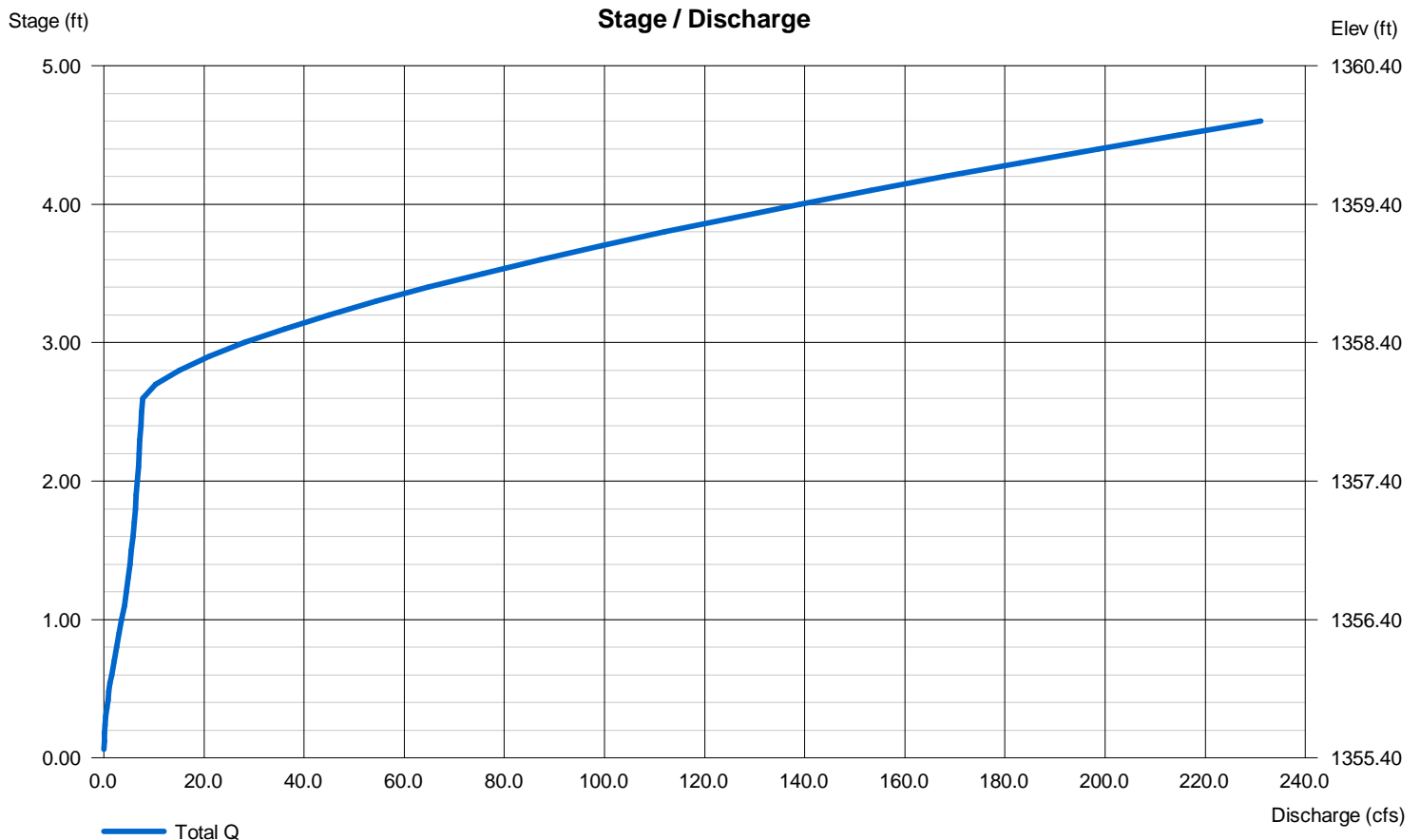
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1355.40	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 1.00	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)	= 30.00	0.00	0.00	0.00
Crest El. (ft)	= 1358.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (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

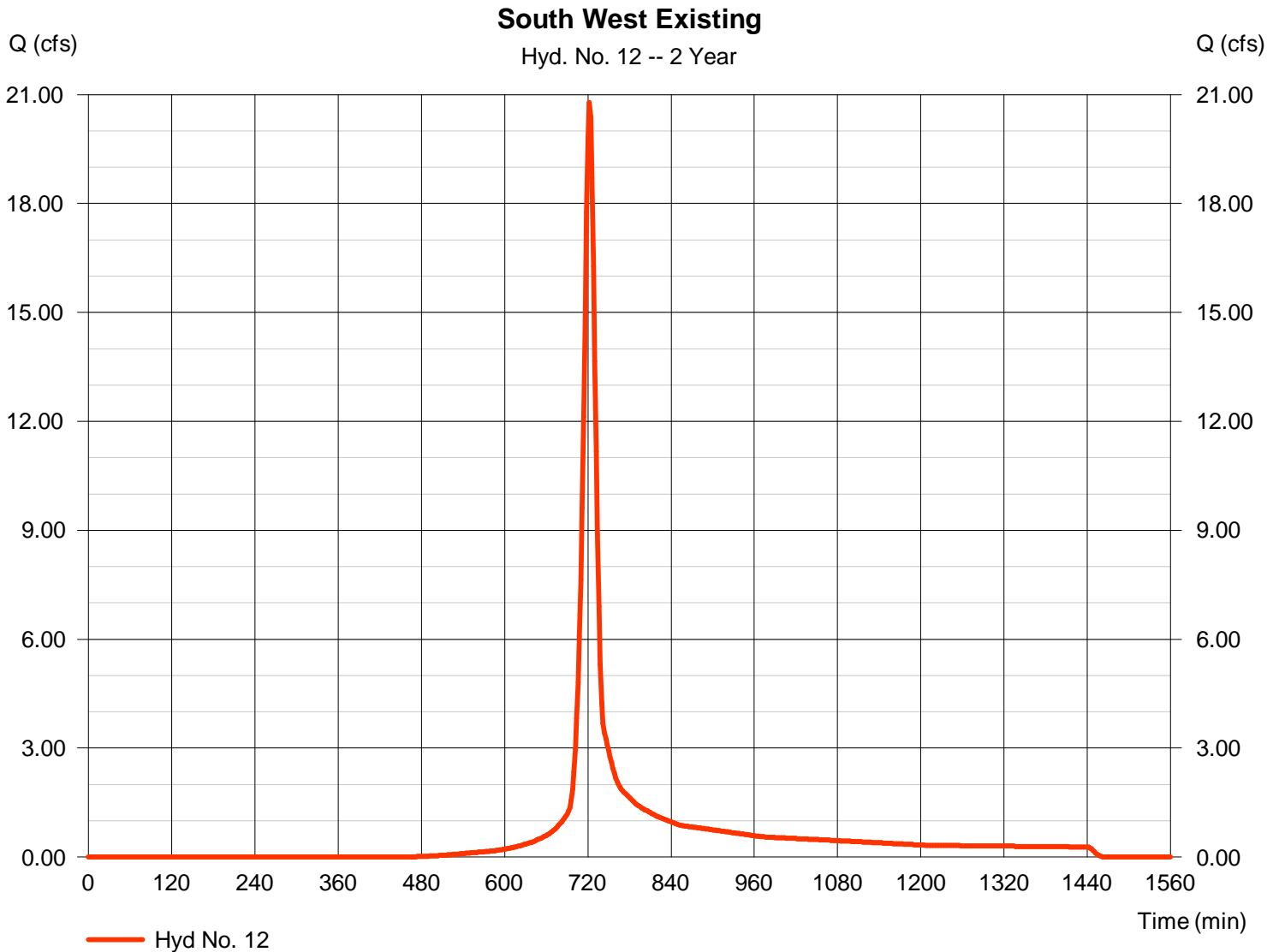
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Tuesday, Jun 18, 2013

Hyd. No. 12

South West Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 20.78 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 58,256 cuft
Drainage area	= 8.500 ac	Curve number	= 84
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

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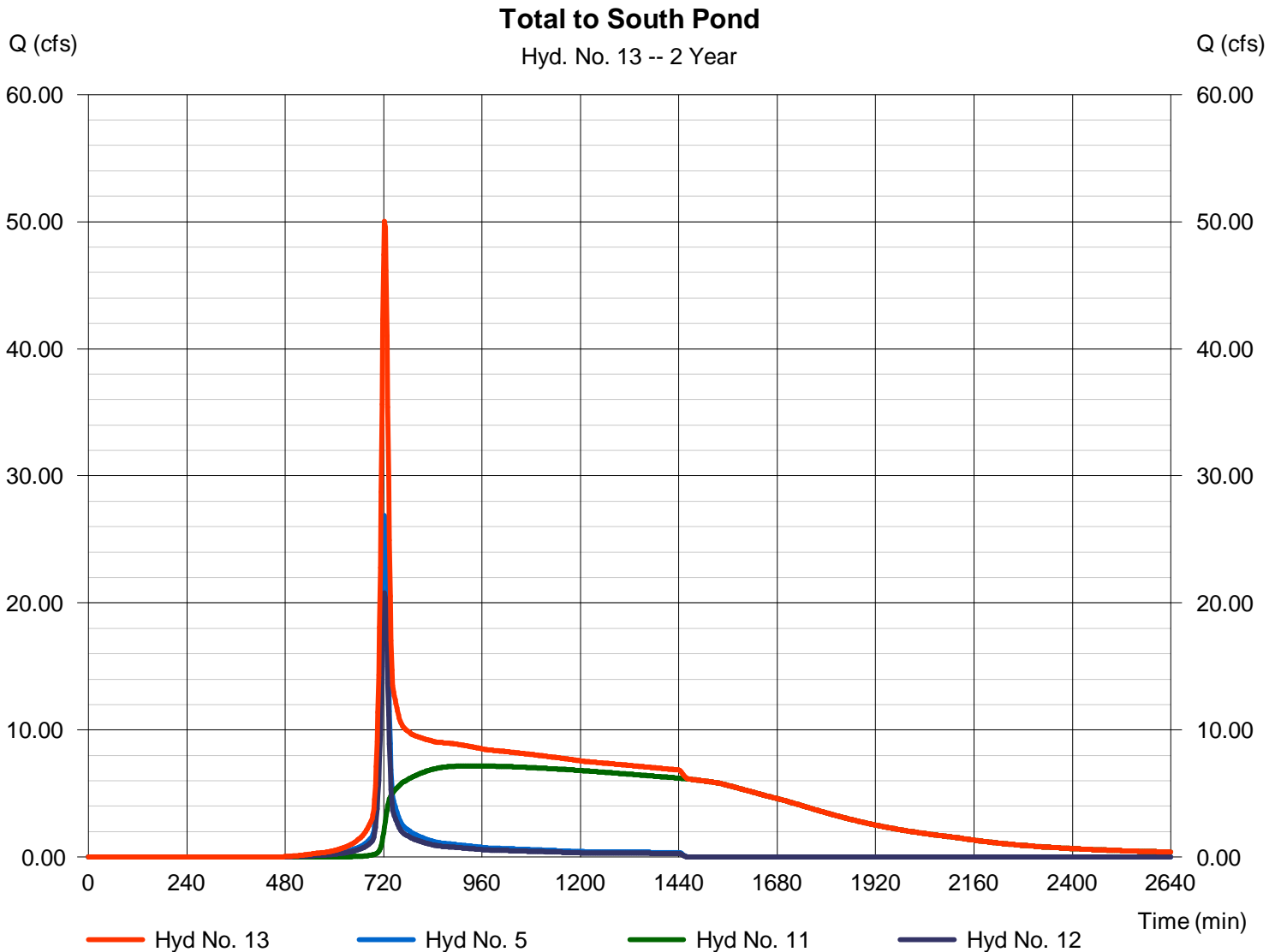
Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 5, 11, 12

Peak discharge = 50.02 cfs
 Time to peak = 722 min
 Hyd. volume = 619,217 cuft
 Contrib. drain. area = 19.500 ac



Hydrograph Report

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

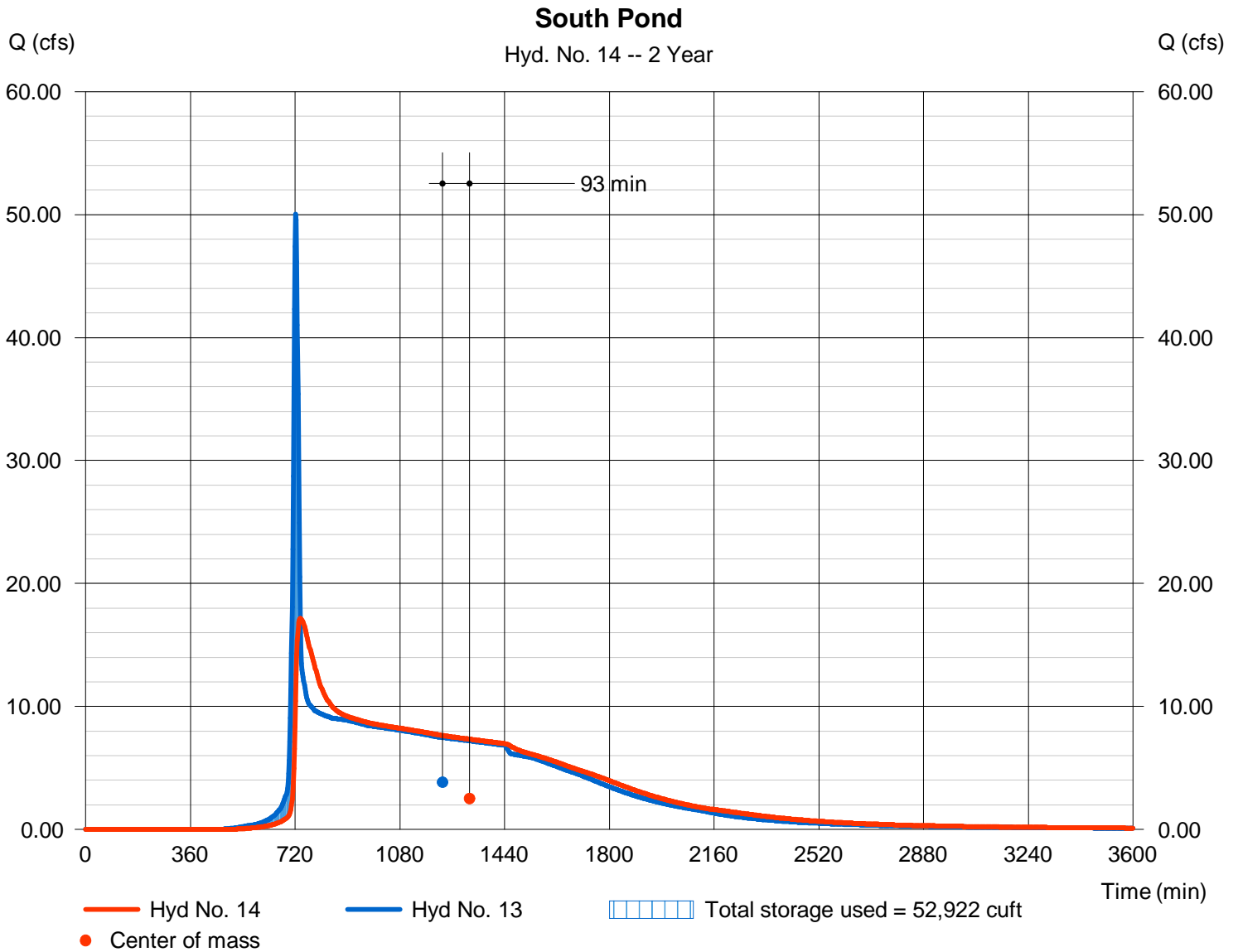
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 17.17 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 619,082 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1349.52 ft
Reservoir name	= South Pond	Max. Storage	= 52,922 cuft

Storage Indication method used.



Pond No. 2 - South Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1349.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1349.00	96,000	0	0
1.00	1350.00	106,400	101,145	101,145
2.00	1351.00	124,000	115,076	216,222
3.00	1352.00	136,000	129,941	346,162
4.00	1353.00	155,000	145,382	491,544
5.00	1354.00	168,000	161,440	652,985

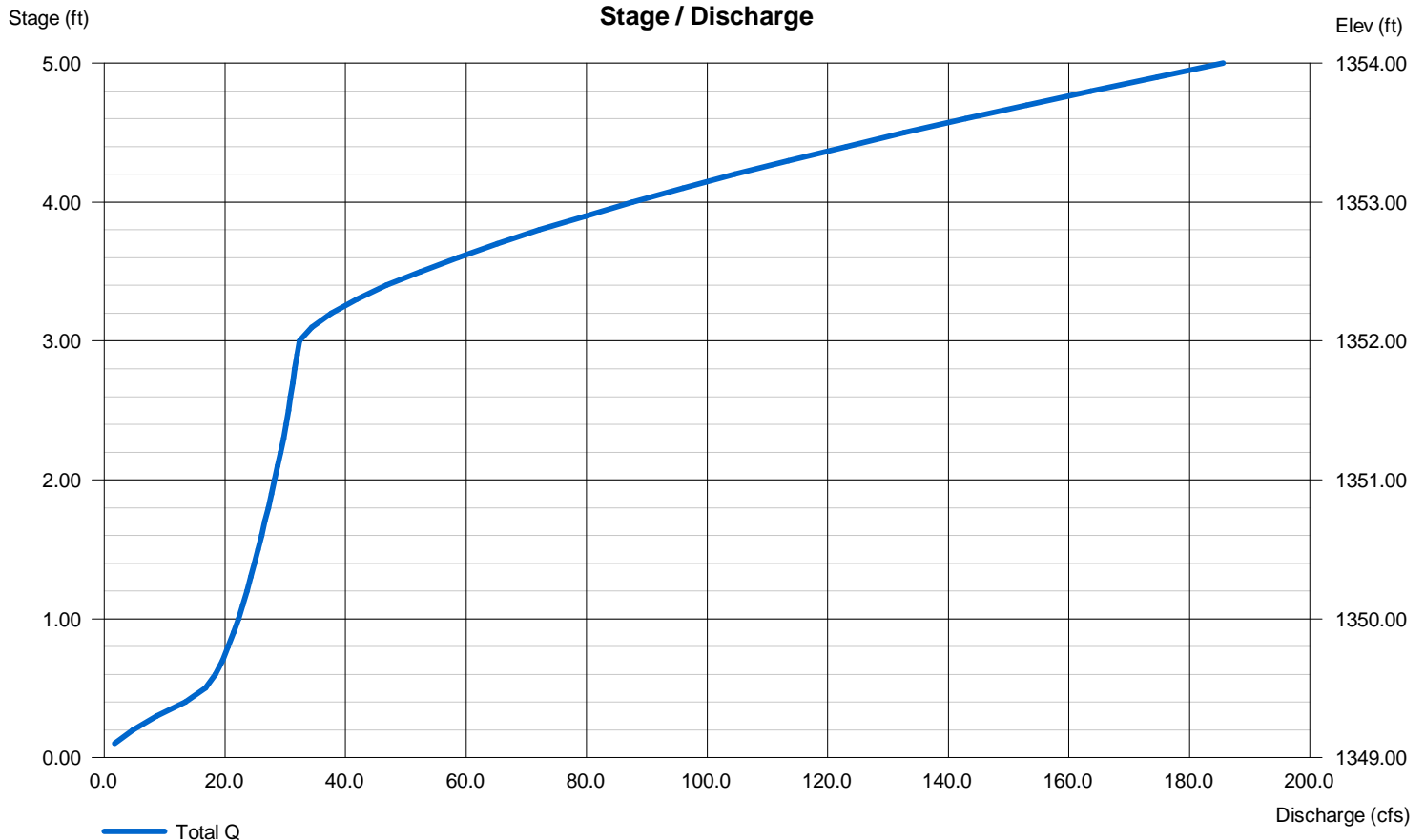
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1346.40	0.00	0.00	0.00
Length (ft)	= 55.00	0.00	0.00	0.00
Slope (%)	= 0.30	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)	= 16.00	20.00	0.00	0.00
Crest El. (ft)	= 1349.00	1352.00	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

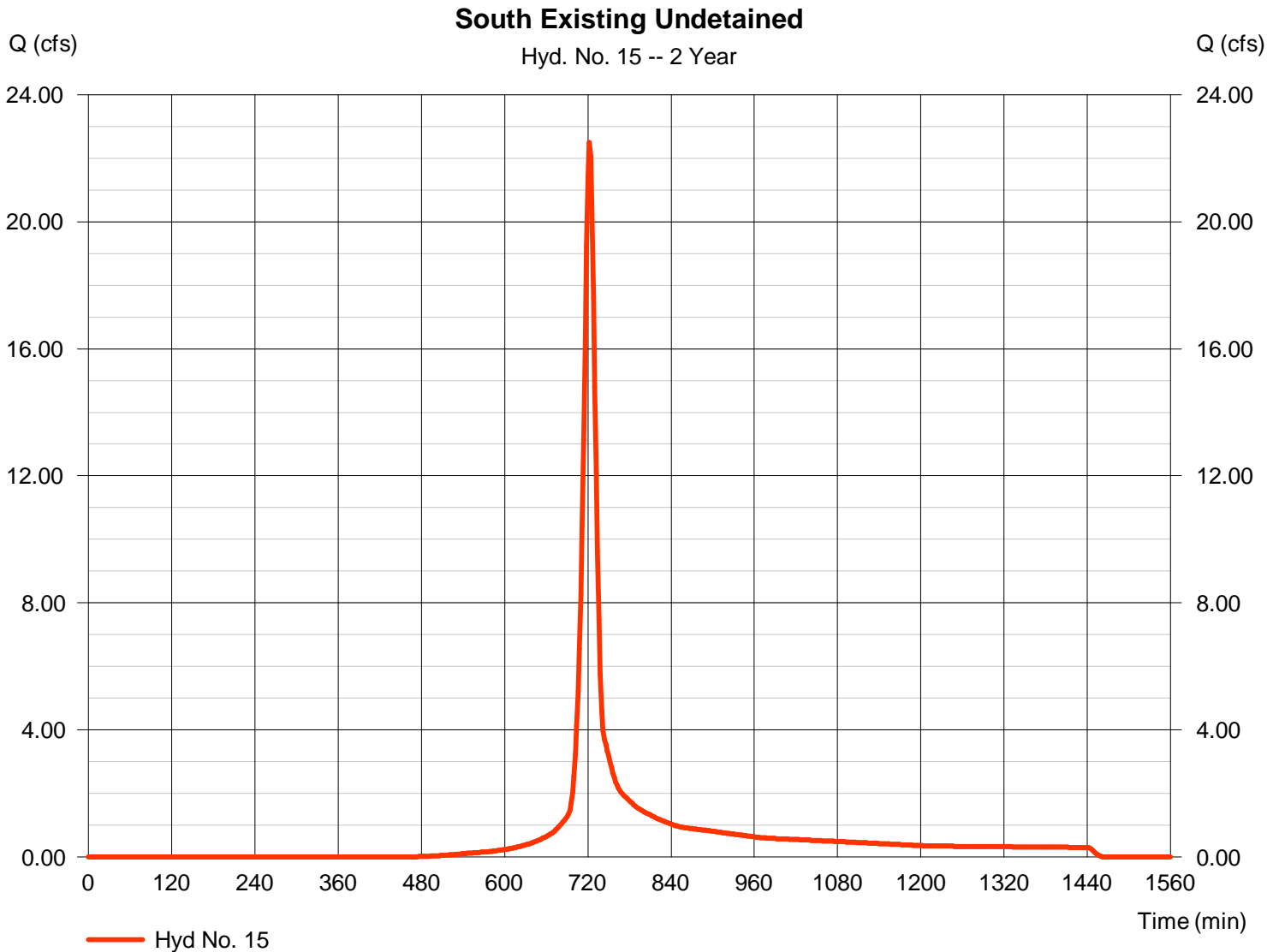
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

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Hyd. No. 15

South Existing Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 22.49 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 63,054 cuft
Drainage area	= 9.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

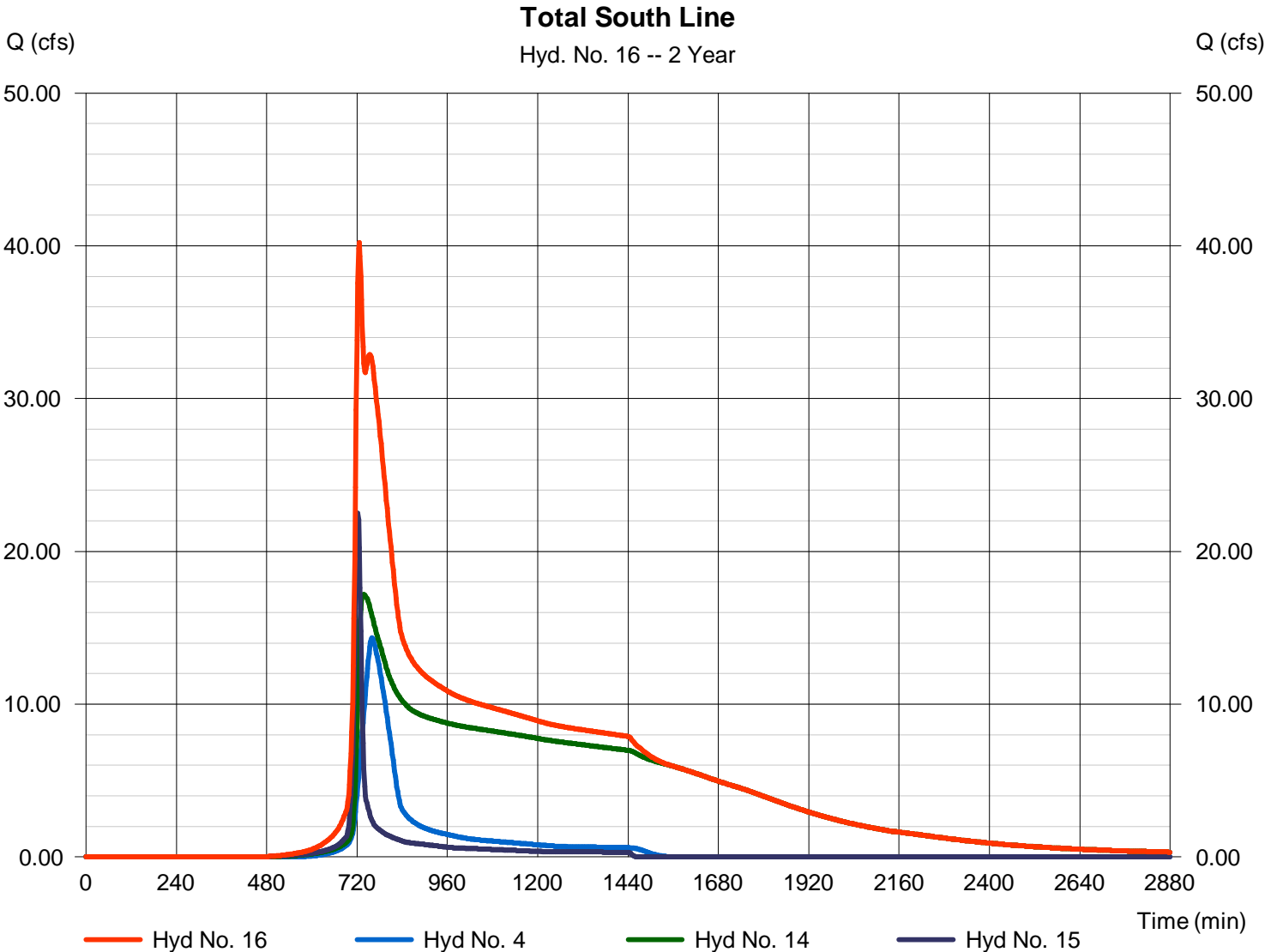
Tuesday, Jun 18, 2013

Hyd. No. 16

Total South Line

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 4, 14, 15

Peak discharge = 40.23 cfs
Time to peak = 726 min
Hyd. volume = 794,382 cuft
Contrib. drain. area = 28.200 ac



Hydrograph Report

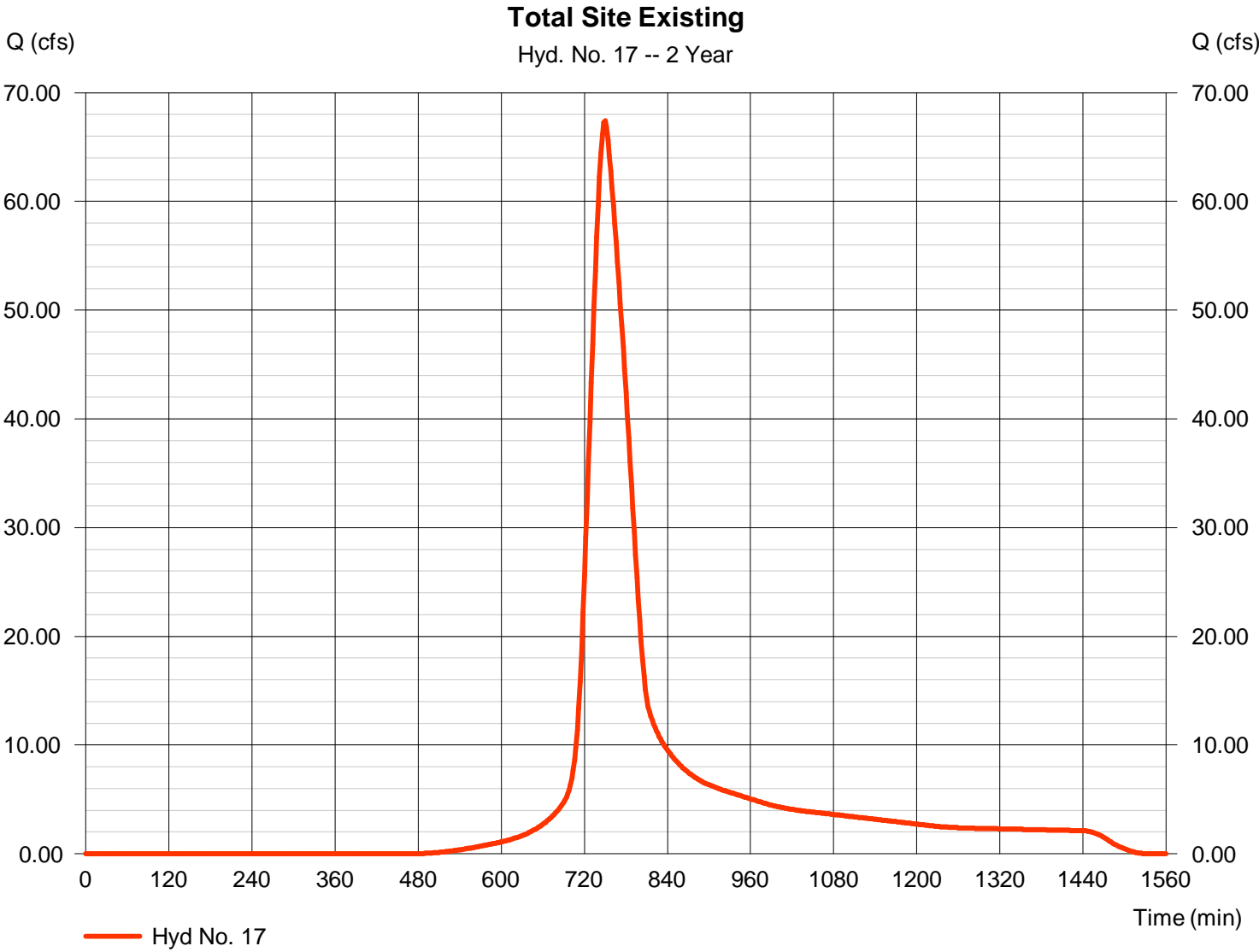
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Site Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 67.44 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 435,822 cuft
Drainage area	= 62.000 ac	Curve number	= 84
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 60.80 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	37.26	2	778	378,168	-----	-----	-----	Offsite North
2	SCS Runoff	38.92	2	722	109,654	-----	-----	-----	Estate Lots & Comm North - Existing
3	SCS Runoff	25.47	2	722	71,774	-----	-----	-----	NorthWest to North Pond
4	SCS Runoff	21.90	2	760	168,850	-----	-----	-----	Offsite West
5	SCS Runoff	38.92	2	722	109,654	-----	-----	-----	South East Existing
6	Combine	72.49	2	722	559,597	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	35.38	2	722	99,686	-----	-----	-----	West Existing Middle Pond
8	SCS Runoff	33.26	2	722	93,705	-----	-----	-----	East Existing Middle Pond
9	Reservoir	67.25	2	726	559,596	6	1357.31	19,223	North Pond
10	Combine	132.32	2	724	752,987	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	23.78	2	856	747,706	10	1358.34	393,884	Middle Pond
12	SCS Runoff	30.07	2	722	84,733	-----	-----	-----	South West Existing
13	Combine	73.26	2	722	942,093	5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	20.84	2	906	941,938	13	1349.83	83,872	South Pond
15	SCS Runoff	32.55	2	722	91,711	-----	-----	-----	South Existing Undetained
16	Combine	58.30	2	724	1,202,498	4, 14, 15	-----	-----	Total South Line
17	SCS Runoff	98.35	2	750	633,900	-----	-----	-----	Total Site Existing
The Ranch Existing.gpw					Return Period: 5 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

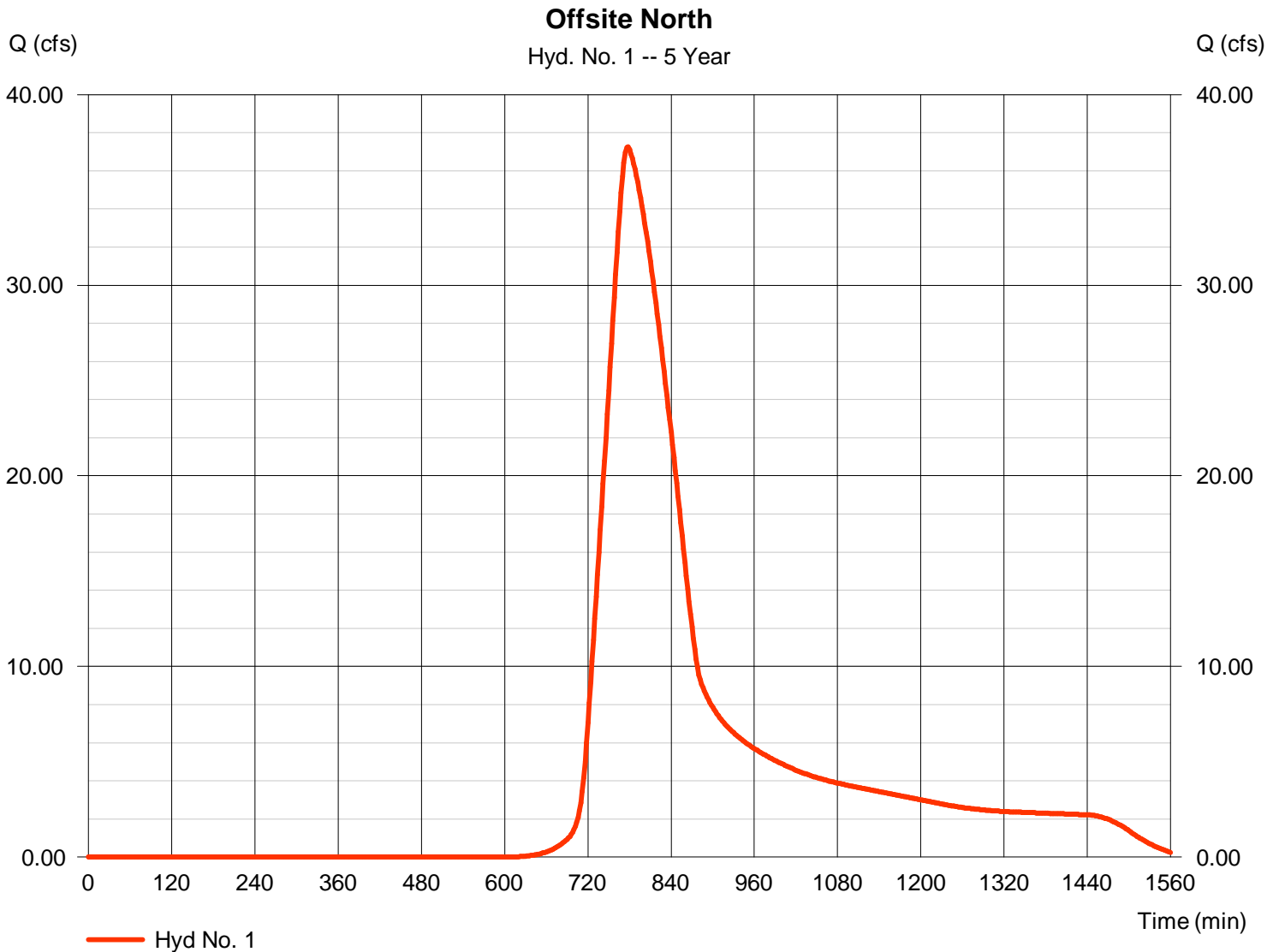
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 37.26 cfs
Storm frequency	= 5 yrs	Time to peak	= 778 min
Time interval	= 2 min	Hyd. volume	= 378,168 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

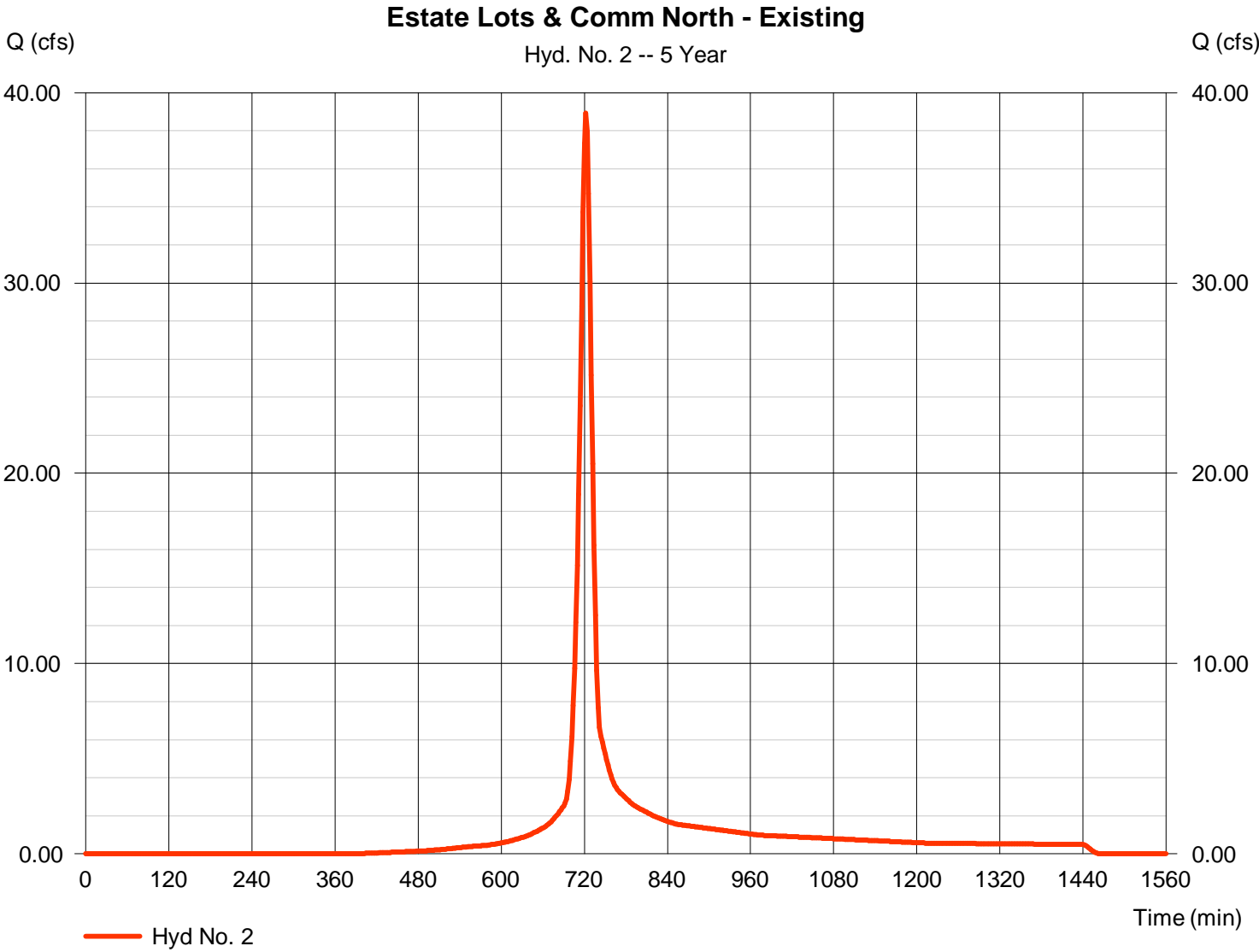
Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots & Comm North - Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 38.92 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 109,654 cuft
Drainage area	= 11.000 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(7.000 x 84) + (4.000 x 98)] / 11.000



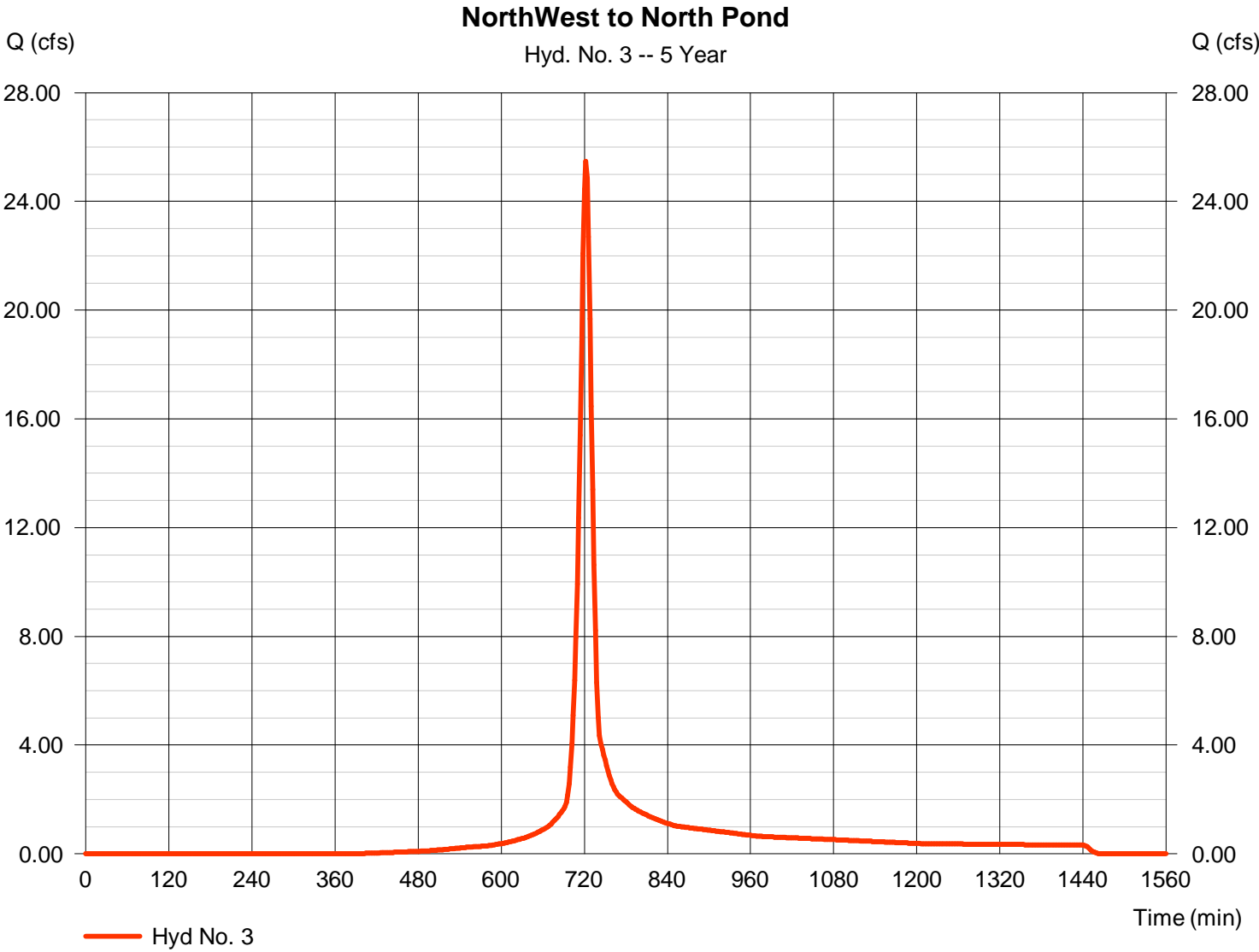
Hydrograph Report

Hyd. No. 3

NorthWest to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 25.47 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 71,774 cuft
Drainage area	= 7.200 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 7.200



Hydrograph Report

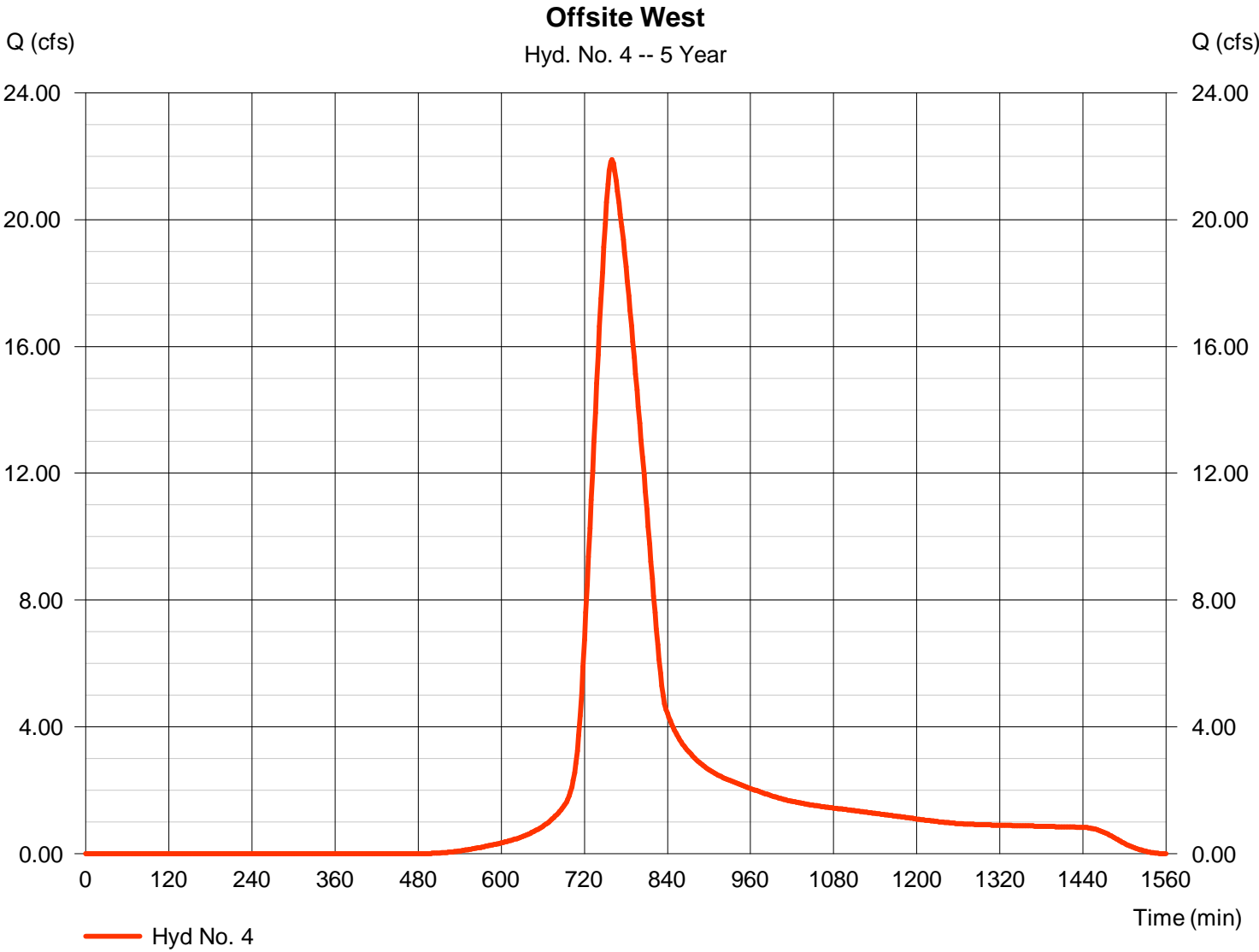
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 21.90 cfs
Storm frequency	= 5 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 168,850 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

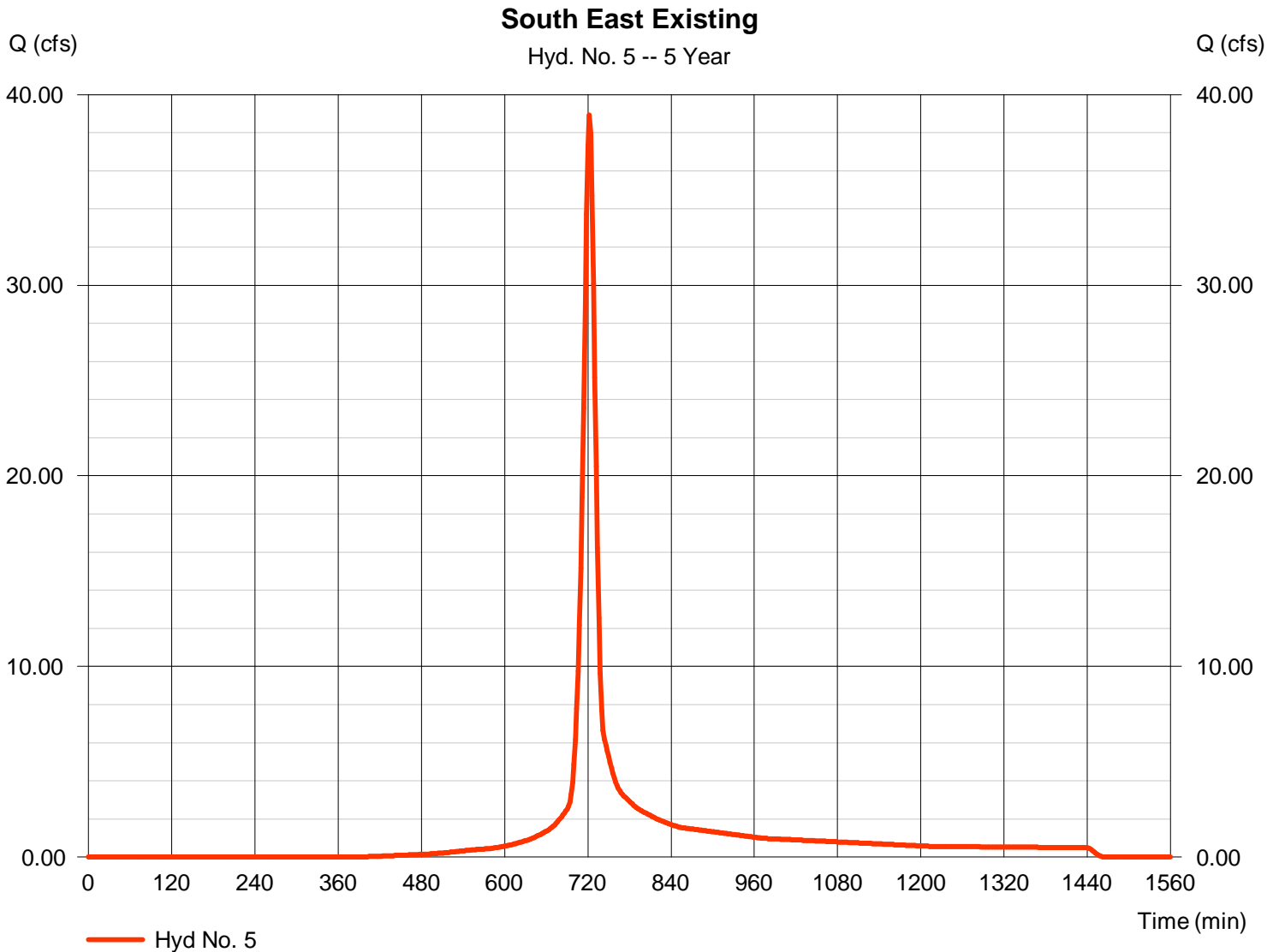
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South East Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 38.92 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 109,654 cuft
Drainage area	= 11.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

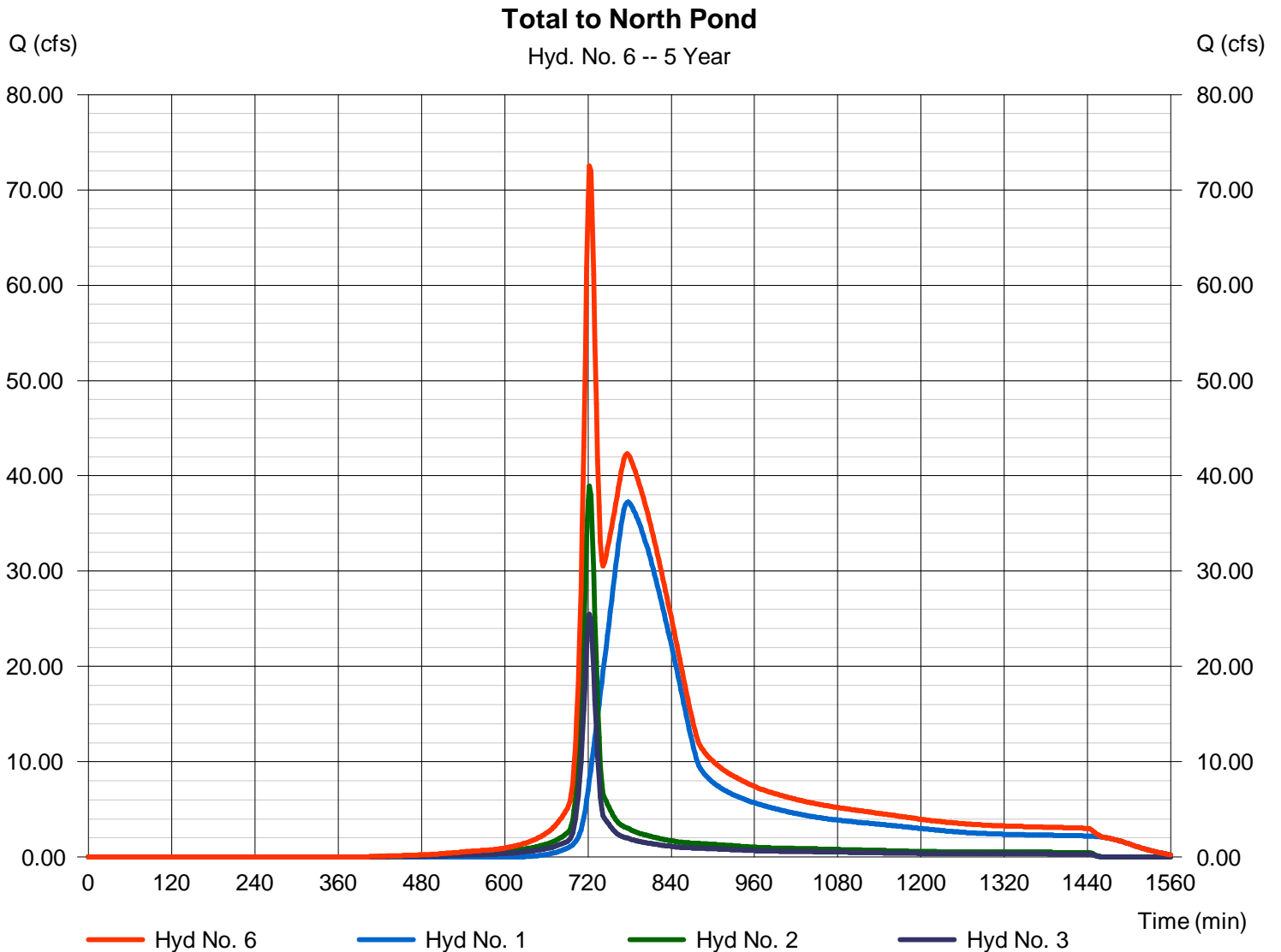
Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

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

Peak discharge = 72.49 cfs
 Time to peak = 722 min
 Hyd. volume = 559,597 cuft
 Contrib. drain. area = 75.200 ac



Hydrograph Report

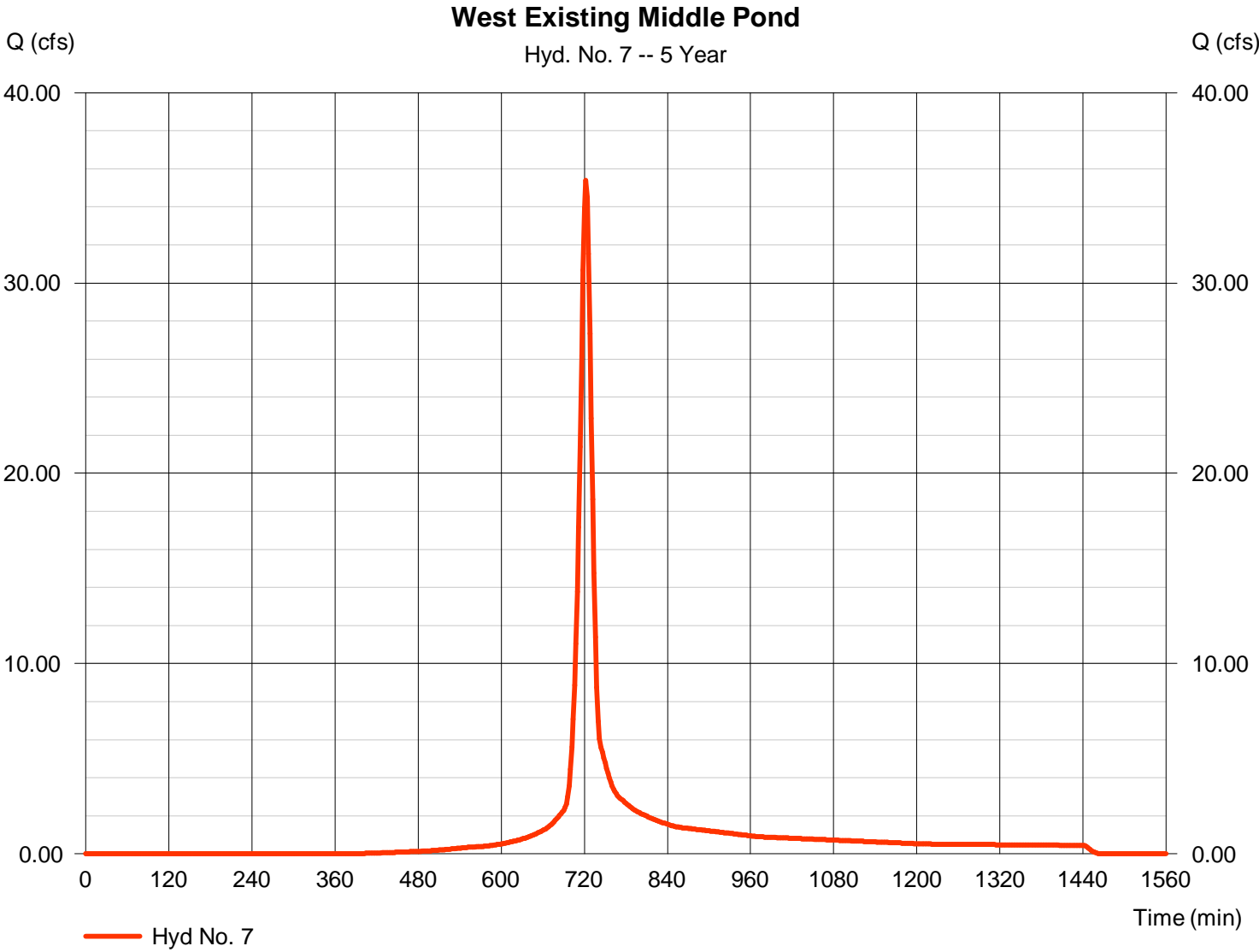
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 7

West Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 35.38 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 99,686 cuft
Drainage area	= 10.000 ac	Curve number	= 84
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

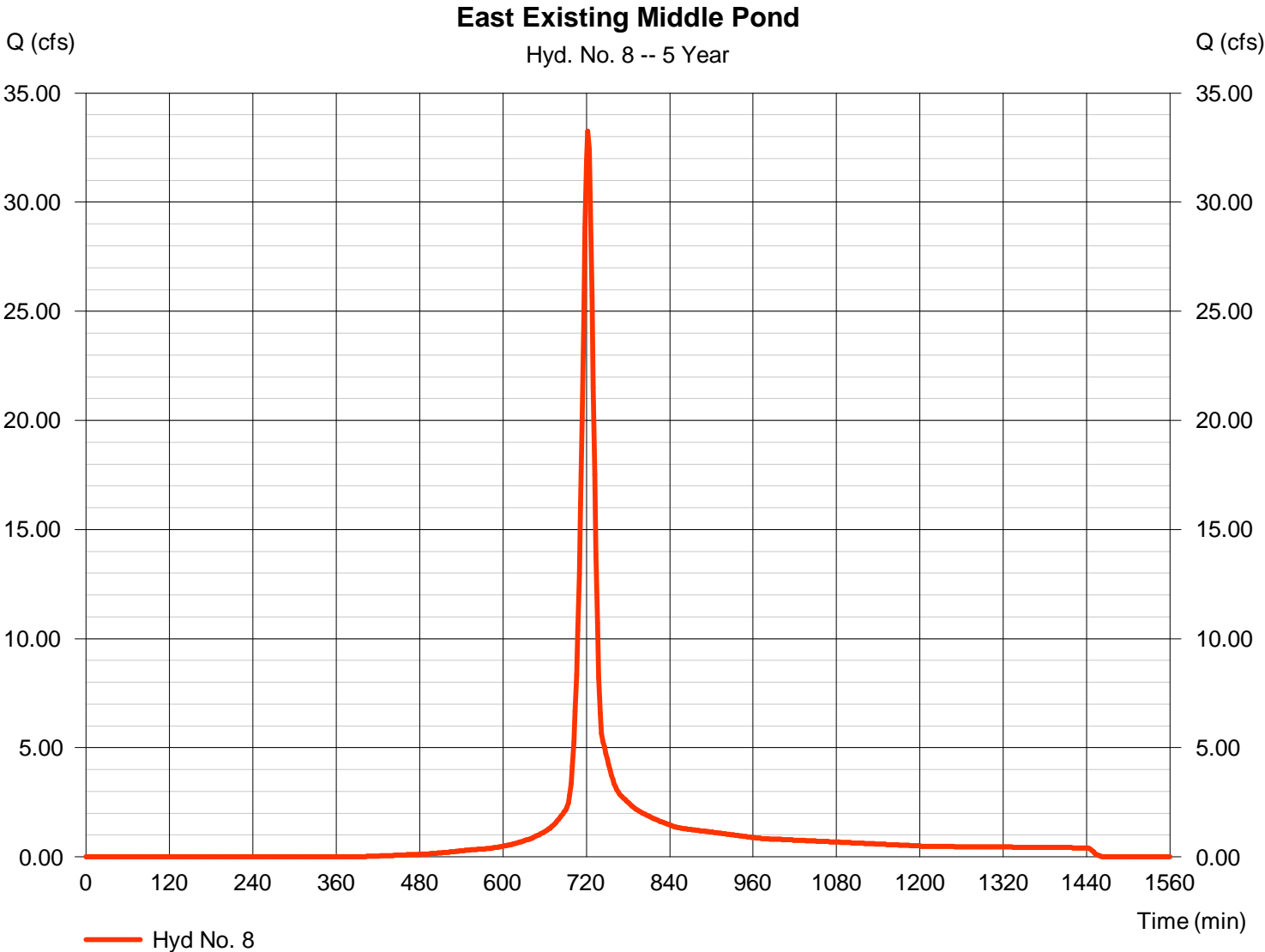


Hydrograph Report

Hyd. No. 8

East Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 33.26 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 93,705 cuft
Drainage area	= 9.400 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

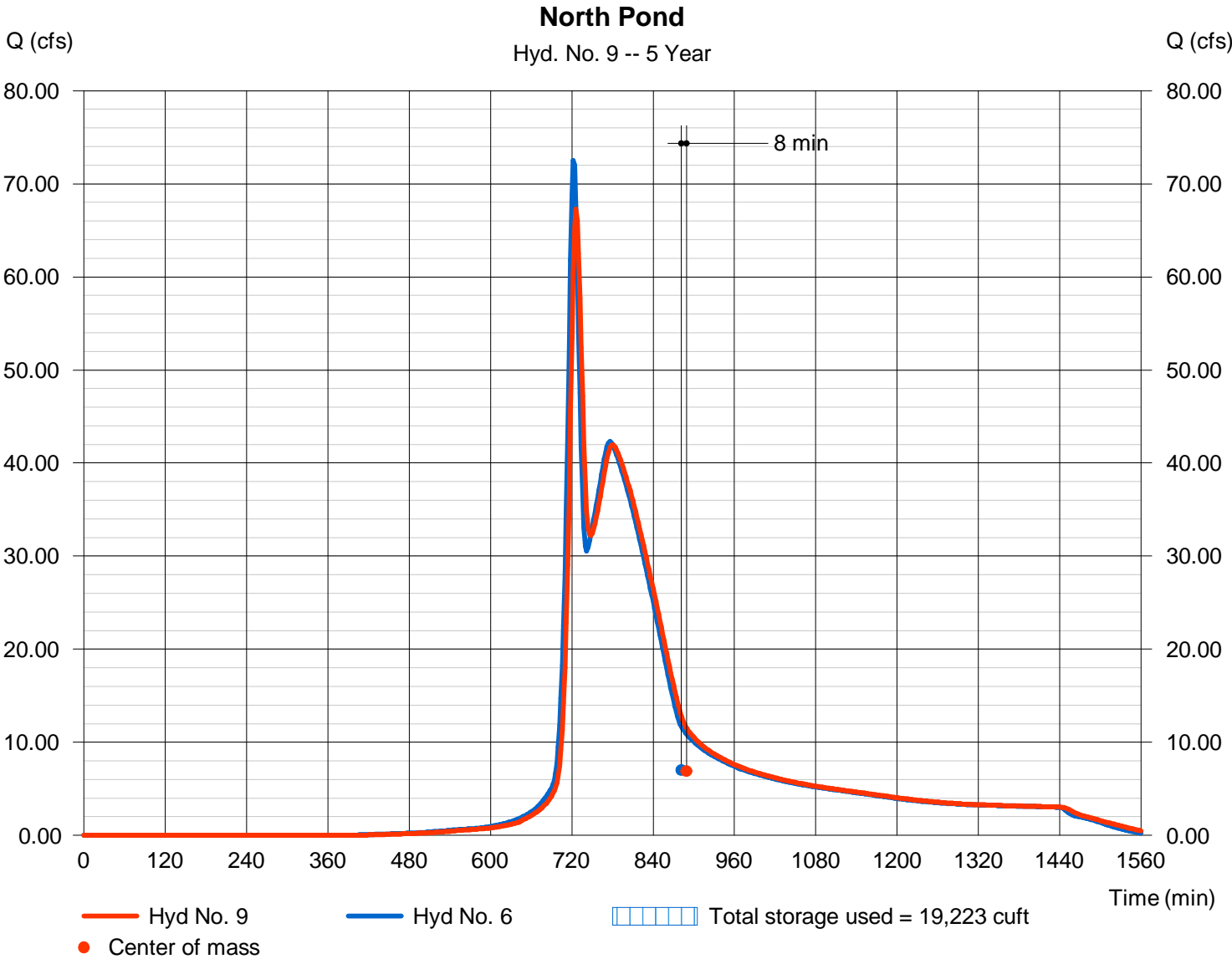
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 67.25 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 559,596 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1357.31 ft
Reservoir name	= North Pond	Max. Storage	= 19,223 cuft

Storage Indication method used.



Hydrograph Report

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

Tuesday, Jun 18, 2013

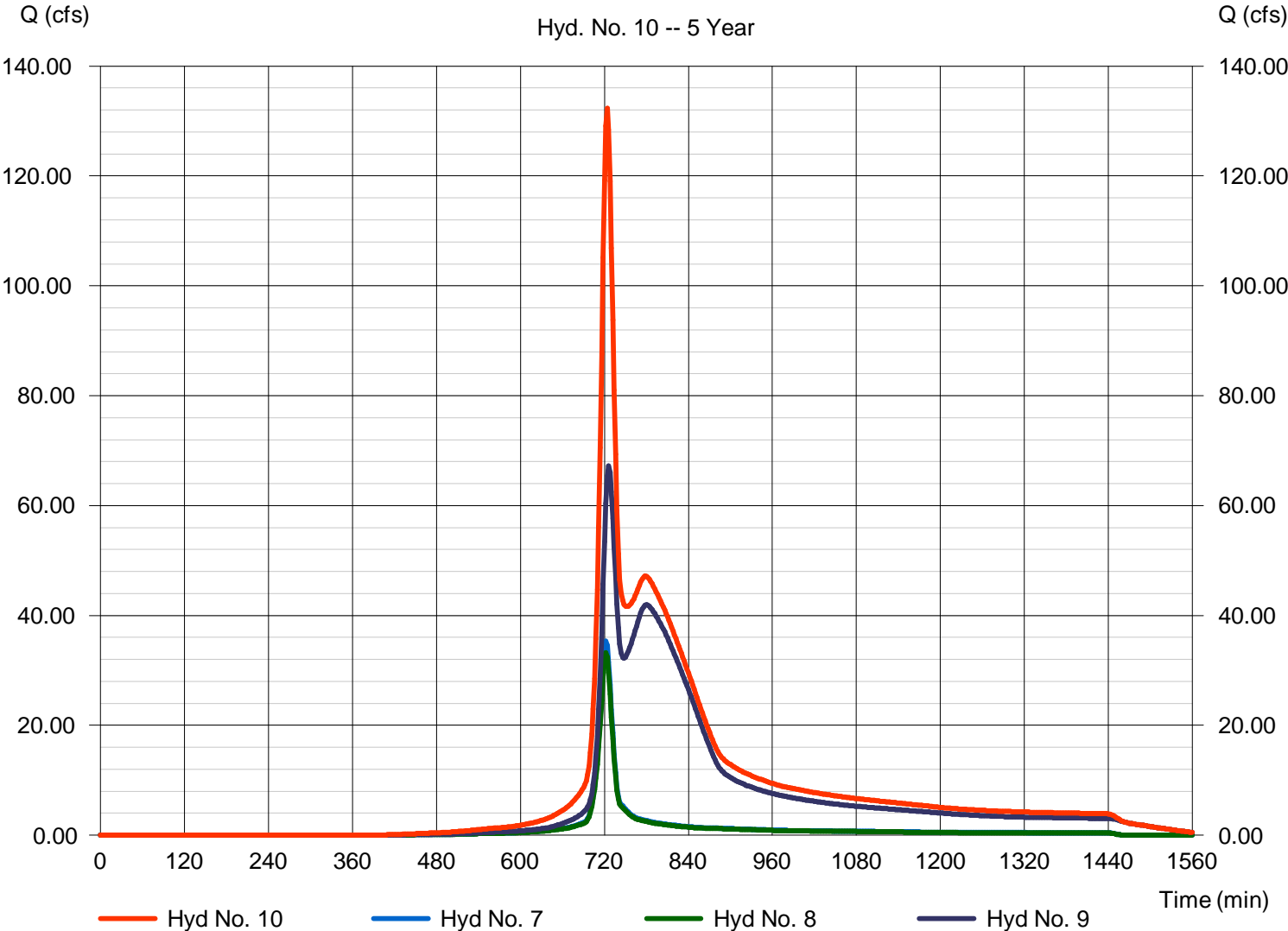
Hyd. No. 10

Total to Middle Pond

Hydrograph type	= Combine	Peak discharge	= 132.32 cfs
Storm frequency	= 5 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 752,987 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 19.400 ac

Total to Middle Pond

Hyd. No. 10 -- 5 Year



Hydrograph Report

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

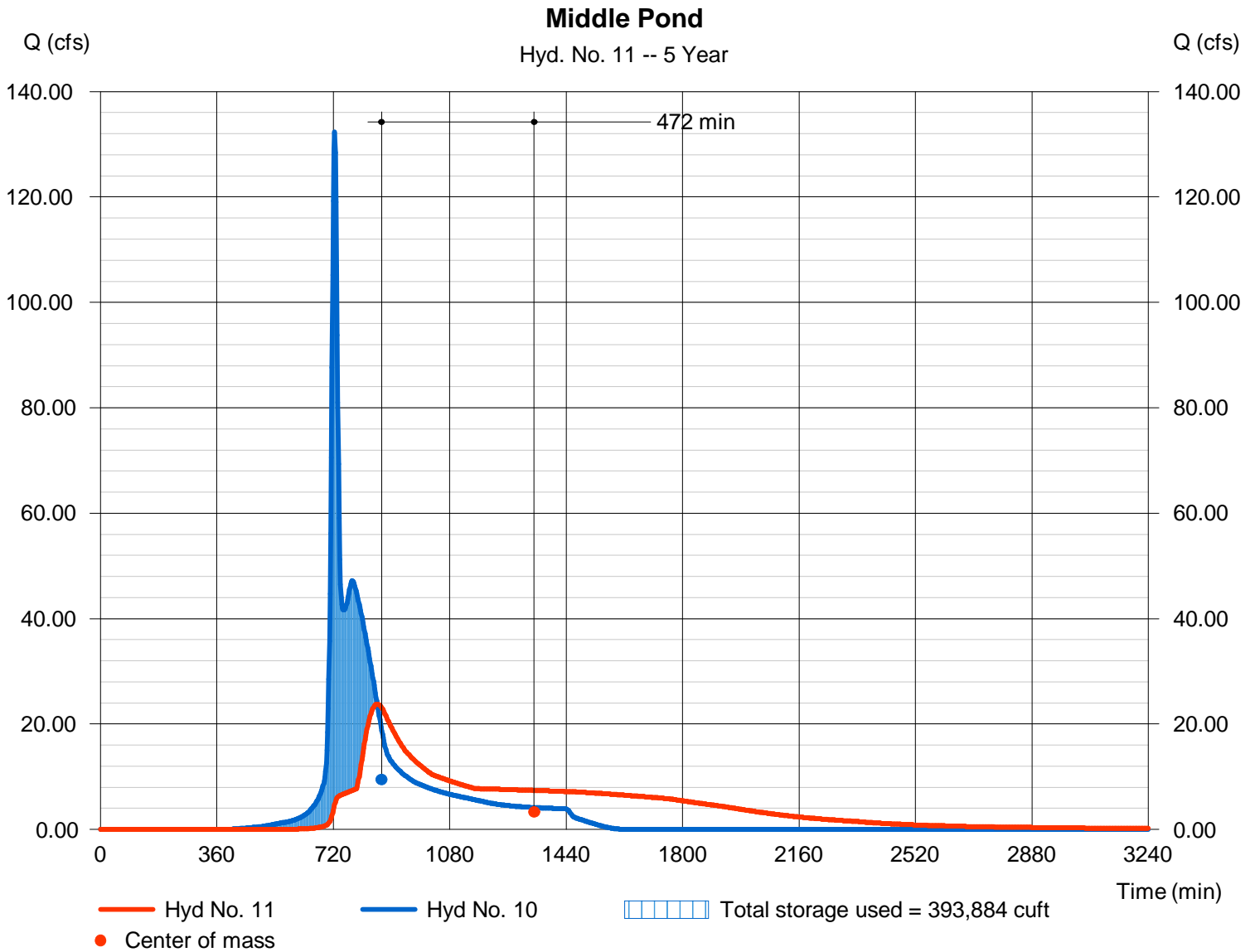
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 23.78 cfs
Storm frequency	= 5 yrs	Time to peak	= 856 min
Time interval	= 2 min	Hyd. volume	= 747,706 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1358.34 ft
Reservoir name	= Middle Pond	Max. Storage	= 393,884 cuft

Storage Indication method used.

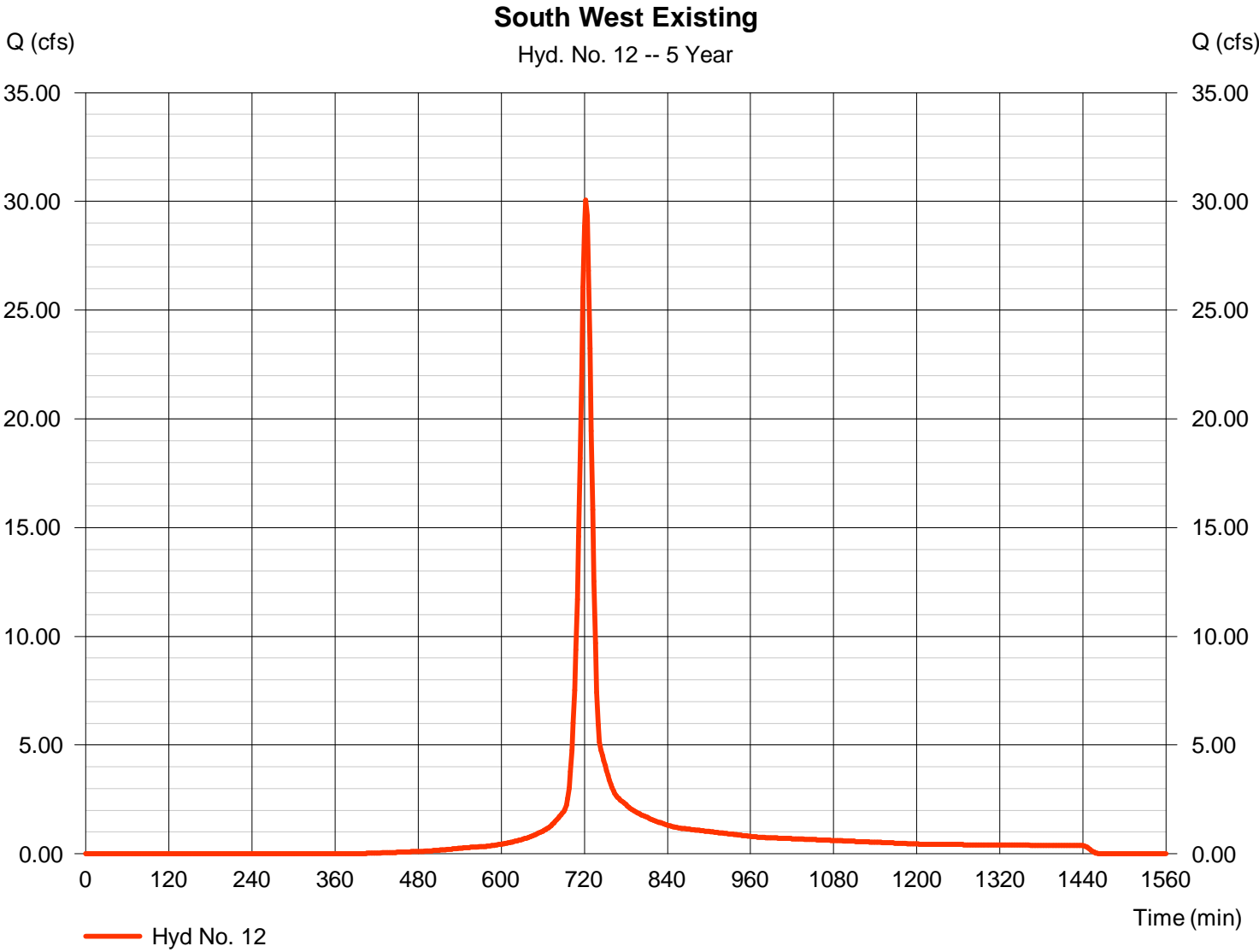


Hydrograph Report

Hyd. No. 12

South West Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 30.07 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 84,733 cuft
Drainage area	= 8.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

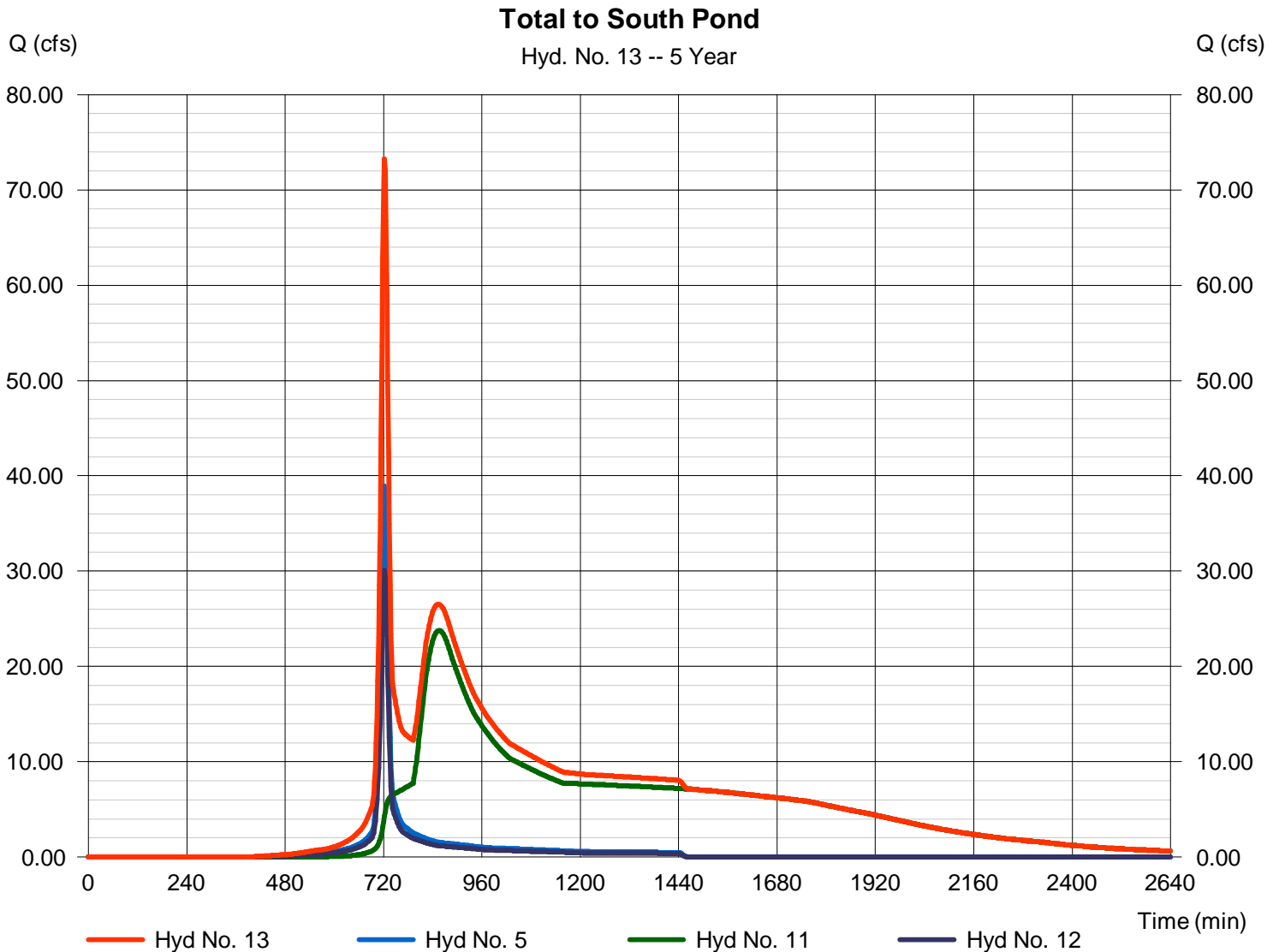
Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 5, 11, 12

Peak discharge = 73.26 cfs
 Time to peak = 722 min
 Hyd. volume = 942,093 cuft
 Contrib. drain. area = 19.500 ac



Hydrograph Report

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

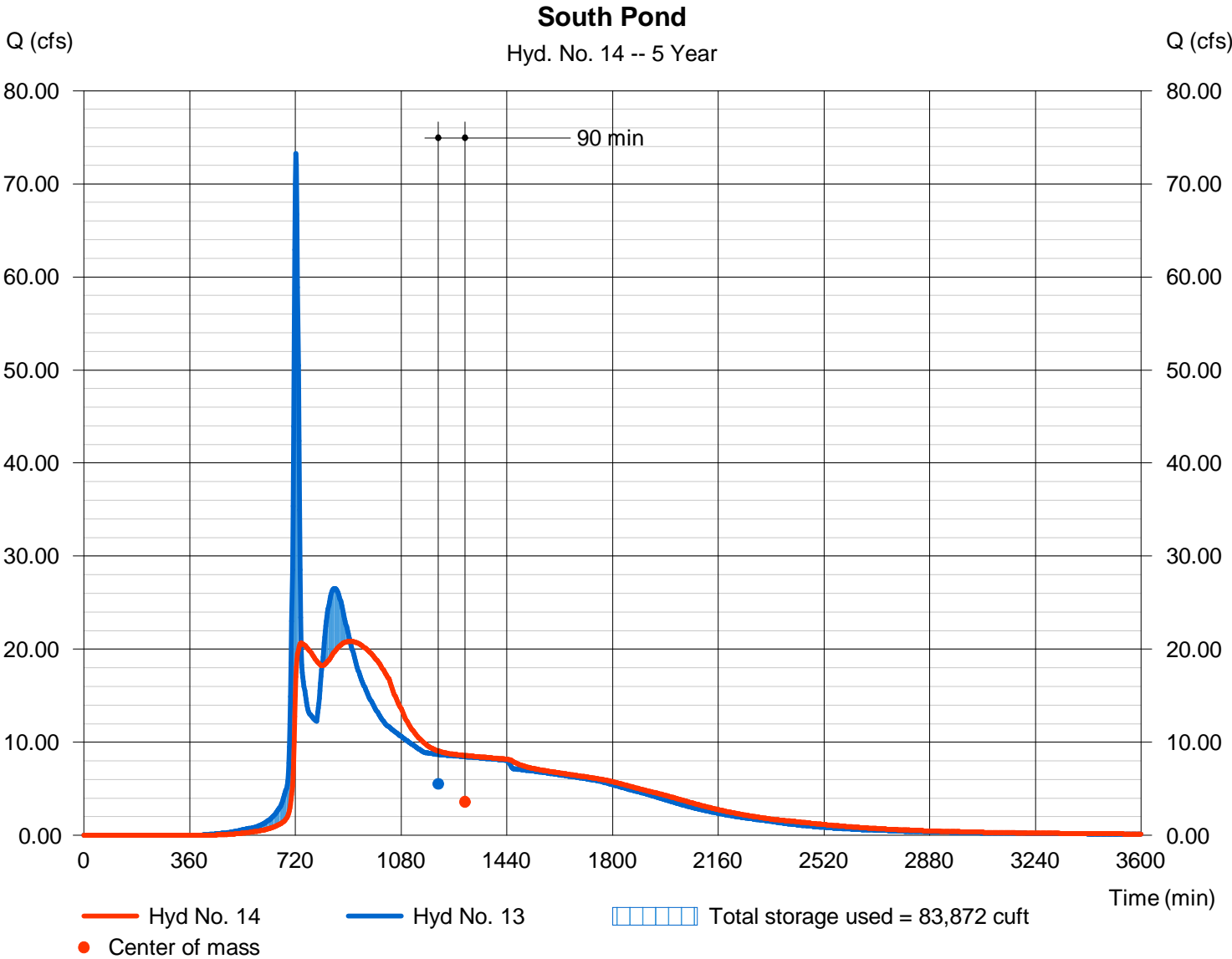
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 20.84 cfs
Storm frequency	= 5 yrs	Time to peak	= 906 min
Time interval	= 2 min	Hyd. volume	= 941,938 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1349.83 ft
Reservoir name	= South Pond	Max. Storage	= 83,872 cuft

Storage Indication method used.



Hydrograph Report

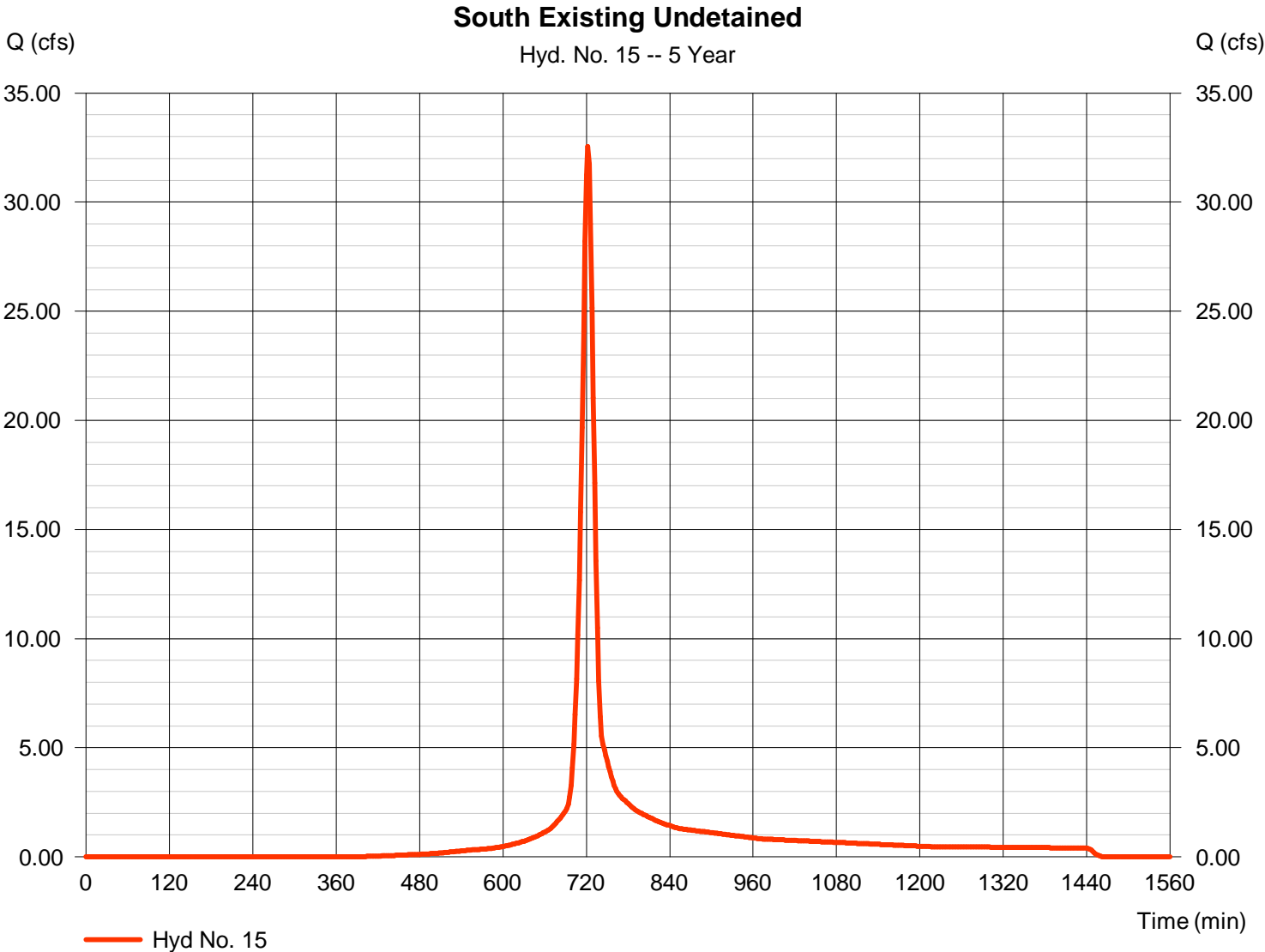
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 15

South Existing Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 32.55 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 91,711 cuft
Drainage area	= 9.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

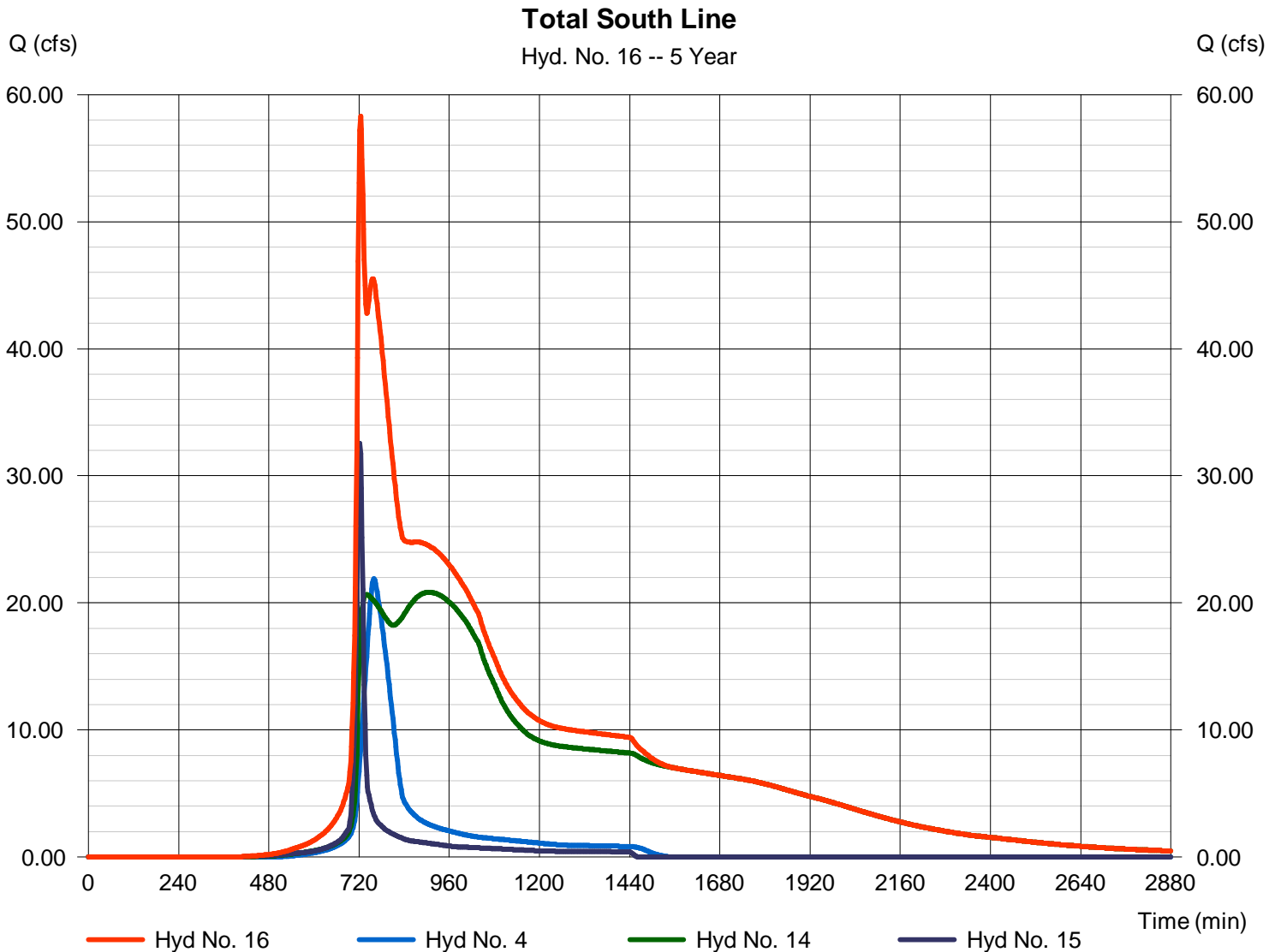
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 16

Total South Line

Hydrograph type	= Combine	Peak discharge	= 58.30 cfs
Storm frequency	= 5 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,202,498 cuft
Inflow hyds.	= 4, 14, 15	Contrib. drain. area	= 28.200 ac



Hydrograph Report

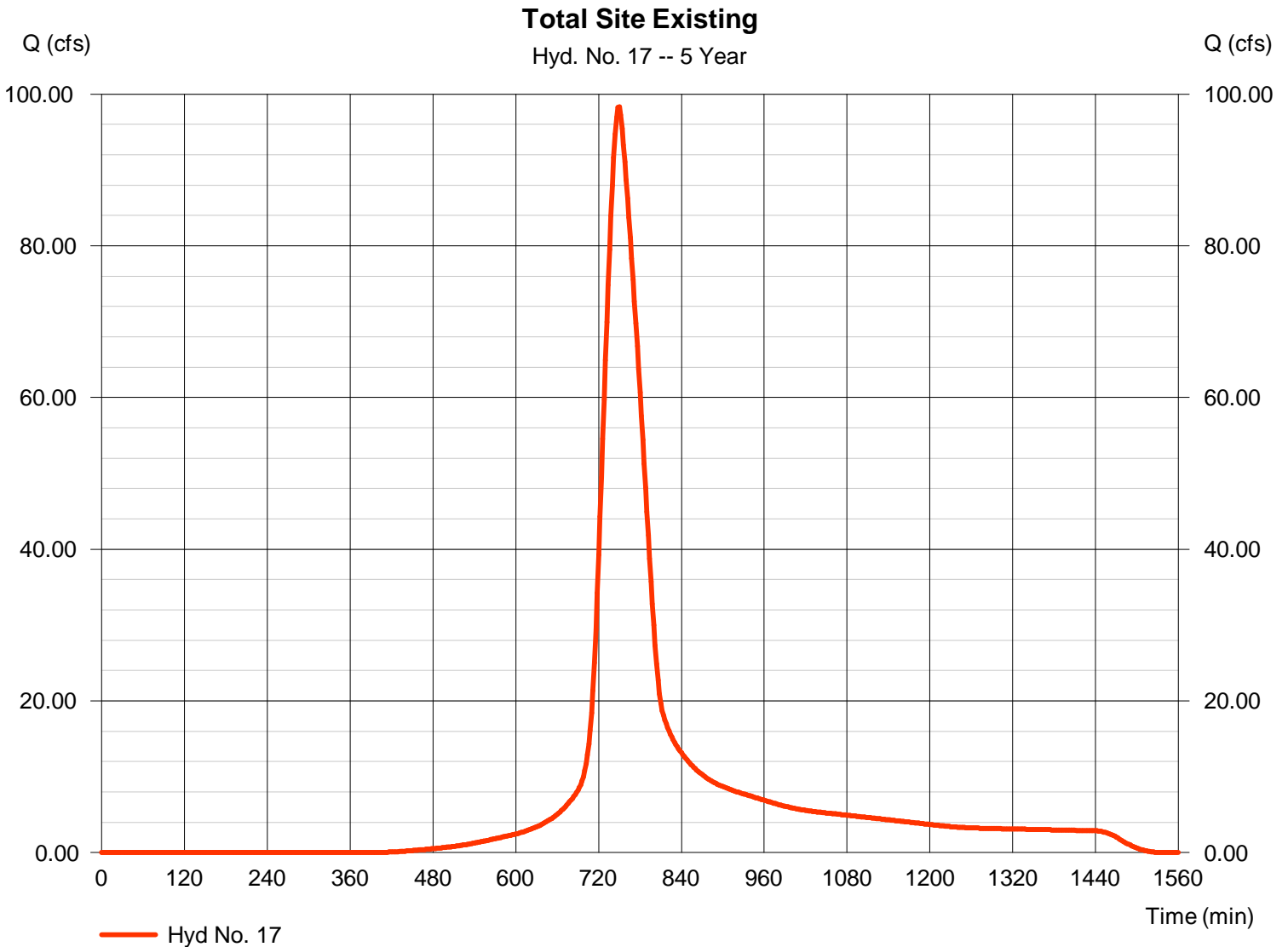
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Site Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 98.35 cfs
Storm frequency	= 5 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 633,900 cuft
Drainage area	= 62.000 ac	Curve number	= 84
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 60.80 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	49.11	2	776	488,822	-----	-----	-----	Offsite North
2	SCS Runoff	47.46	2	722	134,466	-----	-----	-----	Estate Lots & Comm North - Existing
3	SCS Runoff	31.06	2	722	88,014	-----	-----	-----	NorthWest to North Pond
4	SCS Runoff	27.40	2	760	210,454	-----	-----	-----	Offsite West
5	SCS Runoff	47.46	2	722	134,466	-----	-----	-----	South East Existing
6	Combine	90.22	2	722	711,301	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	43.14	2	722	122,241	-----	-----	-----	West Existing Middle Pond
8	SCS Runoff	40.56	2	722	114,907	-----	-----	-----	East Existing Middle Pond
9	Reservoir	84.44	2	726	711,301	6	1357.52	22,883	North Pond
10	Combine	163.85	2	724	948,449	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	41.54	2	830	943,094	10	1358.56	437,015	Middle Pond
12	SCS Runoff	36.67	2	722	103,905	-----	-----	-----	South West Existing
13	Combine	89.47	2	722	1,181,465	5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	27.31	2	906	1,181,304	13	1350.82	195,453	South Pond
15	SCS Runoff	39.69	2	722	112,462	-----	-----	-----	South Existing Undetained
16	Combine	69.45	2	724	1,504,220	4, 14, 15	-----	-----	Total South Line
17	SCS Runoff	120.42	2	748	777,330	-----	-----	-----	Total Site Existing
The Ranch Existing.gpw					Return Period: 10 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

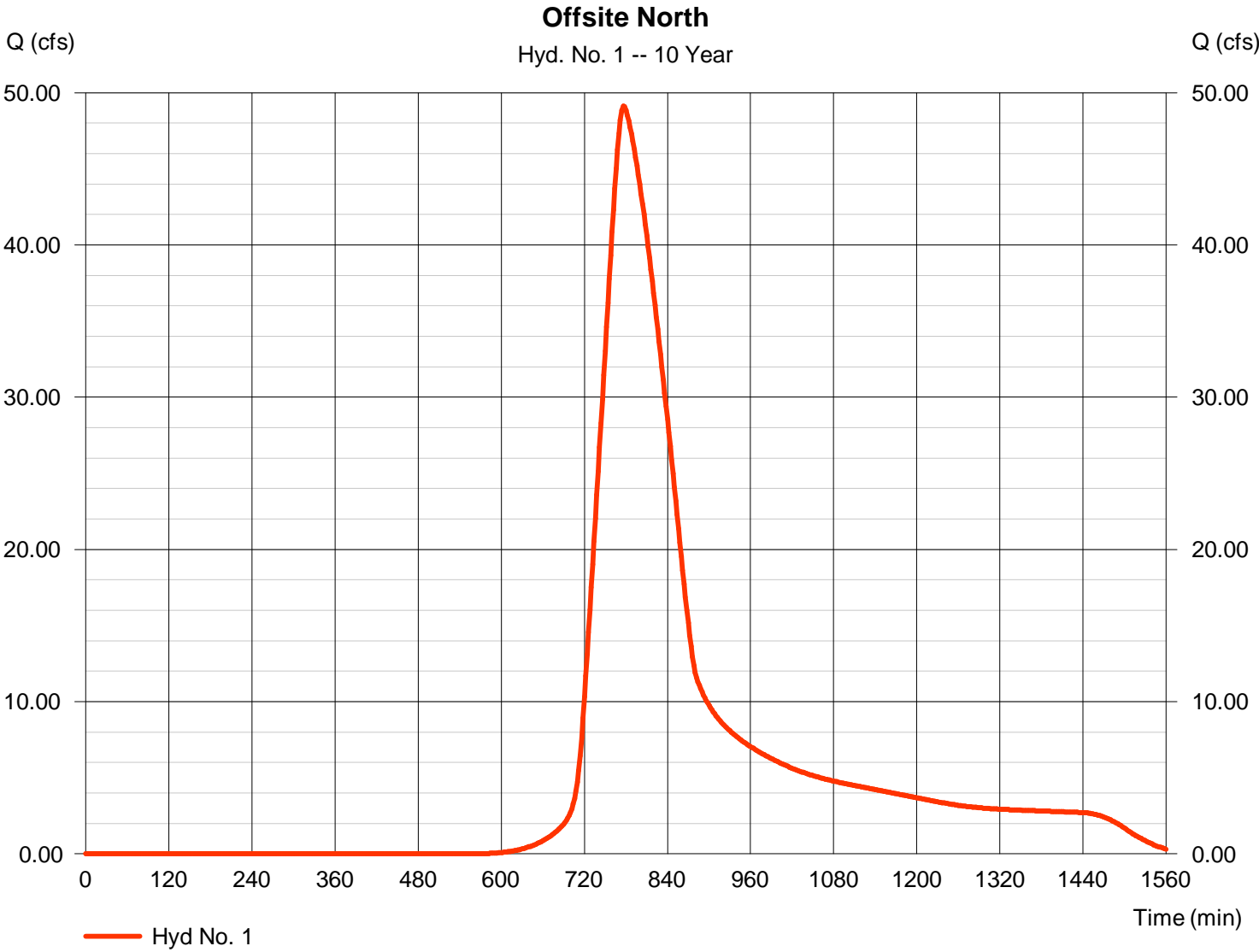
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 49.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 776 min
Time interval	= 2 min	Hyd. volume	= 488,822 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

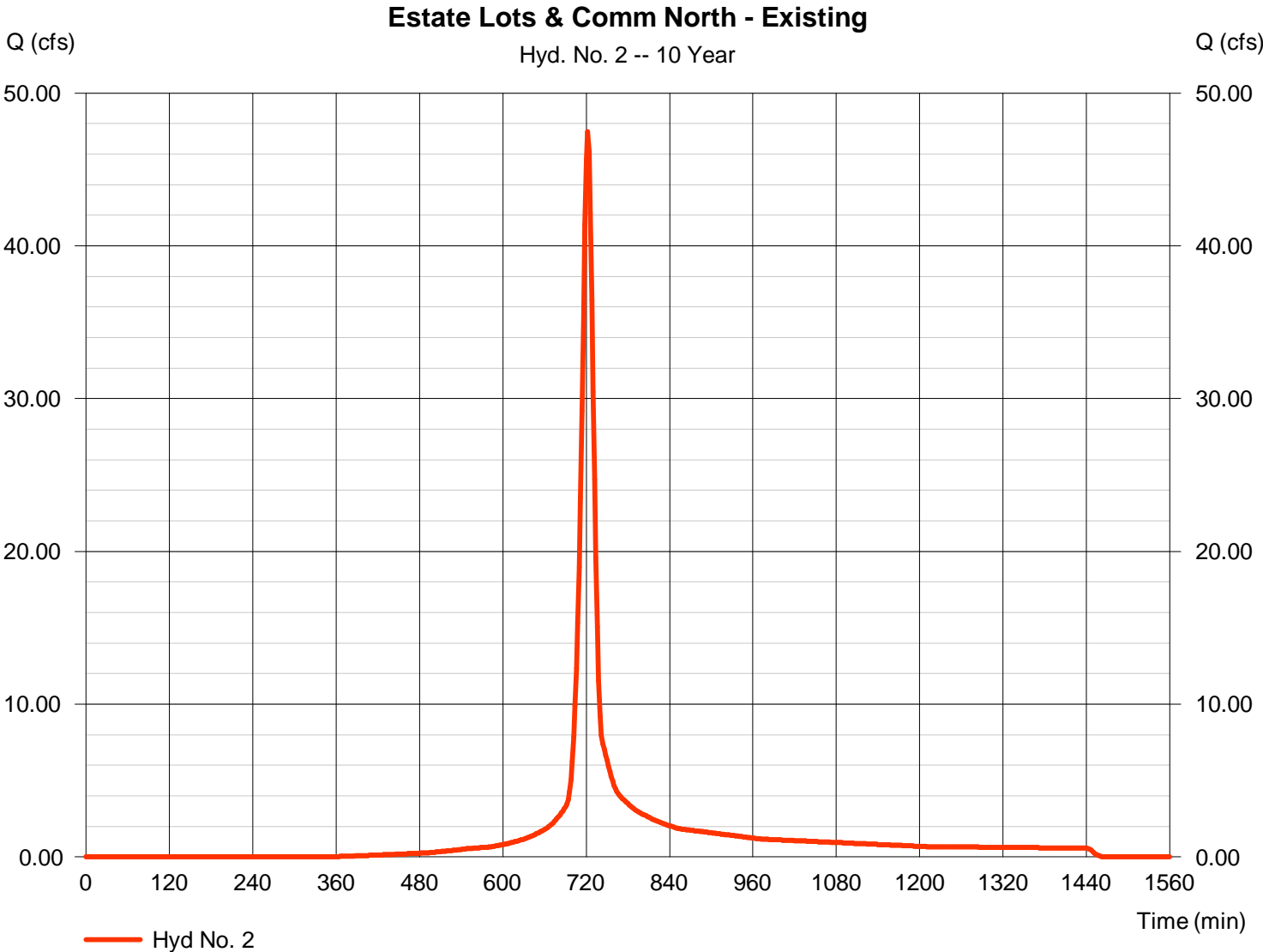
Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots & Comm North - Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 47.46 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 134,466 cuft
Drainage area	= 11.000 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(7.000 x 84) + (4.000 x 98)] / 11.000



Hydrograph Report

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

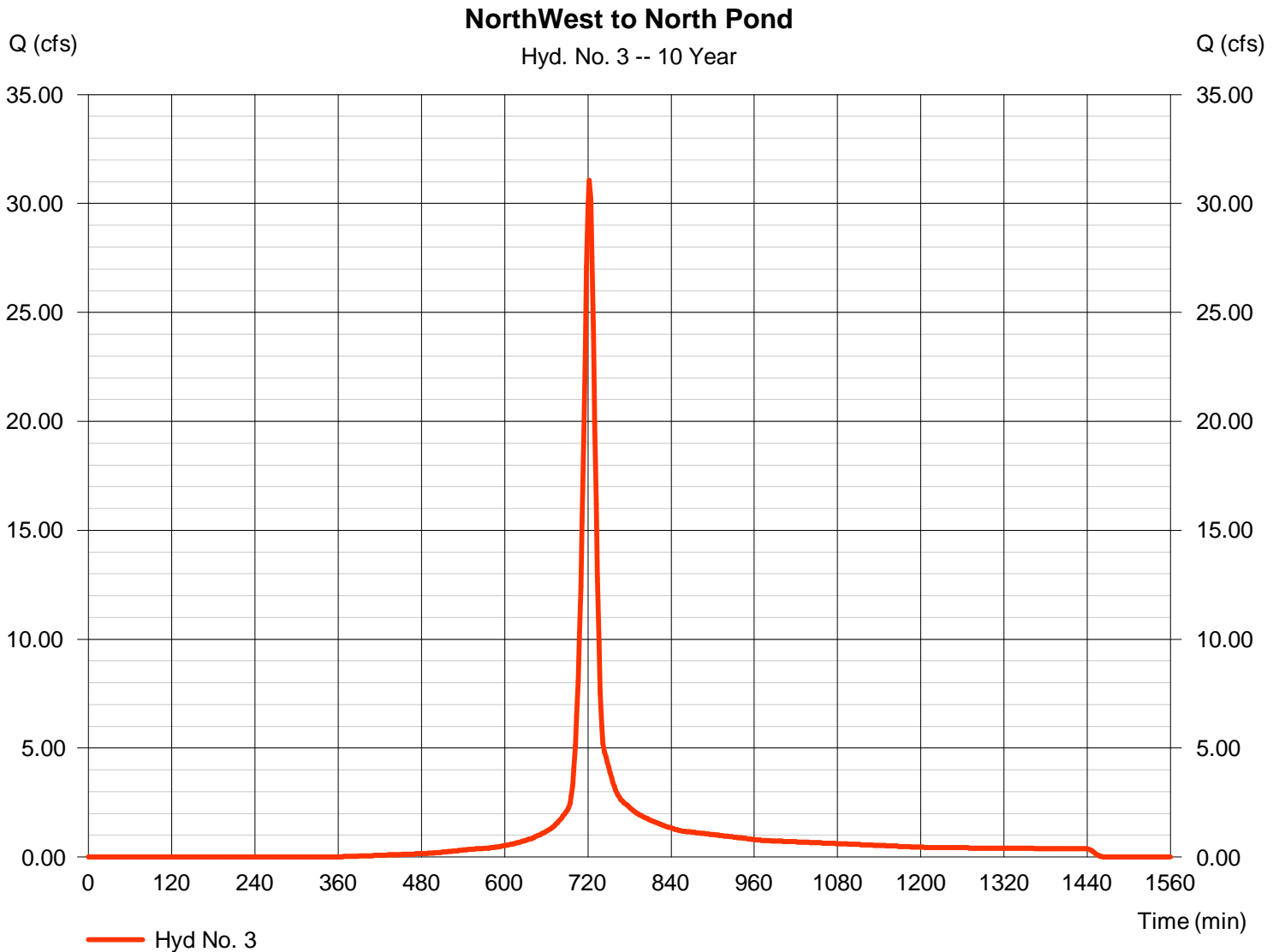
Tuesday, Jun 18, 2013

Hyd. No. 3

NorthWest to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 31.06 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 88,014 cuft
Drainage area	= 7.200 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 7.200



Hydrograph Report

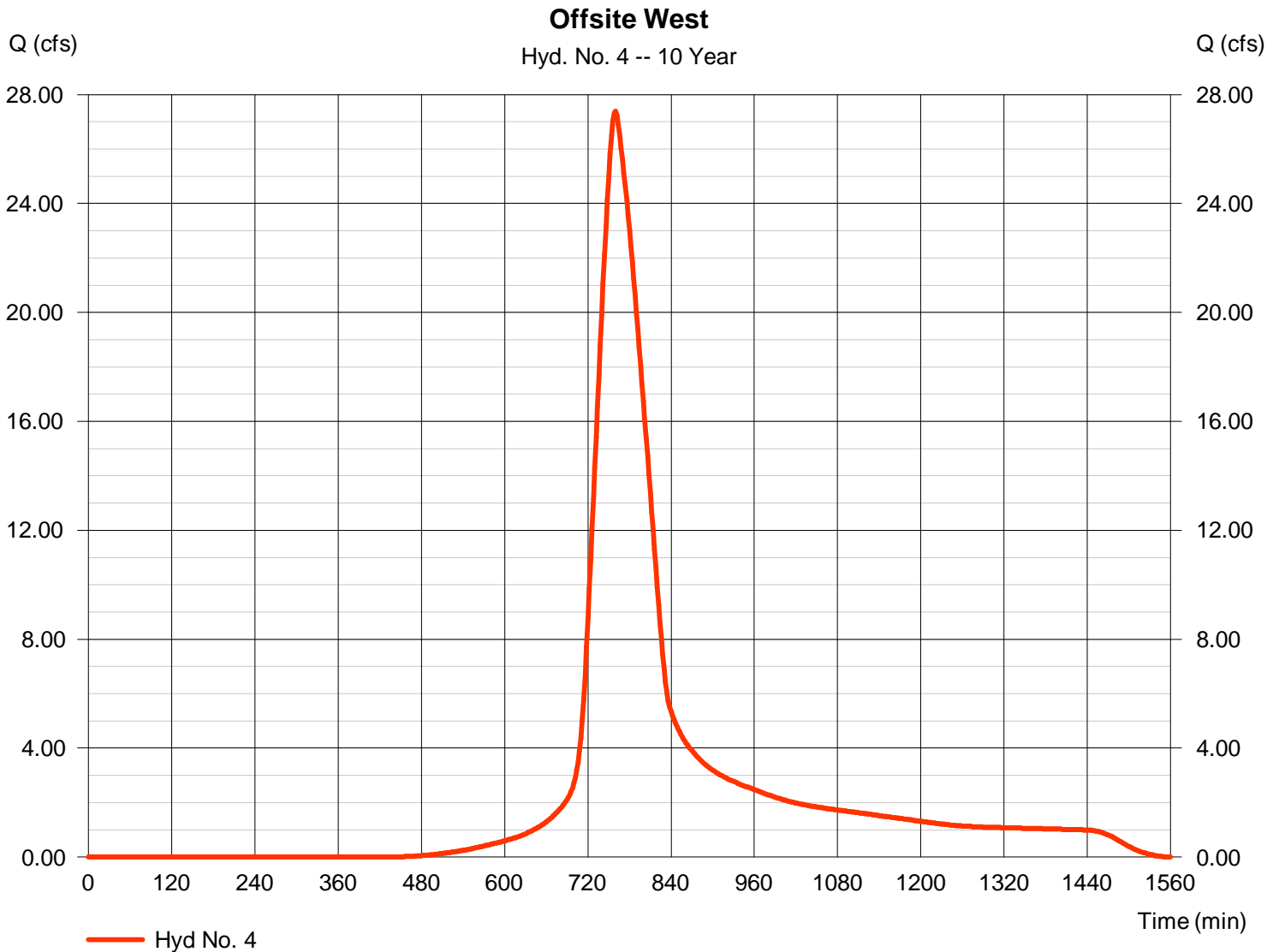
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 27.40 cfs
Storm frequency	= 10 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 210,454 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

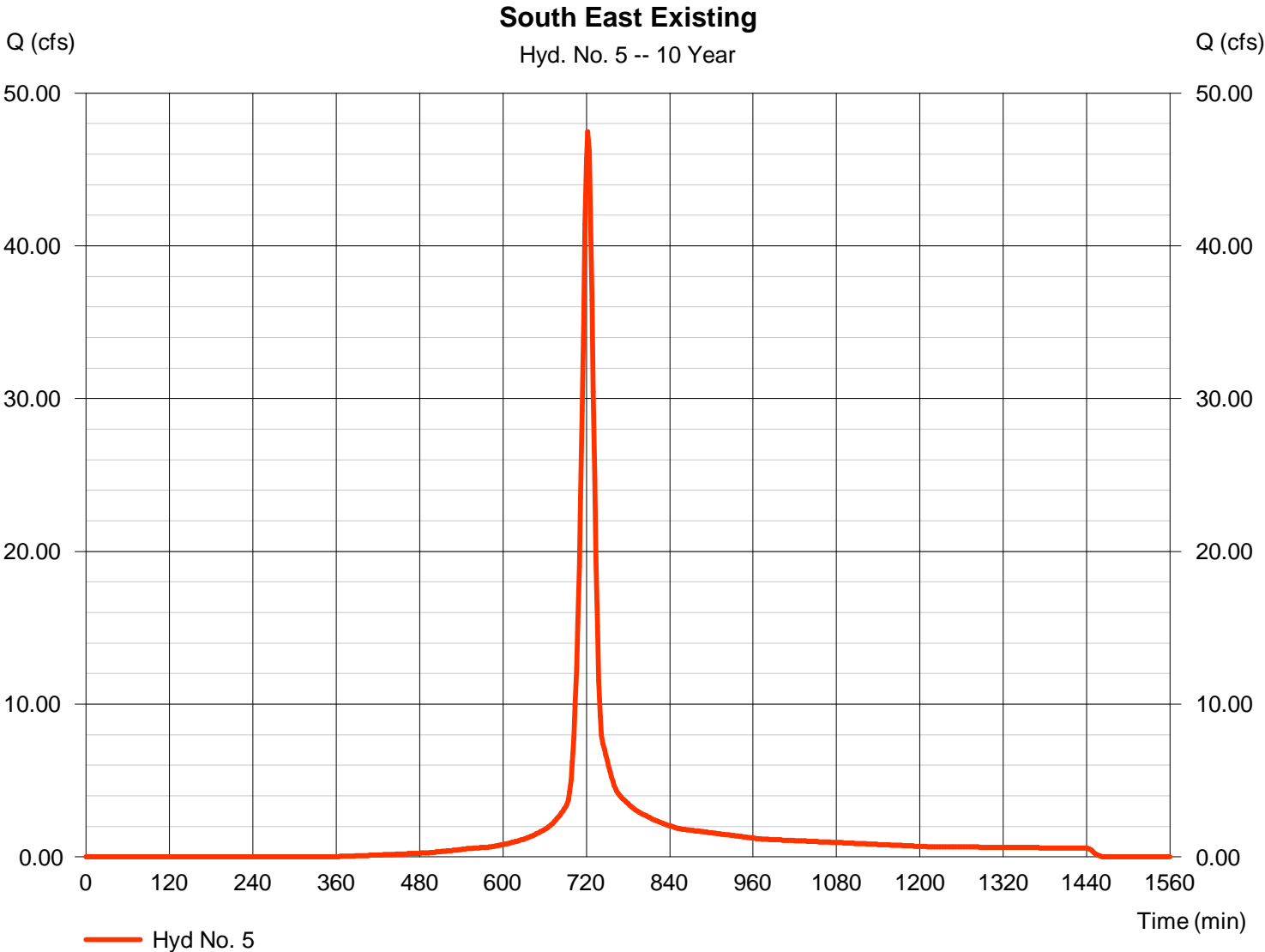
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South East Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 47.46 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 134,466 cuft
Drainage area	= 11.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

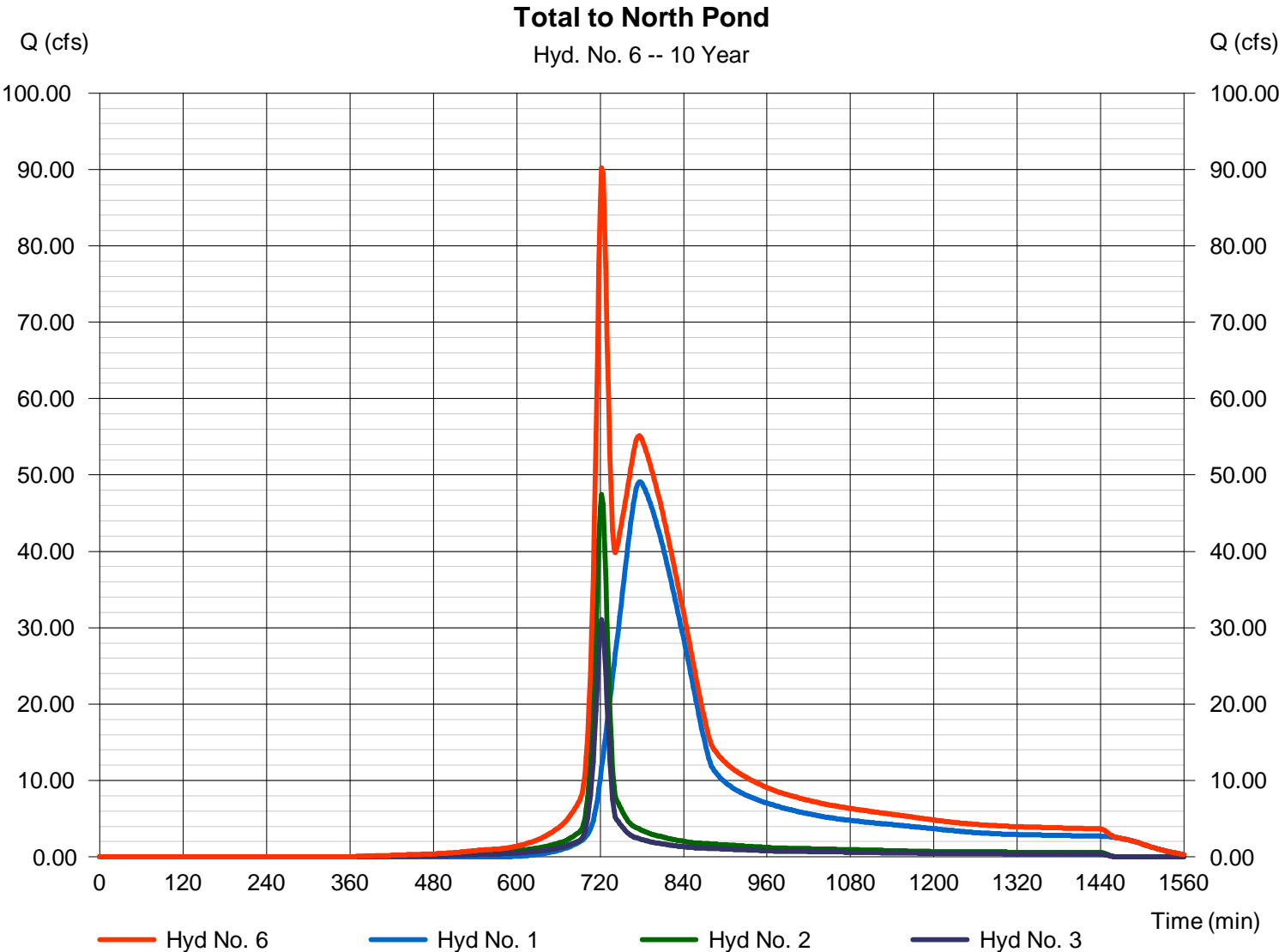
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 90.22 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 711,301 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 75.200 ac

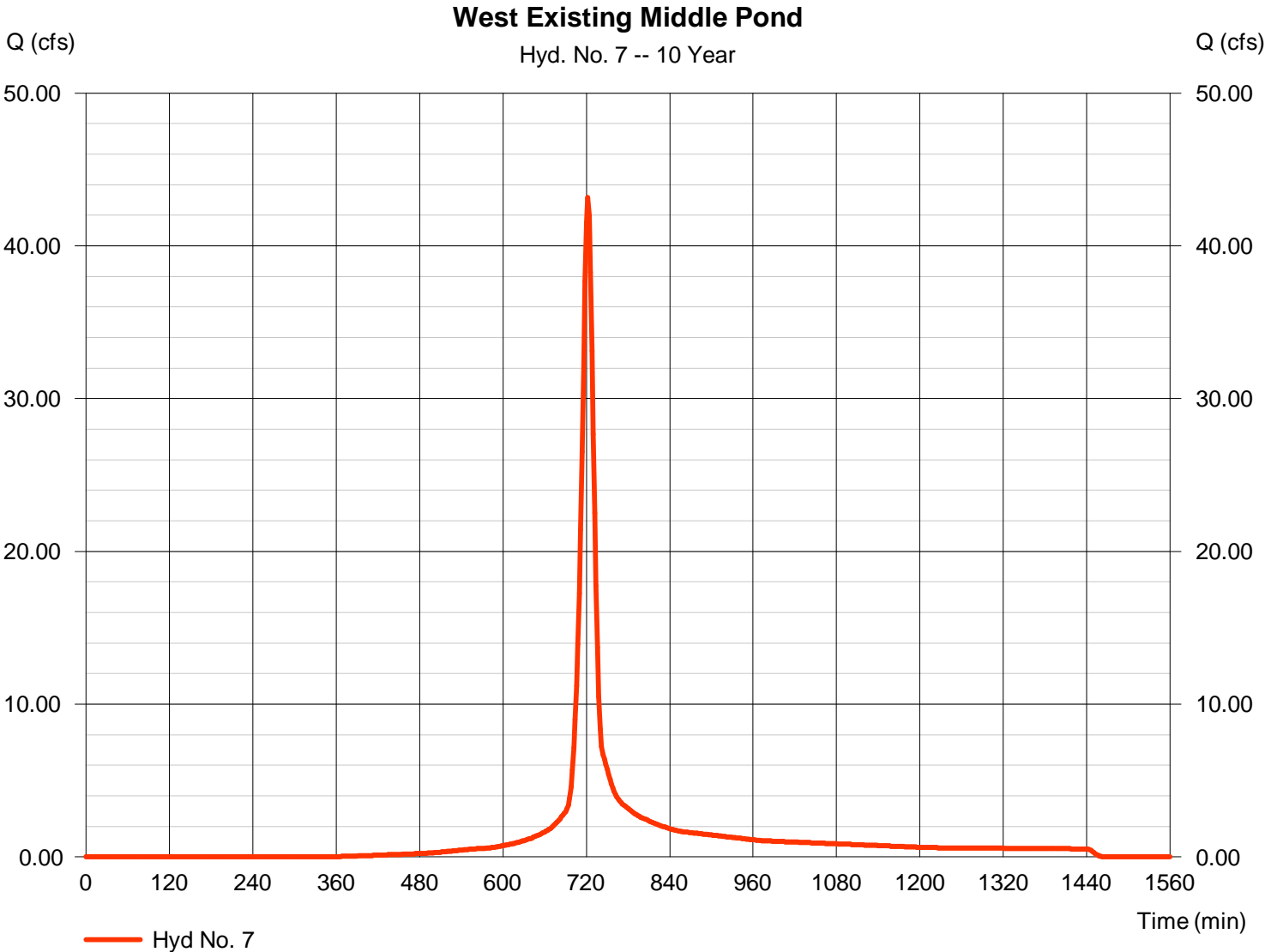


Hydrograph Report

Hyd. No. 7

West Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 43.14 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 122,241 cuft
Drainage area	= 10.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

Tuesday, Jun 18, 2013

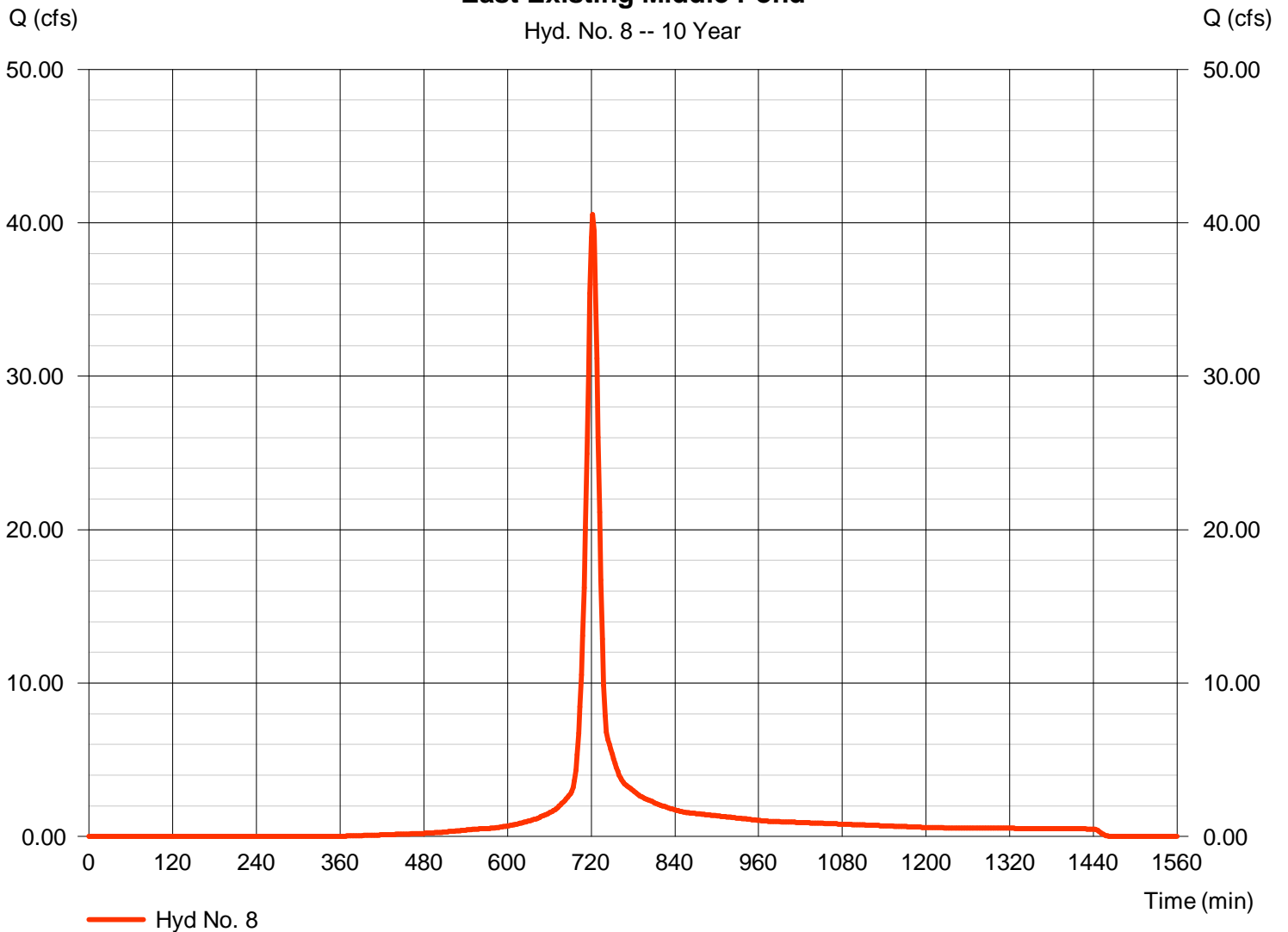
Hyd. No. 8

East Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 40.56 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 114,907 cuft
Drainage area	= 9.400 ac	Curve number	= 84
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

East Existing Middle Pond

Hyd. No. 8 -- 10 Year



Hydrograph Report

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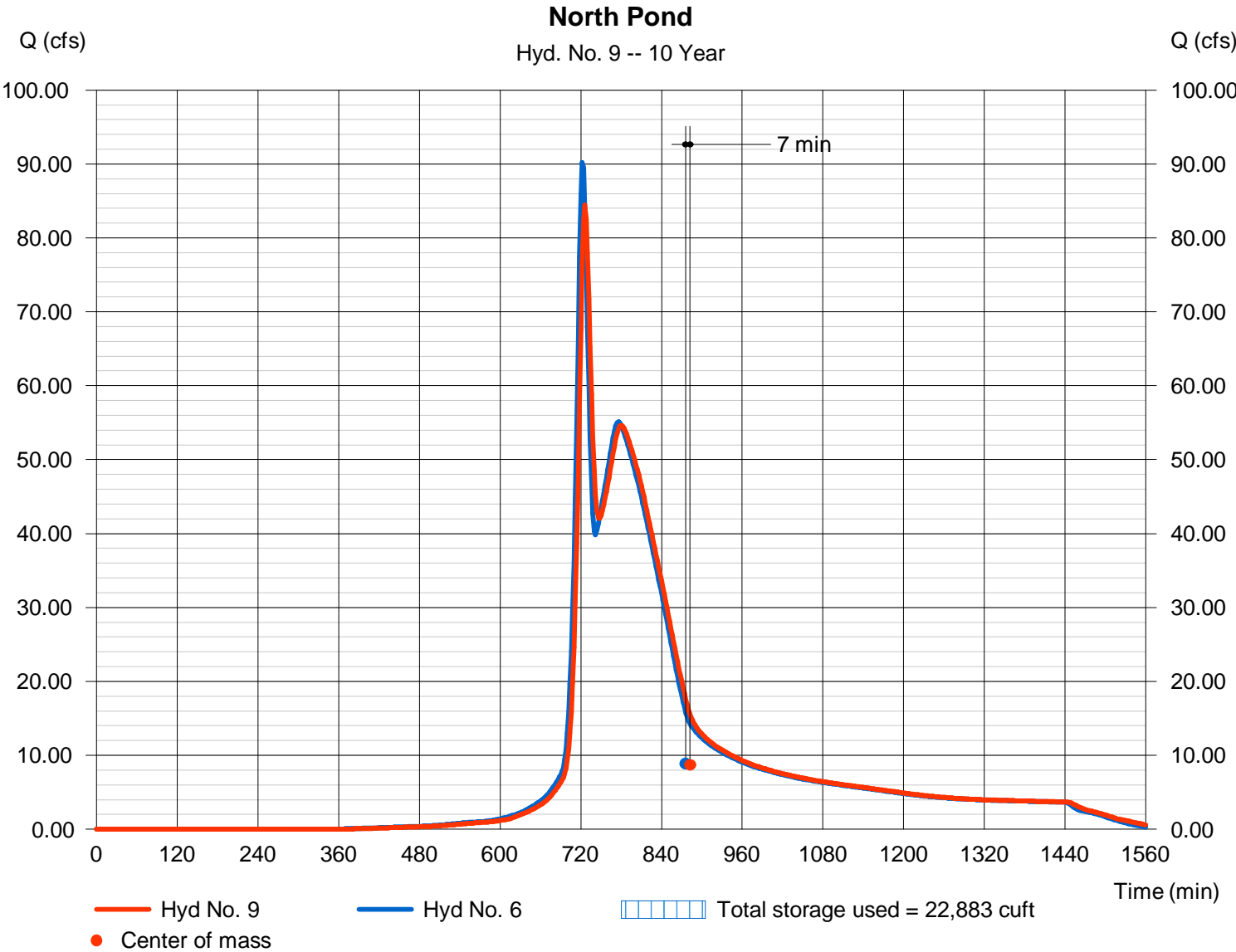
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 84.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 711,301 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1357.52 ft
Reservoir name	= North Pond	Max. Storage	= 22,883 cuft

Storage Indication method used.



Hydrograph Report

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Tuesday, Jun 18, 2013

Hyd. No. 10

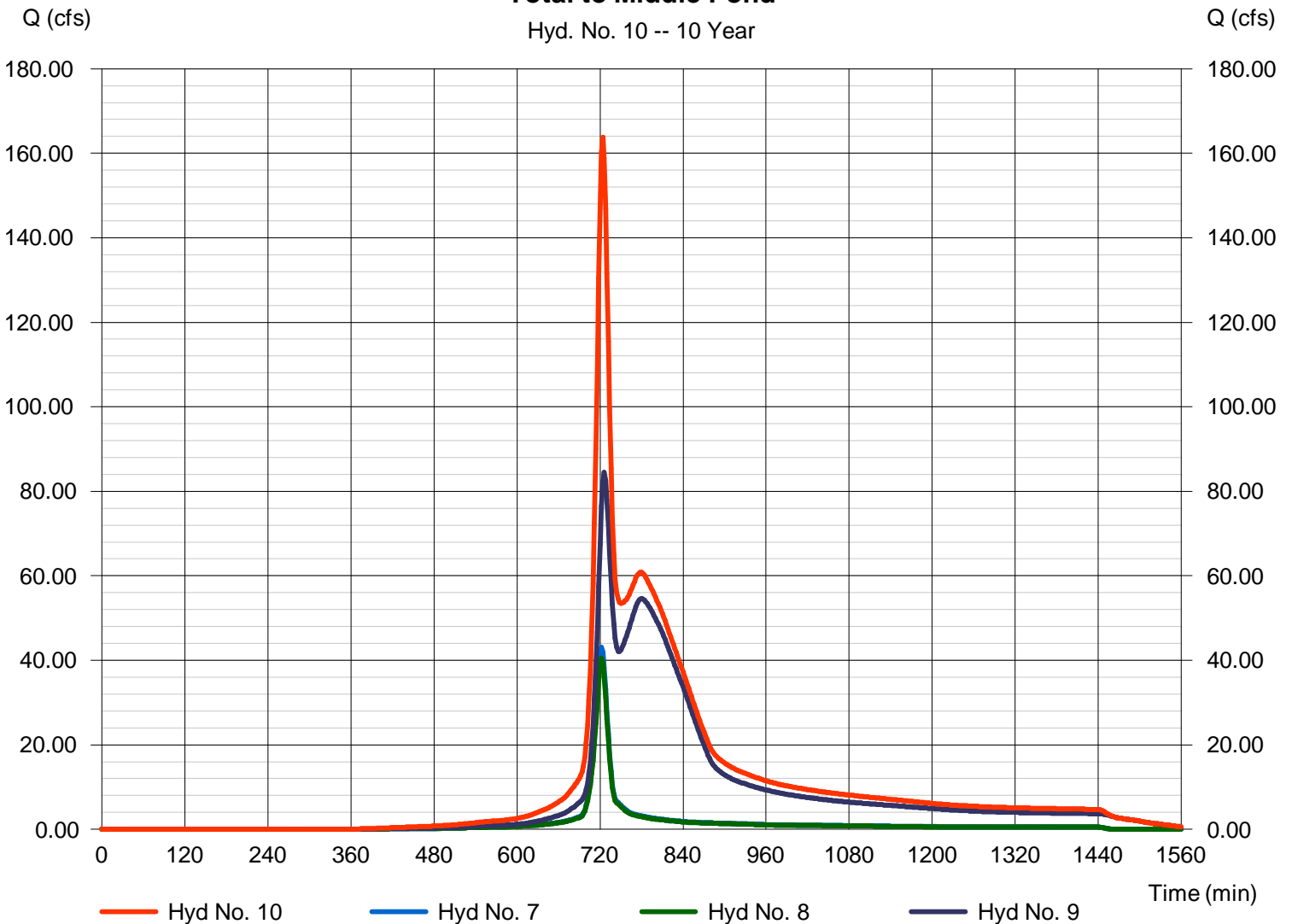
Total to Middle Pond

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 163.85 cfs
 Time to peak = 724 min
 Hyd. volume = 948,449 cuft
 Contrib. drain. area = 19.400 ac

Total to Middle Pond

Hyd. No. 10 -- 10 Year



Hydrograph Report

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

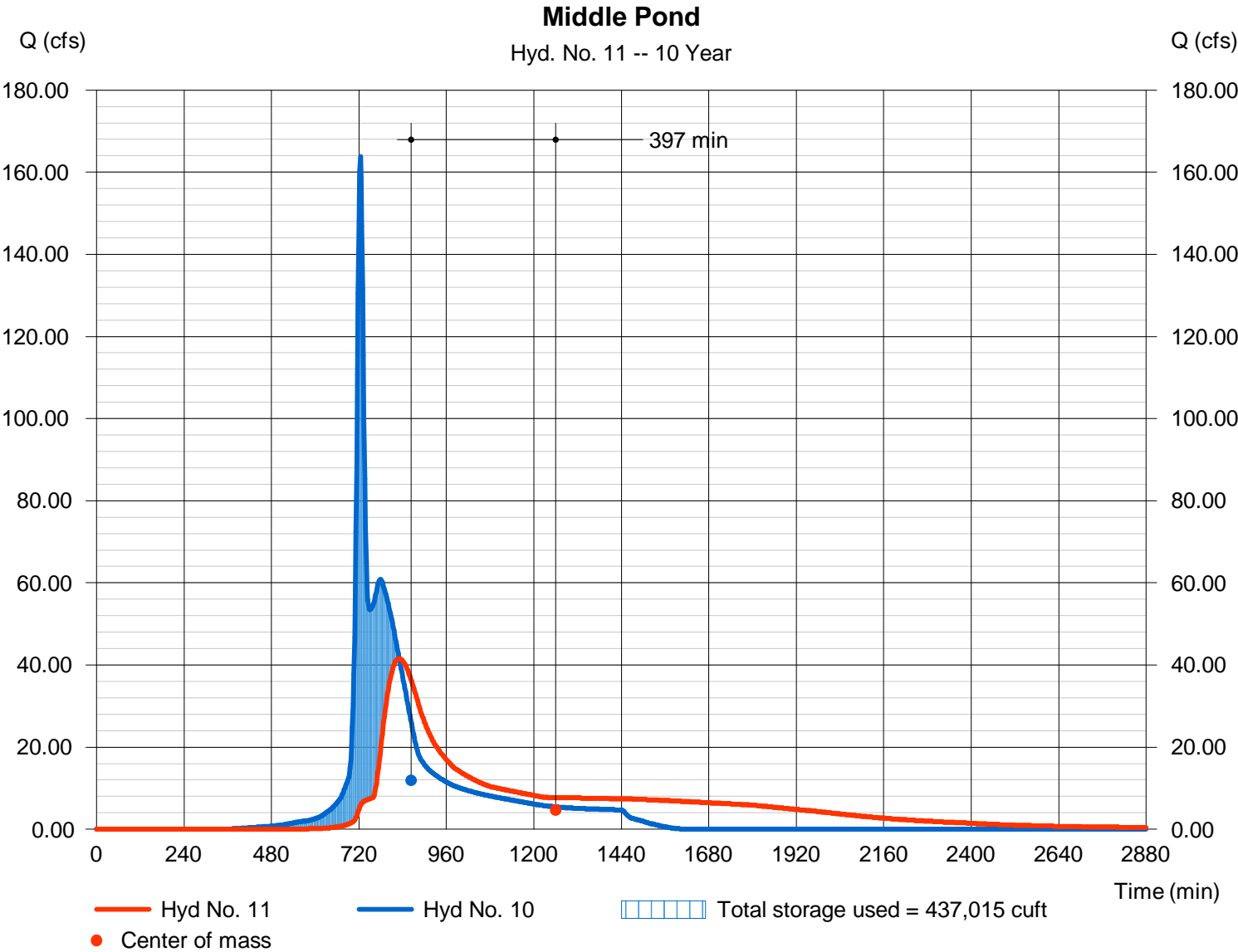
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 41.54 cfs
Storm frequency	= 10 yrs	Time to peak	= 830 min
Time interval	= 2 min	Hyd. volume	= 943,094 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1358.56 ft
Reservoir name	= Middle Pond	Max. Storage	= 437,015 cuft

Storage Indication method used.



Hydrograph Report

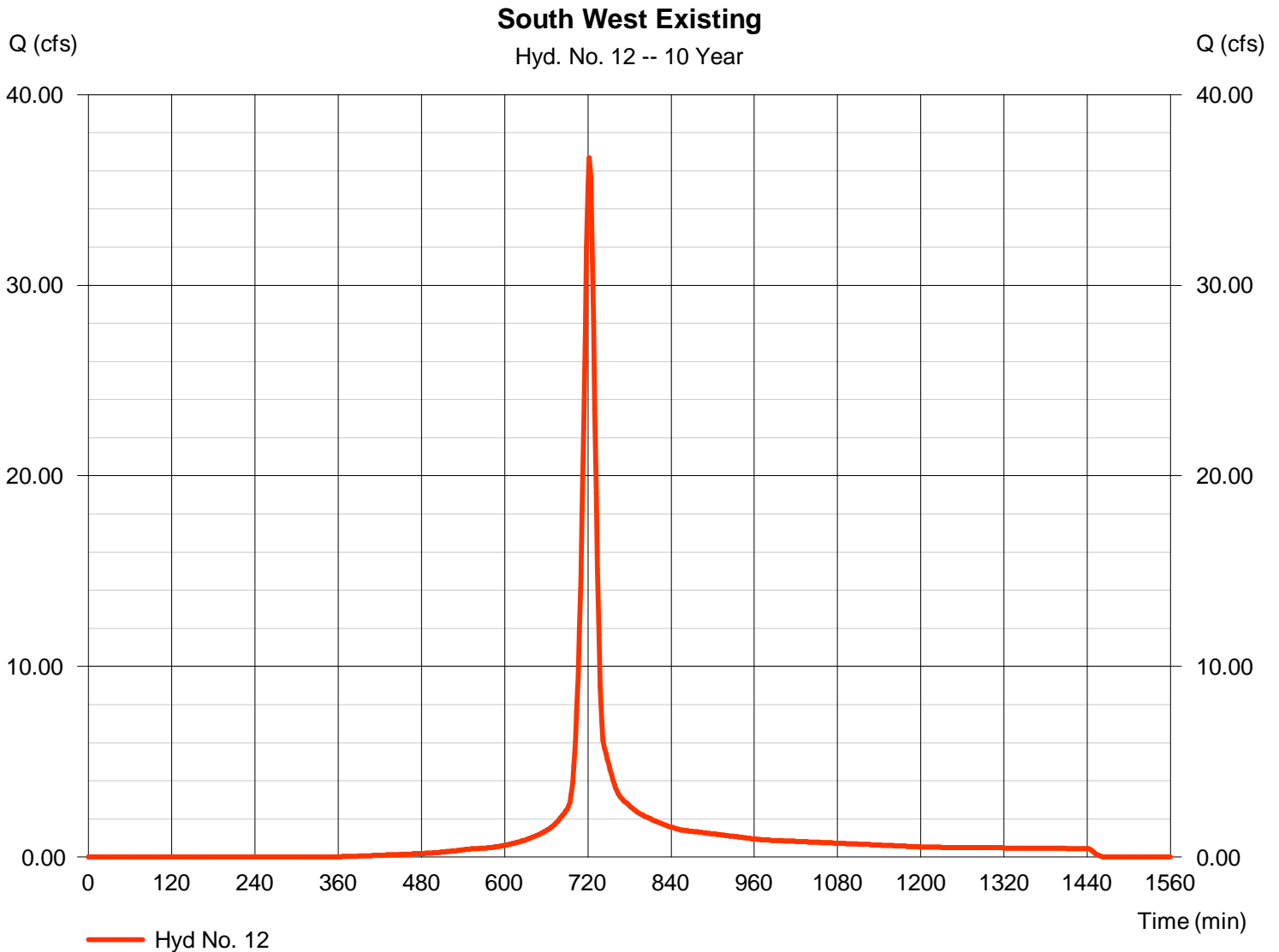
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 36.67 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 103,905 cuft
Drainage area	= 8.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

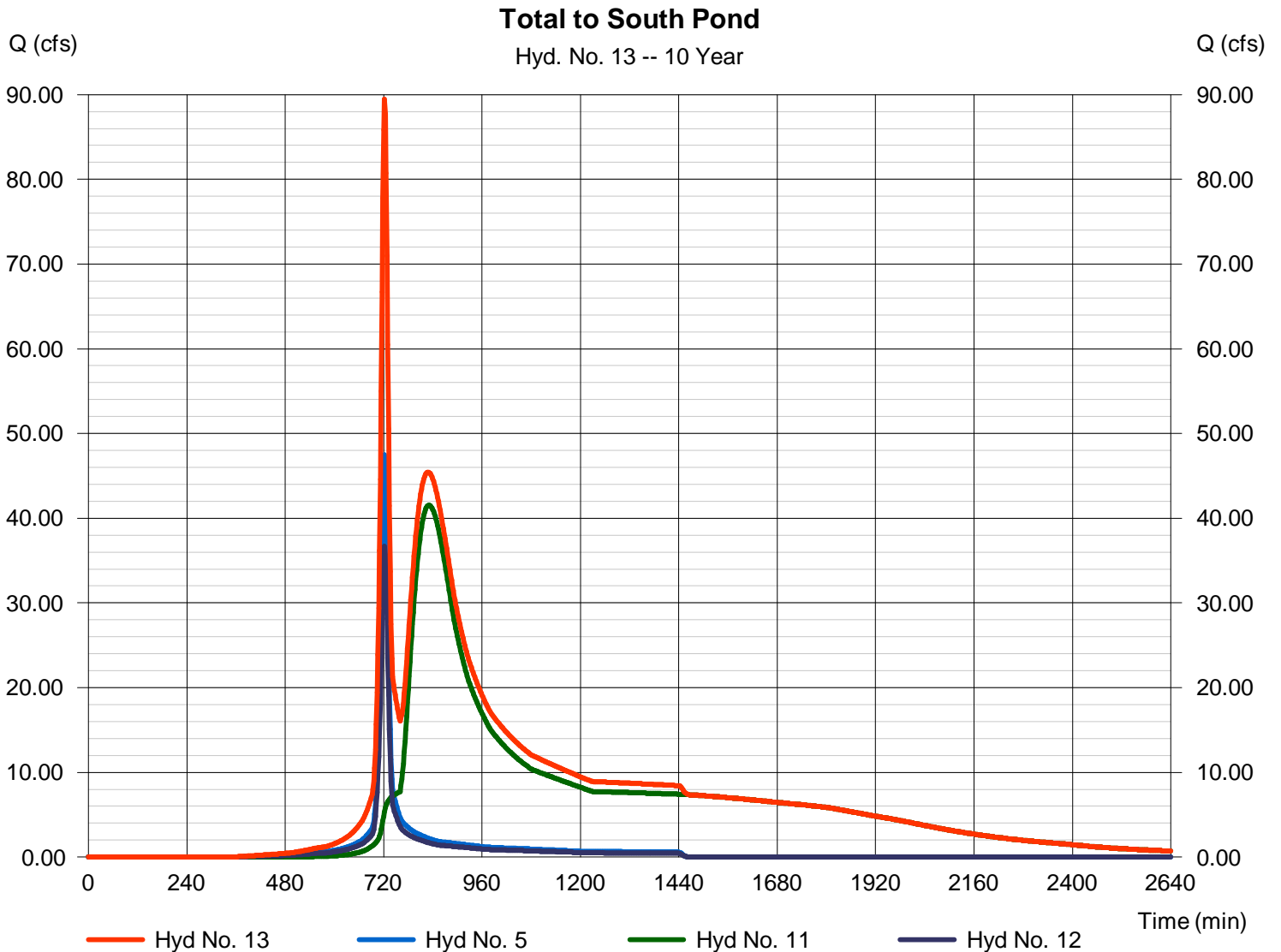
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 89.47 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,181,465 cuft
Inflow hyds.	= 5, 11, 12	Contrib. drain. area	= 19.500 ac



Hydrograph Report

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

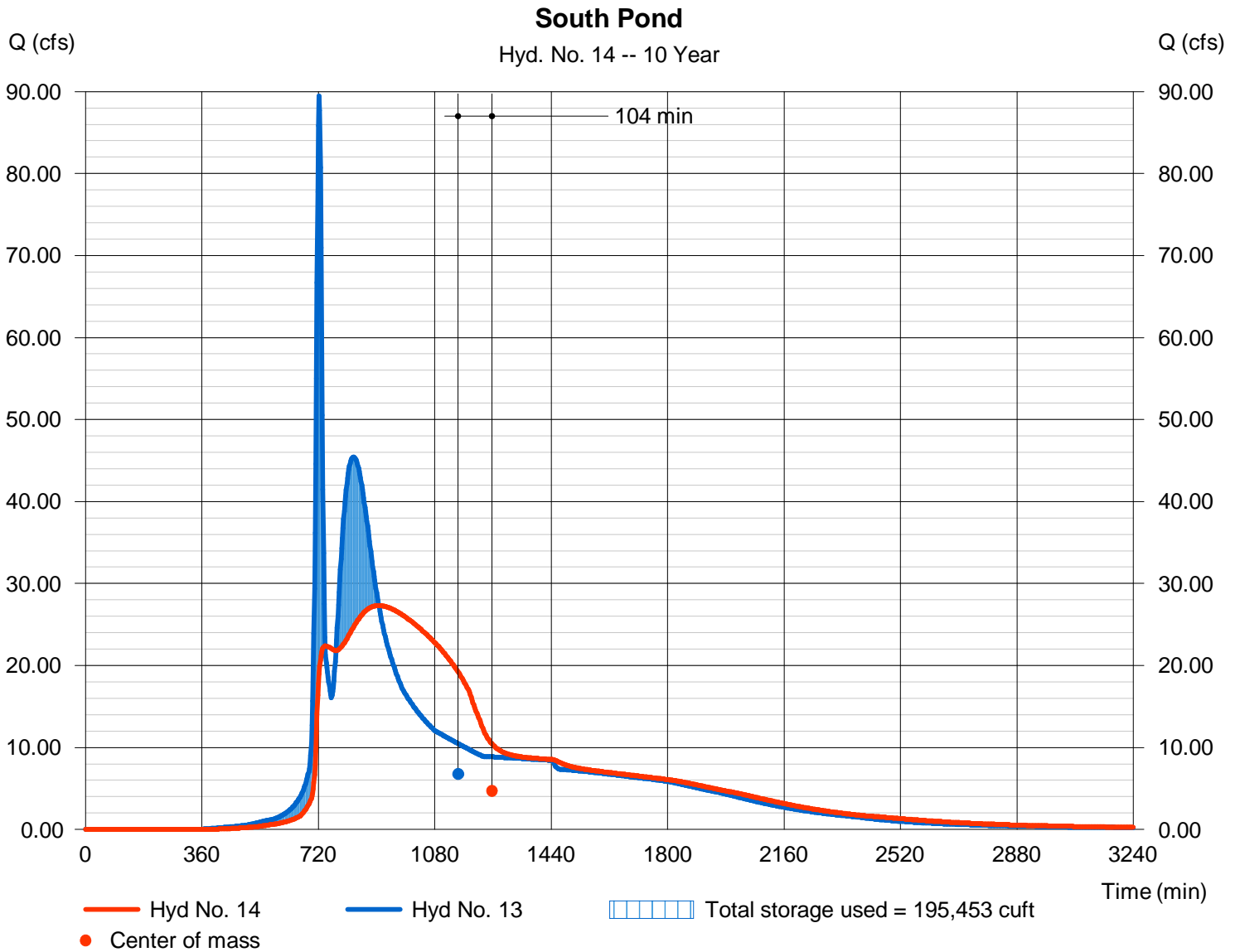
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 27.31 cfs
Storm frequency	= 10 yrs	Time to peak	= 906 min
Time interval	= 2 min	Hyd. volume	= 1,181,304 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1350.82 ft
Reservoir name	= South Pond	Max. Storage	= 195,453 cuft

Storage Indication method used.



Hydrograph Report

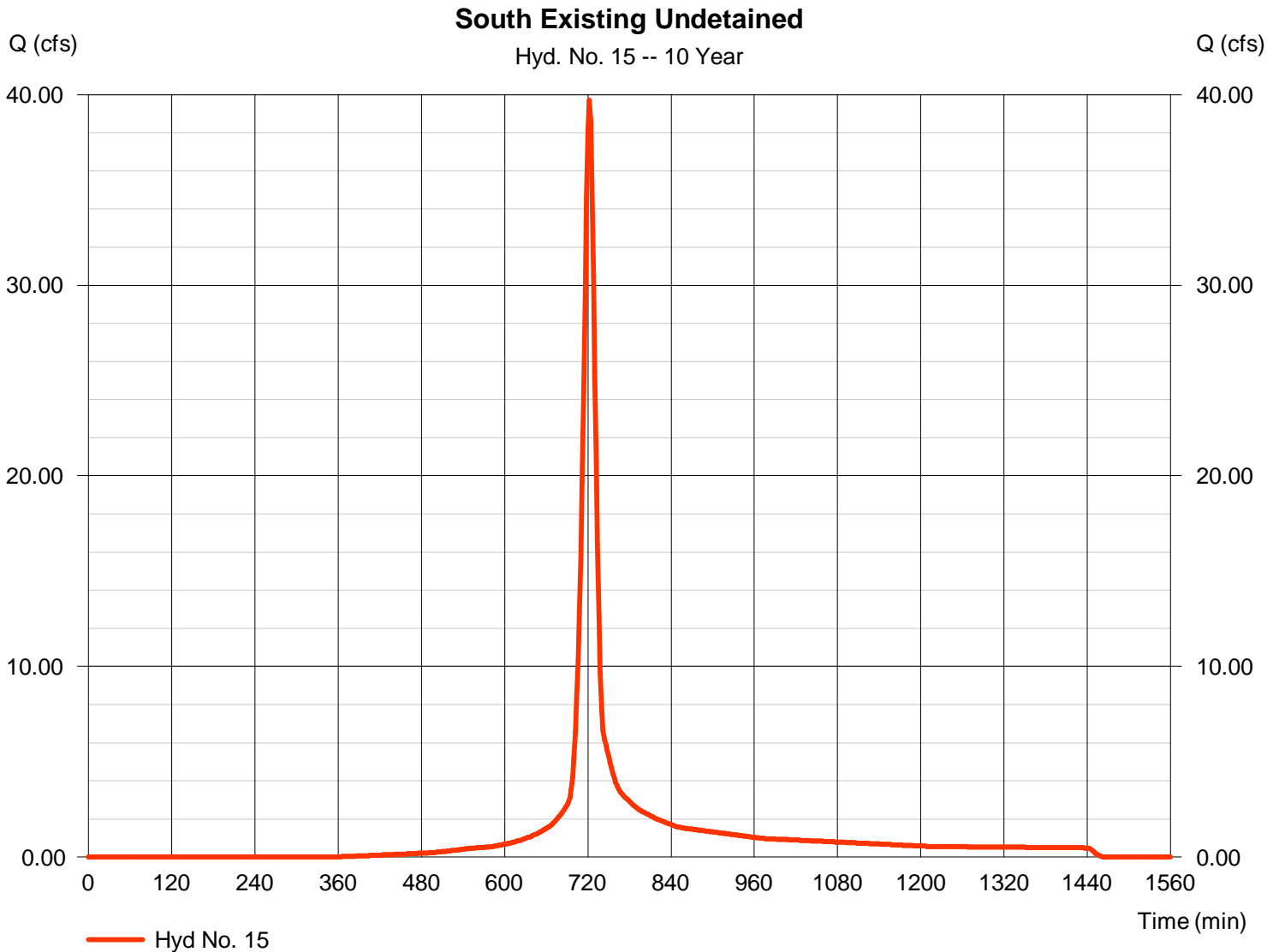
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 15

South Existing Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 39.69 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 112,462 cuft
Drainage area	= 9.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

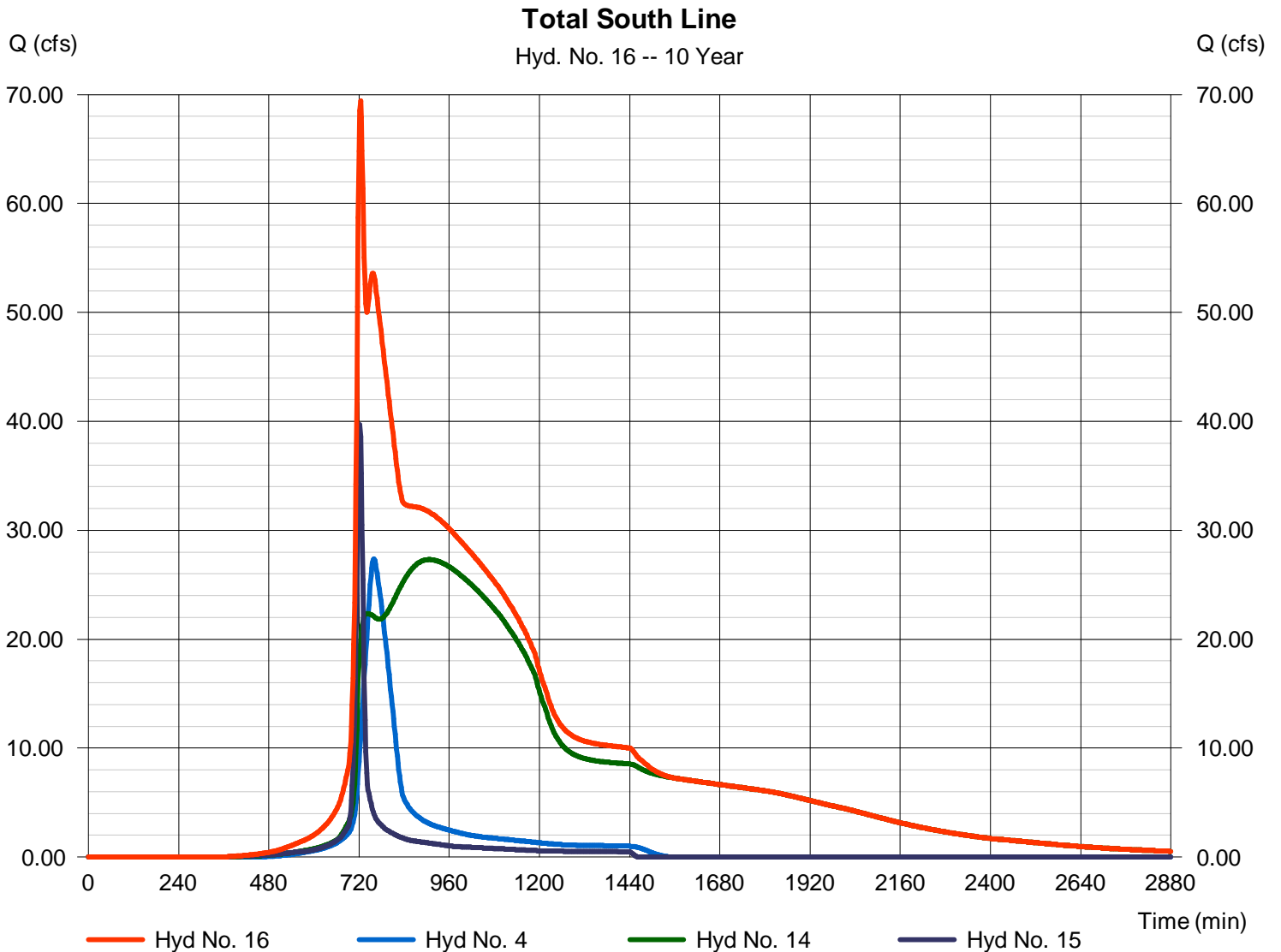
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 16

Total South Line

Hydrograph type	= Combine	Peak discharge	= 69.45 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,504,220 cuft
Inflow hyds.	= 4, 14, 15	Contrib. drain. area	= 28.200 ac



Hydrograph Report

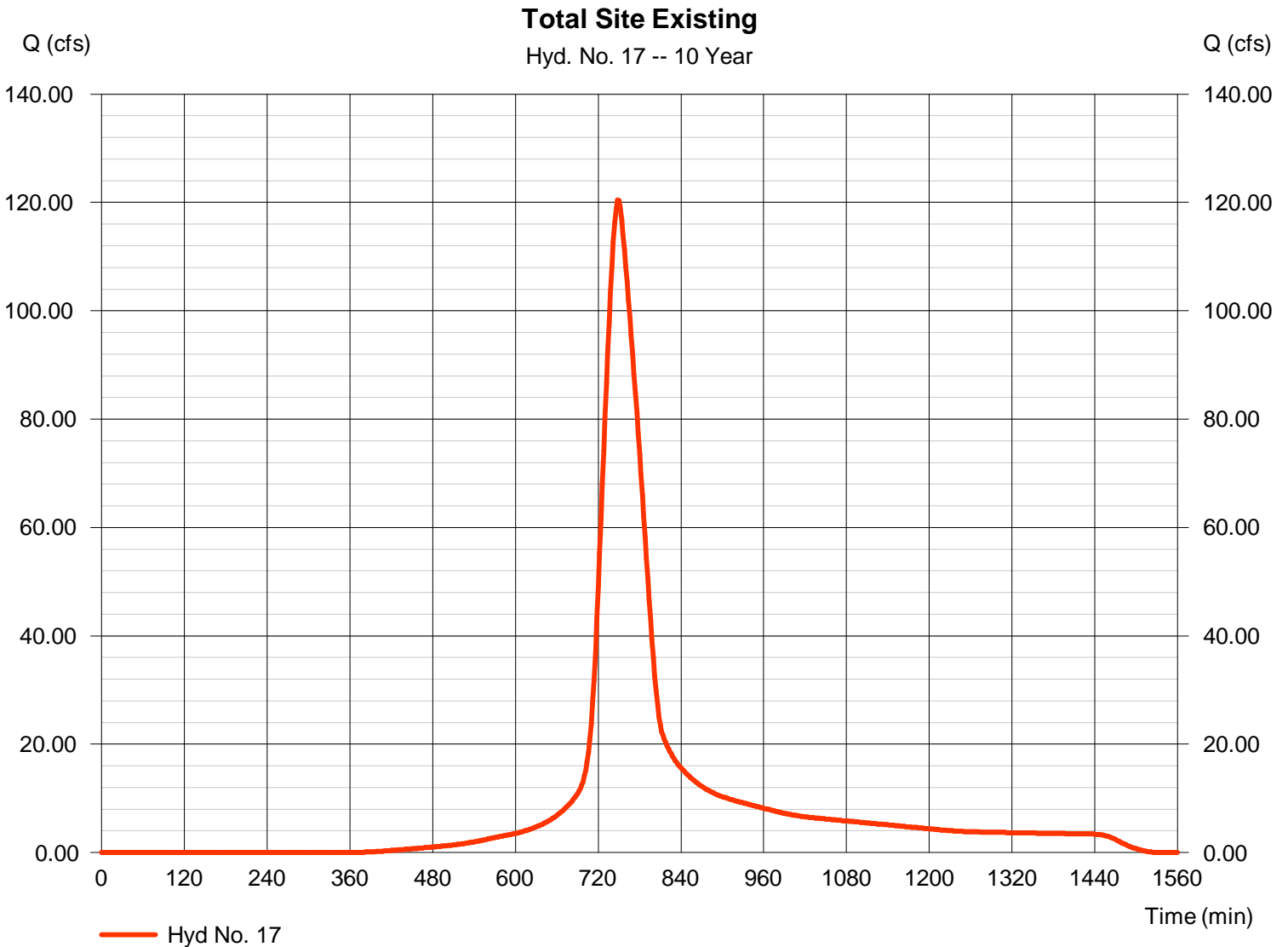
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Tuesday, Jun 18, 2013

Hyd. No. 17

Total Site Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 120.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 777,330 cuft
Drainage area	= 62.000 ac	Curve number	= 84
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 60.80 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	65.14	2	776	638,856	-----	-----	-----	Offsite North
2	SCS Runoff	58.49	2	722	167,024	-----	-----	-----	Estate Lots & Comm North - Existing
3	SCS Runoff	38.28	2	722	109,325	-----	-----	-----	NorthWest to North Pond
4	SCS Runoff	34.61	2	760	265,573	-----	-----	-----	Offsite West
5	SCS Runoff	58.49	2	722	167,024	-----	-----	-----	South East Existing
6	Combine	113.53	2	722	915,205	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	53.17	2	722	151,840	-----	-----	-----	West Existing Middle Pond
8	SCS Runoff	49.98	2	722	142,730	-----	-----	-----	East Existing Middle Pond
9	Reservoir	107.17	2	726	915,204	6	1357.79	27,366	North Pond
10	Combine	205.36	2	724	1,209,773	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	63.64	2	814	1,204,344	10	1358.79	481,042	Middle Pond
12	SCS Runoff	45.20	2	722	129,064	-----	-----	-----	South West Existing
13	Combine	109.95	2	722	1,500,433	5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	35.25	2	902	1,500,265	13	1352.13	364,500	South Pond
15	SCS Runoff	48.92	2	722	139,693	-----	-----	-----	South Existing Undetained
16	Combine	83.39	2	724	1,905,532	4, 14, 15	-----	-----	Total South Line
17	SCS Runoff	149.13	2	748	965,548	-----	-----	-----	Total Site Existing
The Ranch Existing.gpw					Return Period: 25 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

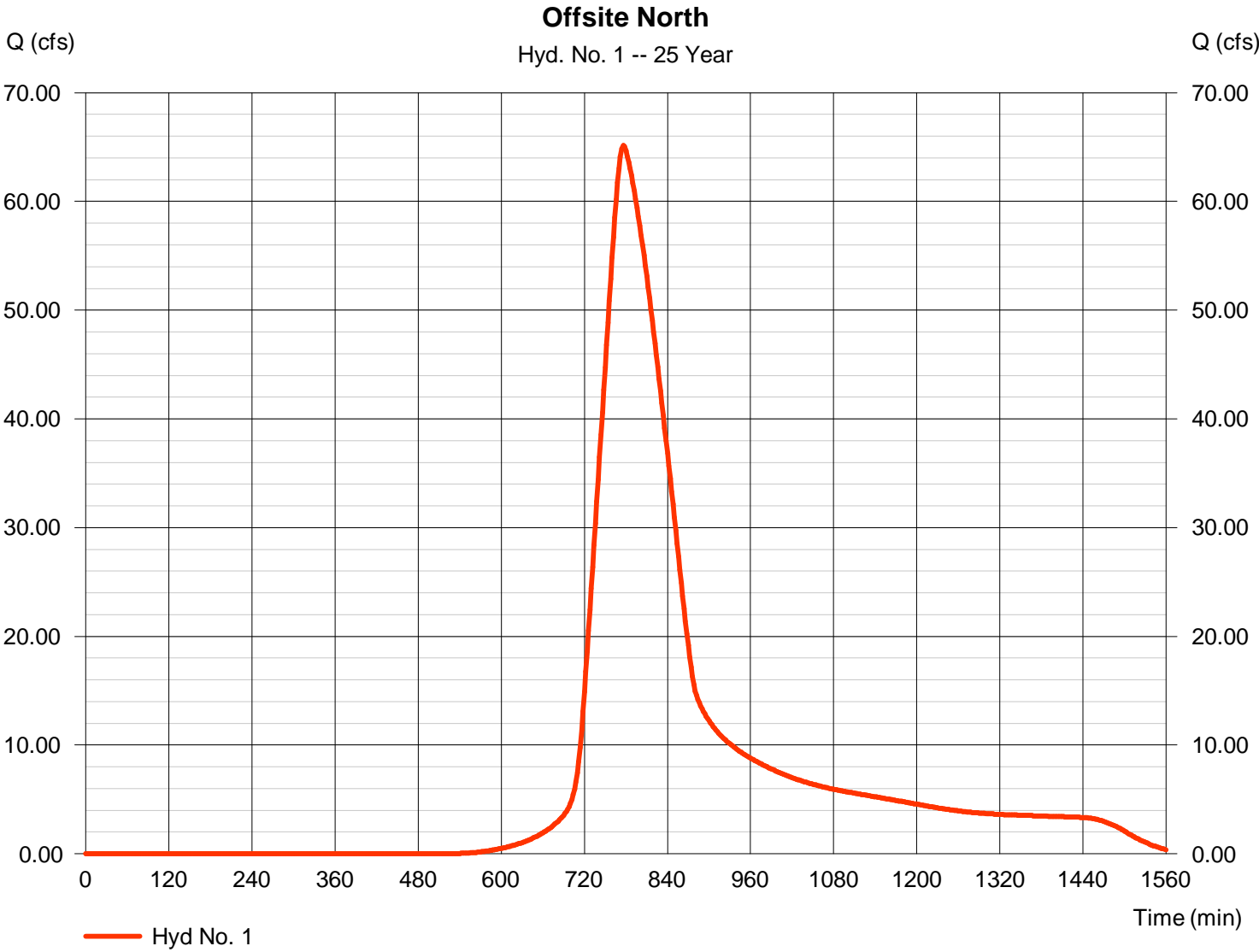
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 65.14 cfs
Storm frequency	= 25 yrs	Time to peak	= 776 min
Time interval	= 2 min	Hyd. volume	= 638,856 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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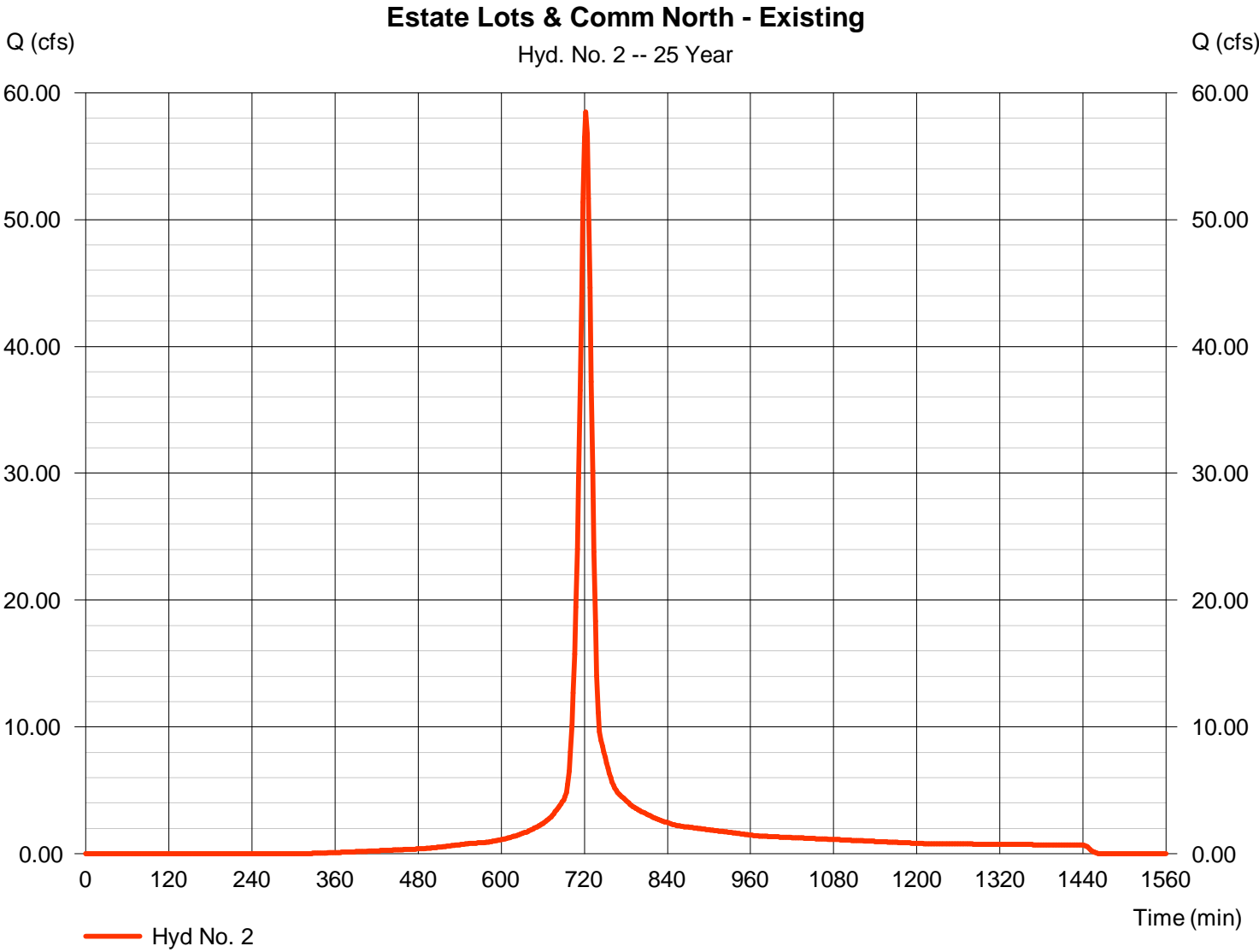
Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots & Comm North - Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 58.49 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 167,024 cuft
Drainage area	= 11.000 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(7.000 x 84) + (4.000 x 98)] / 11.000



Hydrograph Report

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

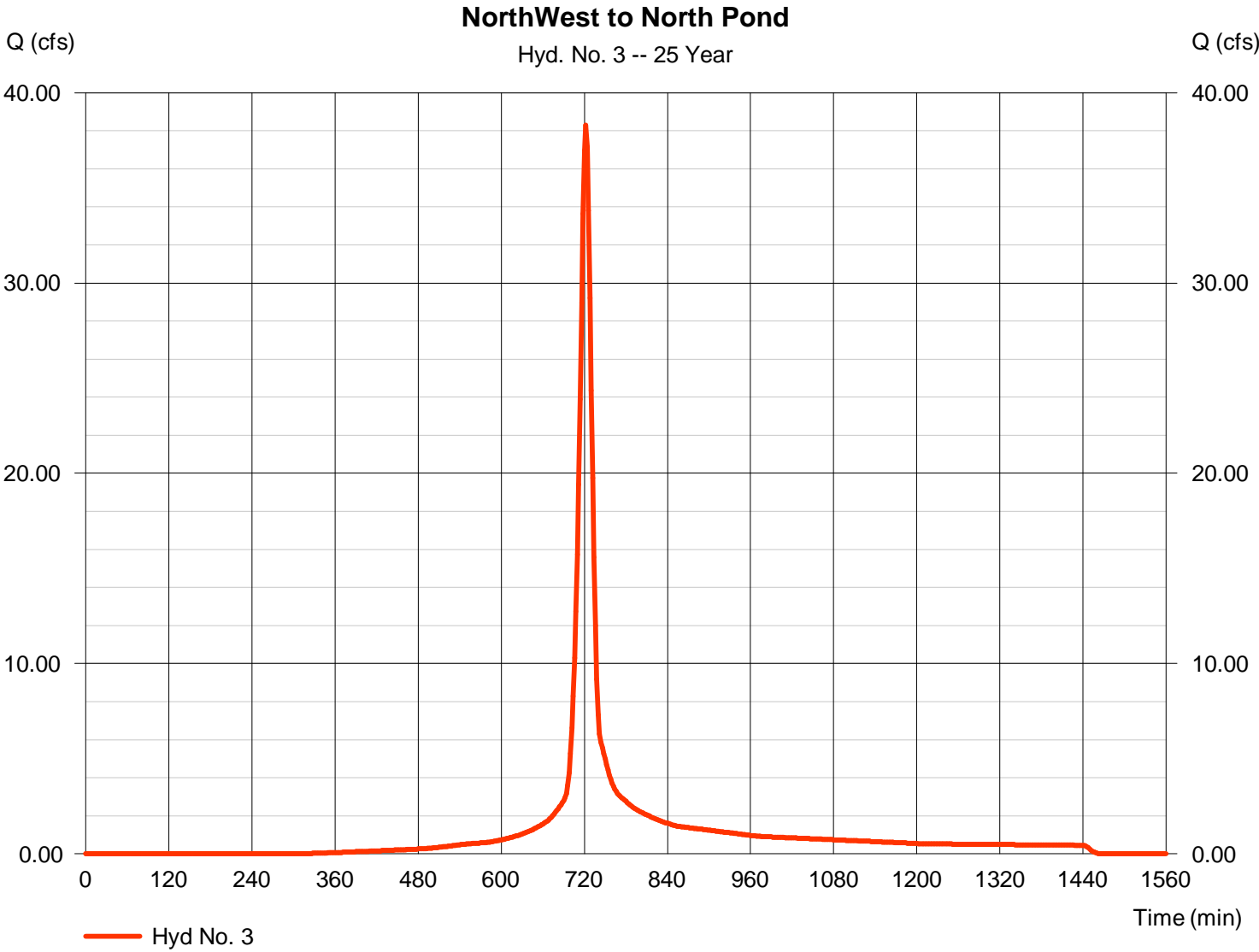
Tuesday, Jun 18, 2013

Hyd. No. 3

NorthWest to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 38.28 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 109,325 cuft
Drainage area	= 7.200 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 7.200



Hydrograph Report

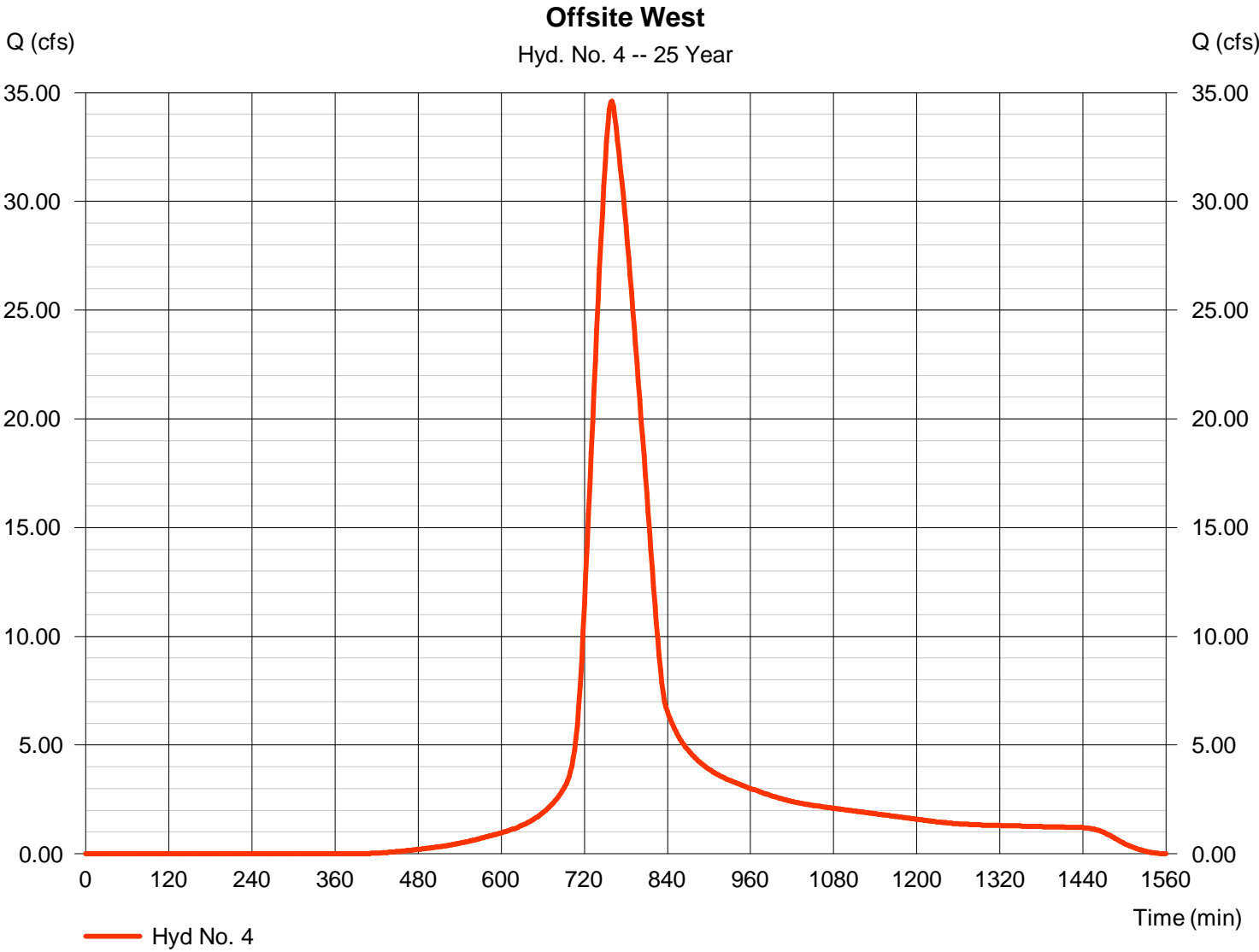
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 34.61 cfs
Storm frequency	= 25 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 265,573 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

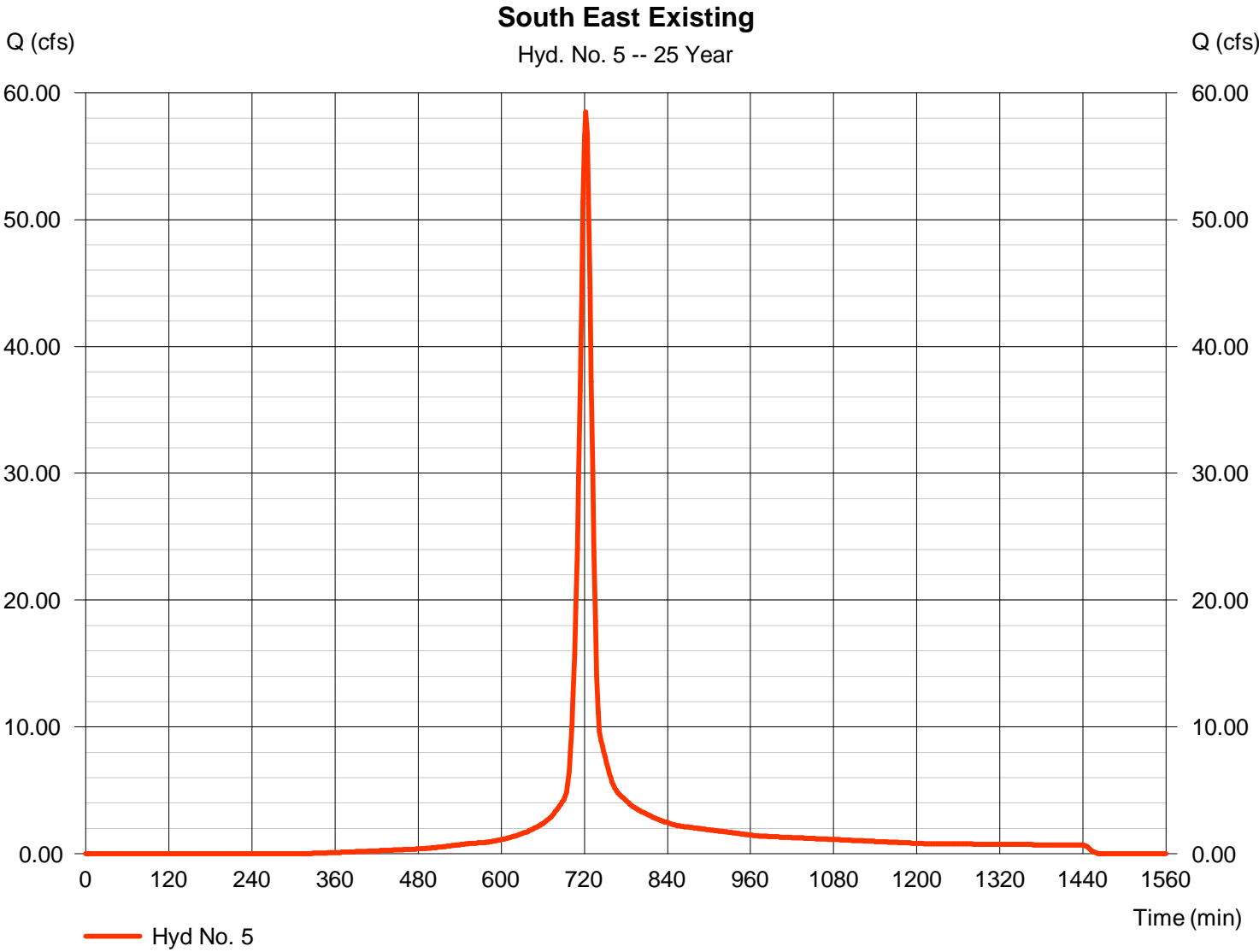
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South East Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 58.49 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 167,024 cuft
Drainage area	= 11.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

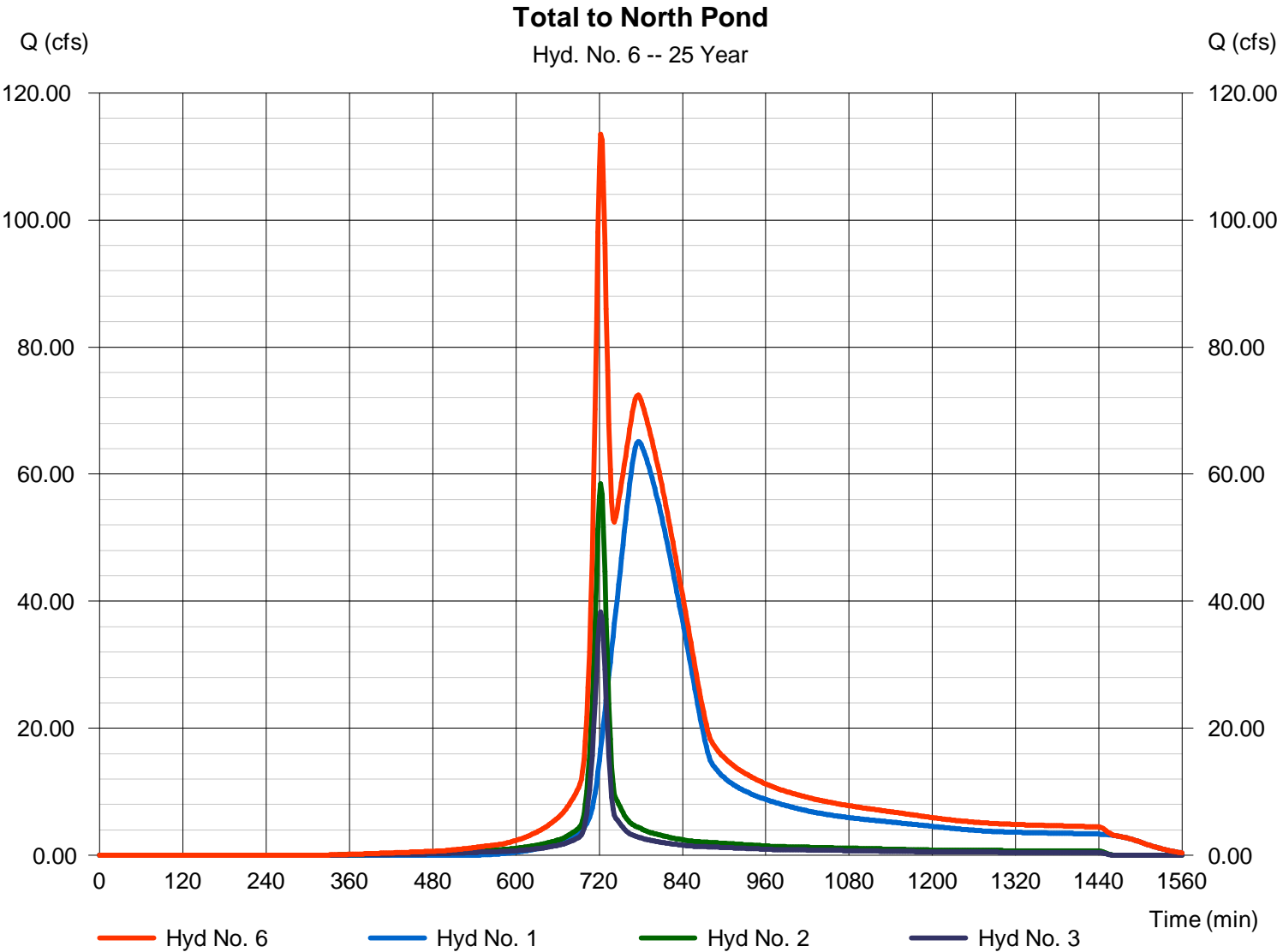
Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

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

Peak discharge = 113.53 cfs
Time to peak = 722 min
Hyd. volume = 915,205 cuft
Contrib. drain. area = 75.200 ac



Hydrograph Report

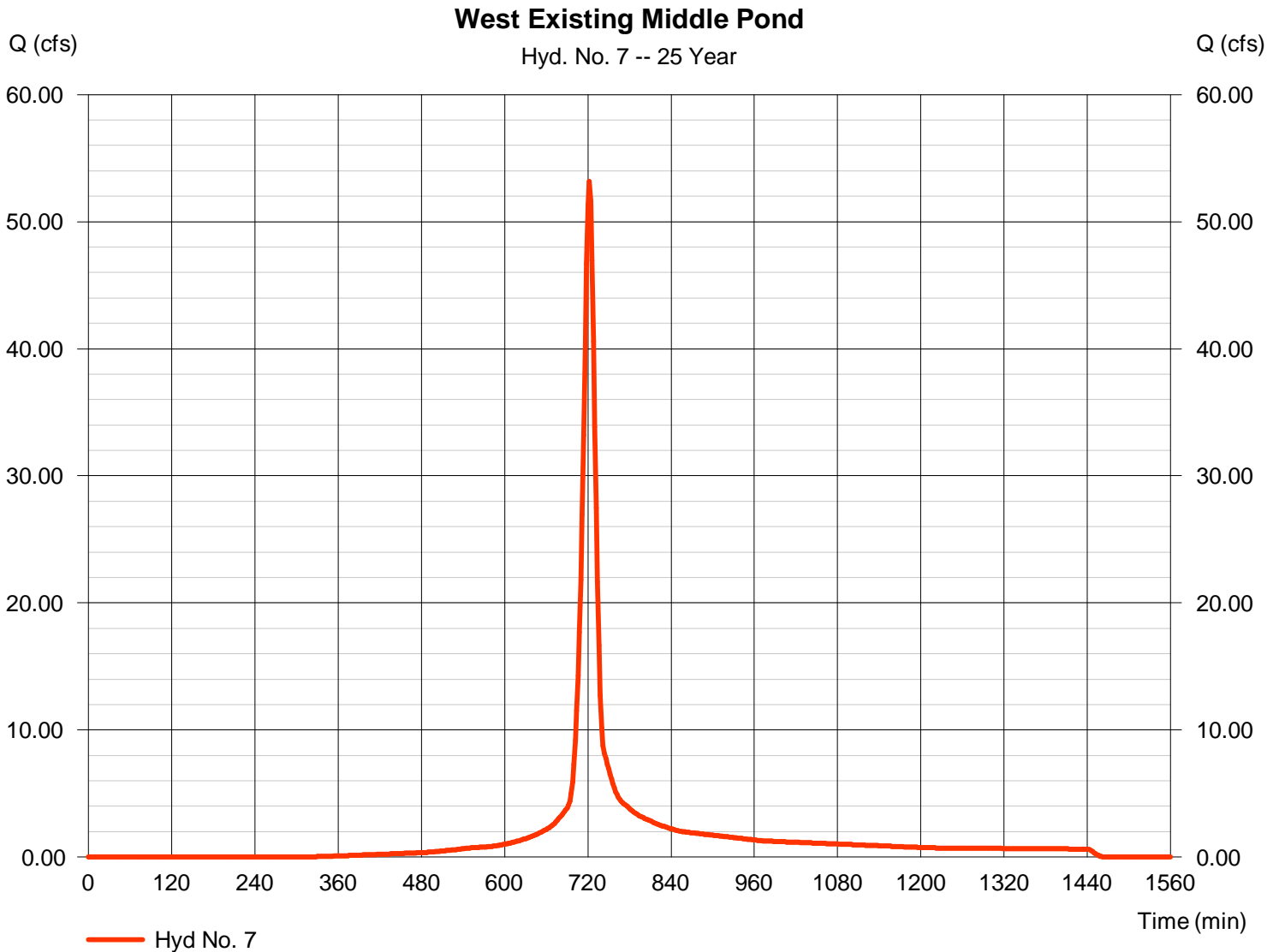
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 7

West Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 53.17 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 151,840 cuft
Drainage area	= 10.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

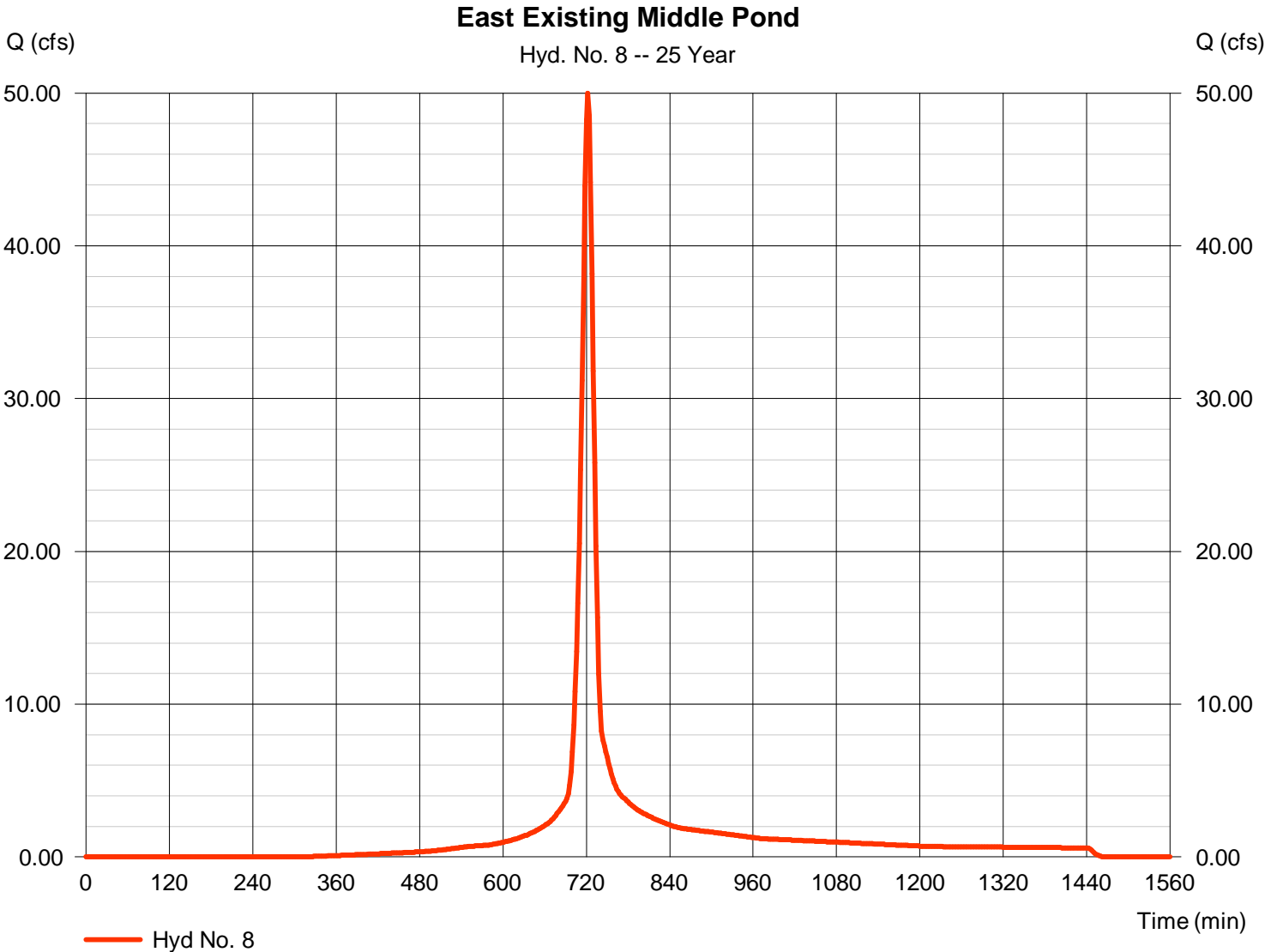
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

East Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 49.98 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 142,730 cuft
Drainage area	= 9.400 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

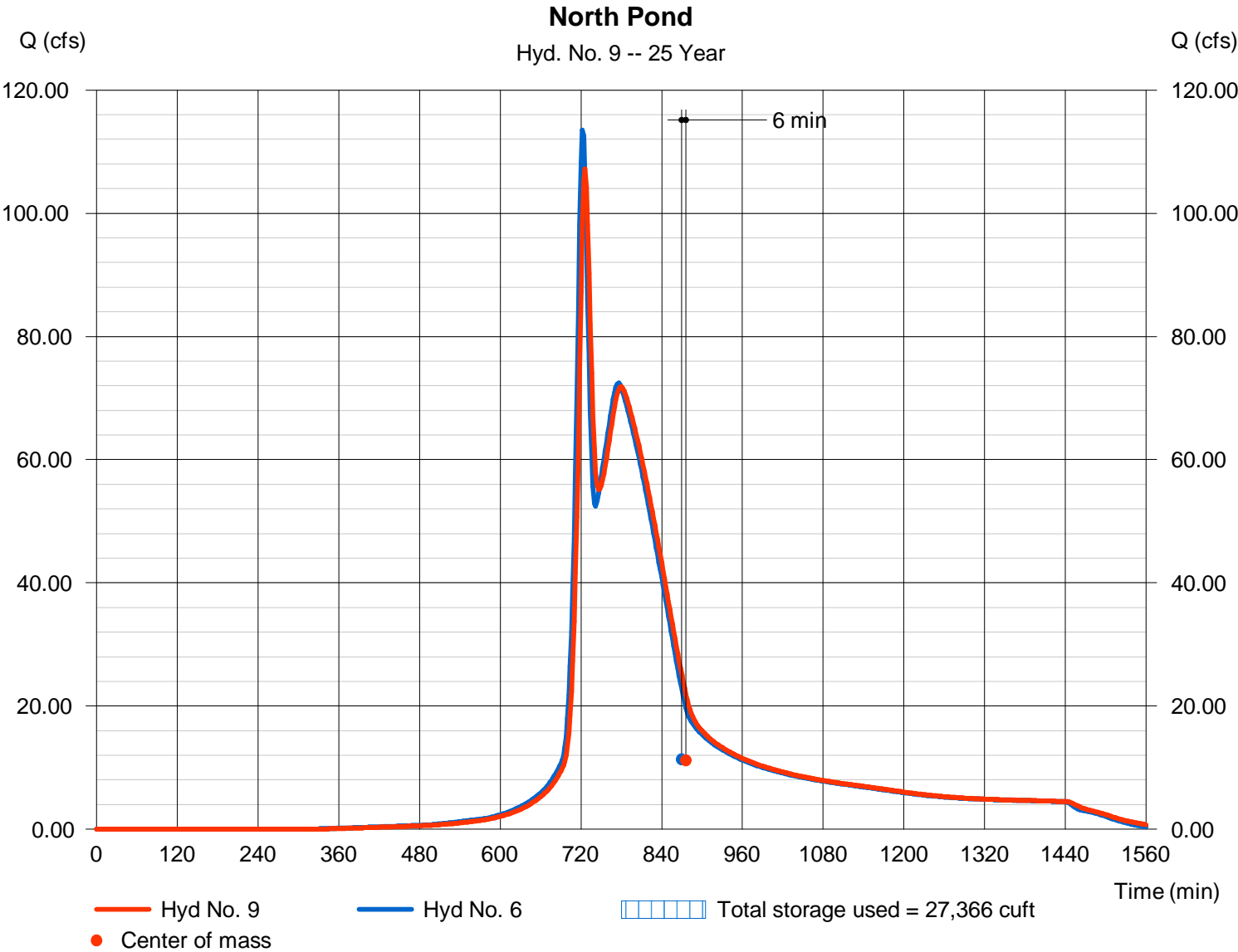
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 107.17 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 915,204 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1357.79 ft
Reservoir name	= North Pond	Max. Storage	= 27,366 cuft

Storage Indication method used.



Hydrograph Report

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

Tuesday, Jun 18, 2013

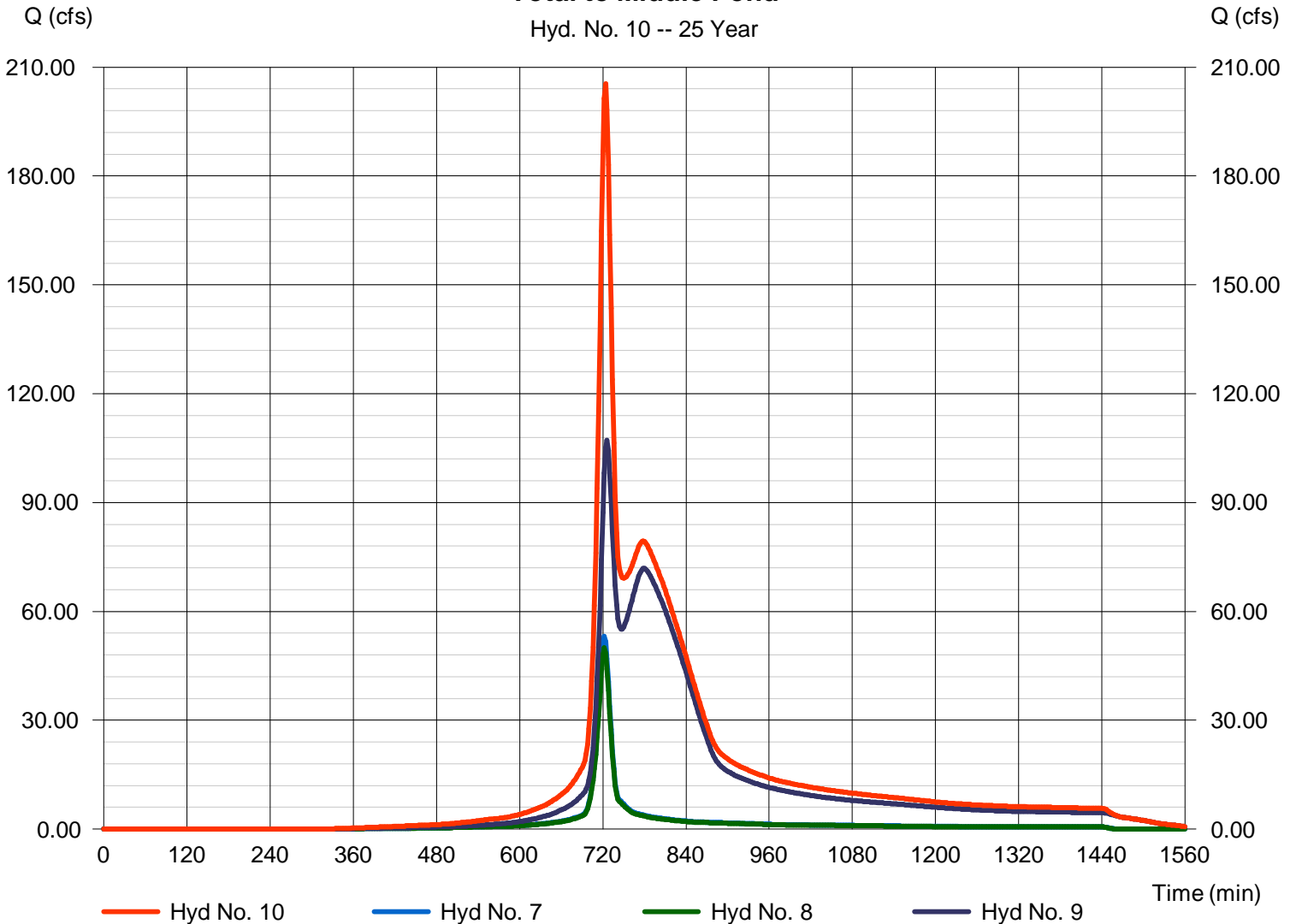
Hyd. No. 10

Total to Middle Pond

Hydrograph type	= Combine	Peak discharge	= 205.36 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,209,773 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 19.400 ac

Total to Middle Pond

Hyd. No. 10 -- 25 Year



Hydrograph Report

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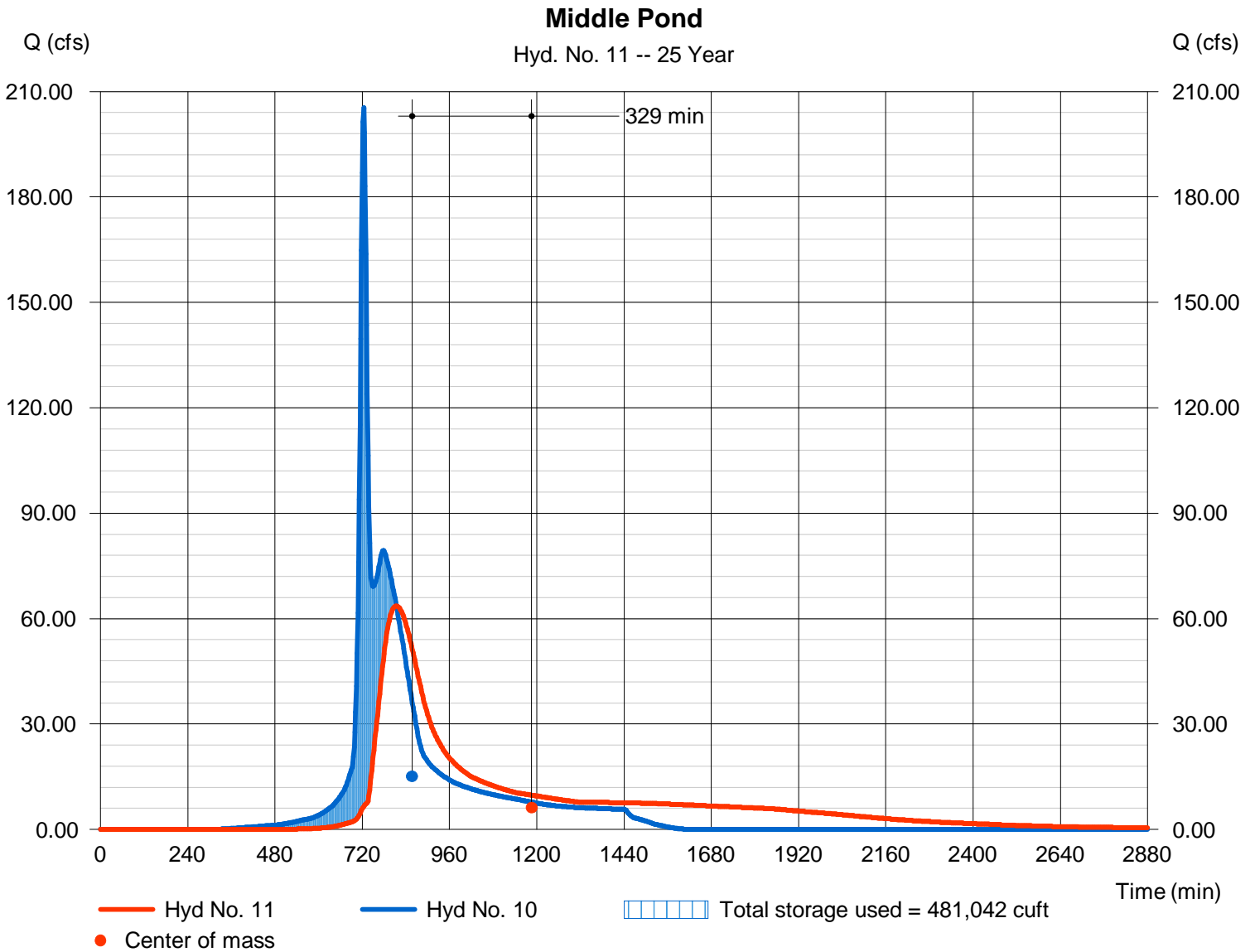
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 63.64 cfs
Storm frequency	= 25 yrs	Time to peak	= 814 min
Time interval	= 2 min	Hyd. volume	= 1,204,344 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1358.79 ft
Reservoir name	= Middle Pond	Max. Storage	= 481,042 cuft

Storage Indication method used.



Hydrograph Report

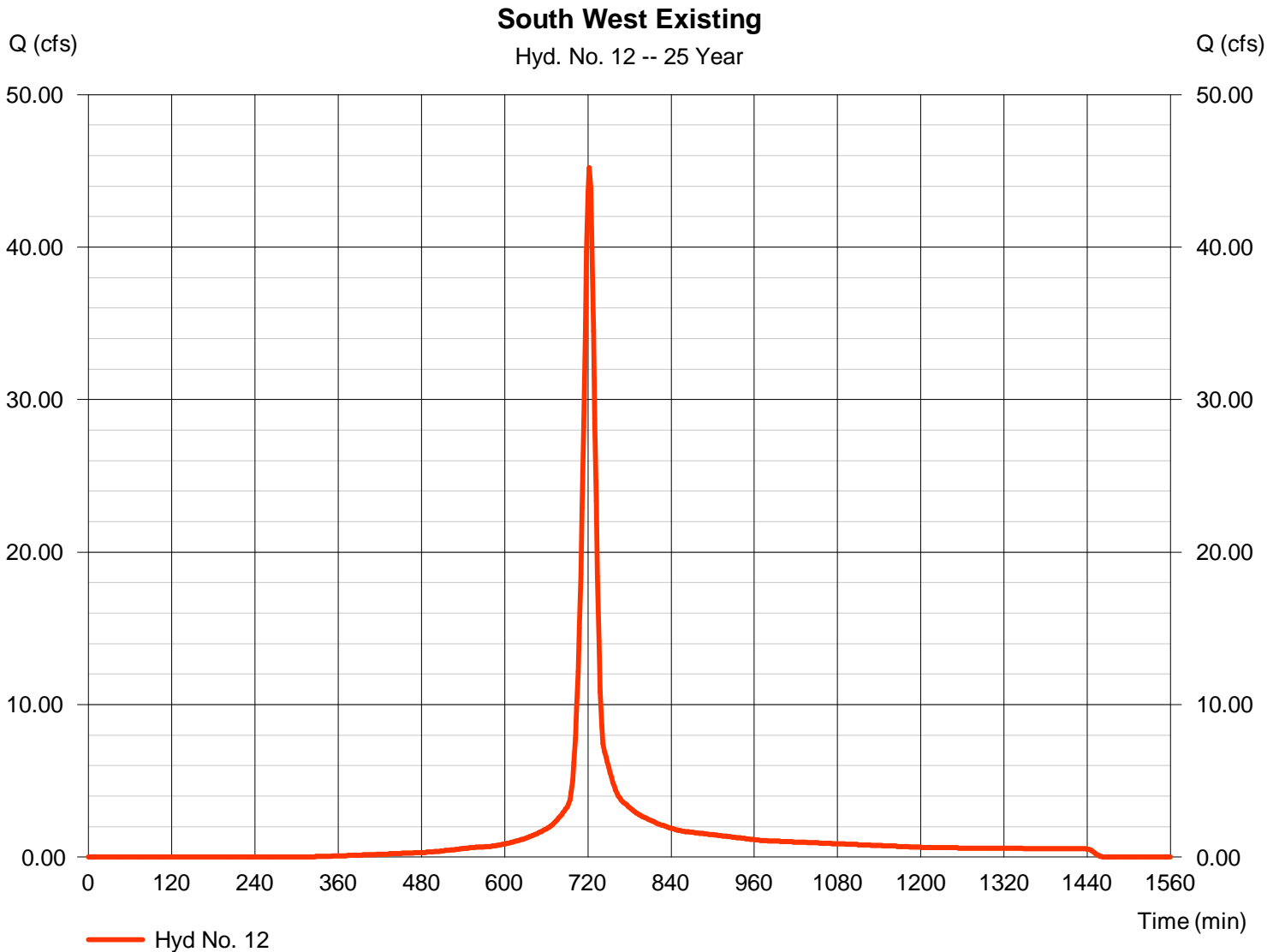
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 45.20 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 129,064 cuft
Drainage area	= 8.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

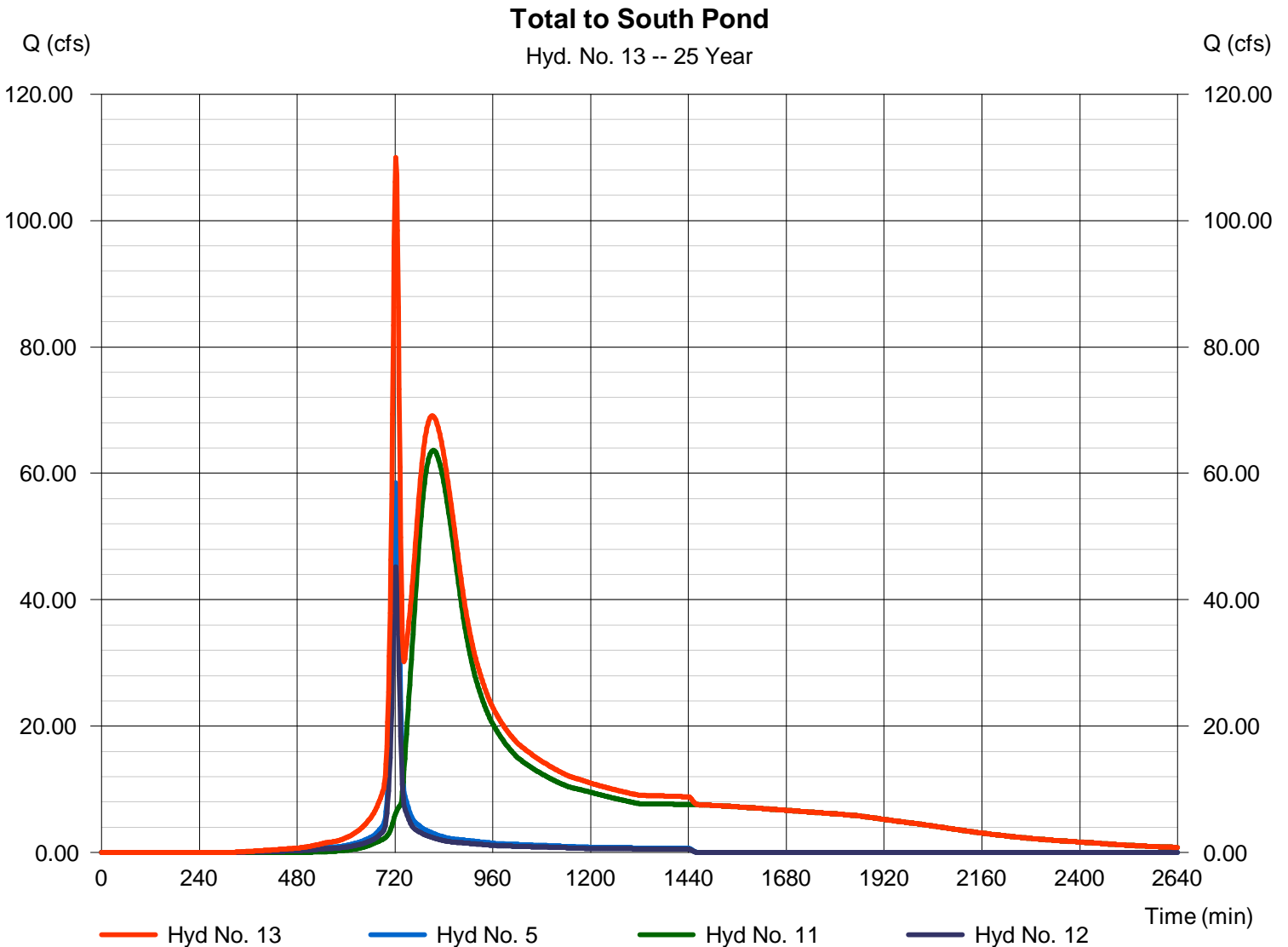
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 109.95 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,500,433 cuft
Inflow hyds.	= 5, 11, 12	Contrib. drain. area	= 19.500 ac



Hydrograph Report

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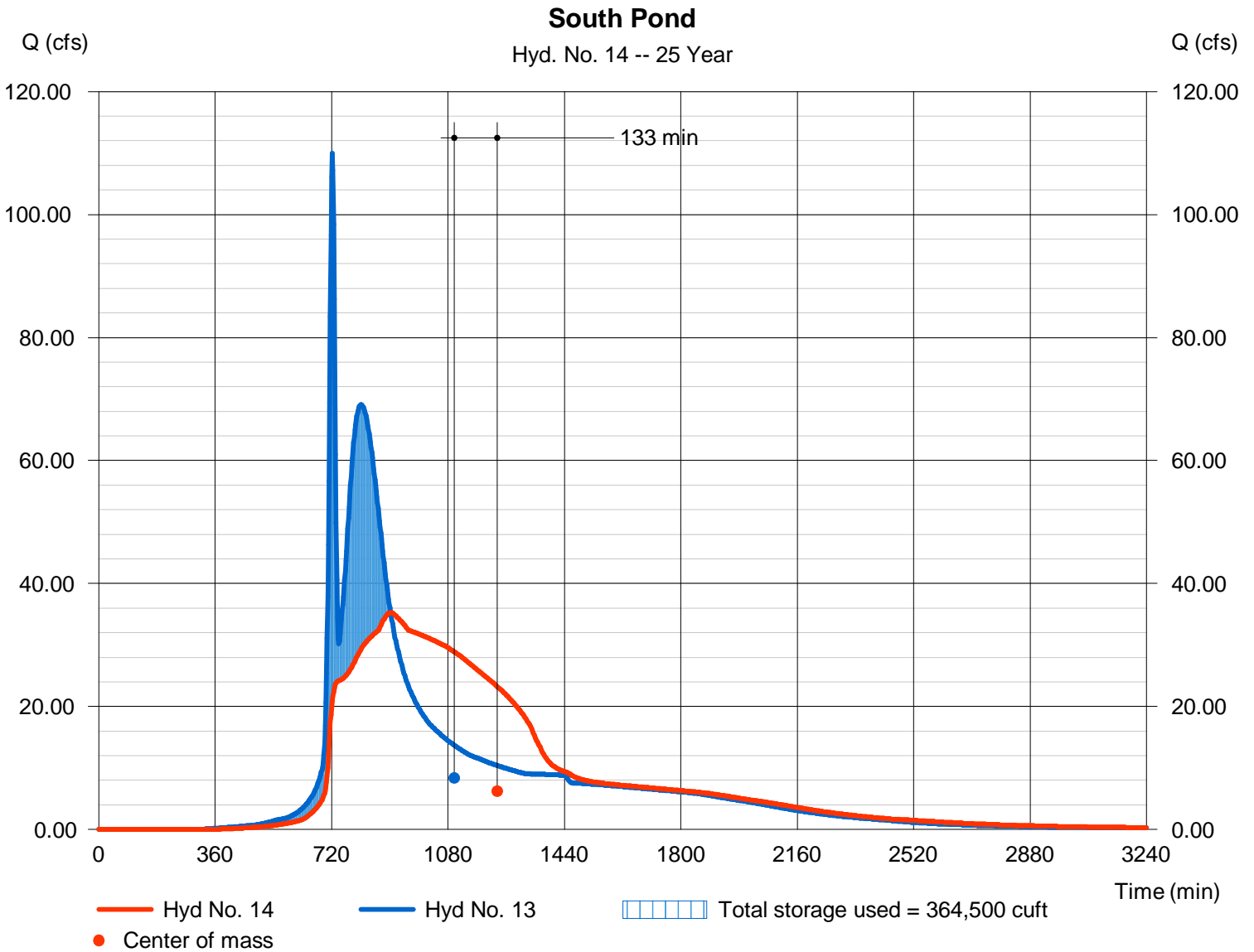
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 35.25 cfs
Storm frequency	= 25 yrs	Time to peak	= 902 min
Time interval	= 2 min	Hyd. volume	= 1,500,265 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1352.13 ft
Reservoir name	= South Pond	Max. Storage	= 364,500 cuft

Storage Indication method used.



Hydrograph Report

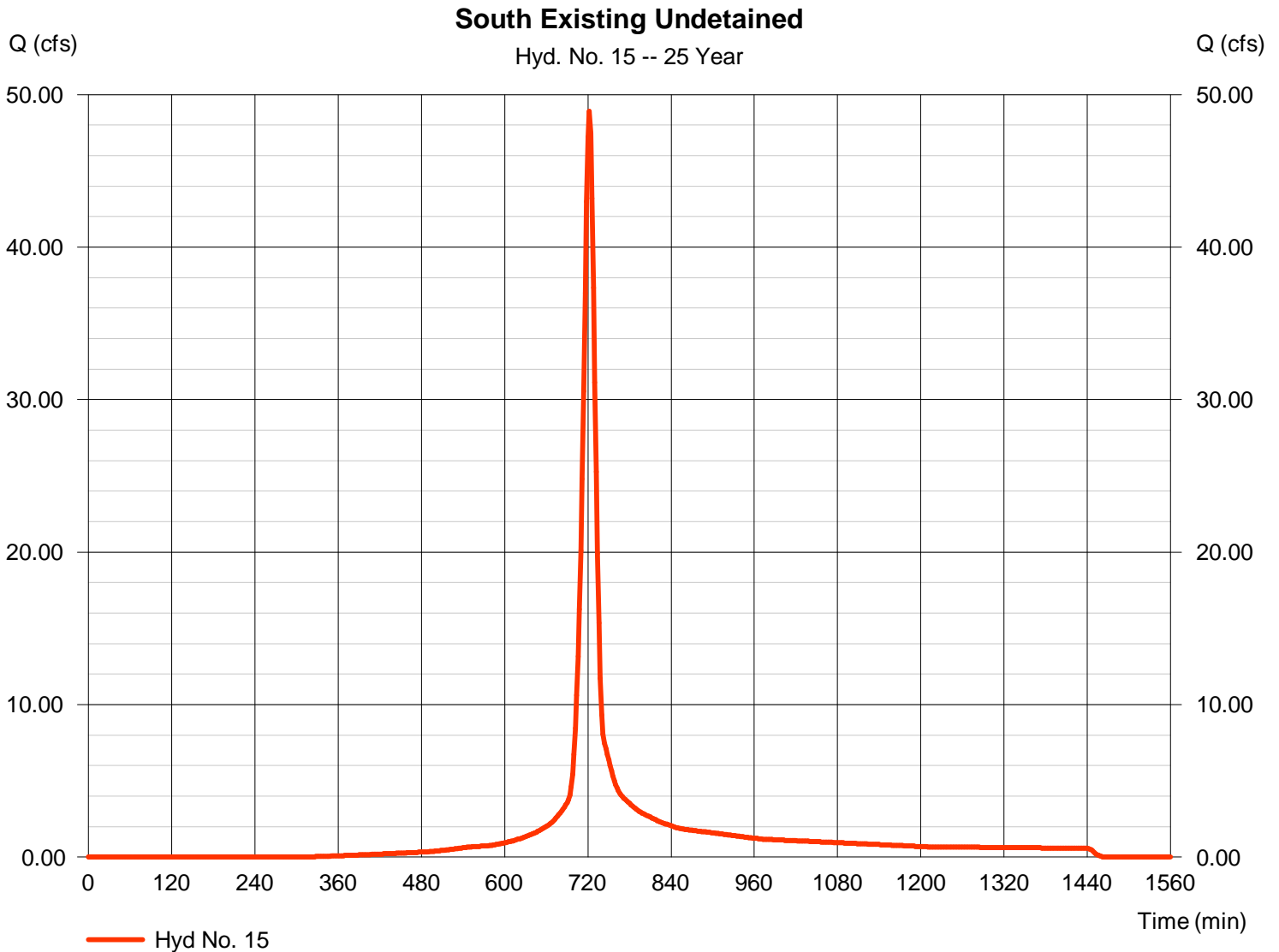
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 15

South Existing Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 48.92 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 139,693 cuft
Drainage area	= 9.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

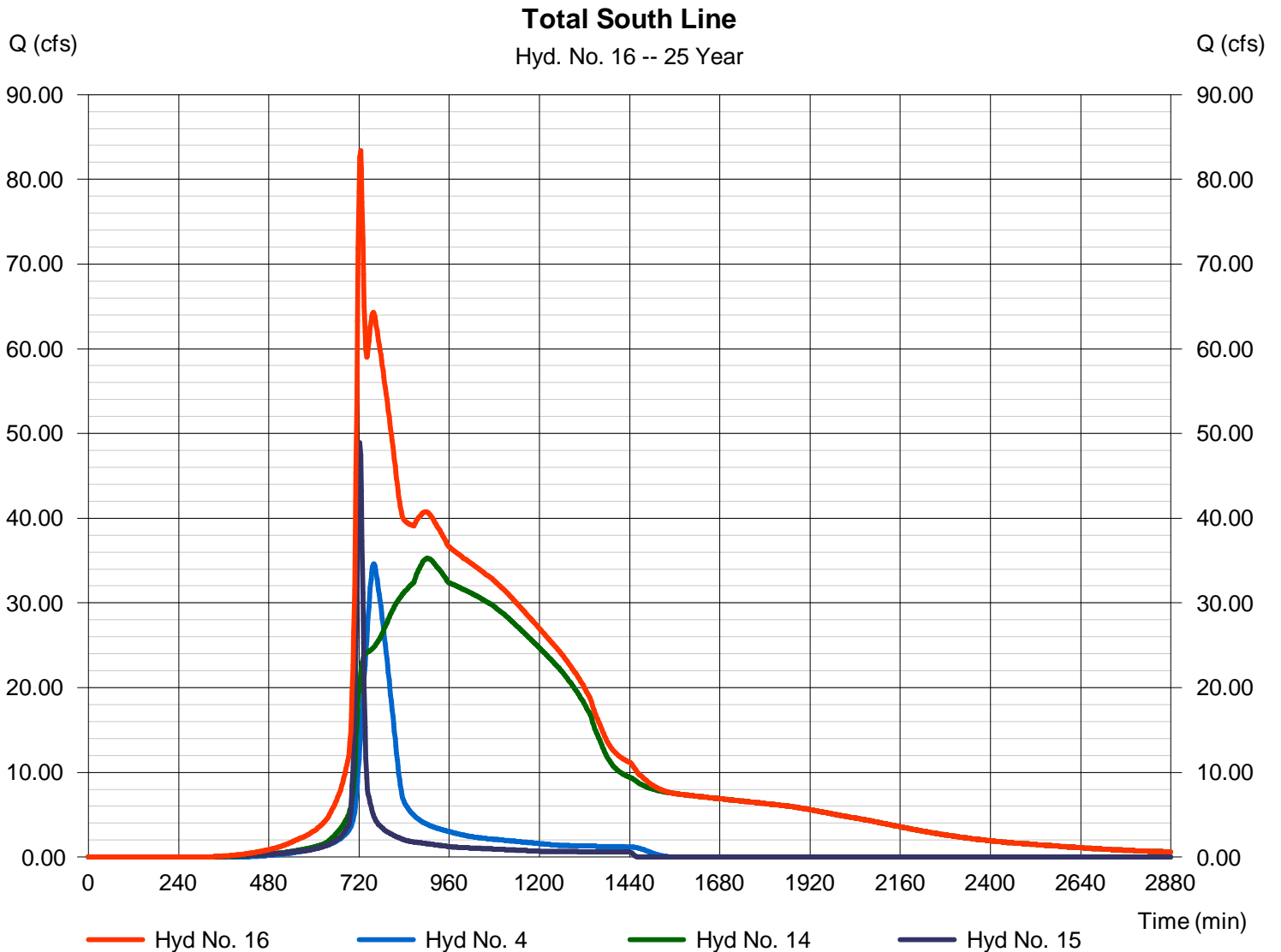
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 16

Total South Line

Hydrograph type	= Combine	Peak discharge	= 83.39 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,905,532 cuft
Inflow hyds.	= 4, 14, 15	Contrib. drain. area	= 28.200 ac



Hydrograph Report

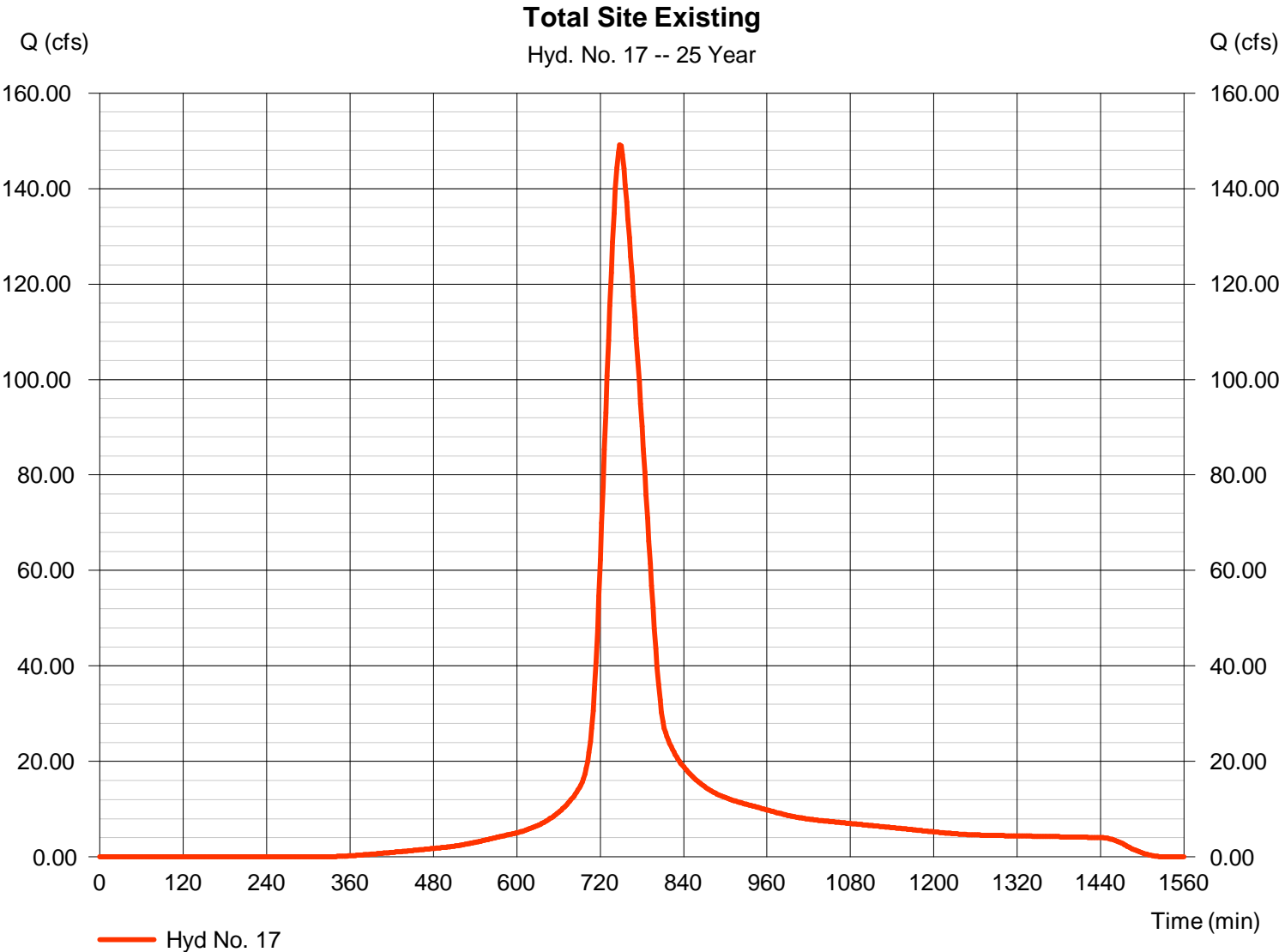
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Site Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 149.13 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 965,548 cuft
Drainage area	= 62.000 ac	Curve number	= 84
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 60.80 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	79.90	2	776	777,794	-----	-----	-----	Offsite North
2	SCS Runoff	68.30	2	722	196,410	-----	-----	-----	Estate Lots & Comm North - Existing
3	SCS Runoff	44.71	2	722	128,559	-----	-----	-----	NorthWest to North Pond
4	SCS Runoff	41.10	2	760	315,692	-----	-----	-----	Offsite West
5	SCS Runoff	68.30	2	722	196,410	-----	-----	-----	South East Existing
6	Combine	134.57	2	722	1,102,764	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	62.09	2	722	178,555	-----	-----	-----	West Existing Middle Pond
8	SCS Runoff	58.37	2	722	167,841	-----	-----	-----	East Existing Middle Pond
9	Reservoir	127.66	2	726	1,102,763	6	1358.01	31,164	North Pond
10	Combine	242.72	2	724	1,449,160	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	82.91	2	804	1,443,682	10	1358.96	514,583	Middle Pond
12	SCS Runoff	52.78	2	722	151,772	-----	-----	-----	South West Existing
13	Combine	127.92	2	722	1,791,865	5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	63.17	2	862	1,791,696	13	1352.67	443,516	South Pond
15	SCS Runoff	57.13	2	722	164,270	-----	-----	-----	South Existing Undetained
16	Combine	95.52	2	724	2,271,656	4, 14, 15	-----	-----	Total South Line
17	SCS Runoff	174.74	2	748	1,135,424	-----	-----	-----	Total Site Existing
The Ranch Existing.gpw					Return Period: 50 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

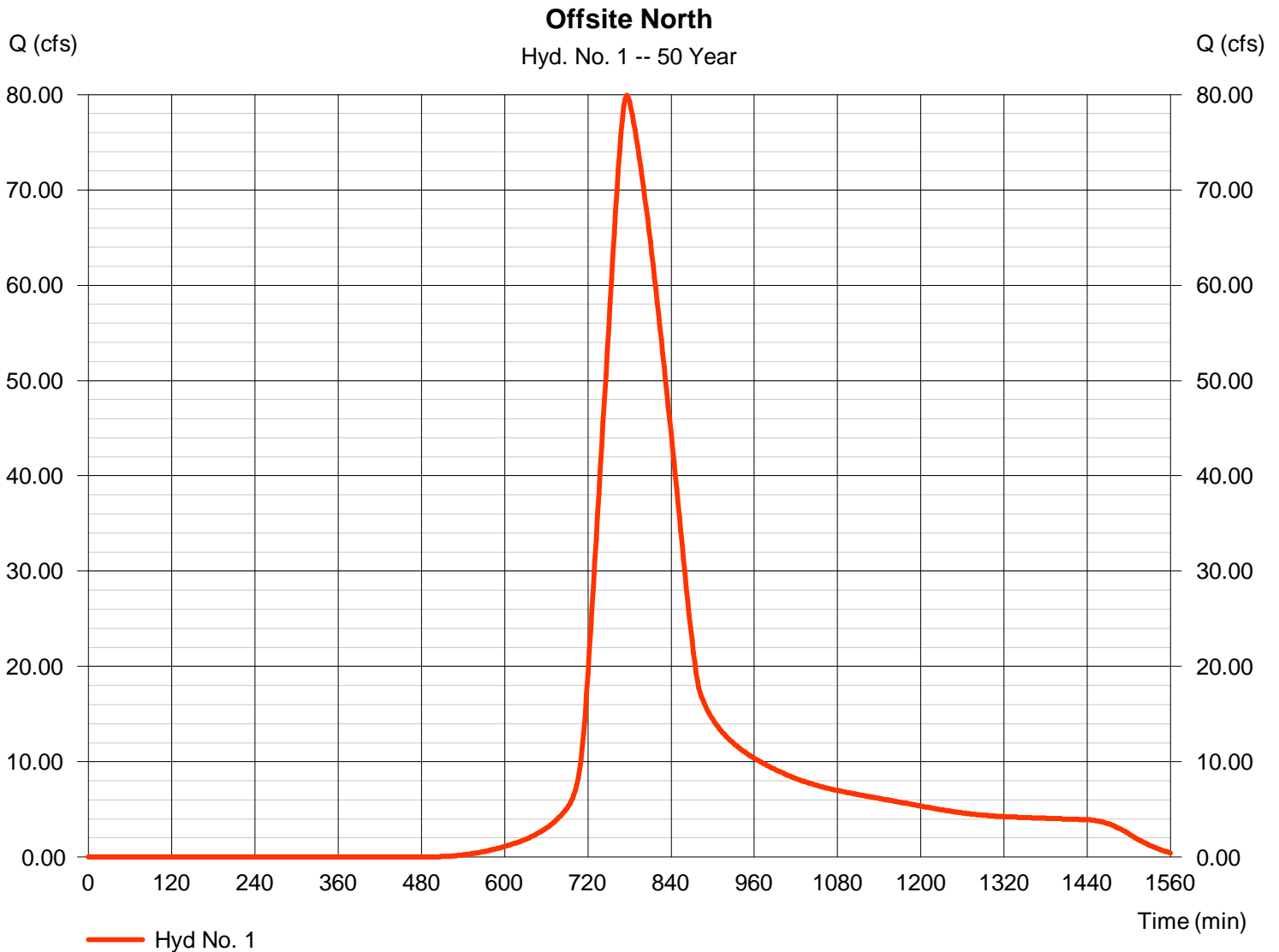
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 79.90 cfs
Storm frequency	= 50 yrs	Time to peak	= 776 min
Time interval	= 2 min	Hyd. volume	= 777,794 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

Tuesday, Jun 18, 2013

Hyd. No. 2

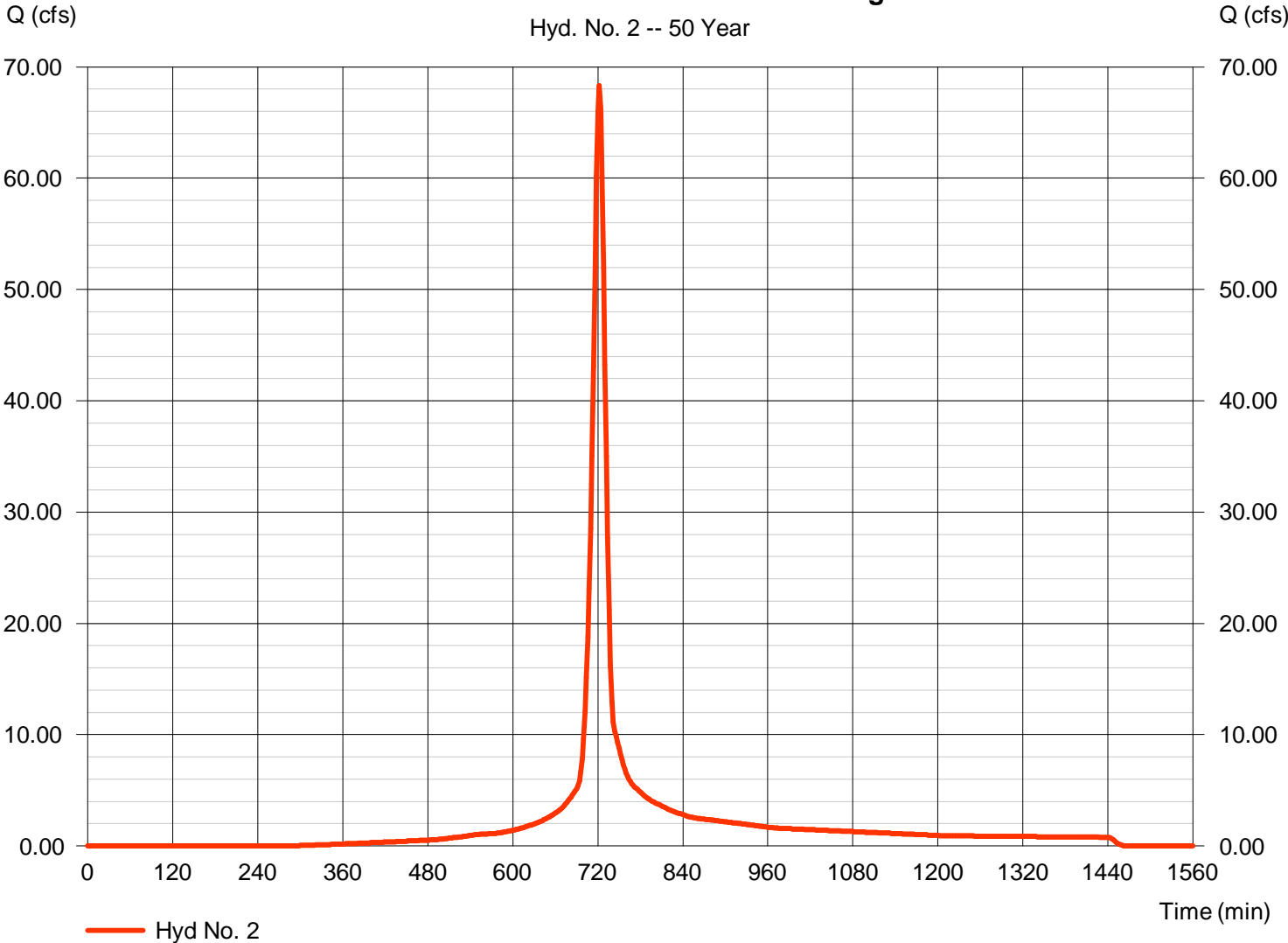
Estate Lots & Comm North - Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 68.30 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 196,410 cuft
Drainage area	= 11.000 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(7.000 x 84) + (4.000 x 98)] / 11.000

Estate Lots & Comm North - Existing

Hyd. No. 2 -- 50 Year



Hydrograph Report

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

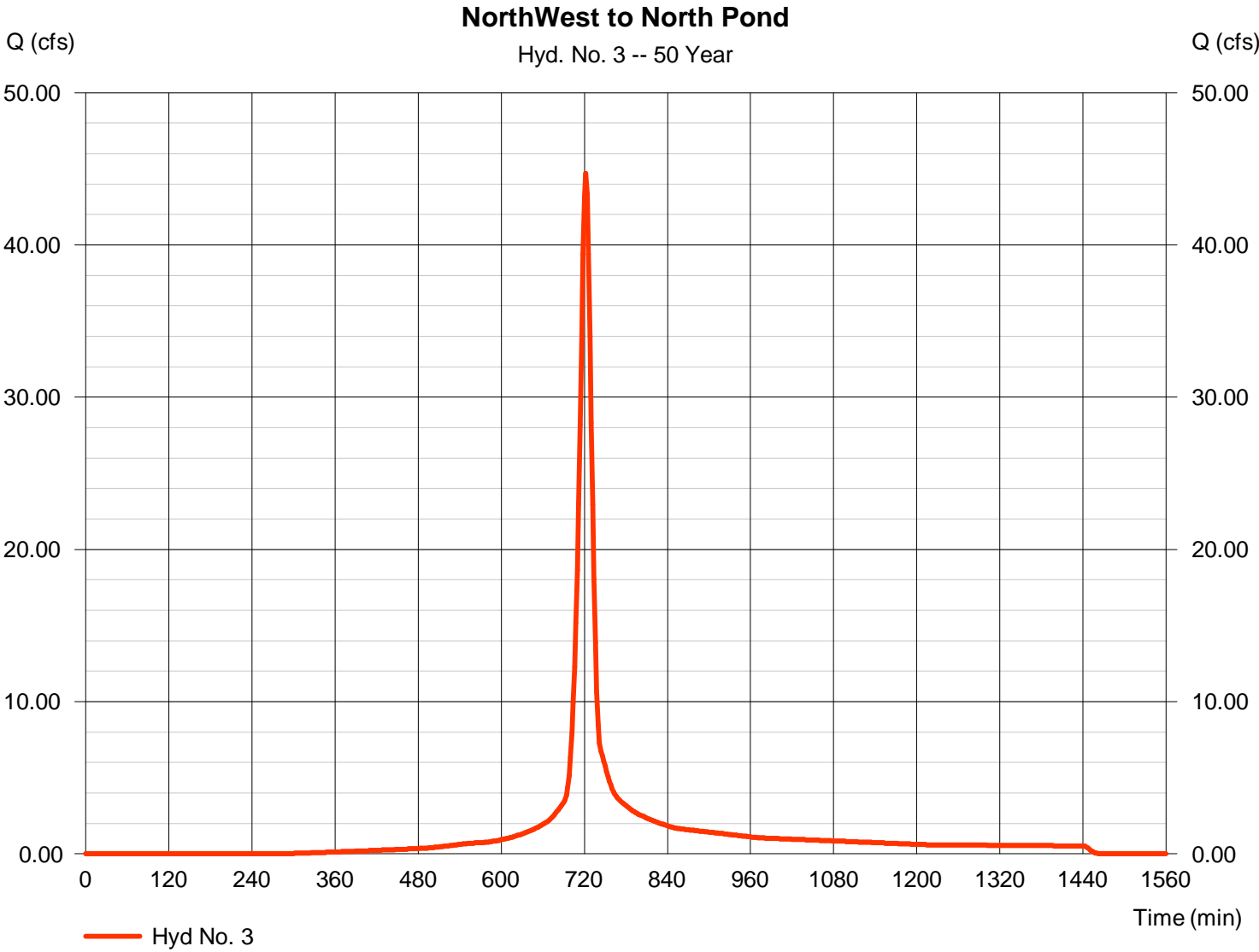
Tuesday, Jun 18, 2013

Hyd. No. 3

NorthWest to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 44.71 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 128,559 cuft
Drainage area	= 7.200 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 7.200



Hydrograph Report

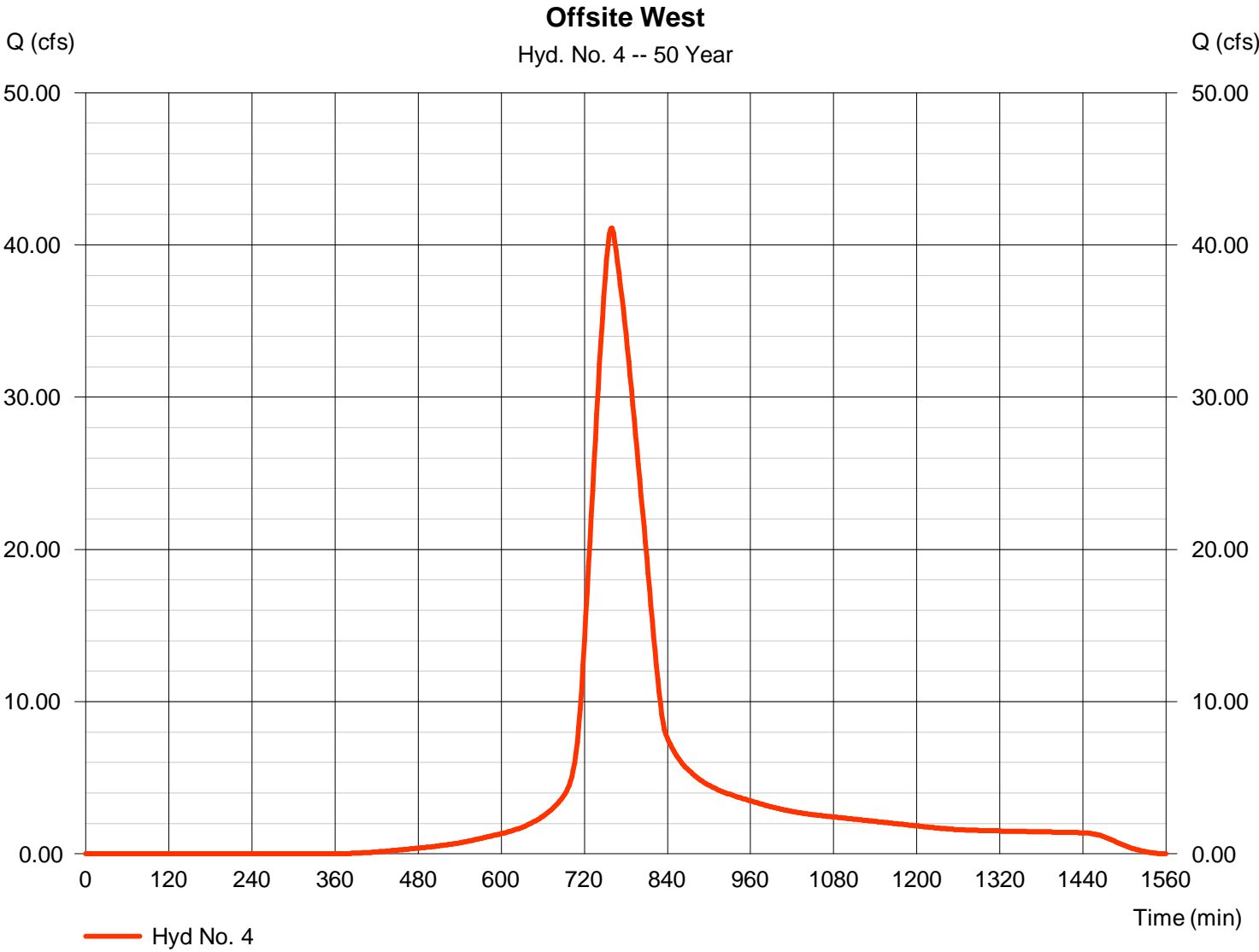
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 41.10 cfs
Storm frequency	= 50 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 315,692 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

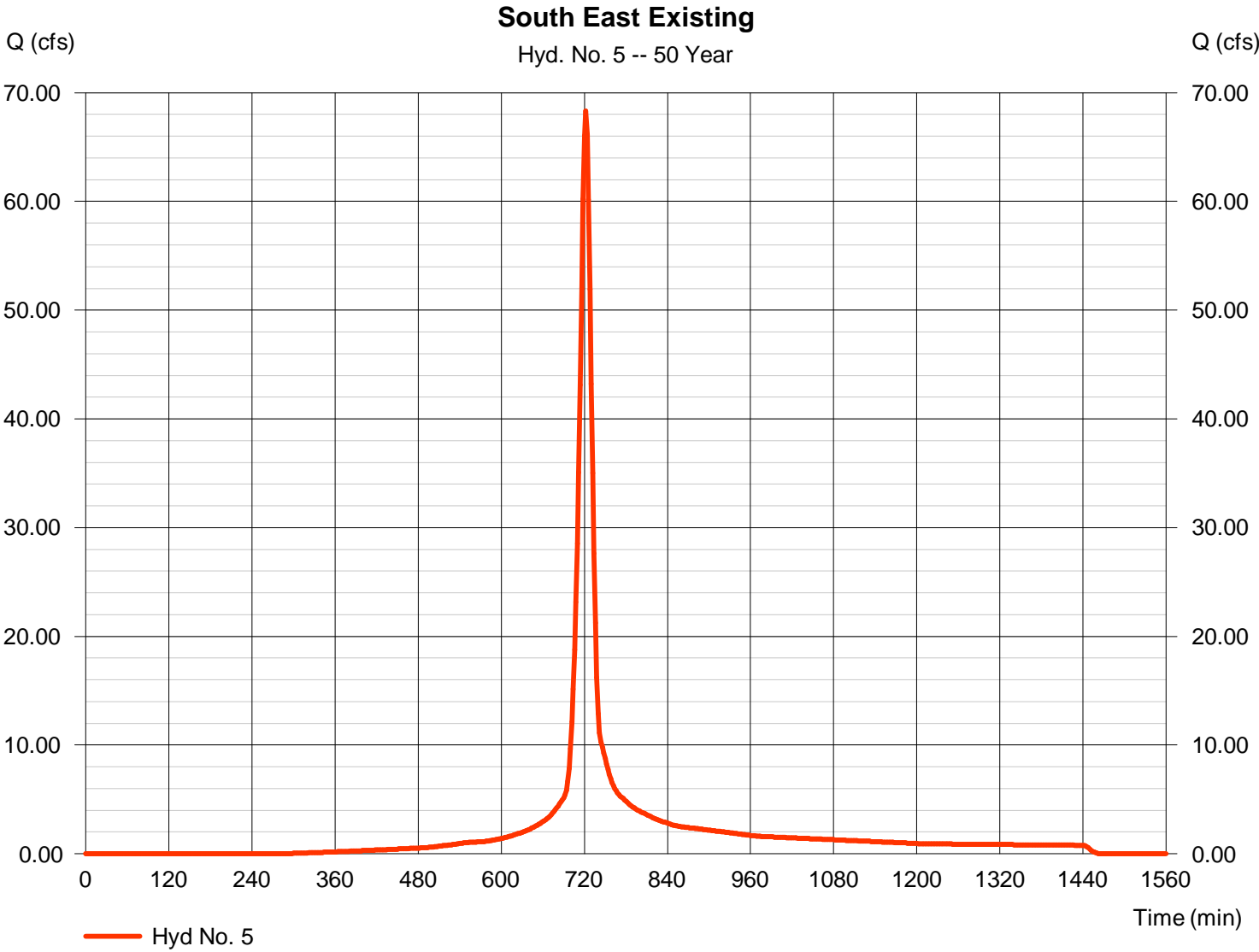
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South East Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 68.30 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 196,410 cuft
Drainage area	= 11.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

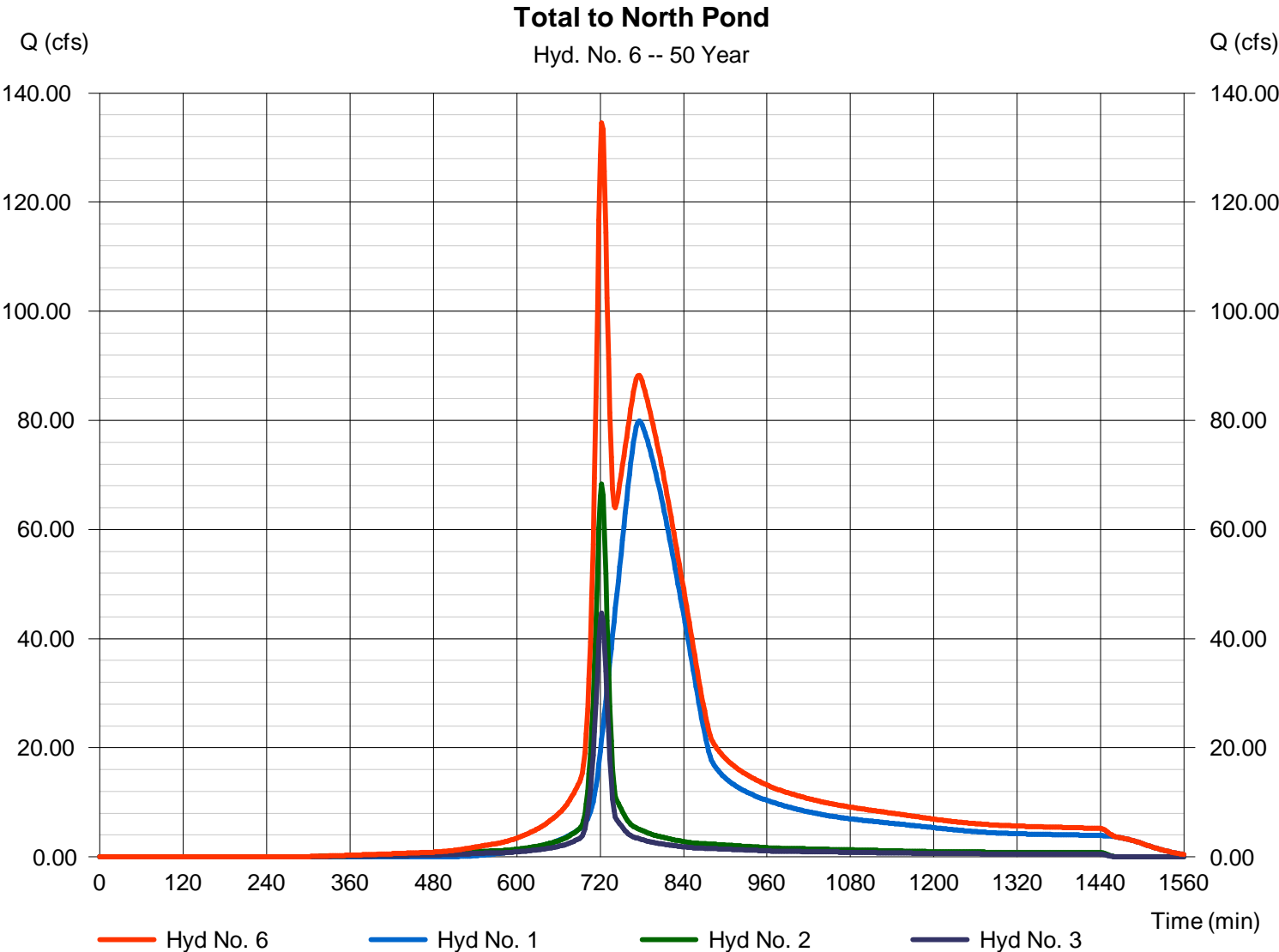
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 134.57 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,102,764 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 75.200 ac



Hydrograph Report

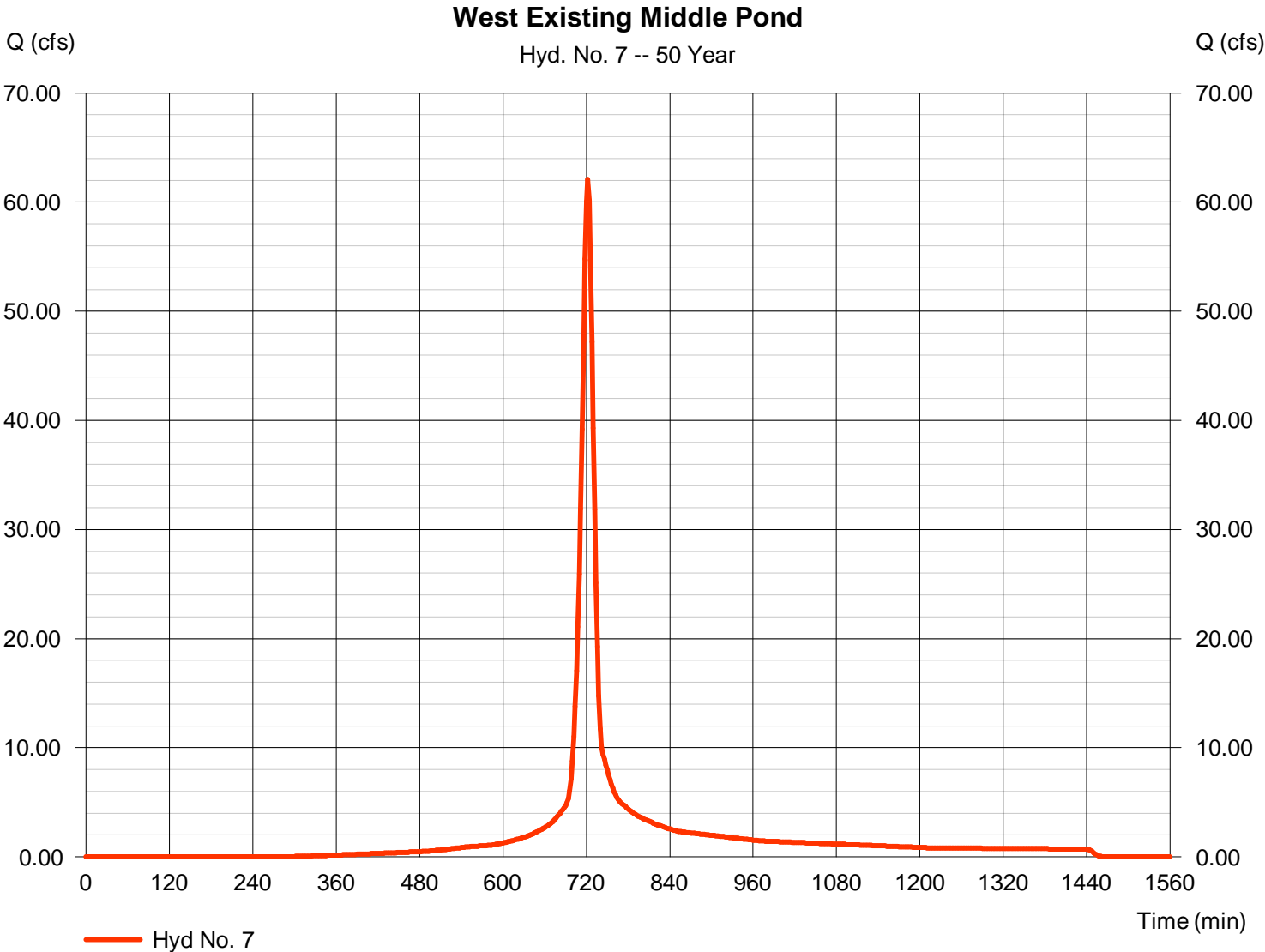
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 7

West Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 62.09 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 178,555 cuft
Drainage area	= 10.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

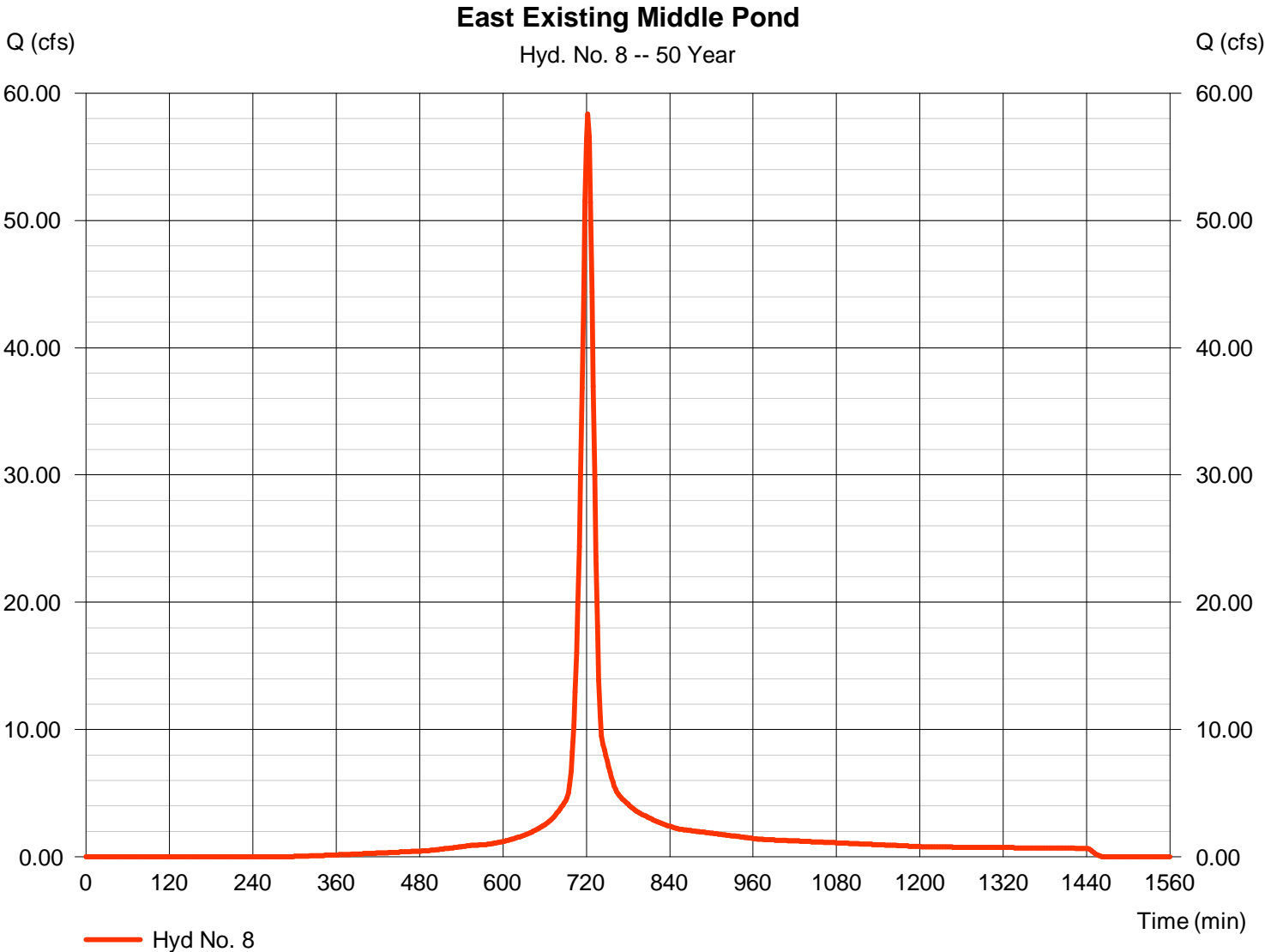
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

East Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 58.37 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 167,841 cuft
Drainage area	= 9.400 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

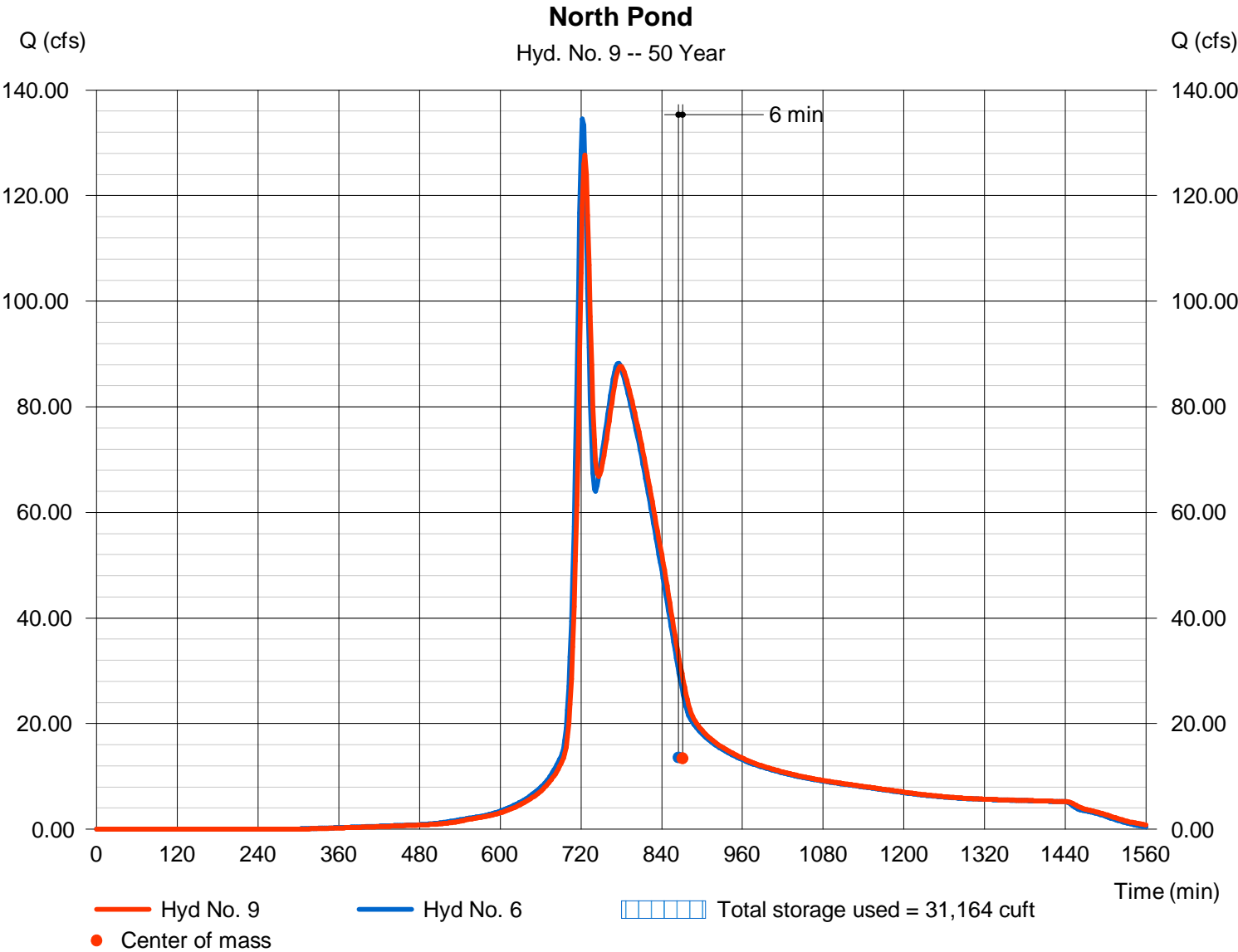
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 127.66 cfs
Storm frequency	= 50 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,102,763 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1358.01 ft
Reservoir name	= North Pond	Max. Storage	= 31,164 cuft

Storage Indication method used.



Hydrograph Report

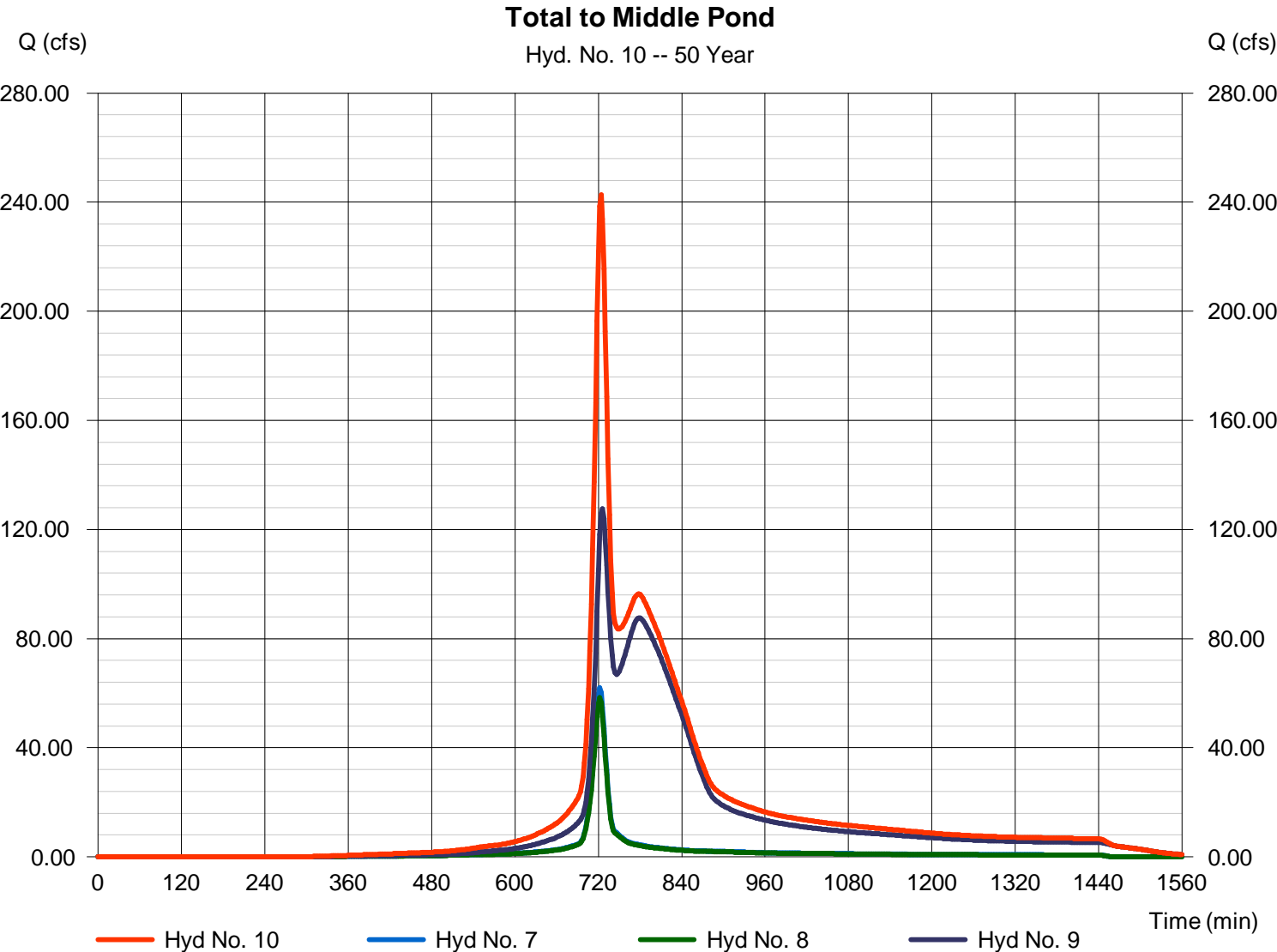
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type	= Combine	Peak discharge	= 242.72 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,449,160 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 19.400 ac



Hydrograph Report

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

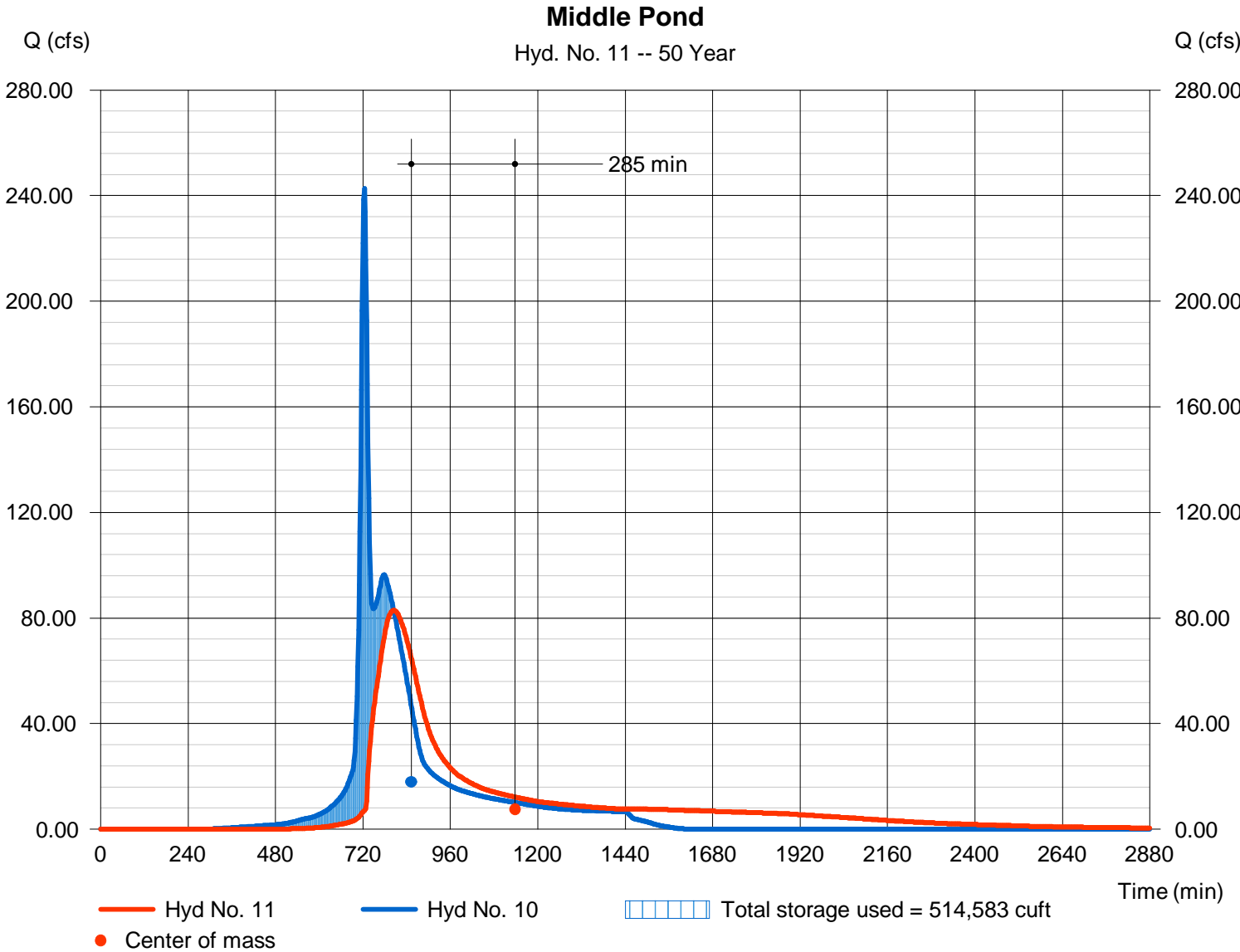
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 82.91 cfs
Storm frequency	= 50 yrs	Time to peak	= 804 min
Time interval	= 2 min	Hyd. volume	= 1,443,682 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1358.96 ft
Reservoir name	= Middle Pond	Max. Storage	= 514,583 cuft

Storage Indication method used.



Hydrograph Report

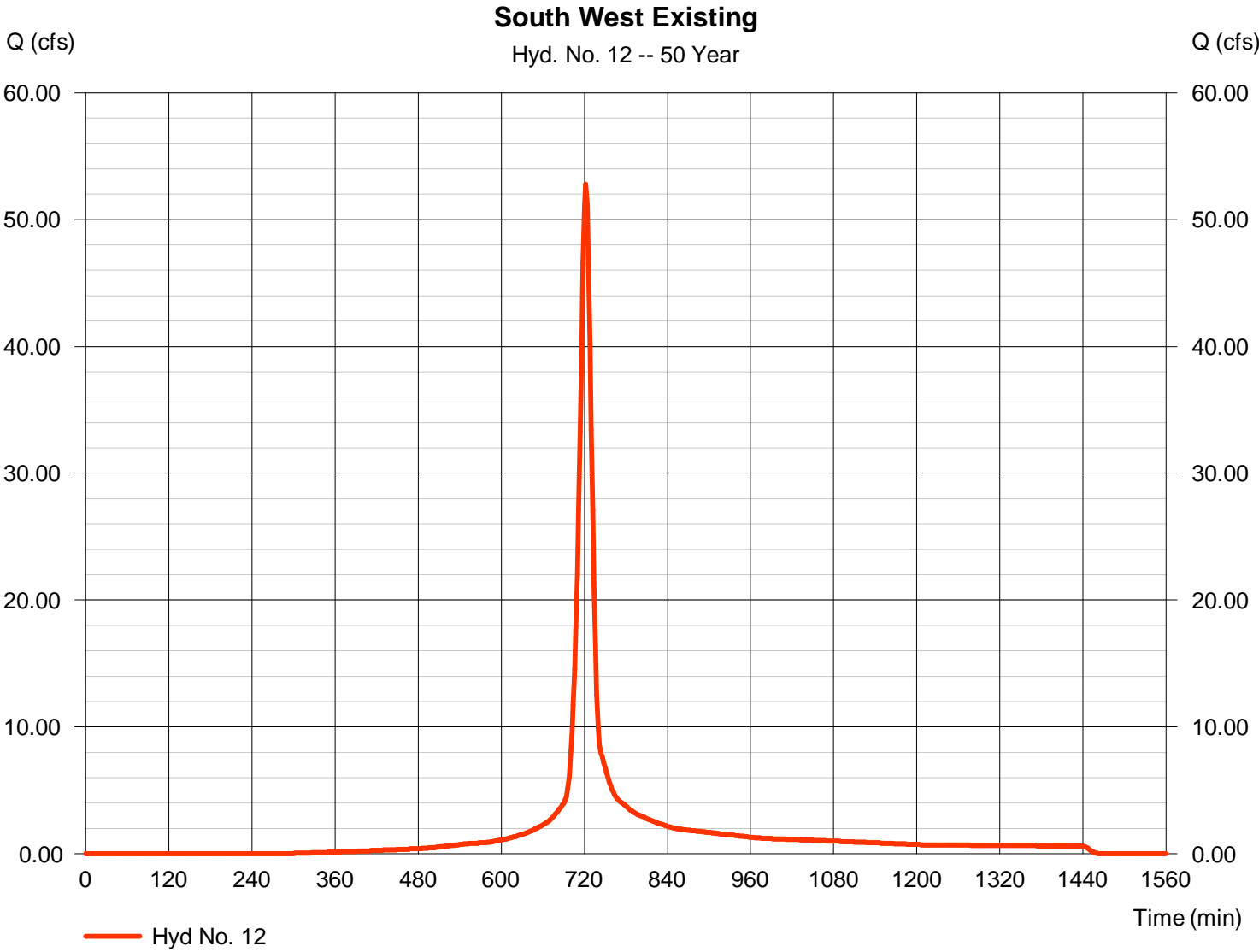
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 52.78 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 151,772 cuft
Drainage area	= 8.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

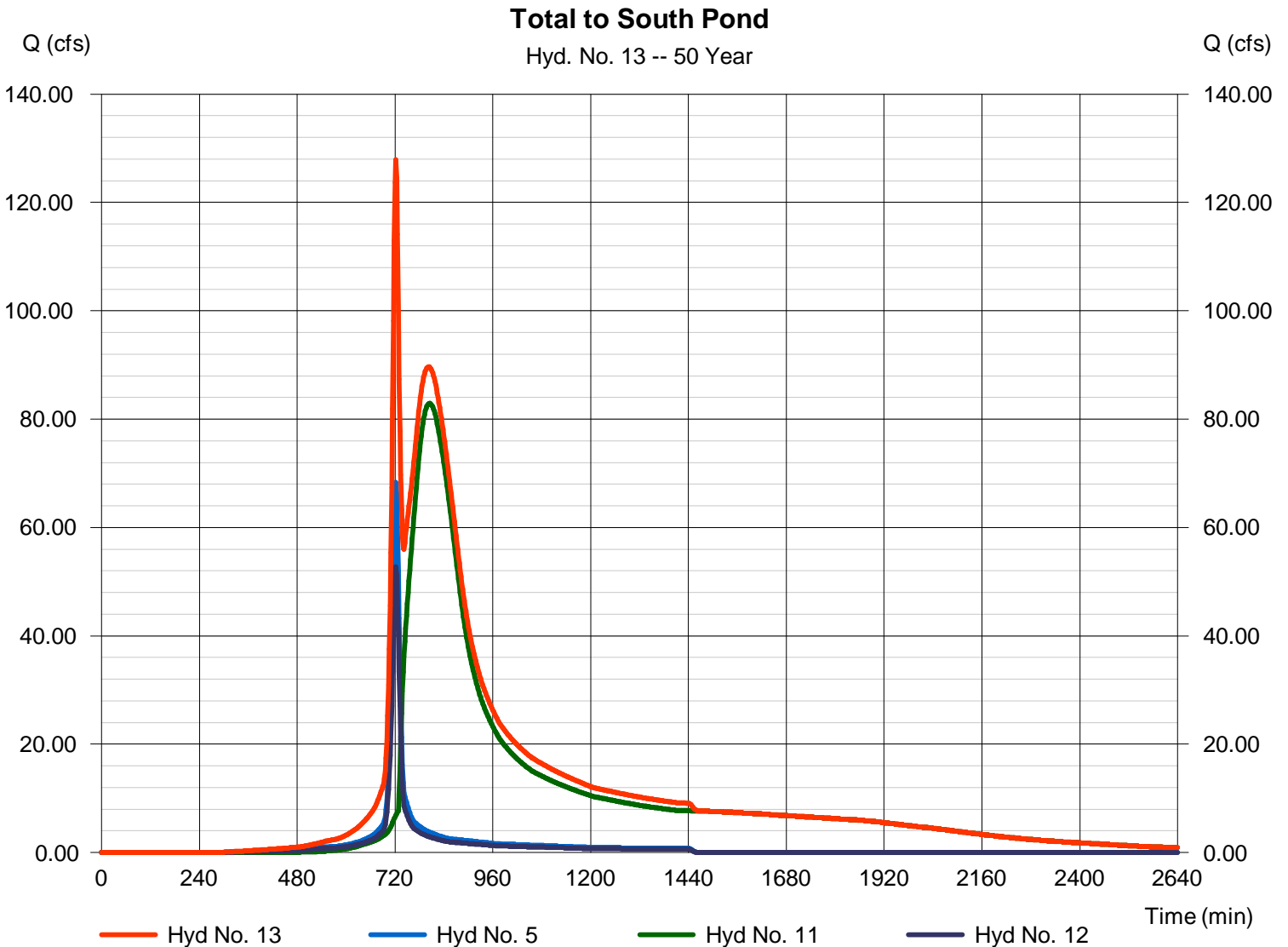
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 127.92 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,791,865 cuft
Inflow hyds.	= 5, 11, 12	Contrib. drain. area	= 19.500 ac



Hydrograph Report

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

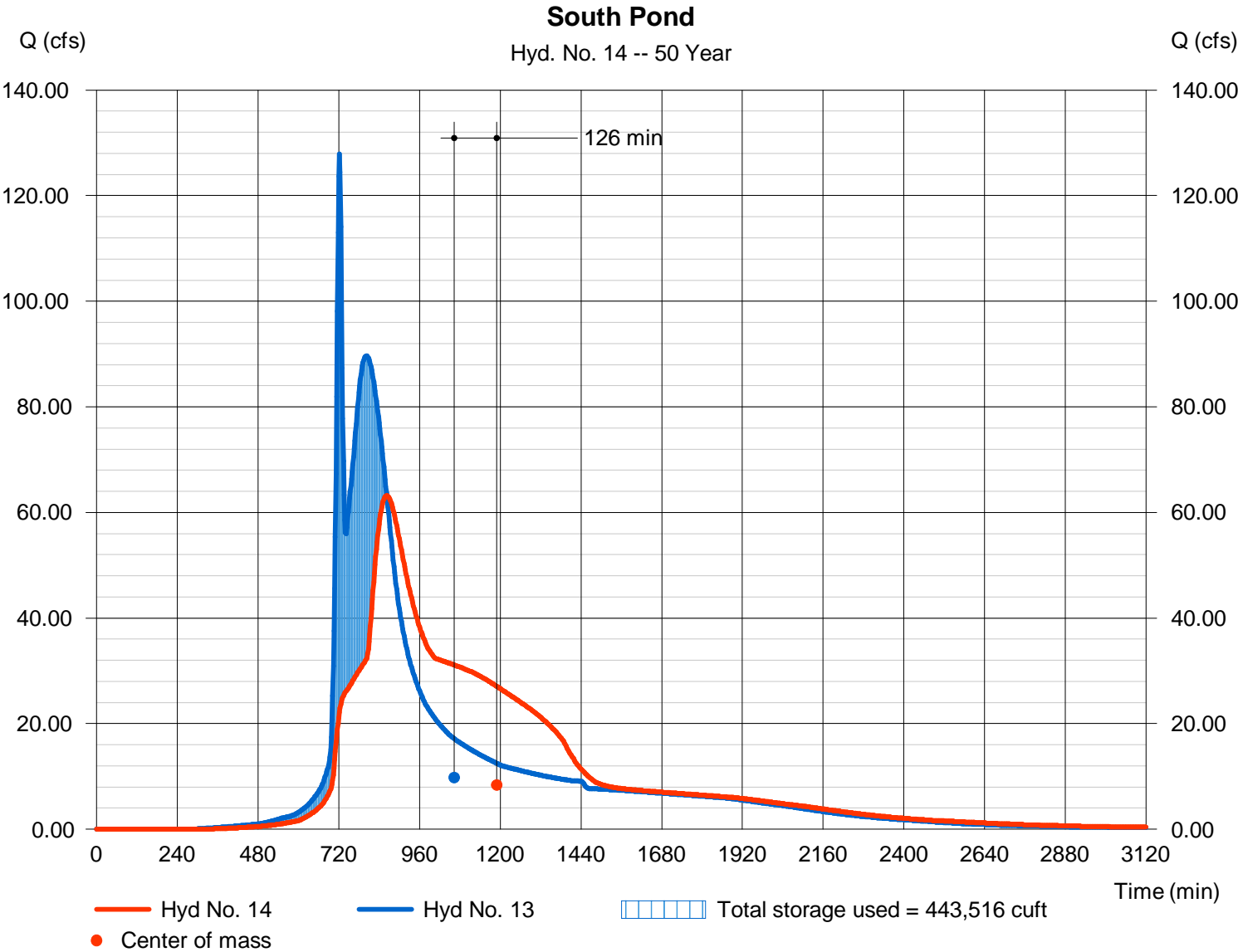
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 63.17 cfs
Storm frequency	= 50 yrs	Time to peak	= 862 min
Time interval	= 2 min	Hyd. volume	= 1,791,696 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1352.67 ft
Reservoir name	= South Pond	Max. Storage	= 443,516 cuft

Storage Indication method used.



Hydrograph Report

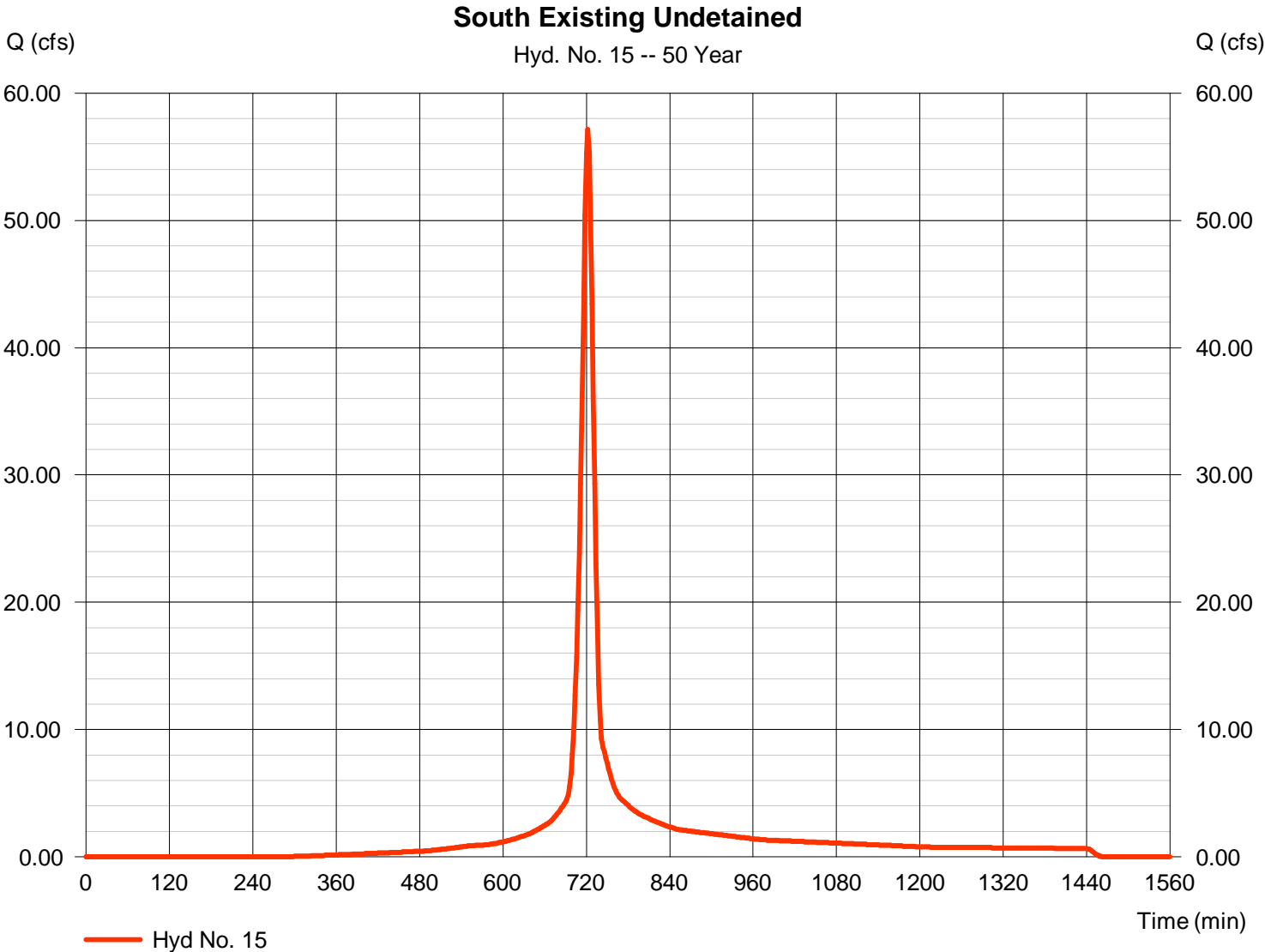
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 15

South Existing Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 57.13 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 164,270 cuft
Drainage area	= 9.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

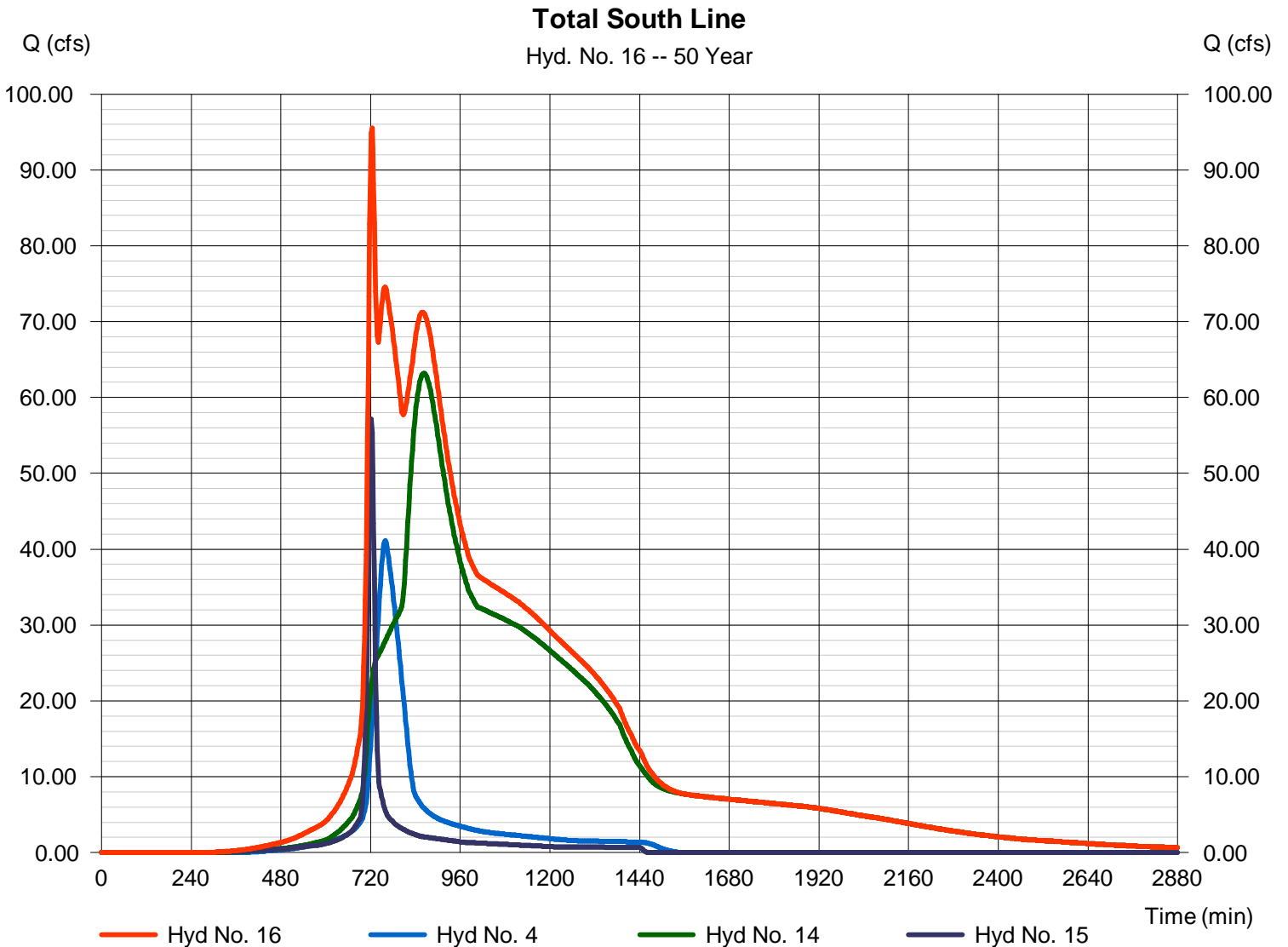
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 16

Total South Line

Hydrograph type	= Combine	Peak discharge	= 95.52 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 2,271,656 cuft
Inflow hyds.	= 4, 14, 15	Contrib. drain. area	= 28.200 ac



Hydrograph Report

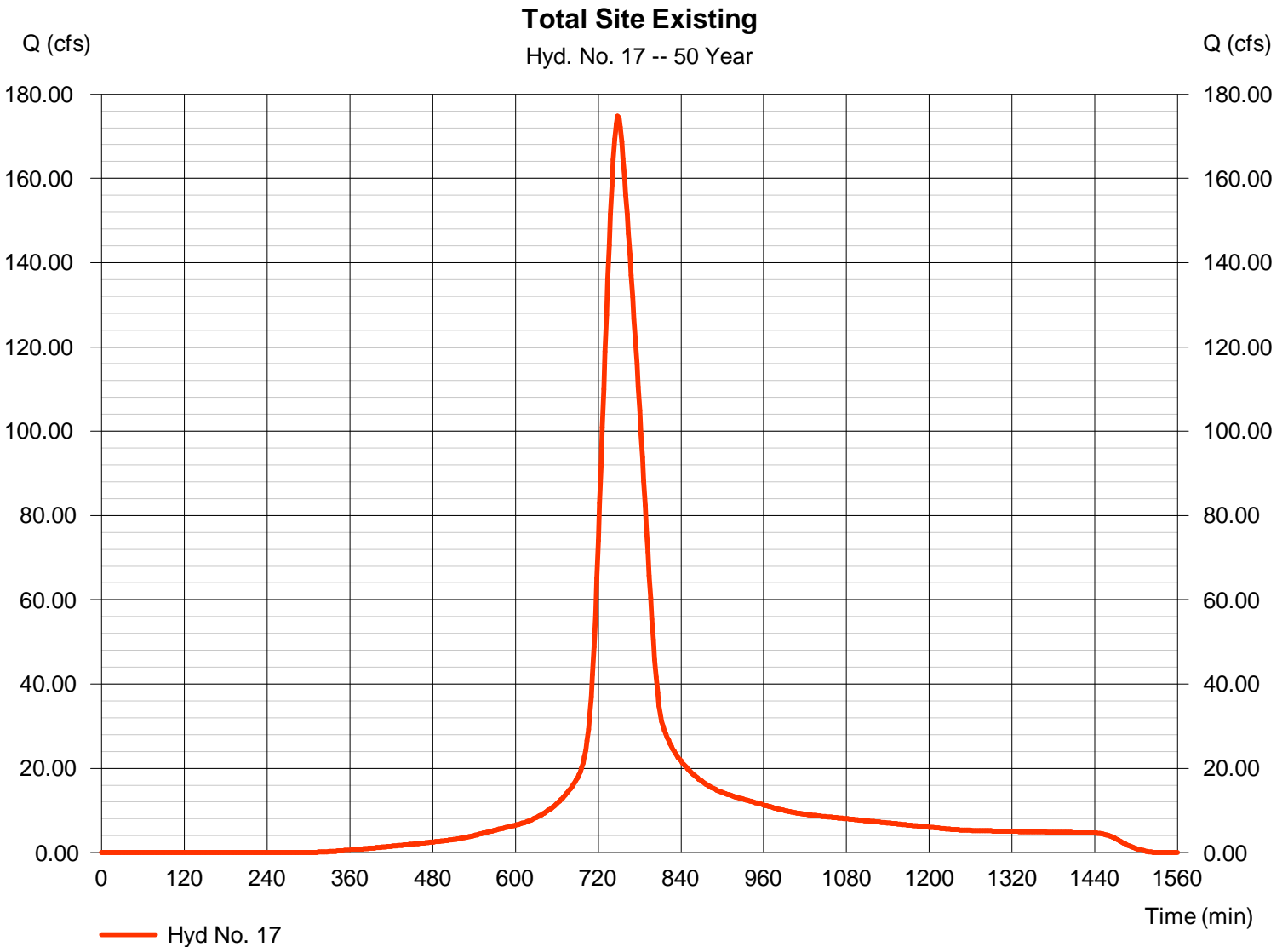
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Site Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 174.74 cfs
Storm frequency	= 50 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,135,424 cuft
Drainage area	= 62.000 ac	Curve number	= 84
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 60.80 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	96.91	2	776	938,878	-----	-----	-----	Offsite North
2	SCS Runoff	79.33	2	722	229,830	-----	-----	-----	Estate Lots & Comm North - Existing
3	SCS Runoff	51.92	2	722	150,434	-----	-----	-----	NorthWest to North Pond
4	SCS Runoff	48.45	2	760	373,004	-----	-----	-----	Offsite West
5	SCS Runoff	79.33	2	722	229,830	-----	-----	-----	South East Existing
6	Combine	158.48	2	722	1,319,143	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	72.12	2	722	208,936	-----	-----	-----	West Existing Middle Pond
8	SCS Runoff	67.79	2	722	196,400	-----	-----	-----	East Existing Middle Pond
9	Reservoir	148.39	2	726	1,319,141	6	1358.22	36,271	North Pond
10	Combine	280.99	2	724	1,724,478	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	104.10	2	798	1,718,968	10	1359.14	549,993	Middle Pond
12	SCS Runoff	61.30	2	722	177,596	-----	-----	-----	South West Existing
13	Combine	148.07	2	722	2,126,398	5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	91.96	2	840	2,126,222	13	1353.05	499,904	South Pond
15	SCS Runoff	66.35	2	722	192,222	-----	-----	-----	South Existing Undetained
16	Combine	109.04	2	724	2,691,452	4, 14, 15	-----	-----	Total South Line
17	SCS Runoff	203.57	2	748	1,328,622	-----	-----	-----	Total Site Existing
The Ranch Existing.gpw					Return Period: 100 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

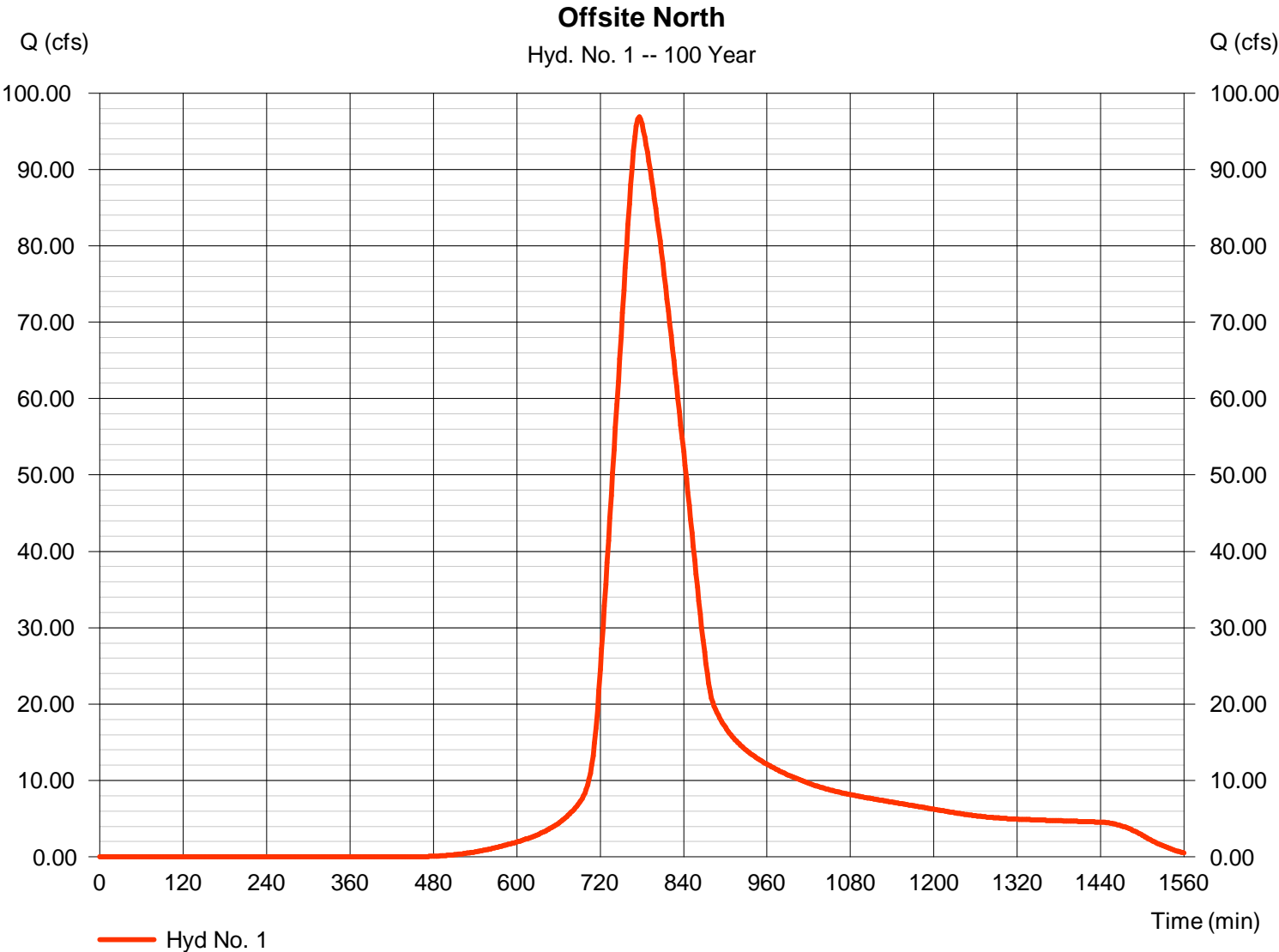
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 96.91 cfs
Storm frequency	= 100 yrs	Time to peak	= 776 min
Time interval	= 2 min	Hyd. volume	= 938,878 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

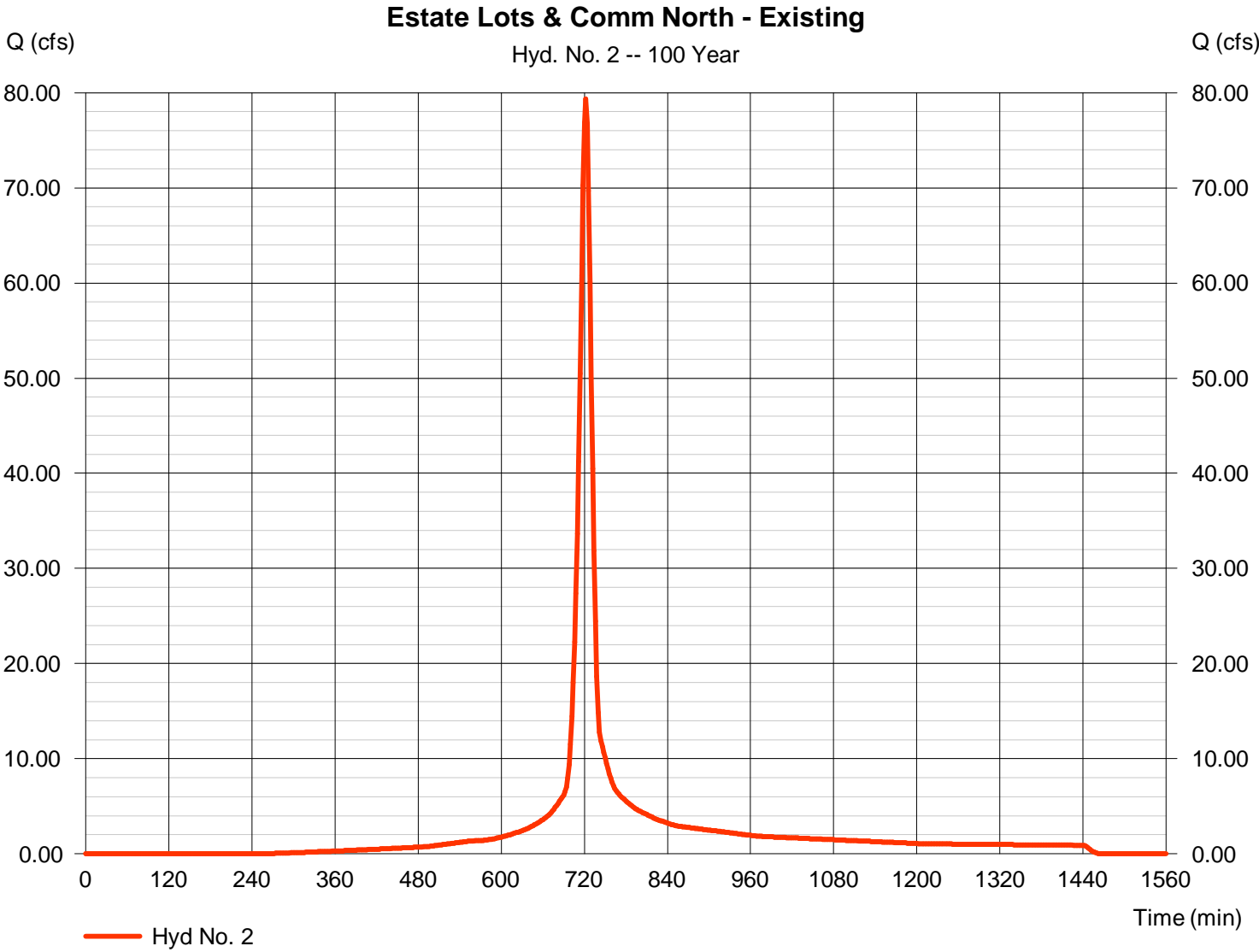
Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots & Comm North - Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 79.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 229,830 cuft
Drainage area	= 11.000 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(7.000 x 84) + (4.000 x 98)] / 11.000



Hydrograph Report

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

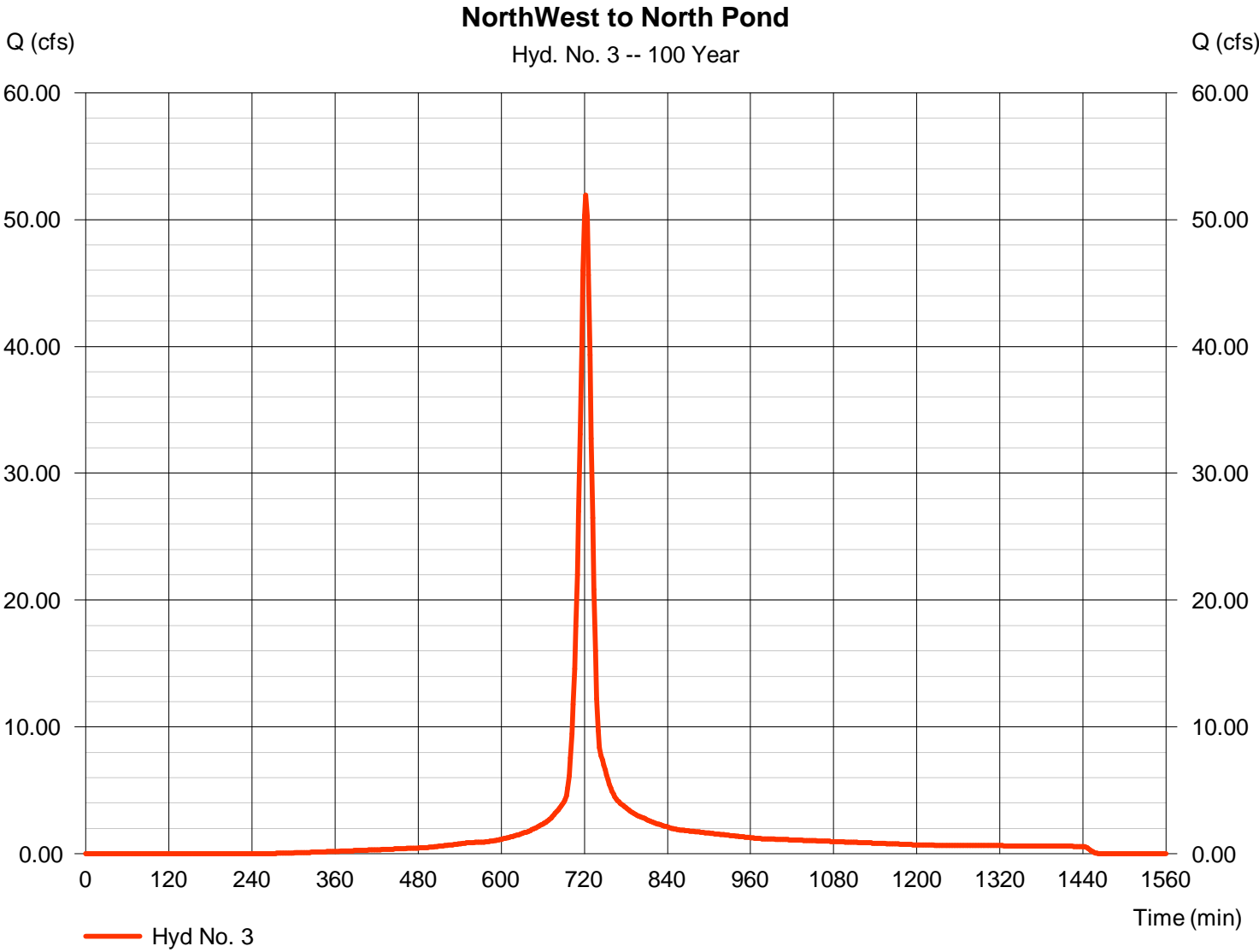
Tuesday, Jun 18, 2013

Hyd. No. 3

NorthWest to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 51.92 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 150,434 cuft
Drainage area	= 7.200 ac	Curve number	= 84*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 7.200



Hydrograph Report

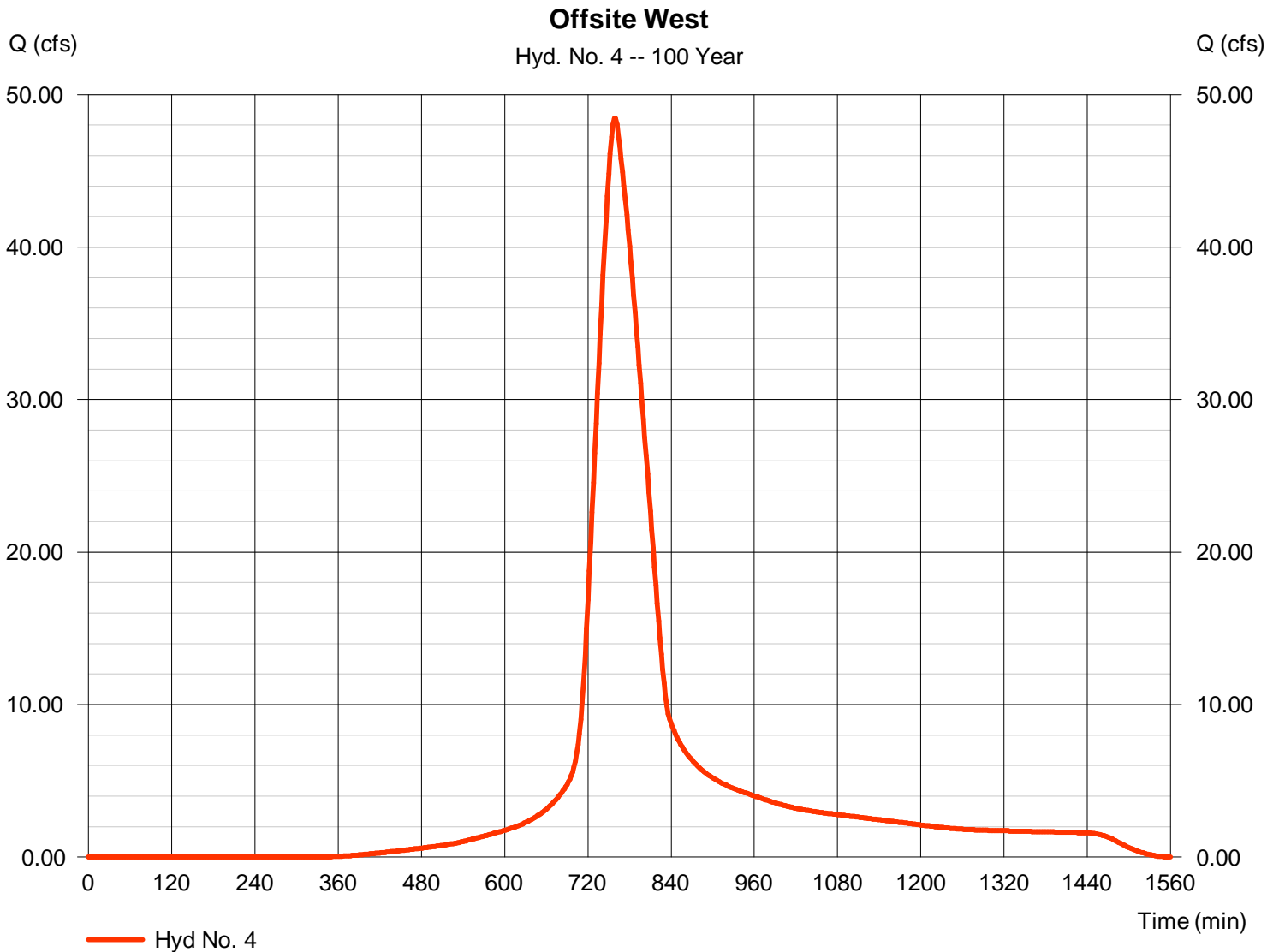
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 48.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 373,004 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

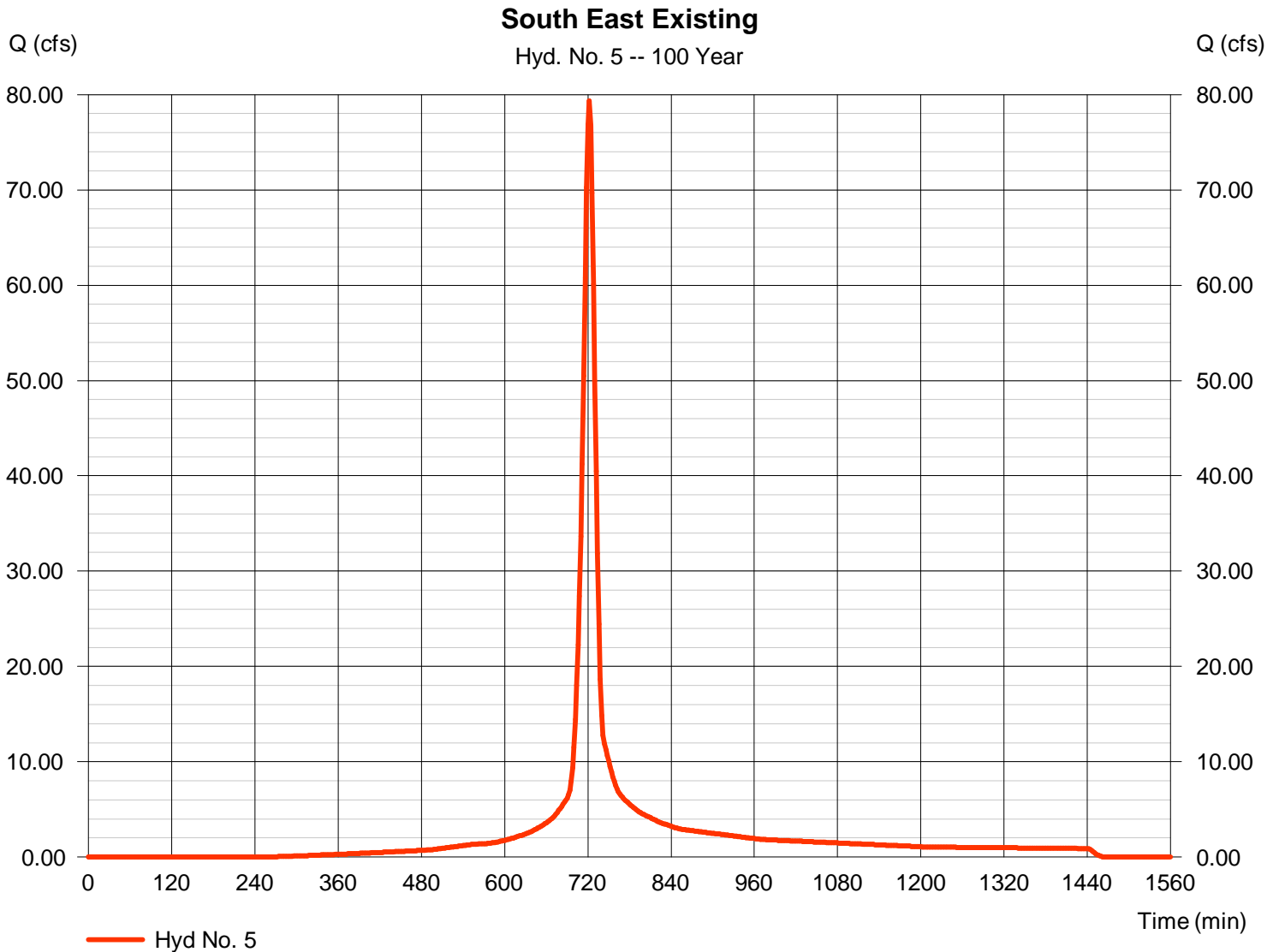
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South East Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 79.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 229,830 cuft
Drainage area	= 11.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

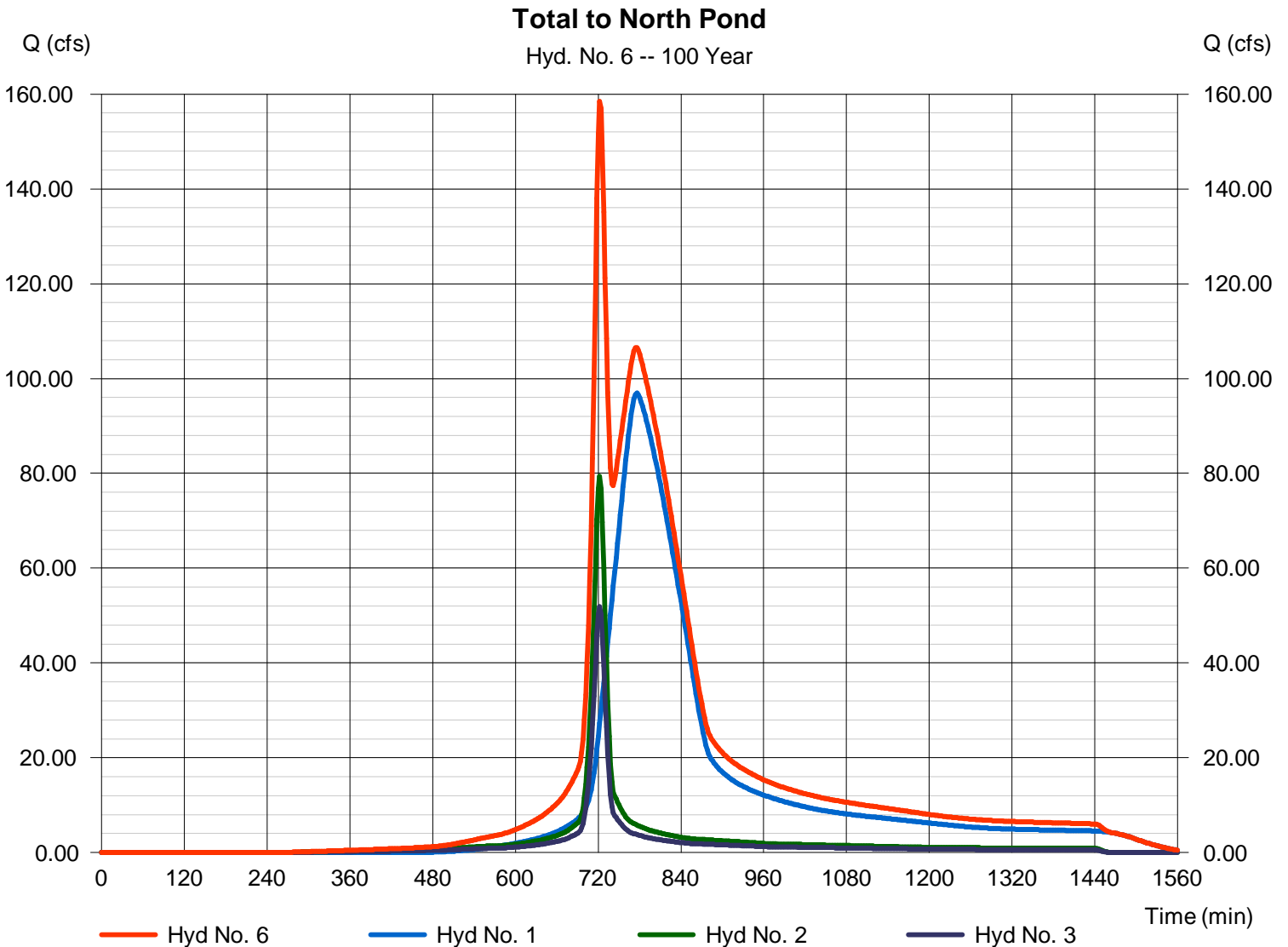
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 158.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,319,143 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 75.200 ac



Hydrograph Report

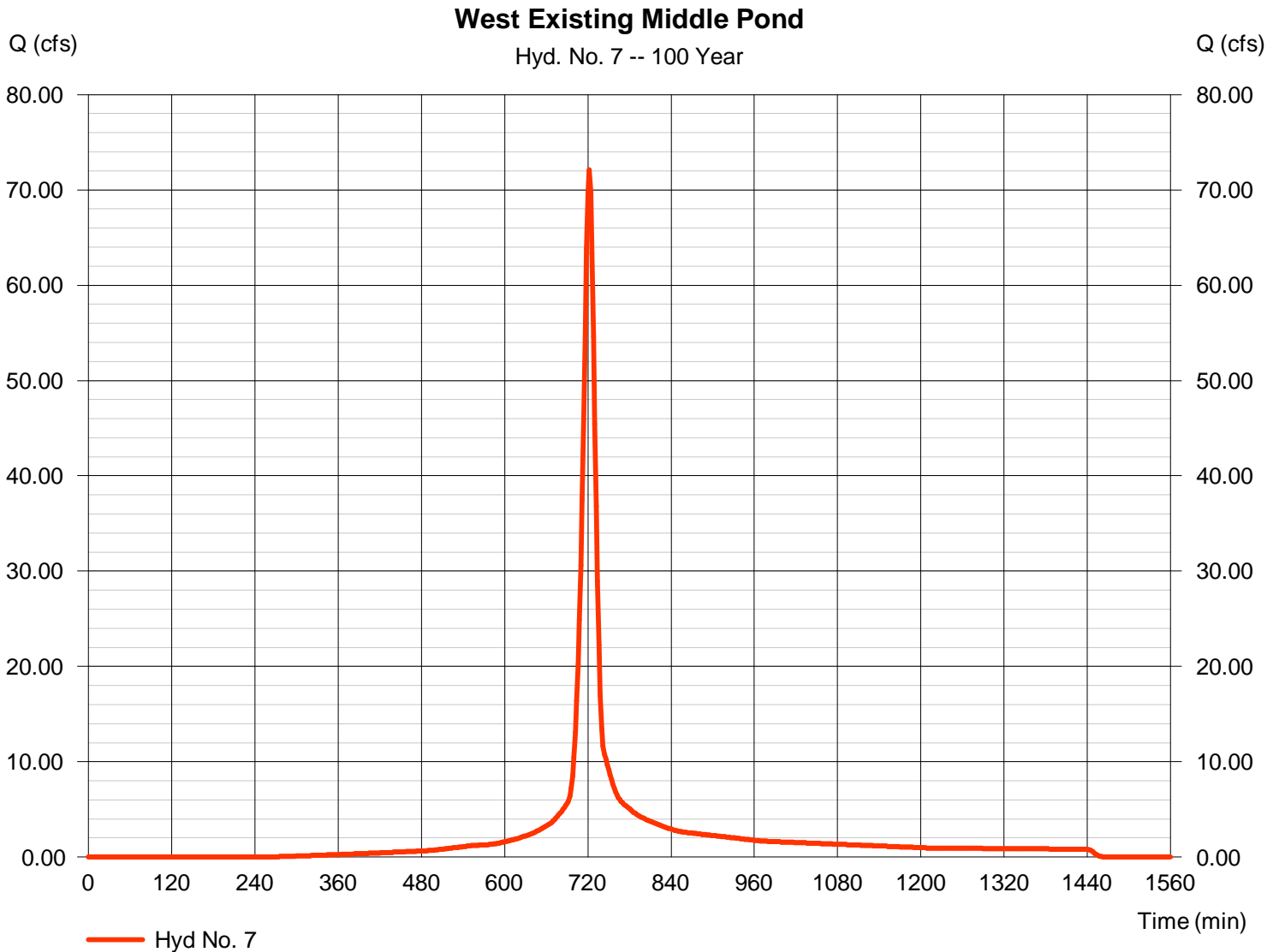
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 7

West Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 72.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 208,936 cuft
Drainage area	= 10.000 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

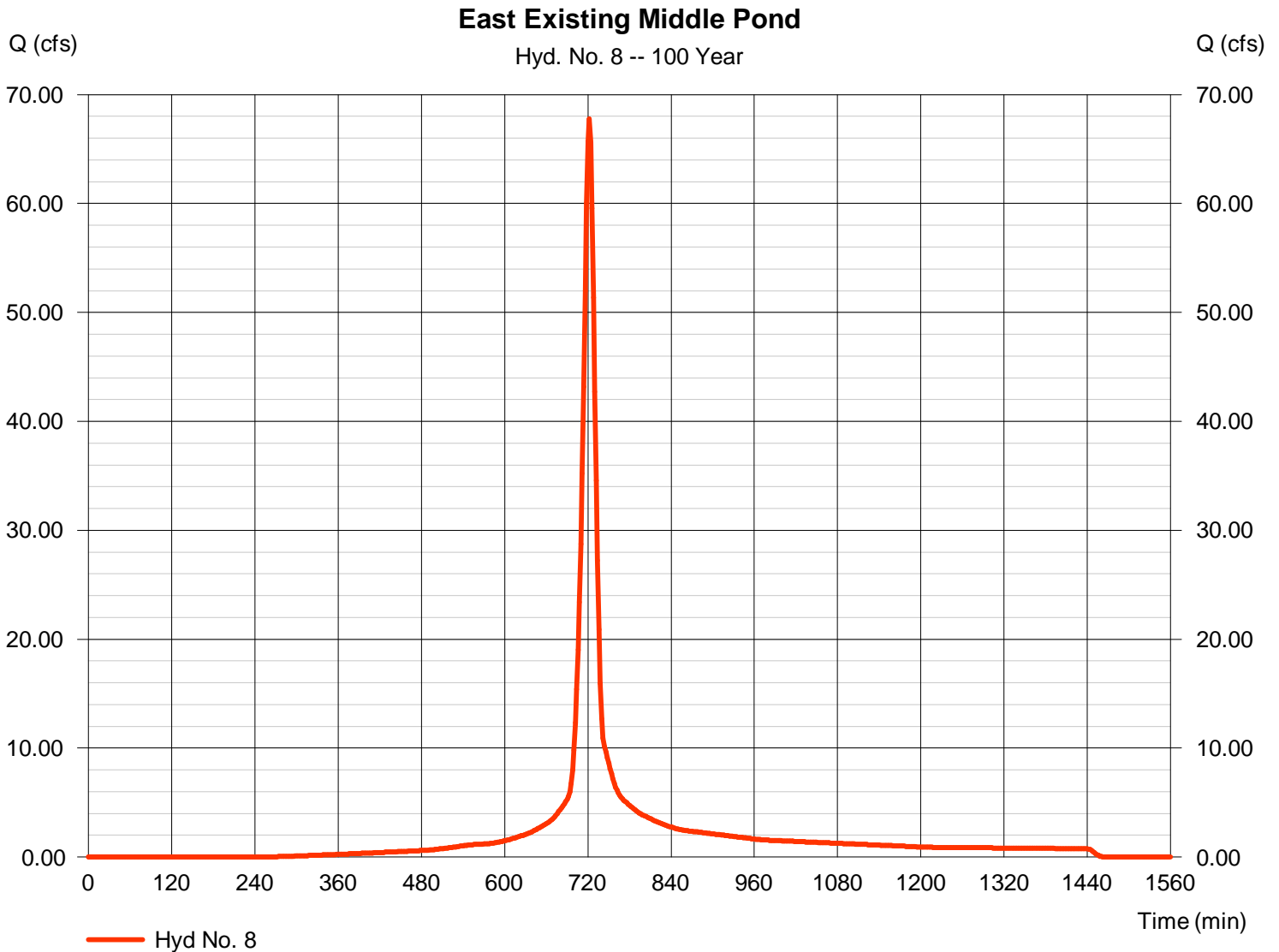
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

East Existing Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 67.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 196,400 cuft
Drainage area	= 9.400 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

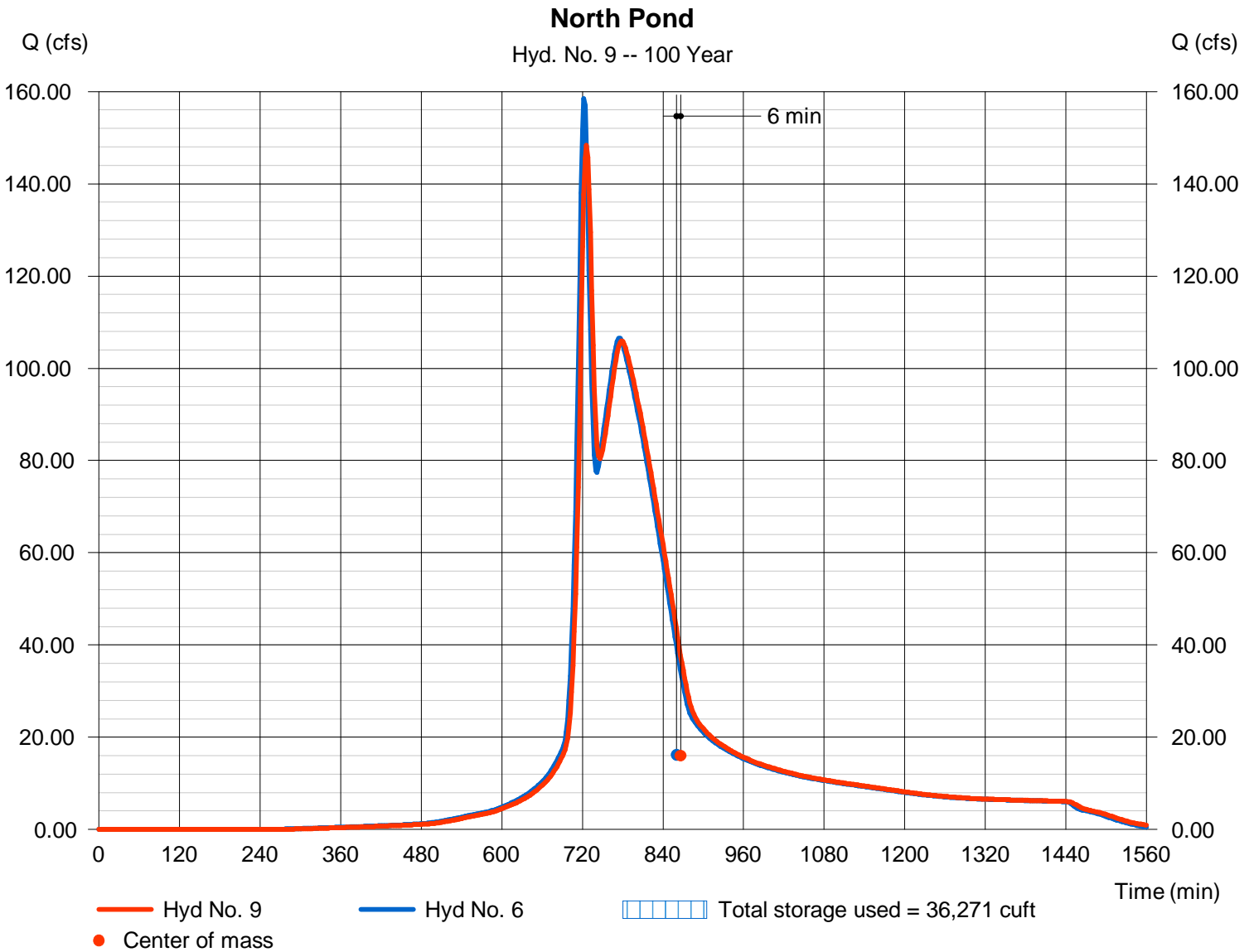
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 148.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,319,141 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1358.22 ft
Reservoir name	= North Pond	Max. Storage	= 36,271 cuft

Storage Indication method used.



Hydrograph Report

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

Tuesday, Jun 18, 2013

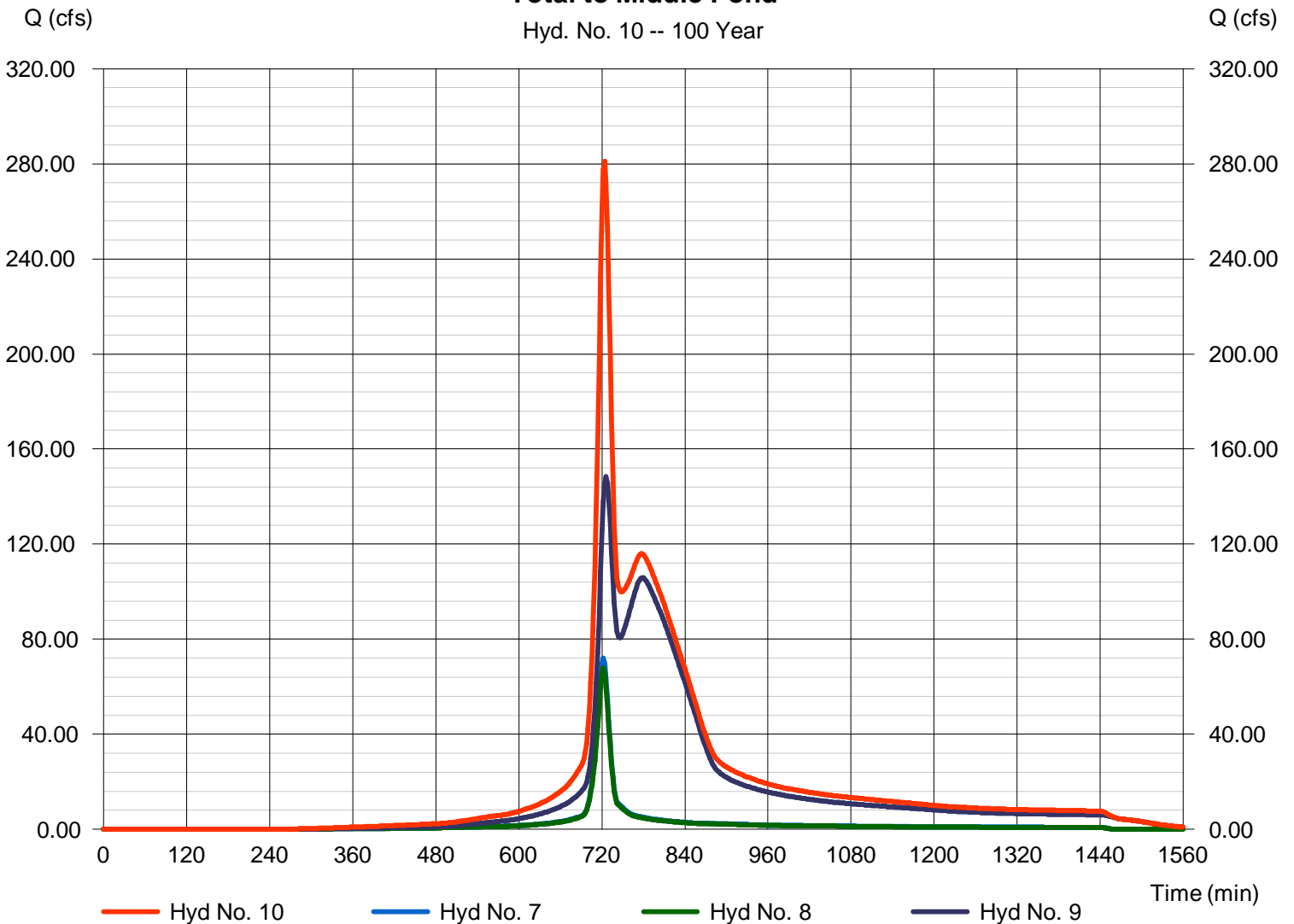
Hyd. No. 10

Total to Middle Pond

Hydrograph type	= Combine	Peak discharge	= 280.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,724,478 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 19.400 ac

Total to Middle Pond

Hyd. No. 10 -- 100 Year



Hydrograph Report

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

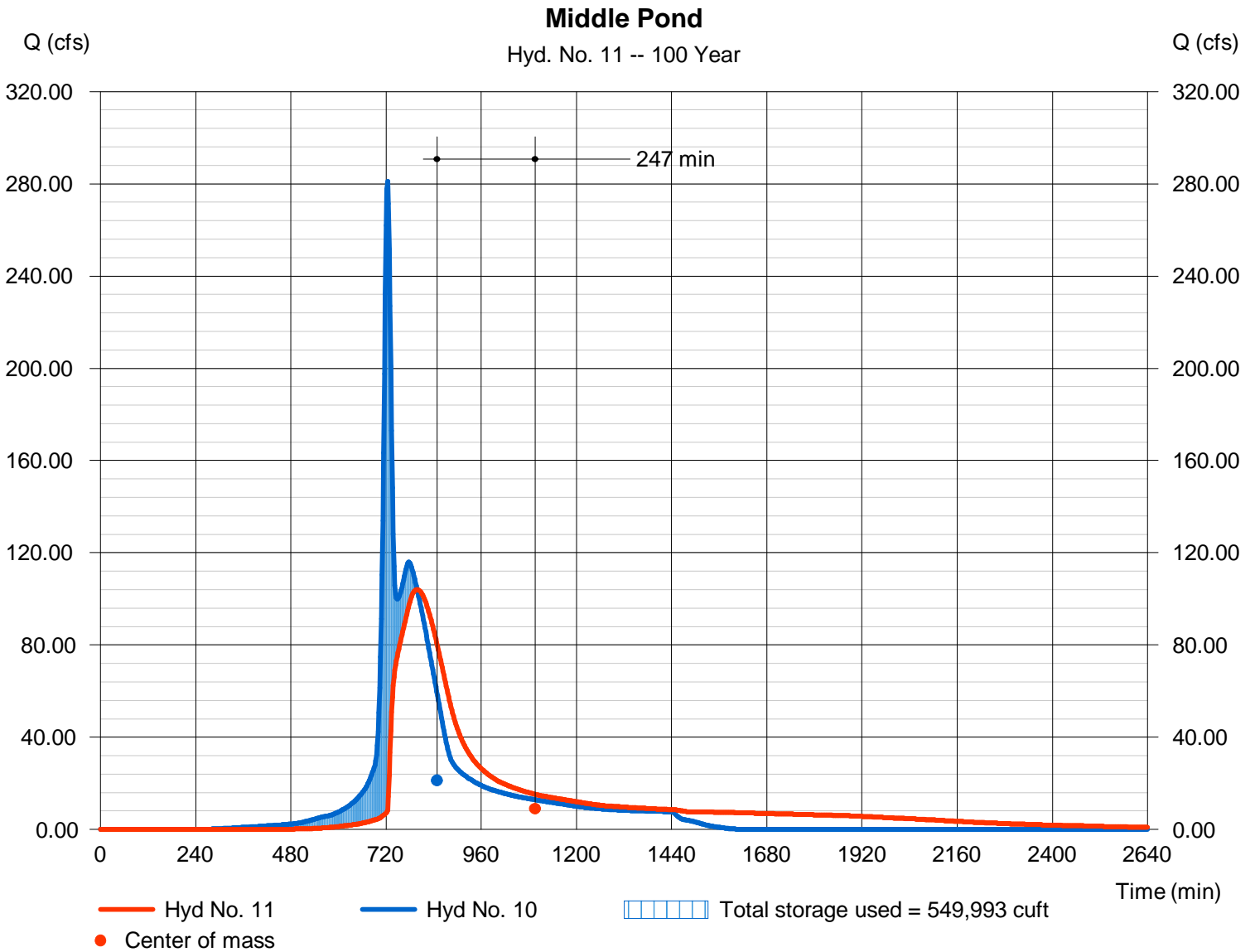
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 104.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 798 min
Time interval	= 2 min	Hyd. volume	= 1,718,968 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1359.14 ft
Reservoir name	= Middle Pond	Max. Storage	= 549,993 cuft

Storage Indication method used.



Hydrograph Report

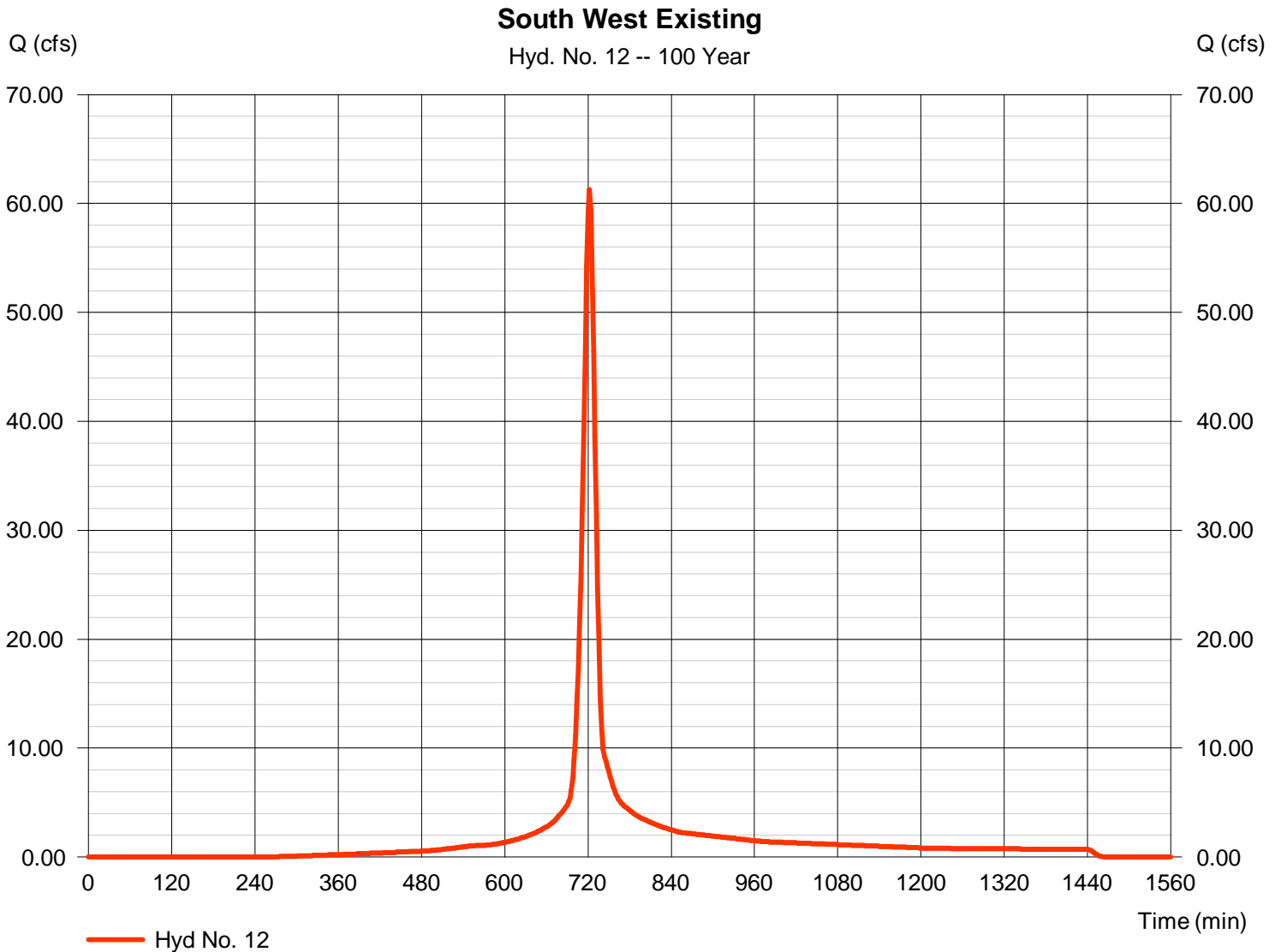
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 61.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 177,596 cuft
Drainage area	= 8.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

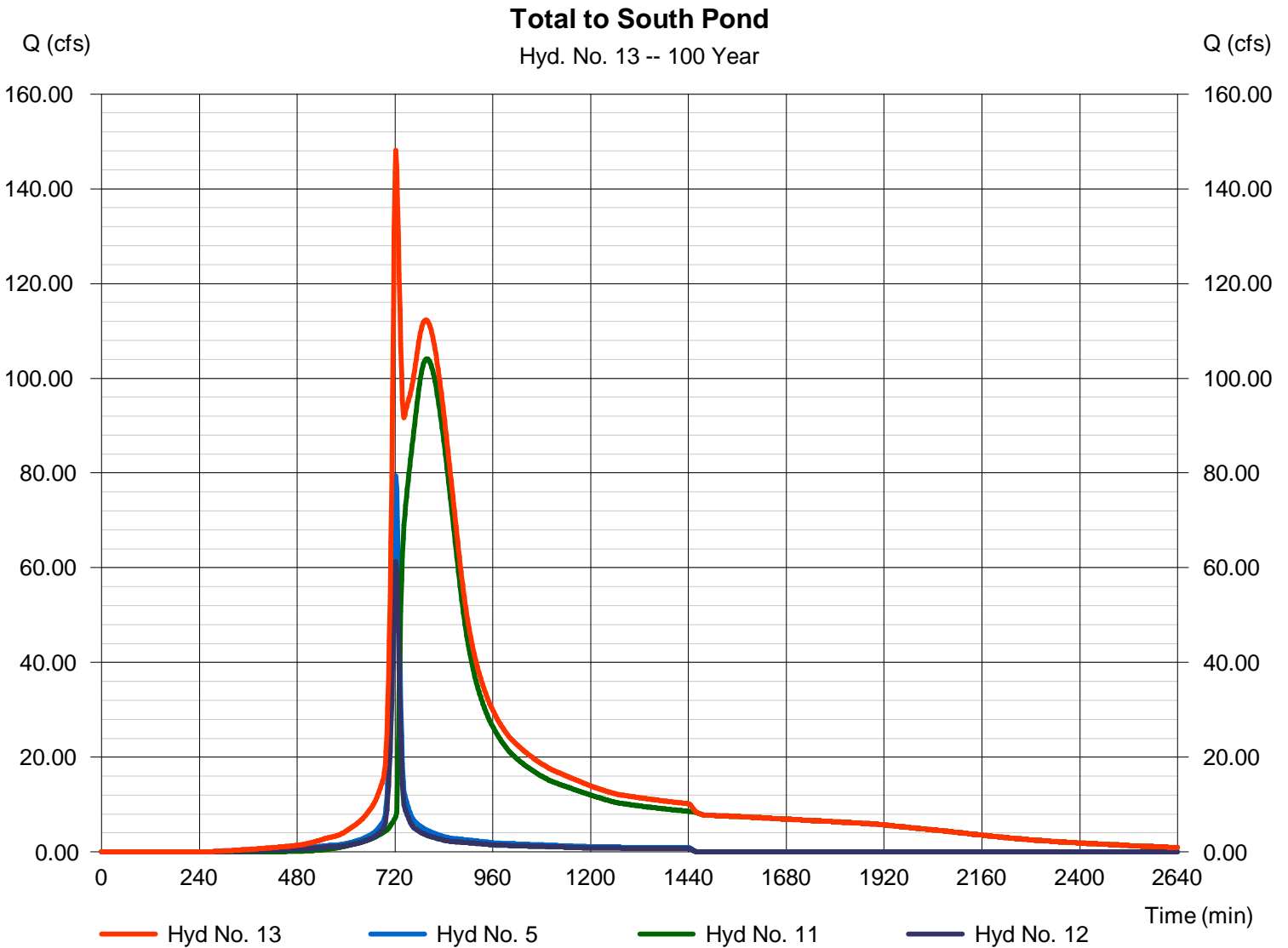
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 148.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,126,398 cuft
Inflow hyds.	= 5, 11, 12	Contrib. drain. area	= 19.500 ac



Hydrograph Report

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

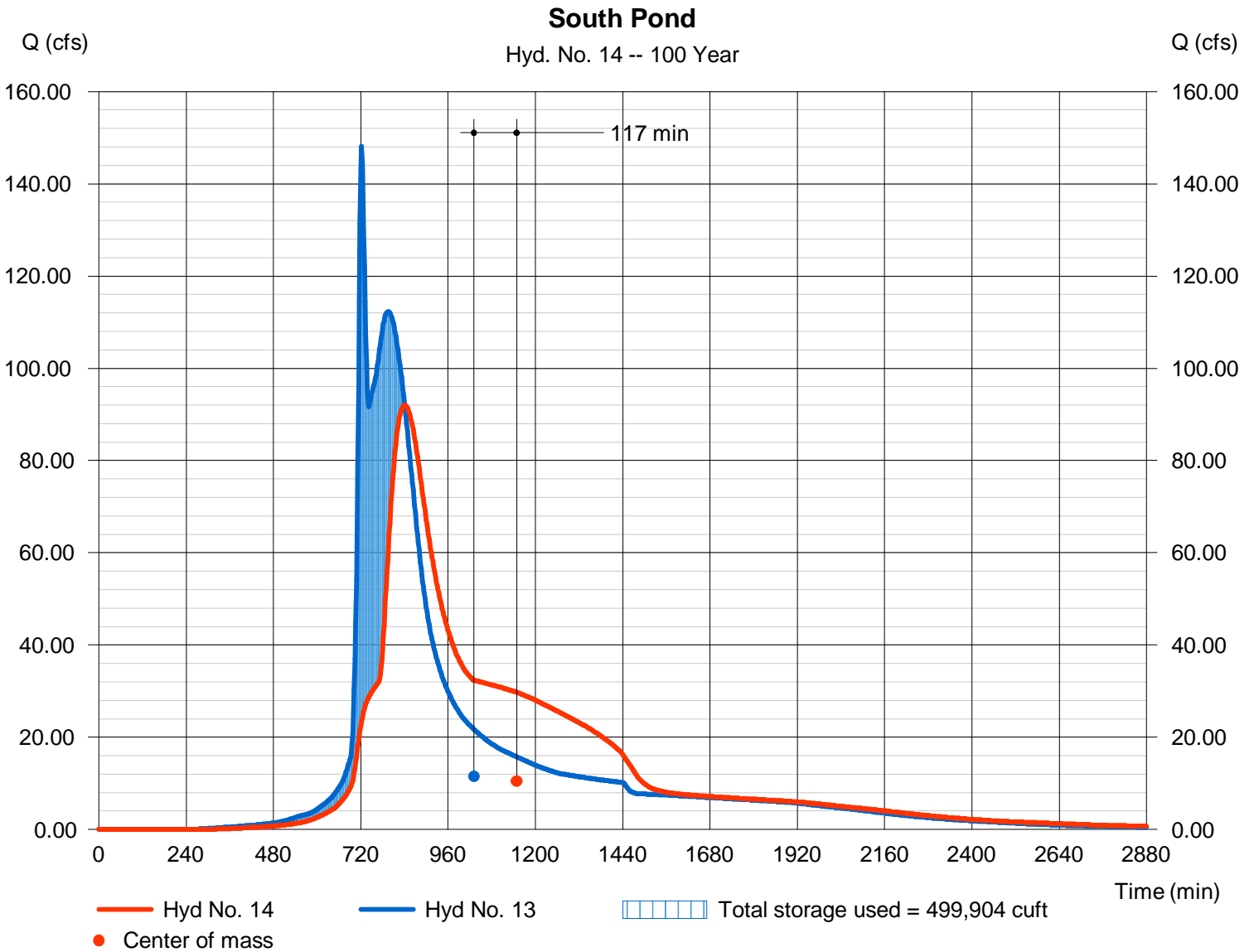
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 91.96 cfs
Storm frequency	= 100 yrs	Time to peak	= 840 min
Time interval	= 2 min	Hyd. volume	= 2,126,222 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1353.05 ft
Reservoir name	= South Pond	Max. Storage	= 499,904 cuft

Storage Indication method used.



Hydrograph Report

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

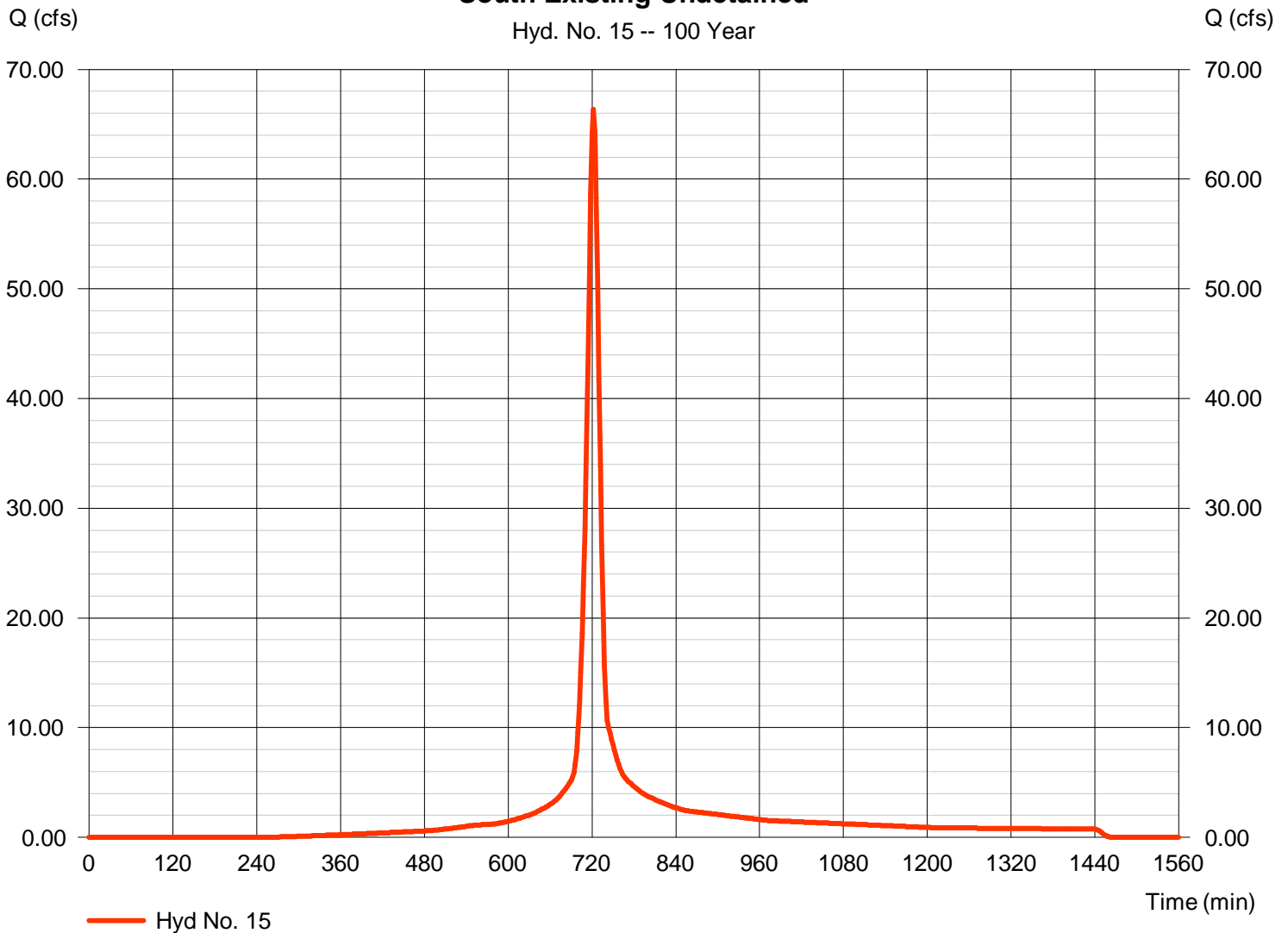
Tuesday, Jun 18, 2013

Hyd. No. 15

South Existing Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 66.35 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 192,222 cuft
Drainage area	= 9.200 ac	Curve number	= 84
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

South Existing Undetained



Hydrograph Report

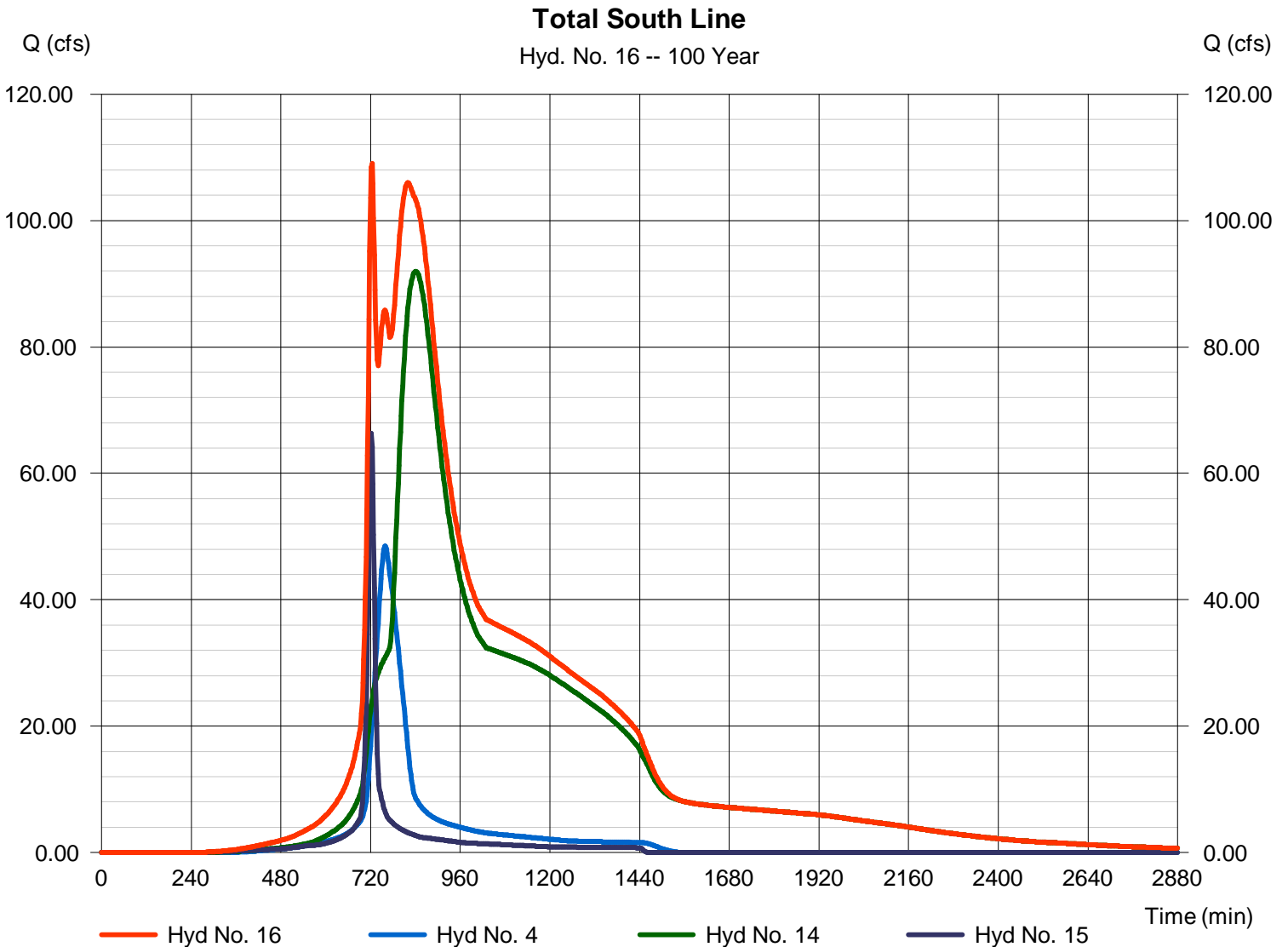
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 16

Total South Line

Hydrograph type	= Combine	Peak discharge	= 109.04 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 2,691,452 cuft
Inflow hyds.	= 4, 14, 15	Contrib. drain. area	= 28.200 ac



Hydrograph Report

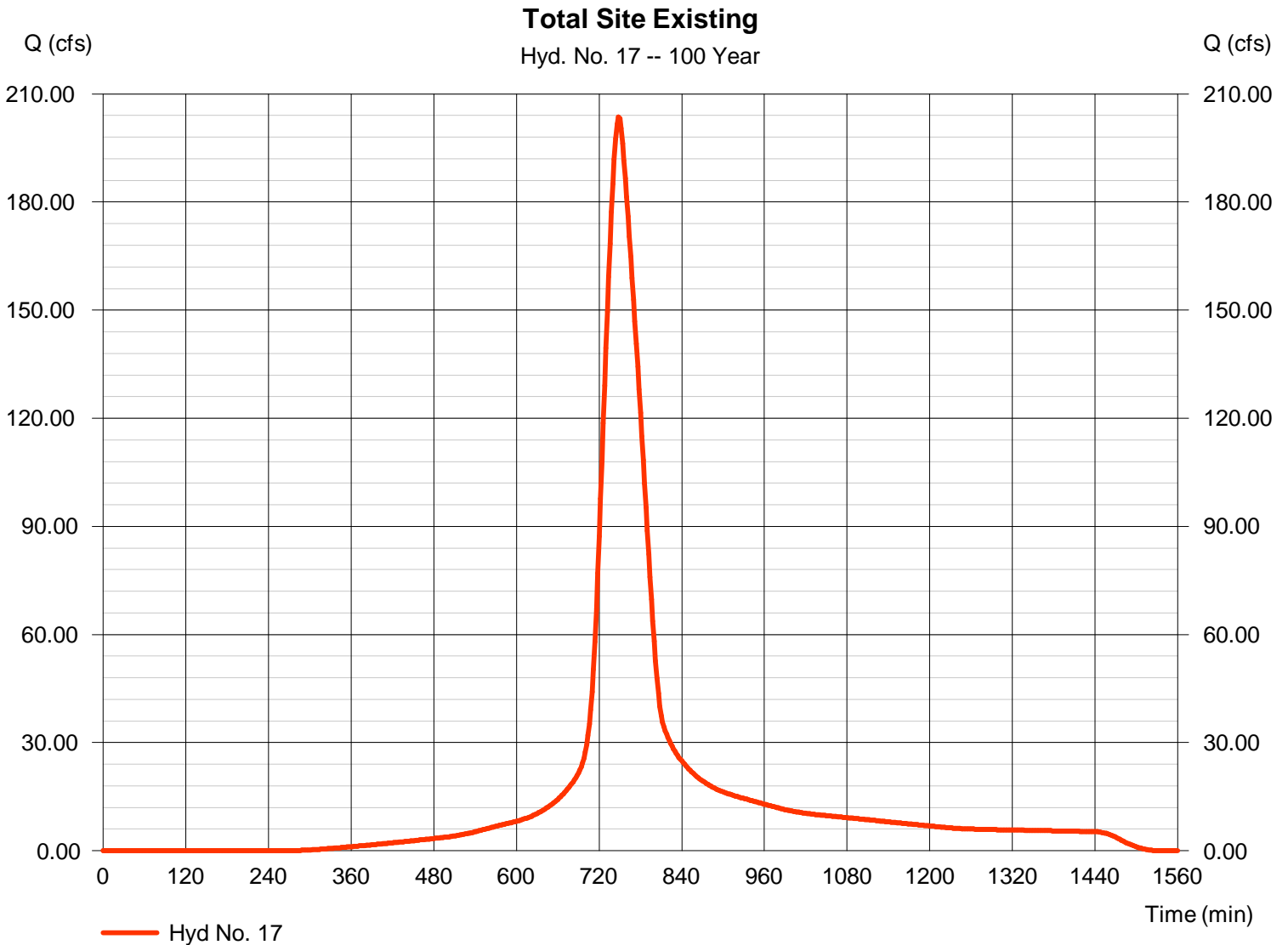
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Site Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 203.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,328,622 cuft
Drainage area	= 62.000 ac	Curve number	= 84
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 60.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydraflow Rainfall Report

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

Tuesday, Jun 18, 2013

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

$$\text{Intensity} = B / (Tc + D)^E$$

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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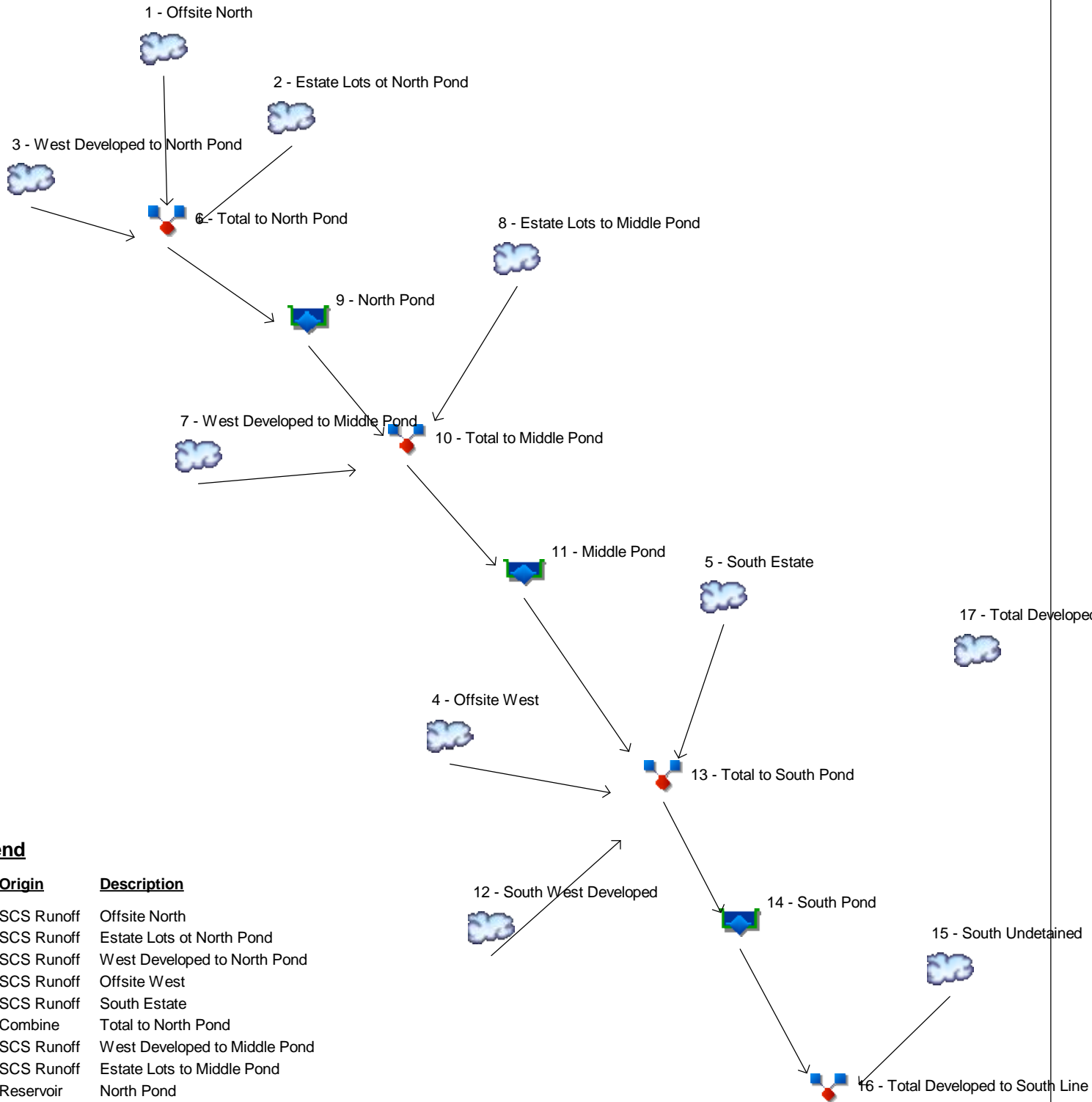
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Watershed Model Schematic

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Legend

Hyd. Origin	Description
1 SCS Runoff	Offsite North
2 SCS Runoff	Estate Lots of North Pond
3 SCS Runoff	West Developed to North Pond
4 SCS Runoff	Offsite West
5 SCS Runoff	South Estate
6 Combine	Total to North Pond
7 SCS Runoff	West Developed to Middle Pond
8 SCS Runoff	Estate Lots to Middle Pond
9 Reservoir	North Pond
10 Combine	Total to Middle Pond
11 Reservoir	Middle Pond
12 SCS Runoff	South West Developed
13 Combine	Total to South Pond
14 Reservoir	South Pond
15 SCS Runoff	South Undetained
16 Combine	Total Developed to South Line
17 SCS Runoff	Total Developed Site

Hydrograph Return Period Recap

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

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	-----	12.29	21.68	0.289	37.26	49.11	65.14	79.90	96.91	Offsite North
2	SCS Runoff	-----	23.01	33.01	3.581	47.76	58.25	71.78	83.83	97.36	Estate Lots ot North Pond
3	SCS Runoff	-----	20.36	28.25	4.124	39.69	47.73	58.05	67.21	77.46	West Developed to North Pond
4	SCS Runoff	-----	9.387	14.33	0.832	21.90	27.40	34.61	41.10	48.45	Offsite West
5	SCS Runoff	-----	15.00	21.52	2.334	31.14	37.97	46.79	54.64	63.46	South Estate
6	Combine	1, 2, 3,	45.11	65.04	7.706	95.55	117.67	146.60	172.59	202.05	Total to North Pond
7	SCS Runoff	-----	11.86	16.45	2.403	23.12	27.80	33.82	39.15	45.12	West Developed to Middle Pond
8	SCS Runoff	-----	8.864	12.71	1.379	18.40	22.44	27.65	32.29	37.50	Estate Lots to Middle Pond
9	Reservoir	6	11.29	19.55	0.479	32.16	45.62	61.13	75.40	91.64	North Pond
10	Combine	7, 8, 9	23.26	34.52	3.821	53.04	67.22	82.94	97.18	120.73	Total to Middle Pond
11	Reservoir	10	12.03	20.70	0.894	33.40	47.25	59.94	68.75	76.10	Middle Pond
12	SCS Runoff	-----	13.84	19.20	2.803	26.97	32.44	39.45	45.67	52.64	South West Developed
13	Combine	4, 5, 11, 12	37.46	55.86	5.752	85.24	107.66	137.75	165.00	190.31	Total to South Pond
14	Reservoir	13	17.08	22.81	0.860	38.77	55.65	75.40	89.87	103.98	South Pond
15	SCS Runoff	-----	18.85	26.43	3.526	37.49	45.30	55.33	64.23	74.22	South Undetained
16	Combine	14, 15	20.64	32.64	3.573	53.33	63.97	78.05	93.13	107.93	Total Developed to South Line
17	SCS Runoff	-----	71.59	96.89	17.40	133.24	158.65	191.21	220.02	252.31	Total Developed Site

Hydrograph Summary Report

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

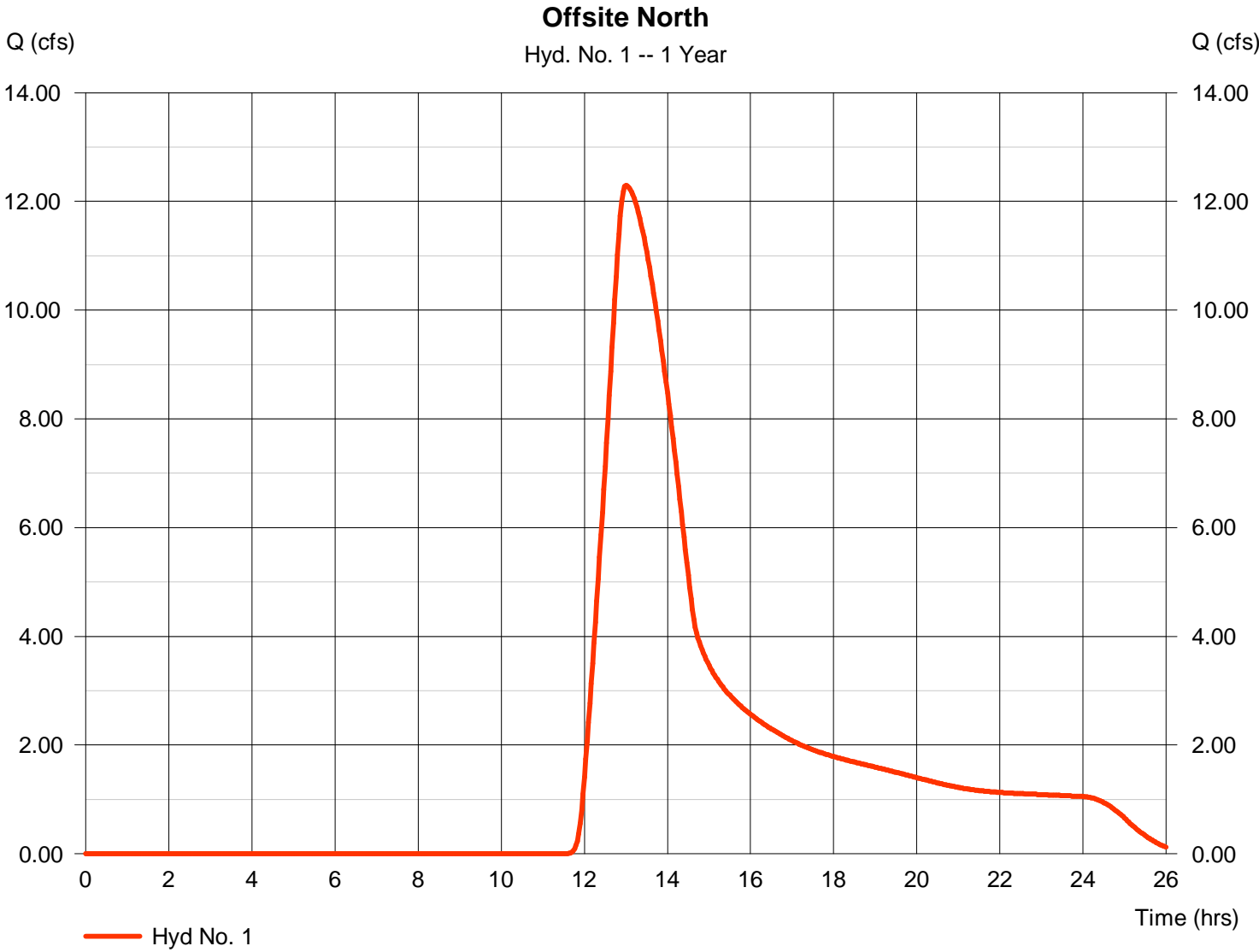
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	12.29	2	780	143,720	-----	-----	-----	Offsite North	
2	SCS Runoff	23.01	2	722	64,665	-----	-----	-----	Estate Lots ot North Pond	
3	SCS Runoff	20.36	2	722	57,078	-----	-----	-----	West Developed to North Pond	
4	SCS Runoff	9.387	2	760	75,598	-----	-----	-----	Offsite West	
5	SCS Runoff	15.00	2	722	42,152	-----	-----	-----	South Estate	
6	Combine	45.11	2	722	265,462	1, 2, 3,	-----	-----	Total to North Pond	
7	SCS Runoff	11.86	2	722	33,249	-----	-----	-----	West Developed to Middle Pond	
8	SCS Runoff	8.864	2	722	24,908	-----	-----	-----	Estate Lots to Middle Pond	
9	Reservoir	11.29	2	834	264,218	6	1357.53	88,986	North Pond	
10	Combine	23.26	2	724	322,374	7, 8, 9	-----	-----	Total to Middle Pond	
11	Reservoir	12.03	2	850	322,331	10	1354.37	26,207	Middle Pond	
12	SCS Runoff	13.84	2	722	38,791	-----	-----	-----	South West Developed	
13	Combine	37.46	2	724	478,871	4, 5, 11, 12	-----	-----	Total to South Pond	
14	Reservoir	17.08	2	820	476,943	13	1349.62	85,542	South Pond	
15	SCS Runoff	18.85	2	722	52,824	-----	-----	-----	South Undetained	
16	Combine	20.64	2	724	529,766	14, 15	-----	-----	Total Developed to South Line	
17	SCS Runoff	71.59	2	742	405,409	-----	-----	-----	Total Developed Site	
The Ranch Total Site.gpw					Return Period: 1 Year			Tuesday, Jun 18, 2013		

Hydrograph Report

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 12.29 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.00 hrs
Time interval	= 2 min	Hyd. volume	= 143,720 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

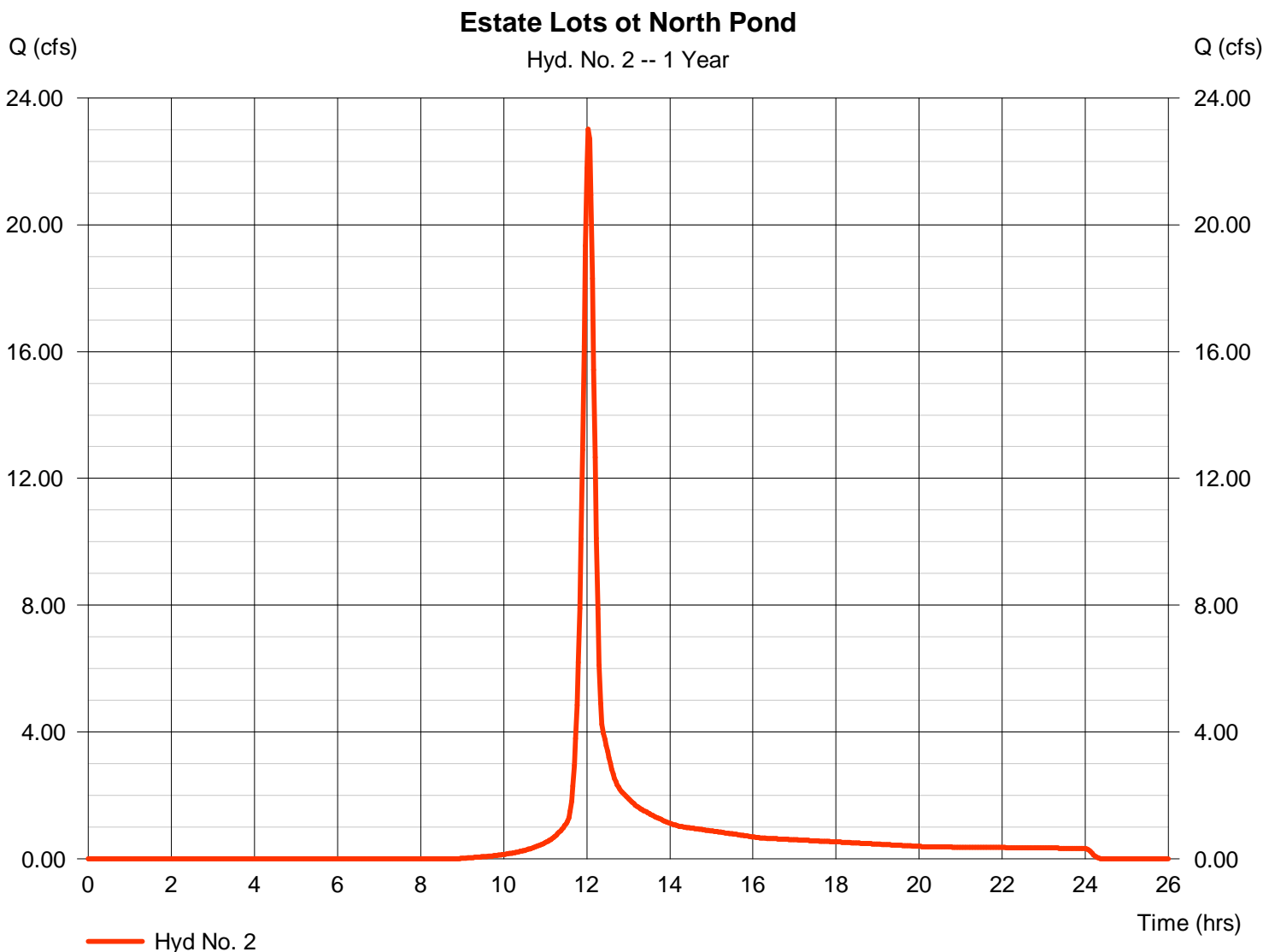
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 23.01 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 64,665 cuft
Drainage area	= 13.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

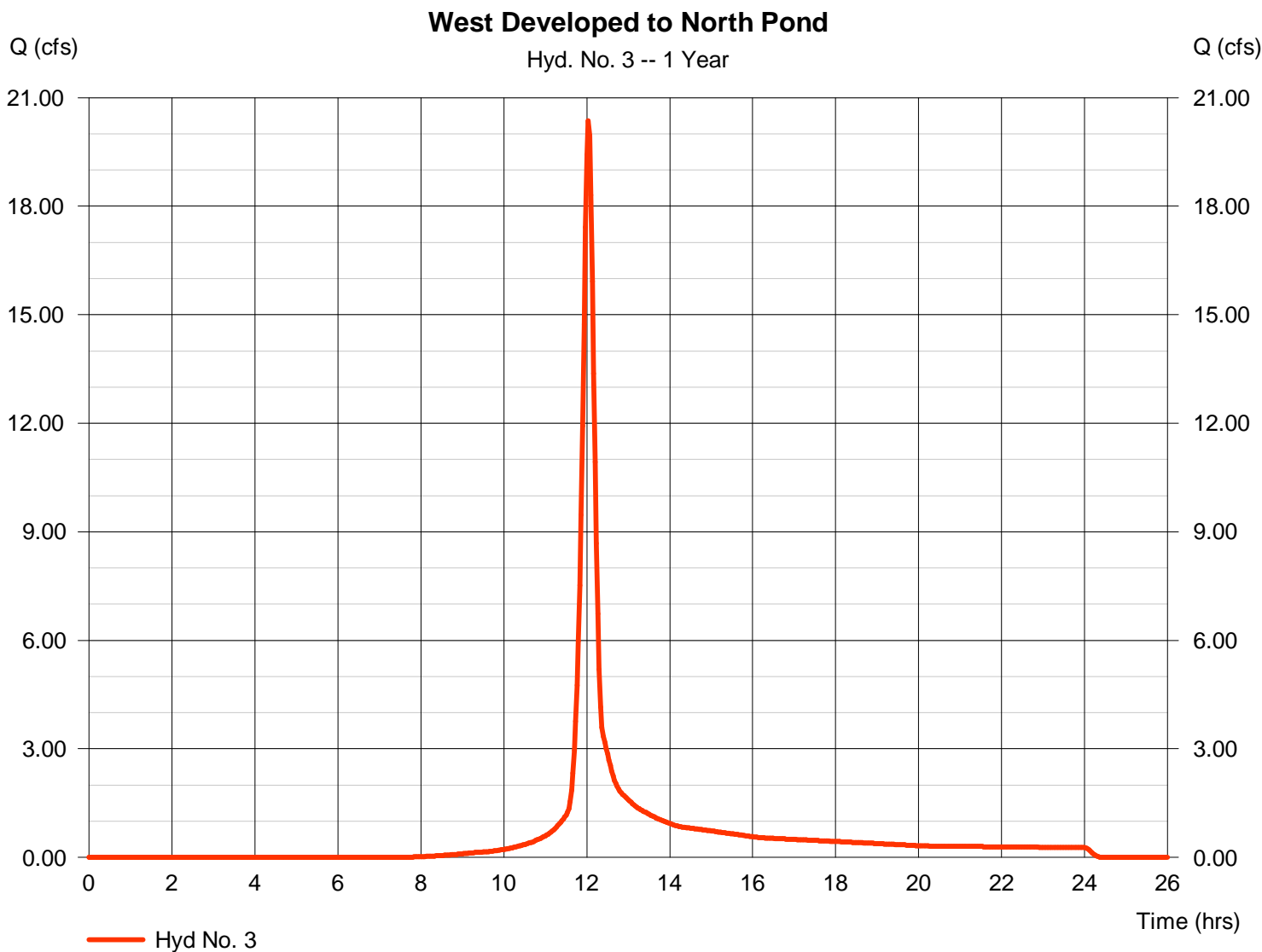
Tuesday, Jun 18, 2013

Hyd. No. 3

West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 20.36 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 57,078 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = $[(2.900 \times 98) + (11.600 \times 84)] / 10.300$



Hydrograph Report

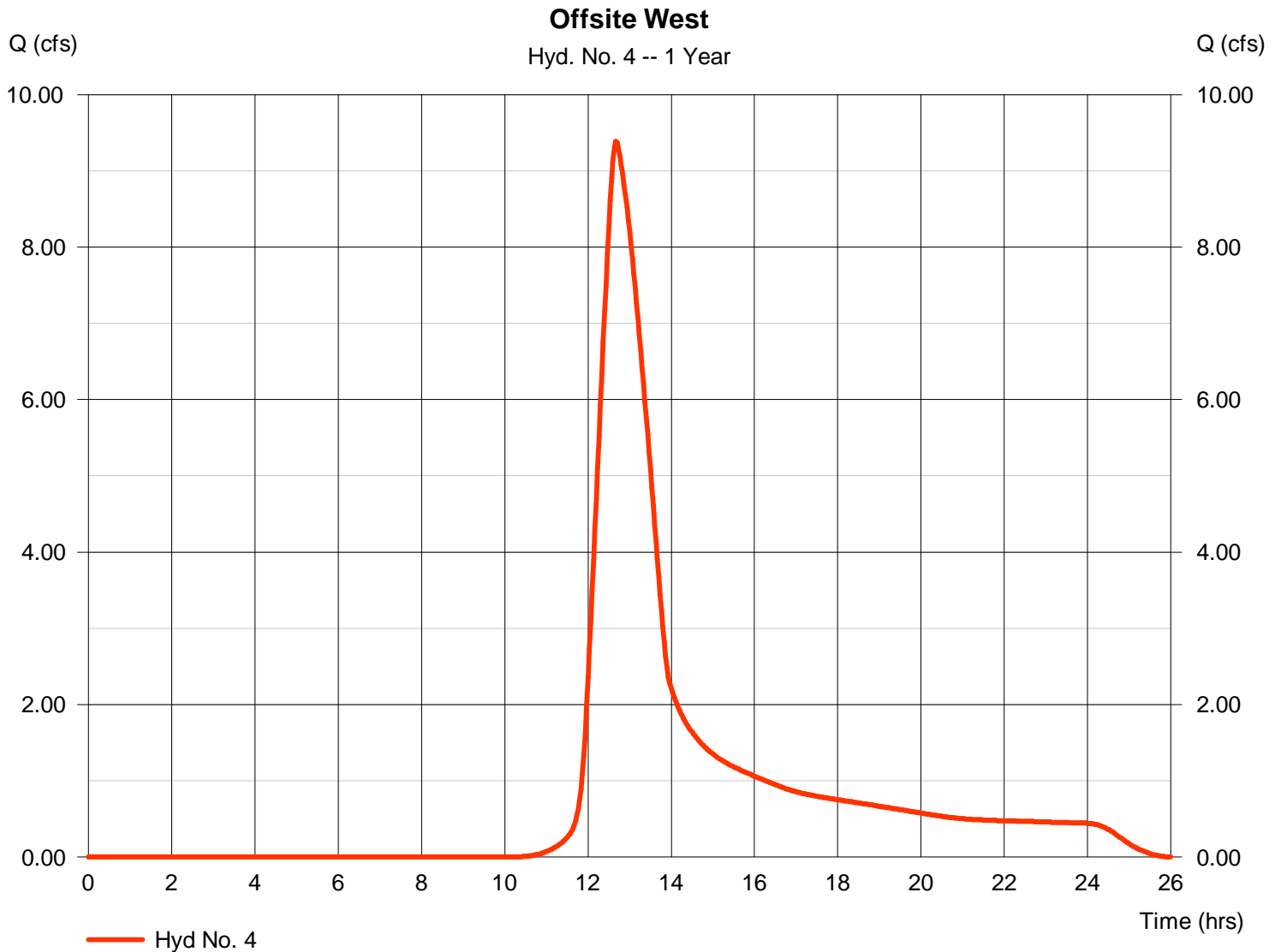
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 9.387 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 75,598 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

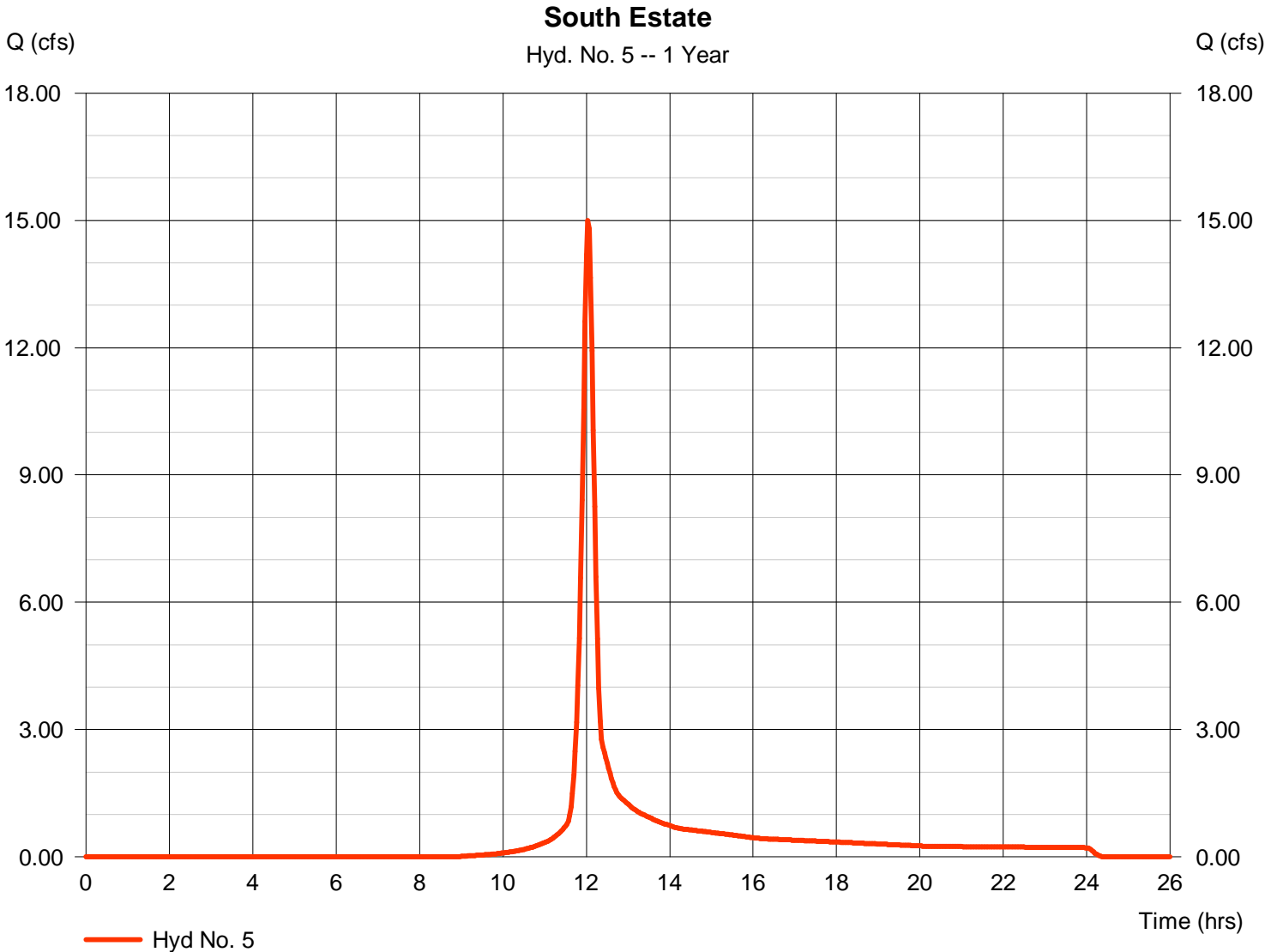
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 15.00 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 42,152 cuft
Drainage area	= 8.800 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

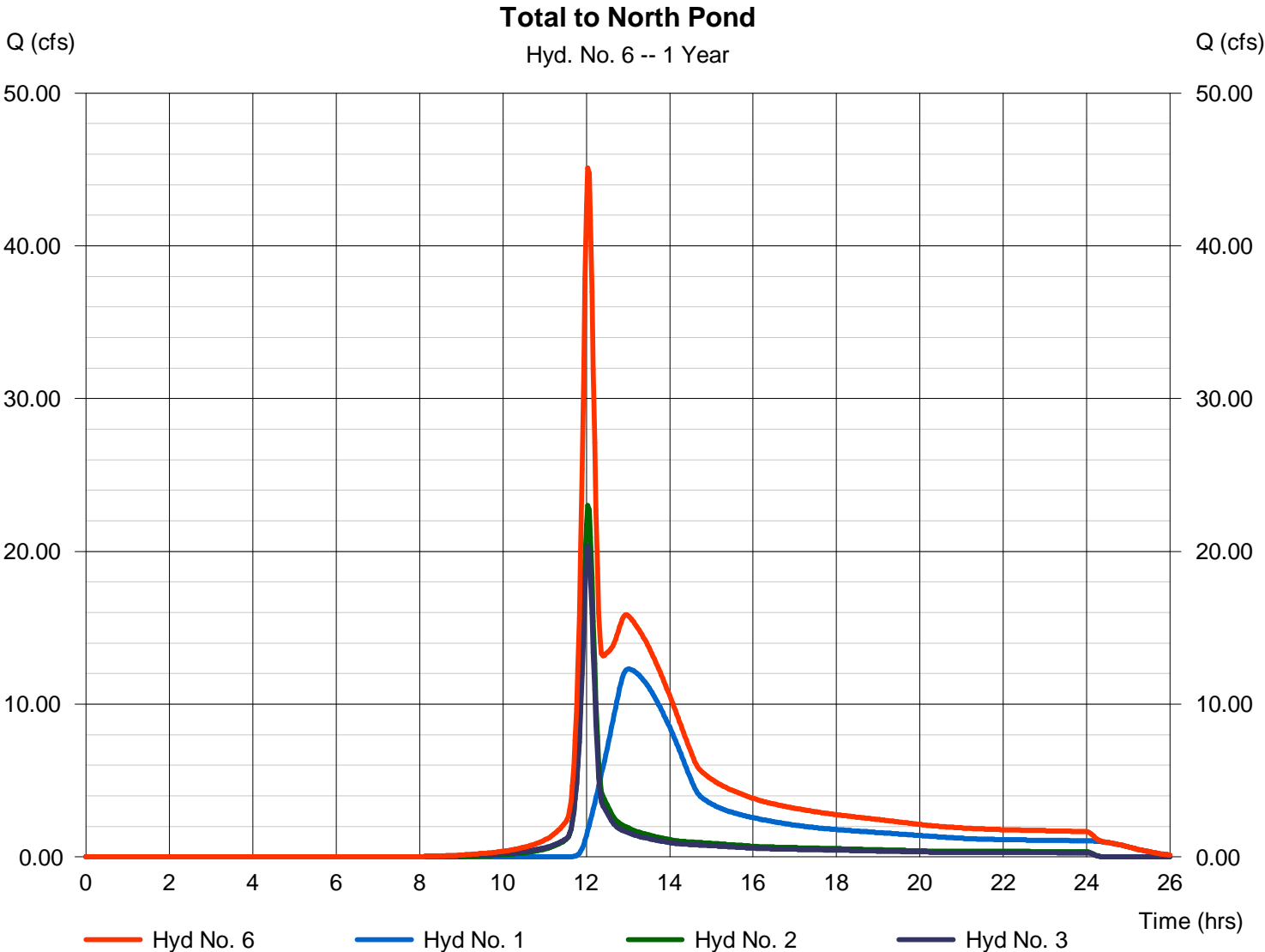
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 45.11 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 265,462 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 80.800 ac



Hydrograph Report

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Tuesday, Jun 18, 2013

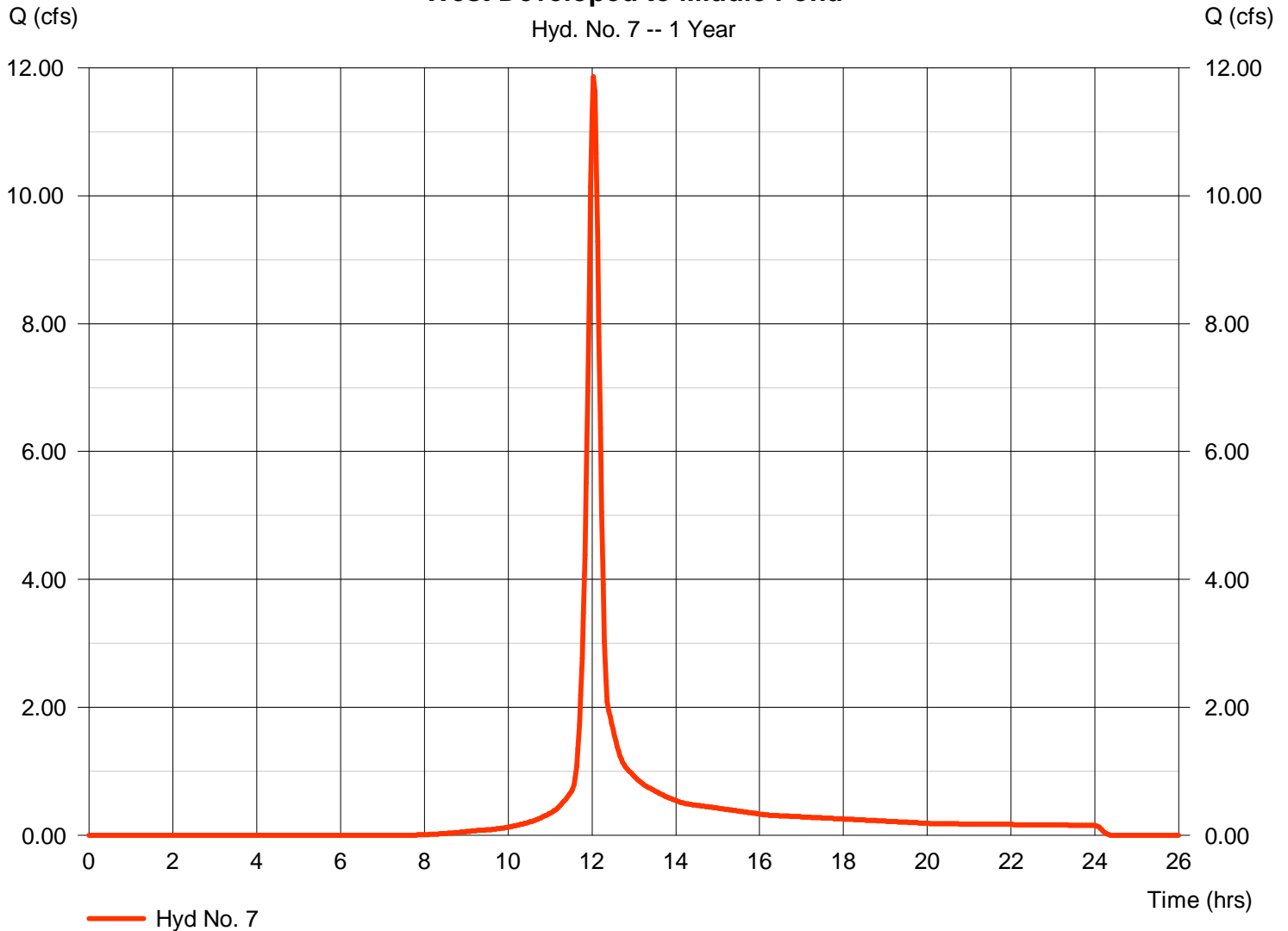
Hyd. No. 7

West Developed to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 11.86 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 33,249 cuft
Drainage area	= 6.000 ac	Curve number	= 87
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

West Developed to Middle Pond

Hyd. No. 7 -- 1 Year



Hydrograph Report

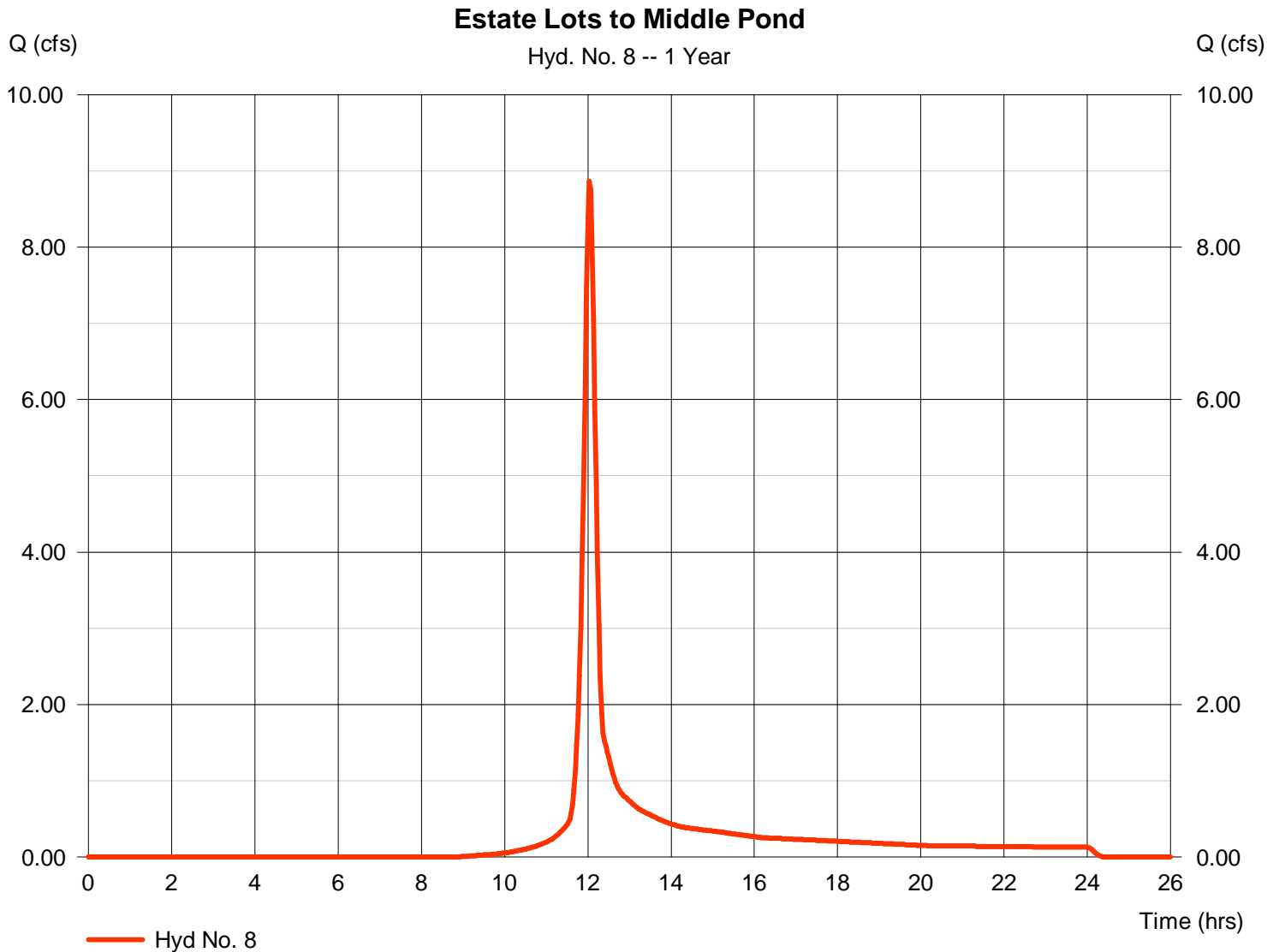
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 8.864 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 24,908 cuft
Drainage area	= 5.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

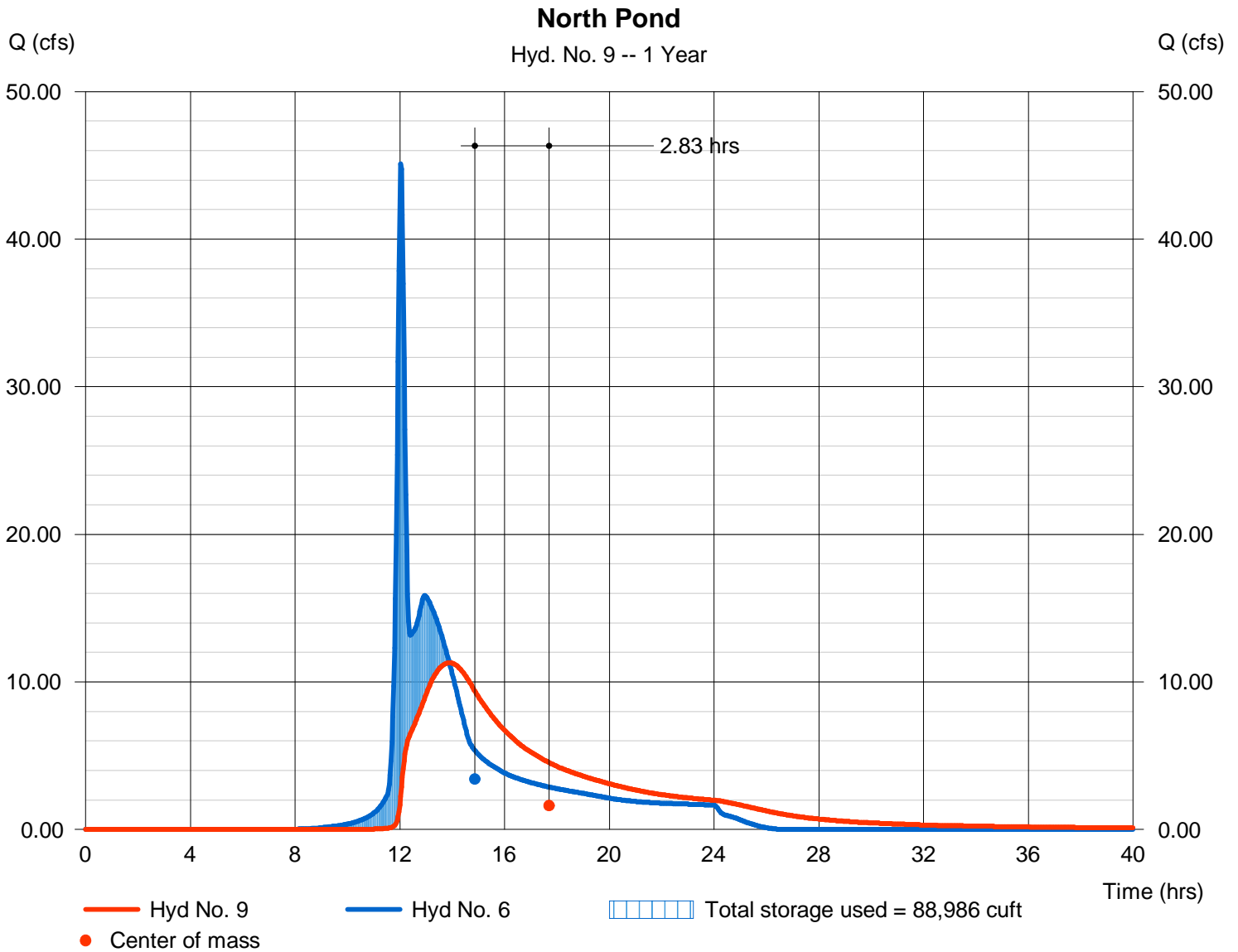
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 11.29 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.90 hrs
Time interval	= 2 min	Hyd. volume	= 264,218 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1357.53 ft
Reservoir name	= North Pond	Max. Storage	= 88,986 cuft

Storage Indication method used.



Pond No. 1 - North Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1356.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1356.50	77,500	0	0
0.50	1357.00	85,400	40,705	40,705
1.50	1358.00	97,000	91,129	131,834
2.50	1359.00	110,130	103,485	235,320
3.50	1360.00	124,000	116,985	352,304
4.50	1361.00	130,000	126,976	479,280

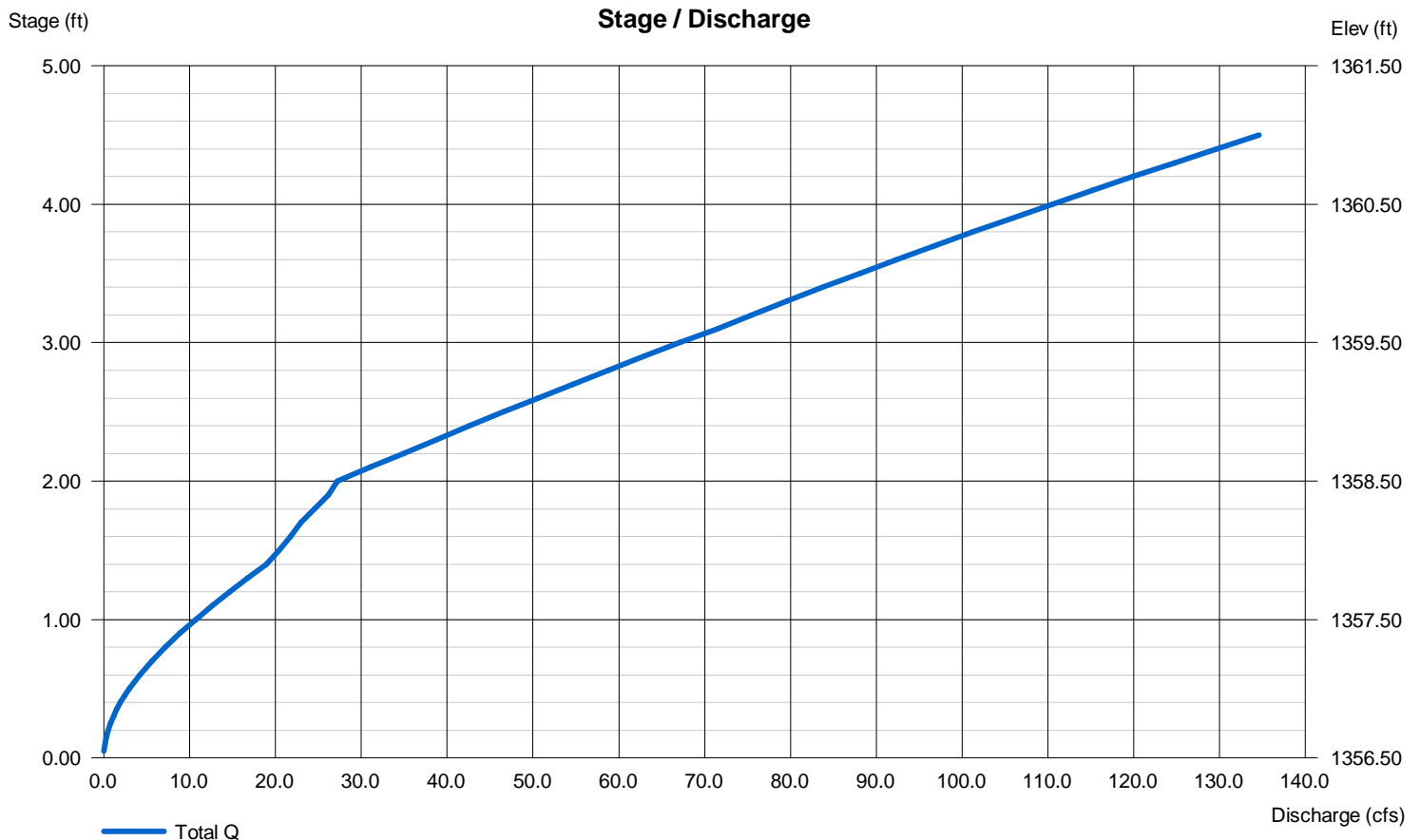
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 1356.50	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 1.00	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)	= 5.00	0.00	0.00	0.00
Crest El. (ft)	= 1358.20	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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



Hydrograph Report

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

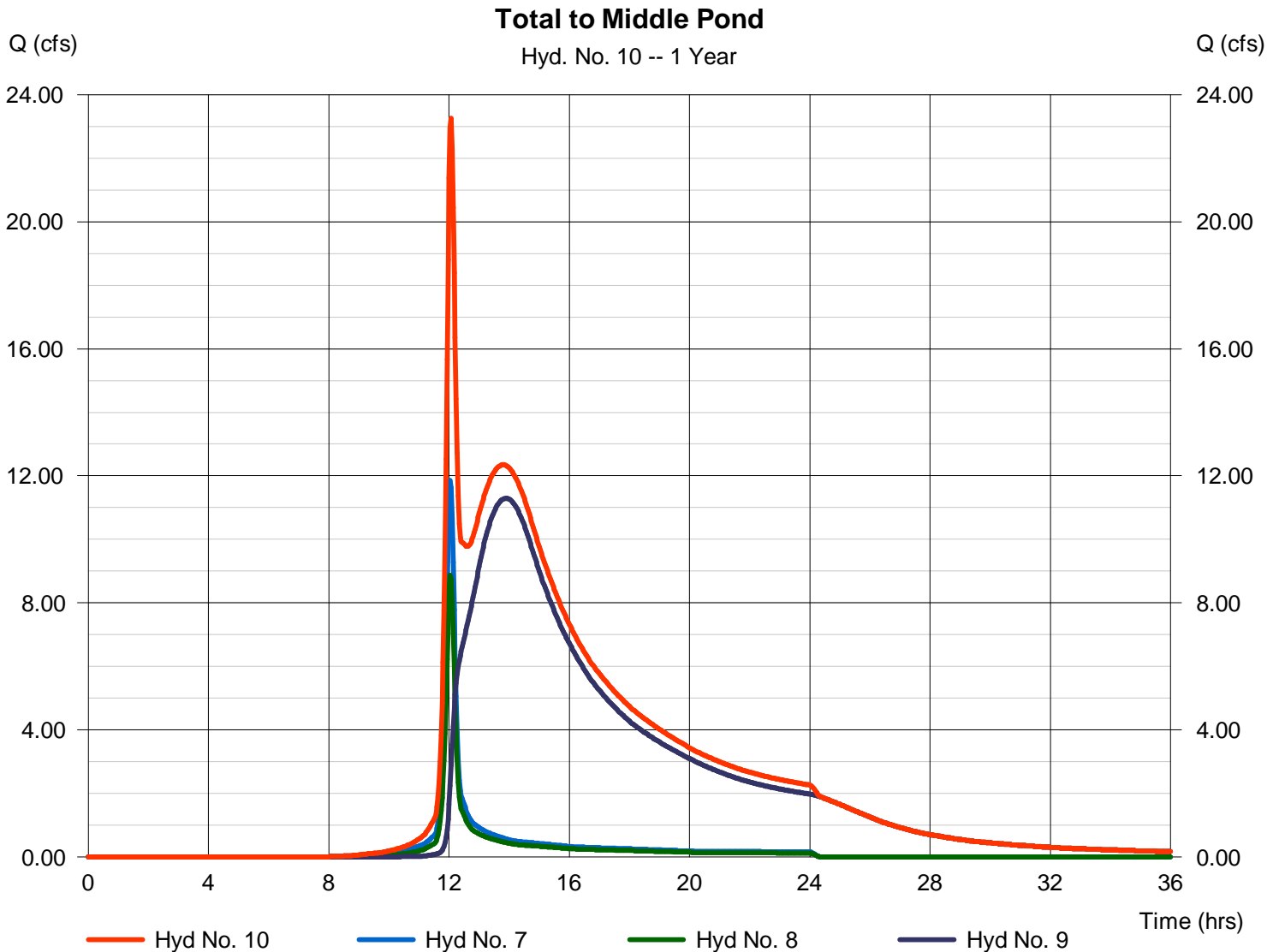
Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 23.26 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 322,374 cuft
 Contrib. drain. area = 11.200 ac



Hydrograph Report

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

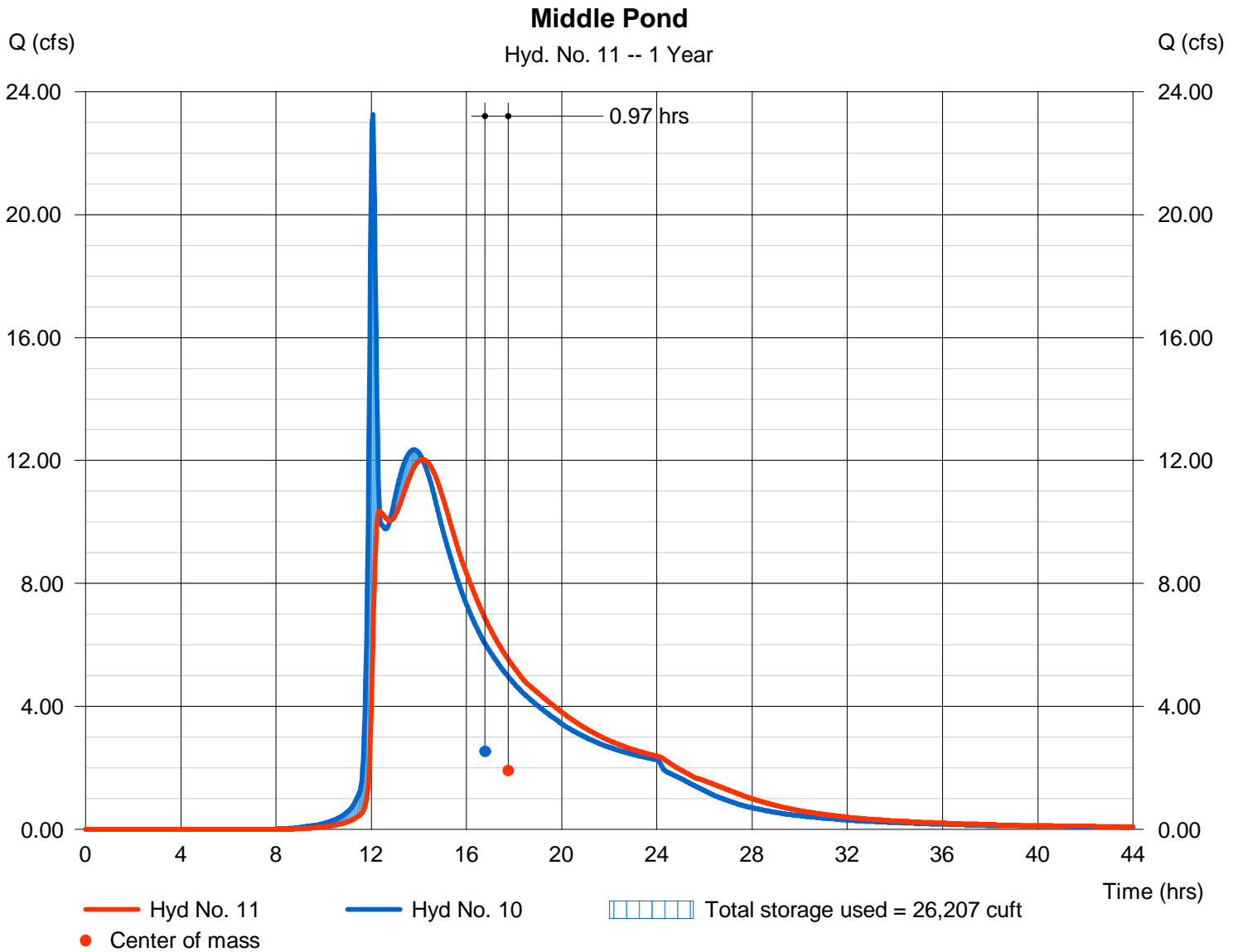
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 12.03 cfs
Storm frequency	= 1 yrs	Time to peak	= 14.17 hrs
Time interval	= 2 min	Hyd. volume	= 322,331 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1354.37 ft
Reservoir name	= Middle Pond	Max. Storage	= 26,207 cuft

Storage Indication method used.



Pond No. 3 - Middle Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1354.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1354.00	62,300	0	0
1.00	1355.00	80,000	70,959	70,959
2.00	1356.00	105,900	92,639	163,597
3.00	1357.00	136,100	120,673	284,270
4.00	1358.00	161,500	148,604	432,874
5.00	1359.00	170,000	165,715	598,589

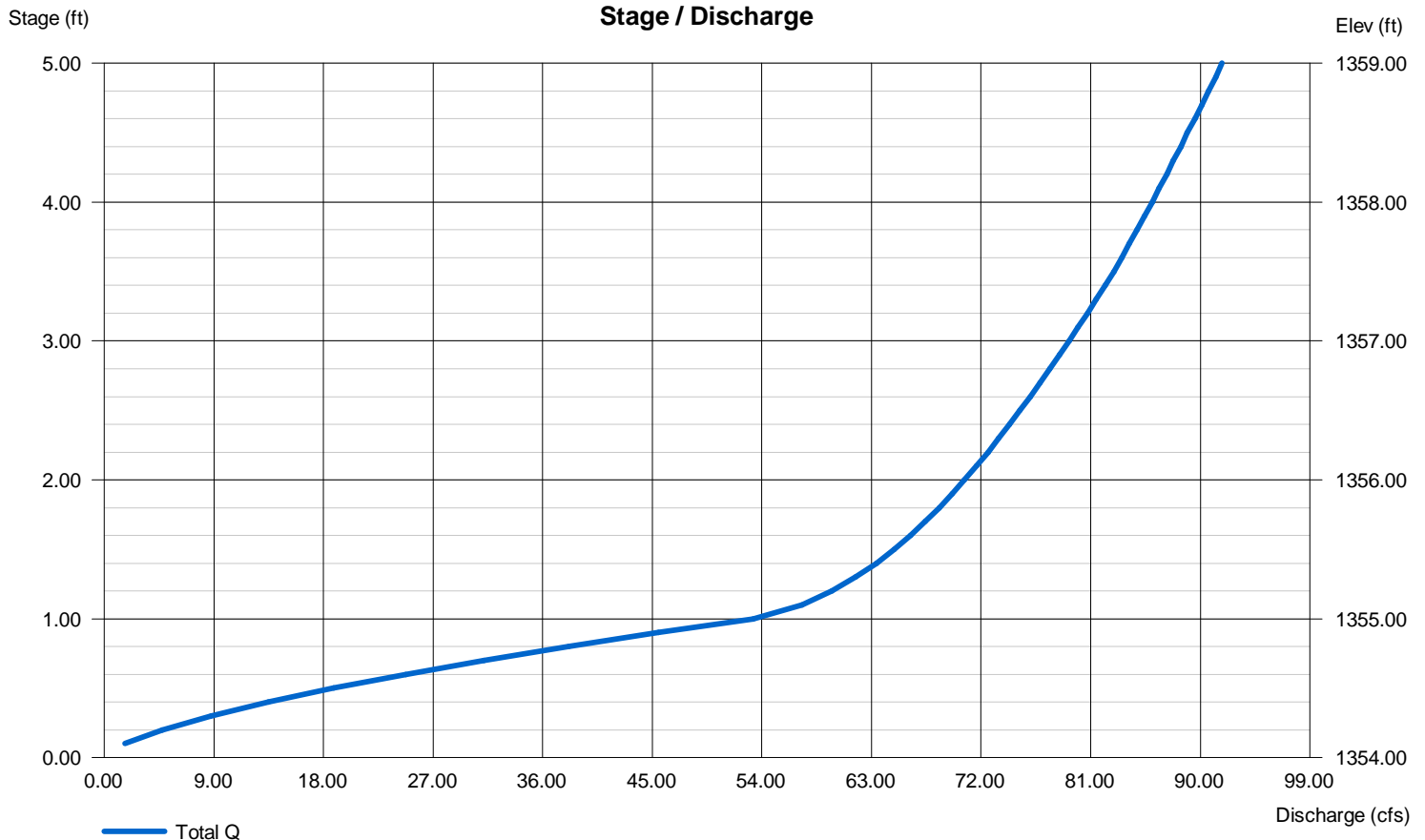
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	0.00	0.00	0.00
Span (in)	= 36.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1350.00	0.00	0.00	0.00
Length (ft)	= 230.00	0.00	0.00	0.00
Slope (%)	= 1.00	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)	= 16.00	0.00	0.00	0.00
Crest El. (ft)	= 1354.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
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

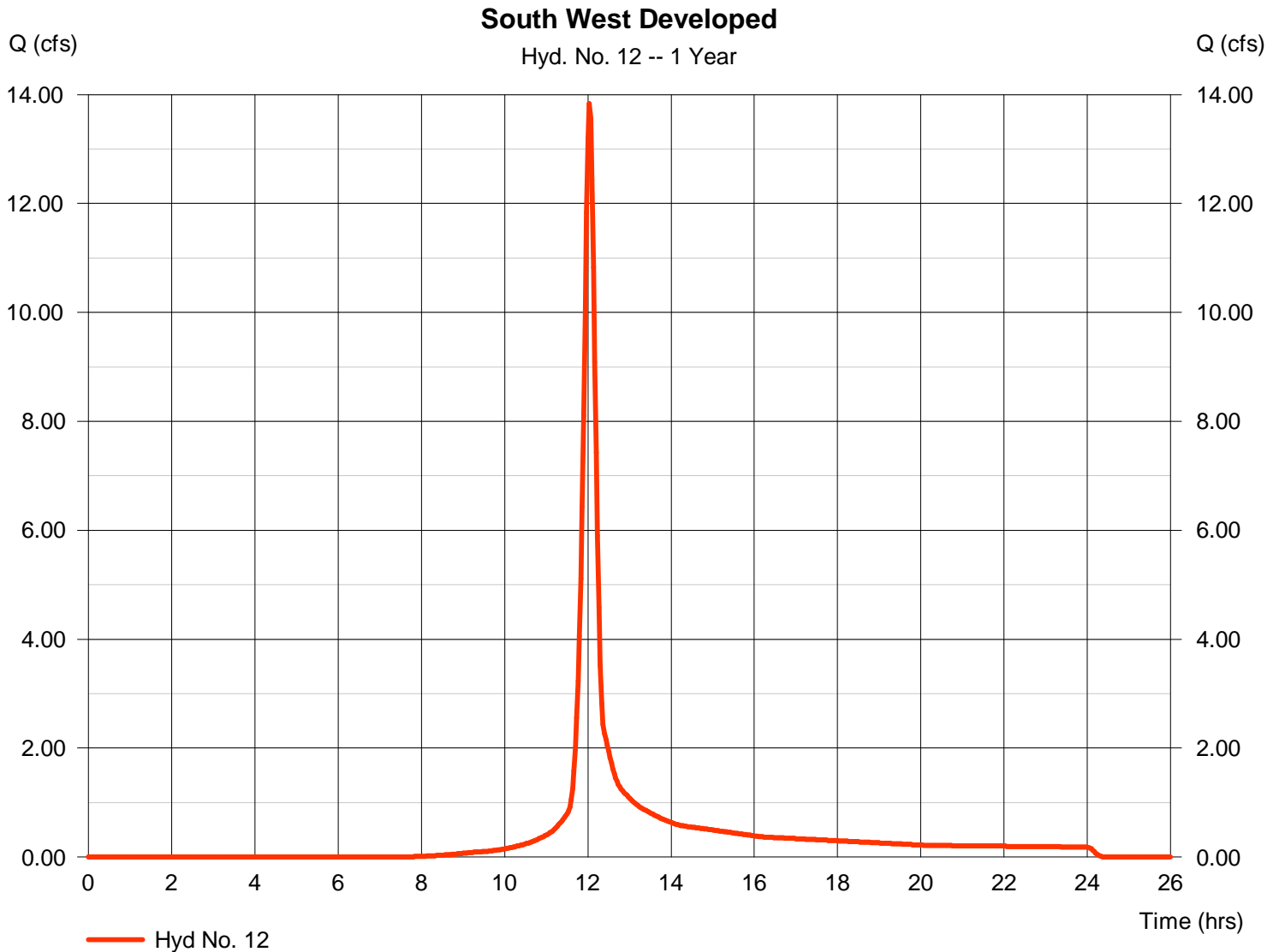
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 13.84 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 38,791 cuft
Drainage area	= 7.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

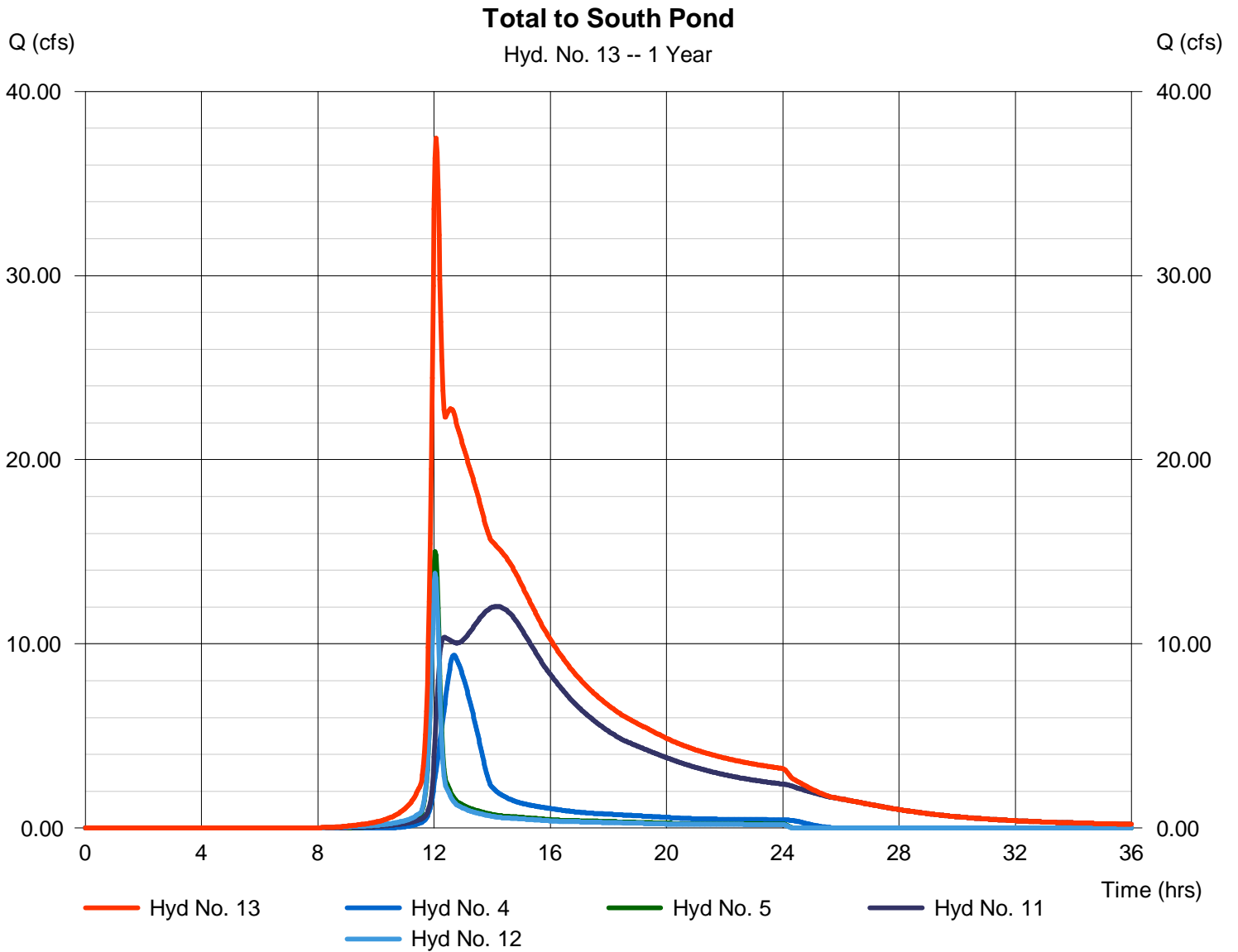
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 37.46 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 478,871 cuft
Inflow hyds.	= 4, 5, 11, 12	Contrib. drain. area	= 34.800 ac



Hydrograph Report

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

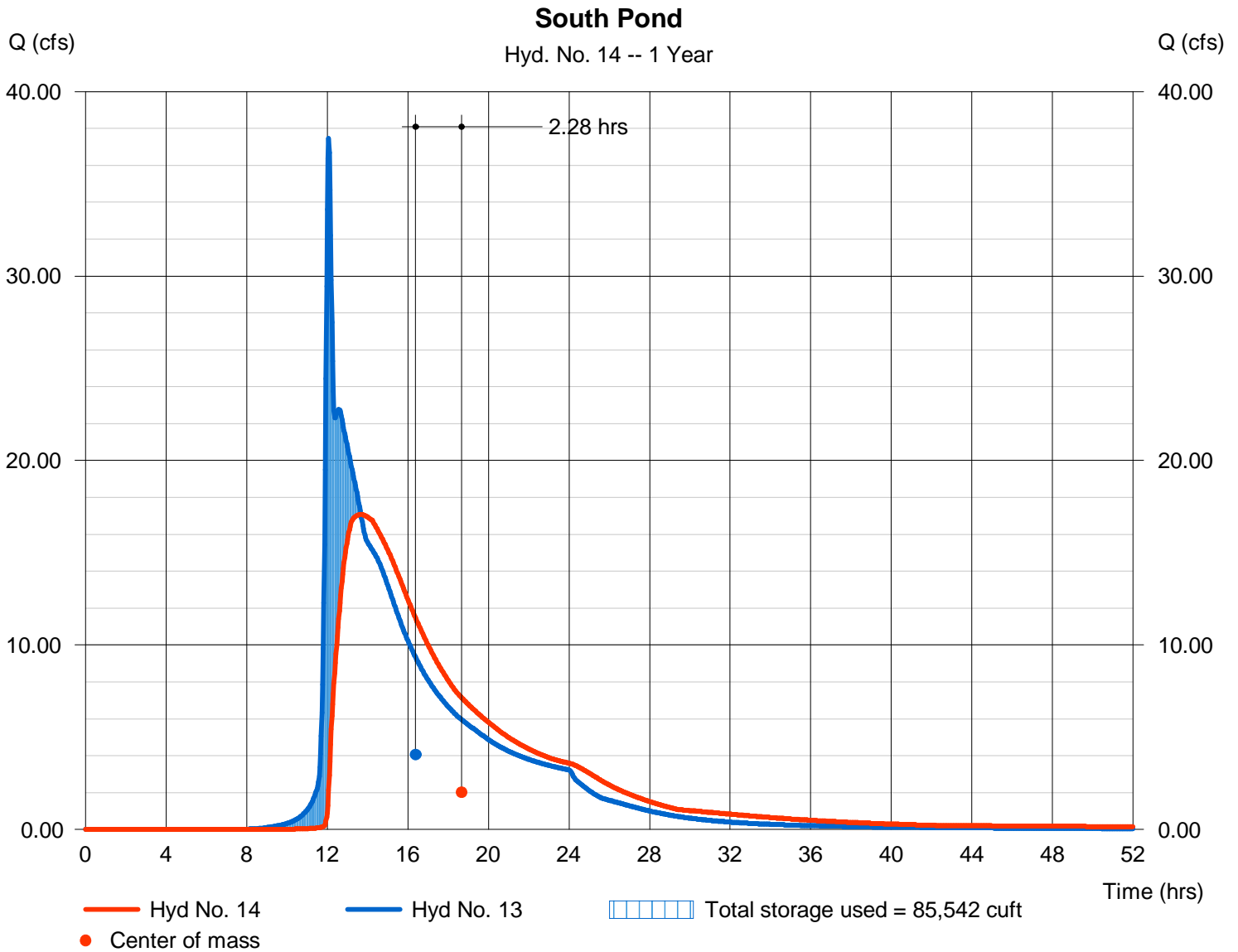
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 17.08 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.67 hrs
Time interval	= 2 min	Hyd. volume	= 476,943 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1349.62 ft
Reservoir name	= South Pond	Max. Storage	= 85,542 cuft

Storage Indication method used.



Pond No. 2 - South Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1349.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1349.00	134,000	0	0
1.00	1350.00	143,700	138,808	138,808
2.00	1351.00	153,700	148,657	287,465
3.00	1352.00	164,000	158,806	446,271
4.00	1353.00	174,400	169,157	615,428
5.00	1354.00	185,000	179,656	795,084

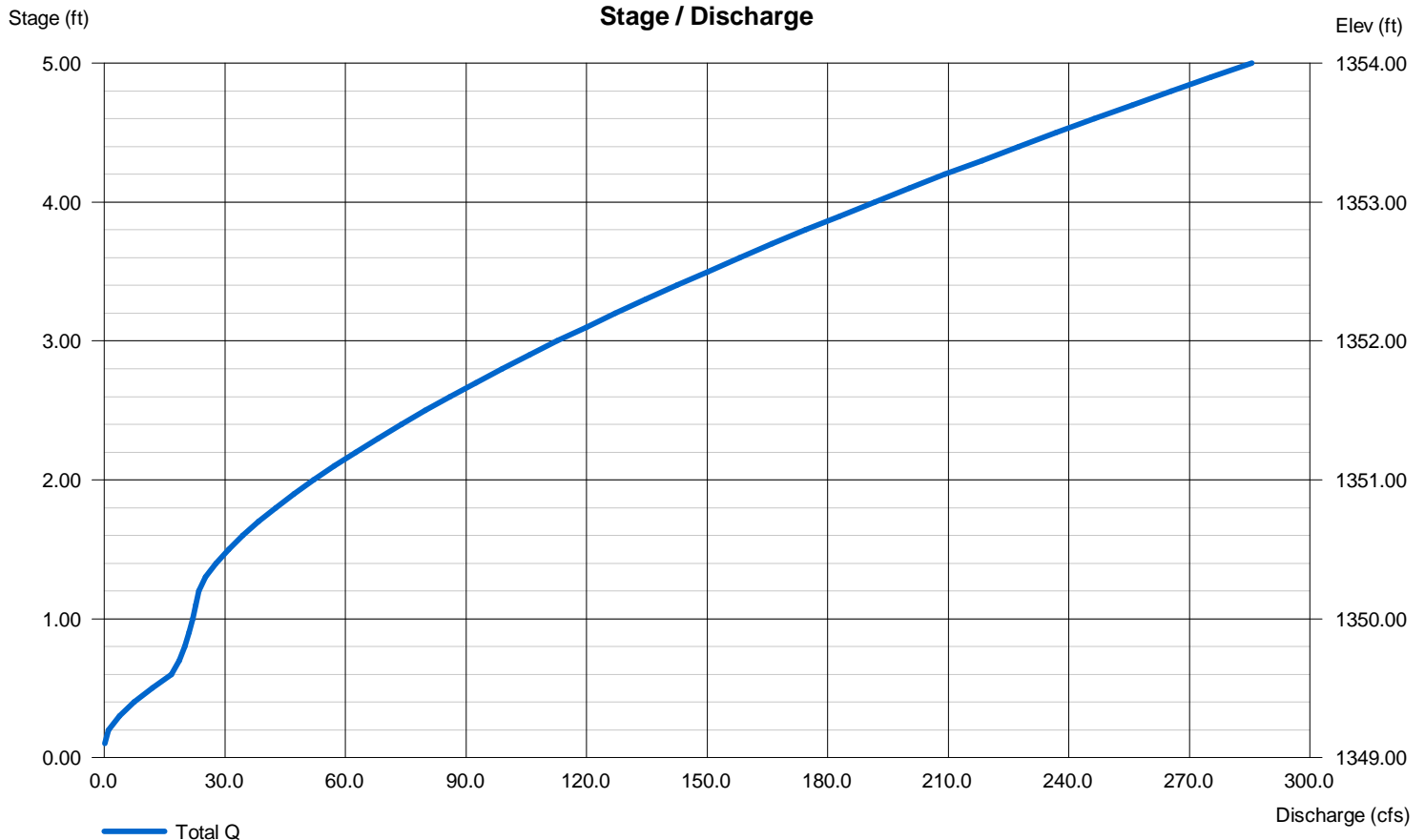
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	5.00	0.00	0.00
Span (in)	= 24.00	5.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1346.40	1348.60	0.00	0.00
Length (ft)	= 55.00	0.00	0.00	0.00
Slope (%)	= 0.30	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)	= 16.00	10.00	0.00	0.00
Crest El. (ft)	= 1349.14	1350.20	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

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

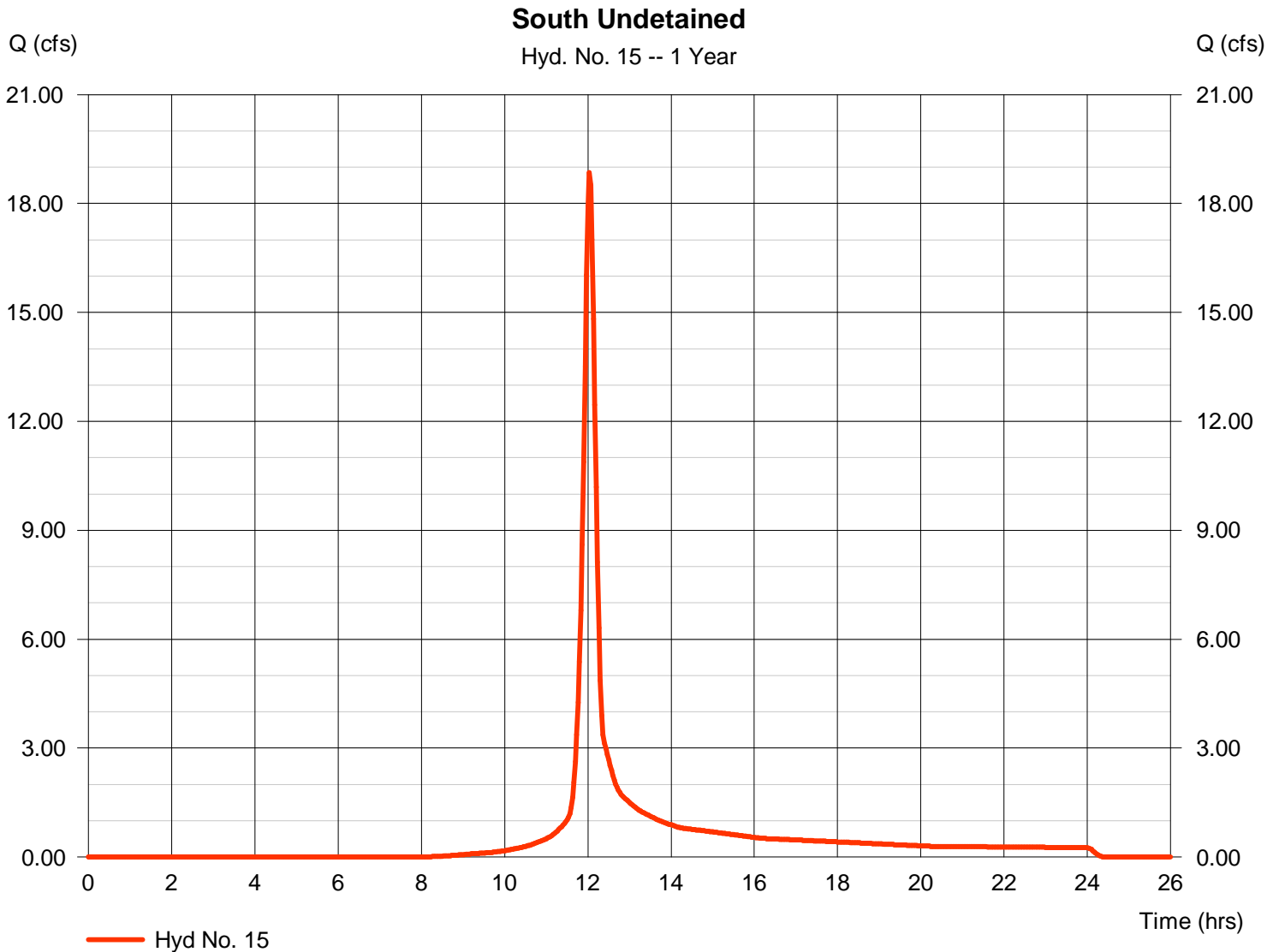
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 18.85 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 52,824 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = [(2.800 x 90) + (7.200 x 84)] / 10.000



Hydrograph Report

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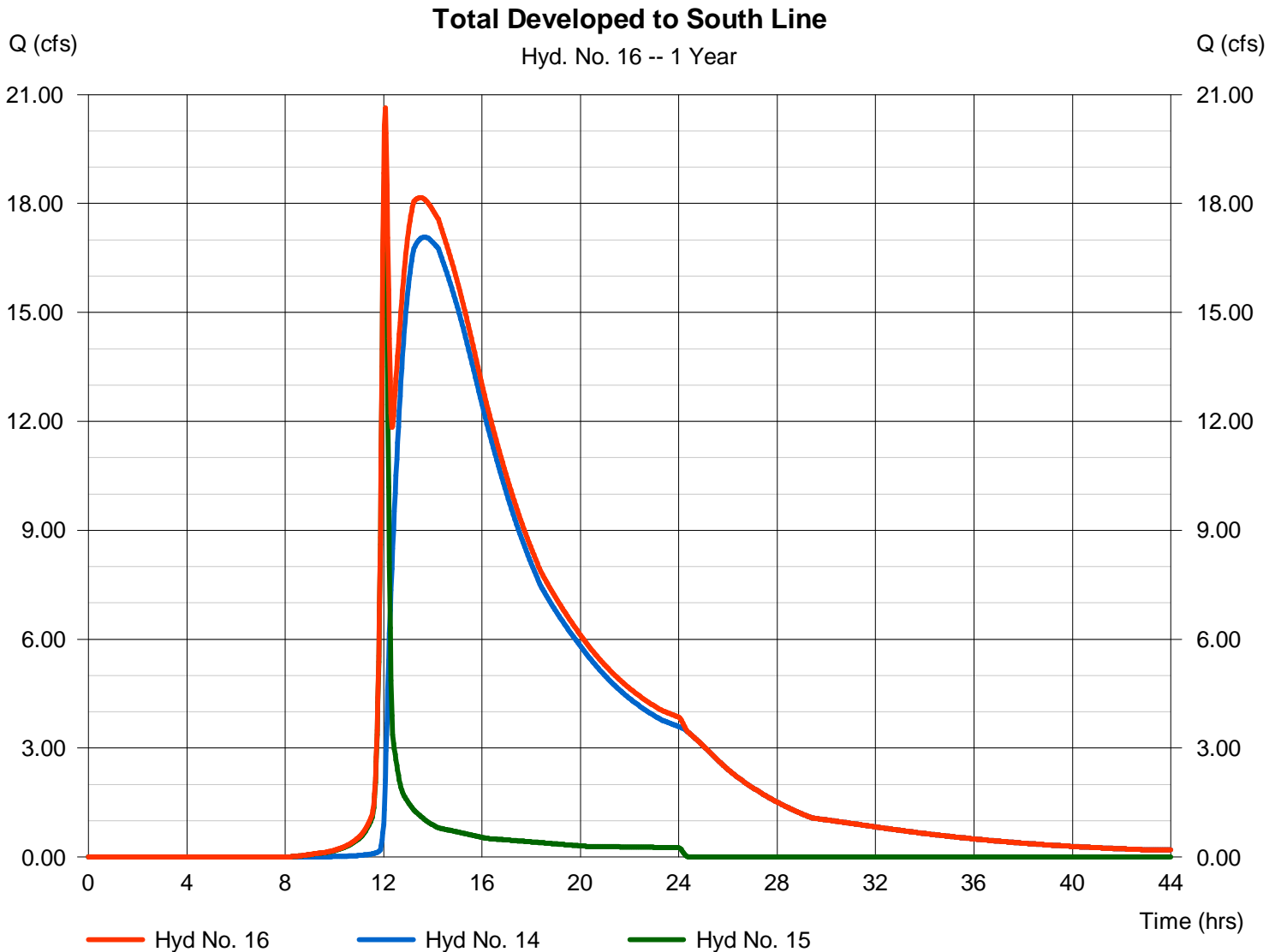
Tuesday, Jun 18, 2013

Hyd. No. 16

Total Developed to South Line

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 2 min
 Inflow hyds. = 14, 15

Peak discharge = 20.64 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 529,766 cuft
 Contrib. drain. area = 10.000 ac



Hydrograph Report

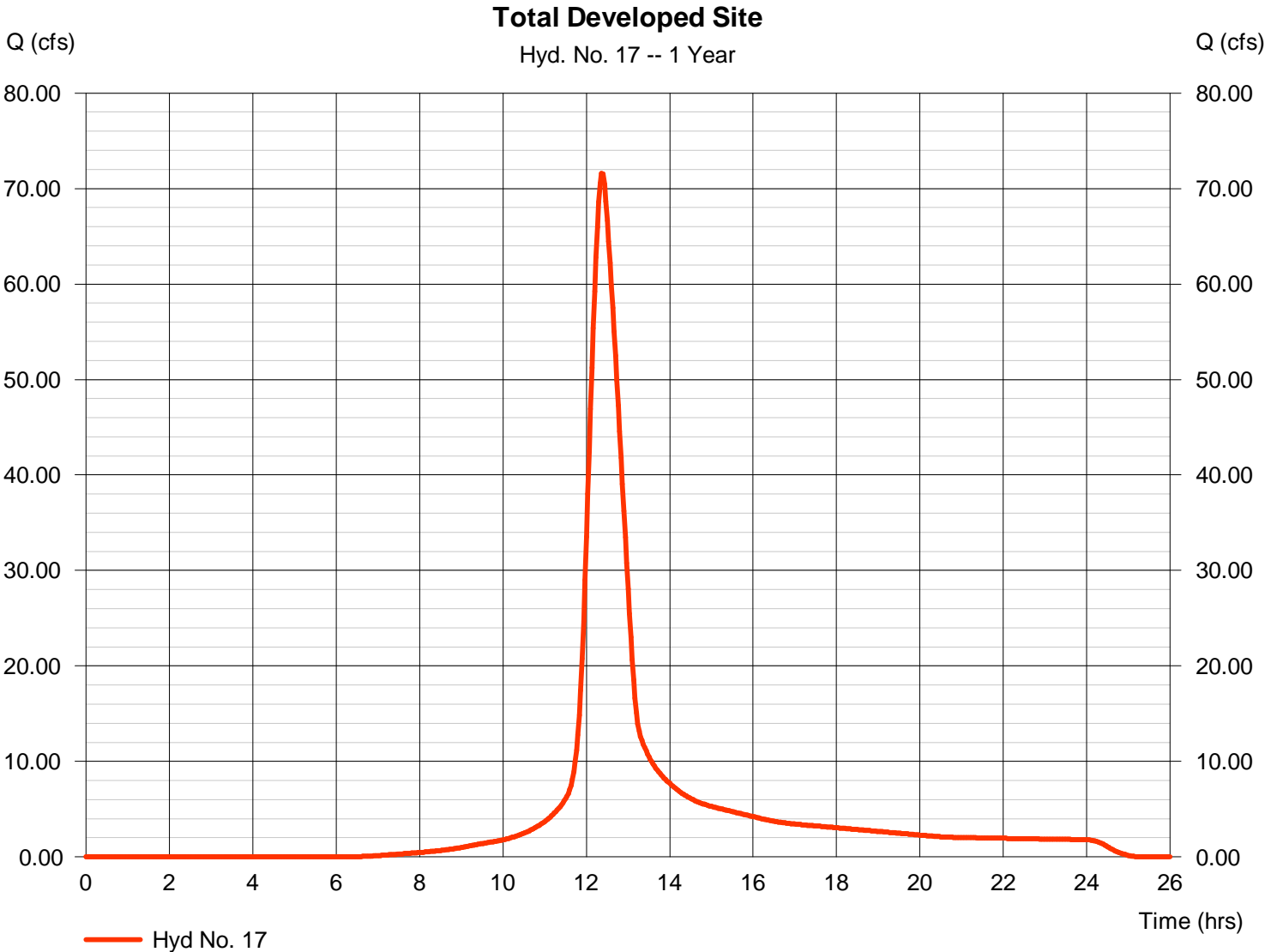
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 71.59 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 405,409 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 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	21.68	2	778	232,863	-----	-----	-----	Offsite North	
2	SCS Runoff	33.01	2	722	92,524	-----	-----	-----	Estate Lots of North Pond	
3	SCS Runoff	28.25	2	722	79,559	-----	-----	-----	West Developed to North Pond	
4	SCS Runoff	14.33	2	760	112,247	-----	-----	-----	Offsite West	
5	SCS Runoff	21.52	2	722	60,312	-----	-----	-----	South Estate	
6	Combine	65.04	2	722	404,946	1, 2, 3,	-----	-----	Total to North Pond	
7	SCS Runoff	16.45	2	722	46,345	-----	-----	-----	West Developed to Middle Pond	
8	SCS Runoff	12.71	2	722	35,639	-----	-----	-----	Estate Lots to Middle Pond	
9	Reservoir	19.55	2	826	403,675	6	1357.94	126,724	North Pond	
10	Combine	34.52	2	724	485,659	7, 8, 9	-----	-----	Total to Middle Pond	
11	Reservoir	20.70	2	840	485,615	10	1354.53	37,709	Middle Pond	
12	SCS Runoff	19.20	2	722	54,069	-----	-----	-----	South West Developed	
13	Combine	55.86	2	724	712,243	4, 5, 11, 12	-----	-----	Total to South Pond	
14	Reservoir	22.81	2	880	710,260	13	1350.10	153,823	South Pond	
15	SCS Runoff	26.43	2	722	74,266	-----	-----	-----	South Undetained	
16	Combine	32.64	2	724	784,526	14, 15	-----	-----	Total Developed to South Line	
17	SCS Runoff	96.89	2	742	550,938	-----	-----	-----	Total Developed Site	
The Ranch Total Site.gpw					Return Period: 2 Year			Tuesday, Jun 18, 2013		

Hydrograph Report

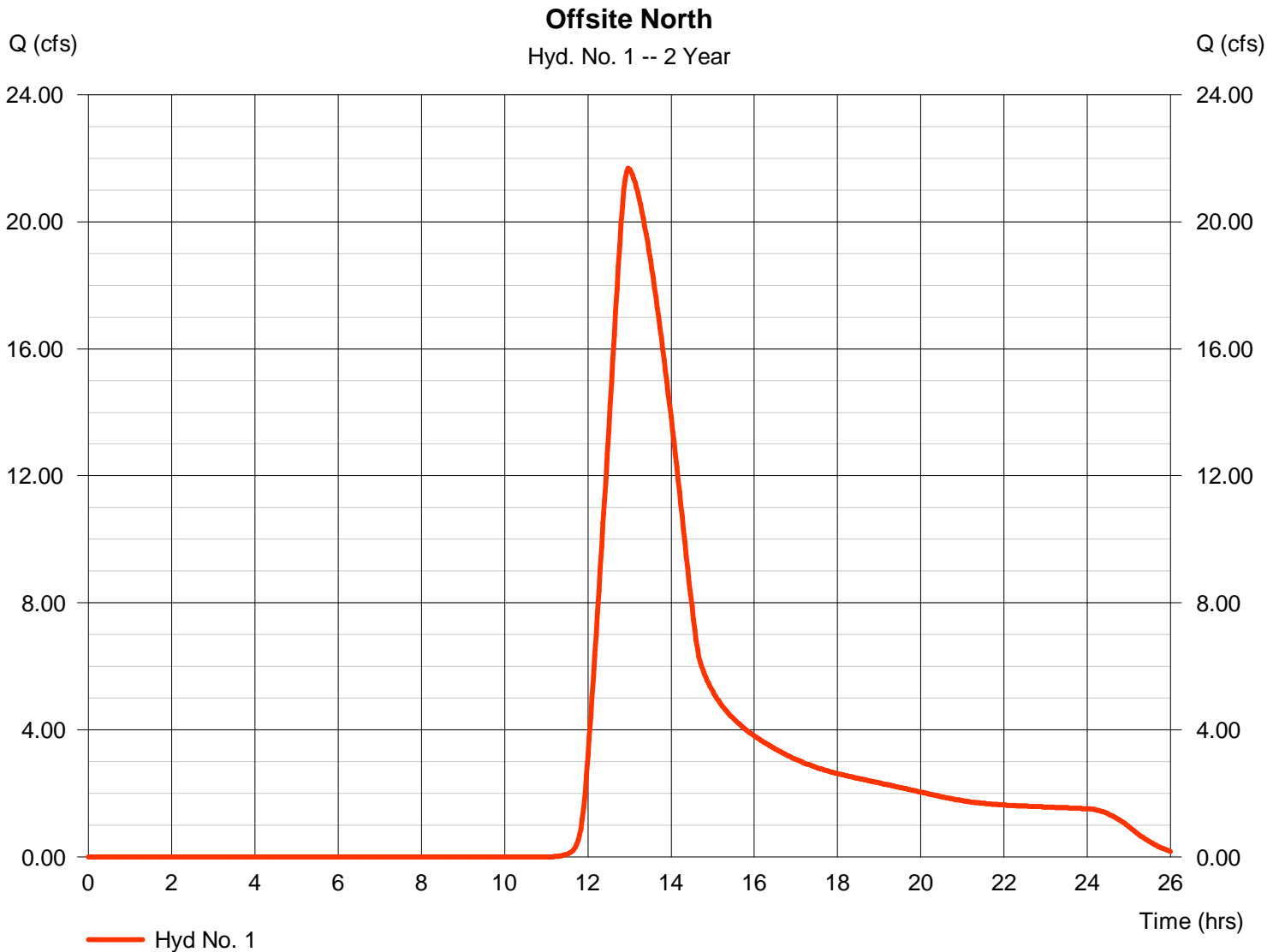
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 21.68 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.97 hrs
Time interval	= 2 min	Hyd. volume	= 232,863 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

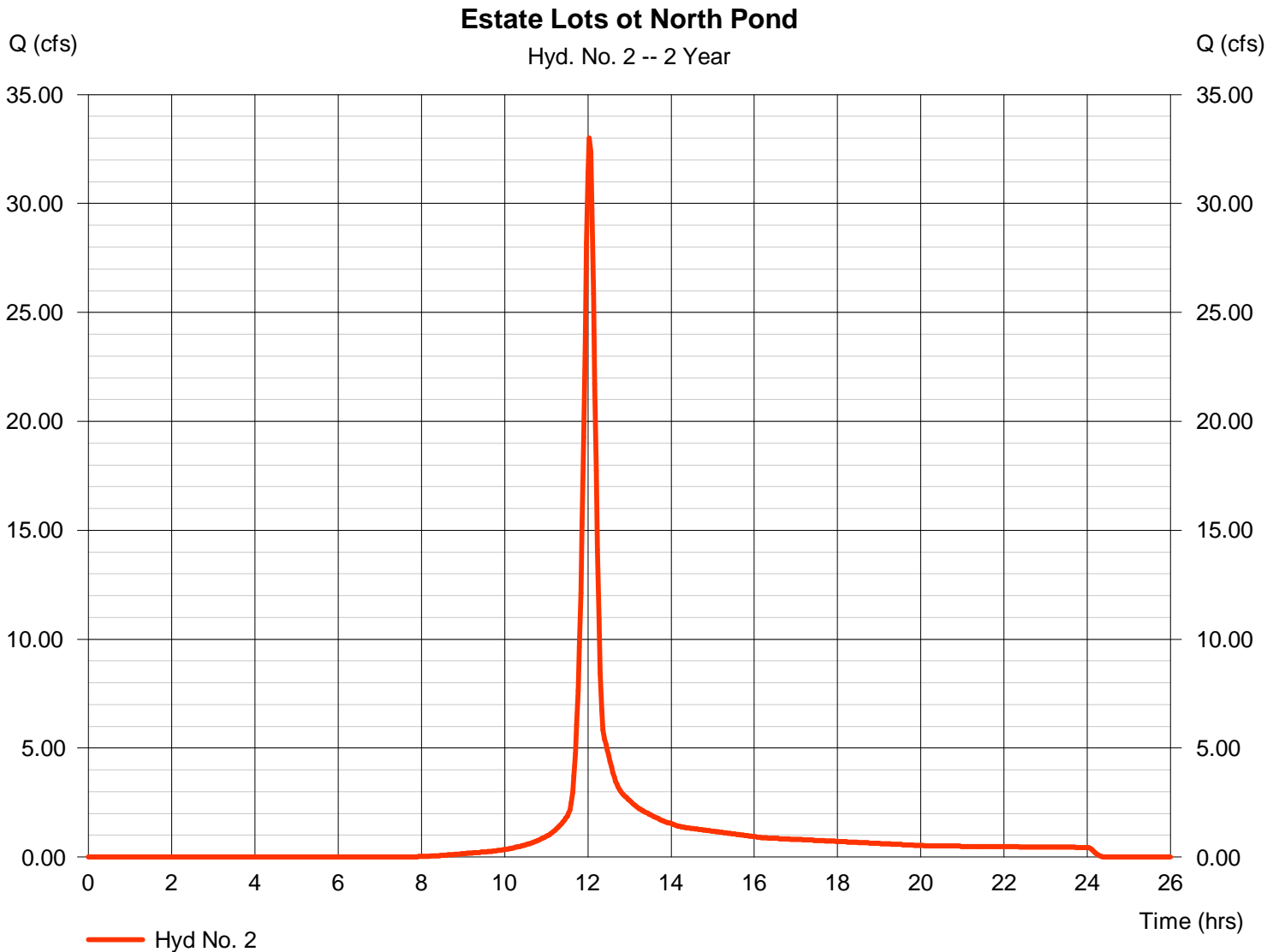
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 33.01 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 92,524 cuft
Drainage area	= 13.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

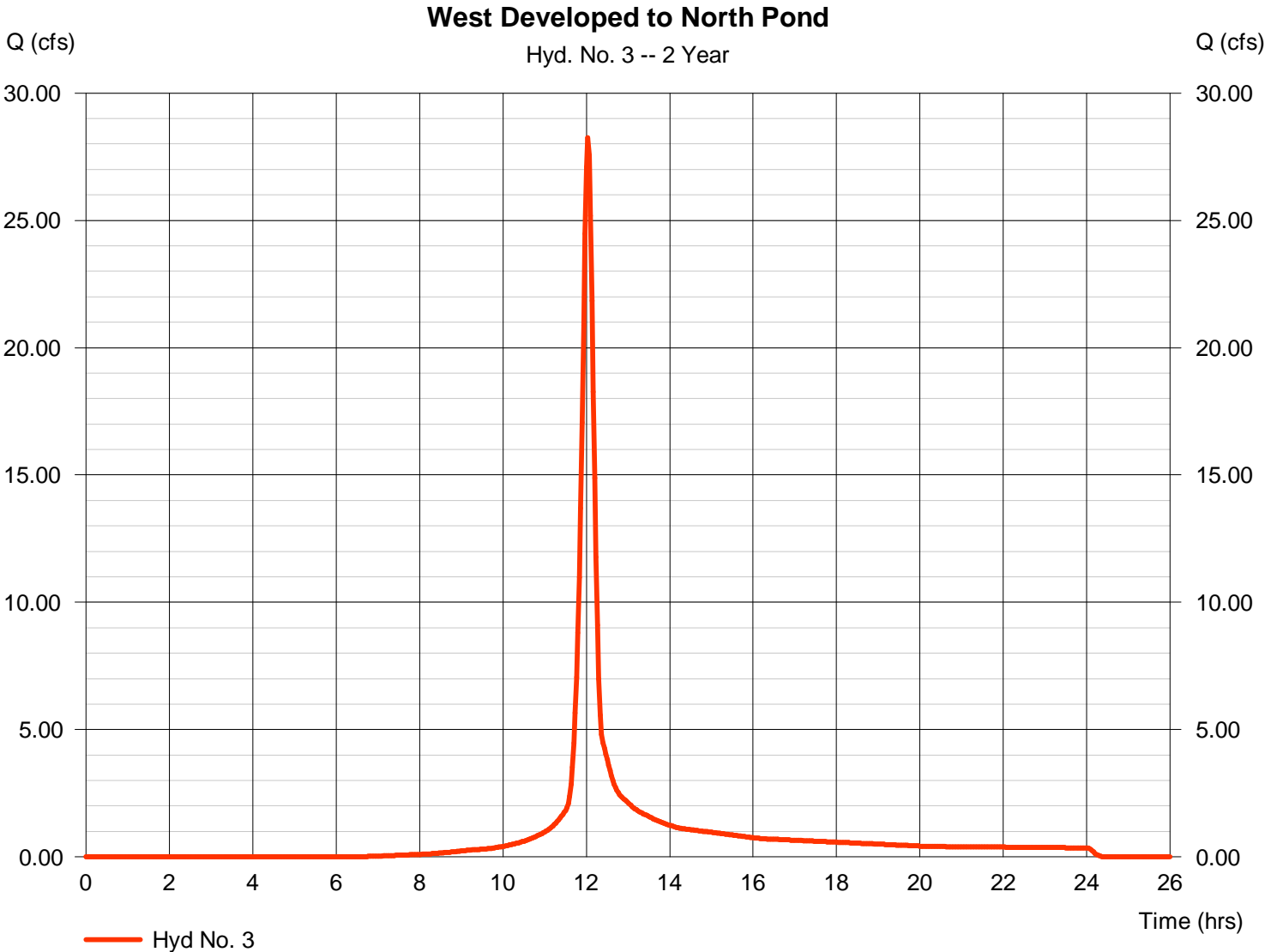
Tuesday, Jun 18, 2013

Hyd. No. 3

West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 28.25 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 79,559 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 10.300



Hydrograph Report

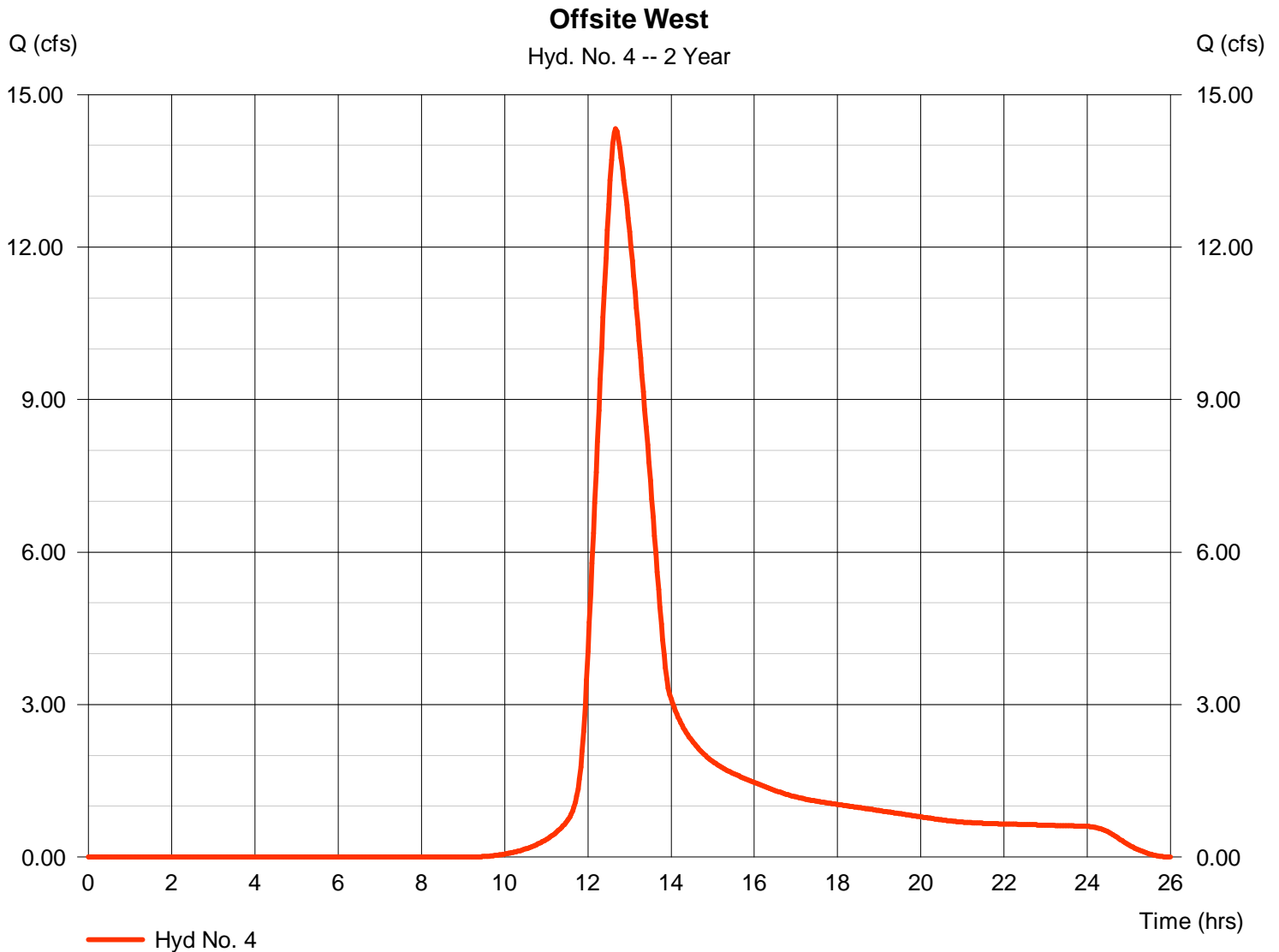
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 14.33 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 112,247 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

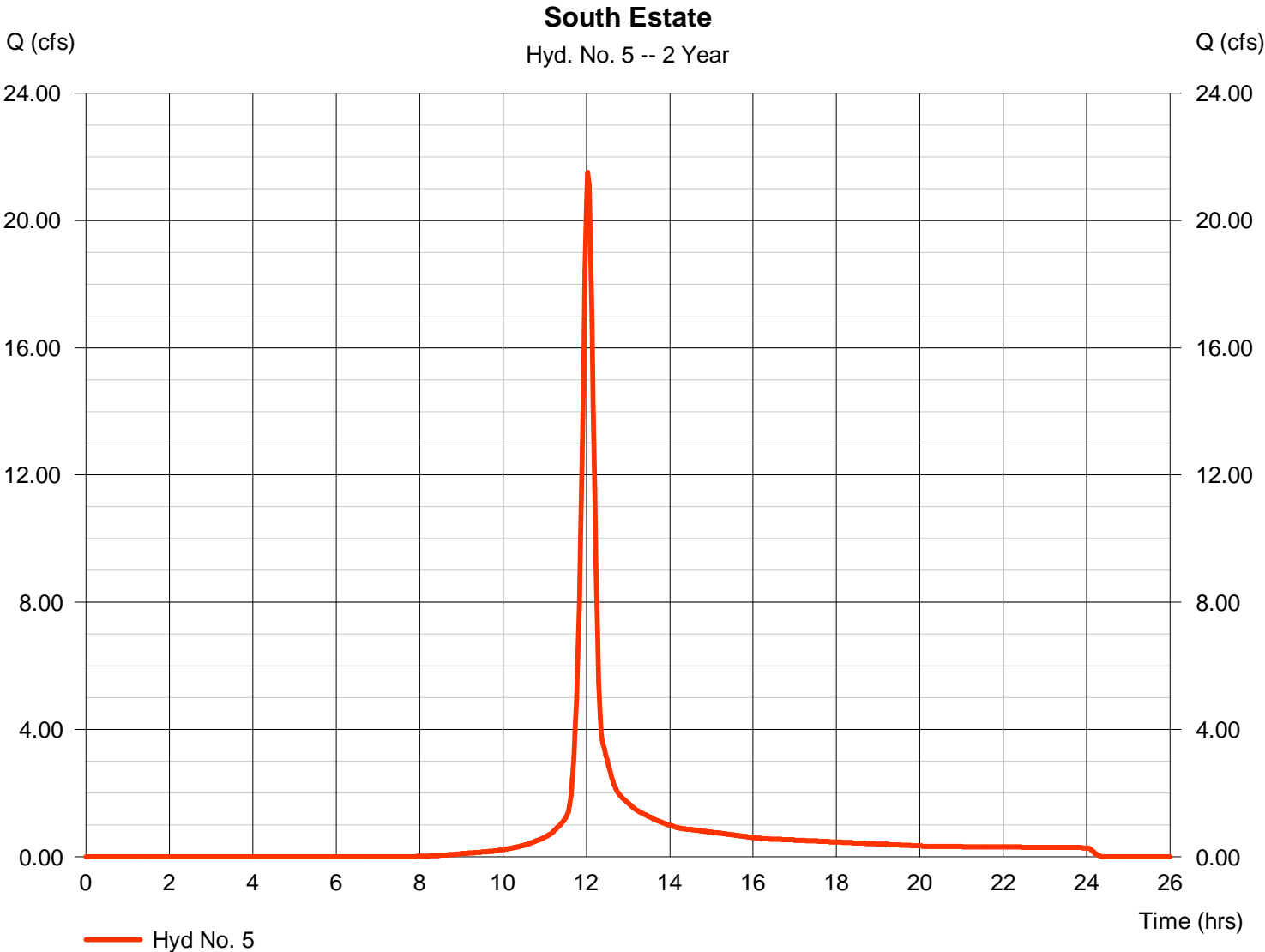
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 21.52 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 60,312 cuft
Drainage area	= 8.800 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

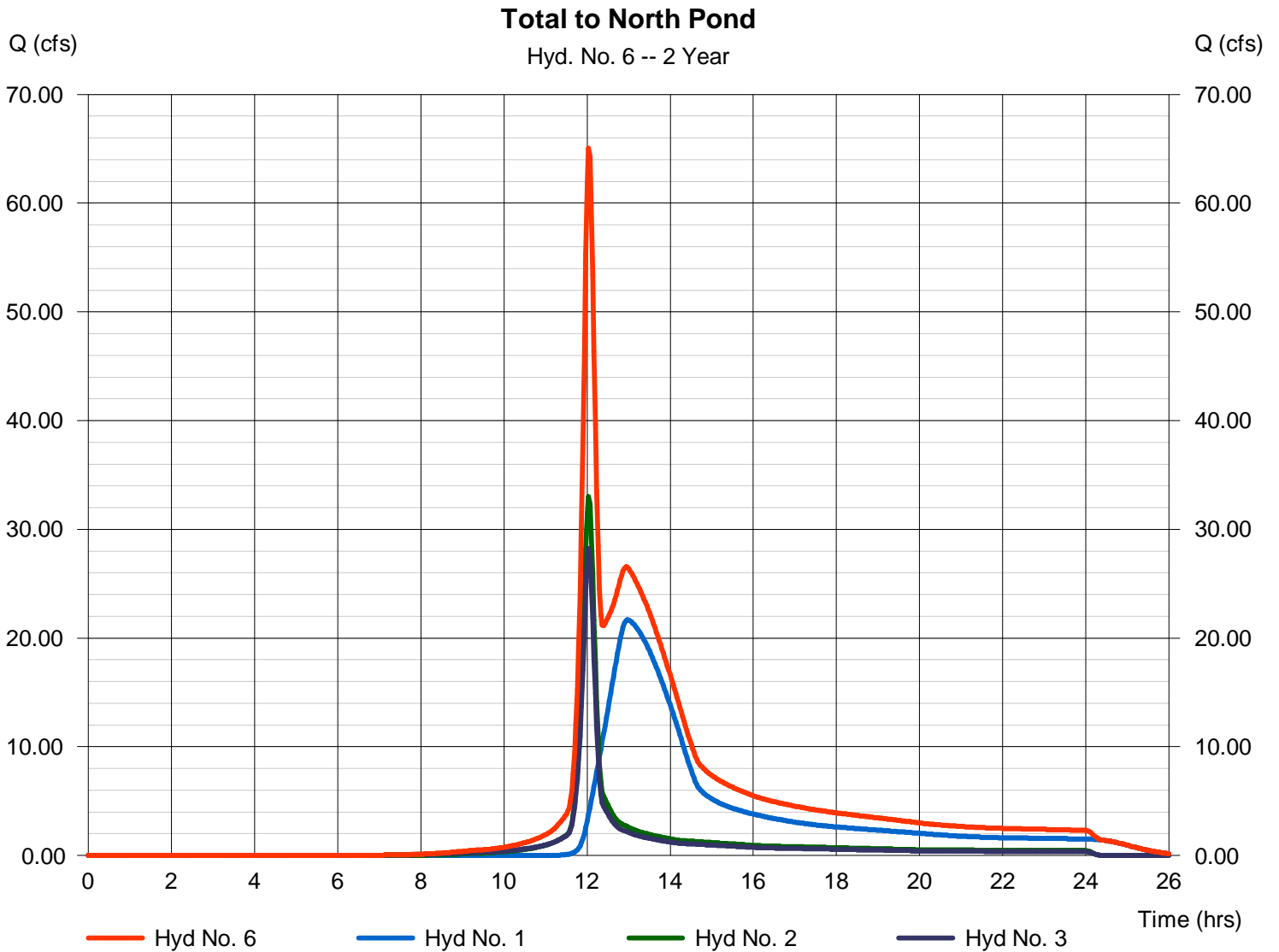
Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

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

Peak discharge = 65.04 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 404,946 cuft
 Contrib. drain. area = 80.800 ac

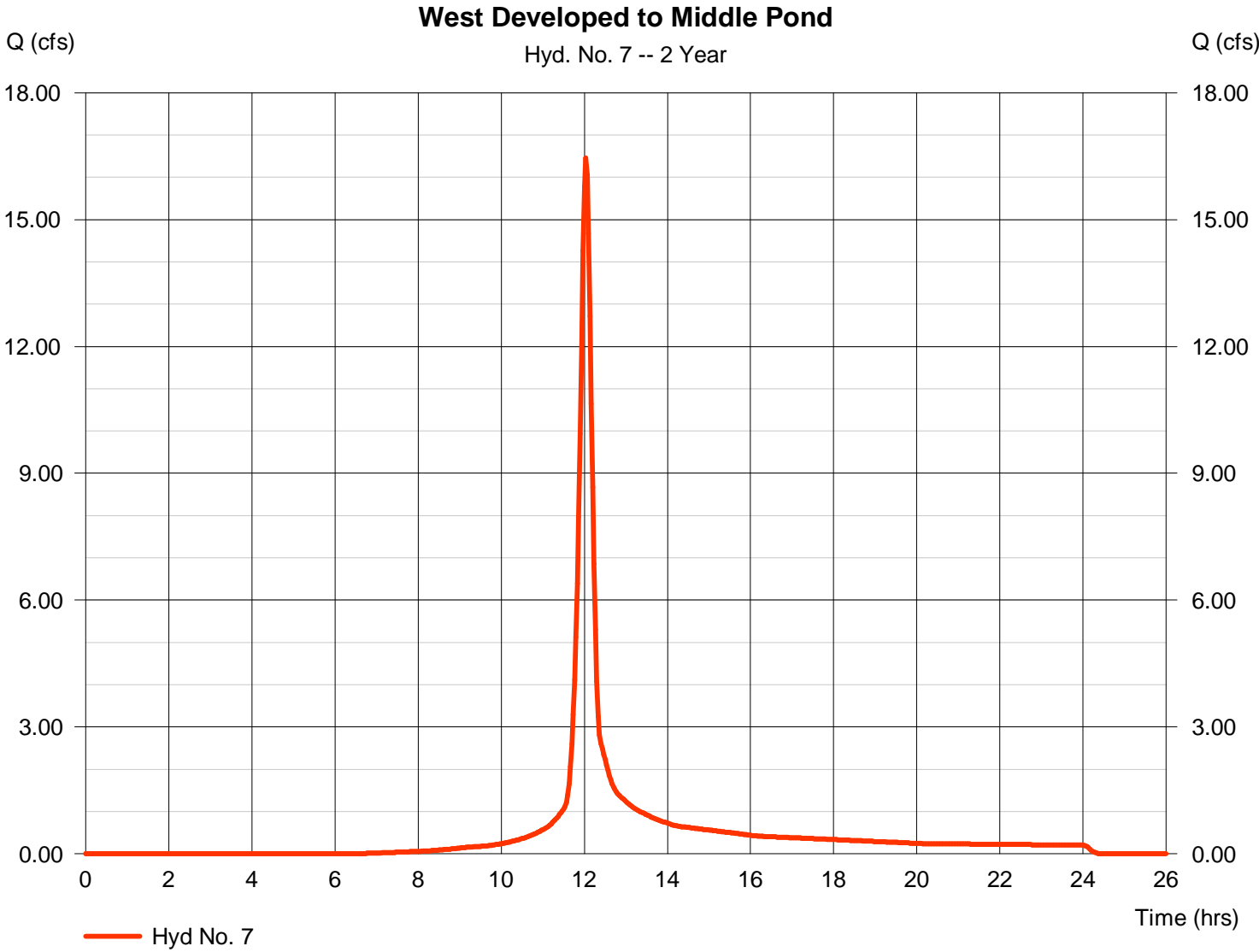


Hydrograph Report

Hyd. No. 7

West Developed to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 16.45 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 46,345 cuft
Drainage area	= 6.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

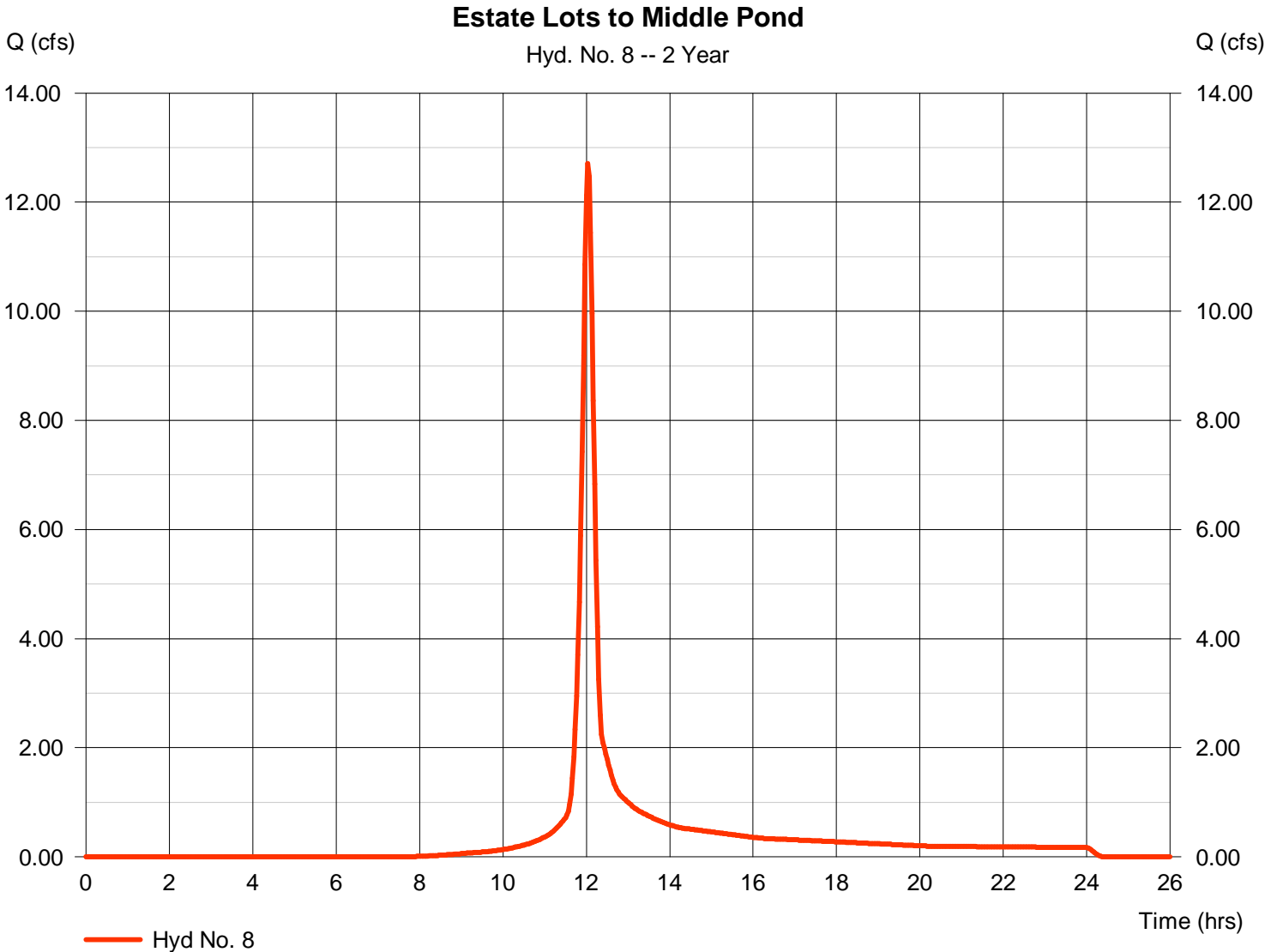
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 12.71 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 35,639 cuft
Drainage area	= 5.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

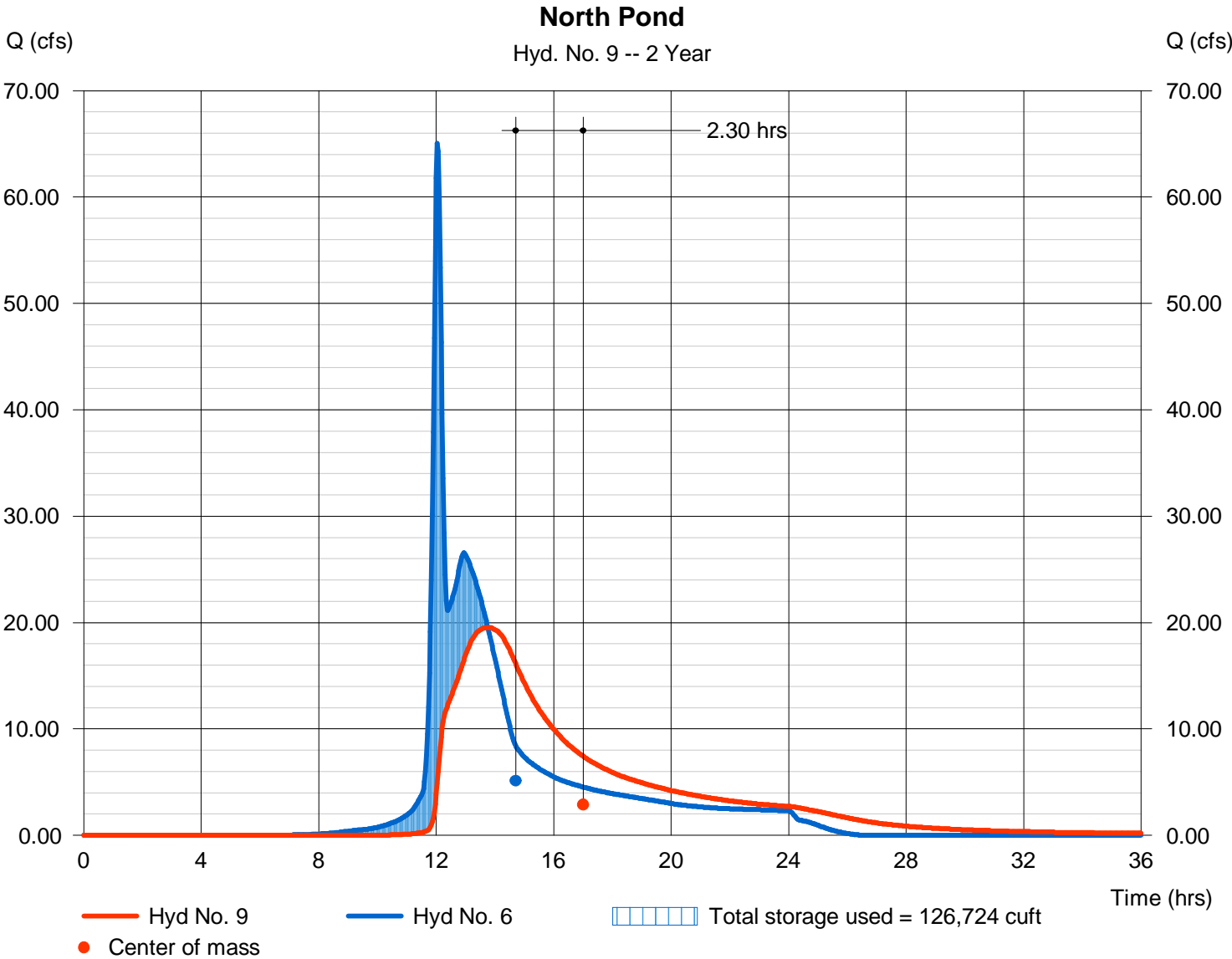
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 19.55 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.77 hrs
Time interval	= 2 min	Hyd. volume	= 403,675 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1357.94 ft
Reservoir name	= North Pond	Max. Storage	= 126,724 cuft

Storage Indication method used.



Hydrograph Report

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

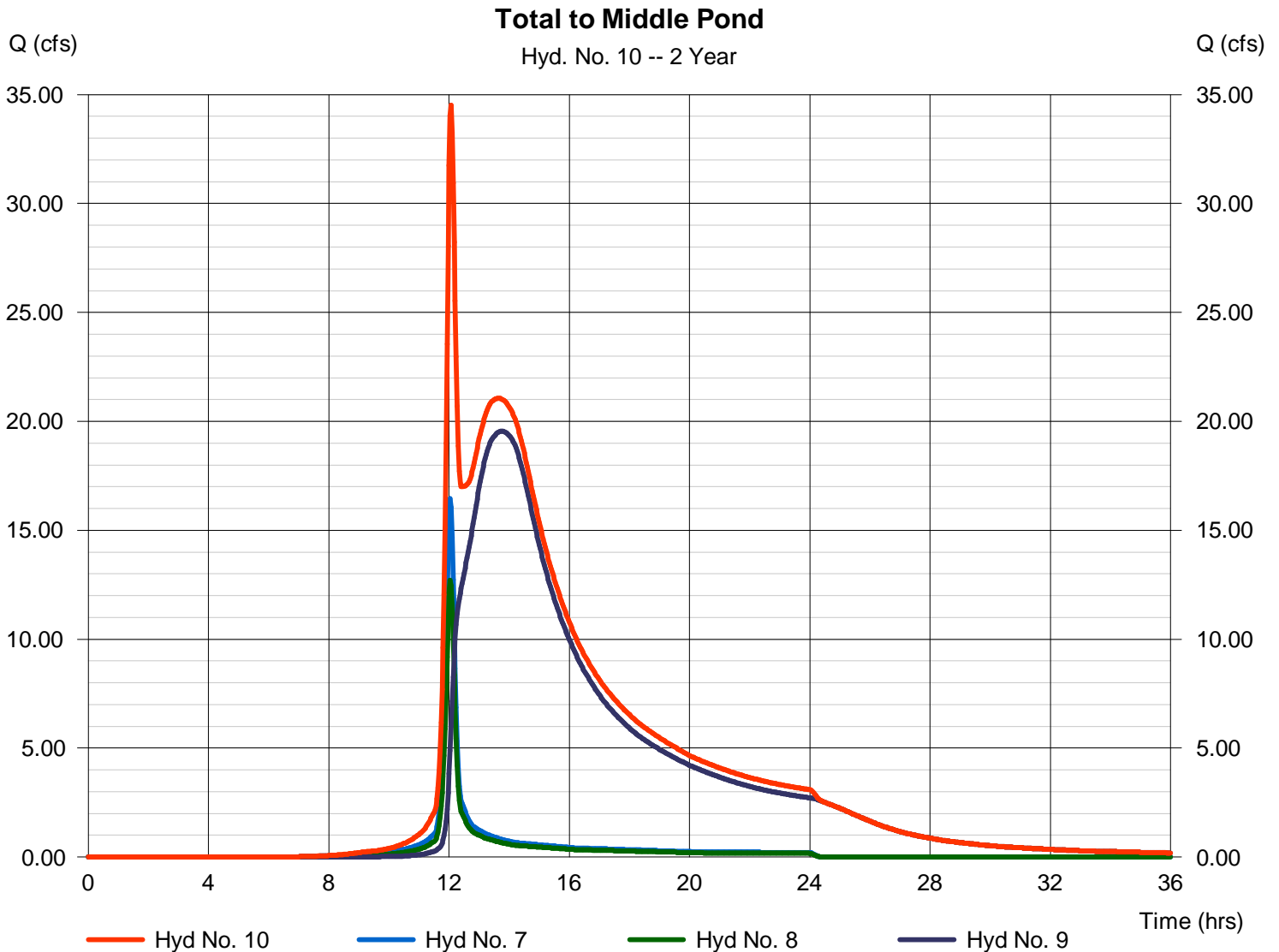
Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 34.52 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 485,659 cuft
 Contrib. drain. area = 11.200 ac



Hydrograph Report

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

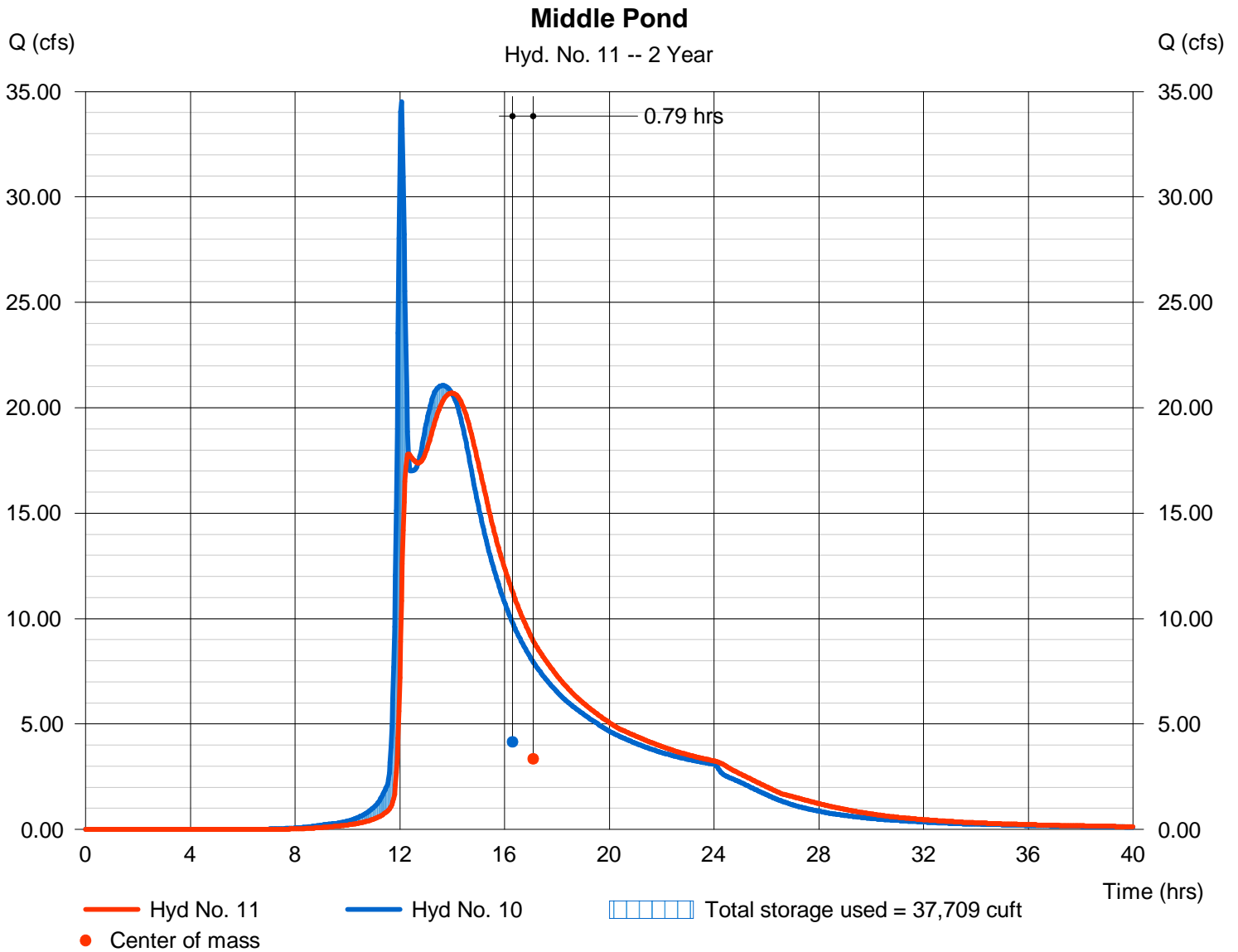
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 20.70 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.00 hrs
Time interval	= 2 min	Hyd. volume	= 485,615 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1354.53 ft
Reservoir name	= Middle Pond	Max. Storage	= 37,709 cuft

Storage Indication method used.



Hydrograph Report

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

Tuesday, Jun 18, 2013

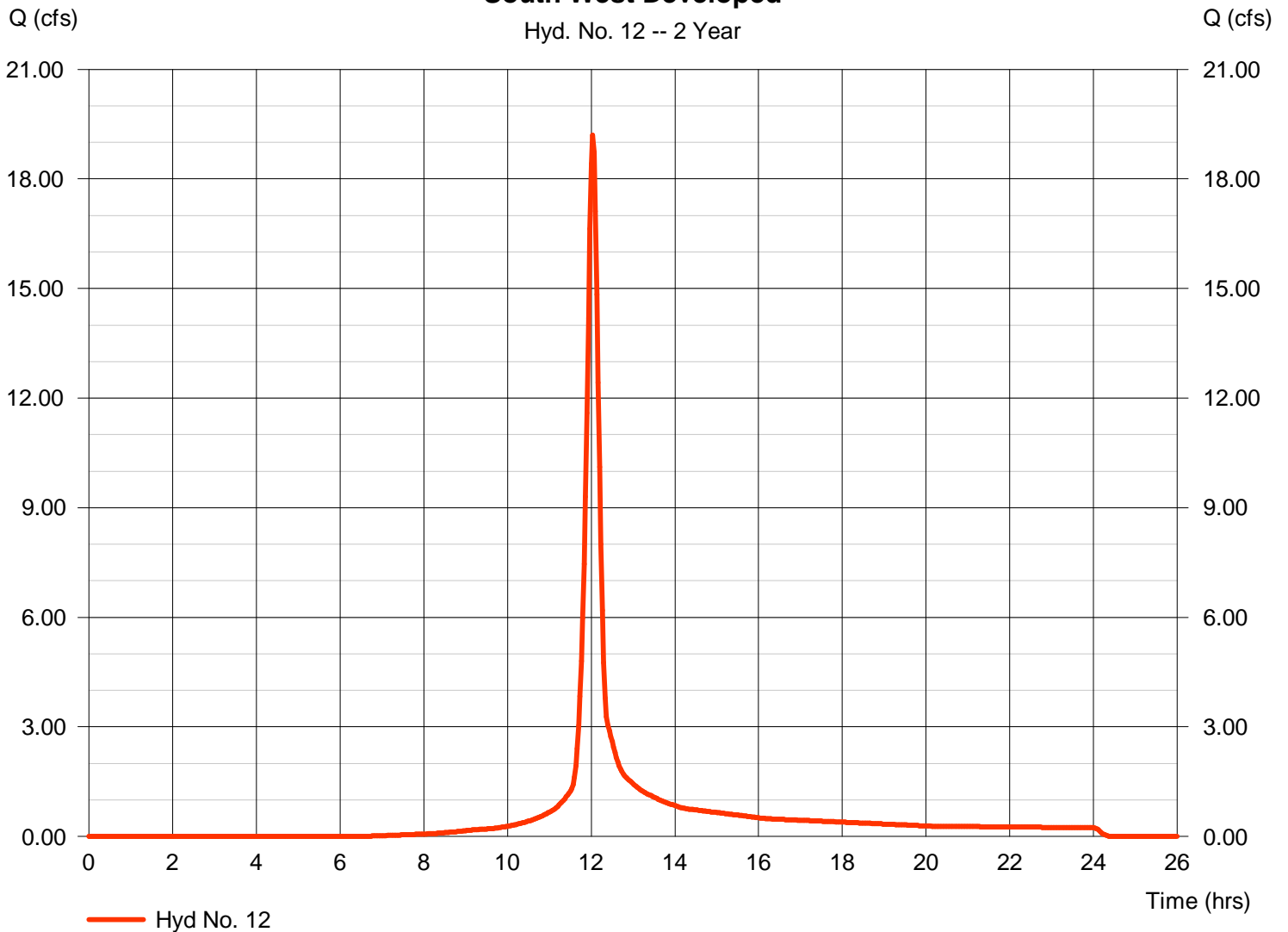
Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 19.20 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 54,069 cuft
Drainage area	= 7.000 ac	Curve number	= 87
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

South West Developed

Hyd. No. 12 -- 2 Year



Hydrograph Report

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

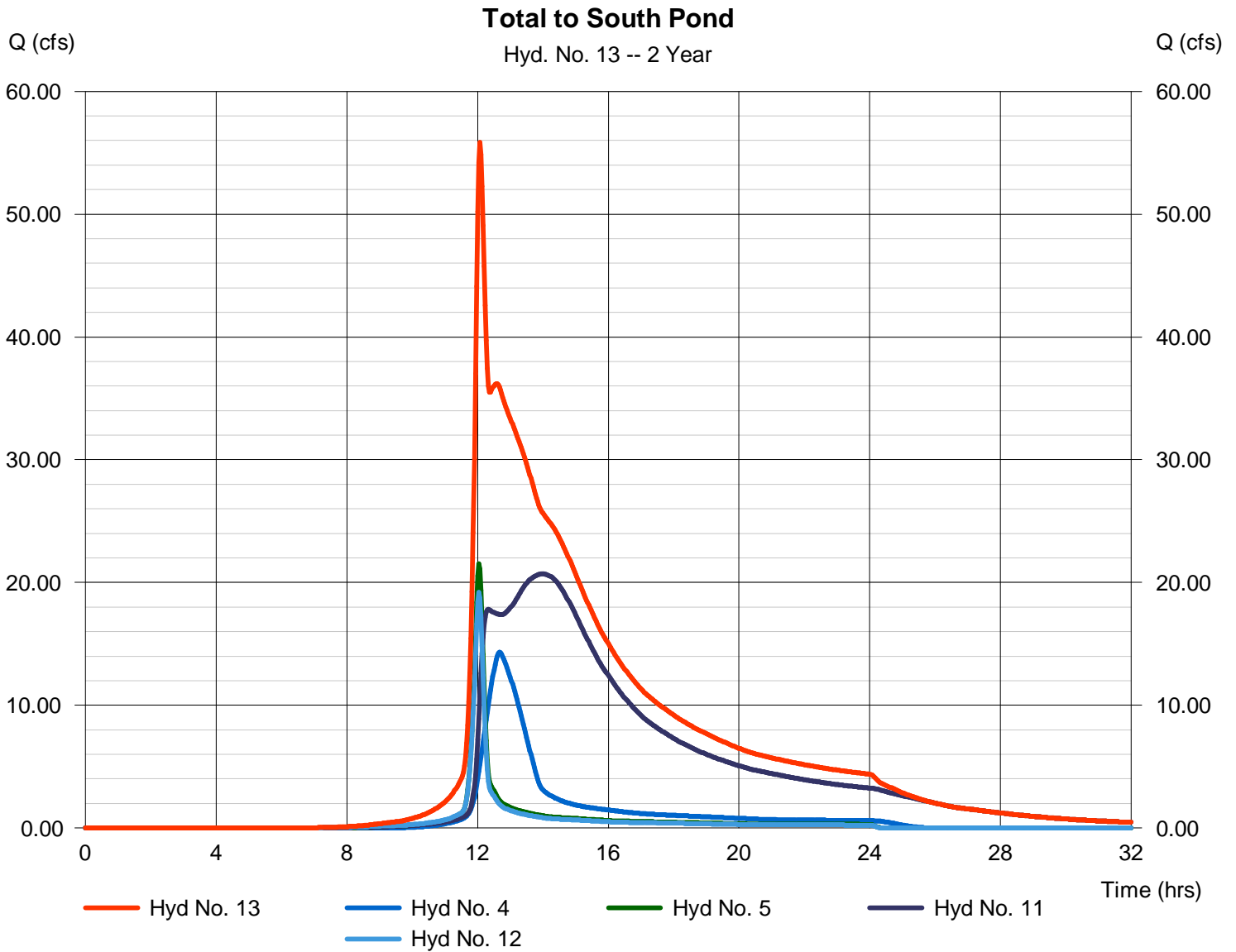
Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 4, 5, 11, 12

Peak discharge = 55.86 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 712,243 cuft
 Contrib. drain. area = 34.800 ac



Hydrograph Report

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

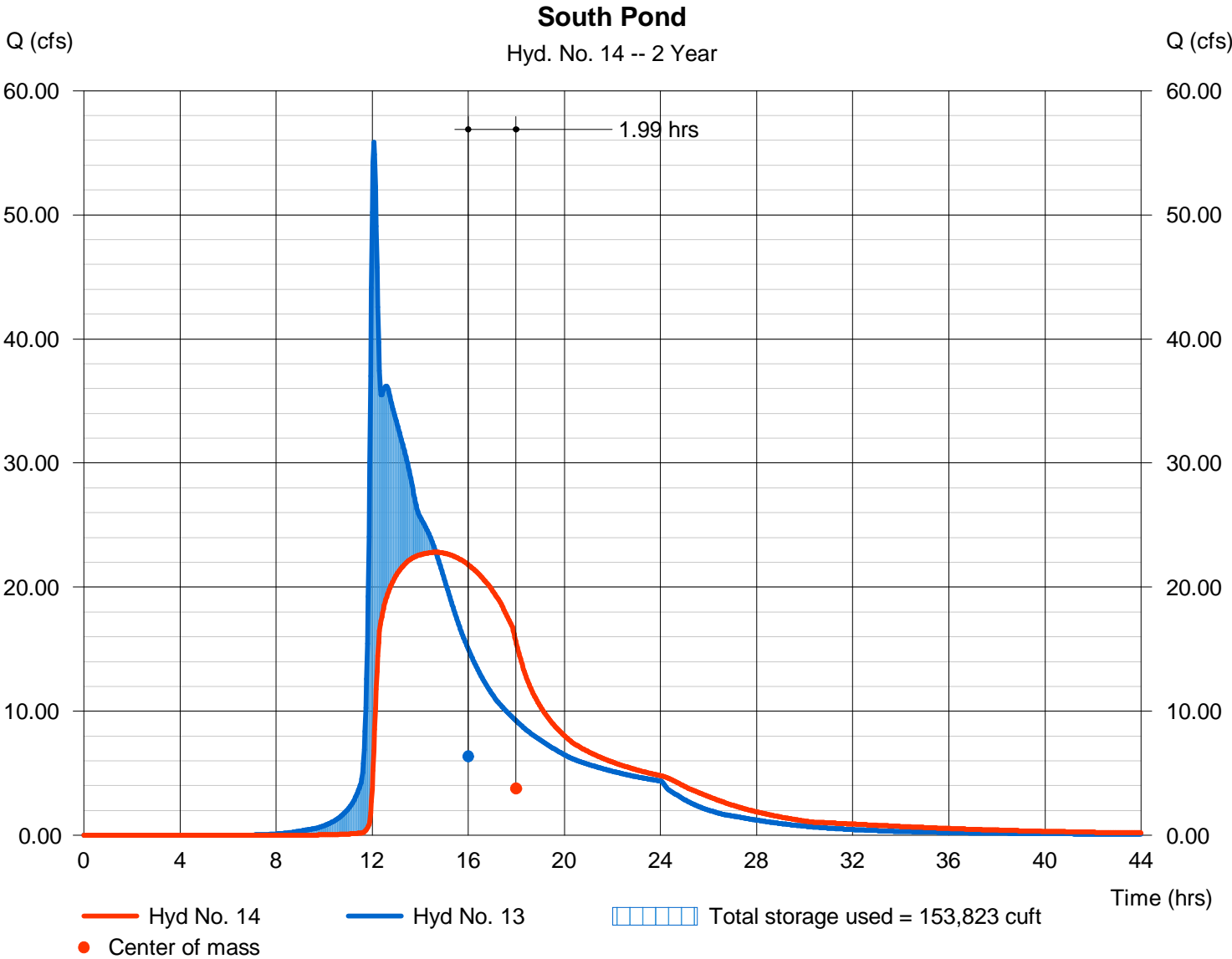
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 22.81 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.67 hrs
Time interval	= 2 min	Hyd. volume	= 710,260 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1350.10 ft
Reservoir name	= South Pond	Max. Storage	= 153,823 cuft

Storage Indication method used.



Hydrograph Report

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

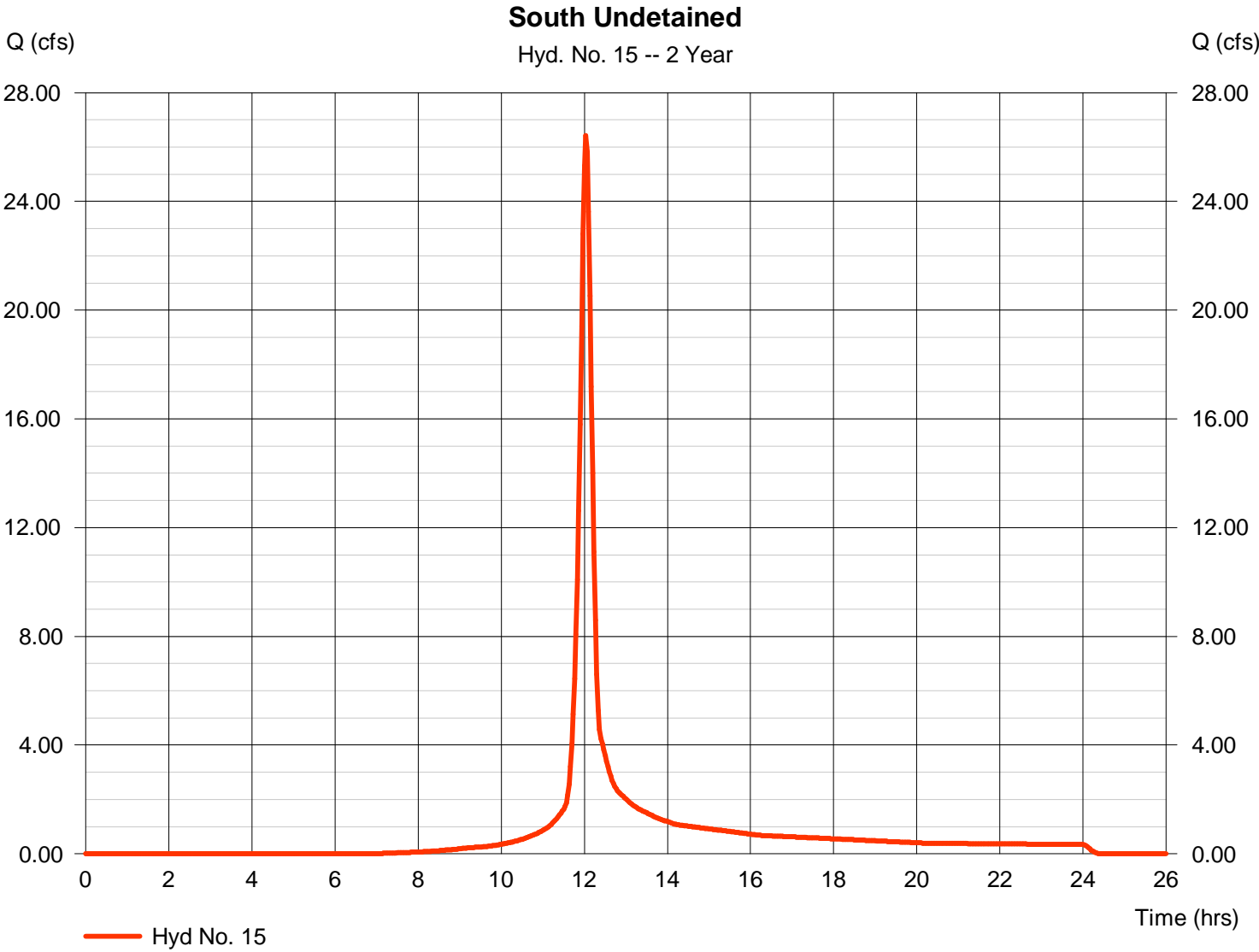
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 26.43 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 74,266 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = [(2.800 x 90) + (7.200 x 84)] / 10.000



Hydrograph Report

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

Tuesday, Jun 18, 2013

Hyd. No. 16

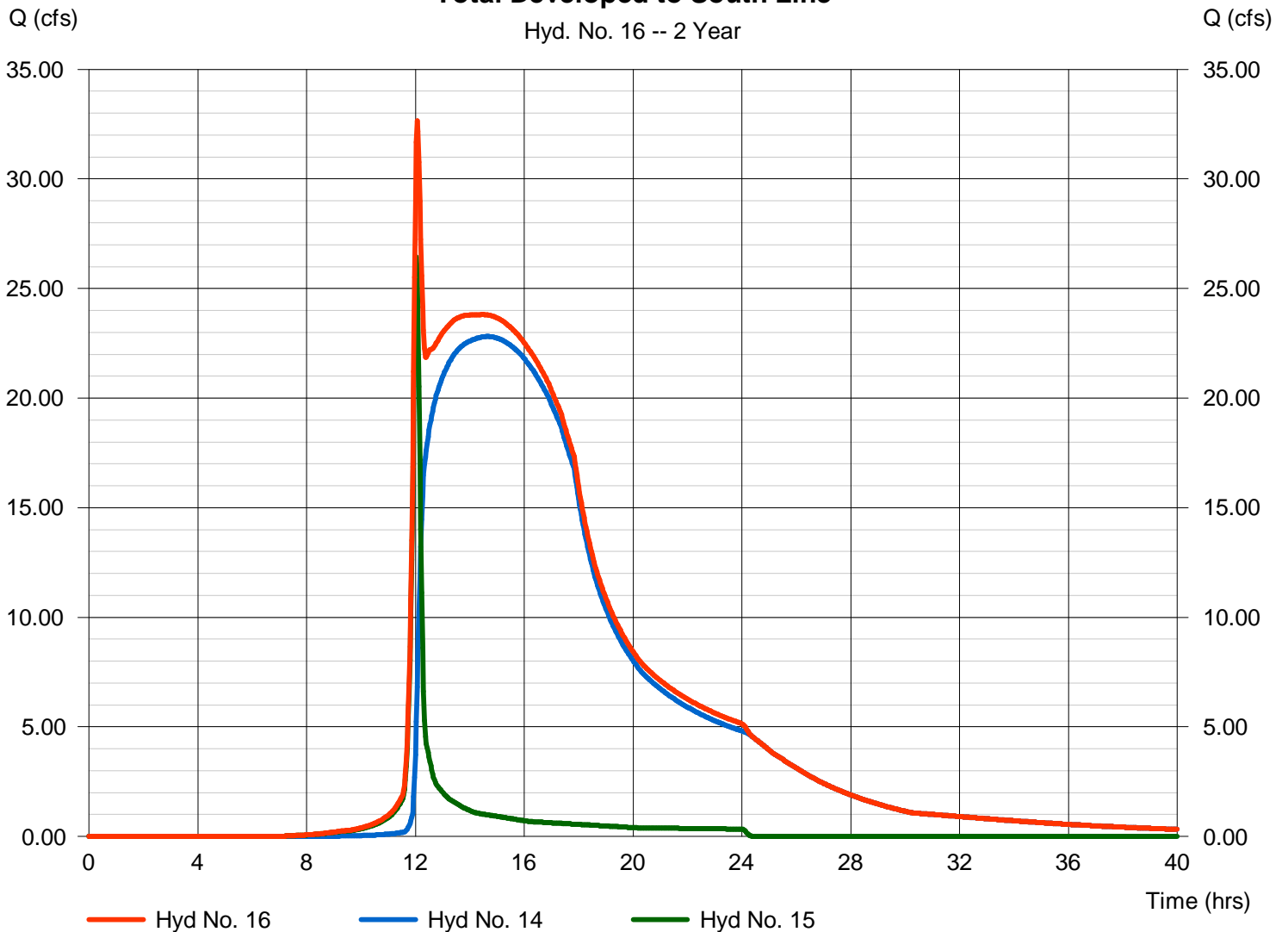
Total Developed to South Line

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 14, 15

Peak discharge = 32.64 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 784,526 cuft
 Contrib. drain. area = 10.000 ac

Total Developed to South Line

Hyd. No. 16 -- 2 Year



Hydrograph Report

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

Tuesday, Jun 18, 2013

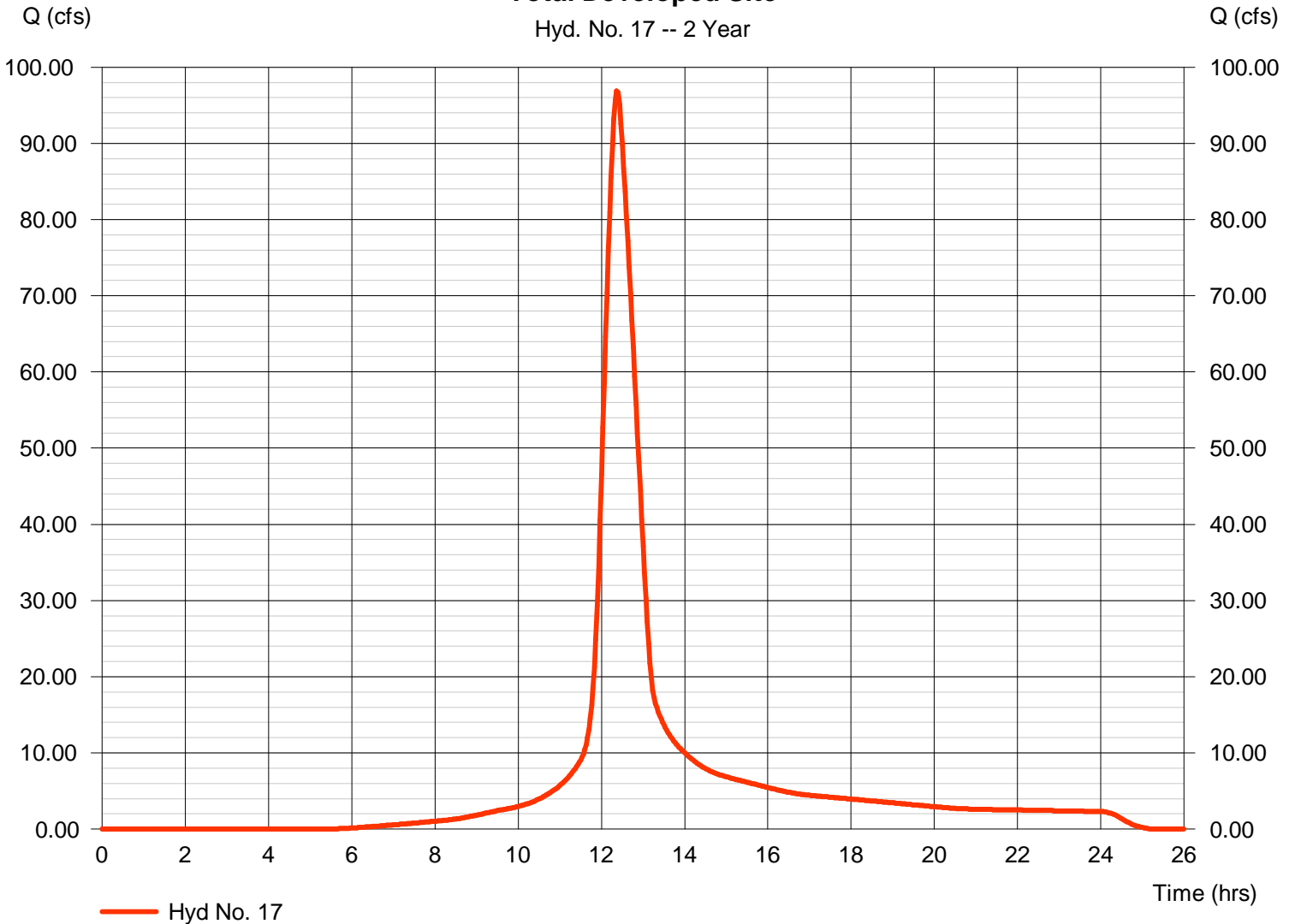
Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 96.89 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 550,938 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Developed Site

Hyd. No. 17 -- 2 Year



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	0.289	2	868	8,591	-----	-----	-----	Offsite North	
2	SCS Runoff	3.581	2	724	11,767	-----	-----	-----	Estate Lots ot North Pond	
3	SCS Runoff	4.124	2	724	12,358	-----	-----	-----	West Developed to North Pond	
4	SCS Runoff	0.832	2	774	10,496	-----	-----	-----	Offsite West	
5	SCS Runoff	2.334	2	724	7,671	-----	-----	-----	South Estate	
6	Combine	7.706	2	724	32,716	1, 2, 3,	-----	-----	Total to North Pond	
7	SCS Runoff	2.403	2	724	7,199	-----	-----	-----	West Developed to Middle Pond	
8	SCS Runoff	1.379	2	724	4,533	-----	-----	-----	Estate Lots to Middle Pond	
9	Reservoir	0.479	2	1068	31,671	6	1356.70	15,898	North Pond	
10	Combine	3.821	2	724	43,403	7, 8, 9	-----	-----	Total to Middle Pond	
11	Reservoir	0.894	2	750	43,367	10	1354.05	3,765	Middle Pond	
12	SCS Runoff	2.803	2	724	8,399	-----	-----	-----	South West Developed	
13	Combine	5.752	2	724	69,932	4, 5, 11, 12	-----	-----	Total to South Pond	
14	Reservoir	0.860	2	1186	68,378	13	1349.18	24,318	South Pond	
15	SCS Runoff	3.526	2	724	10,814	-----	-----	-----	South Undetained	
16	Combine	3.573	2	724	79,192	14, 15	-----	-----	Total Developed to South Line	
17	SCS Runoff	17.40	2	744	103,006	-----	-----	-----	Total Developed Site	
The Ranch Total Site.gpw					Return Period: 3 Year			Tuesday, Jun 18, 2013		

Hydrograph Report

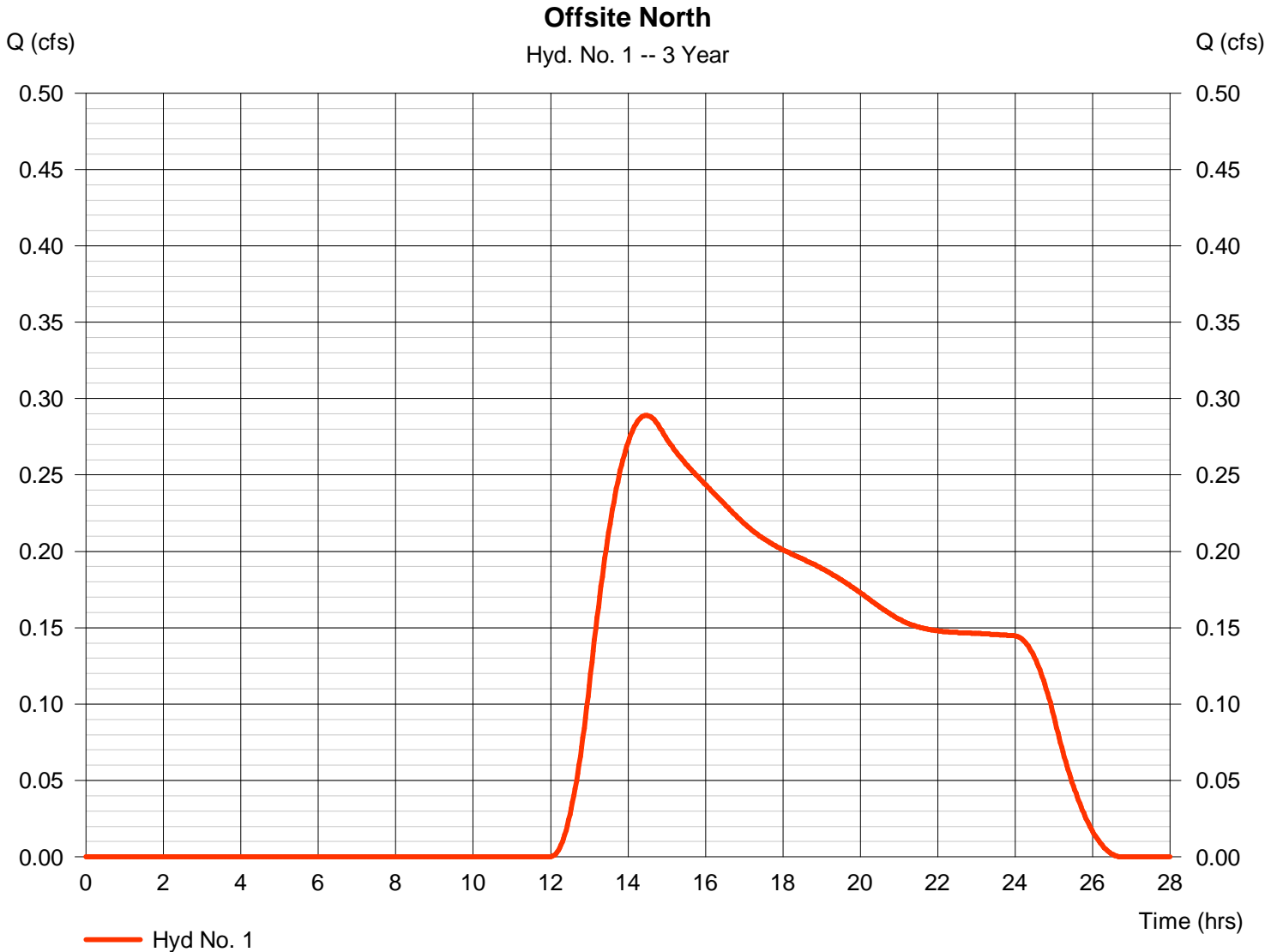
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 0.289 cfs
Storm frequency	= 3 yrs	Time to peak	= 14.47 hrs
Time interval	= 2 min	Hyd. volume	= 8,591 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

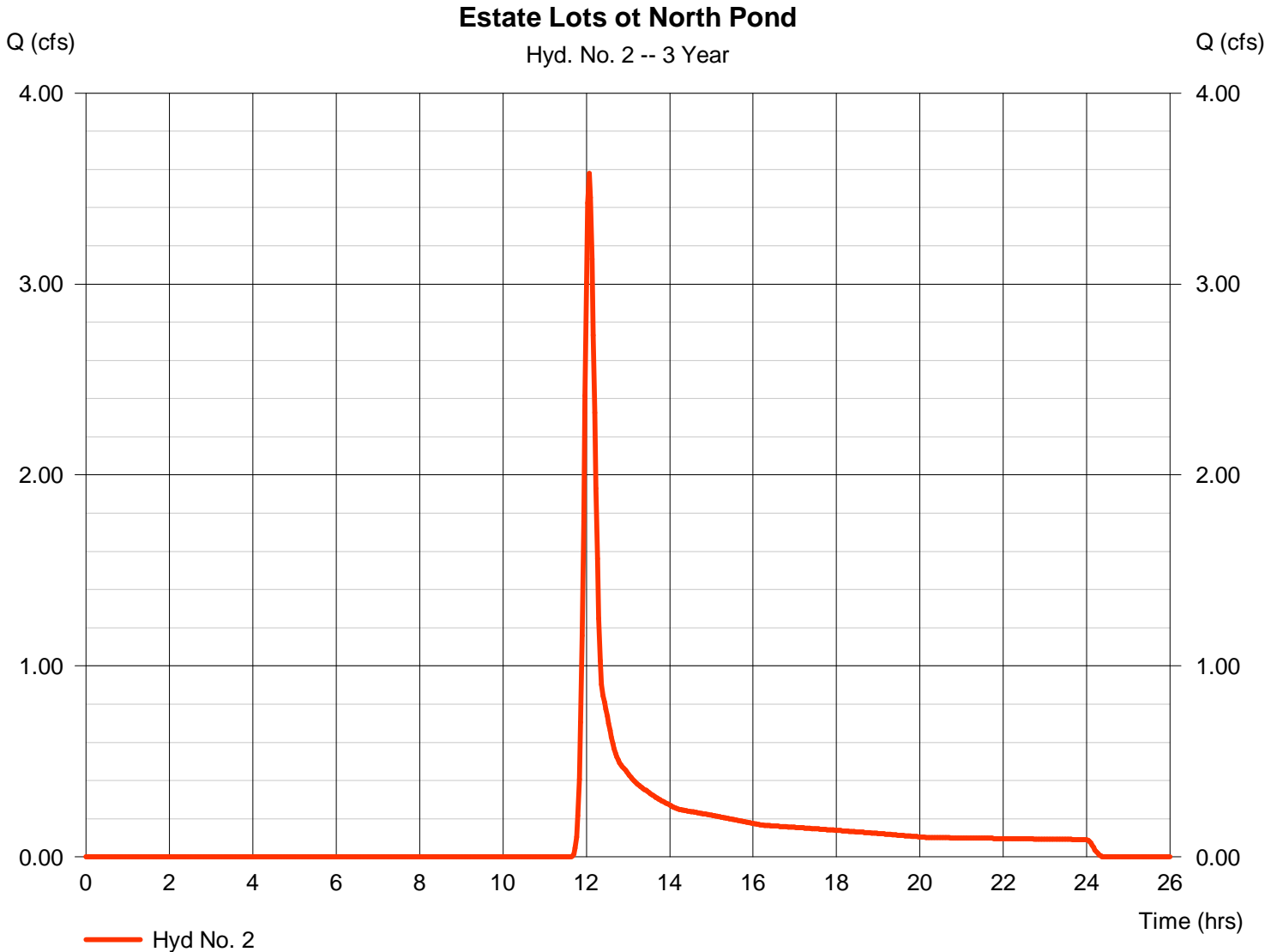
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 3.581 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,767 cuft
Drainage area	= 13.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

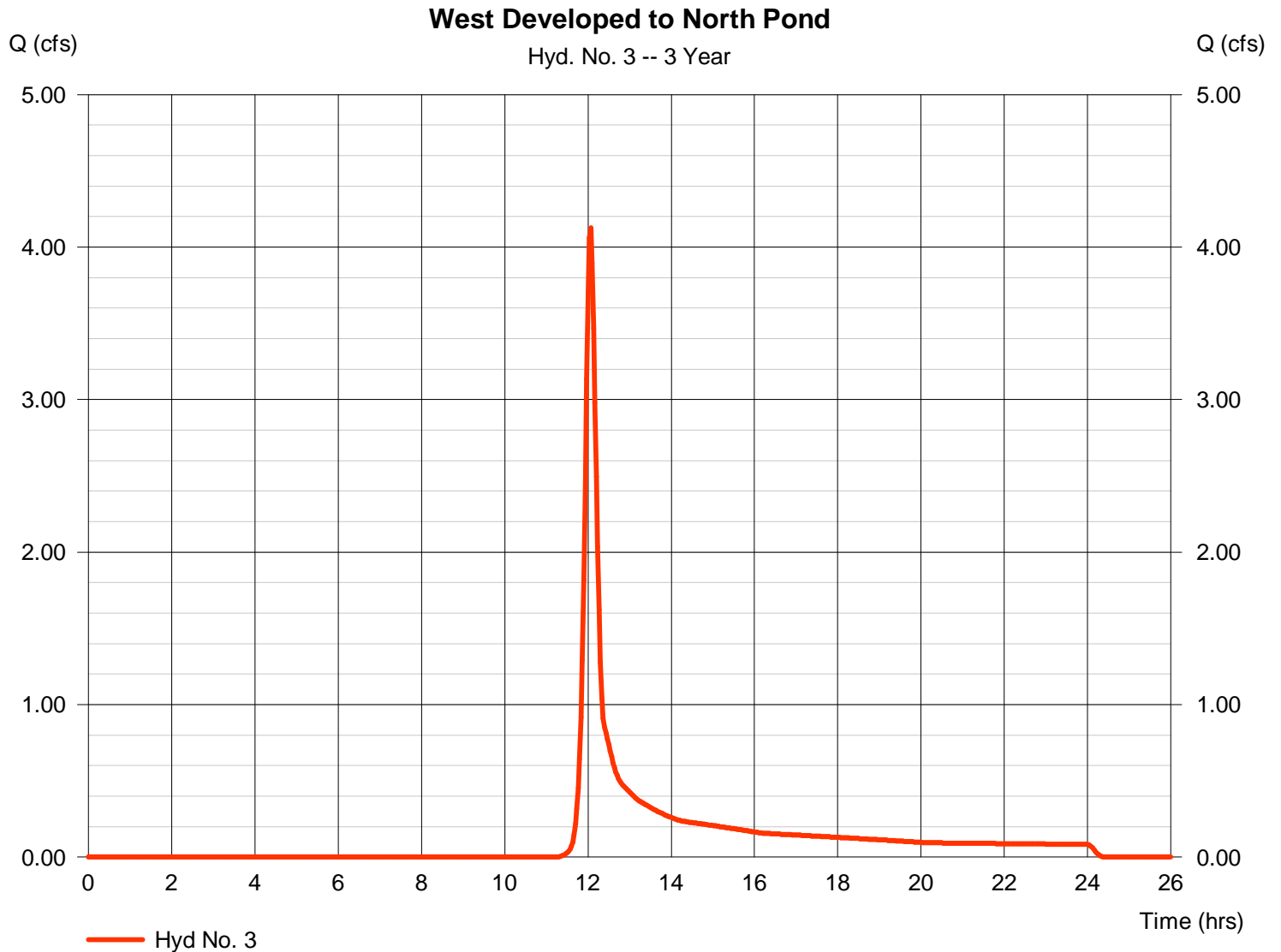
Tuesday, Jun 18, 2013

Hyd. No. 3

West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 4.124 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 12,358 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 10.300



Hydrograph Report

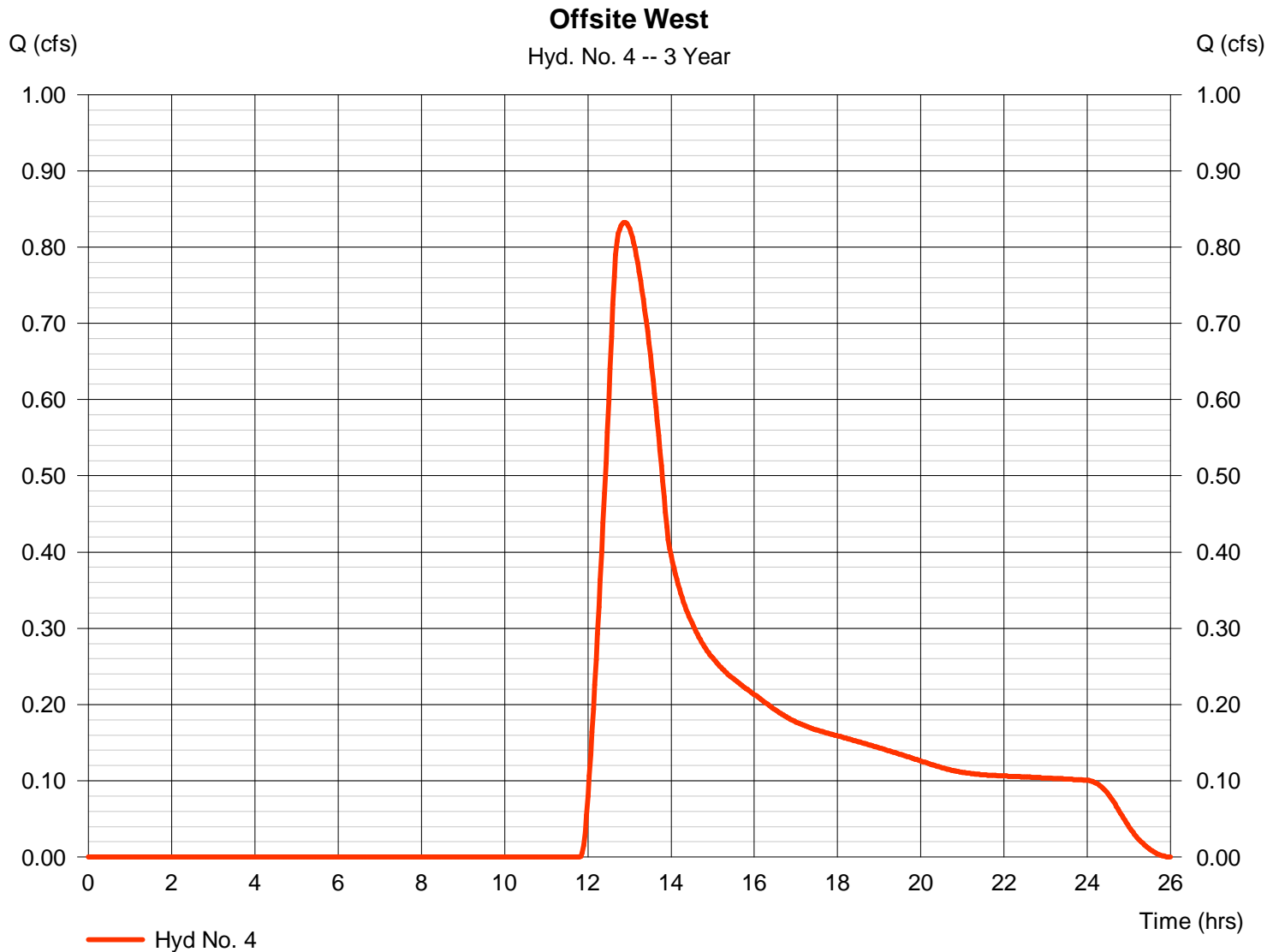
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 0.832 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.90 hrs
Time interval	= 2 min	Hyd. volume	= 10,496 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

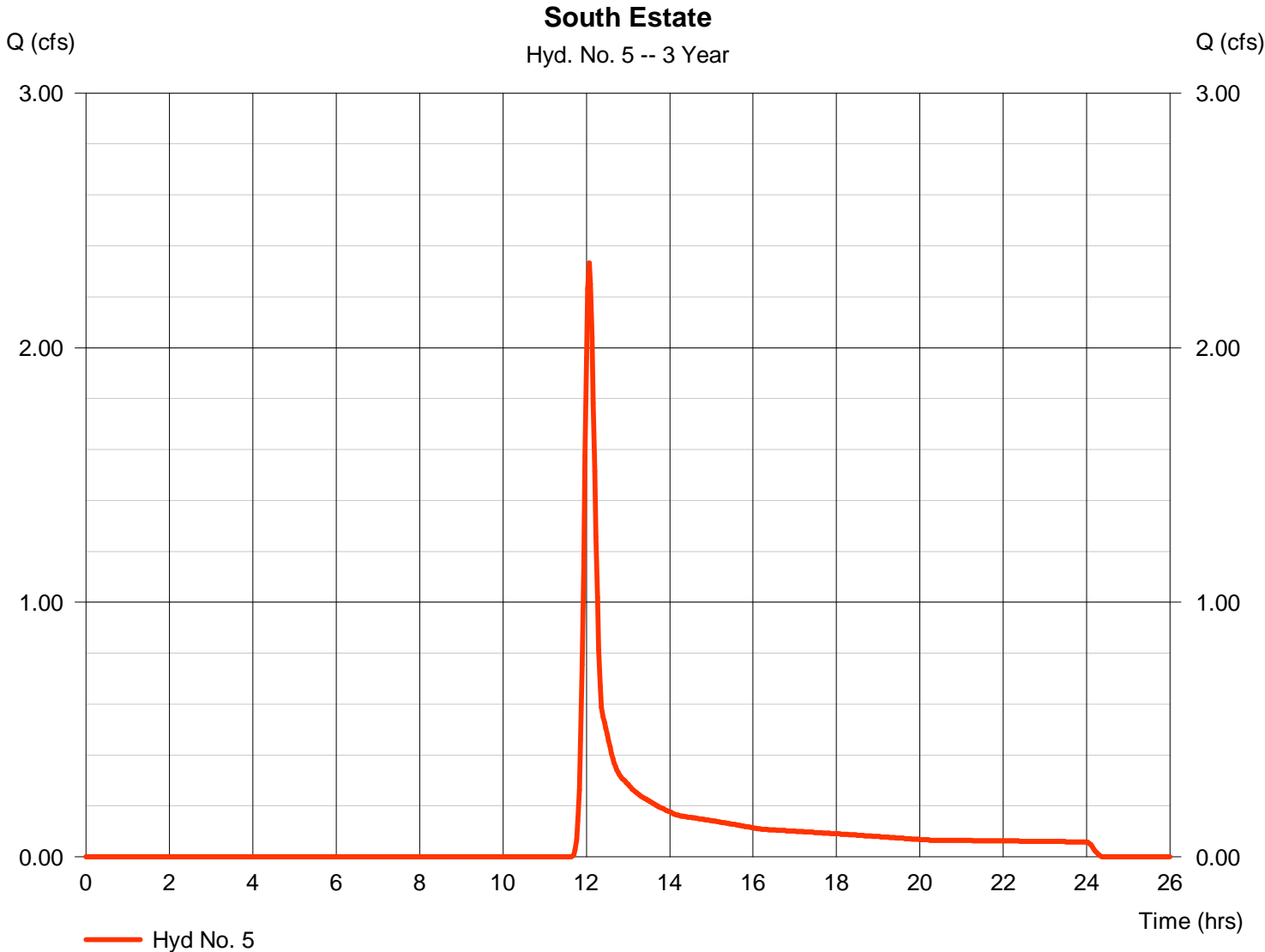


Hydrograph Report

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 2.334 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,671 cuft
Drainage area	= 8.800 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

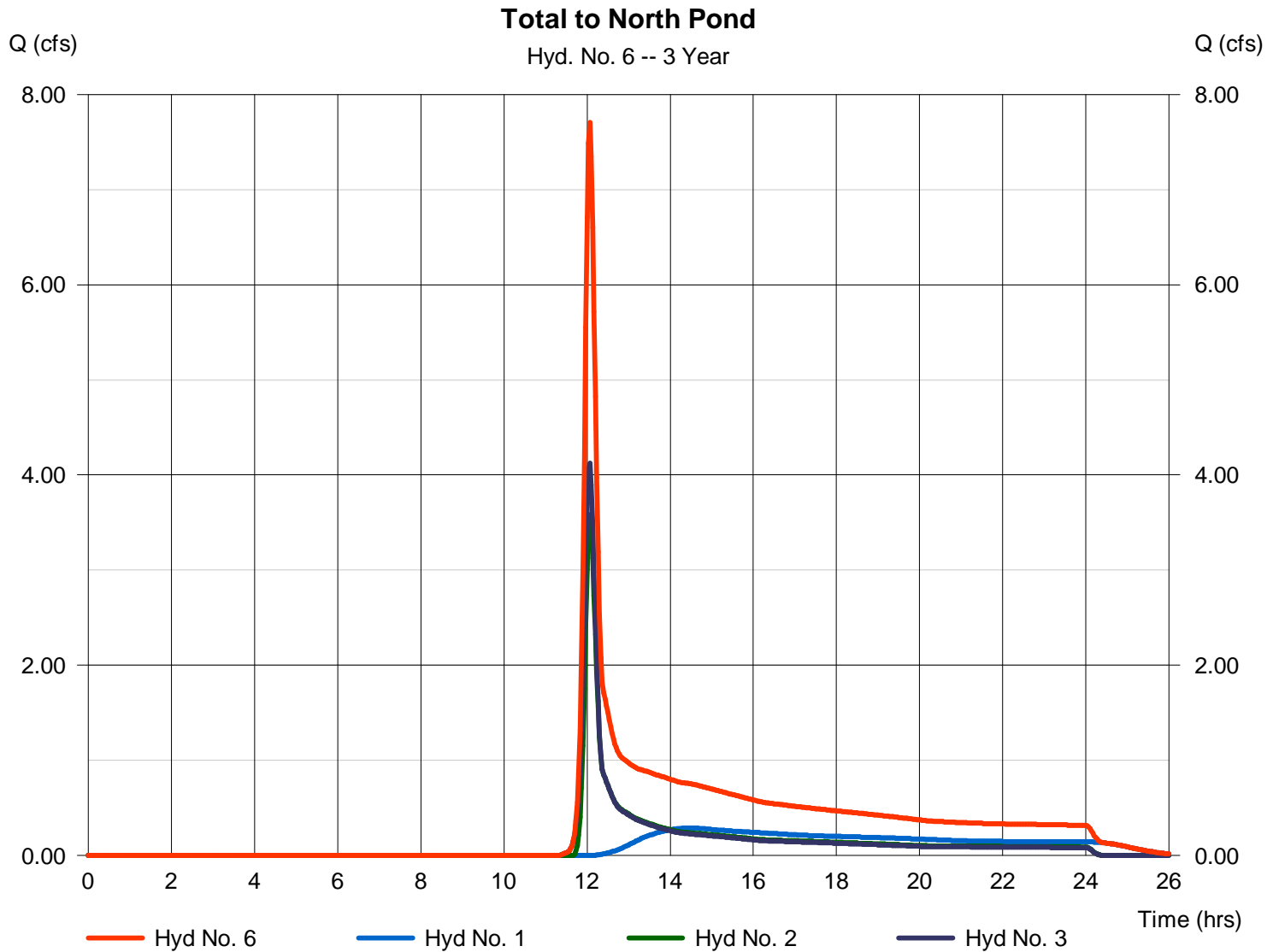
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 7.706 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 32,716 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 80.800 ac

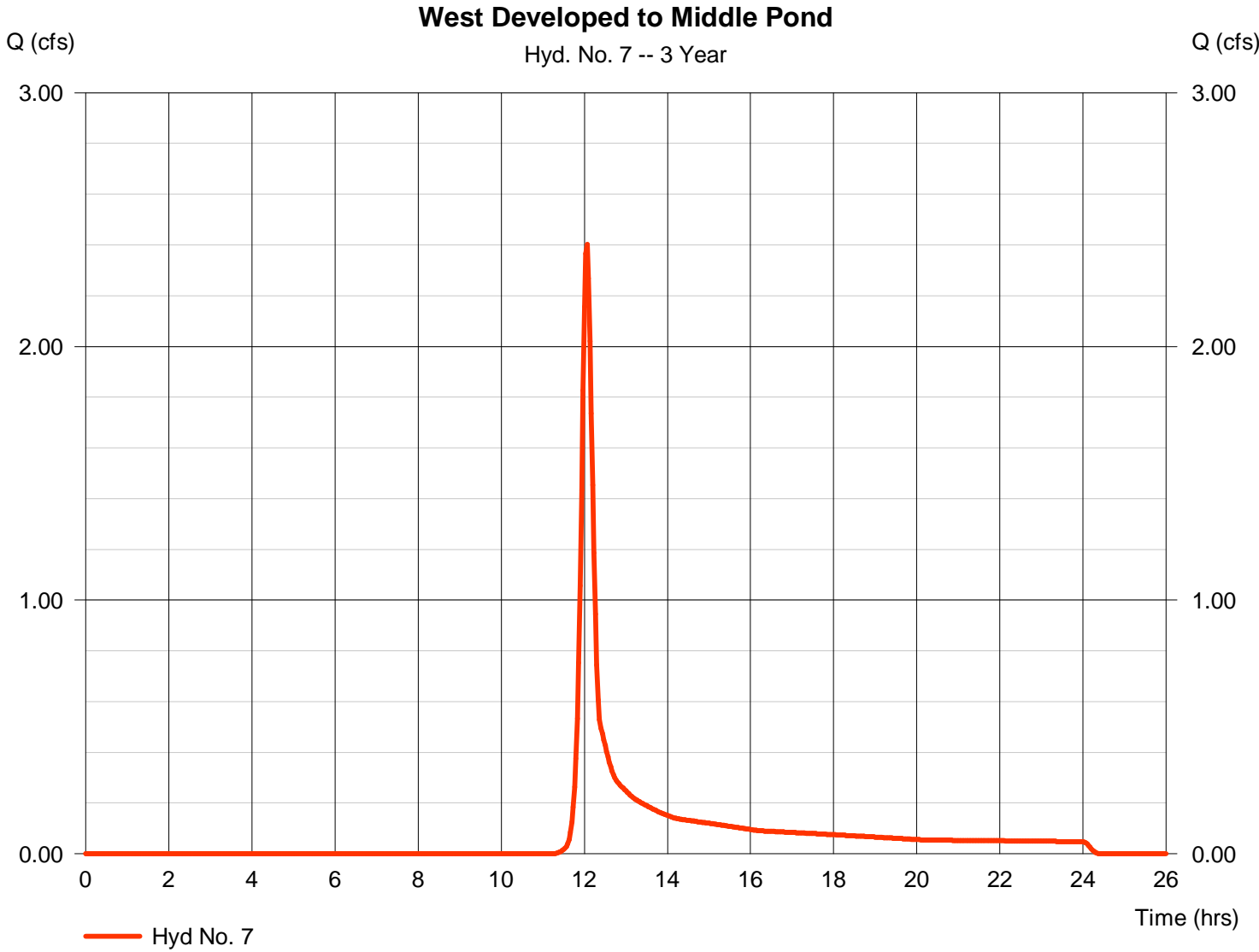


Hydrograph Report

Hyd. No. 7

West Developed to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 2.403 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,199 cuft
Drainage area	= 6.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

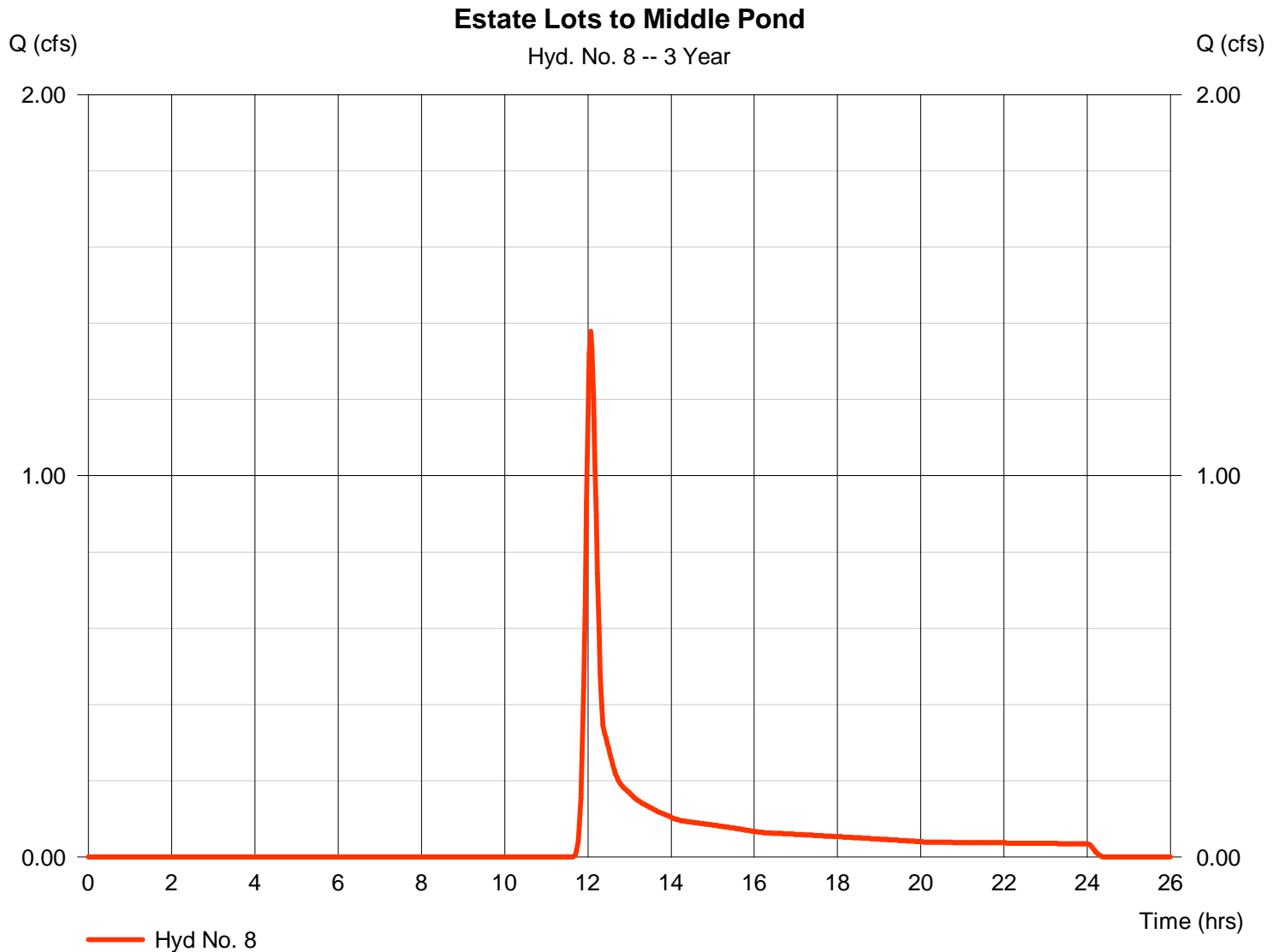
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 1.379 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,533 cuft
Drainage area	= 5.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

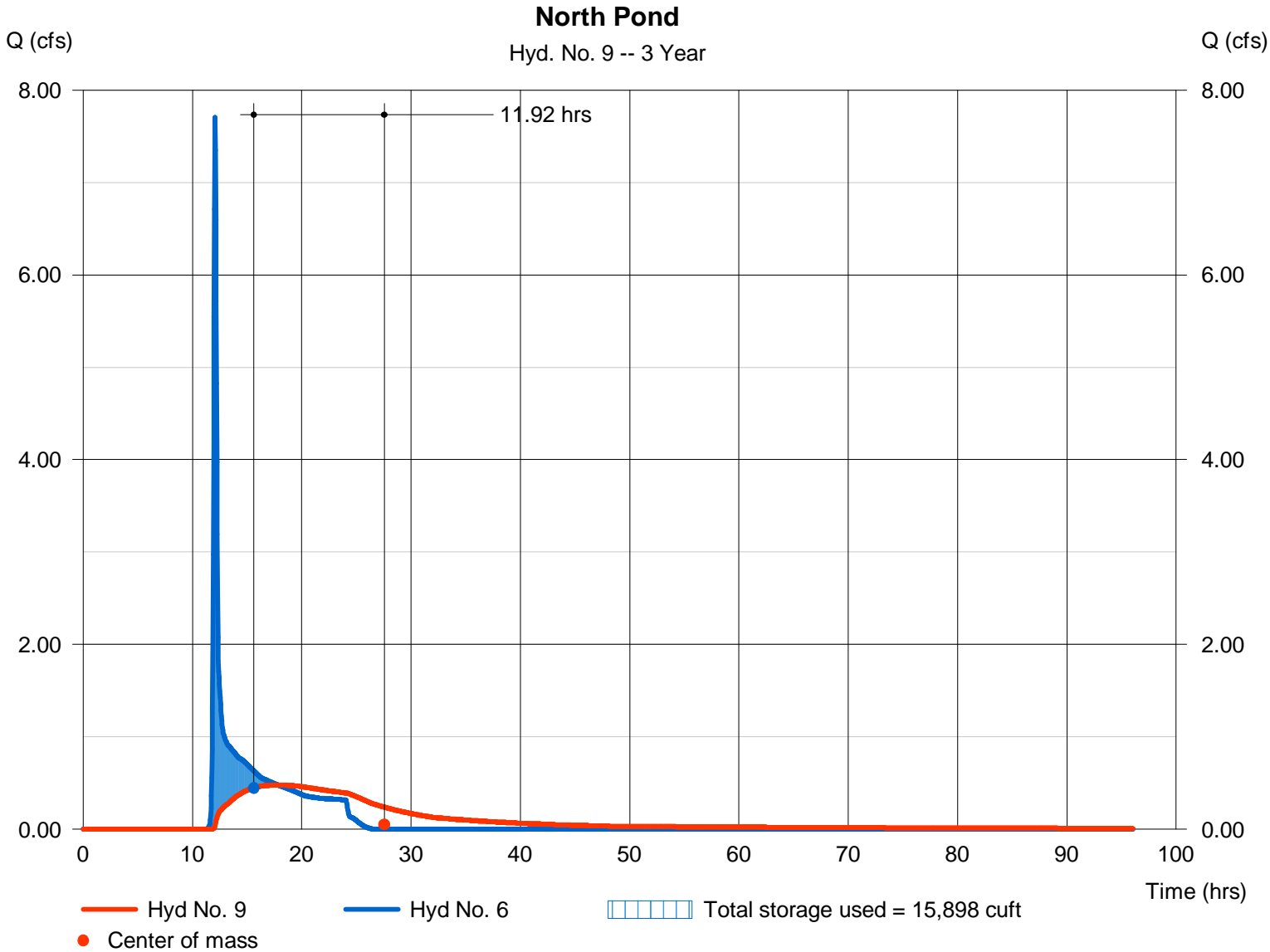
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 0.479 cfs
Storm frequency	= 3 yrs	Time to peak	= 17.80 hrs
Time interval	= 2 min	Hyd. volume	= 31,671 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1356.70 ft
Reservoir name	= North Pond	Max. Storage	= 15,898 cuft

Storage Indication method used.



Hydrograph Report

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

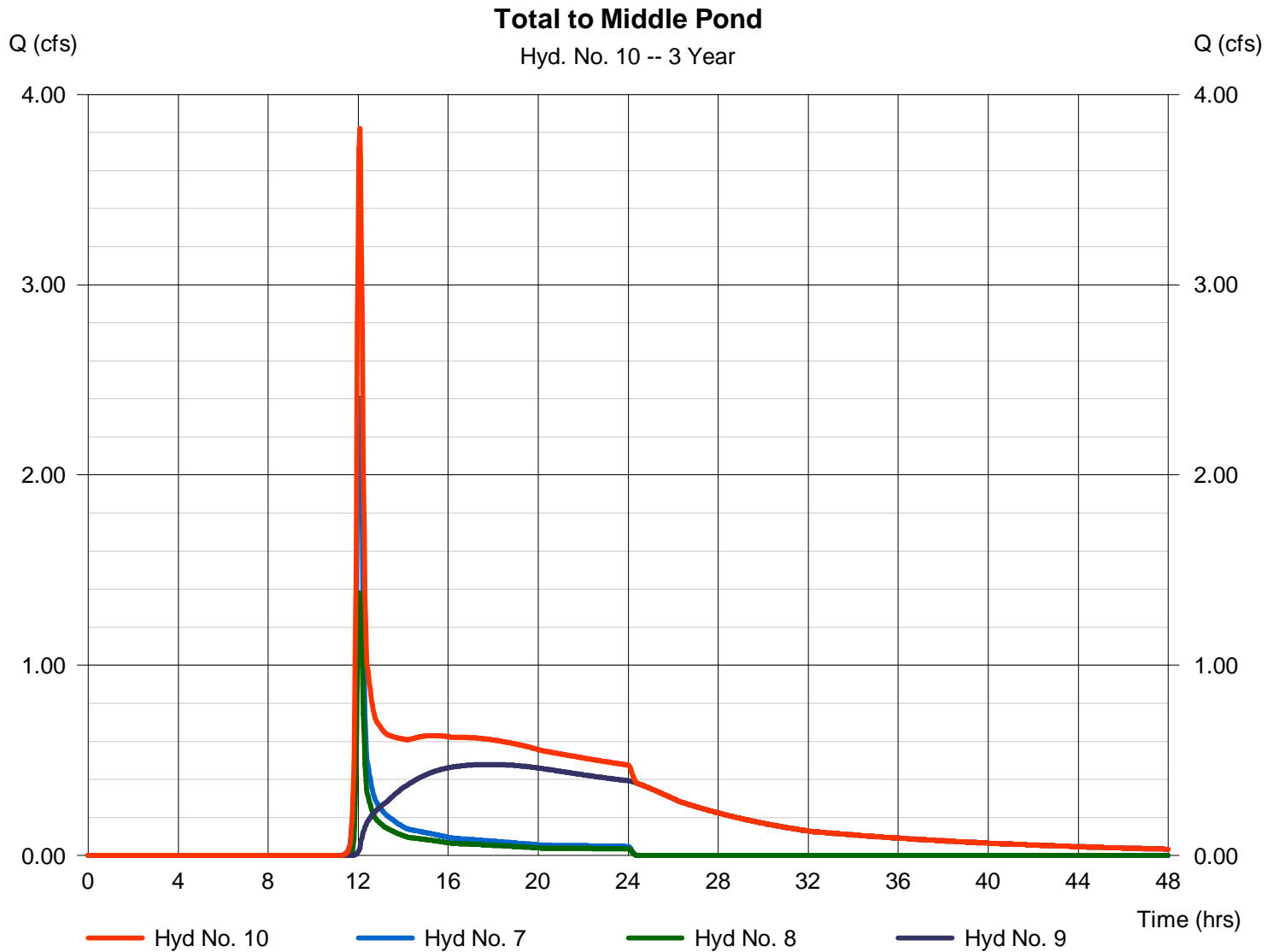
Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type = Combine
 Storm frequency = 3 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 3.821 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 43,403 cuft
 Contrib. drain. area = 11.200 ac



Hydrograph Report

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

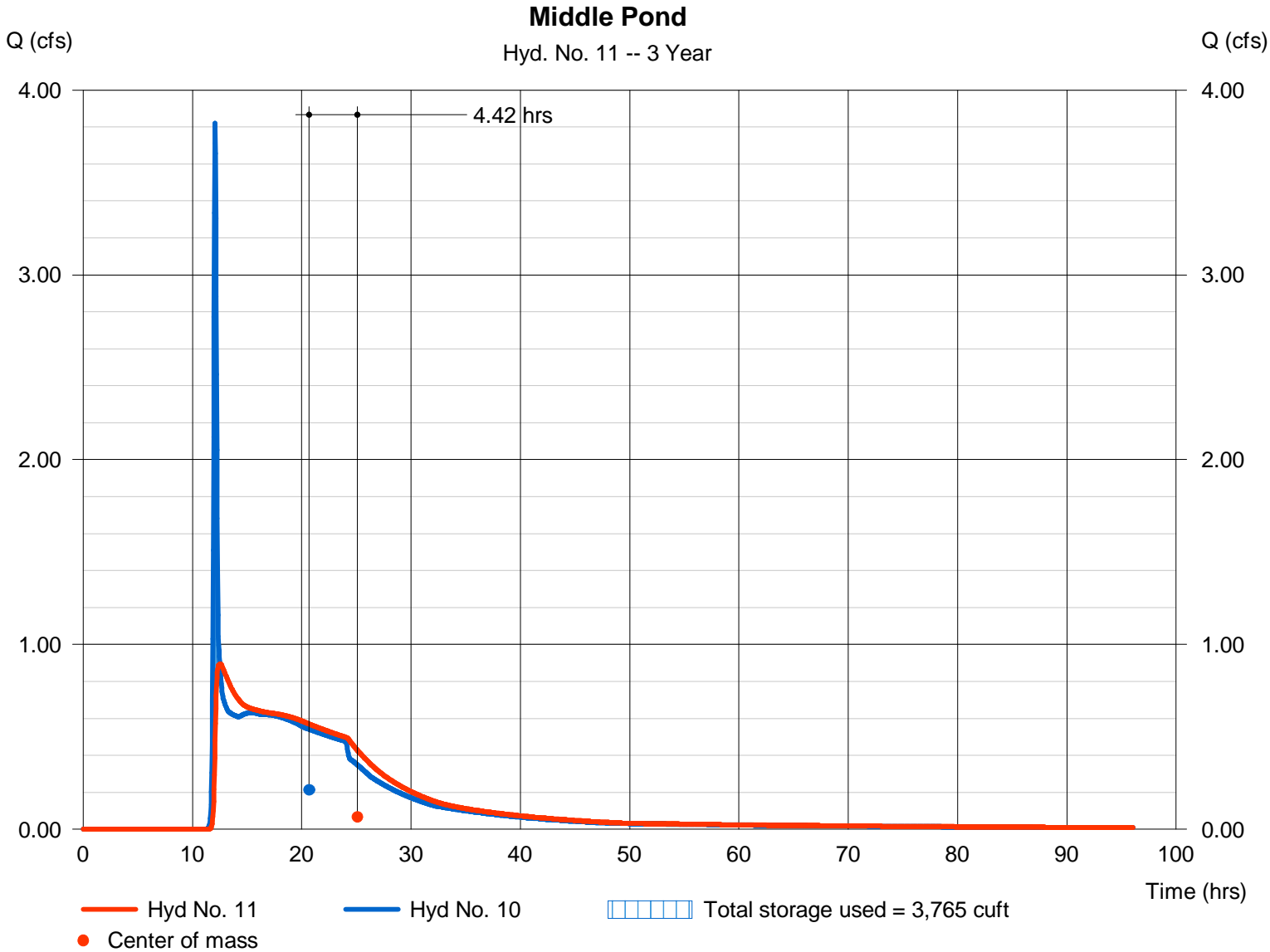
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 0.894 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.50 hrs
Time interval	= 2 min	Hyd. volume	= 43,367 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1354.05 ft
Reservoir name	= Middle Pond	Max. Storage	= 3,765 cuft

Storage Indication method used.



Hydrograph Report

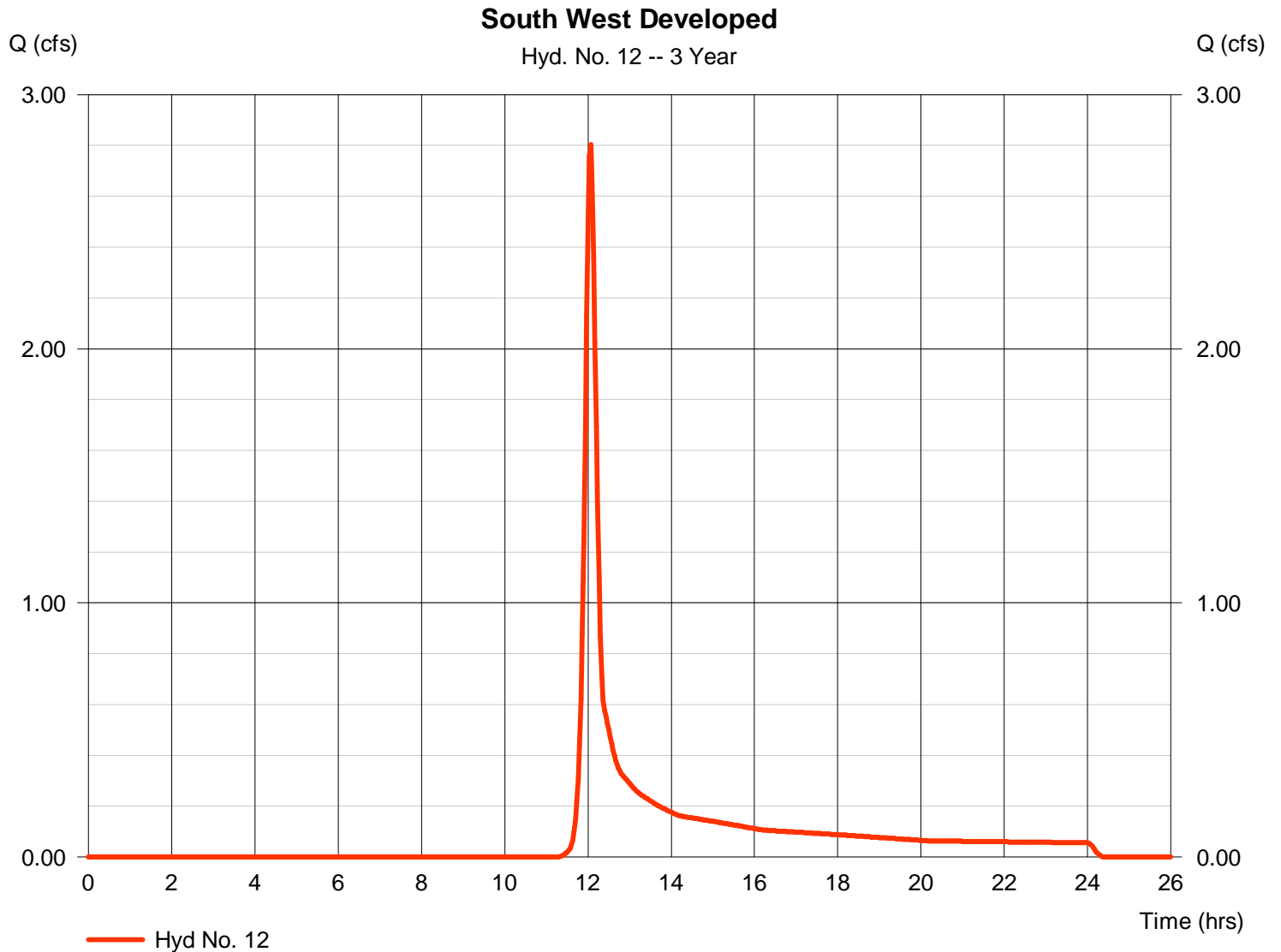
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 2.803 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 8,399 cuft
Drainage area	= 7.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

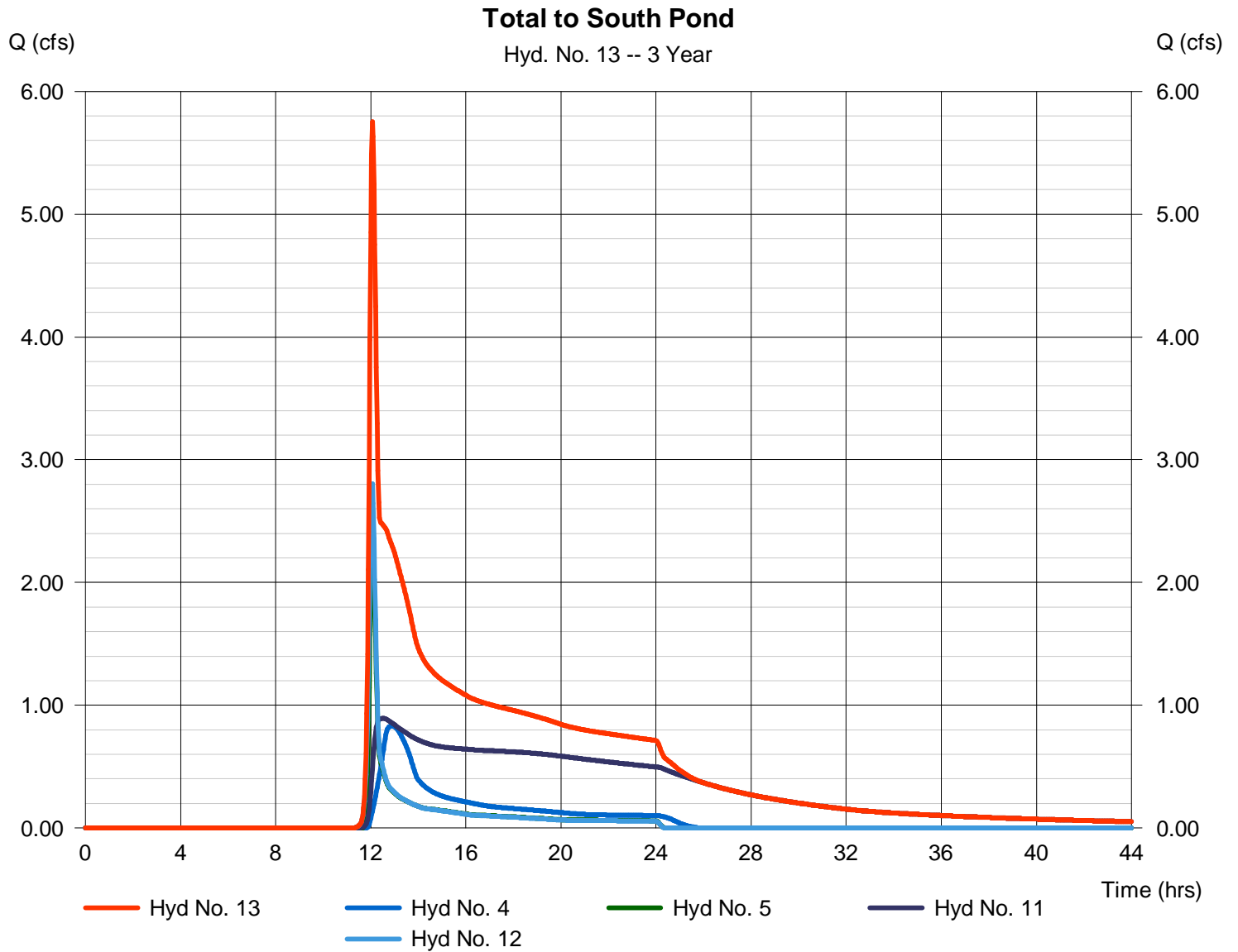
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 5.752 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 69,932 cuft
Inflow hyds.	= 4, 5, 11, 12	Contrib. drain. area	= 34.800 ac



Hydrograph Report

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

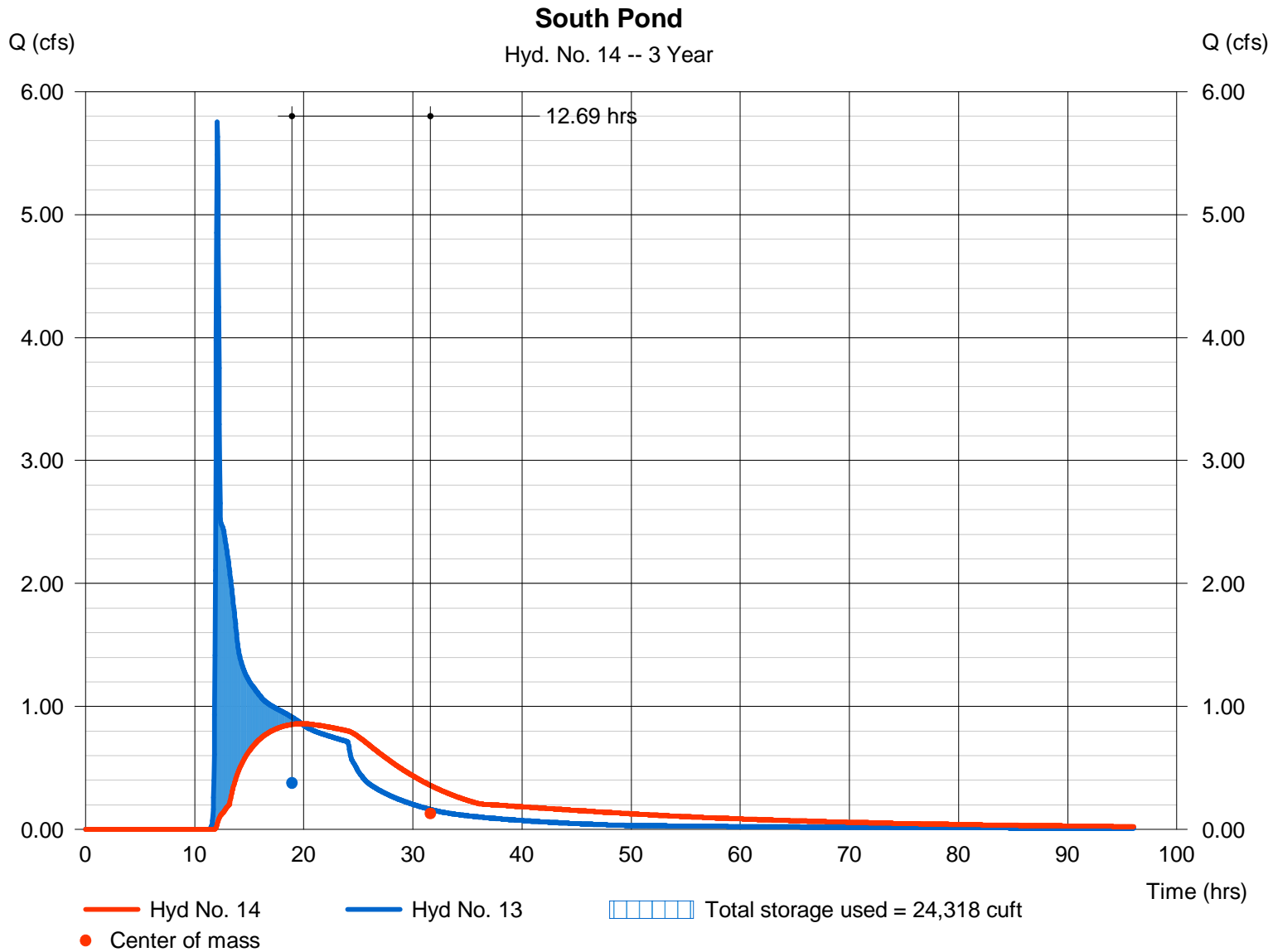
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 0.860 cfs
Storm frequency	= 3 yrs	Time to peak	= 19.77 hrs
Time interval	= 2 min	Hyd. volume	= 68,378 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1349.18 ft
Reservoir name	= South Pond	Max. Storage	= 24,318 cuft

Storage Indication method used.



Hydrograph Report

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

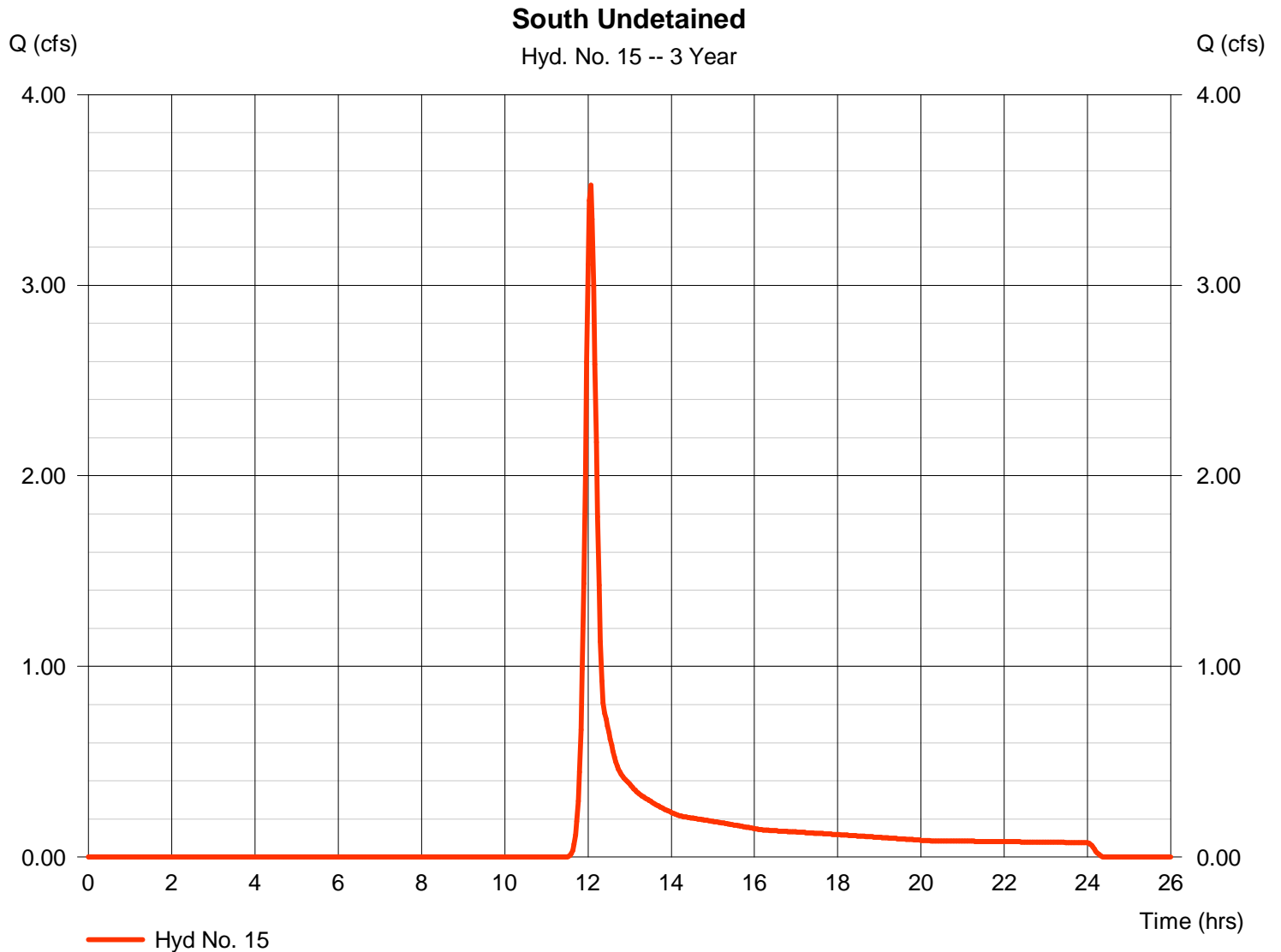
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 3.526 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 10,814 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = [(2.800 x 90) + (7.200 x 84)] / 10.000



Hydrograph Report

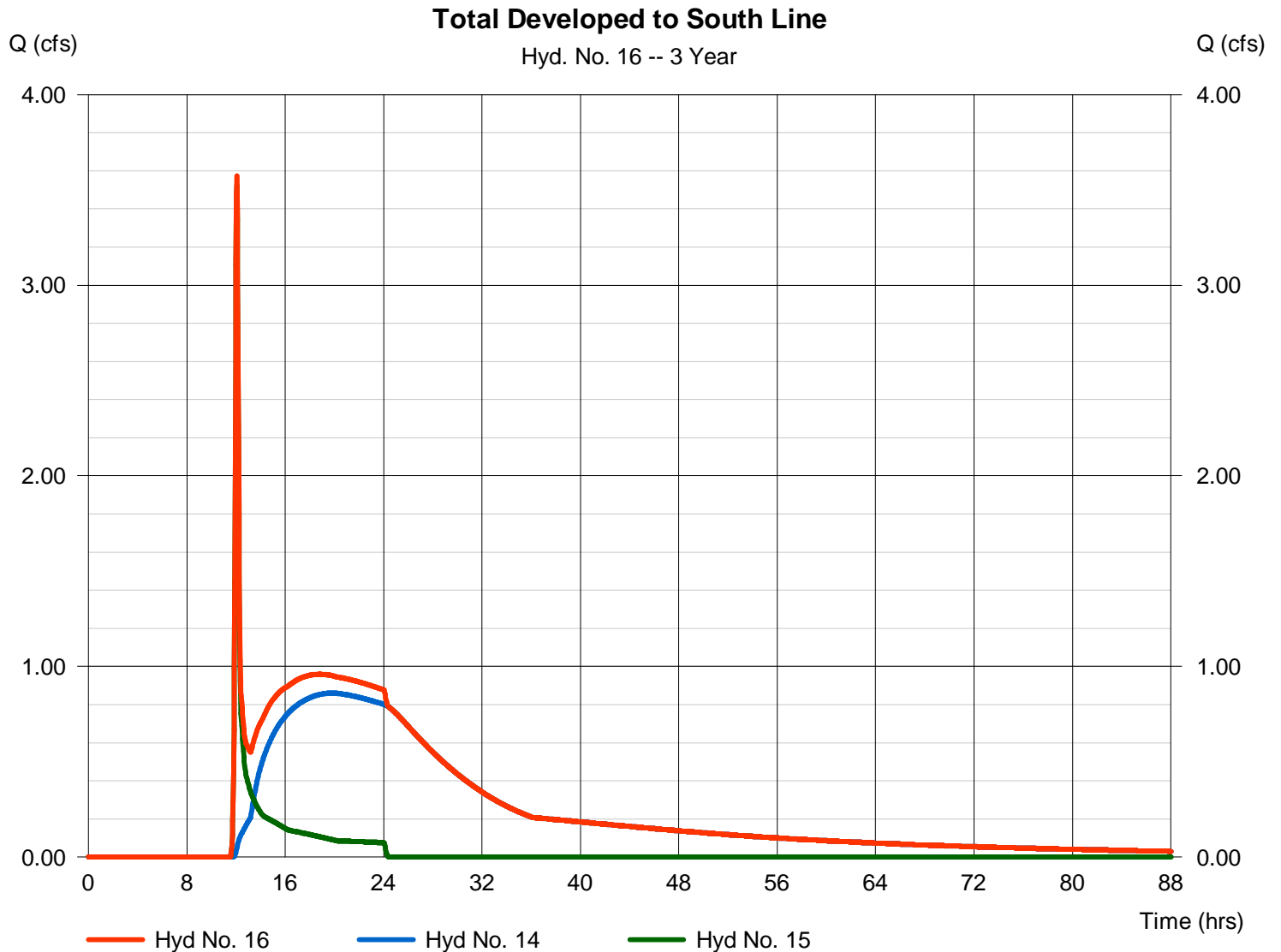
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 16

Total Developed to South Line

Hydrograph type	= Combine	Peak discharge	= 3.573 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 79,192 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 10.000 ac



Hydrograph Report

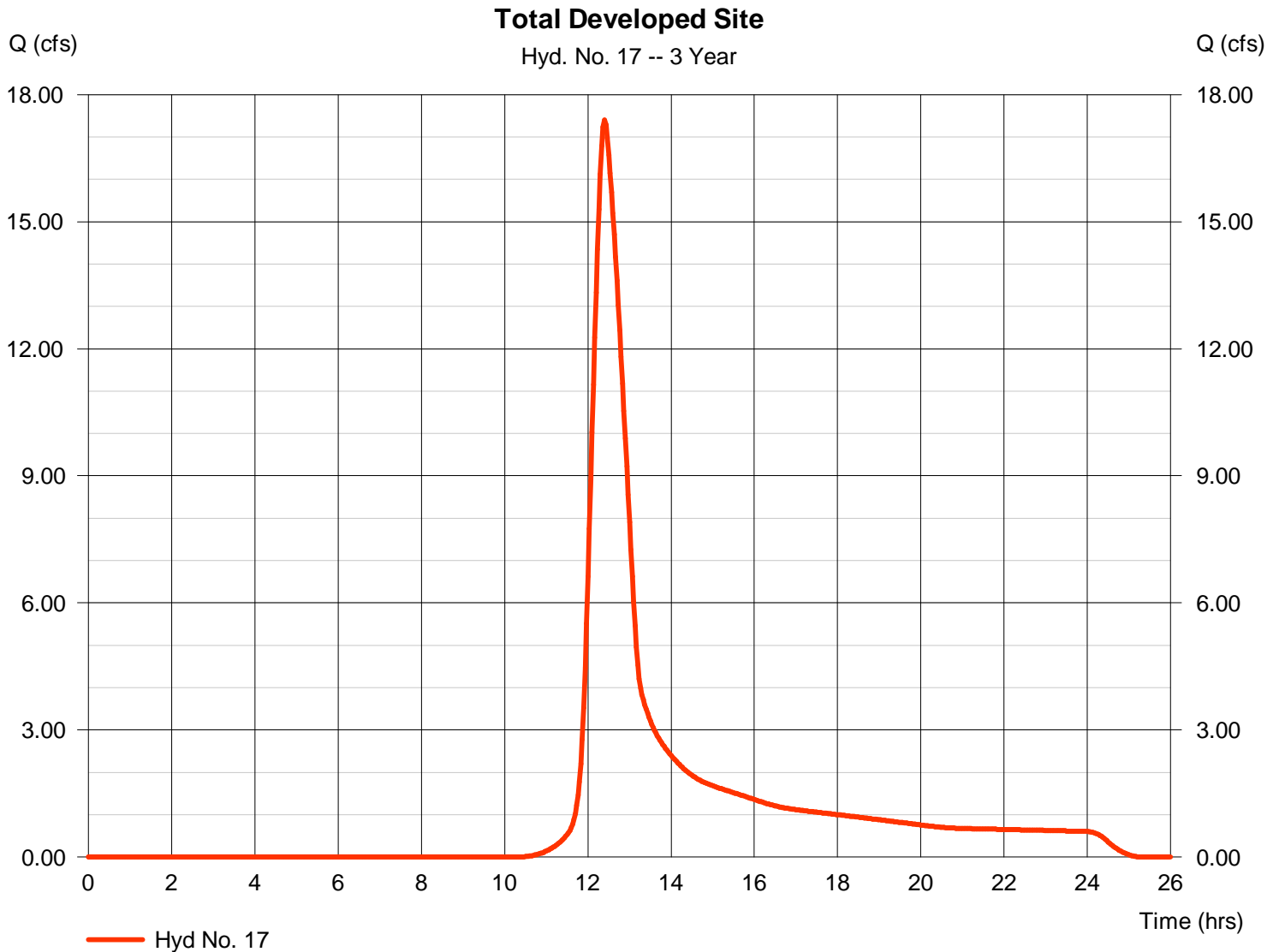
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 17.40 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 103,006 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 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	37.26	2	778	378,168	-----	-----	-----	Offsite North
2	SCS Runoff	47.76	2	722	134,576	-----	-----	-----	Estate Lots ot North Pond
3	SCS Runoff	39.69	2	722	112,969	-----	-----	-----	West Developed to North Pond
4	SCS Runoff	21.90	2	760	168,850	-----	-----	-----	Offsite West
5	SCS Runoff	31.14	2	722	87,724	-----	-----	-----	South Estate
6	Combine	95.55	2	722	625,714	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	23.12	2	722	65,807	-----	-----	-----	West Developed to Middle Pond
8	SCS Runoff	18.40	2	722	51,837	-----	-----	-----	Estate Lots to Middle Pond
9	Reservoir	32.16	2	822	624,415	6	1358.63	196,914	North Pond
10	Combine	53.04	2	724	742,059	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	33.40	2	836	742,015	10	1354.73	51,922	Middle Pond
12	SCS Runoff	26.97	2	722	76,775	-----	-----	-----	South West Developed
13	Combine	85.24	2	724	1,075,364	4, 5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	38.77	2	852	1,073,330	13	1350.71	244,098	South Pond
15	SCS Runoff	37.49	2	722	106,292	-----	-----	-----	South Undetained
16	Combine	53.33	2	724	1,179,623	14, 15	-----	-----	Total Developed to South Line
17	SCS Runoff	133.24	2	742	764,250	-----	-----	-----	Total Developed Site
The Ranch Total Site.gpw					Return Period: 5 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

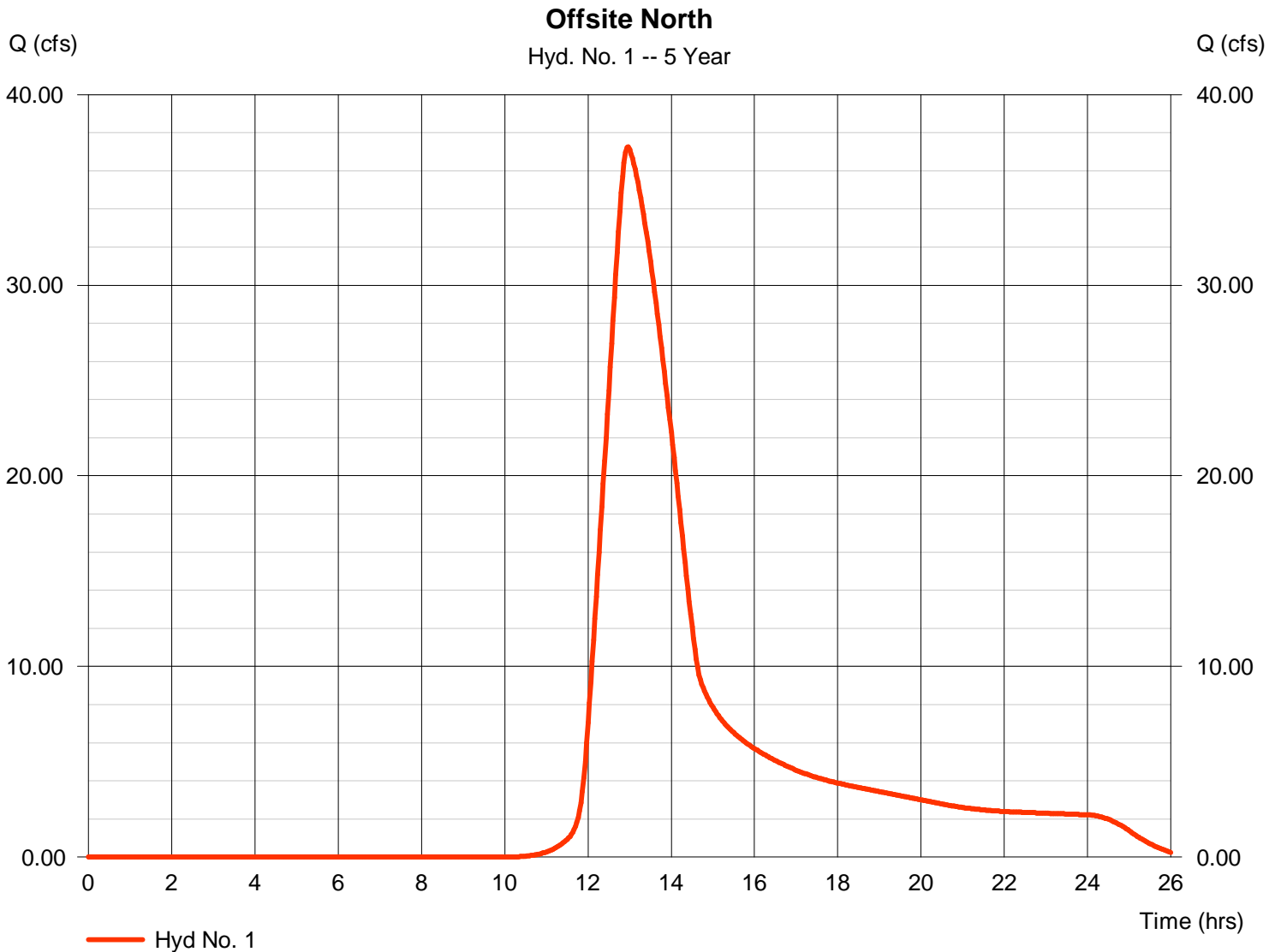
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 37.26 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.97 hrs
Time interval	= 2 min	Hyd. volume	= 378,168 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

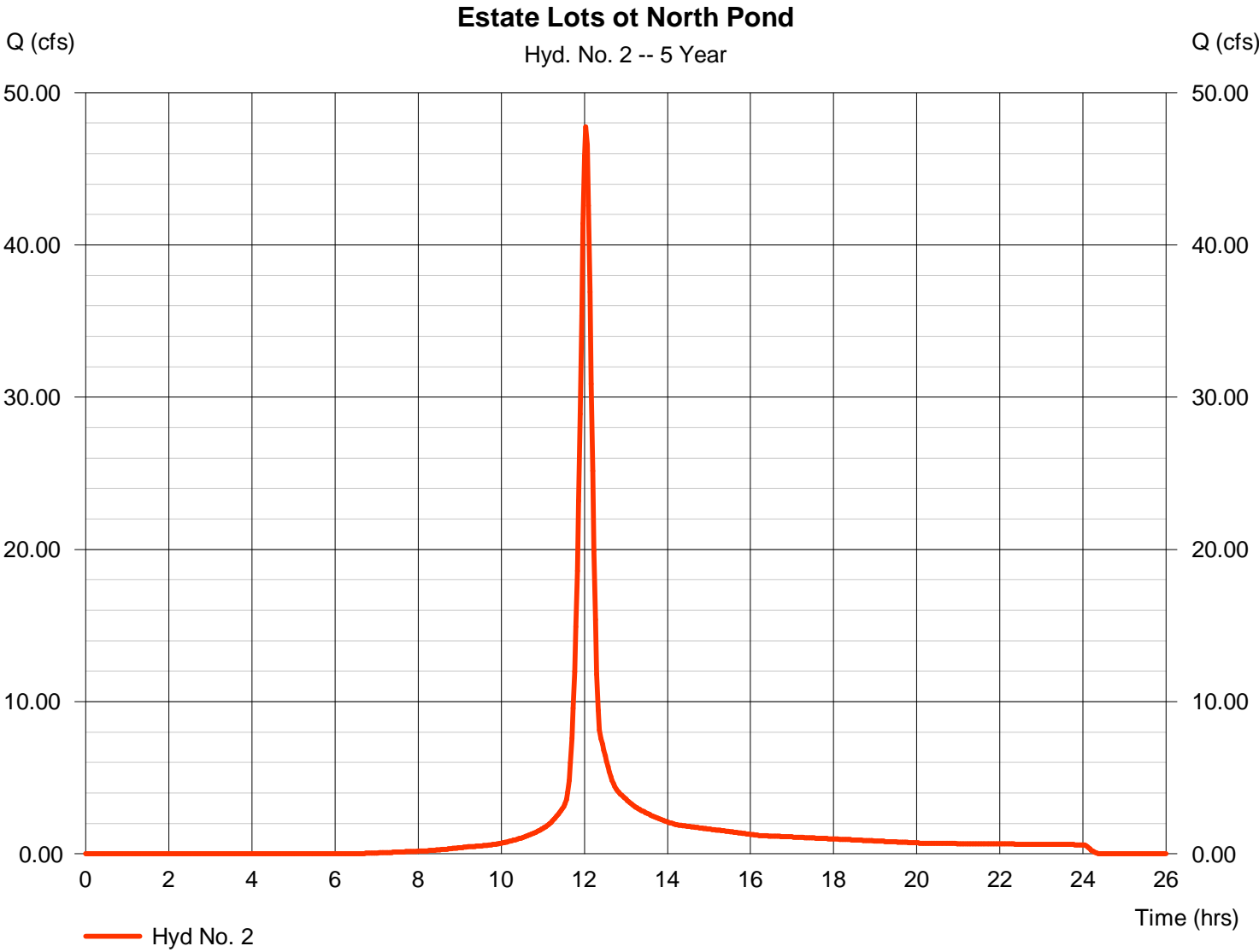
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 47.76 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 134,576 cuft
Drainage area	= 13.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

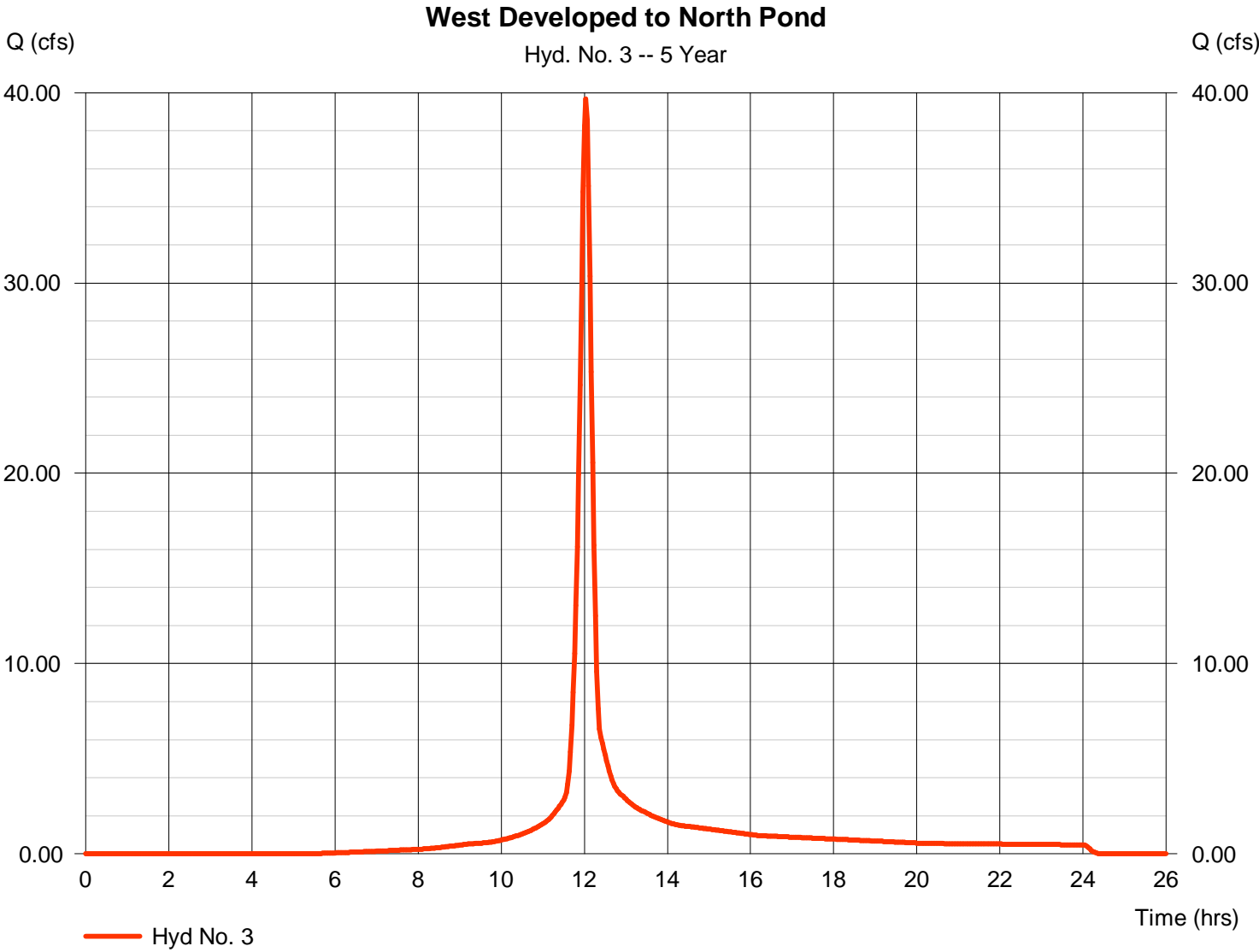
Tuesday, Jun 18, 2013

Hyd. No. 3

West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 39.69 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 112,969 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 10.300



Hydrograph Report

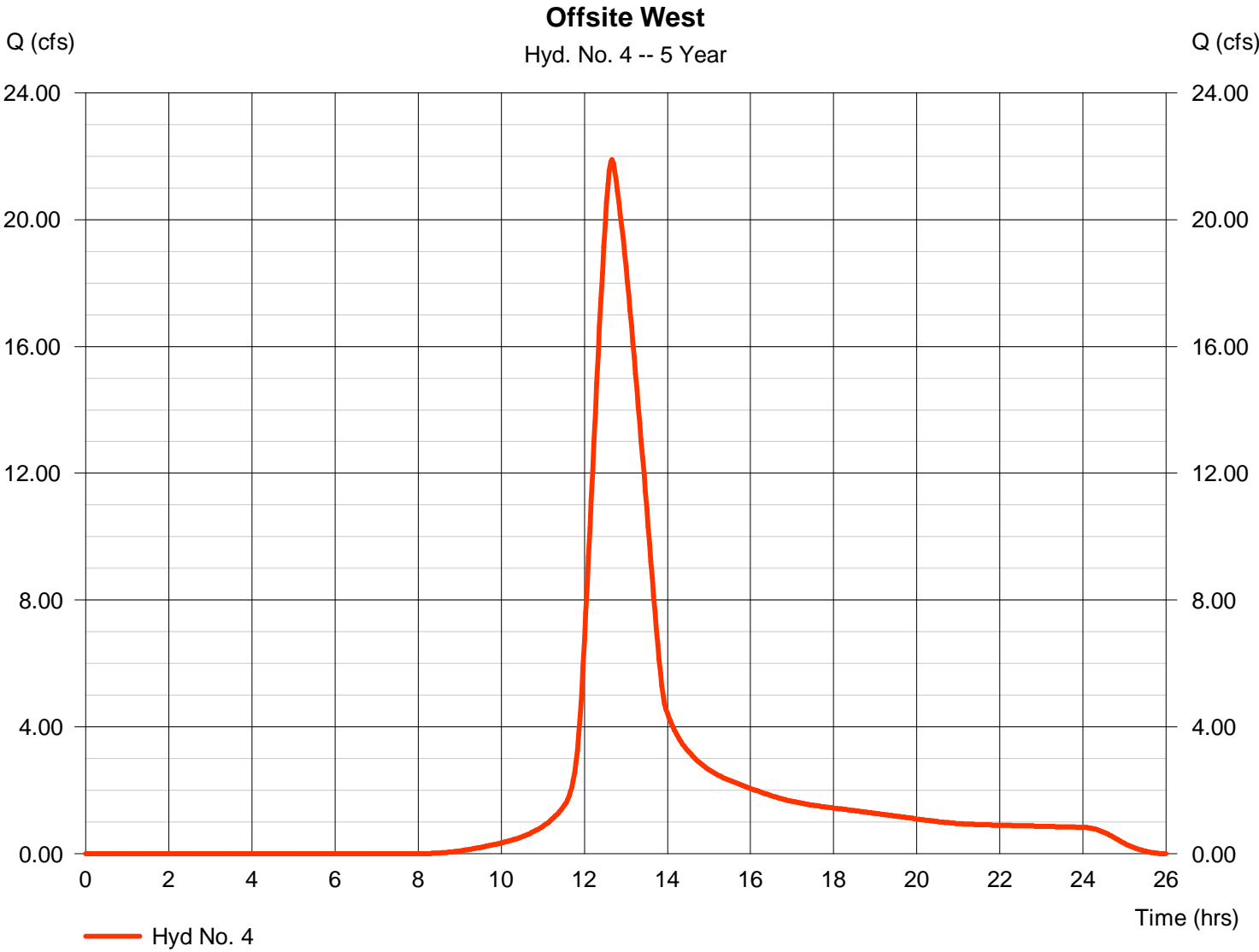
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Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 21.90 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 168,850 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

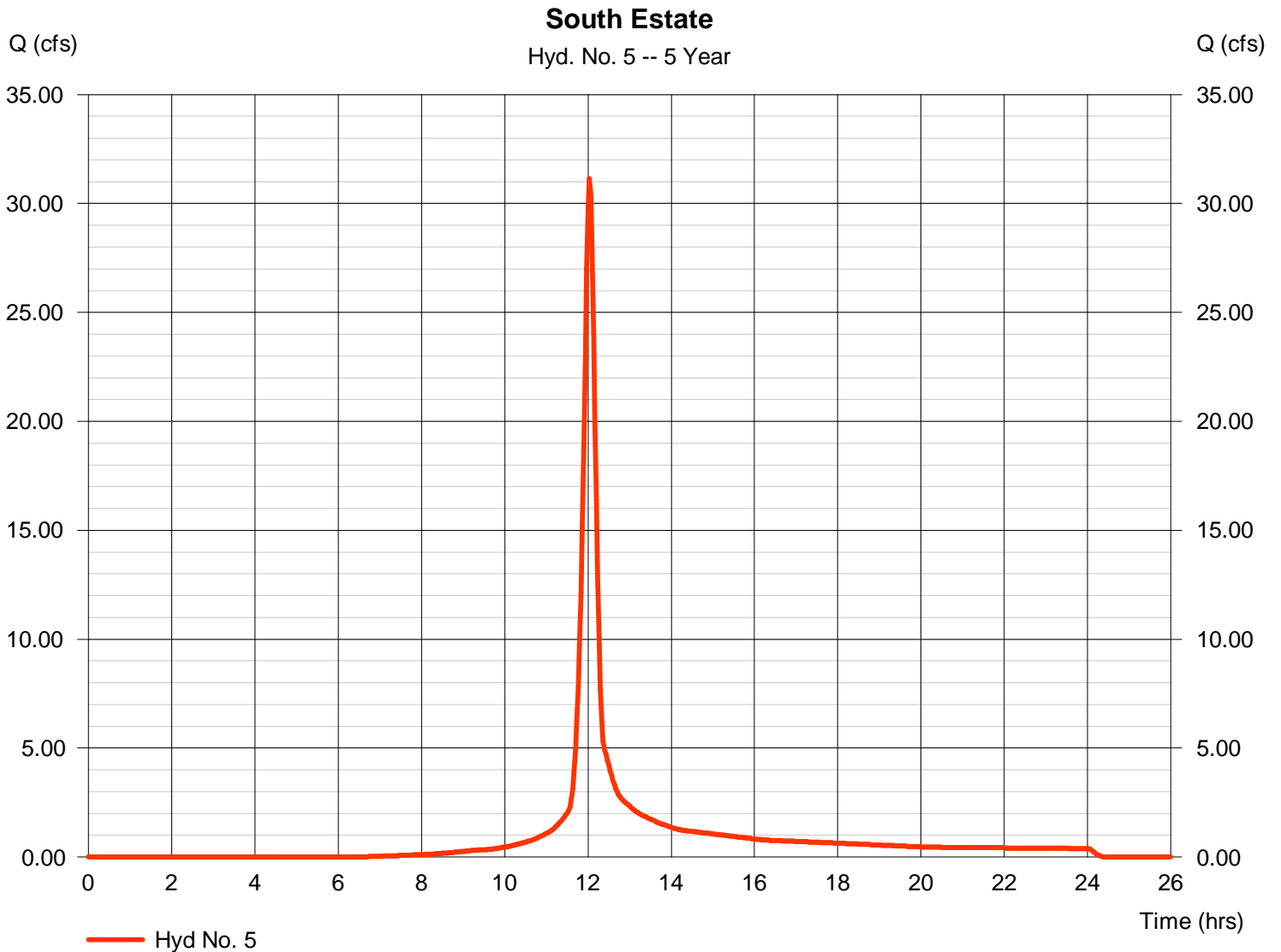
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 31.14 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 87,724 cuft
Drainage area	= 8.800 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

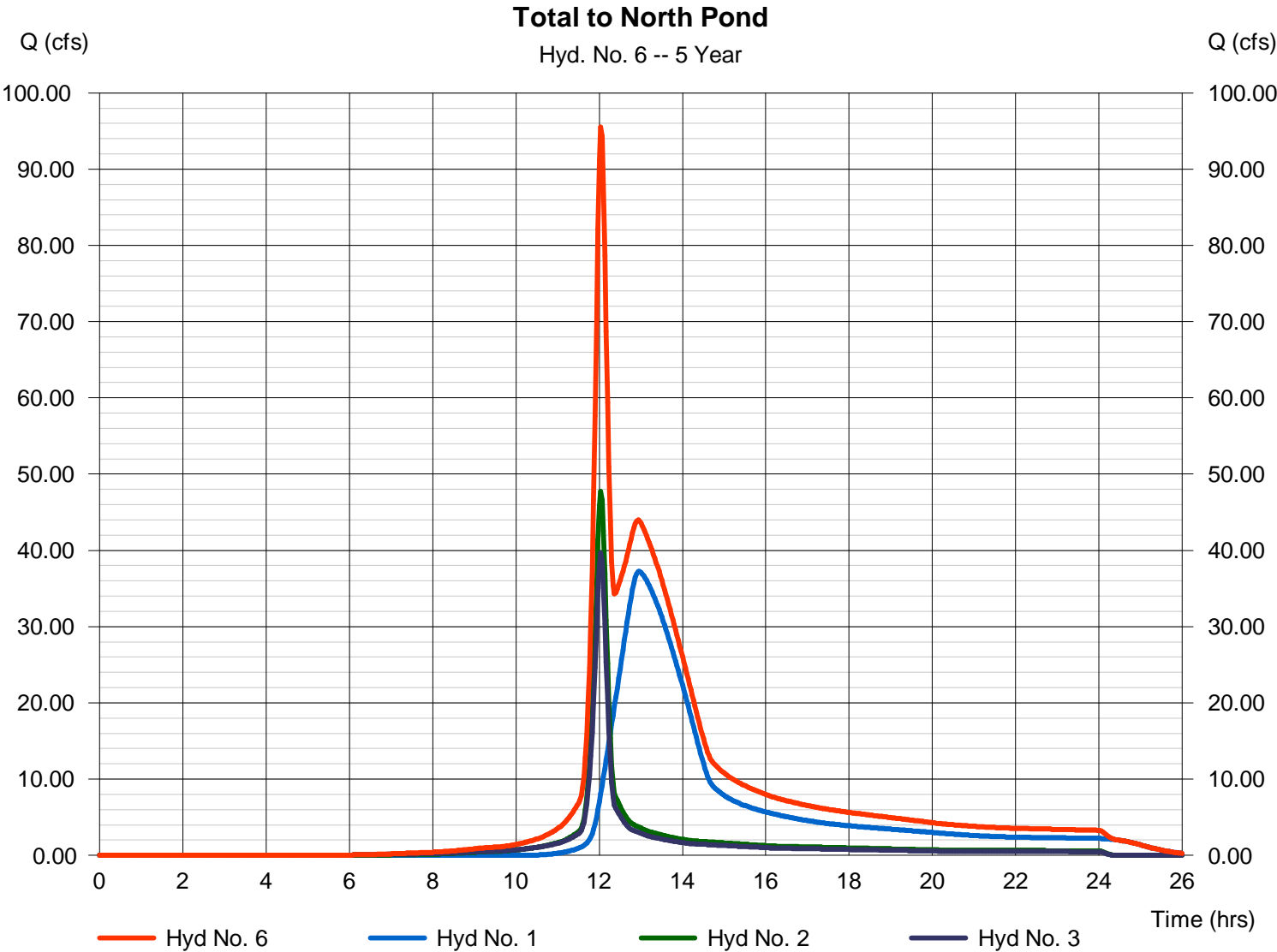
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 95.55 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 625,714 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 80.800 ac



Hydrograph Report

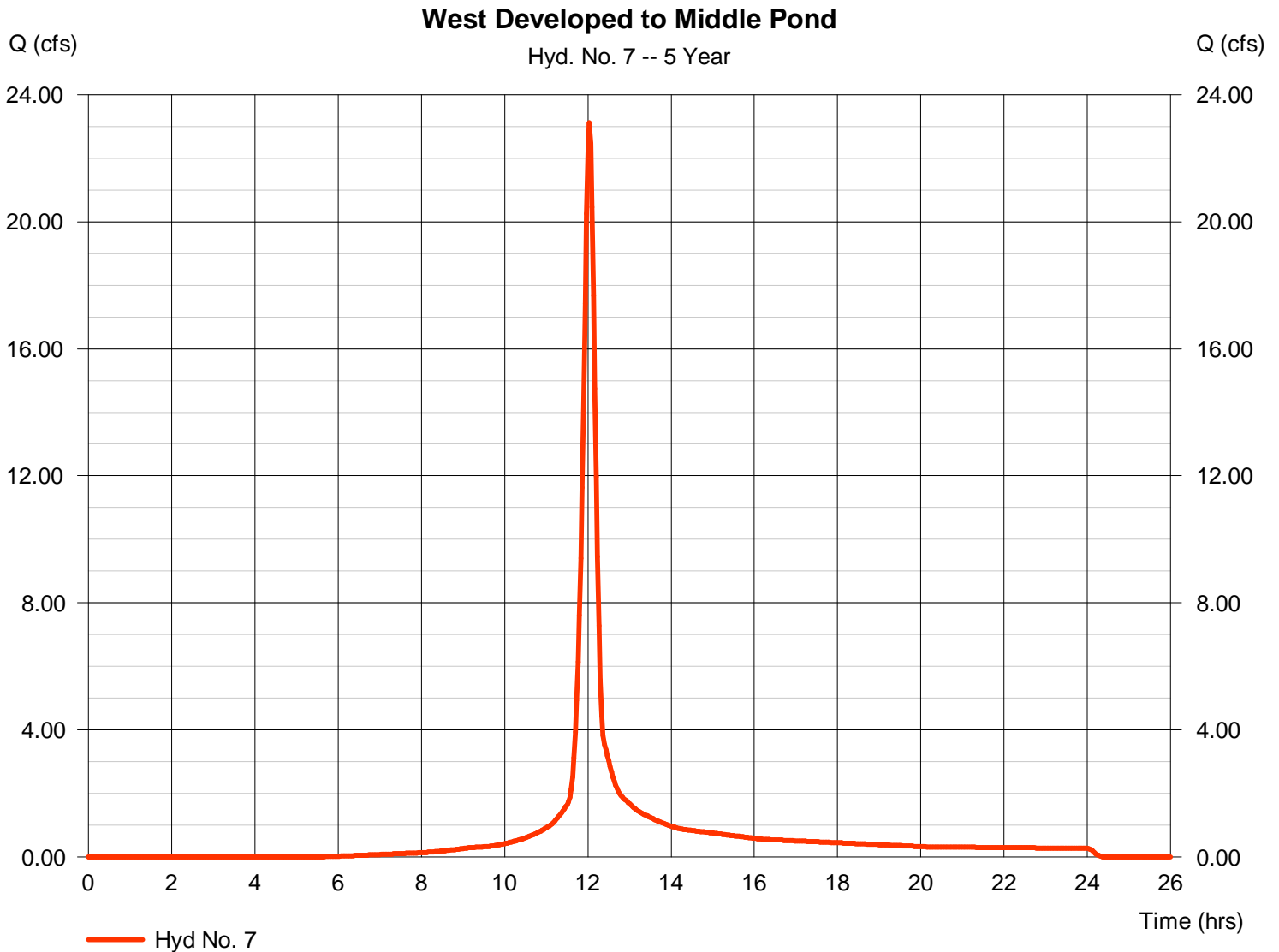
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 7

West Developed to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 23.12 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 65,807 cuft
Drainage area	= 6.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

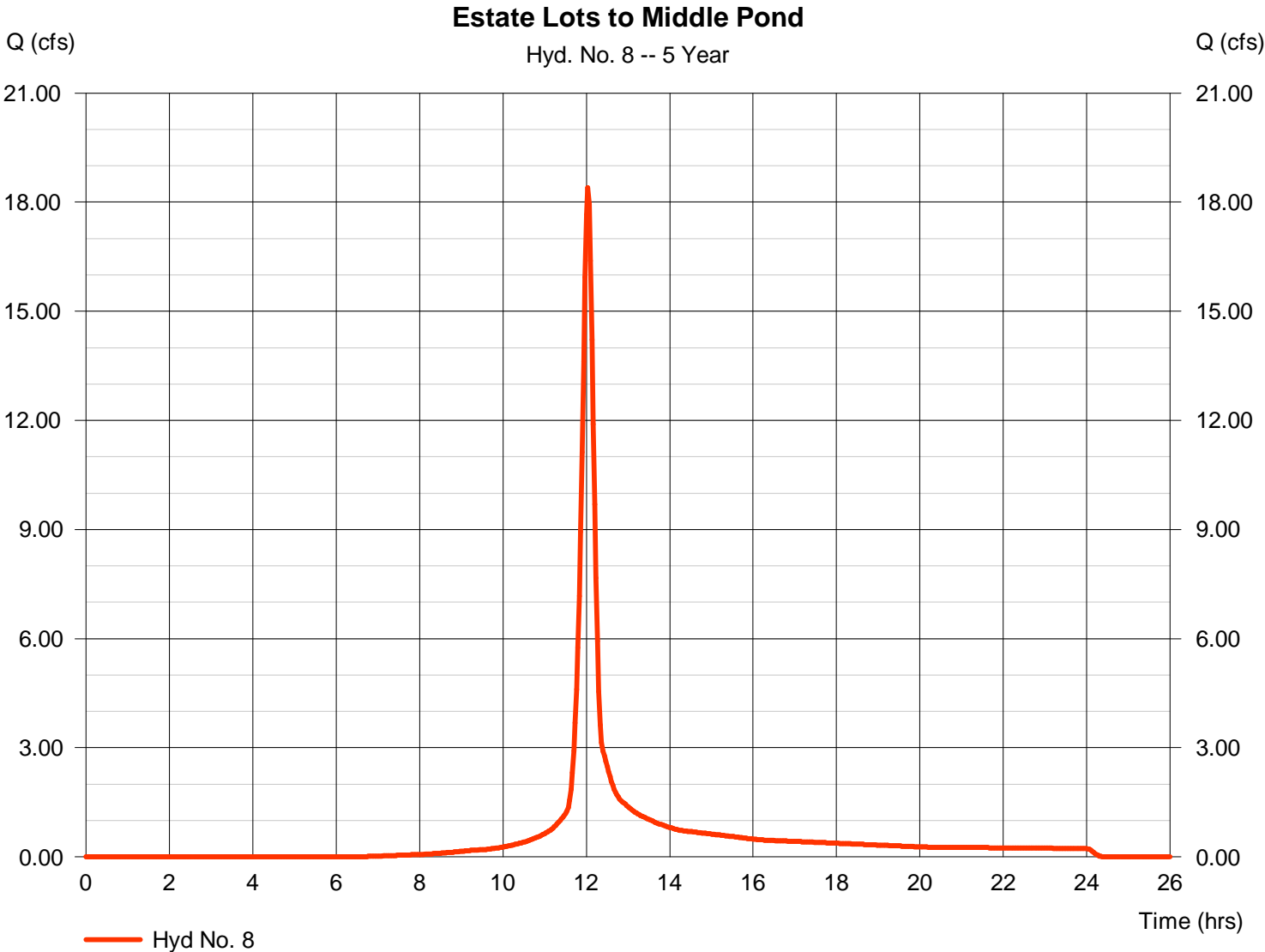
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 18.40 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 51,837 cuft
Drainage area	= 5.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

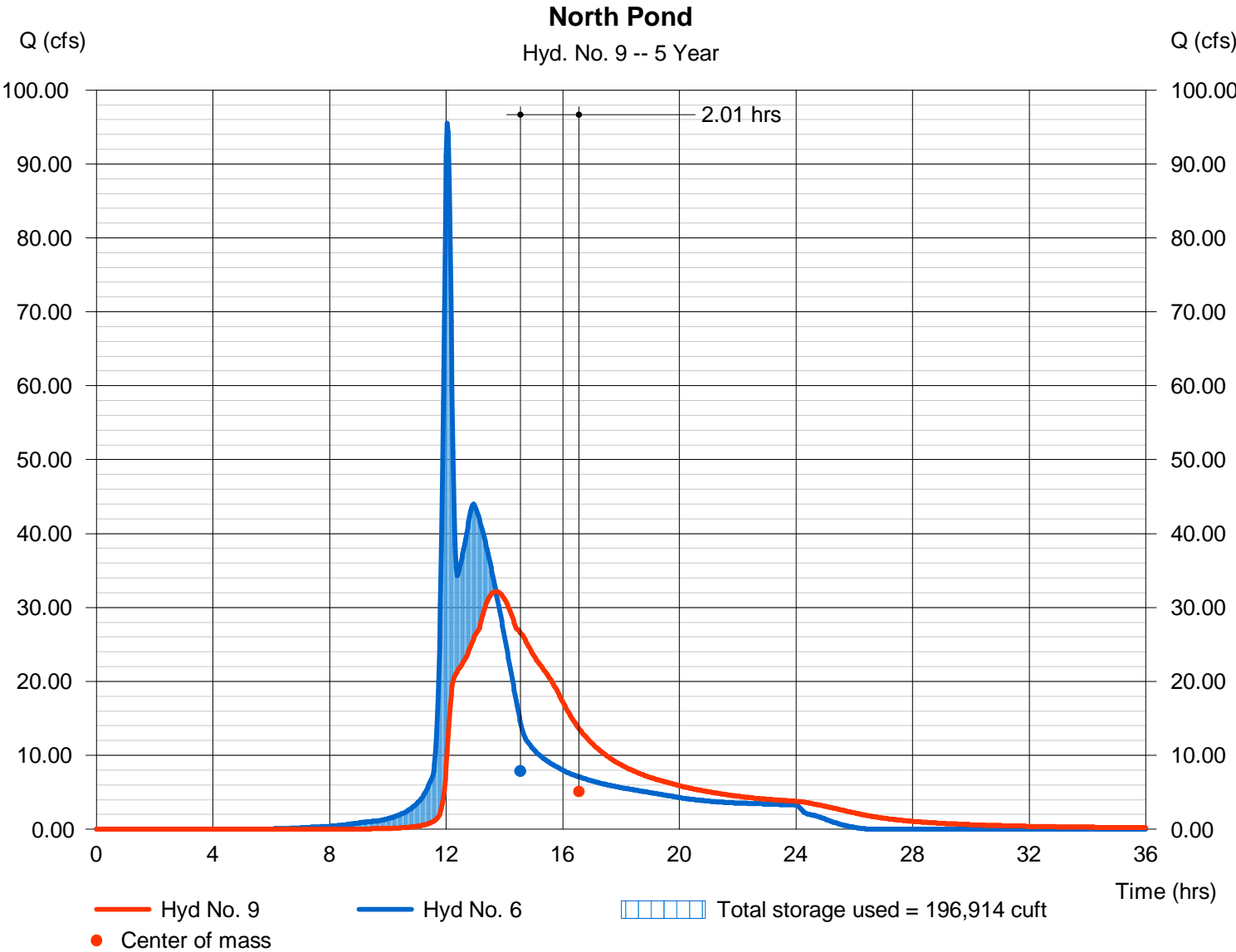
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 32.16 cfs
Storm frequency	= 5 yrs	Time to peak	= 13.70 hrs
Time interval	= 2 min	Hyd. volume	= 624,415 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1358.63 ft
Reservoir name	= North Pond	Max. Storage	= 196,914 cuft

Storage Indication method used.



Hydrograph Report

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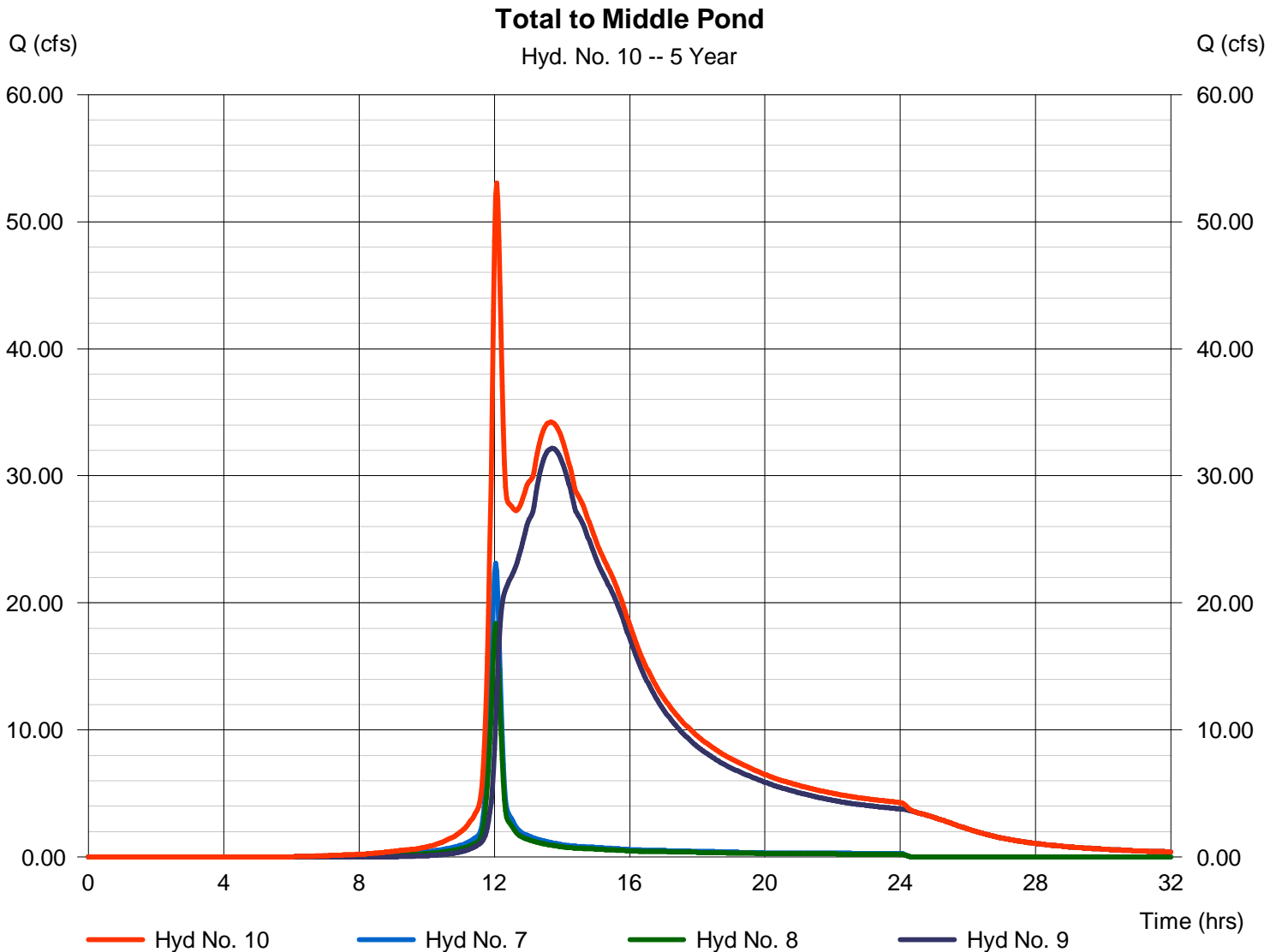
Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type = Combine
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyds. = 7, 8, 9

Peak discharge = 53.04 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 742,059 cuft
 Contrib. drain. area = 11.200 ac



Hydrograph Report

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

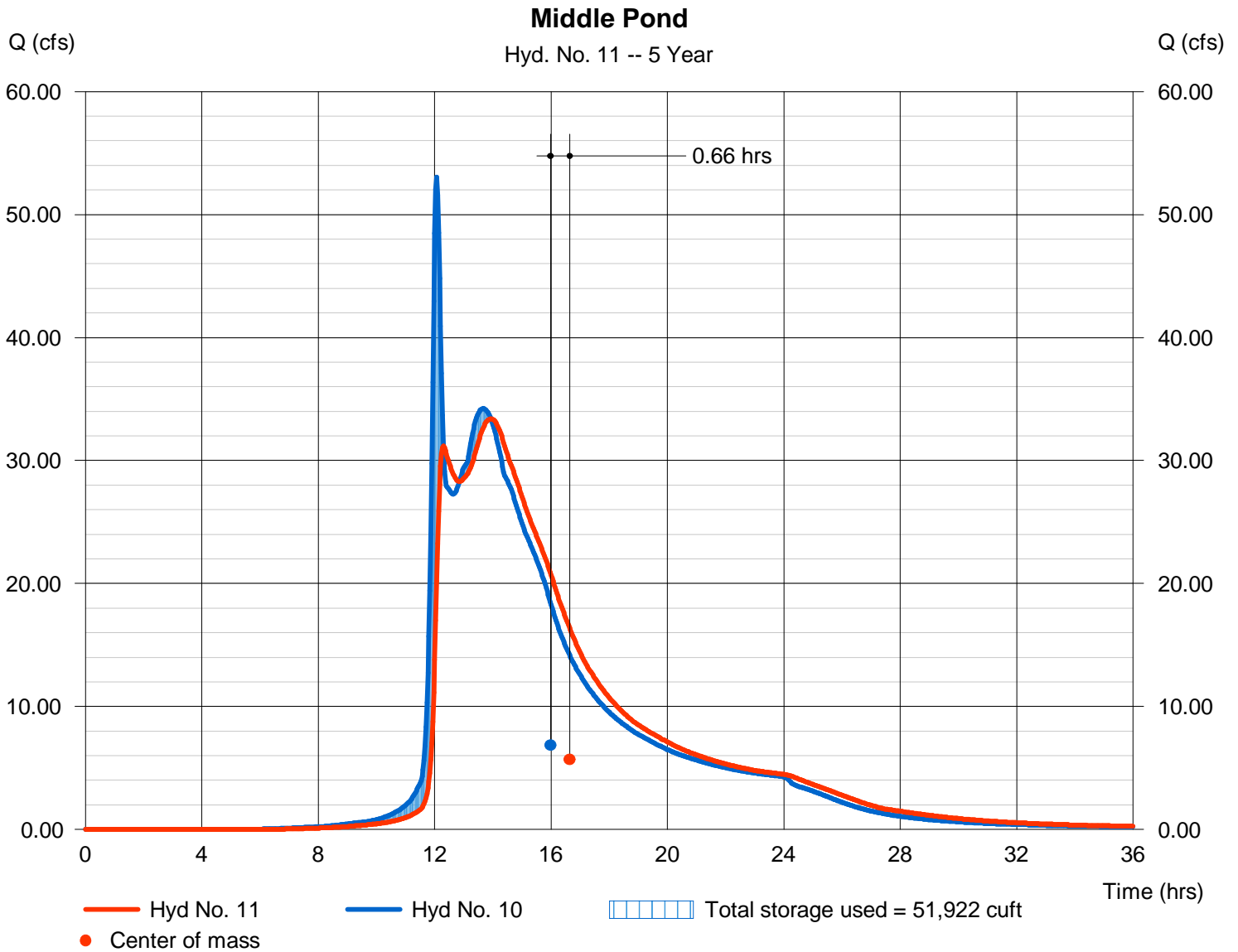
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 33.40 cfs
Storm frequency	= 5 yrs	Time to peak	= 13.93 hrs
Time interval	= 2 min	Hyd. volume	= 742,015 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1354.73 ft
Reservoir name	= Middle Pond	Max. Storage	= 51,922 cuft

Storage Indication method used.



Hydrograph Report

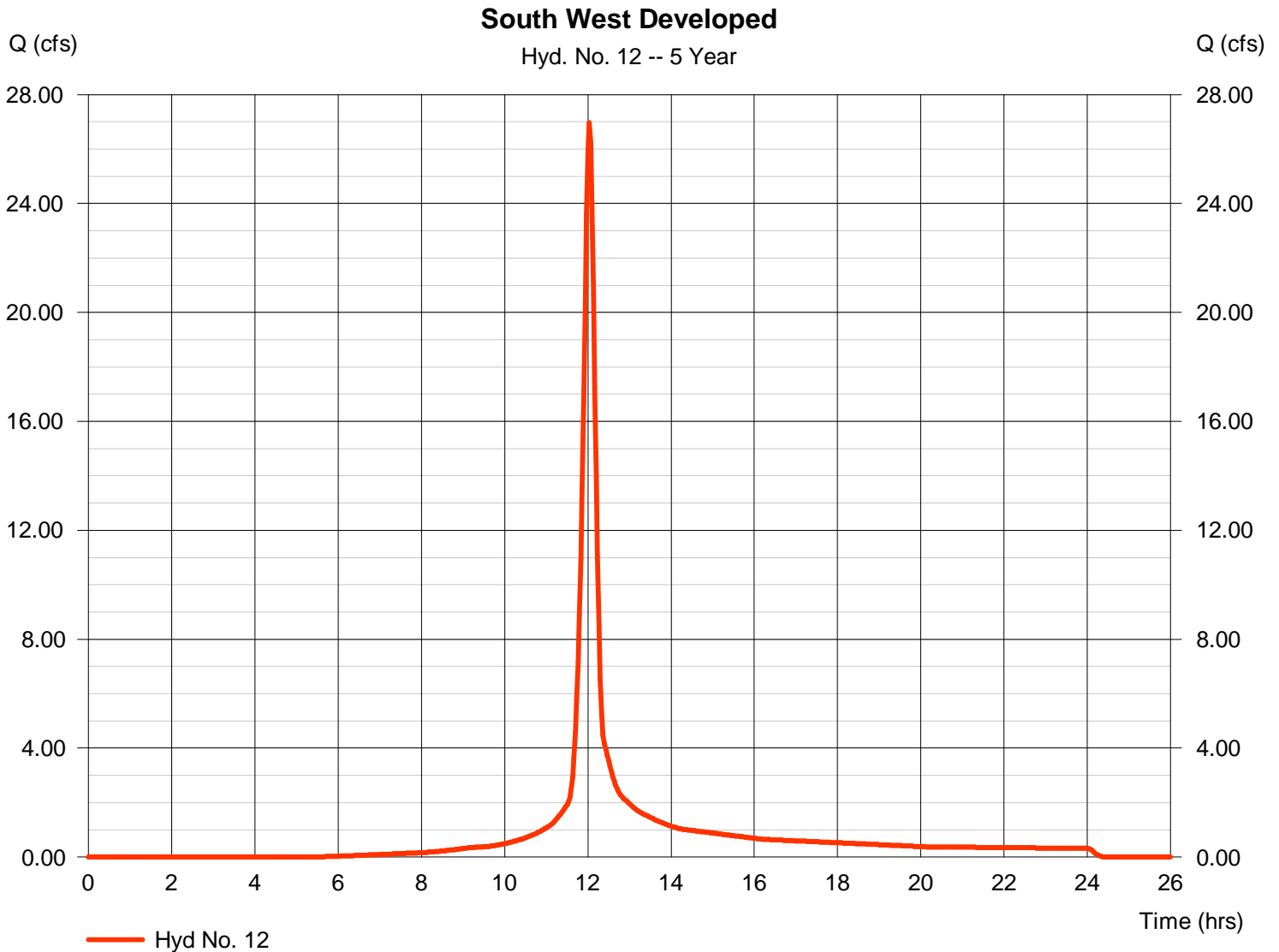
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 26.97 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 76,775 cuft
Drainage area	= 7.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

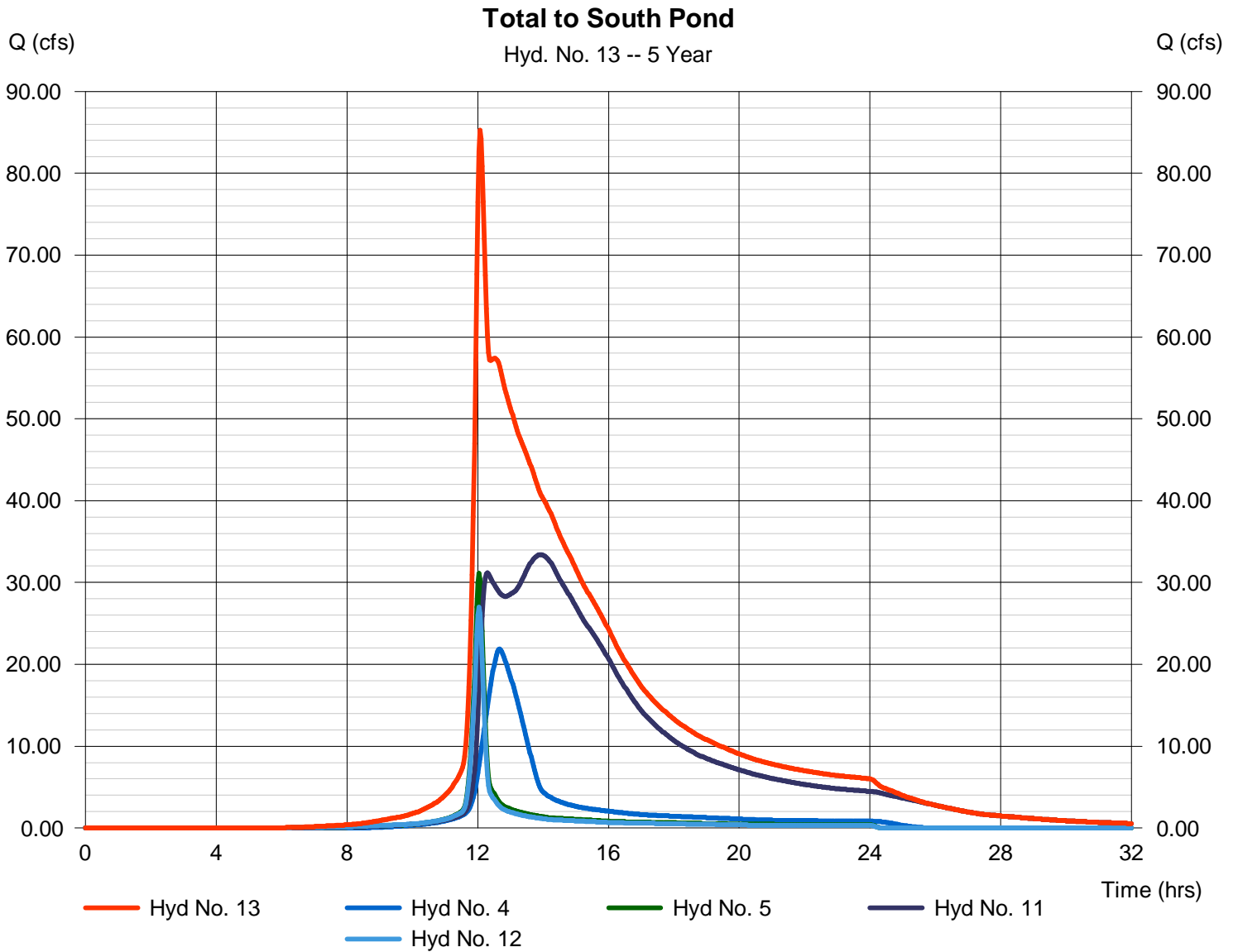
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 85.24 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,075,364 cuft
Inflow hyds.	= 4, 5, 11, 12	Contrib. drain. area	= 34.800 ac



Hydrograph Report

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

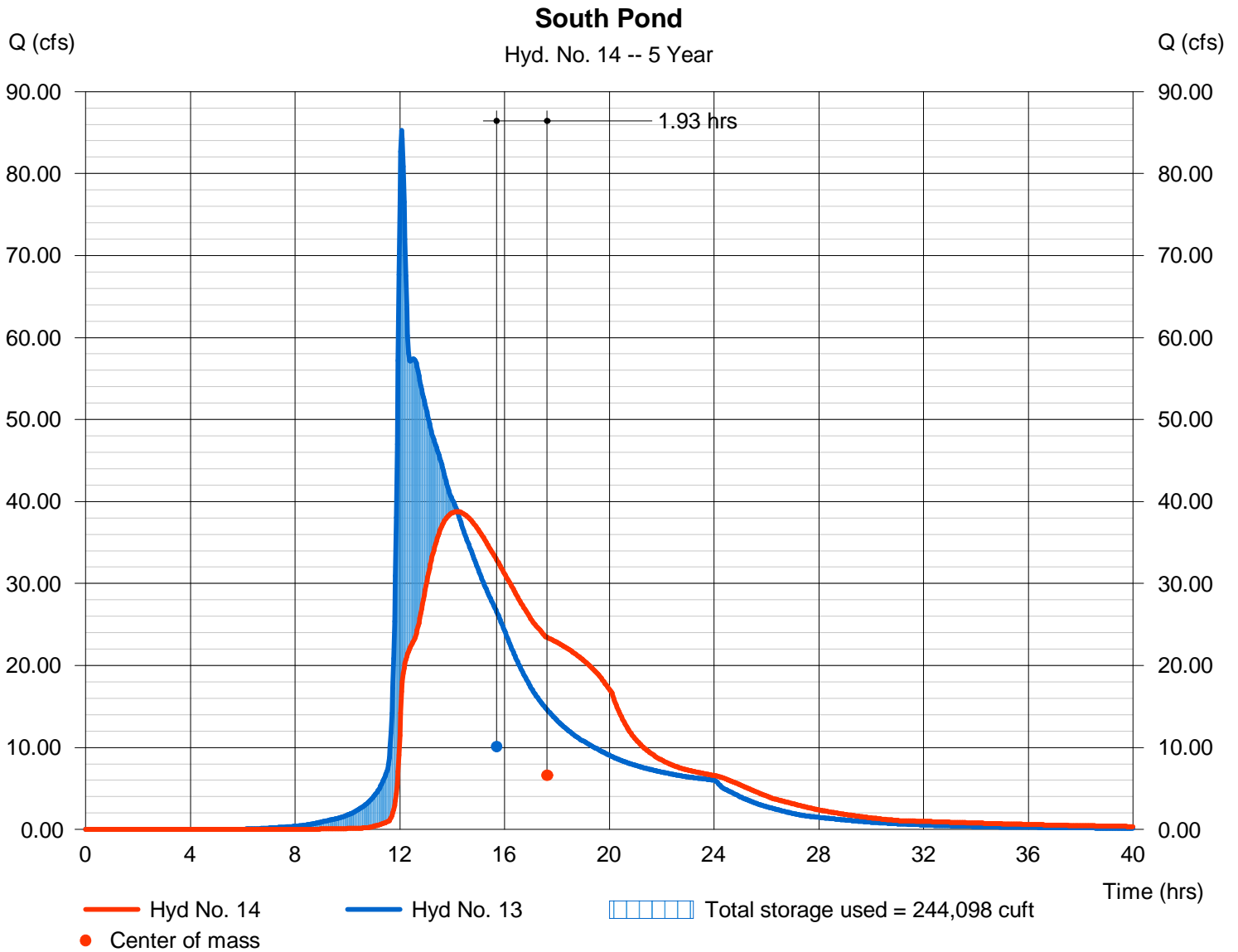
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 38.77 cfs
Storm frequency	= 5 yrs	Time to peak	= 14.20 hrs
Time interval	= 2 min	Hyd. volume	= 1,073,330 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1350.71 ft
Reservoir name	= South Pond	Max. Storage	= 244,098 cuft

Storage Indication method used.



Hydrograph Report

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

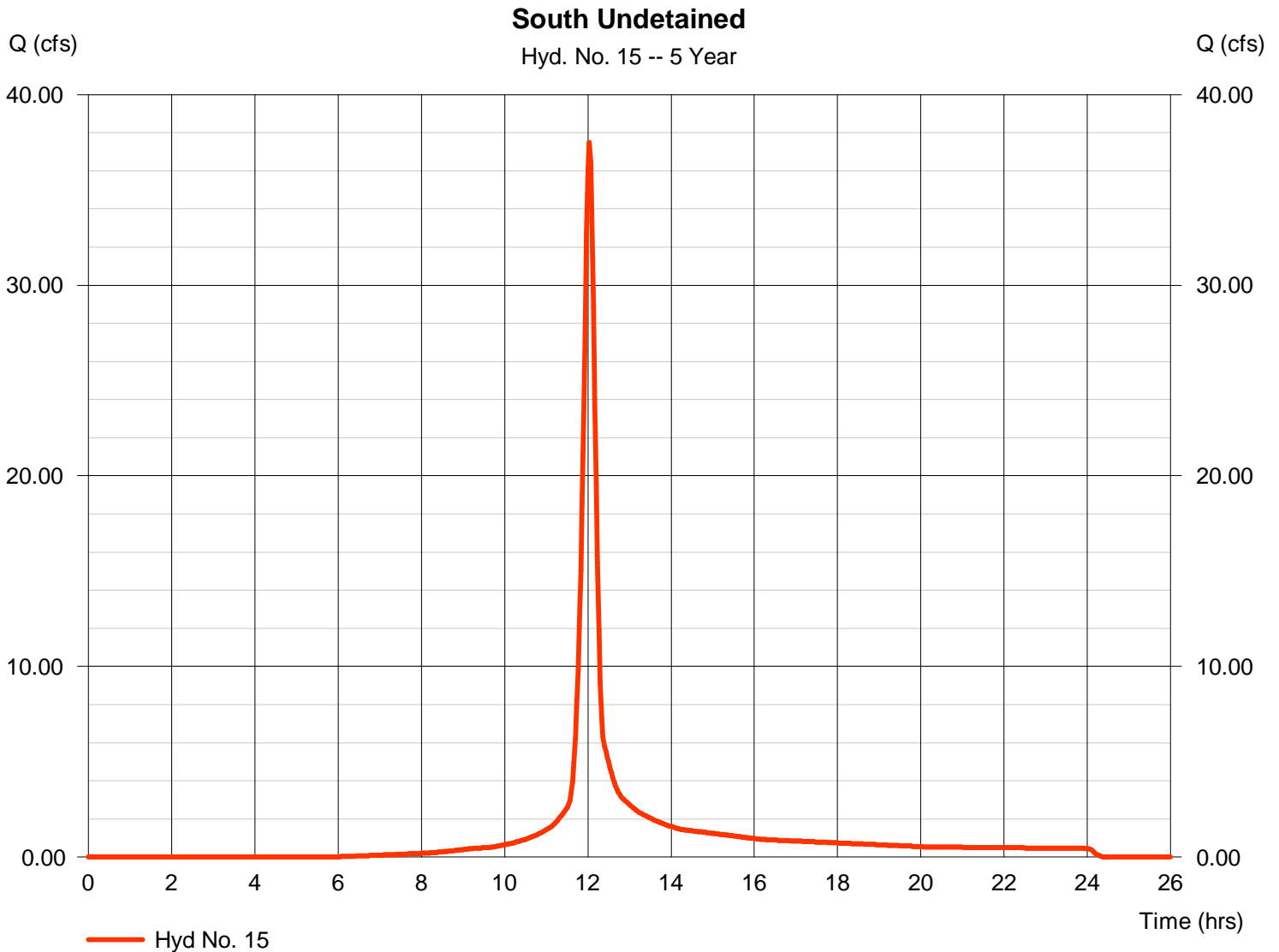
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 37.49 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 106,292 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = [(2.800 x 90) + (7.200 x 84)] / 10.000



Hydrograph Report

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

Tuesday, Jun 18, 2013

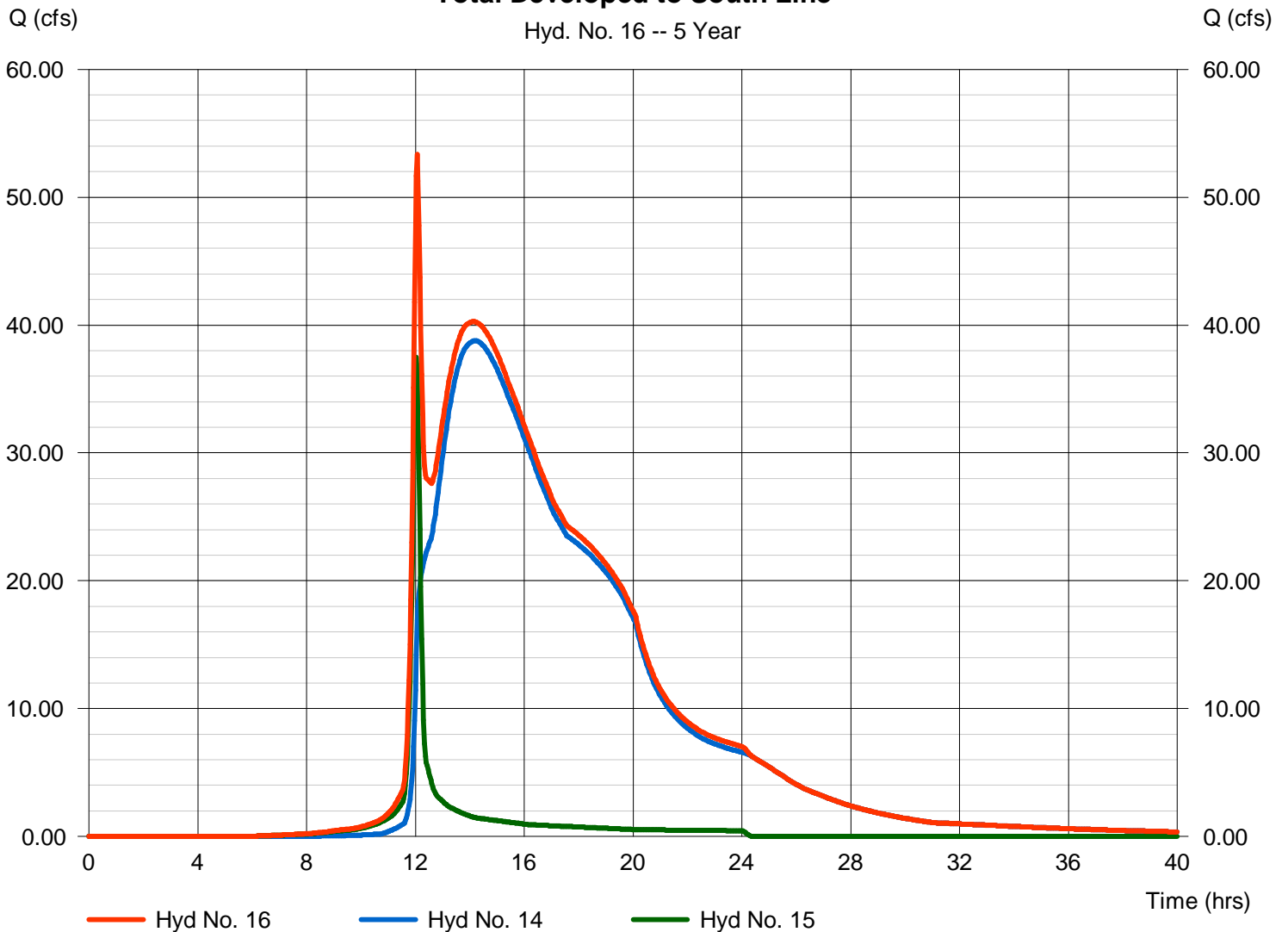
Hyd. No. 16

Total Developed to South Line

Hydrograph type	= Combine	Peak discharge	= 53.33 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,179,623 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 10.000 ac

Total Developed to South Line

Hyd. No. 16 -- 5 Year



Hydrograph Report

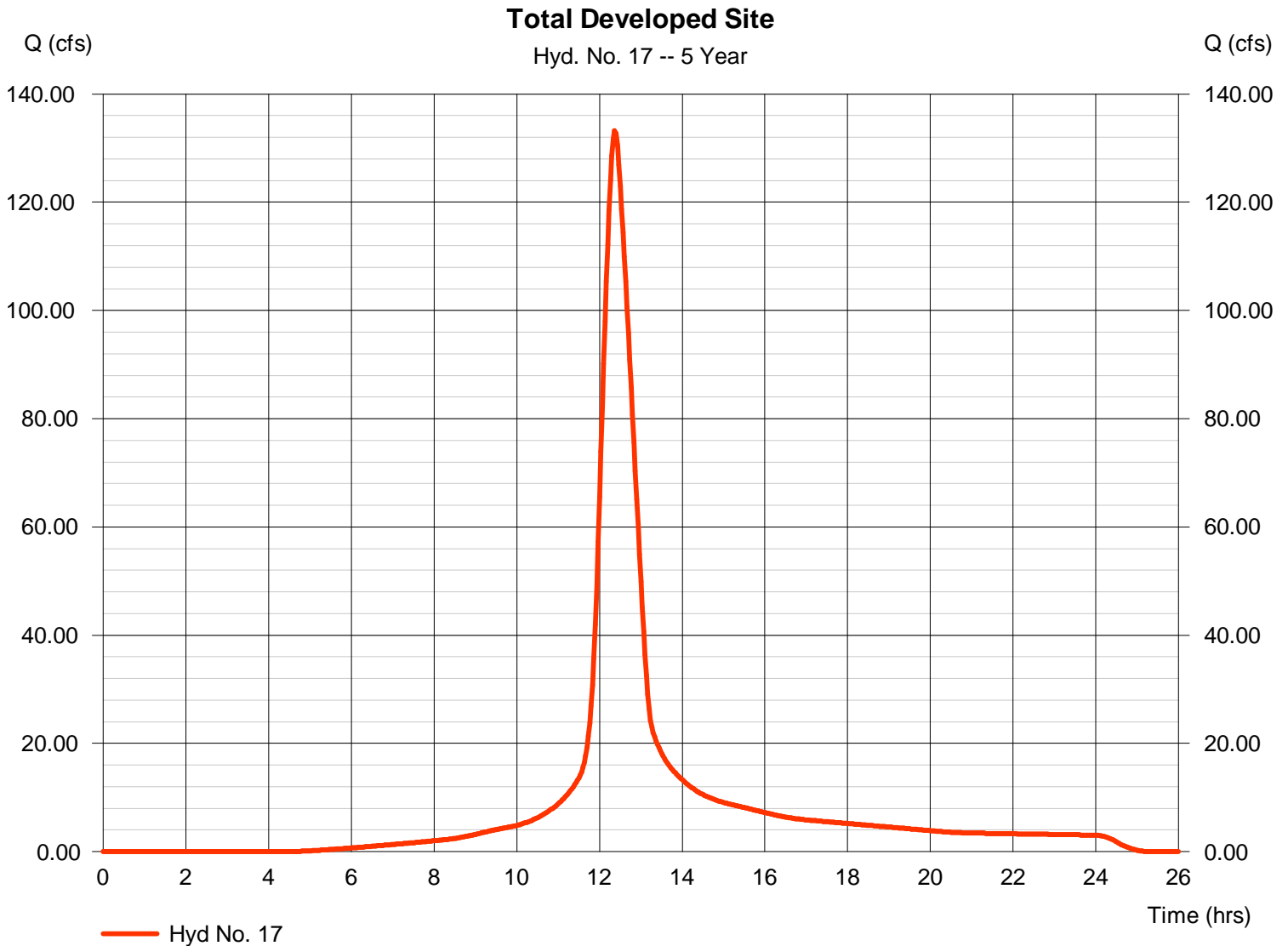
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 133.24 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 764,250 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 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	49.11	2	776	488,822	-----	-----	-----	Offsite North
2	SCS Runoff	58.25	2	722	165,026	-----	-----	-----	Estate Lots of North Pond
3	SCS Runoff	47.73	2	722	136,923	-----	-----	-----	West Developed to North Pond
4	SCS Runoff	27.40	2	760	210,454	-----	-----	-----	Offsite West
5	SCS Runoff	37.97	2	722	107,572	-----	-----	-----	South Estate
6	Combine	117.67	2	722	790,771	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	27.80	2	722	79,761	-----	-----	-----	West Developed to Middle Pond
8	SCS Runoff	22.44	2	722	63,566	-----	-----	-----	Estate Lots to Middle Pond
9	Reservoir	45.62	2	812	789,459	6	1358.98	232,831	North Pond
10	Combine	67.22	2	724	932,786	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	47.25	2	824	932,740	10	1354.92	65,462	Middle Pond
12	SCS Runoff	32.44	2	722	93,054	-----	-----	-----	South West Developed
13	Combine	107.66	2	724	1,343,820	4, 5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	55.65	2	836	1,341,763	13	1351.07	298,461	South Pond
15	SCS Runoff	45.30	2	722	129,327	-----	-----	-----	South Undetained
16	Combine	63.97	2	722	1,471,090	14, 15	-----	-----	Total Developed to South Line
17	SCS Runoff	158.65	2	742	915,865	-----	-----	-----	Total Developed Site
The Ranch Total Site.gpw					Return Period: 10 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

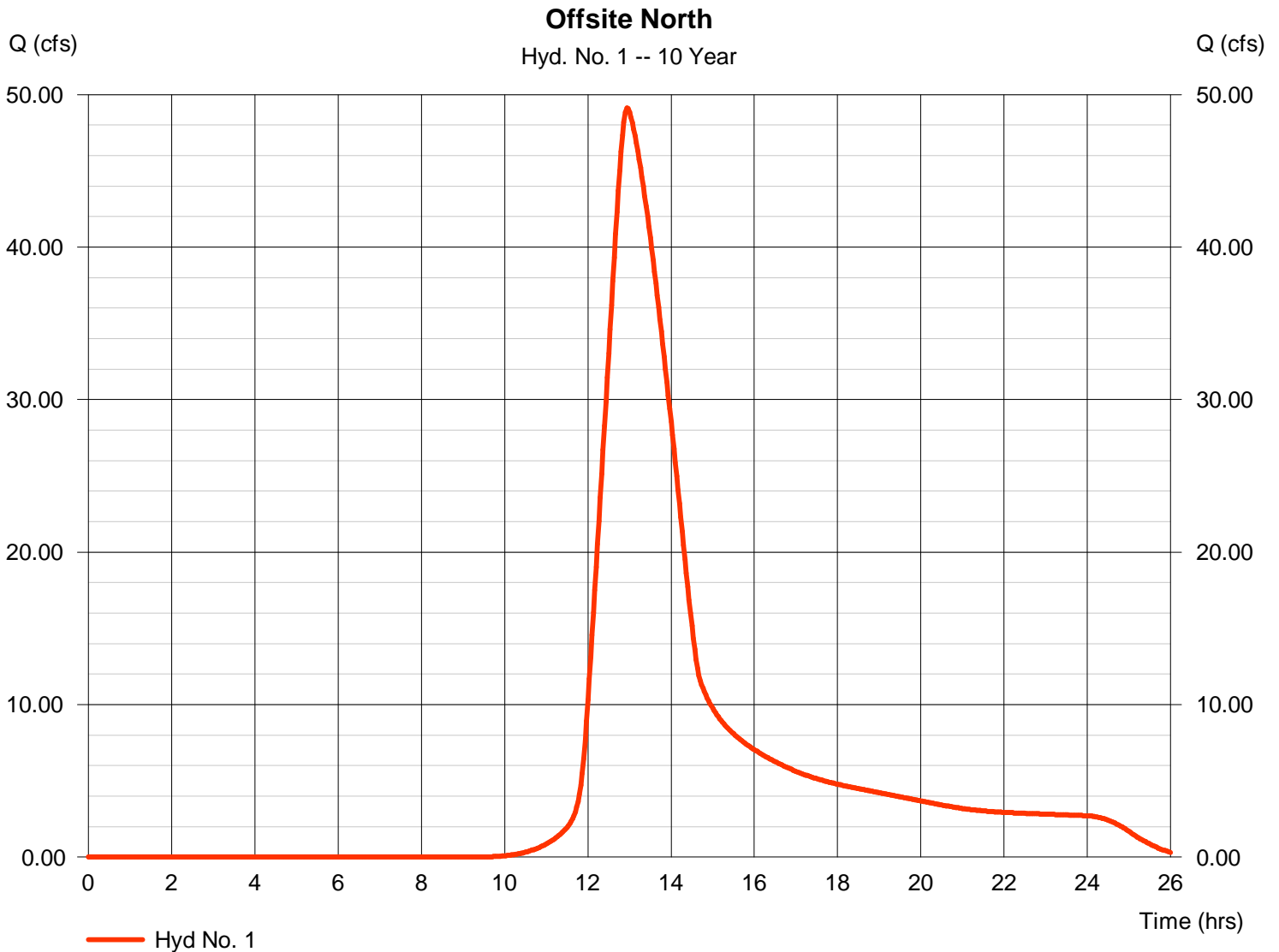
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 49.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.93 hrs
Time interval	= 2 min	Hyd. volume	= 488,822 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

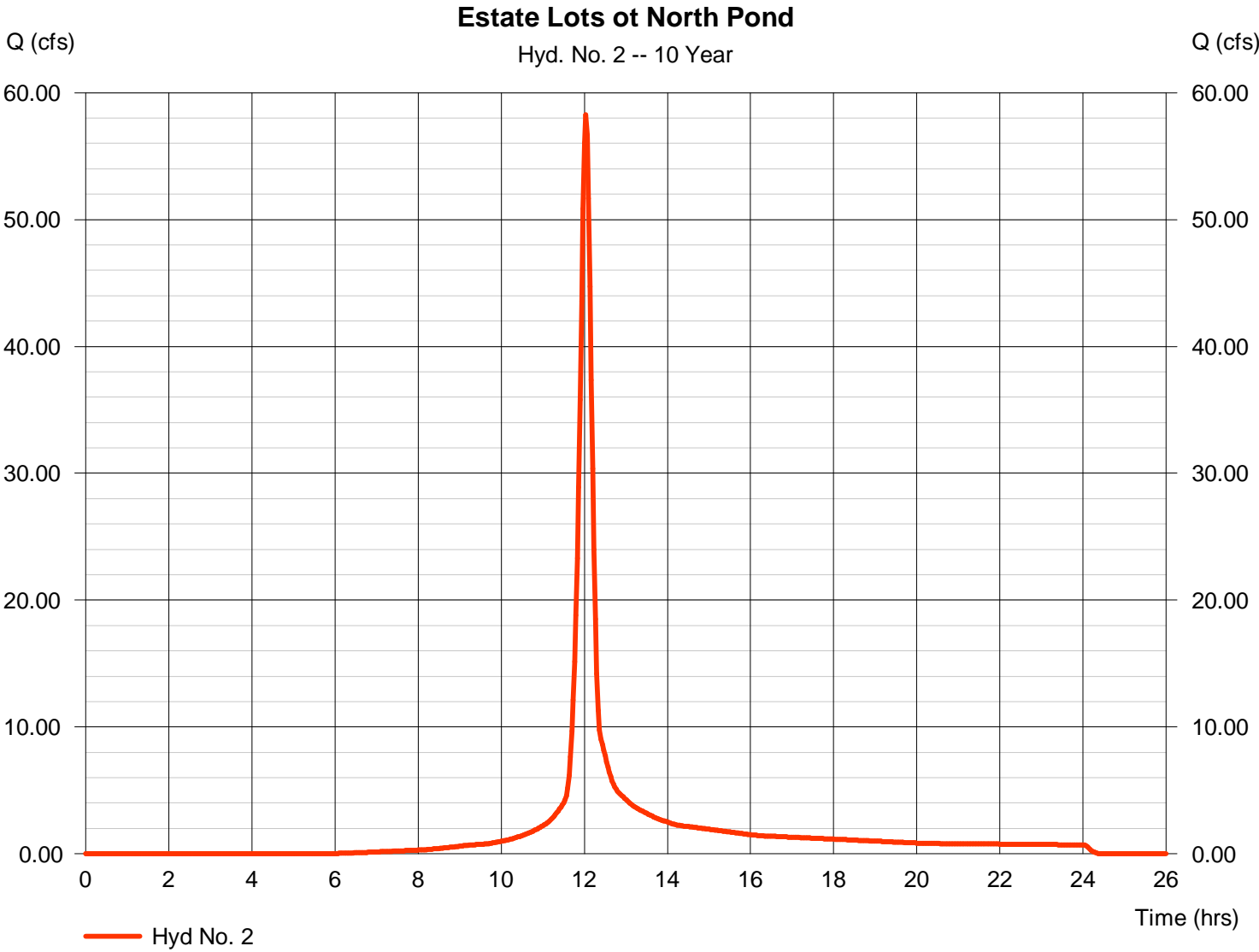
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 58.25 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 165,026 cuft
Drainage area	= 13.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

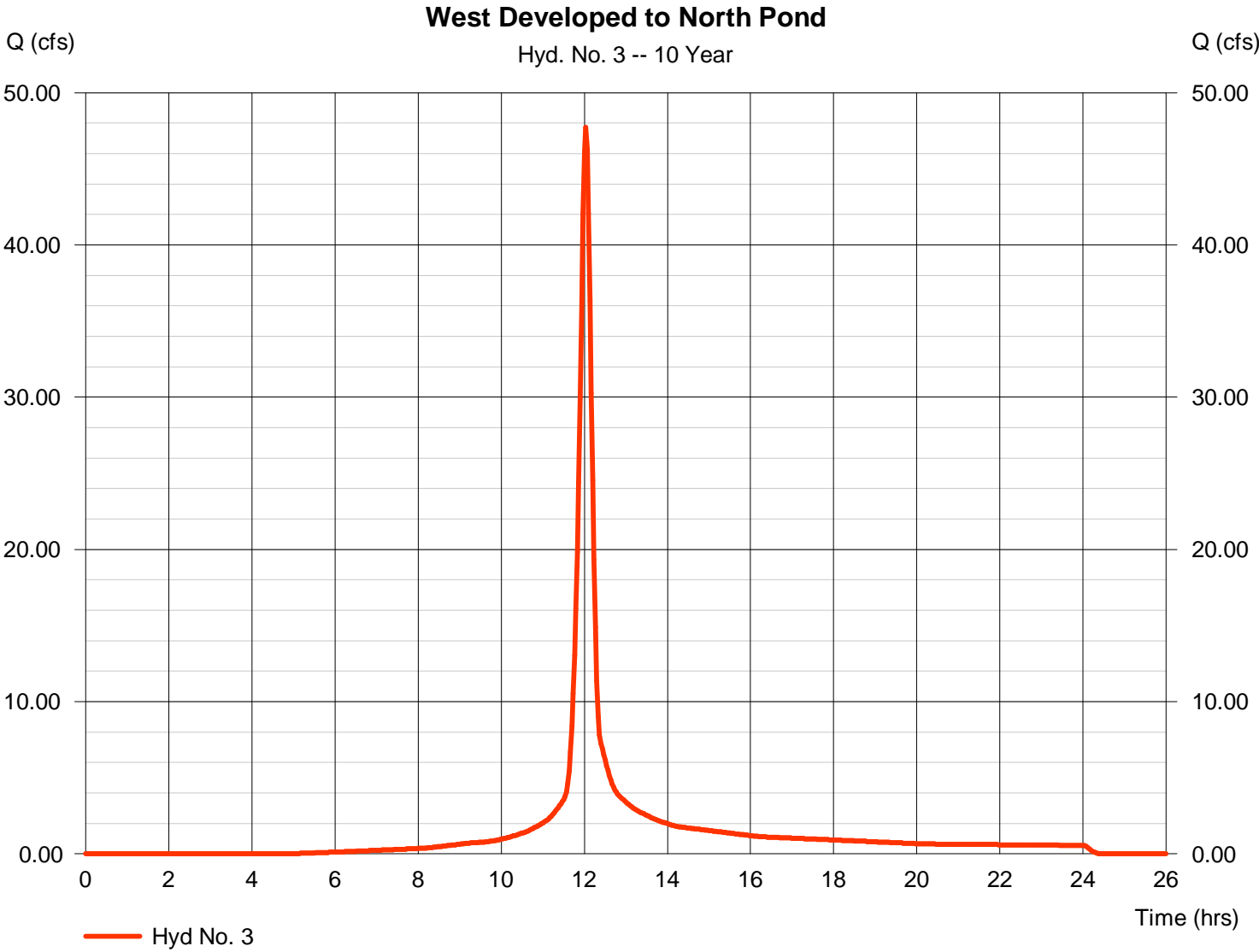
Tuesday, Jun 18, 2013

Hyd. No. 3

West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 47.73 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 136,923 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 10.300



Hydrograph Report

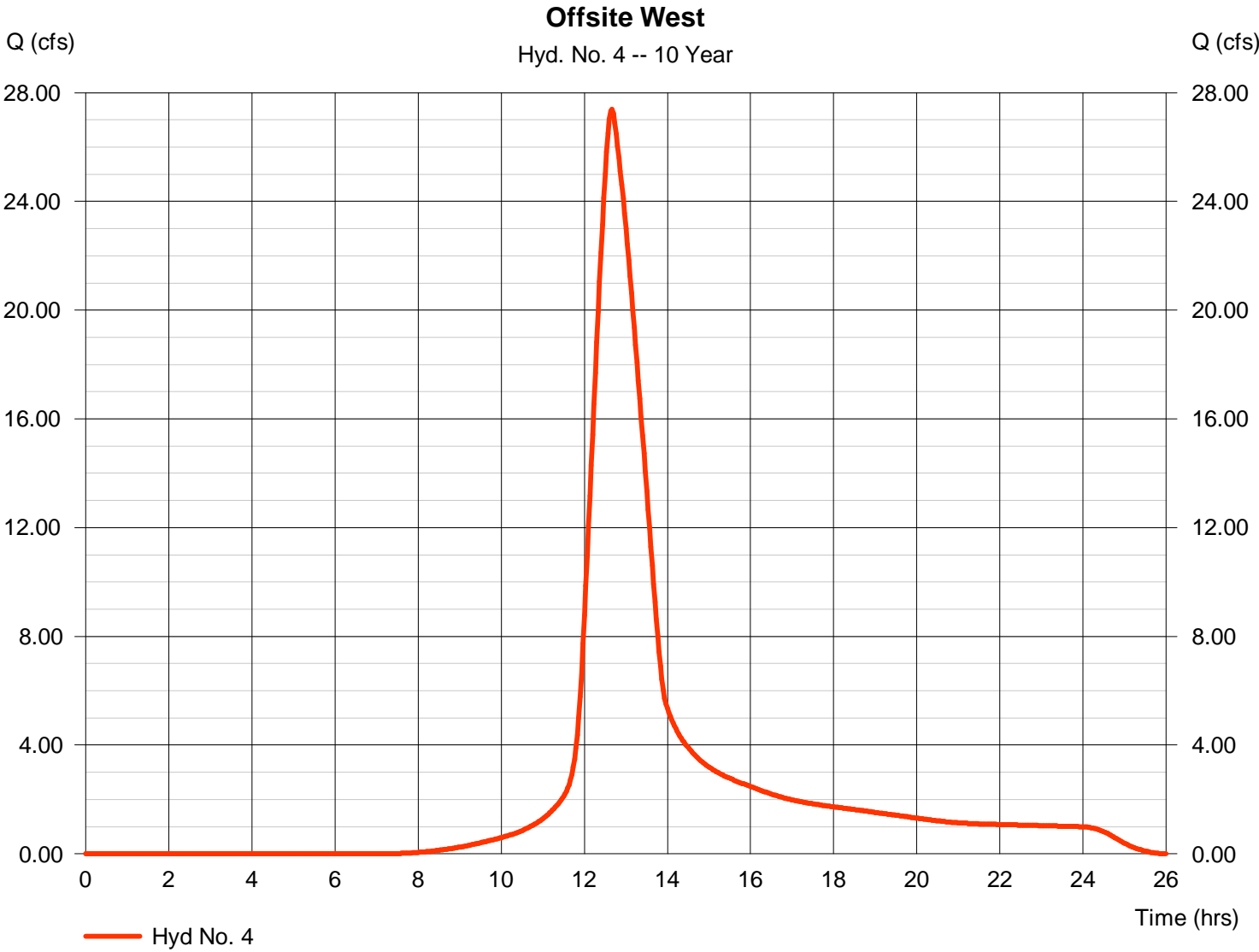
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 27.40 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 210,454 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

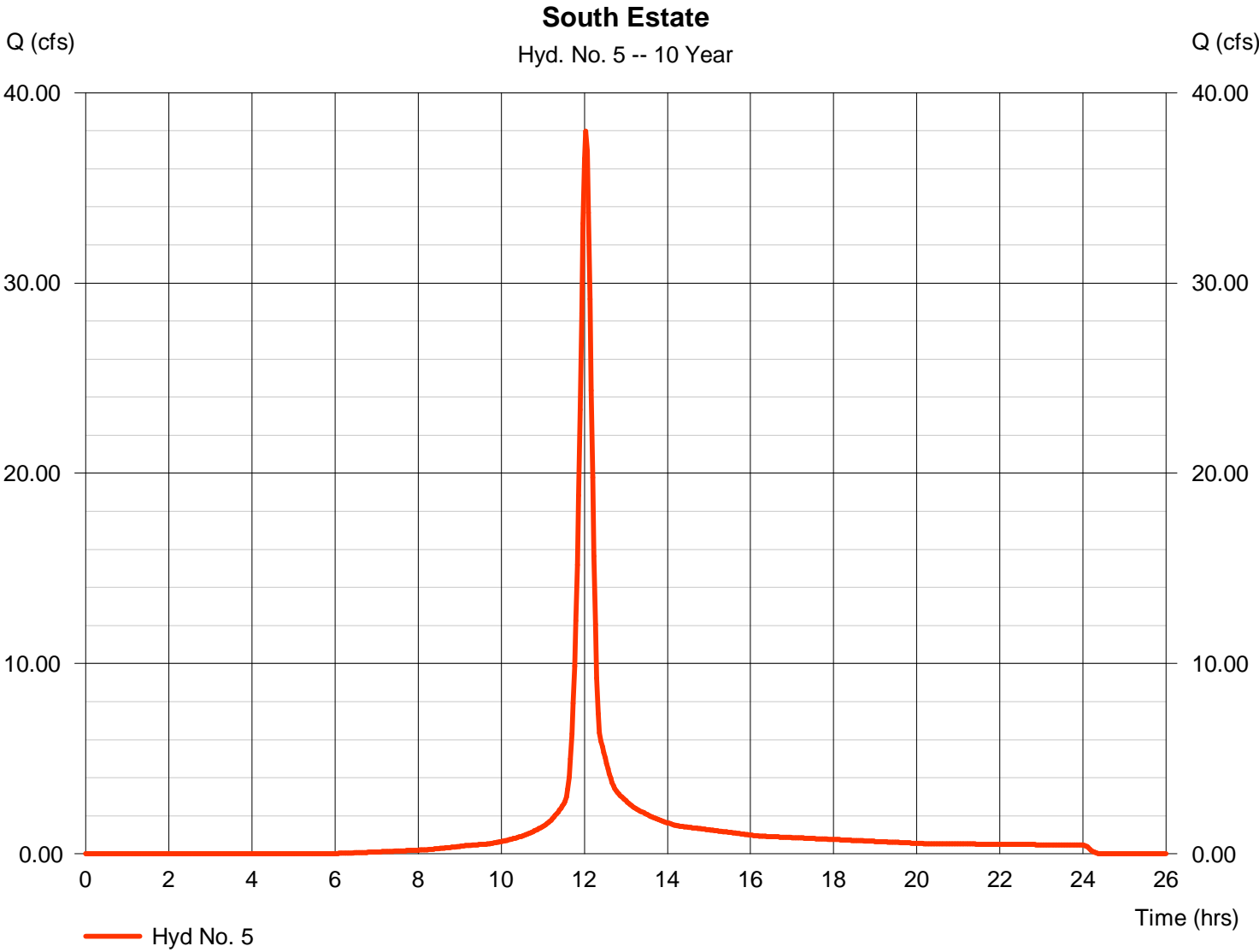
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 37.97 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 107,572 cuft
Drainage area	= 8.800 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

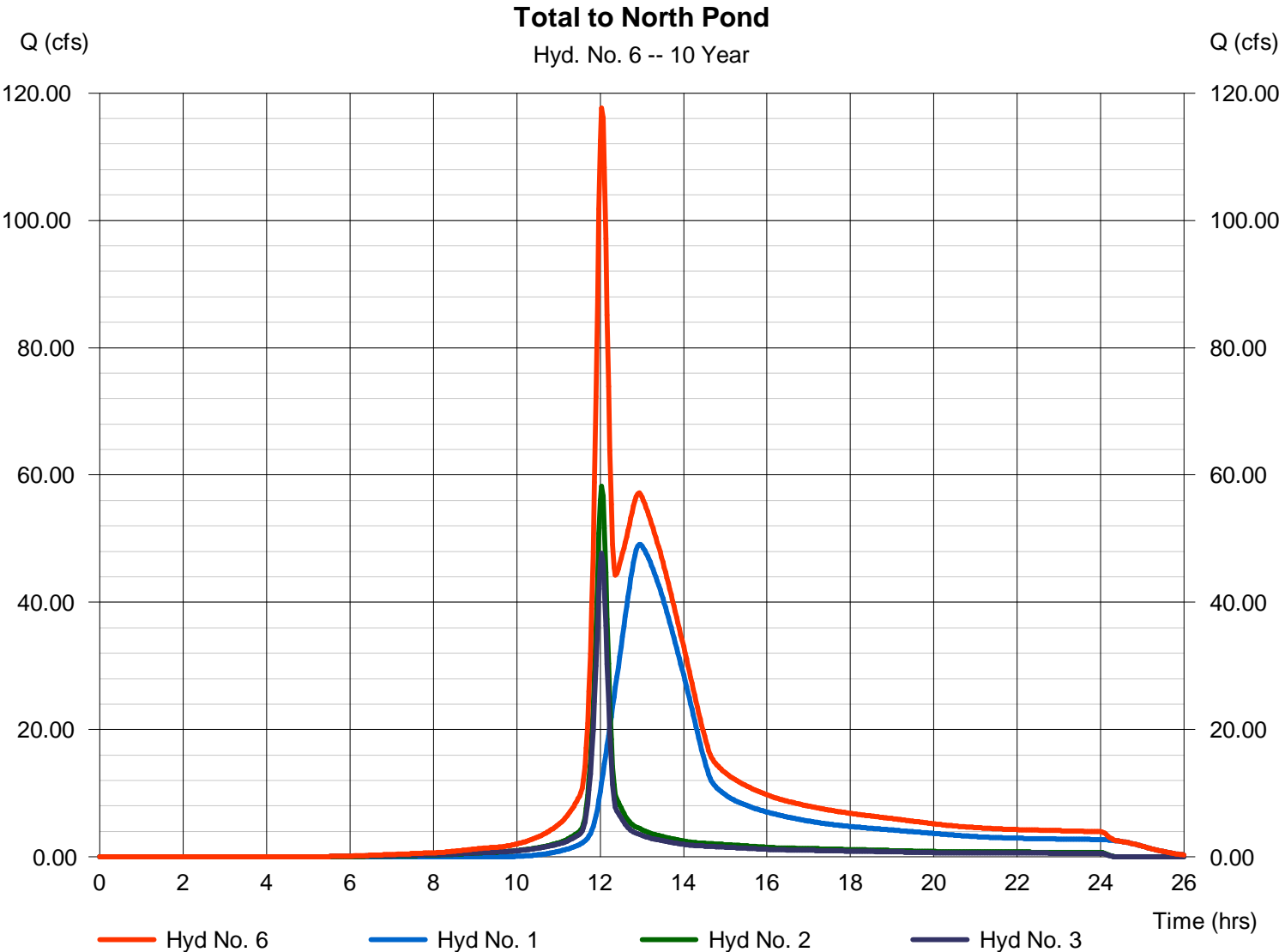
Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

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

Peak discharge = 117.67 cfs
Time to peak = 12.03 hrs
Hyd. volume = 790,771 cuft
Contrib. drain. area = 80.800 ac



Hydrograph Report

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

Tuesday, Jun 18, 2013

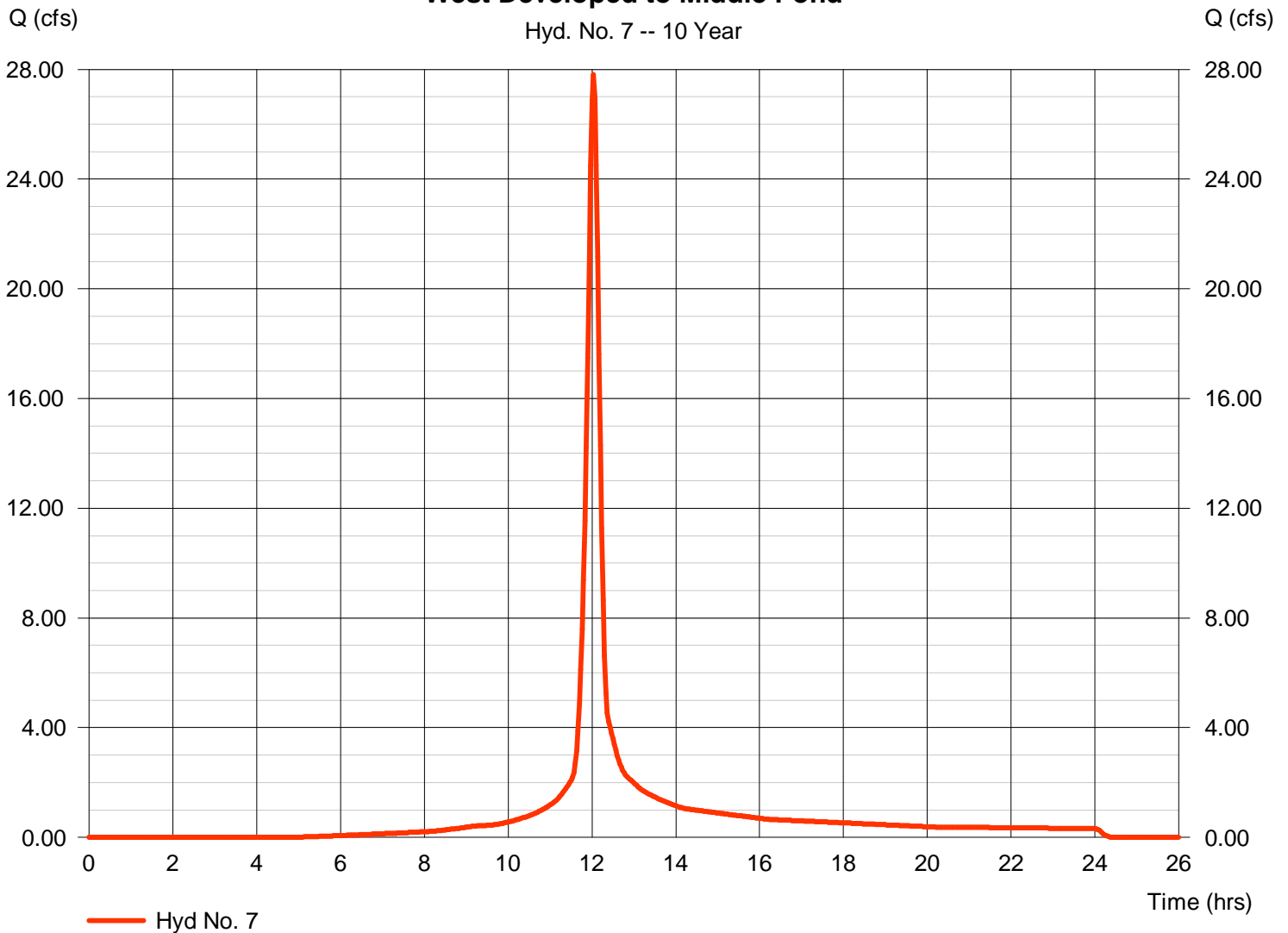
Hyd. No. 7

West Developed to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 27.80 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 79,761 cuft
Drainage area	= 6.000 ac	Curve number	= 87
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

West Developed to Middle Pond

Hyd. No. 7 -- 10 Year



Hydrograph Report

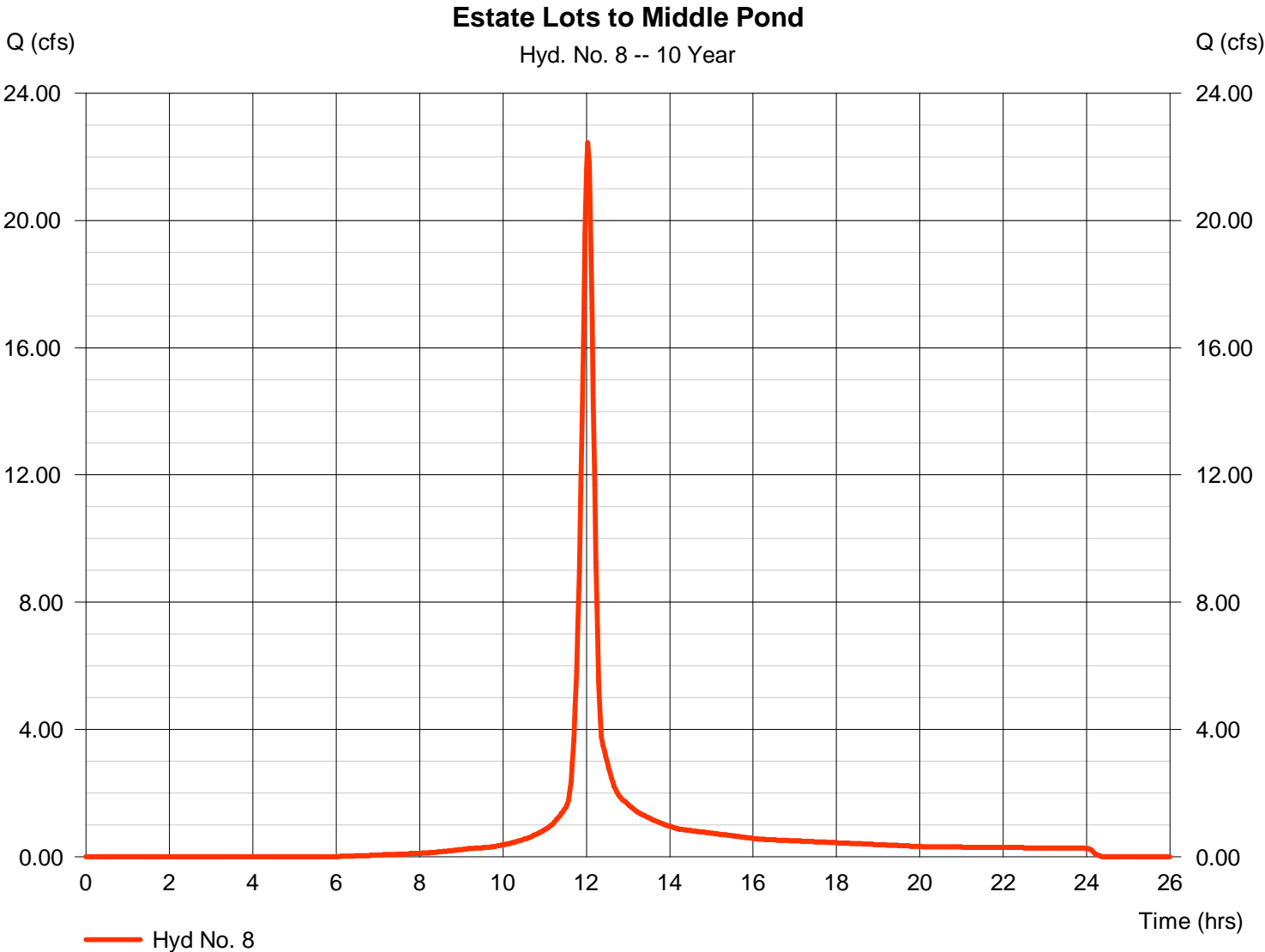
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 22.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 63,566 cuft
Drainage area	= 5.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

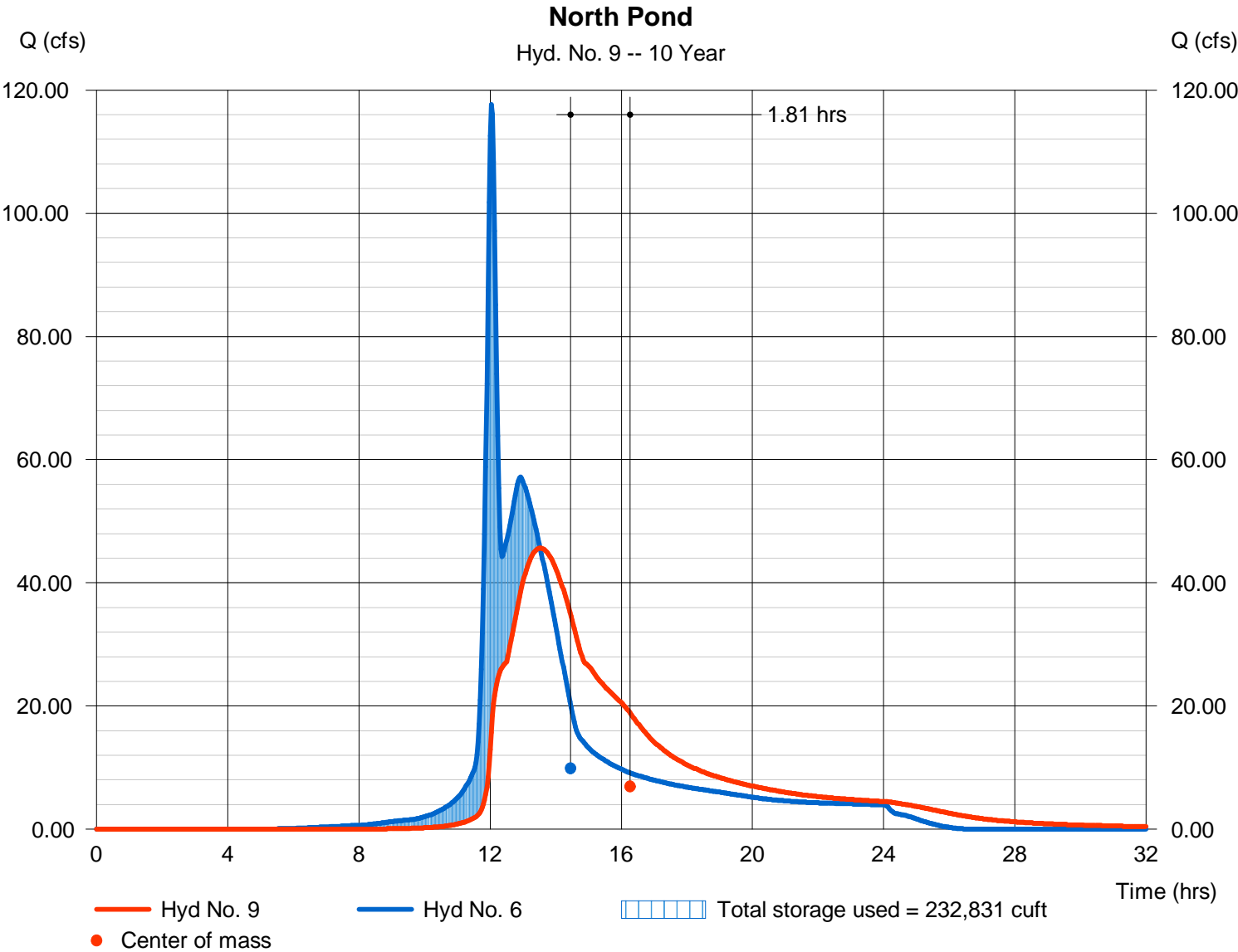
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 45.62 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.53 hrs
Time interval	= 2 min	Hyd. volume	= 789,459 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1358.98 ft
Reservoir name	= North Pond	Max. Storage	= 232,831 cuft

Storage Indication method used.



Hydrograph Report

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

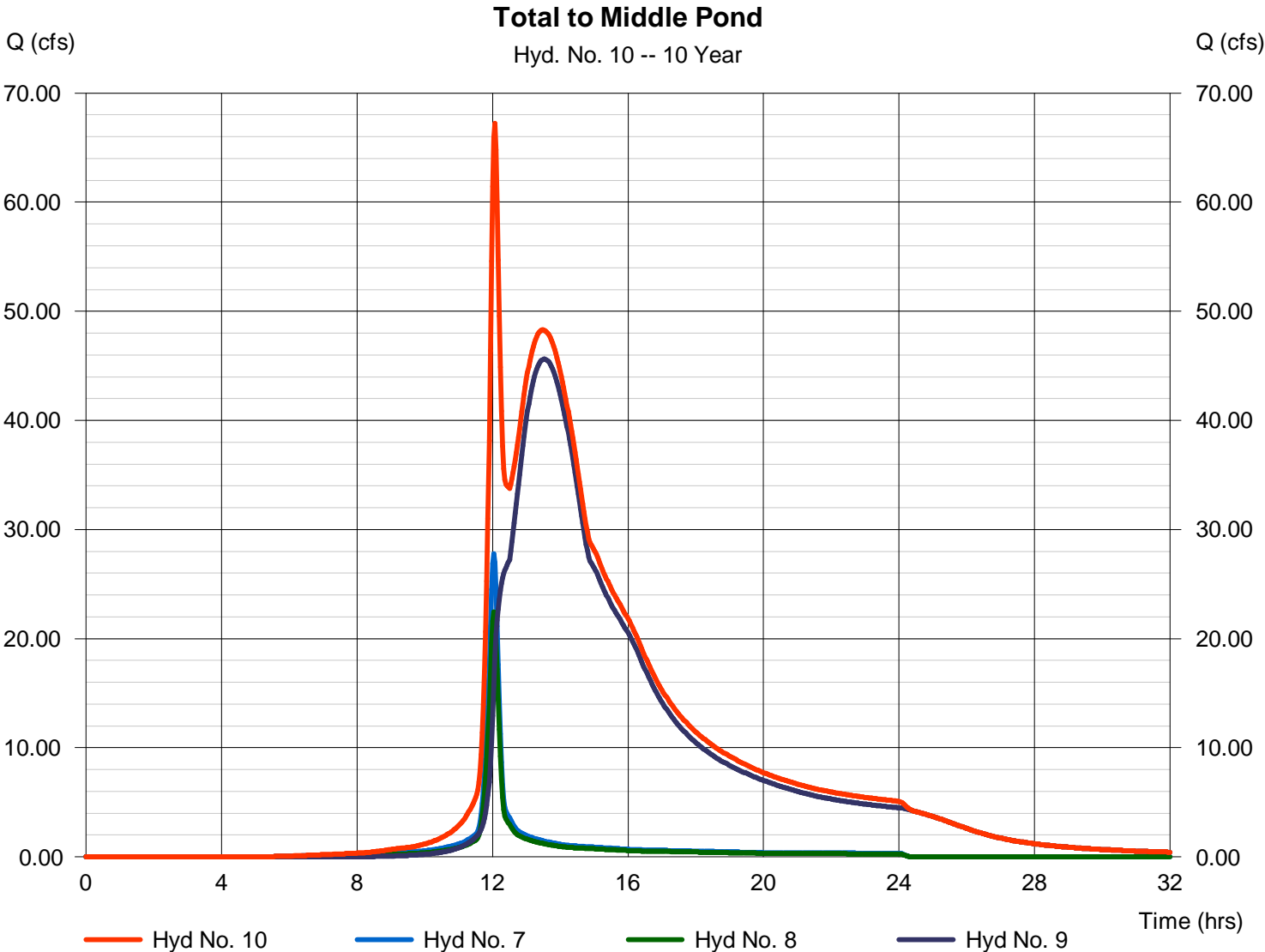
Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 7, 8, 9

Peak discharge = 67.22 cfs
Time to peak = 12.07 hrs
Hyd. volume = 932,786 cuft
Contrib. drain. area = 11.200 ac



Hydrograph Report

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

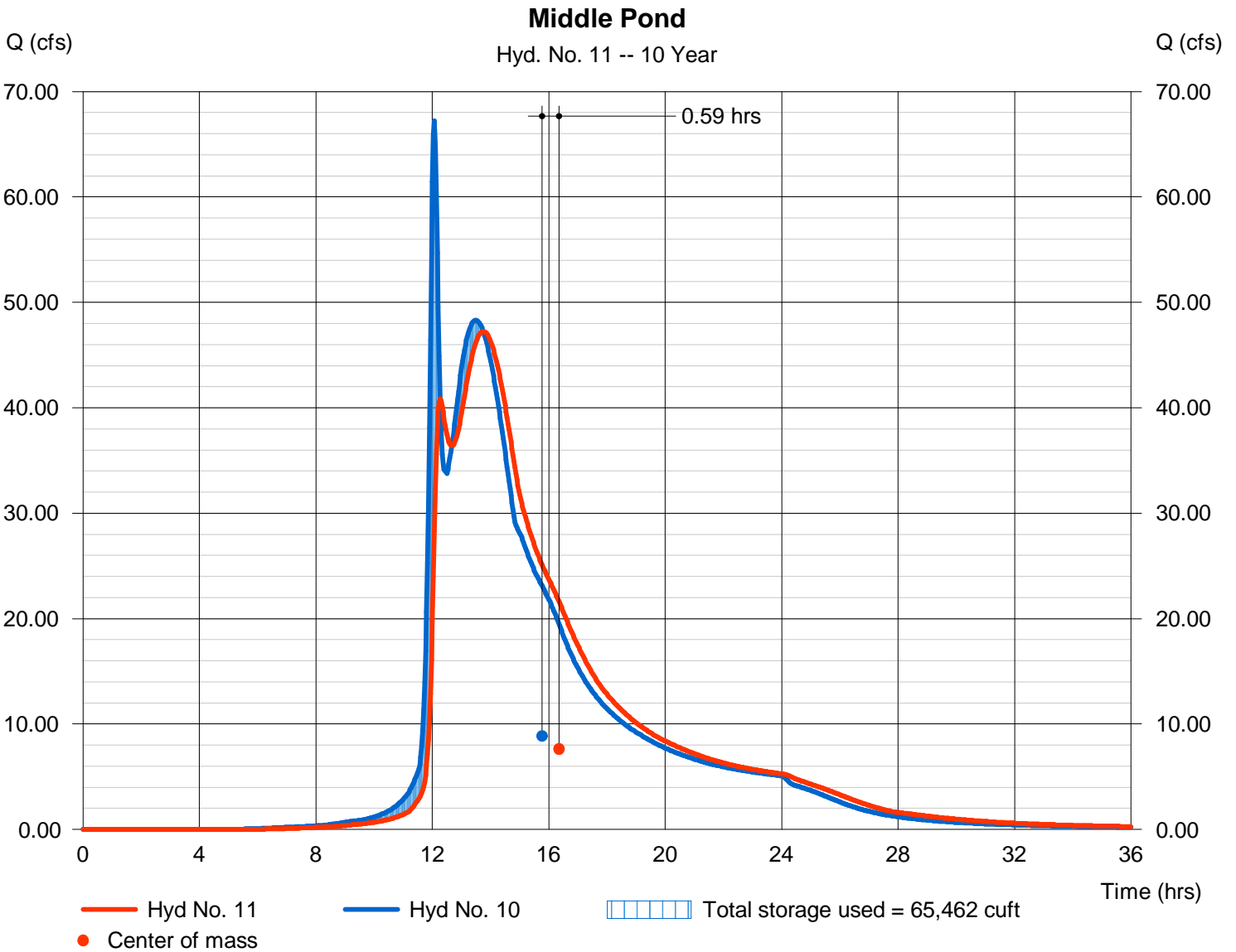
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 47.25 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.73 hrs
Time interval	= 2 min	Hyd. volume	= 932,740 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1354.92 ft
Reservoir name	= Middle Pond	Max. Storage	= 65,462 cuft

Storage Indication method used.



Hydrograph Report

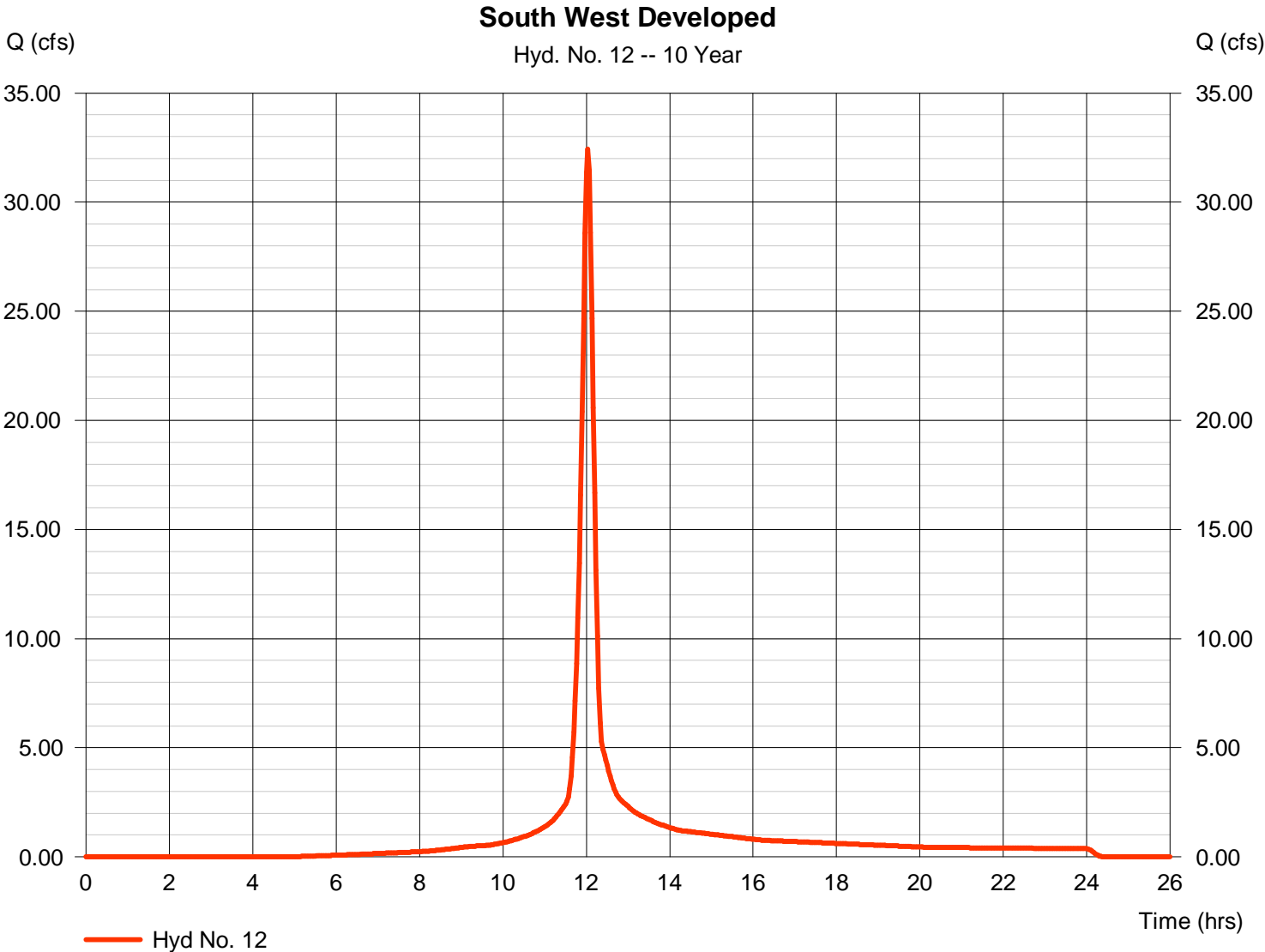
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 32.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 93,054 cuft
Drainage area	= 7.000 ac	Curve number	= 87
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

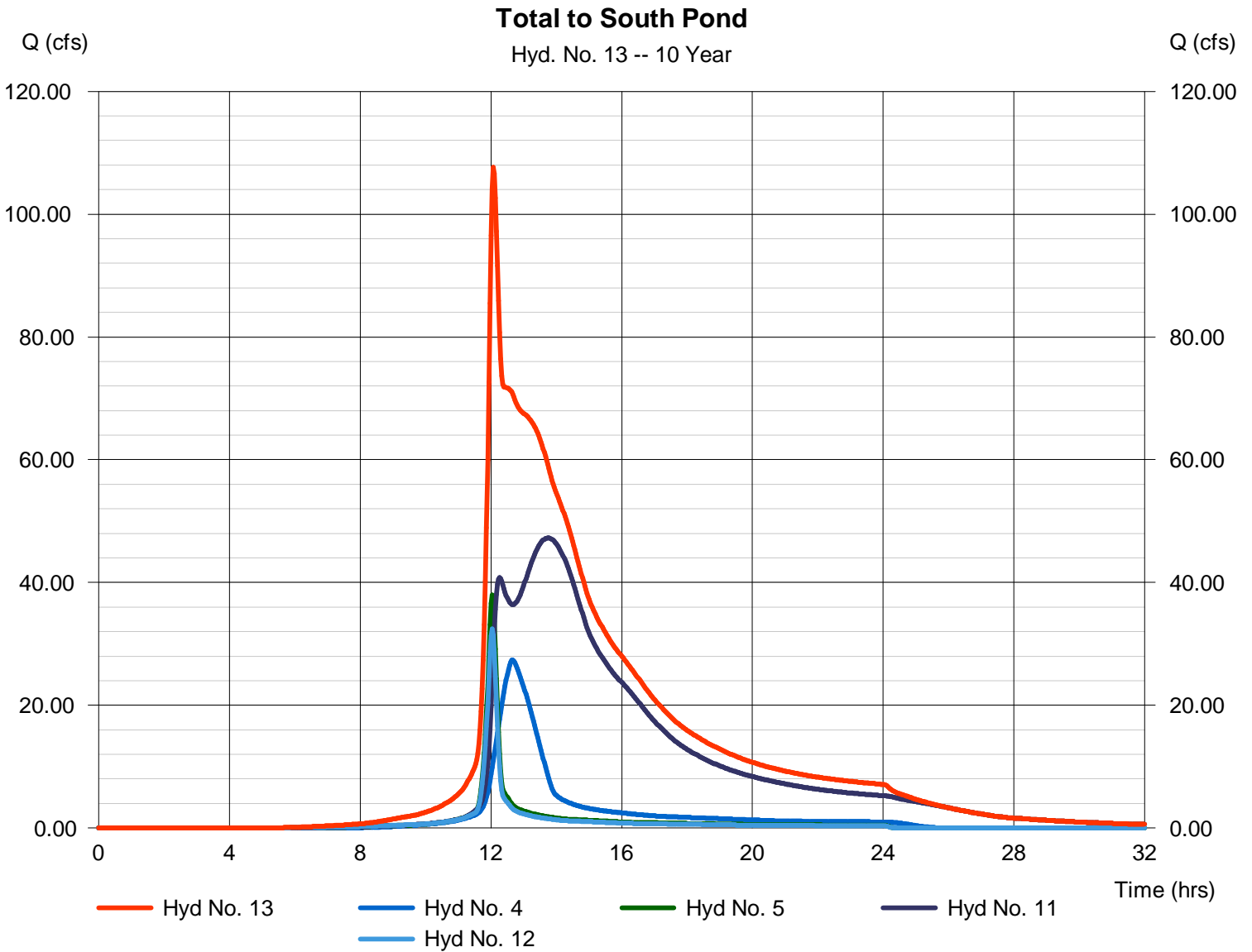
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Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 107.66 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,343,820 cuft
Inflow hyds.	= 4, 5, 11, 12	Contrib. drain. area	= 34.800 ac



Hydrograph Report

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

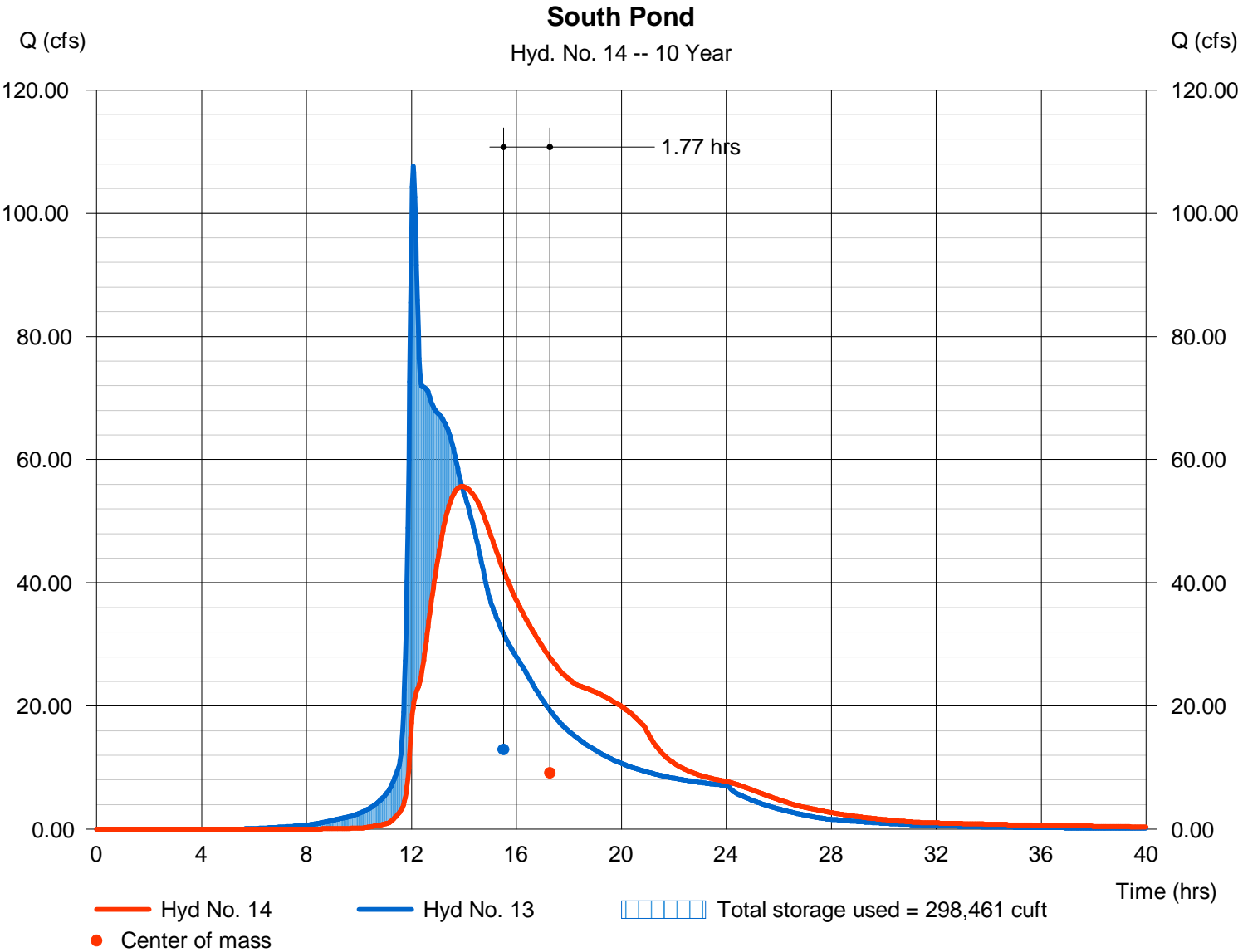
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 55.65 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,341,763 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1351.07 ft
Reservoir name	= South Pond	Max. Storage	= 298,461 cuft

Storage Indication method used.



Hydrograph Report

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

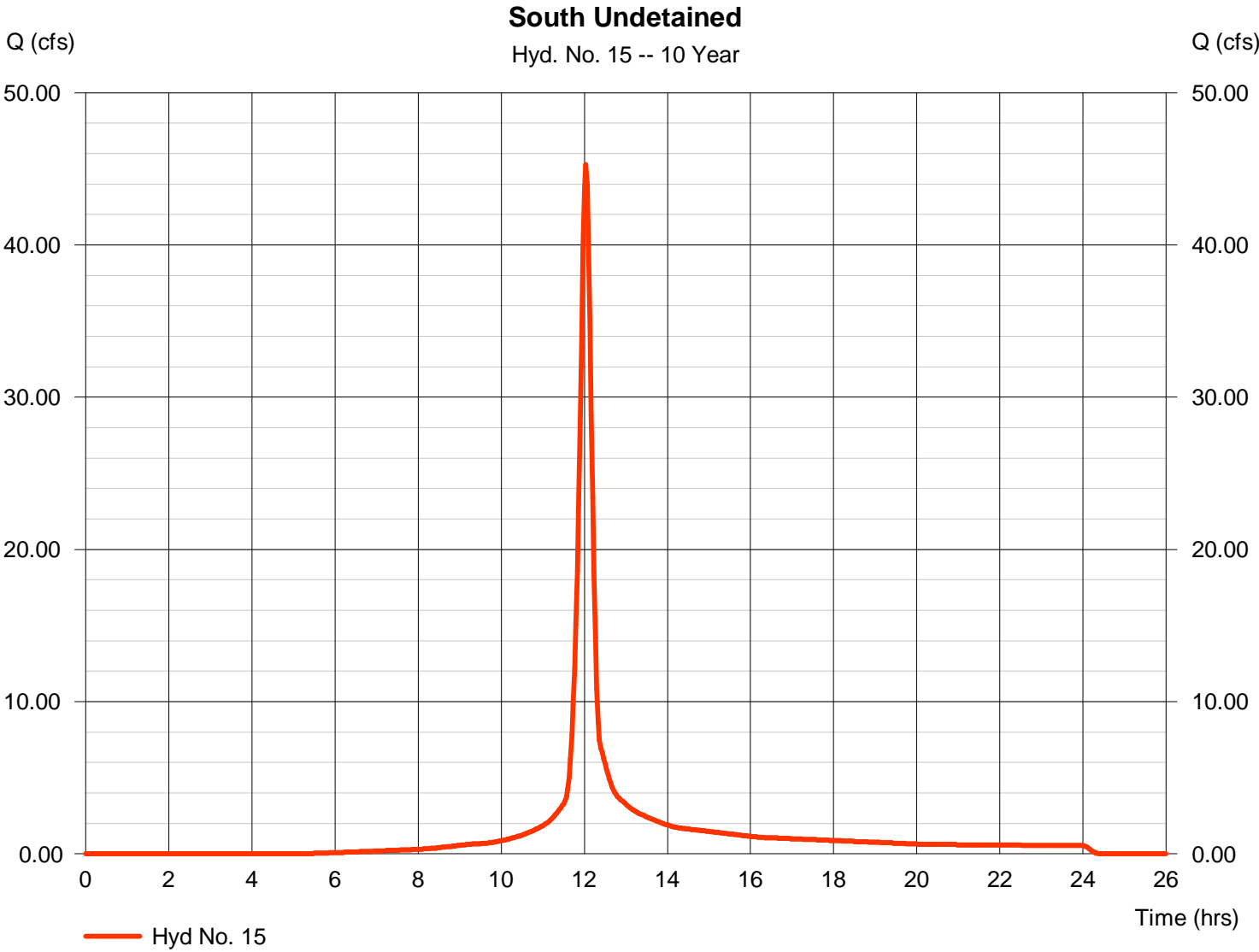
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 45.30 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 129,327 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = [(2.800 x 90) + (7.200 x 84)] / 10.000



Hydrograph Report

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

Tuesday, Jun 18, 2013

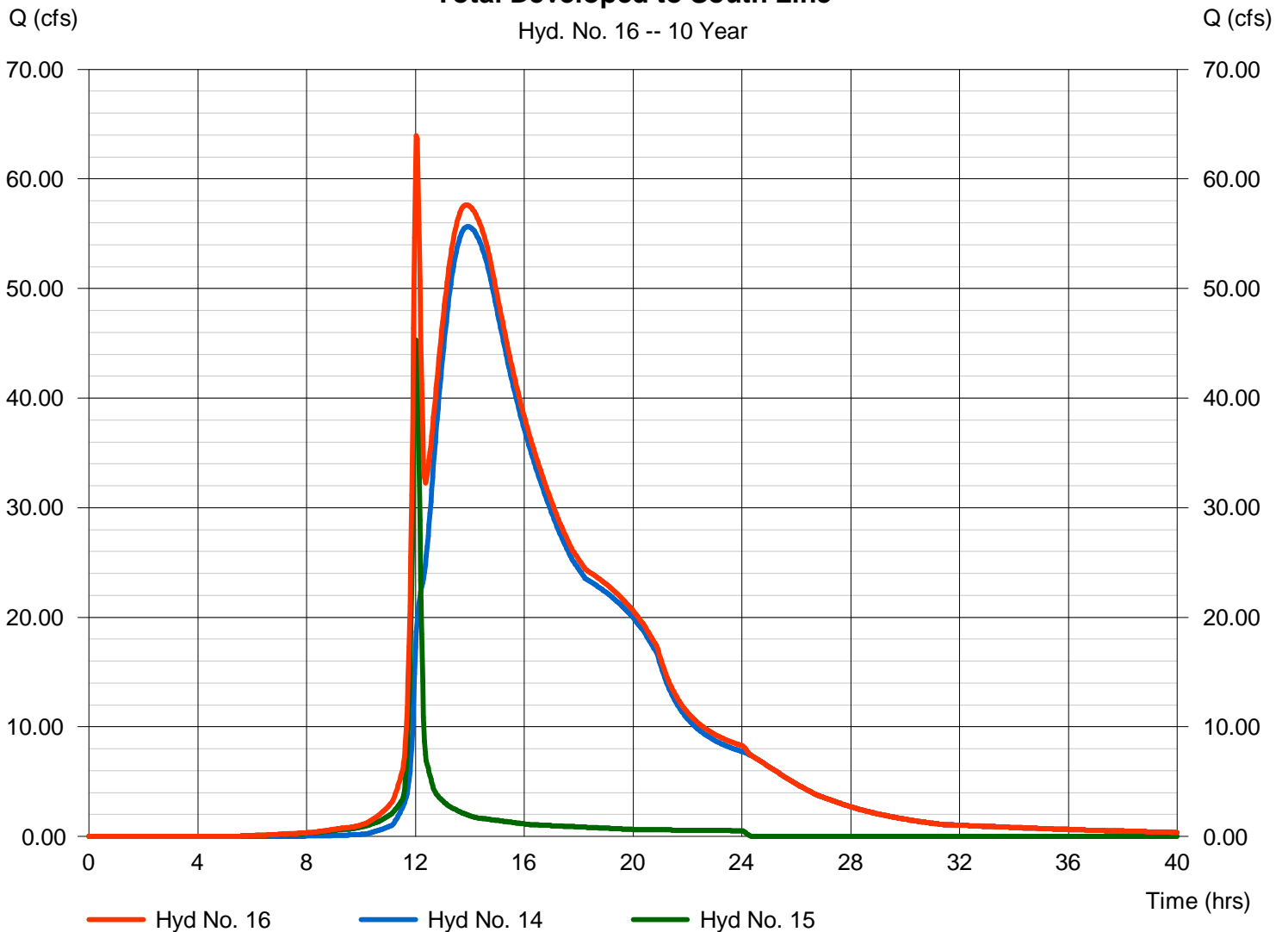
Hyd. No. 16

Total Developed to South Line

Hydrograph type	= Combine	Peak discharge	= 63.97 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 1,471,090 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 10.000 ac

Total Developed to South Line

Hyd. No. 16 -- 10 Year



Hydrograph Report

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Tuesday, Jun 18, 2013

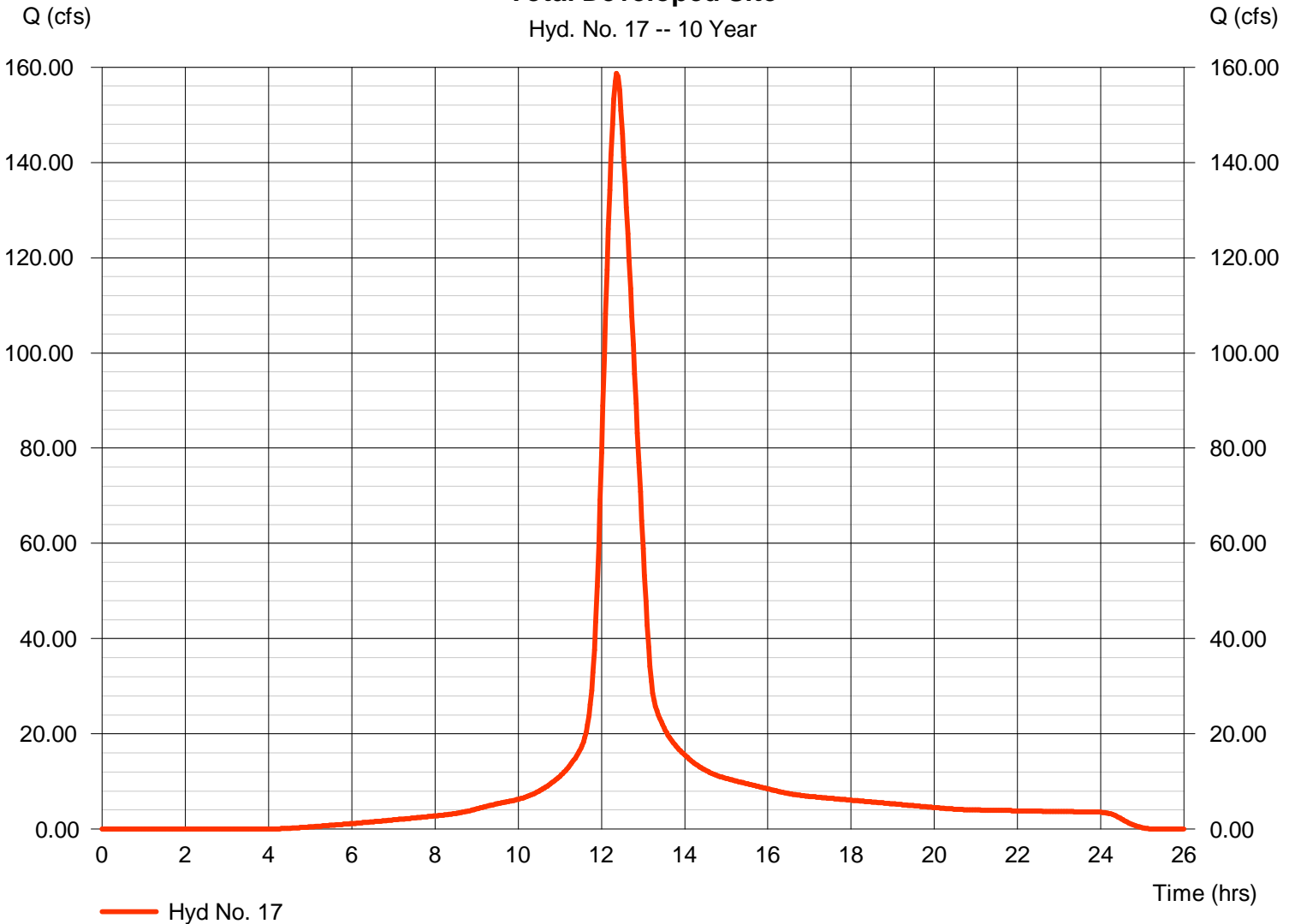
Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 158.65 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 915,865 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Developed Site

Hyd. No. 17 -- 10 Year



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	65.14	2	776	638,856	-----	-----	-----	Offsite North
2	SCS Runoff	71.78	2	722	204,984	-----	-----	-----	Estate Lots of North Pond
3	SCS Runoff	58.05	2	722	168,162	-----	-----	-----	West Developed to North Pond
4	SCS Runoff	34.61	2	760	265,573	-----	-----	-----	Offsite West
5	SCS Runoff	46.79	2	722	133,619	-----	-----	-----	South Estate
6	Combine	146.60	2	722	1,012,002	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	33.82	2	722	97,958	-----	-----	-----	West Developed to Middle Pond
8	SCS Runoff	27.65	2	722	78,957	-----	-----	-----	Estate Lots to Middle Pond
9	Reservoir	61.13	2	808	1,010,676	6	1359.36	277,148	North Pond
10	Combine	82.94	2	722	1,187,593	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	59.94	2	836	1,187,547	10	1355.21	90,421	Middle Pond
12	SCS Runoff	39.45	2	722	114,285	-----	-----	-----	South West Developed
13	Combine	137.75	2	724	1,701,025	4, 5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	75.40	2	822	1,698,938	13	1351.42	354,792	South Pond
15	SCS Runoff	55.33	2	722	159,426	-----	-----	-----	South Undetained
16	Combine	78.05	2	818	1,858,364	14, 15	-----	-----	Total Developed to South Line
17	SCS Runoff	191.21	2	742	1,112,542	-----	-----	-----	Total Developed Site
The Ranch Total Site.gpw					Return Period: 25 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

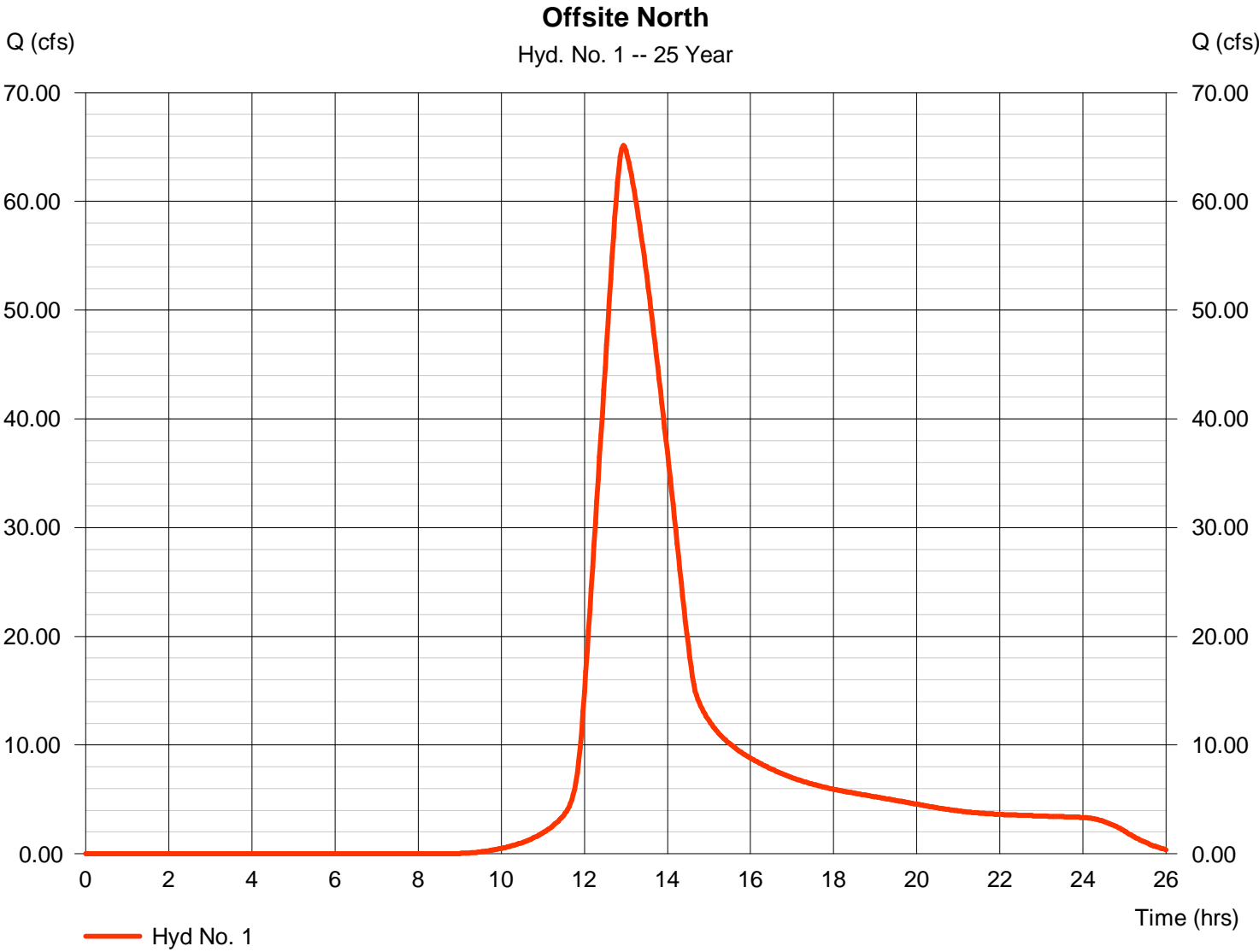
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 65.14 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.93 hrs
Time interval	= 2 min	Hyd. volume	= 638,856 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

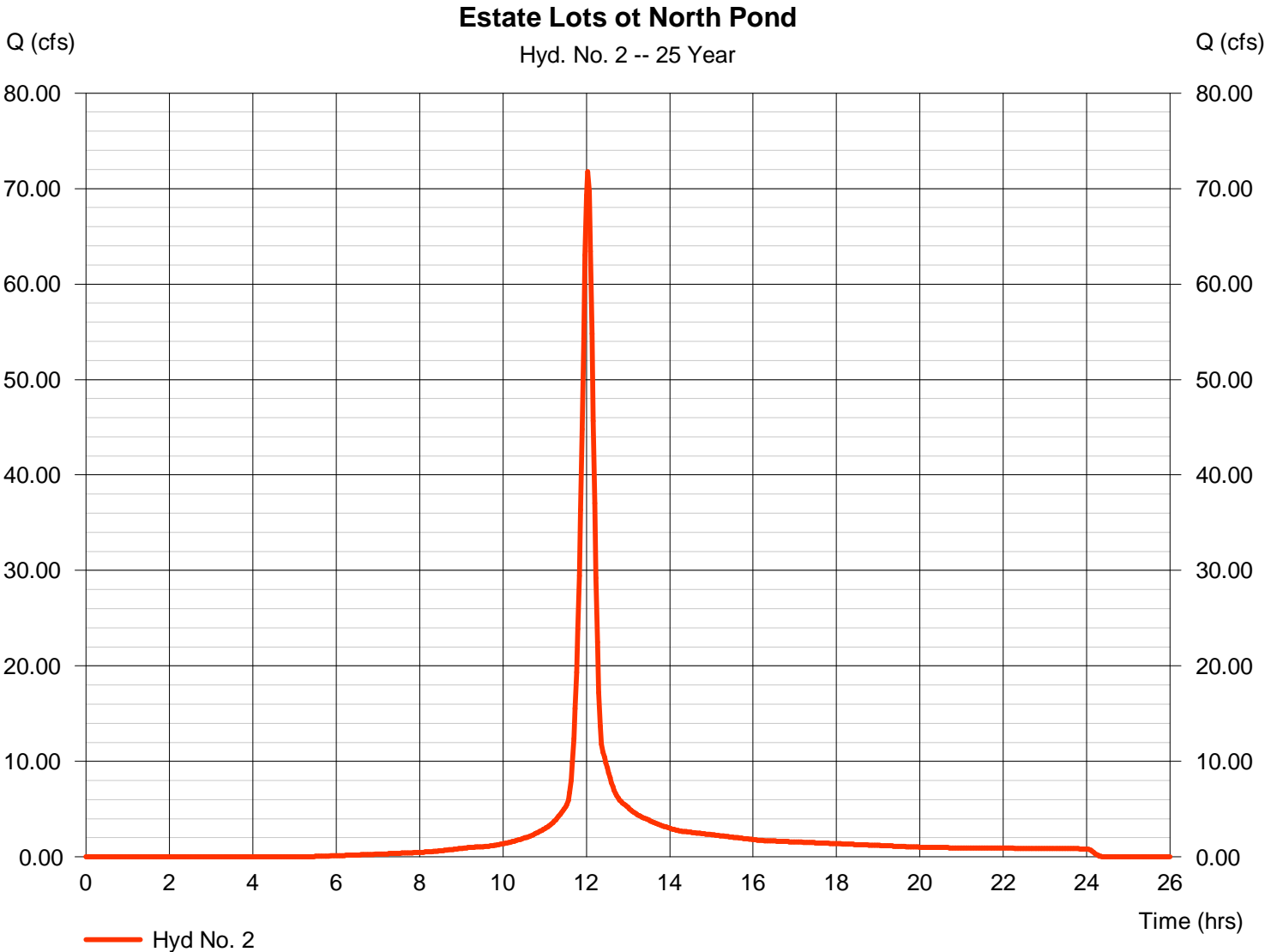
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 71.78 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 204,984 cuft
Drainage area	= 13.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

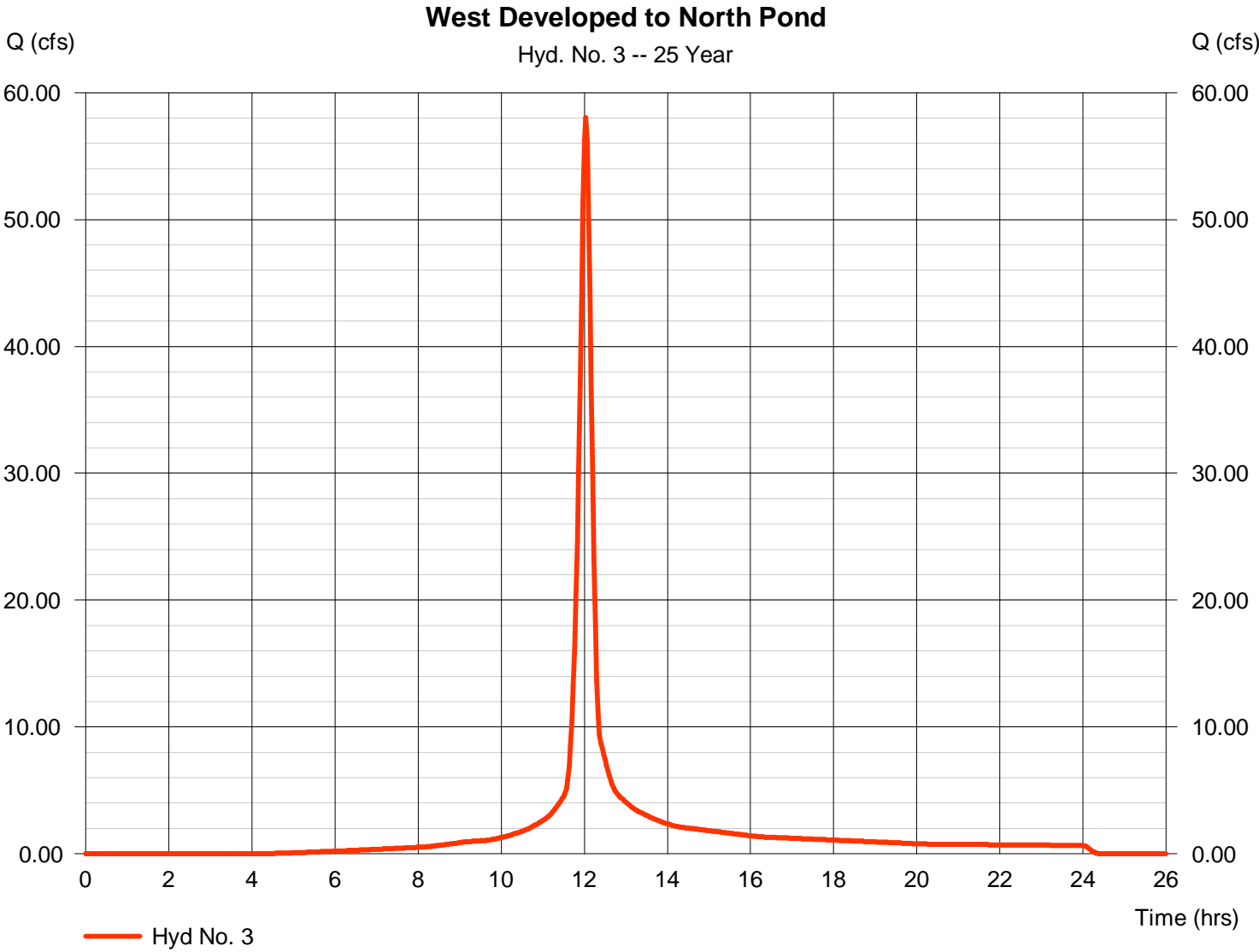
Tuesday, Jun 18, 2013

Hyd. No. 3

West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 58.05 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 168,162 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 10.300



Hydrograph Report

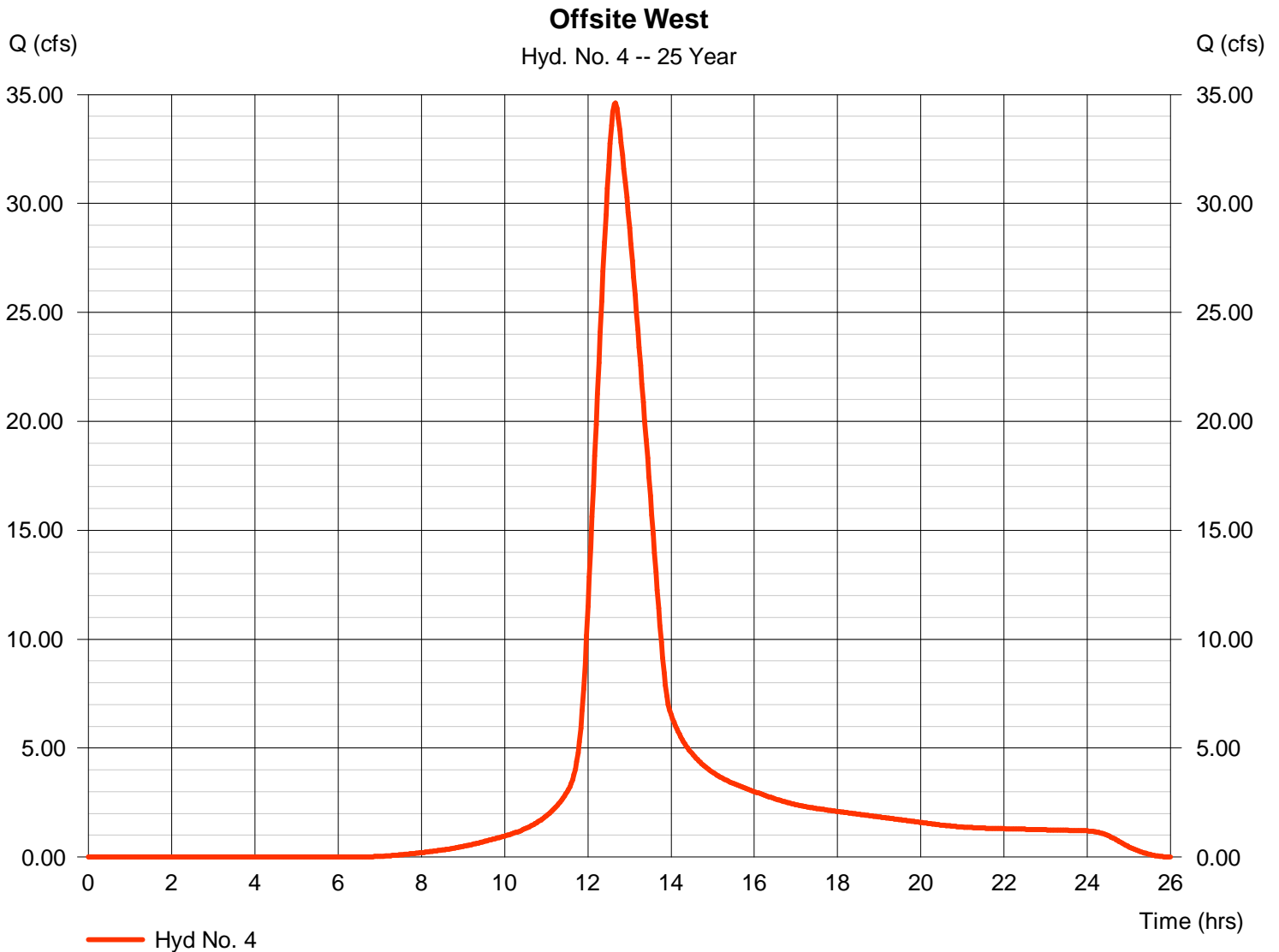
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 34.61 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 265,573 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

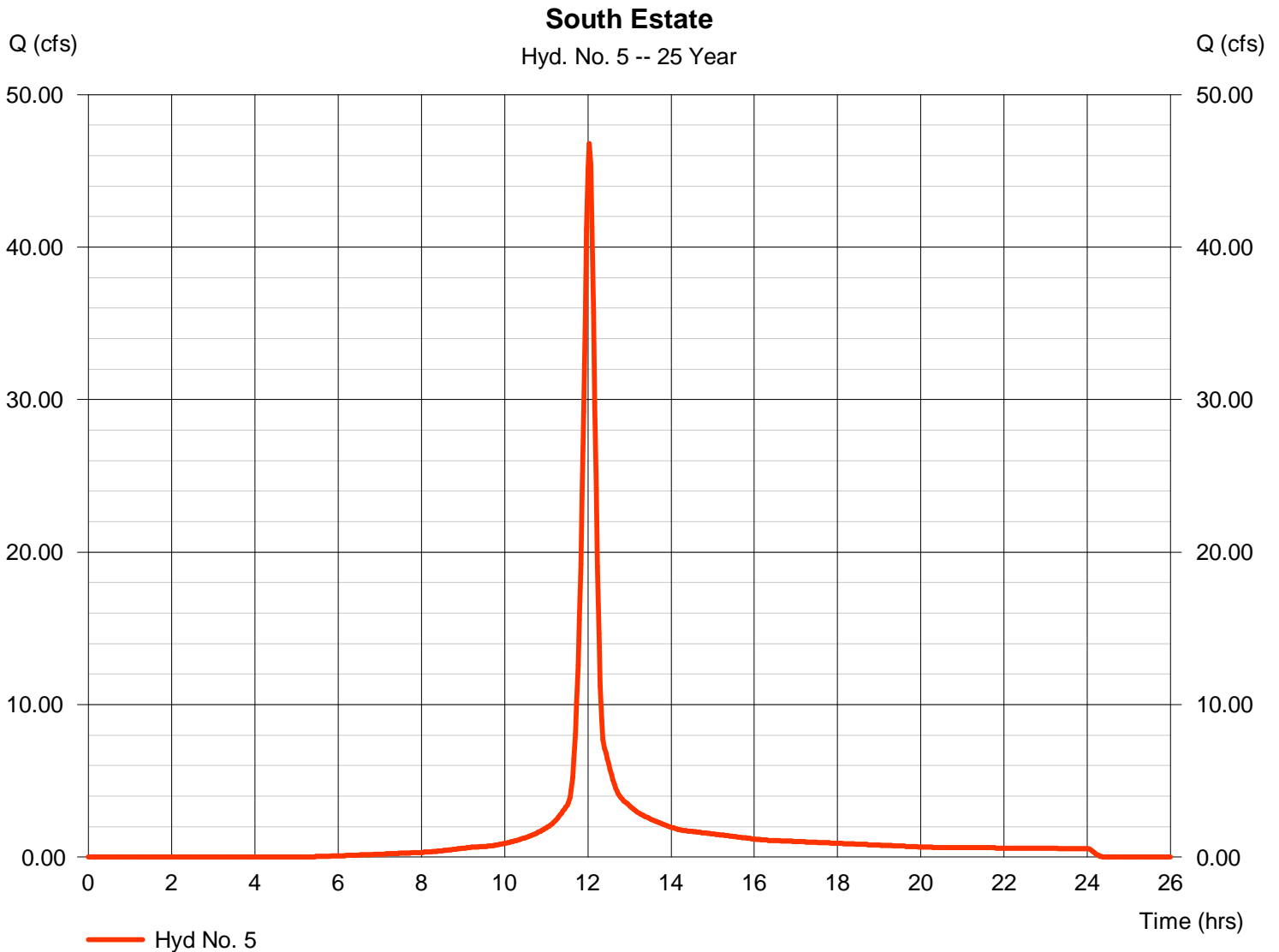
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 46.79 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 133,619 cuft
Drainage area	= 8.800 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

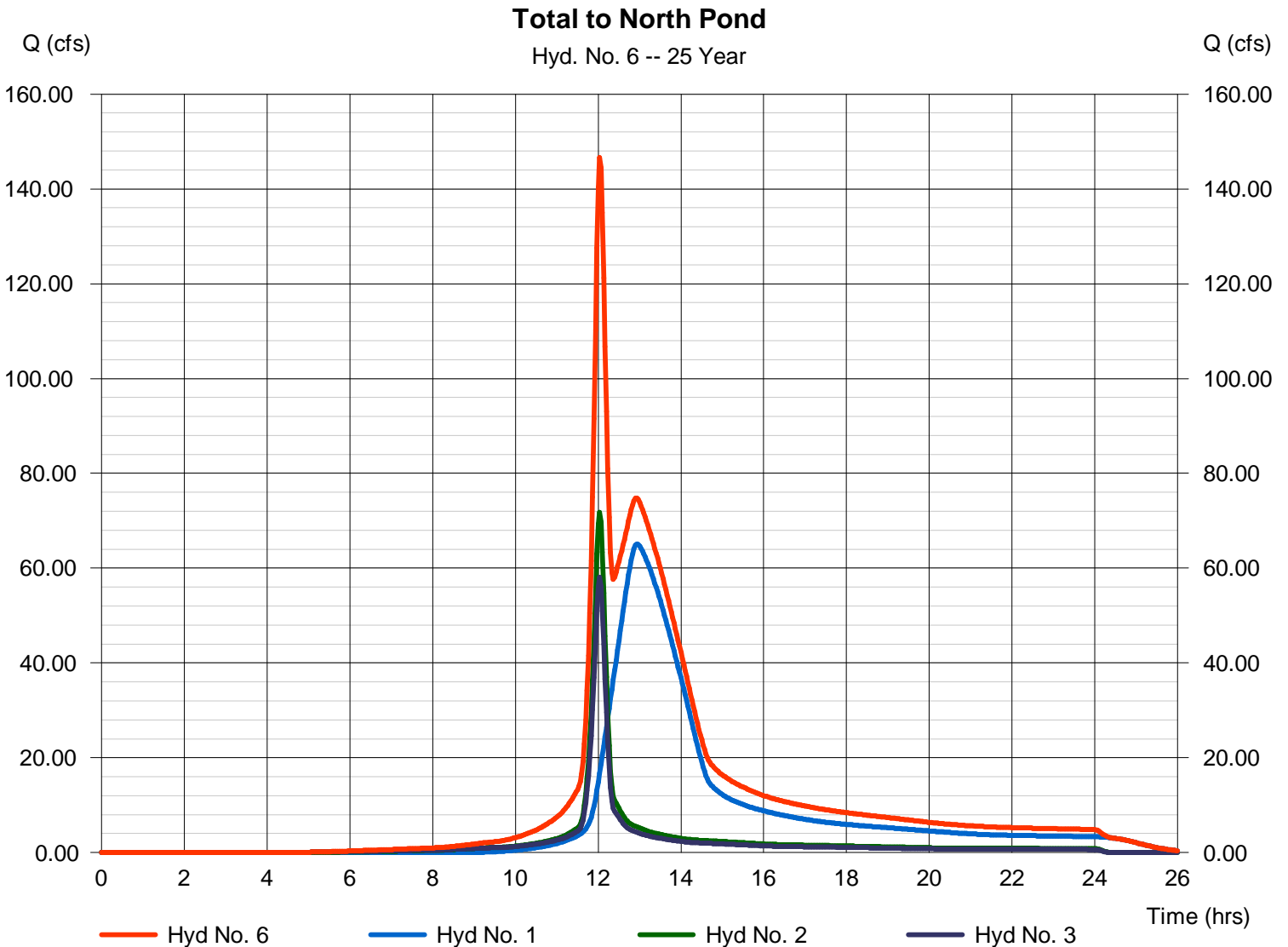
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 146.60 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 1,012,002 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 80.800 ac



Hydrograph Report

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

Tuesday, Jun 18, 2013

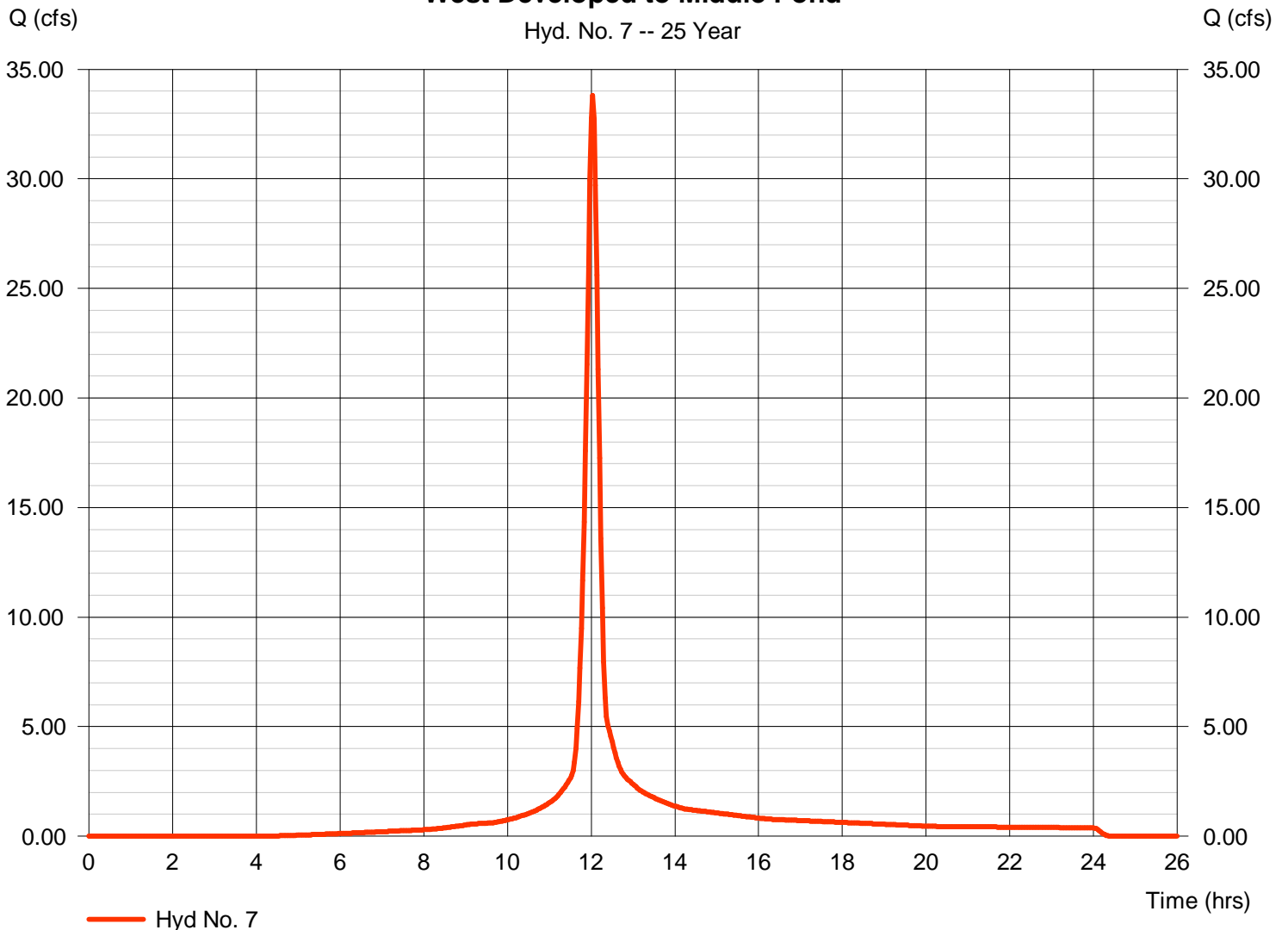
Hyd. No. 7

West Developed to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 33.82 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 97,958 cuft
Drainage area	= 6.000 ac	Curve number	= 87
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

West Developed to Middle Pond

Hyd. No. 7 -- 25 Year



Hydrograph Report

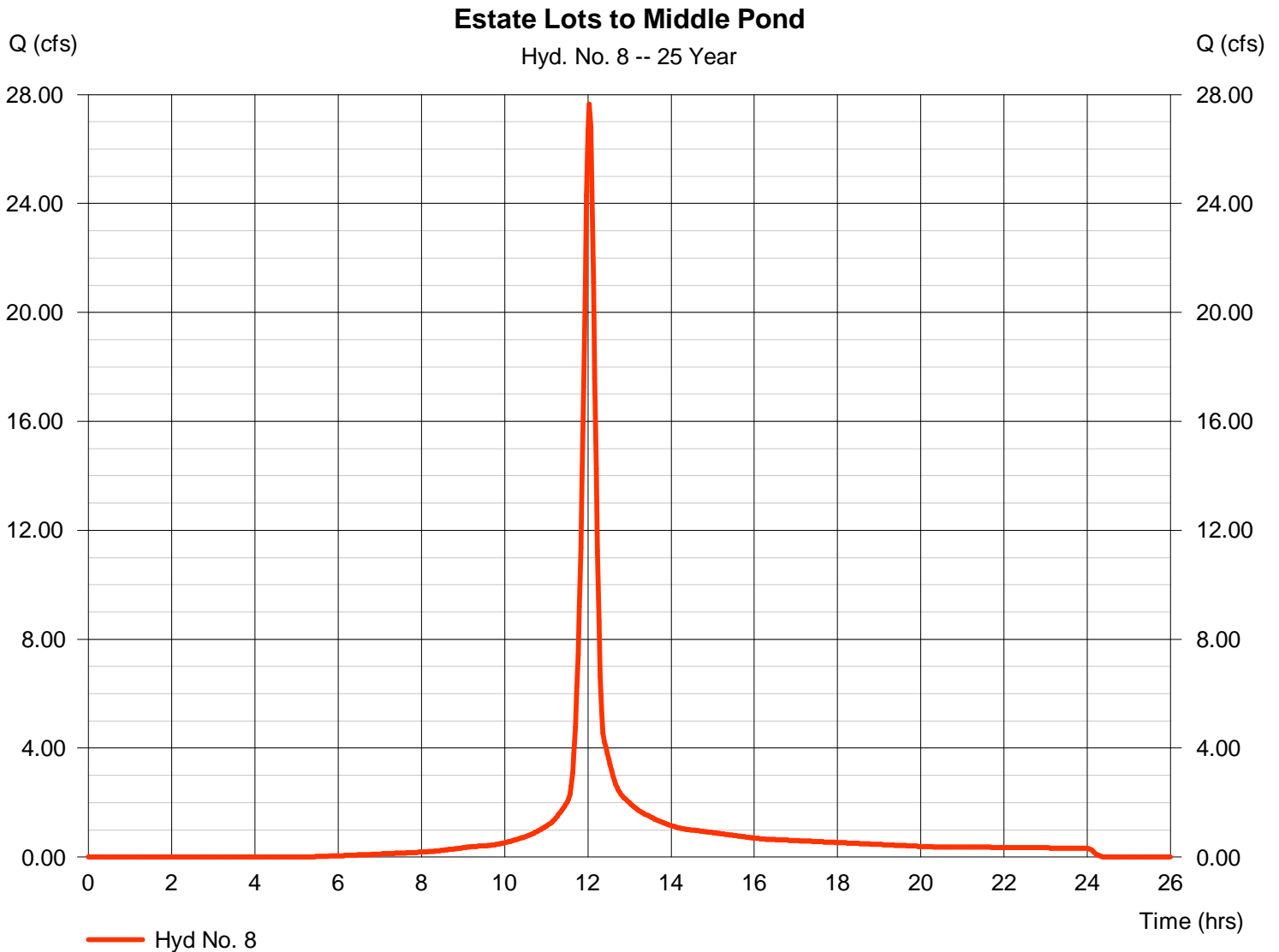
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 27.65 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 78,957 cuft
Drainage area	= 5.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

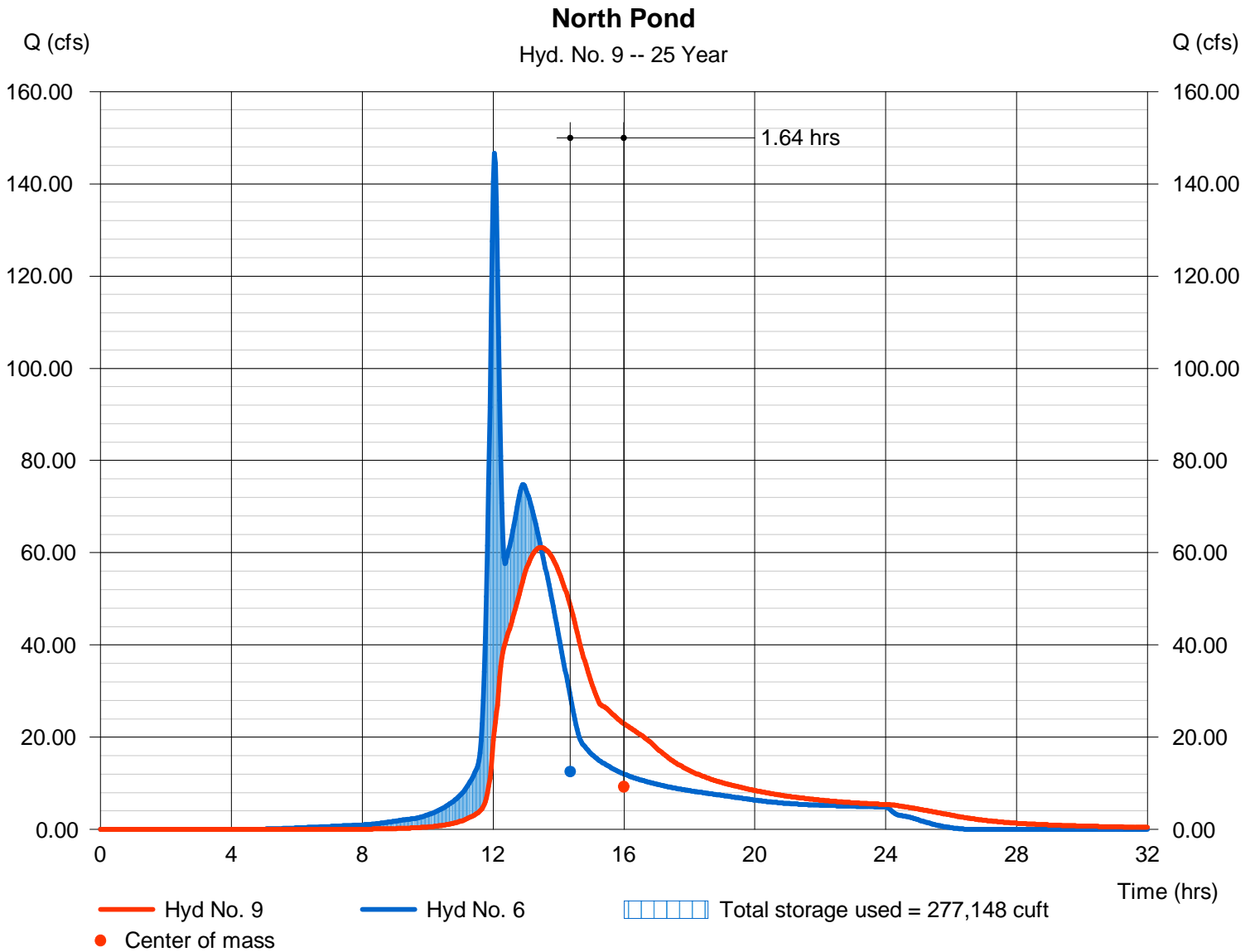
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 61.13 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.47 hrs
Time interval	= 2 min	Hyd. volume	= 1,010,676 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1359.36 ft
Reservoir name	= North Pond	Max. Storage	= 277,148 cuft

Storage Indication method used.



Hydrograph Report

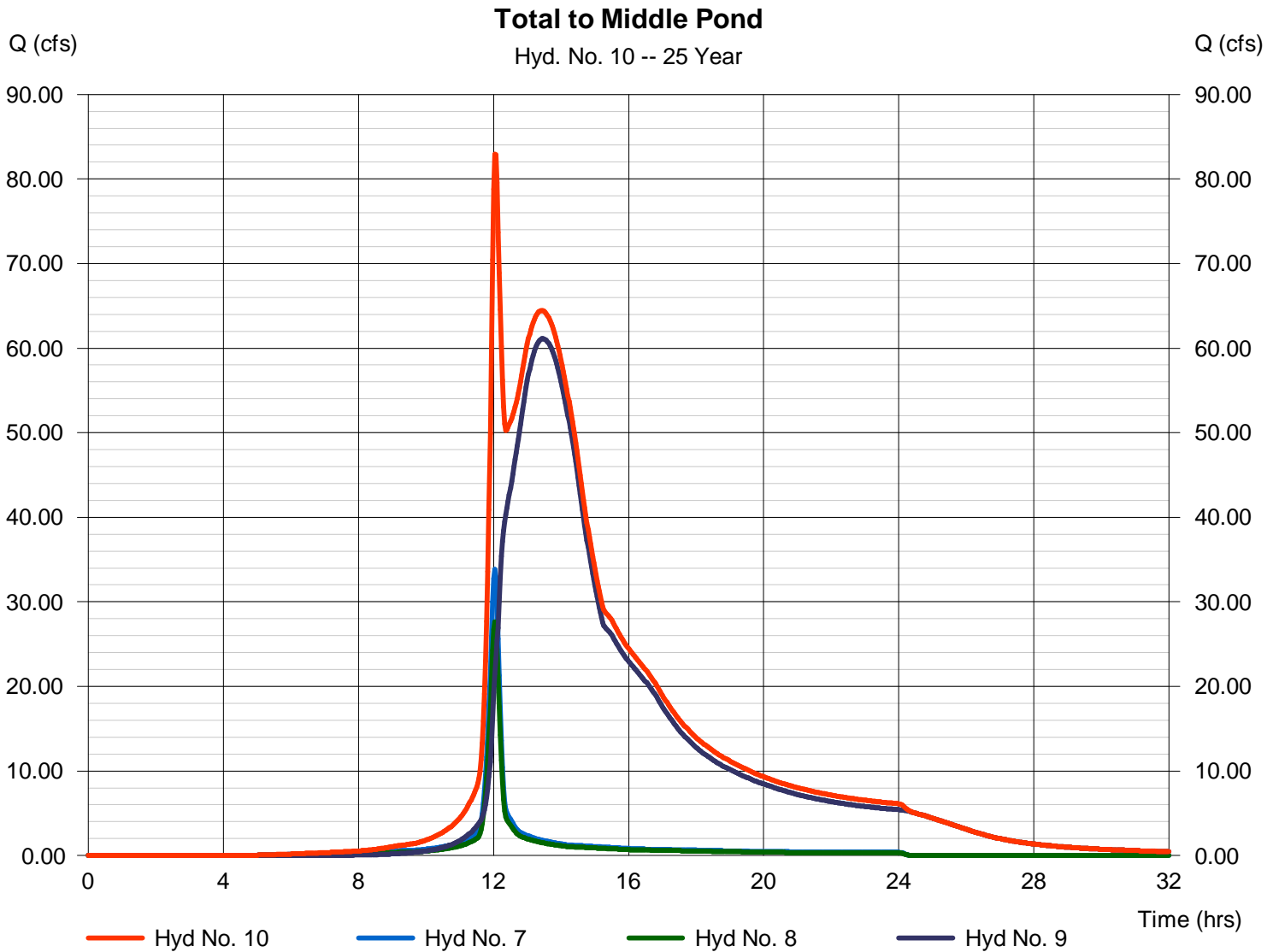
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type	= Combine	Peak discharge	= 82.94 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 1,187,593 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 11.200 ac



Hydrograph Report

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

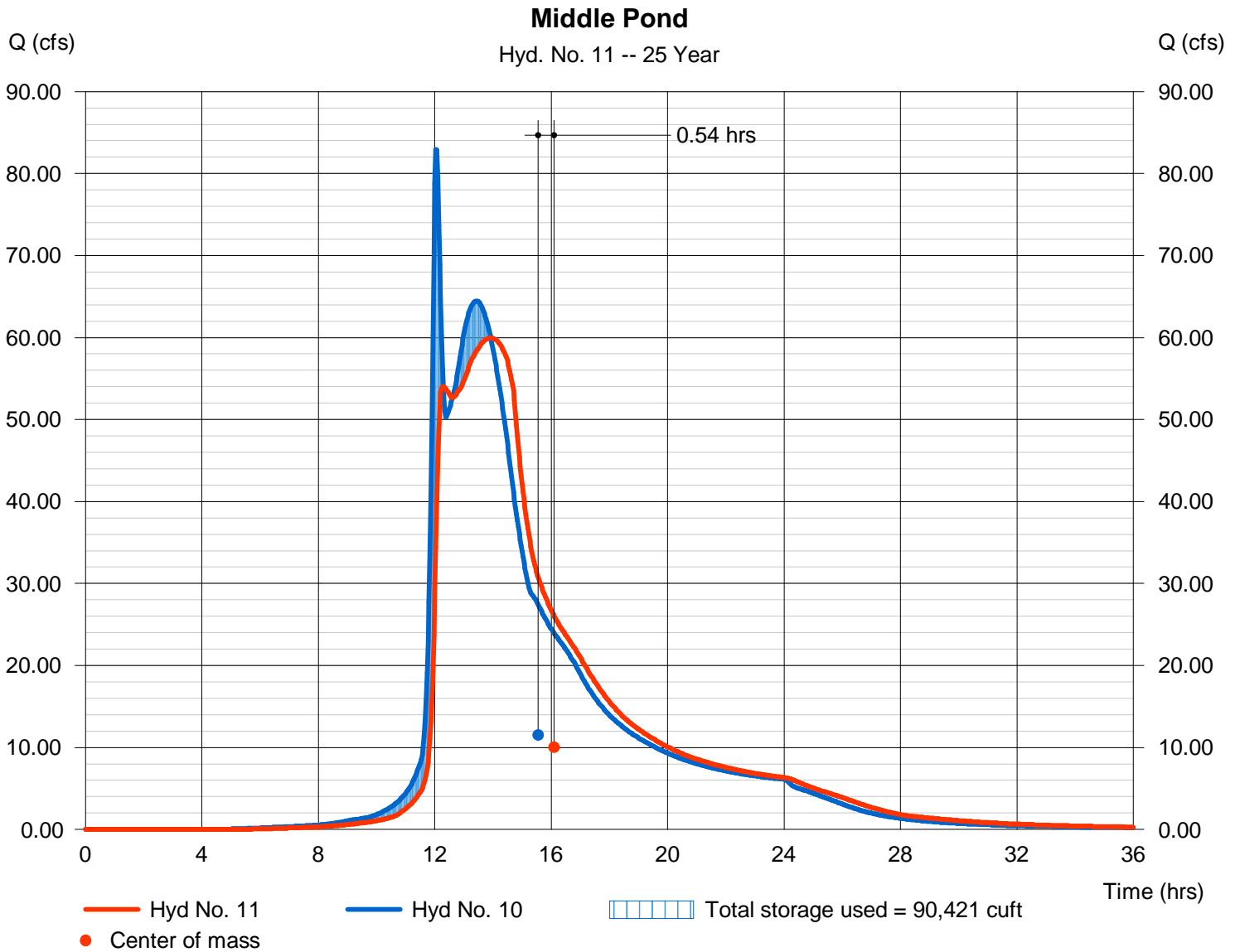
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 59.94 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,187,547 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1355.21 ft
Reservoir name	= Middle Pond	Max. Storage	= 90,421 cuft

Storage Indication method used.



Hydrograph Report

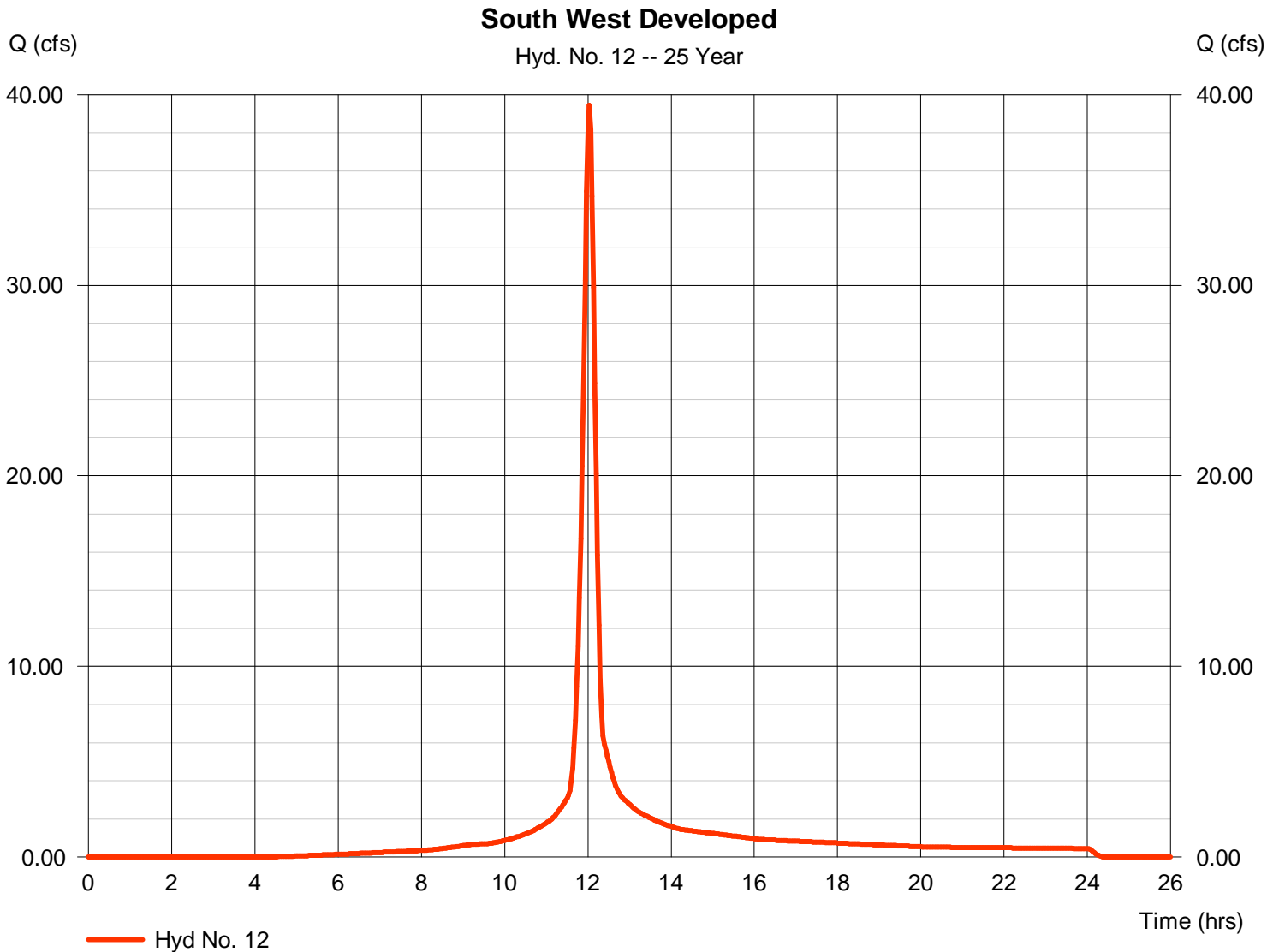
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 39.45 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 114,285 cuft
Drainage area	= 7.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

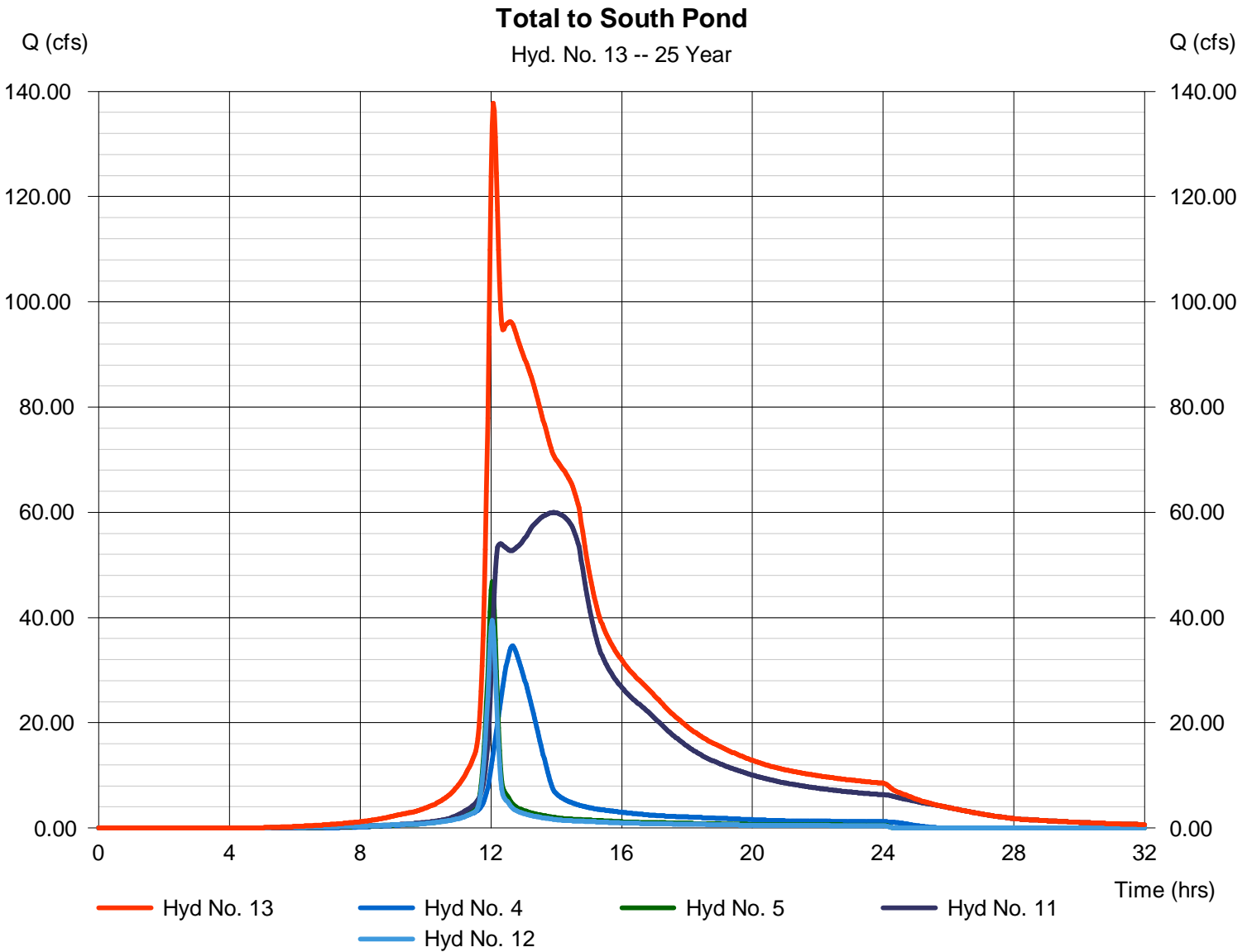
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 137.75 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,701,025 cuft
Inflow hyds.	= 4, 5, 11, 12	Contrib. drain. area	= 34.800 ac



Hydrograph Report

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

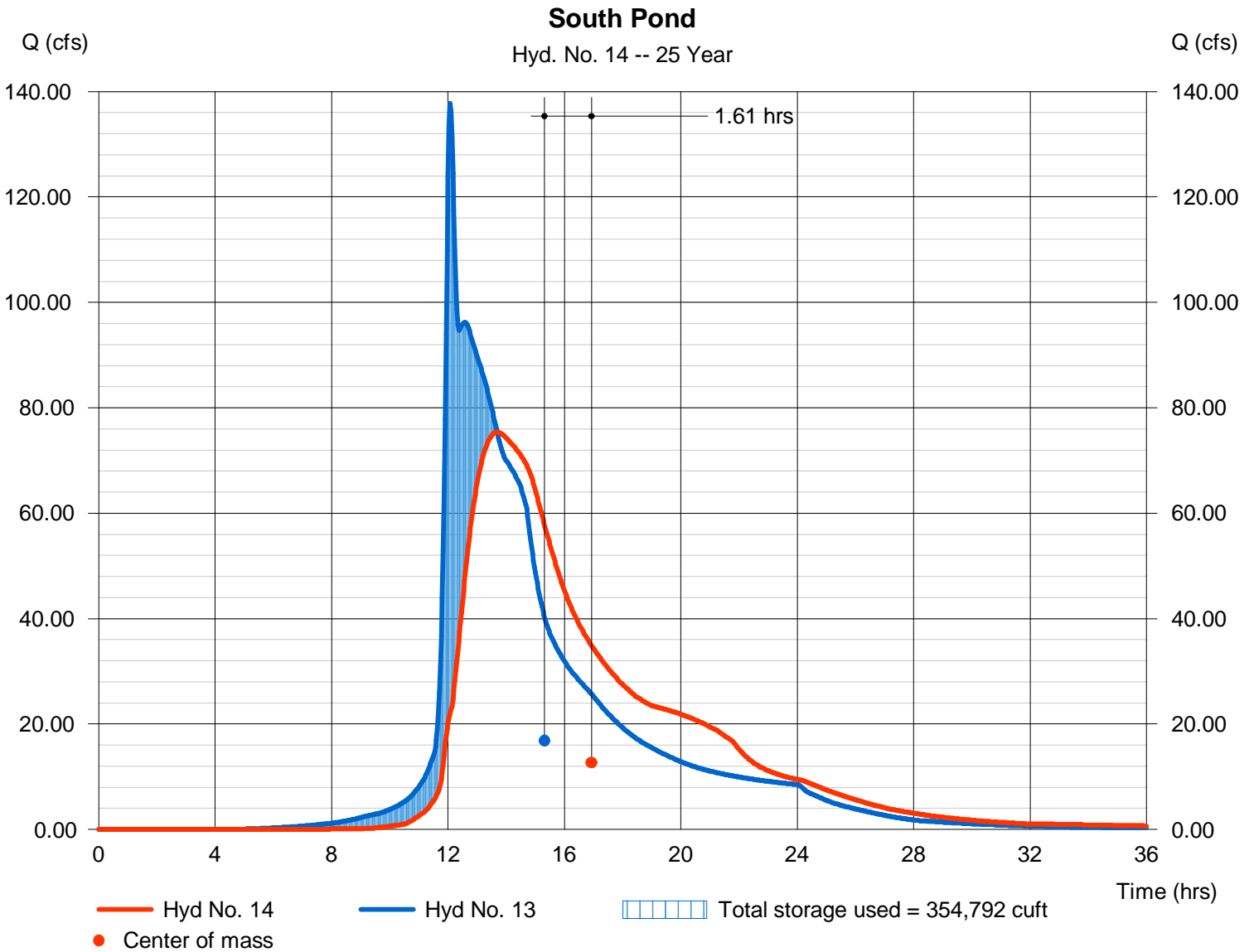
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 75.40 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.70 hrs
Time interval	= 2 min	Hyd. volume	= 1,698,938 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1351.42 ft
Reservoir name	= South Pond	Max. Storage	= 354,792 cuft

Storage Indication method used.



Hydrograph Report

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

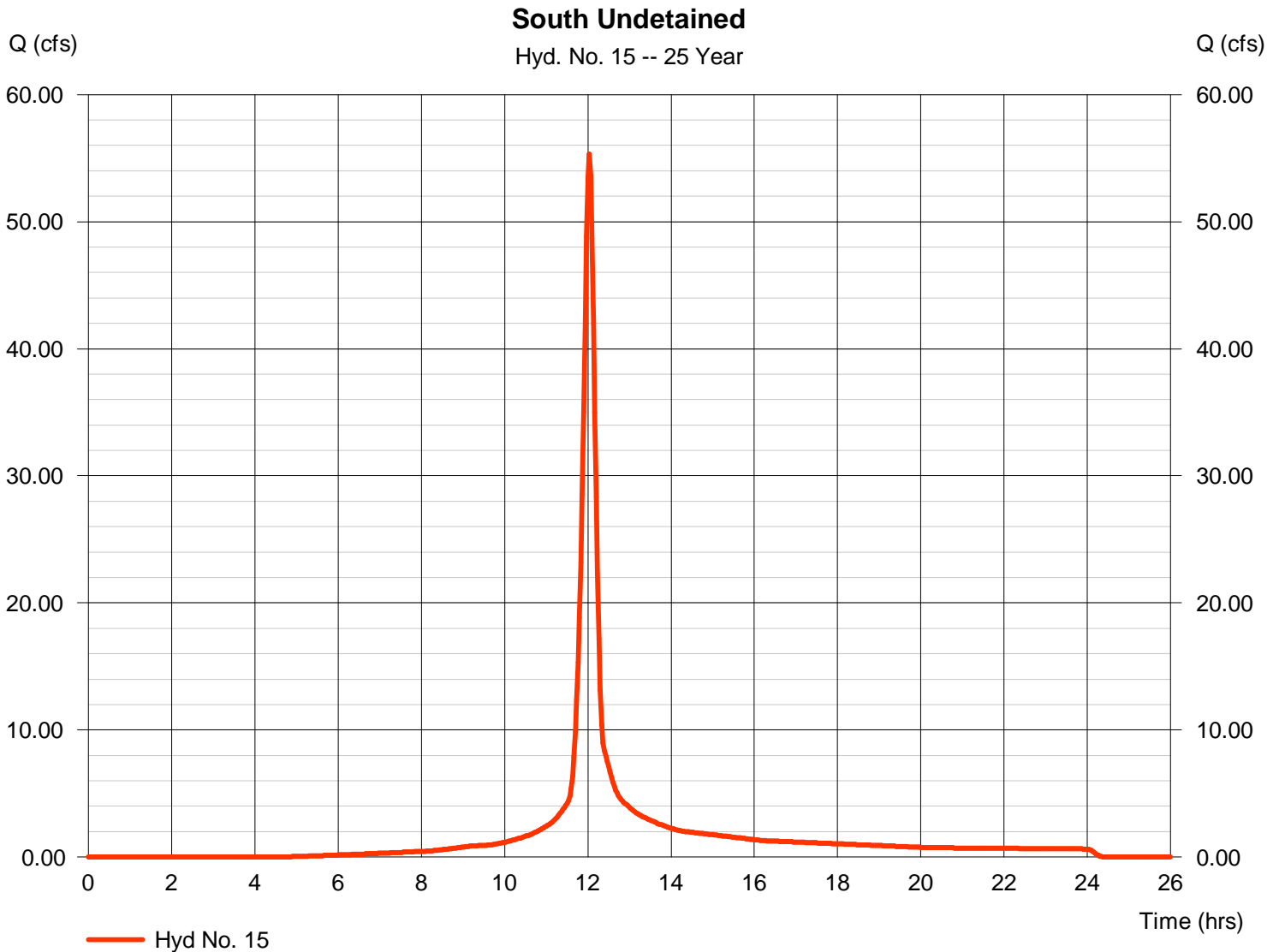
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 55.33 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 159,426 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = [(2.800 x 90) + (7.200 x 84)] / 10.000



Hydrograph Report

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

Tuesday, Jun 18, 2013

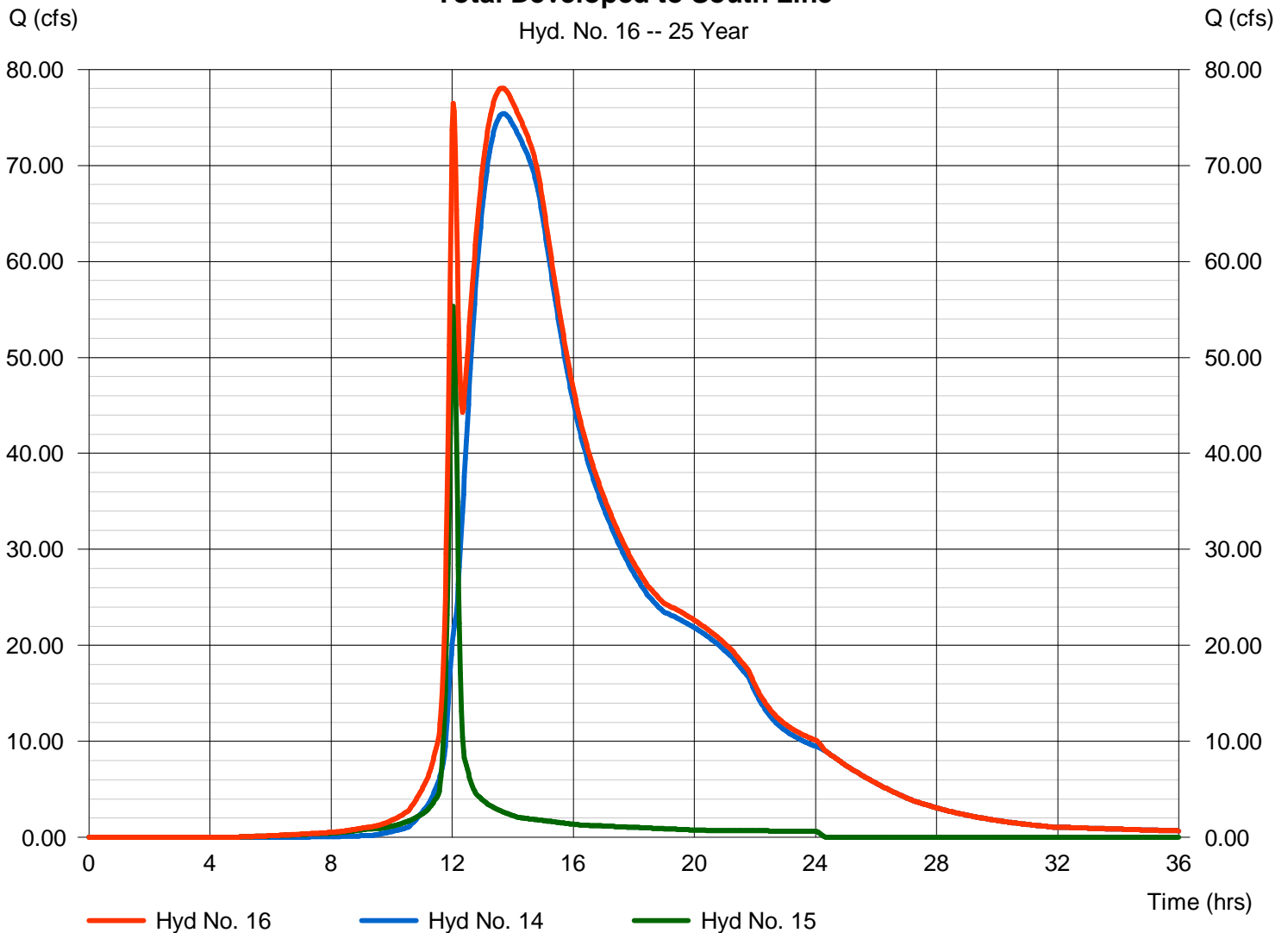
Hyd. No. 16

Total Developed to South Line

Hydrograph type	= Combine	Peak discharge	= 78.05 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.63 hrs
Time interval	= 2 min	Hyd. volume	= 1,858,364 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 10.000 ac

Total Developed to South Line

Hyd. No. 16 -- 25 Year



Hydrograph Report

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

Tuesday, Jun 18, 2013

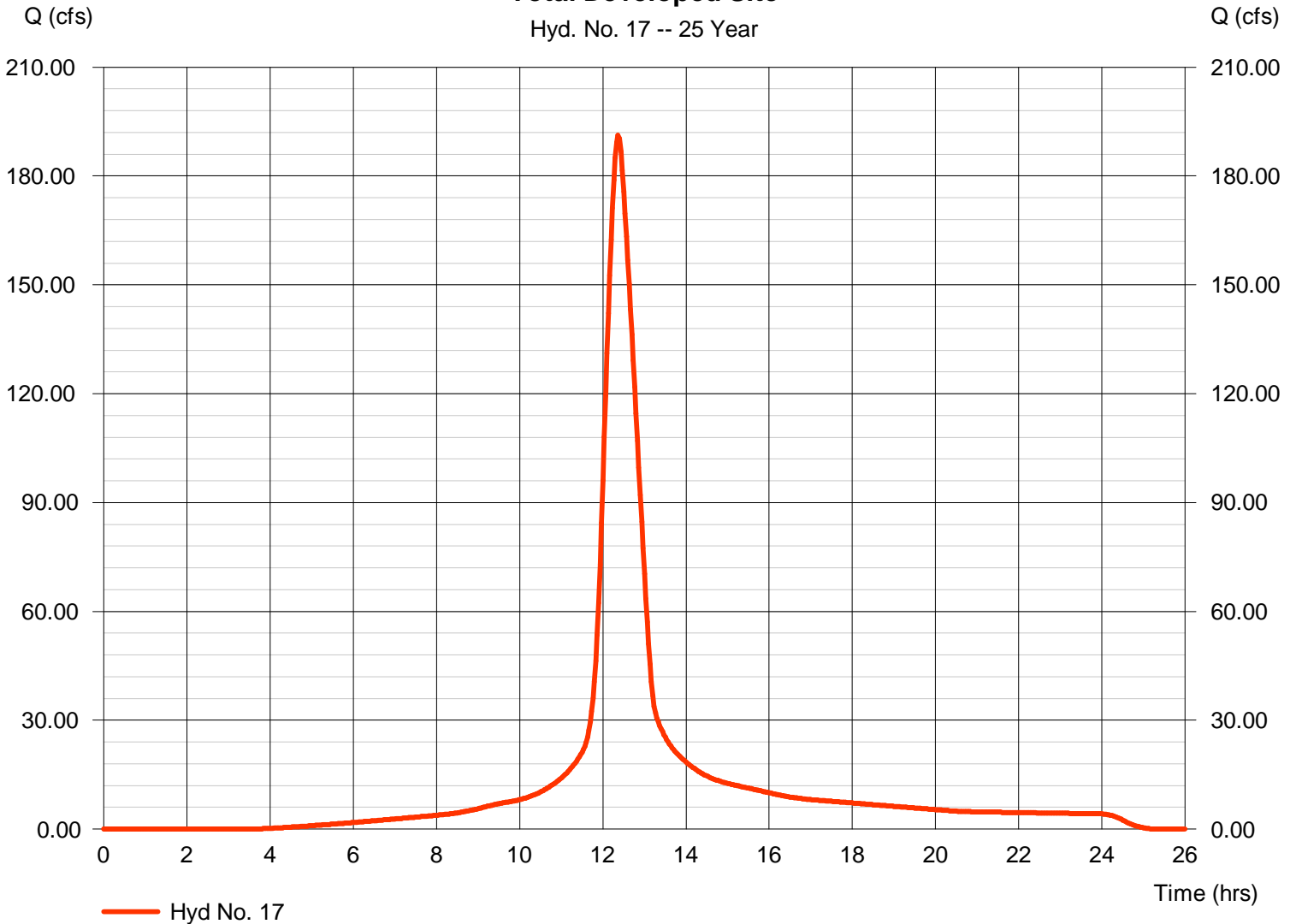
Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 191.21 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 1,112,542 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Developed Site

Hyd. No. 17 -- 25 Year



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	79.90	2	776	777,794	-----	-----	-----	Offsite North
2	SCS Runoff	83.83	2	722	241,049	-----	-----	-----	Estate Lots of North Pond
3	SCS Runoff	67.21	2	722	196,223	-----	-----	-----	West Developed to North Pond
4	SCS Runoff	41.10	2	760	315,692	-----	-----	-----	Offsite West
5	SCS Runoff	54.64	2	722	157,128	-----	-----	-----	South Estate
6	Combine	172.59	2	722	1,215,067	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	39.15	2	722	114,304	-----	-----	-----	West Developed to Middle Pond
8	SCS Runoff	32.29	2	722	92,848	-----	-----	-----	Estate Lots to Middle Pond
9	Reservoir	75.40	2	806	1,213,731	6	1359.70	317,059	North Pond
10	Combine	97.18	2	724	1,420,884	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	68.75	2	846	1,420,839	10	1355.82	146,814	Middle Pond
12	SCS Runoff	45.67	2	722	133,355	-----	-----	-----	South West Developed
13	Combine	165.00	2	724	2,027,014	4, 5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	89.87	2	814	2,024,908	13	1351.66	392,180	South Pond
15	SCS Runoff	64.23	2	722	186,504	-----	-----	-----	South Undetained
16	Combine	93.13	2	812	2,211,415	14, 15	-----	-----	Total Developed to South Line
17	SCS Runoff	220.02	2	742	1,288,507	-----	-----	-----	Total Developed Site
The Ranch Total Site.gpw					Return Period: 50 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

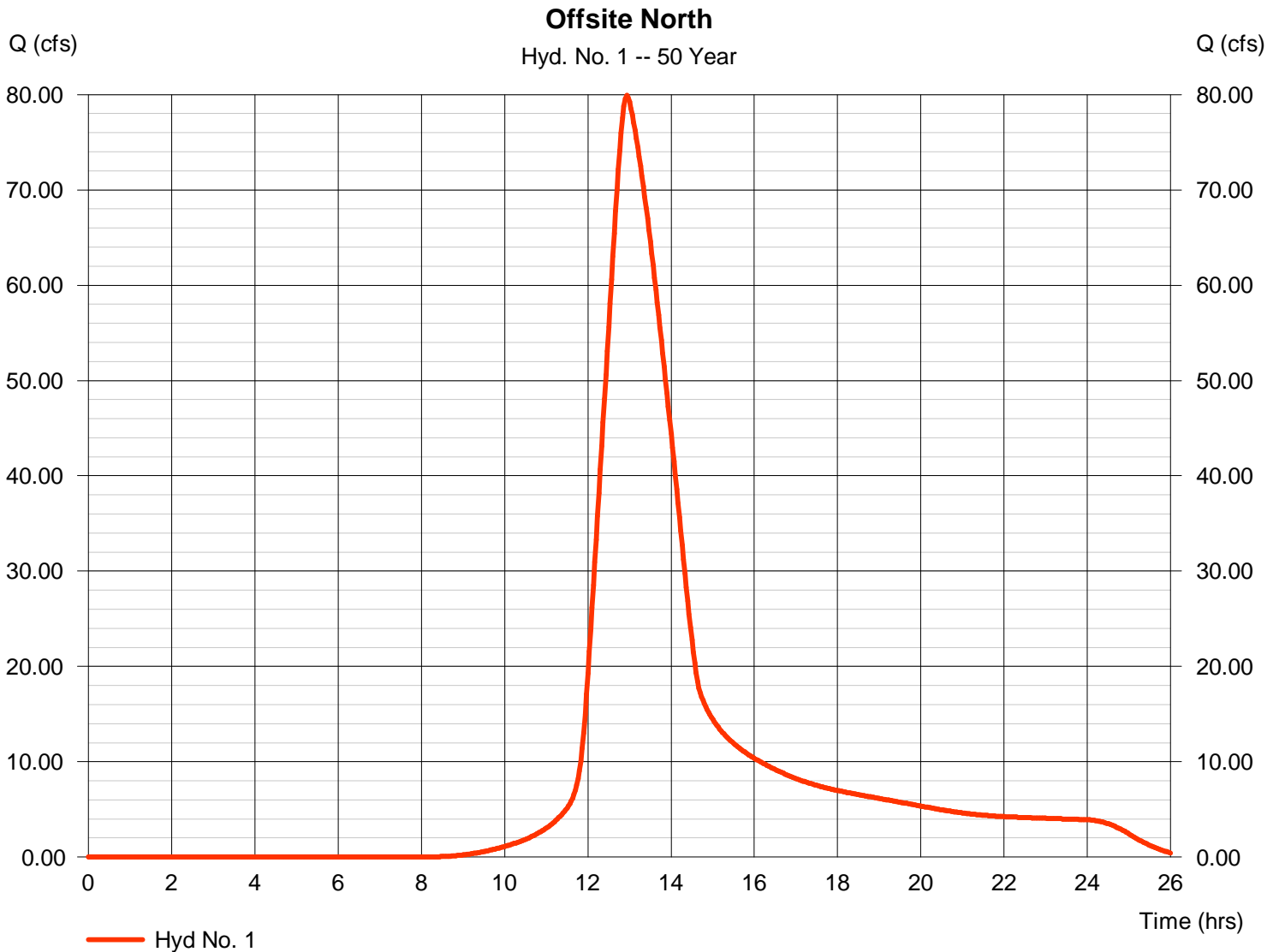
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 79.90 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.93 hrs
Time interval	= 2 min	Hyd. volume	= 777,794 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

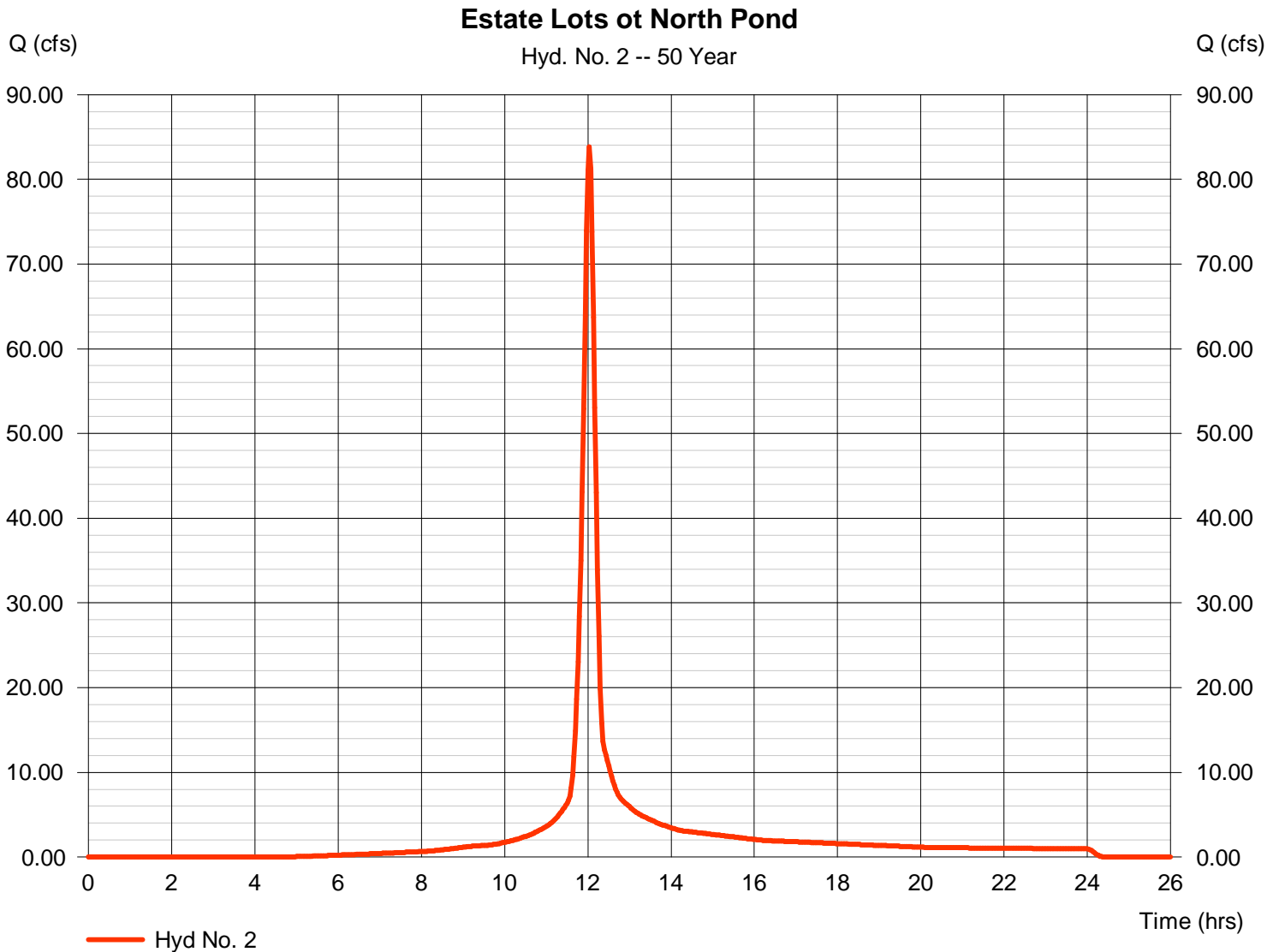
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 83.83 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 241,049 cuft
Drainage area	= 13.500 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

Tuesday, Jun 18, 2013

Hyd. No. 3

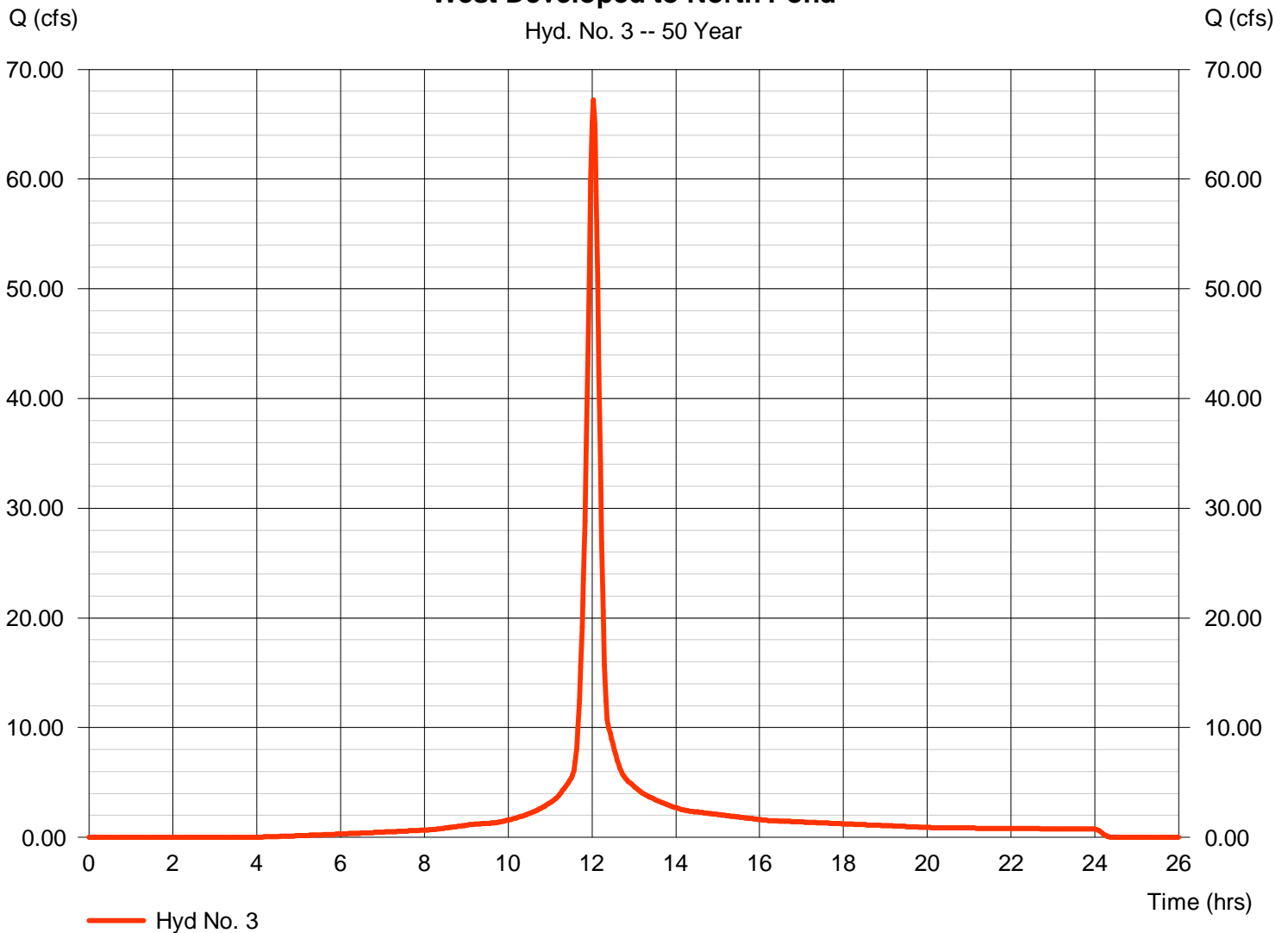
West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 67.21 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 196,223 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 10.300

West Developed to North Pond

Hyd. No. 3 -- 50 Year



Hydrograph Report

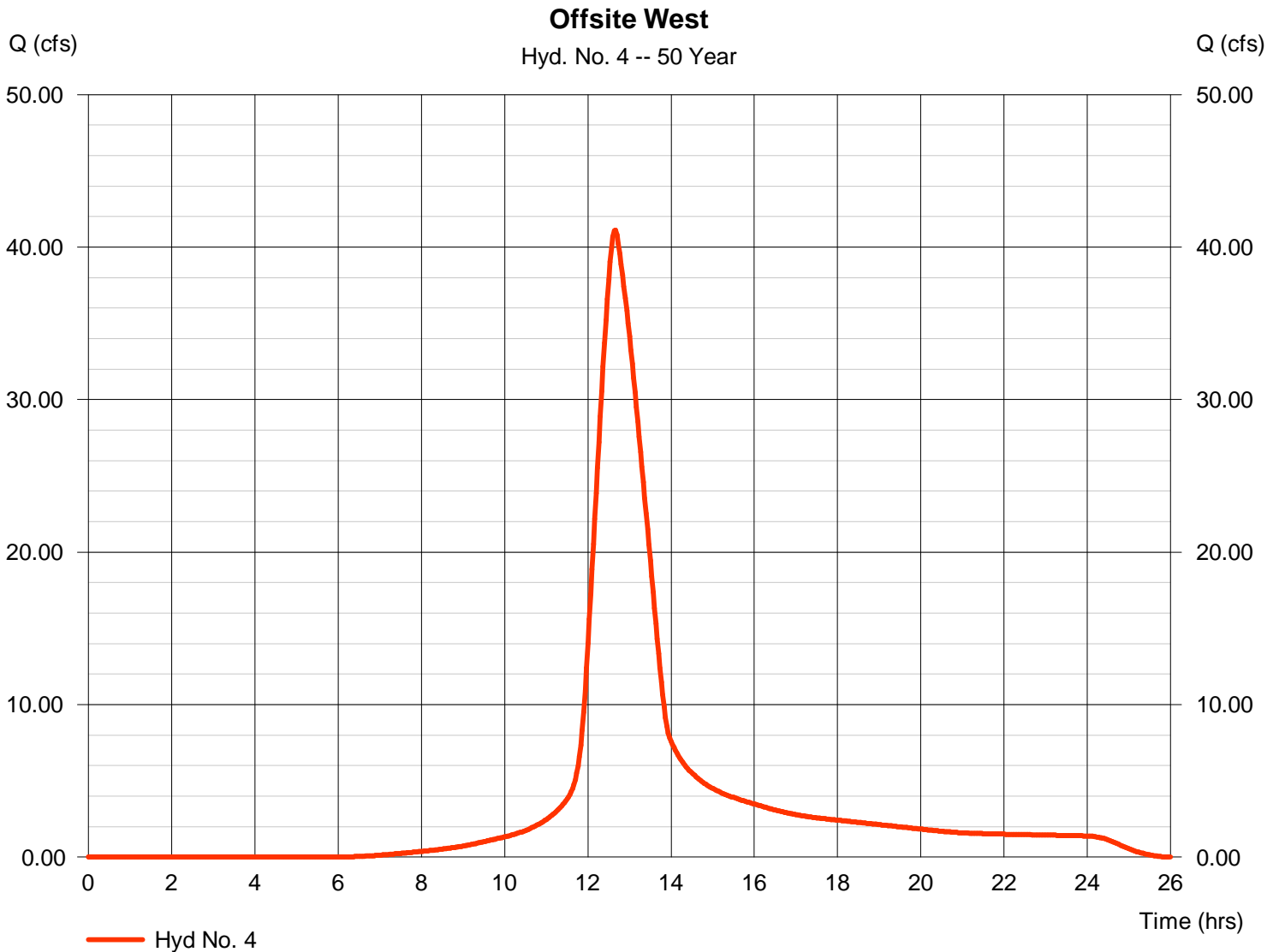
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 41.10 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 315,692 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

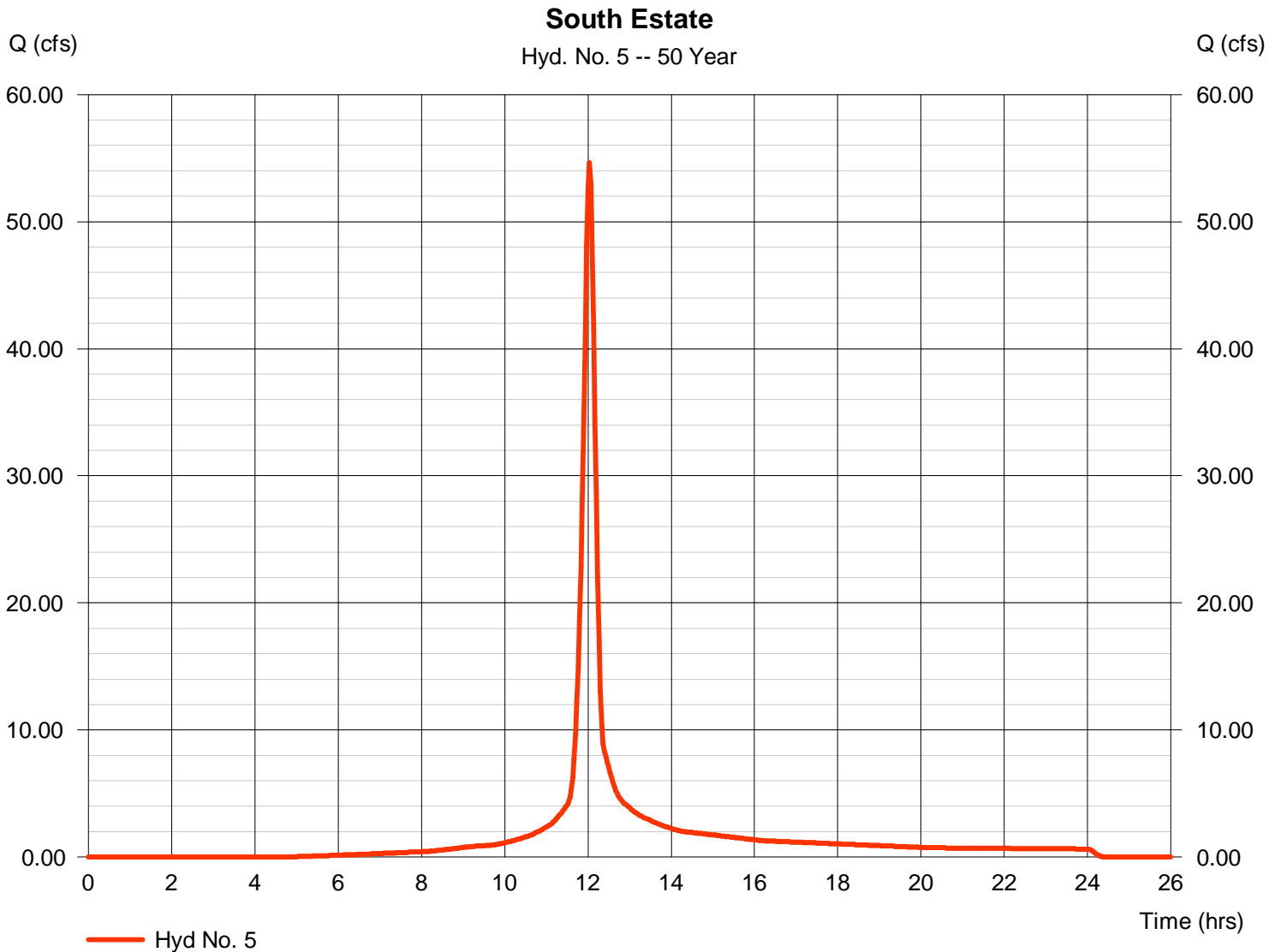
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 54.64 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 157,128 cuft
Drainage area	= 8.800 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

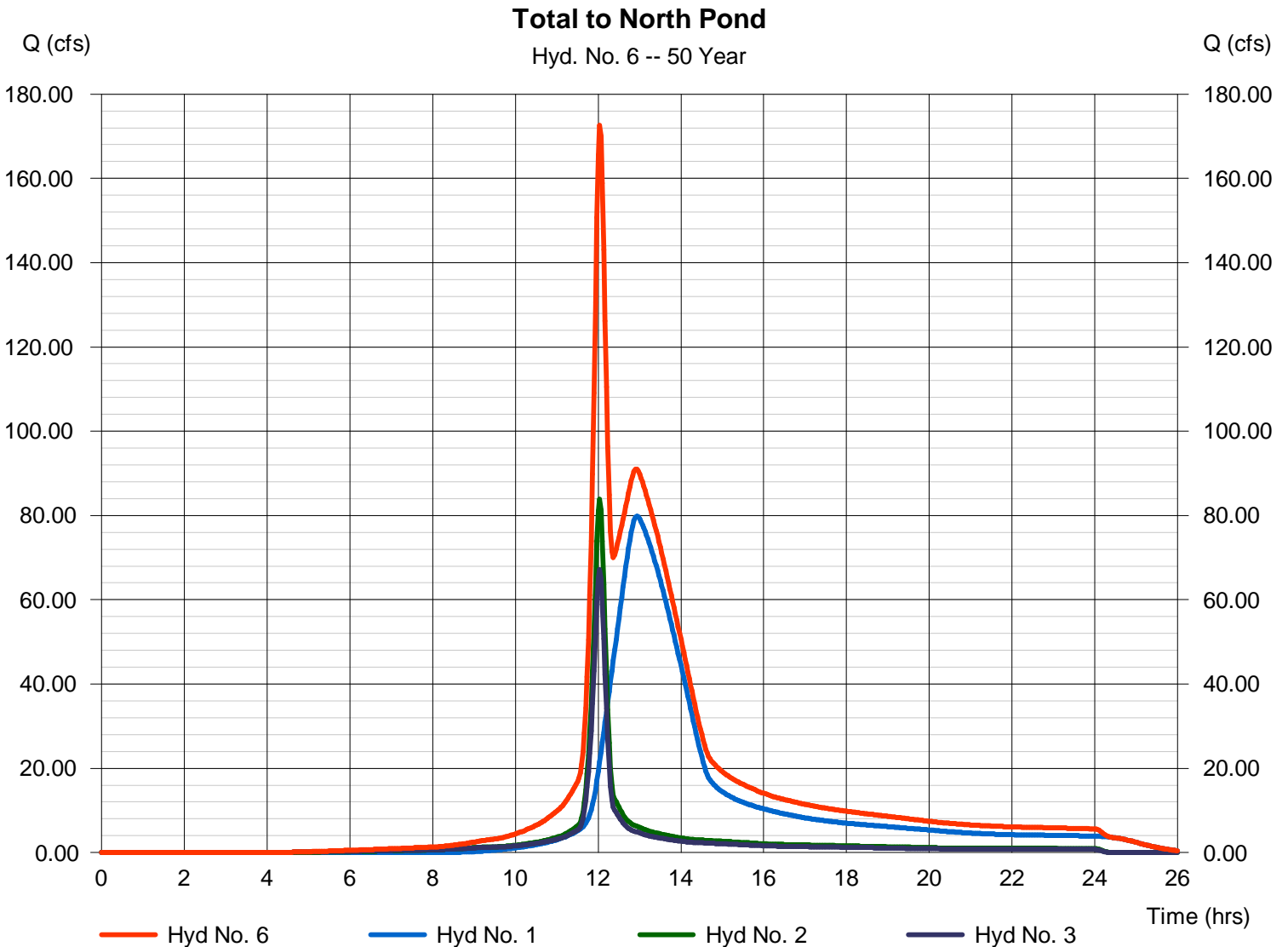
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 172.59 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 1,215,067 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 80.800 ac



Hydrograph Report

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

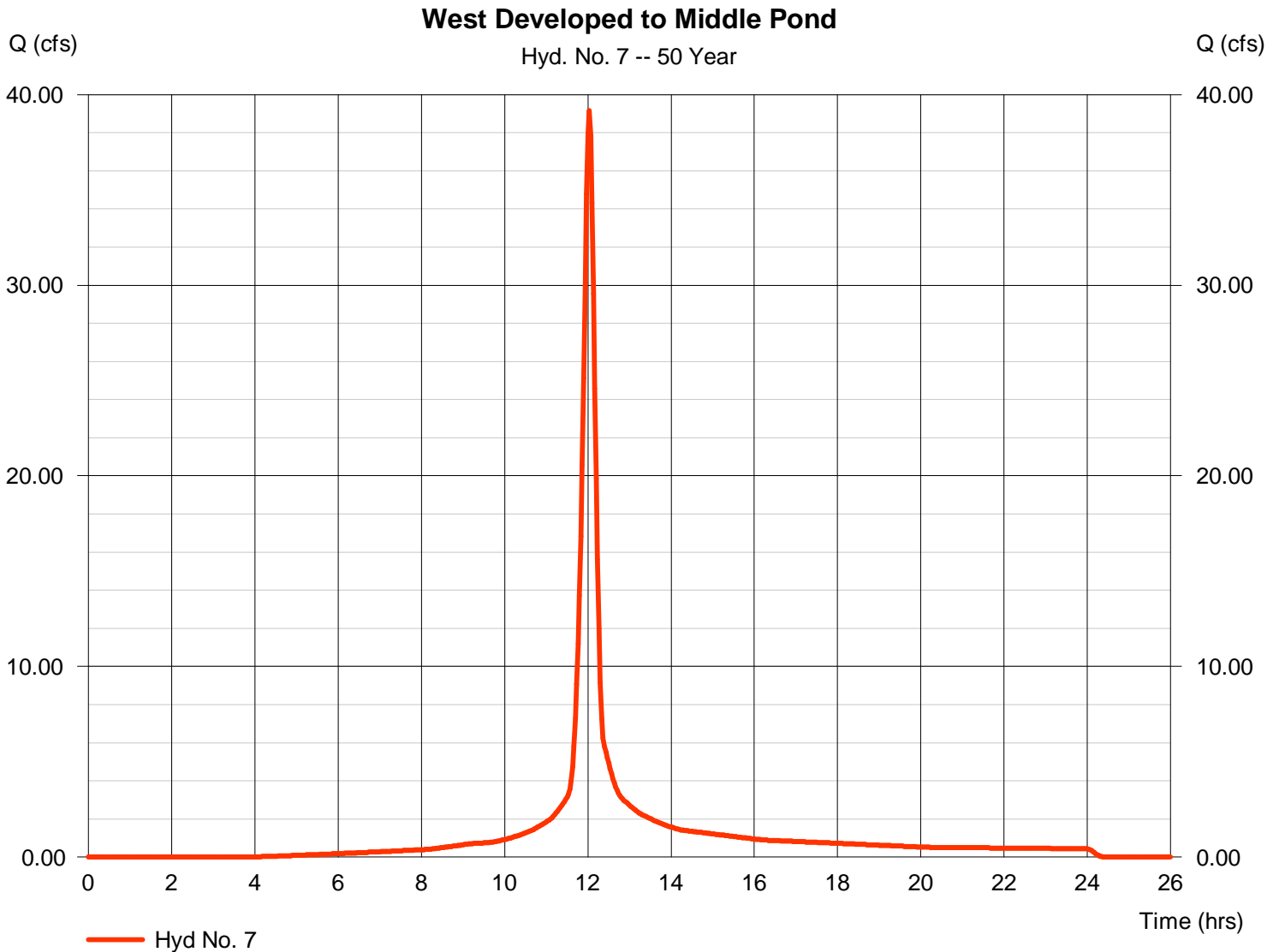
Tuesday, Jun 18, 2013

Hyd. No. 7

West Developed to Middle Pond

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 6.000 ac
 Basin Slope = 0.0 %
 Tc method = User
 Total precip. = 6.90 in
 Storm duration = 24 hrs

Peak discharge = 39.15 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 114,304 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484



Hydrograph Report

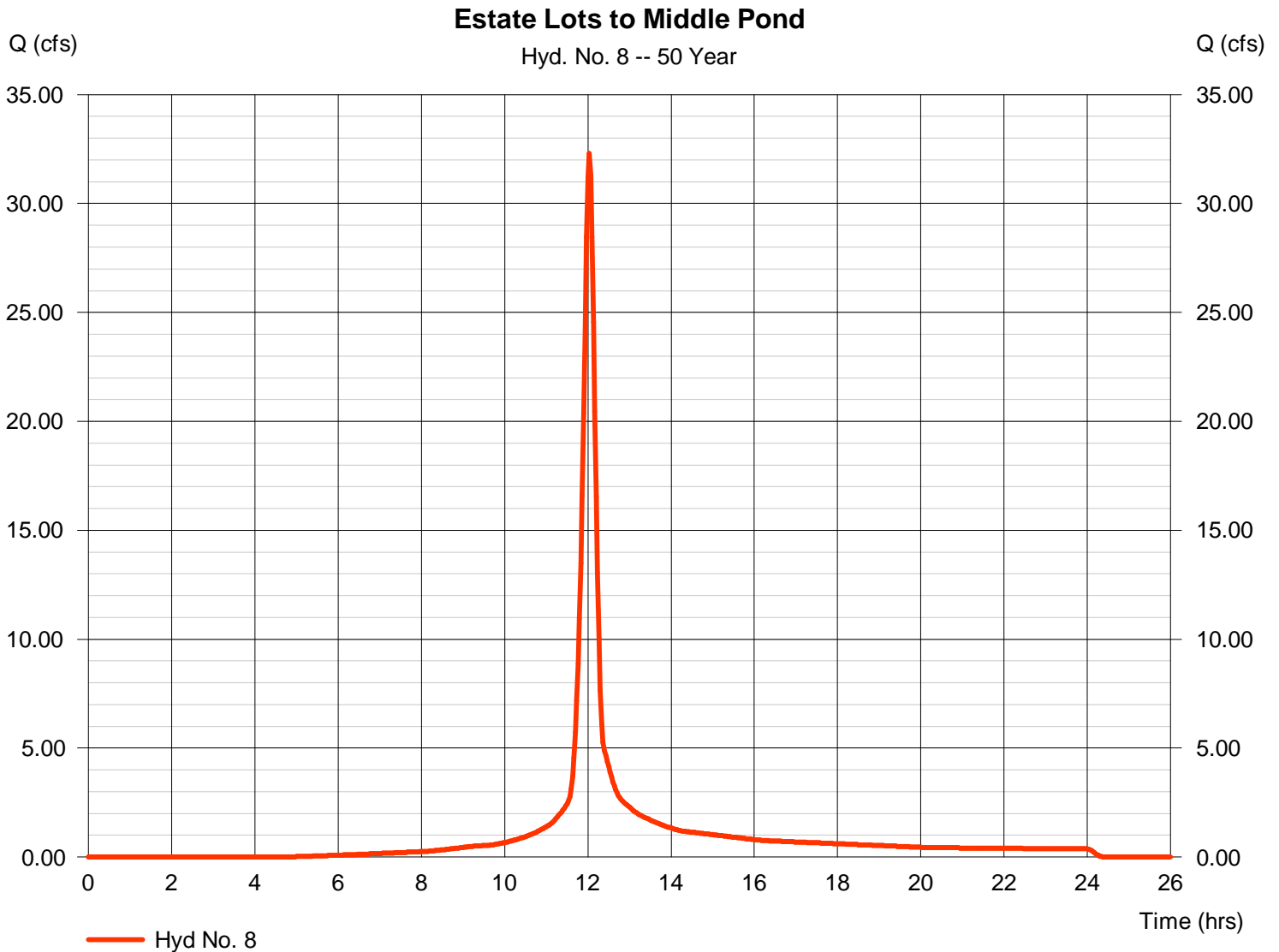
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 32.29 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 92,848 cuft
Drainage area	= 5.200 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

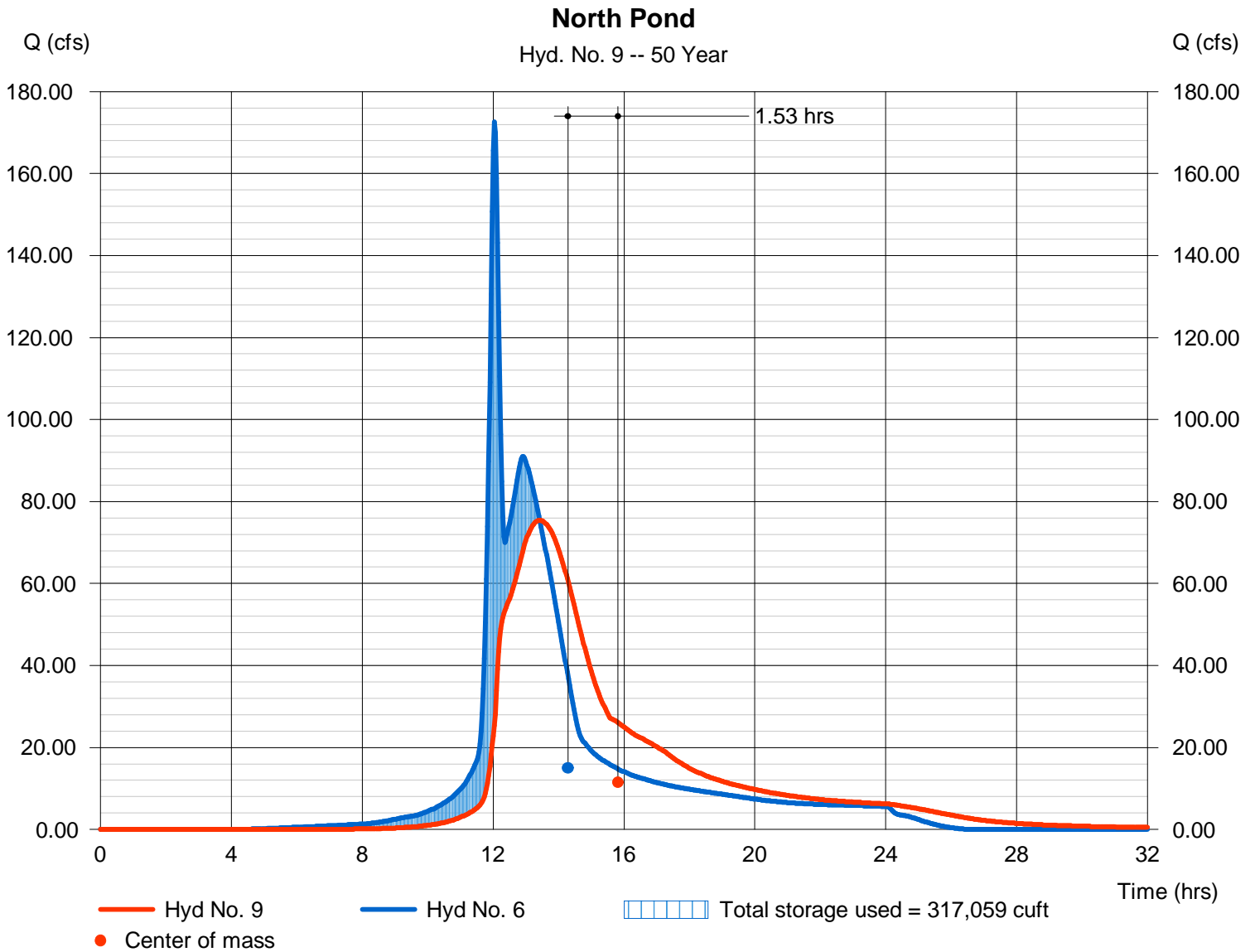
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 75.40 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,213,731 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1359.70 ft
Reservoir name	= North Pond	Max. Storage	= 317,059 cuft

Storage Indication method used.



Hydrograph Report

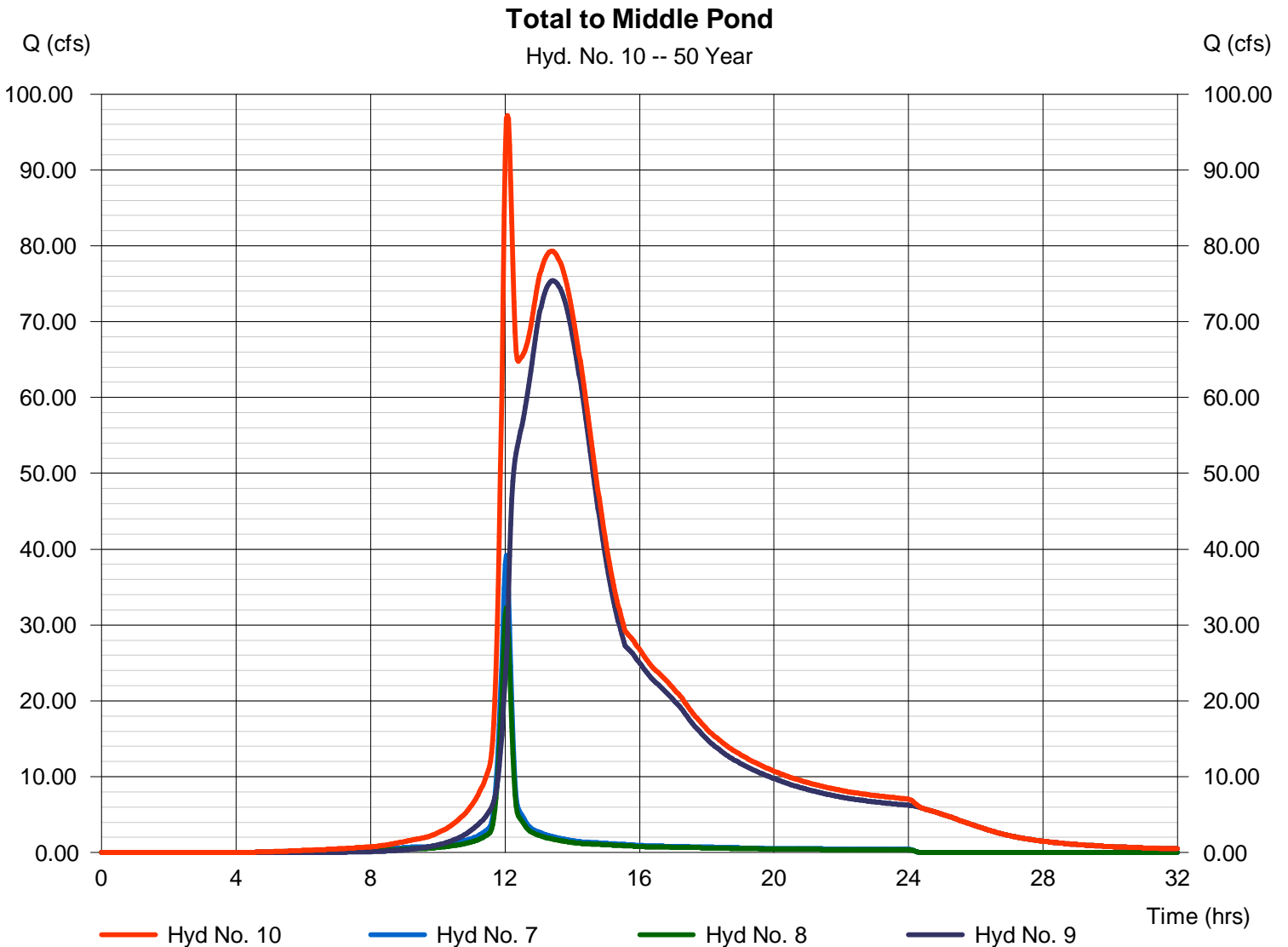
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 10

Total to Middle Pond

Hydrograph type	= Combine	Peak discharge	= 97.18 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,420,884 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 11.200 ac



Hydrograph Report

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

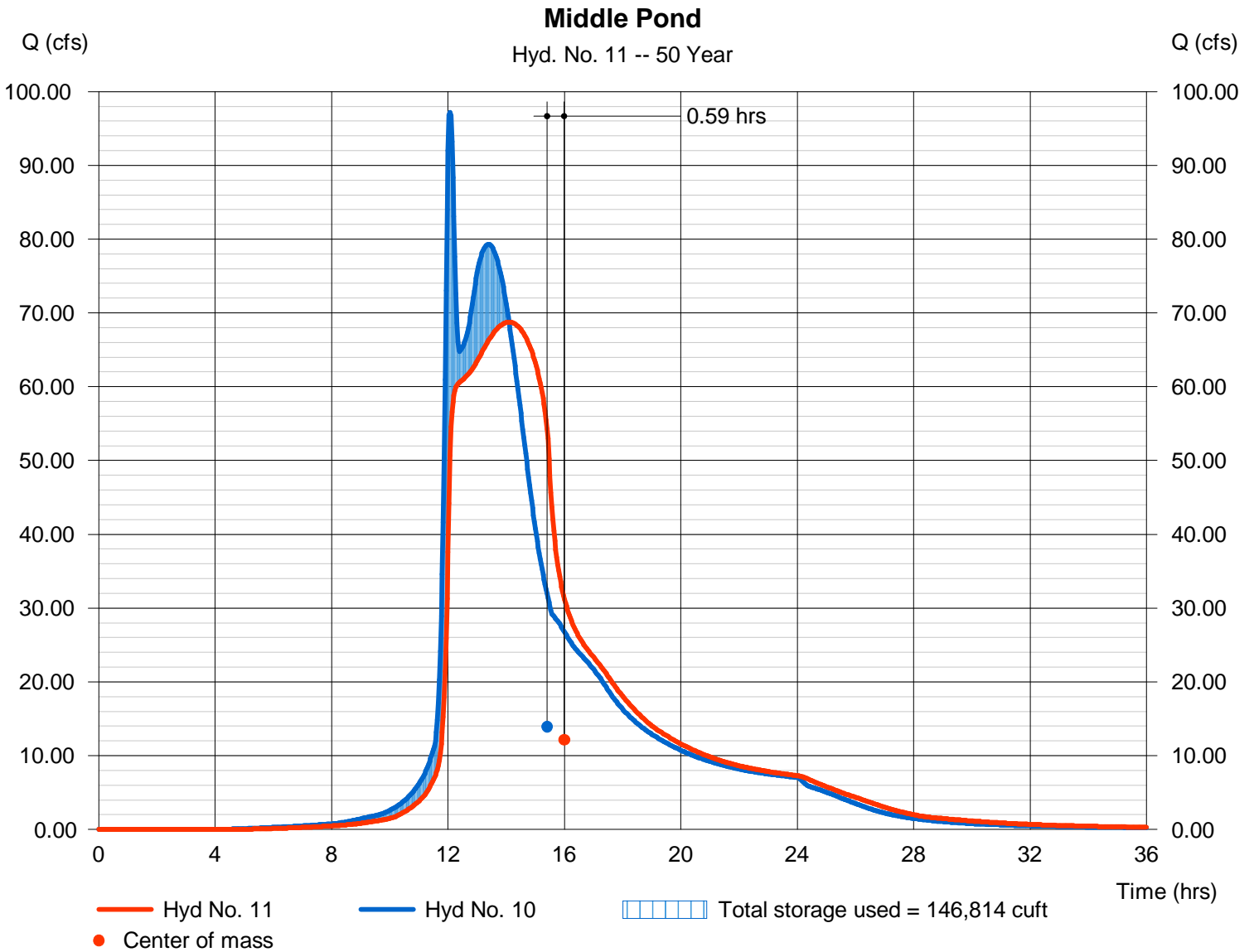
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 68.75 cfs
Storm frequency	= 50 yrs	Time to peak	= 14.10 hrs
Time interval	= 2 min	Hyd. volume	= 1,420,839 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1355.82 ft
Reservoir name	= Middle Pond	Max. Storage	= 146,814 cuft

Storage Indication method used.



Hydrograph Report

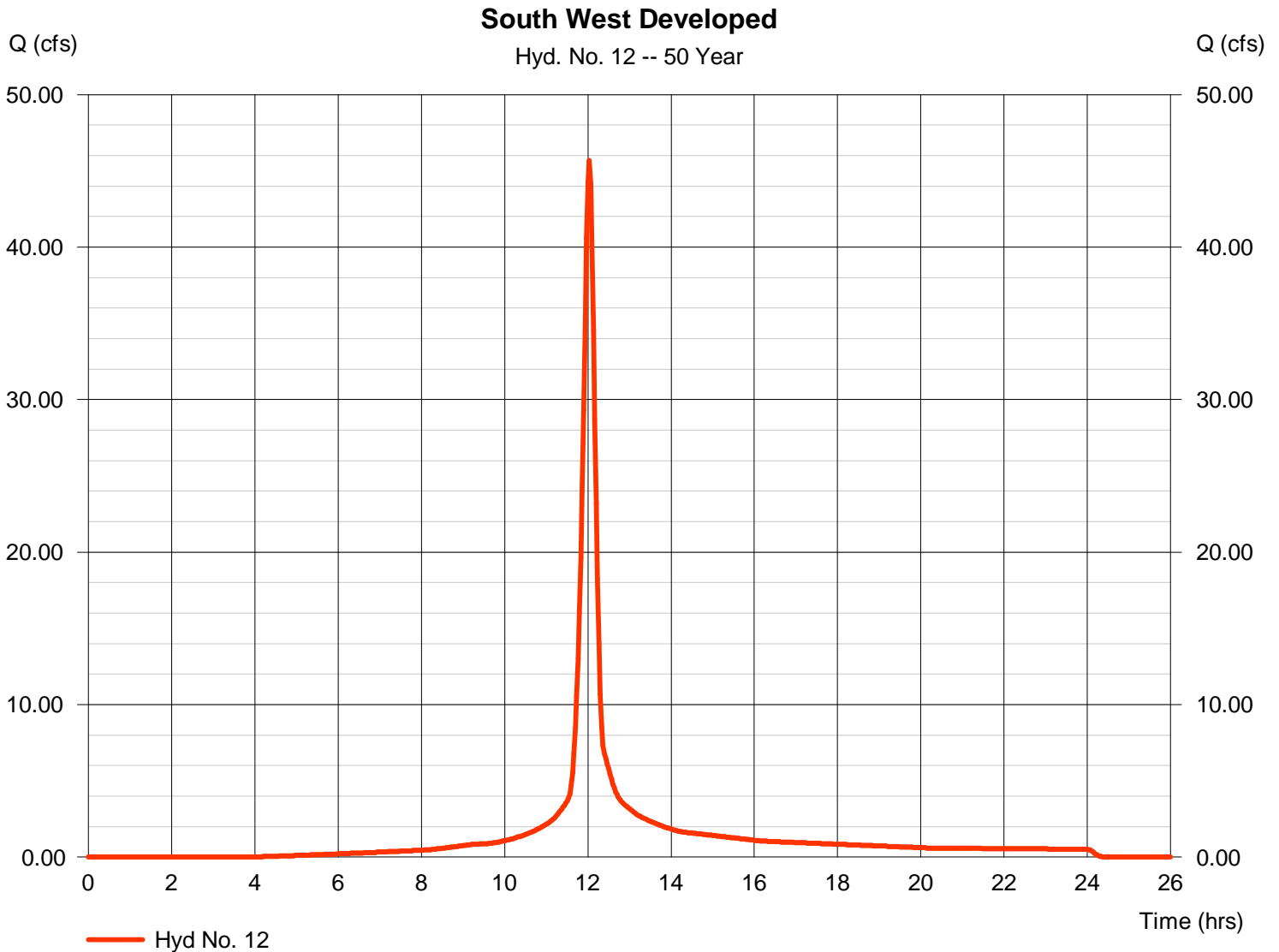
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 45.67 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 133,355 cuft
Drainage area	= 7.000 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

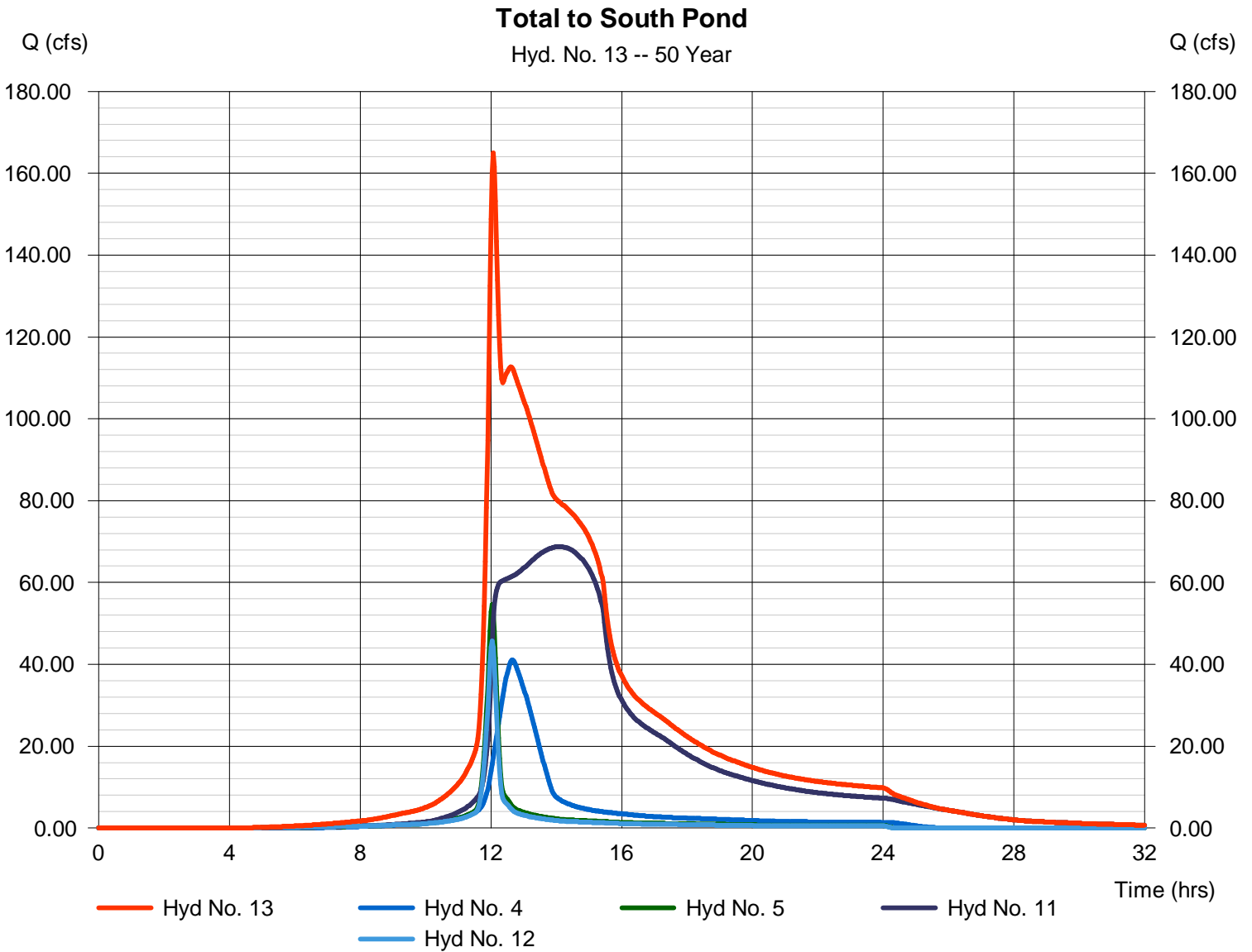
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 165.00 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,027,014 cuft
Inflow hyds.	= 4, 5, 11, 12	Contrib. drain. area	= 34.800 ac



Hydrograph Report

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

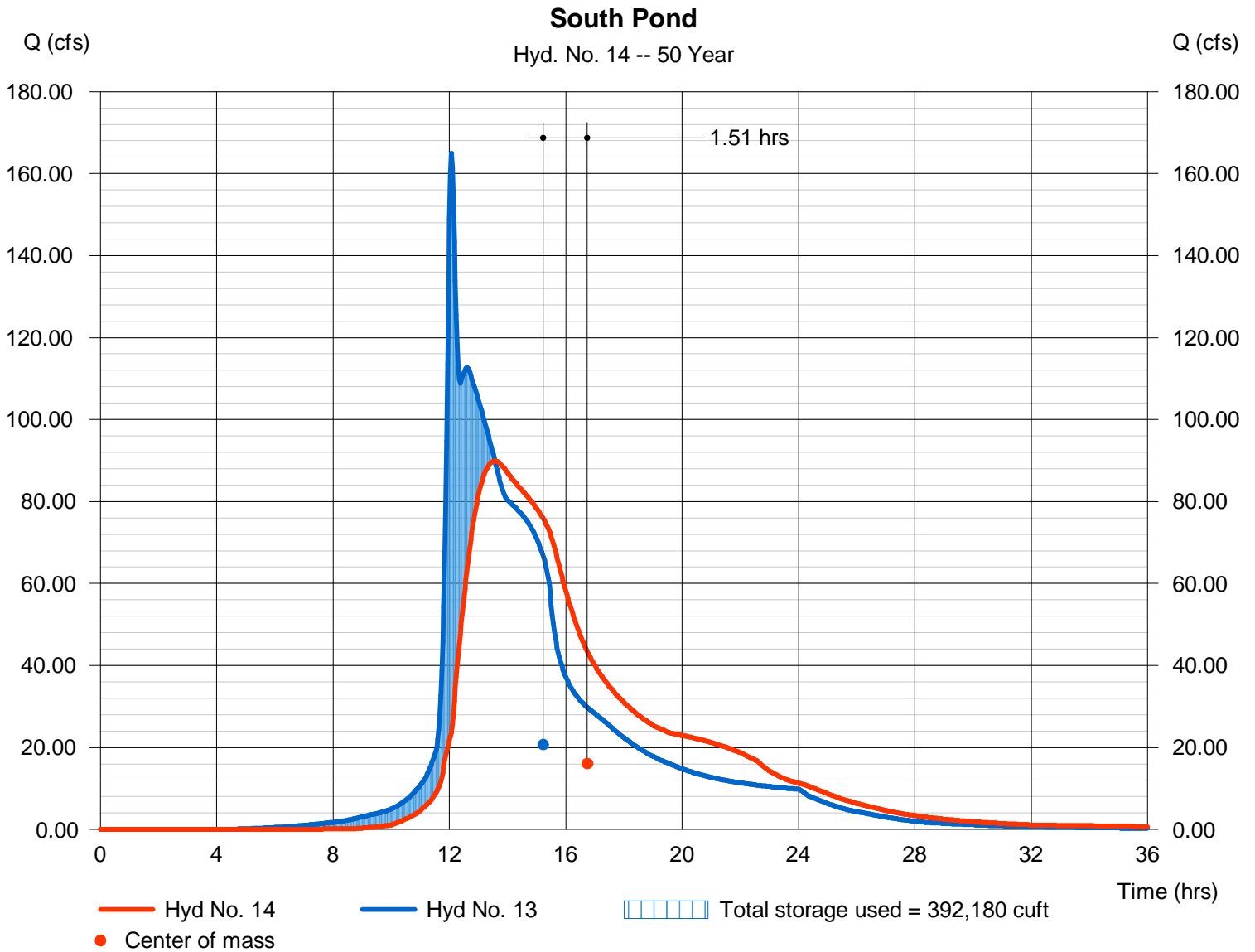
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 89.87 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.57 hrs
Time interval	= 2 min	Hyd. volume	= 2,024,908 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1351.66 ft
Reservoir name	= South Pond	Max. Storage	= 392,180 cuft

Storage Indication method used.



Hydrograph Report

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

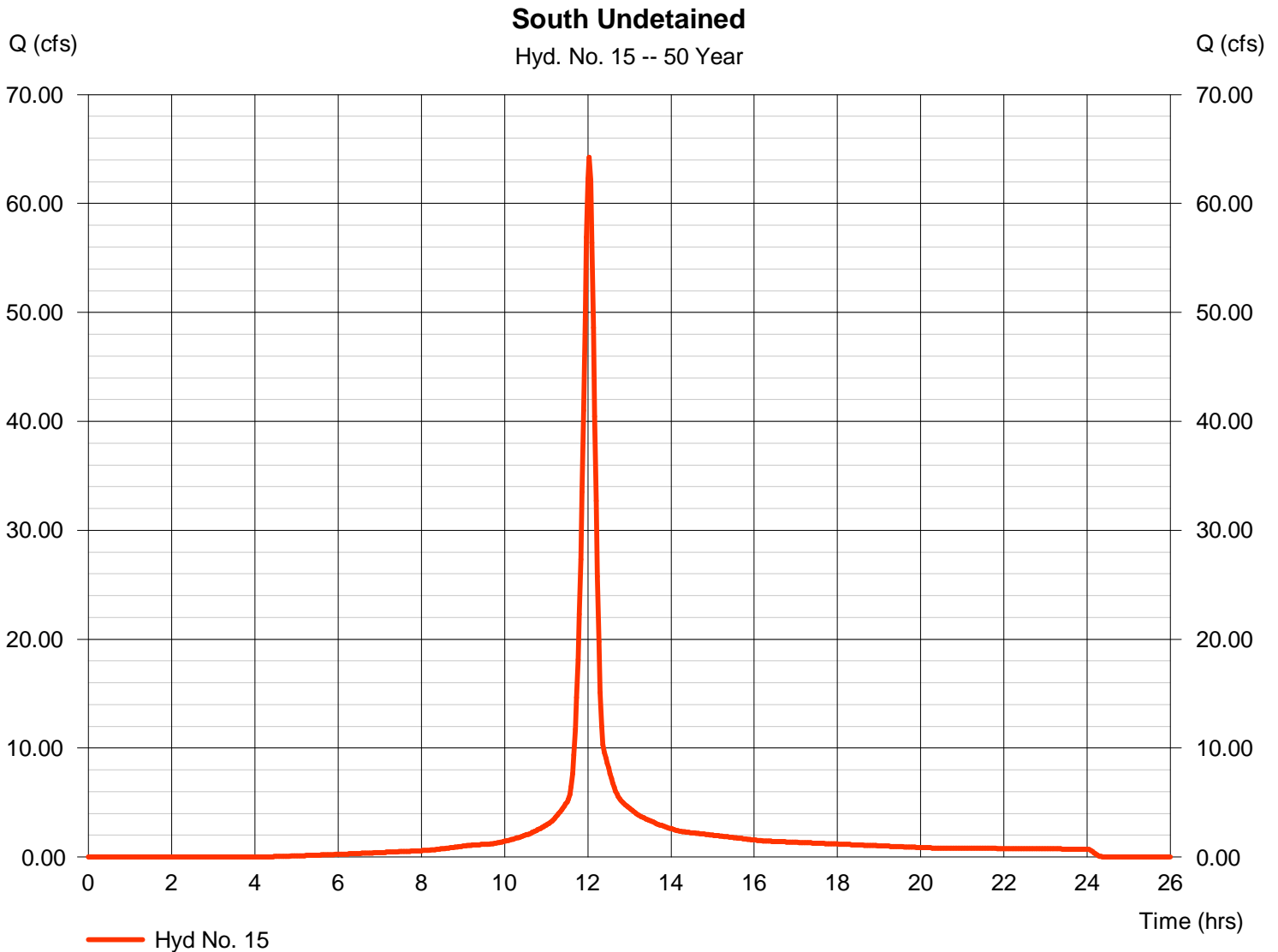
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 64.23 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 186,504 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = $[(2.800 \times 90) + (7.200 \times 84)] / 10.000$



Hydrograph Report

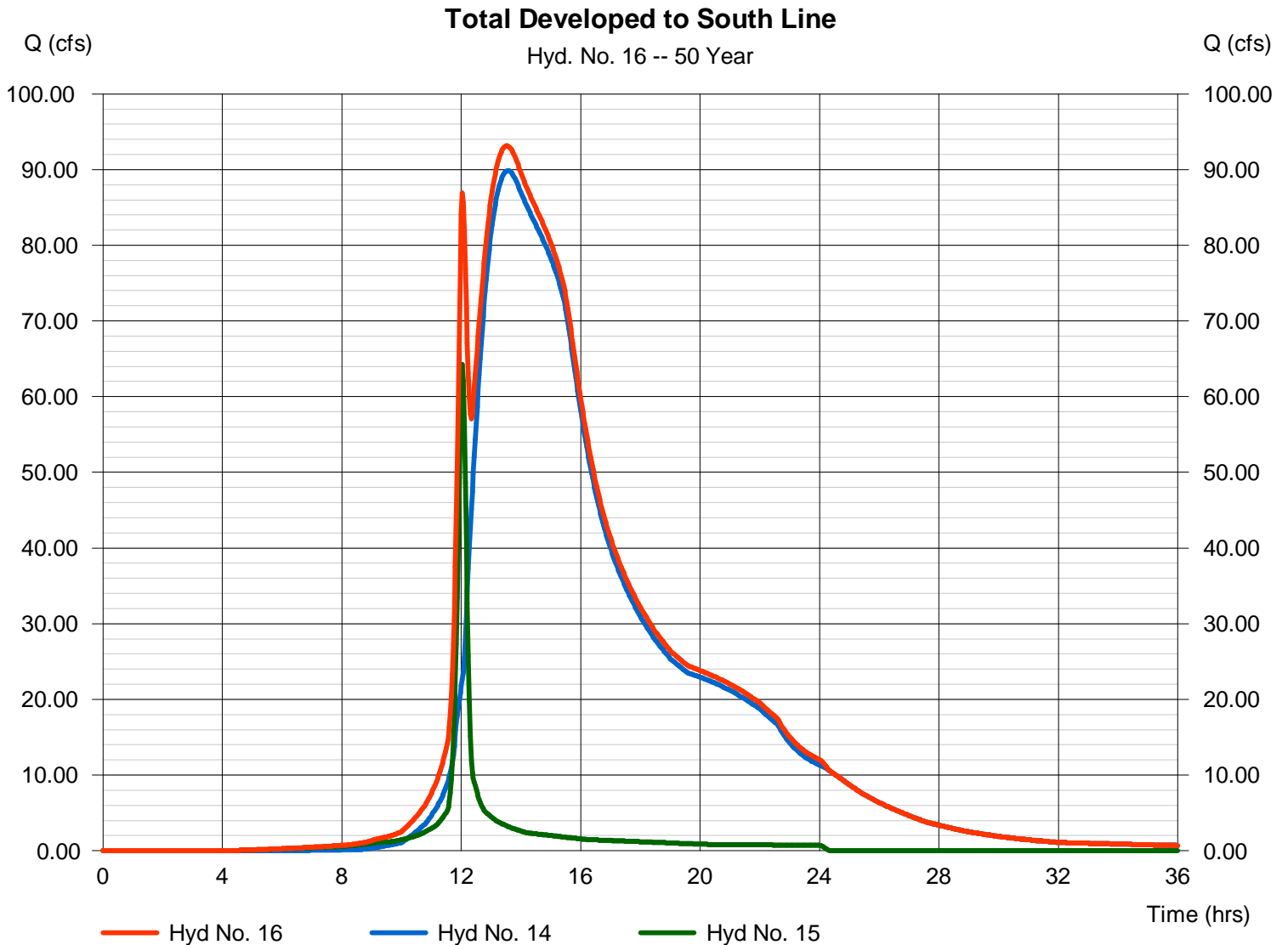
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 16

Total Developed to South Line

Hydrograph type	= Combine	Peak discharge	= 93.13 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.53 hrs
Time interval	= 2 min	Hyd. volume	= 2,211,415 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 10.000 ac



Hydrograph Report

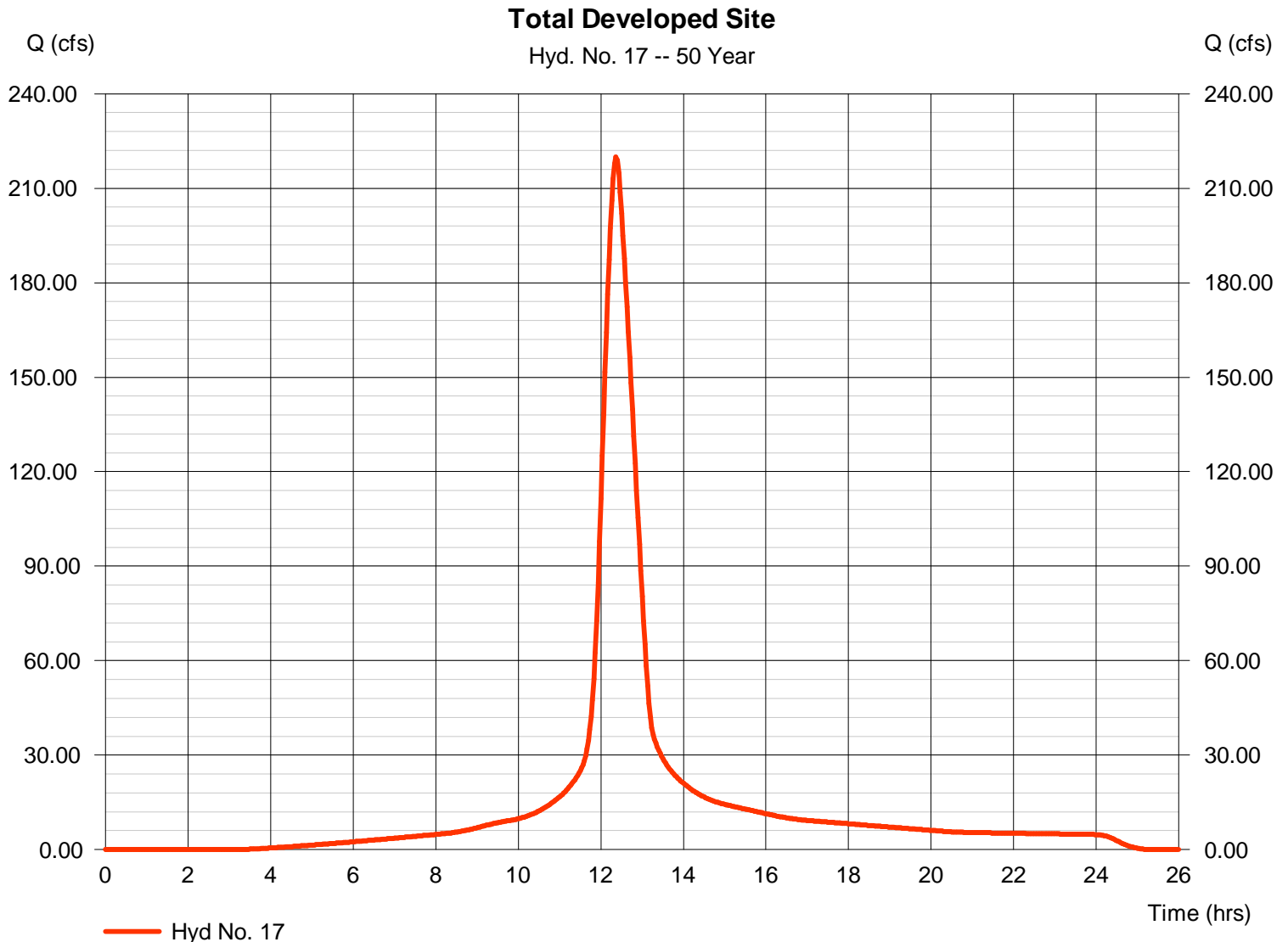
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 220.02 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 1,288,507 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 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	96.91	2	776	938,878	-----	-----	-----	Offsite North
2	SCS Runoff	97.36	2	722	282,064	-----	-----	-----	Estate Lots ot North Pond
3	SCS Runoff	77.46	2	722	228,025	-----	-----	-----	West Developed to North Pond
4	SCS Runoff	48.45	2	760	373,004	-----	-----	-----	Offsite West
5	SCS Runoff	63.46	2	722	183,864	-----	-----	-----	South Estate
6	Combine	202.05	2	722	1,448,968	1, 2, 3,	-----	-----	Total to North Pond
7	SCS Runoff	45.12	2	722	132,830	-----	-----	-----	West Developed to Middle Pond
8	SCS Runoff	37.50	2	722	108,647	-----	-----	-----	Estate Lots to Middle Pond
9	Reservoir	91.64	2	804	1,447,622	6	1360.08	362,837	North Pond
10	Combine	120.73	2	724	1,689,098	7, 8, 9	-----	-----	Total to Middle Pond
11	Reservoir	76.10	2	856	1,689,057	10	1356.61	236,893	Middle Pond
12	SCS Runoff	52.64	2	722	154,969	-----	-----	-----	South West Developed
13	Combine	190.31	2	724	2,400,892	4, 5, 11, 12	-----	-----	Total to South Pond
14	Reservoir	103.98	2	806	2,398,771	13	1351.87	426,037	South Pond
15	SCS Runoff	74.22	2	722	217,227	-----	-----	-----	South Undetained
16	Combine	107.93	2	804	2,615,997	14, 15	-----	-----	Total Developed to South Line
17	SCS Runoff	252.31	2	742	1,487,364	-----	-----	-----	Total Developed Site
The Ranch Total Site.gpw					Return Period: 100 Year			Tuesday, Jun 18, 2013	

Hydrograph Report

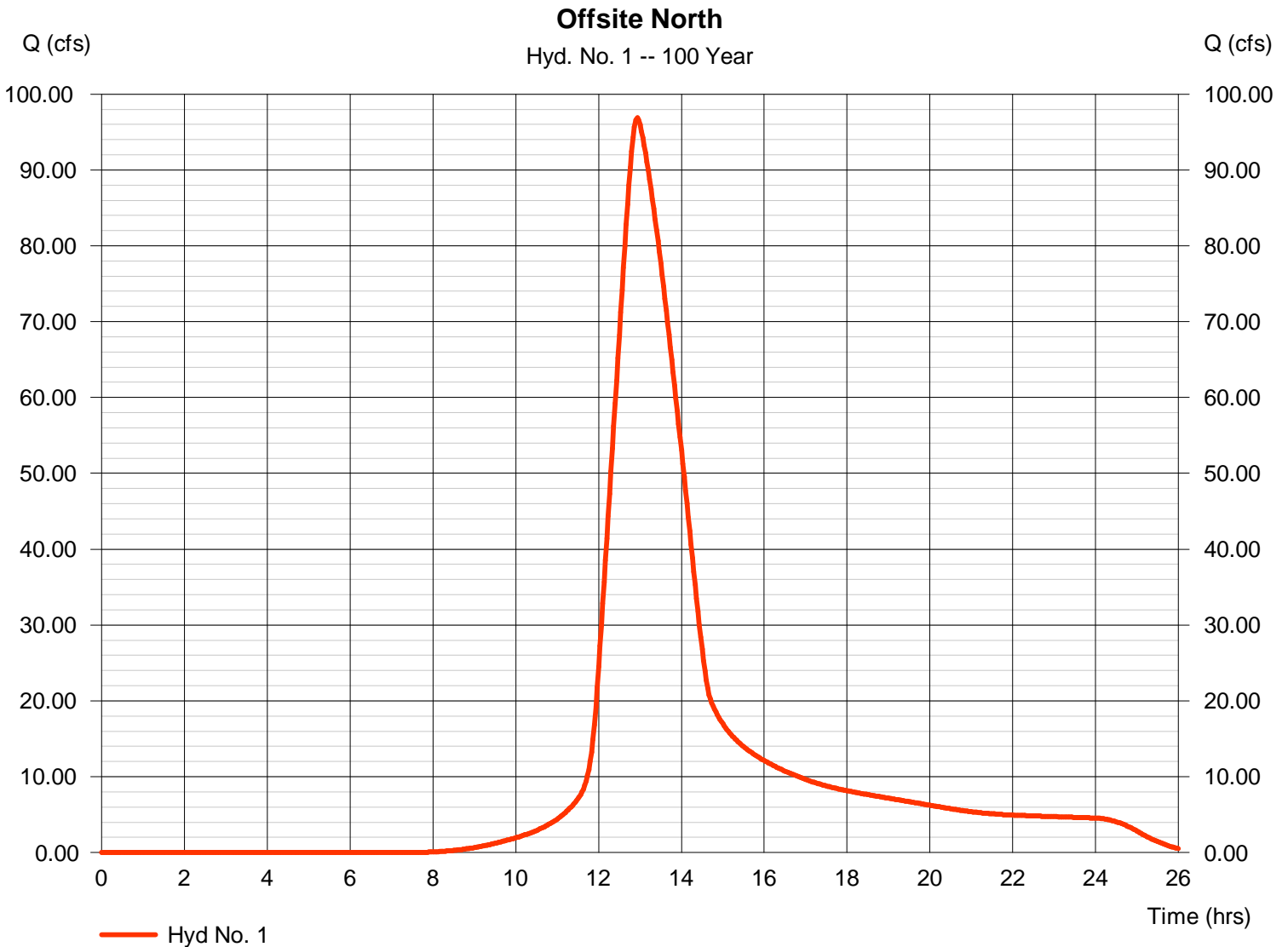
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Tuesday, Jun 18, 2013

Hyd. No. 1

Offsite North

Hydrograph type	= SCS Runoff	Peak discharge	= 96.91 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.93 hrs
Time interval	= 2 min	Hyd. volume	= 938,878 cuft
Drainage area	= 57.000 ac	Curve number	= 72
Basin Slope	= 0.6 %	Hydraulic length	= 2400 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

Tuesday, Jun 18, 2013

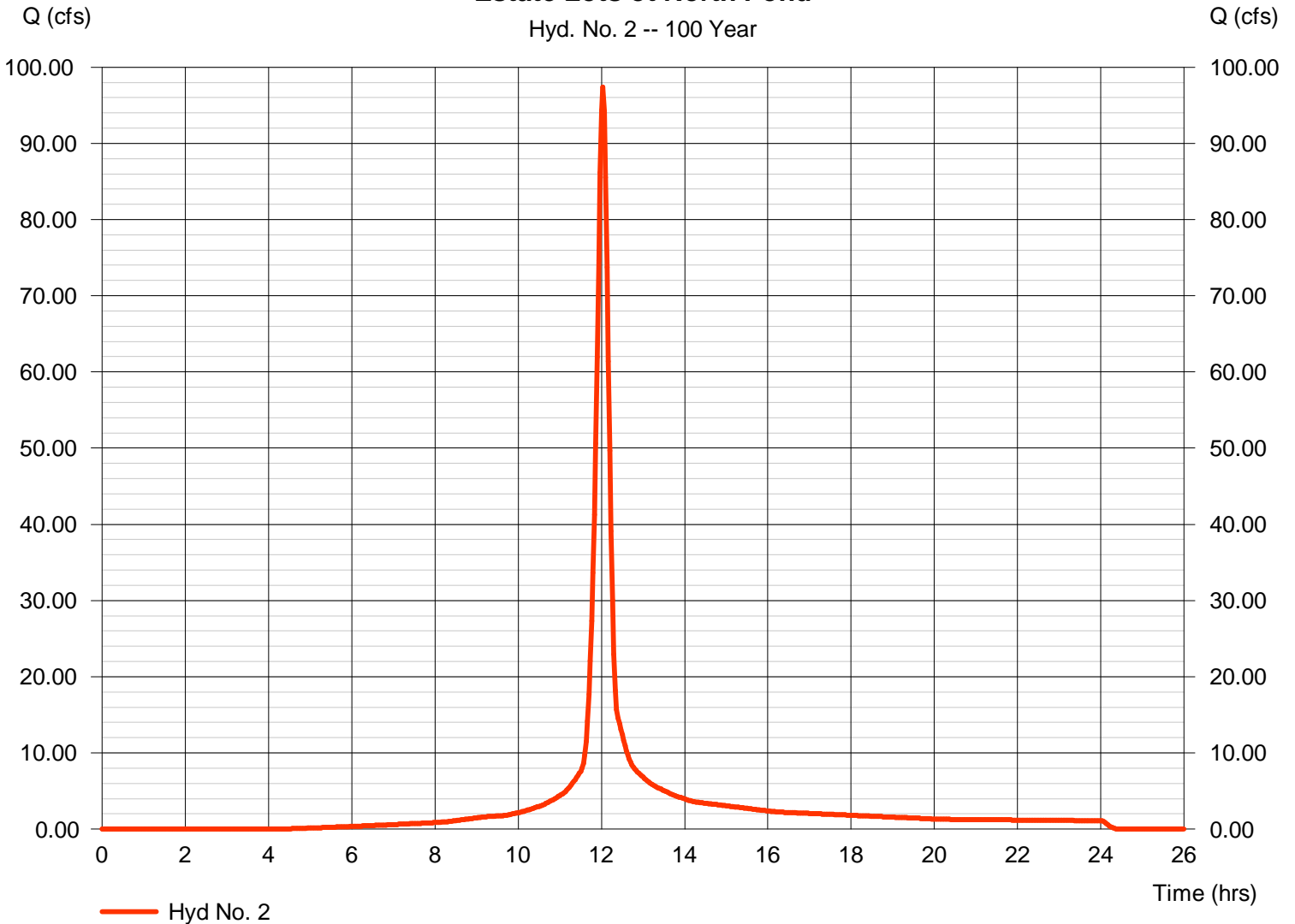
Hyd. No. 2

Estate Lots ot North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 97.36 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 282,064 cuft
Drainage area	= 13.500 ac	Curve number	= 84
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

Estate Lots ot North Pond

Hyd. No. 2 -- 100 Year



Hydrograph Report

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

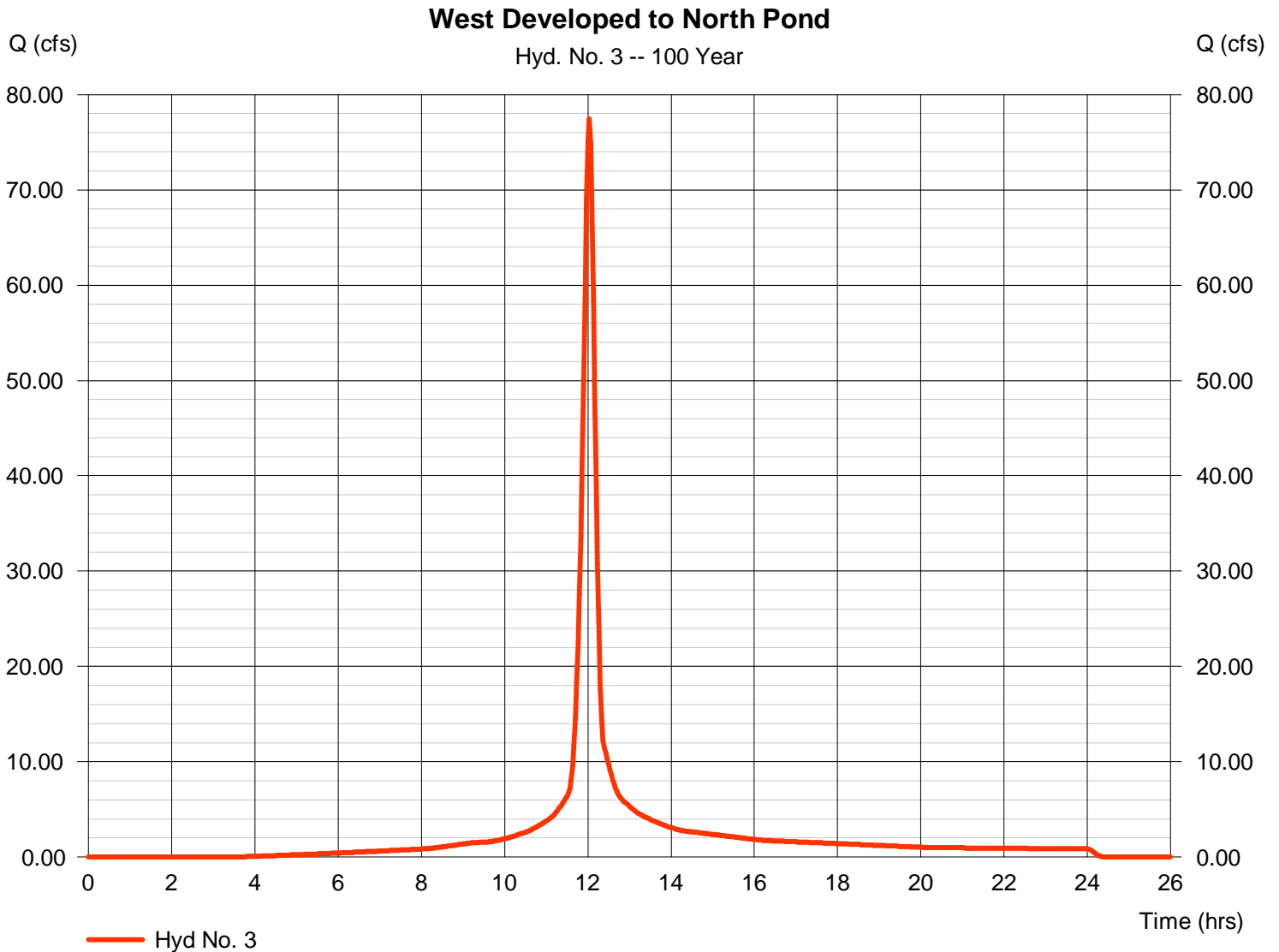
Tuesday, Jun 18, 2013

Hyd. No. 3

West Developed to North Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 77.46 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 228,025 cuft
Drainage area	= 10.300 ac	Curve number	= 87*
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

* Composite (Area/CN) = [(2.900 x 98) + (11.600 x 84)] / 10.300



Hydrograph Report

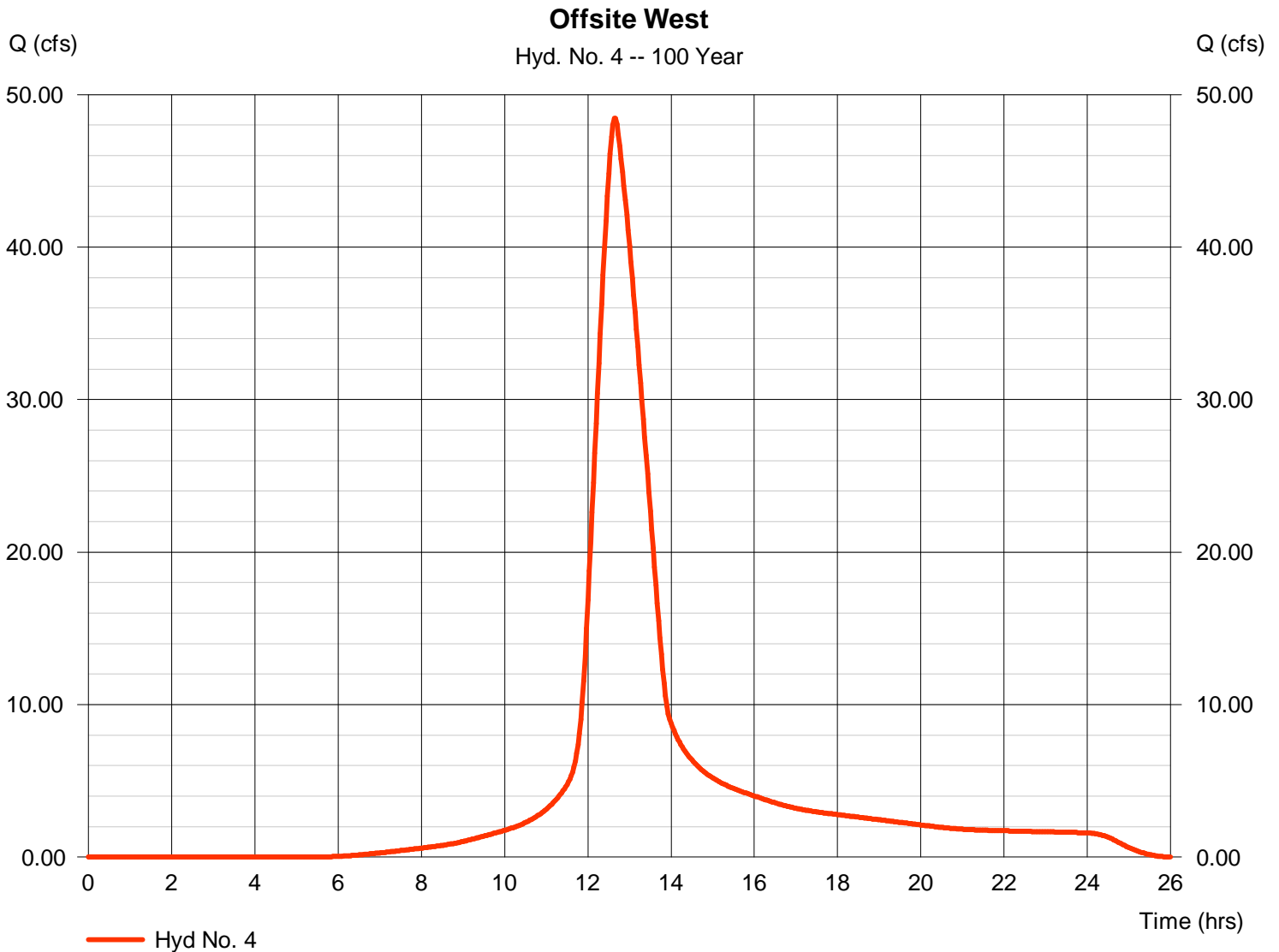
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Tuesday, Jun 18, 2013

Hyd. No. 4

Offsite West

Hydrograph type	= SCS Runoff	Peak discharge	= 48.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 373,004 cuft
Drainage area	= 19.000 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 1900 ft
Tc method	= LAG	Time of conc. (Tc)	= 75.20 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

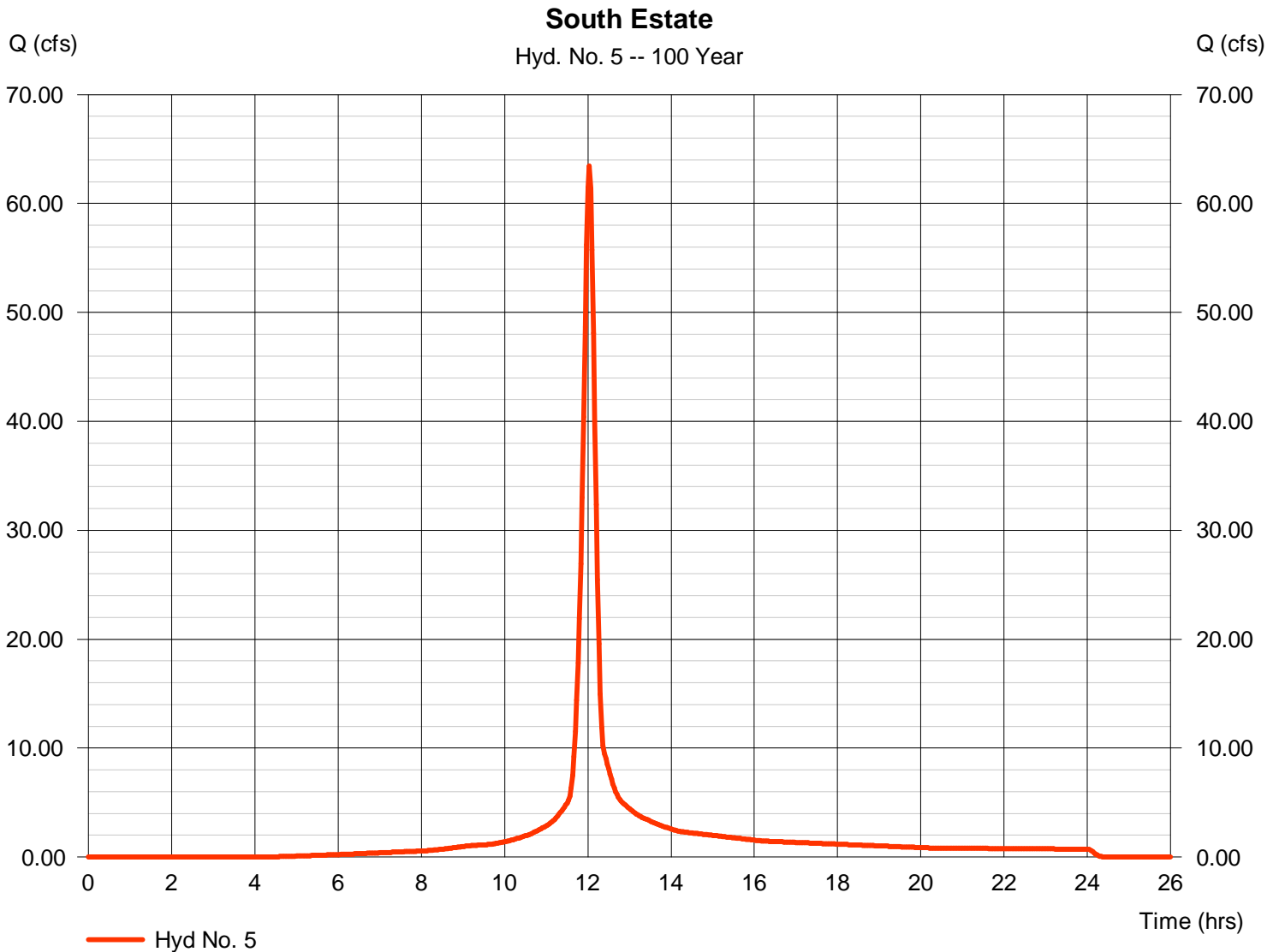
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Tuesday, Jun 18, 2013

Hyd. No. 5

South Estate

Hydrograph type	= SCS Runoff	Peak discharge	= 63.46 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 183,864 cuft
Drainage area	= 8.800 ac	Curve number	= 84
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

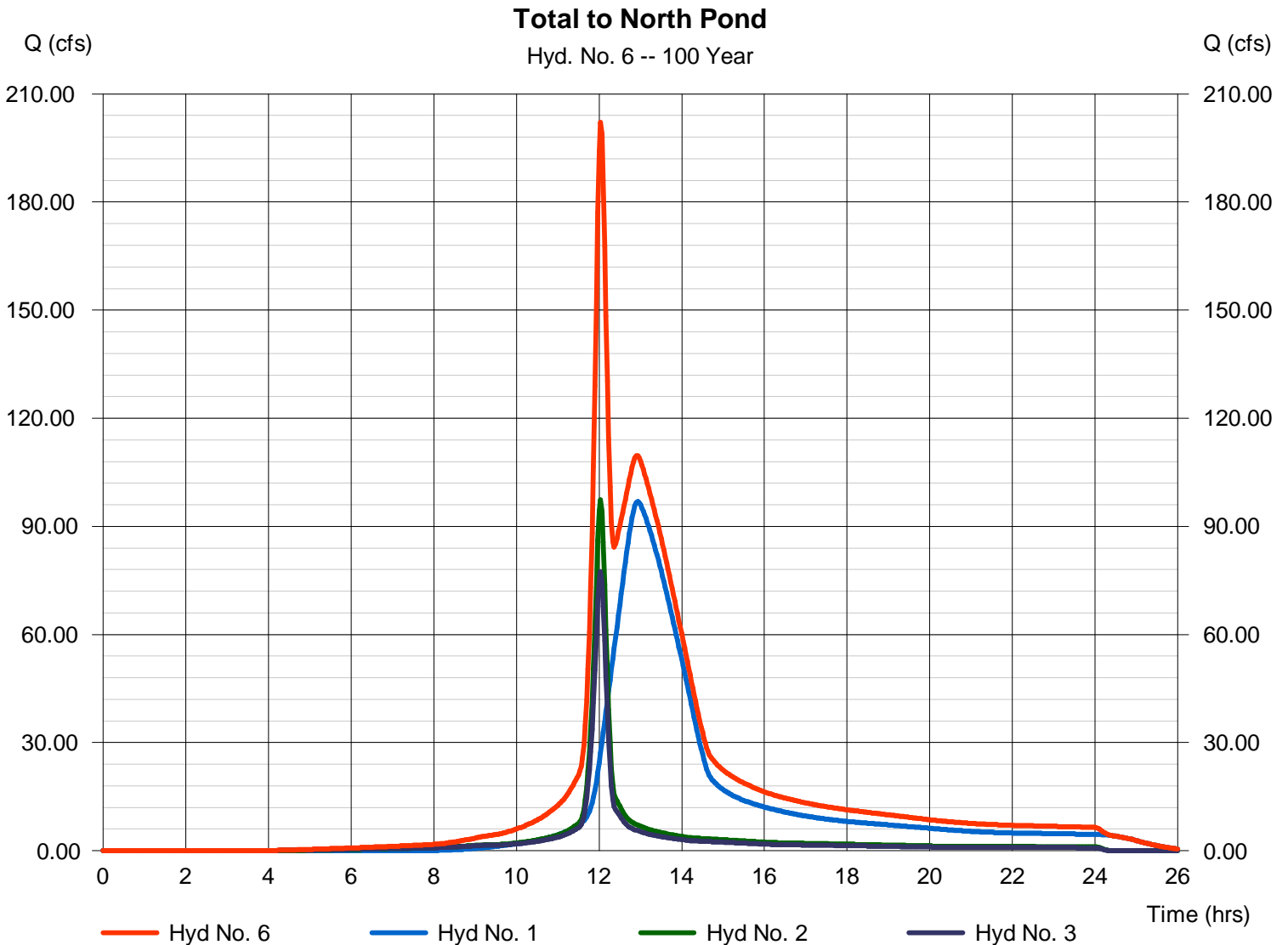
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Tuesday, Jun 18, 2013

Hyd. No. 6

Total to North Pond

Hydrograph type	= Combine	Peak discharge	= 202.05 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 1,448,968 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 80.800 ac



Hydrograph Report

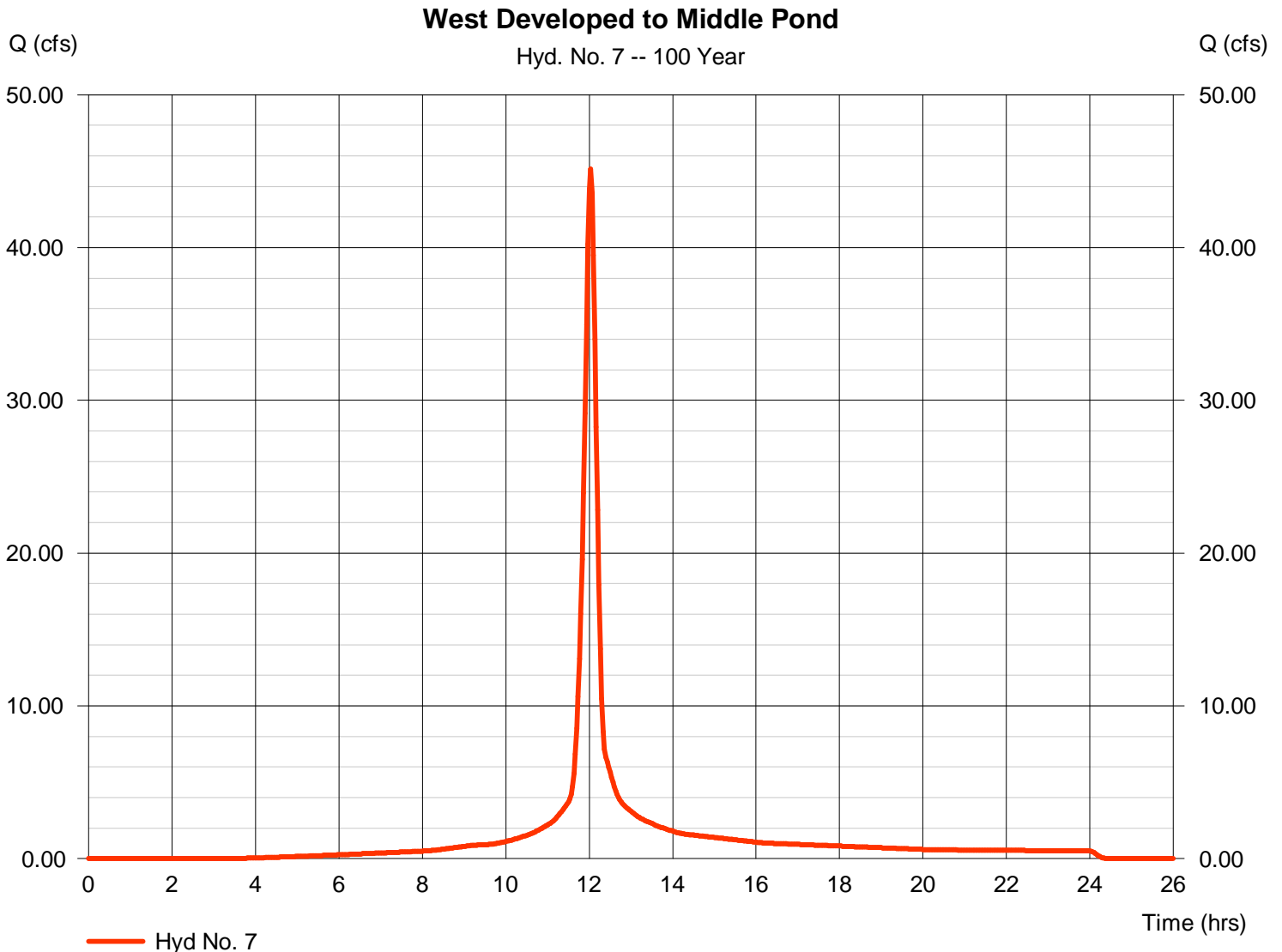
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Tuesday, Jun 18, 2013

Hyd. No. 7

West Developed to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 45.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 132,830 cuft
Drainage area	= 6.000 ac	Curve number	= 87
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

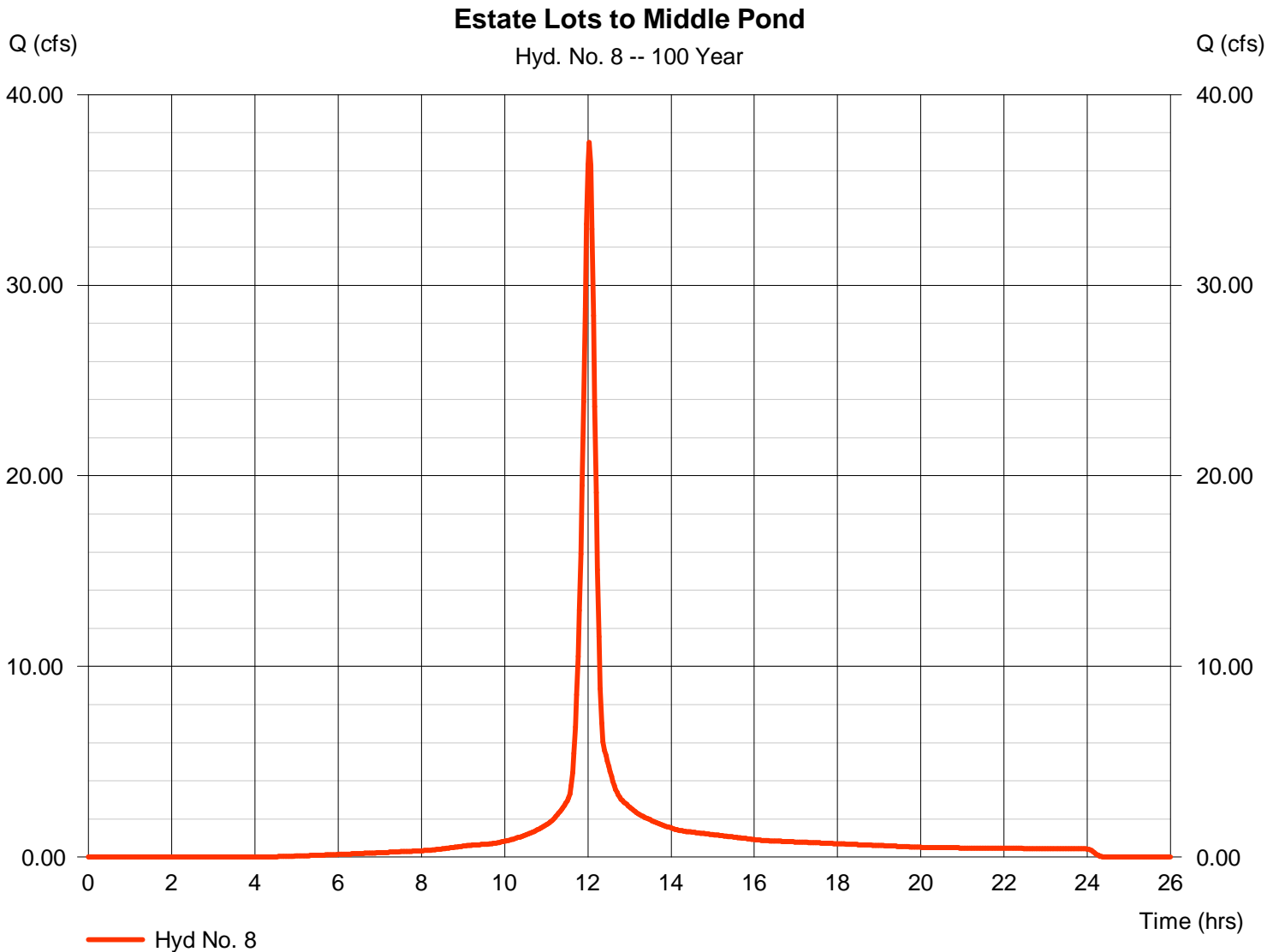
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Tuesday, Jun 18, 2013

Hyd. No. 8

Estate Lots to Middle Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 37.50 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 108,647 cuft
Drainage area	= 5.200 ac	Curve number	= 84
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

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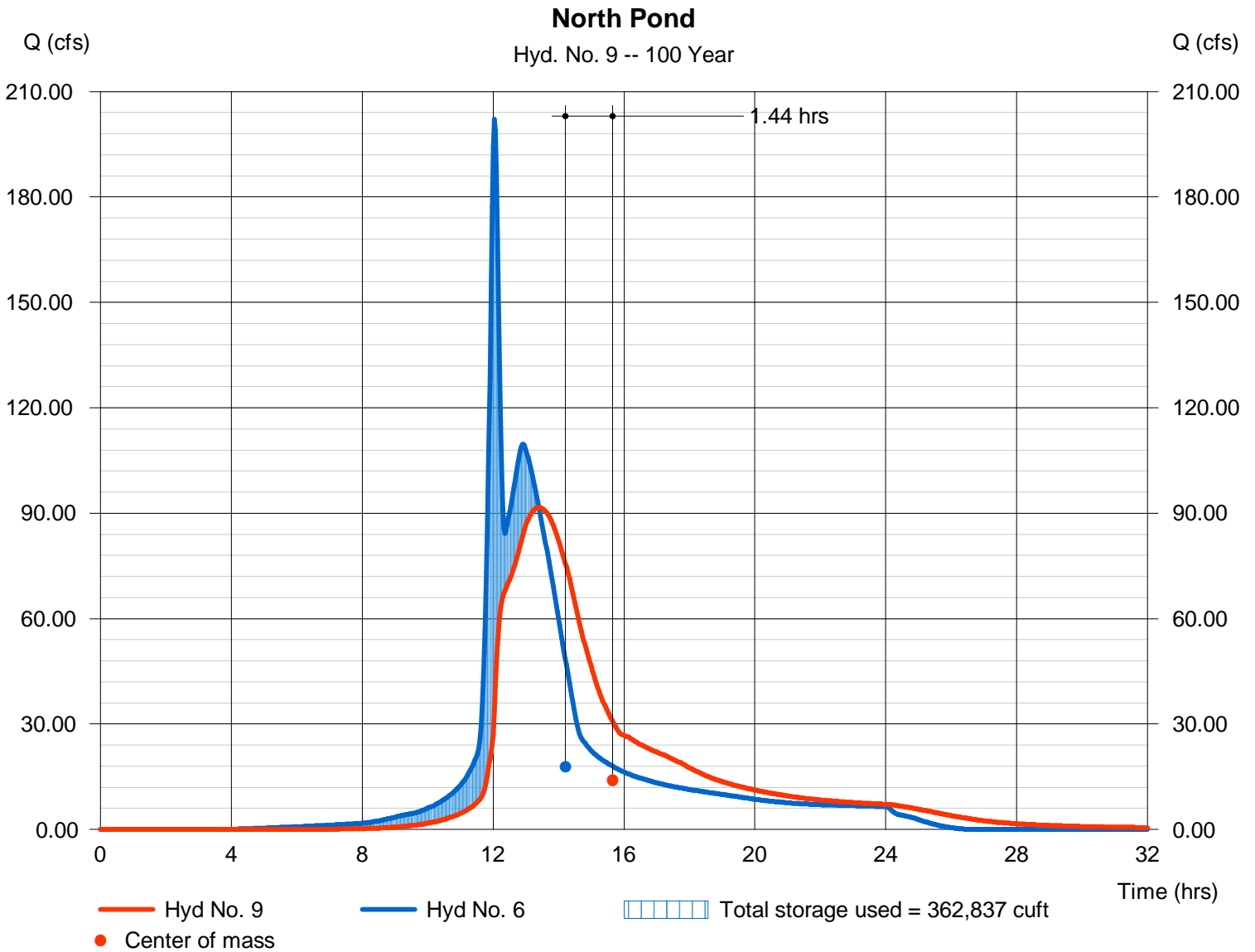
Tuesday, Jun 18, 2013

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 91.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.40 hrs
Time interval	= 2 min	Hyd. volume	= 1,447,622 cuft
Inflow hyd. No.	= 6 - Total to North Pond	Max. Elevation	= 1360.08 ft
Reservoir name	= North Pond	Max. Storage	= 362,837 cuft

Storage Indication method used.



Hydrograph Report

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Tuesday, Jun 18, 2013

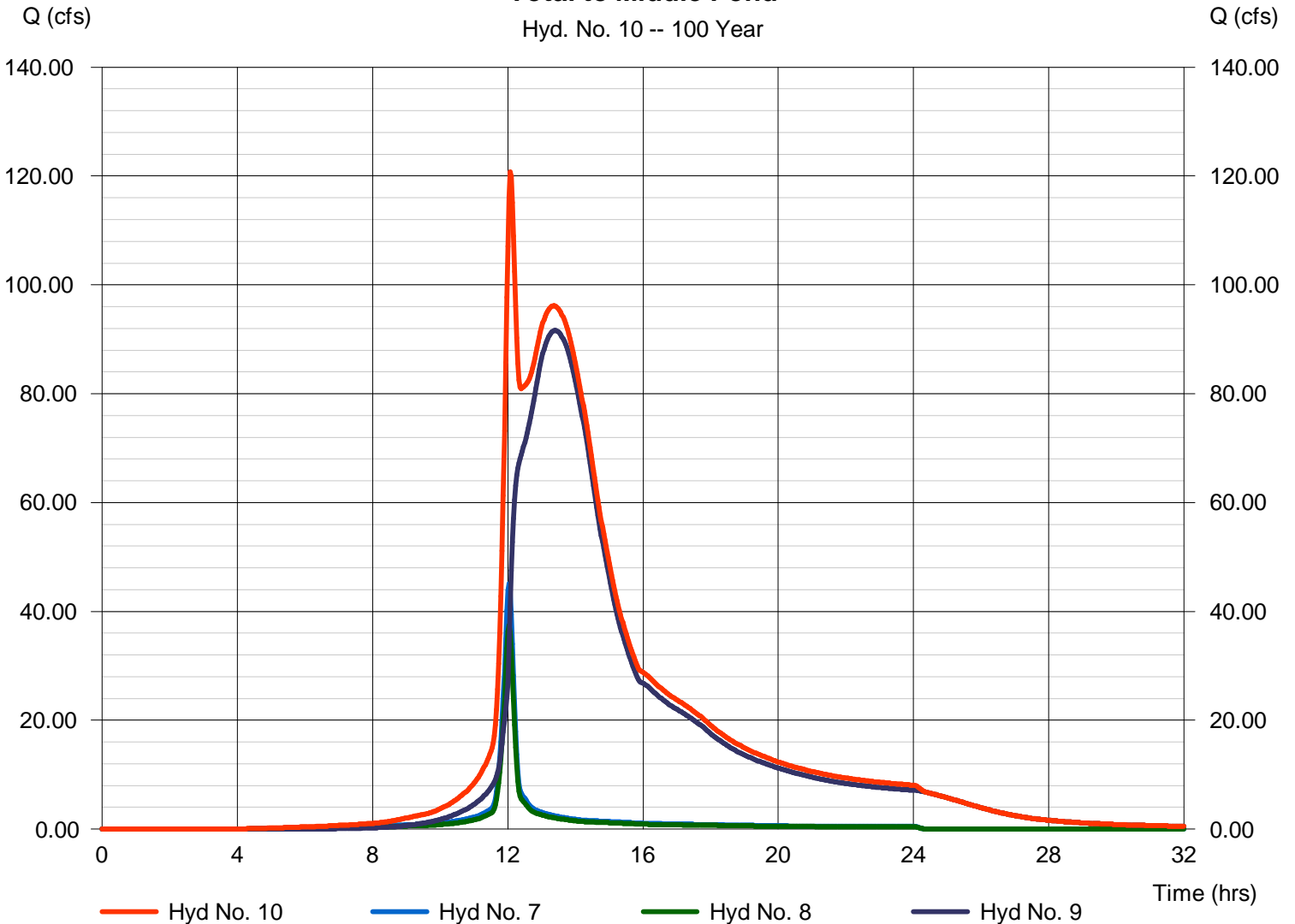
Hyd. No. 10

Total to Middle Pond

Hydrograph type	= Combine	Peak discharge	= 120.73 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,689,098 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 11.200 ac

Total to Middle Pond

Hyd. No. 10 -- 100 Year



Hydrograph Report

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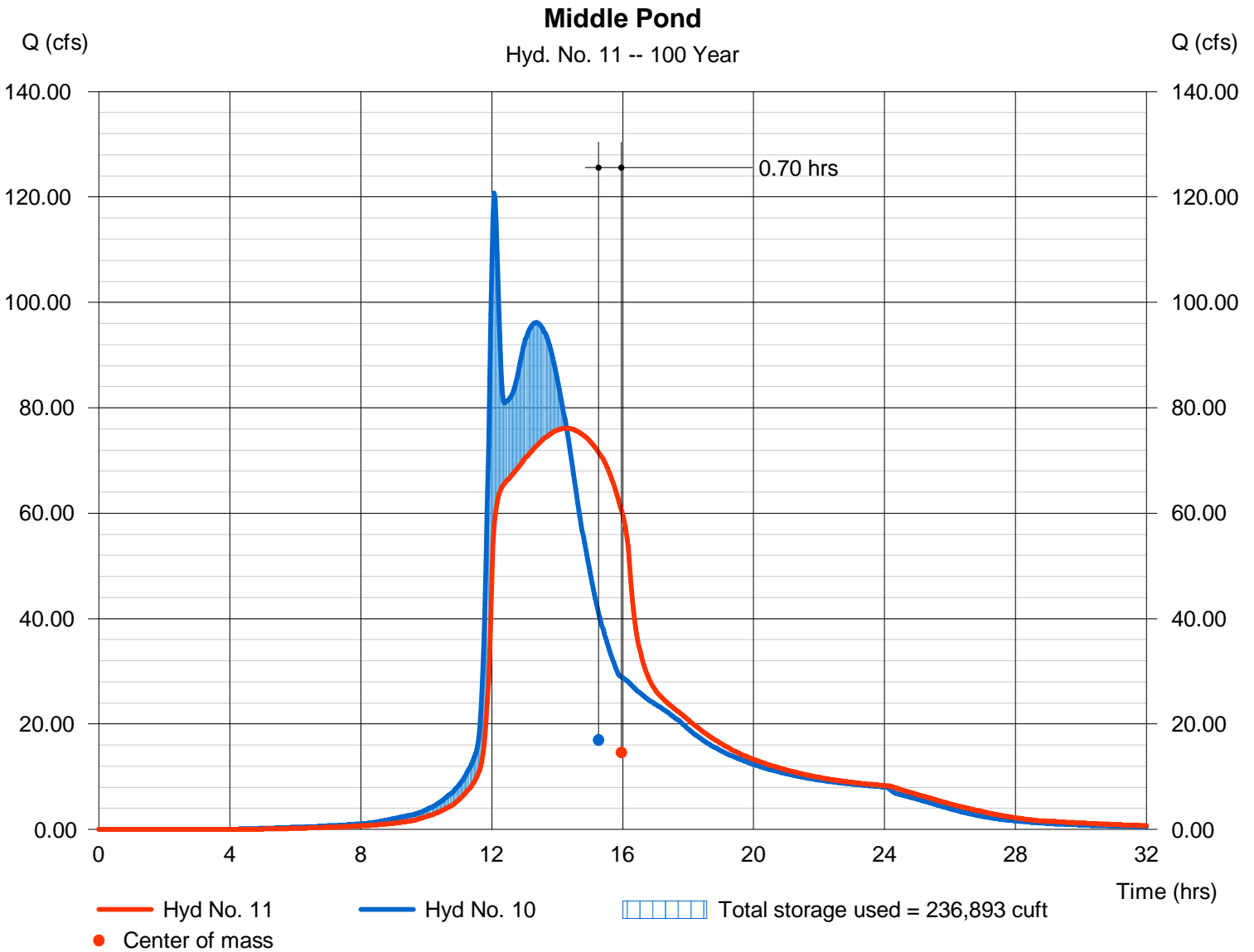
Tuesday, Jun 18, 2013

Hyd. No. 11

Middle Pond

Hydrograph type	= Reservoir	Peak discharge	= 76.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 14.27 hrs
Time interval	= 2 min	Hyd. volume	= 1,689,057 cuft
Inflow hyd. No.	= 10 - Total to Middle Pond	Max. Elevation	= 1356.61 ft
Reservoir name	= Middle Pond	Max. Storage	= 236,893 cuft

Storage Indication method used.



Hydrograph Report

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Tuesday, Jun 18, 2013

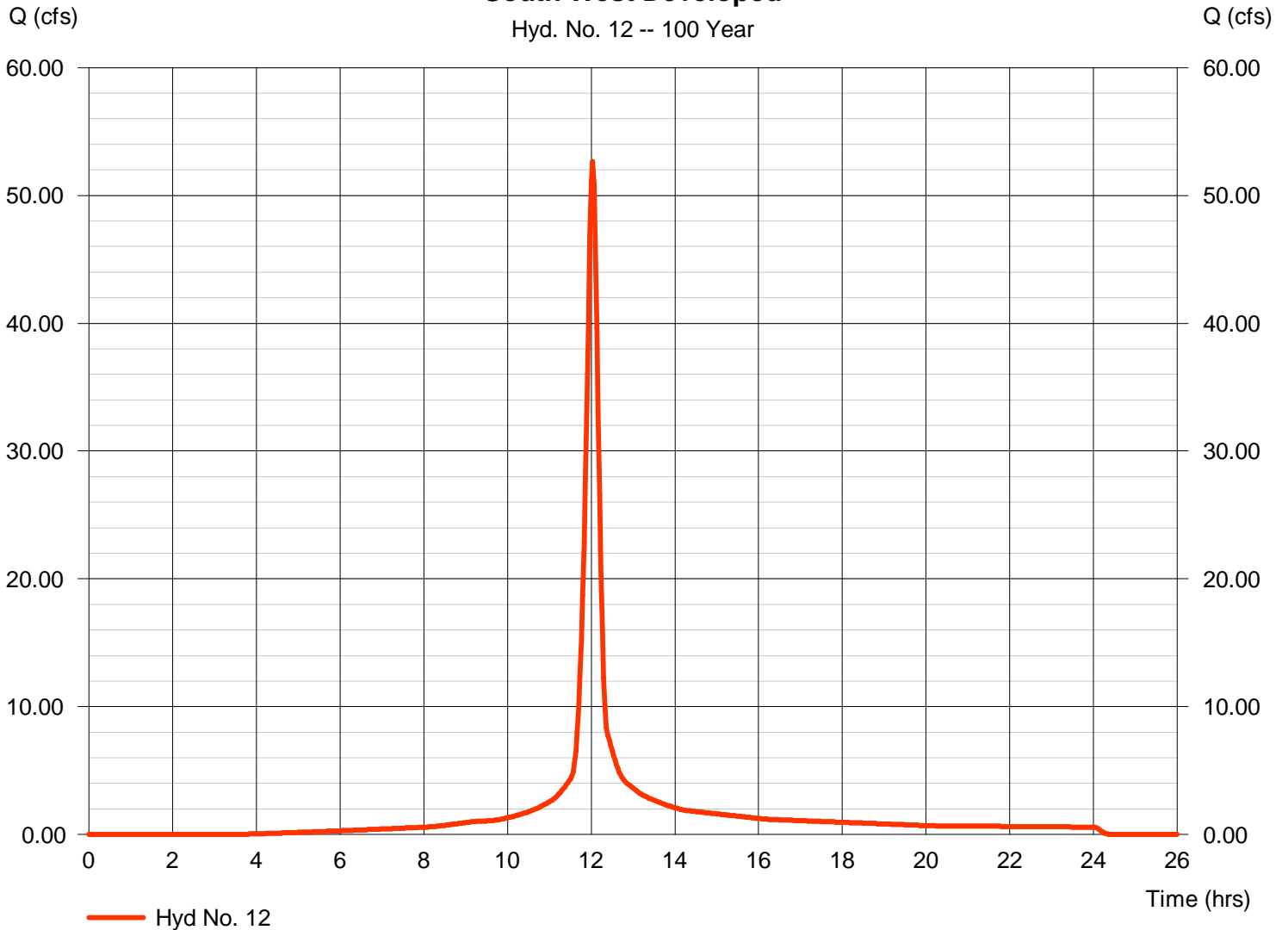
Hyd. No. 12

South West Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 52.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 154,969 cuft
Drainage area	= 7.000 ac	Curve number	= 87
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

South West Developed

Hyd. No. 12 -- 100 Year



Hydrograph Report

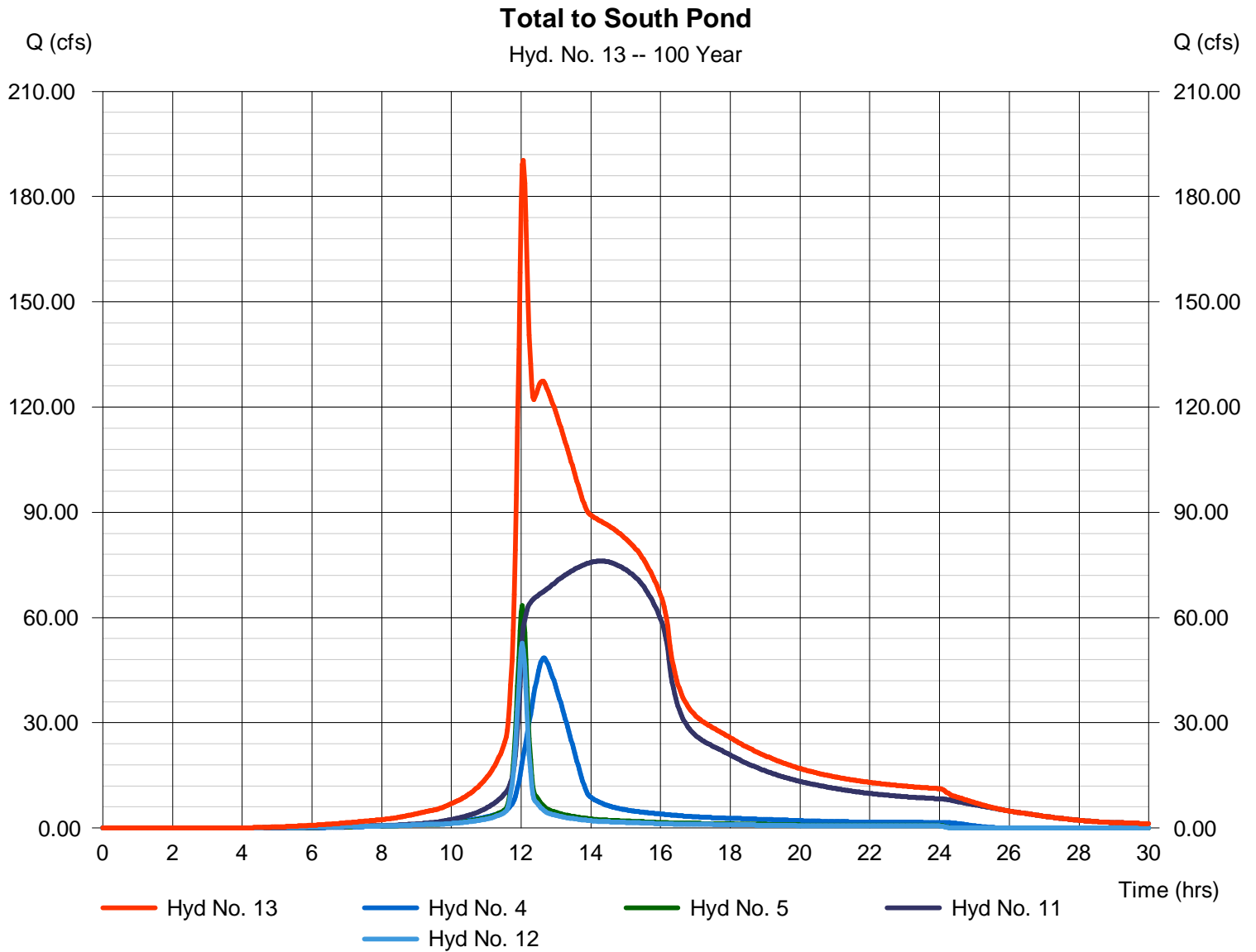
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Tuesday, Jun 18, 2013

Hyd. No. 13

Total to South Pond

Hydrograph type	= Combine	Peak discharge	= 190.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,400,892 cuft
Inflow hyds.	= 4, 5, 11, 12	Contrib. drain. area	= 34.800 ac



Hydrograph Report

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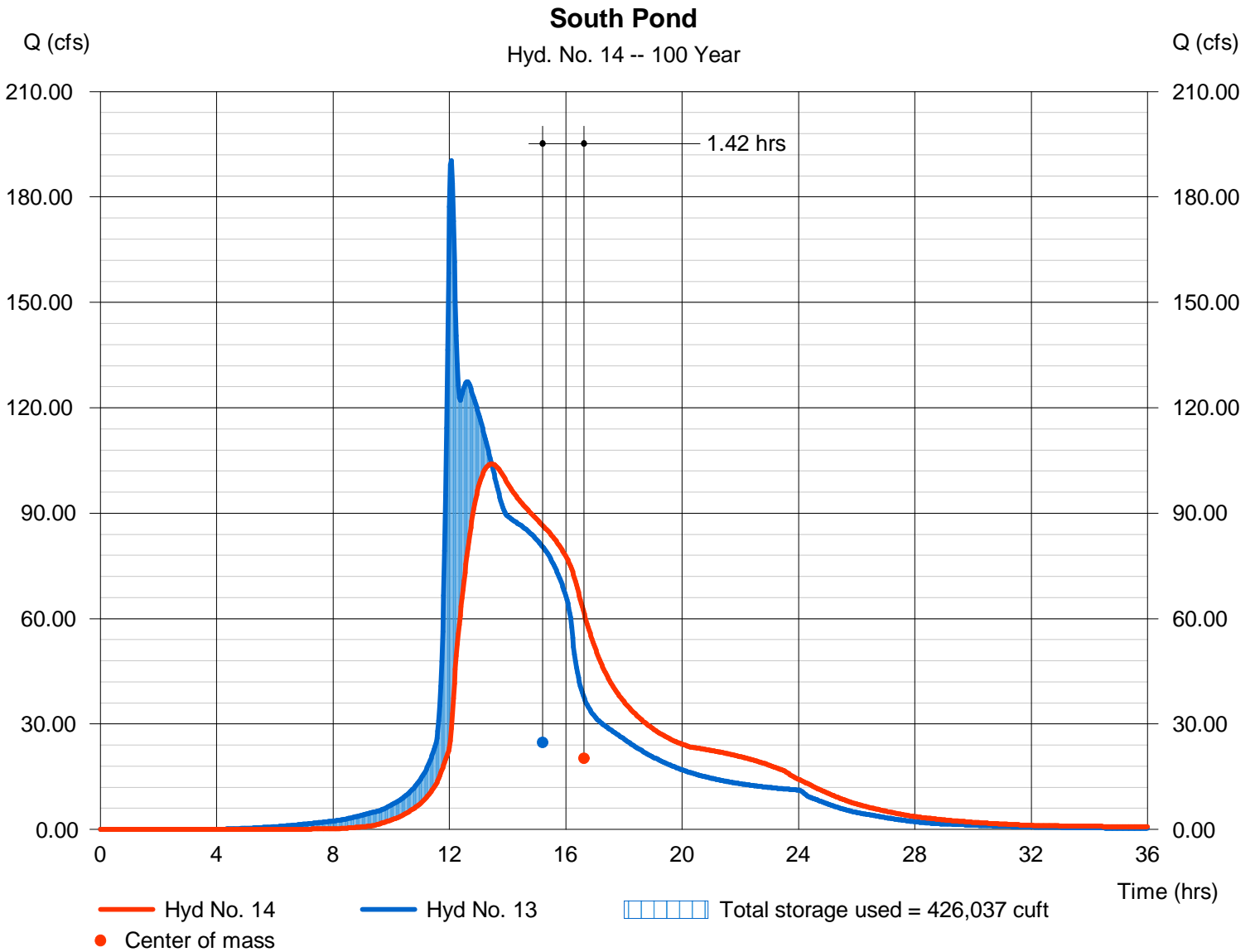
Tuesday, Jun 18, 2013

Hyd. No. 14

South Pond

Hydrograph type	= Reservoir	Peak discharge	= 103.98 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.43 hrs
Time interval	= 2 min	Hyd. volume	= 2,398,771 cuft
Inflow hyd. No.	= 13 - Total to South Pond	Max. Elevation	= 1351.87 ft
Reservoir name	= South Pond	Max. Storage	= 426,037 cuft

Storage Indication method used.



Hydrograph Report

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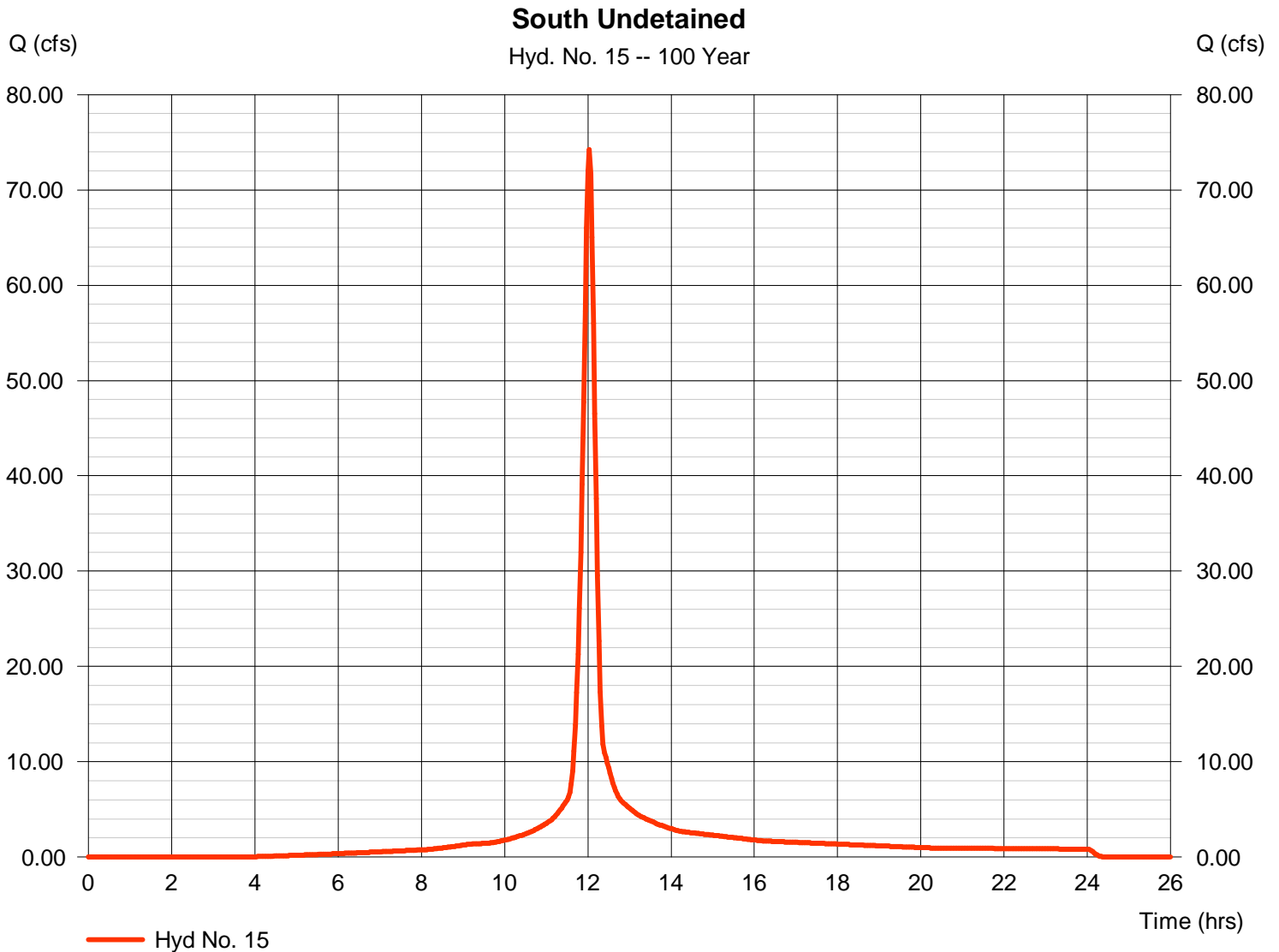
Tuesday, Jun 18, 2013

Hyd. No. 15

South Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 74.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 217,227 cuft
Drainage area	= 10.000 ac	Curve number	= 86*
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

* Composite (Area/CN) = [(2.800 x 90) + (7.200 x 84)] / 10.000



Hydrograph Report

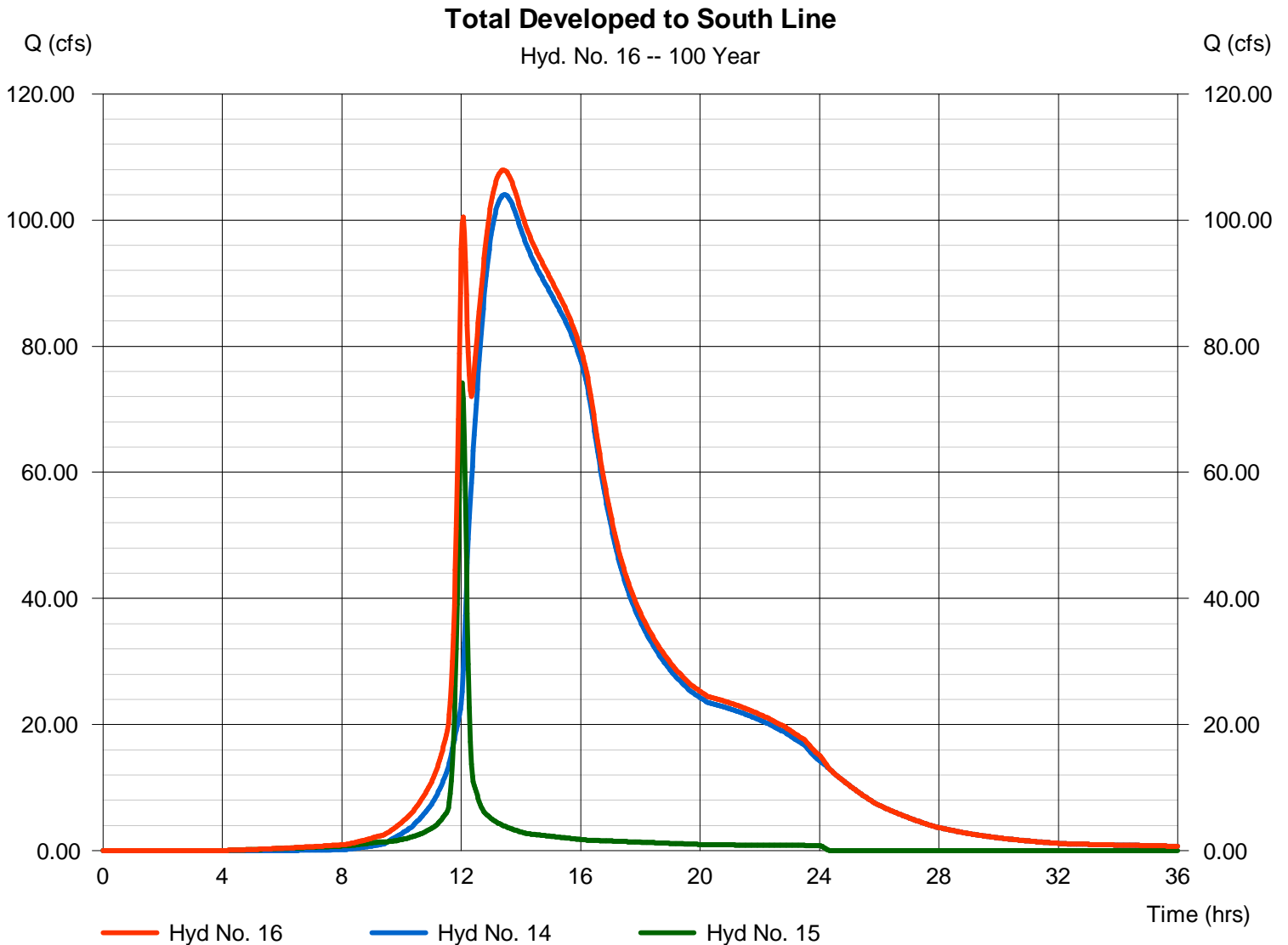
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Tuesday, Jun 18, 2013

Hyd. No. 16

Total Developed to South Line

Hydrograph type	= Combine	Peak discharge	= 107.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.40 hrs
Time interval	= 2 min	Hyd. volume	= 2,615,997 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 10.000 ac



Hydrograph Report

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Tuesday, Jun 18, 2013

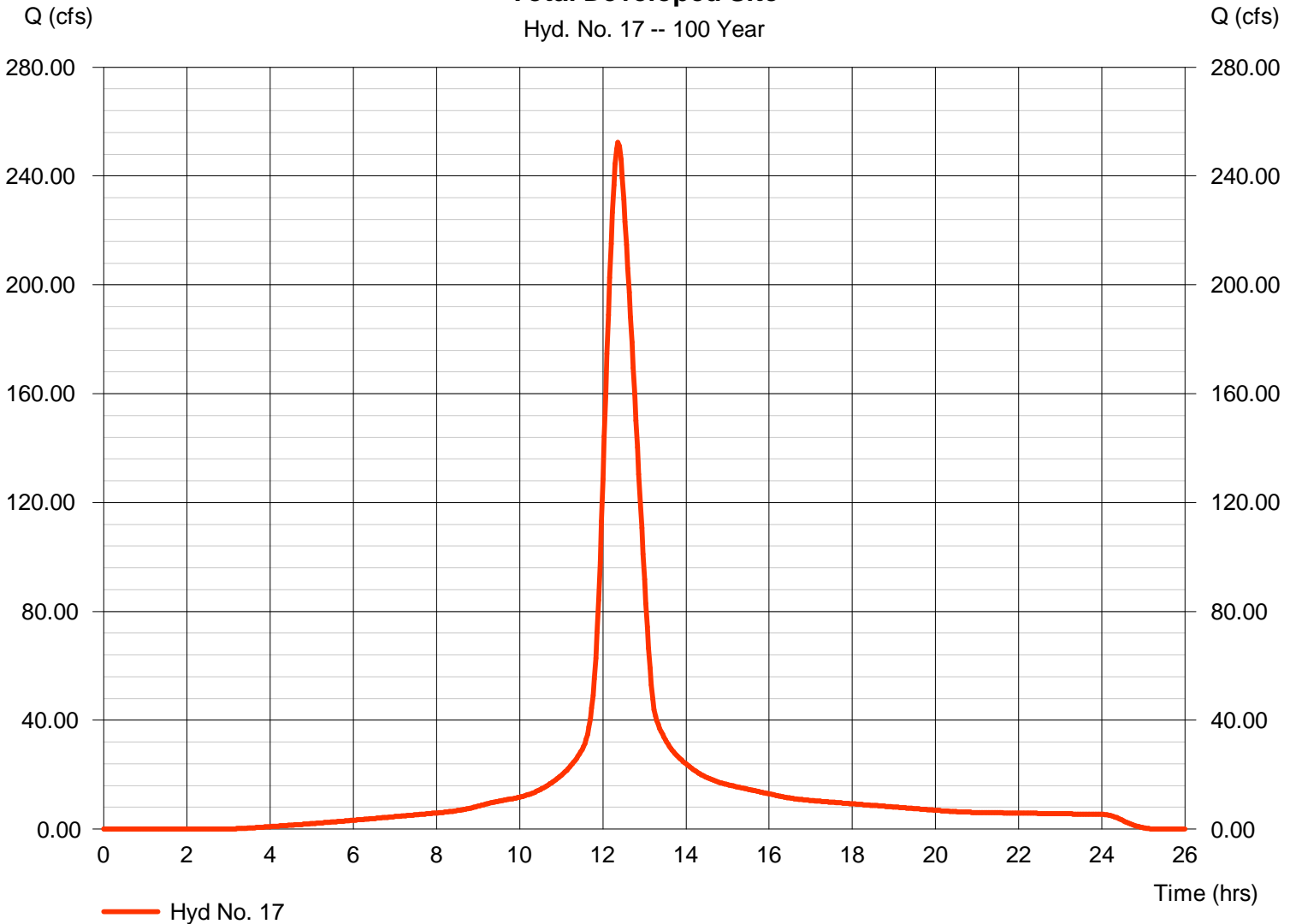
Hyd. No. 17

Total Developed Site

Hydrograph type	= SCS Runoff	Peak discharge	= 252.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 1,487,364 cuft
Drainage area	= 62.000 ac	Curve number	= 90
Basin Slope	= 0.8 %	Hydraulic length	= 2300 ft
Tc method	= LAG	Time of conc. (Tc)	= 48.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Developed Site

Hyd. No. 17 -- 100 Year



Hydraflow Rainfall Report

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

Tuesday, Jun 18, 2013

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

$$\text{Intensity} = B / (Tc + D)^E$$

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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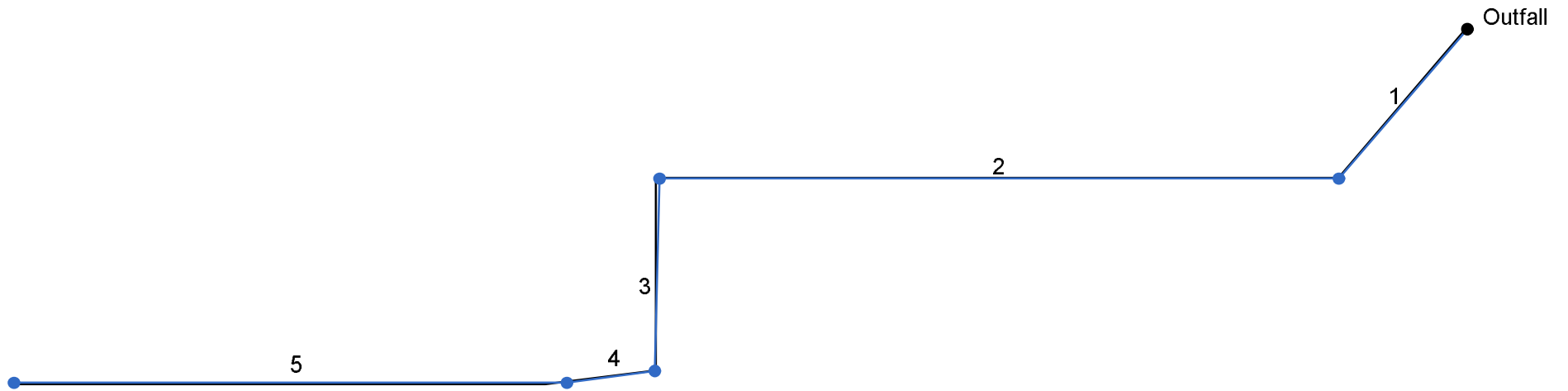
HydraFlow SWS

System 1

System 2

System 3

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Project File: sws1.stm

Number of lines: 5

Date: 6/19/2013

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
5	4	210.025	7.696	DrGrt	0.00	3.50	0.72	15.0	1357.38	0.20	1357.80	24	Cir	0.012	1.00	1363.00	
4	3	33.800	80.890	Curb	0.00	3.00	0.72	15.0	1356.81	0.20	1356.88	30	Cir	0.012	0.50	1365.00	
3	2	73.350	-88.586	Curb	0.00	3.00	0.72	15.0	1356.67	0.20	1356.81	30	Cir	0.012	1.48	1365.00	
2	1	258.005	49.399	MH	0.00	0.00	0.00	0.0	1355.65	0.20	1356.17	36	Cir	0.012	1.00	1365.50	
1	End	75.117	130.601	DrGrt	0.00	0.25	0.72	15.0	1355.50	0.20	1355.65	36	Cir	0.012	1.19	1361.10	
Project File: sws1.stm												Number of lines: 5				Date: 6/19/2013	

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
5		DropGrate	1363.00	Cir	4.00	4.00	24	Cir	1357.80			
4		Curb-	1365.00	Cir	4.00	4.00	30	Cir	1356.88	24	Cir	1357.38
3		Curb-	1365.00	Cir	4.00	4.00	30	Cir	1356.81	30	Cir	1356.81
2		Manhole	1365.50	Cir	4.00	4.00	36	Cir	1356.17	30	Cir	1356.67
1		DropGrate	1361.10	Cir	4.00	4.00	36	Cir	1355.65	36	Cir	1355.65

Project File: sws1.stm

Number of Structures: 5

Run Date: 6/19/2013

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
5		13.13	24	Cir	210.025	1357.38	1357.80	0.200	1361.41*	1362.02*	0.27	1362.29	4	DropGrate
4		23.84	30	Cir	33.800	1356.81	1356.88	0.201	1361.13*	1361.23*	0.18	1361.41	3	Curb-
3		34.73	30	Cir	73.350	1356.67	1356.81	0.200	1359.53*	1359.98*	1.15	1361.13	2	Curb-
2		34.57	36	Cir	258.005	1355.65	1356.17	0.200	1358.61	1359.16	0.37	1359.53	1	Manhole
1		34.67	36	Cir	75.117	1355.50	1355.65	0.200	1357.38	1357.96	0.65	1358.61	End	DropGrate

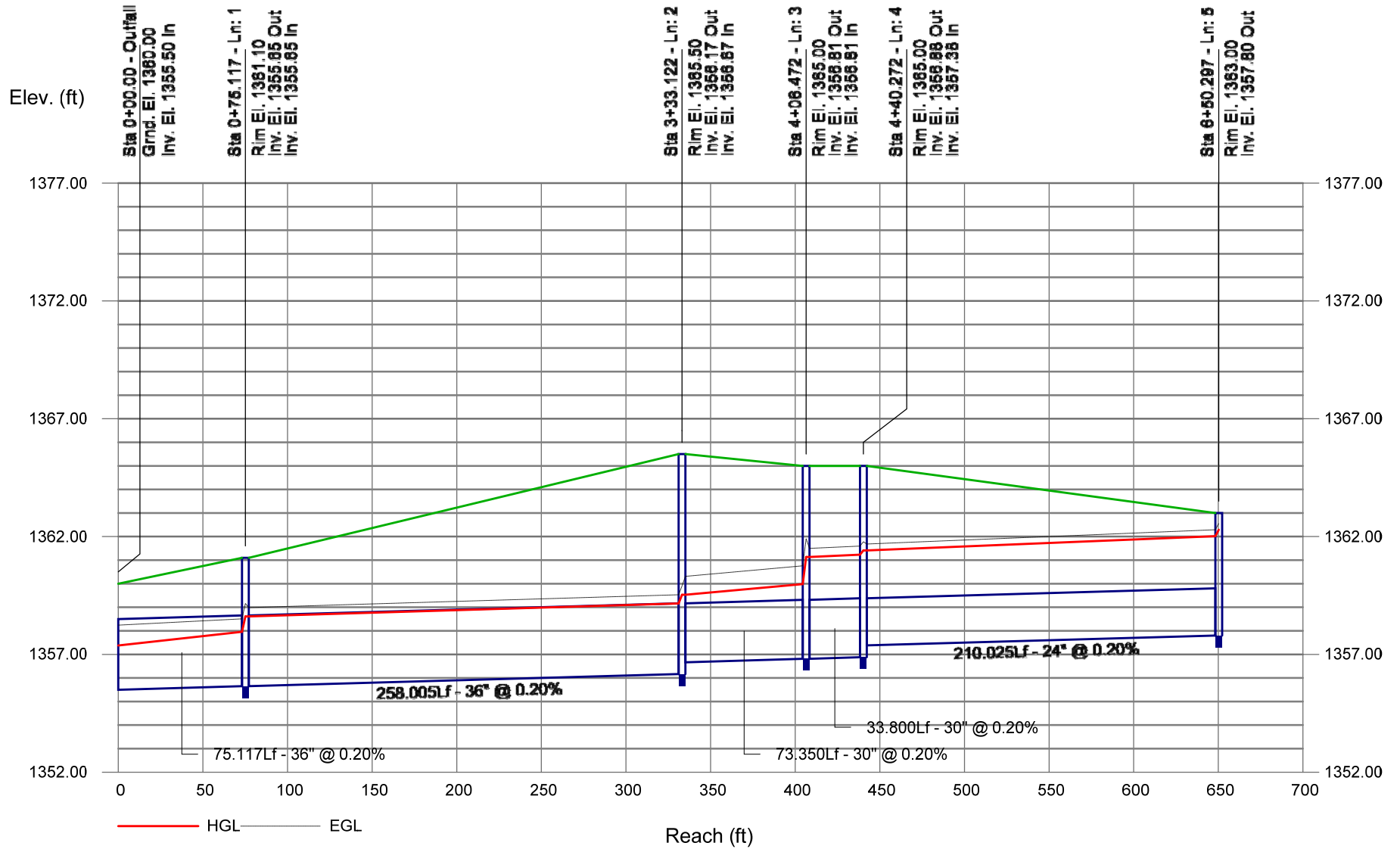
Project File: sws1.stm

Number of lines: 5

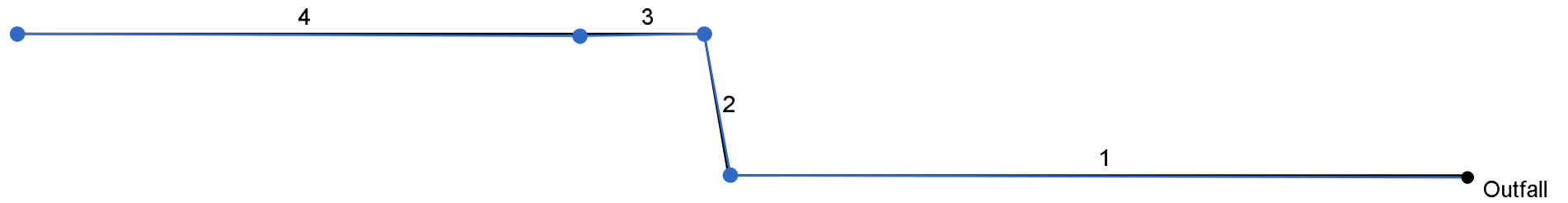
Run Date: 6/19/2013

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
4	3	169.004	1.227	DrGrt	0.00	21.00	0.70	75.0	1351.70	0.62	1352.74	36	Cir	0.012	1.00	1359.00	
3	2	37.344	-80.545	Curb	0.00	1.50	0.72	15.0	1351.03	0.87	1351.35	36	Cir	0.012	0.50	1360.50	
2	1	43.298	79.371	Curb	0.00	1.90	0.72	15.0	1349.69	2.51	1350.78	36	Cir	0.012	1.48	1360.50	
1	End	221.407	-179.831	MH	0.00	0.00	0.00	0.0	1345.50	1.78	1349.44	36	Cir	0.012	0.99	1361.10	
Project File: sws2.stm												Number of lines: 4				Date: 6/19/2013	

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
4		DropGrate	1359.00	Cir	4.00	4.00	36	Cir	1352.74			
3		Curb-	1360.50	Cir	4.00	4.00	36	Cir	1351.35	36	Cir	1351.70
2		Curb-	1360.50	Cir	4.00	4.00	36	Cir	1350.78	36	Cir	1351.03
1		Manhole	1361.10	Cir	4.00	4.00	36	Cir	1349.44	36	Cir	1349.69

Project File: sws2.stm	Number of Structures: 4	Run Date: 6/19/2013
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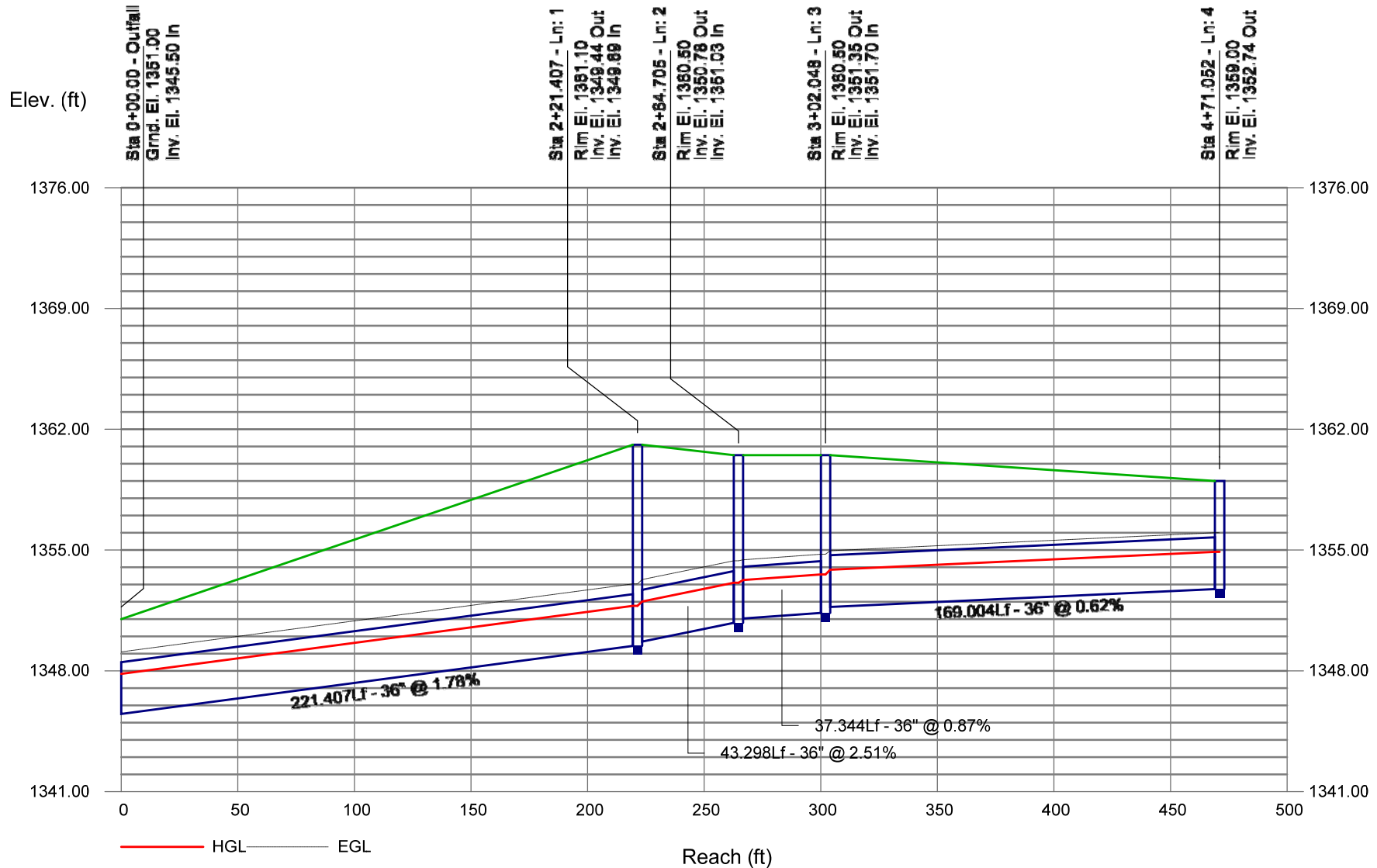
Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
4		45.81	36	Cir	169.004	1351.70	1352.74	0.615	1353.86	1354.90	1.10	1354.90	3	DropGrate
3		48.99	36	Cir	37.344	1351.03	1351.35	0.870	1353.26	1353.59	n/a	1353.59	2	Curb-
2		53.19	36	Cir	43.298	1349.69	1350.78	2.508	1352.02	1353.10	n/a	1353.10	1	Curb-
1		53.14	36	Cir	221.407	1345.50	1349.44	1.781	1347.82	1351.77	n/a	1351.77	End	Manhole

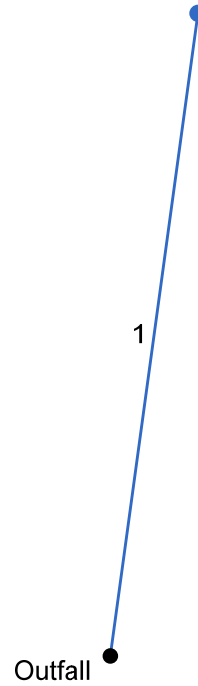
Project File: sws2.stm	Number of lines: 4	Run Date: 6/19/2013
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NOTES: Return period = 100 Yrs.

Storm Sewer Profile



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data							Line ID	
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)		Inlet/ Rim El (ft)
1	End	180.000	-82.262	Curb	0.00	1.80	0.72	15.0	1351.25	2.02	1354.89	15	Cir	0.012	1.00	1359.00	

Project File: sws3.stm

Number of lines: 1

Date: 6/19/2013

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1		Curb-	1359.00	Cir	4.00	4.00	15	Cir	1354.89			

Project File: sws3.stm

Number of Structures: 1

Run Date: 6/19/2013

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1		6.75	15	Cir	180.000	1351.25	1354.89	2.023	1352.42	1355.93	n/a	1355.93 j	End	Curb-

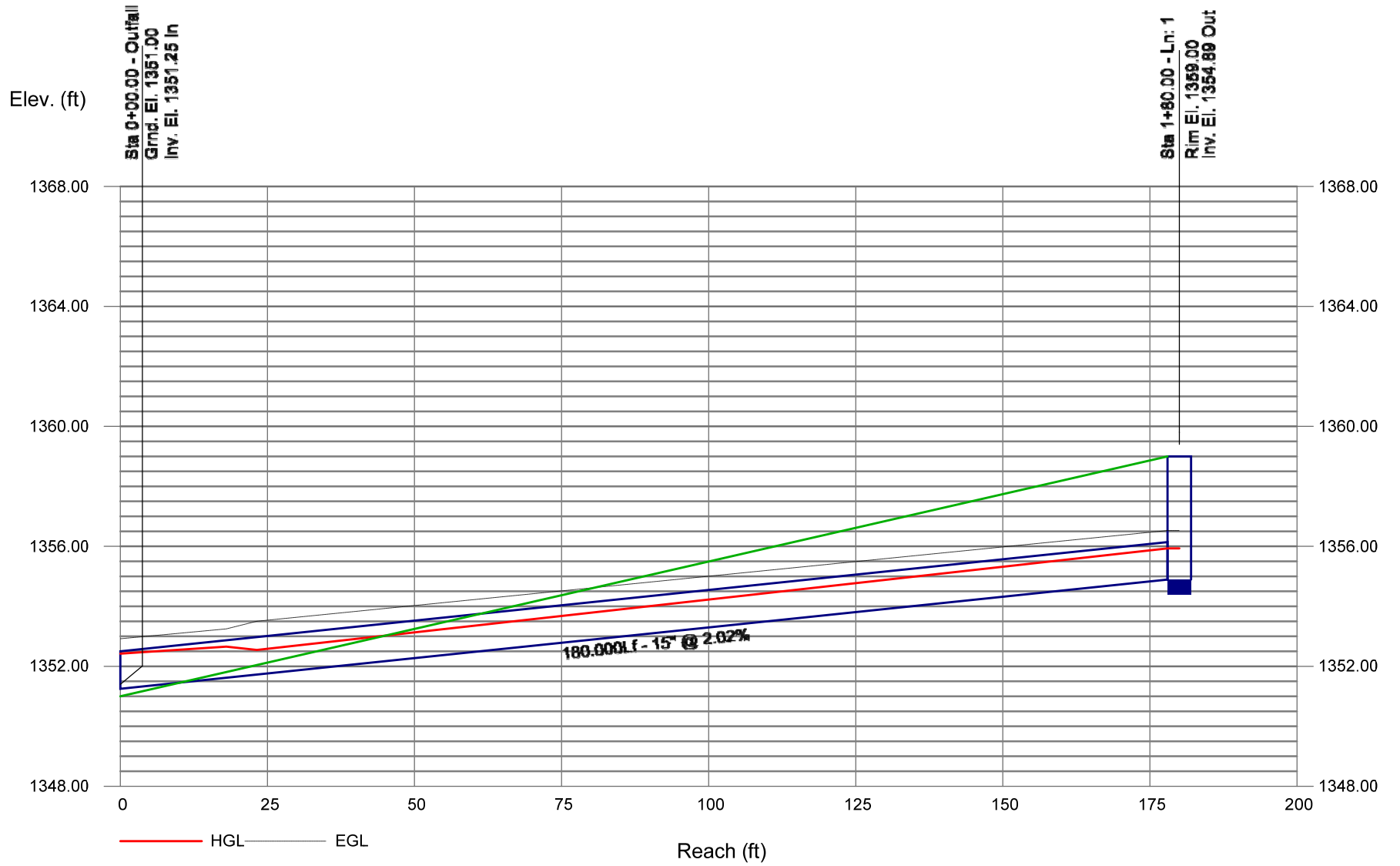
Project File: sws3.stm

Number of lines: 1

Run Date: 6/19/2013

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Profile



Water Quality
&
Channel Protection

Table 4-13 Volumetric Runoff Coefficients by Land Use and Hydrologic Soil Group

Land Use	Hydrologic Soil Group				Land Use	Hydrologic Soil Group			
	A	B	C	D		A	B	C	D
Undisturbed	0.02	0.03	0.04	0.05	Undisturbed	55	71	80	84
Turf or Disturbed Soils	0.15	0.20	0.22	0.25	Turf or Disturbed Soils	71	80	84	88
Impervious Cover	0.95	0.95	0.95	0.95	Impervious Cover	98	98	98	98

Basin #	Weighted Volumetric Runoff Coef. (R _v) (eq. 4-24*)										WQ _v ft ³ eq. 4-25*
	Undist. ft ²	Dist. ft ²	Red. Imp. ft ²	New Imp. ft ²	Total Area ft ²	U %	D %	Redev. I %	I %	R _v %	
Res Lots	0	326,700	0	980,100	1,306,800	0.000	0.063	0.000	0.713	0.7750	101,277
Estate Lots	1,215,330	0	0	135,030	1,350,360	0.028	0.000	0.000	0.095	0.1229	16,595
N Comm	0	26,130	0	148,100	174,230	0.000	0.037	0.000	0.808	0.8450	14,723
TOTALS	1,215,330	352,830	0	1,263,230	2,831,390						132,595

91

Pond Volume Below Static Pool						
Basin	Pond Bottom Area				Depth Feet	Volume Acre-Ft.
	Static Sq.Ft.	Acre	Sq. Ft.	Acre		
N Pond	62184	1.4	34000	0.8	7	7.7
M Pond	54000	1.2	27500	0.6	7	6.5
S Pond	80000	1.8	50000	1.1	7	10.4
Totals:		1.4		0.8		24.7

Pond Volume > WQv		
Pond	WQv	Check
24.7	3.0	Yes

Basin	% Impervious	Composite CN
Residential Lots	25%	91
Estate Lots	10%	85
N Commercial	85%	97

VOLUME

• EXISTING 1yr = 304,593 ft³

• DEVELOPED 1yr = 405,409 ft³

CRV needed = Δ = 100,816 ft³

(volumes from HydraFlow
for each conditions.)

- TO RELEASE VOLUME IN 24 HOURS -

$$24 \text{ HOURS} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ sec}}{1 \text{ min}} = 86,400 \text{ sec}$$

$$Q = \frac{100,816 \text{ ft}^3}{86,400 \text{ sec}} = 1.17 \text{ ft}^3/\text{sec} \quad (\text{size orifice for this flow})$$

ORIFICE EQ:

$$Q = CA (2gH)^{.5}$$

H=? Assume 4' Head
from centroid = 0.33'

$$1.17 = (0.8) (2 \times 32.2 \times 0.33)^{.5} A$$

$$A = 0.316 \text{ ft}^2 \\ = 45.5 \text{ in}^2 \quad \rightarrow \quad D = 7.6 \text{ in}$$

- TO RELEASE VOLUME IN 48 HOURS -

$$48 \text{ HOURS} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ sec}}{1 \text{ min}} = 172,800 \text{ sec}$$

$$Q = \frac{100,816 \text{ ft}^3}{172,800 \text{ sec}} = 0.58 \text{ ft}^3/\text{sec} \quad (\text{size orifice for this flow})$$

ORIFICE EQ:

$$Q = CA (2gH)^{.5}$$

H=? Assume 6' Head for
smaller pipe $h=0.5'$

$$0.58 = (0.8) (2 \times 32.2 \times 0.5)^{.5} A$$

$$A = 0.128 \text{ ft}^2 \\ = 18.4 \text{ in}^2 \quad \rightarrow \quad D = 4.8 \text{ in}$$

- TO RELEASE THE CRV over 24 hours USE 8 in ORIFICE, UP TO 48 HOURS USE 5" ORIFICE..... IN THIS CASE WE RECOMMEND 5" ORIFICE, TO FALL BETWEEN THE REQUIRED 24-48 HOUR TIME INTERVAL.

Drainage Plan
1:100 Scale