

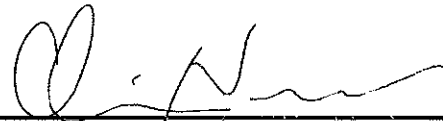
CIVIL ENGINEERING
ENVIRONMENTAL
SURVEYING
LANDSCAPE ARCHITECTURE
GEOTECHNICAL

STORMWATER MANAGEMENT REPORT

248 Stickles Pond Road
Block 151 Lot 21
Andover Township
Sussex County, New Jersey

Prepared For:
BHT Properties Group
5081 SW 48th Street, 1023
Davie, Florida 33314

December 12, 2019



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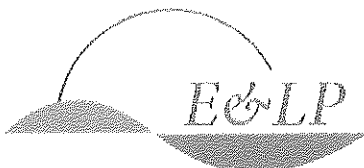


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1. PROJECT DESCRIPTION

1.1 Existing Conditions

The site is identified as 248 Stickles Pond Road and is located in the Township of Andover, County of Sussex, New Jersey. The tax parcel designation is Block 151, Lot 21. This project's overall property is the former Newton Airport. It is bordered by Stickles Pond to the Northeast and the Pequest River to the Northwest along the property lines. The total parcel area is 4,393,962 ft² (\pm 100.87 acres). The existing development features consist of 3 unoccupied buildings, multiple barns, multiple trailers and detached garages, paved driveways and an asphalt runaway. Currently, the site land cover consists of grassland and wooded areas. Field investigation for wetlands discovered the presence of freshwater wetlands on the property. The topographic relief of the property ranges from 588 to 645 feet about MSL. The surface topography fluctuates from moderately flat land along Stickles Pond Road, the southern part of the property, to various steep sections scattered throughout the property. There are no existing stormwater conveyance on the site that collects the generated stormwater runoff. Therefore, the stormwater runoff generated within the site is in its majority contained within the site boundaries and the remaining runoff it discharges toward the adjacent properties and Stickles Pond.

1.2 Proposed Conditions

The project proposes the construction of a vehicle storage facility for auction and the construction of a \pm 12,860 square feet office building. Access and parking on the site will include a two-way driveway from Stickles Pond Road and surface paved parking along the frontage of the office building. Amenities proposed for the site include a proposed concrete sidewalk along the front, side, and rear of the proposed building. The total limit of disturbance created by the proposed development is \pm 59.79 acres (\pm 59.30% of the total area of the site) and the net increase in impervious coverage is \pm 15.76 acres (\pm 15.52 acres increase in impervious coverage). The project is considered a major project in accordance with the NJDEP Phase II Stormwater Regulations, as it will include greater than 1.0 acre of disturbance and creates greater than 1/4 acre of new impervious surface. Stormwater on the proposed site will be controlled with:

- Nine sections of pervious gravel pavement systems designed to capture, treat and infiltrate the stormwater runoff.
- Two above-ground infiltration basins designed to capture, treat and infiltrate the stormwater runoff.

Due to the existing drainage characteristics of the site, the proposed stormwater management systems have been designed to capture, treat and infiltrate the water quality storm event and the 2, 10, and 100-year storm events in order to meet the water quantity peak reduction requirements, water quality requirements, and the ground water requirements specified on N.J.A.C. 7:8-5.4 and N.J.A.C. 7:8-5.5. Therefore, an exception waiver is requested for the use of infiltration as part of the routing for the 2, 10 and 100-year storm events.



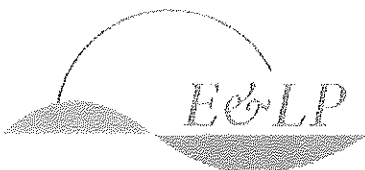
1.3 Soil Conditions

Per the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey of Sussex County, the site is underlain by four soil types:

- FaxC - Farmington-Rock Outcrop Complex (0 to 15 percent slopes).
The Farmington series consists of shallow, well drained and somewhat excessively drained soils formed in till. They are nearly level to very steep soils on glaciated uplands. It is not on the hydric soils list;
- HdxpAb – Hazen-Paulins Kill Complex (0 to 3 percent slopes);
Hazen Hero Fredon soils are present surrounding the Paulins Kill and surrounding floodplains. This general soil unit consists of nearly level to very steep, deep, well drained and poorly drained soils, on river terraces, outwash terraces and kames. It is not on the hydric soils list;
- USFARC – Urban Land-Farmington-Rock Outcrop Complex (0 to 15 percent slopes).
Urban Land consists of nearly level to moderately steep areas where the soils have been altered or obscured by urban works and structures;
- RnfD – Rock Outcrop – Farmington-Galway Complex (15 to 35 percent slopes). Rock Outcrop consists of steep, well-drained soil. It is not on the hydric soil list.

Farmington-Rock Outcrop (FaxC) comprises 33% of the total disturbed area, Hazen-Paulins Kill (HdxpAb) comprises 59%, Urban Land-Farmington-Rock Outcrop (USFARC) comprises 5% and the remaining 3% of the total disturbed area is comprised by Rock Outcrop – Farmington-Galway (RnfD). Both FaxC, USFARC and RnfD are classified as Hydrologic Soil Group (HSG) 'D', and HdxpAb is classified as Hydrologic Soil Group (HSG) 'A'. A USDA NRCS Web Soil Survey map is included in Appendix A.

In situ soil testing was performed onsite in the location of the proposed stormwater management systems and along the areas with different USDA NRCS soil group classifications to obtain physical data regarding the infiltration rates of the site. The lab data results are included in Appendix H. The results obtained indicate that the site is well-drained within the proposed limit of disturbance. The obtained soil permeability rates were greater than 5.67 inches per hour; therefore, in accordance with NJ Stormwater BMP Manual Appendix E, the soil hydrologic groups can be classified as Hydrologic Soil Group 'A'.



2. METHODOLOGY

2.1 Stormwater Runoff Calculation Methodology

The stormwater quantity runoff analysis has been performed utilizing the Soil Conservation Service (SCS) Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds," revised June 1986. The site runoff has been calculated for the 2-, 10-, and 100-year storm frequencies in accordance with NJDEP's stormwater regulations for water quantity control (N.J.A.C. 7:8-5.4).

The analysis utilized the SCS Type III 24-hour rainfall distribution. The time of concentration (Tc) calculations were calculated based on the TR-55 methodology. Several potential Tc flow paths were analyzed in order to determine the most appropriate flow path. CN values were calculated for each drainage area. The summary of results and supporting calculations for the existing and proposed stormwater quantity runoff analysis can be found in Appendices B, C and D of this report.

2.2 Stormwater Runoff Quality

The stormwater runoff quality analysis has been performed in accordance with NJDEP's Stormwater Management Regulations (N.J.A.C. 7:8-5.5). This stormwater management plan serves to reduce the post-construction load of Total Suspended Solids (TSS) generated from the water quality design storm by 80 percent, as an annual average. This reduction has been applied to all areas of new development on the site. The water quality design storm consists of 1.25 inches of rain falling in 2 hours with the NJDEP distribution as illustrated in N.J.A.C. 7:8-5.5 "Table 1 - Water Quality Design Storm Distribution" (refer to Appendix H).

Nine sections pervious pavement system and two above-ground infiltration basins to obtain the required 80% TSS removal from the total proposed impervious area (refer to Appendix G).

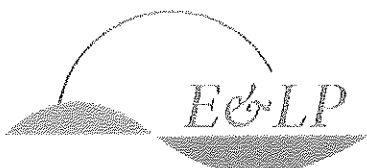
2.3 Groundwater Recharge

A groundwater recharge analysis has been performed in accordance with NJDEP's Stormwater Management Rules (N.J.A.C. 7:8-5.4). The New Jersey Groundwater Recharge Spreadsheet (NJGRS) Version 2.0 (Updated November 2003) was utilized to determine the groundwater recharge associated with the site. Computations of the pre-development and post-development annual groundwater recharge rates and the annual recharge deficit was prepared based on the New Jersey Geological Survey Report GSR-32 "A Method for Evaluating Ground-Water Recharge Areas in New Jersey", which is incorporated into the NJGRS spreadsheet (refer to Appendix G of this report).

2.4 Non-Structural Stormwater Management Strategies

As per N.J.A.C. 7:8-5.3 requirements non-structural stormwater strategies have been incorporated into the design to the maximum extent practicable:

- The impervious surfaces are minimized on the project site to meet current codes and the runoff over the impervious surfaces flow into the proposed stormwater systems.
- The Time of Concentration decrease is minimized to the extent practicable.
- Land disturbance is being minimized to the extent practicable.



- Soil compaction will be minimized and any areas of over compaction will be mediated.
- Low maintenance trees and native grasses are proposed to encourage retention of all plantings.
- The use of natural open channel swales is utilized to convey the stormwater runoff through portions of the site where it is feasible.

2.5 Stormwater Conveyance

The storm sewer hydraulics is based upon the Manning Equation as defined in the "Handbook of Hydraulics," by Brater and King, Sixth Edition. Storm sewer capacity is based on full depth gravity flow. Two stormwater conveyance pipes are proposed to convey the water to each of the two infiltration basins. Refer to Appendix E for calculations.

3. STORMWATER ANALYSIS

3.1 Existing Conditions Stormwater Runoff Quantity

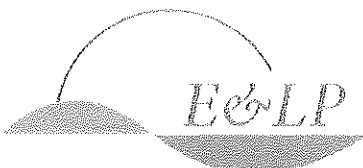
The Pre-Development Drainage Area Plan (Appendix B) illustrates the existing drainage areas on site. The pre-development drainage areas have been delineated only within the proposed limit of disturbance anticipated by the proposed development. The site has been analyzed as nine distinct drainage areas: EDA-A, EDA-B, EDA-C, EDA-D, EDA-E, EDA-F, EDA-G, EDA-H, and EDA-I.

EDA-A is defined as 14.93 acres of site area that drains from the southern section of Stickles Pond Road and the middle-south section of the site toward a low point located east from the common property line with Block 151, Lot 20. The drainage area contains multiple land covers as follows: 8.88 acres of grassland, 4.60 acres of woods, and 1.46 acres of impervious area. Due to the topographic characteristics of the drainage area, the generated stormwater runoff is contained within the site boundaries and it is infiltrated to the ground.

EDA-B is defined as 18.04 acres of site area that drains from the north section of Stickles Pond Road and the middle-north section of the site toward the existing wetlands. The drainage area contains multiple land covers as follows: 12.21 acres of grassland, 3.47 acres of woods, and 2.36 acres of impervious area. Due to the topographic characteristics of the drainage area, the generated stormwater runoff is contained within the site boundaries and it is infiltrated to the ground.

EDA-C is comprised of 4.77 acres of site area that drains from the north section of Stickles Pond Road and east section of the site toward the Stickles pond. The drainage area contains multiple land covers as follows: 2.80 acres of grassland, 0.97 acres of woods, and 1.0 acres of impervious area.

EDA-D is comprised of 3.64 acres of site area that drains from the middle-north west section of the site and west section of the site toward a low point located east from the common property line with Block 151, Lot 20. The drainage area contains multiple land covers as follows: 0.43 acres of grassland, and 3.20 acres of woods. Due to the topographic characteristics of the drainage area, the generated stormwater runoff is contained within the site boundaries and it is infiltrated to the ground.



EDA-E is comprised 4.55 acres of site area that drains from the middle-north west section of the site toward the north section of the site, to a point located along the common property line with Block 151, Lot 22. The drainage area contains 4.55 acres of woods.

EDA-F is comprised 0.88 acres of site area that drains from the west section of the site toward the adjacent property, Block 151, Lot 17. The drainage area contains 0.88 acres of woods.

EDA-G is comprised of 4.98 acres of site area that drains from the northwest section of the site toward the adjacent property, Block 151, Lot 22. The drainage area contains 4.98 acres of woods.

EDA-H is comprised of 12.10 acres of site area that drains from the upper north section of the site toward a low point. The drainage area contains multiple land covers as follows: 8.92 acres of grassland and 3.18 acres of woods. Due to the topographic characteristics of the drainage area, the generated stormwater runoff is contained within the site boundaries and it is infiltrated to the ground.

EDA-I is comprised of 1.05 acres of site area that drains from the upper northeast section of the site toward Stickles pond. The drainage area contains 1.05 acres of woods.

The curve numbers (CN) and time of concentration (Tc) for the existing drainage areas have been calculated utilizing the TR-55 method for each drainage. Runoff hydrographs have been calculated for the 2, 10, and 100 years storm.

The pre-development runoff from the drainage areas is listed in the following table:

Drainage Area	2-year Storm	10-year Storm	100-year Storm
EDA-A	3.992 CFS	12.10 CFS	34.07 CFS
EDA-B	4.459 CFS	8.148 CFS	24.99 CFS
EDA-C	4.833 CFS	9.441 CFS	19.46 CFS
EDA-D	4.666 CFS	9.249 CFS	18.51 CFS
EDA-E	5.581 CFS	11.09 CFS	22.23 CFS
EDA-F	1.009 CFS	2.003 CFS	4.017 CFS
EDA-G	2.574 CFS	6.941 CFS	17.01 CFS
EDA-H	0.000 CFS	0.152 CFS	3.714 CFS
EDA-I	0.000 CFS	0.000 CFS	0.053 CFS

Refer to Appendices B through D for a summary of the composite curve numbers (CN), pre-development peak discharge rates for the 2-, 10-, and 100-year storms, and the associated runoff hydrographs.

3.2 Proposed Conditions Stormwater Runoff Quantity

The Post-Development Drainage Area Plan (Appendix B), illustrates the proposed drainage areas for the post-development condition. The post-development drainage areas have been delineated only within the proposed limit of disturbance anticipated by the proposed development. To accommodate the proposed site development, the site has been analyzed as nine distinct drainage areas: PDA-A, PDA-B, PDA-C, PDA-D, PDA-E, PDA-F, PDA-G, PDA-H, and PDA-I.

PDA-A is comprised of 6.24 acres of site area along the lower south section of Stickles Pond Road and the lower south section of the site. For the purpose of analysis, PDA-A has been divided into two sub-drainage areas: PDA-A1 and PDA-A2. PDA A-1 is a 5.28 acres site drainage comprised of the proposed building, paved areas and lawn areas located along the lower south section of the



site and the lower south section of the Stuckles Pond Road. The stormwater runoff generated from PDA-A1 is captured, treated and infiltrated by the proposed above-ground infiltration basin: SWM-A1. Since in existing conditions the stormwater runoff generated by EDA-A is contained within the site and its outlet point is through infiltration to the ground, the same approach has been used to define the point of discharge of the proposed above-ground infiltration basin SWM-A1. SWM-A1 has been designed to capture, treat and infiltrate the water quality storm, and the 2,10, and 100-year storms by using a permeability rate of 5 inches per hour. The permeability rate used has been obtained from the results obtained from the in-situ soil testing investigation (refer to Appendix H).

PDA-A2 is a 0.96 acres site area comprised of a portion of the proposed vehicle storage facility and lawn areas located in the lower south portion of the site. The stormwater runoff generated from PDA-A2 is captured, treated and infiltrated by the proposed pervious pavement system: SWM-A2. Since in existing conditions the stormwater runoff generated by EDA-A is contained within the site and its outlet point is through infiltration to the ground, the same approach has been used to define the point of discharge of the proposed pervious pavement system SWM-A2. SWM-A2 has been designed to capture, treat and infiltrate the water quality storm, and the 2,10, and 100-year storms by using a permeability rate of 5 inches per hour. The permeability rate used has been obtained from the results obtained from the in-situ soil testing investigation (refer to Appendix H).

PDA-B is comprised of 26.68 acres of site area along the north section of Stuckles Pond Road and the middle-north section of the site. For the purpose of analysis, PDA-B has been divided into four sub-drainage areas: PDA-B1, PDA-B2, PDA-B3 and PDA-B4. PDA-B1 is a 13.30 acres site area comprised of a portion of the proposed vehicle storage area and lawn areas located along the upper middle-north section of the site and the north section of Stuckles Pond Road. The stormwater runoff generated from PDA-B1 is captured, treated and infiltrated by the proposed pervious pavement system: SWM-B1. Since in the existing conditions the stormwater runoff generated by EDA-B is contained within the site and its outlet point is through infiltration to the ground, the same approach has been used to define the point of discharge of the proposed pervious pavement system SWM-B1. SWM-B1 has been designed to capture, treat and infiltrate the water quality storm, and the 2,10, and 100-year storms by using a permeability rate of 5 inches per hour. The permeability rate used has been obtained from the results obtained from the in-situ soil testing investigation (refer to Appendix H).

PDA-B2 is a 11.39 acres site area comprised of a portion of the proposed vehicle storage area and lawn areas located along the middle section of the site and the middle section of Stuckles Pond Road. The stormwater runoff generated from PDA-B2 is captured, treated and infiltrated by the proposed pervious pavement system: SWM-B2. Since in the existing conditions the stormwater runoff generated by EDA-B is contained within the site and its outlet point is through infiltration to the ground, the same approach has been used to define the point of discharge of the proposed pervious pavement system SWM-B2. SWM-B2 has been designed to capture, treat and infiltrate the water quality storm, and the 2,10, and 100-year storms by using a permeability rate of 5 inches per hour. The permeability rate used has been obtained from the results obtained from the in-situ soil testing investigation (refer to Appendix H). PDA-B3 is a 0.23 acres site area comprised of lawn areas in the middle section of the site. The stormwater runoff generated by PDA-B3 bypasses the proposed stormwater management systems and it drains to the existing wetlands.

PDA-B4 is a 1.76 acres site area comprised of a portion of the proposed vehicle storage area and lawn areas located along the south section of the site. The stormwater runoff generated from PDA-B4 is captured, treated and infiltrated by the proposed pervious pavement system: SWM-B4. Since in the existing conditions the stormwater runoff generated by EDA-B is contained within the site and its outlet point is through infiltration to the ground, the same approach has



been used to define the point of discharge of the proposed pervious pavement system SWM-B4. SWM-B4 has been designed to capture, treat and infiltrate the water quality storm, and the 2,10, and 100-year storms by using a permeability rate of 5 inches per hour. The permeability rate used has been obtained from the results obtained from the in-situ soil testing investigation (refer to Appendix H).

PDA-C is a 0.58 acres site area along the upper north section of Stickles Pond Road. It is comprised of lawn areas and the upper north section of the Stickles Pond Road. The stormwater runoff generated from PDA-C bypasses the proposed stormwater management systems and it drains to the existing Stickles pond.

PDA-D is a 9.02 acres site area along the middle-north west section of the site and the lower west section of the site. It is comprised of a portion of the proposed vehicle storage area, lawn areas and wooded area. The stormwater runoff generated from PDA-D is captured, treated and infiltrated by the proposed pervious pavement system: SWM-D. Since in the existing conditions the stormwater runoff generated by PDA-D is contained within the site and its outlet point is through infiltration to the ground, the same approach has been used to define the point of discharge of the proposed pervious pavement system SWM-D. SWM-B4 has been designed to capture, treat and infiltrate the water quality storm, and the 2,10, and 100-year storms by using a permeability rate of 5 inches per hour. The permeability rate used has been obtained from the results obtained from the in-situ soil testing investigation (refer to Appendix H).

PDA-E is comprised of 2.32 acres of site area along the middle-north west section of the site toward the north section of the site. For the purpose of analysis, PDA-E has been divided into two sub-drainage areas: PDA-E1 and PDA-E2. PDA-E1 is a 2.12 acres site area comprised of a portion of the proposed vehicle storage area, lawn areas and wooded areas located along the middle-northwest section of the site. The stormwater runoff generated by PDA-E1 is captured, treated and infiltrated by the proposed pervious pavement system: SWM-E1. The proposed pervious pavement system SWM-E1 has been designed to capture, treat and infiltrate the water quality storm, and the 2,10 and 100-year storms. PDA-E2 is a 0.20 acres site area comprised of grass and wood areas. The stormwater runoff generated by PDA-E2 bypasses the proposed stormwater management systems and discharges to the adjacent property, Block 151, Lot 22. By designing the proposed pervious pavement system to capture, treat and infiltrate the water quality storms, and the 2,10, and 100-year storms, no increase in peak discharge toward Block 151, Lot 22 is expected to occur.

PDA-F is a 0.59 acres site area along the west section of the site. It is comprised of grass areas and it drains toward the adjacent property, Block 151, Lot 17.

PDA-G is comprised of 6.13 acres of site area along the northwest section of the site. For the purpose of analysis, PDA-G has been divided into two sub-drainage areas: PDA-G1 and PDA-G2. PDA-G1 is a 5.83 acres site area comprised of a portion of the proposed vehicle storage area and lawn areas located along the northwest section of the site. The stormwater runoff generated by PDA-G1 is captured, treated and infiltrated by the proposed above-ground infiltration basin: SWM-G1. The proposed above-ground infiltration basin has been designed to capture, treat and infiltrate the water quality storm, and the 2, 10, and 100-year storms. PDA-G2 is a 0.30 acres site area comprised of lawn located areas along the northwest section of the site. The stormwater runoff generated by PDA-G2 bypasses the proposed stormwater management systems and it drains to the adjacent property, Block 151, Lot 22. By designing the proposed above-ground infiltration basin to capture, treat and infiltrate the water quality storms, and the 2,10, and 100-year storms, no increase in peak discharge toward Block 151, Lot 22 is expected to occur.

PDA-H is comprised of 11.37 acres of site area along the upper north section of the site. For the purpose of analysis, PDA-H has been divided into two sub-drainage areas: PGD-H1 and PDA-H1.



PDA H1 is a 10.61 acres site area comprised of a portion of the proposed vehicle storage area and lawn areas located along the upper north section of the site. The stormwater runoff generated by PDA-H1 is captured, treated and infiltrated by a proposed pervious pavement system: SWM-H1. The proposed pervious pavement system SWM-H1 has been designed to capture, treat and infiltrate the water quality storm and the 2, 10 and 100-year storms. PDA-H2 is a 0.76 acres site area comprised of grass areas and wooded areas. The stormwater runoff generated by PDA-H2 drains to a low point located along the upper north section of the site.

PDA-I is a 2.04 acres of site area located along the upper northeast section of the site. It is comprised of a portion of the proposed vehicle storage area, lawn areas and wooded areas. The stormwater runoff generated by PDA-I is captured, treated and infiltrated by the proposed pervious pavement system: SWM-I. The proposed pervious pavement system SWM-I has been designed to capture, treat and infiltrate the water quality storm and the 2,10 and 100-year storm.

The post-development drainage area discharges, and the performance of the stormwater management systems are summarized in the tables below:

Table-2: Post-Development Drainage Areas Peak Discharge Summary

Drainage Area	2-year Storm	10-year Storm	100-year Storm
PDA-A	0.000 CFS	0.000 CFS	0.000 CFS
PDA-B	0.018 CFS	0.145 CFS	0.589 CFS
PDA-C	0.404 CFS	0.980 CFS	2.301 CFS
PDA-D	0.000 CFS	0.000 CFS	0.000 CFS
PDA-E	0.311 CFS	0.604 CFS	1.187 CFS
PDA-F	0.919 CFS	1.781 CFS	3.503 CFS
PDA-G	0.467 CFS	0.906 CFS	14.15 CFS
PDA-H	0.000 CFS	0.000 CFS	0.045 CFS
PDA-I	0.000 CFS	0.000 CFS	0.000 CFS

Table-3: Stormwater Management System Performance: SWM-A1

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	592.48 FT	16,995 CF
10-Yr	0.000 CFS	593.37 FT	28,867 CF
100-Yr	0.000 CFS	595.06 FT	55,398 CF

Table-4: Stormwater Management System Performance: SWM-A2

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	600.62 FT	3,731 CF
10-Yr	0.000 CFS	600.97 FT	5,822 CF
100-Yr	0.000 CFS	601.62 FT	9,722 CF

Table-5: Stormwater Management System Performance: SWM-B1

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	600.67 FT	34,403 CF
10-Yr	0.000 CFS	601.03 FT	60,074 CF
100-Yr	0.000 CFS	601.74 FT	111,262 CF

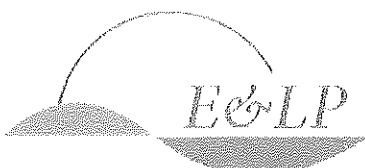


Table-6: Stormwater Management System Performance: SWM-B2

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	597.44 FT	19,780 CF
10-Yr	0.000 CFS	597.71 FT	35,912 CF
100-Yr	0.000 CFS	598.30 FT	70,775 CF

Table-7: Stormwater Management System Performance: SWM-B4

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	595.94 FT	6,103 CF
10-Yr	0.000 CFS	596.58 FT	10,293 CF
100-Yr	0.000 CFS	597.87 FT	18,699 CF

Table-8: Stormwater Management System Performance: SWM-D

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	598.57 FT	41,347 CF
10-Yr	0.000 CFS	599.49 FT	65,747 CF
100-Yr	0.000 CFS	601.23 FT	111,719 CF

Table-9: Stormwater Management System Performance: SWM-E1

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	613.60 FT	10,622 CF
10-Yr	0.000 CFS	615.36 FT	17,066 CF
100-Yr	0.000 CFS	618.13 FT	29,322 CF

Table-10: Stormwater Management System Performance: SWM-G1

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	598.64 FT	20,497 CF
10-Yr	0.000 CFS	600.62 FT	37,943 CF
100-Yr	13.44 CFS	601.97 FT	52,582 CF

Table-11: Stormwater Management System Performance: SWM-H1

Storm	Peak Basin Discharge	Water Surface Elevation	Max. Storage
2-Yr	0.000 CFS	597.97 FT	26,660 CF
10-Yr	0.000 CFS	598.54 FT	47,431 CF
100-Yr	0.000 CFS	599.70 FT	90,138 CF



The proposed Stormwater Management Systems provide the necessary detention time and storage to achieve the reduction factors required by N.J.A.C.7:8. A summary table has been provided below documenting the overall performance of the systems.

Table-12: Pre-Development and Post Development Peak Discharge Runoff Comparison Table

Drainage Areas	Storm	Existing Peak Discharge	Reduction Required	Target Runoff	Proposed Peak Discharge
EDA-A/PDA-A	2-Year	3.992 CFS	50%	1.996 CFS	0.000 CFS
	10-Year	12.10 CFS	75%	9.075 CFS	3.699 CFS
	100-Year	34.07 CFS	80%	27.256 CFS	23.20 CFS
EDA-B/PDA-B	2-Year	4.459 CFS	50%	2.229 CFS	0.018 CFS
	10-Year	8.148 CFS	75%	6.111 CFS	0.145 CFS
	100-Year	24.99 CFS	80%	19.992 CFS	0.589 CFS
EDA-C/PDA-C	2-Year	4.833 CFS	50%	2.416 CFS	0.404 CFS
	10-Year	9.441 CFS	75%	7.080 CFS	0.980 CFS
	100-Year	19.46 CFS	80%	15.568 CFS	2.301 CFS
EDA-D/PDA-D	2-Year	4.666 CFS	50%	2.333 CFS	0.000 CFS
	10-Year	9.249 CFS	75%	6.936 CFS	0.000 CFS
	100-Year	18.51 CFS	80%	14.808 CFS	0.000 CFS
EDA-E/PDA-E	2-Year	5.581 CFS	50%	2.790 CFS	0.311 CFS
	10-Year	11.09 CFS	75%	8.317 CFS	0.604 CFS
	100-Year	22.23 CFS	80%	17.784 CFS	1.187 CFS
EDA-F/PDA-F	2-Year	1.009 CFS	50%	0.504 CFS	0.919 CFS
	10-Year	2.003 CFS	75%	1.502 CFS	1.781 CFS
	100-Year	4.017 CFS	80%	3.213 CFS	3.503 CFS
EDA-G/PDA-G	2-Year	2.574 CFS	50%	1.287 CFS	0.467 CFS
	10-Year	6.941 CFS	75%	5.205 CFS	0.906 CFS
	100-Year	17.01 CFS	80%	13.608 CFS	14.15 CFS
EDA-E/PDA-H	2-Year	0.000 CFS	50%	0.000 CFS	0.000 CFS
	10-Year	0.152 CFS	75%	0.114 CFS	0.000 CFS
	100-Year	3.714 CFS	80%	2.971 CFS	0.045 CFS
EDA-E/PDA-I	2-Year	0.000 CFS	50%	0.000 CFS	0.000 CFS
	10-Year	0.000 CFS	75%	0.000 CFS	0.000 CFS
	100-Year	0.053 CFS	80%	0.042 CFS	0.000 CFS

3.3 Stormwater Runoff Quality

Proposed runoff quality has achieved the required TSS removal, in accordance with NJDEP standards. The water quality storm calculations are contained in Appendix F. Quality treatment has been provided for PDA-A, PDA-B, PDA-D, PDA-E, PDA-G, PDA-H and PDA-I through the use of nine sections of pervious pavement systems and two above-ground infiltration basins designed to treat the entire water quality storm volume without overflow. Consequently, the proposed porous pavement system qualifies for an 80% TSS removal rate in accordance with NJDEP Phase II standards.

3.4 Groundwater Recharge

For the groundwater recharge calculations, the soil type chosen to model the site recharge capacity were: Hazen, Sandy Land, and Urban Land. The web soil survey soil groups Farmington-Rock Outcrop and Rock Outcrop-Farmington-Galway are not in the available list of soils offered



by The New Jersey Groundwater Recharge Spreadsheet (NJGRS) Version 2.0 (Updated November 2003). The soil type Sandy Land was chosen base on the results obtained from the on-site in situ soil investigations conducted at the site (refer to Appendix H).

The existing site has a total annual recharge of 3,748,618 C.F. The proposed development creates a groundwater recharge deficit of 1,768,031 C.F. Nine sections of propose pervious pavement systems and two above-ground infiltration basins have been proposed to infiltrate the groundwater recharge deficit. Table-13: Proposed Ground Water Recharge, shows the recharged volume obtained by each proposed stormwater management system.

SWM Name	Annual BMP Recharge Volume (CF)
SWM-A1	395,315 CF
SWM-A2	37,266 CF
SWM-B1	293,295 CF
SWM-B2	302,858 CF
SWM-B4	85,580 CF
SWM-D	342,303 CF
SWM-E1	81,686 CF
SWM-G1	205,586 CF
SWM-H1	320,752 CF
SWM-I	22,004 CF
Total Proposed Annual Recharge	2,086,645 CF
Net Annual Increase	318,614 CF

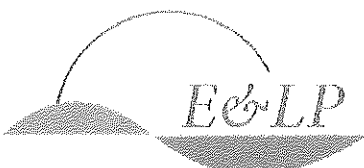
An annual recharge volume of 2,086,645 C.F. is observed in the post development conditions. A net increase in the annual recharge of 318,614 C.F. is observed. The analysis has been performed based upon the approved NJDEP Recharge Spreadsheet and can be found in Appendix G

3.5 Soil Erosion and Sediment Control

Soil Erosion and Sediment Control measures have been designed for the stormwater management system to ensure that water quality is maintained and that the system can safely and adequately control runoff from the property. Design calculations for the conduit outlet protections for the proposed above-ground infiltration basins SWM-A1 and SWM-G1 can be found in Appendix

4. CONCLUSIONS

In conclusion, the proposed design includes a proposed stormwater management system for the property that meets all of the quantity, quality and recharge requirements outlined in the Stormwater Management Rules of N.J.A.C. 7:8. A waiver is requested for the use of infiltration in the routing of the 2, 10 and 100-year storm events. There is no existing stormwater conveyance system to which the proposed peak runoff rates can be discharged to.

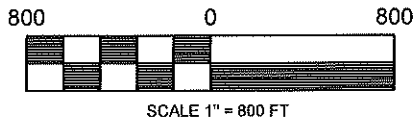
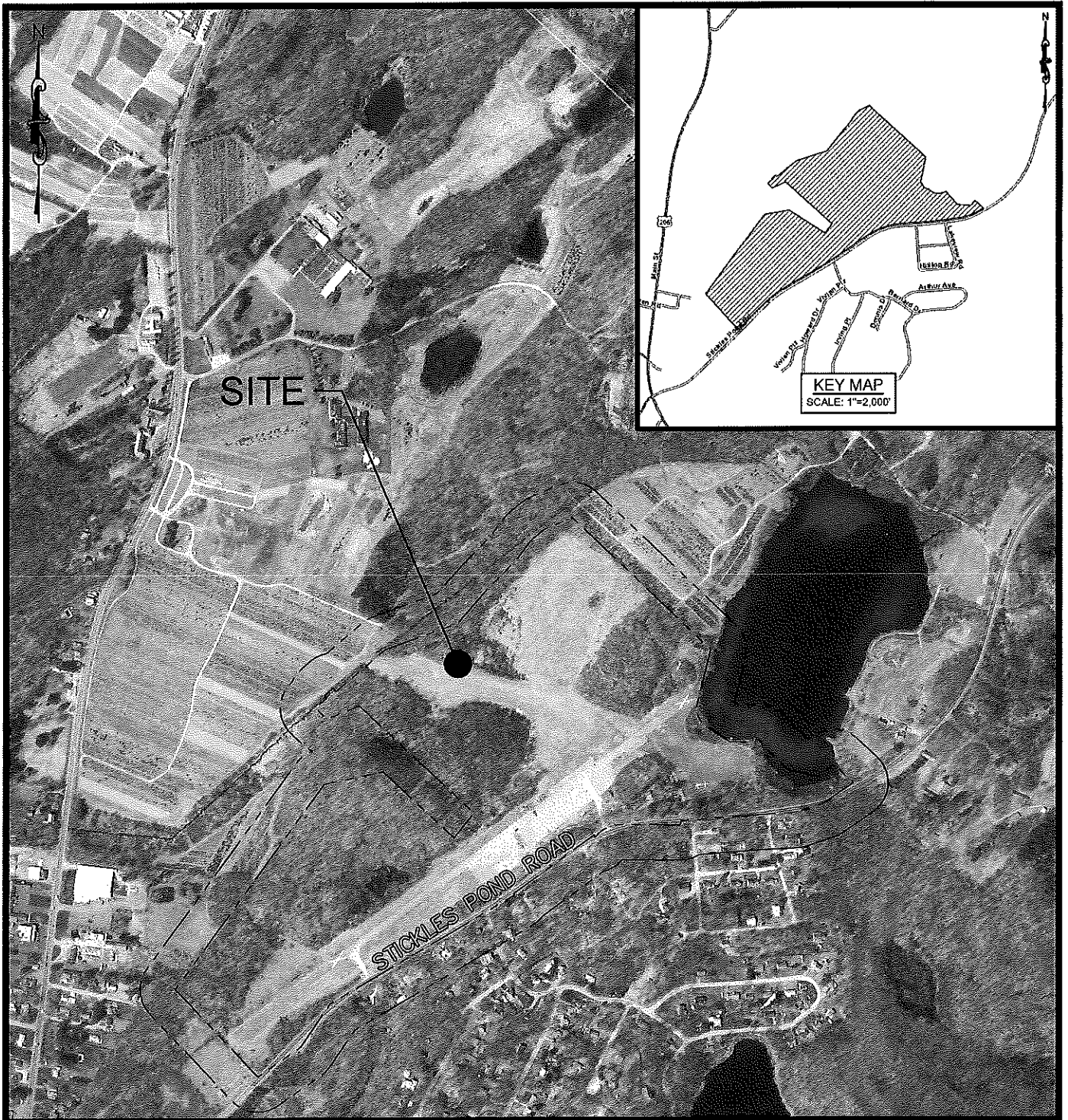


APPENDIX A –
DRAWING EXHIBITS



FIGURE 1 -
AERIAL MAP





TITLE:

AERIAL MAP



140 WEST MAIN STREET, HIGH BRIDGE, NJ 08829
 (908) 238-0544 FAX: (908)238-9572
 C.O.A. #: 24GA28021500

A PROFESSIONAL ASSOCIATION

LOCATION:

BLOCK 151, LOT 21
 248 STICKLES POND ROAD
 TOWNSHIP OF ANDOVER,
 SUSSEX COUNTY, NJ

DATE: 10/22/2019

PROJECT NO.: 0119134

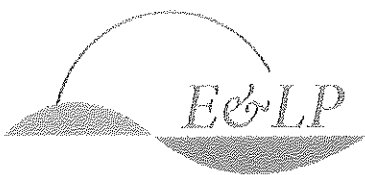
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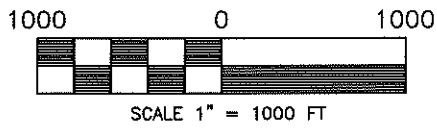
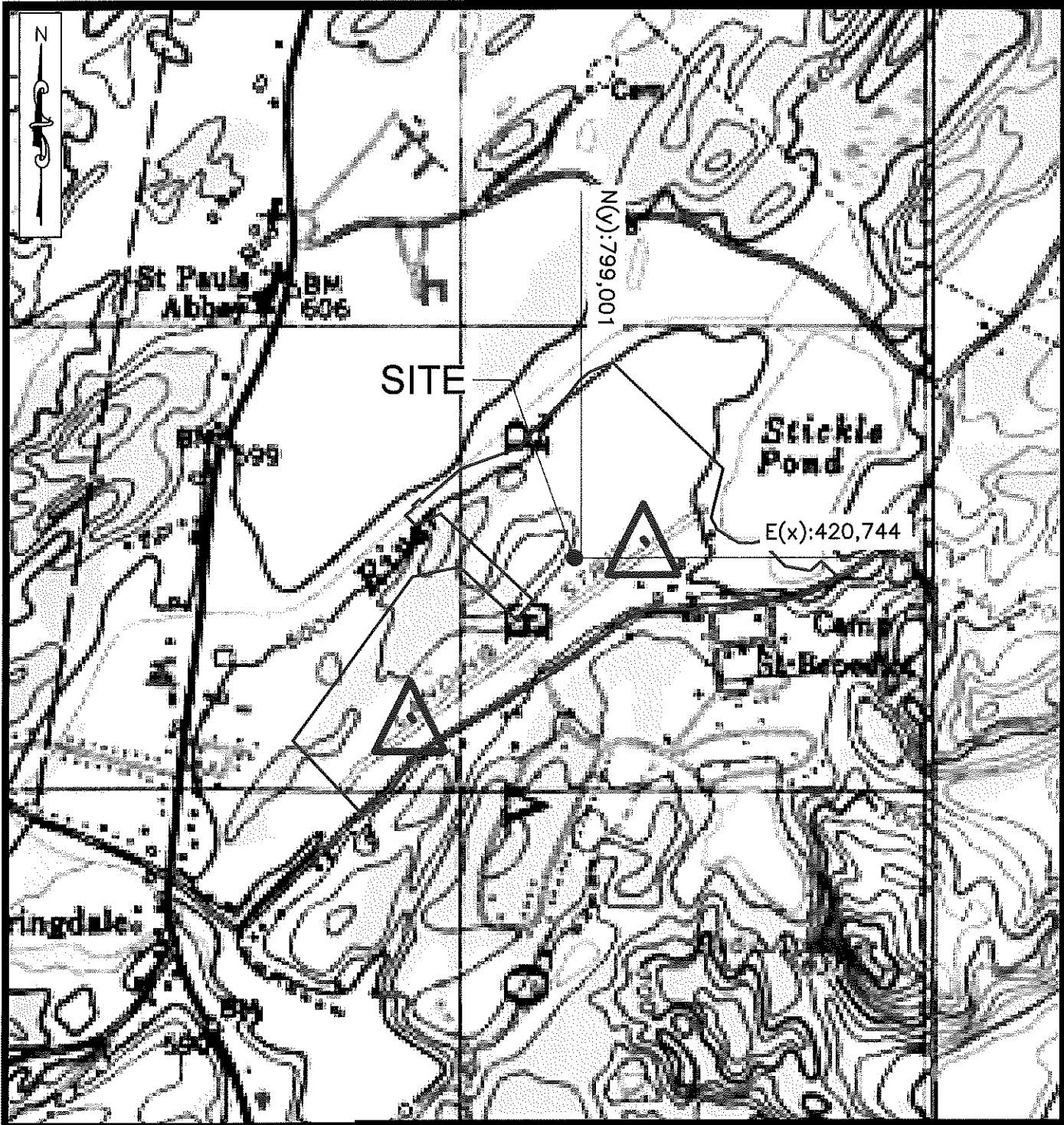
FIGURE No.

A1

IMAGERY SOURCE: NEW JERSEY GEOGRAPHIC
 INFORMATION NETWORK

FIGURE 2 –
USGS MAP





TITLE: **USGS MAP**

140 WEST MAIN STREET, HIGH BRIDGE, NJ 08829
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LOCATION:
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 SUSSEX COUNTY, NJ

DATE: 10/22/2019

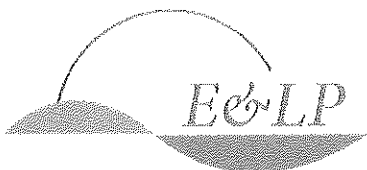
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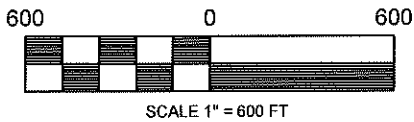
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FIGURE No.
A2

REFERENCES: USGS NEWTON WEST QUAD

FIGURE 3 –
SOIL MAP





TITLE:

SOIL MAP



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 C.O.A. #: 24GA28021500

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LOCATION:

BLOCK 161, LOT 21
 248 STICKLES POND ROAD
 TOWNSHIP OF ANDOVER,
 SUSSEX COUNTY, NJ

DATE: 10/22/2019

PROJECT NO.: 0119134

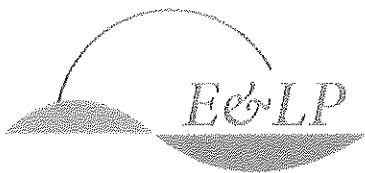
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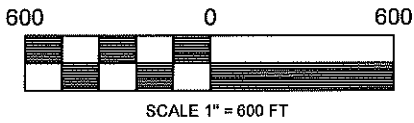
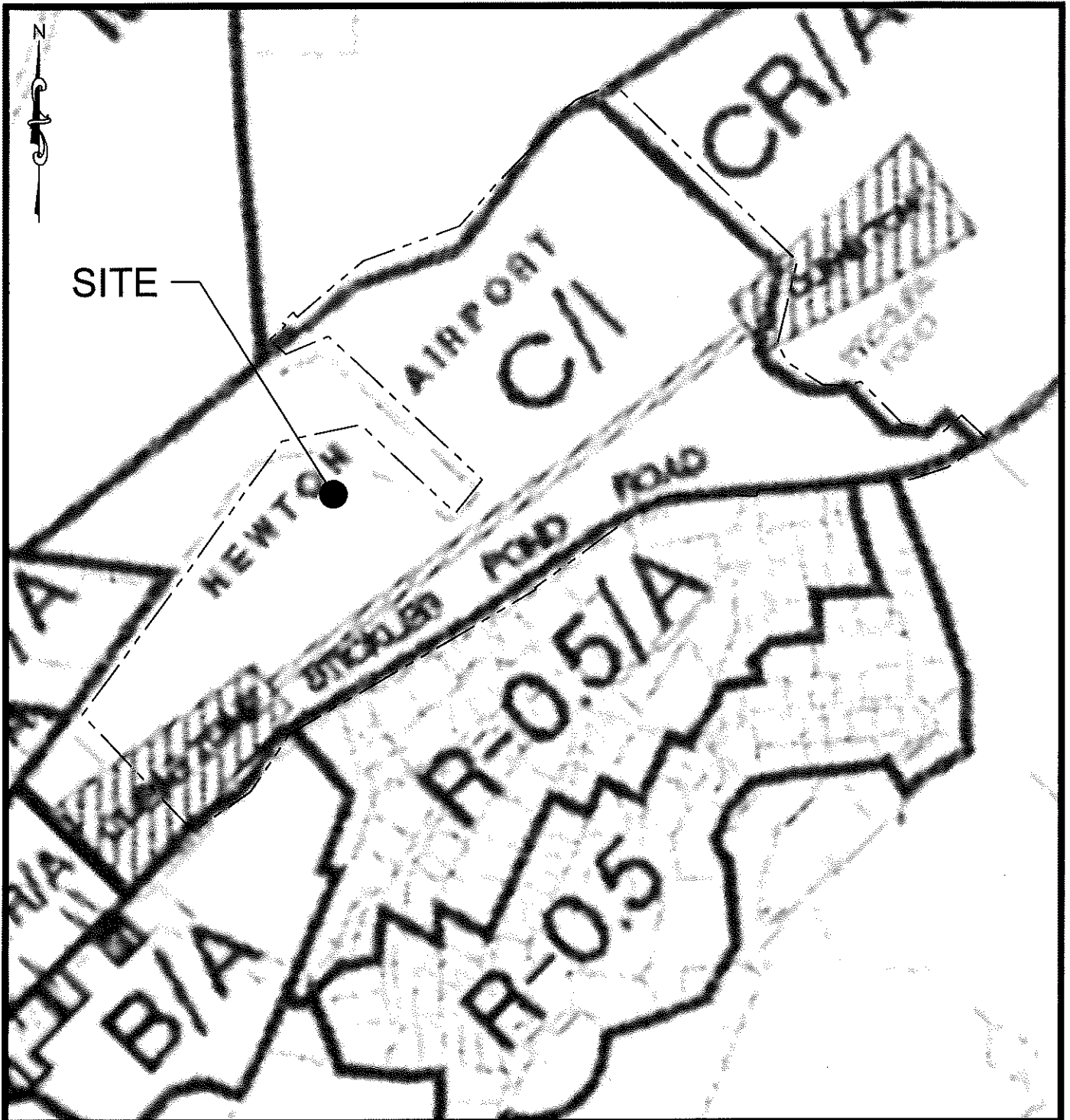
FIGURE No.

A3

IMAGERY SOURCE: NEW JERSEY GEOGRAPHIC
 INFORMATION NETWORK

FIGURE 4 –
ZONING MAP





IMAGERY SOURCE: ANDOVER TOWNSHIP ZONING MAP

TITLE:

ZONING MAP



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 C.O.A. #: 24GA28021500

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LOCATION:

BLOCK 151, LOT 21
 248 STICKLES POND ROAD
 TOWNSHIP OF ANDOVER,
 SUSSEX COUNTY, NJ

DATE: 10/22/2019

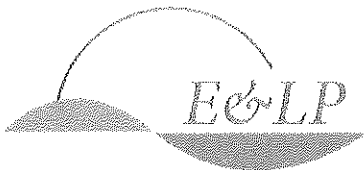
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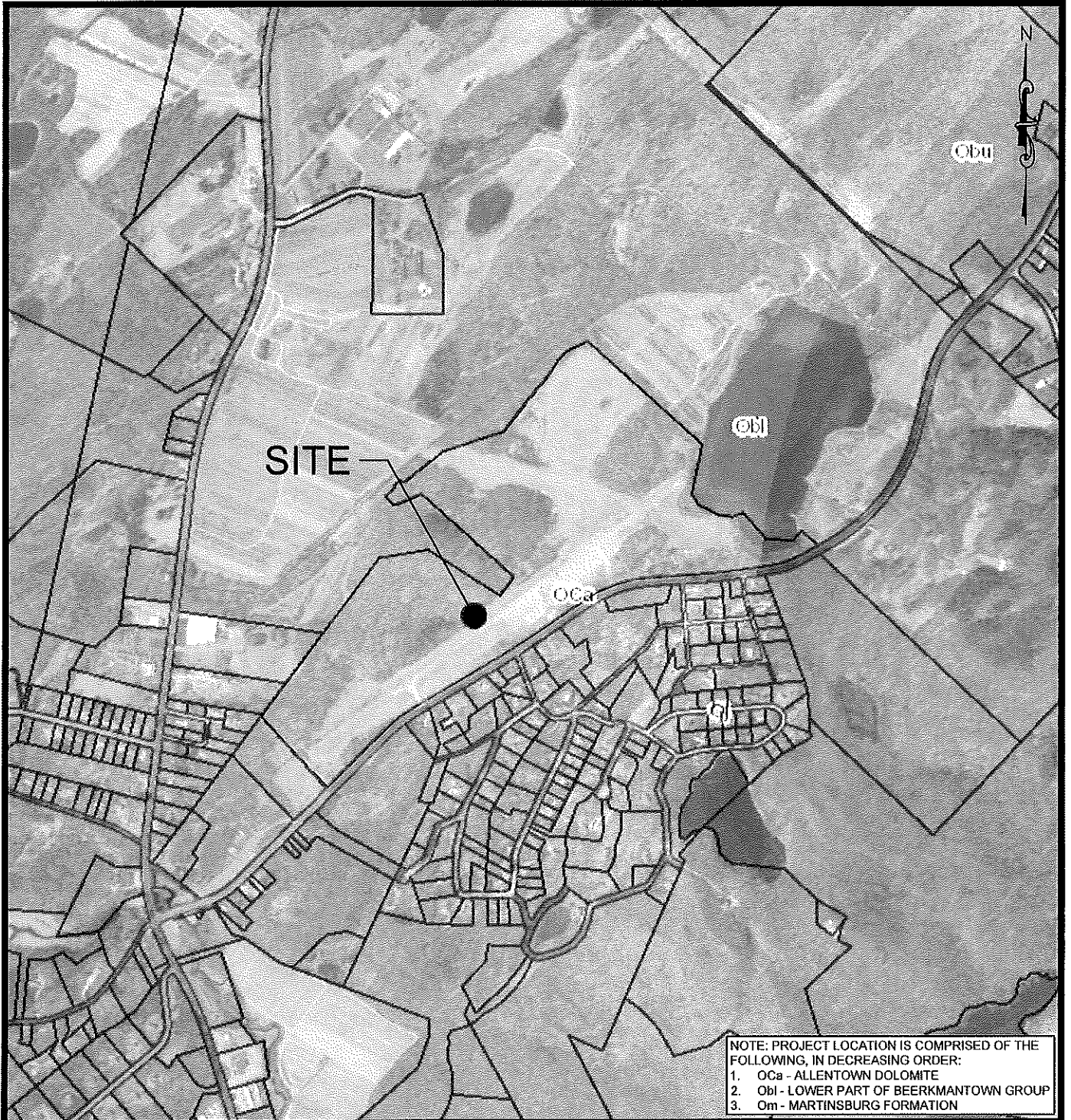
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FIGURE No.

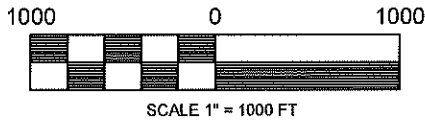
A4

FIGURE 5 –
GEOLOGIC MAP





NOTE: PROJECT LOCATION IS COMPRISED OF THE FOLLOWING, IN DECREASING ORDER:
 1. OCa - ALLENTOWN DOLOMITE
 2. Obi - LOWER PART OF BEERKMANTOWN GROUP
 3. Om - MARTINSBURG FORMATION



TITLE:

GEOLOGIC MAP



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LOCATION:

BLOCK 151, LOT 21
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 TOWNSHIP OF ANDOVER,
 SUSSEX COUNTY, NJ

DATE: 10/22/2019

PROJECT NO.: 0119134

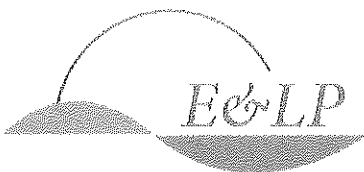
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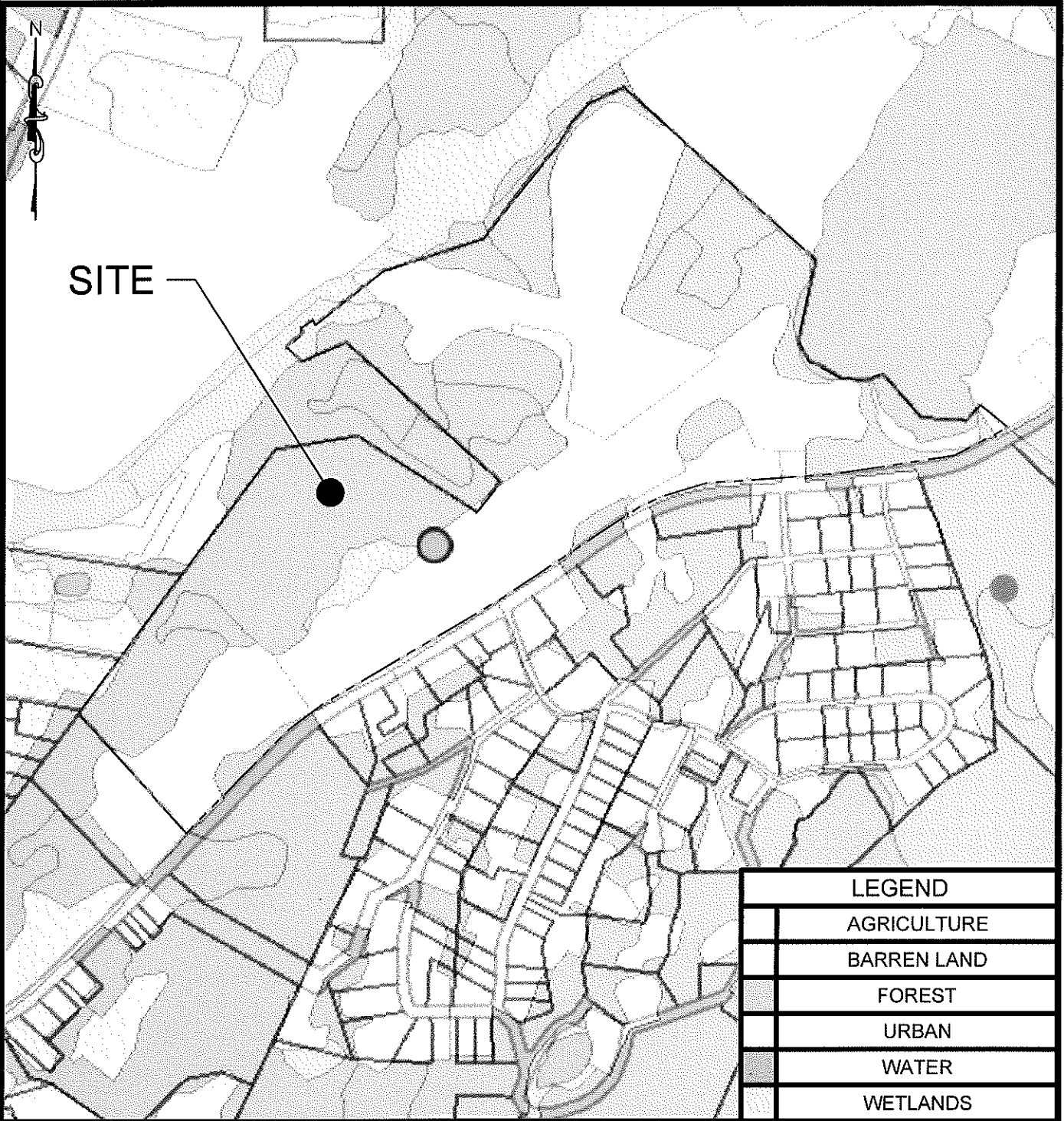
FIGURE No.

A5

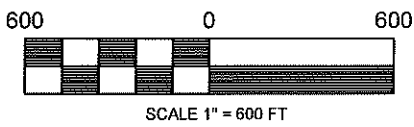
REFERENCES: NJ GEOWEB

FIGURE 6 –
LAND USE MAP





LEGEND	
[Symbol]	AGRICULTURE
[Symbol]	BARREN LAND
[Symbol]	FOREST
[Symbol]	URBAN
[Symbol]	WATER
[Symbol]	WETLANDS



TITLE: **LAND USE MAP**



140 WEST MAIN STREET, HIGH BRIDGE, NJ 08829
 (908) 238-0544 FAX: (908)238-9572
 C.O.A. #: 24GA28021500

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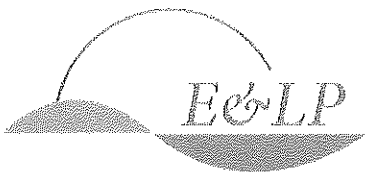
LOCATION:
 BLOCK 151, LOT 21
 248 STICKLES POND ROAD
 TOWNSHIP OF ANDOVER,
 SUSSEX COUNTY, NJ

DATE: 10/22/2019
 PROJECT NO.: 0119134
 FILENAME: 06_LAND USE.DWG

FIGURE No.
A6

IMAGERY SOURCE: ANDOVER TOWNSHIP ZONING MAP

FIGURE 7 –
NOAA ATLAS 14 – POINT PRECIPITATION
FREQUENCY ESTIMATES





NOAA Atlas 14, Volume 2, Version 3
 Location name: Andover Twp, New Jersey, USA*
 Latitude: 41.026°, Longitude: -74.7583°
 Elevation: 602.81 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnín, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

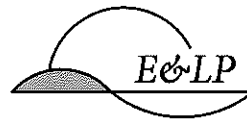
[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.327 (0.295-0.365)	0.391 (0.352-0.435)	0.468 (0.420-0.520)	0.527 (0.472-0.586)	0.605 (0.538-0.671)	0.667 (0.590-0.740)	0.730 (0.640-0.810)	0.798 (0.693-0.887)	0.896 (0.769-1.00)	0.973 (0.825-1.09)
10-min	0.514 (0.463-0.573)	0.616 (0.554-0.685)	0.737 (0.661-0.819)	0.825 (0.739-0.917)	0.942 (0.838-1.05)	1.03 (0.914-1.15)	1.13 (0.999-1.25)	1.22 (1.06-1.36)	1.36 (1.17-1.52)	1.47 (1.24-1.65)
15-min	0.637 (0.573-0.710)	0.763 (0.687-0.850)	0.916 (0.822-1.02)	1.03 (0.922-1.14)	1.18 (1.05-1.31)	1.29 (1.14-1.43)	1.41 (1.24-1.57)	1.53 (1.33-1.70)	1.70 (1.46-1.91)	1.84 (1.56-2.07)
30-min	0.856 (0.771-0.955)	1.04 (0.933-1.15)	1.28 (1.15-1.42)	1.46 (1.31-1.62)	1.70 (1.51-1.89)	1.89 (1.67-2.10)	2.09 (1.84-2.32)	2.30 (2.00-2.56)	2.61 (2.24-2.92)	2.86 (2.42-3.21)
60-min	1.06 (0.951-1.18)	1.29 (1.16-1.43)	1.62 (1.45-1.80)	1.88 (1.68-2.08)	2.23 (1.99-2.48)	2.53 (2.23-2.80)	2.84 (2.49-3.15)	3.18 (2.76-3.54)	3.67 (3.15-4.11)	4.09 (3.47-4.59)
2-hr	1.29 (1.16-1.42)	1.56 (1.42-1.73)	1.98 (1.78-2.19)	2.31 (2.07-2.55)	2.79 (2.49-3.07)	3.19 (2.83-3.52)	3.64 (3.20-4.01)	4.13 (3.60-4.57)	4.87 (4.18-5.41)	5.50 (4.66-6.14)
3-hr	1.44 (1.31-1.60)	1.74 (1.58-1.93)	2.19 (1.98-2.43)	2.55 (2.30-2.82)	3.07 (2.75-3.39)	3.51 (3.12-3.88)	3.99 (3.51-4.41)	4.51 (3.94-5.01)	5.31 (4.56-5.91)	5.98 (5.08-6.70)
6-hr	1.87 (1.70-2.06)	2.25 (2.05-2.48)	2.80 (2.55-3.09)	3.26 (2.96-3.59)	3.94 (3.55-4.33)	4.54 (4.05-4.99)	5.20 (4.59-5.72)	5.94 (5.18-6.54)	7.06 (6.05-7.81)	8.05 (6.80-8.93)
12-hr	2.33 (2.11-2.59)	2.81 (2.55-3.13)	3.52 (3.18-3.91)	4.13 (3.72-4.57)	5.05 (4.50-5.57)	5.86 (5.17-6.45)	6.77 (5.91-7.46)	7.80 (6.73-8.62)	9.40 (7.95-10.4)	10.8 (8.98-12.0)
24-hr	2.69 (2.50-2.93)	3.24 (3.01-3.52)	4.05 (3.75-4.39)	4.72 (4.36-5.11)	5.72 (5.25-6.18)	6.57 (6.00-7.09)	7.51 (6.81-8.09)	8.54 (7.69-9.19)	10.1 (8.96-10.8)	11.4 (10.0-12.2)
2-day	3.17 (2.85-3.43)	3.82 (3.55-4.13)	4.77 (4.43-5.15)	5.66 (5.14-5.99)	6.69 (6.16-7.20)	7.65 (7.01-8.23)	8.70 (7.92-9.34)	9.83 (8.89-10.6)	11.5 (10.3-12.3)	12.9 (11.4-13.8)
3-day	3.33 (3.10-3.58)	4.00 (3.73-4.32)	4.99 (4.64-5.37)	5.80 (5.38-6.24)	6.97 (6.44-7.48)	7.97 (7.32-8.53)	9.04 (8.25-9.67)	10.2 (9.24-10.9)	11.9 (10.7-12.7)	13.3 (11.8-14.2)
4-day	3.48 (3.25-3.74)	4.18 (3.91-4.50)	5.21 (4.85-5.59)	6.05 (5.62-6.48)	7.26 (6.71-7.76)	8.28 (7.62-8.84)	9.38 (8.58-10.0)	10.6 (9.60-11.3)	12.3 (11.1-13.1)	13.7 (12.3-14.7)
7-day	4.10 (3.84-4.41)	4.91 (4.59-5.27)	6.04 (5.65-6.48)	6.99 (6.51-7.49)	8.36 (7.75-8.93)	9.50 (8.78-10.1)	10.7 (9.86-11.5)	12.1 (11.0-12.9)	14.0 (12.7-15.0)	15.7 (14.0-16.7)
10-day	4.73 (4.44-5.05)	5.65 (5.30-6.03)	6.86 (6.43-7.32)	7.85 (7.34-8.37)	9.24 (8.62-9.85)	10.4 (9.65-11.1)	11.6 (10.7-12.3)	12.9 (11.8-13.7)	14.7 (13.4-15.7)	16.2 (14.7-17.3)
20-day	6.35 (5.98-6.74)	7.53 (7.09-7.99)	8.94 (8.42-9.49)	10.1 (9.47-10.7)	11.6 (10.9-12.3)	12.9 (12.0-13.6)	14.1 (13.2-15.0)	15.5 (14.4-16.4)	17.3 (15.9-18.3)	18.7 (17.2-19.9)
30-day	7.94 (7.51-8.40)	9.36 (8.85-9.89)	10.9 (10.3-11.5)	12.1 (11.4-12.8)	13.7 (12.9-14.4)	14.9 (14.0-15.8)	16.2 (15.2-17.1)	17.5 (16.3-18.4)	19.1 (17.8-20.2)	20.4 (18.9-21.6)
45-day	10.1 (9.62-10.7)	11.9 (11.3-12.5)	13.6 (12.9-14.3)	14.9 (14.2-15.7)	16.6 (15.8-17.5)	17.9 (17.0-18.9)	19.2 (18.2-20.2)	20.4 (19.3-21.5)	22.0 (20.7-23.2)	23.2 (21.8-24.5)
60-day	12.2 (11.5-12.8)	14.2 (13.5-15.0)	16.2 (15.4-17.0)	17.7 (16.8-18.6)	19.5 (18.6-20.6)	21.0 (19.9-22.1)	22.3 (21.1-23.5)	23.7 (22.4-24.9)	25.3 (23.9-26.7)	26.6 (25.0-28.0)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates for a given duration and average recurrence interval will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

TITLE: NOAA ATLAS 14 - POINT PRECIPITATION FREQUENCY ESTIMATES



140 WEST MAIN STREET, HIGH BRIDGE, NJ 08829
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 C.O.A. #: 24GA28021500

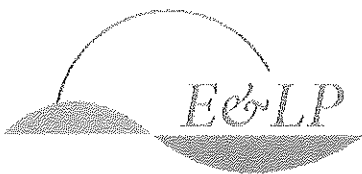
A PROFESSIONAL ASSOCIATION

LOCATION:
 BLOCK 151, LOT 21
 248 STICKLES POND ROAD
 TOWNSHIP OF ANDOVER,
 SUSSEX COUNTY, NJ

DATE: 10/22/2019
 PROJECT NO.: 0119134
 FILENAME: NOAA FREQUENCY.DWG

FIGURE No.
A7

FIGURE 8 –
NJ RSIS TABLE 7.1 – TYPICAL STORMWATER
RUNOFF COEFFICIENTS



N.J.A.C. 5:21

TABLE 7.1
TYPICAL RUNOFF COEFFICIENTS (C VALUES) FOR 100 YEAR FREQUENCY STORM

TABLE 7.1
TYPICAL RUNOFF COEFFICIENTS (C VALUES) FOR 100 YEAR FREQUENCY STORM

Land Use Description	Hydrologic Soil Group			
	A	B	C	D
Cultivated land:				
without conservation treatment	0.49	0.67	0.81	0.88
with conservation treatment	0.27	0.43	0.61	0.67
Pasture or range land:				
poor condition	0.38	0.63	0.78	0.84
good condition	NA	0.25	0.51	0.65
Meadow: good condition	NA	NA	0.44	0.61
Wood or forest land:				
thin stand, poor cover, no mulch	NA	NA	0.59	0.79
good cover	NA	NA	0.45	0.59
Open spaces, lawns, parks, golf courses, cemeteries:				
good condition, grass cover on 75% or more of area	NA	0.25	0.51	0.65
fair condition, grass cover on 50-75% of area	NA	0.45	0.63	0.74
Commercial and business areas (85% impervious)	0.84	0.90	0.93	0.96
Industrial districts (72% impervious)	0.67	0.81	0.88	0.92
Residential:				
Average lot size	Average impervious			
1/8 acre	65%	0.59	0.76	0.86
1/4 acre	38%	0.25	0.55	0.70
1/2 acre	30%	NA	0.49	0.67
3/4 acre	25%	NA	0.45	0.65
1 acre	20%	NA	0.41	0.63
Paved parking lots, roofs, driveways, etc.		0.99	0.99	0.99
Streets and roads:				
paved with curbs and storm sewers		0.99	0.99	0.99
gravel		0.57	0.76	0.84
dirt		0.49	0.69	0.80

Note: NA denotes information is not available; design engineers should rely on another authoritative source.
Source: New Jersey Department of Environmental Protection, Technical Manual for Land Use Regulation Program, Bureaus of Inland and Coastal Regulations, Stream Encroachment Permits (Trenton, New Jersey: Department of Environmental Protection, Revised September 1995) p. 12.

TITLE: NJRSIS TABLE 7.1: TYPICAL RUNOFF COEFFICIENTS



140 WEST MAIN STREET, HIGH BRIDGE, NJ 08829
(908) 238-0544 FAX: (908)238-9572
C.O.A. #: 24GA28021500

A PROFESSIONAL ASSOCIATION

LOCATION:
BLOCK 151, LOT 21
248 STICKLES POND ROAD
TOWNSHIP OF ANDOVER,
SUSSEX COUNTY, NJ

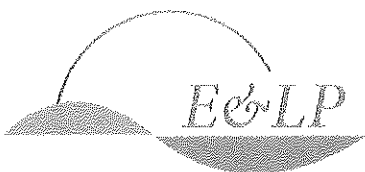
DATE: 10/22/2019
PROJECT NO.: 0119134

FIGURE No.

A8

FILENAME: RUNOFF COEFFICIENTS.DWG

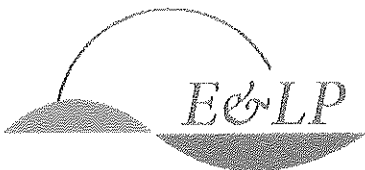
APPENDIX B --
PRE AND POST DEVELOPMENT DRAINAGE AREA MAPS



APPENDIX B –
PRE AND POST DEVELOPMENT DRAINAGE AREA MAPS



APPENDIX C—
CURVE NUMBER WORKSHEETS



248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA A - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Grassland (A)	39	326,936	7.51	292.71
Grassland (D)	80	59,725	1.37	109.69
Wood (A)	30	19,124	0.44	13.17
Wood (D)	77	181,160	4.16	320.23

Totals =

13.47	735.80
-------	--------

Composite Cn = $\frac{735.80}{13.47} = 54.61$

USE Cn = 55

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA A - Pre-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	63,746	1.46	143.41

Totals =

1.46	143.41
------	--------

Composite Cn = $\frac{143.41}{1.46}$ = 98.00

USE Cn = 98.0

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA B - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Grassland (A)	39	487,776	11.20	436.71
Grassland (D)	80	44,048	1.01	80.90
Wood (A)	30	40,529	0.93	27.91
Wood (D)	77	110,833	2.54	195.92

Totals = 15.68 741.44

Composite Cn = $\frac{741.44}{15.68}$ = 47.27

USE Cn = 47

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA B - Pre-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	102,727	2.36	231.11

Totals =

2.36	231.11
------	--------

Composite Cn = $\frac{231.11}{2.36} = 98.00$

USE Cn = 98.0

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA C - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Grassland (A)	39	46,284	1.06	41.44
Grassland (D)	80	75,689	1.74	139.01
Wood (A)	30	3,296	0.08	2.27
Wood (D)	77	38,897	0.89	68.76

Totals =

3.77	251.47
------	--------

Composite Cn = $\frac{251.47}{3.77}$ = 66.73

USE Cn = 67

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
Date: 23-Oct-19
Chk'd: CN
Revised: _____

EDA C - Pre-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	43,452	1.00	97.76

Totals =

1.00	97.76
------	-------

Composite Cn = $\frac{97.76}{1.00}$ = 98.00

USE Cn = 98.0

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA D - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Grassland (D)	80	18,911	0.43	34.73
Wood (D)	77	139,476	3.20	246.55

Totals =

3.64	281.28
------	--------

Composite Cn = $\frac{281.28}{3.64} = 77.36$

USE Cn = 77

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA E - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Wood (D)	77	198,307	4.55	350.54

Totals =

4.55	350.54
------	--------

Composite Cn = $\frac{350.54}{4.55}$ = 77.00

USE Cn = 77.0

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA F - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Wood (D)	77	38,454	0.88	67.97

Totals =

0.88	67.97
------	-------

Composite Cn = $\frac{67.97}{0.88}$ = 77.00

USE Cn = 77.0

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
Date: 23-Oct-19
Chk'd: CN
Revised: _____

EDA G - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Grassland (A)	39	56,368	1.29	50.47
Grassland (D)	80	31,324	0.72	57.53
Wood (A)	30	7,407	0.17	5.10
Wood (D)	77	121,640	2.79	215.02

Totals =

4.98	328.12
------	--------

Composite Cn = $\frac{328.12}{4.98}$ = 65.94

USE Cn = 66

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA H - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Grassland (A)	39	388,727	8.92	348.03
Wood (A)	30	138,459	3.18	95.36

Totals =

12.10	443.39
-------	--------

Composite Cn = $\frac{443.39}{12.10}$ = 36.64

USE Cn = 37

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

EDA I - Pre-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Wood (A)	30	45,901	1.05	31.61

Totals =

1.05	31.61
------	-------

Composite Cn = $\frac{31.61}{1.05}$ = 30.00

USE Cn = 30

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA A1 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Lawn (A)	39	30,765	0.71	27.54
Lawn (D)	80	53,173	1.22	97.66

Totals = 1.93 125.20

Composite Cn = $\frac{125.20}{1.93}$ = 64.97

USE Cn = 65.0

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
Date: 23-Oct-19
Chk'd: CN
Revised: _____

PDA B1 - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	155,850	3.58	350.63

Totals =

3.58	350.63
------	--------

Composite Cn = $\frac{350.63}{3.58}$ = 98.00

USE Cn = 98

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA B2 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Gravel (A)	76	196,682	4.52	343.16
Gravel (D)	91	1,826	0.04	3.81
Lawn (A)	39	90,790	2.08	81.29
Lawn (D)	80	45,941	1.05	84.37

Totals = 7.70 512.63

Composite Cn = $\frac{512.63}{7.70}$ = 66.61

USE Cn = 67

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA B2 - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	35,289	0.81	79.39
Impervious	98	125,253	2.88	281.79

Totals =

3.69	361.18
------	--------

Composite Cn = $\frac{361.18}{3.69}$ = 98.00

USE Cn = 98

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA B3 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Meadow (A)	30	5,291	0.12	3.64
Meadow (D)	78	4,798	0.11	8.59

Totals =

0.23	12.23
------	-------

Composite Cn = $\frac{12.23}{0.23} = 52.83$

USE Cn = 53

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA B4 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Gravel (A)	76	41,784	0.96	72.90
Gravel (D)	91	3,703	0.09	7.74

Totals =

1.04	80.64
------	-------

Composite Cn = $\frac{80.64}{1.04}$ = 77.22

USE Cn = 77

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA B4 - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	31,392	0.72	70.63

Totals = 0.72 70.63

Composite Cn = $\frac{70.63}{0.72}$ = 98.00

USE Cn = 98

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
Date: 23-Oct-19
Chk'd: CN
Revised: _____

PDA C - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Lawn (A)	39	9,241	0.21	8.27
Lawn (D)	80	13,546	0.31	24.88

Totals =

0.52	33.15
------	-------

Composite Cn = $\frac{33.15}{0.52} = 63.37$

USE Cn = 63

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA-C - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	2,498	0.06	5.62

Totals =

0.06	5.62
------	------

Composite Cn = $\frac{5.62}{0.06} = 98.00$

USE Cn = 98.0

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA D - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Gravel (A)	76	7,926	0.18	13.83
Gravel (D)	91	238,498	5.48	498.24
Lawn (D)	80	9,585	0.22	17.60
Wood (D)	77	12,015	0.28	21.24

Totals =

6.15	550.91
------	--------

Composite Cn = $\frac{550.91}{6.15} = 89.54$

USE Cn = 90

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA D - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	124,969	2.87	281.15

Totals =

2.87	281.15
------	--------

Composite Cn = $\frac{281.15}{2.87}$ = 98.00

USE Cn = 98

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA E1 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Gravel (D)	91	54,705	1.26	114.28
Lawn (D)	80	3,794	0.09	6.97
Wood (D)	77	4,520	0.10	7.99

Totals =

1.45	129.24
------	--------

Composite Cn = $\frac{129.24}{1.45}$ = 89.33

USE Cn = 89

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA E1 - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	29,029	0.67	65.31

Totals =

0.67	65.31
------	-------

Composite Cn = $\frac{65.31}{0.67}$ = 98.00

USE Cn = 98

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA E2 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Meadow Grass (D)	78	7,362	0.17	13.18
Wood (D)	77	1,239	0.03	2.19

Totals =

0.20	15.37
------	-------

Composite Cn = $\frac{15.37}{0.20}$ = 77.86

USE Cn = 78

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA F - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Meadow Grass (D)	78	25,619	0.59	45.88

Totals =

0.59	45.88
------	-------

Composite Cn = $\frac{45.88}{0.59}$ = 78.00

USE Cn = 78

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
Date: 23-Oct-19
Chk'd: CN
Revised: _____

PDA G1 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Gravel (A)	76	30,729	0.71	53.61
Gravel (D)	91	111,935	2.57	233.84
Lawn (A)	39	29,163	0.67	26.11
Lawn (D)	80	7,210	0.17	13.24

Totals =

4.11	326.81
------	--------

Composite Cn = $\frac{326.81}{4.11} = 79.51$

USE Cn = 80

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA G1 - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	74,926	1.72	168.57

Totals = 1.72 168.57

Composite Cn = $\frac{168.57}{1.72}$ = 98.00

USE Cn = 98

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA G2 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Meadow (D)	78	13,269	0.30	23.76

Totals =

0.30	23.76
------	-------

Composite Cn = $\frac{23.76}{0.30}$ = 78.00

USE Cn = 78

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA H1 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Gravel (A)	76	287,586	6.60	501.76
Gravel (D)	91	20,514	0.47	42.85
Lawn (A)	39	18,863	0.43	16.89

Totals =

7.51	561.50
------	--------

Composite Cn = $\frac{561.50}{7.51}$ = 74.81

USE Cn = 75

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA H1 - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
*Impervious	98	134,912	3.10	303.52

Totals = 3.10 303.52

$$\text{Composite Cn} = \frac{303.52}{3.10} = 98.00$$

USE Cn = 98

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA H2 - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Meadow (A)	30	6,243	0.14	4.30
Wood (A)	30	27,062	0.62	18.64

Totals =

0.76	22.94
------	-------

Composite Cn = $\frac{22.94}{0.76}$ = 30.00

USE Cn = 30

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA I - Post-Developed (Pervious)

RUNOFF CURVE NUMBER CALCULATIONS:

(S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Gravel (A)	76	41,795	0.96	72.92
Lawn (A)	39	4,149	0.10	3.71
Wood (A)	30	24,393	0.56	16.80

Totals =

1.61	93.44
------	-------

Composite Cn = $\frac{93.44}{1.61} = 57.86$

USE Cn = 58

248 Stickles Pond Road
Andover Township
Sussex County, NJ

By: EAJ
 Date: 23-Oct-19
 Chk'd: CN
 Revised: _____

PDA I - Post-Developed (Impervious)

RUNOFF CURVE NUMBER CALCULATIONS:
 (S.C.S. TR-55 method)

Cover Description	Cn	Area		Product of CN x Area
		(sf)	(acres)	
Impervious	98	18,700	0.43	42.07

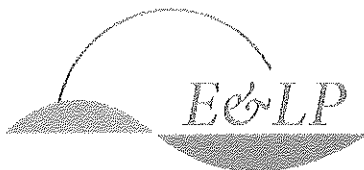
Totals =

0.43	42.07
------	-------

Composite Cn = $\frac{42.07}{0.43}$ = 98.00

USE Cn = 98

APPENDIX D -
HYDROLOGIC ANALYSIS AND RUNOFF QUANTITY
CALCULATIONS



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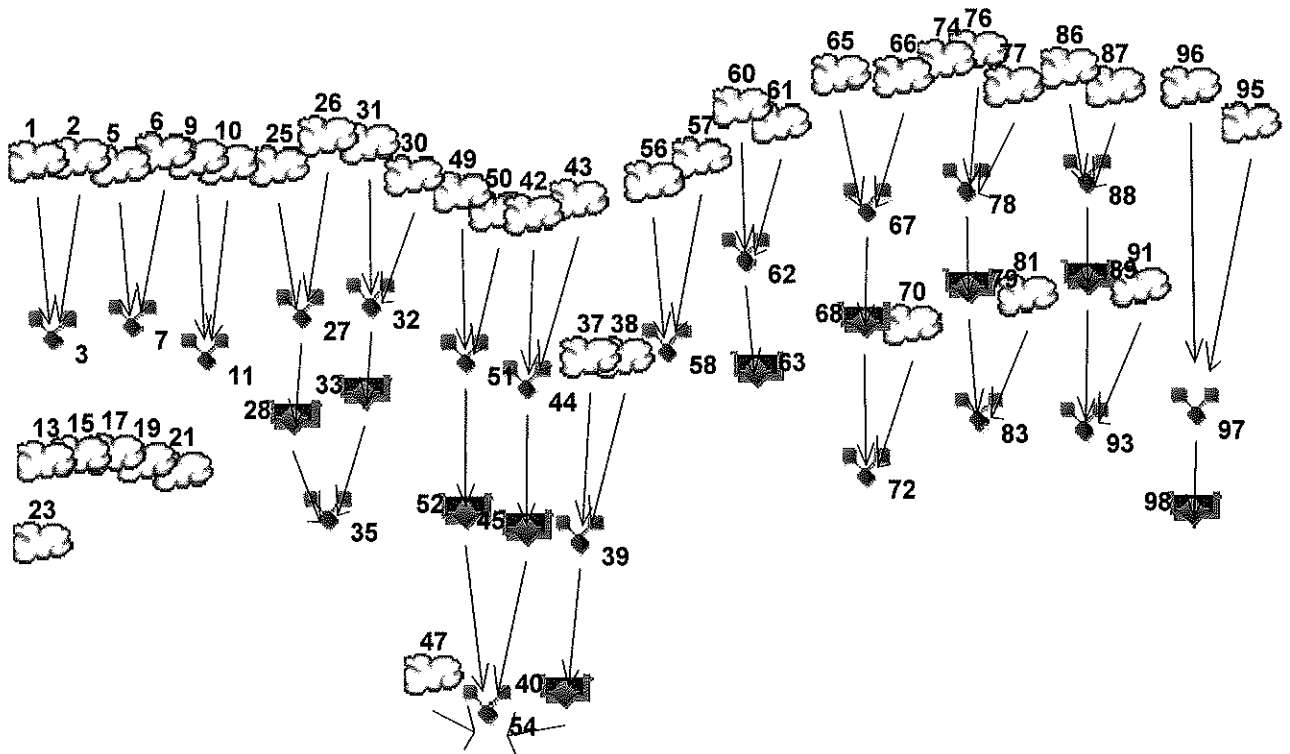
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Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020



Legend

Hyd.	Origin	Description
1	SCS Runoff	SCA-A-PERVIOUS
2	SCS Runoff	SCA-A-IMPERVIOUS
3	Combine	SCA-A
5	SCS Runoff	SCA-B-PERVIOUS
6	SCS Runoff	SCA-B-IMPERVIOUS
7	Combine	SCA-B
9	SCS Runoff	SCA-C-PERVIOUS
10	SCS Runoff	SCA-C-IMPERVIOUS
11	Combine	SCA-C
13	SCS Runoff	SCA-D
15	SCS Runoff	SCA-E
17	SCS Runoff	SCA-F
19	SCS Runoff	SCA-G
21	SCS Runoff	SCA-H
23	SCS Runoff	SCA-I
25	SCS Runoff	POA-A1-PERVIOUS
26	SCS Runoff	POA-A1-IMPERVIOUS
27	Combine	POA-A1
28	Reservoir	SWM-A1
30	SCS Runoff	POA-A2-PERVIOUS
31	SCS Runoff	POA-A2-IMPERVIOUS
32	Combine	POA-A2
33	Reservoir	SWM-A2
35	Combine	POA-A
37	SCS Runoff	POA-B1-PERVIOUS
38	SCS Runoff	POA-B1-IMPERVIOUS
39	Combine	POA-B1
40	Reservoir	SWM-B1
42	SCS Runoff	POA-B2-PERVIOUS
43	SCS Runoff	POA-B2-IMPERVIOUS
44	Combine	POA-B2
45	Reservoir	SWM-B2
47	SCS Runoff	POA-B3
49	SCS Runoff	POA-B4-PERVIOUS
50	SCS Runoff	POA-B4-IMPERVIOUS
51	Combine	POA-B4
52	Reservoir	SWM-B4
54	Combine	POA-B
56	SCS Runoff	POA-C-PERVIOUS
57	SCS Runoff	POA-C-IMPERVIOUS
58	Combine	POA-C
60	SCS Runoff	POA-D-PERVIOUS
61	SCS Runoff	POA-D-IMPERVIOUS
62	Combine	POA-D
63	Reservoir	SWM-D
65	SCS Runoff	POA-E1-PERVIOUS
66	SCS Runoff	POA-E1-IMPERVIOUS
67	Combine	POA-E1
68	Reservoir	SWM-E1
70	SCS Runoff	POA-E2
72	Combine	POA-E
74	SCS Runoff	POA-F
76	SCS Runoff	POA-G1-PERVIOUS
77	SCS Runoff	POA-G1-IMPERVIOUS
78	Combine	POA-G1
79	Reservoir	SWM-G1
81	SCS Runoff	POA-G2
83	Combine	POA-G
86	SCS Runoff	POA-H1-PERVIOUS
87	SCS Runoff	POA-H1-IMPERVIOUS
88	Combine	POA-H1
89	Reservoir	SWM-H1
91	SCS Runoff	POA-H2
93	Combine	POA-H
96	SCS Runoff	POA-I-PERVIOUS
97	SCS Runoff	POA-I-IMPERVIOUS
98	Combine	POA-I
99	Reservoir	SWM-I

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	----	----	1.381	----	----	7.494	----	----	26.48	EDA - A: PERVIOUS
2	SCS Runoff	----	----	3.251	----	----	4.780	----	----	7.621	EDA-A:IMPERVIOUS
3	Combine	1, 2	----	3.992	----	----	12.10	----	----	34.07	EDA-A
5	SCS Runoff	----	----	0.167	----	----	2.541	----	----	15.24	EDA-B: PERVIOUS
6	SCS Runoff	----	----	4.459	----	----	6.557	----	----	10.46	EDA-B: IMPERVIOUS
7	Combine	5, 6	----	4.459	----	----	8.148	----	----	24.99	EDA-B
9	SCS Runoff	----	----	2.140	----	----	5.541	----	----	13.29	EDA-C: PERVIOUS
10	SCS Runoff	----	----	3.254	----	----	4.784	----	----	7.625	EDA-C:IMPERVIOUS
11	Combine	9, 10	----	4.833	----	----	9.441	----	----	19.46	EDA-C
13	SCS Runoff	----	----	4.666	----	----	9.249	----	----	18.51	EDA-D
15	SCS Runoff	----	----	5.581	----	----	11.09	----	----	22.23	EDA-E
17	SCS Runoff	----	----	1.009	----	----	2.003	----	----	4.017	EDA-F
19	SCS Runoff	----	----	2.574	----	----	6.941	----	----	17.01	EDA-G
21	SCS Runoff	----	----	0.000	----	----	0.152	----	----	3.714	EDA-H
23	SCS Runoff	----	----	0.000	----	----	0.000	----	----	0.053	EDA-I
25	SCS Runoff	----	----	0.787	----	----	2.648	----	----	7.188	PDA-A1-PERVIOUS
26	SCS Runoff	----	----	10.54	----	----	15.50	----	----	24.70	PDA-A1-IMPERVIOUS
27	Combine	25, 26	----	11.24	----	----	18.06	----	----	31.79	PDA-A1
28	Reservoir	27	----	0.000	----	----	0.000	----	----	0.000	SWM-A1
30	SCS Runoff	----	----	2.138	----	----	3.436	----	----	5.830	PDA-A2-PERVIOUS
31	SCS Runoff	----	----	1.757	----	----	2.583	----	----	4.117	PDA-A2-IMPERVIOUS
32	Combine	30, 31	----	3.895	----	----	6.019	----	----	9.947	PDA-A2
33	Reservoir	32	----	0.000	----	----	0.000	----	----	0.000	SWM-A2
35	Combine	28, 33,	----	0.000	----	----	0.000	----	----	0.000	PDA-A
37	SCS Runoff	----	----	13.89	----	----	26.50	----	----	51.49	PDA-B1-PERVIOUS
38	SCS Runoff	----	----	9.784	----	----	14.38	----	----	22.93	PDA-B1-IMPERVIOUS
39	Combine	37, 38	----	23.68	----	----	40.88	----	----	74.42	PDA-B1
40	Reservoir	39	----	0.000	----	----	0.000	----	----	0.000	SWM-B1

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
42	SCS Runoff	----	----	3.559	----	----	9.149	----	----	21.96	PDA-B2-PERVIOUS
43	SCS Runoff	----	----	8.015	----	----	11.78	----	----	18.79	PDA-B2-IMPERVIOUS
44	Combine	42, 43	----	11.32	----	----	20.72	----	----	40.55	PDA-B2
45	Reservoir	44	----	0.000	----	----	0.000	----	----	0.000	SWM-B2
47	SCS Runoff	----	----	0.018	----	----	0.145	----	----	0.589	PDA-B3
49	SCS Runoff	----	----	1.533	----	----	3.030	----	----	6.048	PDA-B4-PERVIOUS
50	SCS Runoff	----	----	2.343	----	----	3.444	----	----	5.490	PDA-B4-IMPERVIOUS
51	Combine	49, 50	----	3.859	----	----	6.449	----	----	11.53	PDA-B4
52	Reservoir	51	----	0.000	----	----	0.000	----	----	0.000	SWM-B4
54	Combine	40, 45, 47, 52,	----	0.018	----	----	0.145	----	----	0.589	PDA-B
56	SCS Runoff	----	----	0.224	----	----	0.707	----	----	1.867	PDA-C-PERVIOUS
57	SCS Runoff	----	----	0.195	----	----	0.287	----	----	0.457	PDA-C-IMPERVIOUS
58	Combine	56, 57	----	0.404	----	----	0.980	----	----	2.301	PDA-C
60	SCS Runoff	----	----	13.30	----	----	21.63	----	----	37.09	PDA-D-PERVIOUS
61	SCS Runoff	----	----	10.58	----	----	15.55	----	----	24.78	PDA-D-IMPERVIOUS
62	Combine	60, 61	----	23.34	----	----	36.44	----	----	60.75	PDA-D
63	Reservoir	62	----	0.000	----	----	0.000	----	----	0.000	SWM-D
65	SCS Runoff	----	----	3.694	----	----	6.014	----	----	10.32	PDA-E1-PERVIOUS
66	SCS Runoff	----	----	2.180	----	----	3.205	----	----	5.109	PDA-E1-IMPERVIOUS
67	Combine	65, 66	----	5.870	----	----	9.219	----	----	15.42	PDA-E1
68	Reservoir	67	----	0.000	----	----	0.000	----	----	0.000	SWM-E1
70	SCS Runoff	----	----	0.311	----	----	0.604	----	----	1.187	PDA-E2
72	Combine	68, 70,	----	0.311	----	----	0.604	----	----	1.187	PDA-E
74	SCS Runoff	----	----	0.950	----	----	1.841	----	----	3.622	PDA-F
76	SCS Runoff	----	----	7.103	----	----	13.27	----	----	25.38	PDA-G1-PERVIOUS
77	SCS Runoff	----	----	5.597	----	----	8.228	----	----	13.11	PDA-G1-IMPERVIOUS
78	Combine	76, 77	----	12.66	----	----	21.43	----	----	38.49	PDA-G1
79	Reservoir	78	----	0.000	----	----	0.000	----	----	13.44	SWM-G1

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
81	SCS Runoff	----	-----	0.467	-----	-----	0.906	-----	-----	1.781	PDA-G2
83	Combine	79, 81,	-----	0.467	-----	-----	0.906	-----	-----	14.15	PDA-G
86	SCS Runoff	-----	-----	8.558	-----	-----	17.70	-----	-----	36.54	PDA-H1-PERVIOUS
87	SCS Runoff	-----	-----	10.09	-----	-----	14.83	-----	-----	23.64	PDA-H1-IMPERVIOUS
88	Combine	86, 87	-----	17.99	-----	-----	31.56	-----	-----	58.76	PDA-H1
89	Reservoir	88	-----	0.000	-----	-----	0.000	-----	-----	0.000	SWM-H1
91	SCS Runoff	-----	-----	0.000	-----	-----	0.000	-----	-----	0.045	PDA-H2
93	Combine	89, 91,	-----	0.000	-----	-----	0.000	-----	-----	0.045	PDA-H
95	SCS Runoff	-----	-----	0.291	-----	-----	1.231	-----	-----	3.823	PDA-I-PERVIOUS
96	SCS Runoff	-----	-----	1.399	-----	-----	2.057	-----	-----	3.279	PDA-I-IMPERVIOUS
97	Combine	95, 96	-----	1.448	-----	-----	2.780	-----	-----	6.116	PDA-I
98	Reservoir	97	-----	0.000	-----	-----	0.000	-----	-----	0.000	SWM-I

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 2

EDA-A:IMPERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 0.40	0.00	0.00	
Travel Time (min)	= 2.29	+ 0.00	+ 0.00	= 2.29
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	509.00	600.00	
Watercourse slope (%)	= 0.00	0.20	0.60	
Surface description	= Paved	Paved	Unpaved	
Average velocity (ft/s)	=0.00	0.91	1.25	
Travel Time (min)	= 0.00	+ 9.33	+ 8.00	= 17.33
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	(0)0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				19.60 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

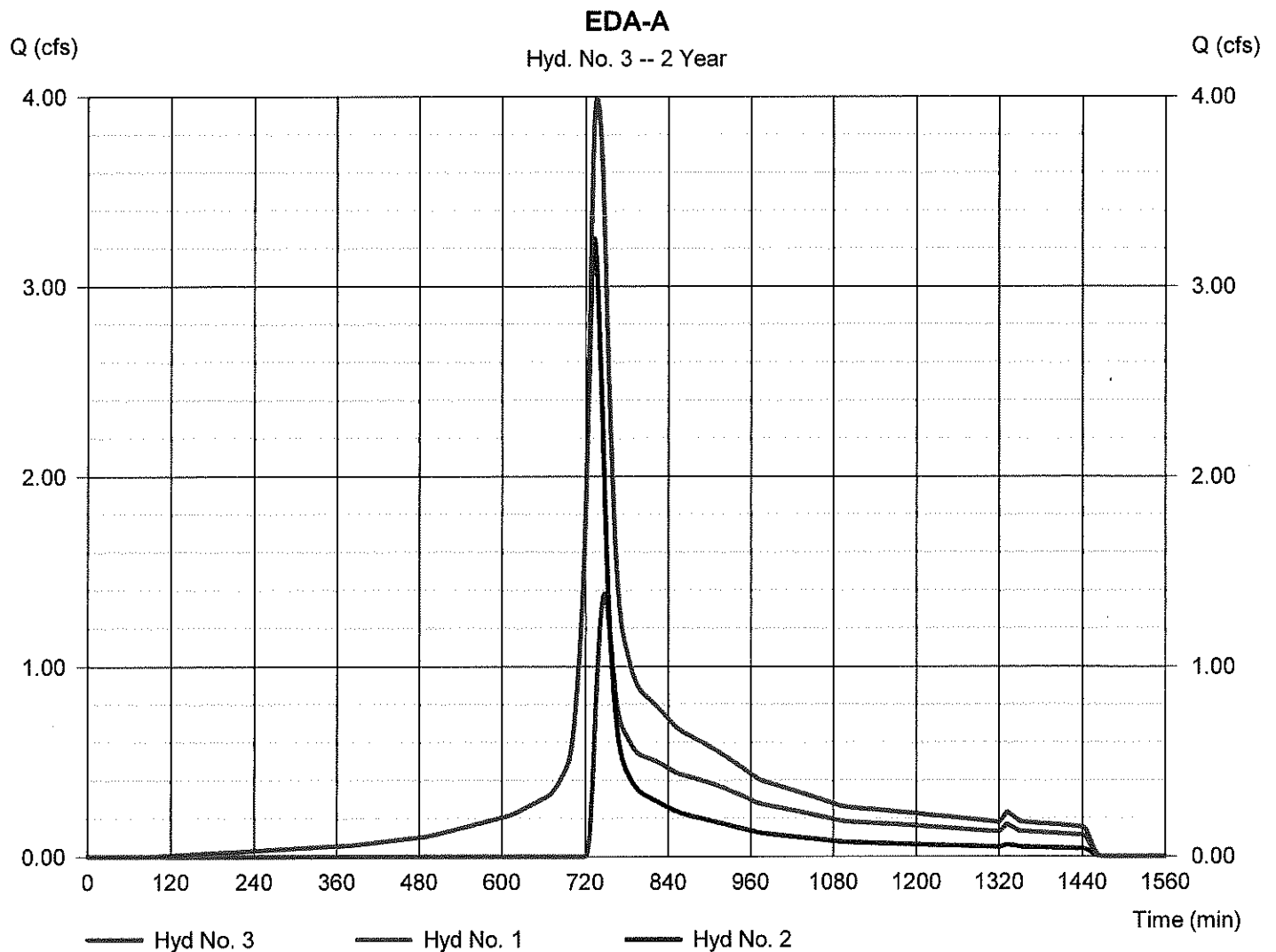
Monday, 11 / 25 / 2019

Hyd. No. 3

EDA-A

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

Peak discharge = 3.992 cfs
Time to peak = 737 min
Hyd. volume = 28,641 cuft
Contrib. drain. area = 14.930 ac



Hydrograph Report

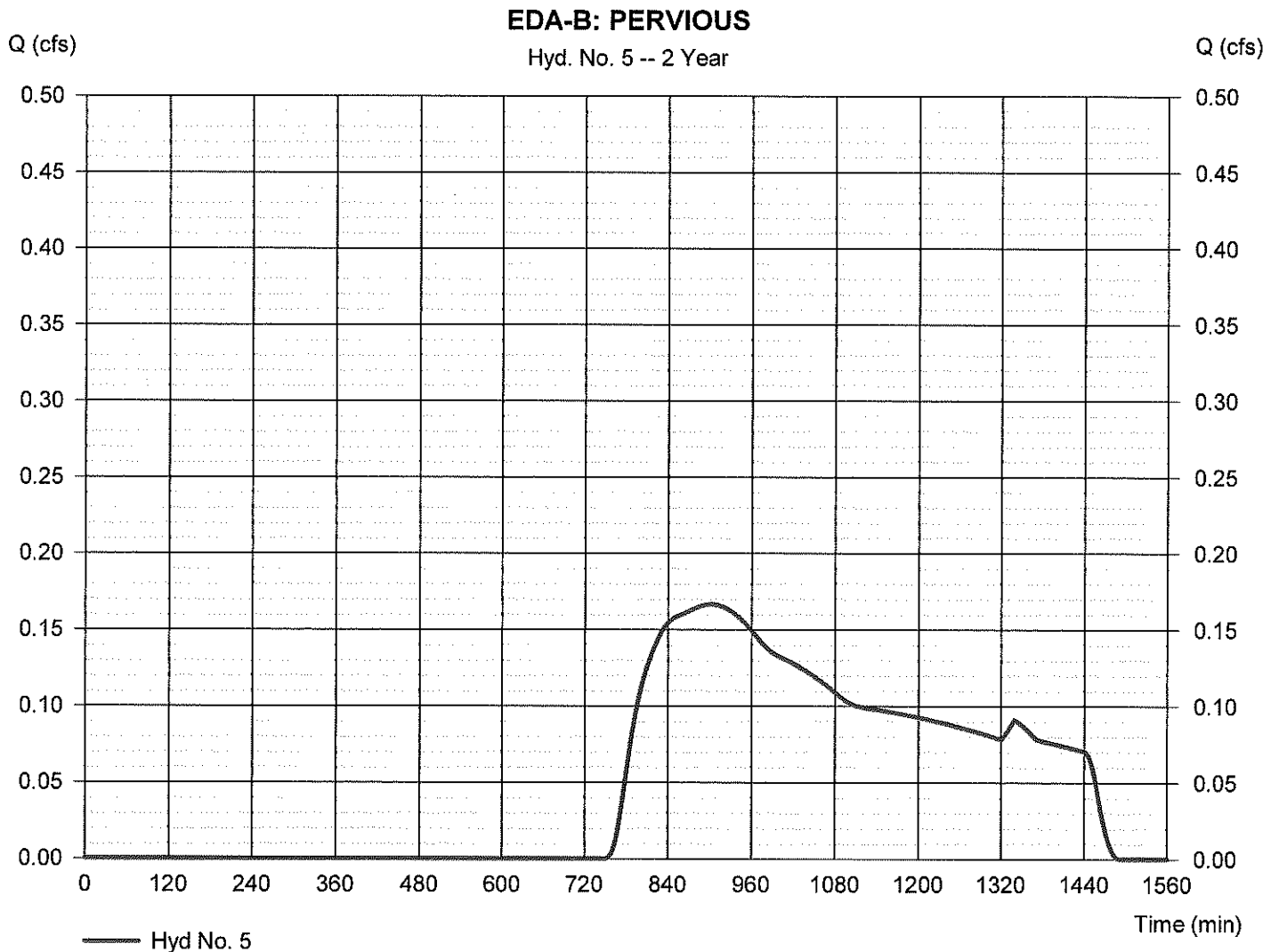
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 5

EDA-B: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.167 cfs
Storm frequency	= 2 yrs	Time to peak	= 901 min
Time interval	= 1 min	Hyd. volume	= 4,531 cuft
Drainage area	= 15.680 ac	Curve number	= 47
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.40 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 5

EDA-B: PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 7.30	0.00	0.00	
Travel Time (min)	= 12.71	+ 0.00	+ 0.00	= 12.71
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	704.00	818.00	
Watercourse slope (%)	= 0.00	4.90	0.30	
Surface description	= Paved	Unpaved	Unpaved	
Average velocity (ft/s)	=0.00	3.57	0.88	
Travel Time (min)	= 0.00	+ 3.29	+ 15.43	= 18.71
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				31.40 min

Hydrograph Report

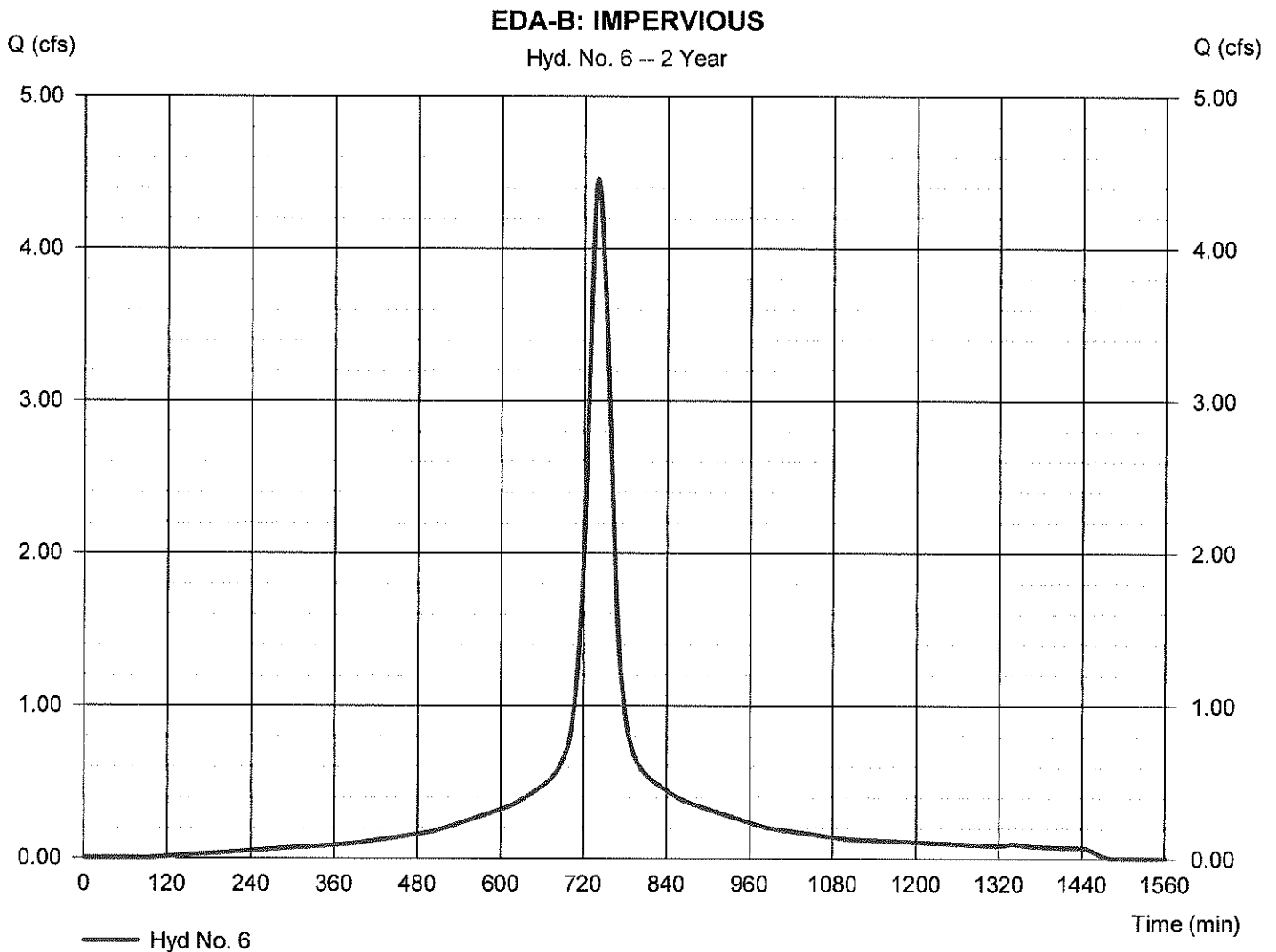
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Monday, 11 / 25 / 2019

Hyd. No. 6

EDA-B: IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 4.459 cfs
Storm frequency	= 2 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 25,763 cuft
Drainage area	= 2.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29.70 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 6

EDA-B: IMPERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 0.10	0.00	0.00	
Travel Time (min)	= 3.99	+ 0.00	+ 0.00	= 3.99
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	1303.00	98.00	
Watercourse slope (%)	= 0.00	0.20	0.30	
Surface description	= Paved	Paved	Unpaved	
Average velocity (ft/s)	=0.00	0.91	0.88	
Travel Time (min)	= 0.00	+ 23.89	+ 1.85	= 25.74
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				29.70 min

Hydrograph Report

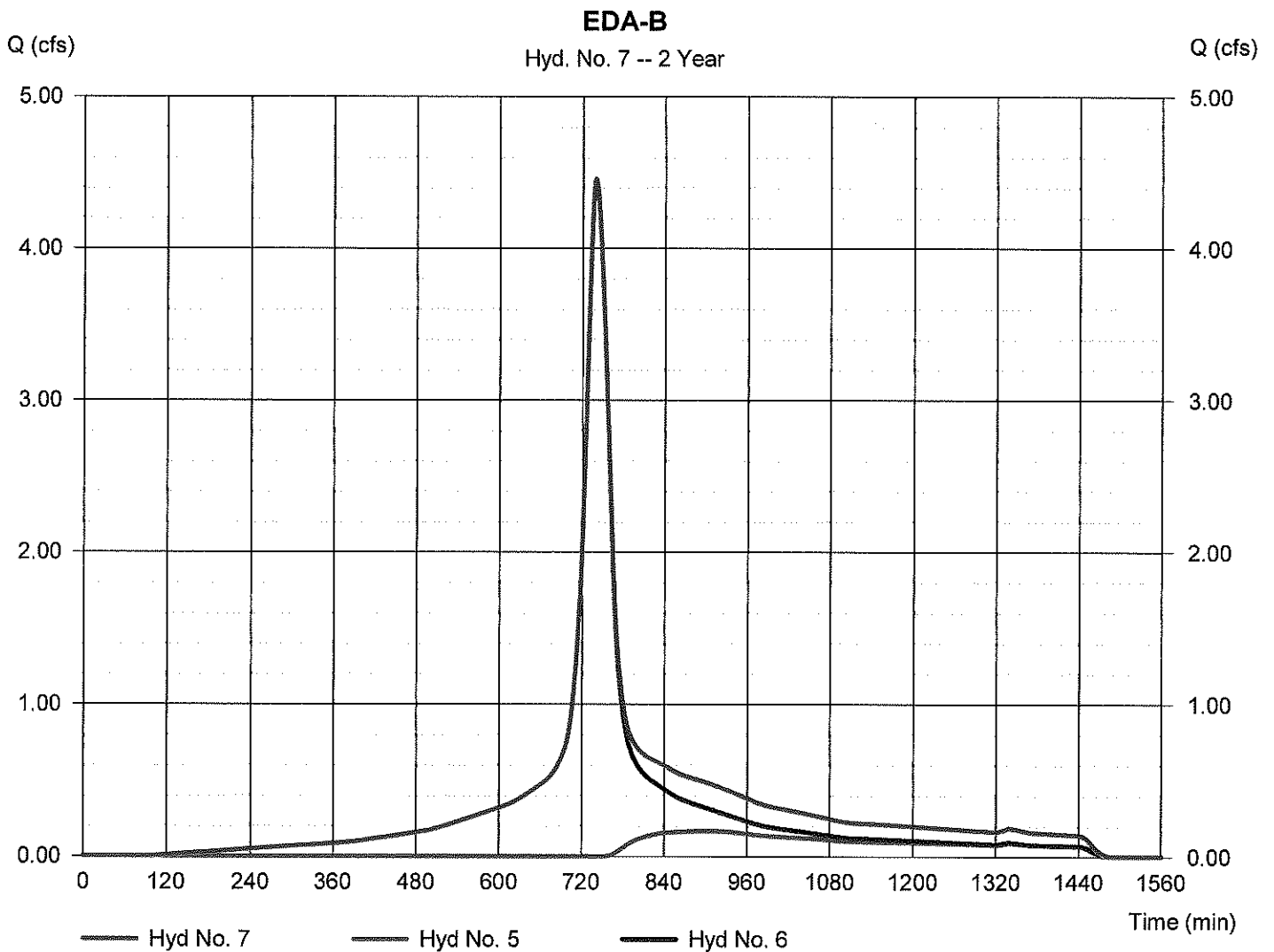
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Monday, 11 / 25 / 2019

Hyd. No. 7

EDA-B

Hydrograph type	= Combine	Peak discharge	= 4.459 cfs
Storm frequency	= 2 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 30,294 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 18.040 ac



Hydrograph Report

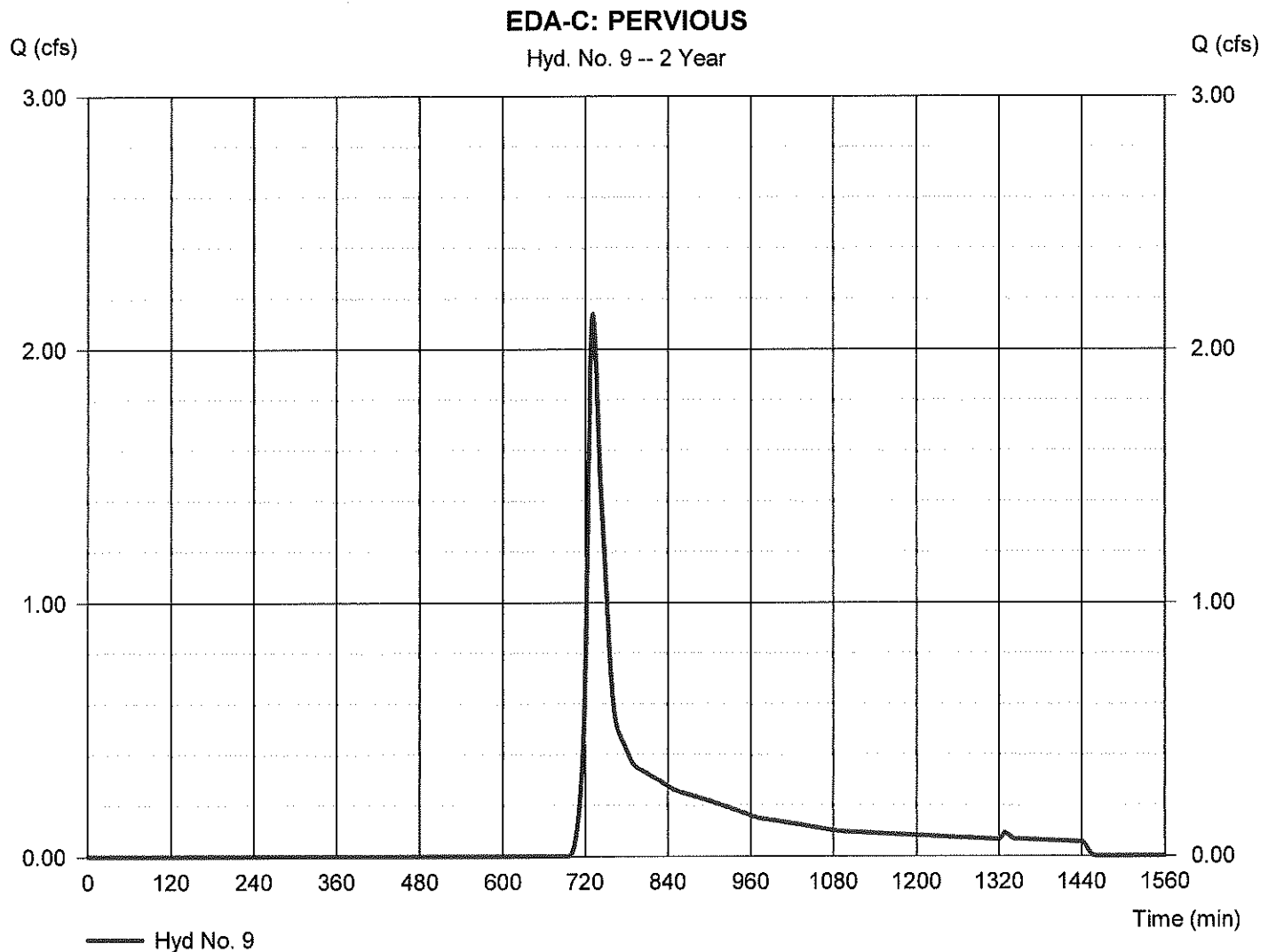
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Monday, 11 / 25 / 2019

Hyd. No. 9

EDA-C: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.140 cfs
Storm frequency	= 2 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 9,540 cuft
Drainage area	= 3.770 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 9

EDA-C: PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 12.10	0.00	0.00	
Travel Time (min)	= 10.39	+ 0.00	+ 0.00	= 10.39
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	73.00	265.00	
Watercourse slope (%)	= 0.00	12.00	1.70	
Surface description	= Paved	Unpaved	Unpaved	
Average velocity (ft/s)	=0.00	5.59	2.10	
Travel Time (min)	= 0.00	+ 0.22	+ 2.10	= 2.32
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				12.70 min

Hydrograph Report

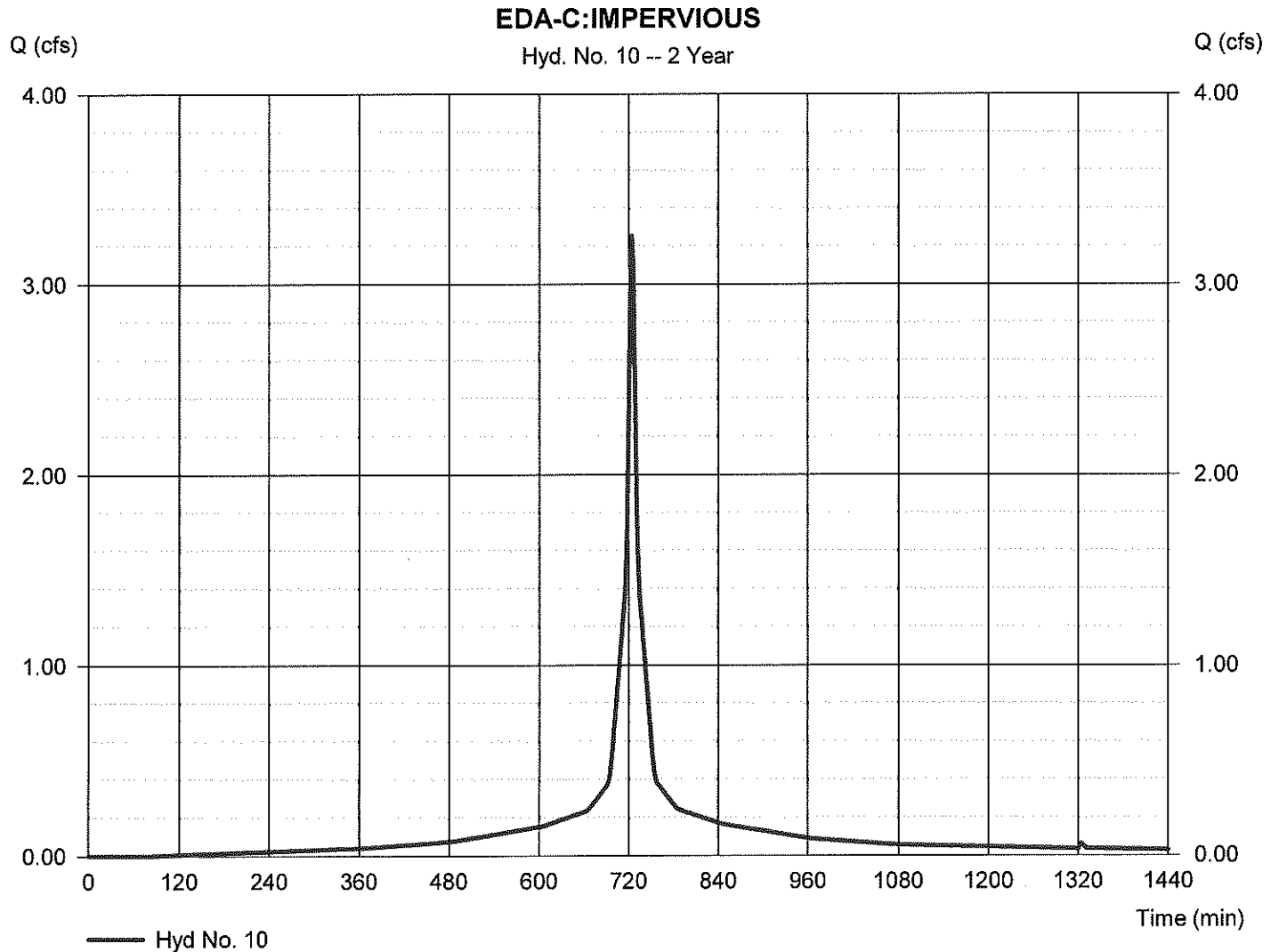
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Monday, 11 / 25 / 2019

Hyd. No. 10

EDA-C:IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.254 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 11,258 cuft
Drainage area	= 1.000 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

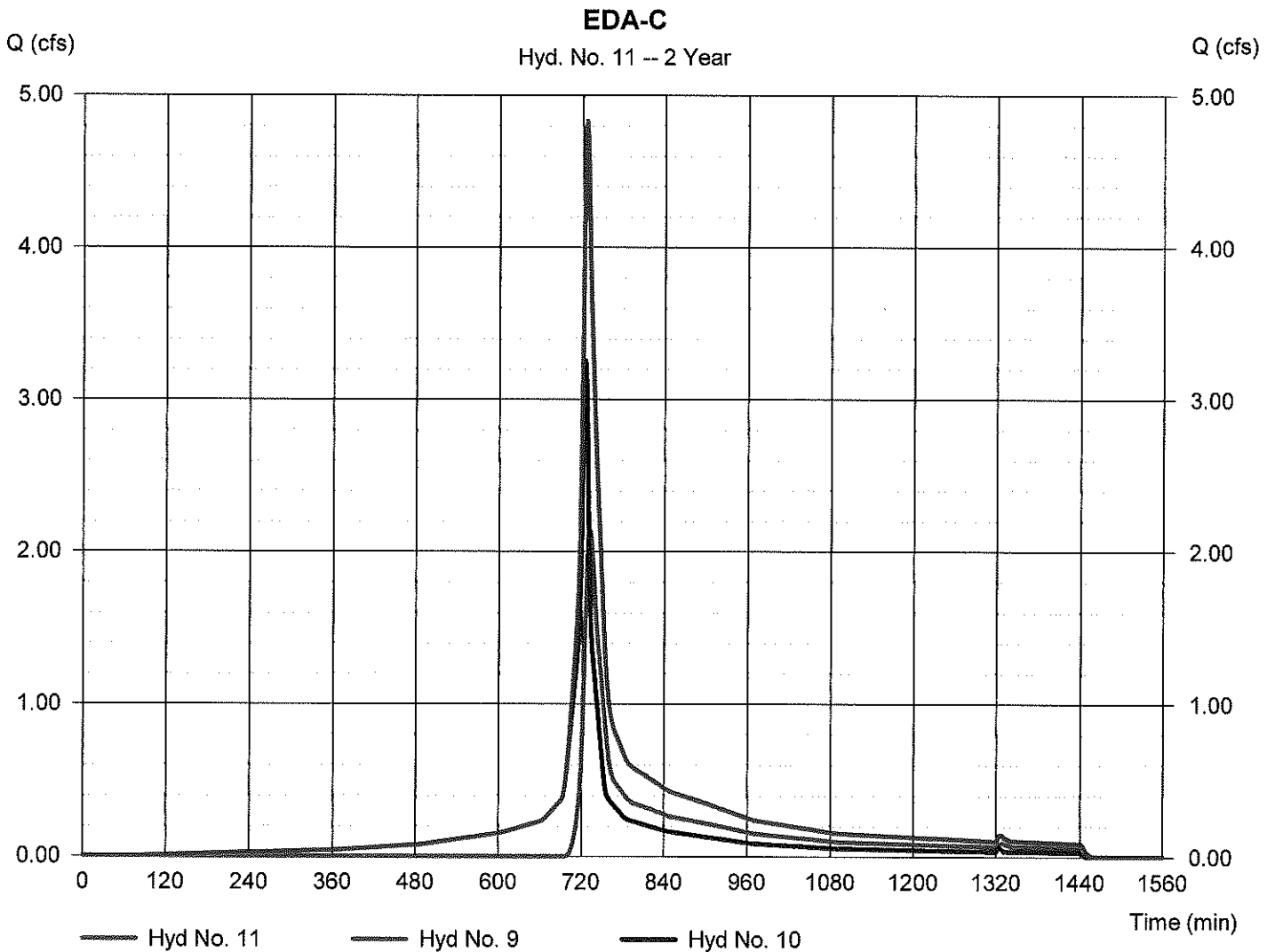
Monday, 11 / 25 / 2019

Hyd. No. 11

EDA-C

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 9, 10

Peak discharge = 4.833 cfs
Time to peak = 726 min
Hyd. volume = 20,797 cuft
Contrib. drain. area = 4.770 ac



Hydrograph Report

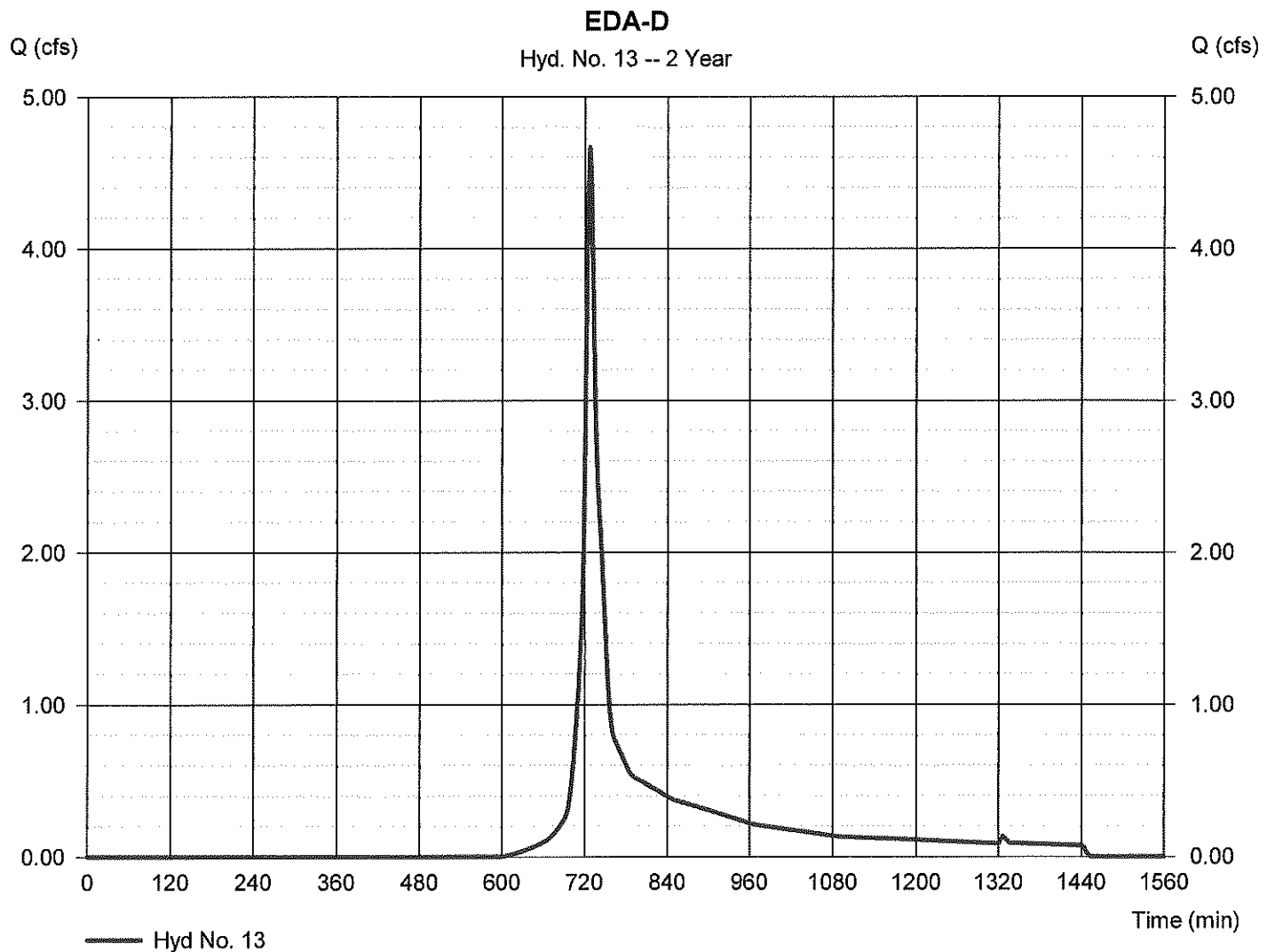
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Monday, 11 / 25 / 2019

Hyd. No. 13

EDA-D

Hydrograph type	= SCS Runoff	Peak discharge	= 4.666 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 16,390 cuft
Drainage area	= 3.640 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 13

EDA-D

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow							
Manning's n-value	= 0.400		0.000		0.000		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.24		0.00		0.00		
Land slope (%)	= 21.20		0.00		0.00		
Travel Time (min)	= 8.30	+	0.00	+	0.00	=	8.30
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		288.00		0.00		
Watercourse slope (%)	= 0.00		3.00		0.00		
Surface description	= Paved		Unpaved		Paved		
Average velocity (ft/s)	=0.00		2.79		0.00		
Travel Time (min)	= 0.00	+	1.72	+	0.00	=	1.72
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	{{0}}0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							10.00 min

Hydrograph Report

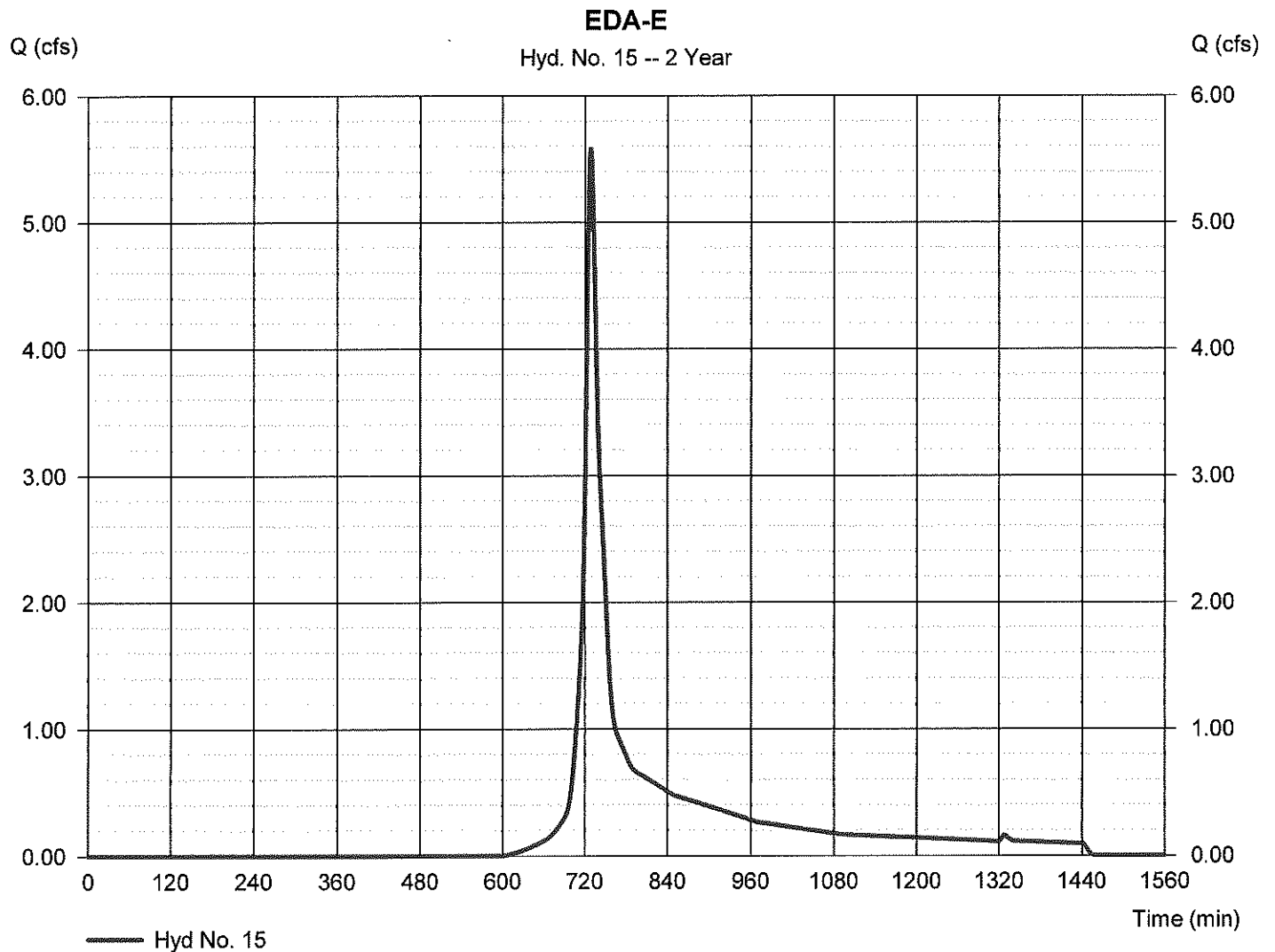
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Monday, 11 / 25 / 2019

Hyd. No. 15

EDA-E

Hydrograph type	= SCS Runoff	Peak discharge	= 5.581 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 20,854 cuft
Drainage area	= 4.550 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 15

EDA-E

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 12.40	0.00	0.00	
Travel Time (min)	= 10.29	+ 0.00	+ 0.00	= 10.29
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	257.00	0.00	
Watercourse slope (%)	= 0.00	5.30	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	3.71	0.00	
Travel Time (min)	= 0.00	+ 1.15	+ 0.00	= 1.15
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				11.40 min

Hydrograph Report

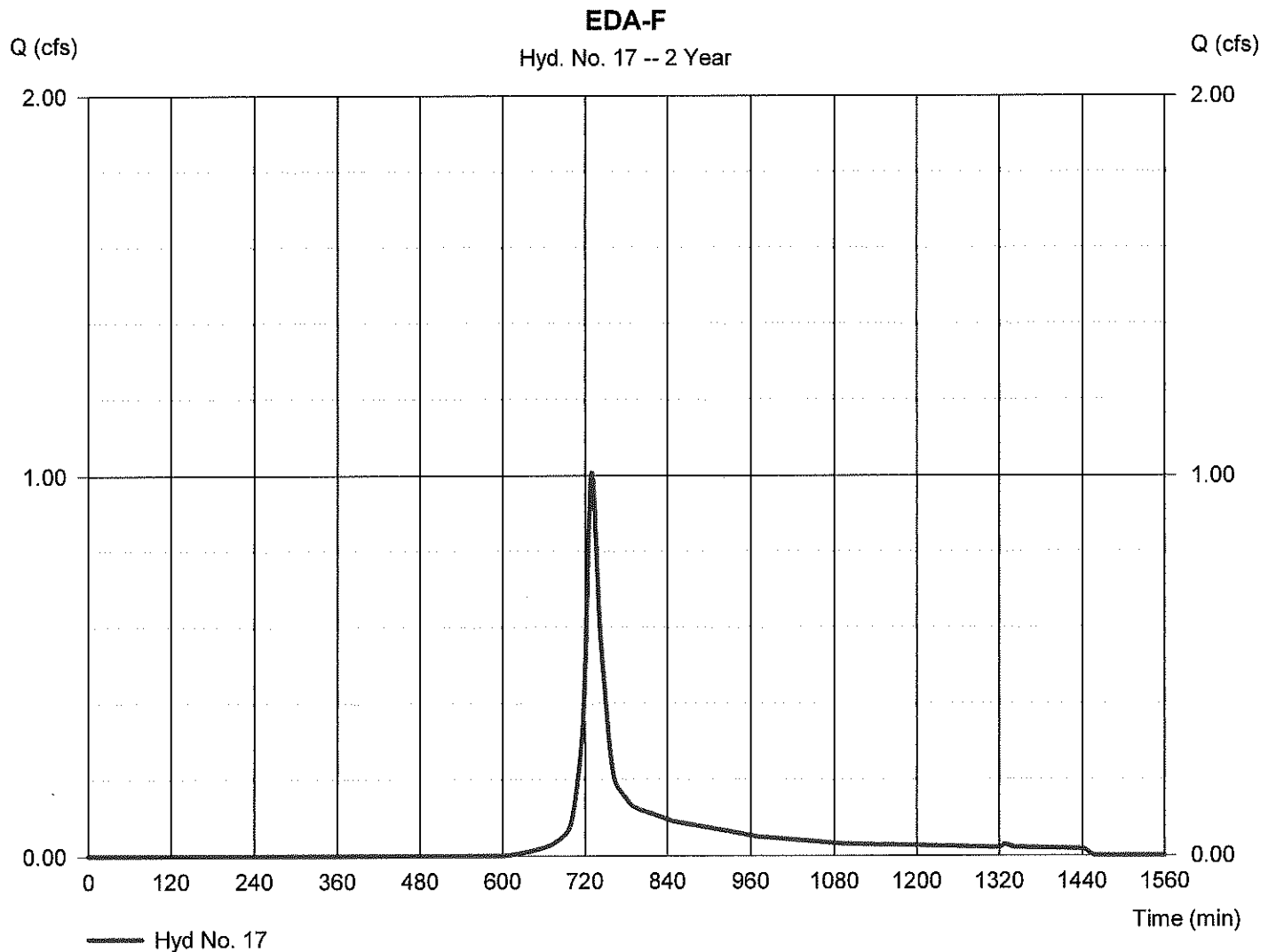
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Monday, 11 / 25 / 2019

Hyd. No. 17

EDA-F

Hydrograph type	= SCS Runoff	Peak discharge	= 1.009 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 3,901 cuft
Drainage area	= 0.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 17

EDA-F

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.240	0.011	
Flow length (ft)	= 51.0	49.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	3.24	0.00	
Land slope (%)	= 16.30	3.20	0.00	
Travel Time (min)	= 5.38	+ 6.64	+ 0.00	= 12.02
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	62.00	0.00	
Watercourse slope (%)	= 0.00	1.00	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	1.61	0.00	
Travel Time (min)	= 0.00	+ 0.64	+ 0.00	= 0.64
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				12.70 min

Hydrograph Report

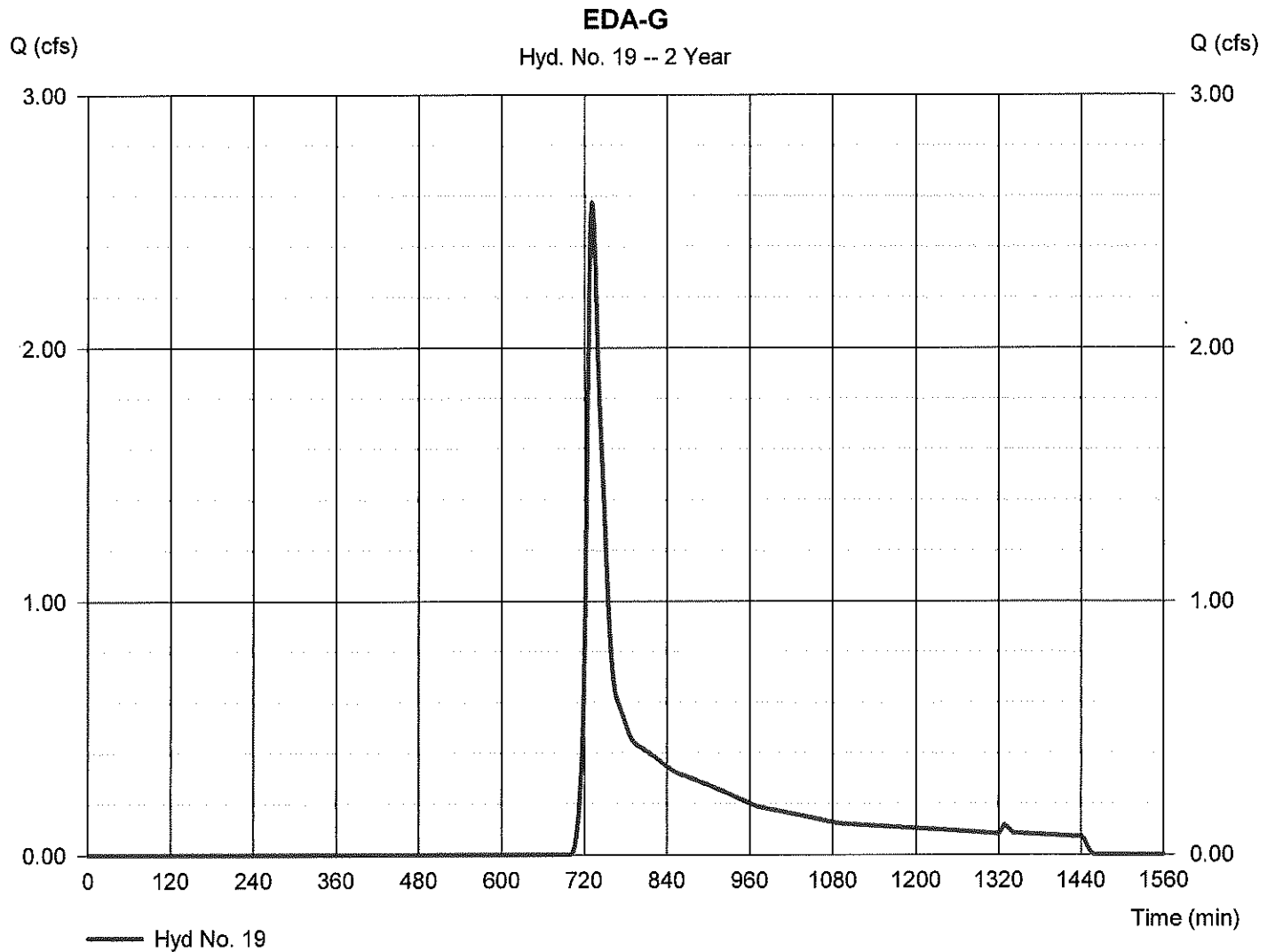
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Monday, 11 / 25 / 2019

Hyd. No. 19

EDA-G

Hydrograph type	= SCS Runoff	Peak discharge	= 2.574 cfs
Storm frequency	= 2 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 11,804 cuft
Drainage area	= 4.980 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.60 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 19

EDA-G

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 10.50	0.00	0.00	
Travel Time (min)	= 10.99	+ 0.00	+ 0.00	= 10.99
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	159.00	276.00	
Watercourse slope (%)	= 0.00	12.20	6.70	
Surface description	= Paved	Unpaved	Unpaved	
Average velocity (ft/s)	=0.00	5.64	4.18	
Travel Time (min)	= 0.00	+ 0.47	+ 1.10	= 1.57
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				12.60 min

Hydrograph Report

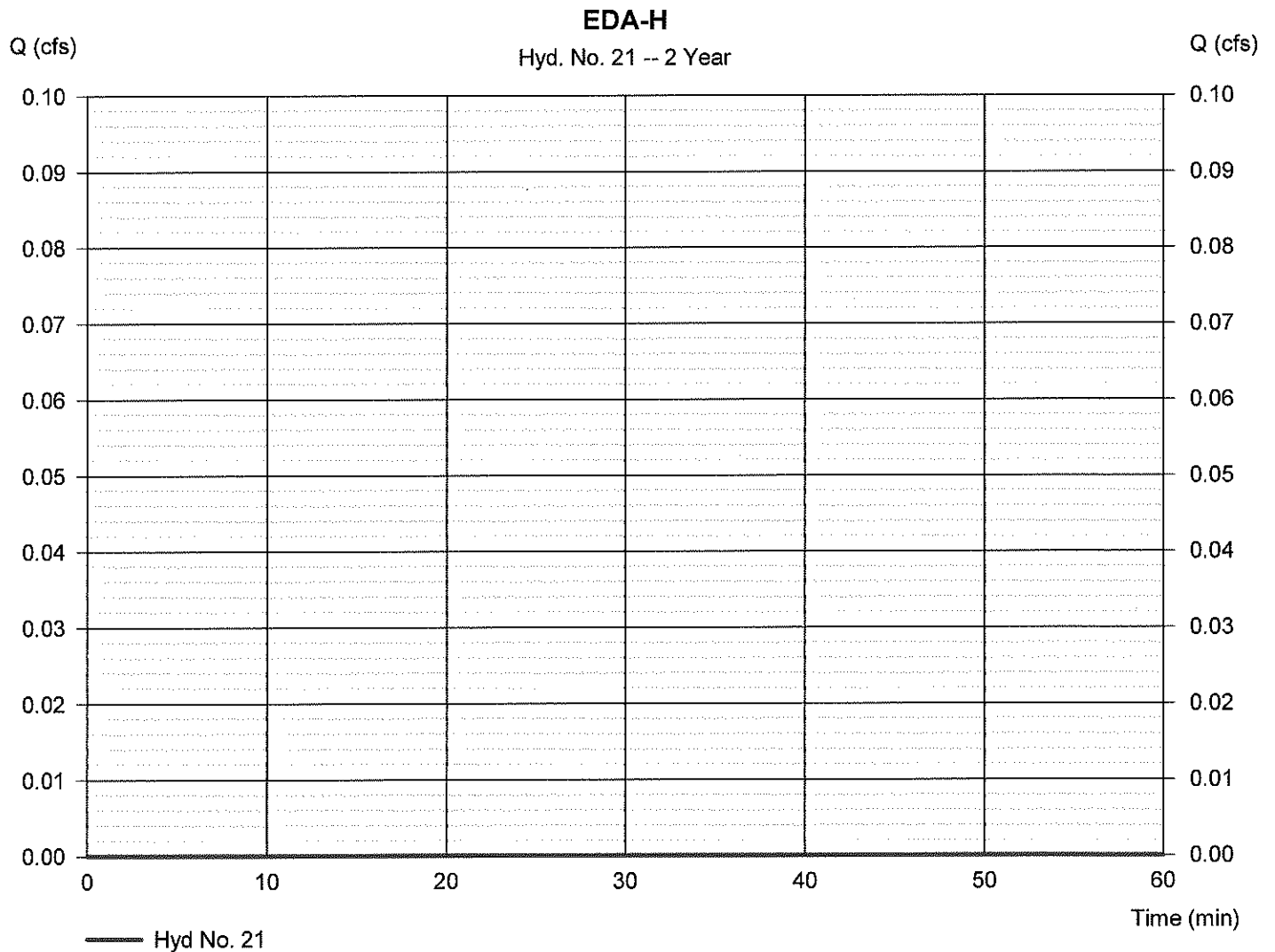
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 21

EDA-H

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 12.100 ac	Curve number	= 37
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 33.50 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 21

EDA-H

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow							
Manning's n-value	= 0.400		0.150		0.011		
Flow length (ft)	= 32.0		68.0		0.0		
Two-year 24-hr precip. (in)	= 3.24		3.24		0.00		
Land slope (%)	= 3.00		0.10		0.00		
Travel Time (min)	= 7.29	+	23.71	+	0.00	=	31.00
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		452.00		
Watercourse slope (%)	= 0.00		0.00		3.40		
Surface description	= Paved		Paved		Unpaved		
Average velocity (ft/s)	=0.00		0.00		2.98		
Travel Time (min)	= 0.00	+	0.00	+	2.53	=	2.53
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	{{0}}0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							33.50 min

Hydrograph Report

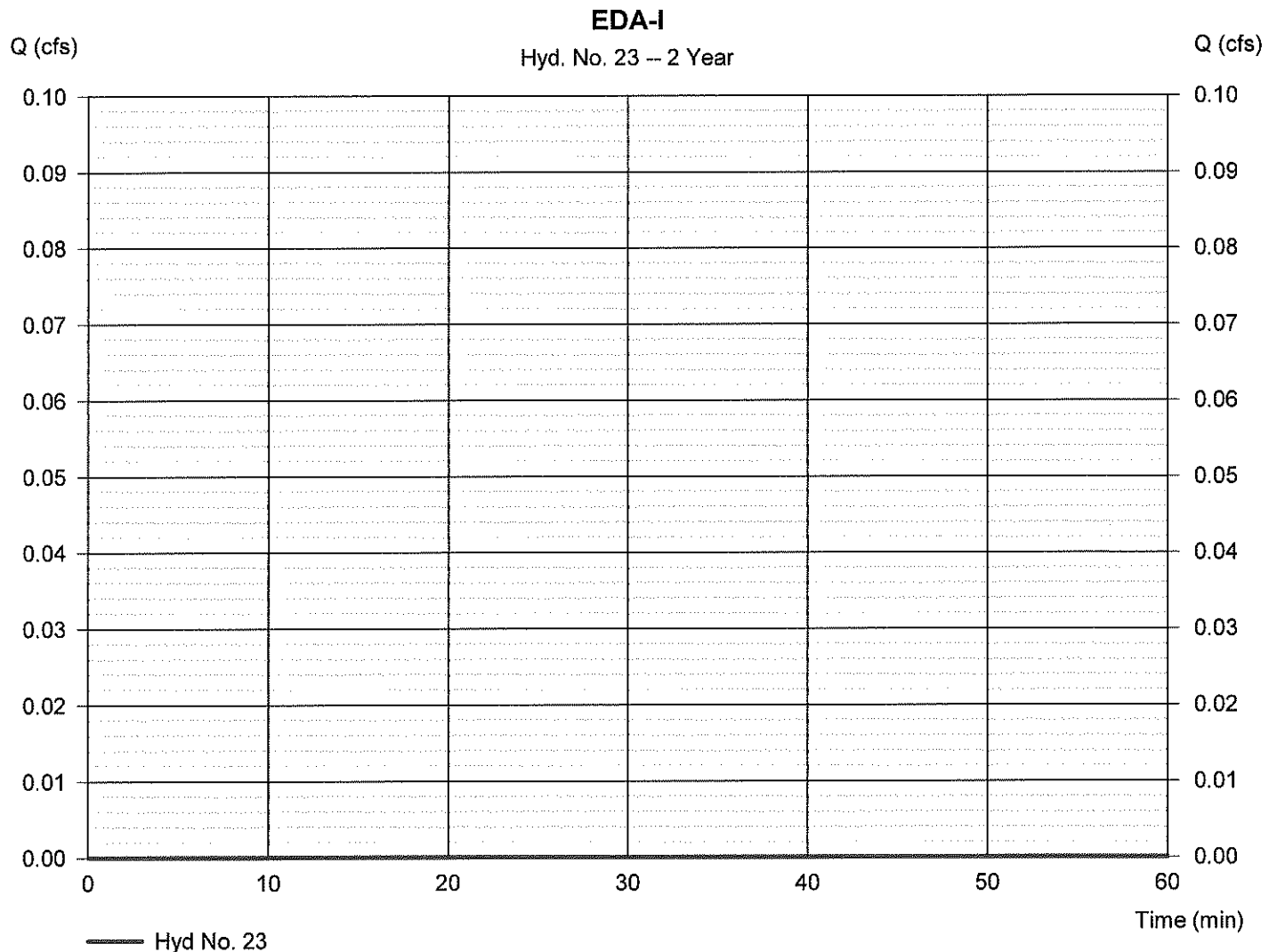
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 23

EDA-I

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 1.050 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 23

EDA-I

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 1.90	0.00	0.00	
Travel Time (min)	= 21.78	+ 0.00	+ 0.00	= 21.78
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	97.00	0.00	
Watercourse slope (%)	= 0.00	13.80	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	5.99	0.00	
Travel Time (min)	= 0.00	+ 0.27	+ 0.00	= 0.27
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				22.10 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

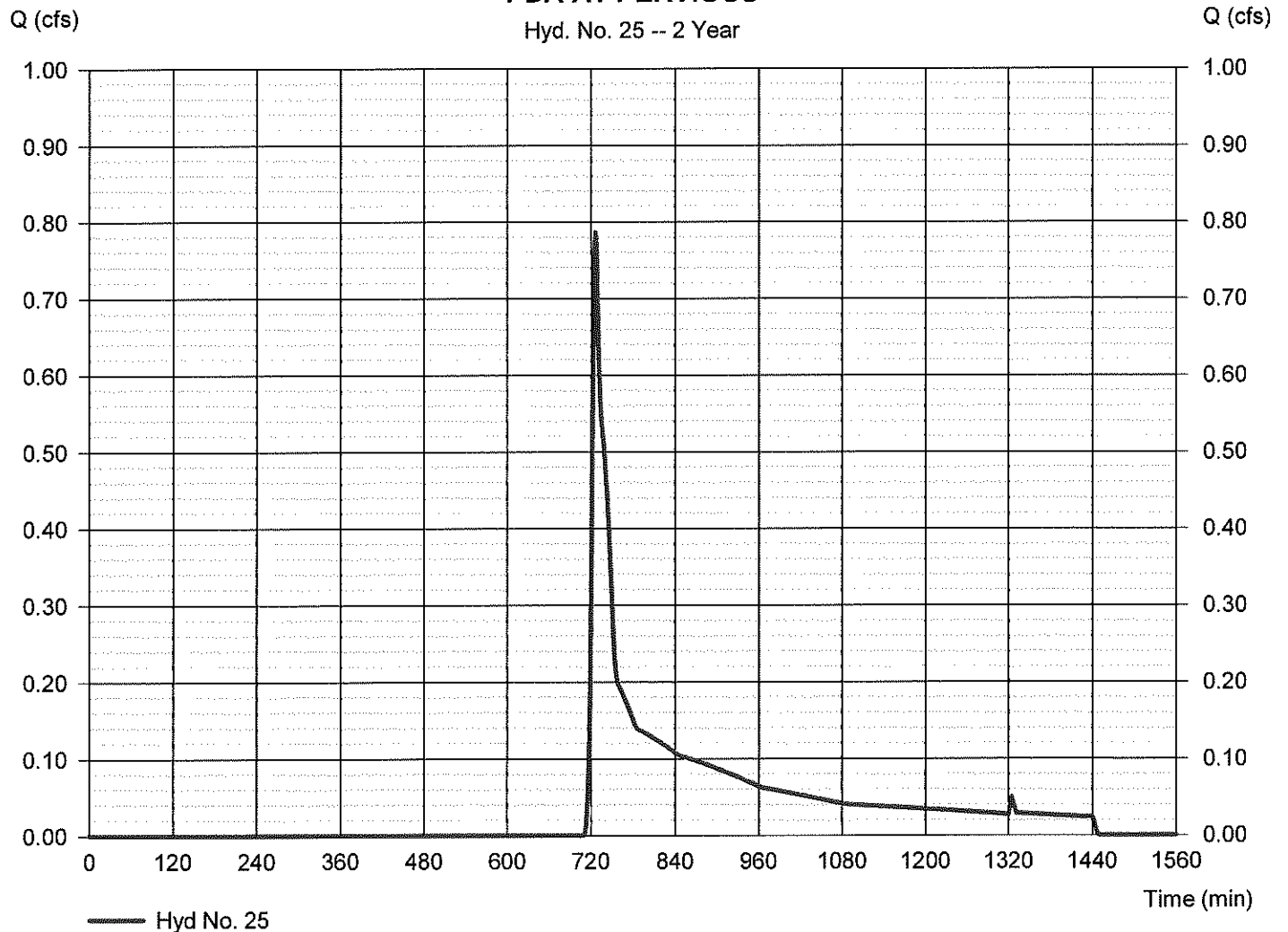
Hyd. No. 25

PDA-A1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.787 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 3,506 cuft
Drainage area	= 1.880 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

PDA-A1-PERVIOUS

Hyd. No. 25 -- 2 Year



Hydrograph Report

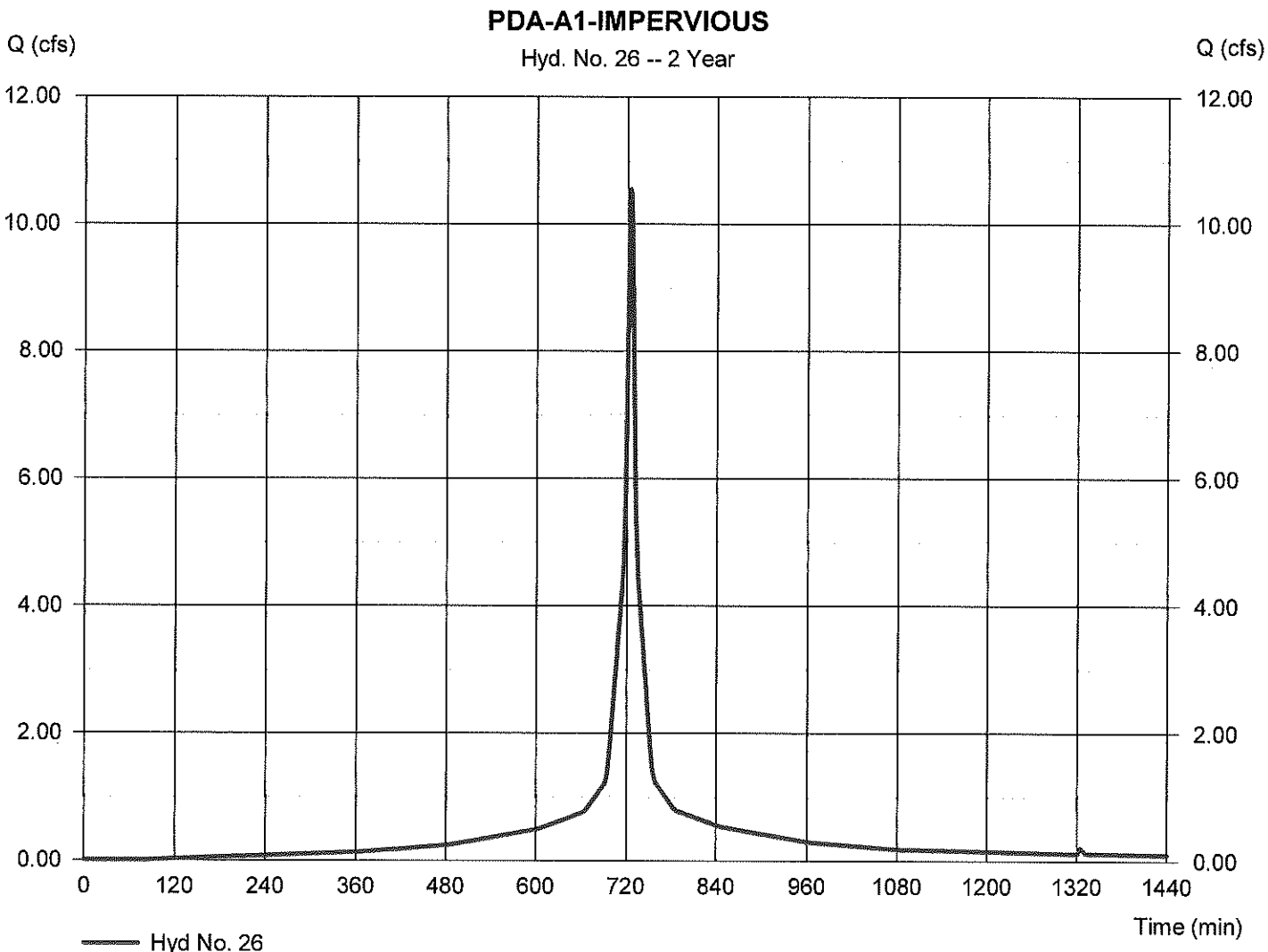
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 26

PDA-A1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 10.54 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 36,475 cuft
Drainage area	= 3.240 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

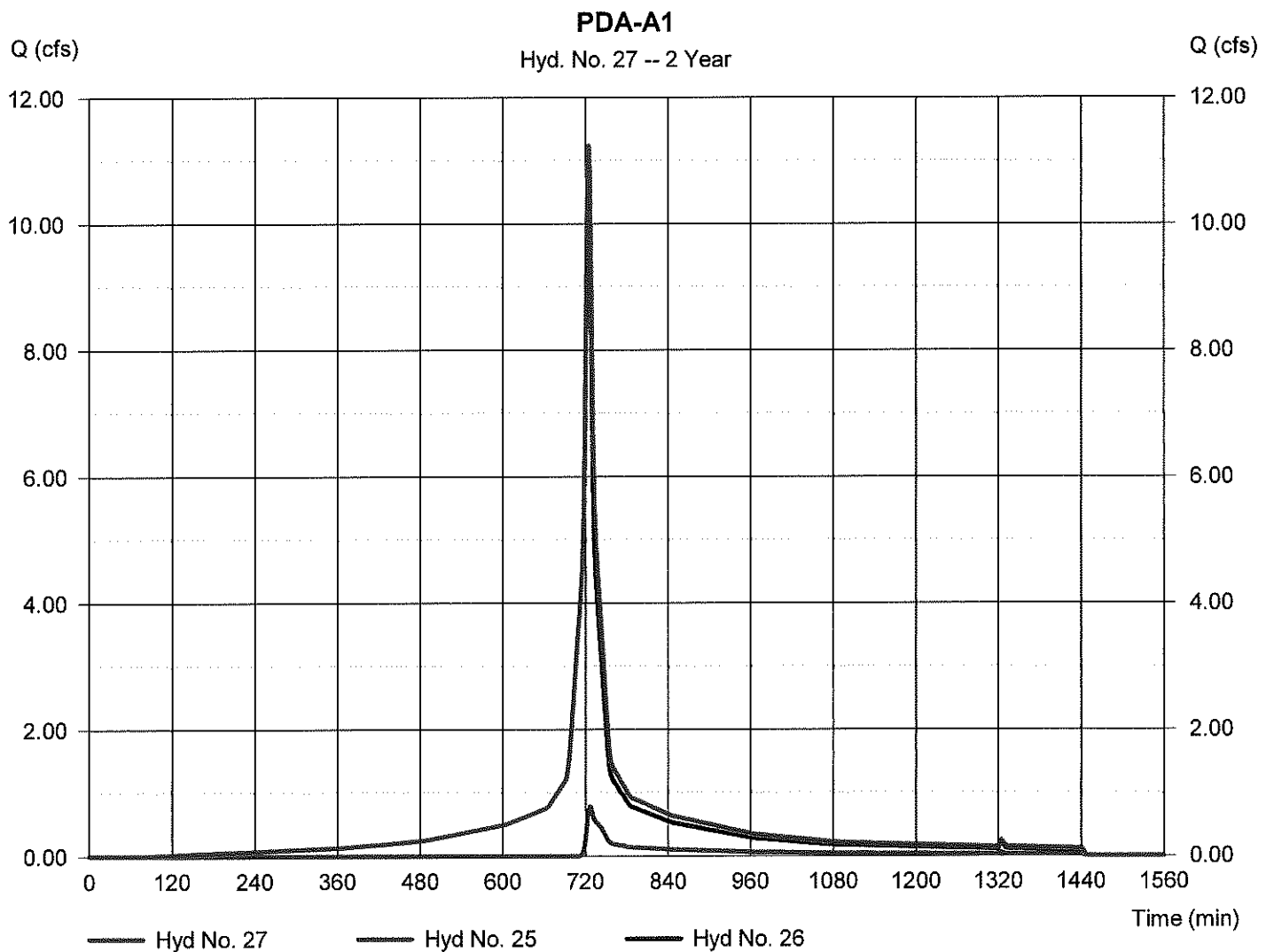
Monday, 11 / 25 / 2019

Hyd. No. 27

PDA-A1

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 25, 26

Peak discharge = 11.24 cfs
Time to peak = 724 min
Hyd. volume = 39,981 cuft
Contrib. drain. area = 5.120 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

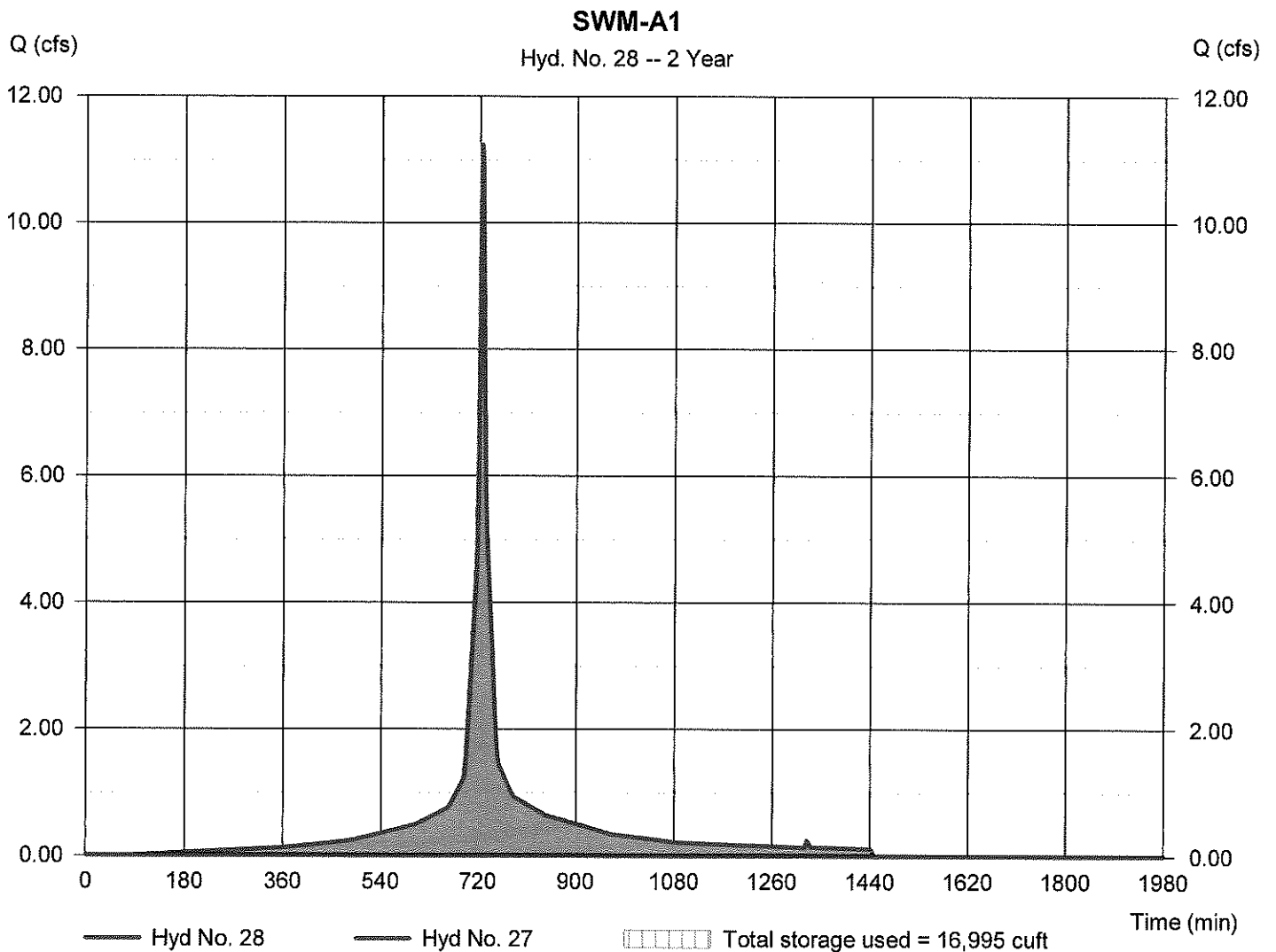
Monday, 11 / 25 / 2019

Hyd. No. 28

SWM-A1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 713 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 27 - PDA-A1	Max. Elevation	= 592.48 ft
Reservoir name	= SWM-A1	Max. Storage	= 16,995 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 1 - SWM-A1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 591.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	591.00	10,042	0	0
1.00	592.00	11,757	10,887	10,887
2.00	593.00	13,529	12,631	23,519
3.00	594.00	15,357	14,431	37,950
4.00	595.00	17,241	16,288	54,238
5.00	596.00	19,182	18,201	72,439

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	= 0	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)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 595.50	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)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	591.00	---	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	10,887	592.00	---	---	---	---	0.00	---	---	---	1.361	---	1.361
2.00	23,519	593.00	---	---	---	---	0.00	---	---	---	1.566	---	1.566
3.00	37,950	594.00	---	---	---	---	0.00	---	---	---	1.777	---	1.777
4.00	54,238	595.00	---	---	---	---	0.00	---	---	---	1.995	---	1.995
5.00	72,439	596.00	---	---	---	---	9.19	---	---	---	2.220	---	11.41

Hydrograph Report

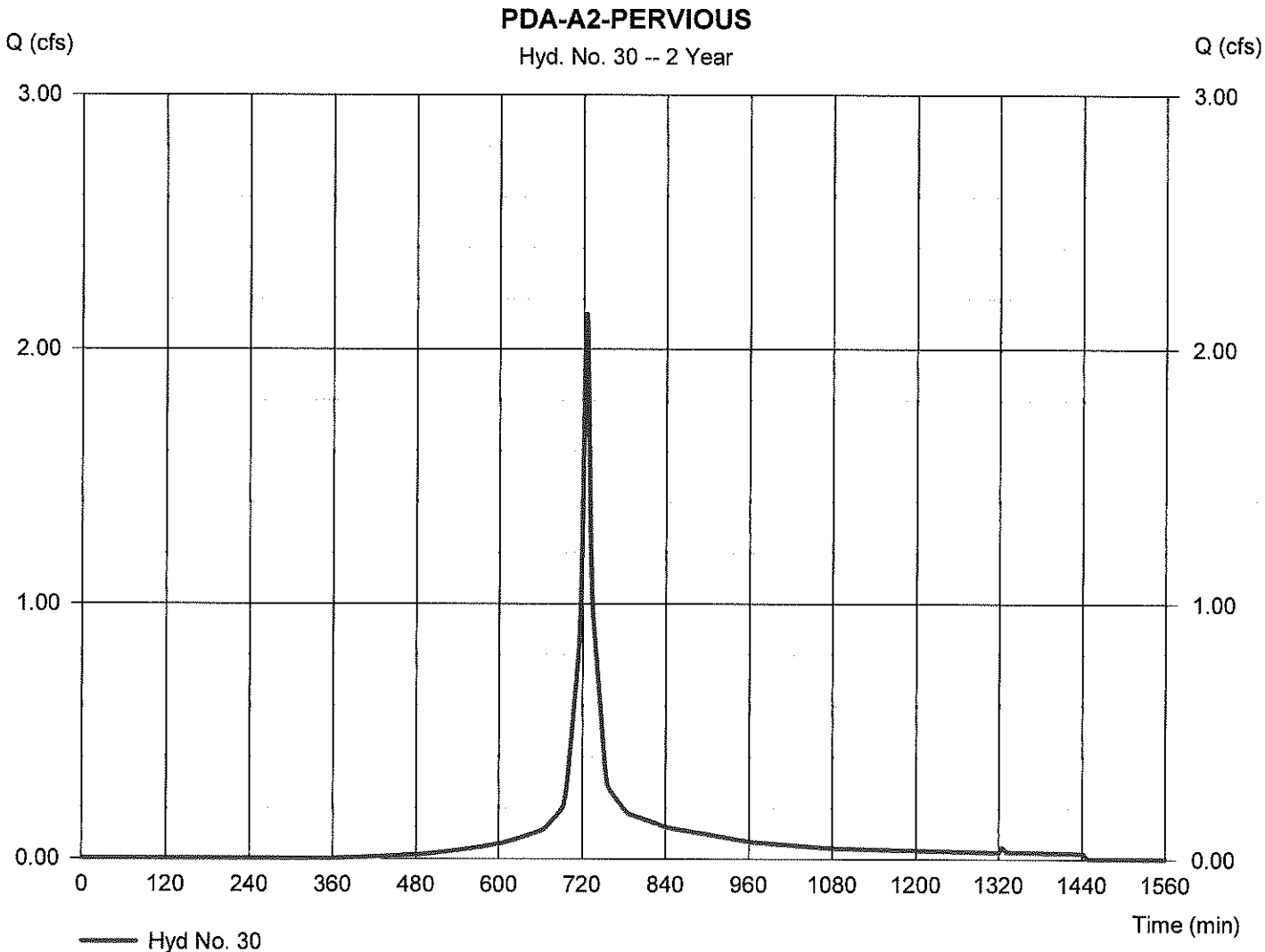
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Monday, 11 / 25 / 2019

Hyd. No. 30

PDA-A2-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.138 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 6,688 cuft
Drainage area	= 0.810 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

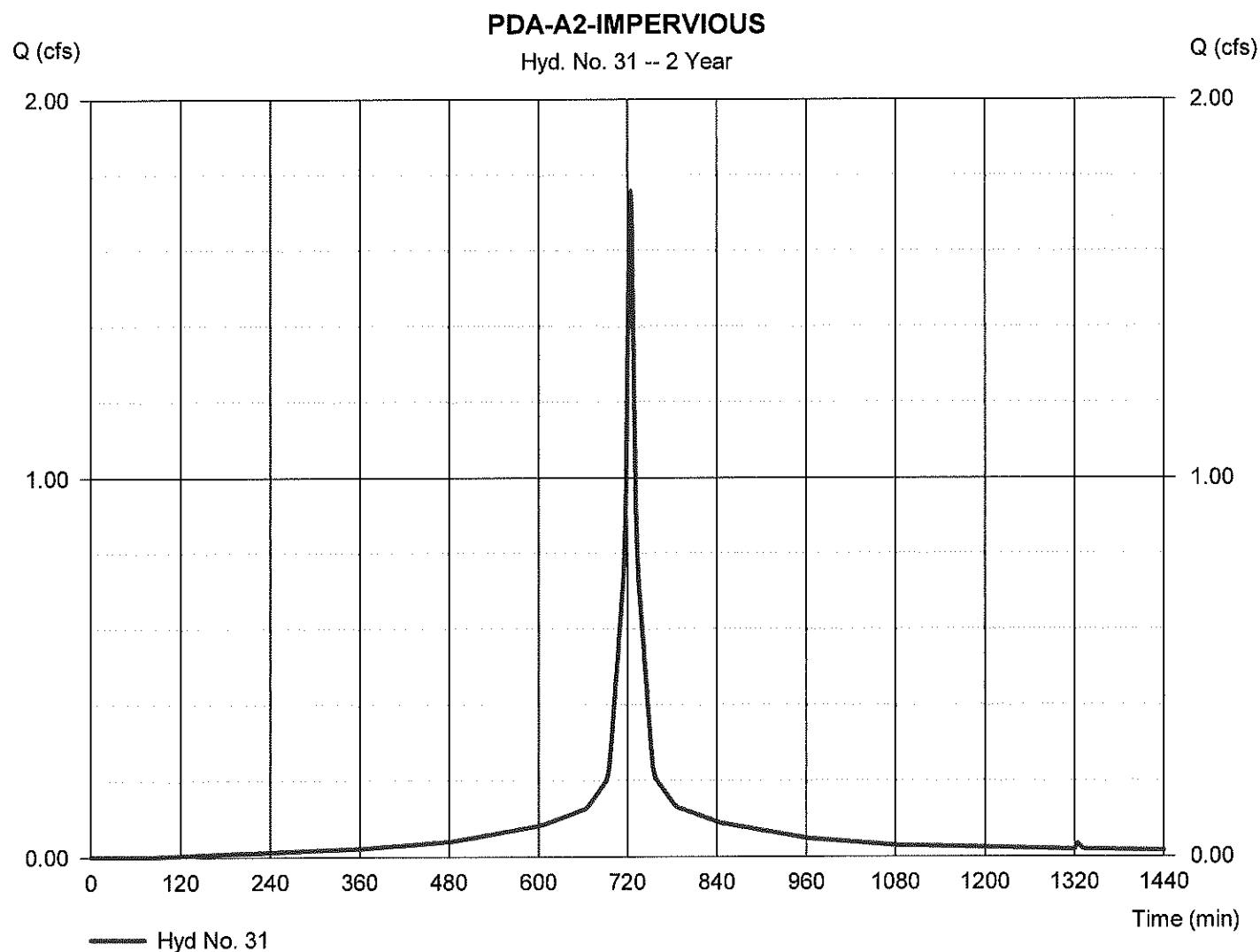
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 31

PDA-A2-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.757 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 6,079 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

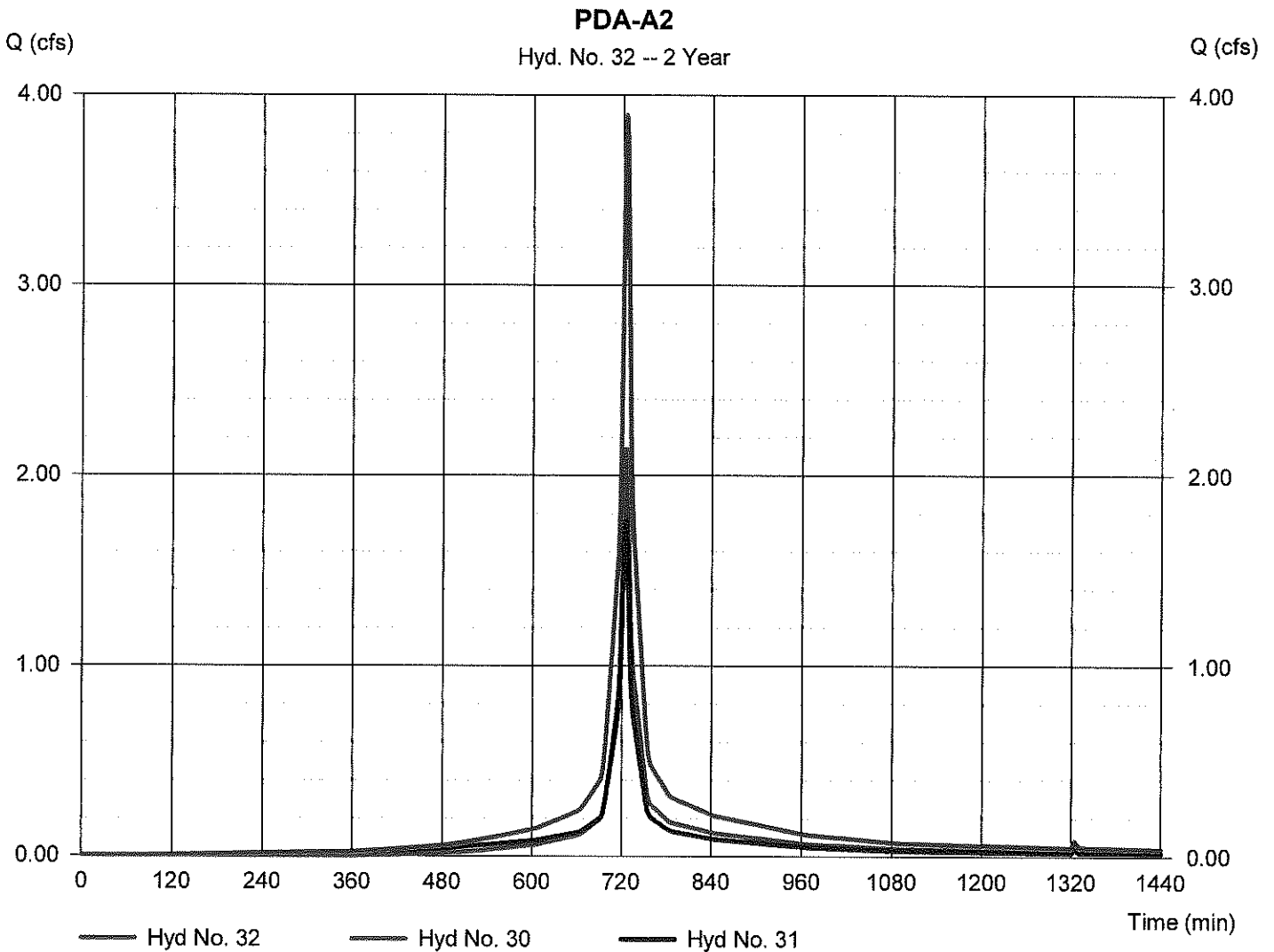
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 32

PDA-A2

Hydrograph type	= Combine	Peak discharge	= 3.895 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 12,767 cuft
Inflow hyds.	= 30, 31	Contrib. drain. area	= 1.350 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

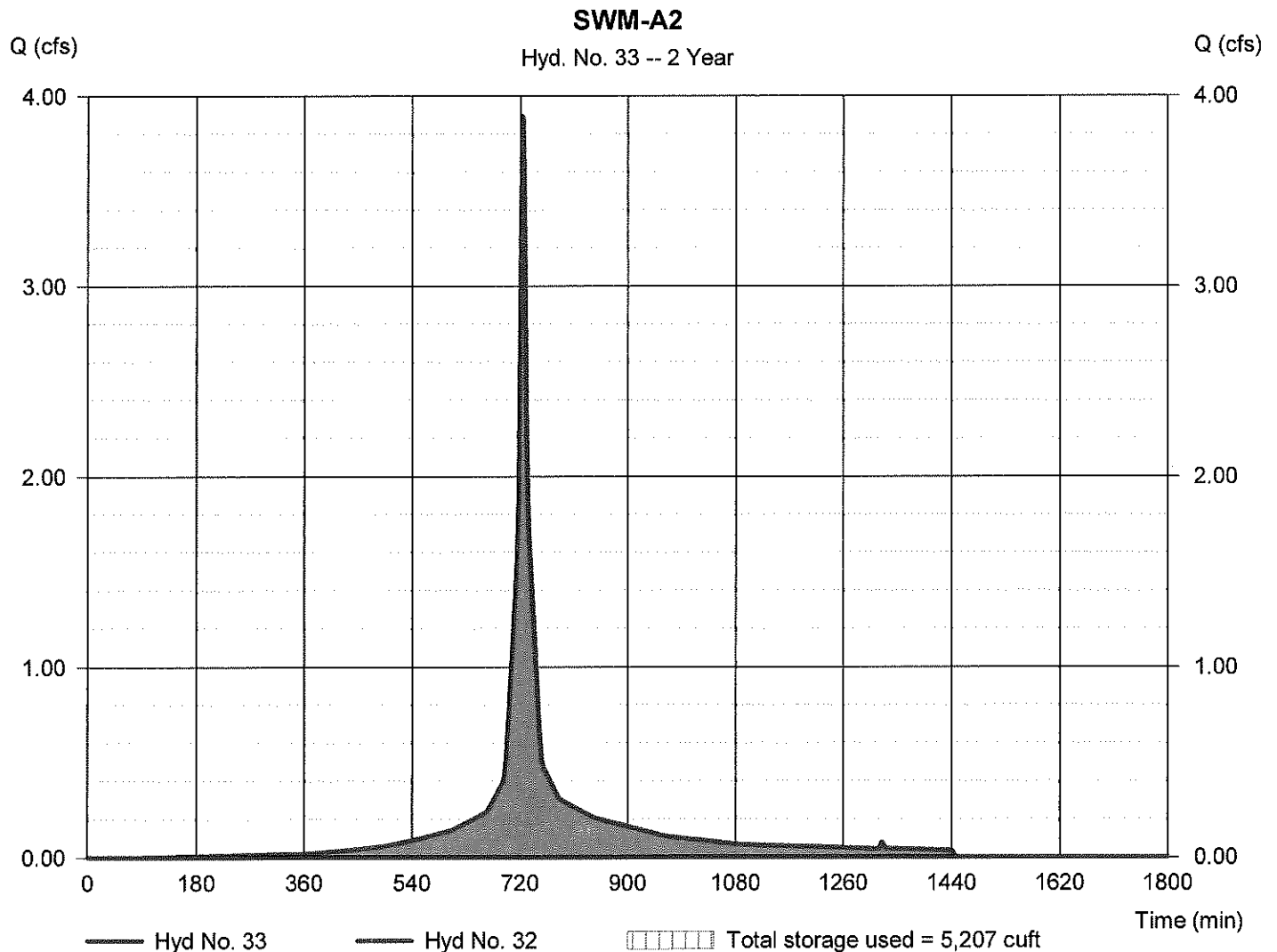
Monday, 11 / 25 / 2019

Hyd. No. 33

SWM-A2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - PDA-A2	Max. Elevation	= 600.65 ft
Reservoir name	= SWM-A2	Max. Storage	= 5,207 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - SWM-A2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 600.00 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	600.00	20,000	0	0
2.00	602.00	20,000	15,998	15,998

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(In/hr)	= 5.000	(by Contour)		
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	600.00	---	---	---	---	---	---	---	---	0.000	---	0.000
2.00	15,998	602.00	---	---	---	---	---	---	---	---	2.315	---	2.315

Hydrograph Report

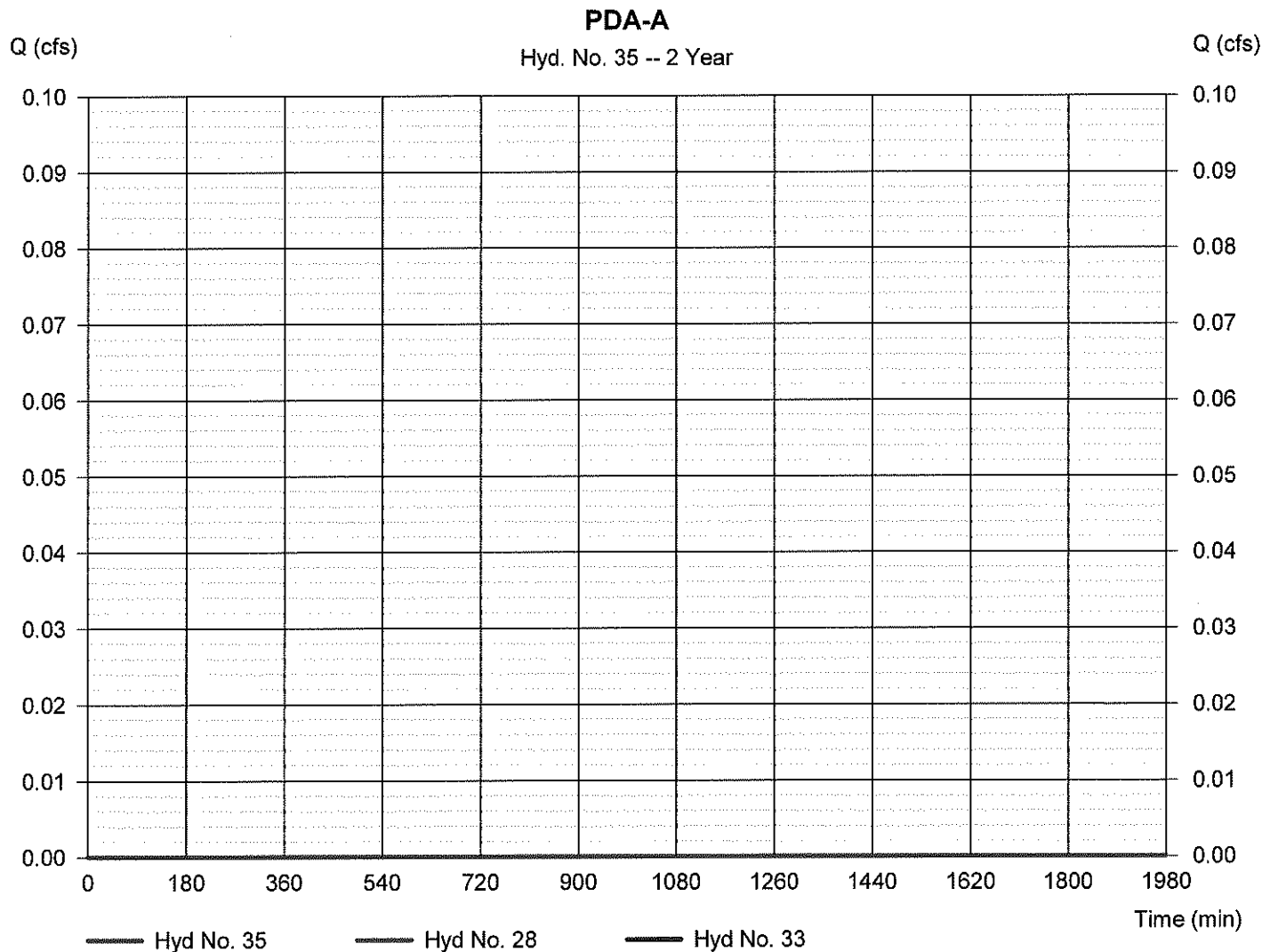
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Monday, 11 / 25 / 2019

Hyd. No. 35

PDA-A

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 1003 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 28, 33	Contrib. drain. area	= 0.000 ac



Hydrograph Report

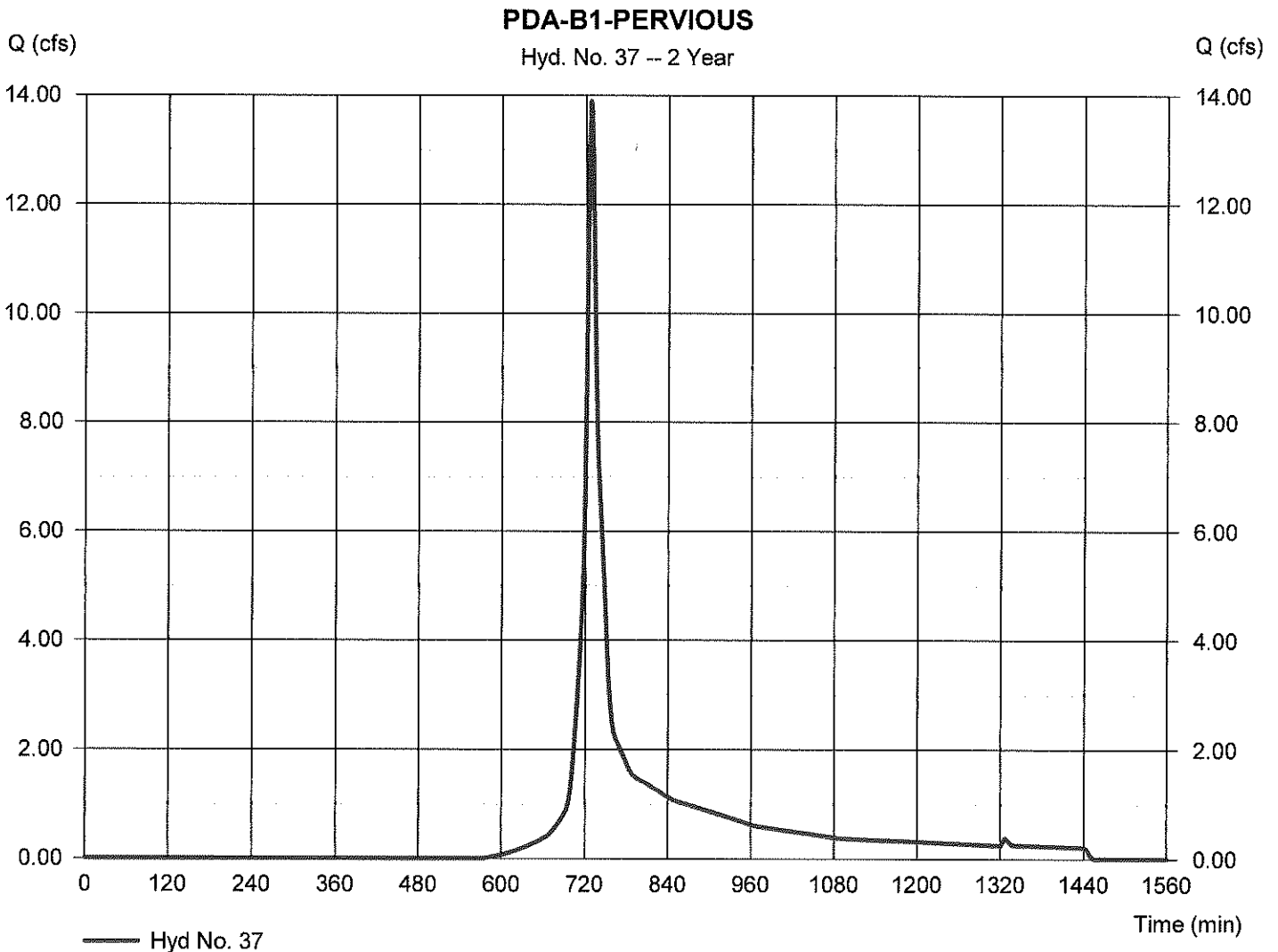
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 37

PDA-B1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 13.89 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 48,226 cuft
Drainage area	= 9.720 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 37

PDA-B1-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 0.20	0.00	0.00	
Travel Time (min)	= 3.02	+ 0.00	+ 0.00	= 3.02
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	458.00	0.00	
Watercourse slope (%)	= 0.00	0.30	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	1.11	0.00	
Travel Time (min)	= 0.00	+ 6.86	+ 0.00	= 6.86
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				9.90 min

Hydrograph Report

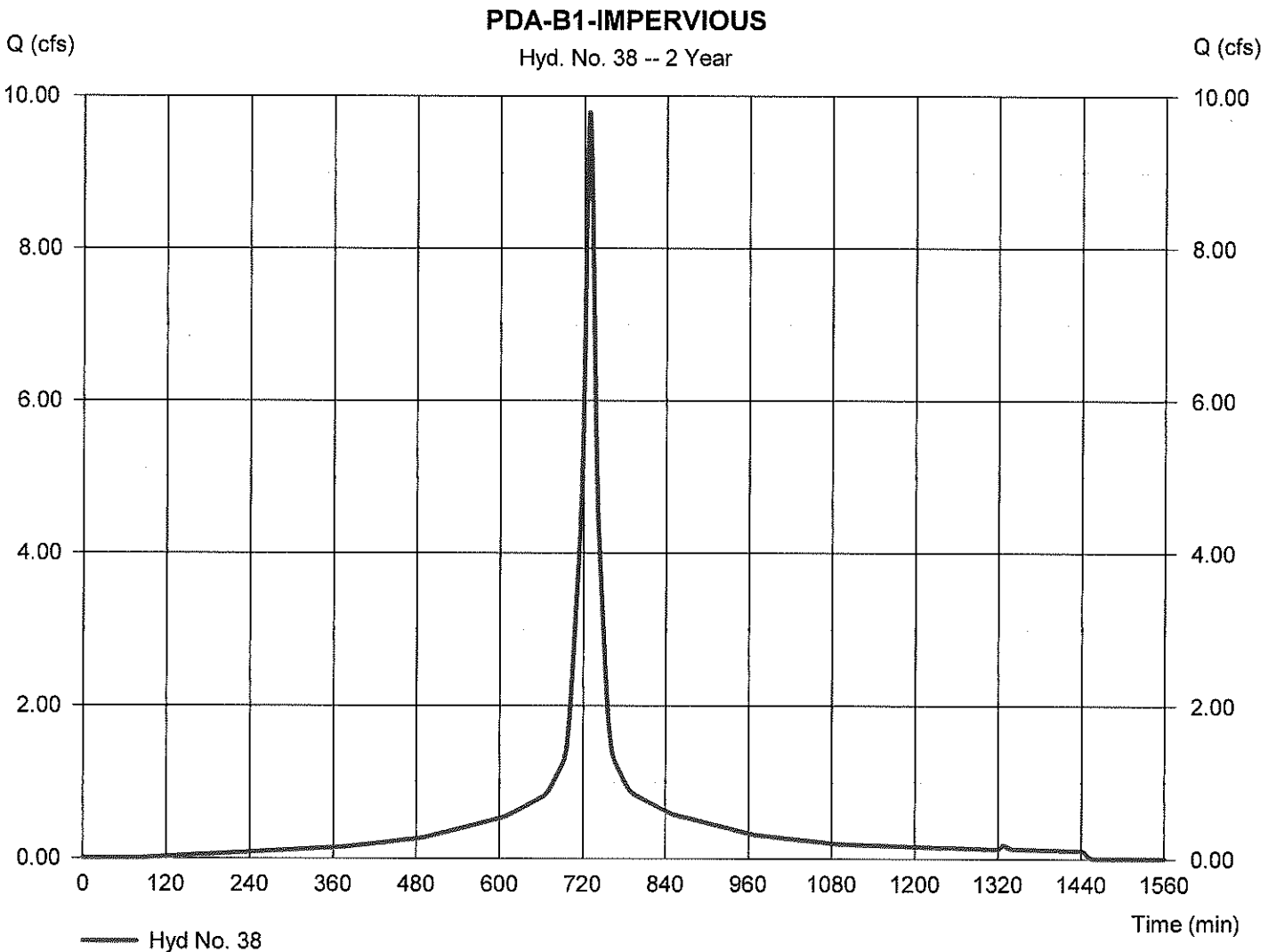
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Hyd. No. 38

PDA-B1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 9.784 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 39,779 cuft
Drainage area	= 3.580 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 38

PDA-B1-IMPERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.150	0.011	
Flow length (ft)	= 44.0	56.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	3.24	0.00	
Land slope (%)	= 0.90	3.60	0.00	
Travel Time (min)	= 0.86	+ 4.84	+ 0.00	= 5.70
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	442.00	
Watercourse slope (%)	= 0.00	0.00	0.50	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	0.00	1.44	
Travel Time (min)	= 0.00	+ 0.00	+ 5.12	= 5.12
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				10.80 min

Hydrograph Report

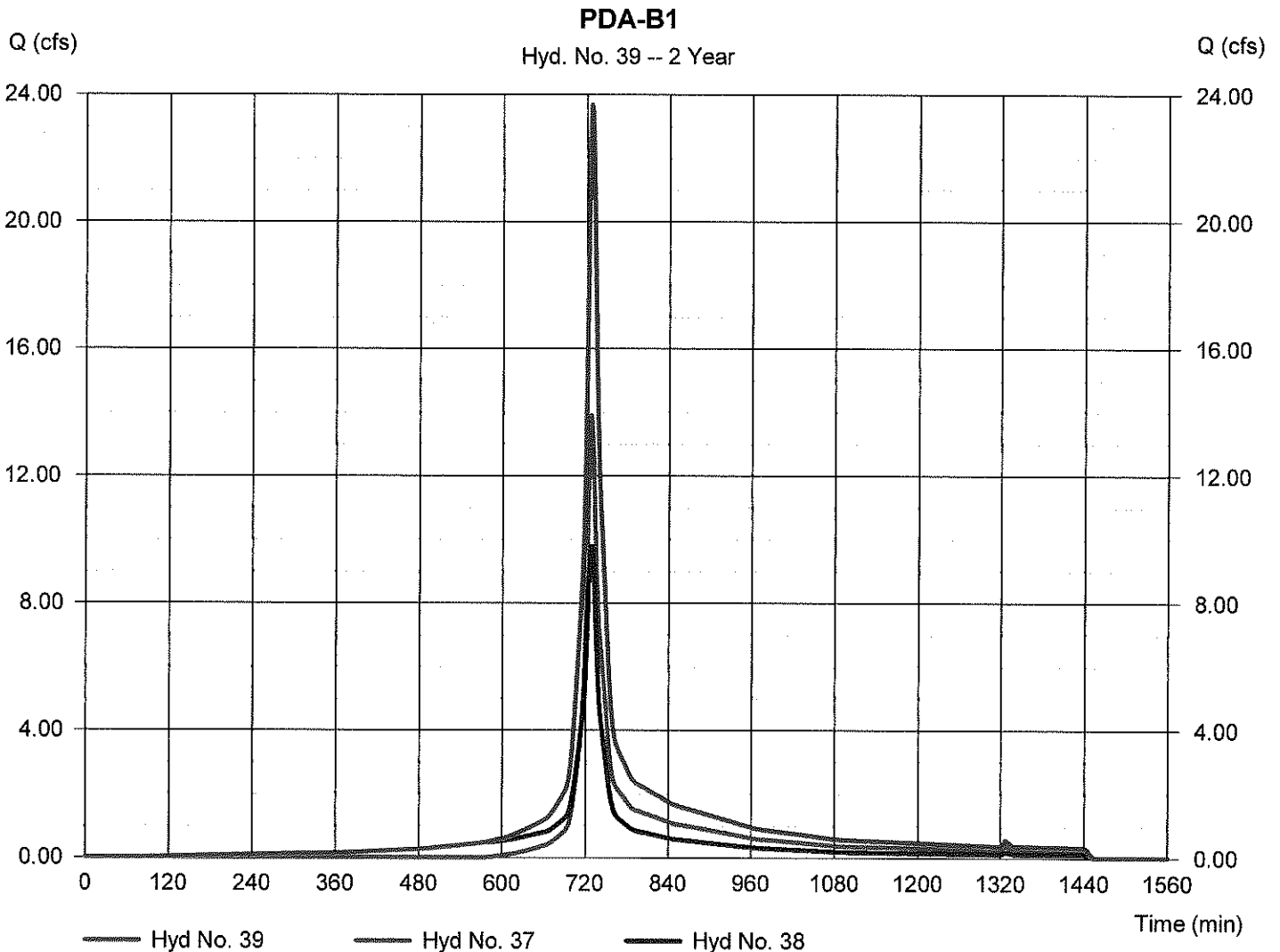
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 39

PDA-B1

Hydrograph type	= Combine	Peak discharge	= 23.68 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 88,006 cuft
Inflow hyds.	= 37, 38	Contrib. drain. area	= 13.300 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

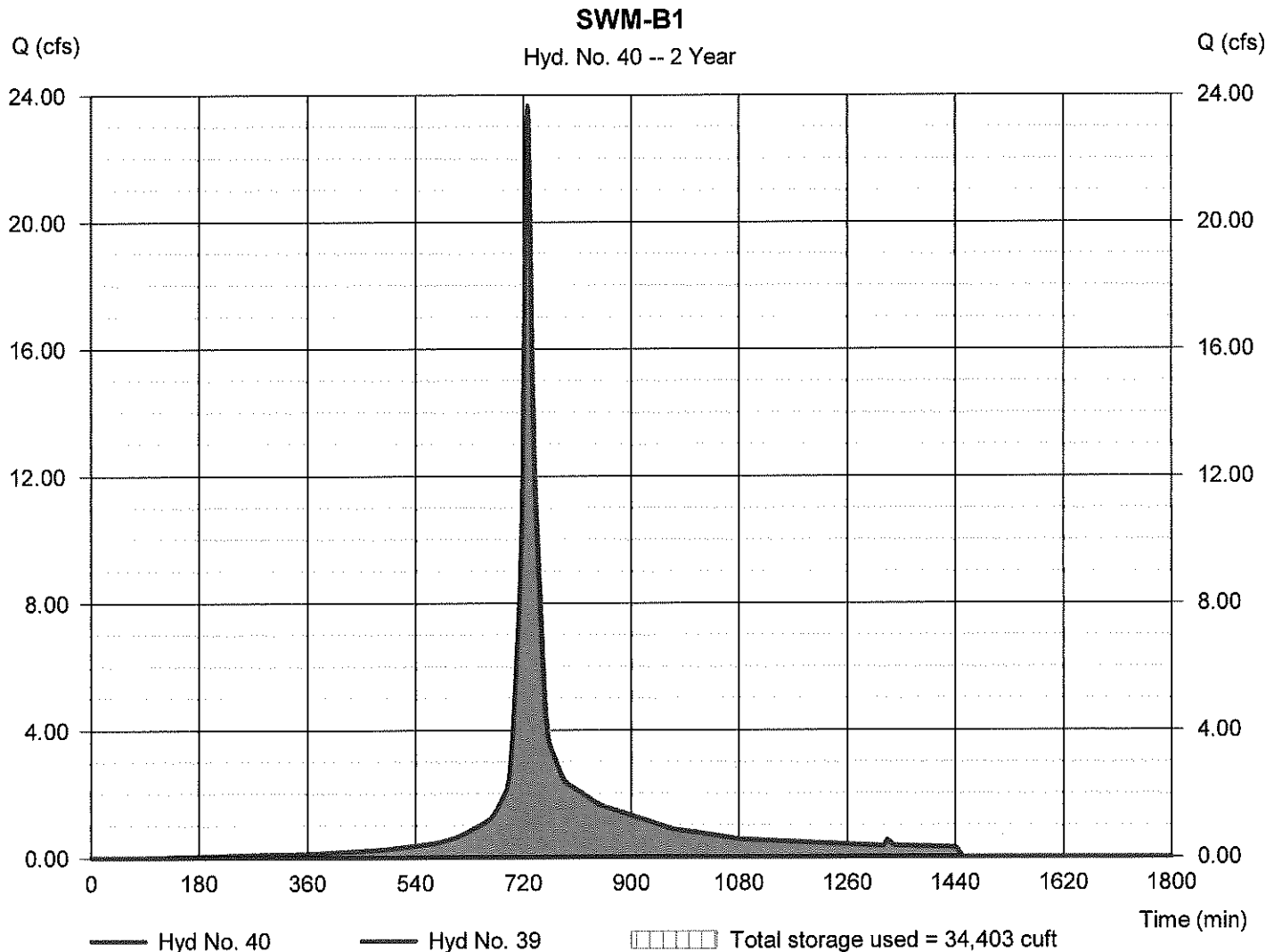
Monday, 11 / 25 / 2019

Hyd. No. 40

SWM-B1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 816 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 39 - PDA-B1	Max. Elevation	= 600.67 ft
Reservoir name	= SWM-B1	Max. Storage	= 34,403 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 6 - SWM-B1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 600.20 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	600.20	181,206	0	0
2.00	602.20	181,206	144,951	144,951

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	600.20	---	---	---	---	---	---	---	---	0.000	---	0.000
2.00	144,951	602.20	---	---	---	---	---	---	---	---	20.973	---	20.97

Hydrograph Report

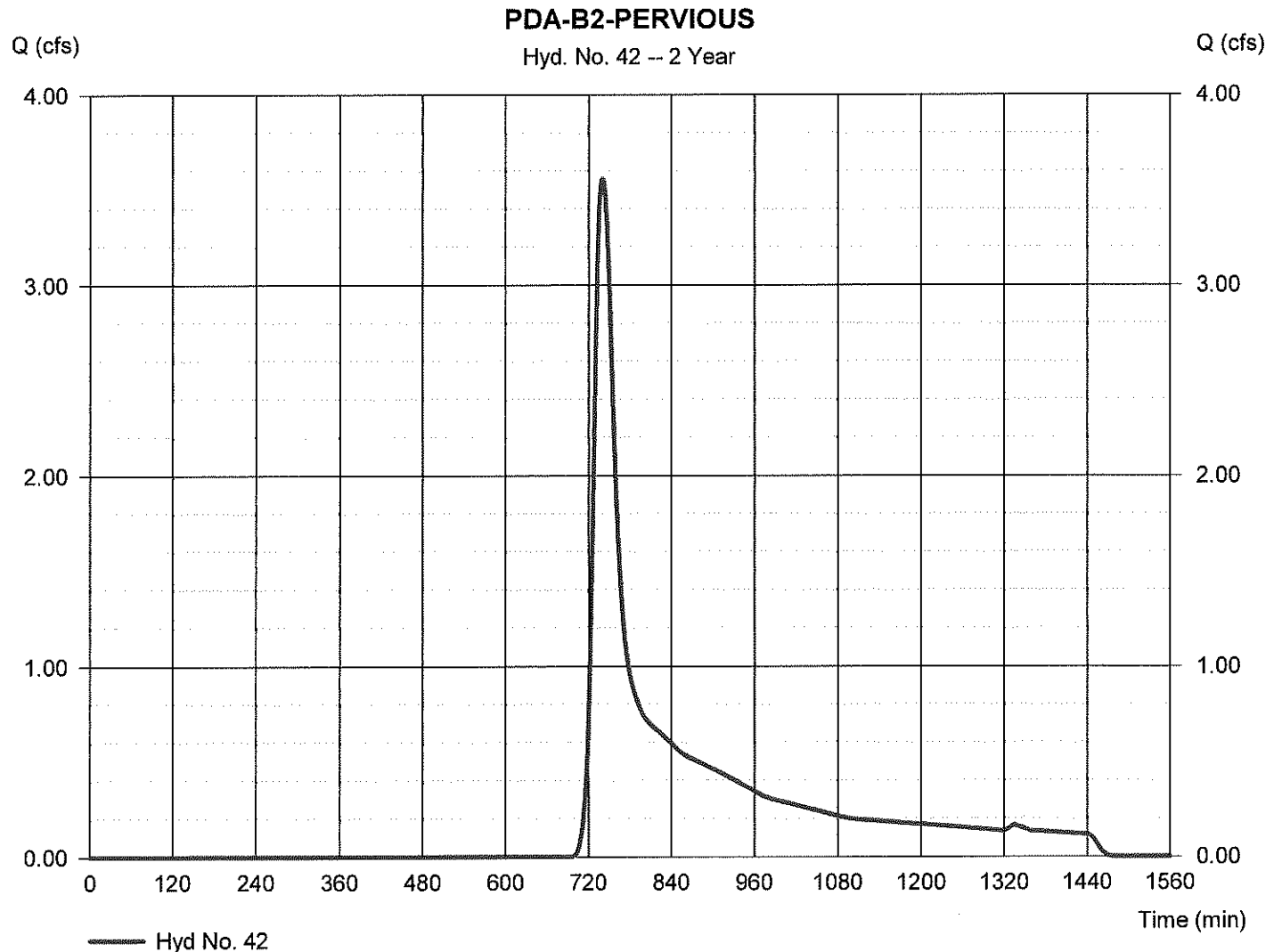
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 42

PDA-B2-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.559 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 1 min	Hyd. volume	= 19,617 cuft
Drainage area	= 7.700 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 42

PDA-B2-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 0.20	0.00	0.00	
Travel Time (min)	= 3.02	+ 0.00	+ 0.00	= 3.02
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	1280.00	0.00	
Watercourse slope (%)	= 0.00	0.30	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	1.11	0.00	
Travel Time (min)	= 0.00	+ 19.16	+ 0.00	= 19.16
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				22.20 min

Hydrograph Report

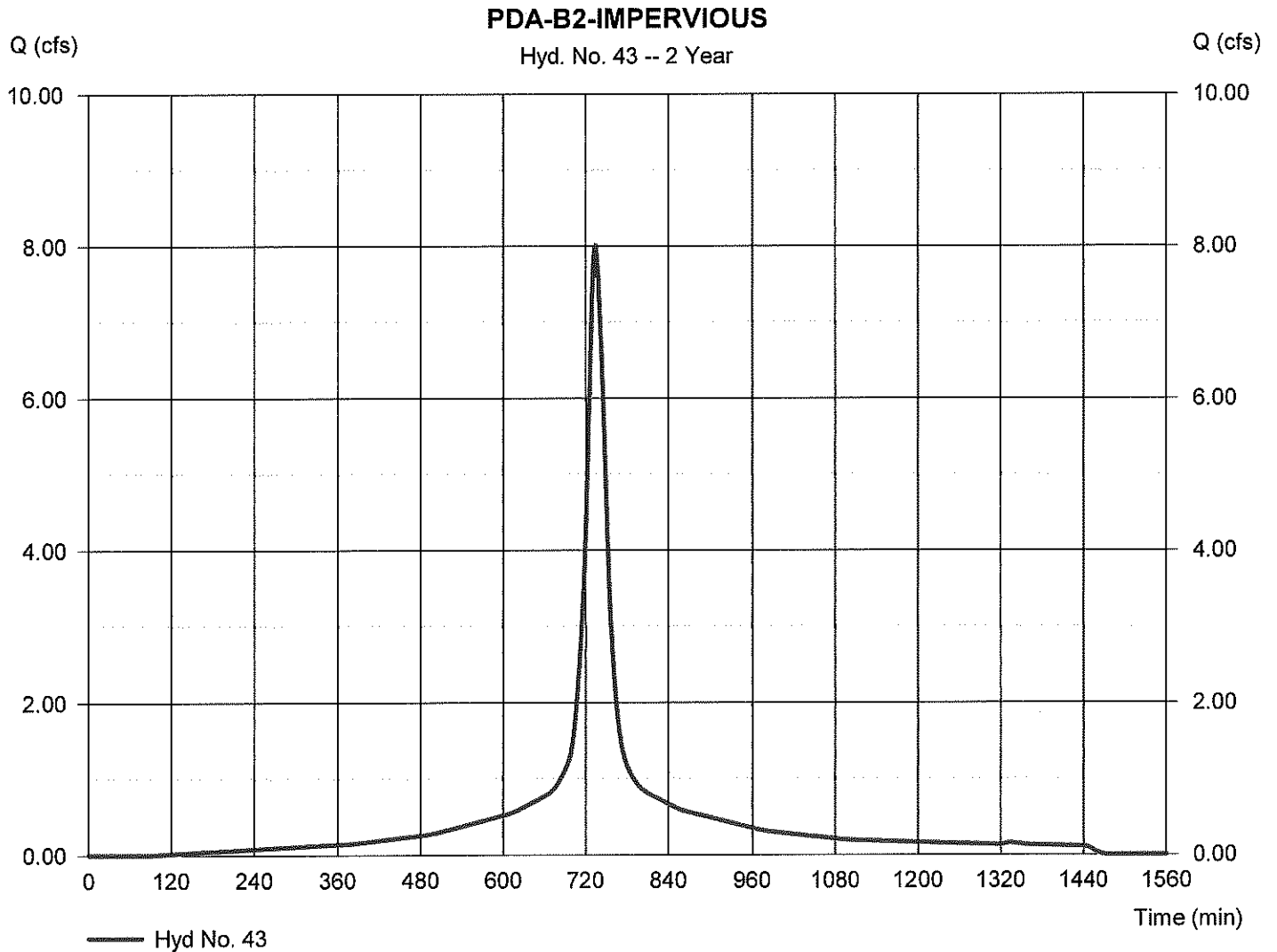
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 43

PDA-B2-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 8.015 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 40,670 cuft
Drainage area	= 3.690 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.90 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 43

PDA-B2-IMPERVIOUS

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow							
Manning's n-value	= 0.011		0.150		0.011		
Flow length (ft)	= 14.0		86.0		0.0		
Two-year 24-hr precip. (in)	= 3.24		3.24		0.00		
Land slope (%)	= 0.90		11.60		0.00		
Travel Time (min)	= 0.34	+	4.27	+	0.00	=	4.62
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		1401.00		
Watercourse slope (%)	= 0.00		0.00		0.50		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		1.44		
Travel Time (min)	= 0.00	+	0.00	+	16.24	=	16.24
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	{0}0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							20.90 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

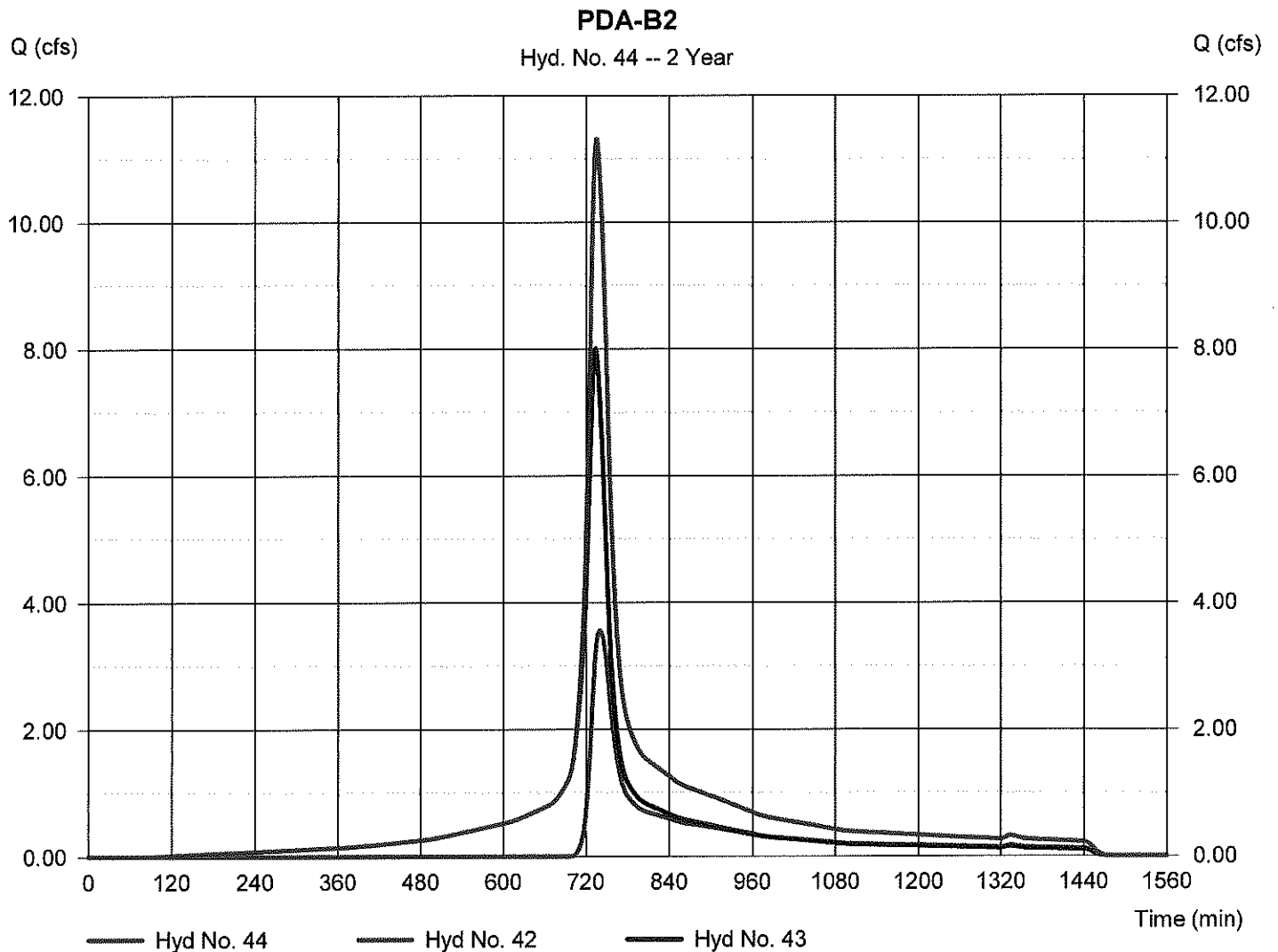
Monday, 11 / 25 / 2019

Hyd. No. 44

PDA-B2

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 42, 43

Peak discharge = 11.32 cfs
Time to peak = 735 min
Hyd. volume = 60,286 cuft
Contrib. drain. area = 11.390 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

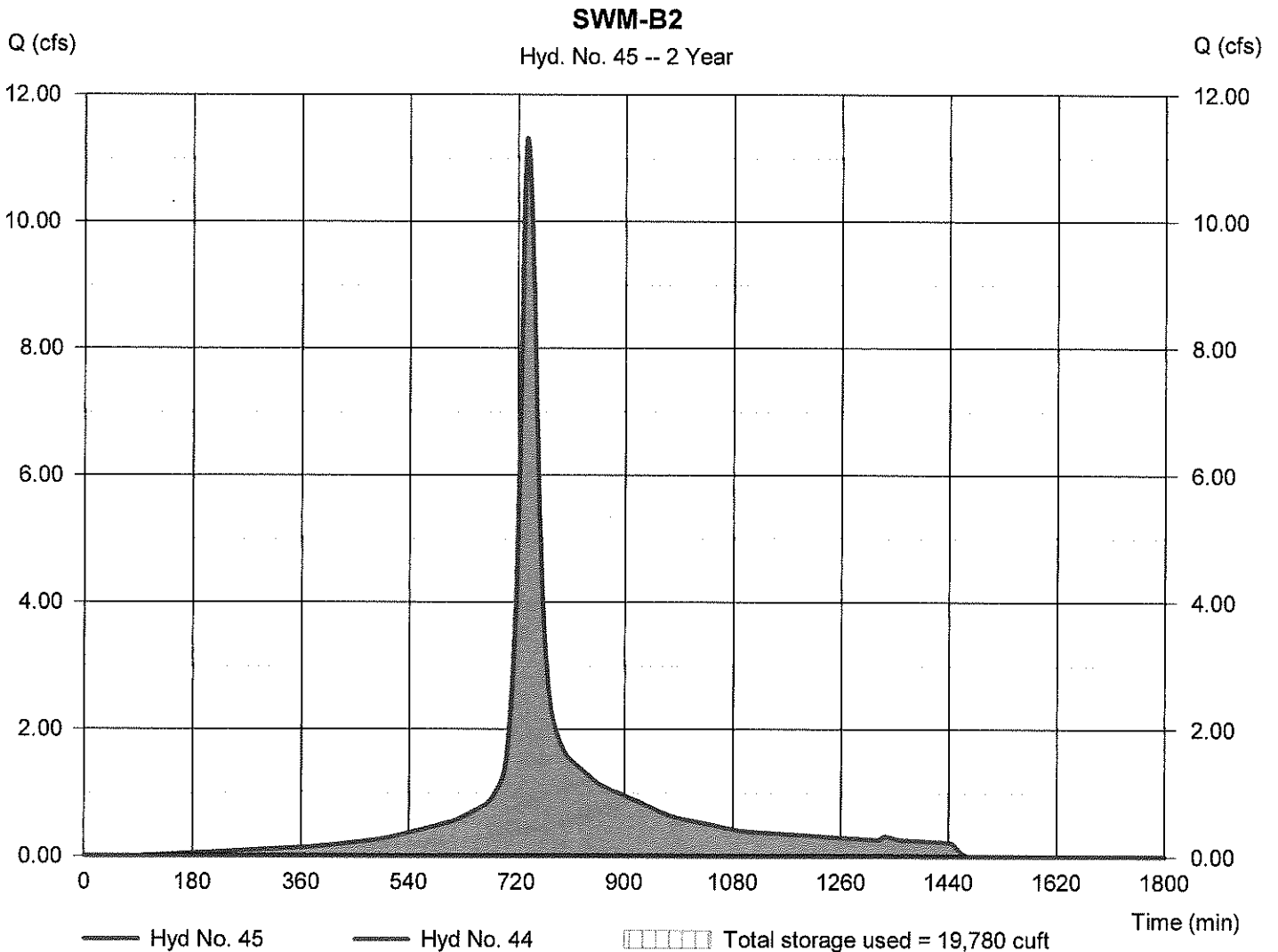
Monday, 11 / 25 / 2019

Hyd. No. 45

SWM-B2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 44 - PDA-B2	Max. Elevation	= 597.44 ft
Reservoir name	= SWM-B2	Max. Storage	= 19,780 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 5 - SWM-B2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 597.10 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	597.10	147,346	0	0
1.50	598.60	147,346	88,399	88,399

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000	(by Contour)		
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	597.10	---	---	---	---	---	---	---	---	0.000	---	0.000
1.50	88,399	598.60	---	---	---	---	---	---	---	---	17.054	---	17.05

Hydrograph Report

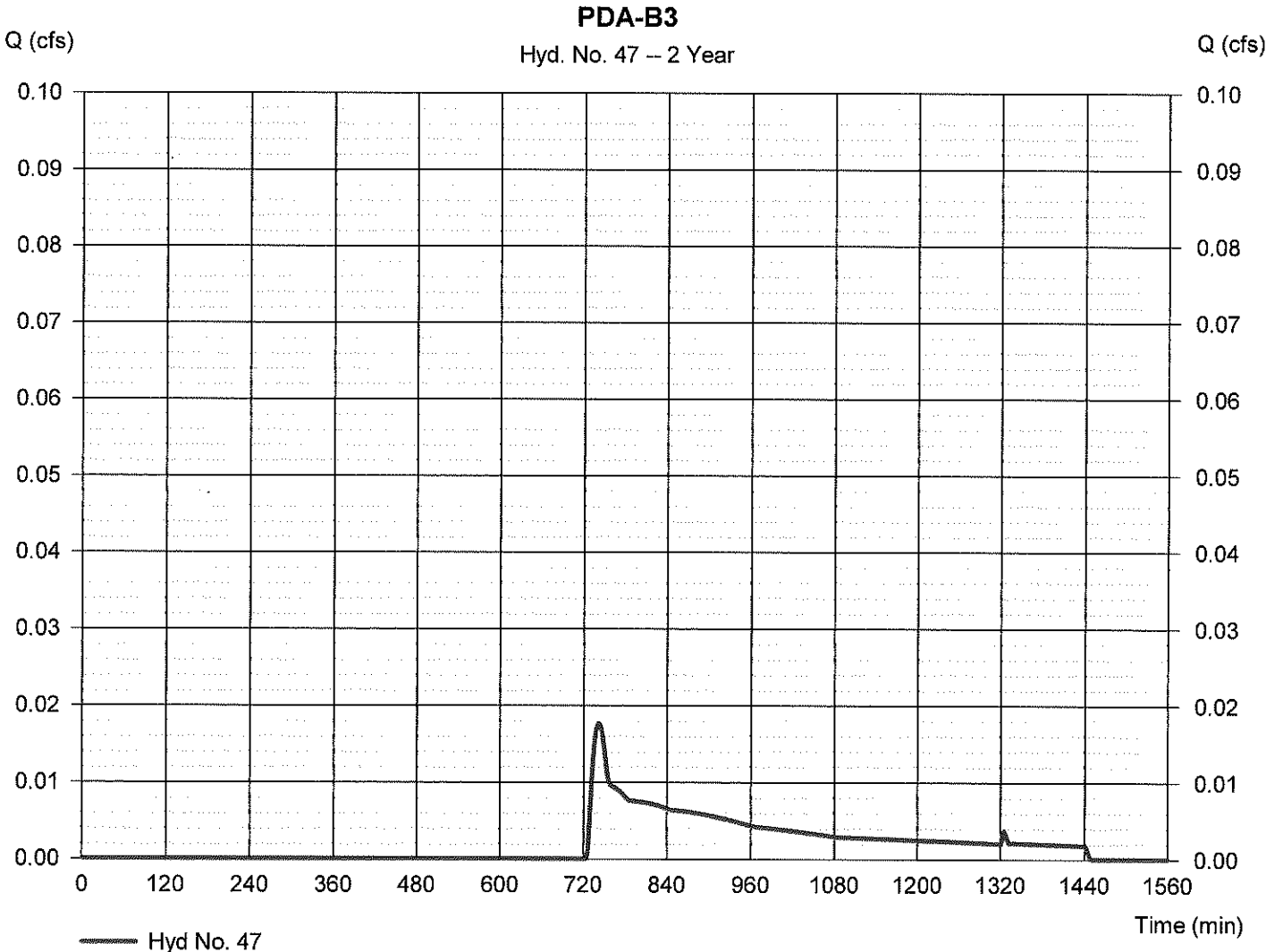
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Monday, 11 / 25 / 2019

Hyd. No. 47

PDA-B3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.018 cfs
Storm frequency	= 2 yrs	Time to peak	= 741 min
Time interval	= 1 min	Hyd. volume	= 179 cuft
Drainage area	= 0.230 ac	Curve number	= 53
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

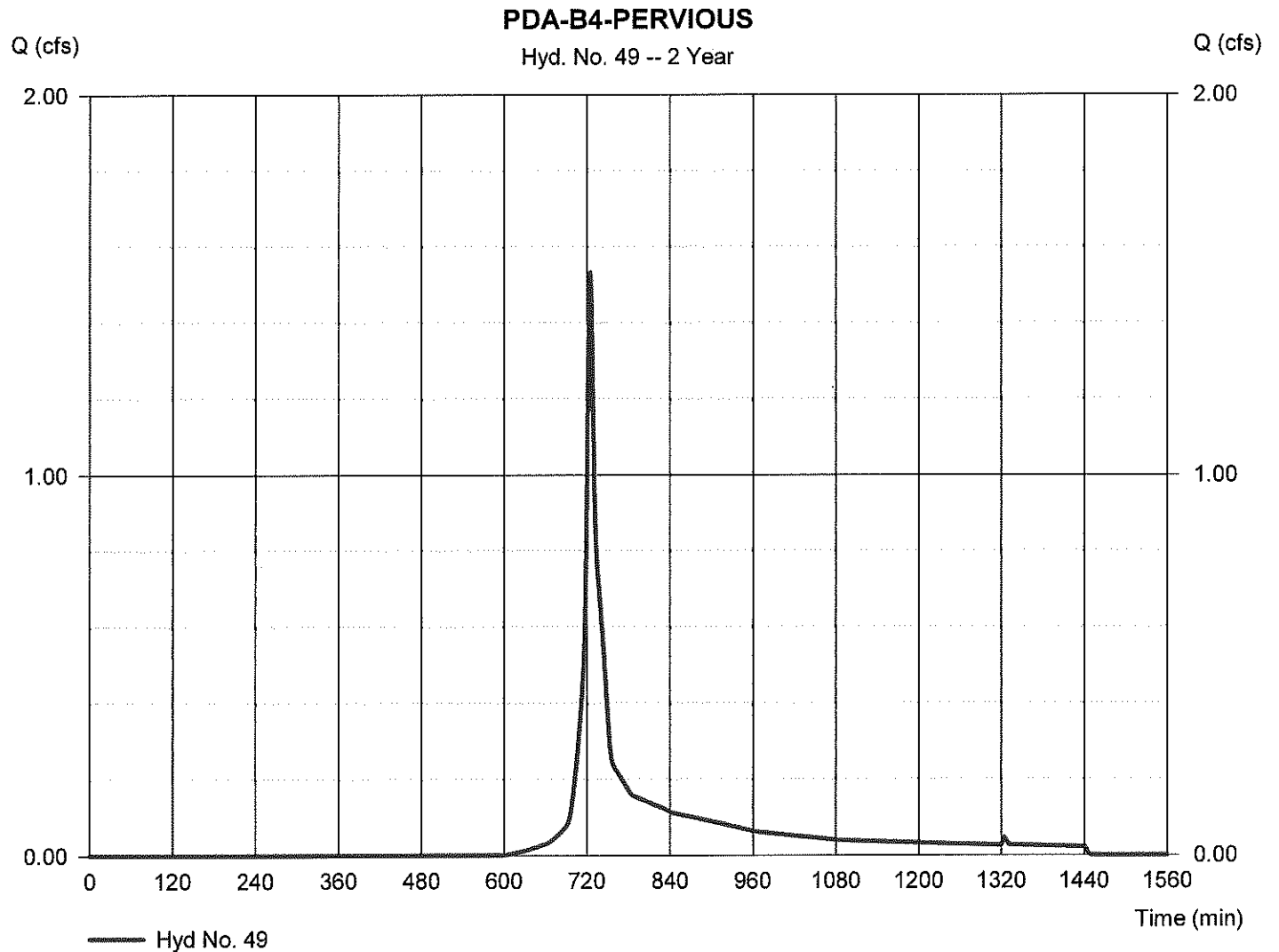
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 49

PDA-B4-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.533 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 4,829 cuft
Drainage area	= 1.040 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

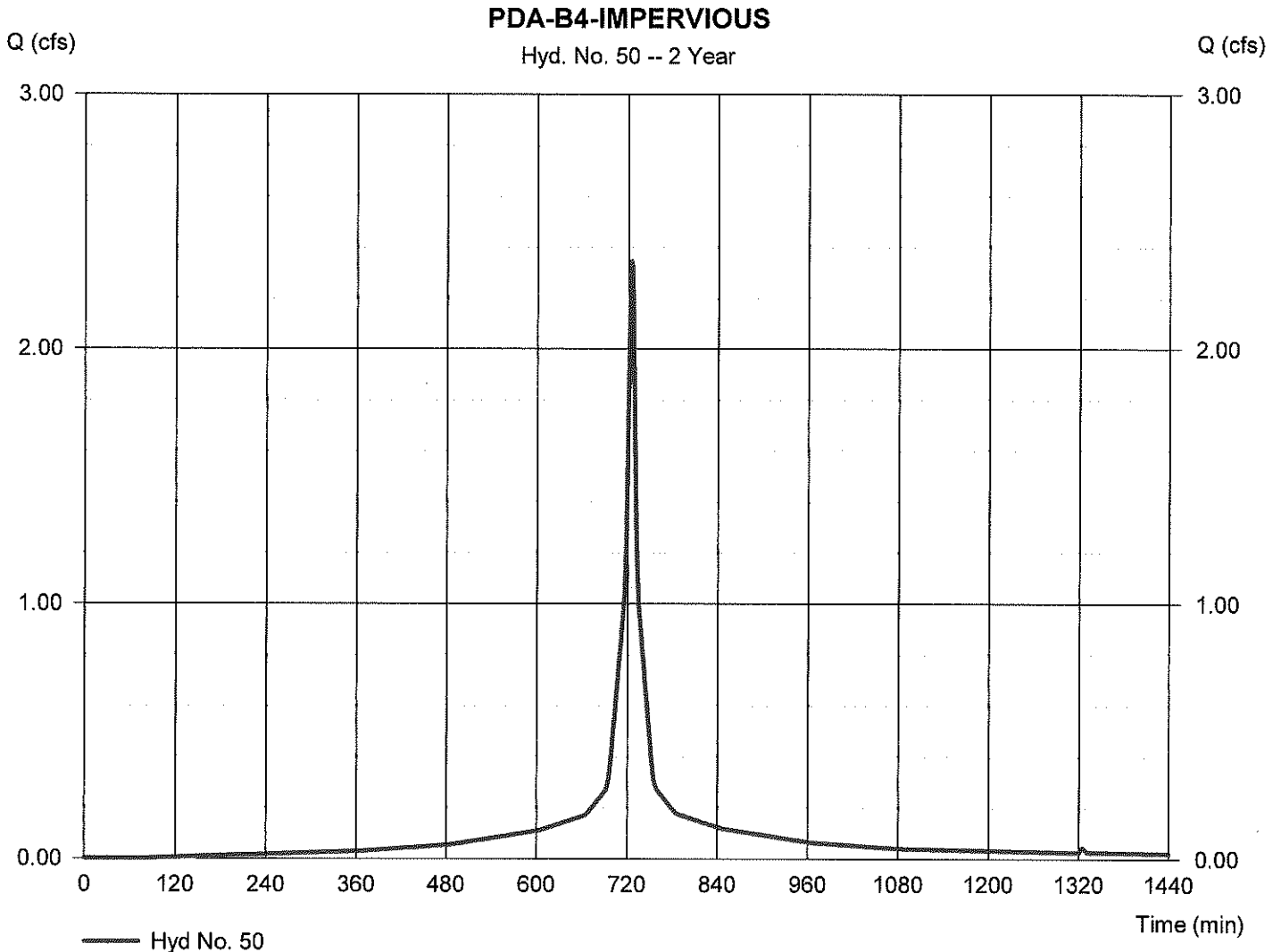
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 50

PDA-B4-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.343 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 8,106 cuft
Drainage area	= 0.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

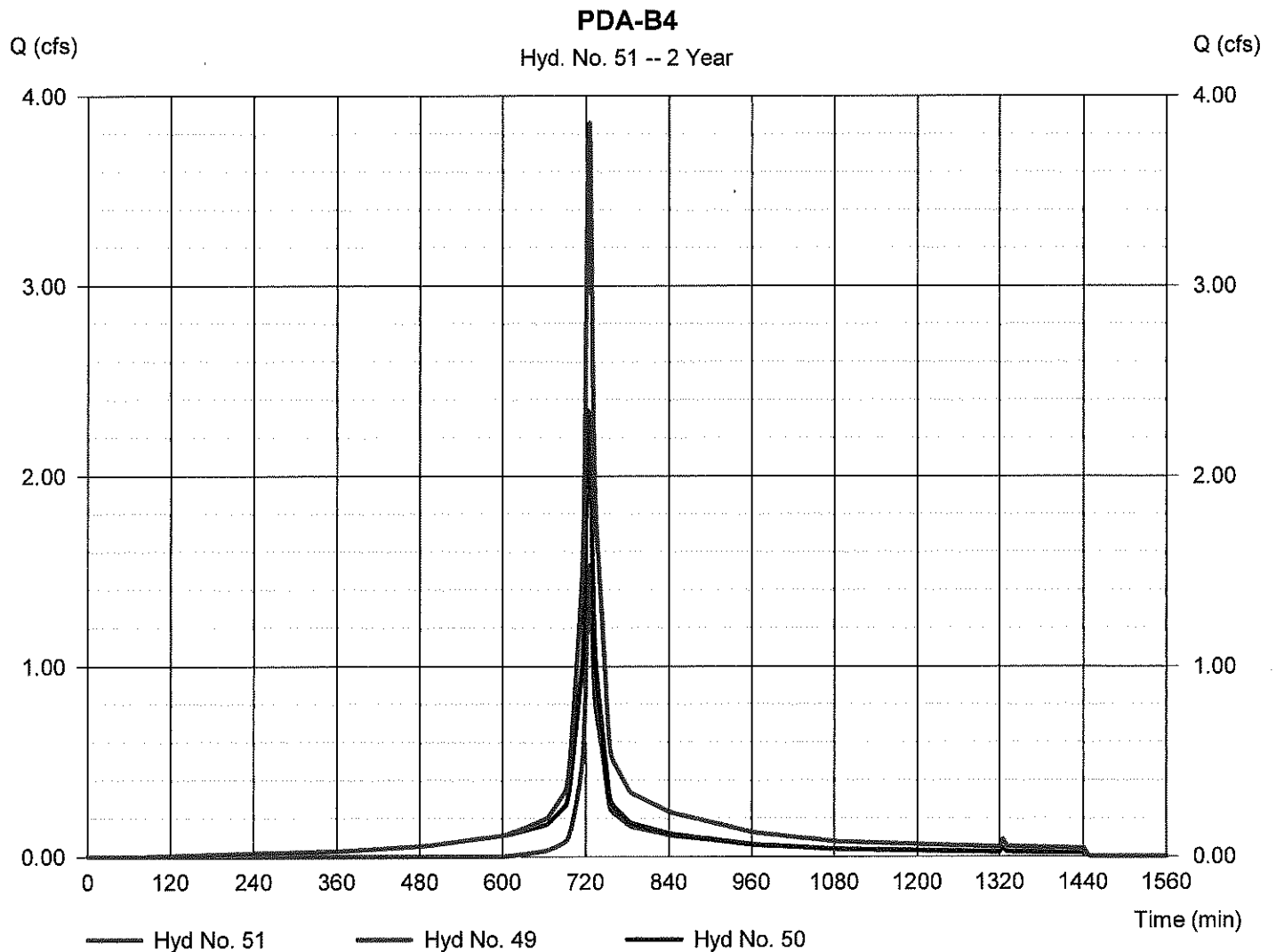
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 51

PDA-B4

Hydrograph type	= Combine	Peak discharge	= 3.859 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 12,935 cuft
Inflow hyds.	= 49, 50	Contrib. drain. area	= 1.760 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

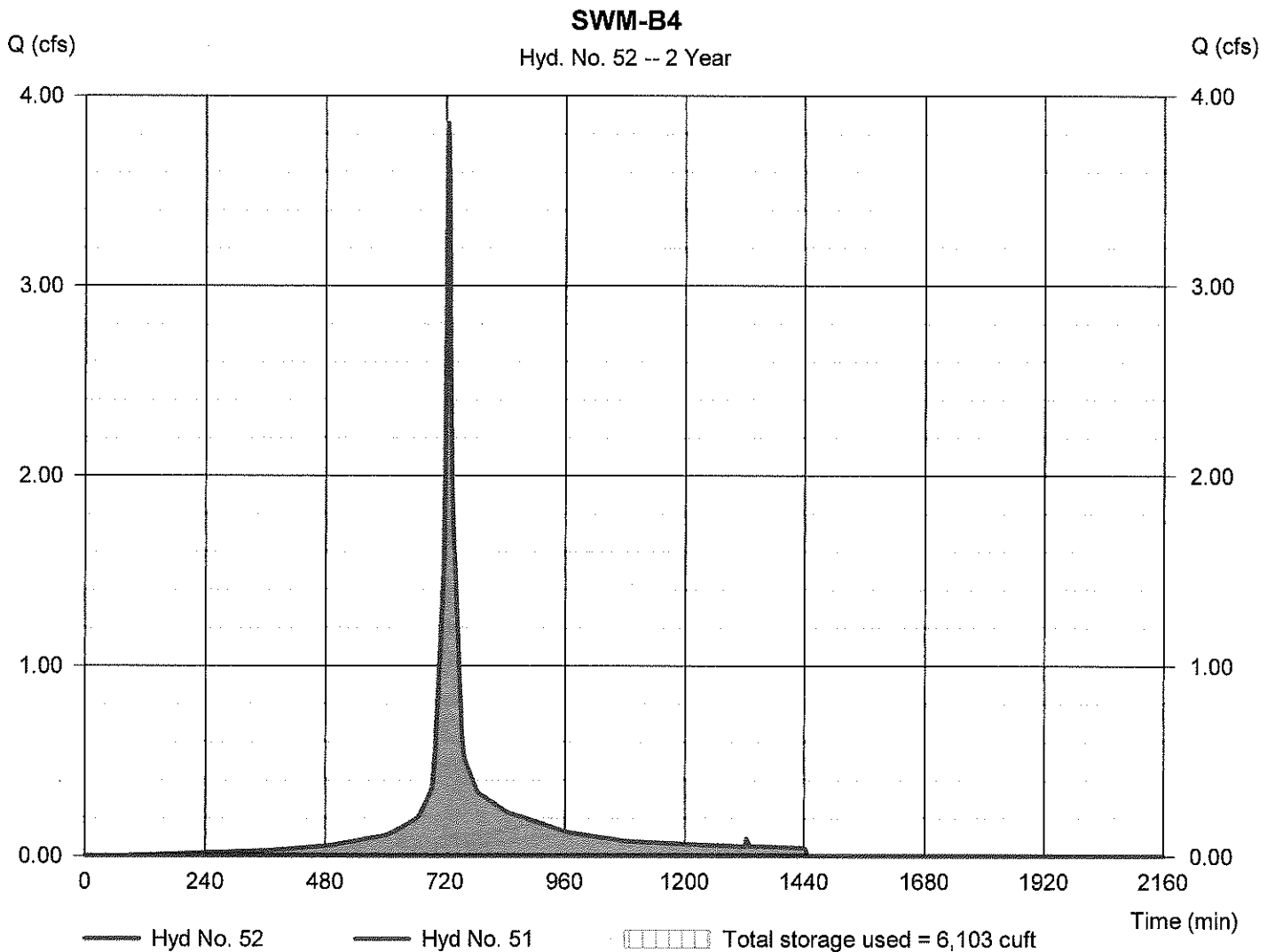
Monday, 11 / 25 / 2019

Hyd. No. 52

SWM-B4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 51 - PDA-B4	Max. Elevation	= 595.94 ft
Reservoir name	= SWM-B4	Max. Storage	= 6,103 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 2 - SWM-B4

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 595.00 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	595.00	16,286	0	0
4.00	599.00	16,286	26,055	26,055

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)	= 1.00	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	595.00	---	---	---	---	---	---	---	---	0.000	---	0.000
4.00	26,055	599.00	---	---	---	---	---	---	---	---	1.885	---	1.885

Hydrograph Report

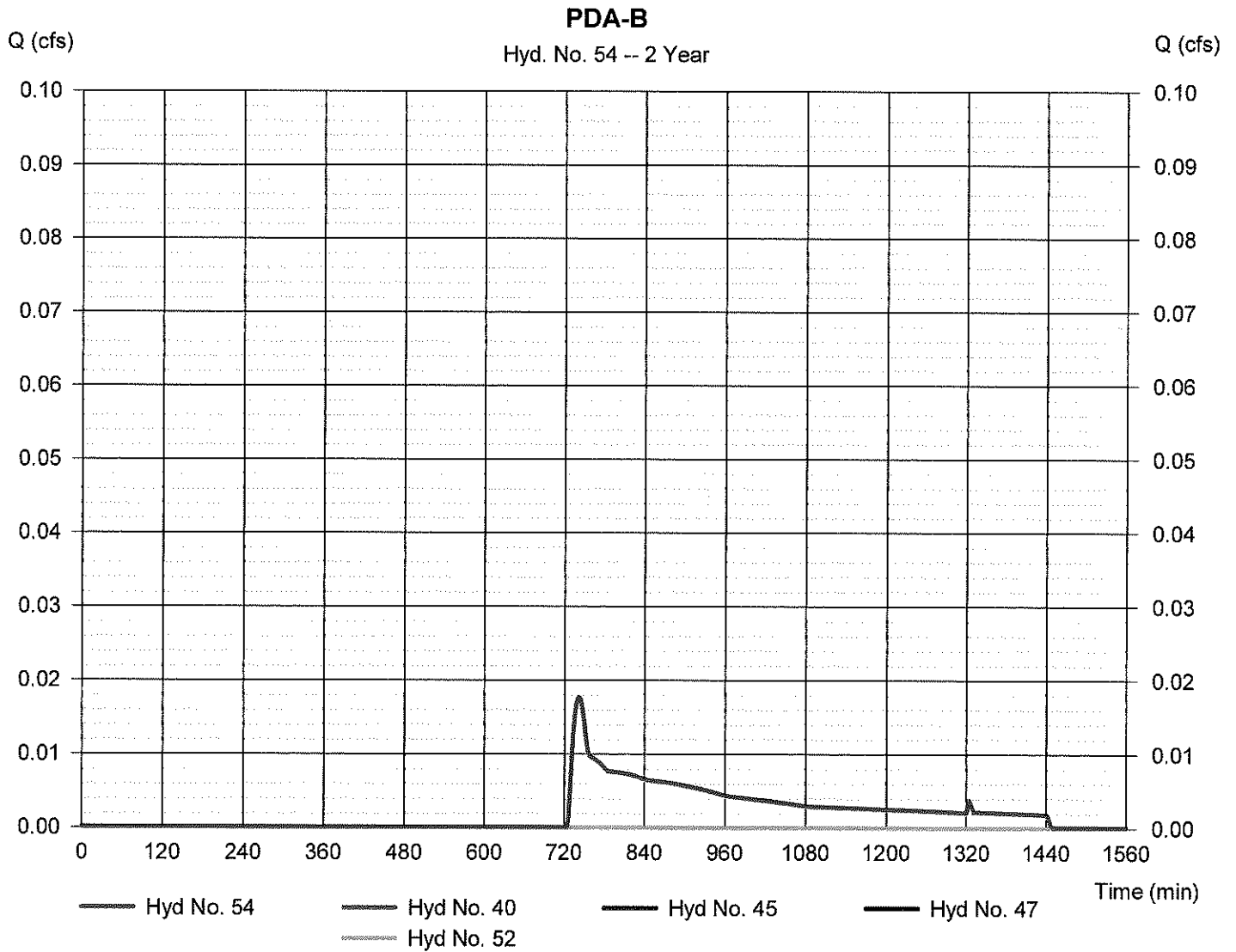
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 54

PDA-B

Hydrograph type	= Combine	Peak discharge	= 0.018 cfs
Storm frequency	= 2 yrs	Time to peak	= 741 min
Time interval	= 1 min	Hyd. volume	= 179 cuft
Inflow hyds.	= 40, 45, 47, 52	Contrib. drain. area	= 0.230 ac



Hydrograph Report

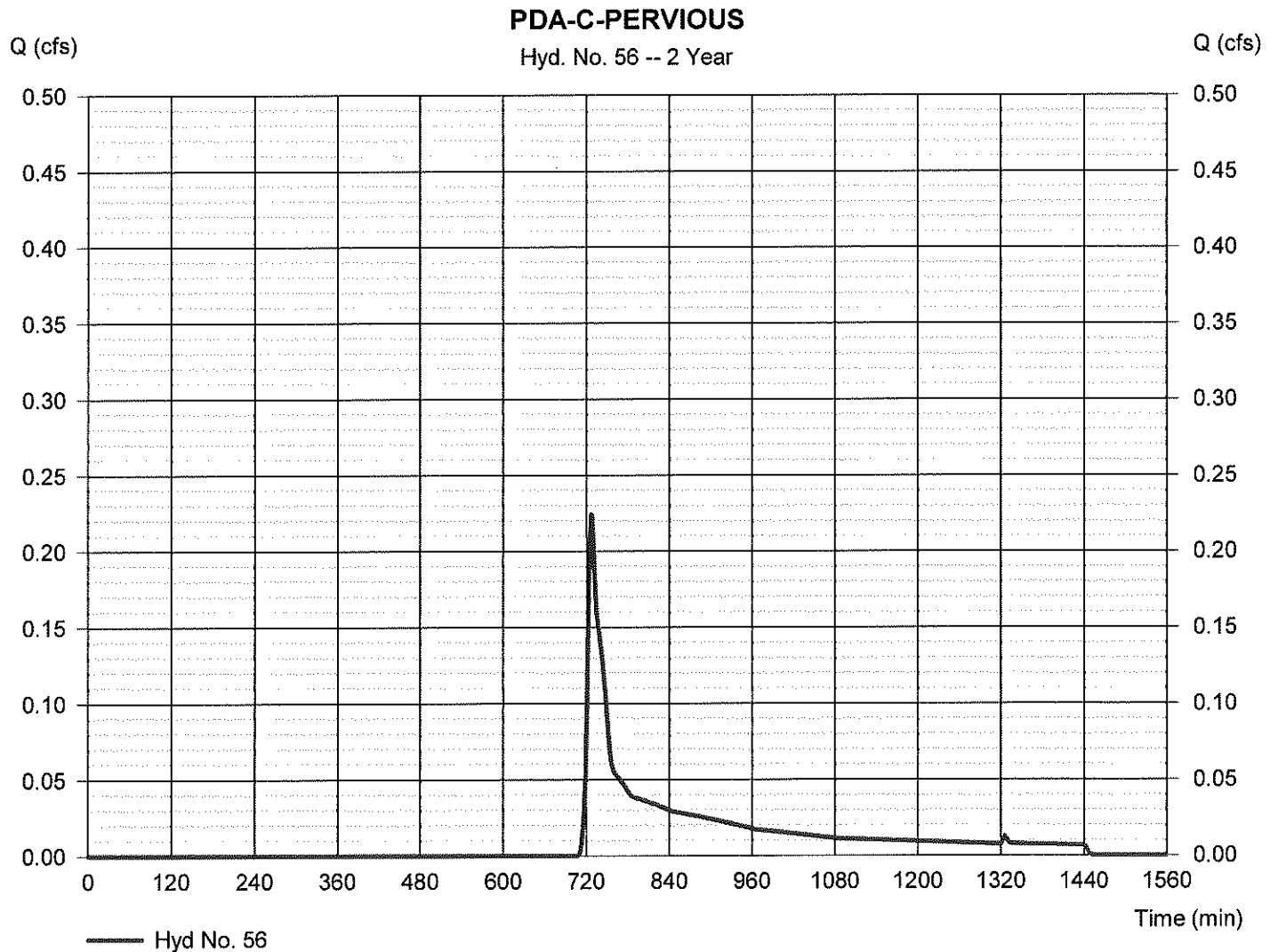
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 56

PDA-C-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.224 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 989 cuft
Drainage area	= 0.520 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 56

PDA-C-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 6.00	0.00	0.00	
Travel Time (min)	= 6.27	+ 0.00	+ 0.00	= 6.27
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	102.00	0.00	
Watercourse slope (%)	= 0.00	3.00	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	2.79	0.00	
Travel Time (min)	= 0.00	+ 0.61	+ 0.00	= 0.61
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				6.90 min

Hydrograph Report

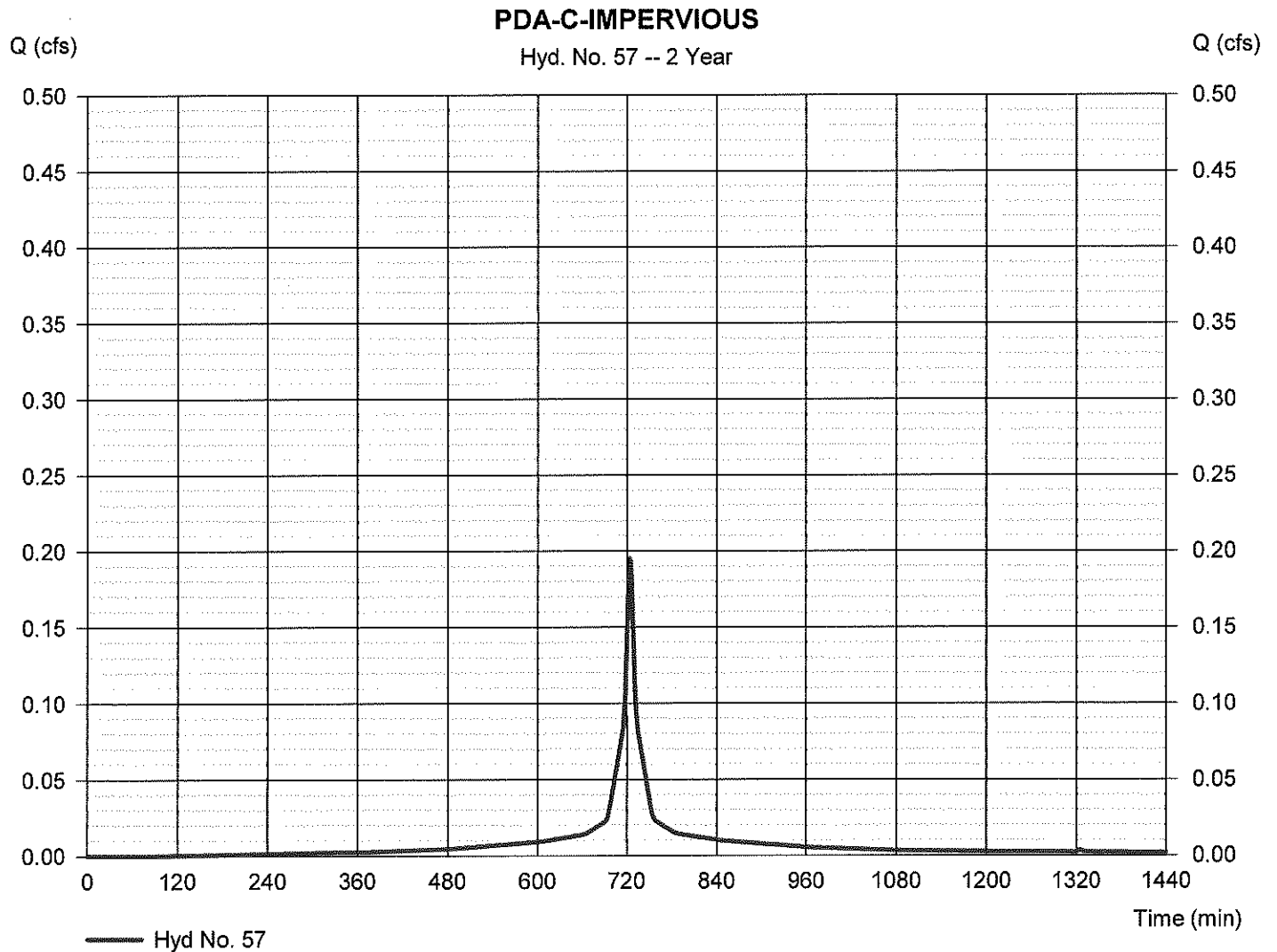
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 57

PDA-C-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.195 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 675 cuft
Drainage area	= 0.060 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.50 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



— Hyd No. 57

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 57

PDA-C-IMPERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.150	0.011	
Flow length (ft)	= 14.0	86.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	3.24	0.00	
Land slope (%)	= 3.00	6.00	0.00	
Travel Time (min)	= 0.21	+ 5.56	+ 0.00	= 5.77
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	110.00	
Watercourse slope (%)	= 0.00	0.00	2.50	
Surface description	= Paved	Paved	Unpaved	
Average velocity (ft/s)	=0.00	0.00	2.55	
Travel Time (min)	= 0.00	+ 0.00	+ 0.72	= 0.72
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				6.50 min

Hydrograph Report

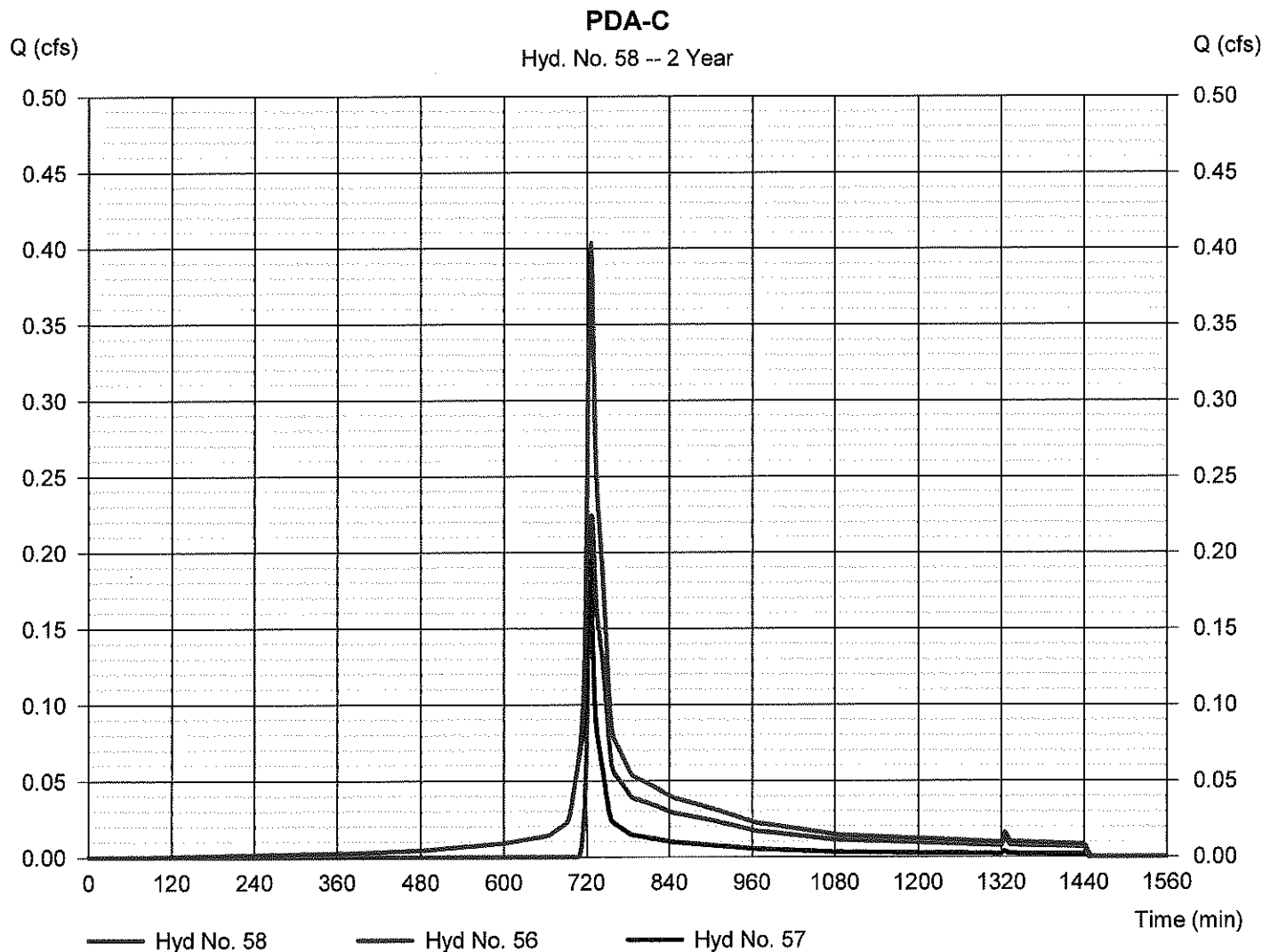
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Monday, 11 / 25 / 2019

Hyd. No. 58

PDA-C

Hydrograph type	= Combine	Peak discharge	= 0.404 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,664 cuft
Inflow hyds.	= 56, 57	Contrib. drain. area	= 0.580 ac



Hydrograph Report

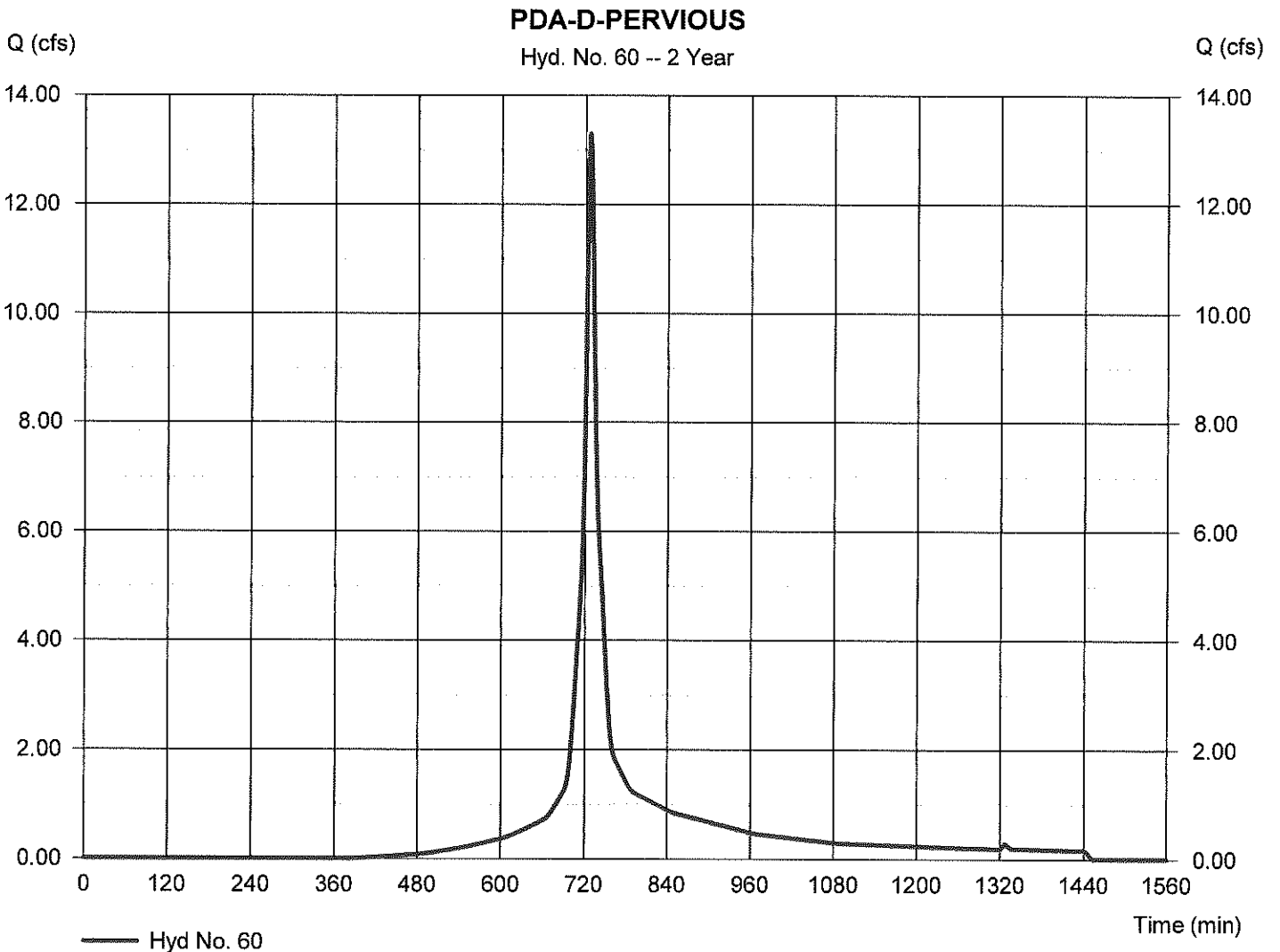
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 60

PDA-D-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 13.30 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 45,901 cuft
Drainage area	= 5.970 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 60

PDA-D-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 51.0	49.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	3.24	0.00	
Land slope (%)	= 40.00	4.60	0.00	
Travel Time (min)	= 3.76	+ 0.49	+ 0.00	= 4.24
Shallow Concentrated Flow				
Flow length (ft)	= 456.00	149.00	202.00	
Watercourse slope (%)	= 3.40	1.30	0.70	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=3.75	2.32	1.70	
Travel Time (min)	= 2.03	+ 1.07	+ 1.98	= 5.08
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				9.30 min

Hydrograph Report

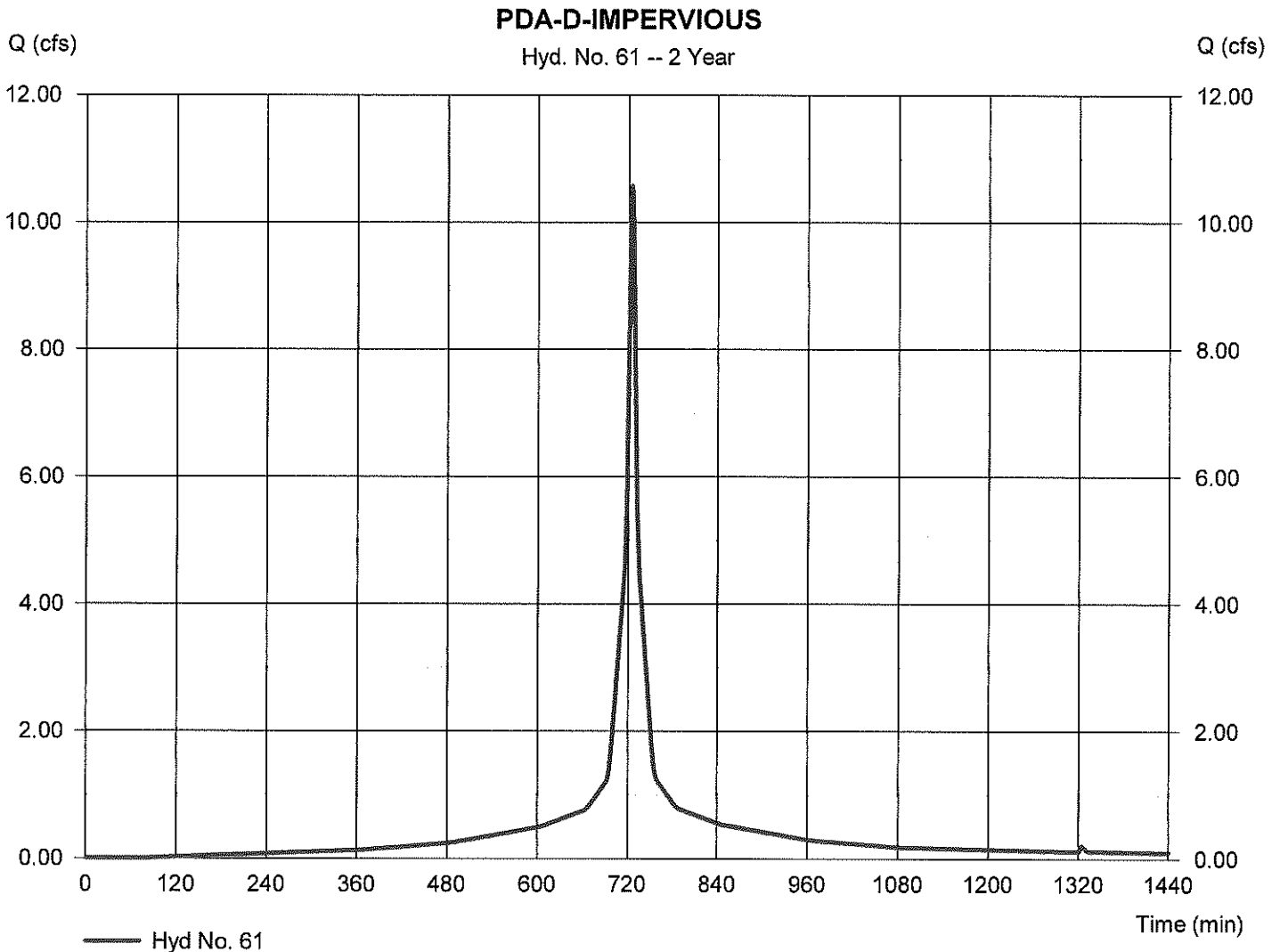
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 61

PDA-D-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 10.58 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 36,588 cuft
Drainage area	= 3.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

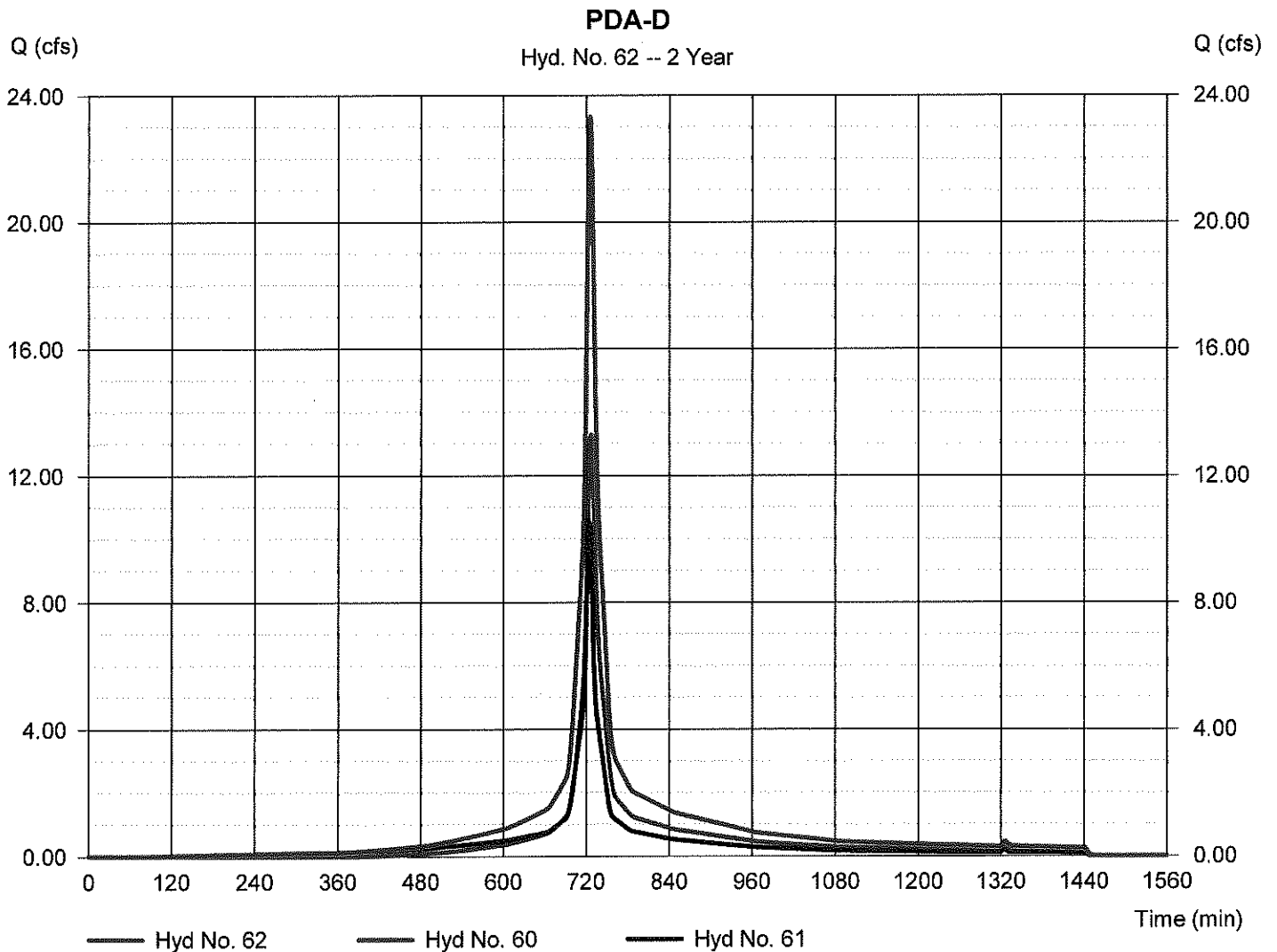
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 62

PDA-D

Hydrograph type	= Combine	Peak discharge	= 23.34 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 82,489 cuft
Inflow hyds.	= 60, 61	Contrib. drain. area	= 9.220 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

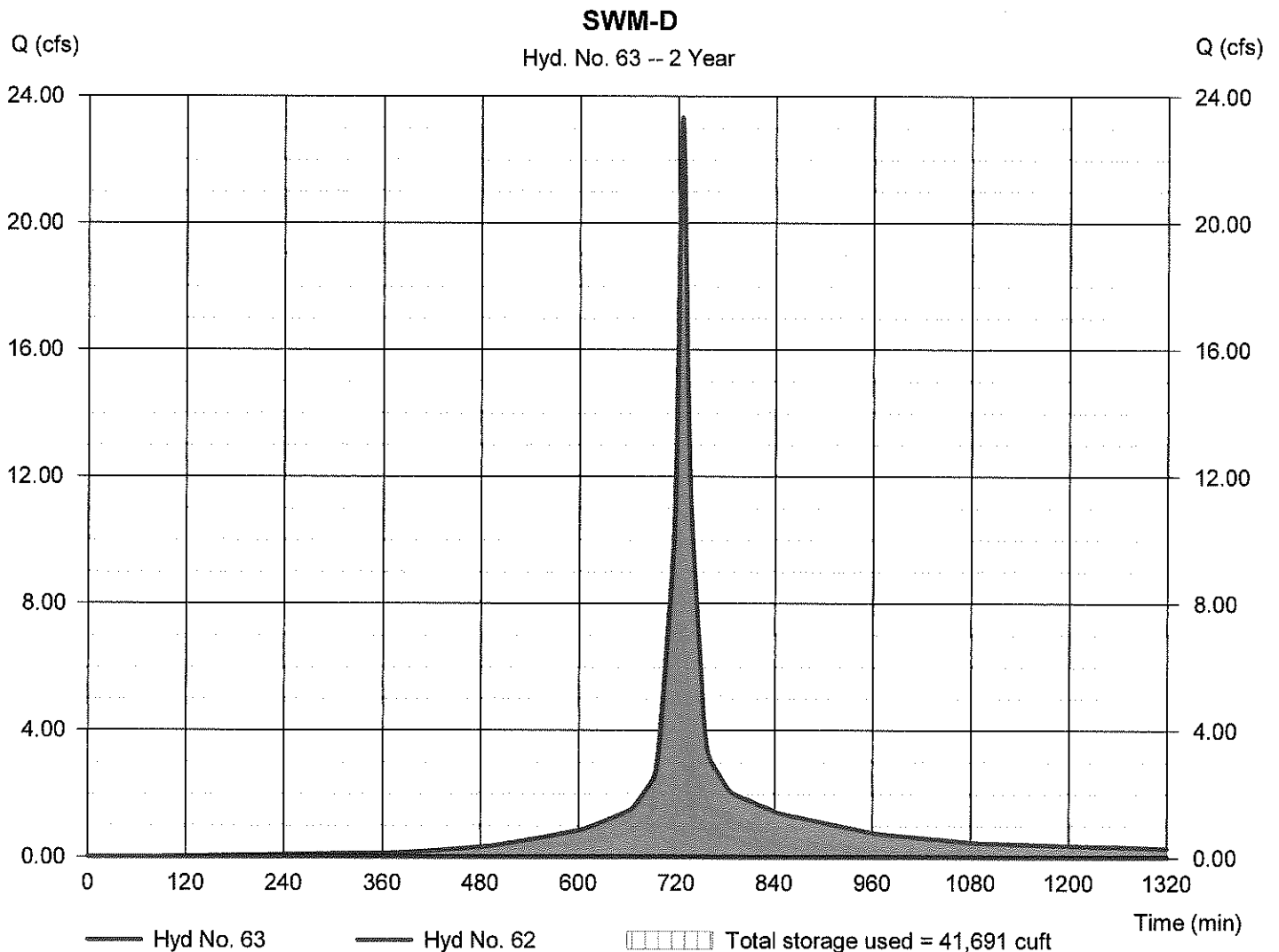
Monday, 11 / 25 / 2019

Hyd. No. 63

SWM-D

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 907 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 62 - PDA-D	Max. Elevation	= 598.58 ft
Reservoir name	= SWM-D	Max. Storage	= 41,691 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 7 - SWM-D

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 597.00 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	597.00	65,978	0	0
4.50	601.50	65,978	118,749	118,749

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	597.00	---	---	---	---	---	---	---	---	0.000	---	0.000
4.50	118,749	601.50	---	---	---	---	---	---	---	---	7.636	---	7.636

Hydrograph Report

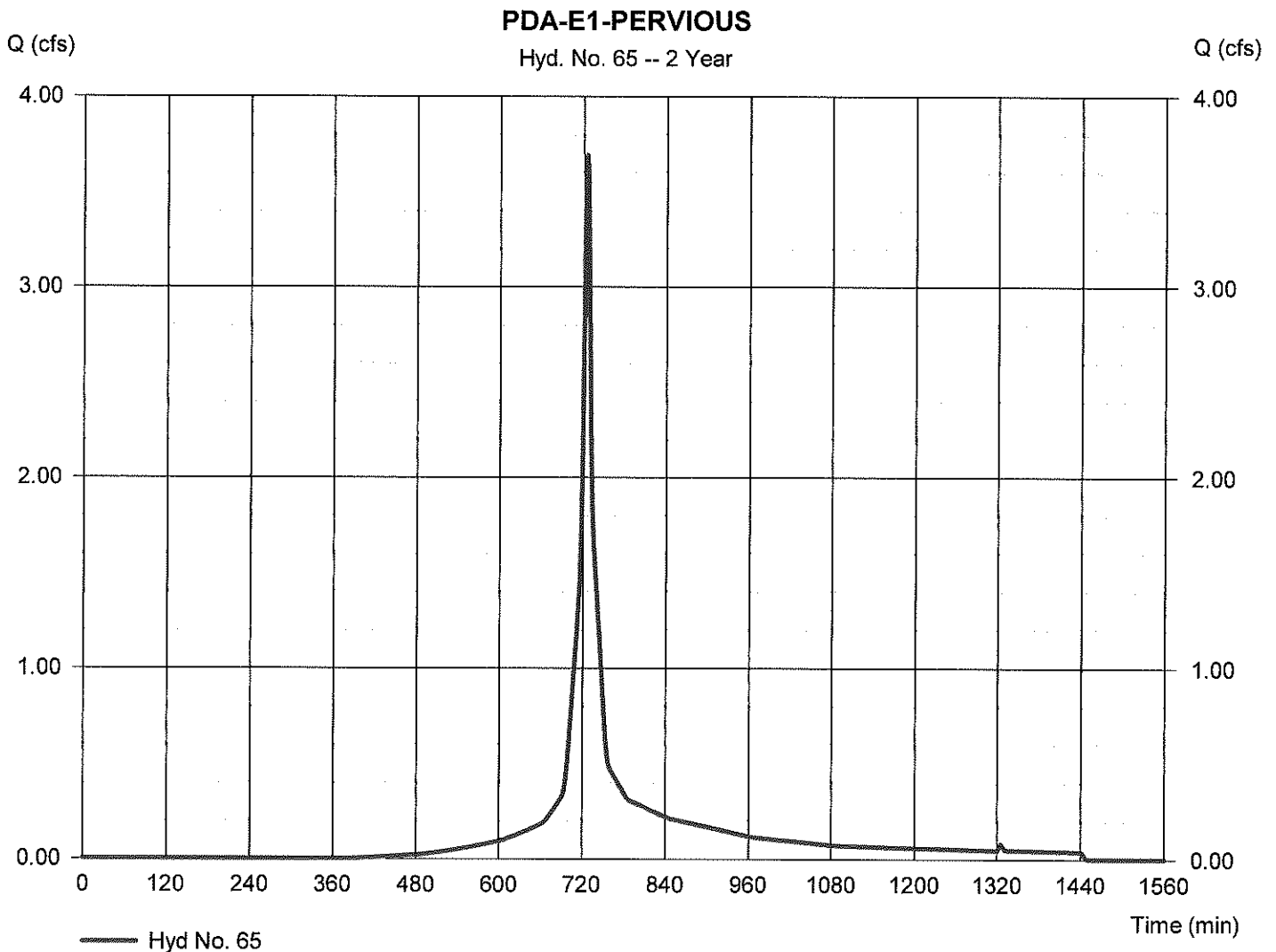
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 65

PDA-E1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.694 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 11,497 cuft
Drainage area	= 1.450 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

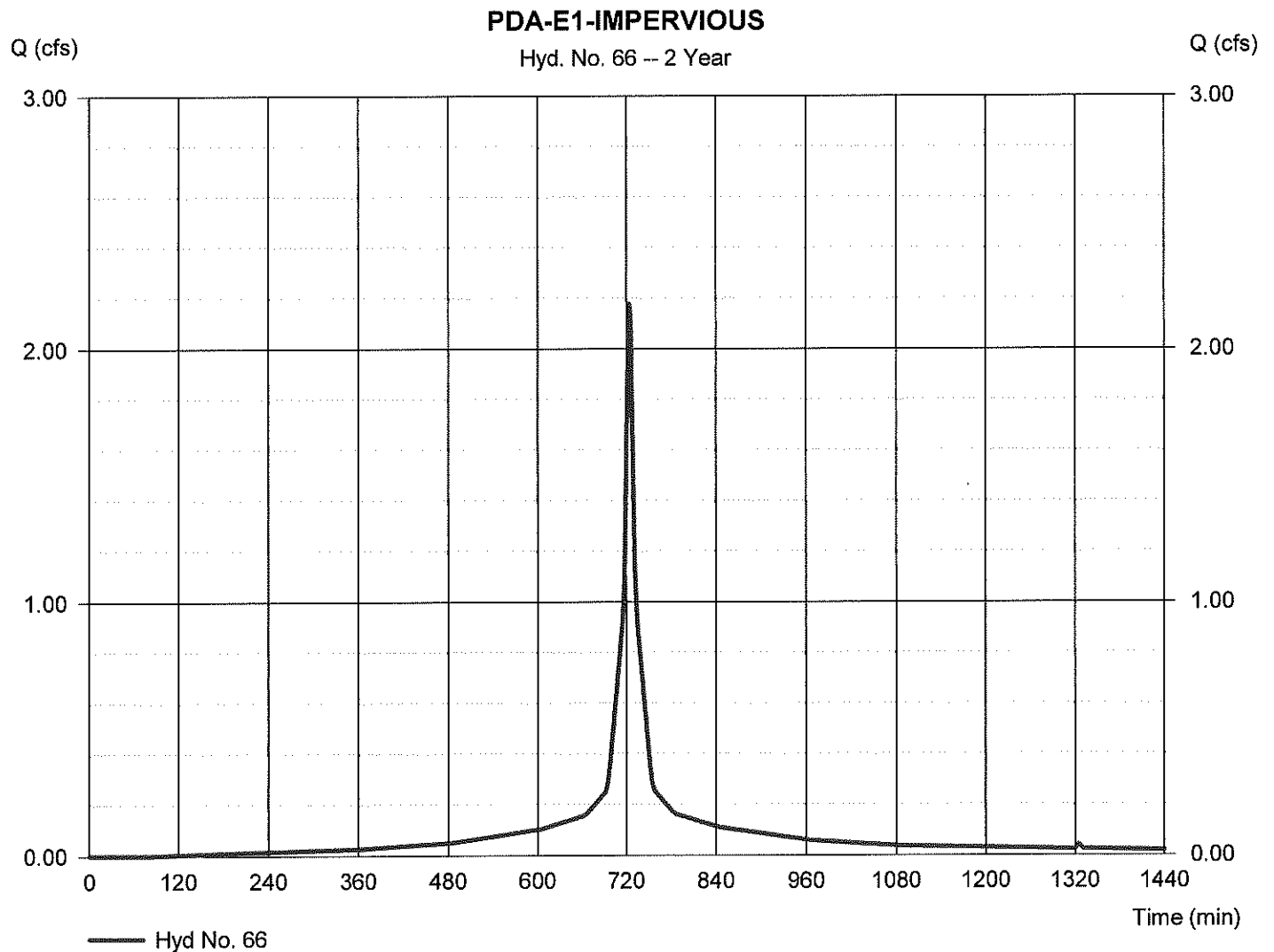
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 66

PDA-E1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.180 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 7,543 cuft
Drainage area	= 0.670 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

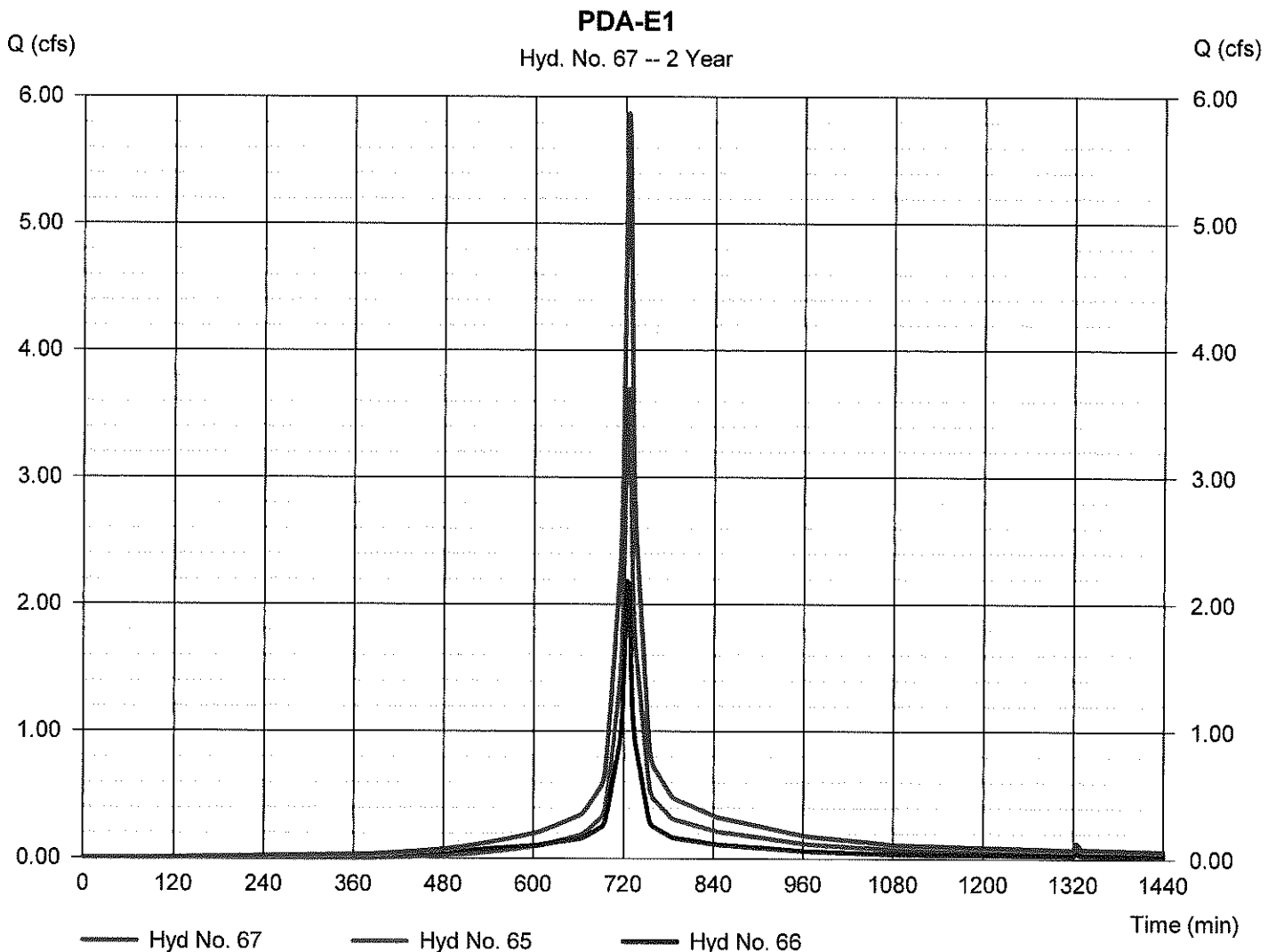
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Monday, 11 / 25 / 2019

Hyd. No. 67

PDA-E1

Hydrograph type	= Combine	Peak discharge	= 5.870 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 19,040 cuft
Inflow hyds.	= 65, 66	Contrib. drain. area	= 2.120 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

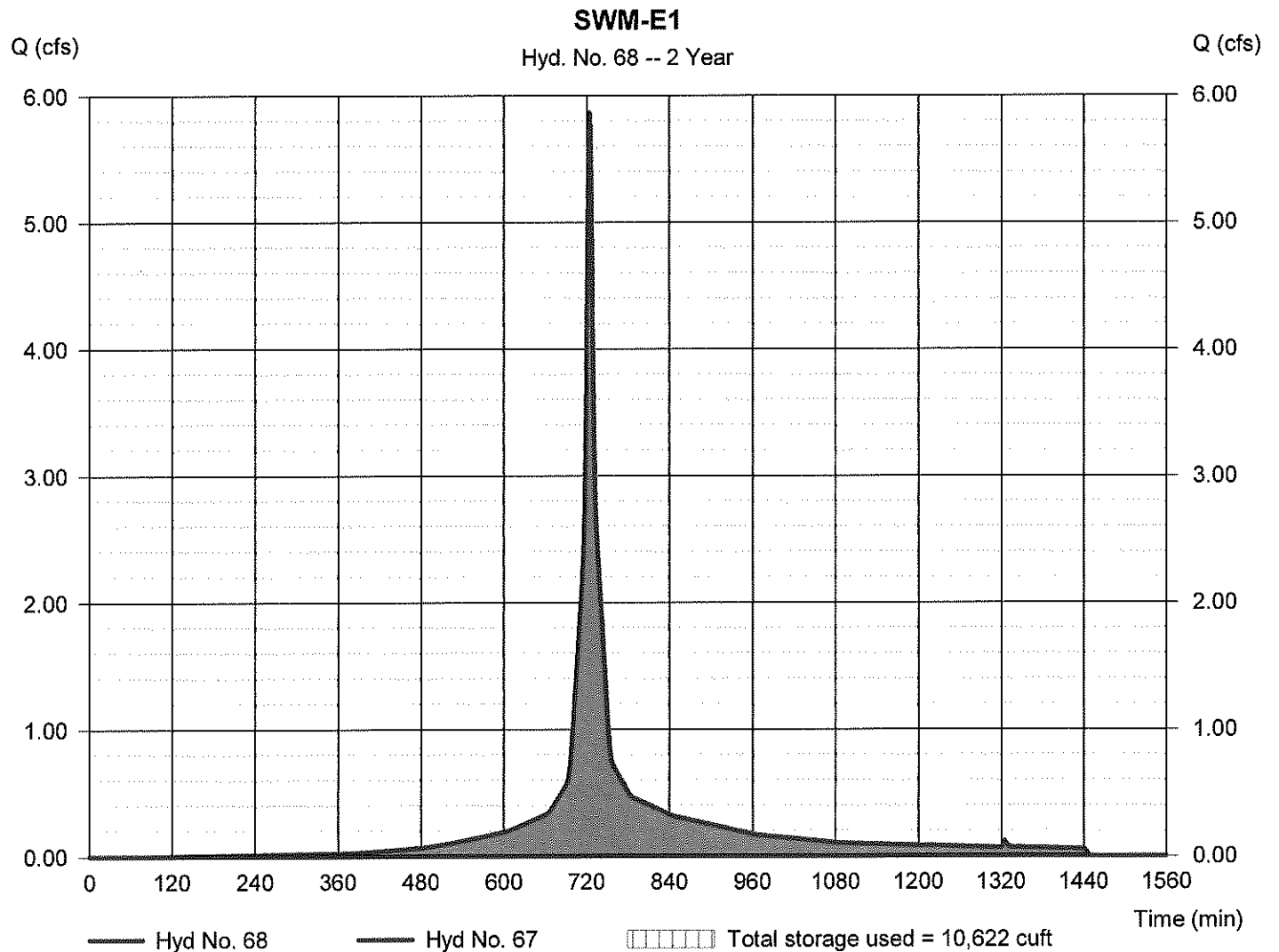
Monday, 11 / 25 / 2019

Hyd. No. 68

SWM-E1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 67 - PDA-E1	Max. Elevation	= 613.90 ft
Reservoir name	= SWM-E1	Max. Storage	= 10,622 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 8 - SWM-E1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 611.50 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	611.50	11,063	0	0
7.00	618.50	11,063	30,974	30,974

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	611.50	---	---	---	---	---	---	---	---	0.000	---	0.000
7.00	30,974	618.50	---	---	---	---	---	---	---	---	1.280	---	1.280

Hydrograph Report

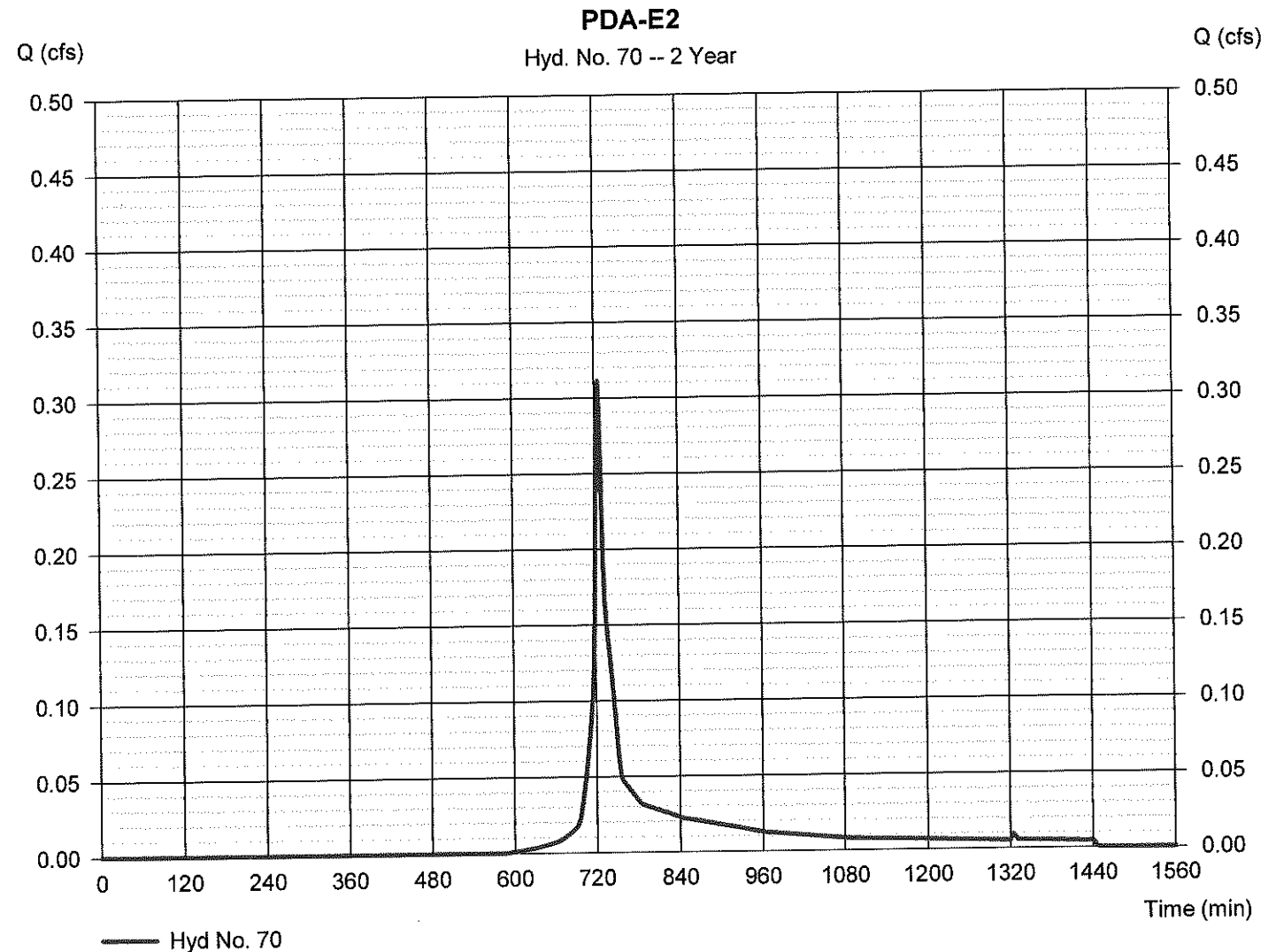
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Monday, 11 / 25 / 2019

Hyd. No. 70

PDA-E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.311 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 975 cuft
Drainage area	= 0.200 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



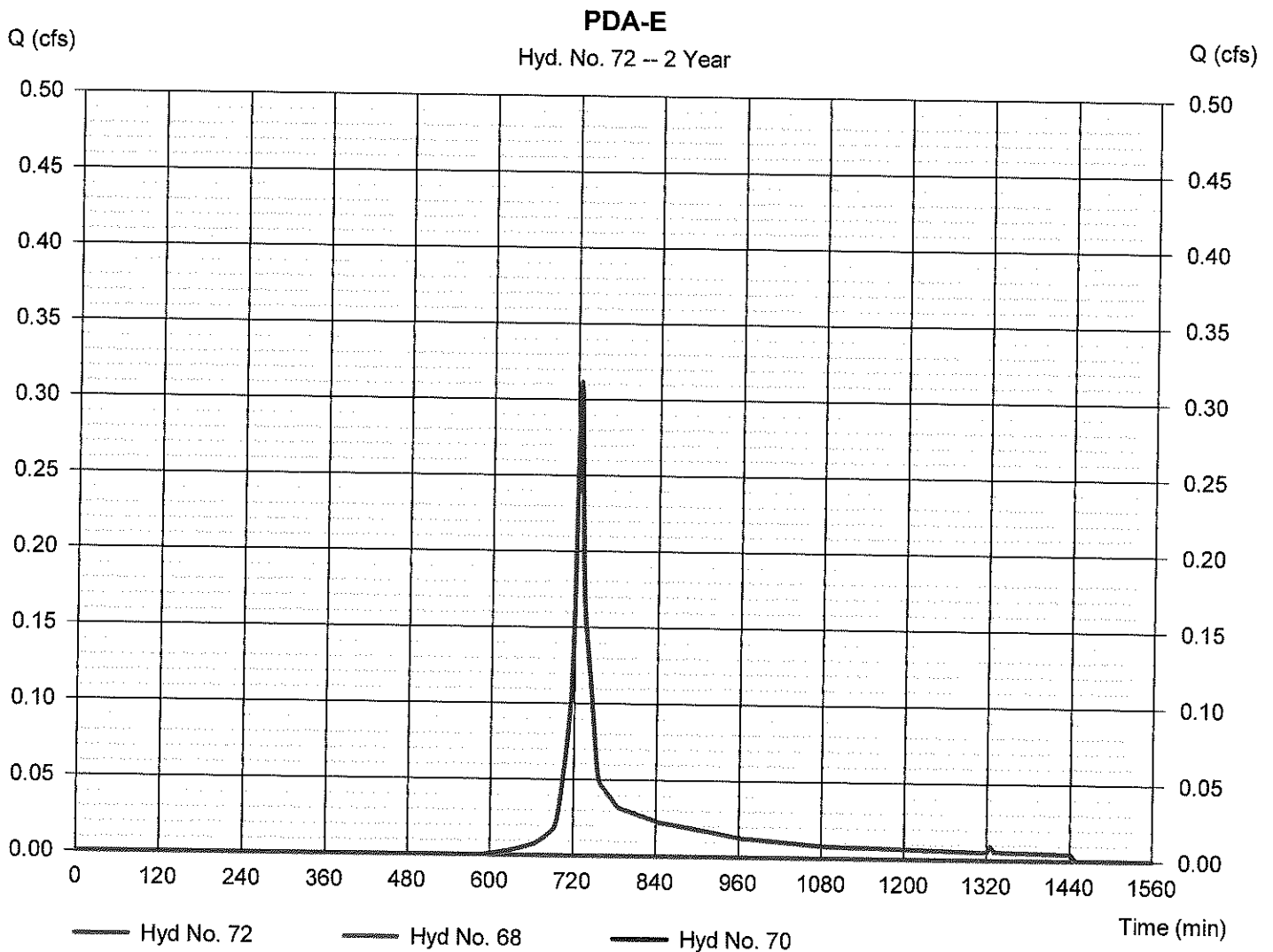
— Hyd. No. 70

Hydrograph Report

Hyd. No. 72

PDA-E

Hydrograph type	= Combine	Peak discharge	= 0.311 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 975 cuft
Inflow hyds.	= 68, 70	Contrib. drain. area	= 0.200 ac



Hydrograph Report

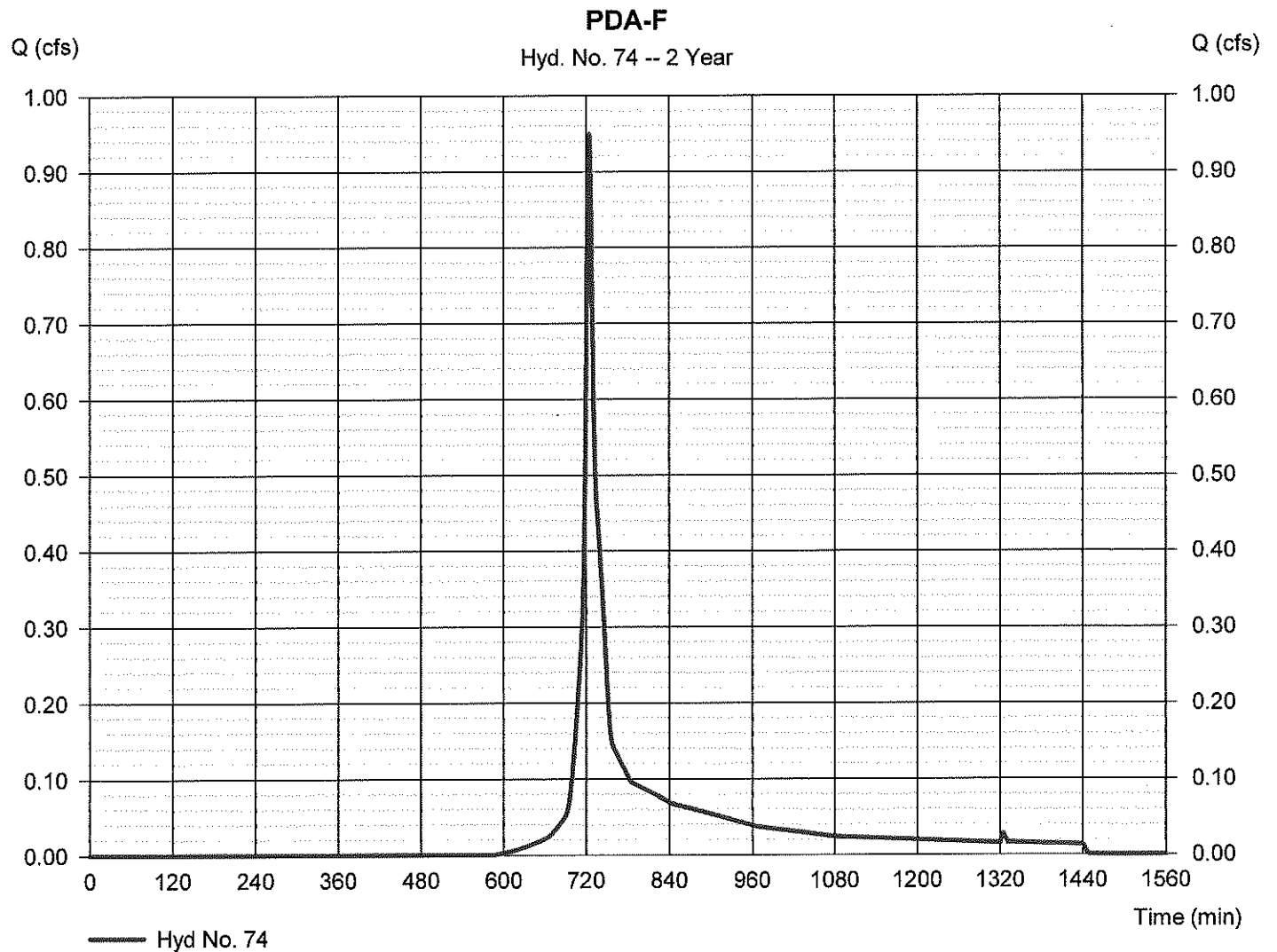
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Monday, 11 / 25 / 2019

Hyd. No. 74

PDA-F

Hydrograph type	= SCS Runoff	Peak discharge	= 0.950 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 2,975 cuft
Drainage area	= 0.610 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

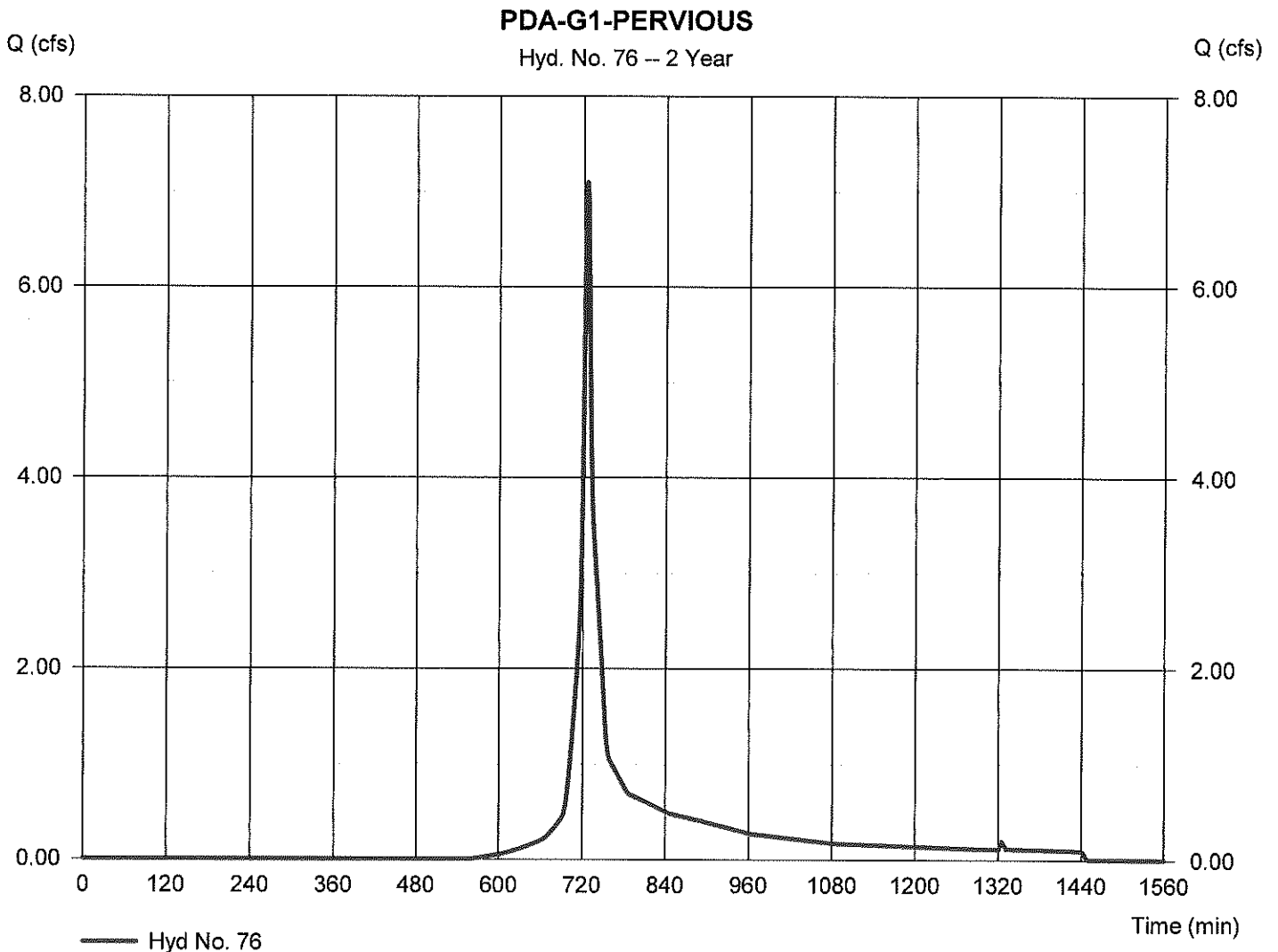
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 76

PDA-G1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 7.103 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 22,044 cuft
Drainage area	= 4.110 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

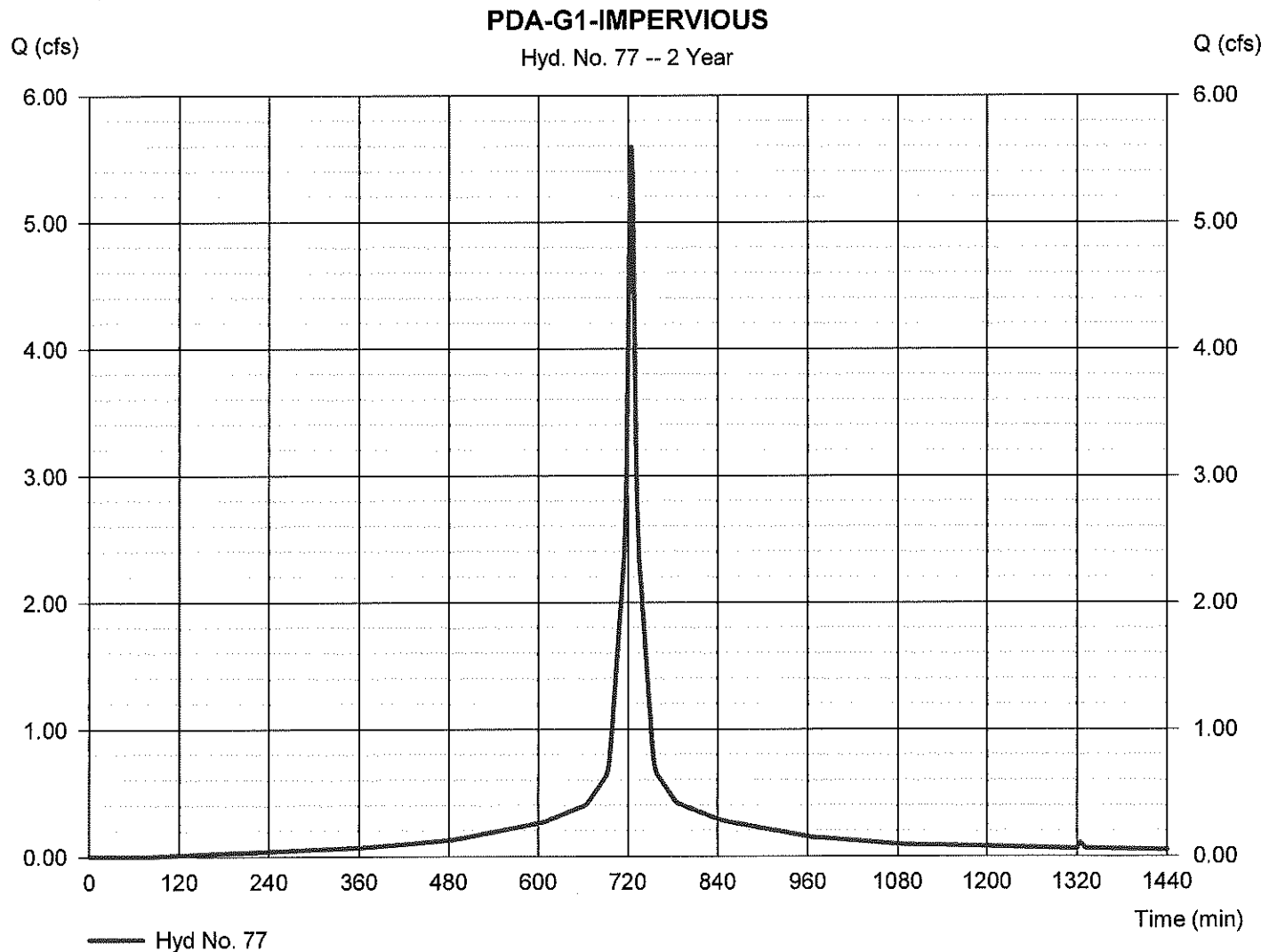
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Monday, 11 / 25 / 2019

Hyd. No. 77

PDA-G1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 5.597 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 19,363 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

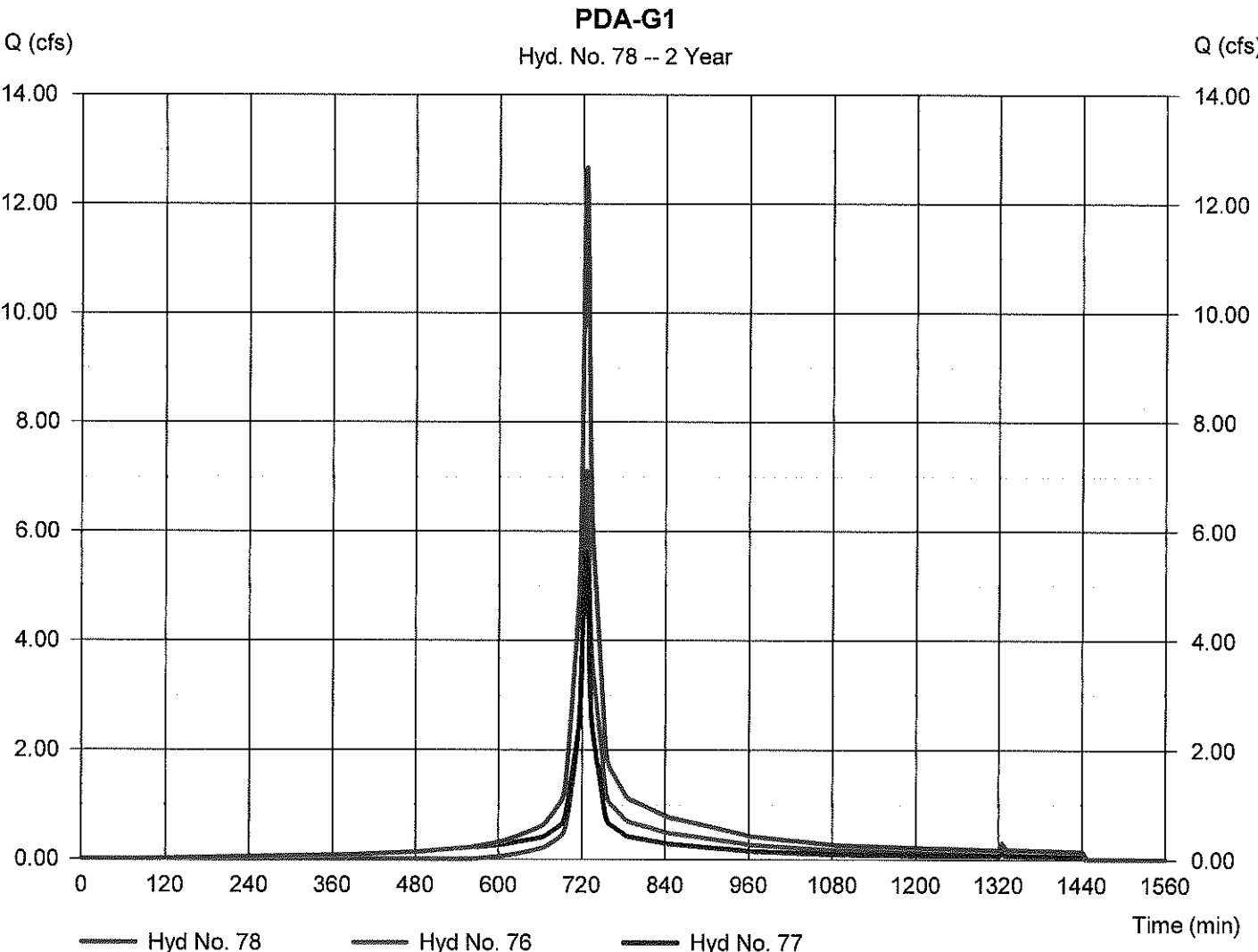
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Monday, 11 / 25 / 2019

Hyd. No. 78

PDA-G1

Hydrograph type	= Combine	Peak discharge	= 12.66 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 41,407 cuft
Inflow hyds.	= 76, 77	Contrib. drain. area	= 5.830 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

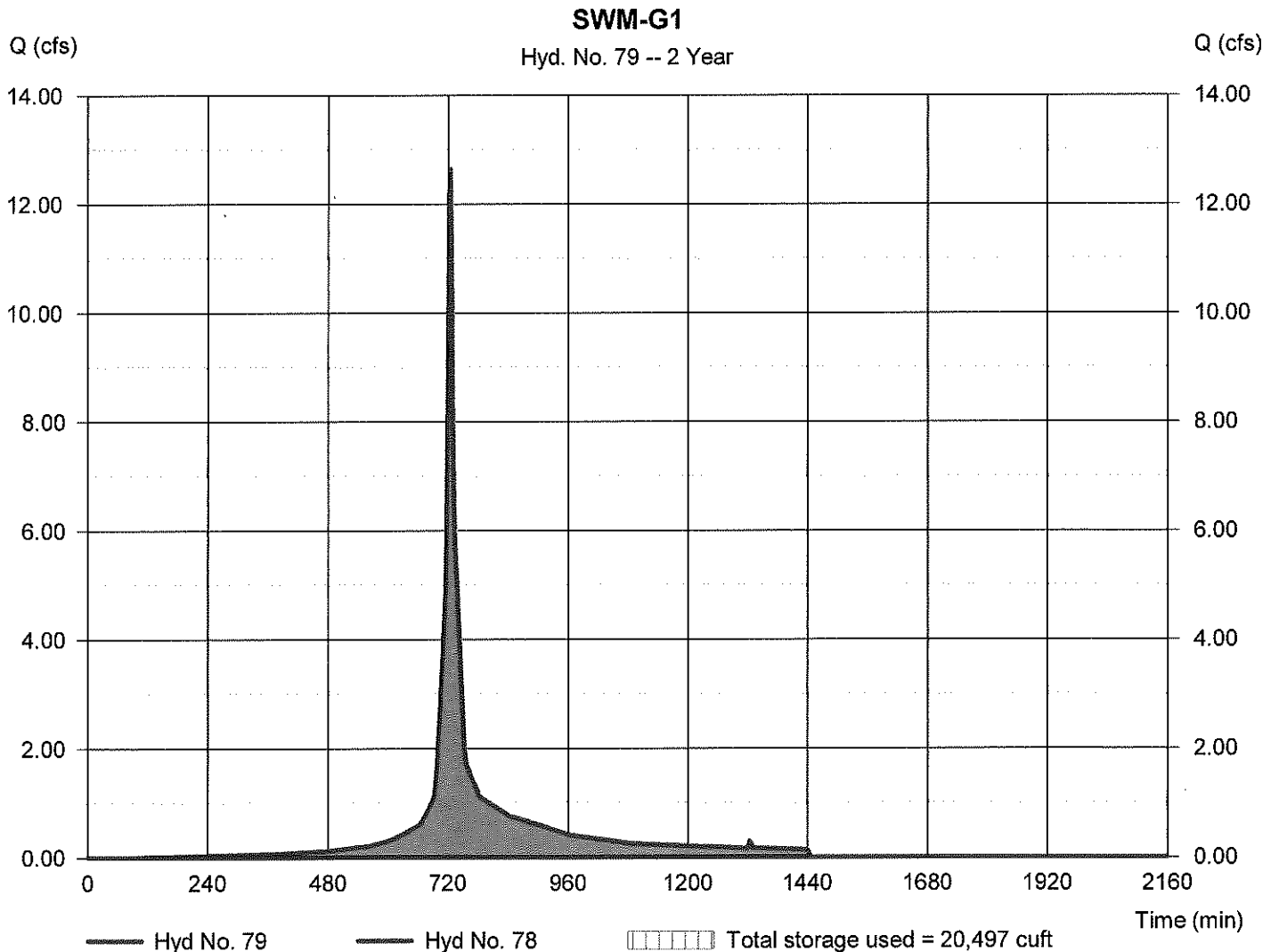
Monday, 11 / 25 / 2019

Hyd. No. 79

SWM-G1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 1482 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 78 - PDA-G1	Max. Elevation	= 598.64 ft
Reservoir name	= SWM-G1	Max. Storage	= 20,497 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 9 - SWM-G1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 595.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	595.00	3,696	0	0
1.00	596.00	4,692	4,184	4,184
2.00	597.00	5,752	5,213	9,396
3.00	598.00	6,869	6,302	15,698
4.00	599.00	8,042	7,447	23,145
5.00	600.00	9,272	8,649	31,795
6.00	601.00	10,559	9,908	41,702
7.00	602.00	11,902	11,223	52,925

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	= 0	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)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 601.40	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)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	595.00	---	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	4,184	596.00	---	---	---	---	0.00	---	---	---	0.543	---	0.543
2.00	9,396	597.00	---	---	---	---	0.00	---	---	---	0.666	---	0.666
3.00	15,698	598.00	---	---	---	---	0.00	---	---	---	0.795	---	0.795
4.00	23,145	599.00	---	---	---	---	0.00	---	---	---	0.931	---	0.931
5.00	31,795	600.00	---	---	---	---	0.00	---	---	---	1.073	---	1.073
6.00	41,702	601.00	---	---	---	---	0.00	---	---	---	1.222	---	1.222
7.00	52,925	602.00	---	---	---	---	14.50	---	---	---	1.378	---	15.88

Hydrograph Report

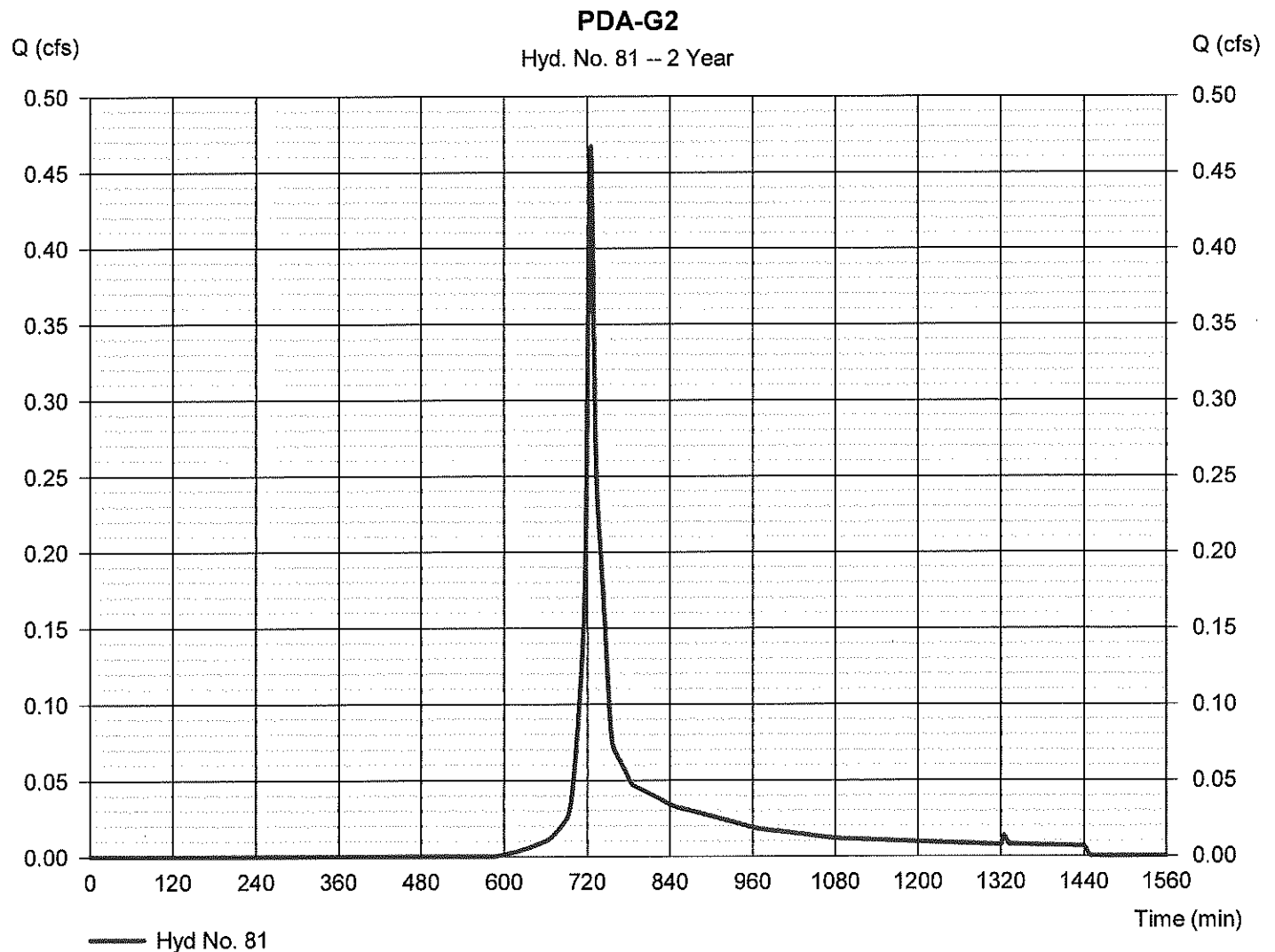
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Monday, 11 / 25 / 2019

Hyd. No. 81

PDA-G2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.467 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 1,463 cuft
Drainage area	= 0.300 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



— Hyd No. 81

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

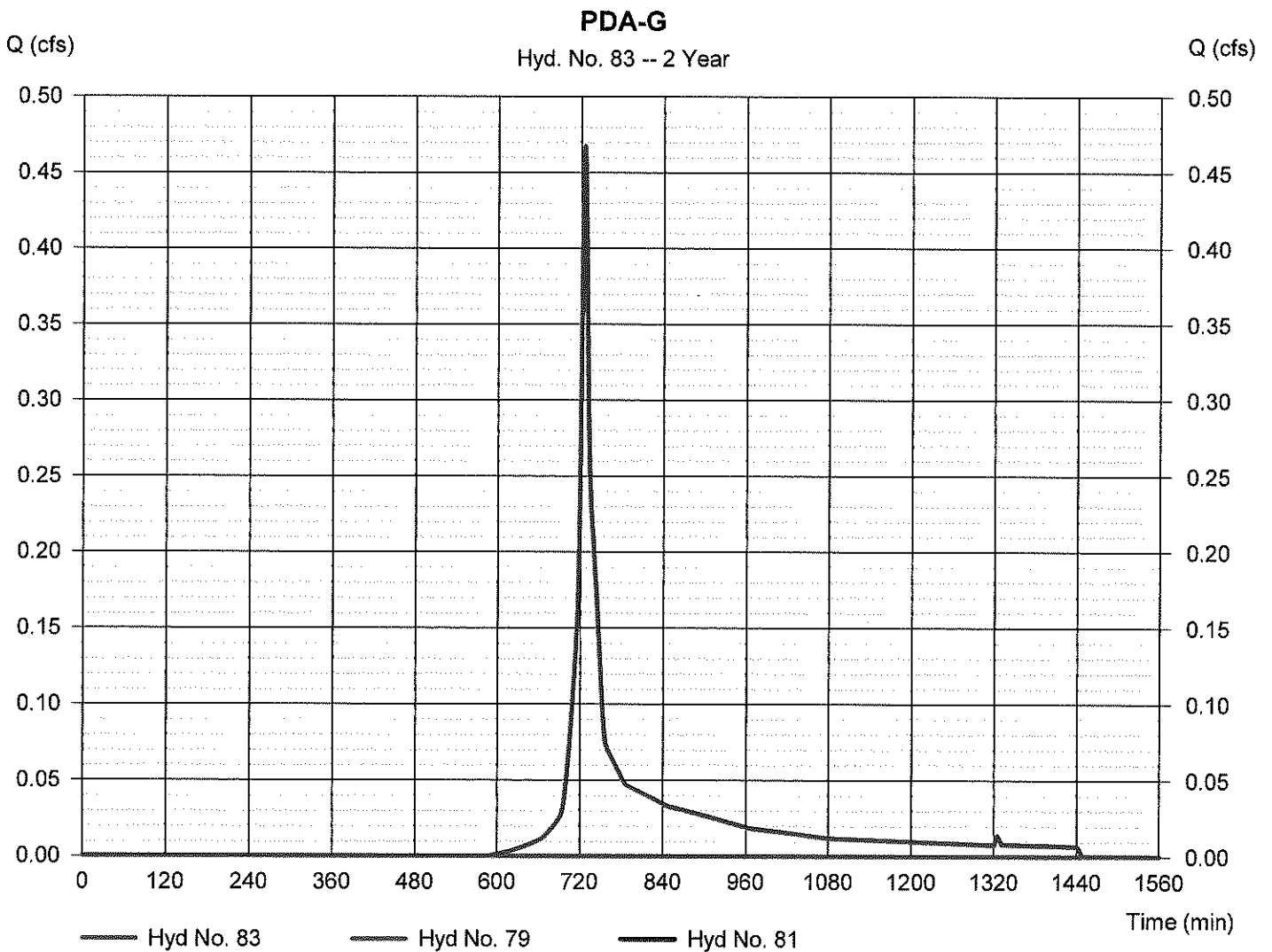
Monday, 11 / 25 / 2019

Hyd. No. 83

PDA-G

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 79, 81

Peak discharge = 0.467 cfs
Time to peak = 725 min
Hyd. volume = 1,463 cuft
Contrib. drain. area = 0.300 ac



Hydrograph Report

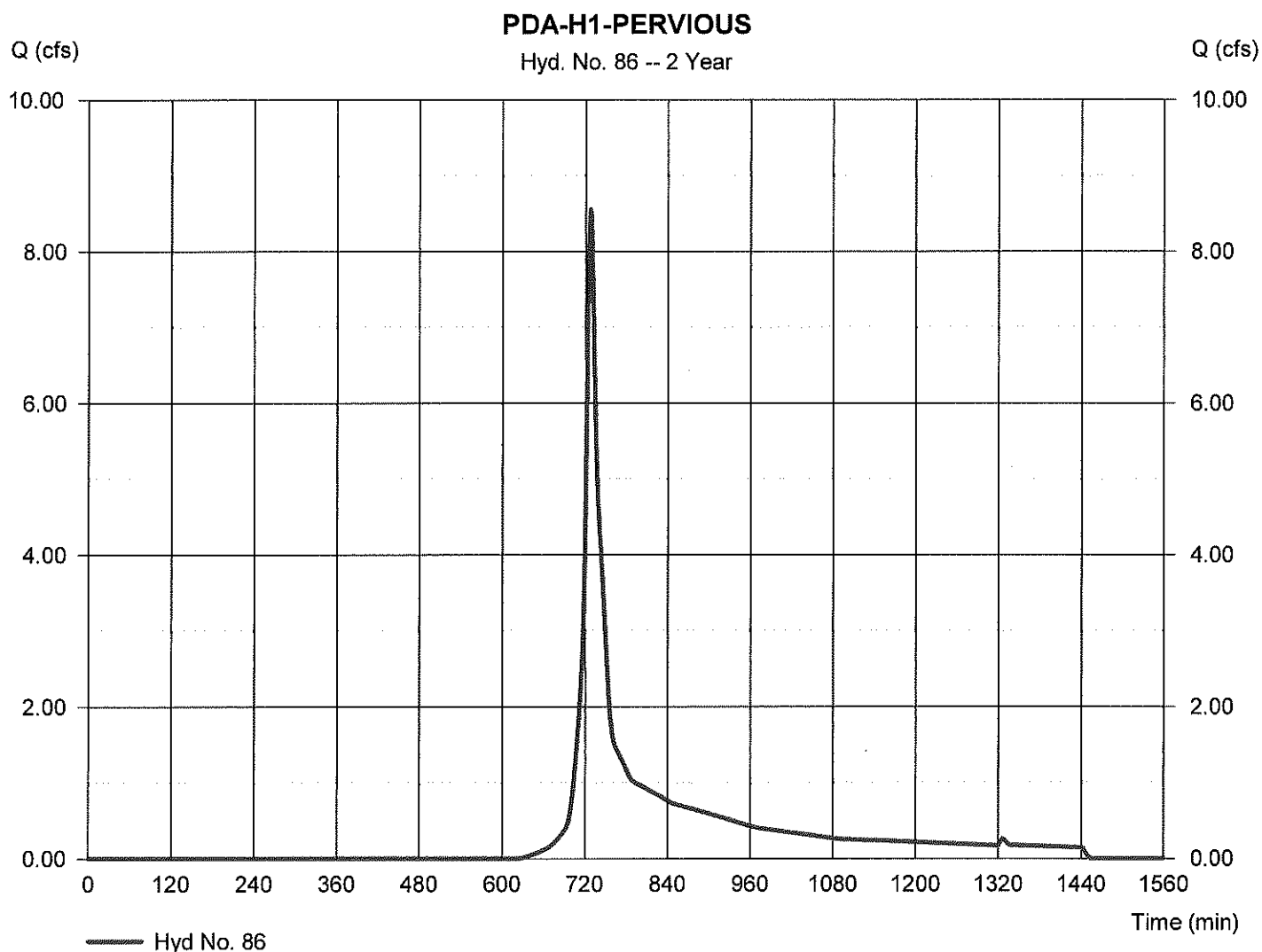
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 86

PDA-H1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 8.558 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 30,563 cuft
Drainage area	= 7.510 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 86

PDA-H1-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 1.50	0.00	0.00	
Travel Time (min)	= 1.35	+ 0.00	+ 0.00	= 1.35
Shallow Concentrated Flow				
Flow length (ft)	= 485.00	316.00	83.00	
Watercourse slope (%)	= 0.90	0.80	0.20	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=1.93	1.82	0.91	
Travel Time (min)	= 4.19	+ 2.90	+ 1.52	= 8.61
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				10.00 min

Hydrograph Report

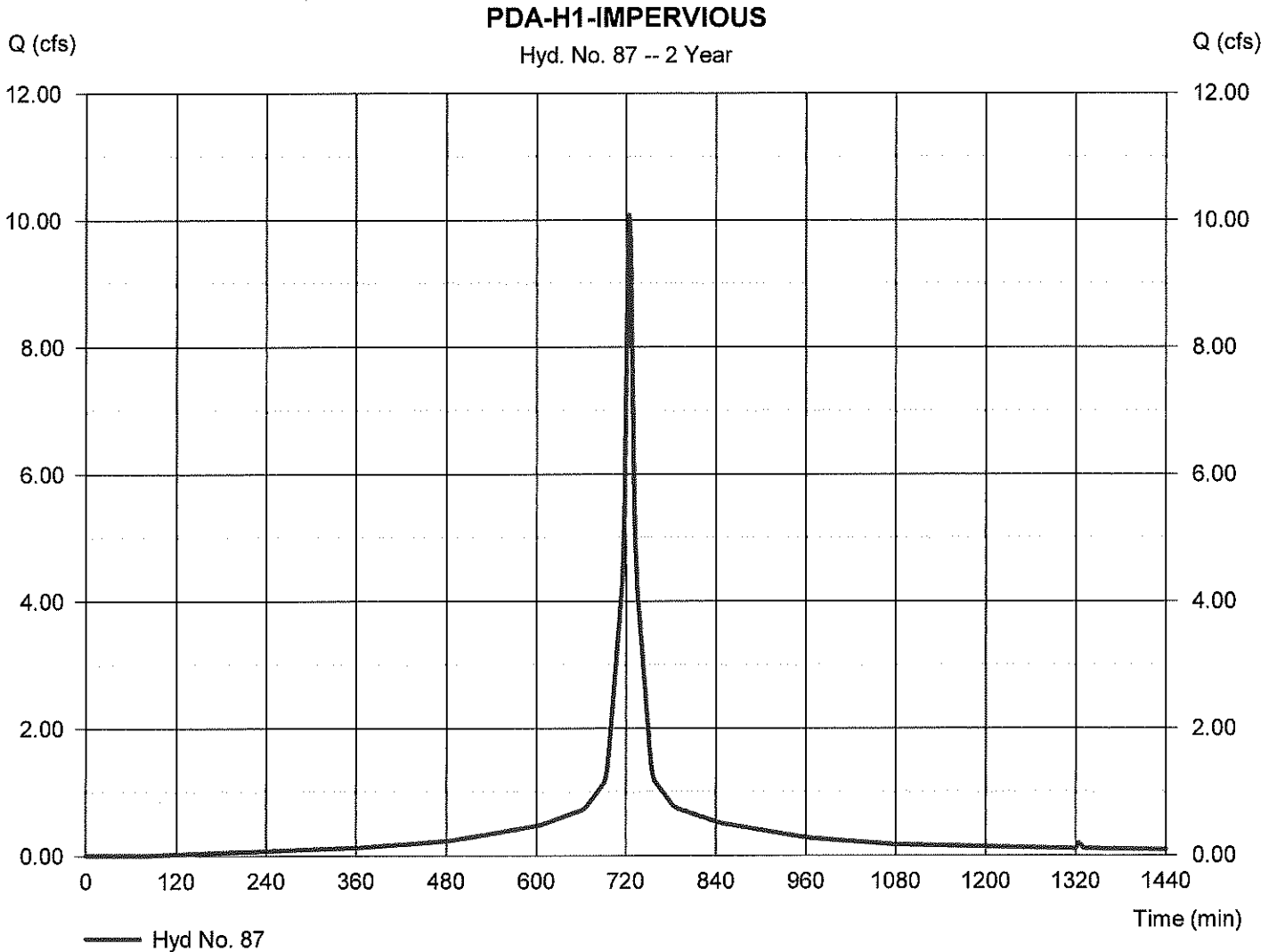
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 87

PDA-H1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 10.09 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 34,899 cuft
Drainage area	= 3.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

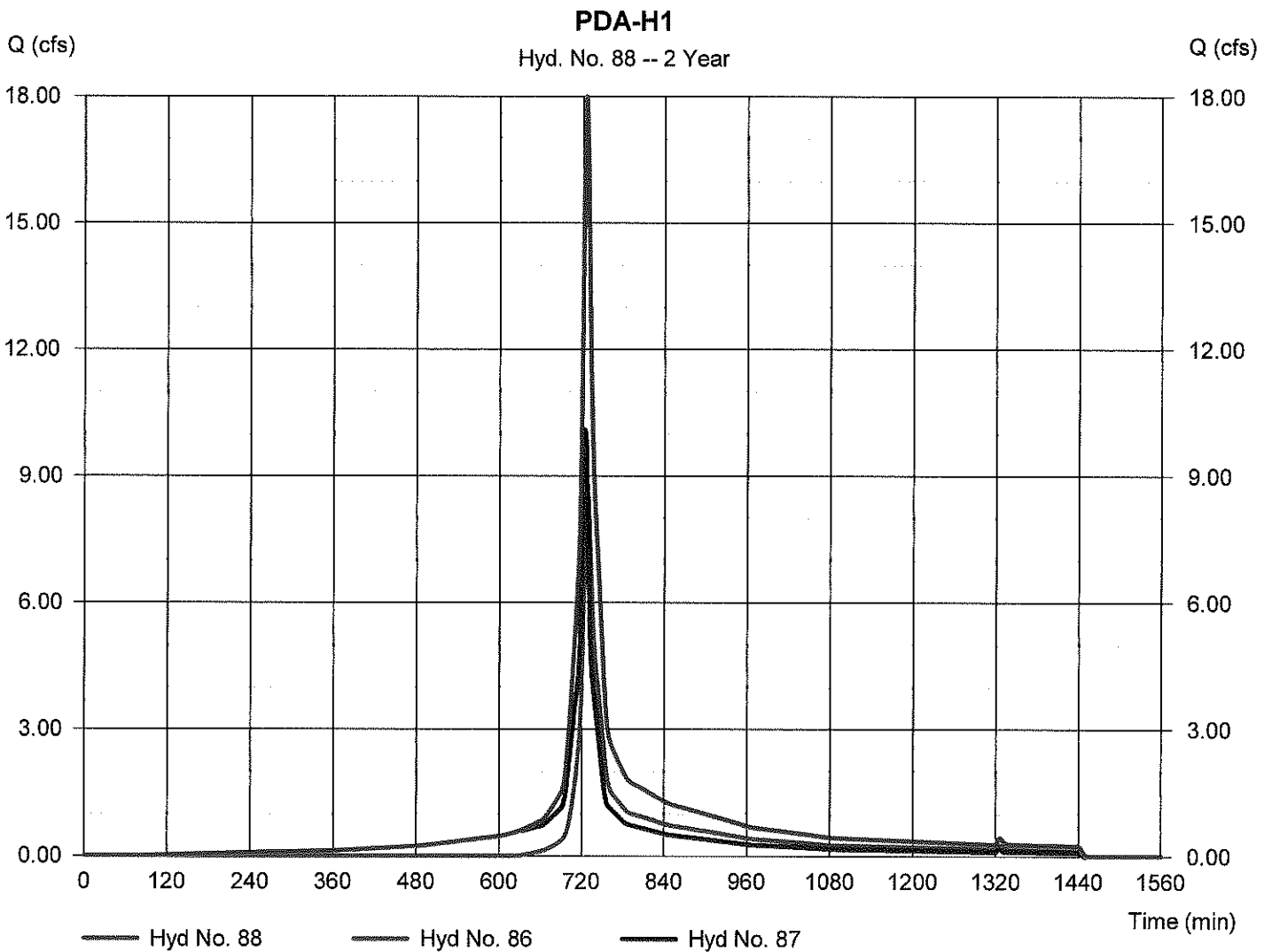
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 88

PDA-H1

Hydrograph type	= Combine	Peak discharge	= 17.99 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 65,462 cuft
Inflow hyds.	= 86, 87	Contrib. drain. area	= 10.610 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

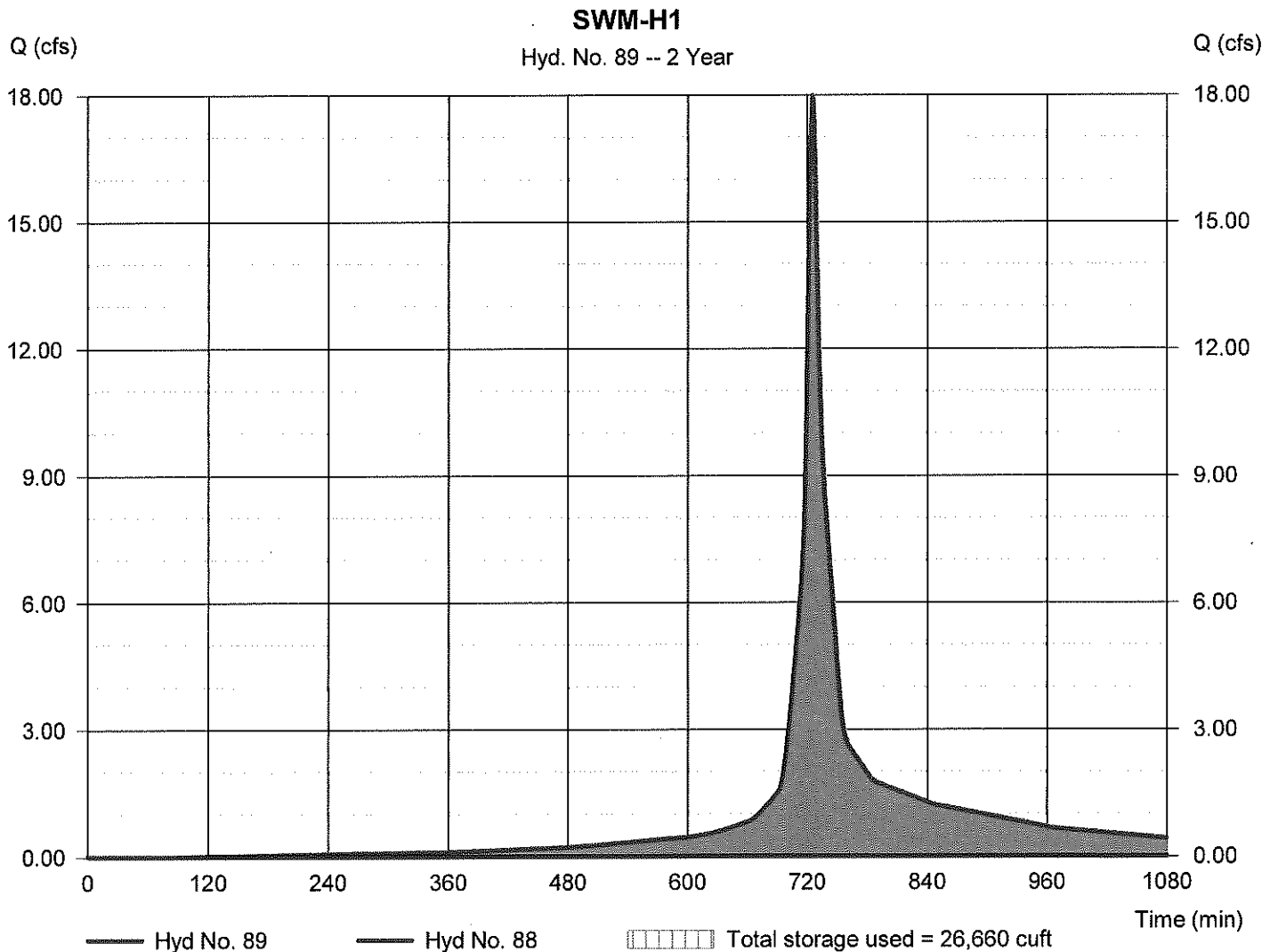
Monday, 11 / 25 / 2019

Hyd. No. 89

SWM-H1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 748 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 88 - PDA-H1	Max. Elevation	= 597.97 ft
Reservoir name	= SWM-H1	Max. Storage	= 26,660 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 10 - SWM-H1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 597.25 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	597.25	92,166	0	0
2.50	599.75	92,166	92,157	92,157

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	597.25	---	---	---	---	---	---	---	---	0.000	---	0.000
2.50	92,157	599.75	---	---	---	---	---	---	---	---	10.667	---	10.67

Hydrograph Report

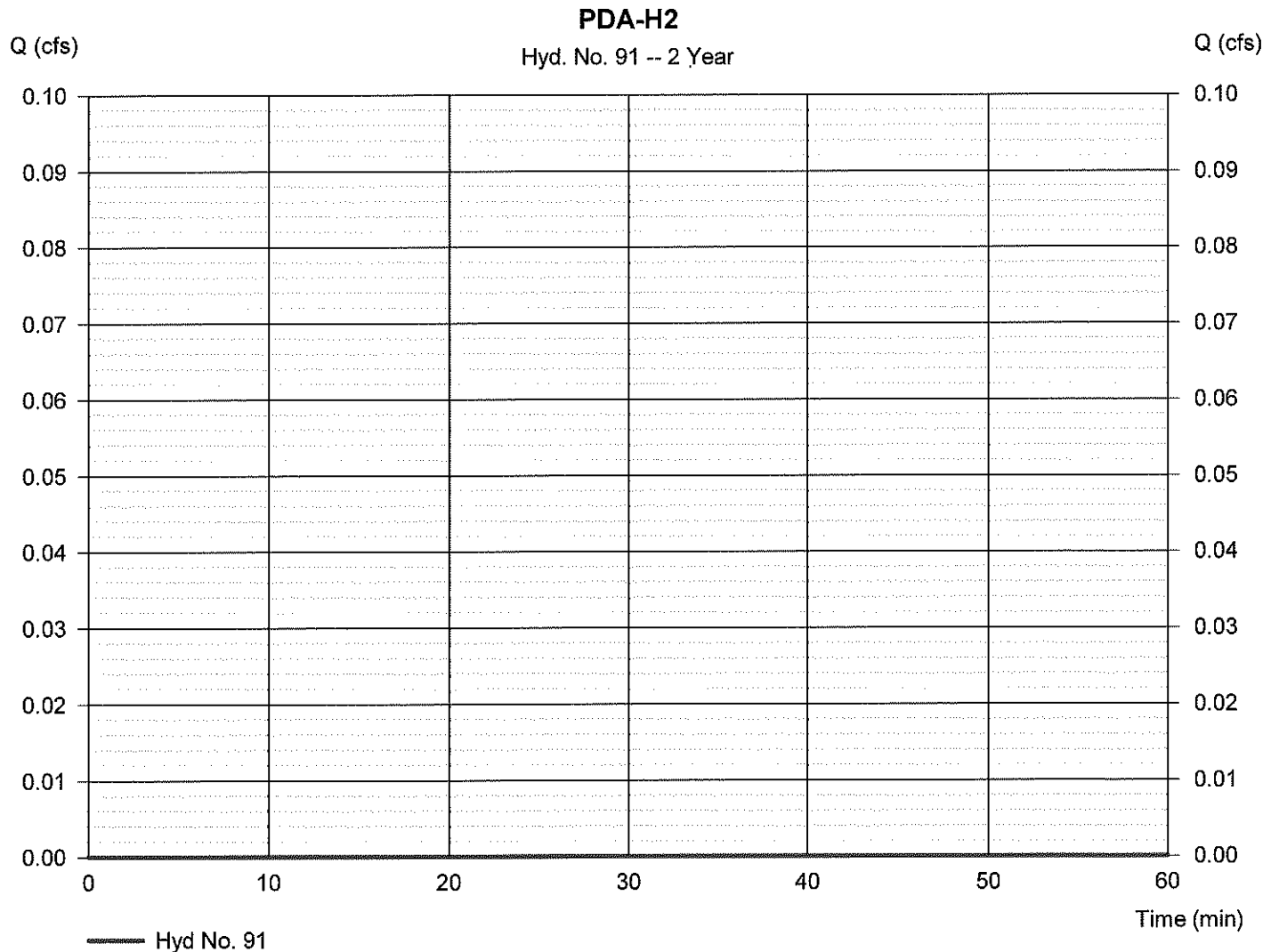
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 91

PDA-H2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.760 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 91

PDA-H2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 9.70	0.00	0.00	
Travel Time (min)	= 11.35	+ 0.00	+ 0.00	= 11.35
Shallow Concentrated Flow				
Flow length (ft)	= 26.00	0.00	0.00	
Watercourse slope (%)	= 33.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=9.27	0.00	0.00	
Travel Time (min)	= 0.05	+ 0.00	+ 0.00	= 0.05
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				11.40 min

Hydrograph Report

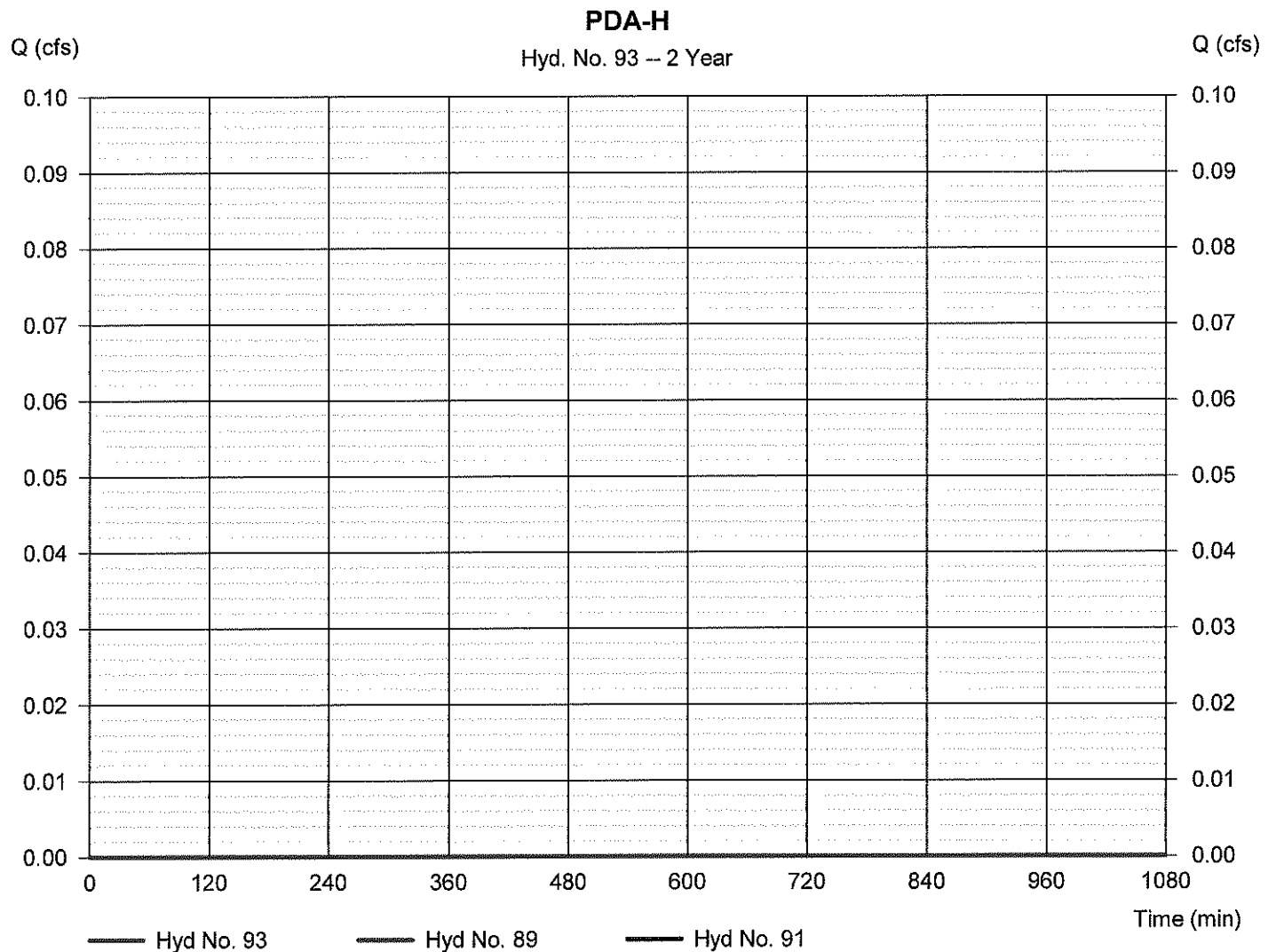
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 93

PDA-H

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 748 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 89, 91	Contrib. drain. area	= 0.760 ac



Hydrograph Report

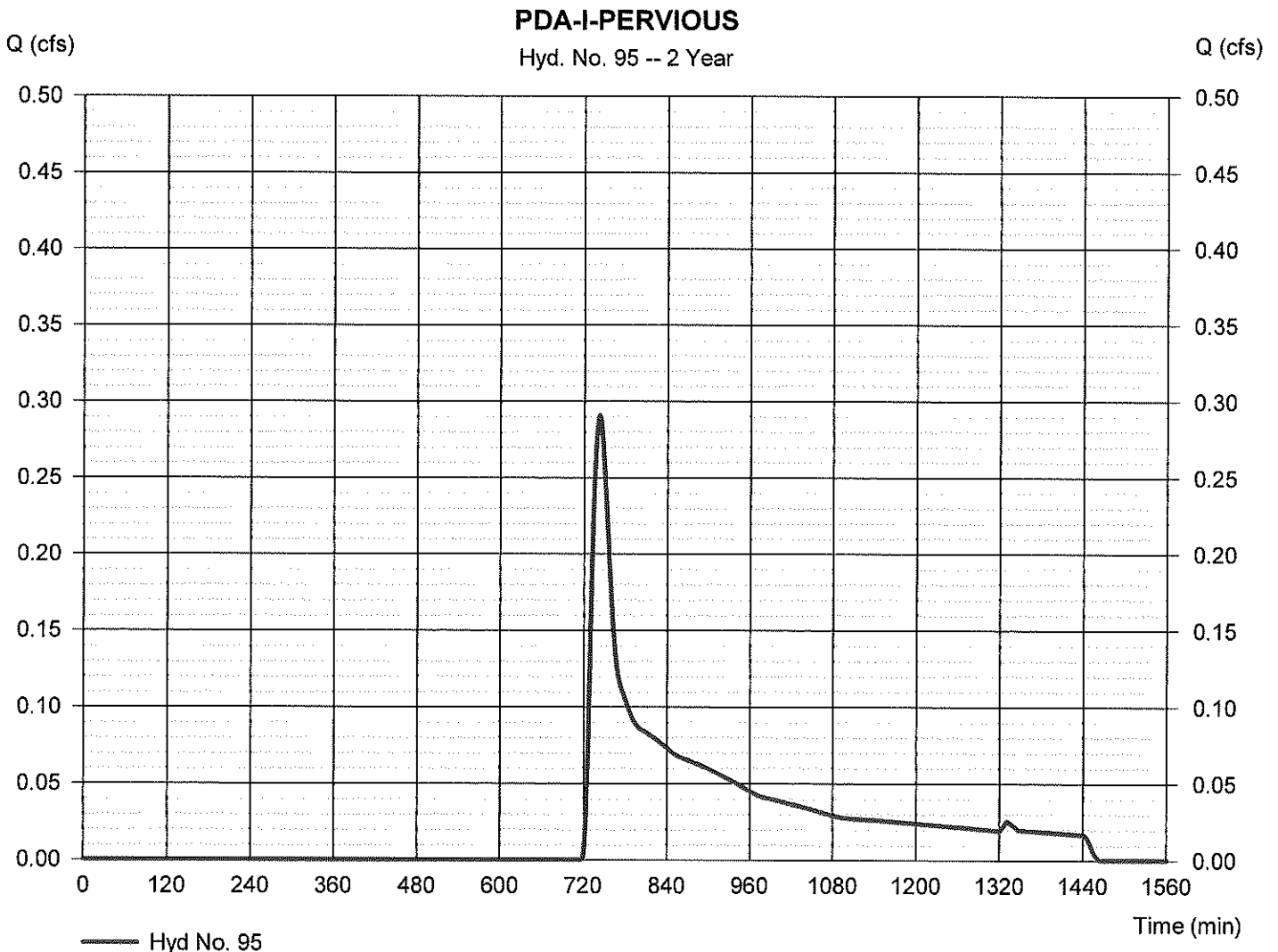
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 95

PDA-I-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.291 cfs
Storm frequency	= 2 yrs	Time to peak	= 742 min
Time interval	= 1 min	Hyd. volume	= 2,103 cuft
Drainage area	= 1.610 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.10 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 95

PDA-I-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 6.80	0.00	0.00	
Travel Time (min)	= 13.08	+ 0.00	+ 0.00	= 13.08
Shallow Concentrated Flow				
Flow length (ft)	= 121.00	141.00	37.00	
Watercourse slope (%)	= 0.85	0.50	1.10	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=1.87	1.44	2.13	
Travel Time (min)	= 1.08	+ 1.63	+ 0.29	= 3.00
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				16.10 min

Hydrograph Report

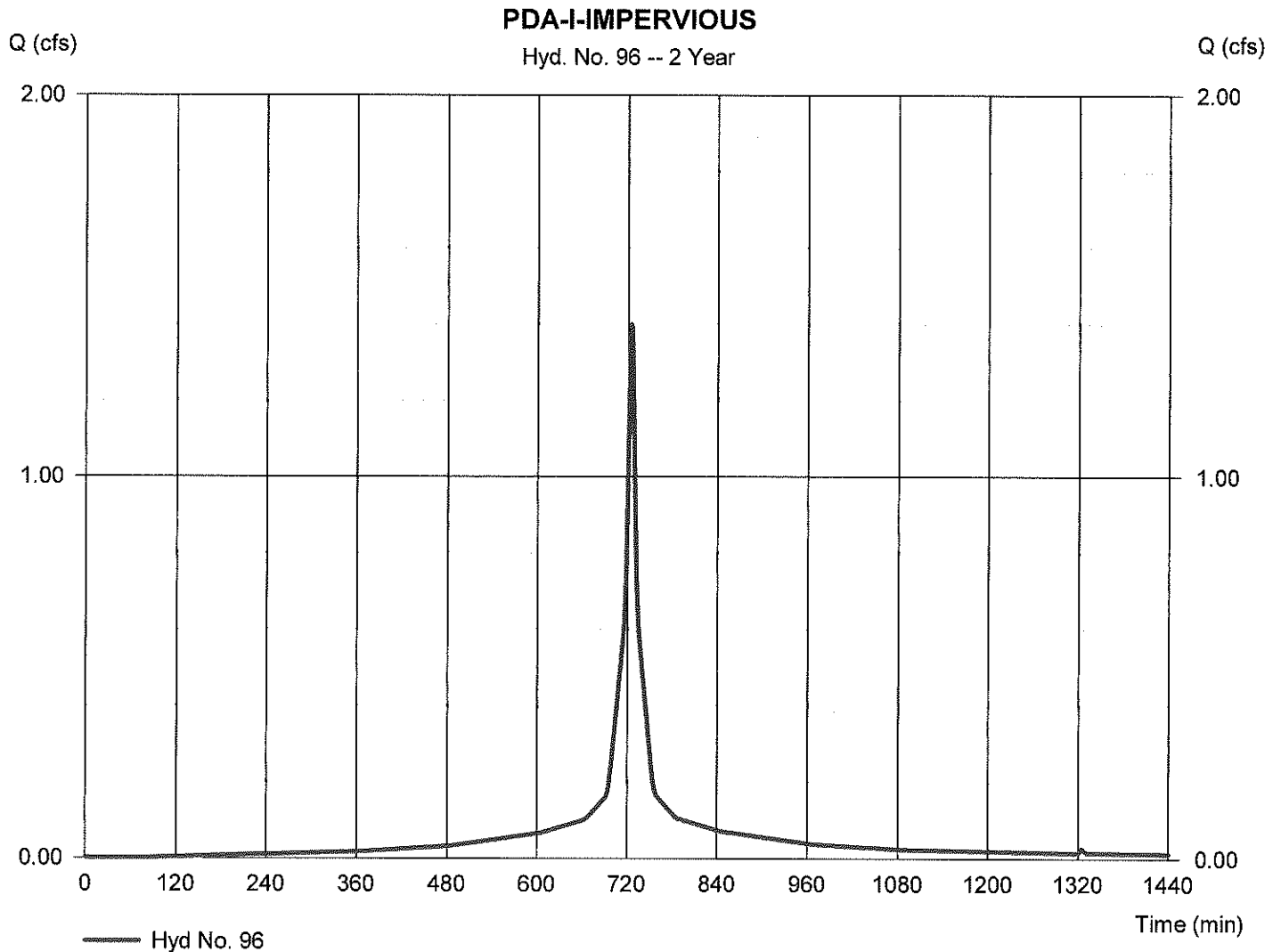
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 96

PDA-I-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.399 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 4,841 cuft
Drainage area	= 0.430 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.24 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

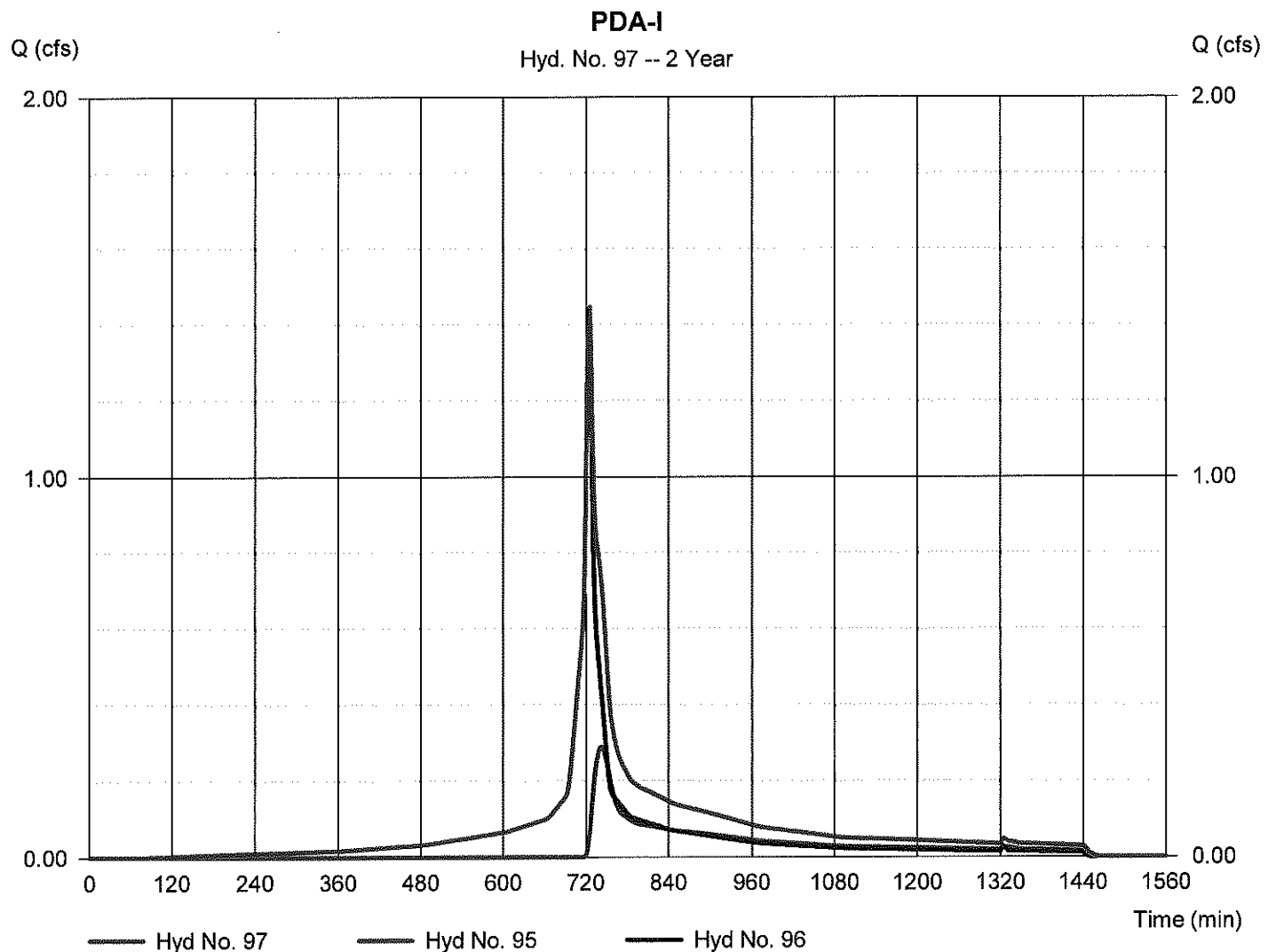
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 97

PDA-I

Hydrograph type	= Combine	Peak discharge	= 1.448 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 6,944 cuft
Inflow hyds.	= 95, 96	Contrib. drain. area	= 2.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

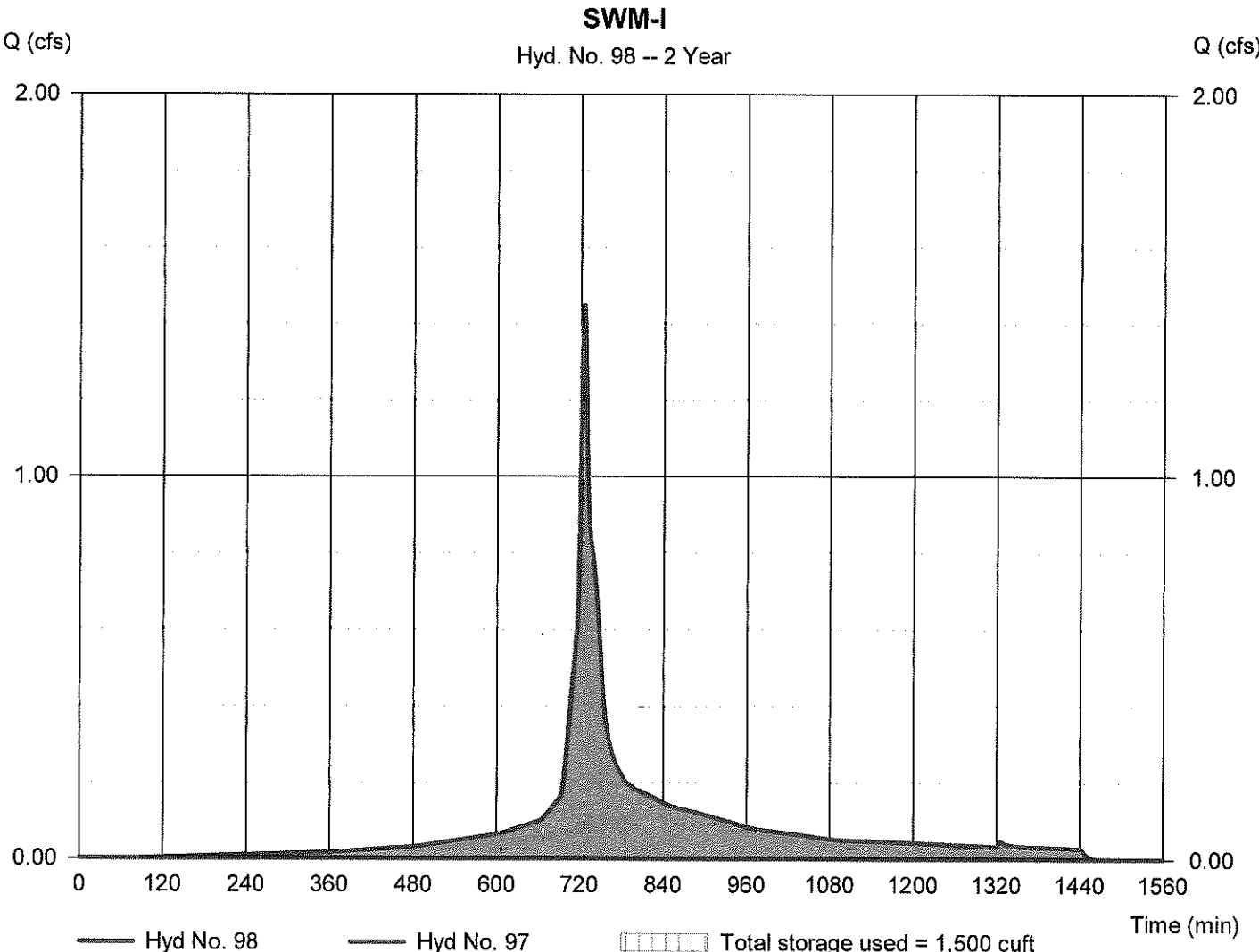
Monday, 11 / 25 / 2019

Hyd. No. 98

SWM-I

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 97 - PDA-I	Max. Elevation	= 604.78 ft
Reservoir name	= SWM-I	Max. Storage	= 1,500 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 11 - SWM-I

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 604.65 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	604.65	28,171	0	0
0.75	605.40	28,171	8,450	8,450

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	604.65	---	---	---	---	---	---	---	---	0.000	---	0.000
0.75	8,450	605.40	---	---	---	---	---	---	---	---	3.261	---	3.261

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	7.494	1	737	41,031	-----	-----	-----	EDA - A: PERVIOUS
2	SCS Runoff	4.780	1	733	23,815	-----	-----	-----	EDA-A:IMPERVIOUS
3	Combine	12.10	1	735	64,846	1, 2	-----	-----	EDA-A
5	SCS Runoff	2.541	1	757	25,513	-----	-----	-----	EDA-B: PERVIOUS
6	SCS Runoff	6.557	1	739	38,496	-----	-----	-----	EDA-B: IMPERVIOUS
7	Combine	8.148	1	744	64,009	5, 6	-----	-----	EDA-B
9	SCS Runoff	5.541	1	730	21,790	-----	-----	-----	EDA-C: PERVIOUS
10	SCS Runoff	4.784	1	724	16,822	-----	-----	-----	EDA-C:IMPERVIOUS
11	Combine	9.441	1	726	38,612	9, 10	-----	-----	EDA-C
13	SCS Runoff	9.249	1	727	31,696	-----	-----	-----	EDA-D
15	SCS Runoff	11.09	1	728	40,327	-----	-----	-----	EDA-E
17	SCS Runoff	2.003	1	729	7,543	-----	-----	-----	EDA-F
19	SCS Runoff	6.941	1	730	27,519	-----	-----	-----	EDA-G
21	SCS Runoff	0.152	1	914	4,173	-----	-----	-----	EDA-H
23	SCS Runoff	0.000	1	1442	1	-----	-----	-----	EDA-I
25	SCS Runoff	2.648	1	725	8,971	-----	-----	-----	PDA-A1-PERVIOUS
26	SCS Runoff	15.50	1	724	54,502	-----	-----	-----	PDA-A1-IMPERVIOUS
27	Combine	18.06	1	724	63,473	25, 26	-----	-----	PDA-A1
28	Reservoir	0.000	1	677	0	27	593.37	28,867	SWM-A1
30	SCS Runoff	3.436	1	724	10,966	-----	-----	-----	PDA-A2-PERVIOUS
31	SCS Runoff	2.583	1	724	9,084	-----	-----	-----	PDA-A2-IMPERVIOUS
32	Combine	6.019	1	724	20,049	30, 31	-----	-----	PDA-A2
33	Reservoir	0.000	1	743	0	32	601.02	8,150	SWM-A2
35	Combine	0.000	1	743	0	28, 33,	-----	-----	PDA-A
37	SCS Runoff	26.50	1	727	90,703	-----	-----	-----	PDA-B1-PERVIOUS
38	SCS Runoff	14.38	1	727	59,439	-----	-----	-----	PDA-B1-IMPERVIOUS
39	Combine	40.88	1	727	150,142	37, 38	-----	-----	PDA-B1
40	Reservoir	0.000	1	730	0	39	601.03	60,074	SWM-B1
Hydrologic Calculations.gpw					Return Period: 10 Year			Monday, 11 / 25 / 2019	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
42	SCS Runoff	9.149	1	737	44,808	----	----	----	PDA-B2-PERVIOUS	
43	SCS Runoff	11.78	1	734	60,769	----	----	----	PDA-B2-IMPERVIOUS	
44	Combine	20.72	1	735	105,577	42, 43	----	----	PDA-B2	
45	Reservoir	0.000	1	746	0	44	597.71	35,912	SWM-B2	
47	SCS Runoff	0.145	1	726	636	----	----	----	PDA-B3	
49	SCS Runoff	3.030	1	725	9,339	----	----	----	PDA-B4-PERVIOUS	
50	SCS Runoff	3.444	1	724	12,112	----	----	----	PDA-B4-IMPERVIOUS	
51	Combine	6.449	1	724	21,450	49, 50	----	----	PDA-B4	
52	Reservoir	0.000	1	744	0	51	596.58	10,293	SWM-B4	
54	Combine	0.145	1	726	636	40, 45, 47, 52,	----	----	PDA-B	
56	SCS Runoff	0.707	1	726	2,467	----	----	----	PDA-C-PERVIOUS	
57	SCS Runoff	0.287	1	724	1,009	----	----	----	PDA-C-IMPERVIOUS	
58	Combine	0.980	1	726	3,477	56, 57	----	----	PDA-C	
60	SCS Runoff	21.63	1	727	76,152	----	----	----	PDA-D-PERVIOUS	
61	SCS Runoff	15.55	1	724	54,670	----	----	----	PDA-D-IMPERVIOUS	
62	Combine	36.44	1	725	130,822	60, 61	----	----	PDA-D	
63	Reservoir	0.000	1	719	0	62	599.52	66,525	SWM-D	
65	SCS Runoff	6.014	1	724	19,074	----	----	----	PDA-E1-PERVIOUS	
66	SCS Runoff	3.205	1	724	11,270	----	----	----	PDA-E1-IMPERVIOUS	
67	Combine	9.219	1	724	30,344	65, 66	----	----	PDA-E1	
68	Reservoir	0.000	1	940	0	67	615.36	17,066	SWM-E1	
70	SCS Runoff	0.604	1	725	1,860	----	----	----	PDA-E2	
72	Combine	0.604	1	725	1,860	68, 70,	----	----	PDA-E	
74	SCS Runoff	1.841	1	725	5,672	----	----	----	PDA-F	
76	SCS Runoff	13.27	1	725	40,905	----	----	----	PDA-G1-PERVIOUS	
77	SCS Runoff	8.228	1	724	28,933	----	----	----	PDA-G1-IMPERVIOUS	
78	Combine	21.43	1	725	69,838	76, 77	----	----	PDA-G1	
79	Reservoir	0.000	1	1214	0	78	600.62	37,943	SWM-G1	
Hydrologic Calculations.gpw					Return Period: 10 Year			Monday, 11 / 25 / 2019		

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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
81	SCS Runoff	0.906	1	725	2,790	----	----	----	PDA-G2
83	Combine	0.906	1	725	2,790	79, 81,	----	----	PDA-G
86	SCS Runoff	17.70	1	727	60,852	----	----	----	PDA-H1-PERVIOUS
87	SCS Runoff	14.83	1	724	52,147	----	----	----	PDA-H1-IMPERVIOUS
88	Combine	31.56	1	726	112,999	86, 87	----	----	PDA-H1
89	Reservoir	0.000	1	748	0	88	598.54	47,431	SWM-H1
91	SCS Runoff	0.000	1	1440	0	----	----	----	PDA-H2
93	Combine	0.000	1	1440	0	89, 91,	----	----	PDA-H
95	SCS Runoff	1.231	1	734	6,056	----	----	----	PDA-I-PERVIOUS
96	SCS Runoff	2.057	1	724	7,233	----	----	----	PDA-I-IMPERVIOUS
97	Combine	2.780	1	726	13,289	95, 96	----	----	PDA-I
98	Reservoir	0.000	1	730	0	97	604.93	3,113	SWM-I
Hydrologic Calculations.gpw					Return Period: 10 Year			Monday, 11 / 25 / 2019	

Hydrograph Report

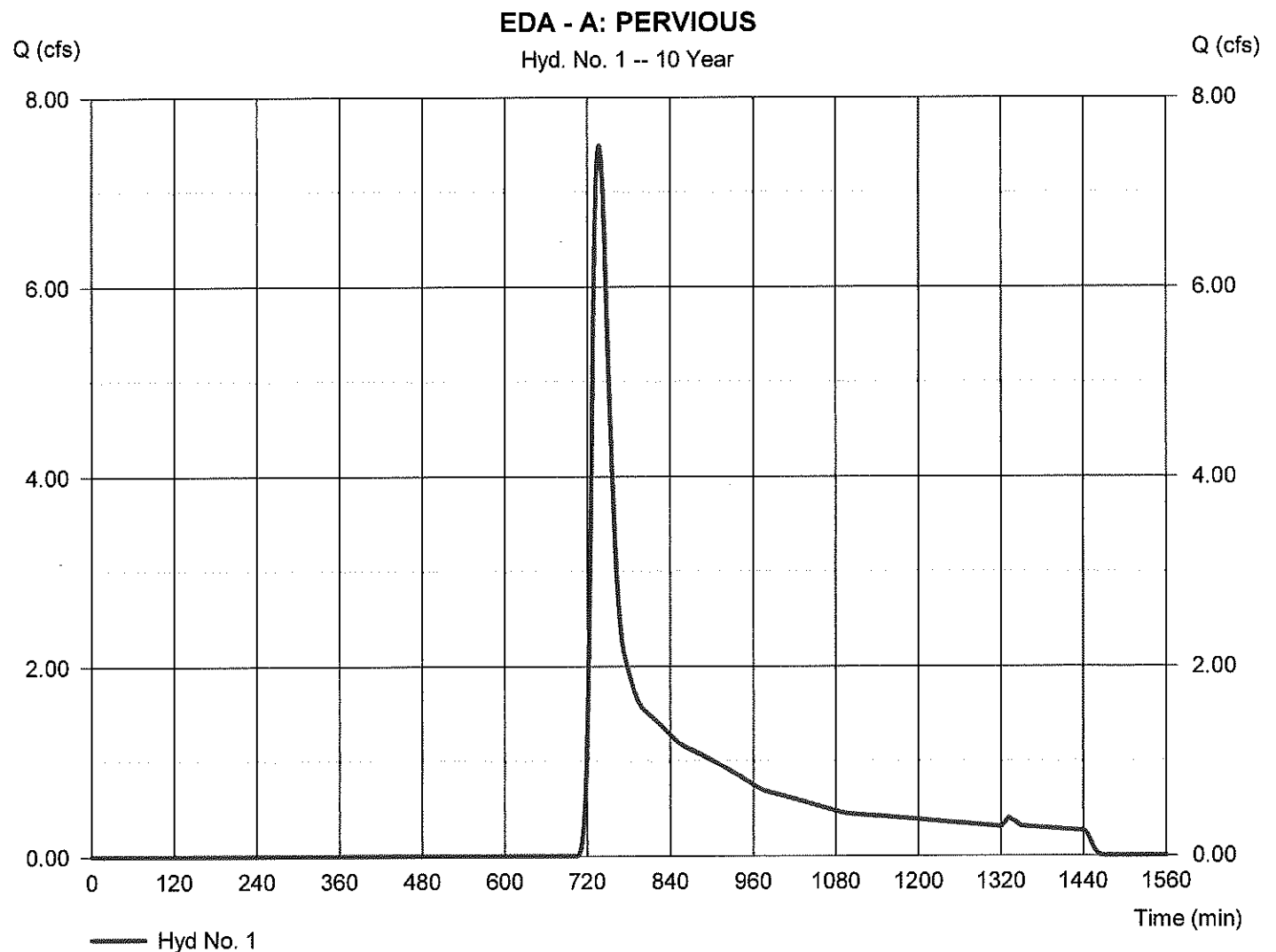
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 1

EDA - A: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 7.494 cfs
Storm frequency	= 10 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 41,031 cuft
Drainage area	= 13.470 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.70 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

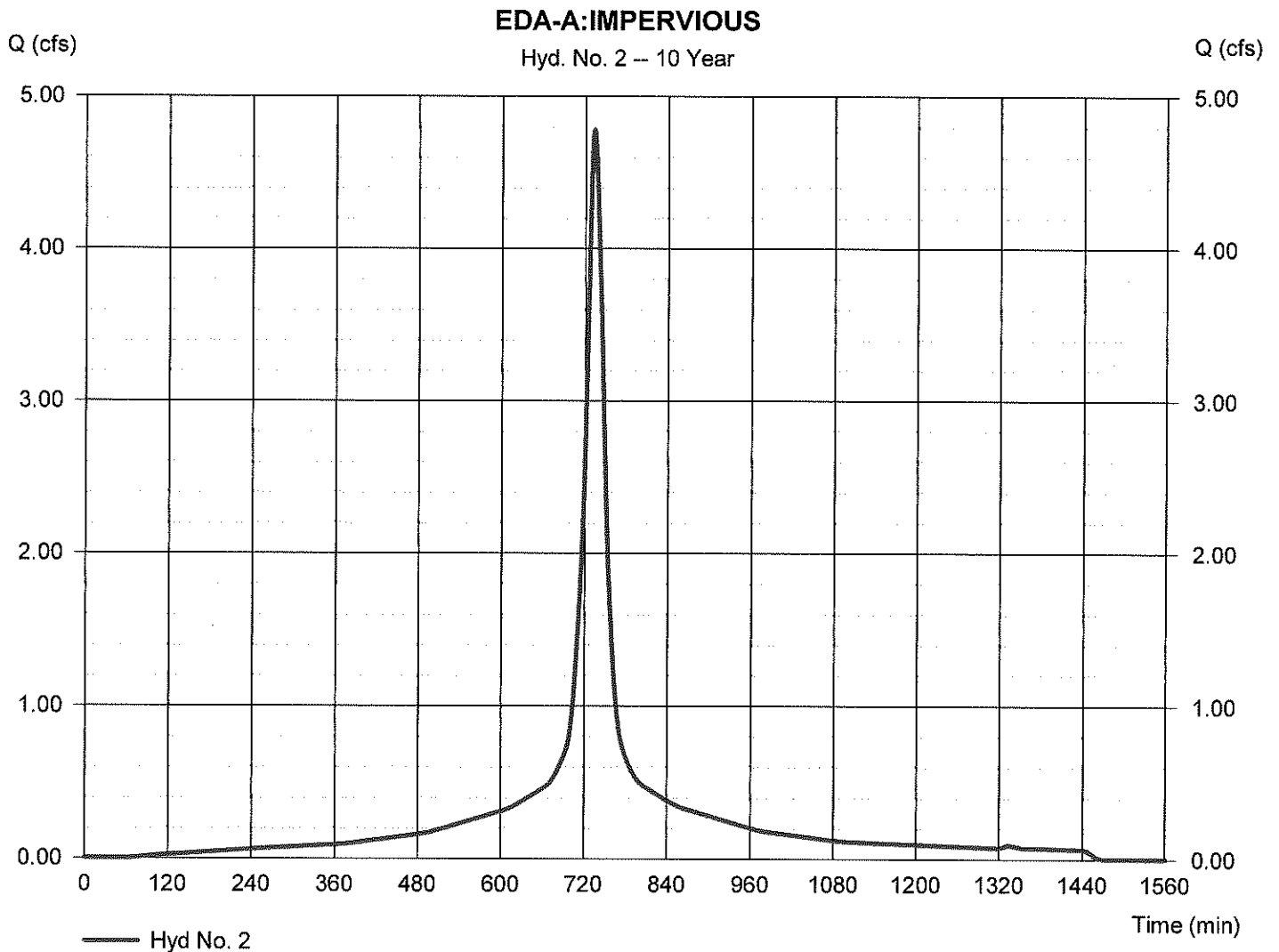
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 2

EDA-A:IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 4.780 cfs
Storm frequency	= 10 yrs	Time to peak	= 733 min
Time interval	= 1 min	Hyd. volume	= 23,815 cuft
Drainage area	= 1.460 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.60 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

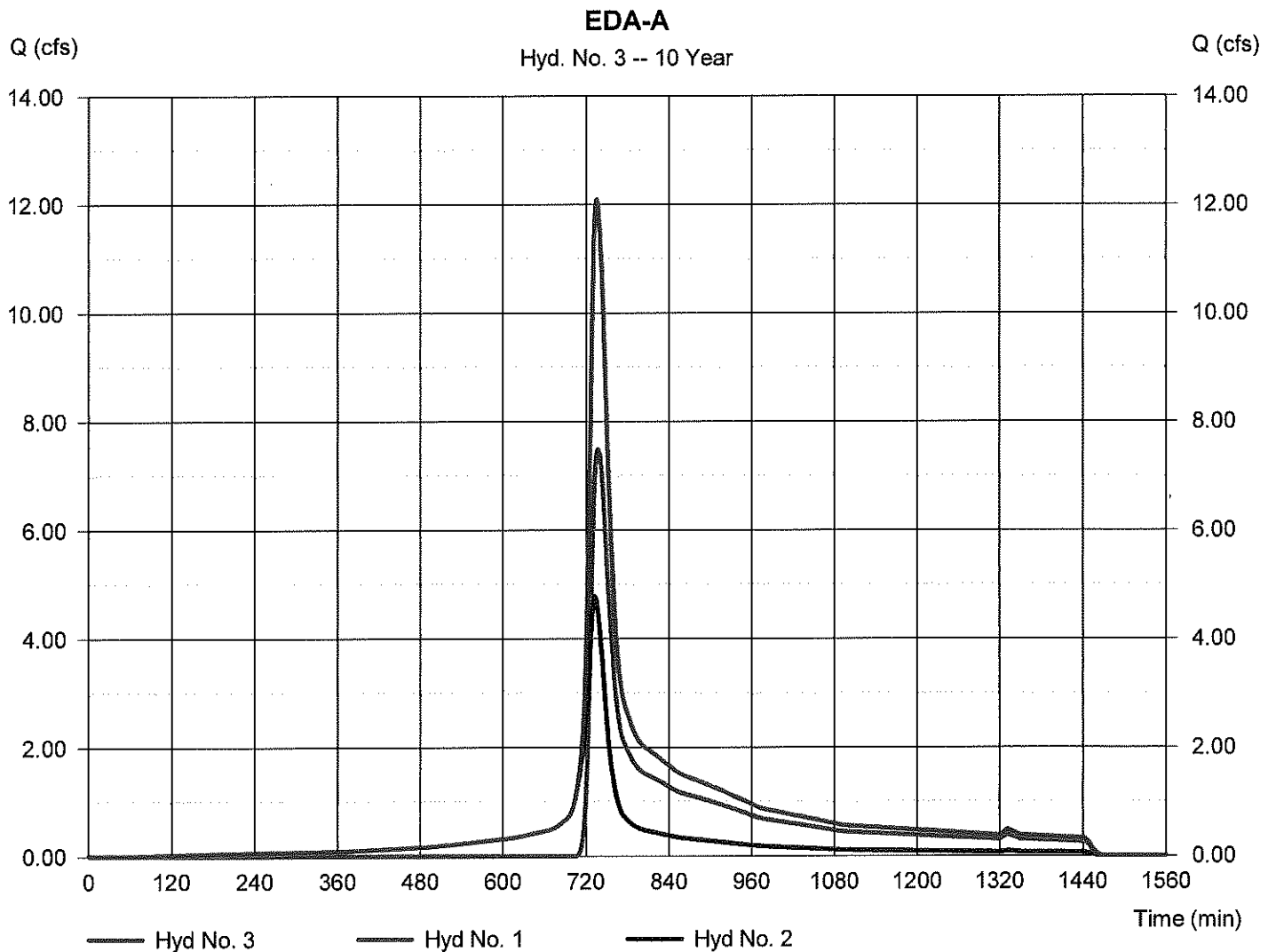
Monday, 11 / 25 / 2019

Hyd. No. 3

EDA-A

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

Peak discharge = 12.10 cfs
 Time to peak = 735 min
 Hyd. volume = 64,846 cuft
 Contrib. drain. area = 14.930 ac



Hydrograph Report

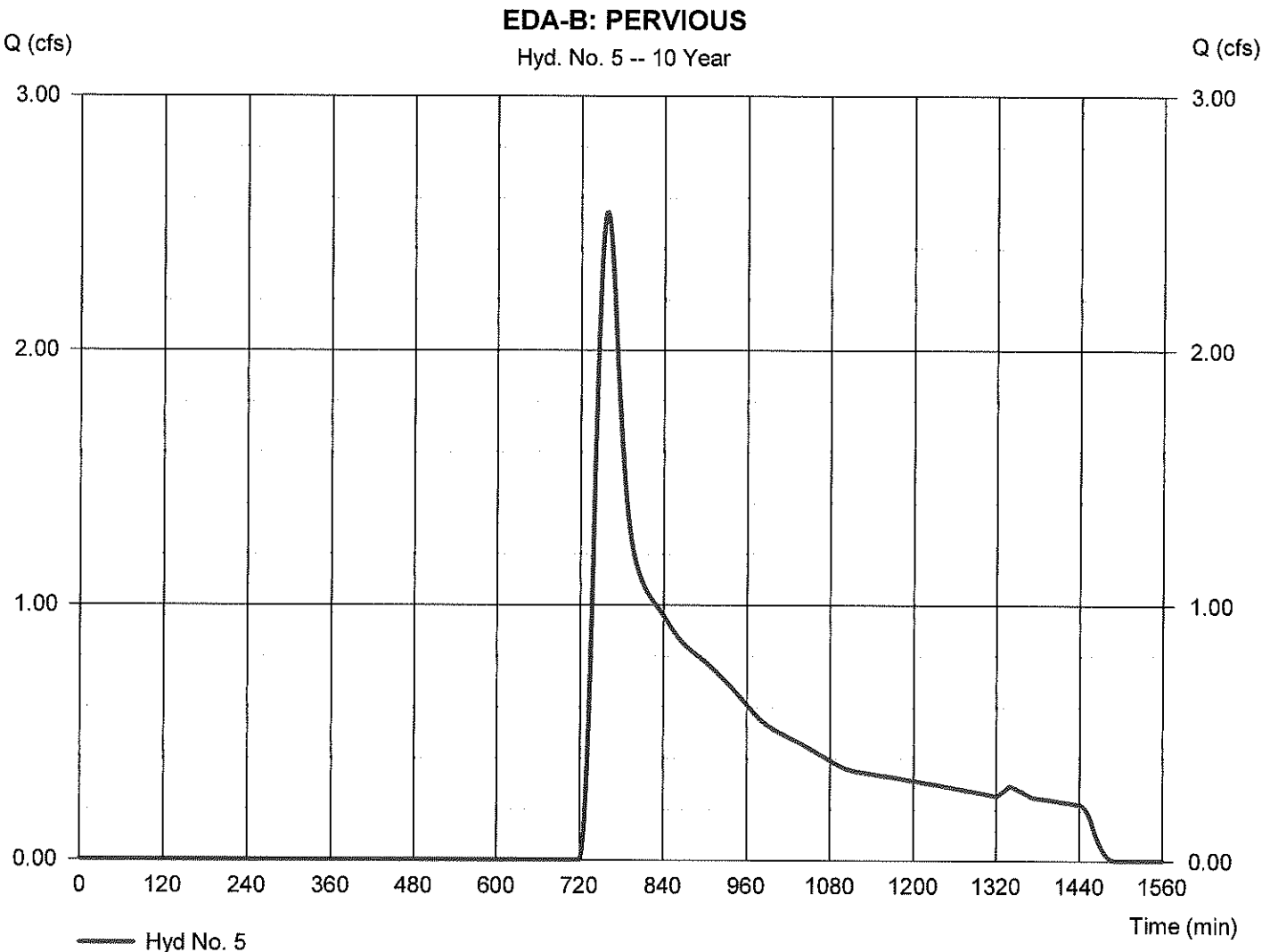
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 5

EDA-B: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.541 cfs
Storm frequency	= 10 yrs	Time to peak	= 757 min
Time interval	= 1 min	Hyd. volume	= 25,513 cuft
Drainage area	= 15.680 ac	Curve number	= 47
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.40 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

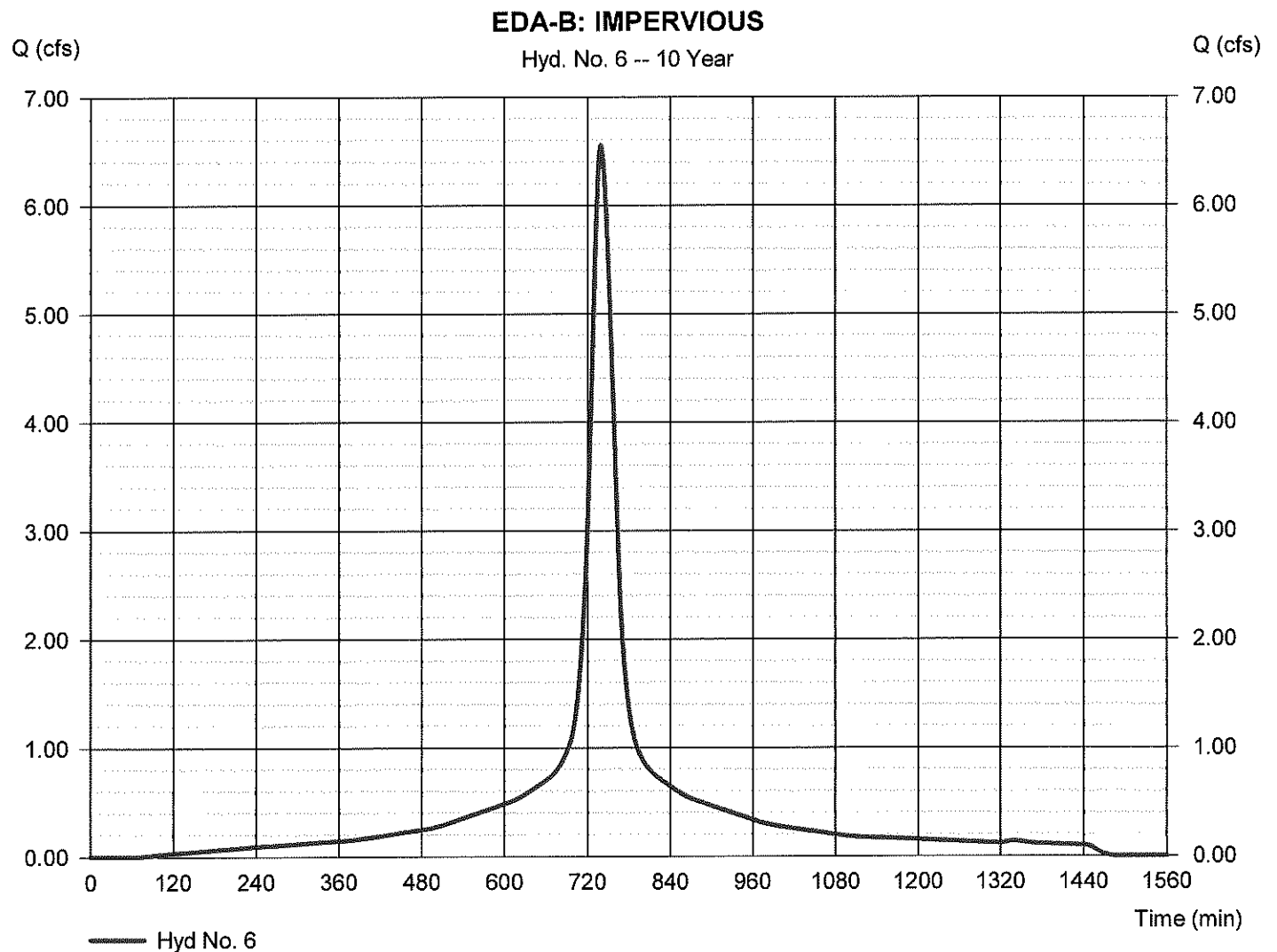
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 6

EDA-B: IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 6.557 cfs
Storm frequency	= 10 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 38,496 cuft
Drainage area	= 2.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29.70 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

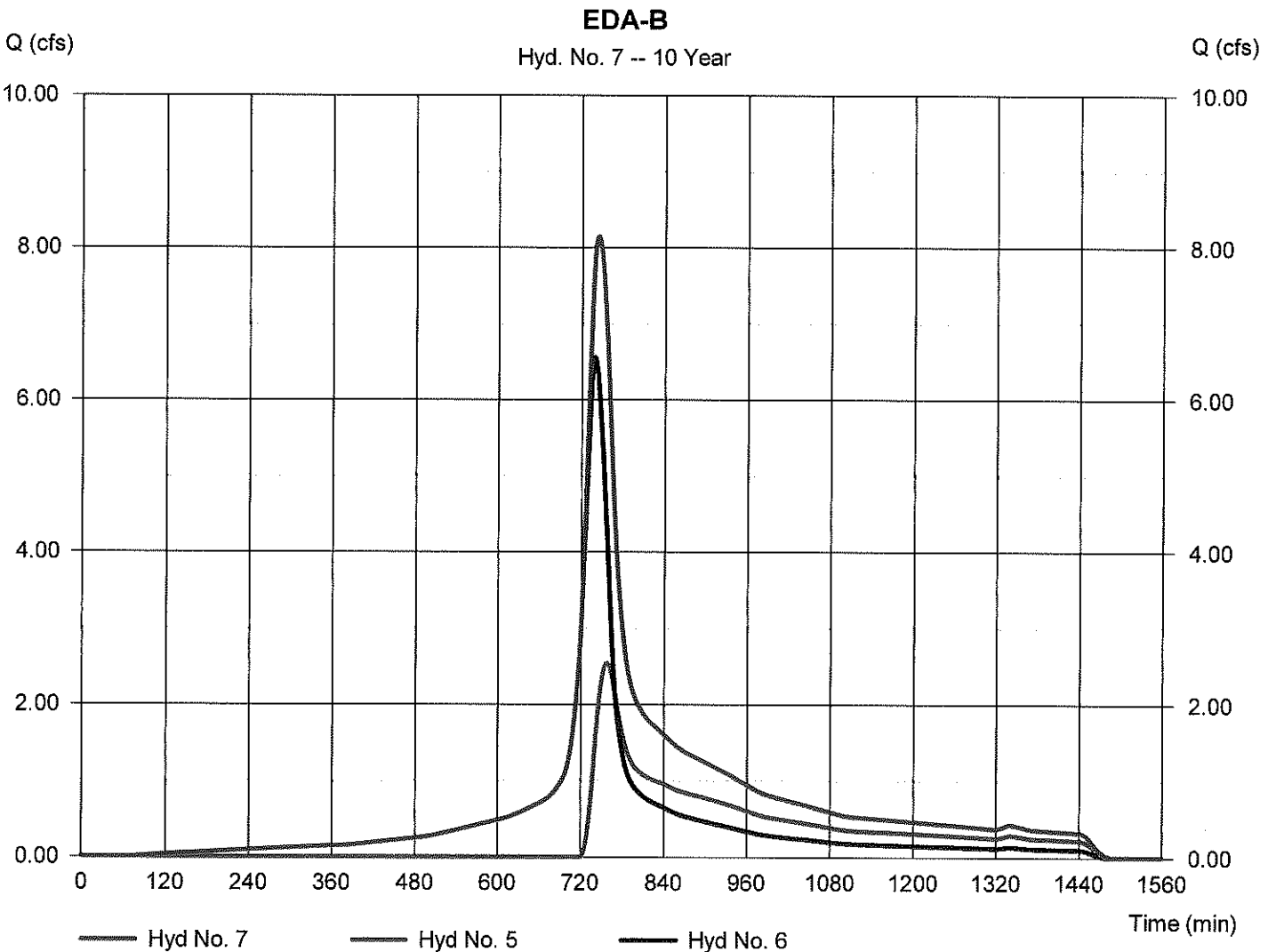
Monday, 11 / 25 / 2019

Hyd. No. 7

EDA-B

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 5, 6

Peak discharge = 8.148 cfs
Time to peak = 744 min
Hyd. volume = 64,009 cuft
Contrib. drain. area = 18.040 ac



Hydrograph Report

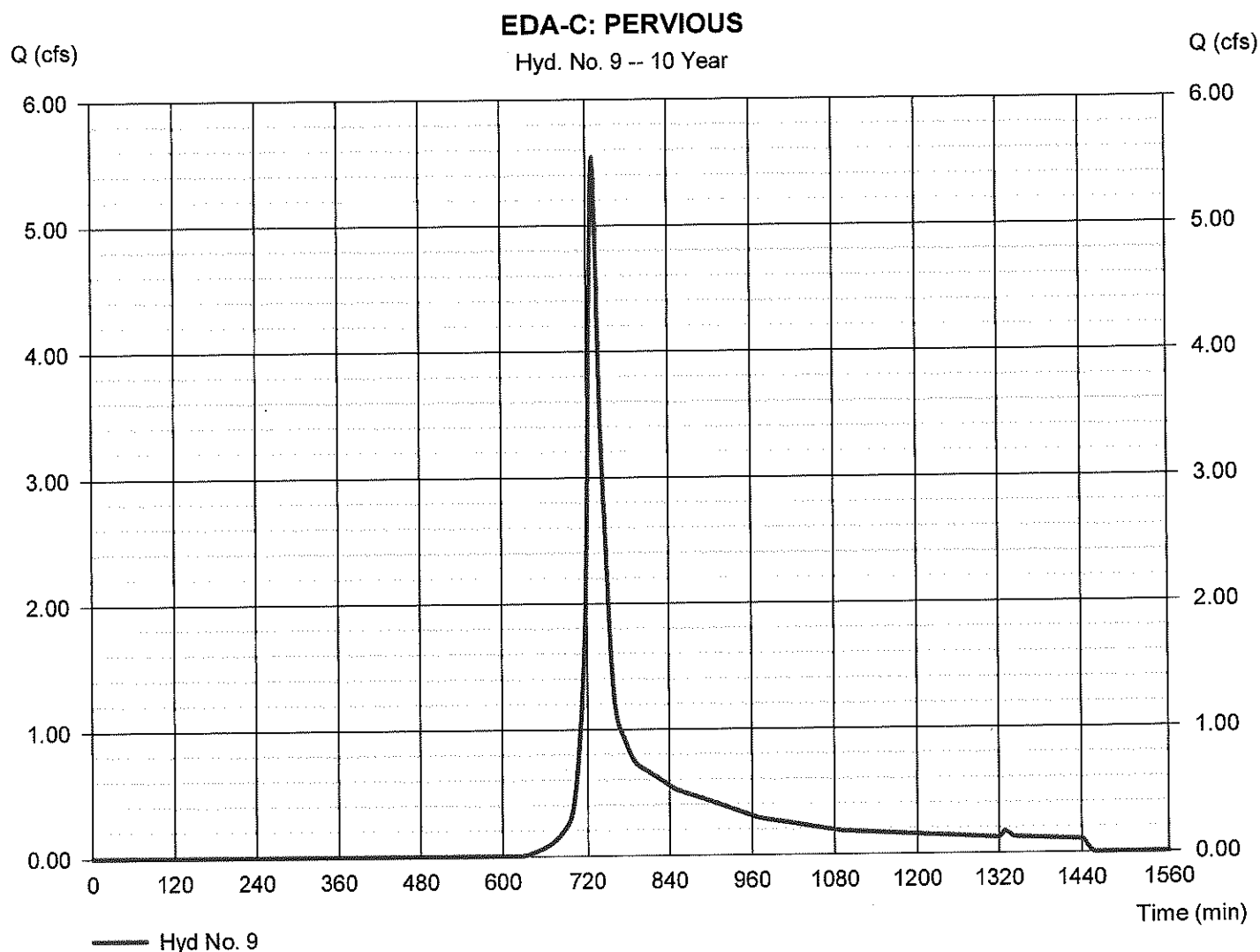
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 9

EDA-C: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 5.541 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 21,790 cuft
Drainage area	= 3.770 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

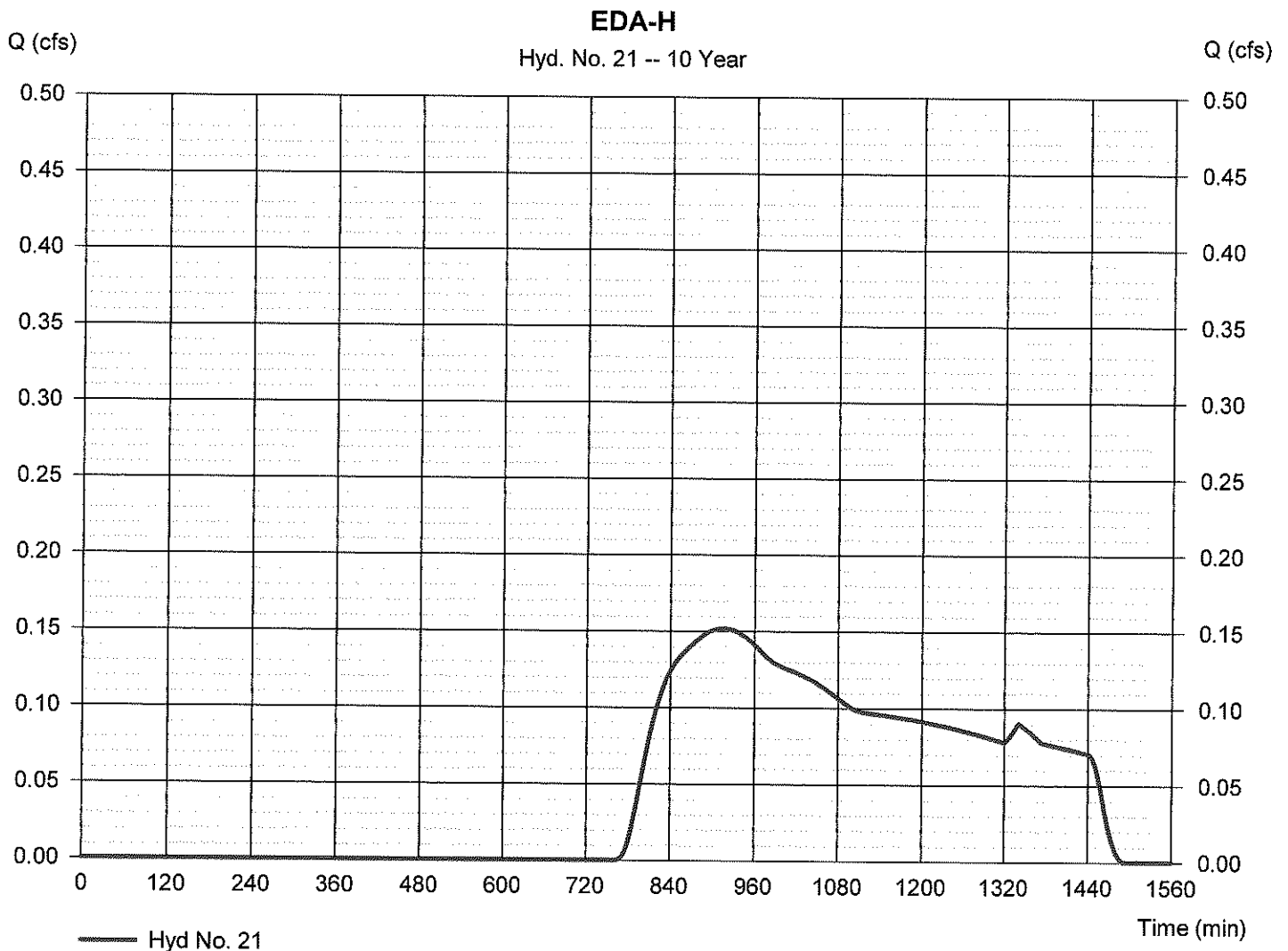


Hydrograph Report

Hyd. No. 21

EDA-H

Hydrograph type	= SCS Runoff	Peak discharge	= 0.152 cfs
Storm frequency	= 10 yrs	Time to peak	= 914 min
Time interval	= 1 min	Hyd. volume	= 4,173 cuft
Drainage area	= 12.100 ac	Curve number	= 37
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 33.50 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

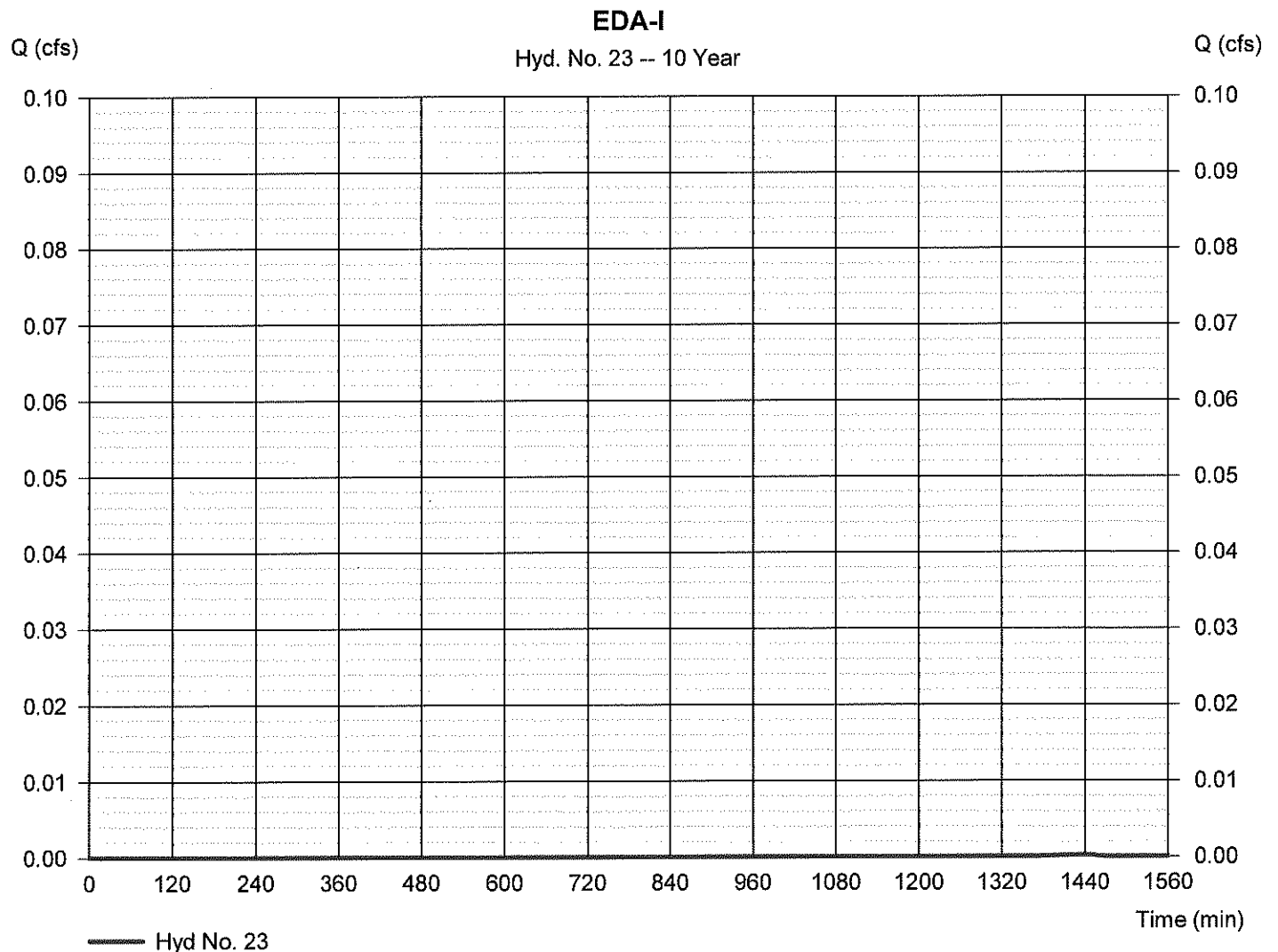
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Monday, 11 / 25 / 2019

Hyd. No. 23

EDA-I

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 1442 min
Time interval	= 1 min	Hyd. volume	= 1 cuft
Drainage area	= 1.050 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

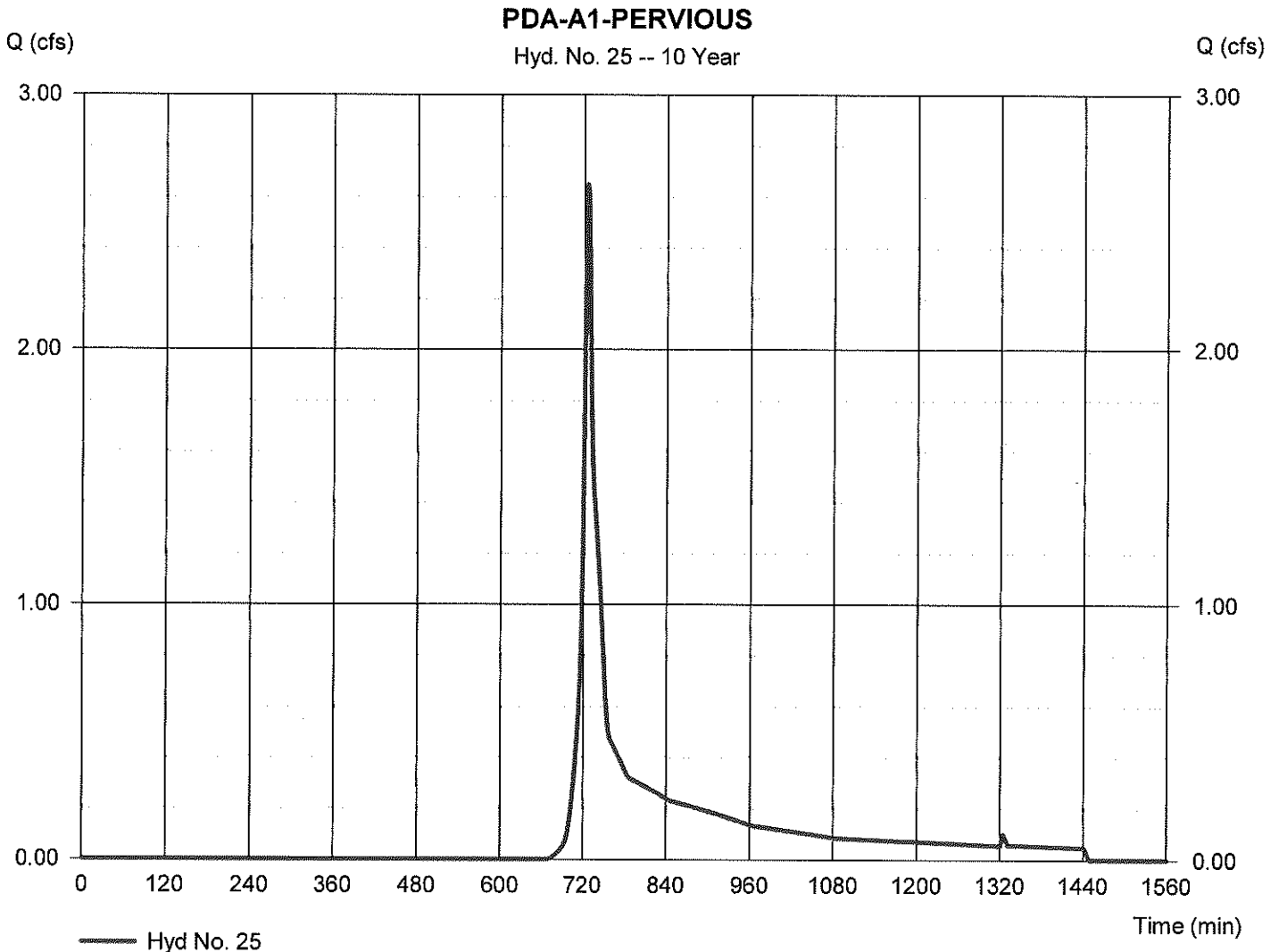
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Monday, 11 / 25 / 2019

Hyd. No. 25

PDA-A1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.648 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 8,971 cuft
Drainage area	= 1.880 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

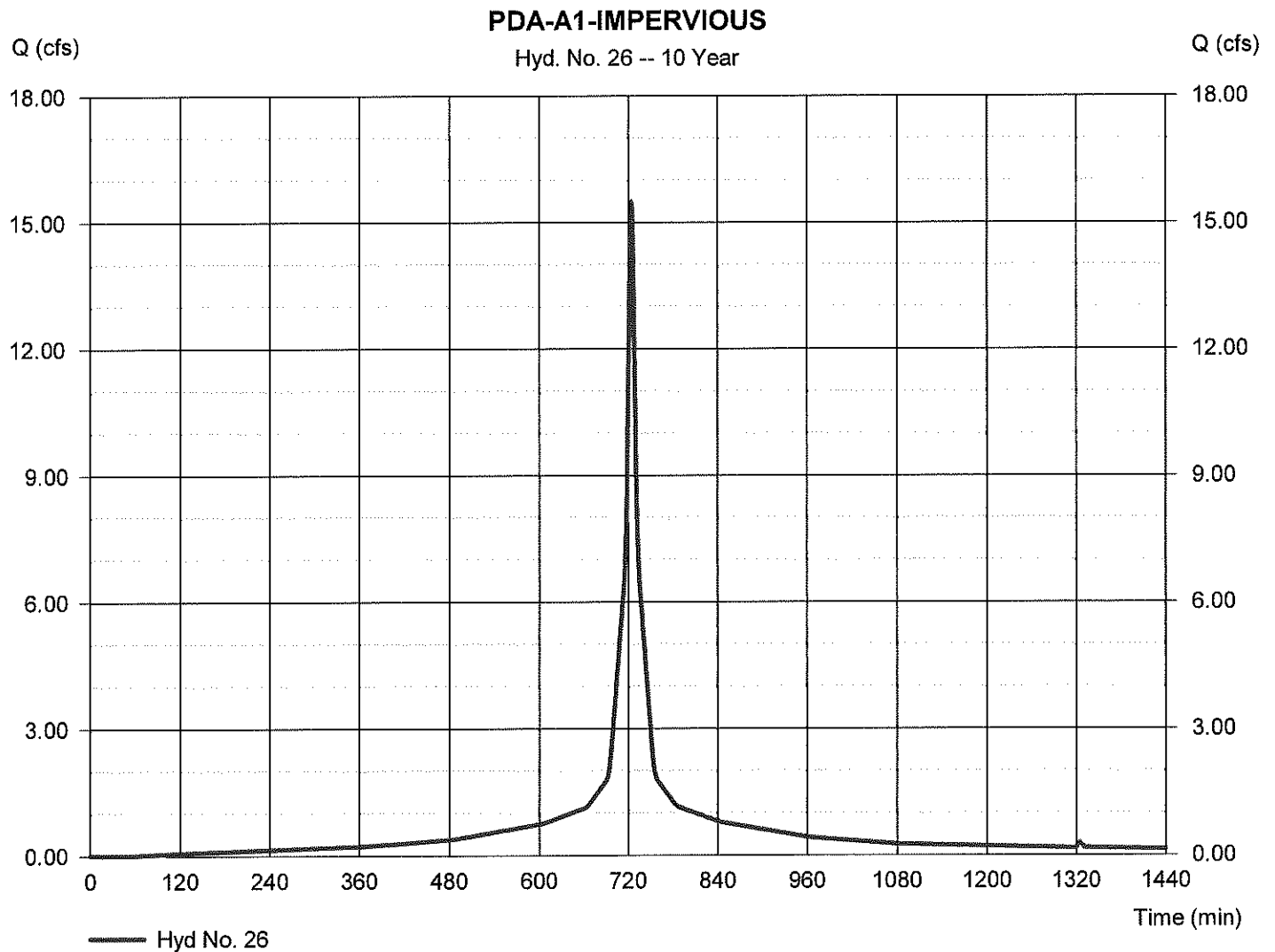
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Hyd. No. 26

PDA-A1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 15.50 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 54,502 cuft
Drainage area	= 3.240 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

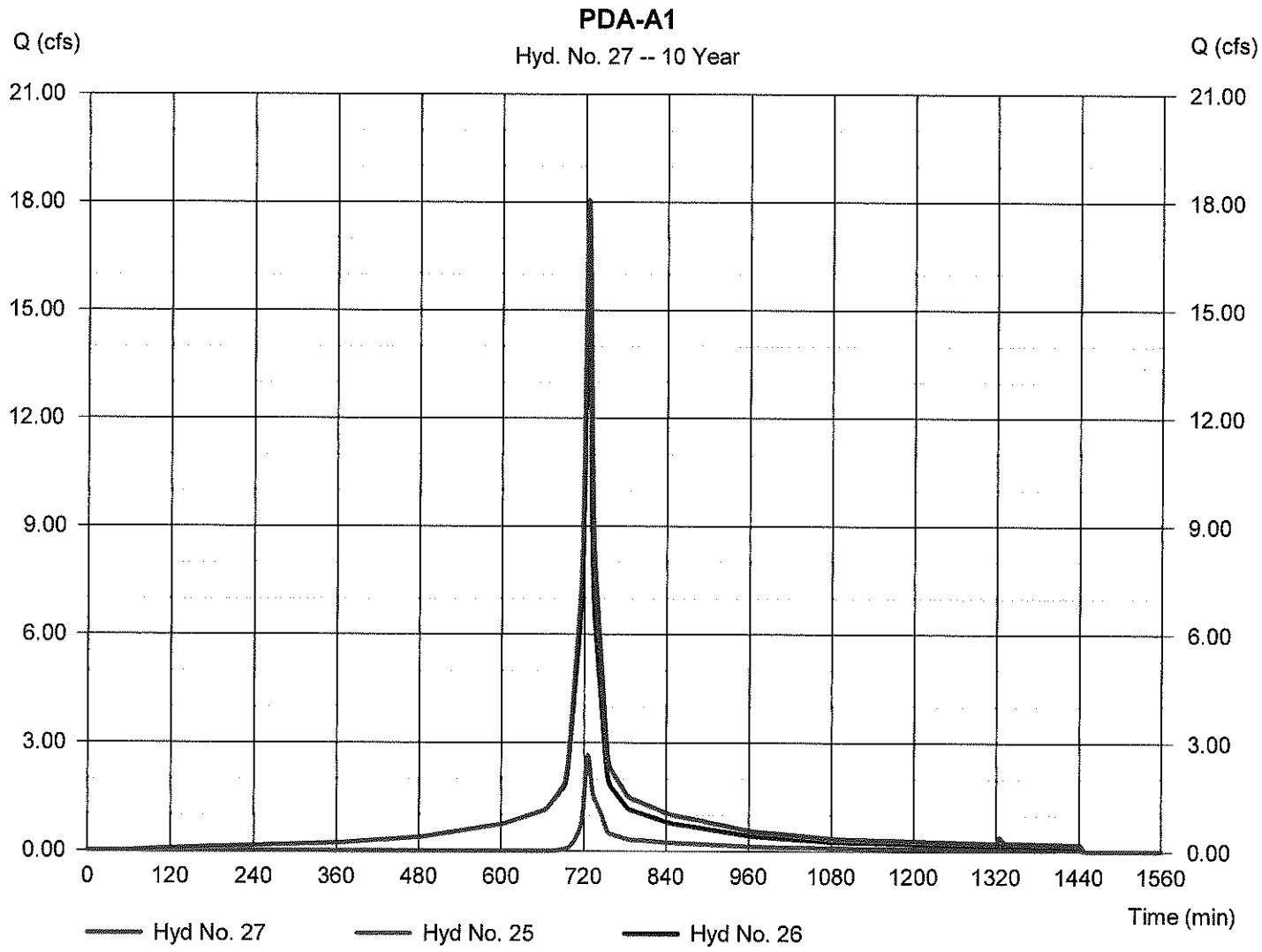
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Hyd. No. 27

PDA-A1

Hydrograph type	= Combine	Peak discharge	= 18.06 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 63,473 cuft
Inflow hyds.	= 25, 26	Contrib. drain. area	= 5.120 ac



Hydrograph Report

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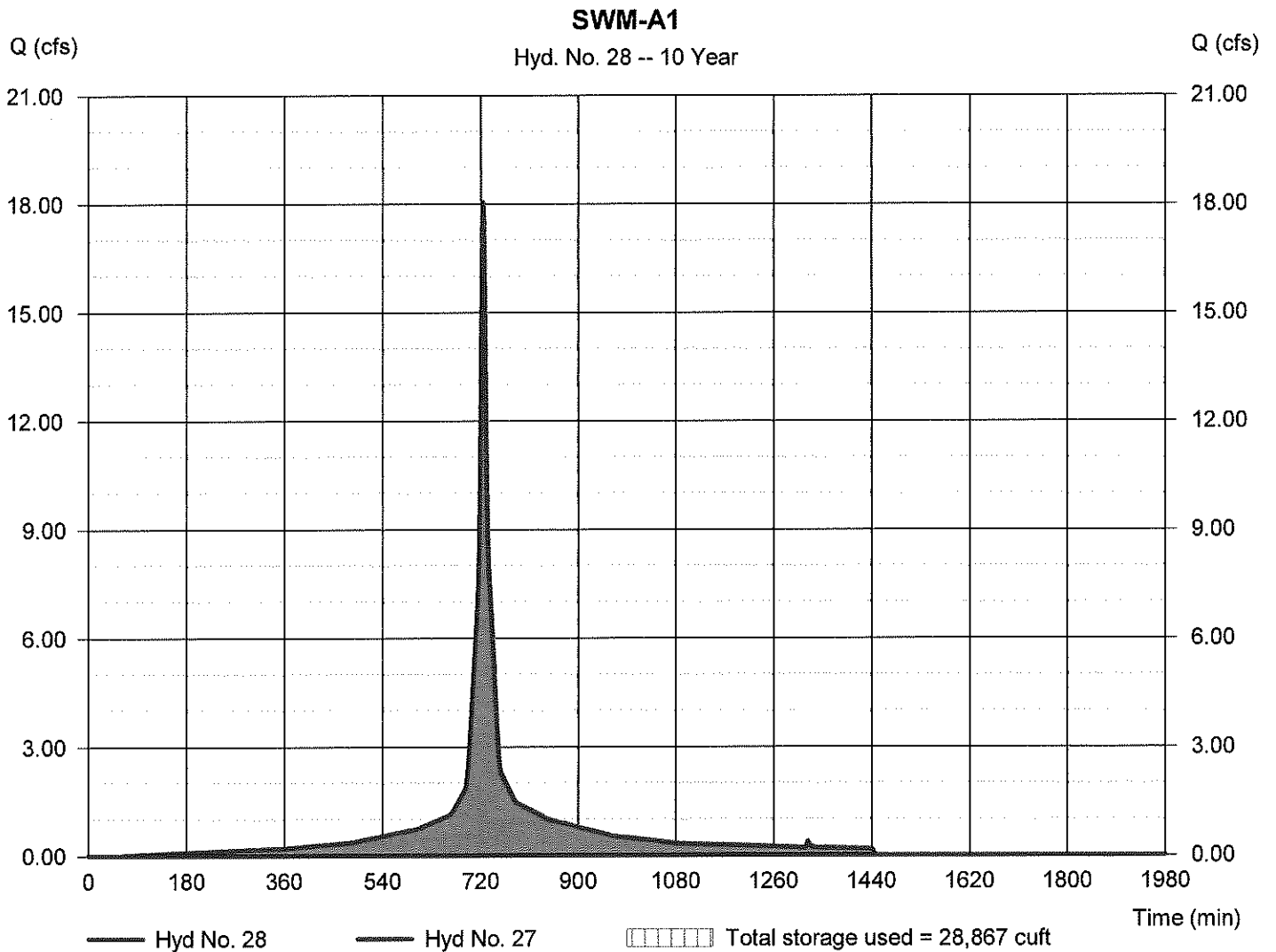
Monday, 11 / 25 / 2019

Hyd. No. 28

SWM-A1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 677 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 27 - PDA-A1	Max. Elevation	= 593.37 ft
Reservoir name	= SWM-A1	Max. Storage	= 28,867 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

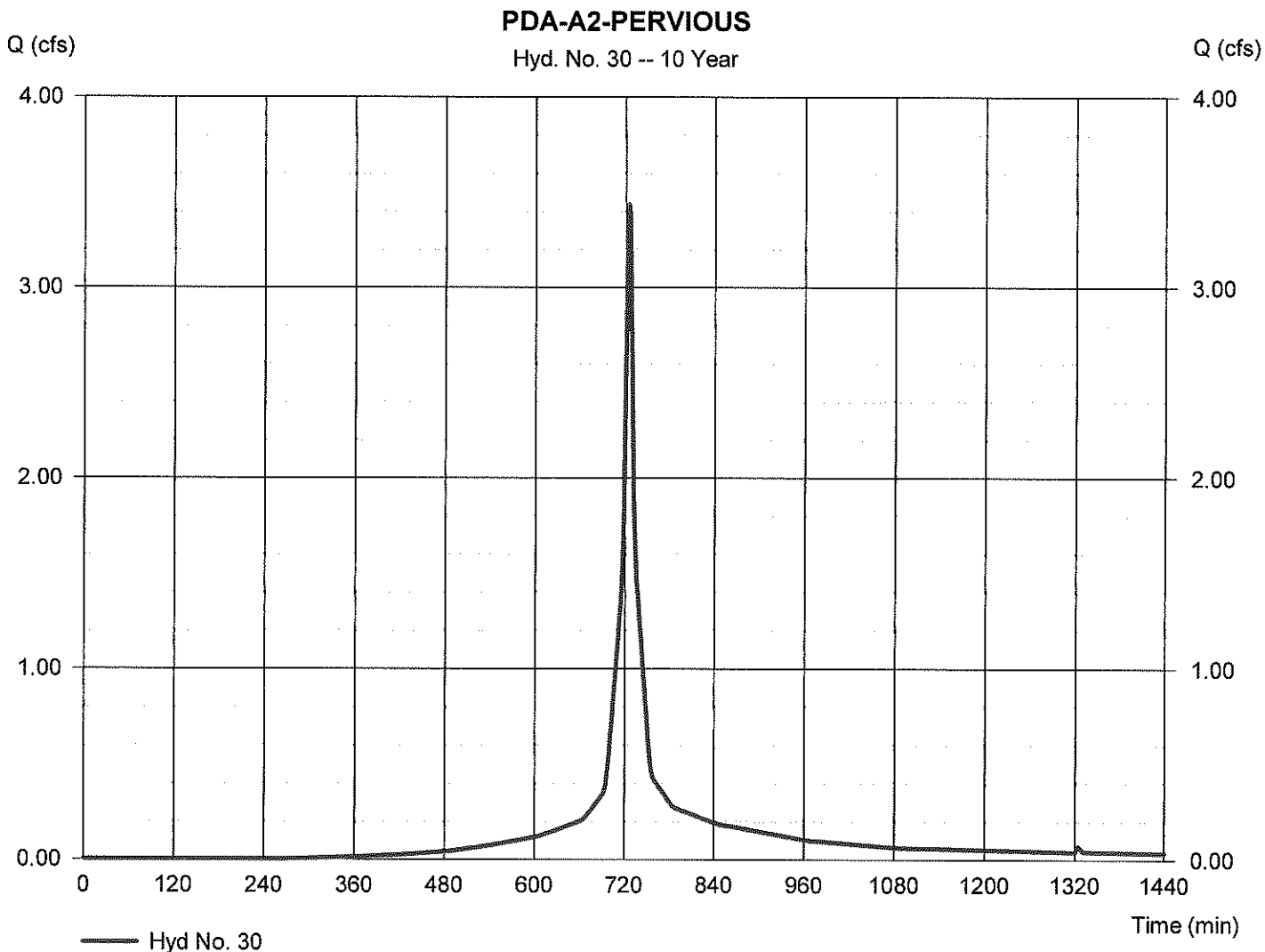
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Hyd. No. 30

PDA-A2-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.436 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 10,966 cuft
Drainage area	= 0.810 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

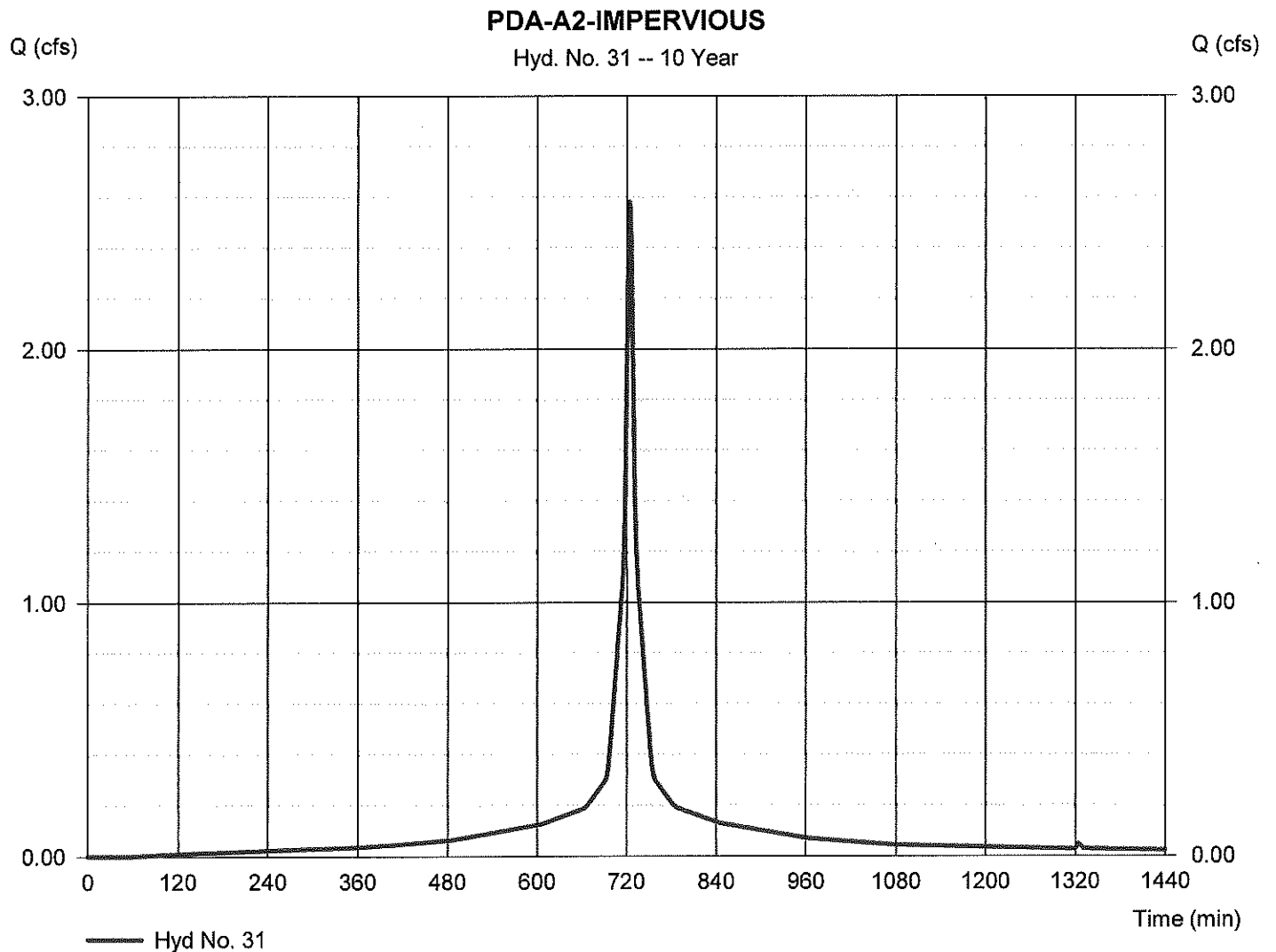
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Hyd. No. 31

PDA-A2-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.583 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 9,084 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

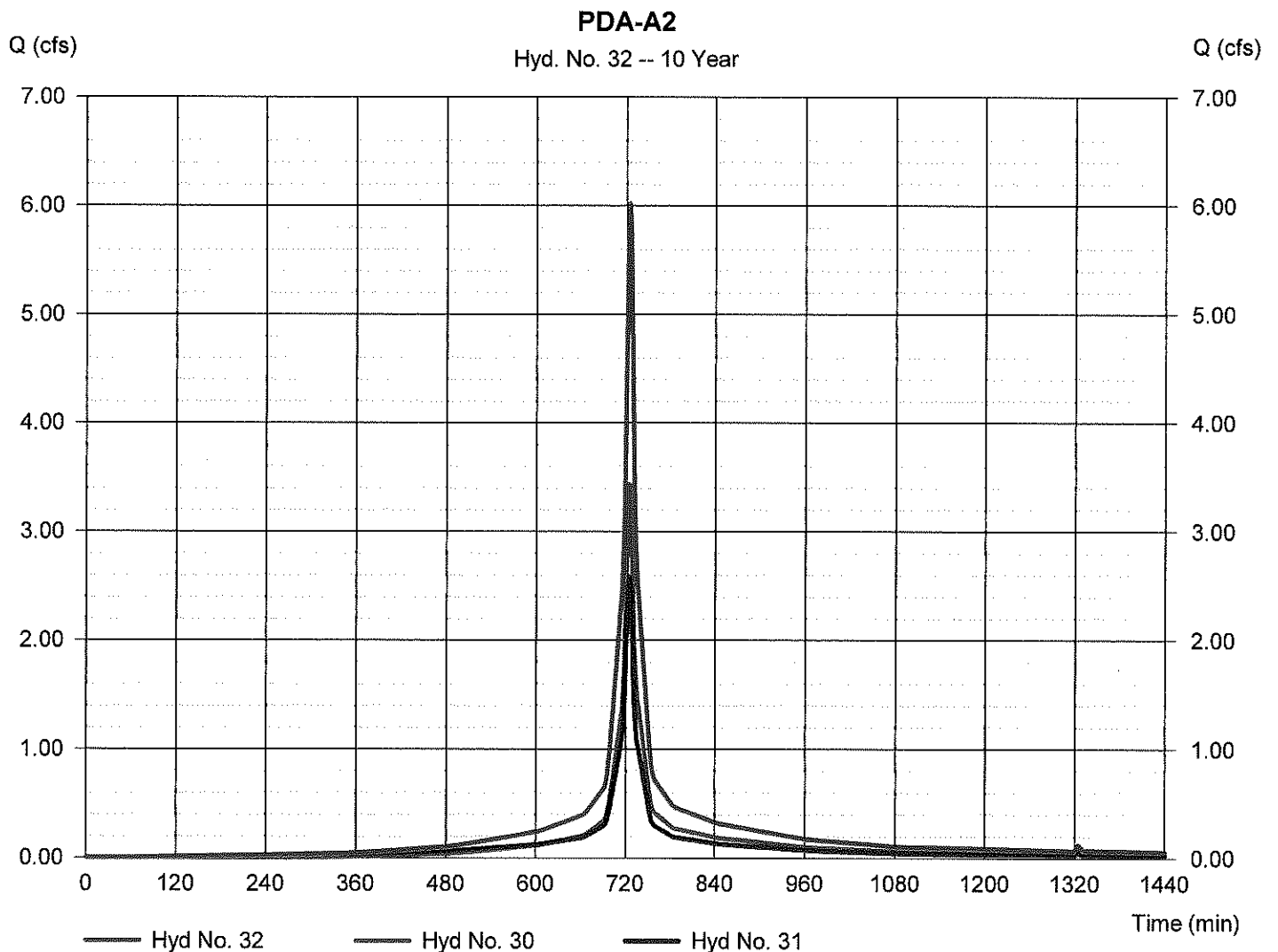
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Hyd. No. 32

PDA-A2

Hydrograph type	= Combine	Peak discharge	= 6.019 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 20,049 cuft
Inflow hyds.	= 30, 31	Contrib. drain. area	= 1.350 ac



Hydrograph Report

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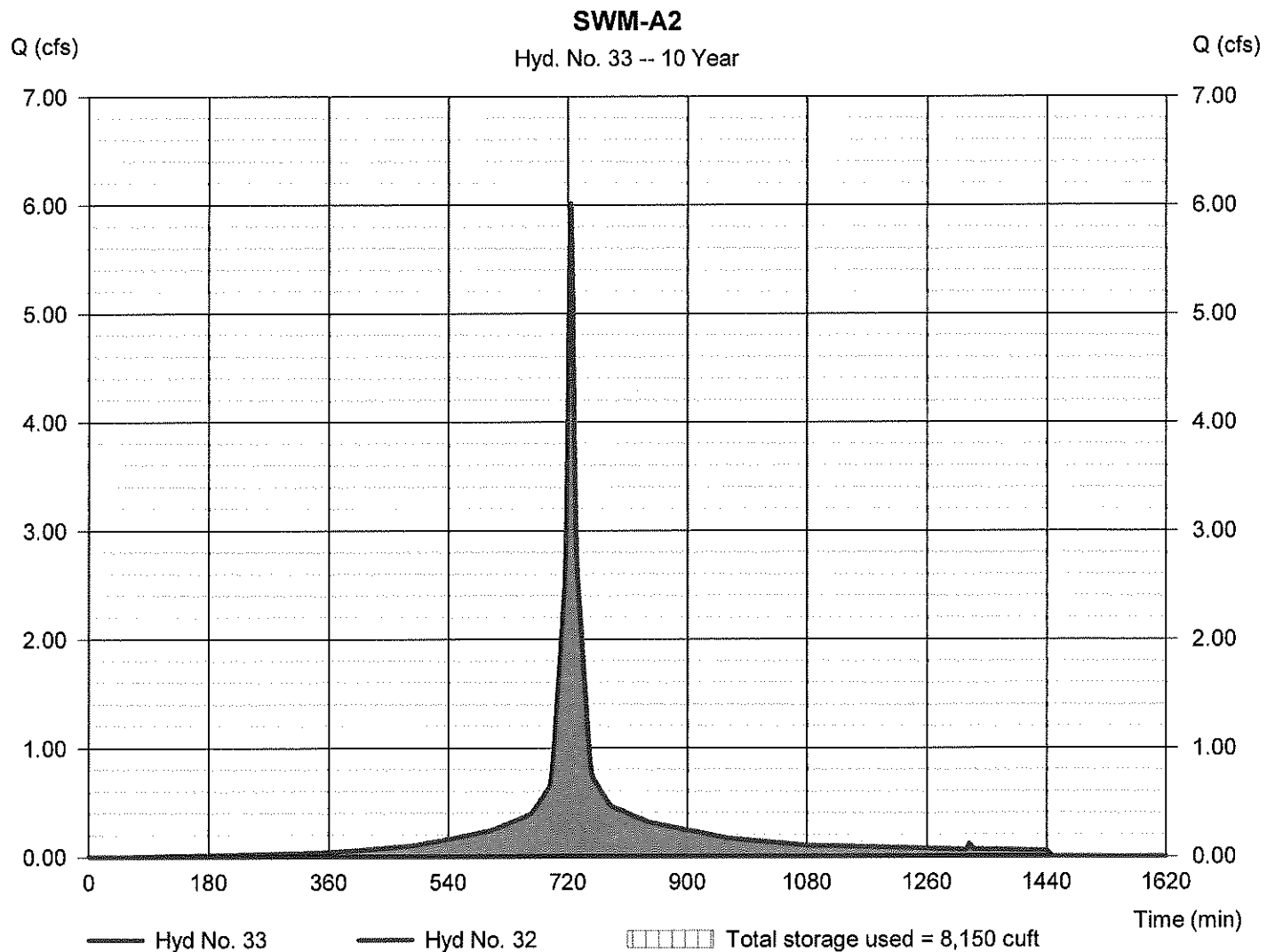
Monday, 11 / 25 / 2019

Hyd. No. 33

SWM-A2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 743 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - PDA-A2	Max. Elevation	= 601.02 ft
Reservoir name	= SWM-A2	Max. Storage	= 8,150 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

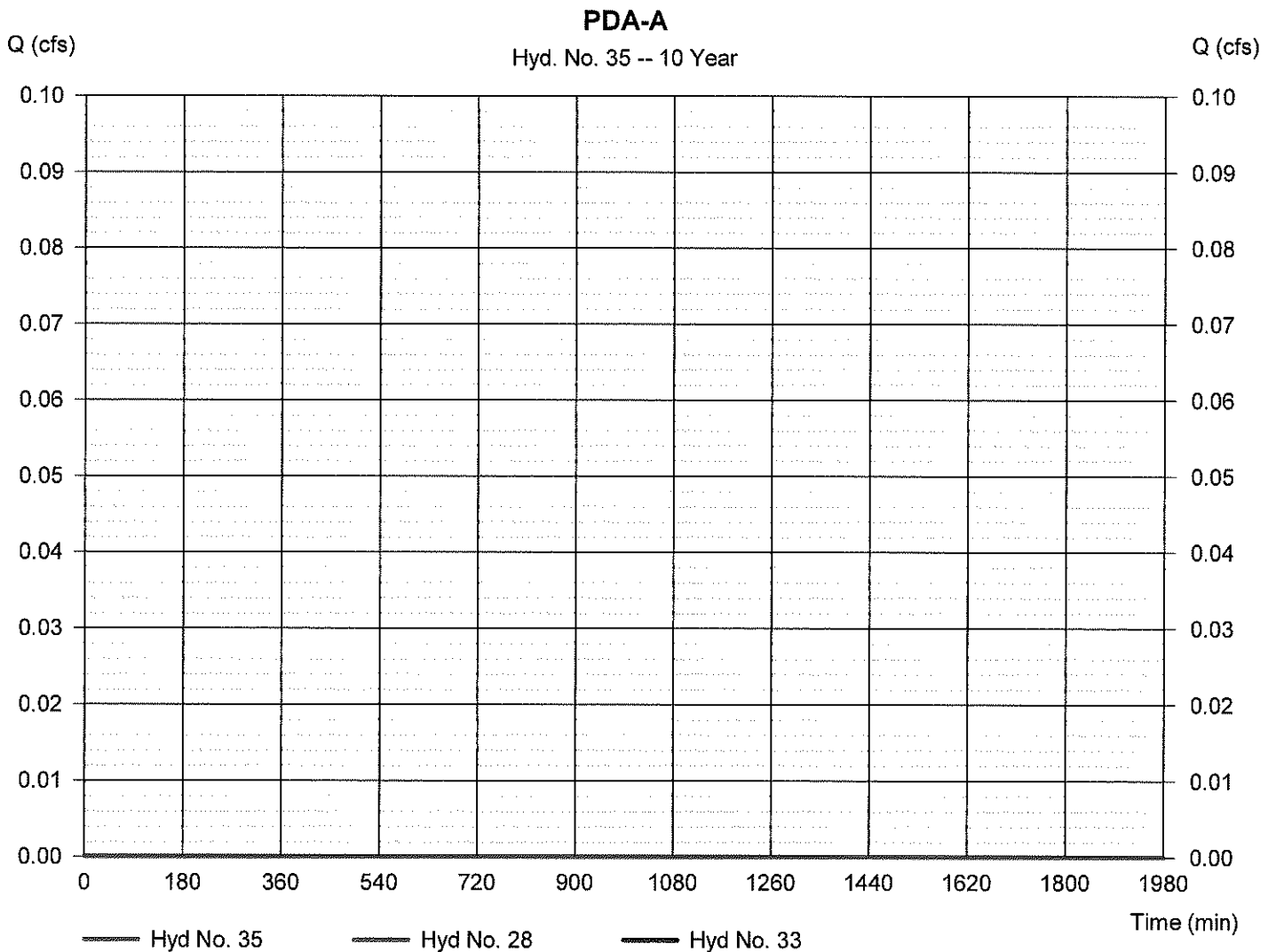
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Hyd. No. 35

PDA-A

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 743 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 28, 33	Contrib. drain. area	= 0.000 ac



Hydrograph Report

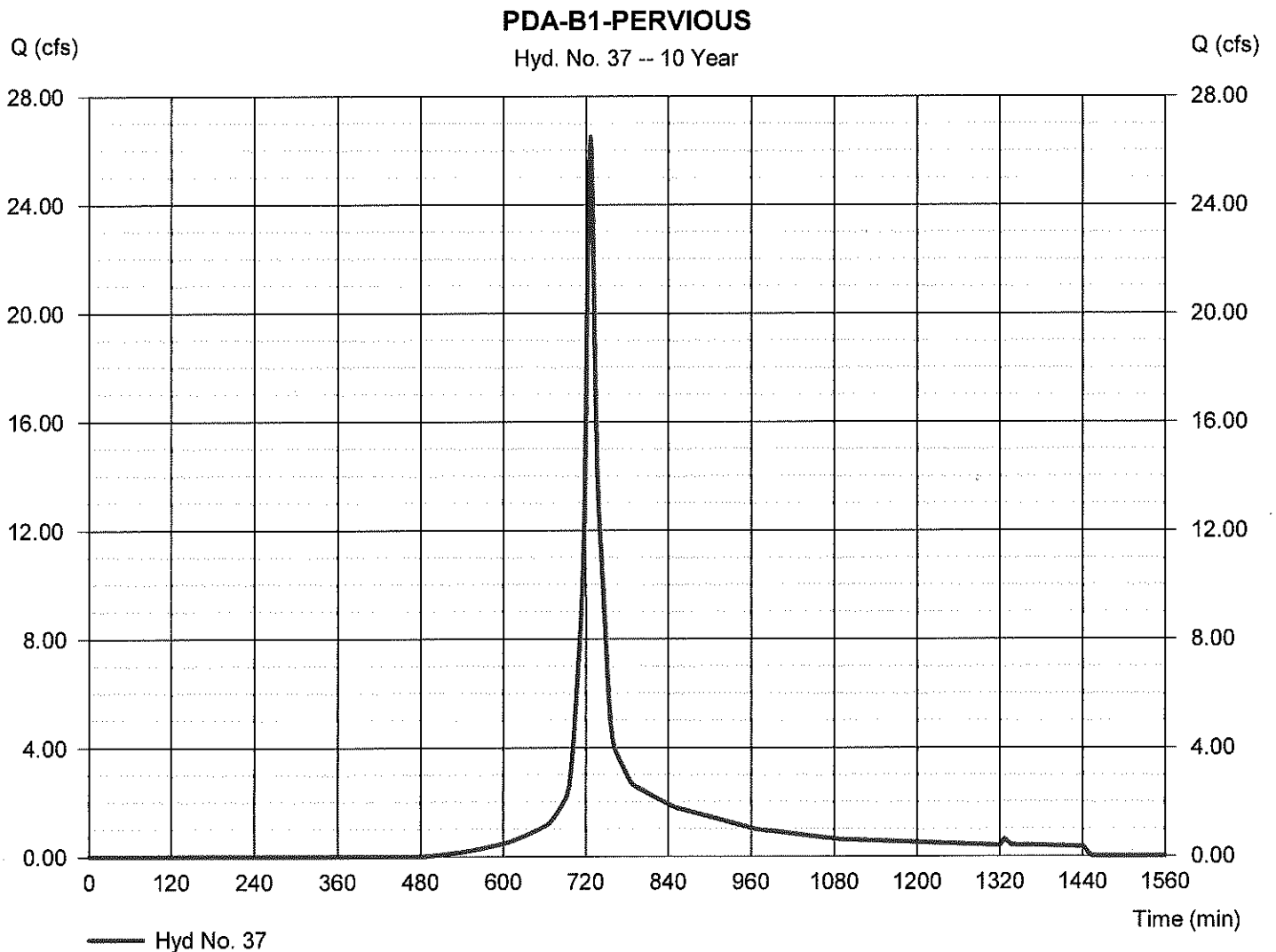
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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Hyd. No. 37

PDA-B1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 26.50 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 90,703 cuft
Drainage area	= 9.720 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

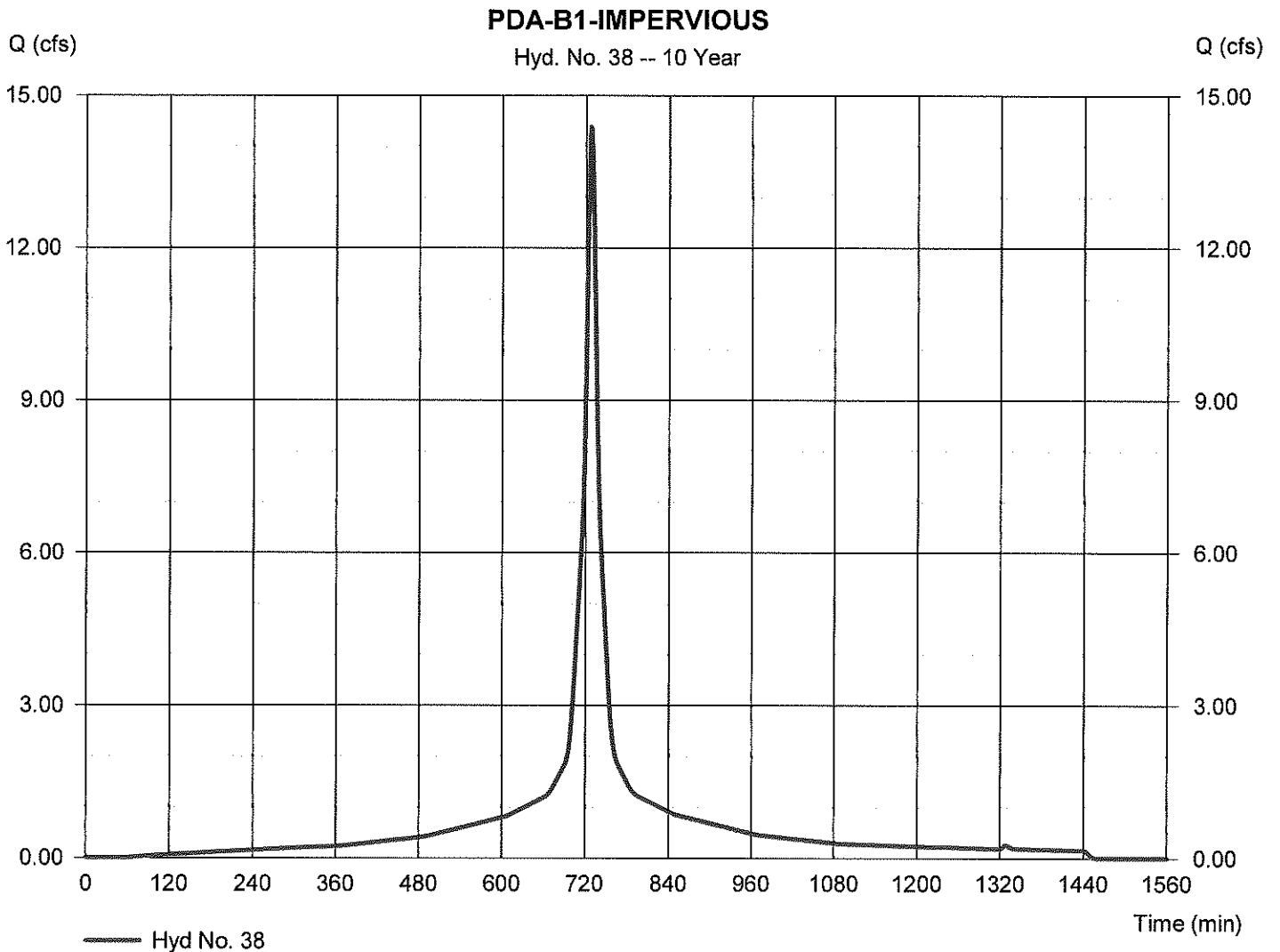
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Monday, 11 / 25 / 2019

Hyd. No. 38

PDA-B1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 14.38 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 59,439 cuft
Drainage area	= 3.580 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

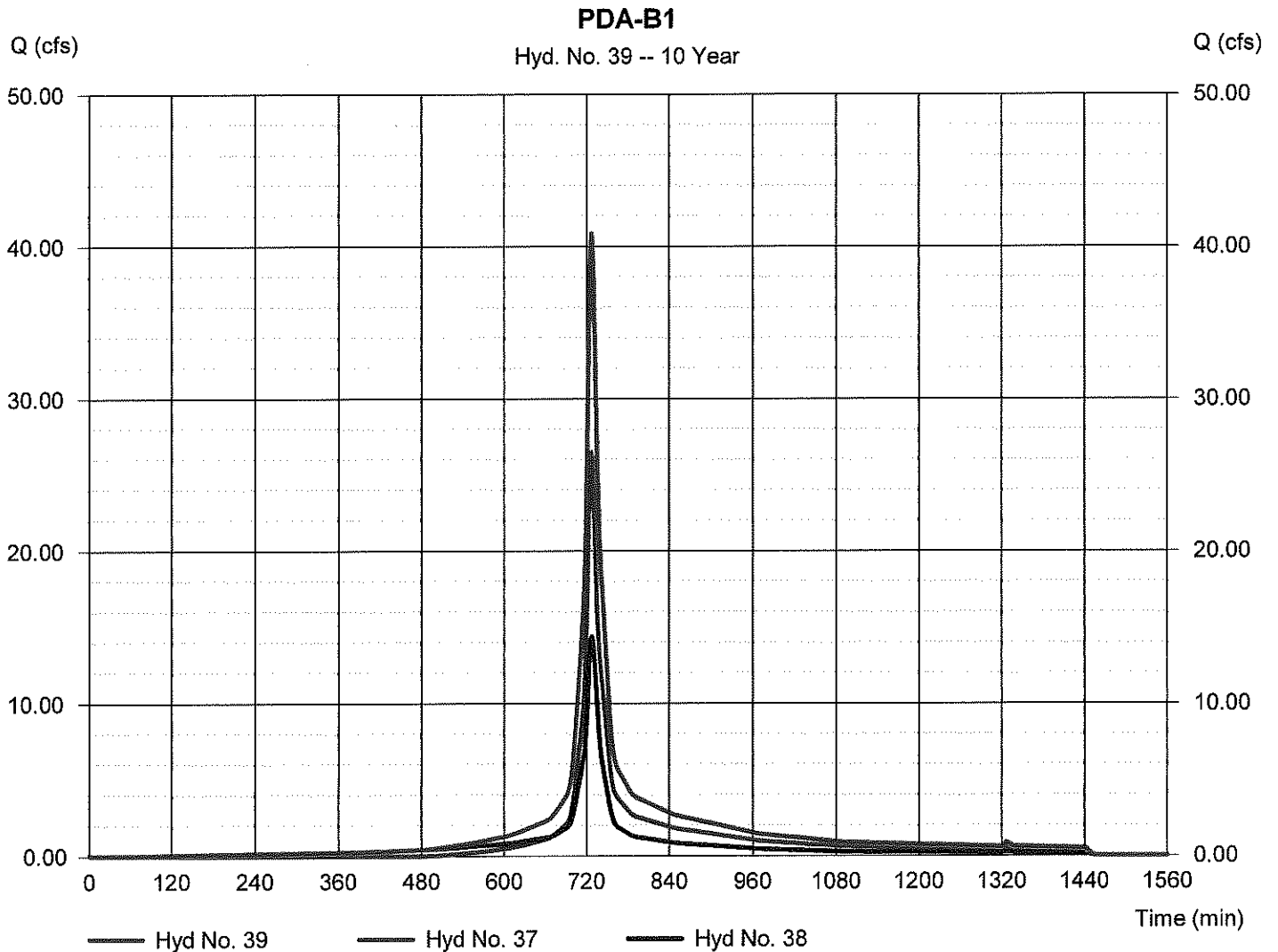
Monday, 11 / 25 / 2019

Hyd. No. 39

PDA-B1

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 37, 38

Peak discharge = 40.88 cfs
 Time to peak = 727 min
 Hyd. volume = 150,142 cuft
 Contrib. drain. area = 13.300 ac



Hydrograph Report

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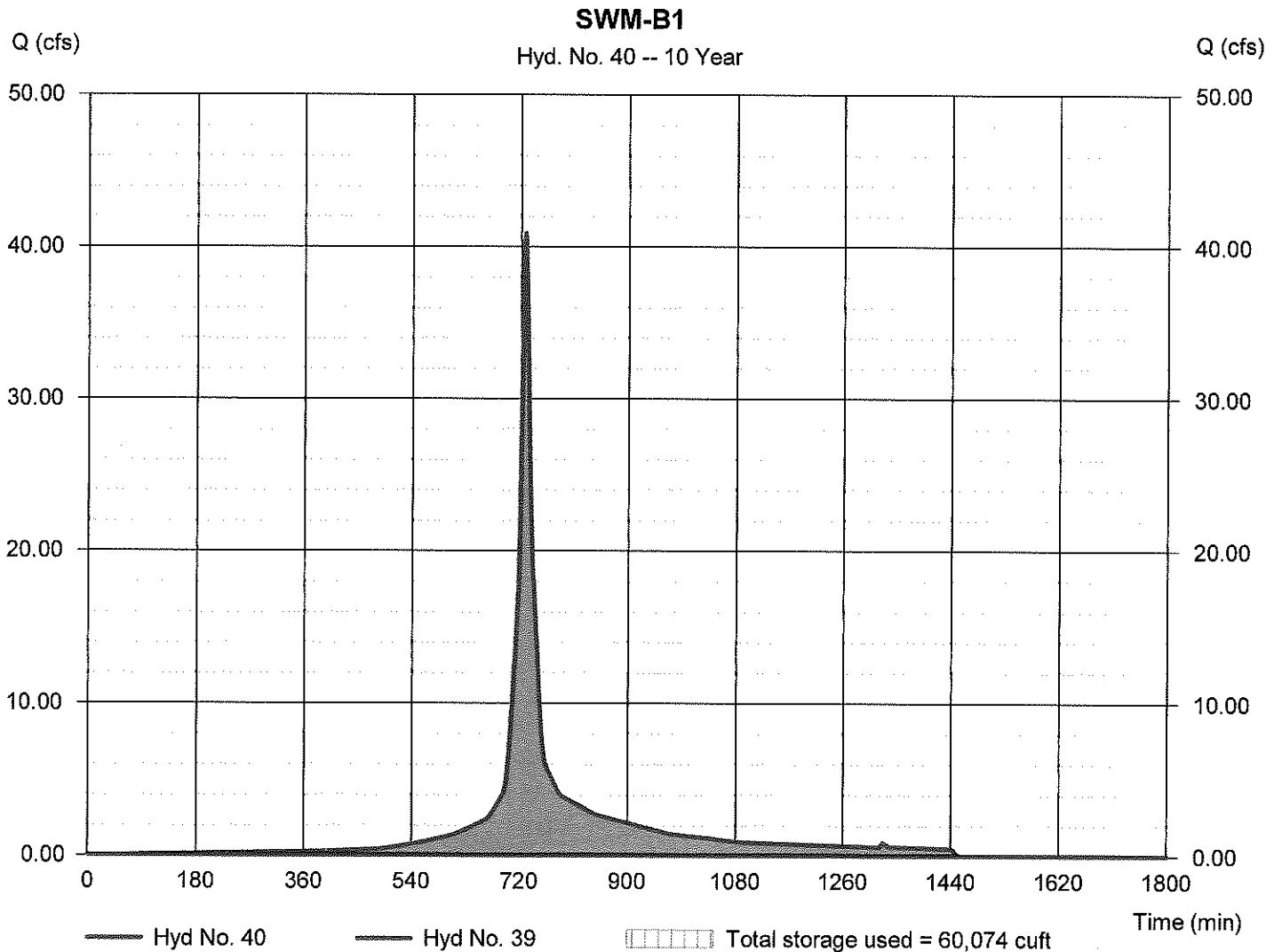
Monday, 11 / 25 / 2019

Hyd. No. 40

SWM-B1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 39 - PDA-B1	Max. Elevation	= 601.03 ft
Reservoir name	= SWM-B1	Max. Storage	= 60,074 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

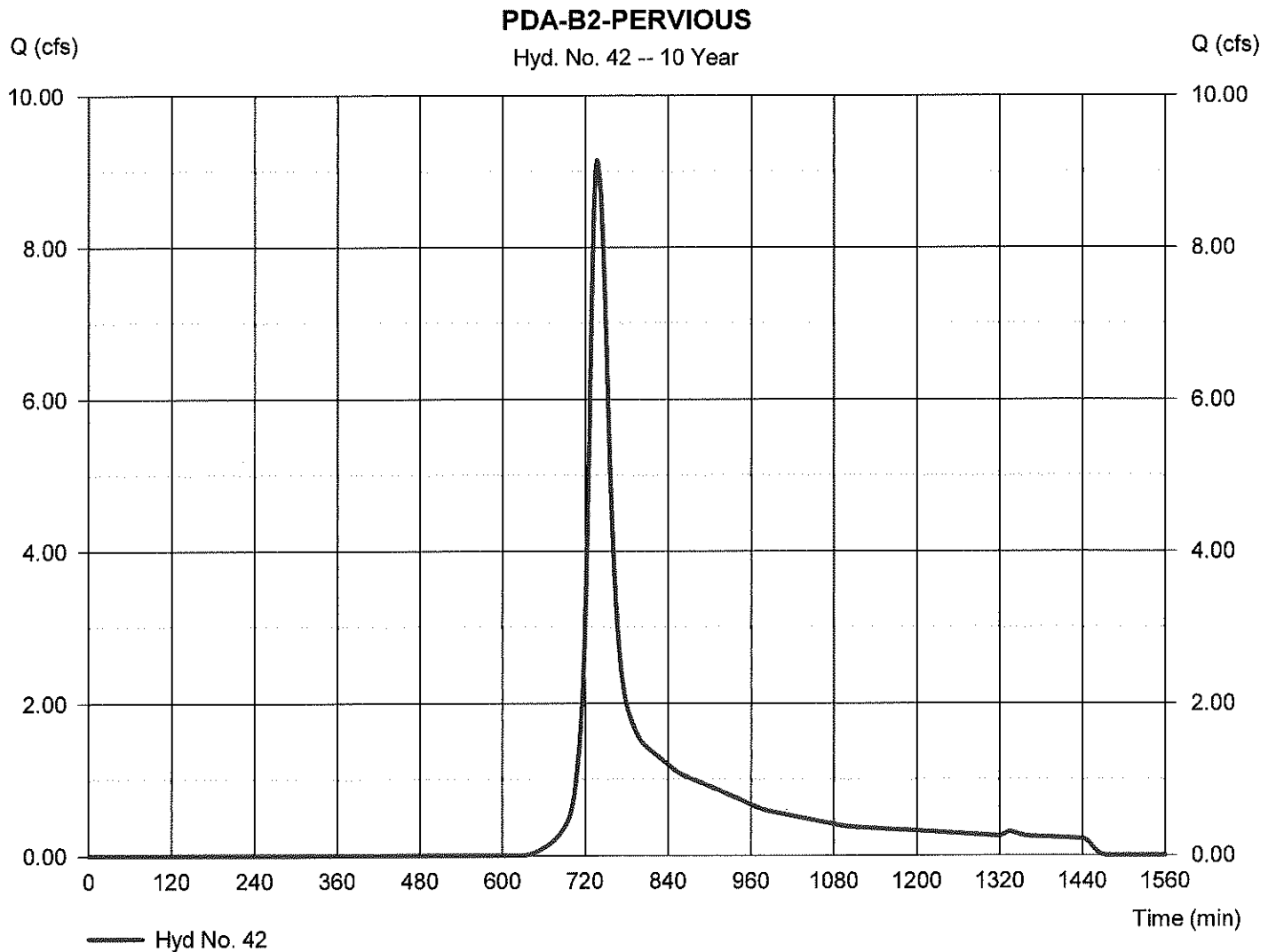
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Hyd. No. 42

PDA-B2-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 9.149 cfs
Storm frequency	= 10 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 44,808 cuft
Drainage area	= 7.700 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

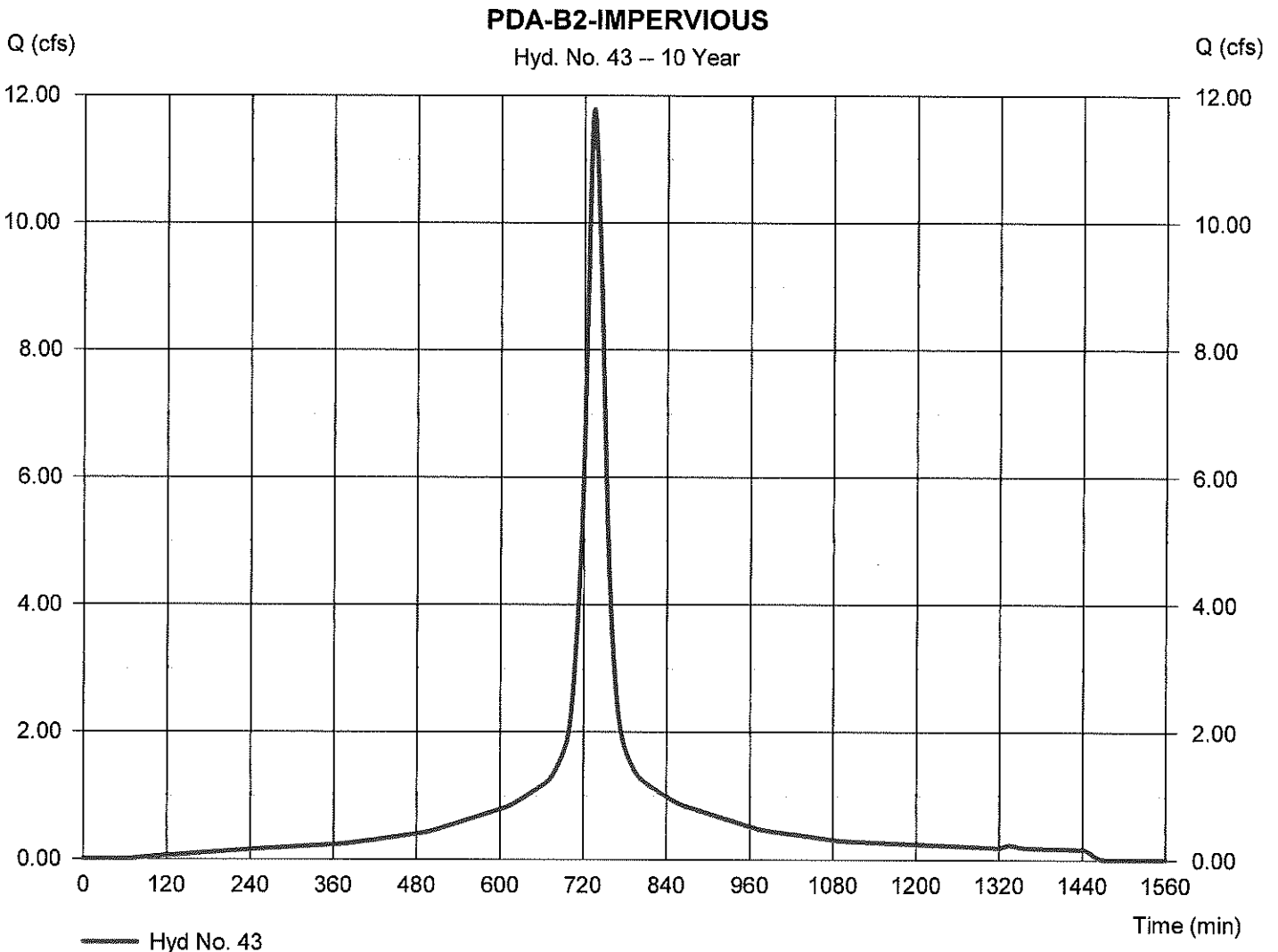
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Hyd. No. 43

PDA-B2-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 11.78 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 60,769 cuft
Drainage area	= 3.690 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.90 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

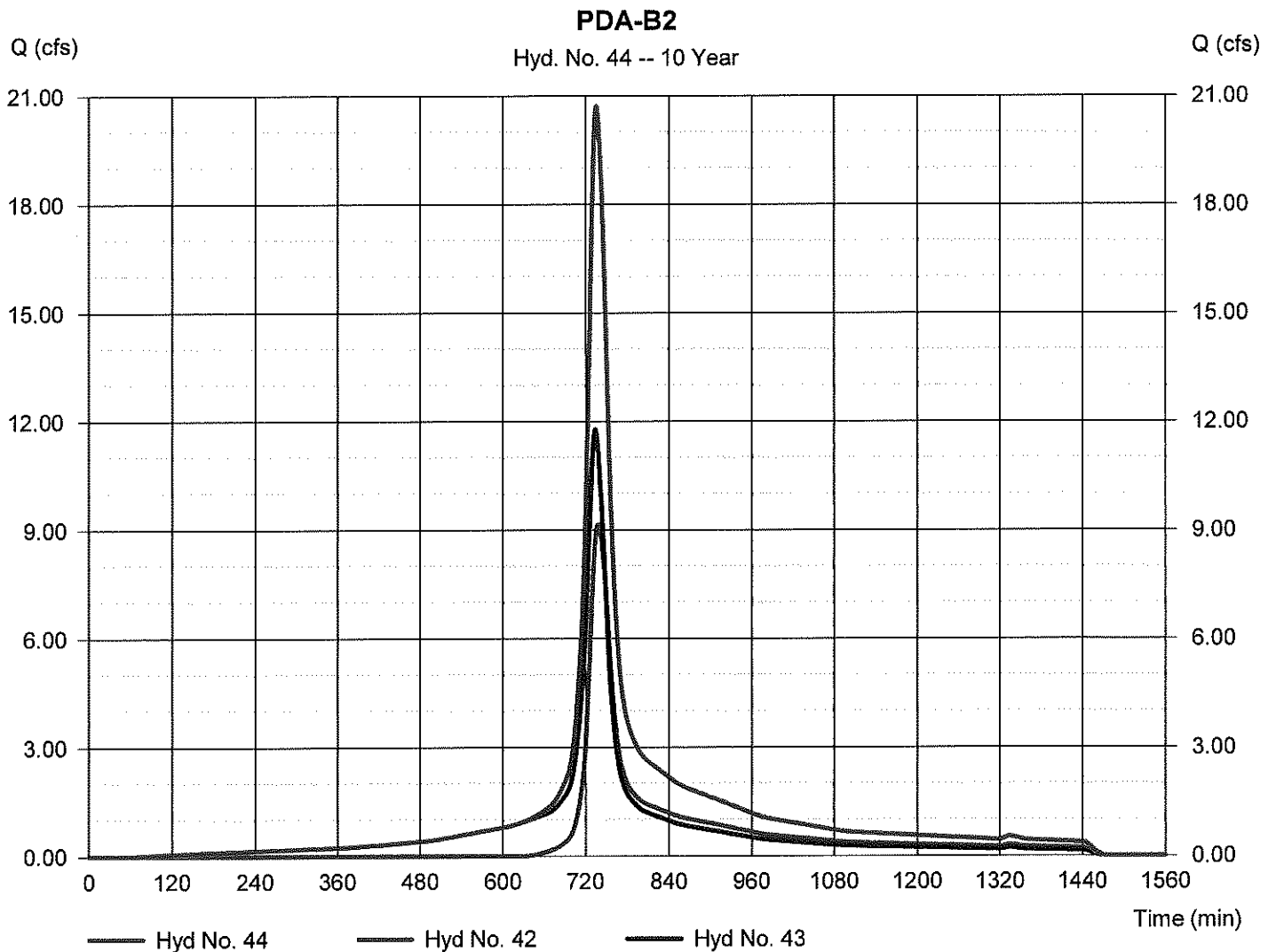
Monday, 11 / 25 / 2019

Hyd. No. 44

PDA-B2

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 42, 43

Peak discharge = 20.72 cfs
 Time to peak = 735 min
 Hyd. volume = 105,577 cuft
 Contrib. drain. area = 11.390 ac



Hydrograph Report

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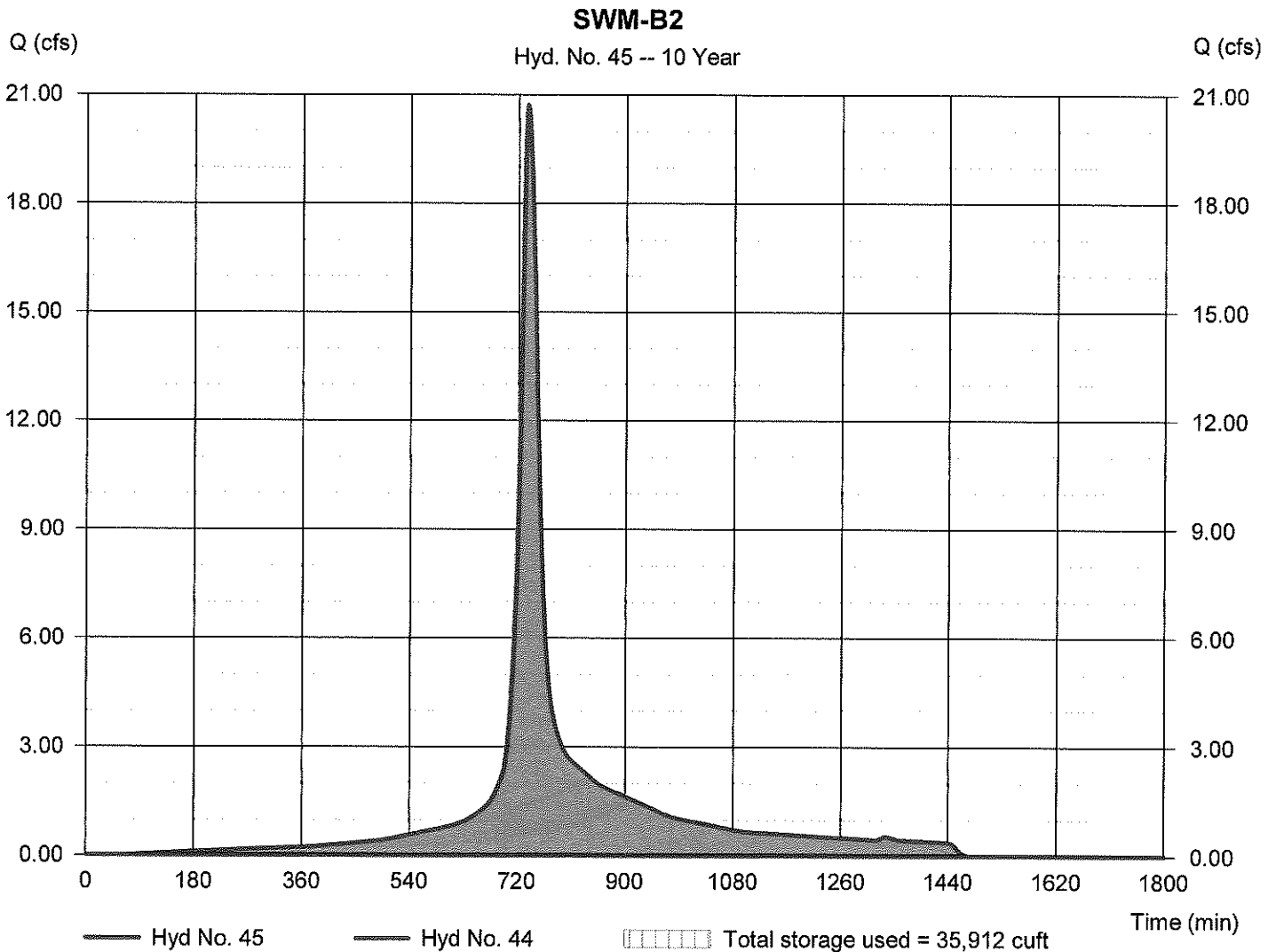
Monday, 11 / 25 / 2019

Hyd. No. 45

SWM-B2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 746 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 44 - PDA-B2	Max. Elevation	= 597.71 ft
Reservoir name	= SWM-B2	Max. Storage	= 35,912 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

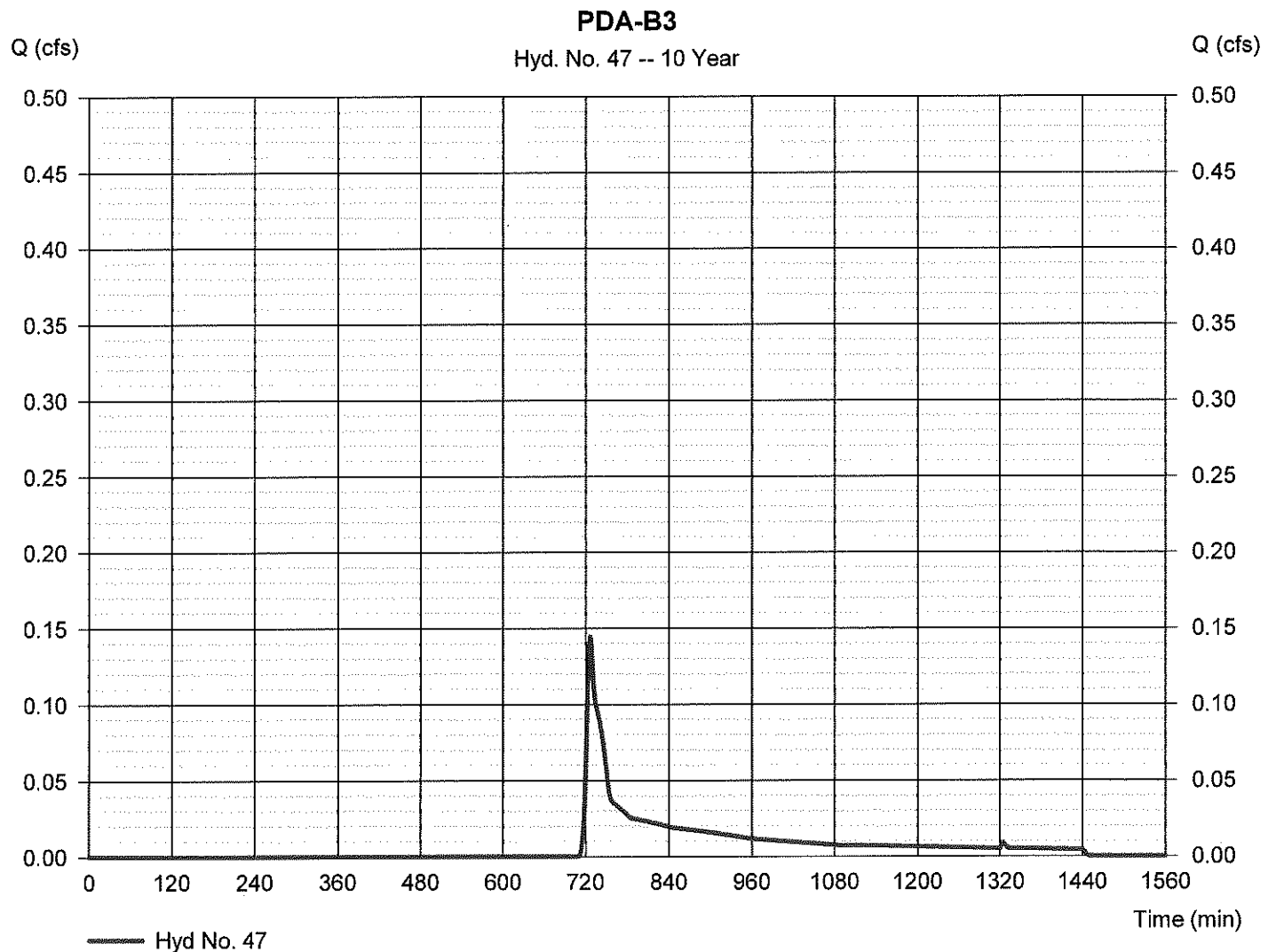
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Hyd. No. 47

PDA-B3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.145 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 636 cuft
Drainage area	= 0.230 ac	Curve number	= 53
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

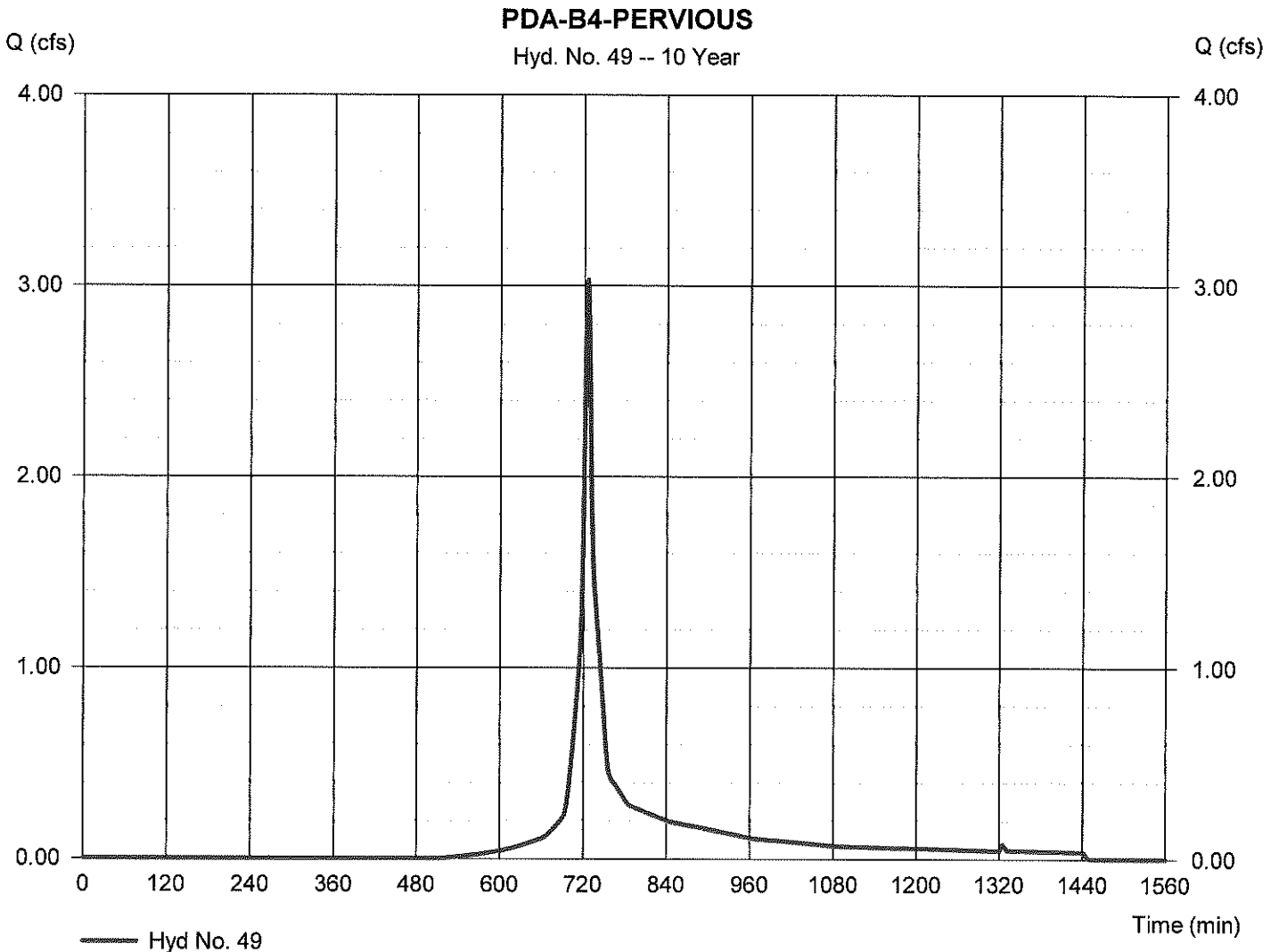
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Hyd. No. 49

PDA-B4-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.030 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 9,339 cuft
Drainage area	= 1.040 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

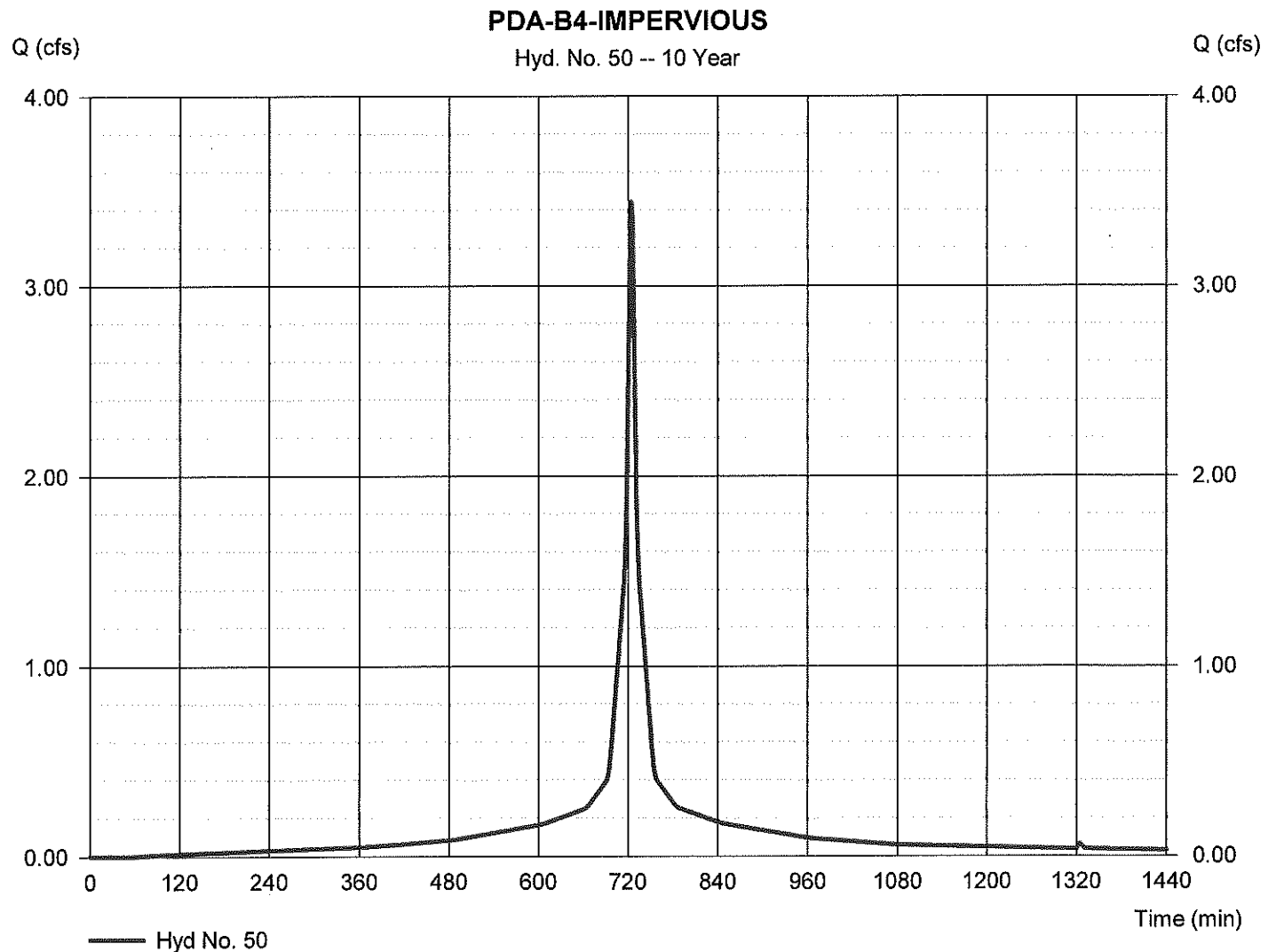
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Hyd. No. 50

PDA-B4-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.444 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 12,112 cuft
Drainage area	= 0.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

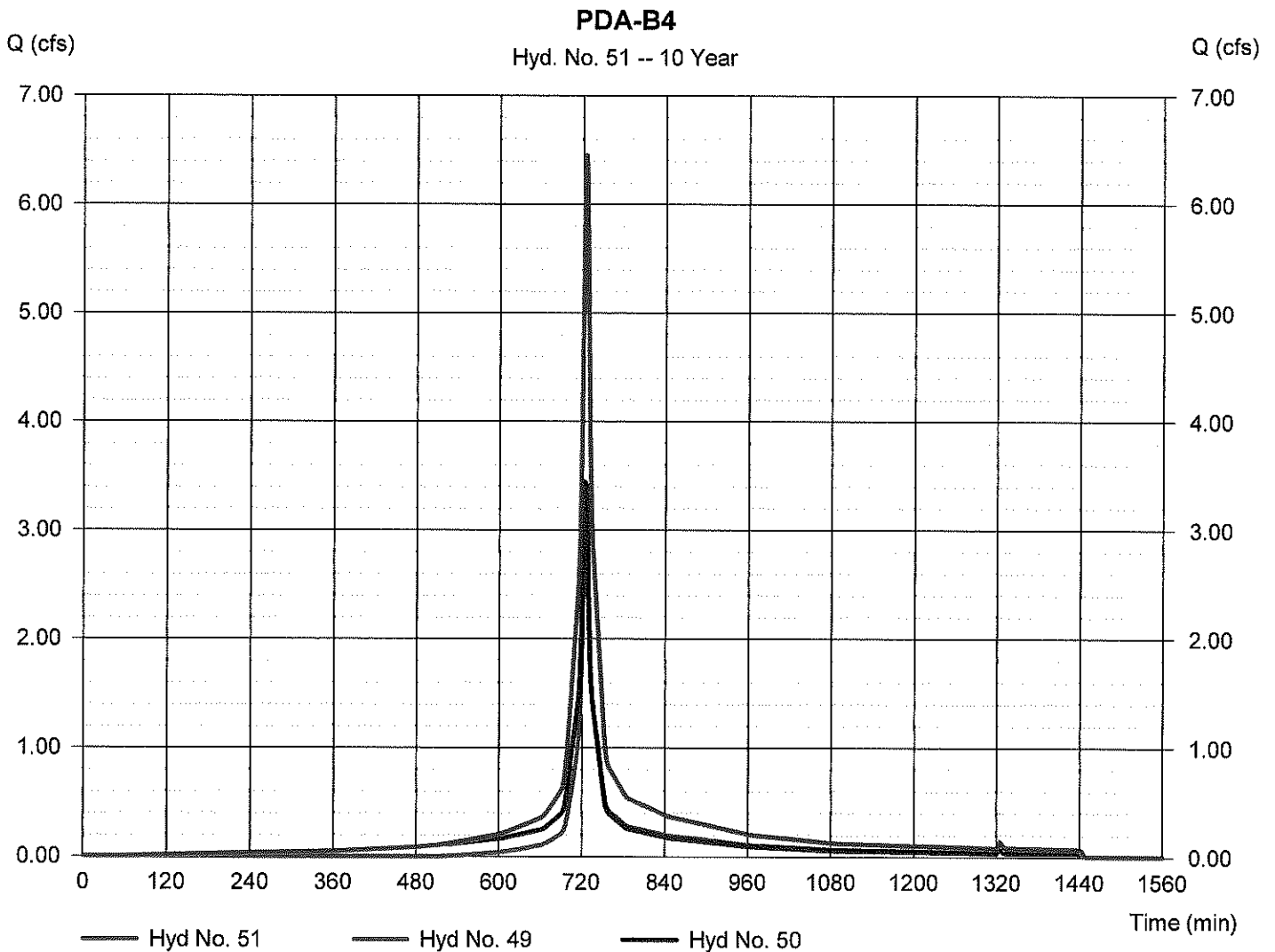
Monday, 11 / 25 / 2019

Hyd. No. 51

PDA-B4

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 49, 50

Peak discharge = 6.449 cfs
Time to peak = 724 min
Hyd. volume = 21,450 cuft
Contrib. drain. area = 1.760 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

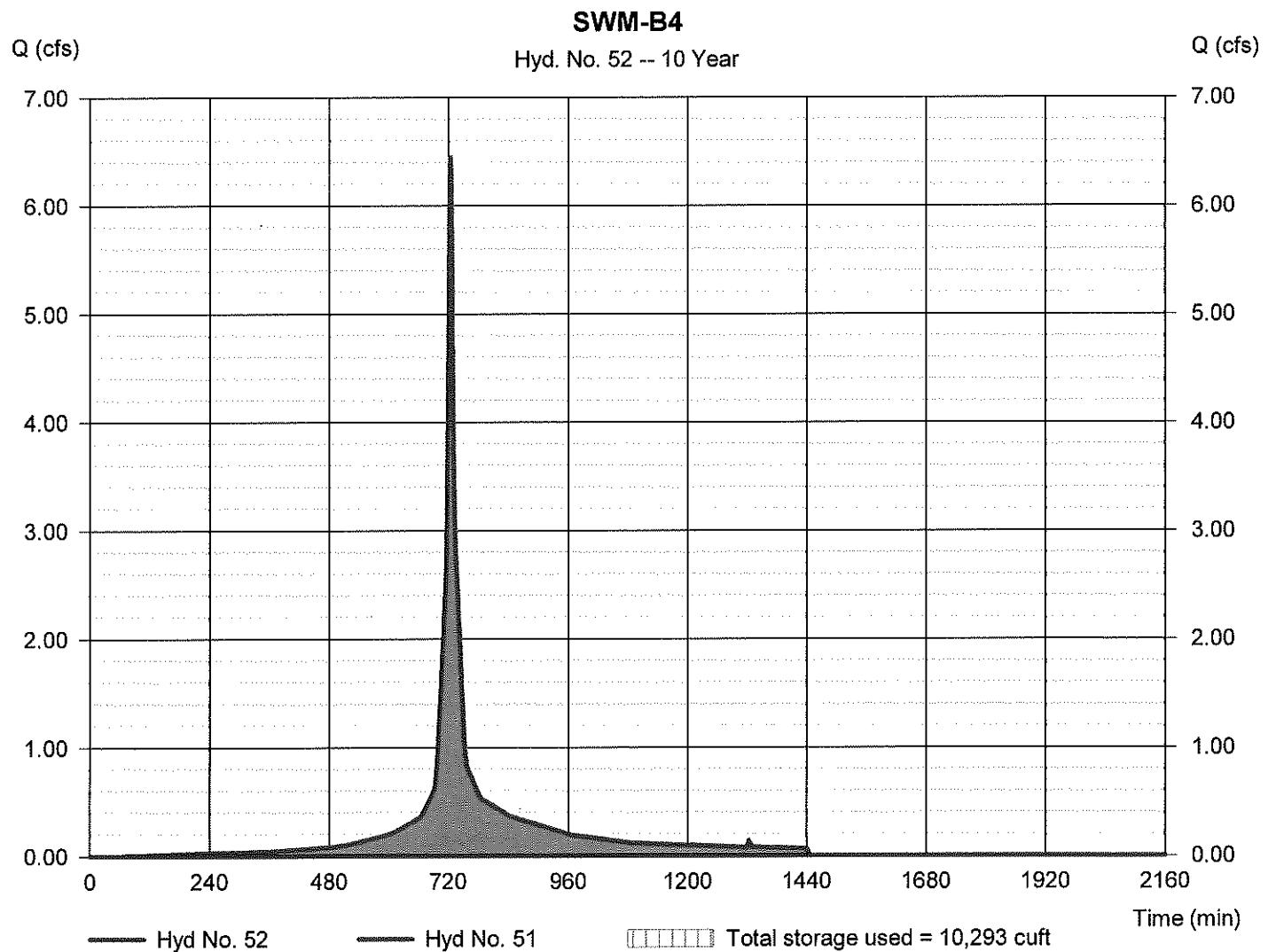
Monday, 11 / 25 / 2019

Hyd. No. 52

SWM-B4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 744 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 51 - PDA-B4	Max. Elevation	= 596.58 ft
Reservoir name	= SWM-B4	Max. Storage	= 10,293 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

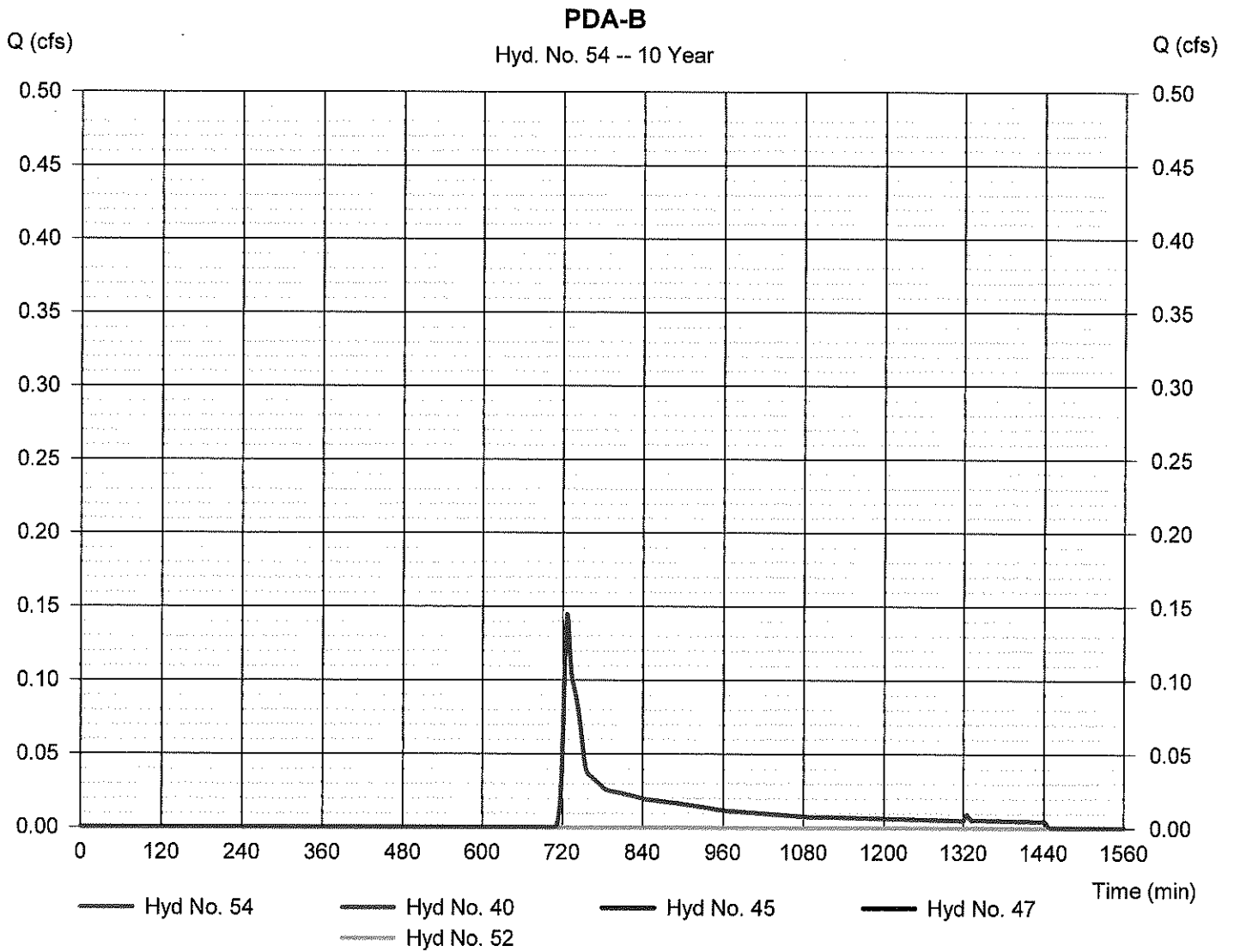
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Monday, 11 / 25 / 2019

Hyd. No. 54

PDA-B

Hydrograph type	= Combine	Peak discharge	= 0.145 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 636 cuft
Inflow hyds.	= 40, 45, 47, 52	Contrib. drain. area	= 0.230 ac



Hydrograph Report

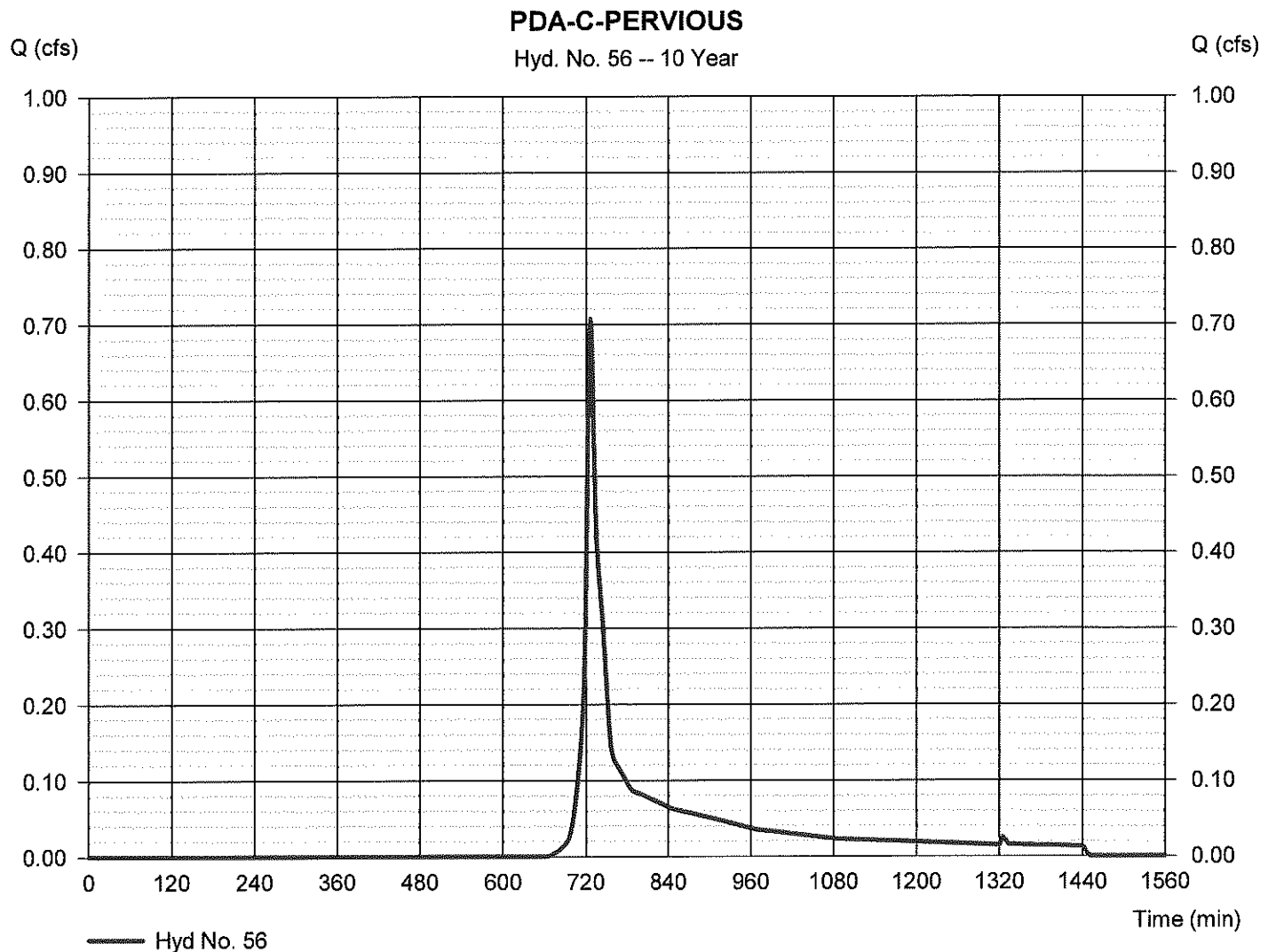
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Monday, 11 / 25 / 2019

Hyd. No. 56

PDA-C-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.707 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,467 cuft
Drainage area	= 0.520 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

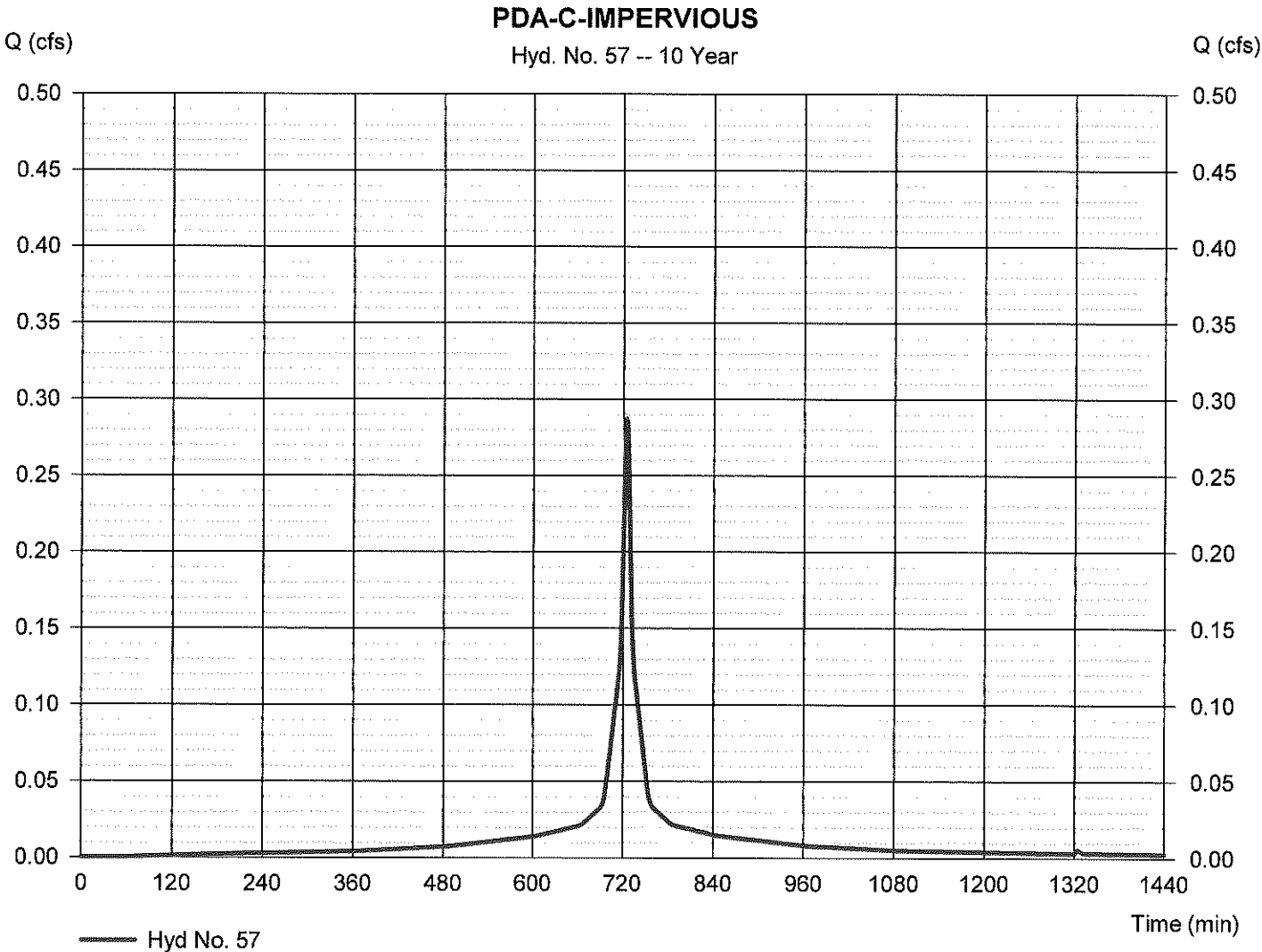
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 57

PDA-C-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.287 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 1,009 cuft
Drainage area	= 0.060 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.50 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

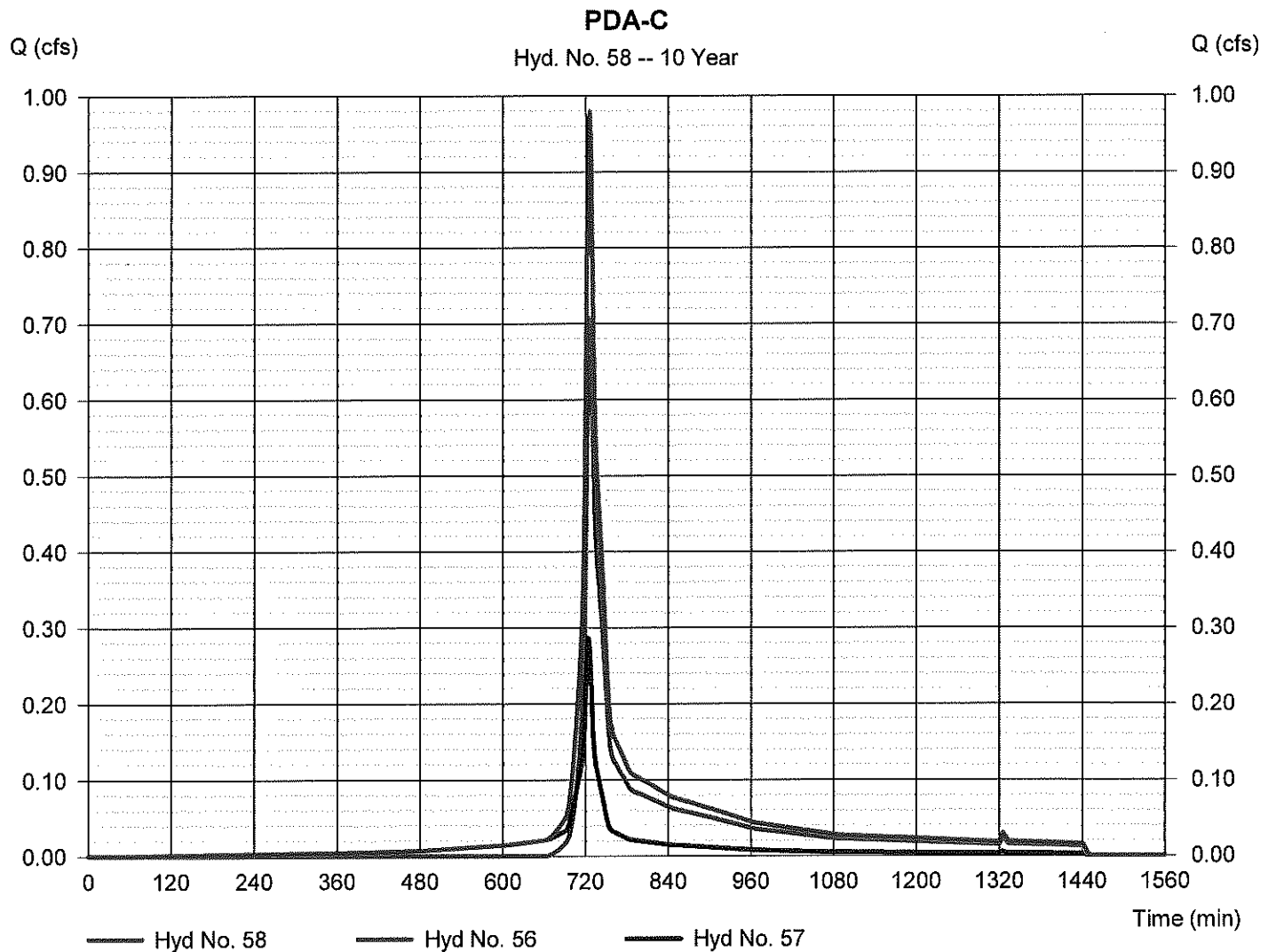
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 58

PDA-C

Hydrograph type	= Combine	Peak discharge	= 0.980 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 3,477 cuft
Inflow hyds.	= 56, 57	Contrib. drain. area	= 0.580 ac



Hydrograph Report

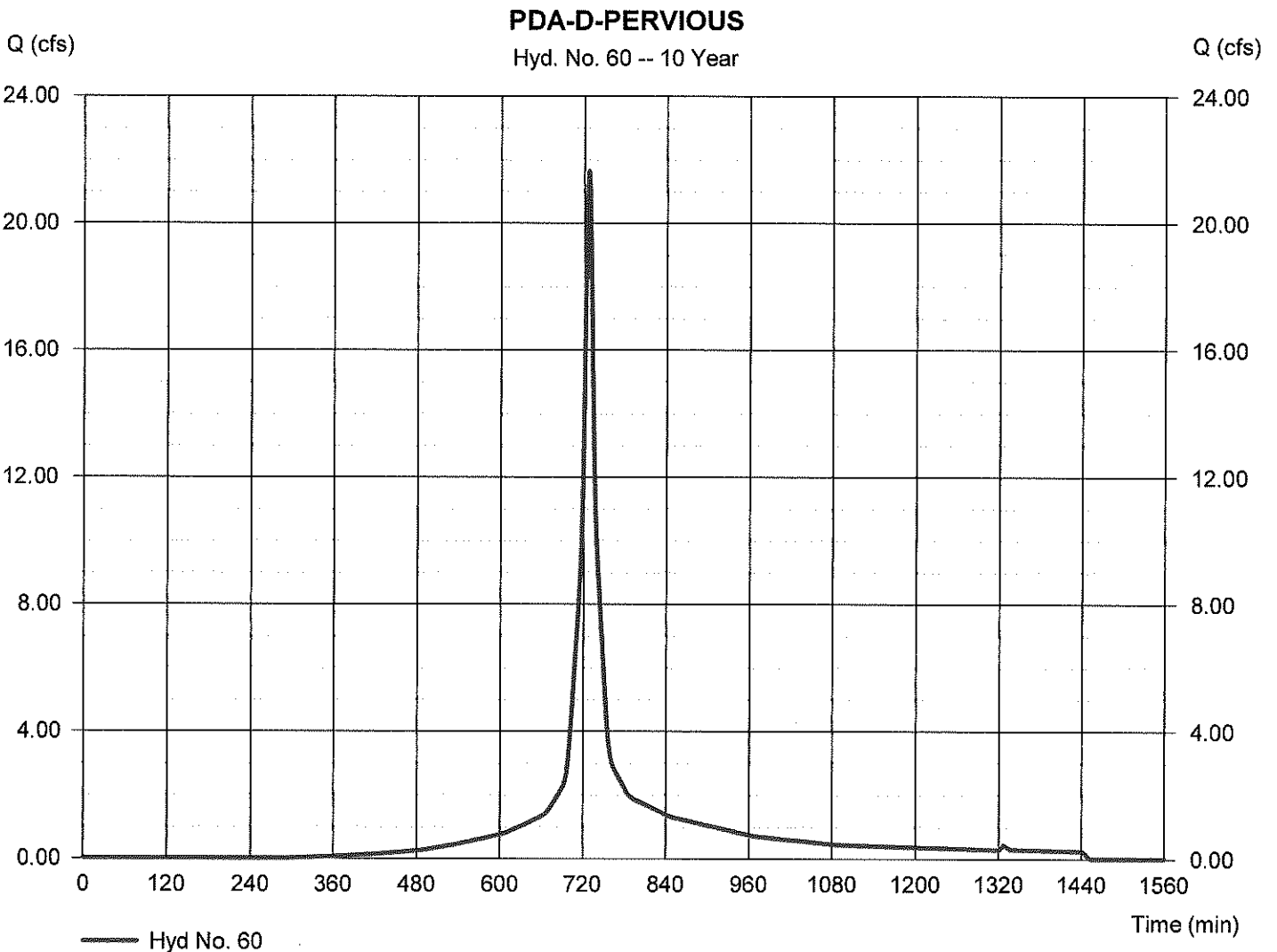
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 60

PDA-D-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 21.63 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 76,152 cuft
Drainage area	= 5.970 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

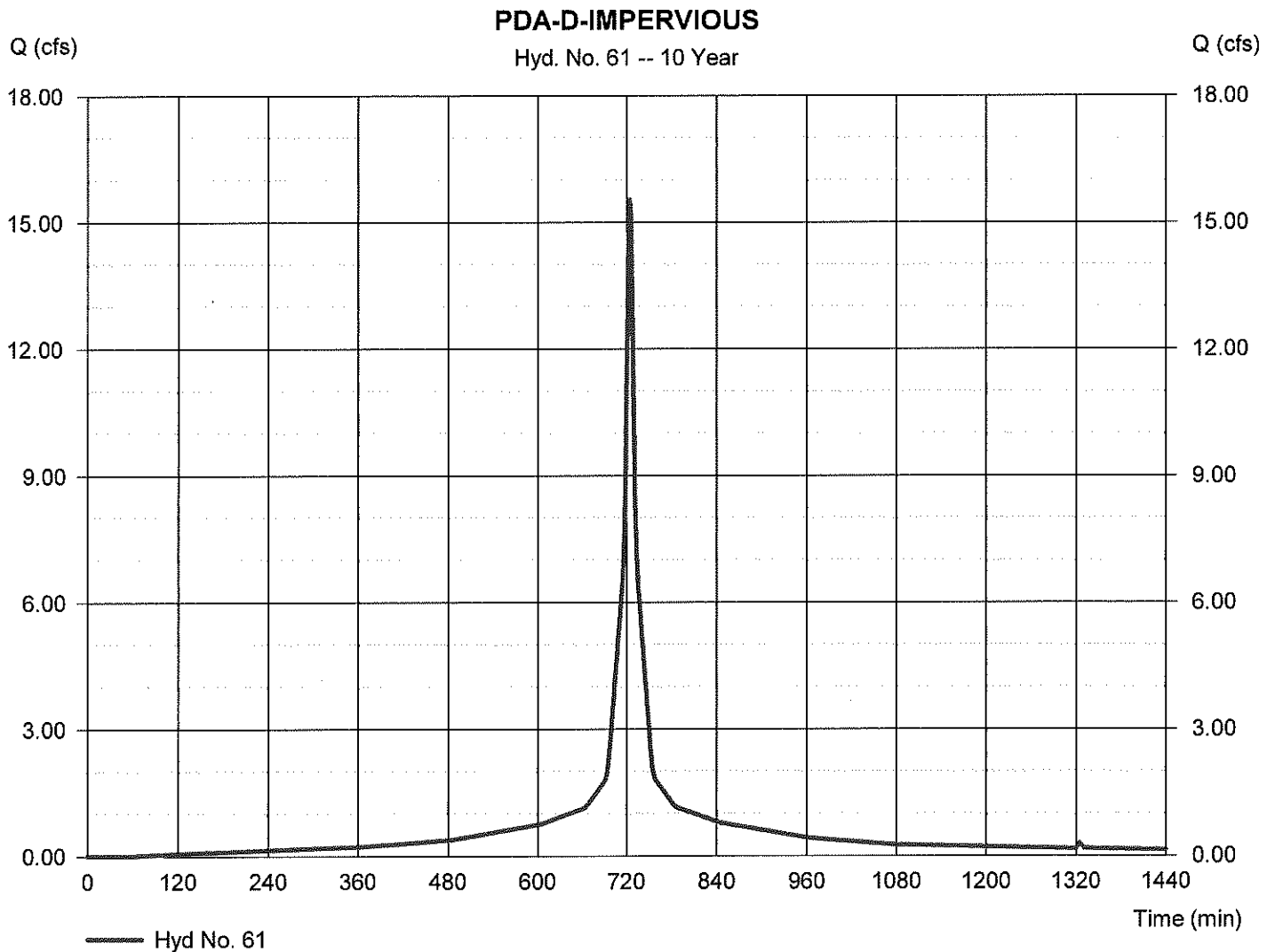
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 61

PDA-D-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 15.55 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 54,670 cuft
Drainage area	= 3.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

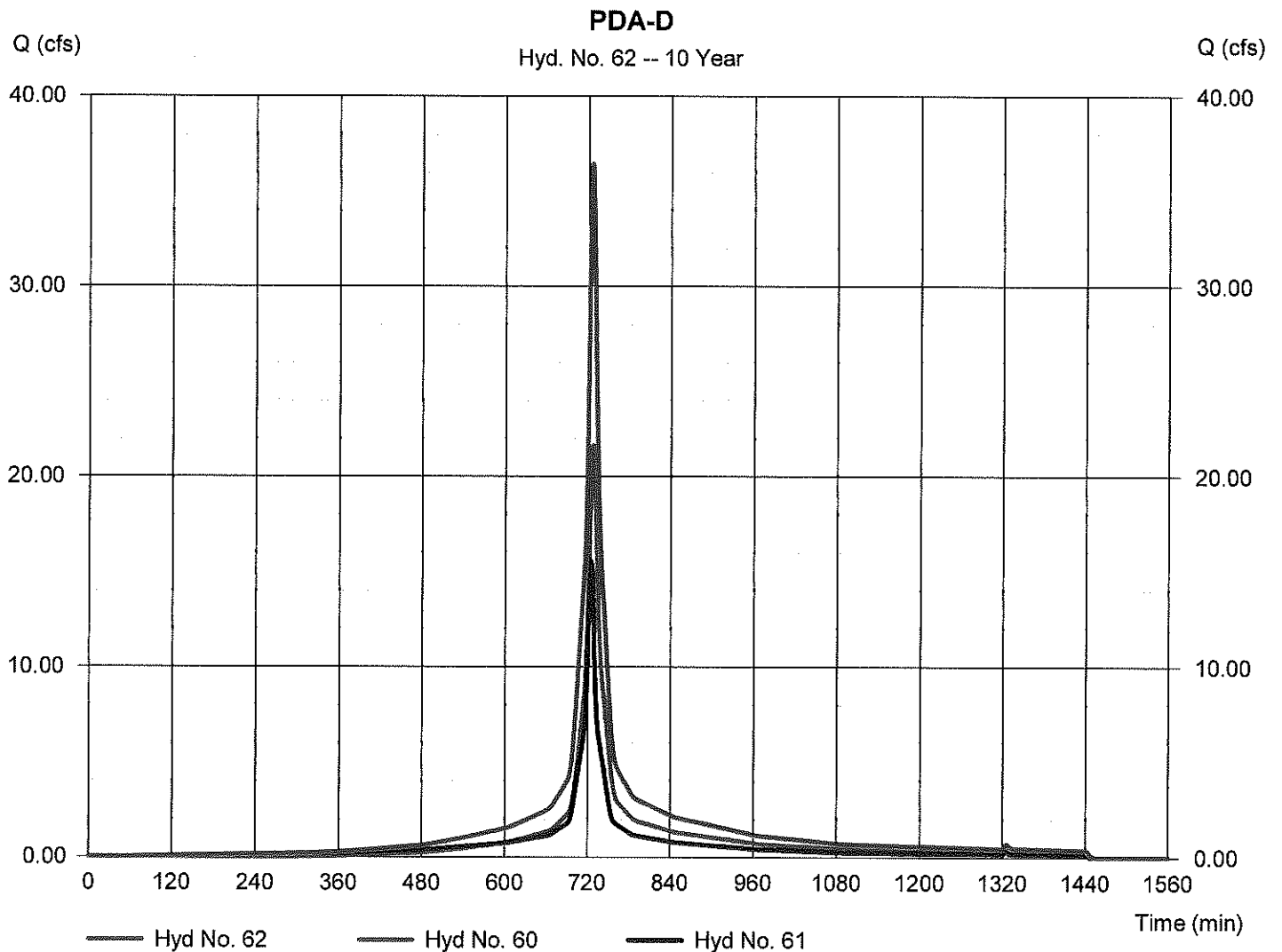
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Monday, 11 / 25 / 2019

Hyd. No. 62

PDA-D

Hydrograph type	= Combine	Peak discharge	= 36.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 130,822 cuft
Inflow hyds.	= 60, 61	Contrib. drain. area	= 9.220 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

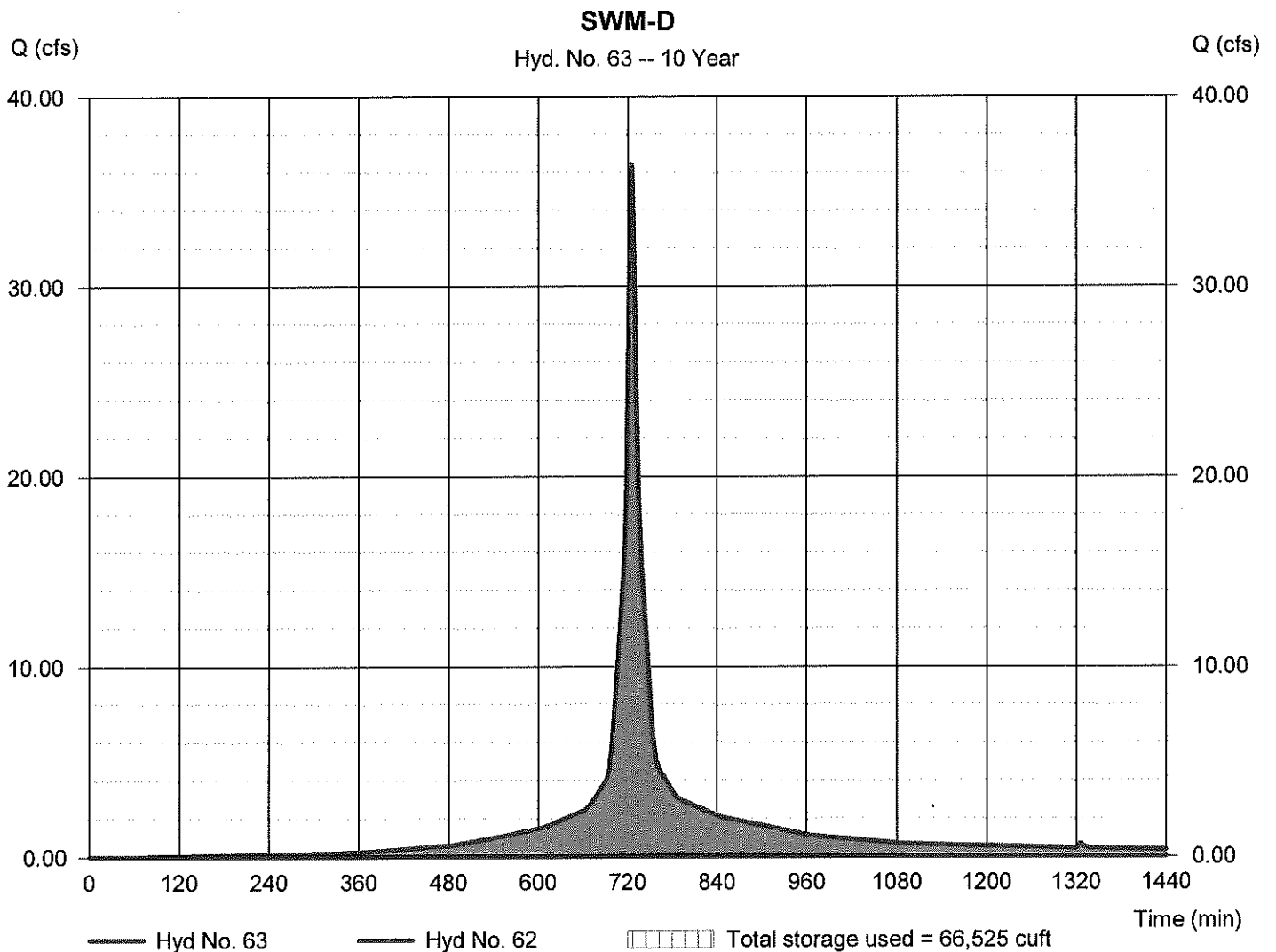
Monday, 11 / 25 / 2019

Hyd. No. 63

SWM-D

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 62 - PDA-D	Max. Elevation	= 599.52 ft
Reservoir name	= SWM-D	Max. Storage	= 66,525 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

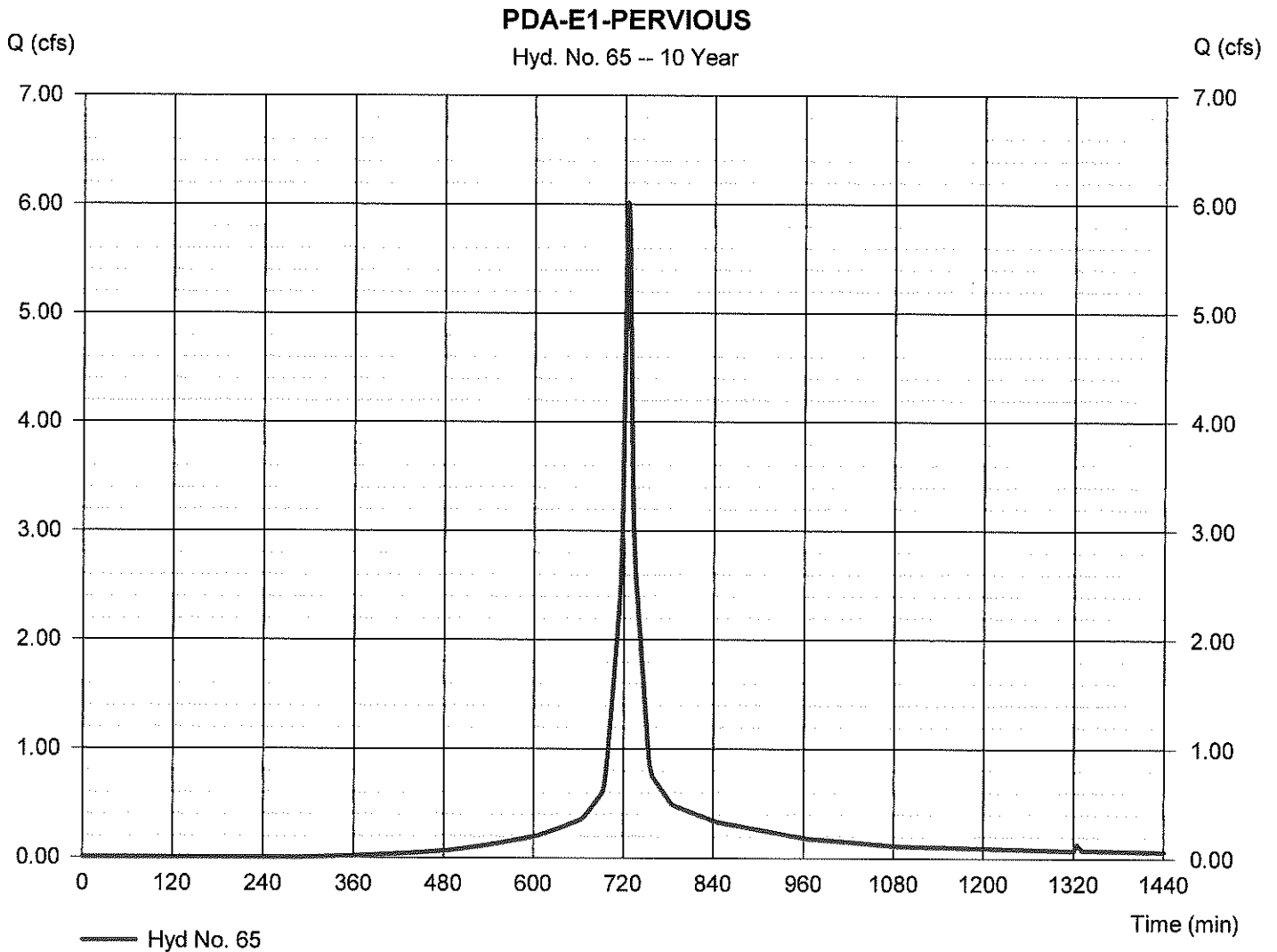
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Monday, 11 / 25 / 2019

Hyd. No. 65

PDA-E1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 6.014 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 19,074 cuft
Drainage area	= 1.450 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

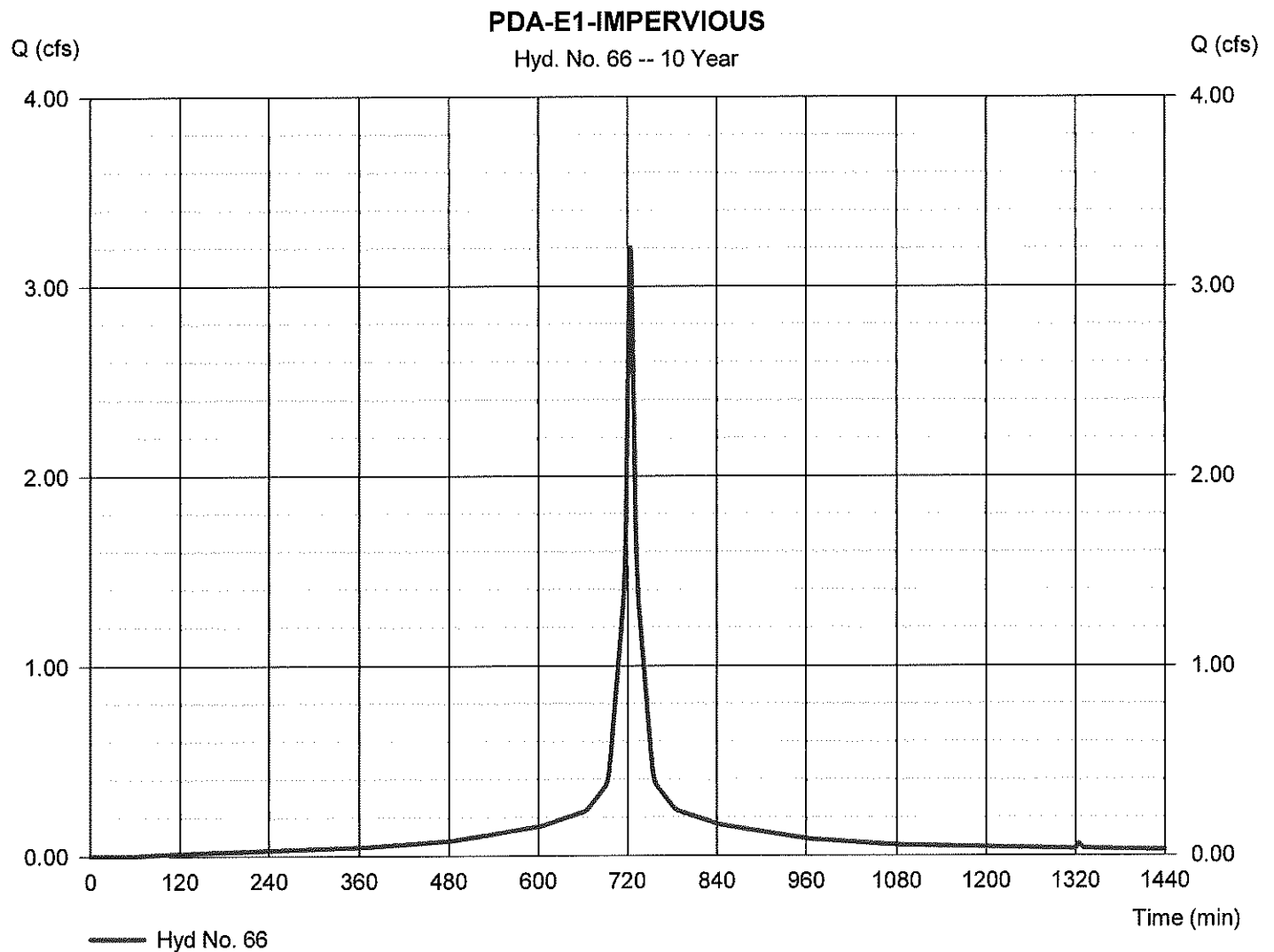
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Monday, 11 / 25 / 2019

Hyd. No. 66

PDA-E1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.205 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 11,270 cuft
Drainage area	= 0.670 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

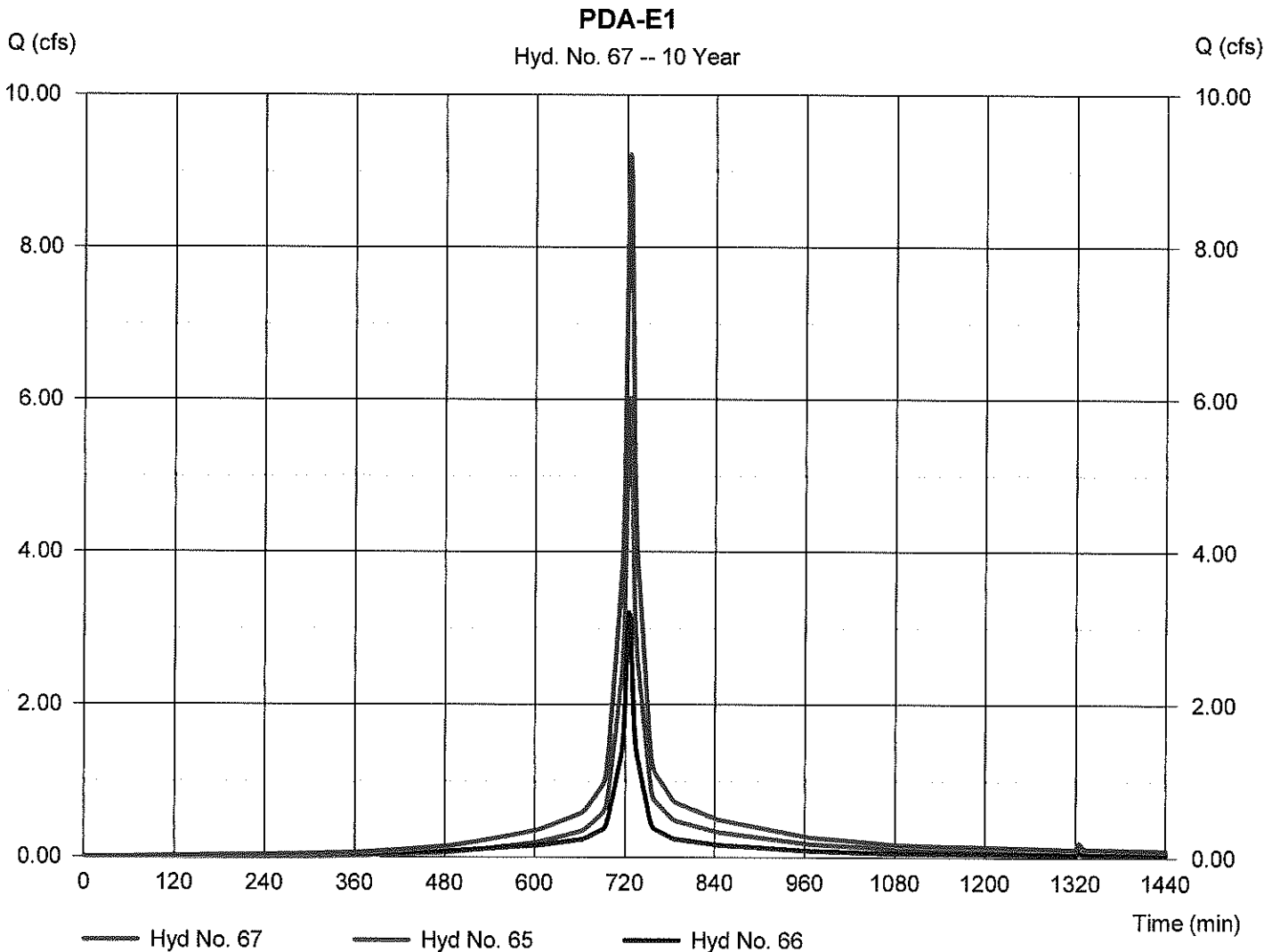
Monday, 11 / 25 / 2019

Hyd. No. 67

PDA-E1

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 65, 66

Peak discharge = 9.219 cfs
Time to peak = 724 min
Hyd. volume = 30,344 cuft
Contrib. drain. area = 2.120 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

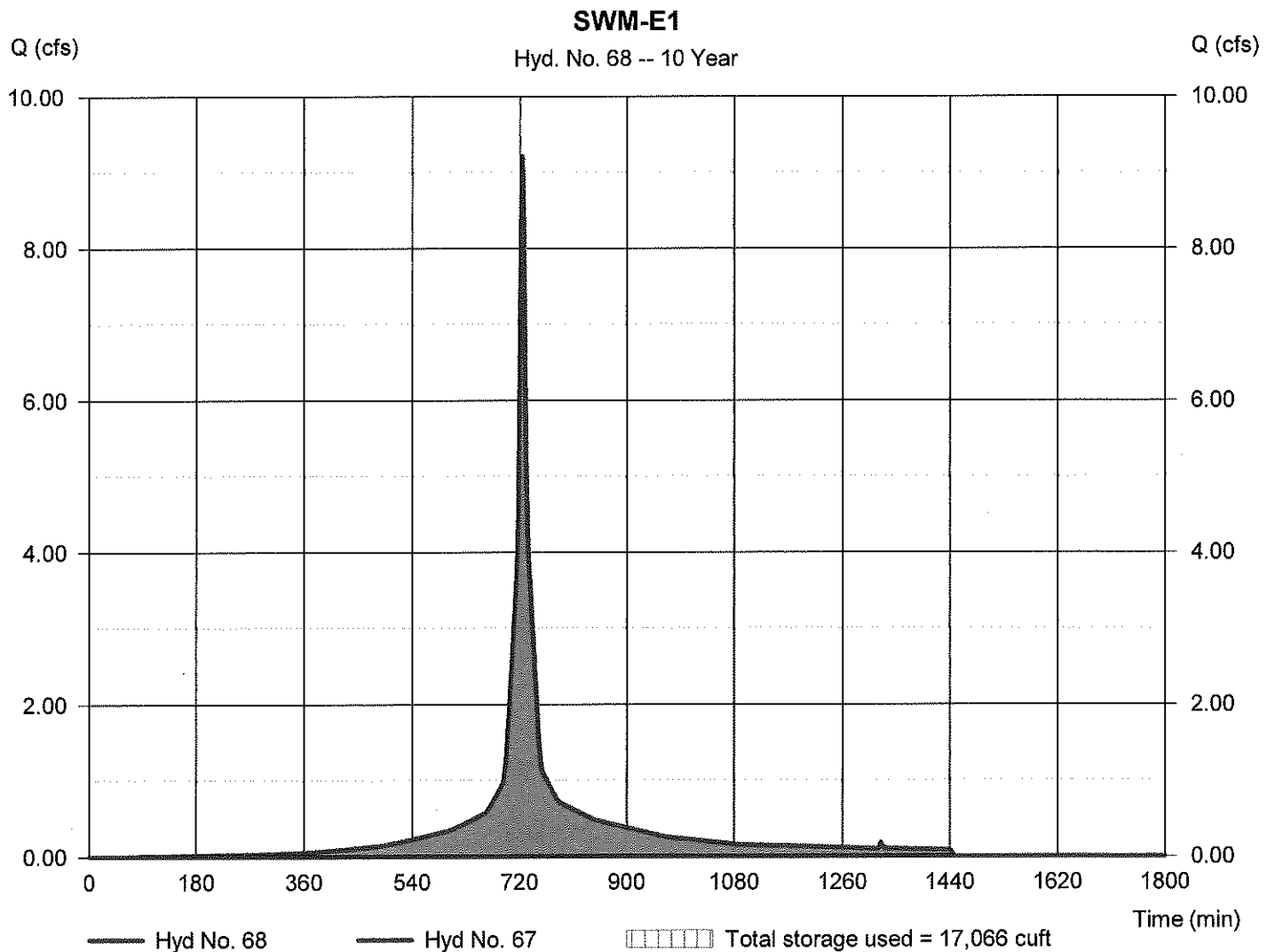
Monday, 11 / 25 / 2019

Hyd. No. 68

SWM-E1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 940 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 67 - PDA-E1	Max. Elevation	= 615.36 ft
Reservoir name	= SWM-E1	Max. Storage	= 17,066 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

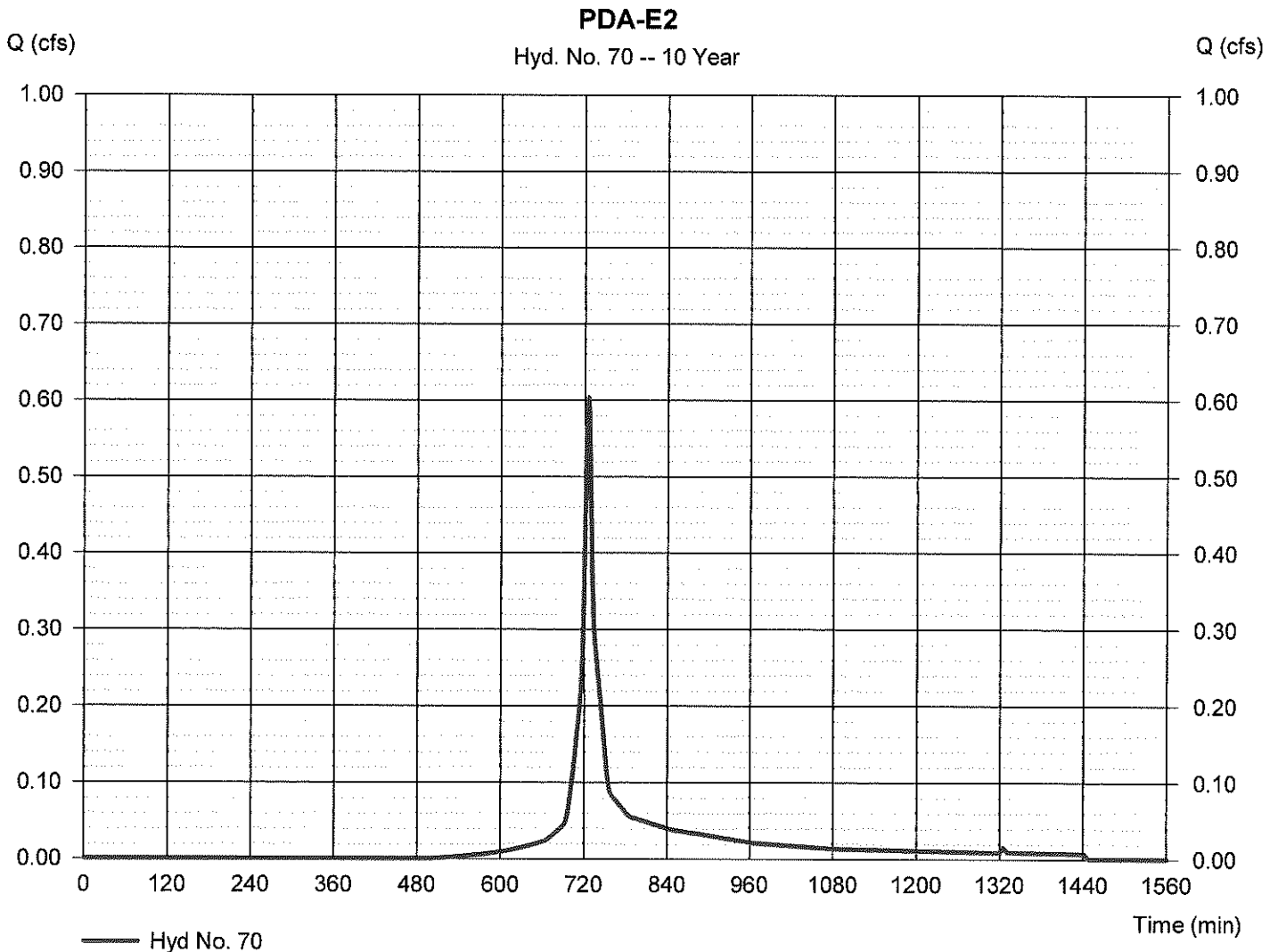
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Hyd. No. 70

PDA-E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.604 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 1,860 cuft
Drainage area	= 0.200 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

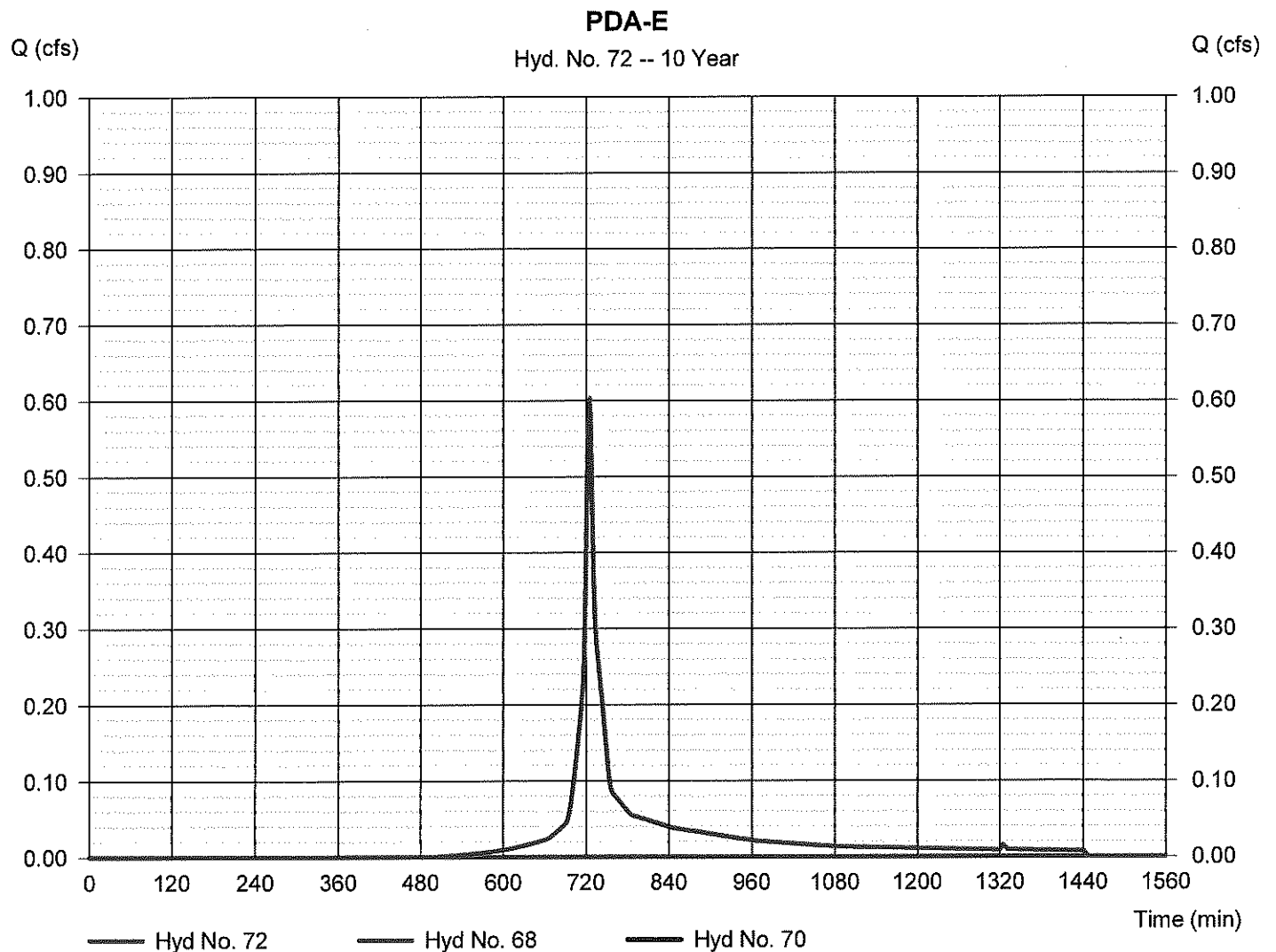
Monday, 11 / 25 / 2019

Hyd. No. 72

PDA-E

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 68, 70

Peak discharge = 0.604 cfs
 Time to peak = 725 min
 Hyd. volume = 1,860 cuft
 Contrib. drain. area = 0.200 ac



Hydrograph Report

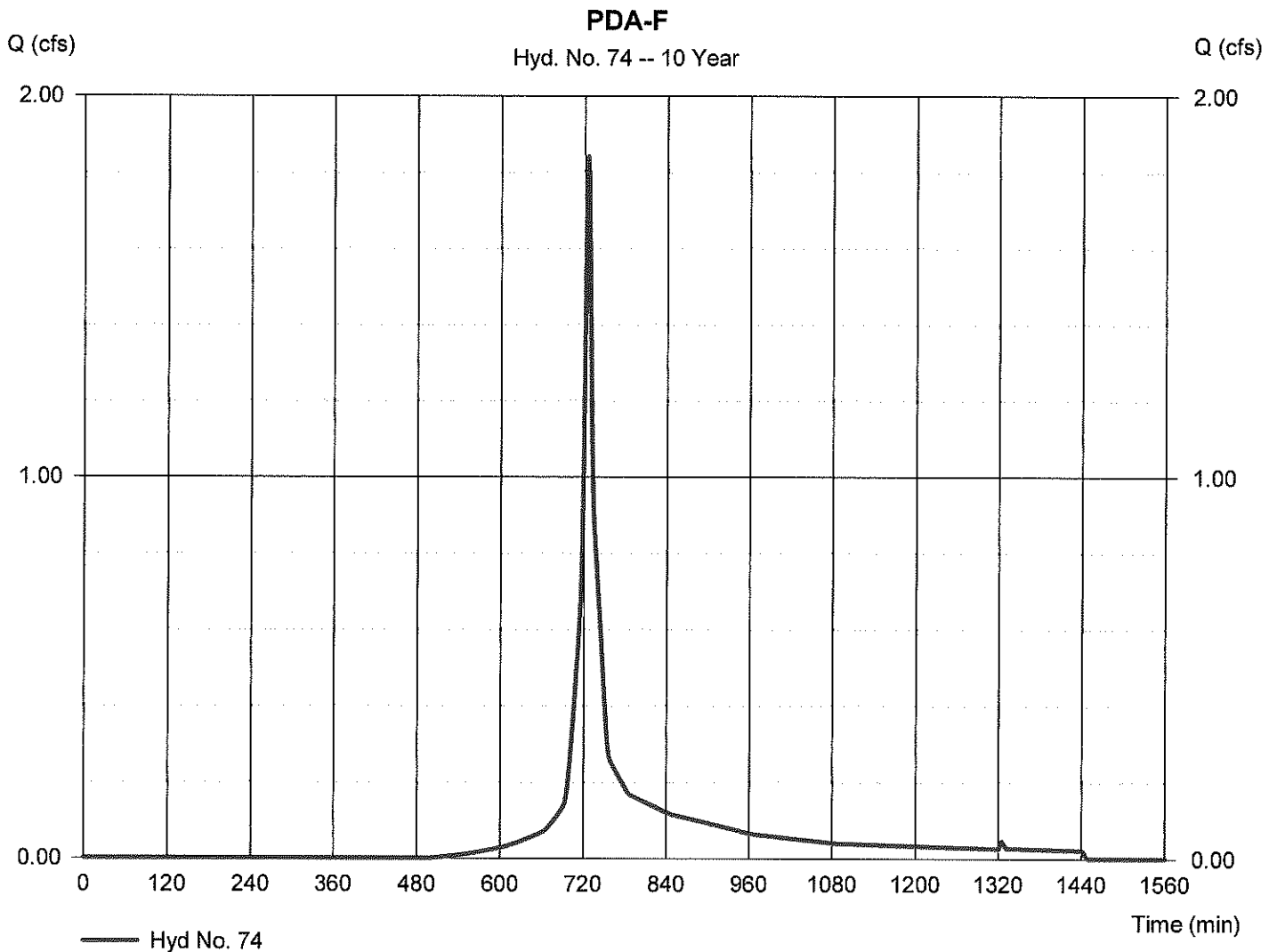
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 74

PDA-F

Hydrograph type	= SCS Runoff	Peak discharge	= 1.841 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 5,672 cuft
Drainage area	= 0.610 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

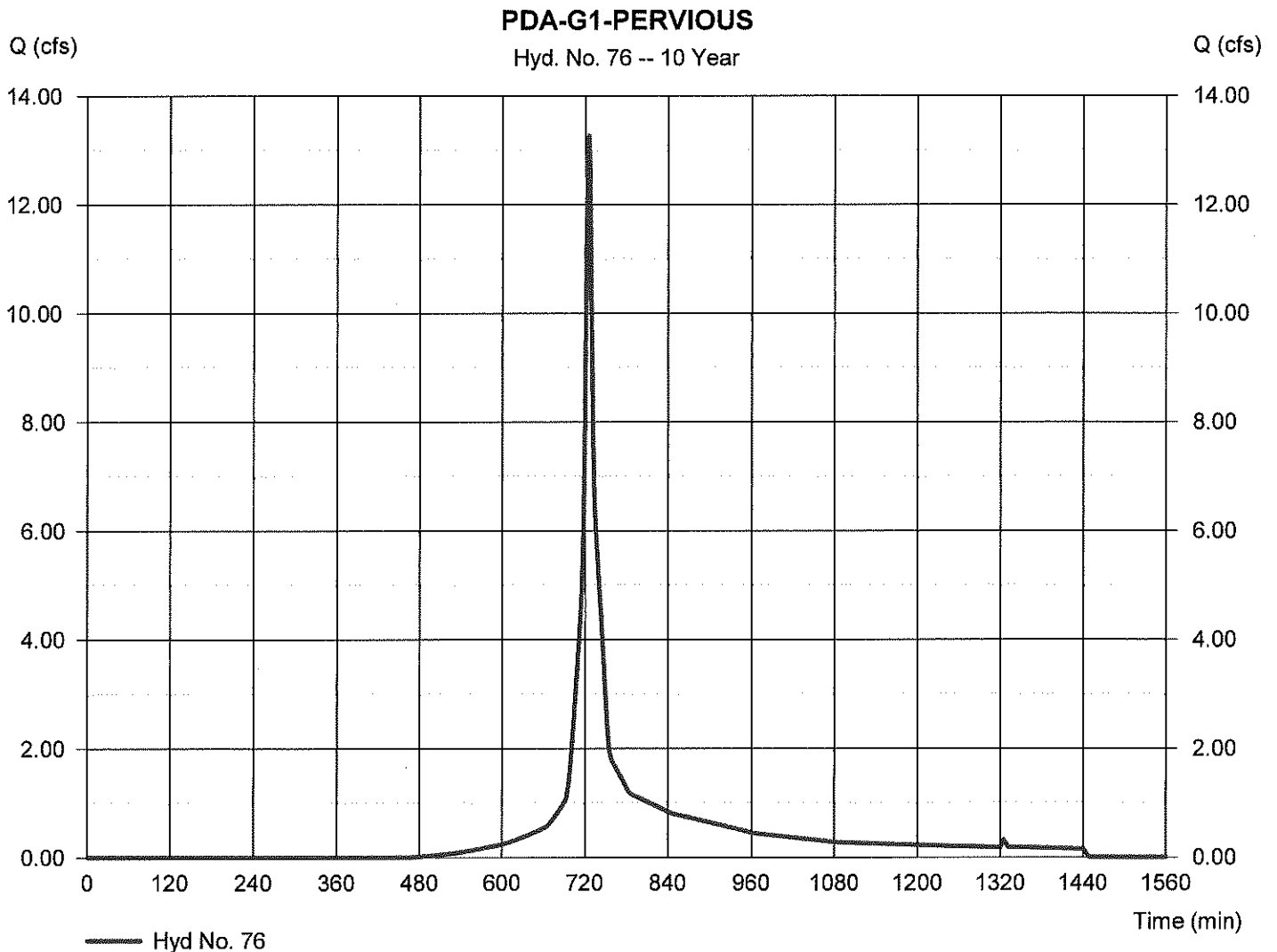
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Monday, 11 / 25 / 2019

Hyd. No. 76

PDA-G1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 13.27 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 40,905 cuft
Drainage area	= 4.110 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

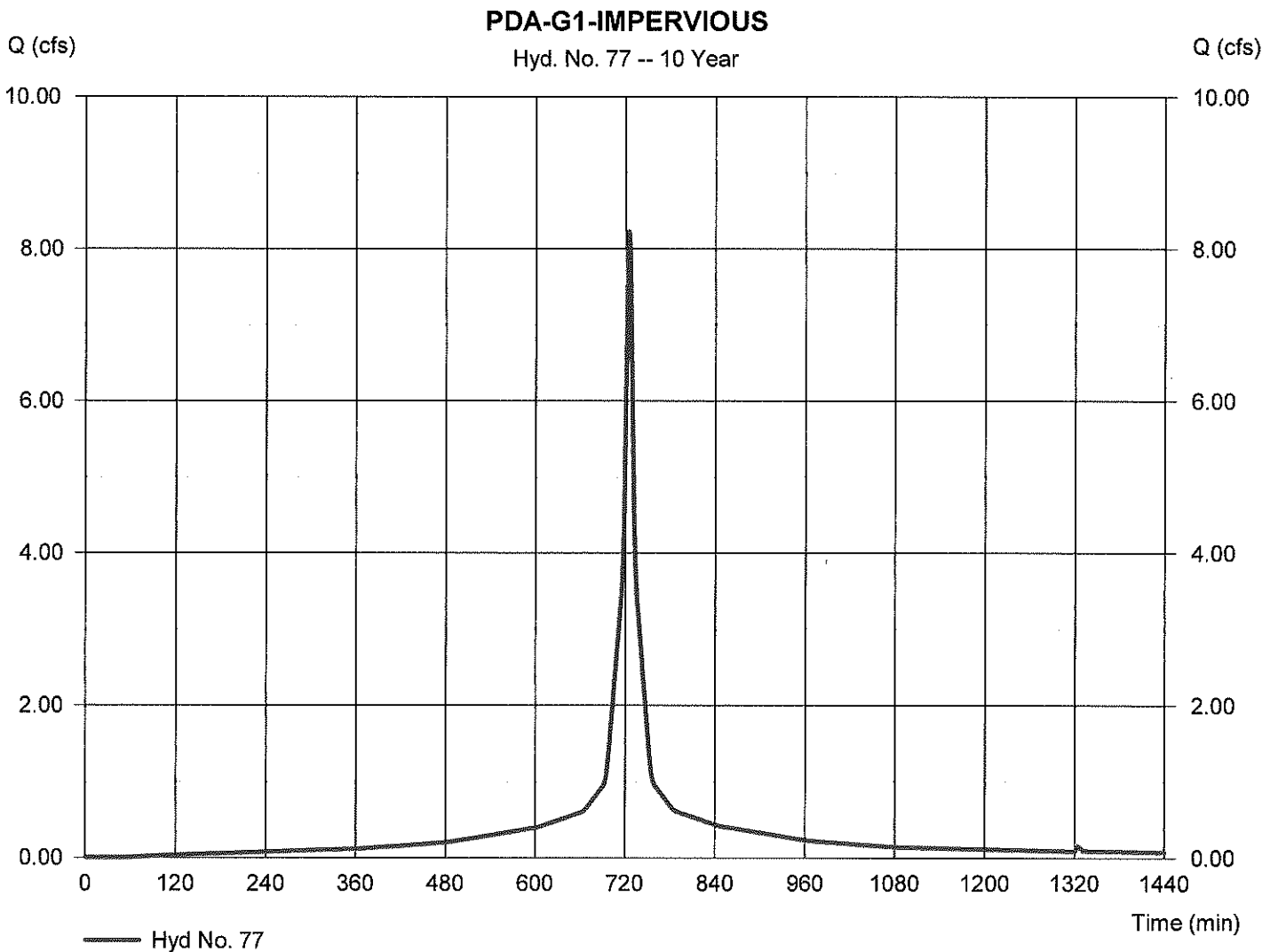
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Monday, 11 / 25 / 2019

Hyd. No. 77

PDA-G1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 8.228 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 28,933 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

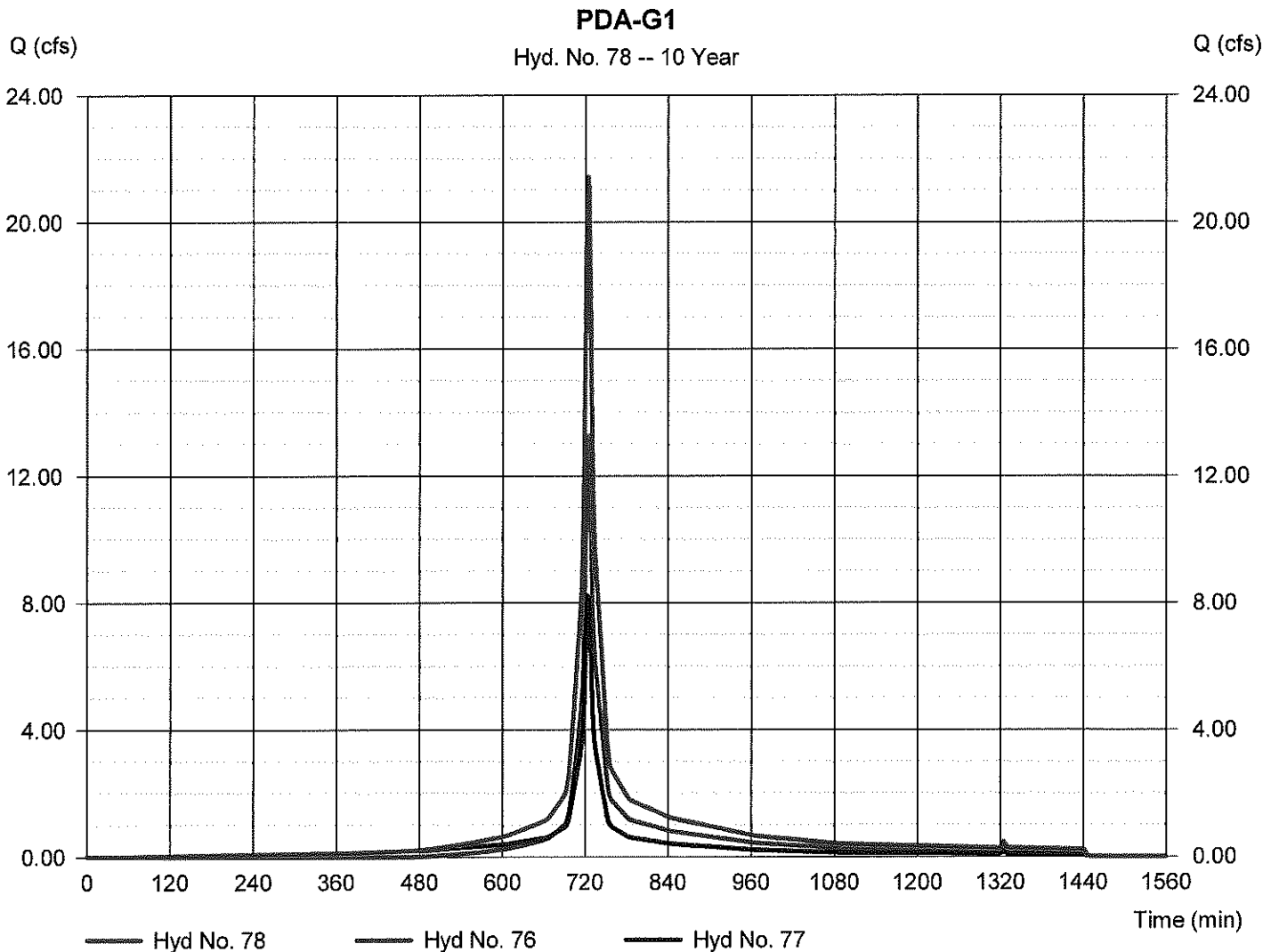
Monday, 11 / 25 / 2019

Hyd. No. 78

PDA-G1

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 76, 77

Peak discharge = 21.43 cfs
 Time to peak = 725 min
 Hyd. volume = 69,838 cuft
 Contrib. drain. area = 5.830 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

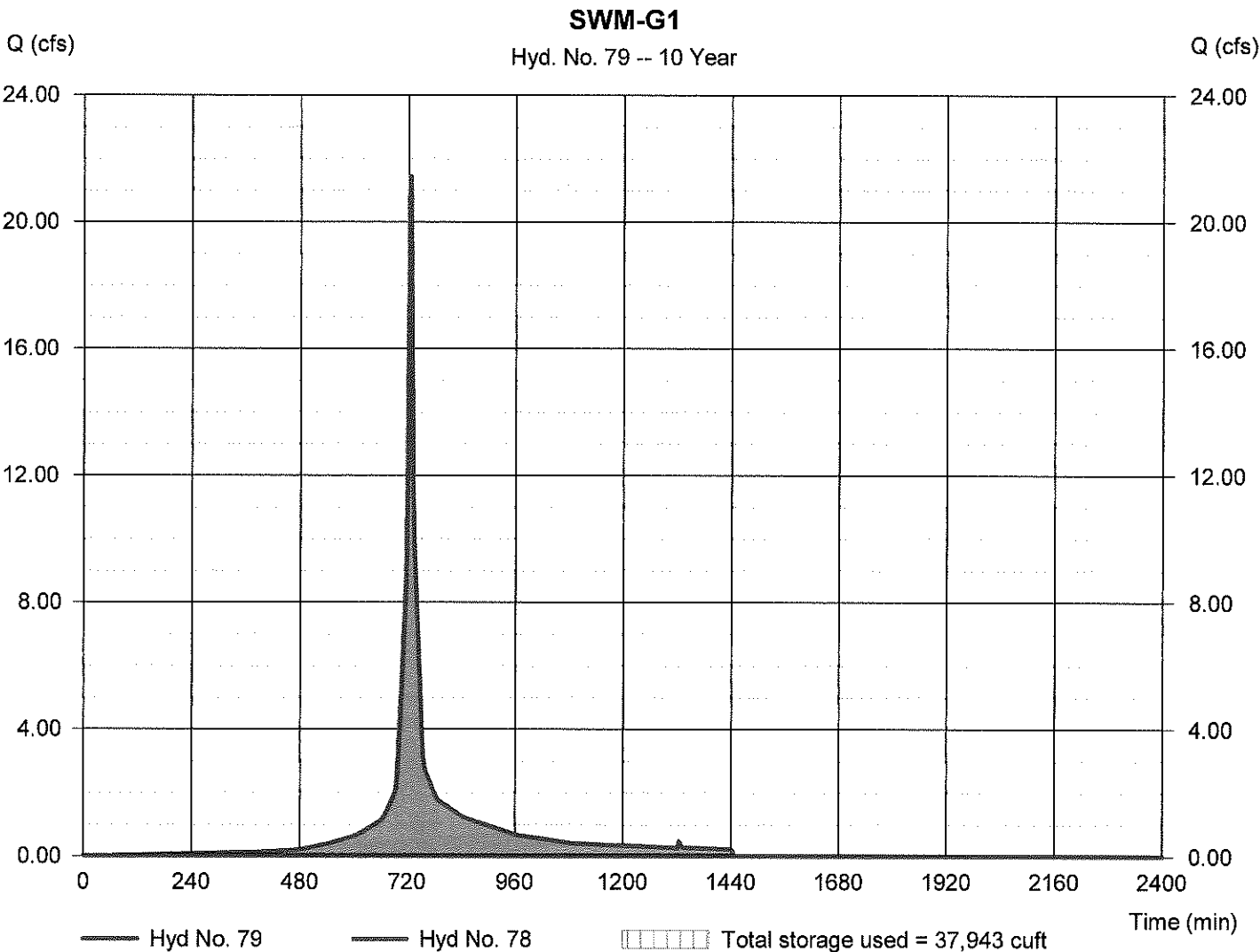
Monday, 11 / 25 / 2019

Hyd. No. 79

SWM-G1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 1214 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 78 - PDA-G1	Max. Elevation	= 600.62 ft
Reservoir name	= SWM-G1	Max. Storage	= 37,943 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

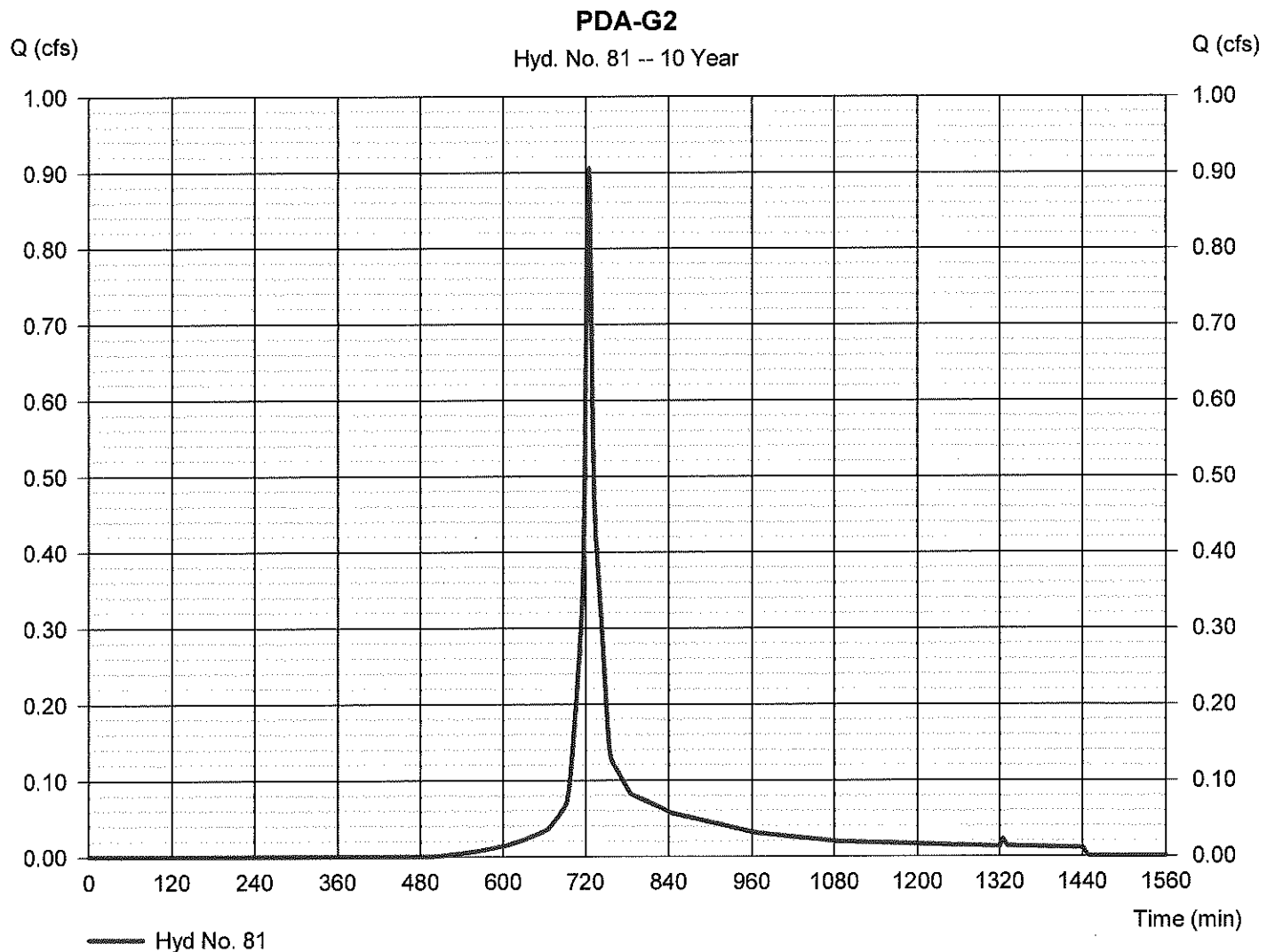
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Monday, 11 / 25 / 2019

Hyd. No. 81

PDA-G2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.906 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 2,790 cuft
Drainage area	= 0.300 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

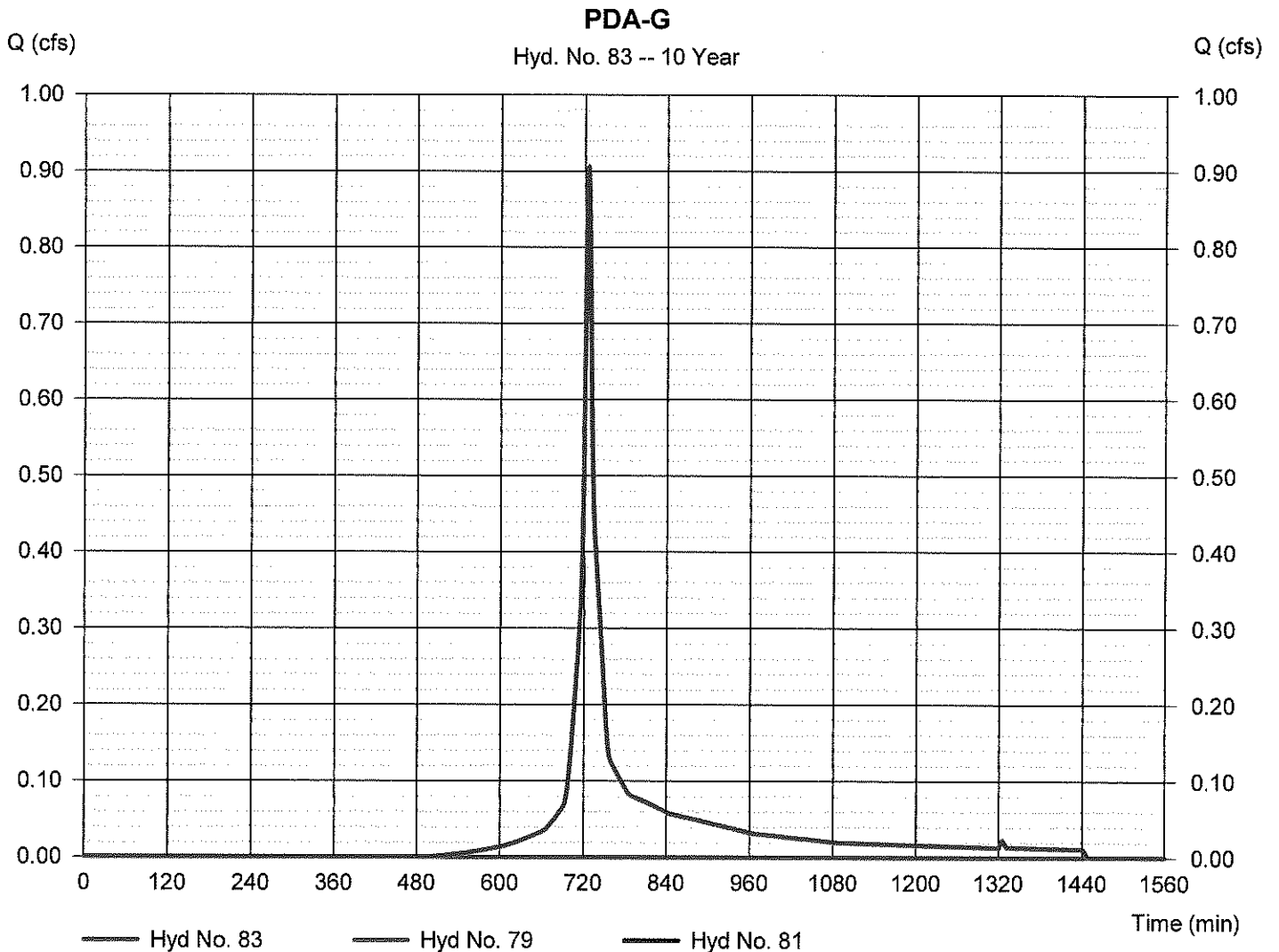
Monday, 11 / 25 / 2019

Hyd. No. 83

PDA-G

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 79, 81

Peak discharge = 0.906 cfs
Time to peak = 725 min
Hyd. volume = 2,790 cuft
Contrib. drain. area = 0.300 ac



Hydrograph Report

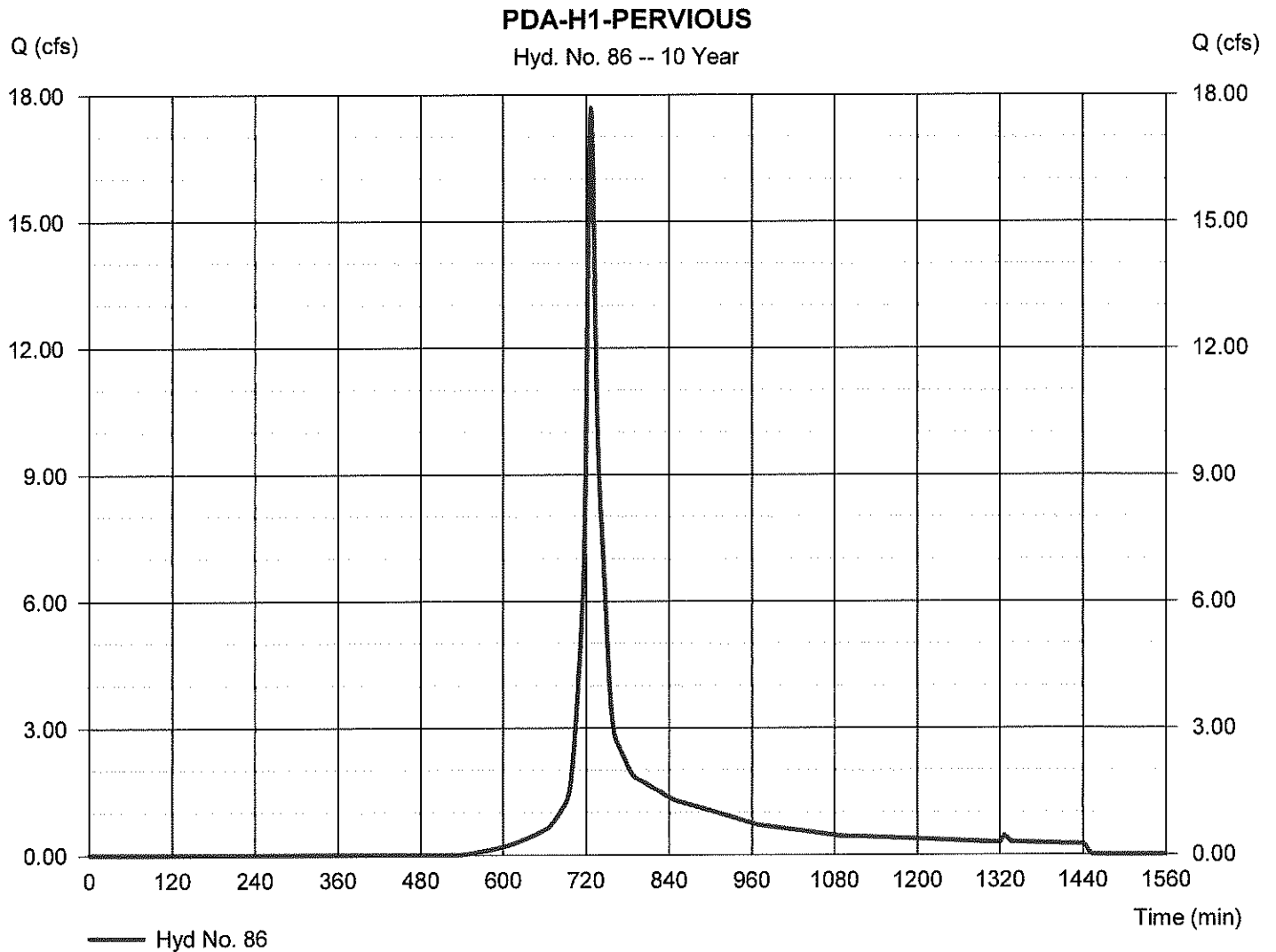
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Monday, 11 / 25 / 2019

Hyd. No. 86

PDA-H1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 17.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 60,852 cuft
Drainage area	= 7.510 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

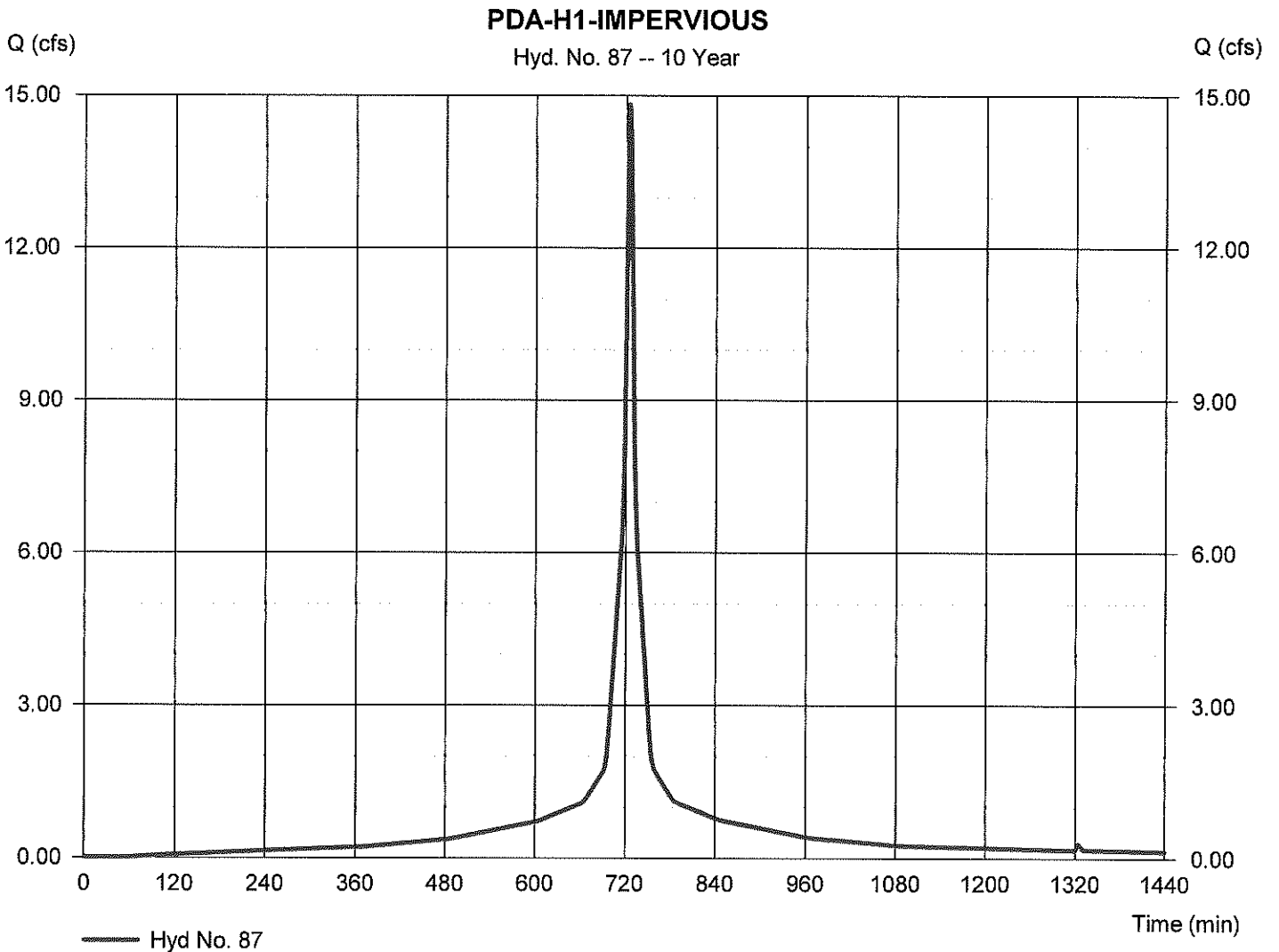
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Monday, 11 / 25 / 2019

Hyd. No. 87

PDA-H1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 14.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 52,147 cuft
Drainage area	= 3.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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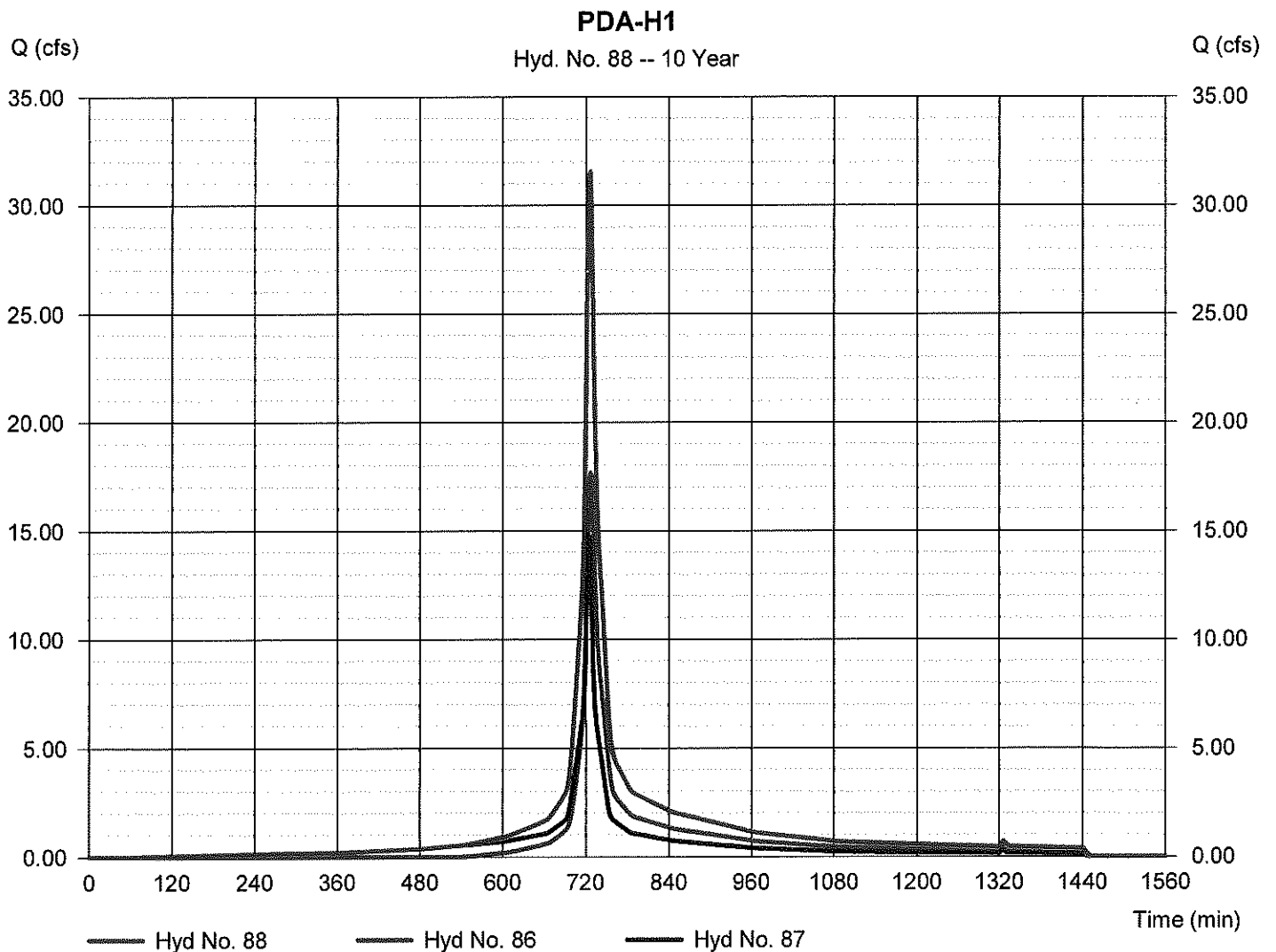
Monday, 11 / 25 / 2019

Hyd. No. 88

PDA-H1

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 86, 87

Peak discharge = 31.56 cfs
 Time to peak = 726 min
 Hyd. volume = 112,999 cuft
 Contrib. drain. area = 10.610 ac



Hydrograph Report

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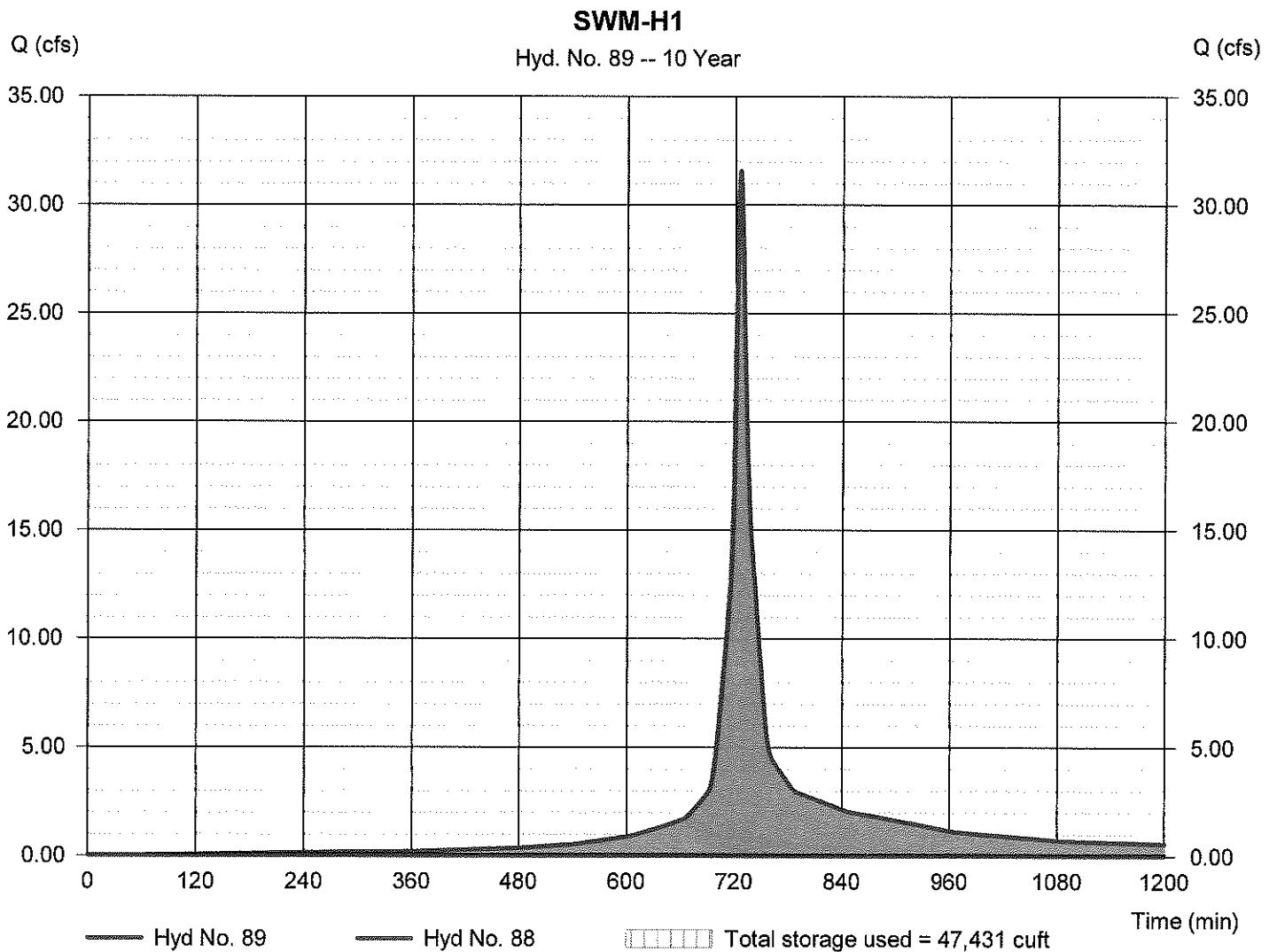
Monday, 11 / 25 / 2019

Hyd. No. 89

SWM-H1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 88 - PDA-H1	Max. Elevation	= 598.54 ft
Reservoir name	= SWM-H1	Max. Storage	= 47,431 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

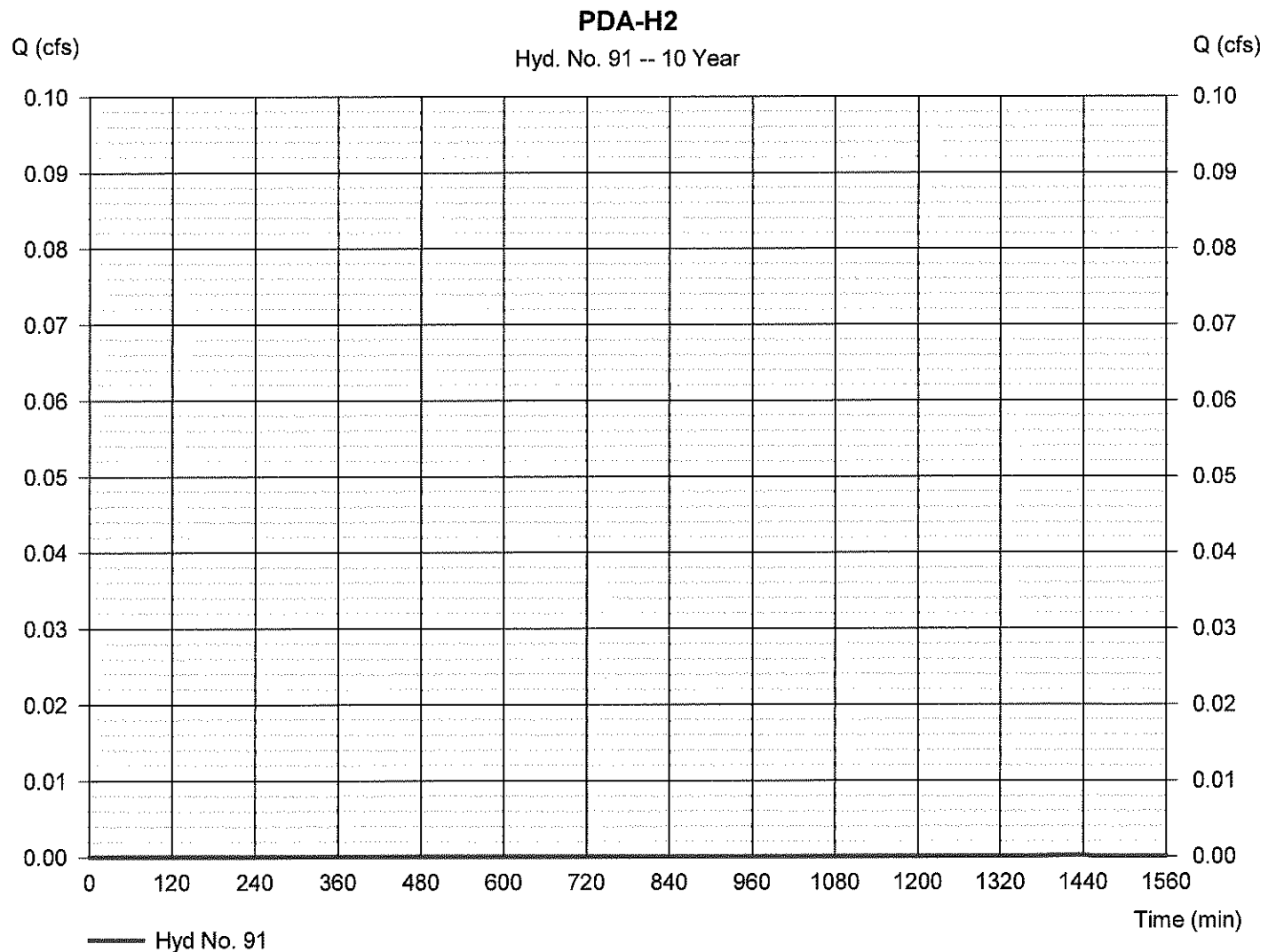
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Monday, 11 / 25 / 2019

Hyd. No. 91

PDA-H2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 1440 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.760 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

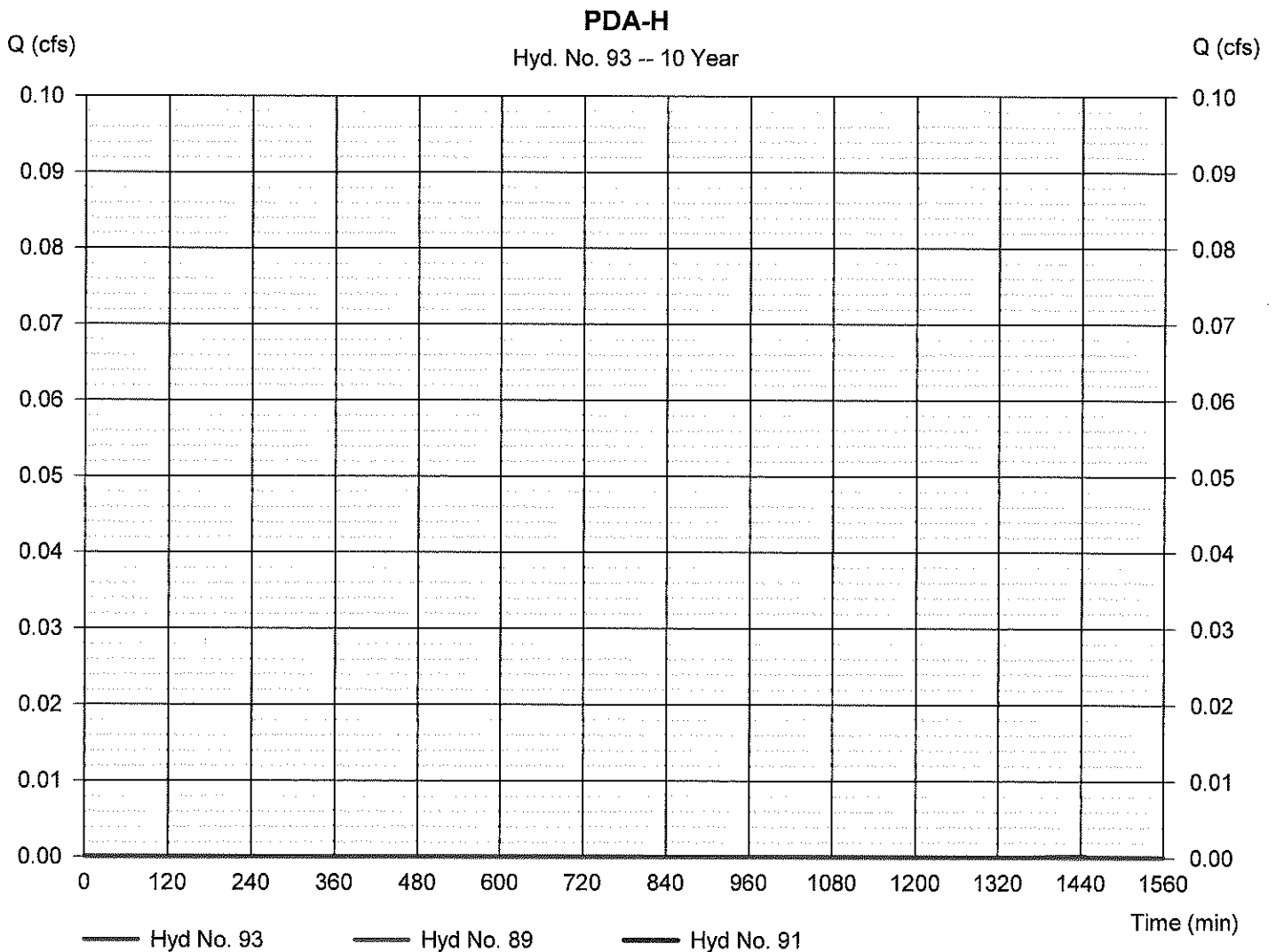
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Monday, 11 / 25 / 2019

Hyd. No. 93

PDA-H

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 1440 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 89, 91	Contrib. drain. area	= 0.760 ac



Hydrograph Report

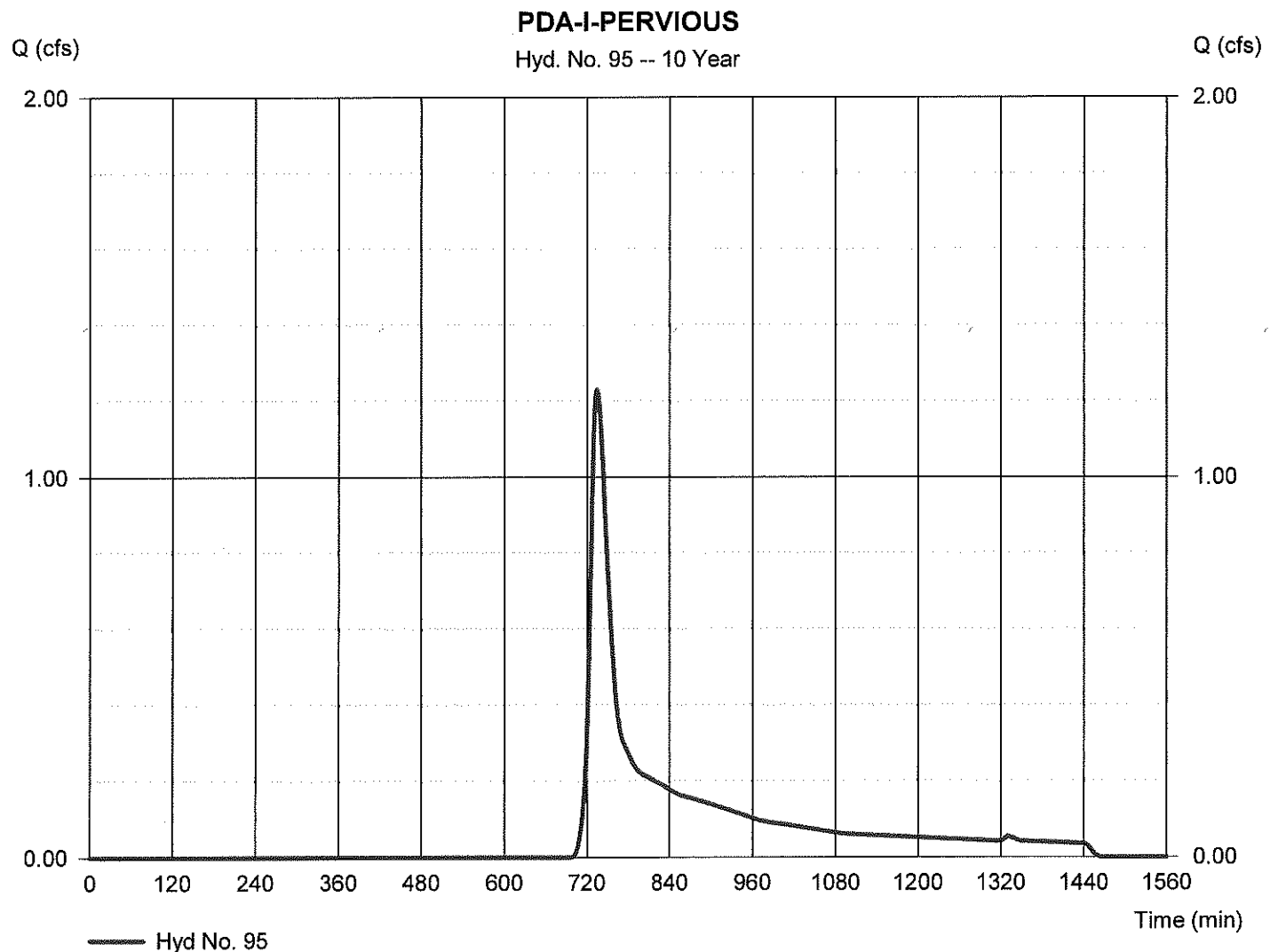
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Hyd. No. 95

PDA-I-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.231 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 6,056 cuft
Drainage area	= 1.610 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.10 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

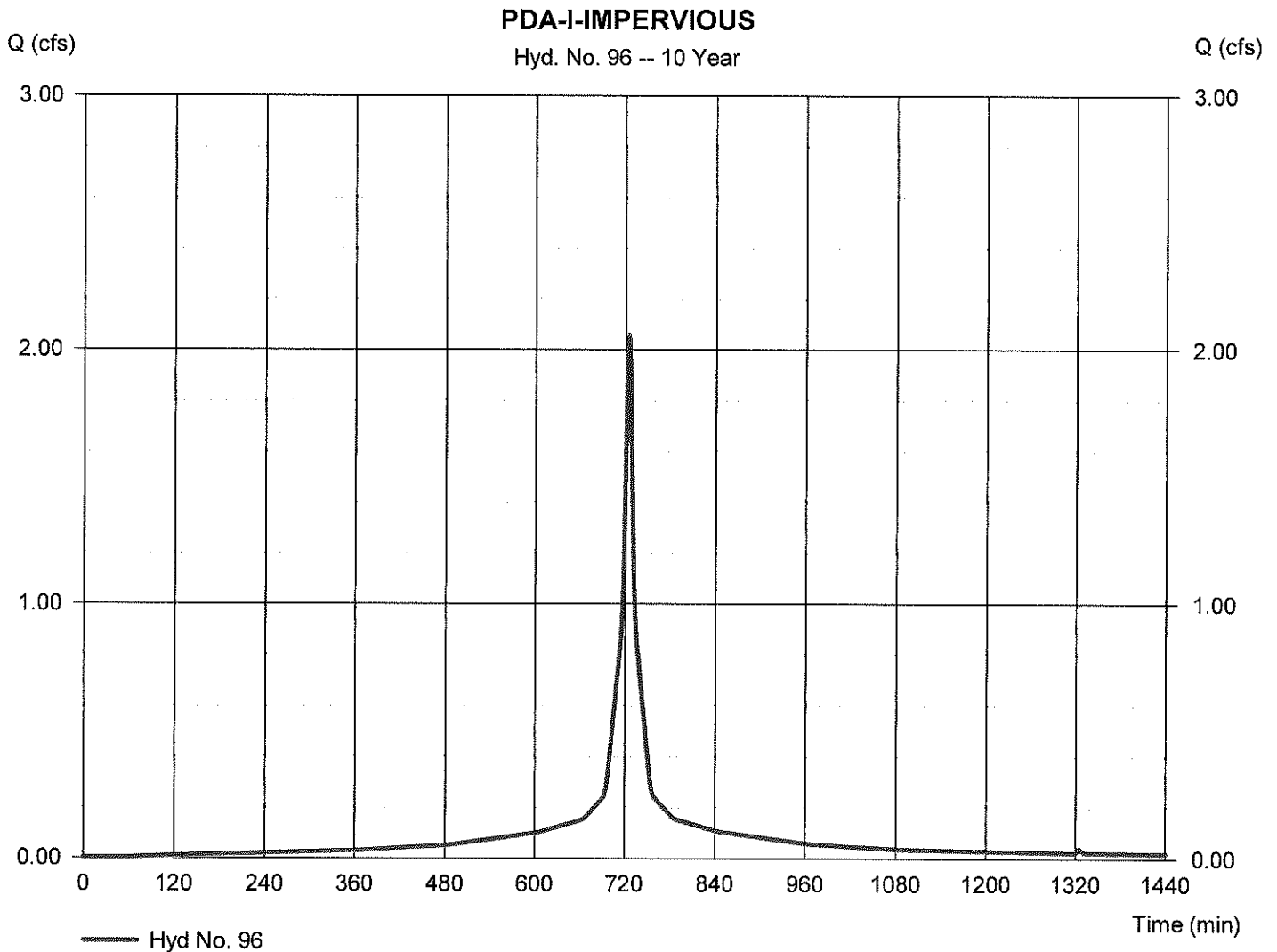
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Monday, 11 / 25 / 2019

Hyd. No. 96

PDA-I-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.057 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 7,233 cuft
Drainage area	= 0.430 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.73 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

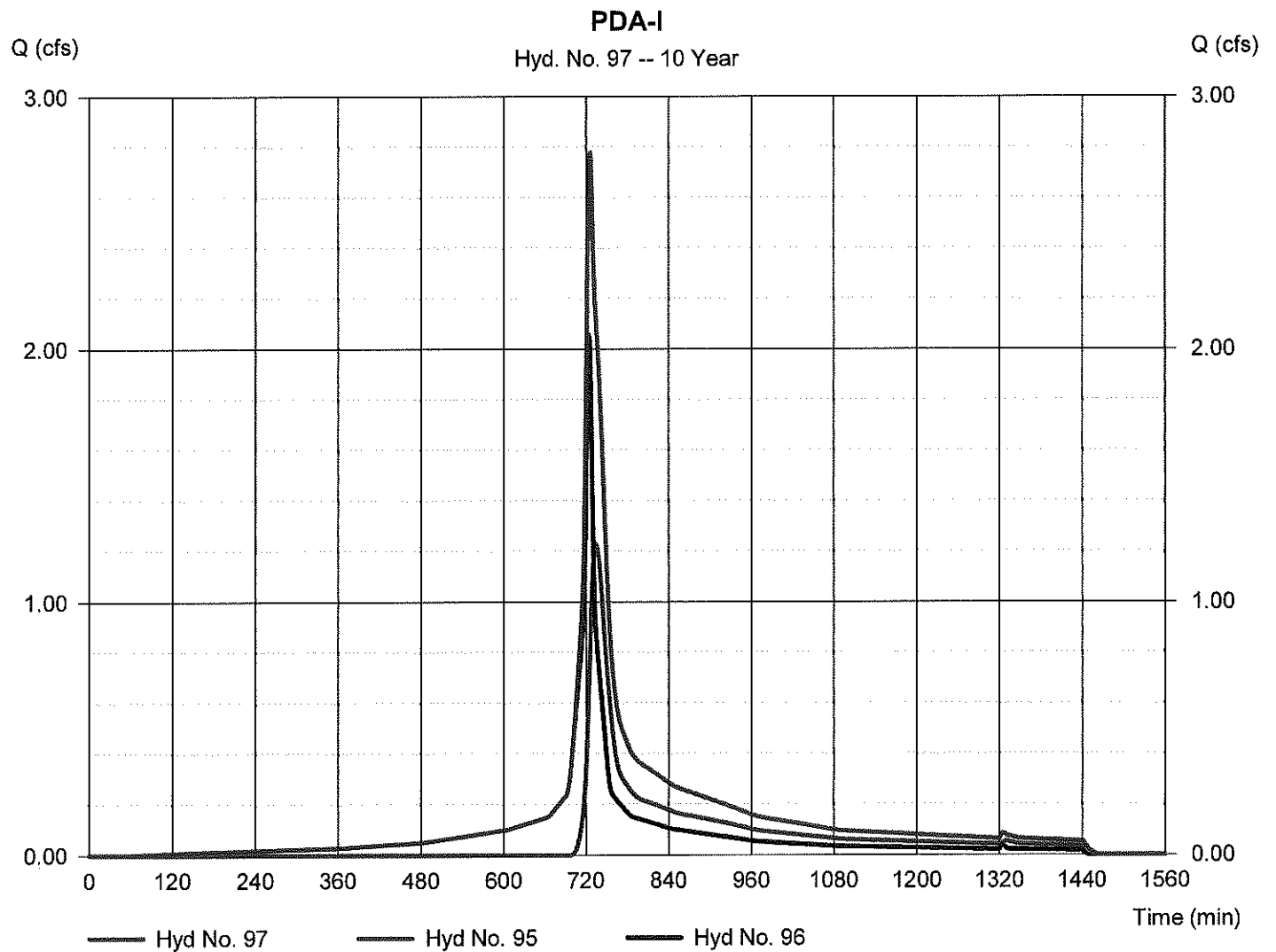
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 97

PDA-I

Hydrograph type	= Combine	Peak discharge	= 2.780 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 13,289 cuft
Inflow hyds.	= 95, 96	Contrib. drain. area	= 2.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

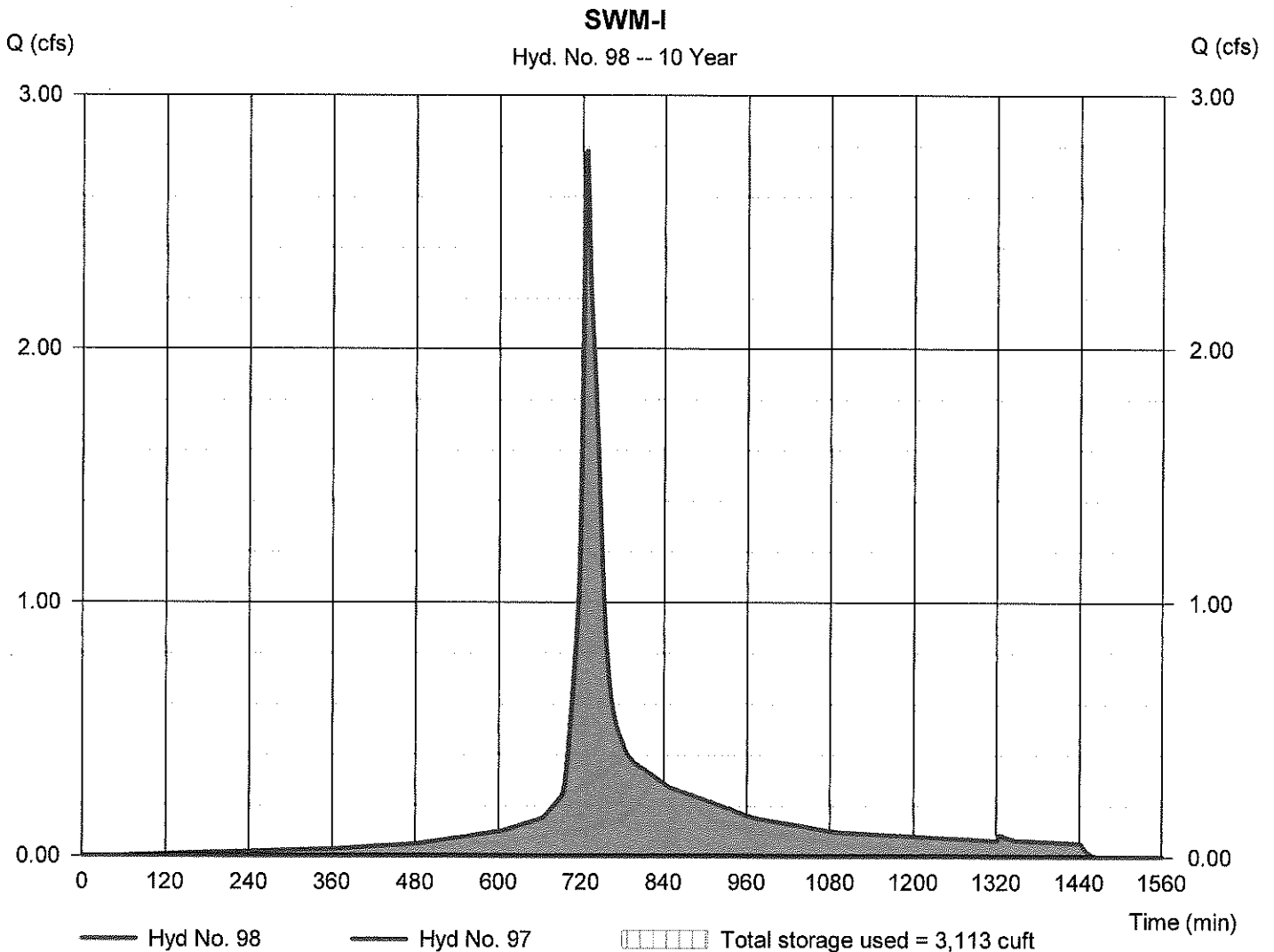
Monday, 11 / 25 / 2019

Hyd. No. 98

SWM-I

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 97 - PDA-I	Max. Elevation	= 604.93 ft
Reservoir name	= SWM-I	Max. Storage	= 3,113 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	26.48	1	734	118,653	----	----	----	EDA - A: PERVIOUS
2	SCS Runoff	7.621	1	733	38,532	----	----	----	EDA-A:IMPERVIOUS
3	Combine	34.07	1	733	157,186	1, 2	----	----	EDA-A
5	SCS Runoff	15.24	1	748	95,695	----	----	----	EDA-B: PERVIOUS
6	SCS Runoff	10.46	1	739	62,285	----	----	----	EDA-B: IMPERVIOUS
7	Combine	24.99	1	744	157,980	5, 6	----	----	EDA-B
9	SCS Runoff	13.29	1	729	50,089	----	----	----	EDA-C: PERVIOUS
10	SCS Runoff	7.625	1	724	27,217	----	----	----	EDA-C:IMPERVIOUS
11	Combine	19.46	1	727	77,306	9, 10	----	----	EDA-C
13	SCS Runoff	18.51	1	727	63,778	----	----	----	EDA-D
15	SCS Runoff	22.23	1	728	81,146	----	----	----	EDA-E
17	SCS Runoff	4.017	1	729	15,178	----	----	----	EDA-F
19	SCS Runoff	17.01	1	729	64,236	----	----	----	EDA-G
21	SCS Runoff	3.714	1	757	34,797	----	----	----	EDA-H
23	SCS Runoff	0.053	1	767	1,167	----	----	----	EDA-I
25	SCS Runoff	7.188	1	725	22,389	----	----	----	PDA-A1-PERVIOUS
26	SCS Runoff	24.70	1	724	88,182	----	----	----	PDA-A1-IMPERVIOUS
27	Combine	31.79	1	724	110,572	25, 26	----	----	PDA-A1
28	Reservoir	0.000	1	592	0	27	595.06	55,398	SWM-A1
30	SCS Runoff	5.830	1	724	19,175	----	----	----	PDA-A2-PERVIOUS
31	SCS Runoff	4.117	1	724	14,697	----	----	----	PDA-A2-IMPERVIOUS
32	Combine	9.947	1	724	33,872	30, 31	----	----	PDA-A2
33	Reservoir	0.000	1	723	0	32	601.71	13,639	SWM-A2
35	Combine	0.000	1	723	0	28, 33,	----	----	PDA-A
37	SCS Runoff	51.49	1	727	178,302	----	----	----	PDA-B1-PERVIOUS
38	SCS Runoff	22.93	1	727	96,171	----	----	----	PDA-B1-IMPERVIOUS
39	Combine	74.42	1	727	274,472	37, 38	----	----	PDA-B1
40	Reservoir	0.000	1	728	0	39	601.74	111,262	SWM-B1
Hydrologic Calculations.gpw					Return Period: 100 Year			Monday, 11 / 25 / 2019	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
42	SCS Runoff	21.96	1	736	103,000	----	----	----	PDA-B2-PERVIOUS	
43	SCS Runoff	18.79	1	734	98,323	----	----	----	PDA-B2-IMPERVIOUS	
44	Combine	40.55	1	735	201,323	42, 43	----	----	PDA-B2	
45	Reservoir	0.000	1	746	0	44	598.30	70,775	SWM-B2	
47	SCS Runoff	0.589	1	725	1,940	-----	----	----	PDA-B3	
49	SCS Runoff	6.048	1	725	18,792	----	----	----	PDA-B4-PERVIOUS	
50	SCS Runoff	5.490	1	724	19,596	----	----	----	PDA-B4-IMPERVIOUS	
51	Combine	11.53	1	724	38,388	49, 50	----	----	PDA-B4	
52	Reservoir	0.000	1	935	0	51	597.87	18,699	SWM-B4	
54	Combine	0.589	1	725	1,940	40, 45, 47, 52,	----	----	PDA-B	
56	SCS Runoff	1.867	1	726	6,051	----	----	----	PDA-C-PERVIOUS	
57	SCS Runoff	0.457	1	724	1,633	----	----	----	PDA-C-IMPERVIOUS	
58	Combine	2.301	1	725	7,684	56, 57	----	----	PDA-C	
60	SCS Runoff	37.09	1	726	134,504	----	----	----	PDA-D-PERVIOUS	
61	SCS Runoff	24.78	1	724	88,454	----	----	----	PDA-D-IMPERVIOUS	
62	Combine	60.75	1	725	222,958	60, 61	----	----	PDA-D	
63	Reservoir	0.000	1	745	0	62	601.30	113,475	SWM-D	
65	SCS Runoff	10.32	1	724	33,689	----	----	----	PDA-E1-PERVIOUS	
66	SCS Runoff	5.109	1	724	18,235	----	----	----	PDA-E1-IMPERVIOUS	
67	Combine	15.42	1	724	51,925	65, 66	----	----	PDA-E1	
68	Reservoir	0.000	1	988	0	67	618.13	29,322	SWM-E1	
70	SCS Runoff	1.187	1	725	3,698	----	----	----	PDA-E2	
72	Combine	1.187	1	725	3,698	68, 70,	----	----	PDA-E	
74	SCS Runoff	3.622	1	725	11,280	----	----	----	PDA-F	
76	SCS Runoff	25.38	1	724	79,500	----	----	----	PDA-G1-PERVIOUS	
77	SCS Runoff	13.11	1	724	46,813	----	----	----	PDA-G1-IMPERVIOUS	
78	Combine	38.49	1	724	126,313	76, 77	----	----	PDA-G1	
79	Reservoir	13.44	1	738	32,582	78	601.97	52,582	SWM-G1	
Hydrologic Calculations.gpw					Return Period: 100 Year			Monday, 11 / 25 / 2019		

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
81	SCS Runoff	1.781	1	725	5,548	----	----	----	PDA-G2	
83	Combine	14.15	1	738	38,129	79, 81,	----	----	PDA-G	
86	SCS Runoff	36.54	1	727	125,452	----	----	----	PDA-H1-PERVIOUS	
87	SCS Runoff	23.64	1	724	84,372	----	----	----	PDA-H1-IMPERVIOUS	
88	Combine	58.76	1	726	209,824	86, 87	----	----	PDA-H1	
89	Reservoir	0.000	1	788	0	88	599.70	90,138	SWM-H1	
91	SCS Runoff	0.045	1	751	867	----	----	----	PDA-H2	
93	Combine	0.045	1	751	867	89, 91,	----	----	PDA-H	
95	SCS Runoff	3.823	1	732	16,344	----	----	----	PDA-I-PERVIOUS	
96	SCS Runoff	3.279	1	724	11,703	----	----	----	PDA-I-IMPERVIOUS	
97	Combine	6.116	1	726	28,048	95, 96	----	----	PDA-I	
98	Reservoir	0.000	1	740	0	97	605.29	7,182	SWM-I	
Hydrologic Calculations.gpw					Return Period: 100 Year			Monday, 11 / 25 / 2019		

Hydrograph Report

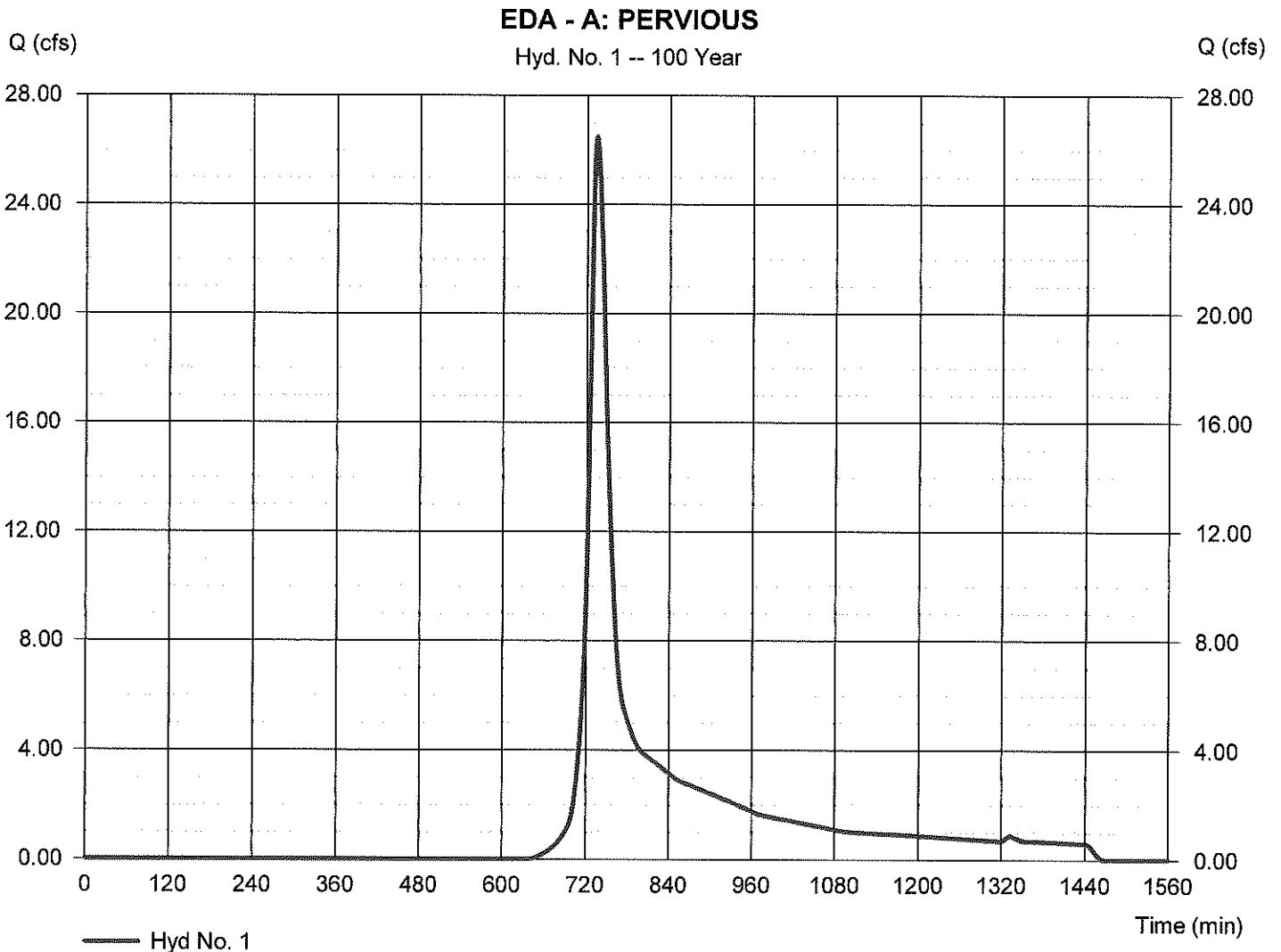
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 1

EDA - A: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 26.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 118,653 cuft
Drainage area	= 13.470 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.70 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

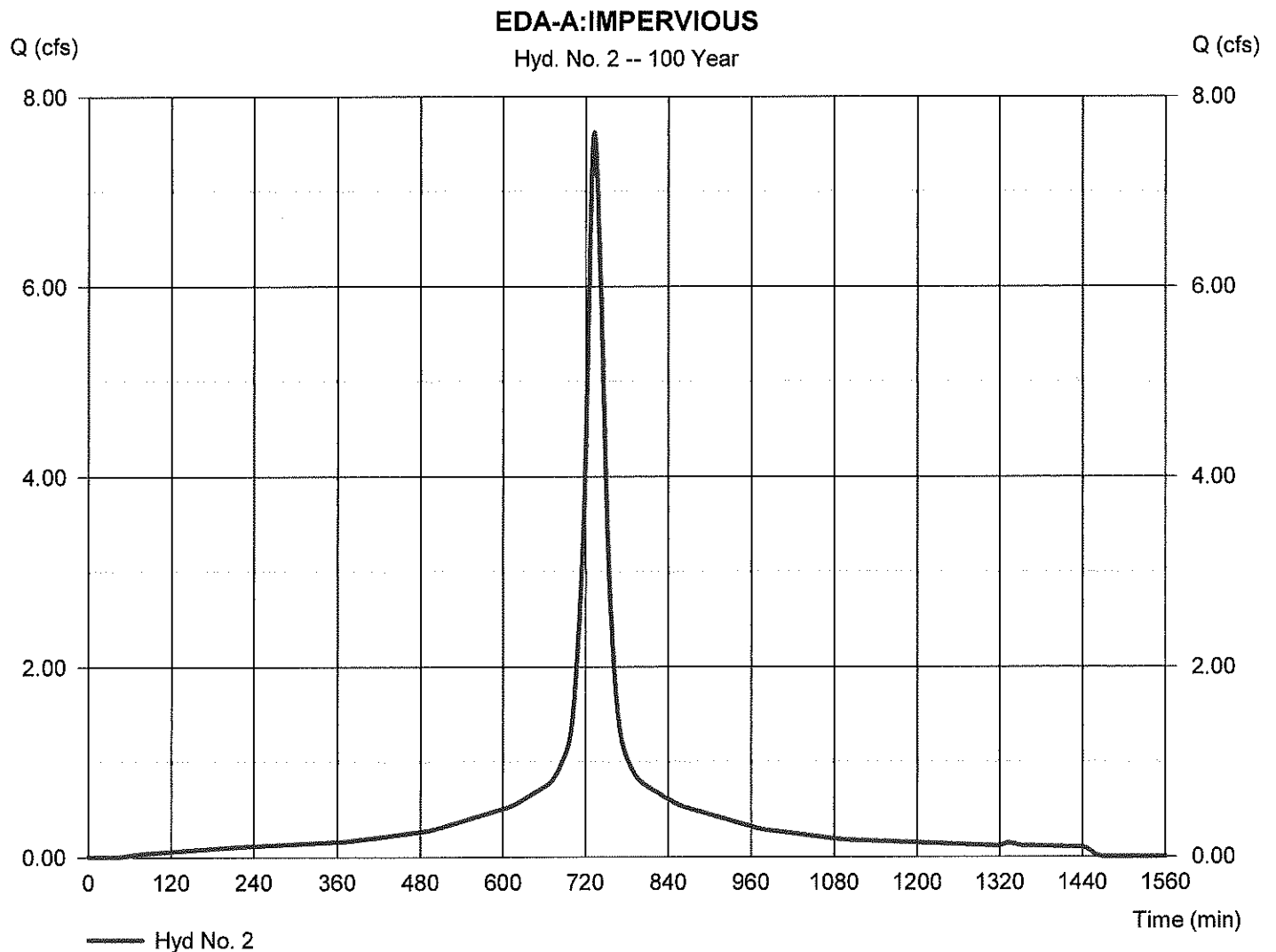
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Monday, 11 / 25 / 2019

Hyd. No. 2

EDA-A:IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 7.621 cfs
Storm frequency	= 100 yrs	Time to peak	= 733 min
Time interval	= 1 min	Hyd. volume	= 38,532 cuft
Drainage area	= 1.460 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.60 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

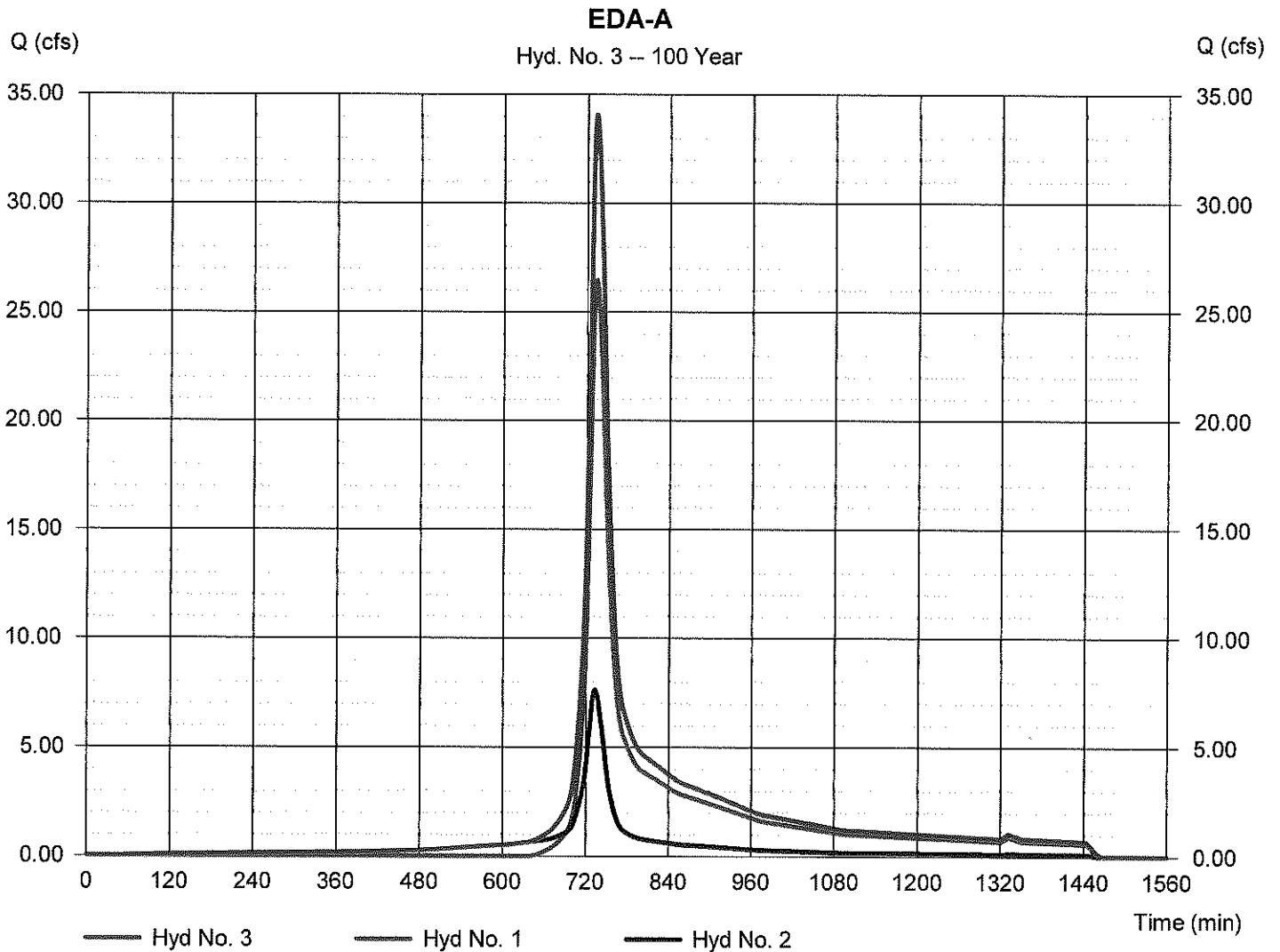
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Hyd. No. 3

EDA-A

Hydrograph type	= Combine	Peak discharge	= 34.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 733 min
Time interval	= 1 min	Hyd. volume	= 157,186 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 14.930 ac



Hydrograph Report

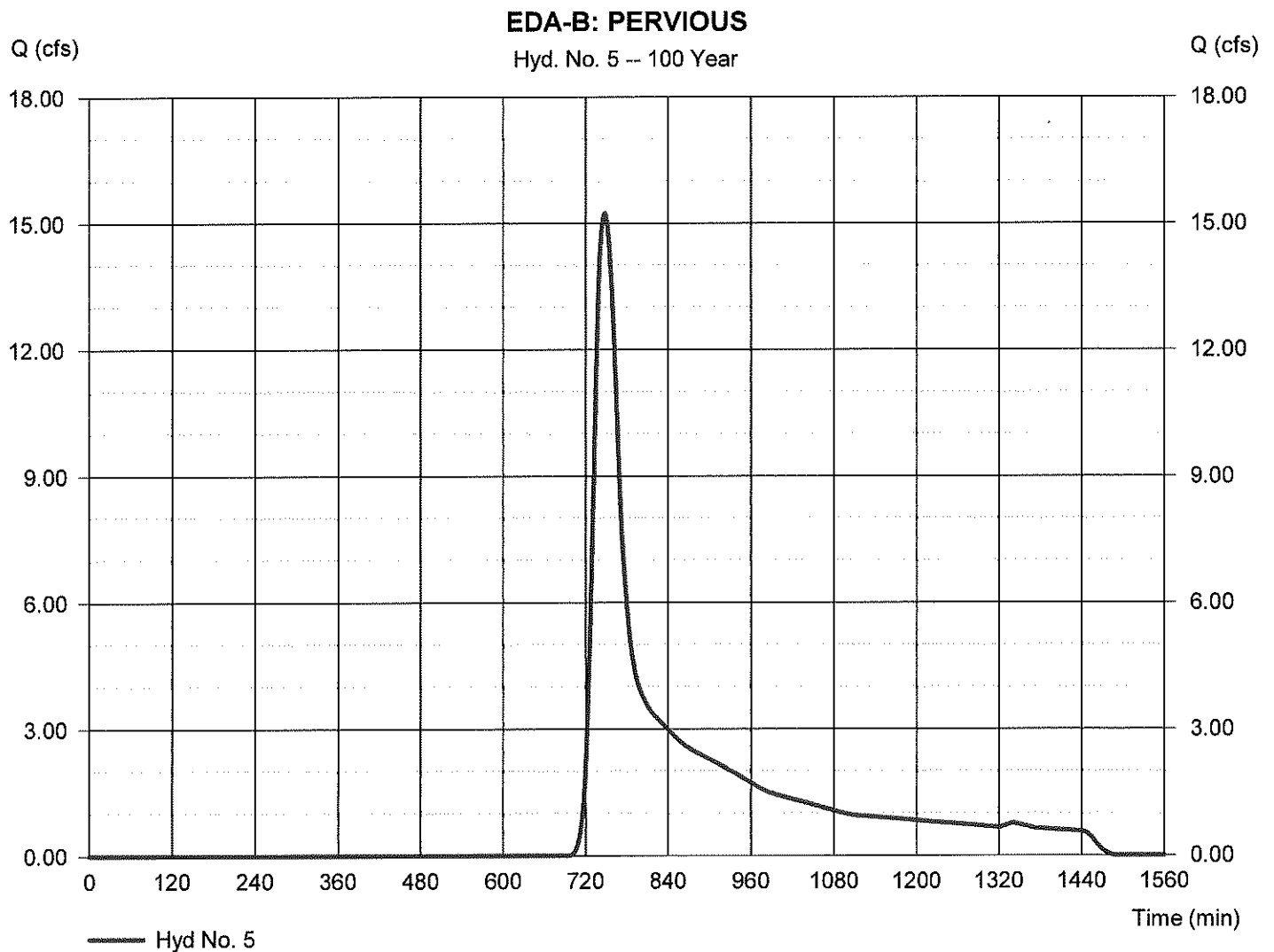
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Monday, 11 / 25 / 2019

Hyd. No. 5

EDA-B: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 15.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 1 min	Hyd. volume	= 95,695 cuft
Drainage area	= 15.680 ac	Curve number	= 47
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.40 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

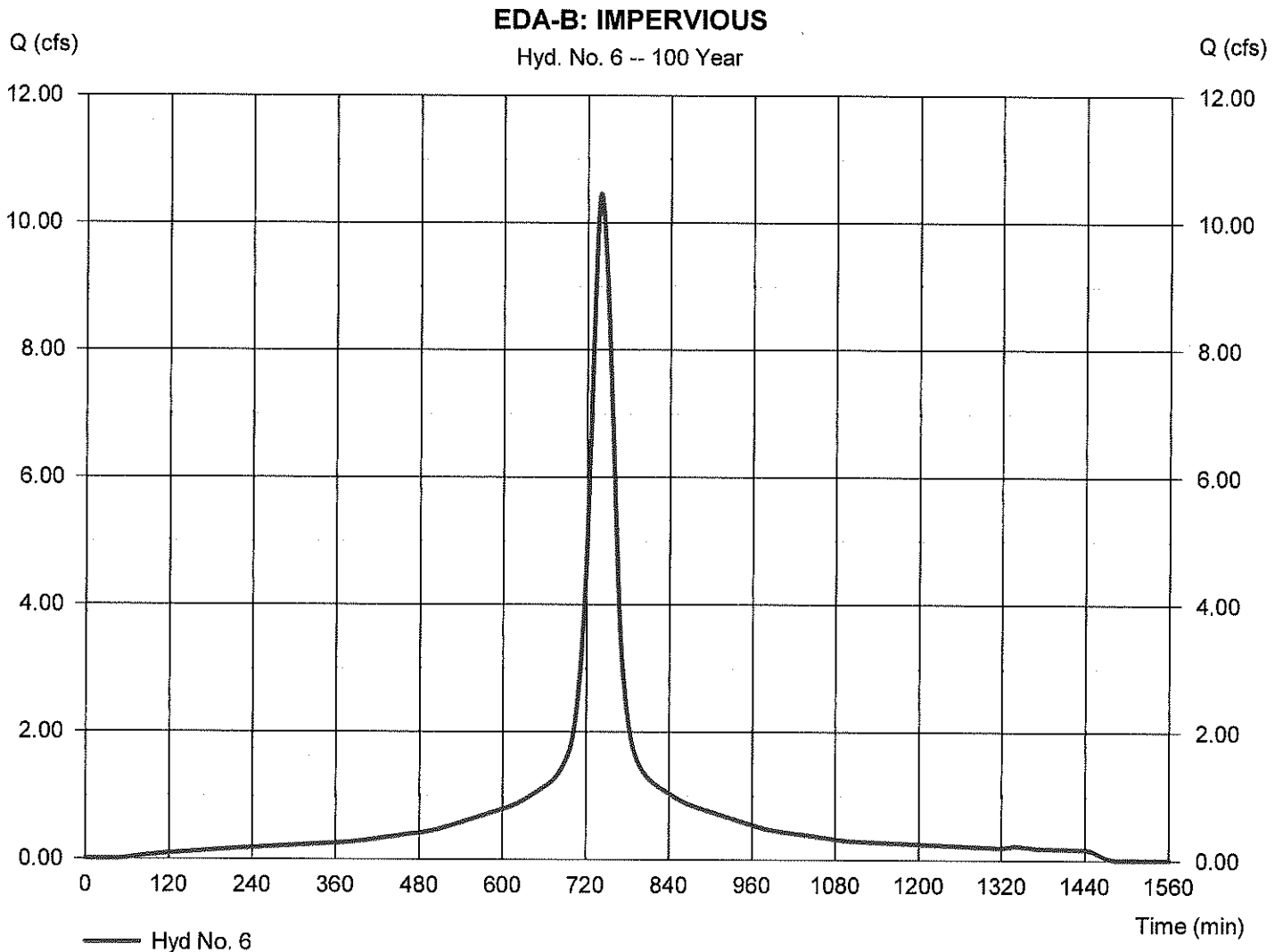
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Monday, 11 / 25 / 2019

Hyd. No. 6

EDA-B: IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 10.46 cfs
Storm frequency	= 100 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 62,285 cuft
Drainage area	= 2.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29.70 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

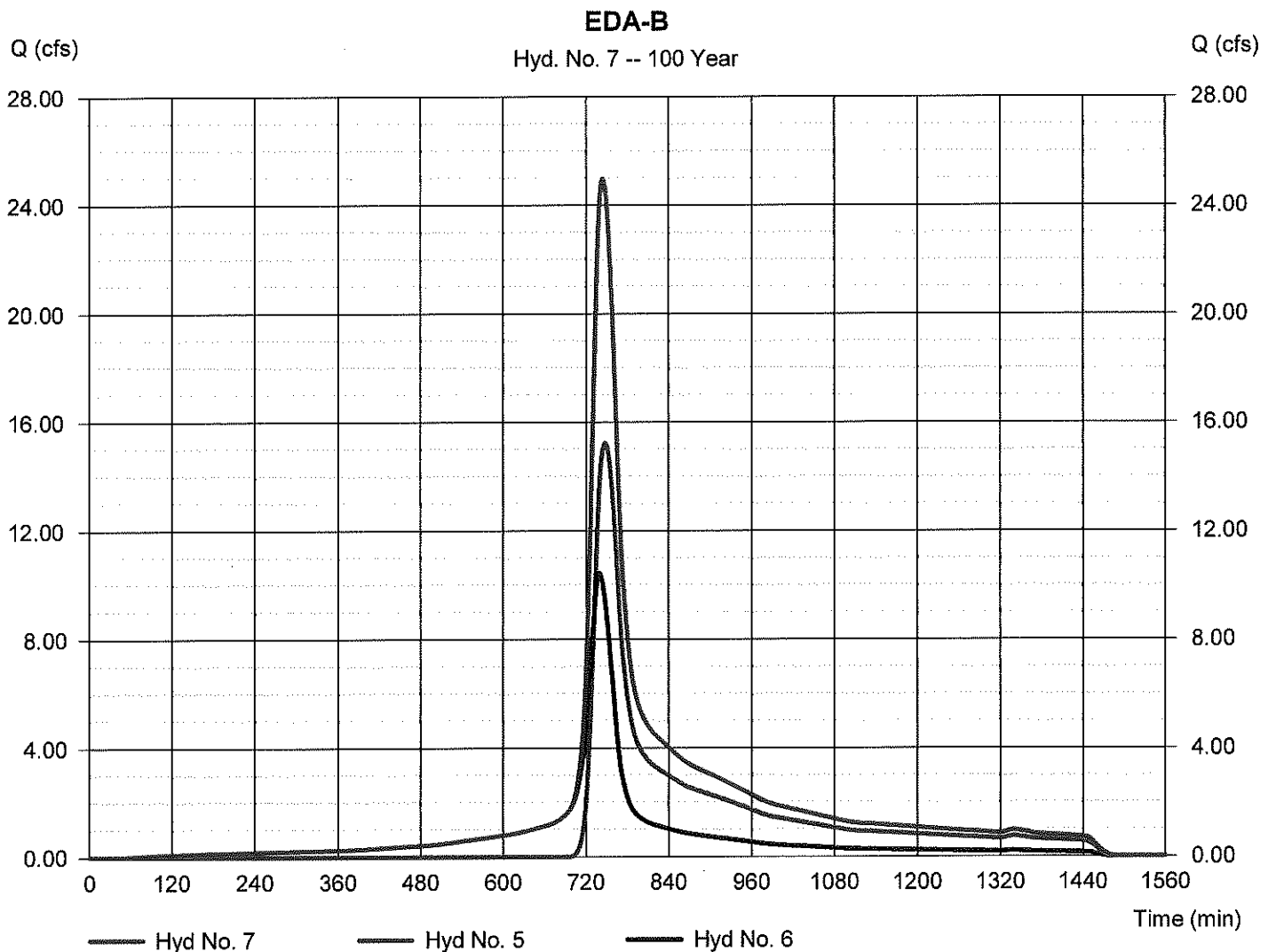
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Monday, 11 / 25 / 2019

Hyd. No. 7

EDA-B

Hydrograph type	= Combine	Peak discharge	= 24.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 744 min
Time interval	= 1 min	Hyd. volume	= 157,980 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 18.040 ac



Hydrograph Report

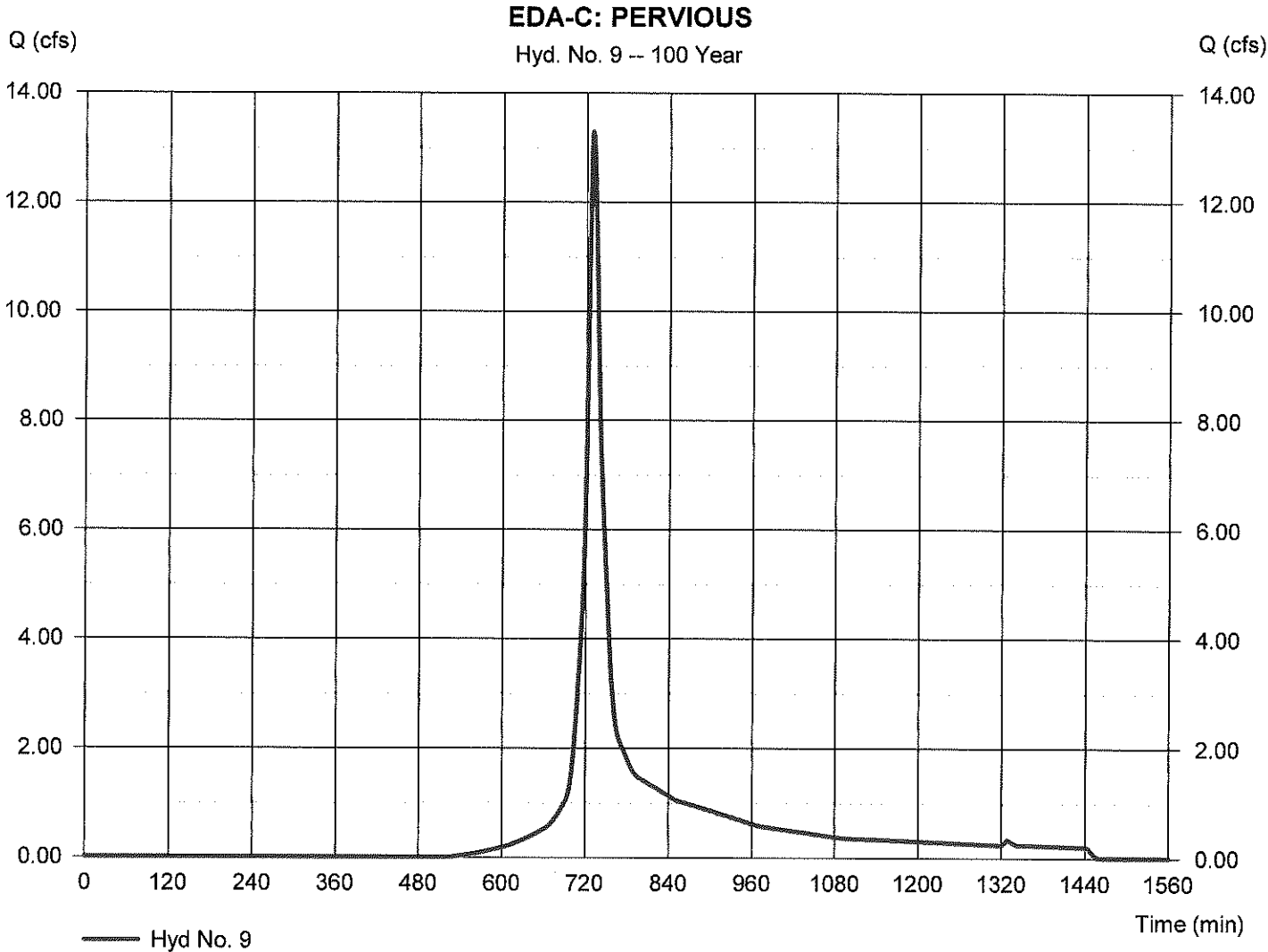
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Hyd. No. 9

EDA-C: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 13.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 50,089 cuft
Drainage area	= 3.770 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

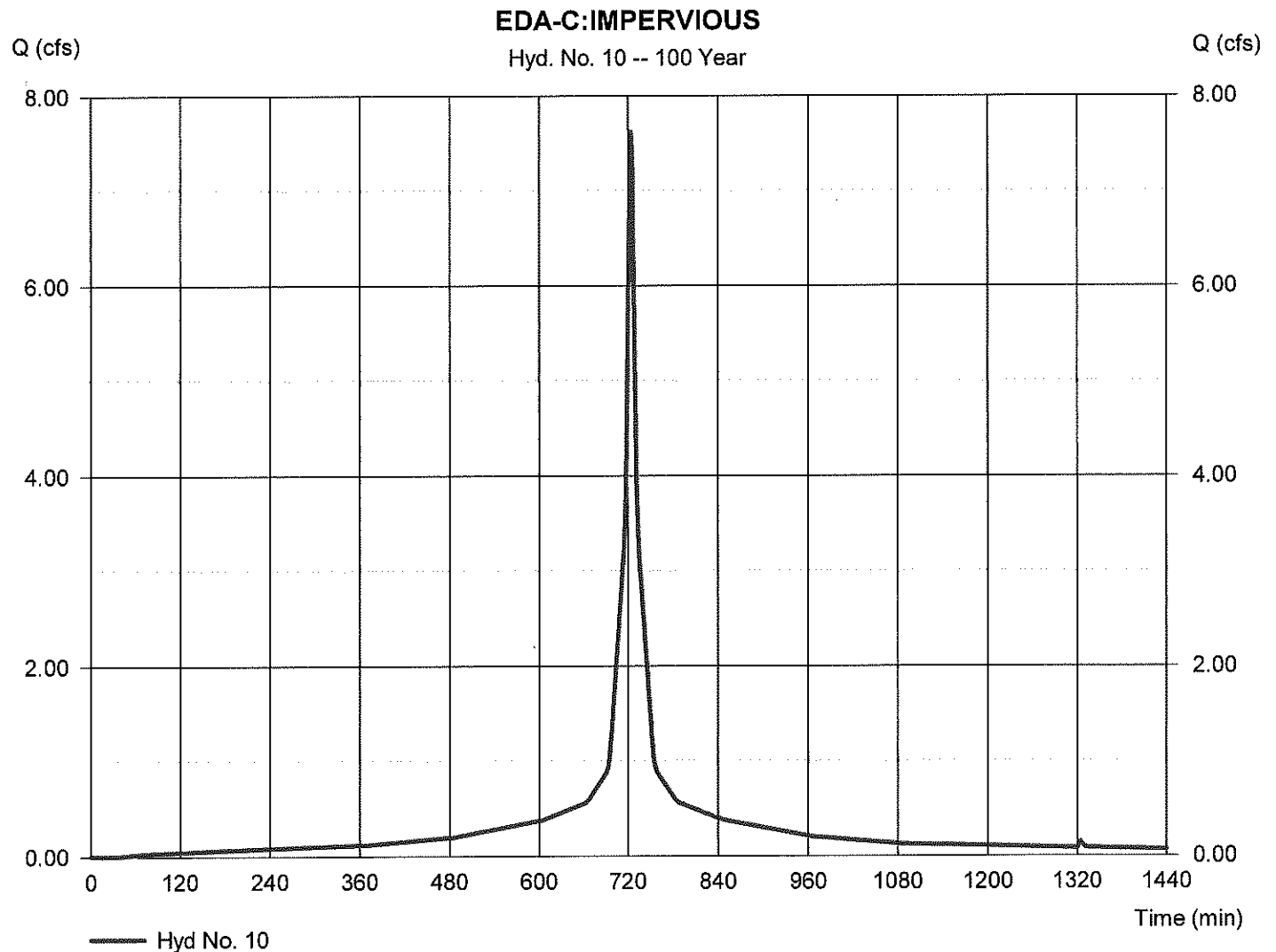
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Monday, 11 / 25 / 2019

Hyd. No. 10

EDA-C:IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 7.625 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 27,217 cuft
Drainage area	= 1.000 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

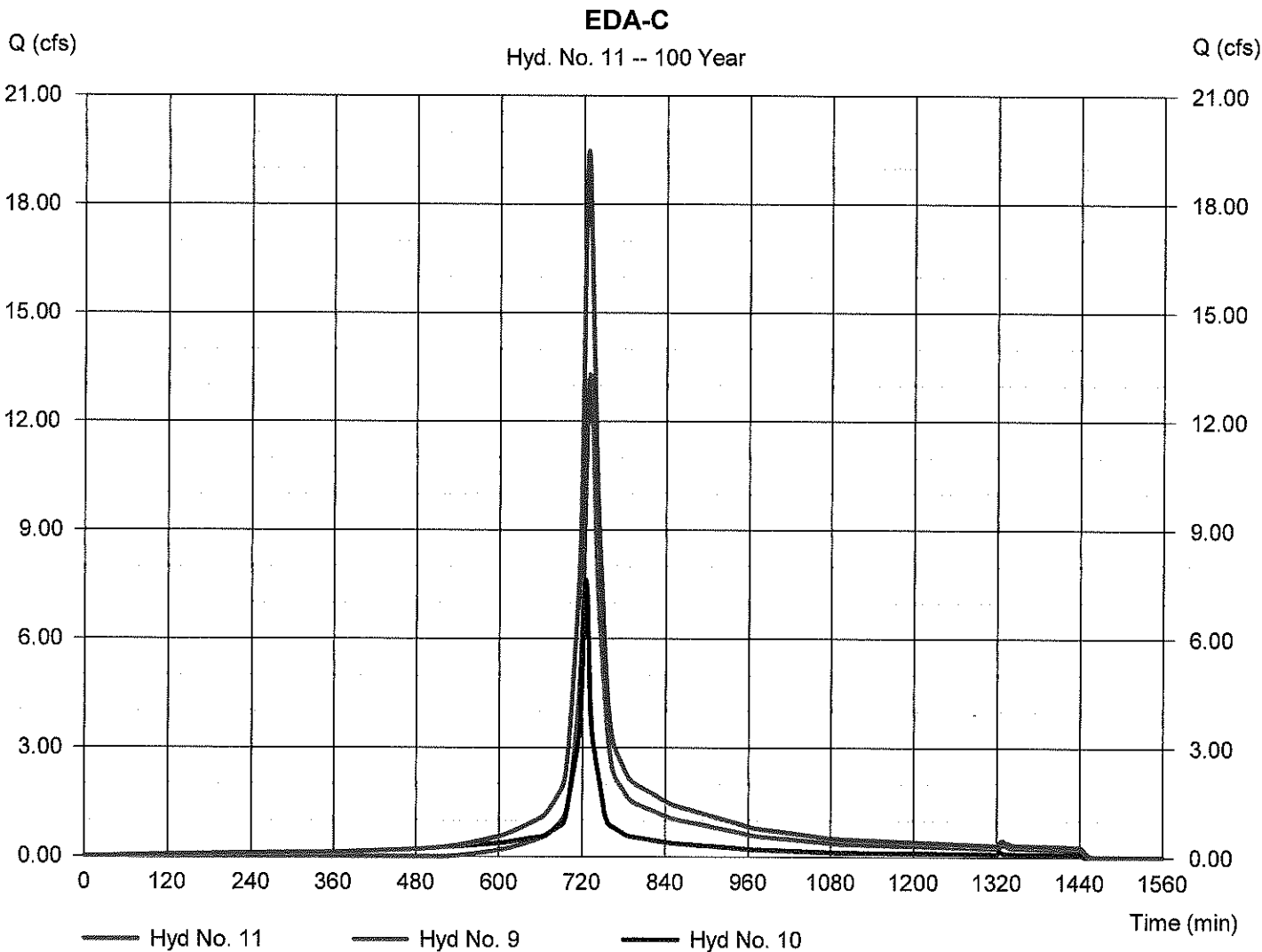
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Hyd. No. 11

EDA-C

Hydrograph type	= Combine	Peak discharge	= 19.46 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 77,306 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 4.770 ac



Hydrograph Report

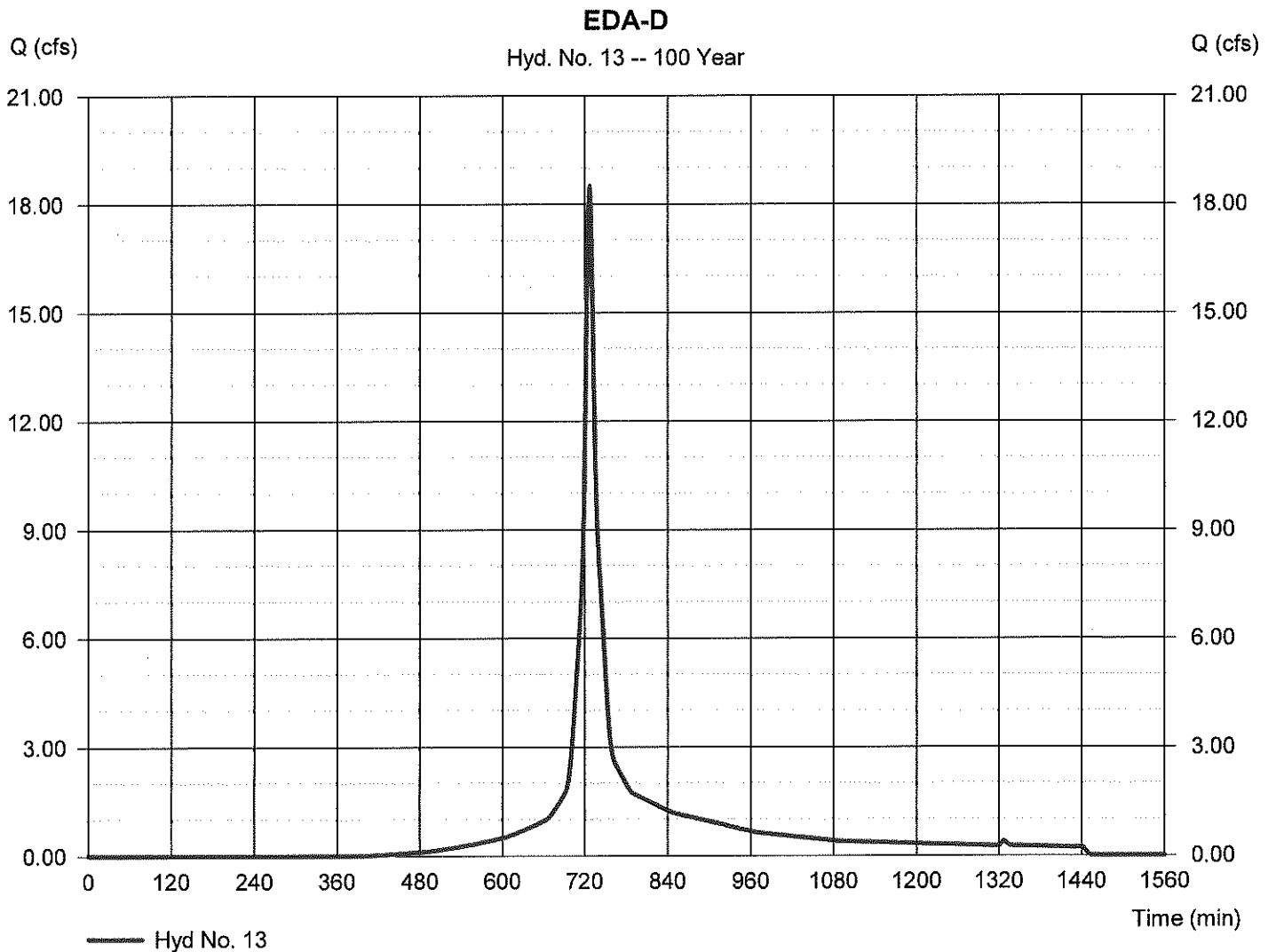
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Monday, 11 / 25 / 2019

Hyd. No. 13

EDA-D

Hydrograph type	= SCS Runoff	Peak discharge	= 18.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 63,778 cuft
Drainage area	= 3.640 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

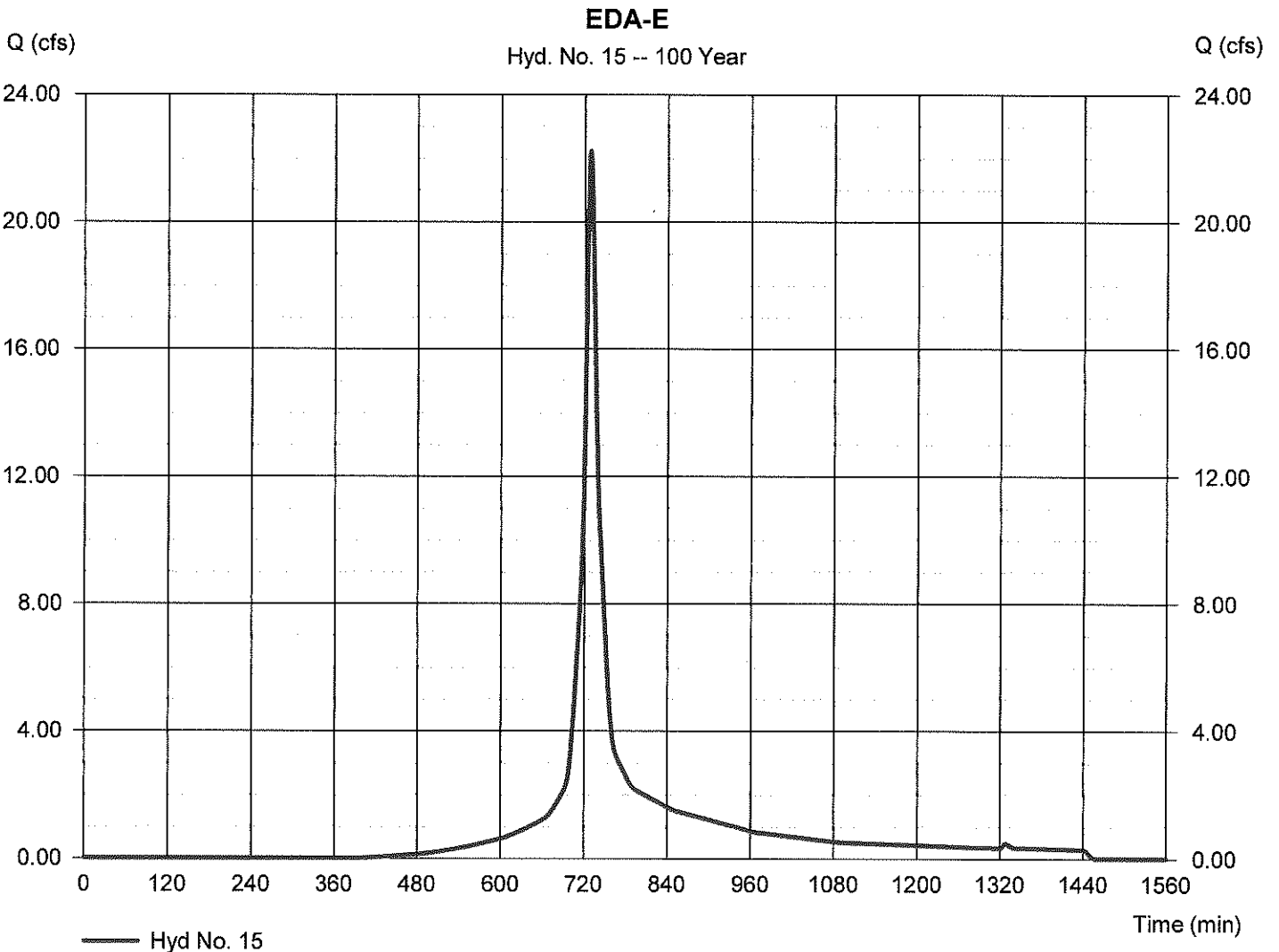
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Hyd. No. 15

EDA-E

Hydrograph type	= SCS Runoff	Peak discharge	= 22.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 81,146 cuft
Drainage area	= 4.550 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

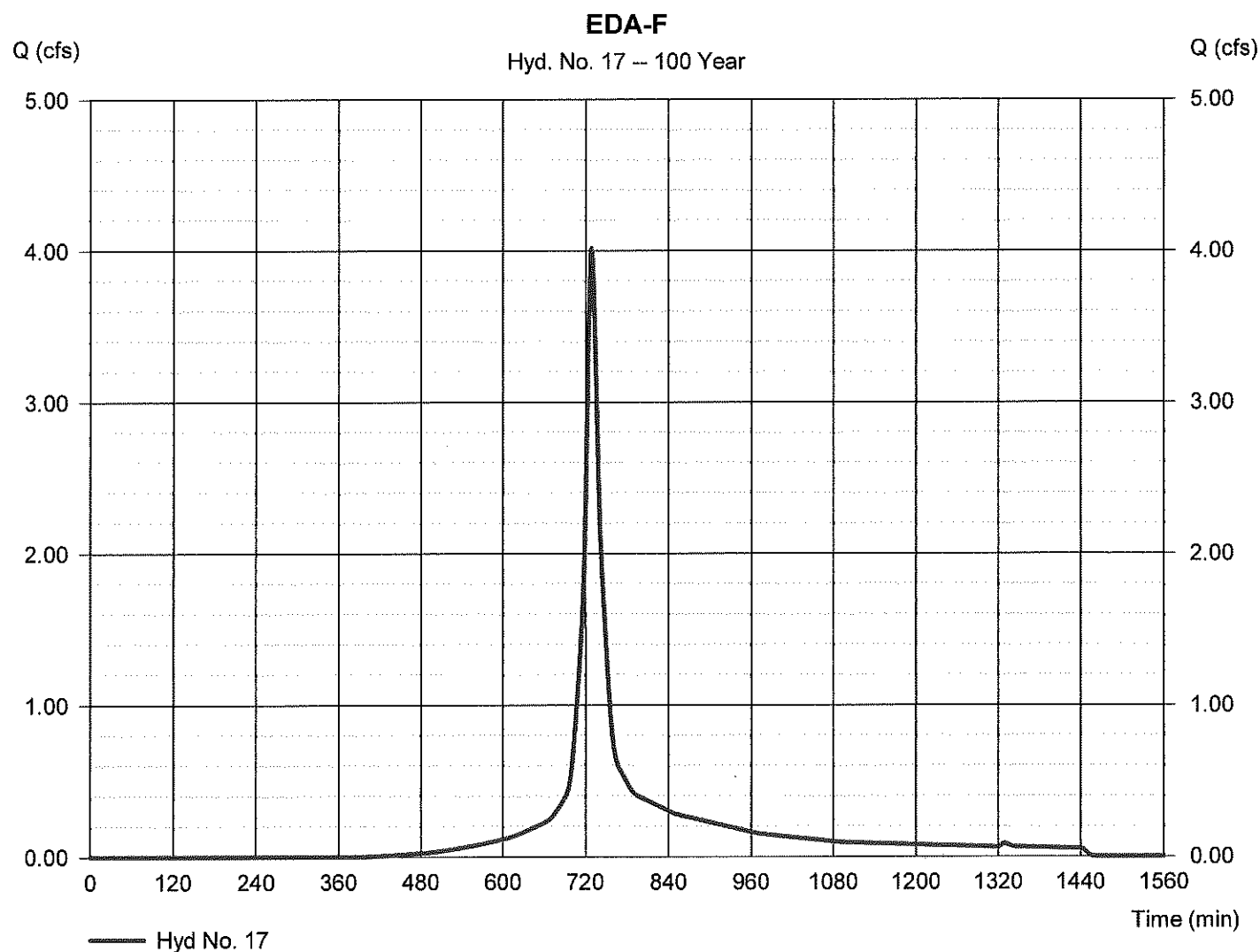
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Hyd. No. 17

EDA-F

Hydrograph type	= SCS Runoff	Peak discharge	= 4.017 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 15,178 cuft
Drainage area	= 0.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

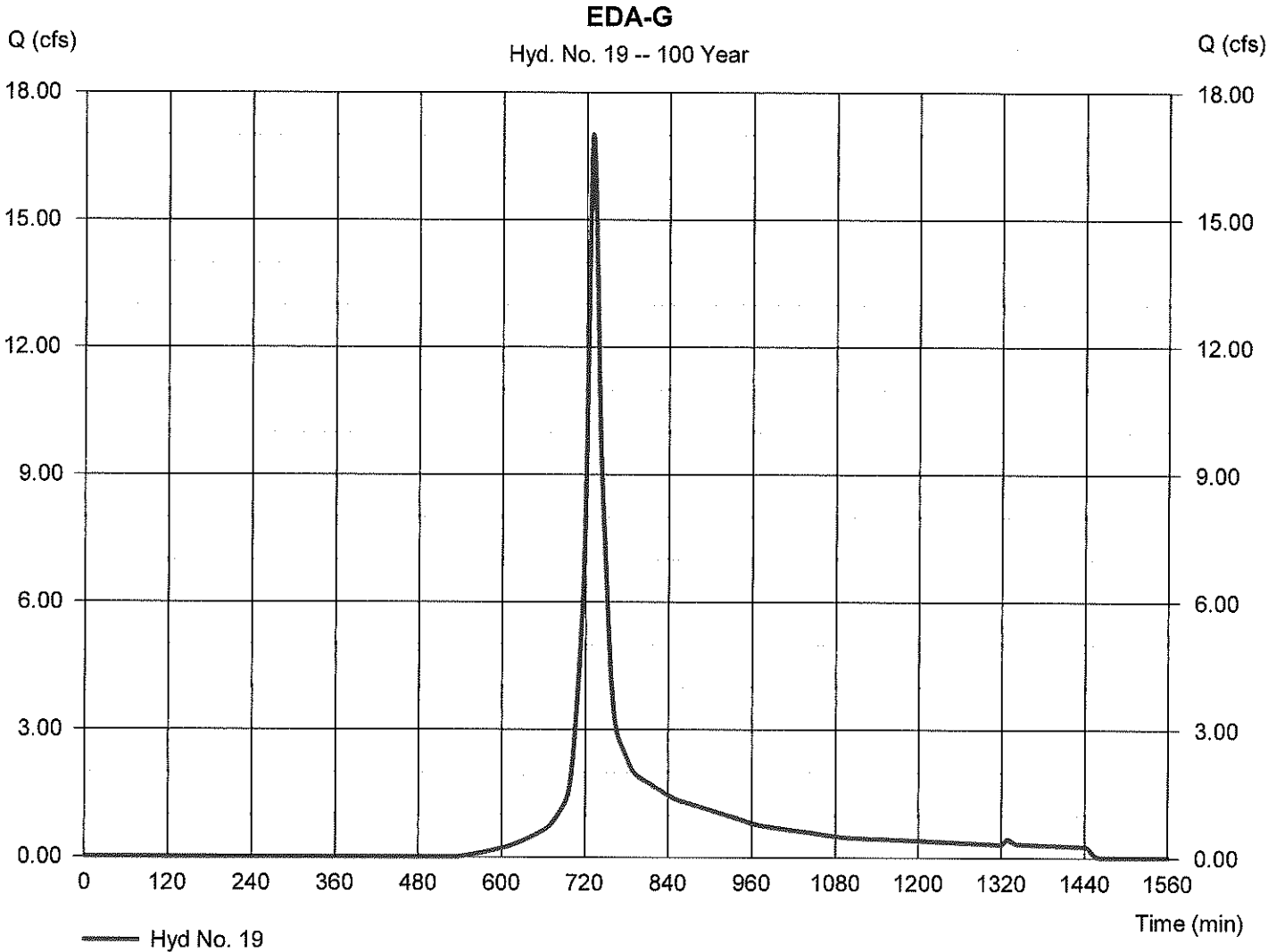
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Hyd. No. 19

EDA-G

Hydrograph type	= SCS Runoff	Peak discharge	= 17.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 64,236 cuft
Drainage area	= 4.980 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.60 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

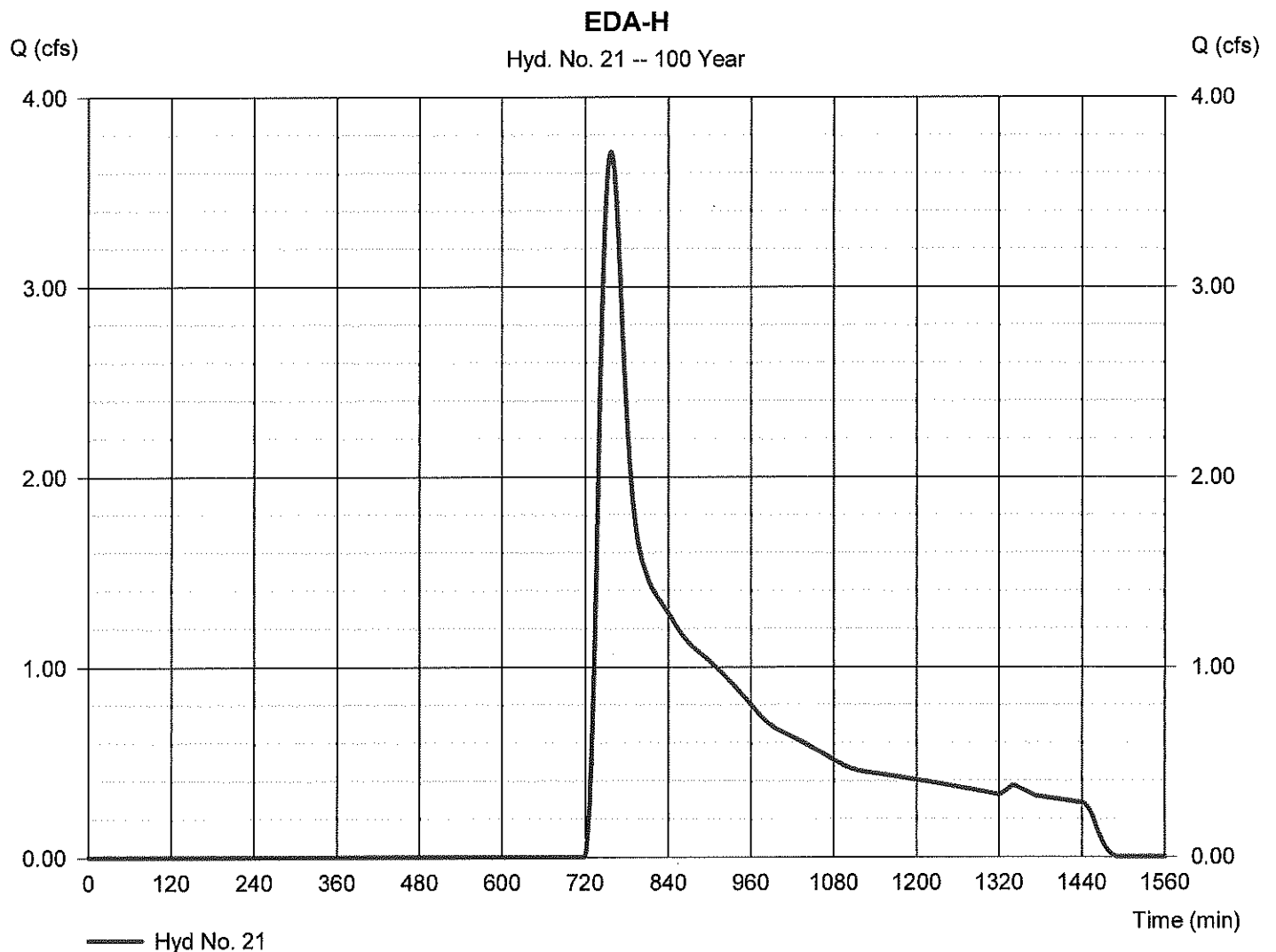
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Hyd. No. 21

EDA-H

Hydrograph type	= SCS Runoff	Peak discharge	= 3.714 cfs
Storm frequency	= 100 yrs	Time to peak	= 757 min
Time interval	= 1 min	Hyd. volume	= 34,797 cuft
Drainage area	= 12.100 ac	Curve number	= 37
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 33.50 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

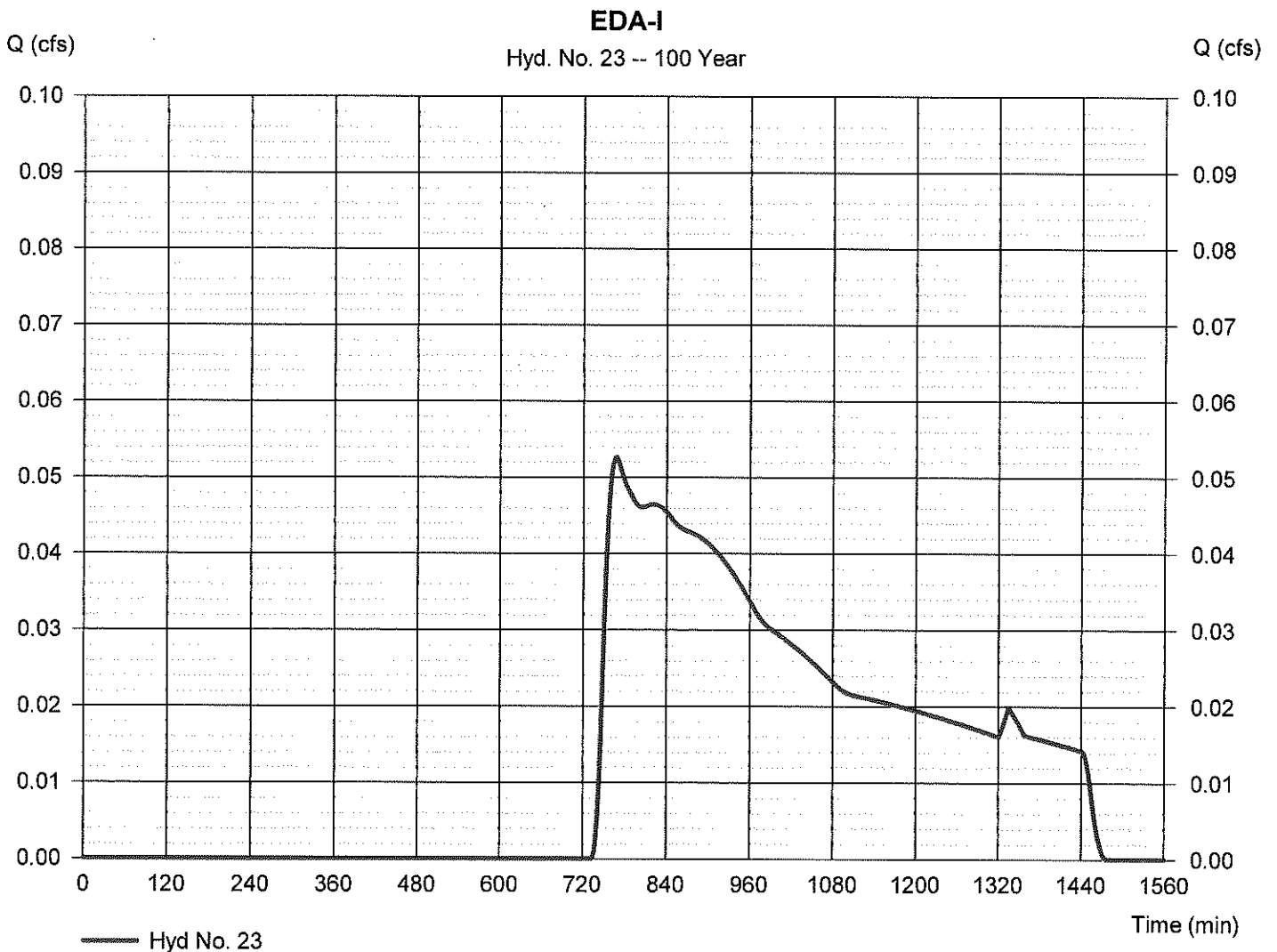
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Monday, 11 / 25 / 2019

Hyd. No. 23

EDA-I

Hydrograph type	= SCS Runoff	Peak discharge	= 0.053 cfs
Storm frequency	= 100 yrs	Time to peak	= 767 min
Time interval	= 1 min	Hyd. volume	= 1,167 cuft
Drainage area	= 1.050 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

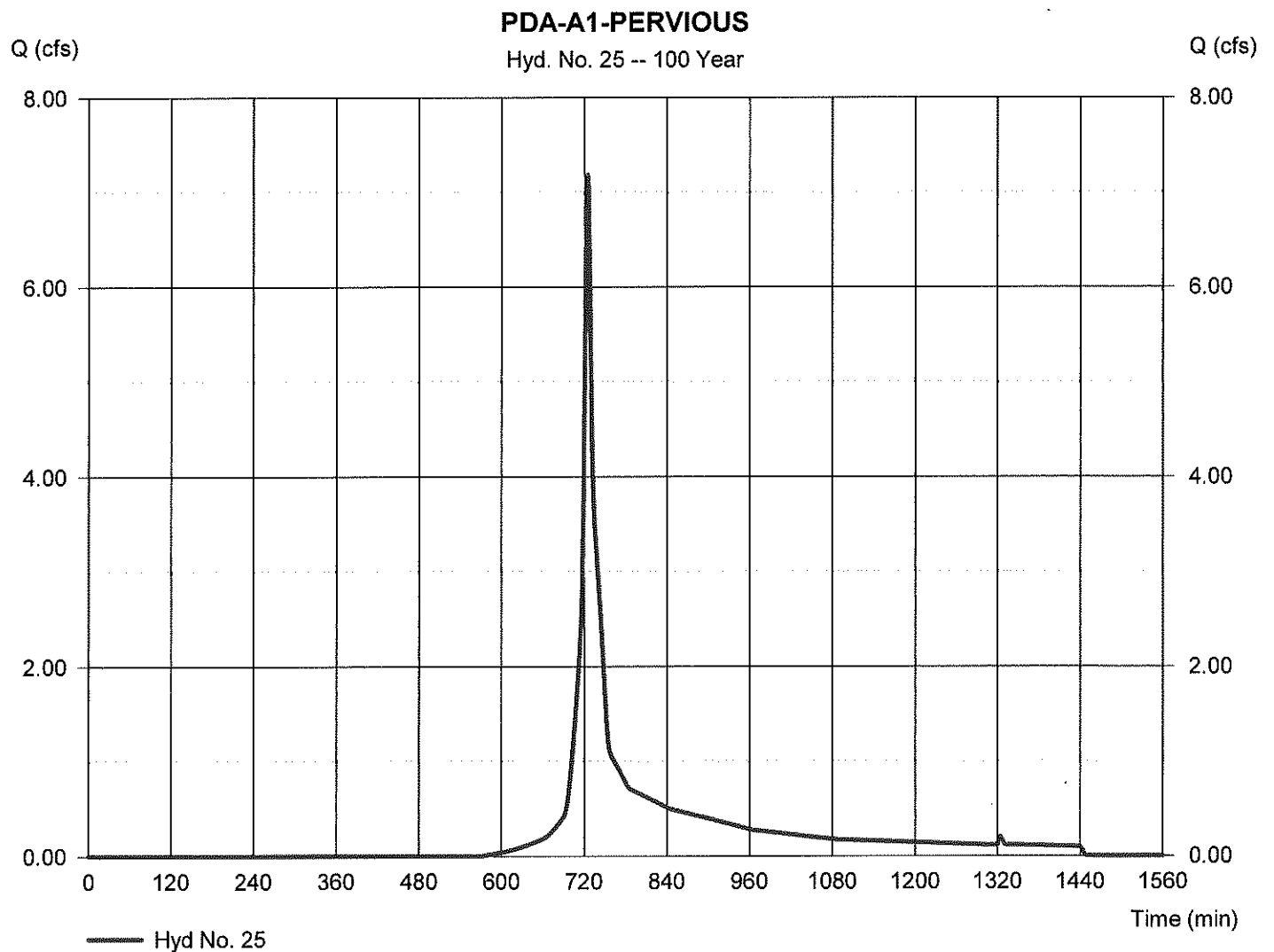
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Monday, 11 / 25 / 2019

Hyd. No. 25

PDA-A1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 7.188 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 22,389 cuft
Drainage area	= 1.880 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

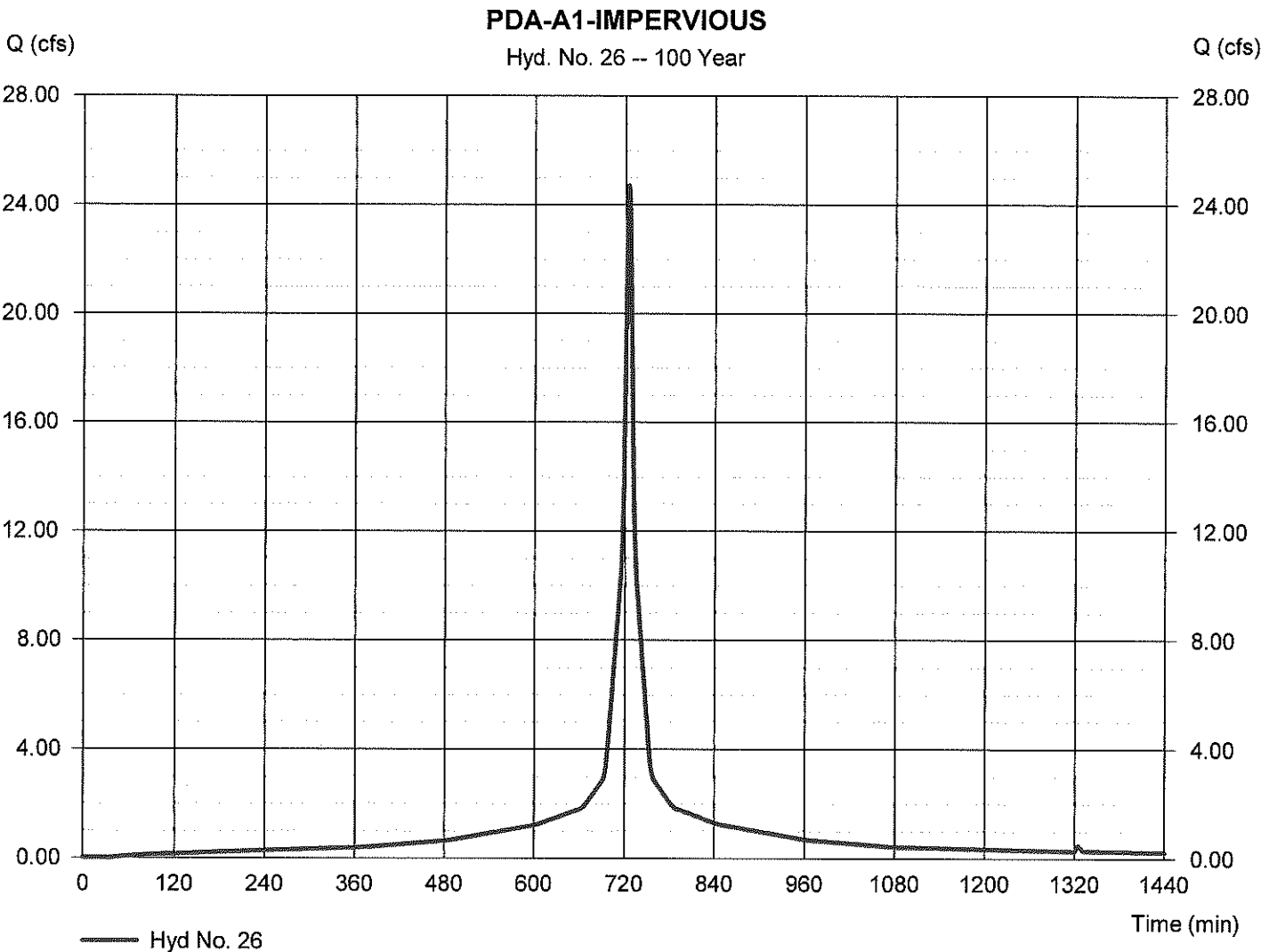
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Monday, 11 / 25 / 2019

Hyd. No. 26

PDA-A1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 24.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 88,182 cuft
Drainage area	= 3.240 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

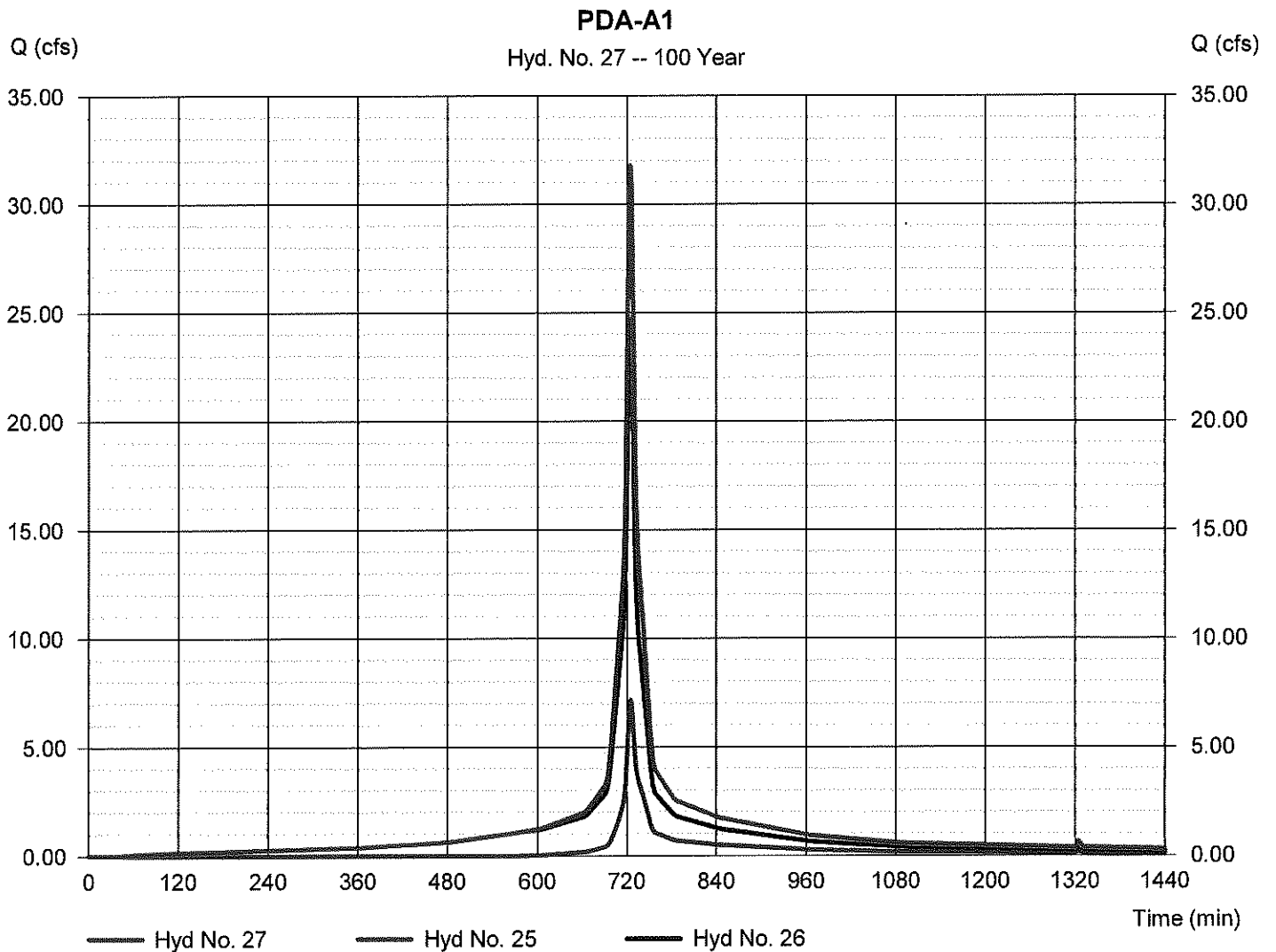
Monday, 11 / 25 / 2019

Hyd. No. 27

PDA-A1

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 25, 26

Peak discharge = 31.79 cfs
 Time to peak = 724 min
 Hyd. volume = 110,572 cuft
 Contrib. drain. area = 5.120 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

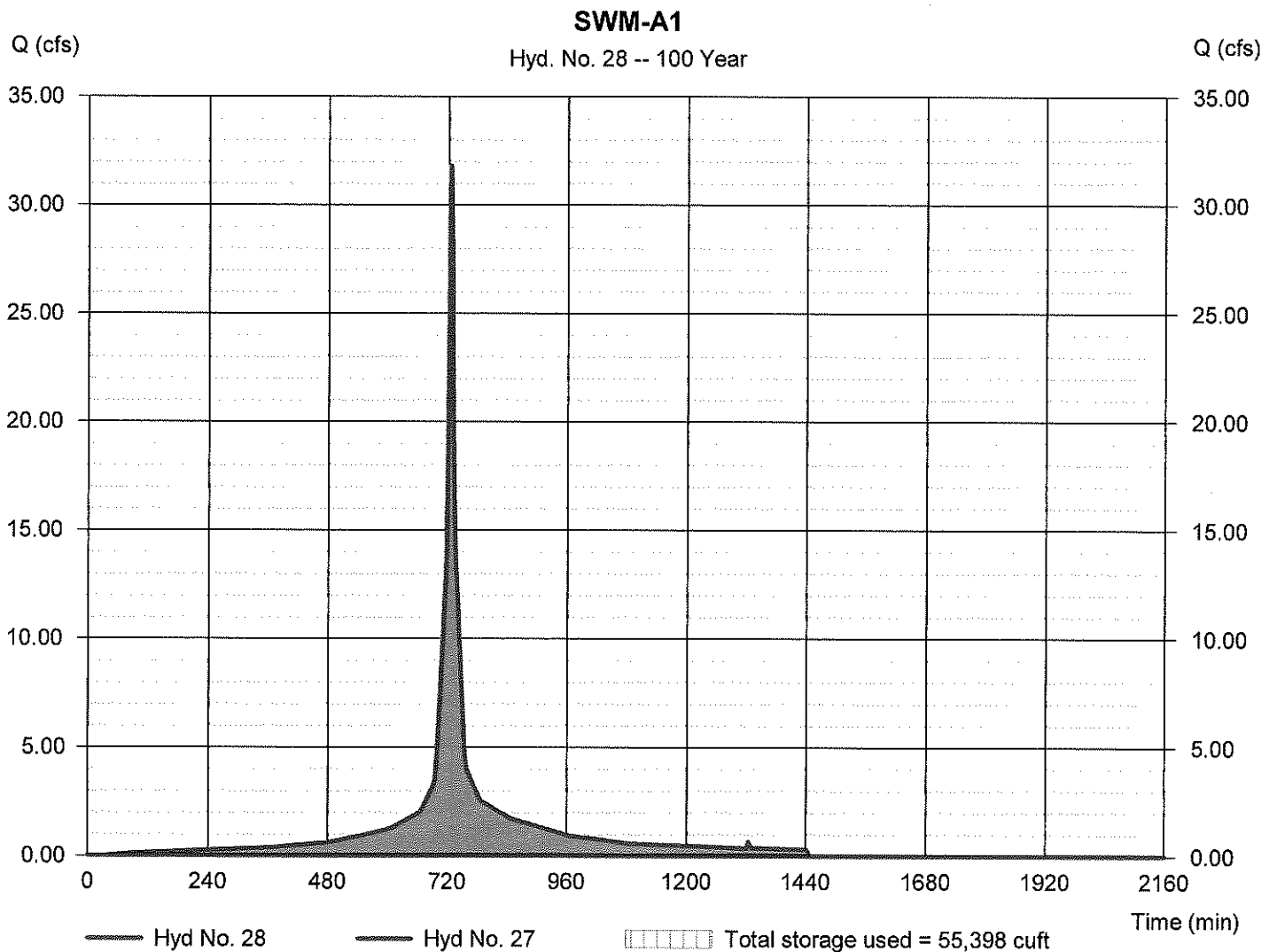
Monday, 11 / 25 / 2019

Hyd. No. 28

SWM-A1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 592 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 27 - PDA-A1	Max. Elevation	= 595.06 ft
Reservoir name	= SWM-A1	Max. Storage	= 55,398 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

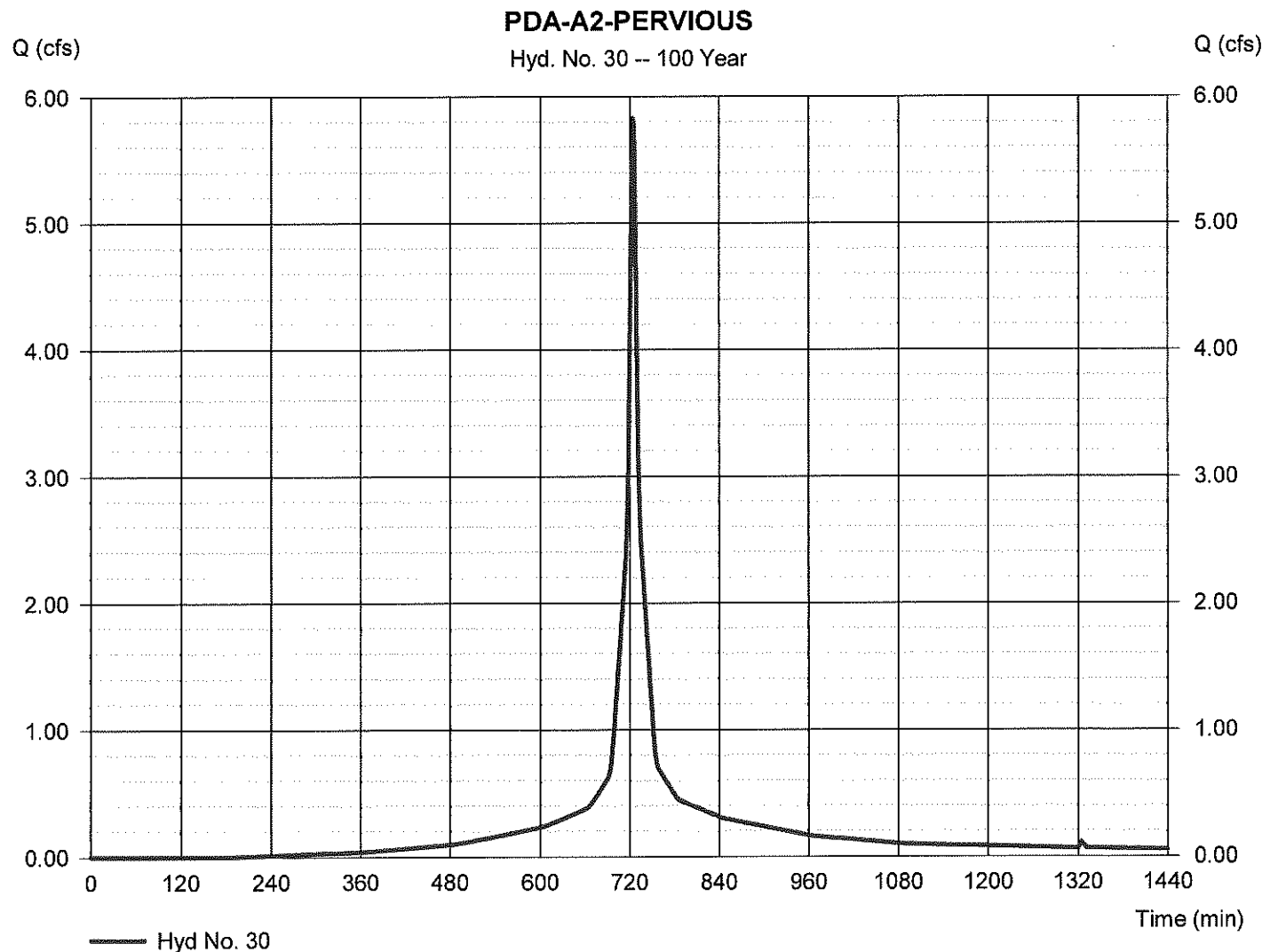
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Monday, 11 / 25 / 2019

Hyd. No. 30

PDA-A2-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 5.830 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 19,175 cuft
Drainage area	= 0.810 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

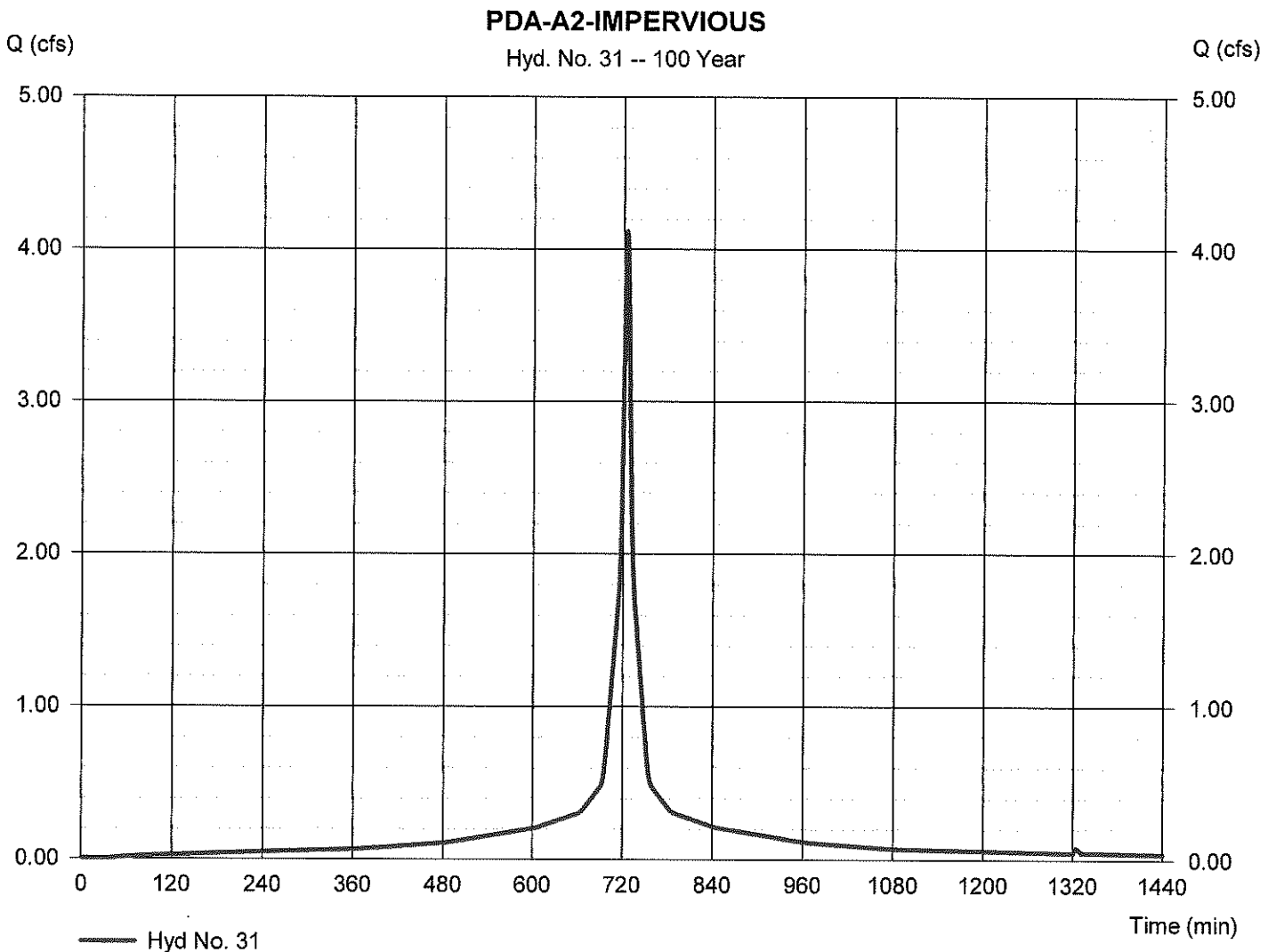
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 31

PDA-A2-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 4.117 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 14,697 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

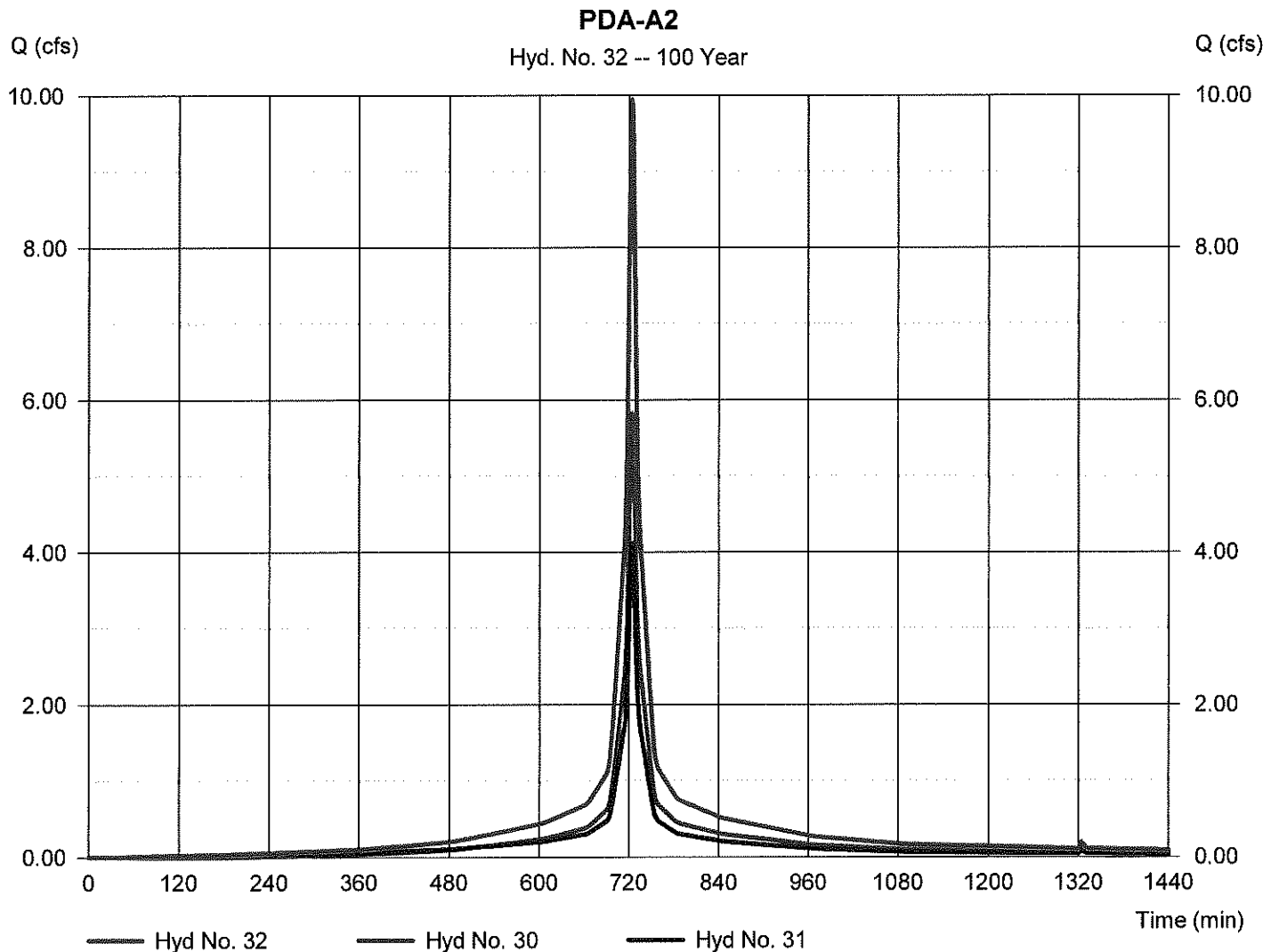
Monday, 11 / 25 / 2019

Hyd. No. 32

PDA-A2

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 30, 31

Peak discharge = 9.947 cfs
 Time to peak = 724 min
 Hyd. volume = 33,872 cuft
 Contrib. drain. area = 1.350 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

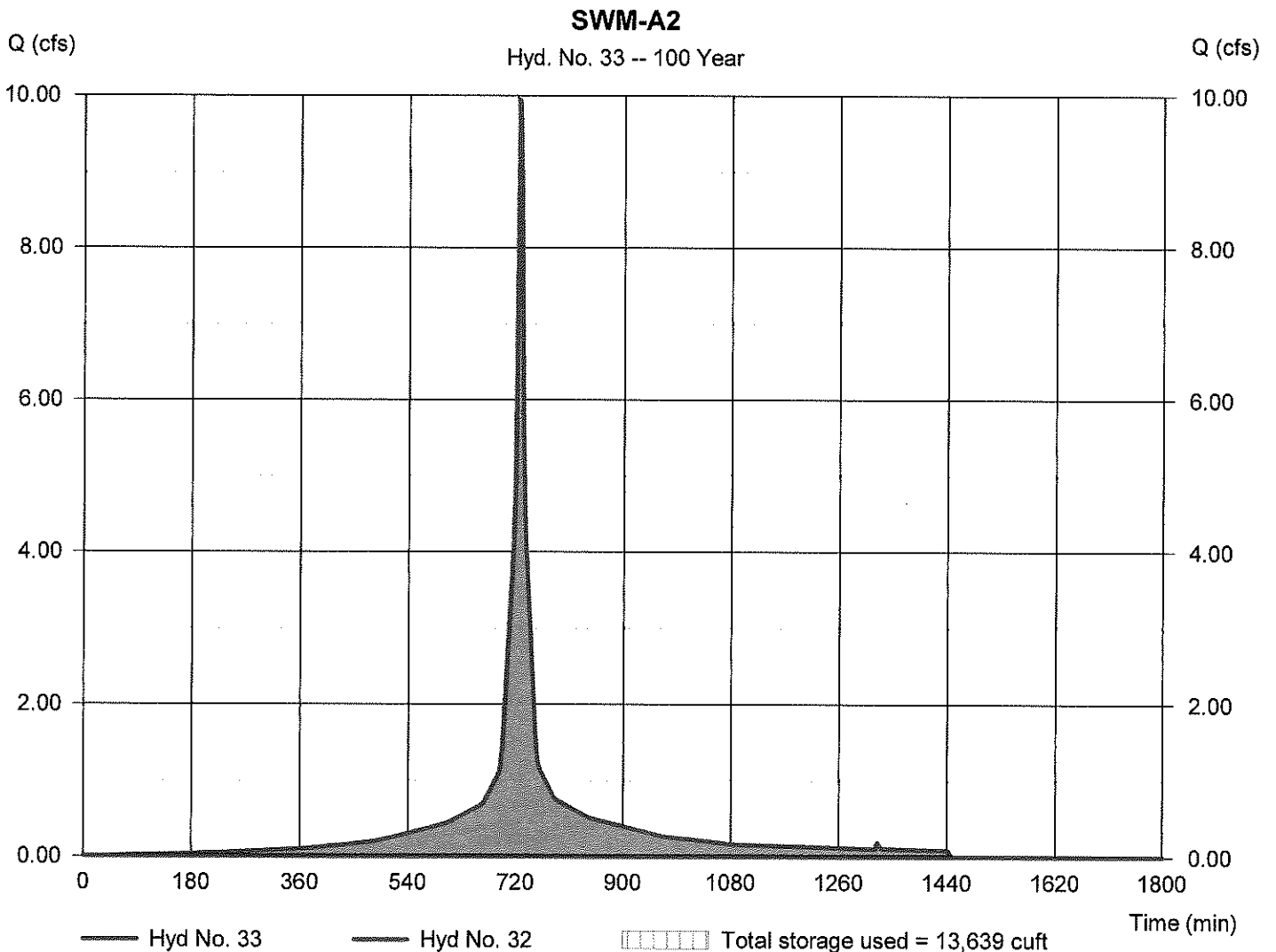
Monday, 11 / 25 / 2019

Hyd. No. 33

SWM-A2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - PDA-A2	Max. Elevation	= 601.71 ft
Reservoir name	= SWM-A2	Max. Storage	= 13,639 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

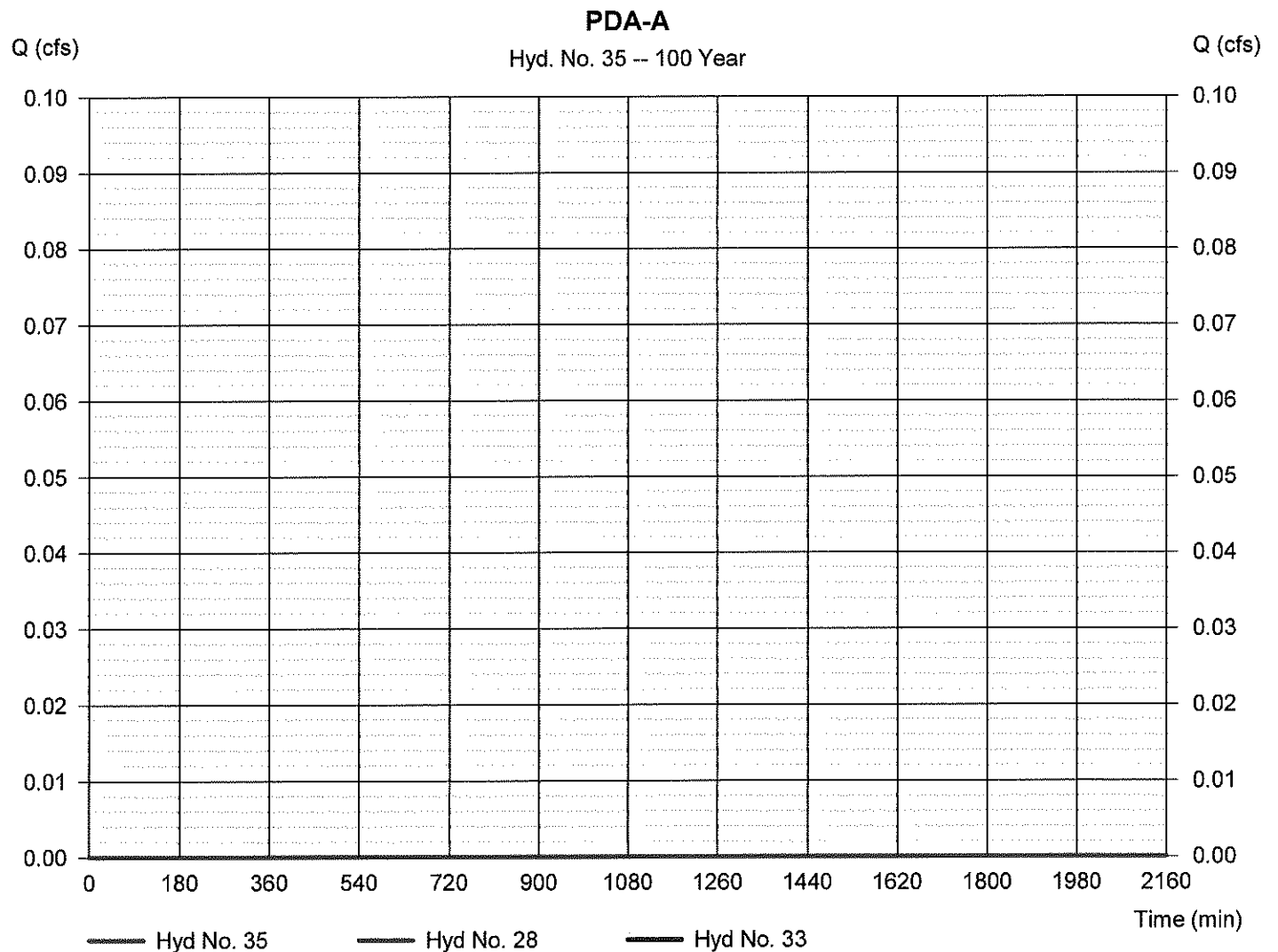
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Monday, 11 / 25 / 2019

Hyd. No. 35

PDA-A

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 28, 33	Contrib. drain. area	= 0.000 ac



Hydrograph Report

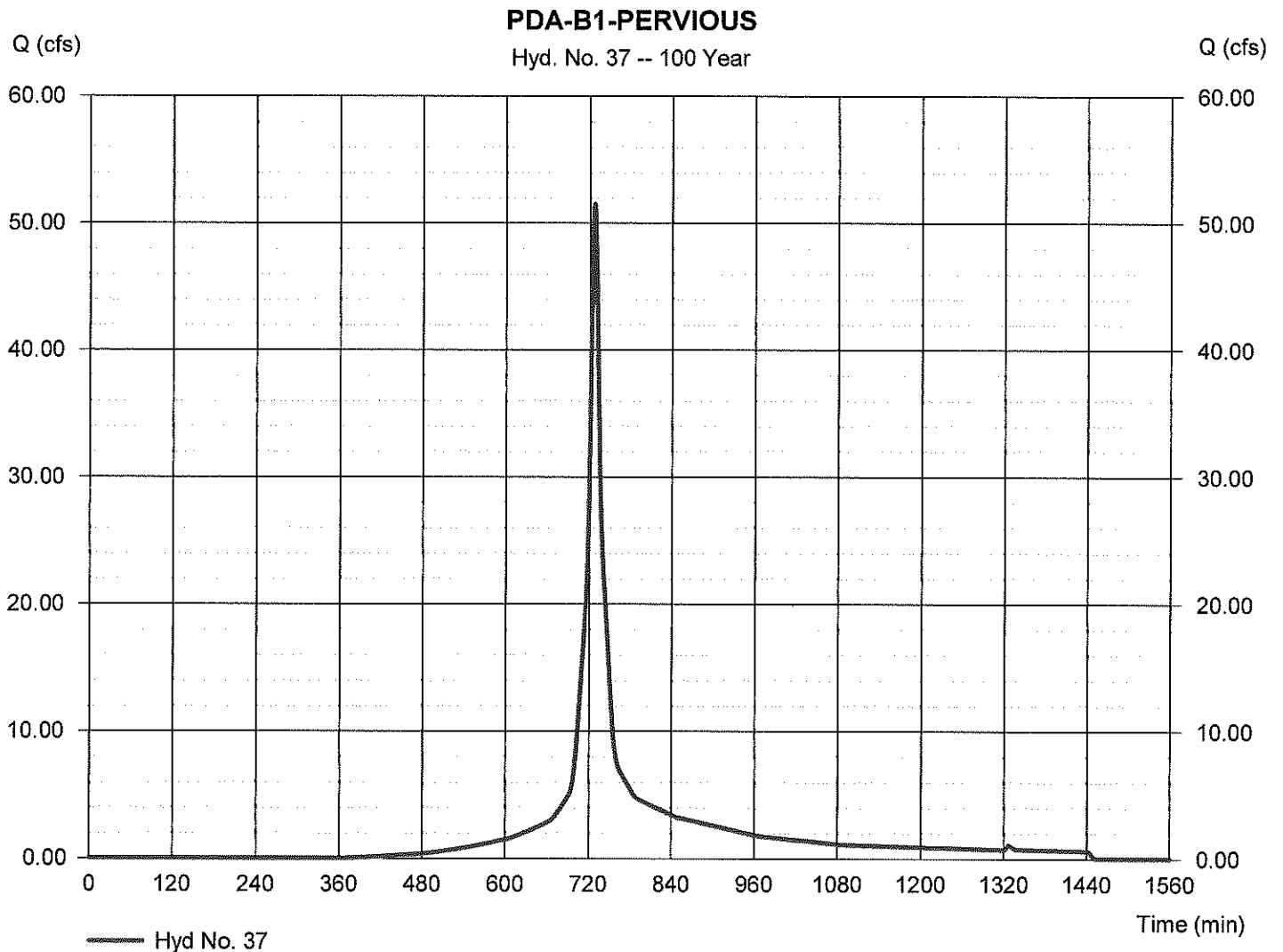
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 37

PDA-B1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 51.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 178,302 cuft
Drainage area	= 9.720 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

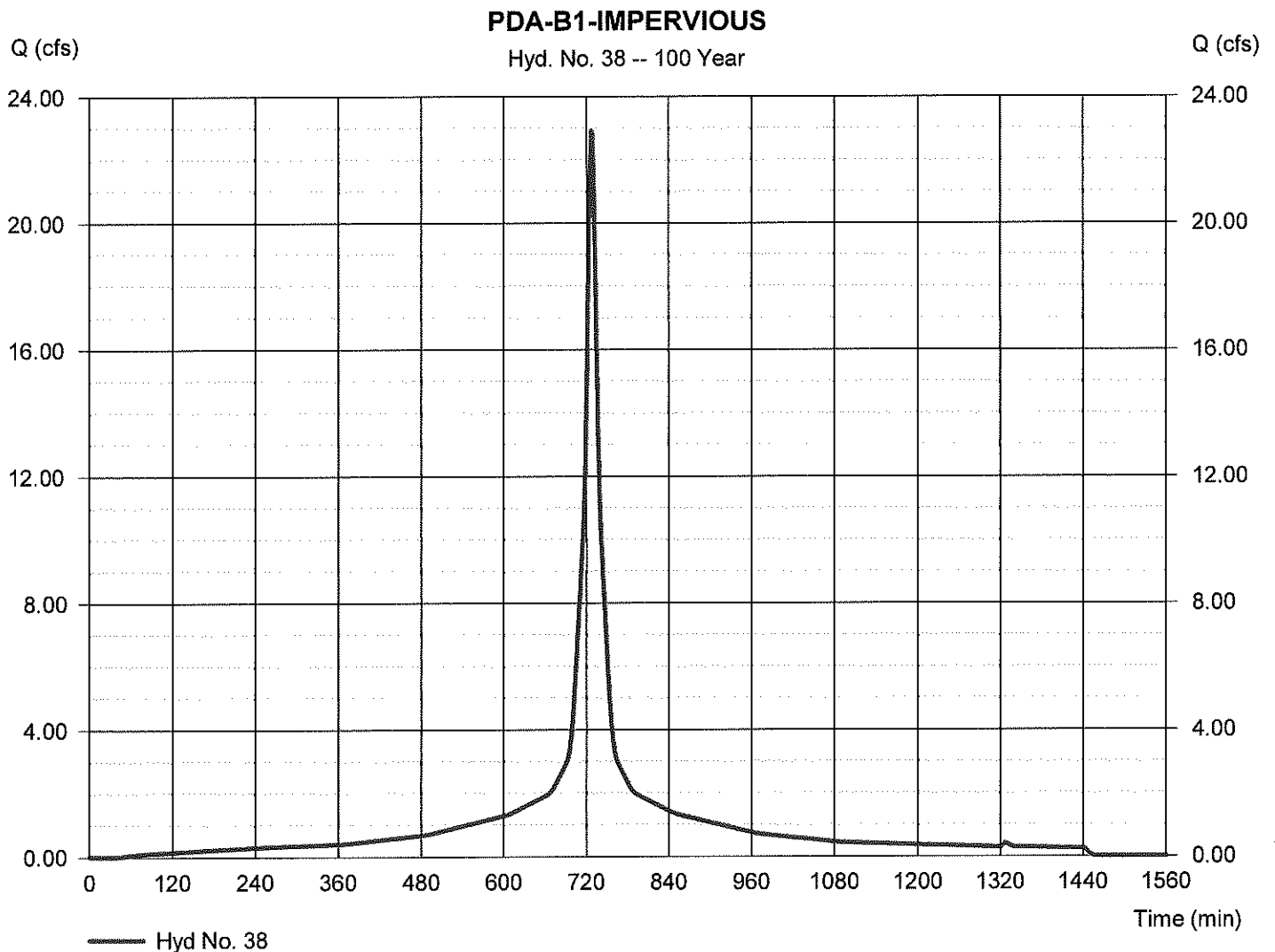
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Monday, 11 / 25 / 2019

Hyd. No. 38

PDA-B1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 22.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 96,171 cuft
Drainage area	= 3.580 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

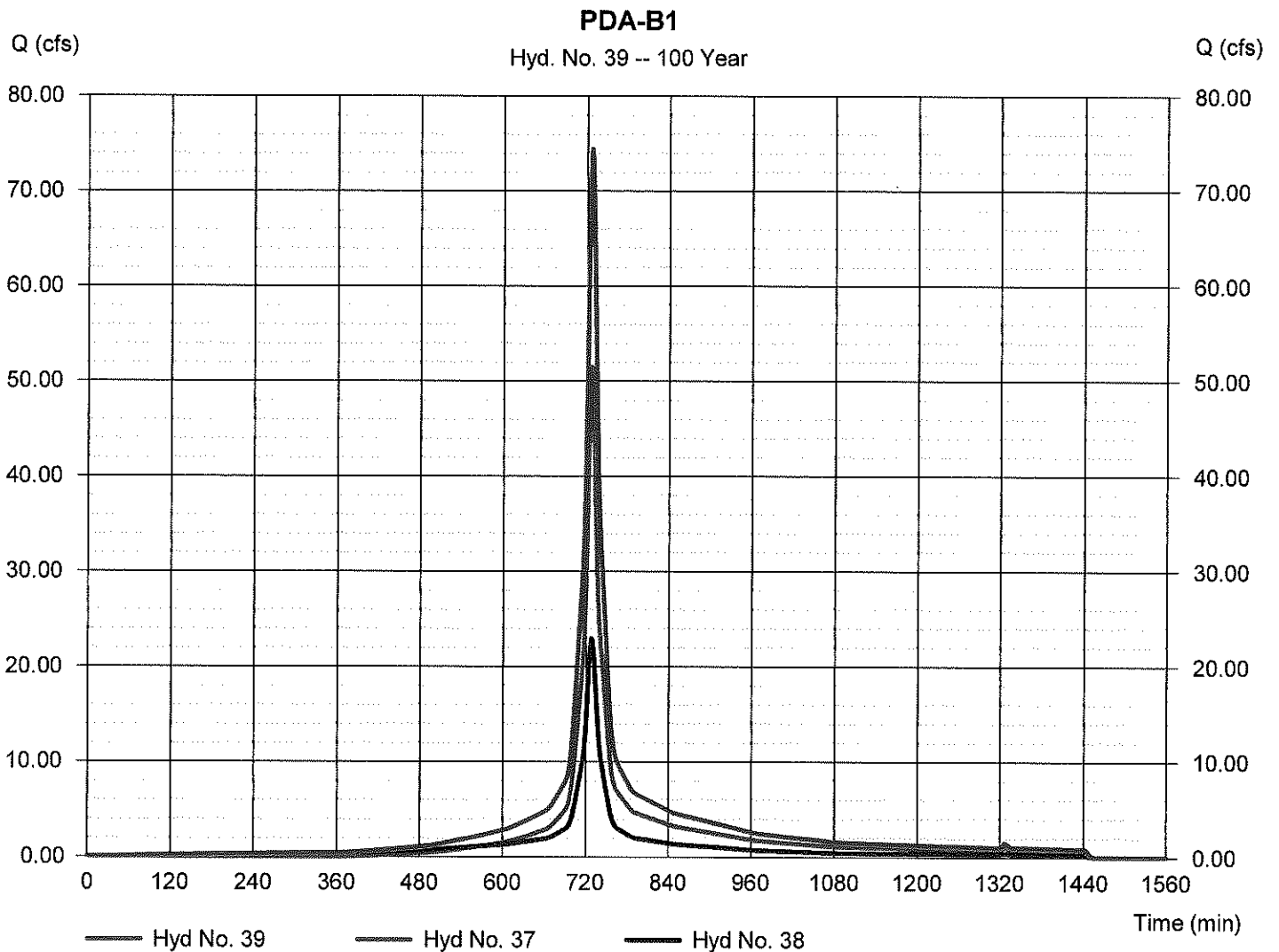
Monday, 11 / 25 / 2019

Hyd. No. 39

PDA-B1

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 37, 38

Peak discharge = 74.42 cfs
 Time to peak = 727 min
 Hyd. volume = 274,472 cuft
 Contrib. drain. area = 13.300 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

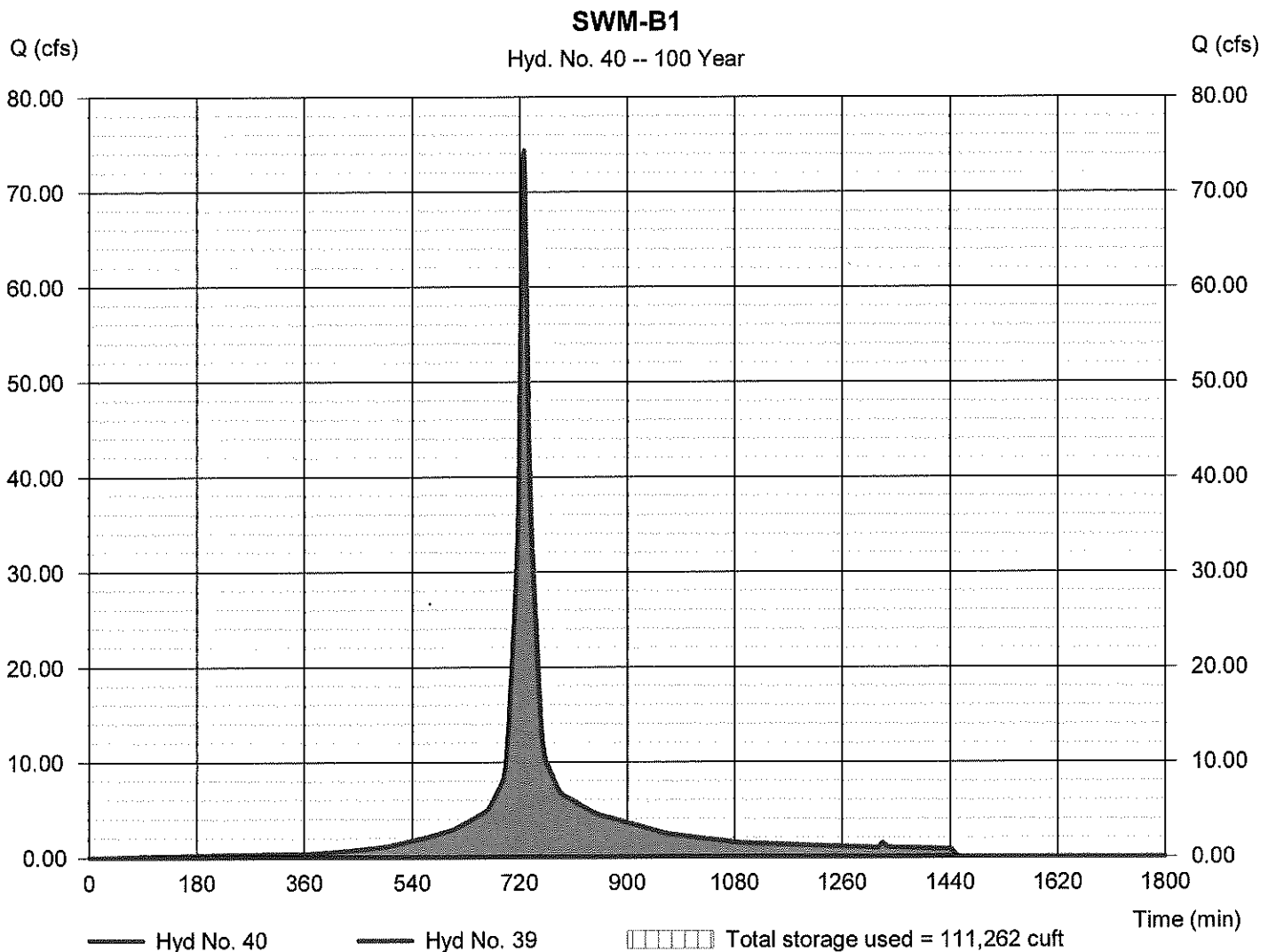
Monday, 11 / 25 / 2019

Hyd. No. 40

SWM-B1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 39 - PDA-B1	Max. Elevation	= 601.74 ft
Reservoir name	= SWM-B1	Max. Storage	= 111,262 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

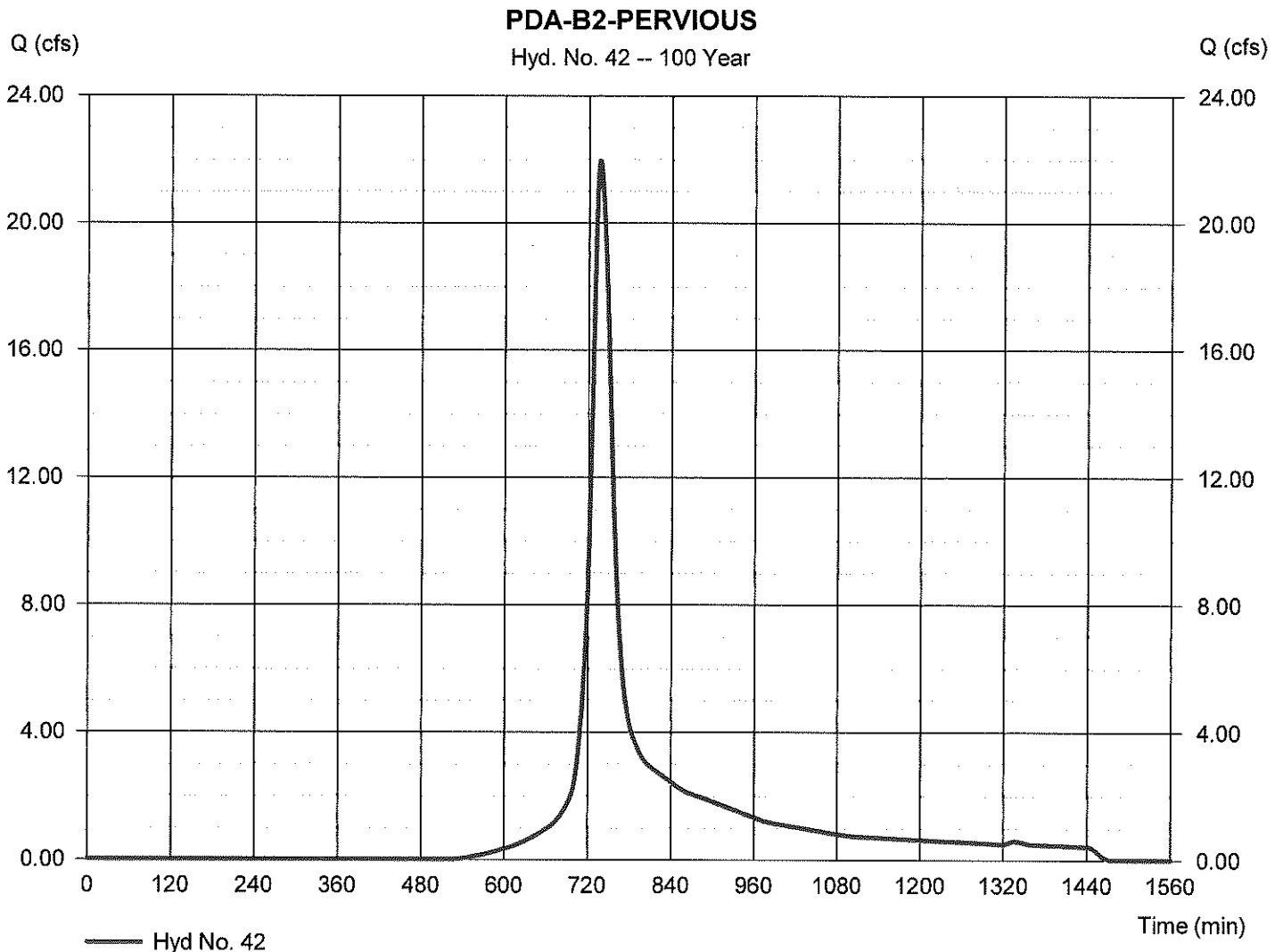
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Hyd. No. 42

PDA-B2-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 21.96 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 103,000 cuft
Drainage area	= 7.700 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

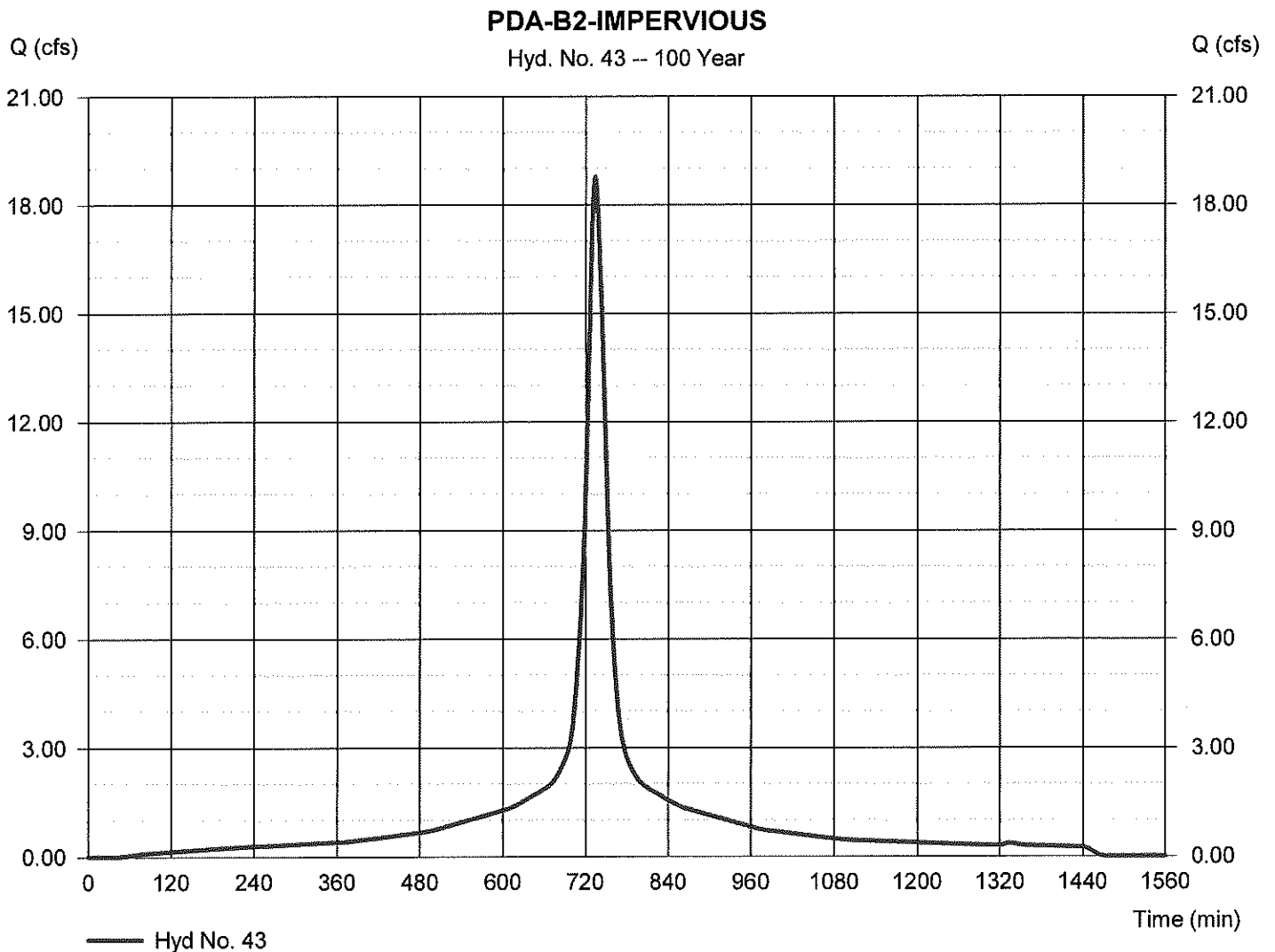
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Hyd. No. 43

PDA-B2-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 18.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 98,323 cuft
Drainage area	= 3.690 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.90 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

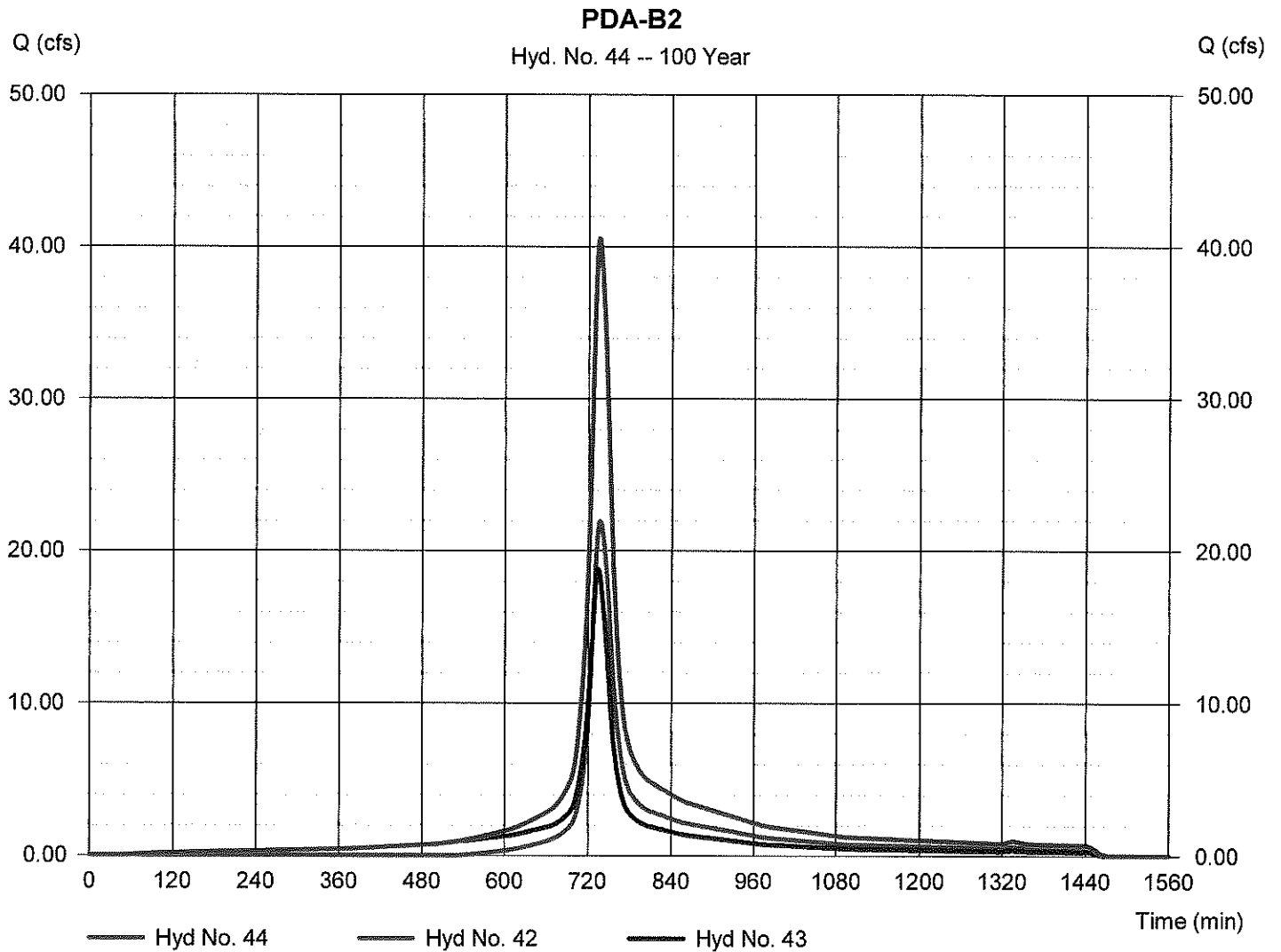
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Hyd. No. 44

PDA-B2

Hydrograph type	= Combine	Peak discharge	= 40.55 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 1 min	Hyd. volume	= 201,323 cuft
Inflow hyds.	= 42, 43	Contrib. drain. area	= 11.390 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

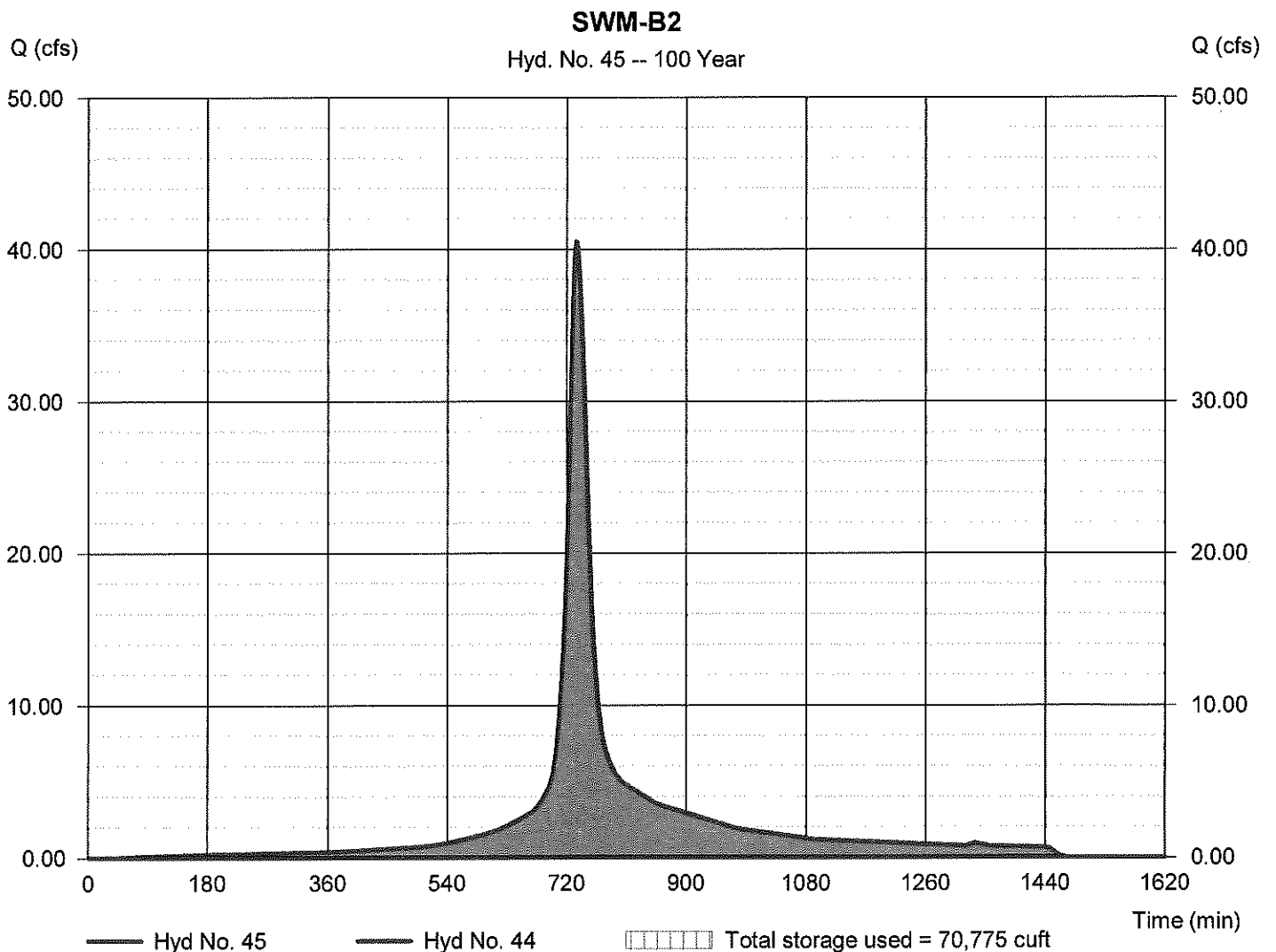
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Hyd. No. 45

SWM-B2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 44 - PDA-B2	Max. Elevation	= 598.30 ft
Reservoir name	= SWM-B2	Max. Storage	= 70,775 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

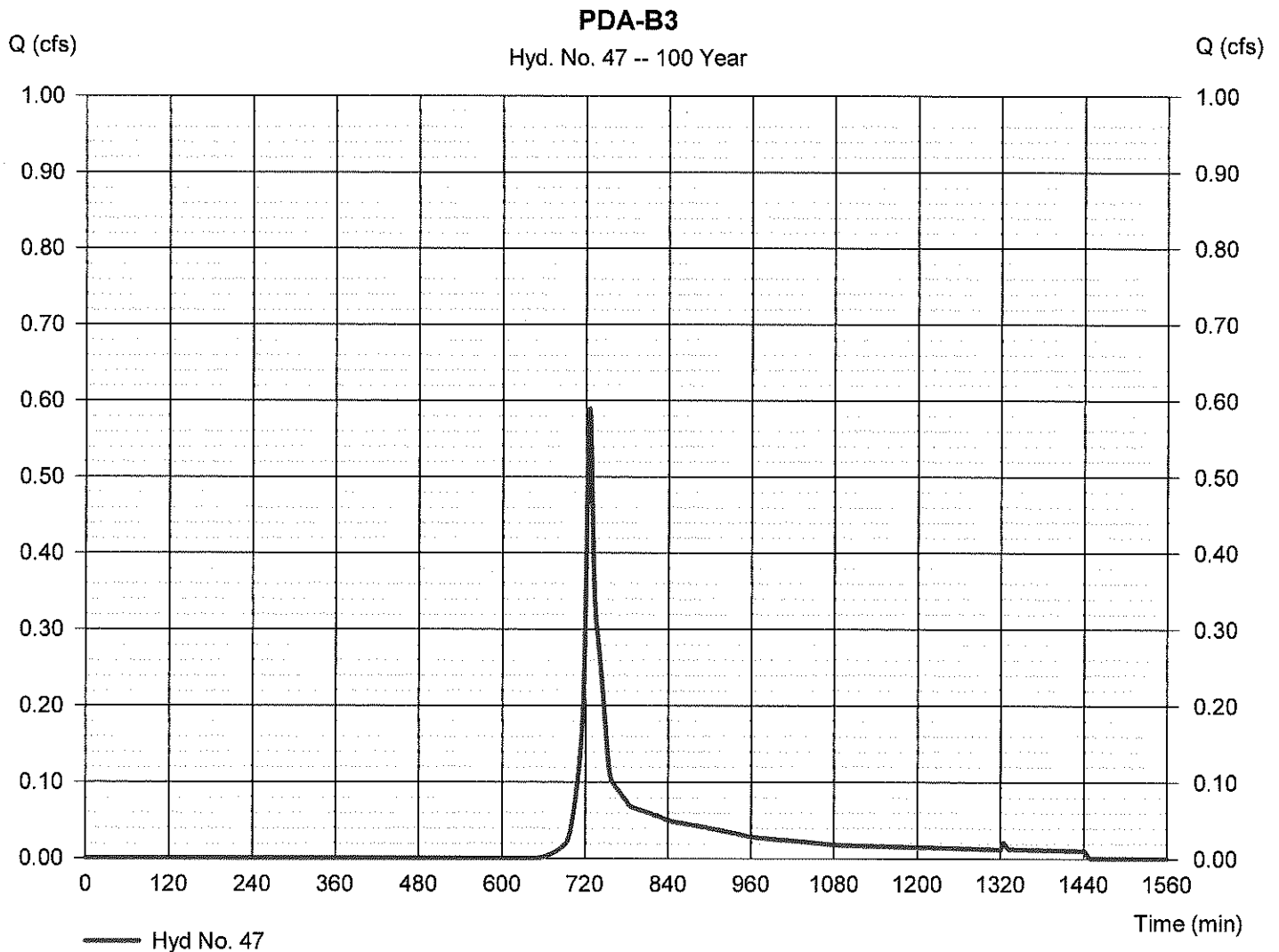
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Hyd. No. 47

PDA-B3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.589 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 1,940 cuft
Drainage area	= 0.230 ac	Curve number	= 53
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

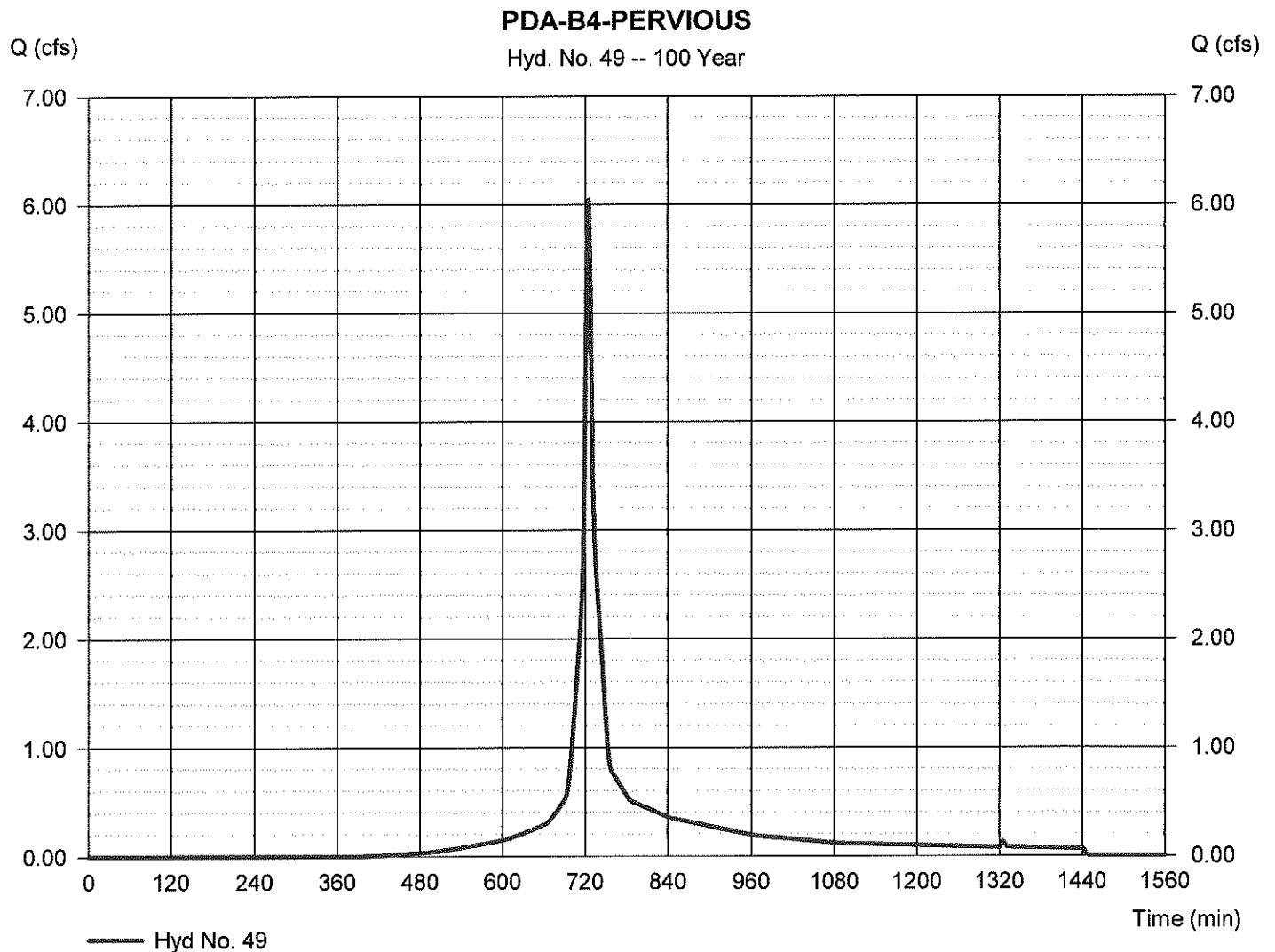
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Hyd. No. 49

PDA-B4-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 6.048 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 18,792 cuft
Drainage area	= 1.040 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



— Hyd No. 49

Hydrograph Report

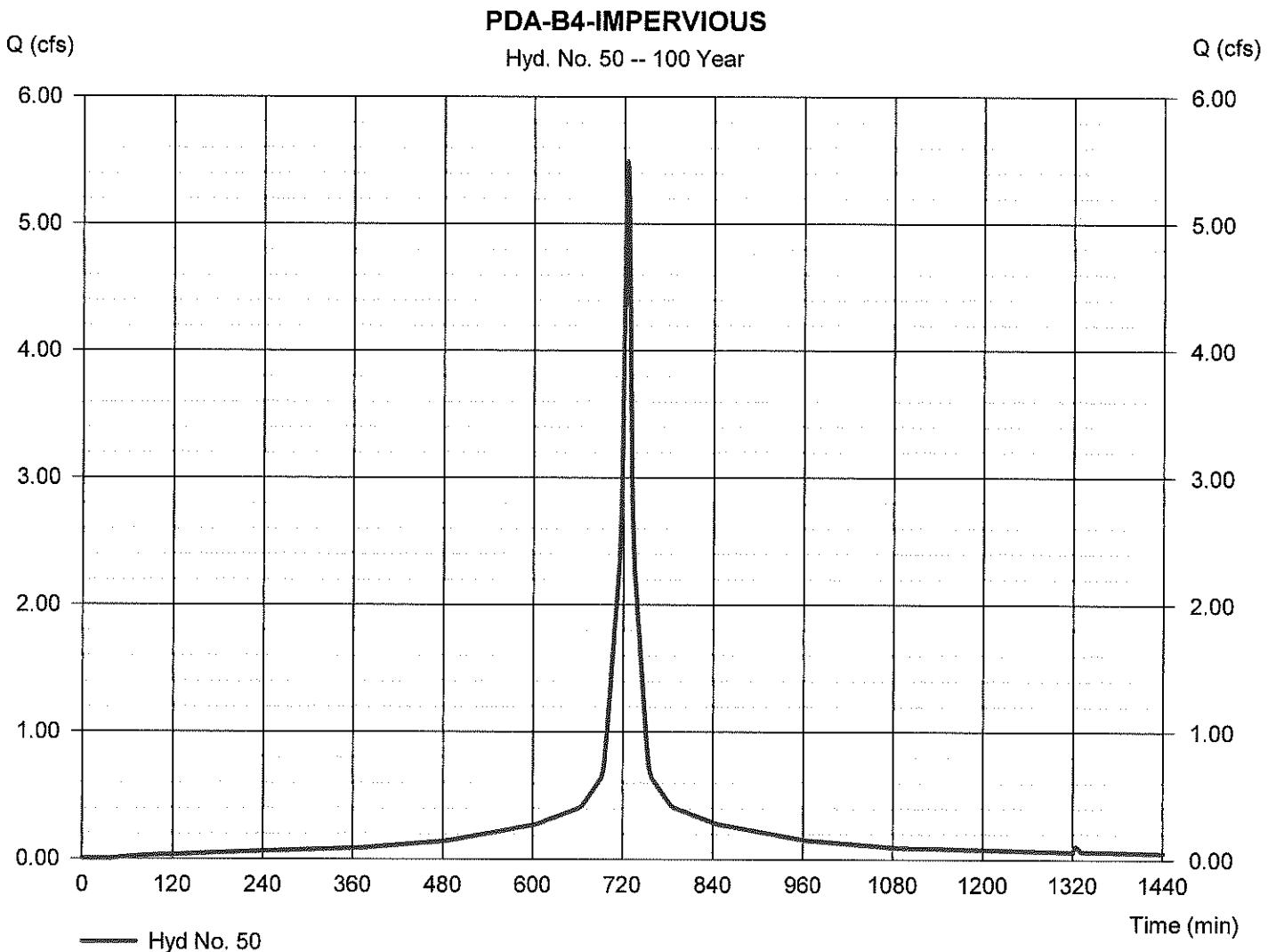
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Hyd. No. 50

PDA-B4-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 5.490 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 19,596 cuft
Drainage area	= 0.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

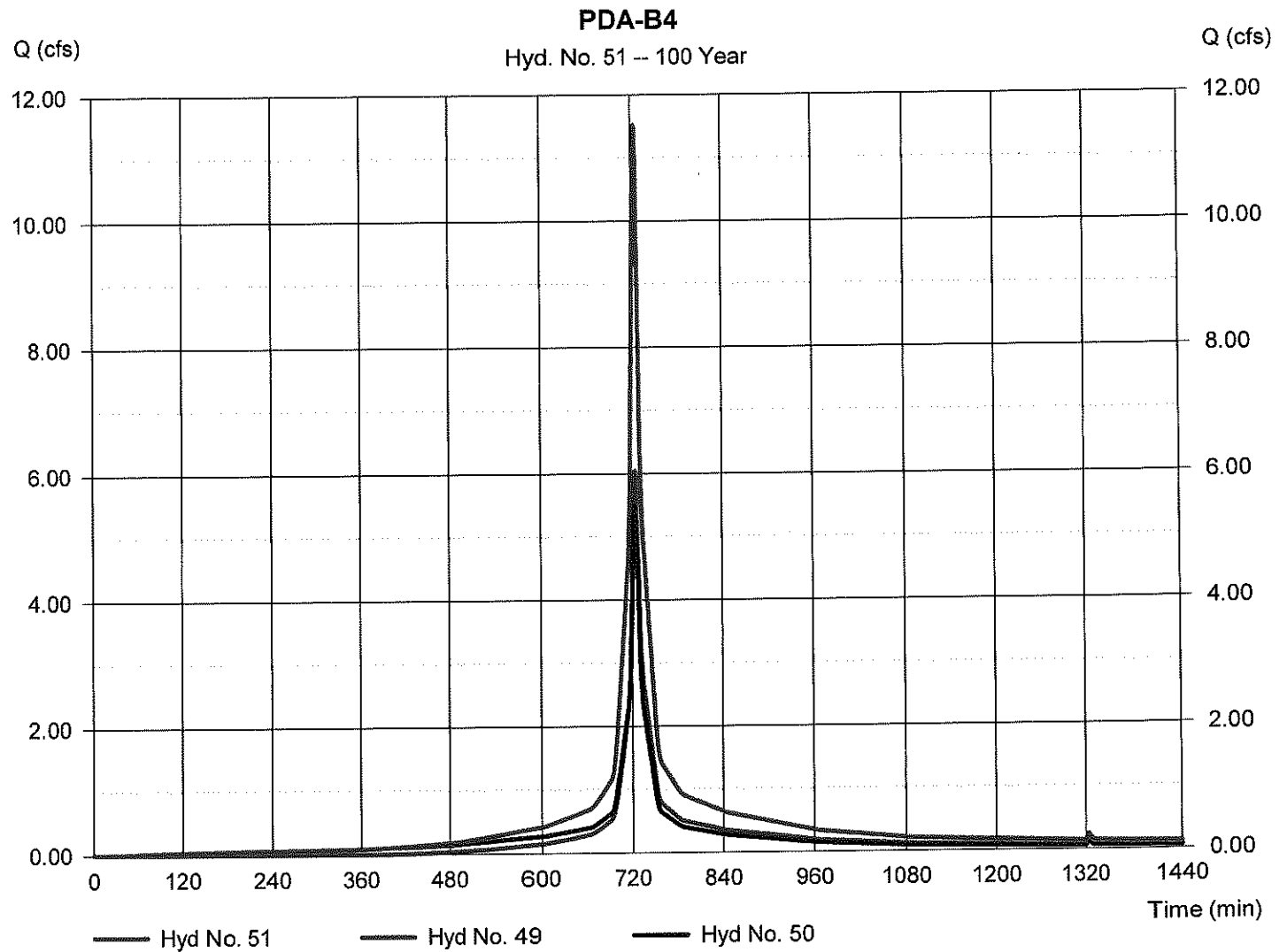
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Hyd. No. 51

PDA-B4

Hydrograph type	= Combine	Peak discharge	= 11.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 38,388 cuft
Inflow hyds.	= 49, 50	Contrib. drain. area	= 1.760 ac



Hydrograph Report

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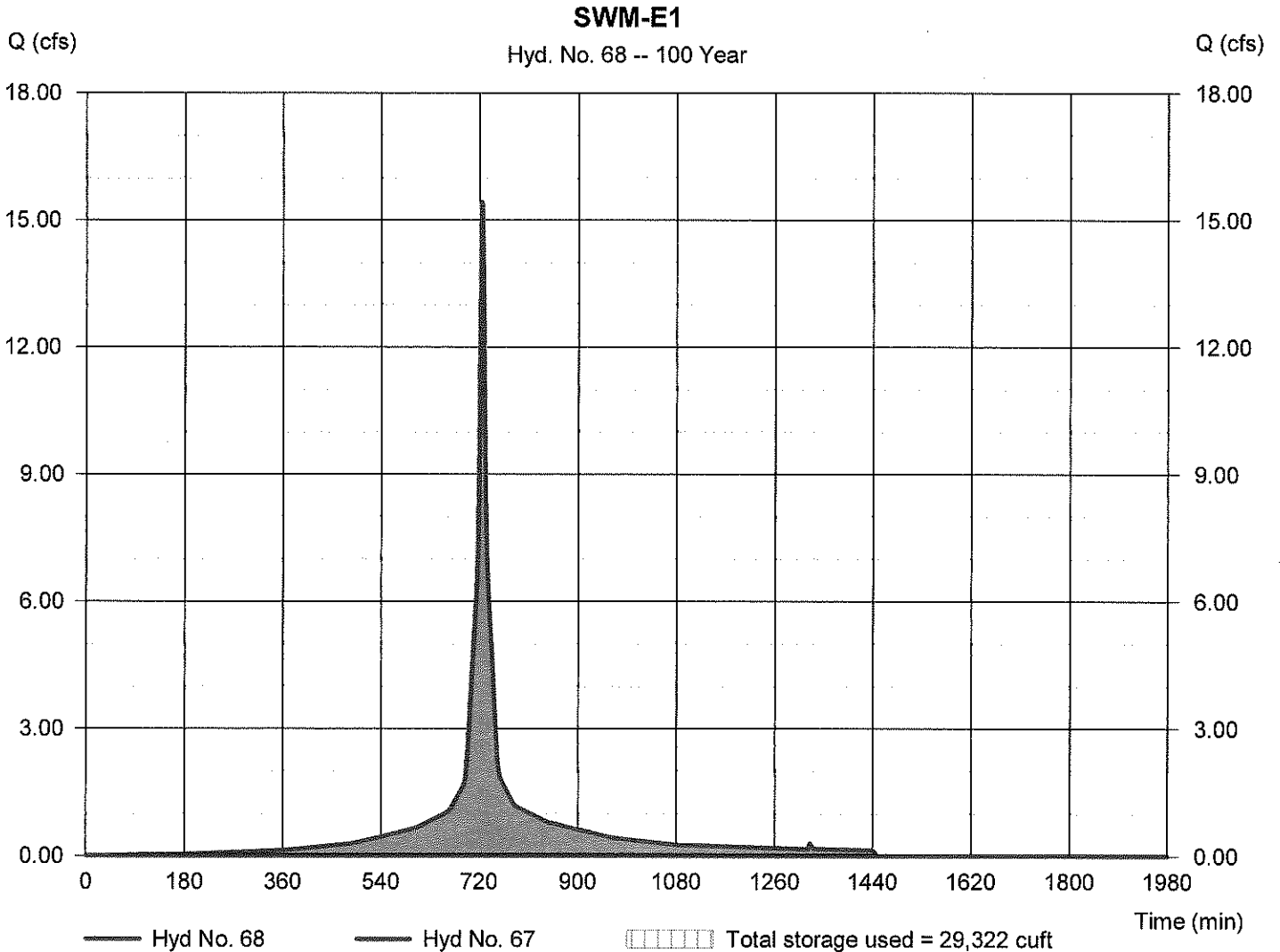
Monday, 11 / 25 / 2019

Hyd. No. 68

SWM-E1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 988 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 67 - PDA-E1	Max. Elevation	= 618.13 ft
Reservoir name	= SWM-E1	Max. Storage	= 29,322 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

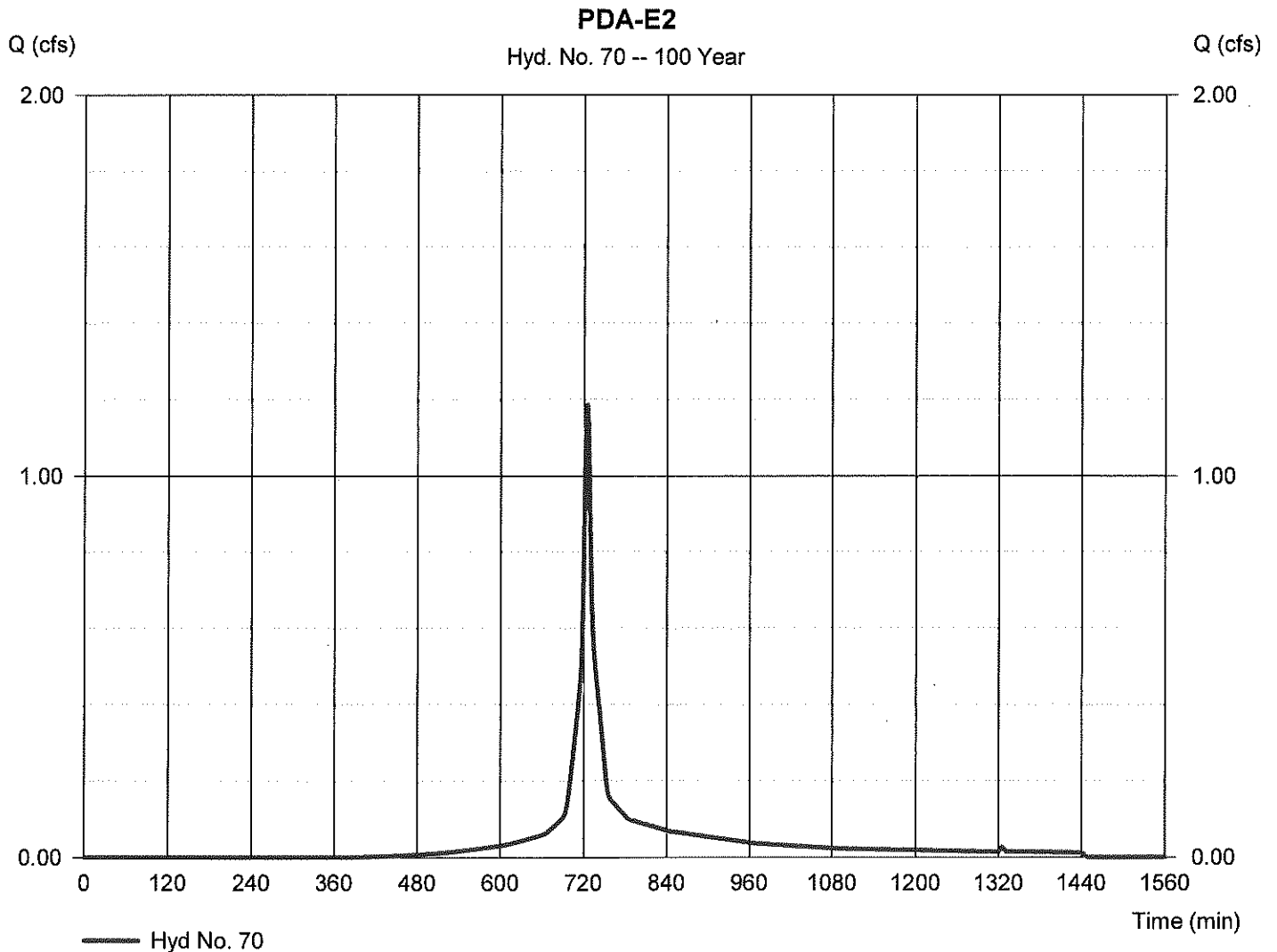
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Hyd. No. 70

PDA-E2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.187 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 3,698 cuft
Drainage area	= 0.200 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

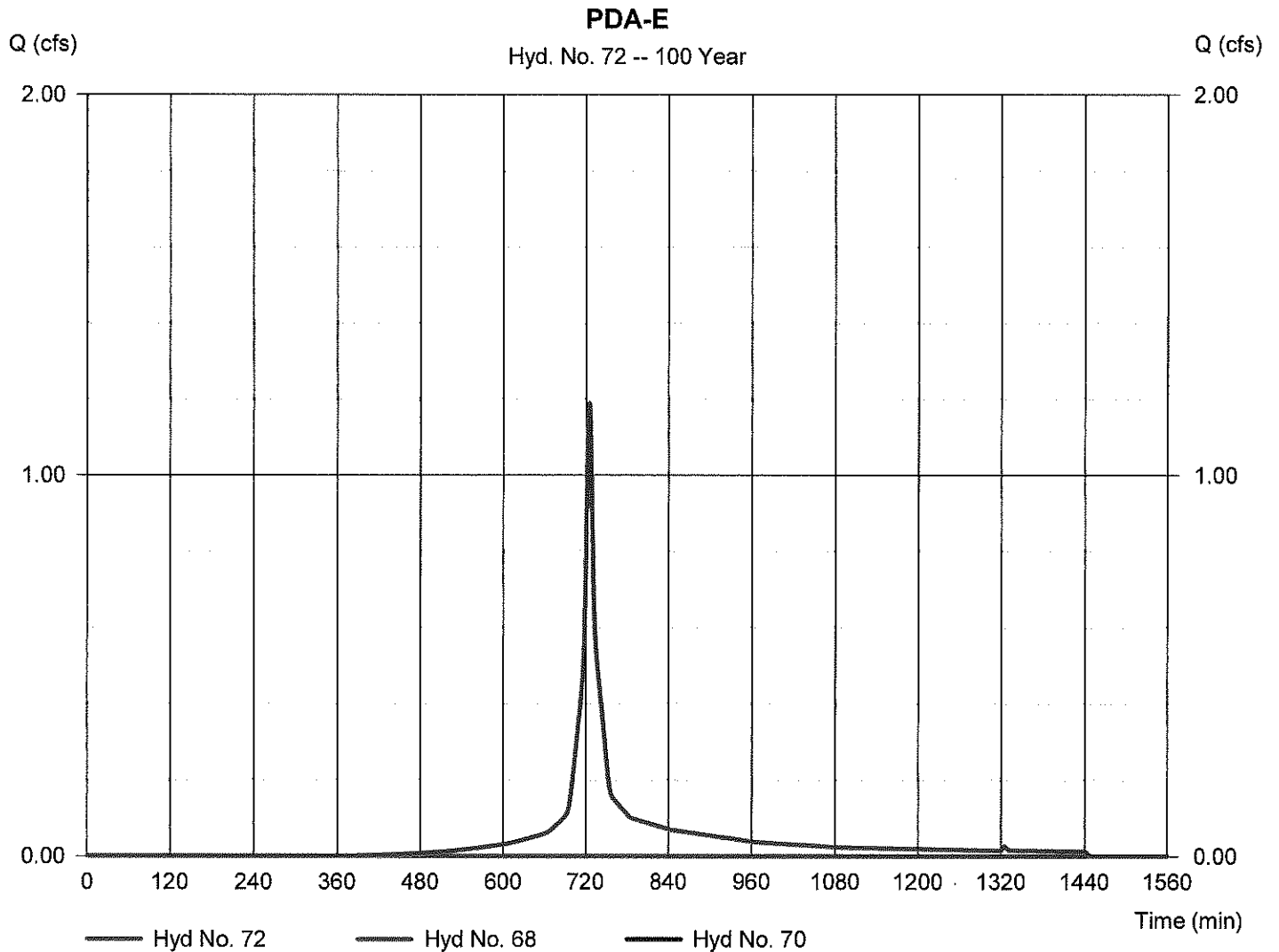
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Hyd. No. 72

PDA-E

Hydrograph type	= Combine	Peak discharge	= 1.187 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 3,698 cuft
Inflow hyds.	= 68, 70	Contrib. drain. area	= 0.200 ac



Hydrograph Report

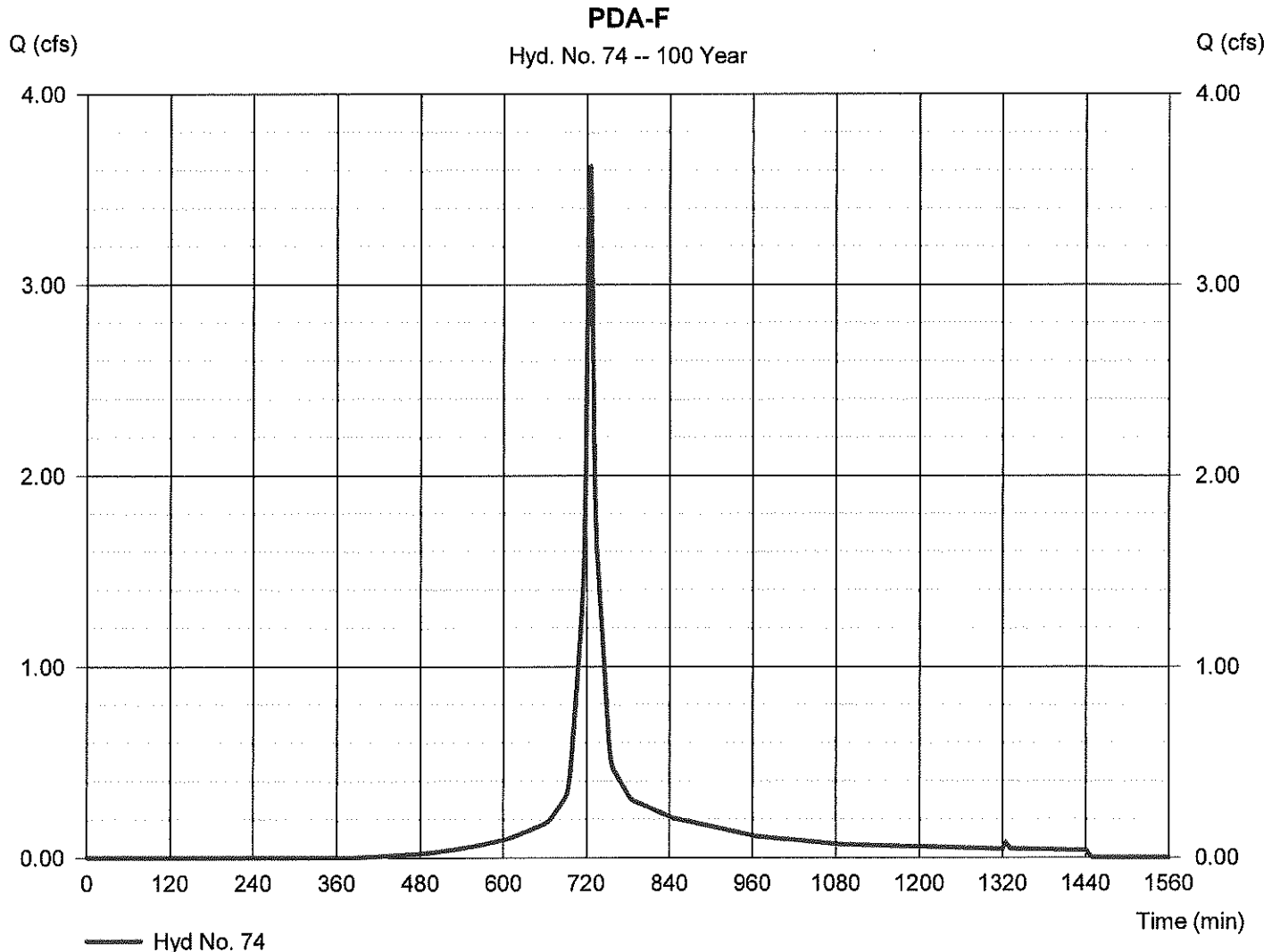
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Hyd. No. 74

PDA-F

Hydrograph type	= SCS Runoff	Peak discharge	= 3.622 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 11,280 cuft
Drainage area	= 0.610 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

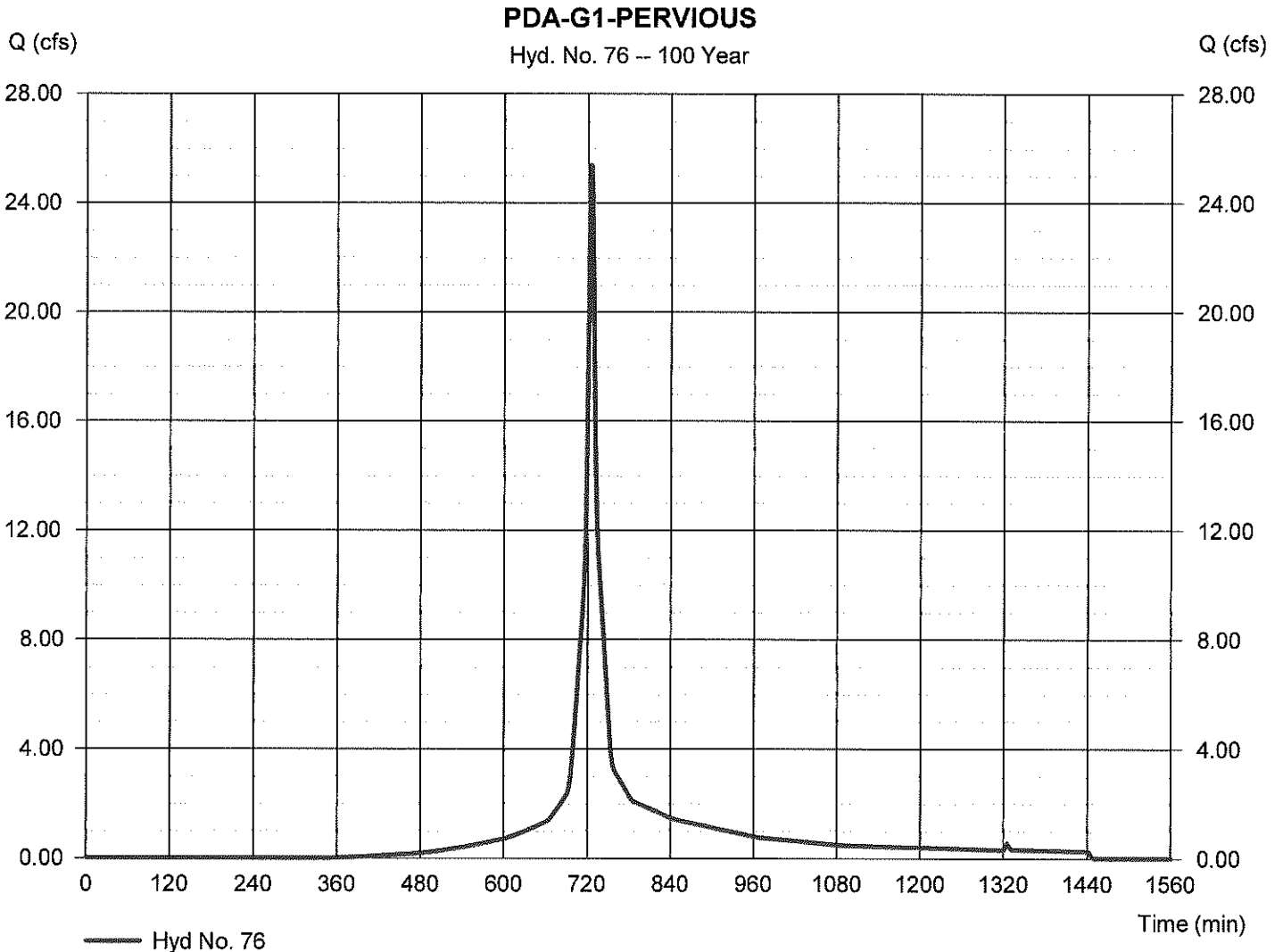
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Hyd. No. 76

PDA-G1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 25.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 79,500 cuft
Drainage area	= 4.110 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

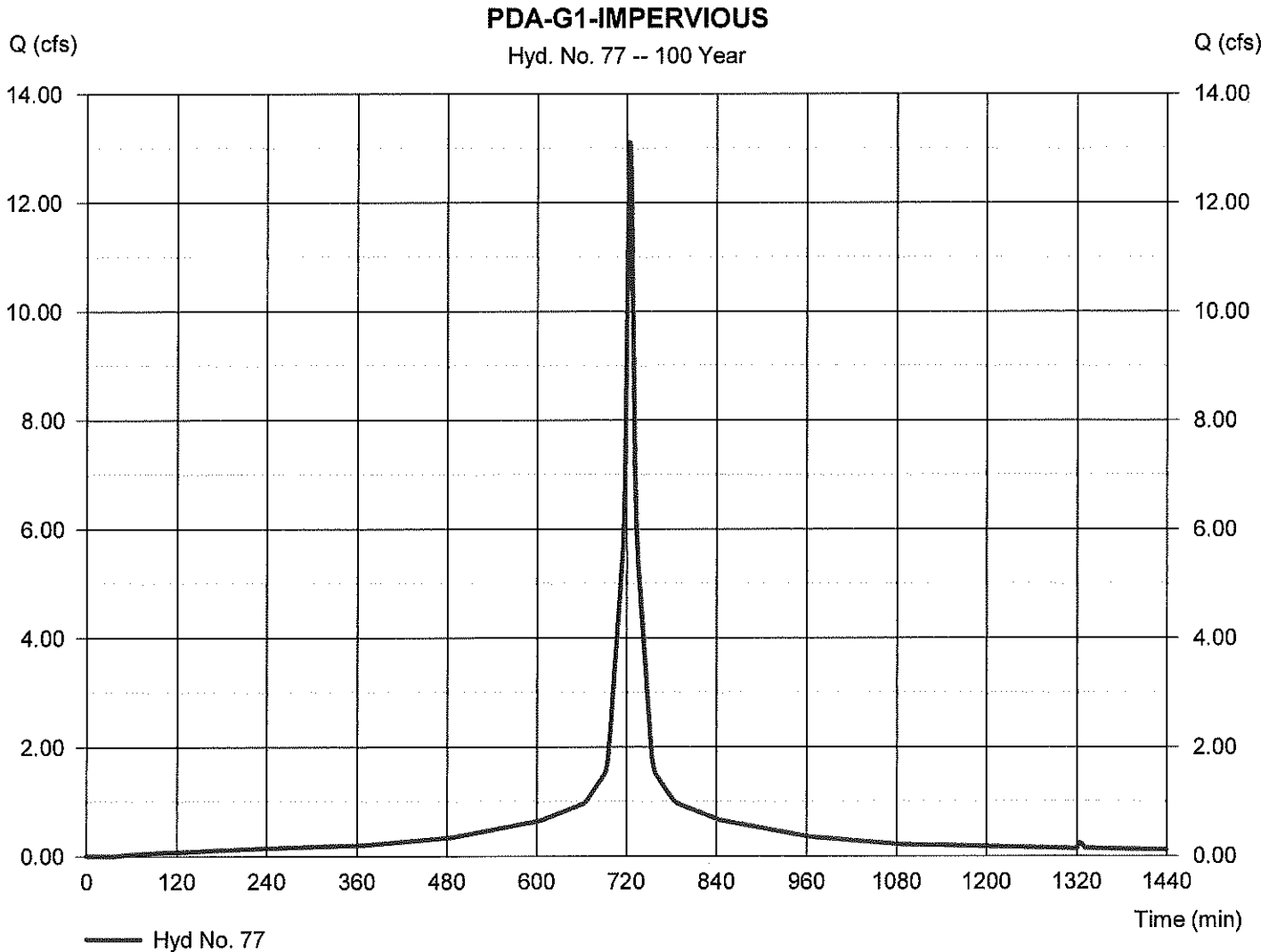
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Hyd. No. 77

PDA-G1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 13.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 46,813 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

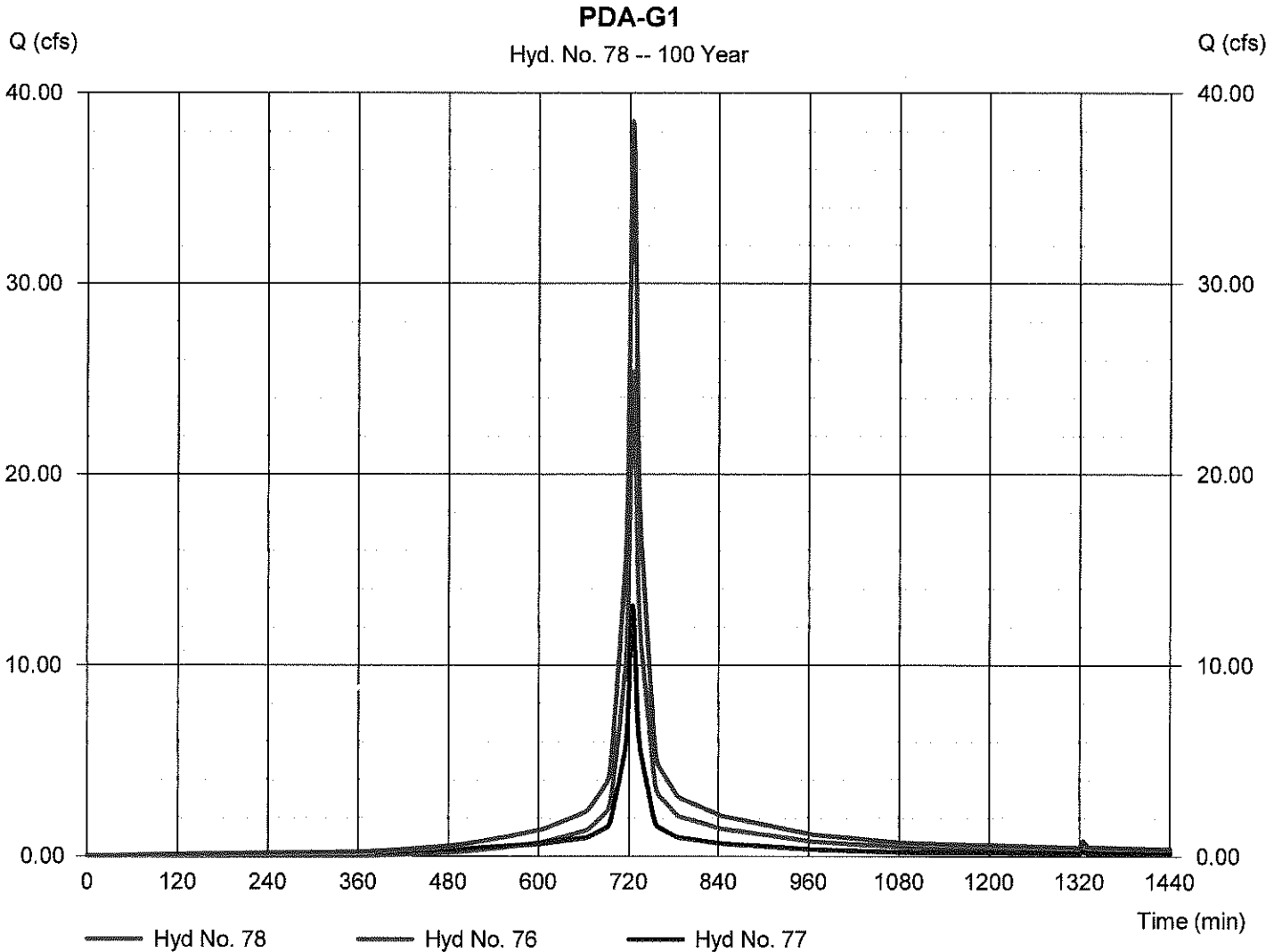
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Hyd. No. 78

PDA-G1

Hydrograph type	= Combine	Peak discharge	= 38.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 126,313 cuft
Inflow hyds.	= 76, 77	Contrib. drain. area	= 5.830 ac



Hydrograph Report

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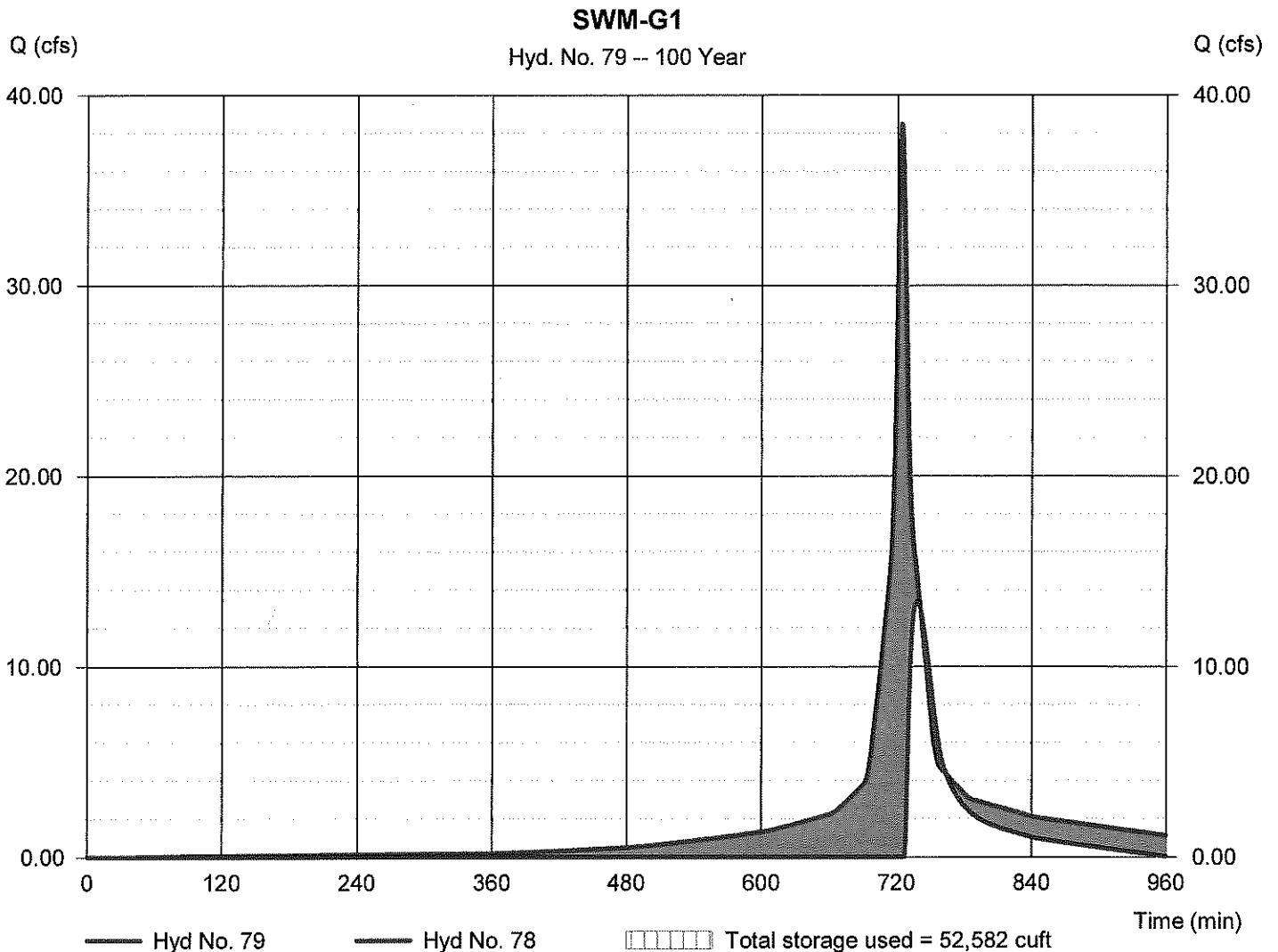
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Hyd. No. 79

SWM-G1

Hydrograph type	= Reservoir	Peak discharge	= 13.44 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 32,582 cuft
Inflow hyd. No.	= 78 - PDA-G1	Max. Elevation	= 601.97 ft
Reservoir name	= SWM-G1	Max. Storage	= 52,582 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

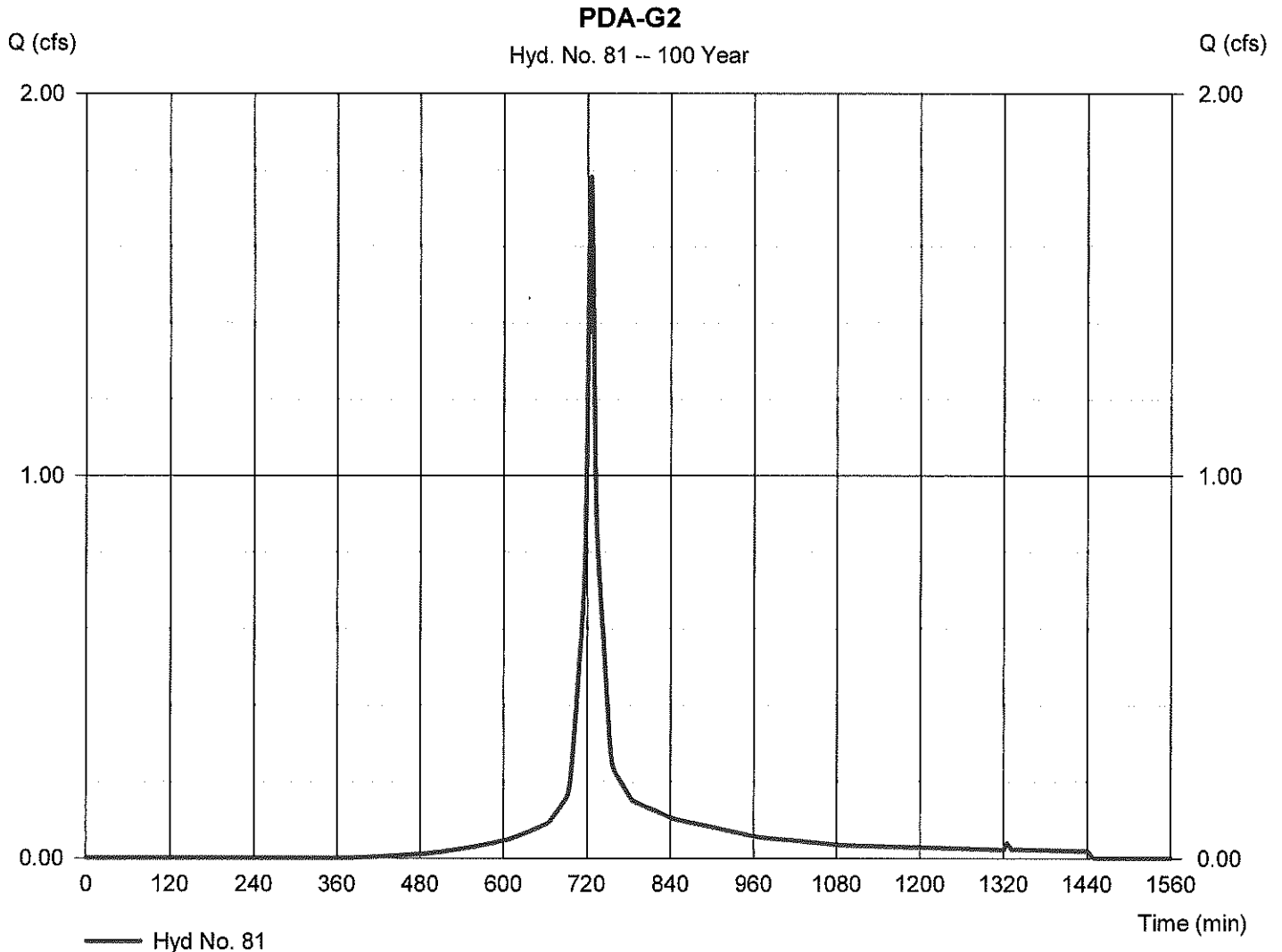
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Hyd. No. 81

PDA-G2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.781 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 5,548 cuft
Drainage area	= 0.300 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

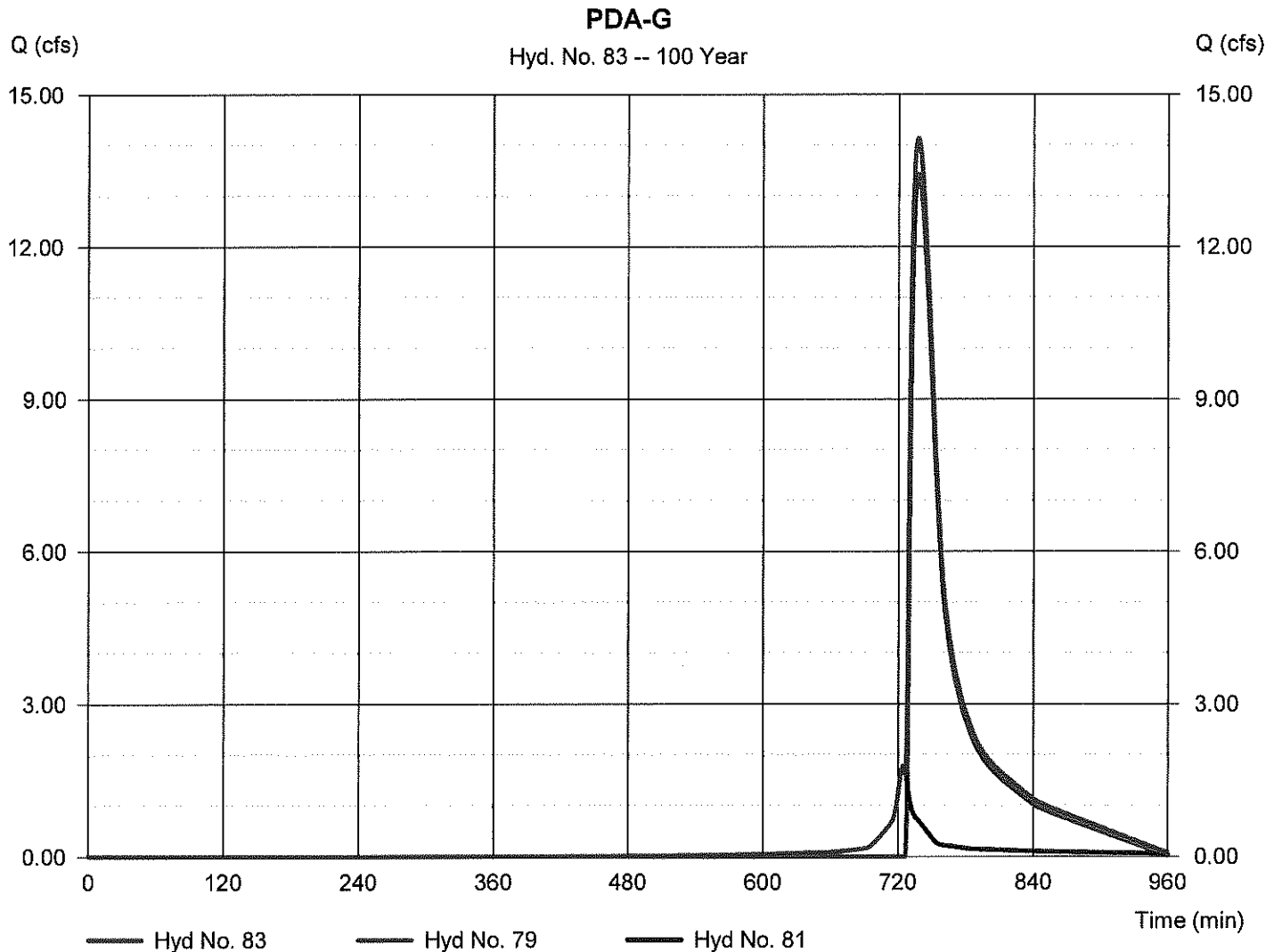
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Hyd. No. 83

PDA-G

Hydrograph type	= Combine	Peak discharge	= 14.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 38,129 cuft
Inflow hyds.	= 79, 81	Contrib. drain. area	= 0.300 ac



Hydrograph Report

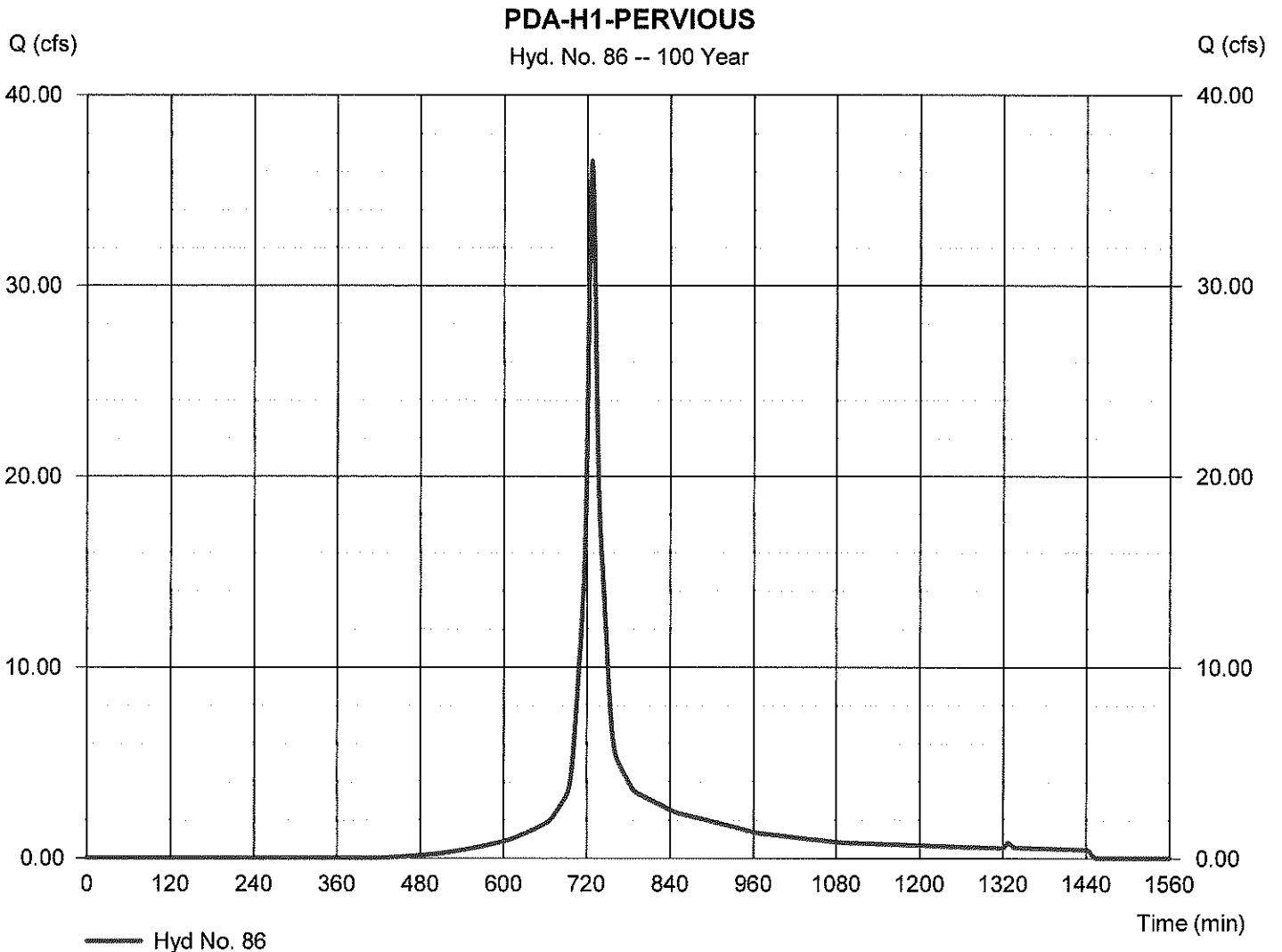
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Monday, 11 / 25 / 2019

Hyd. No. 86

PDA-H1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 36.54 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 125,452 cuft
Drainage area	= 7.510 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

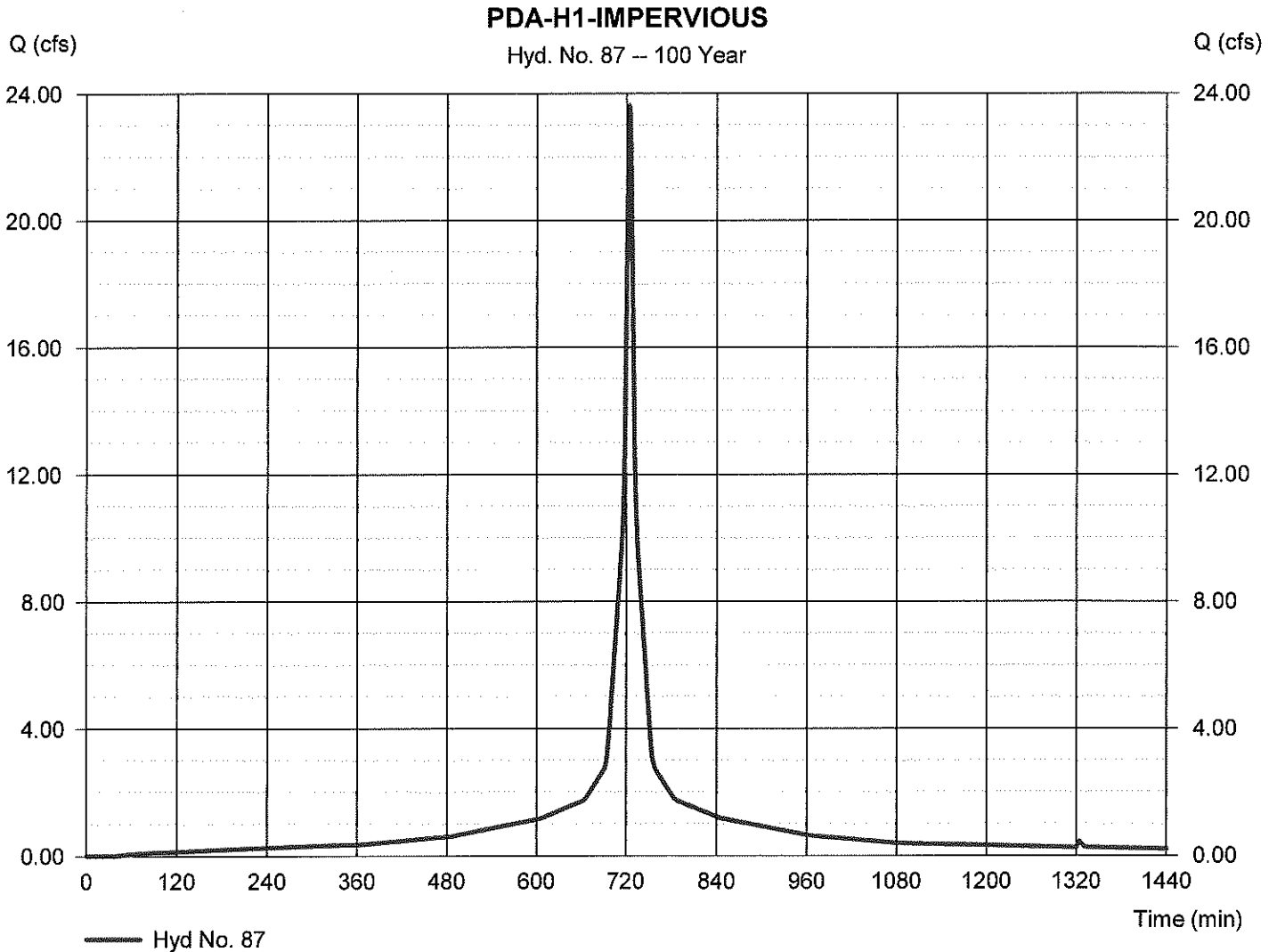
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Monday, 11 / 25 / 2019

Hyd. No. 87

PDA-H1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 23.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 84,372 cuft
Drainage area	= 3.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



— Hyd No. 87

Hydrograph Report

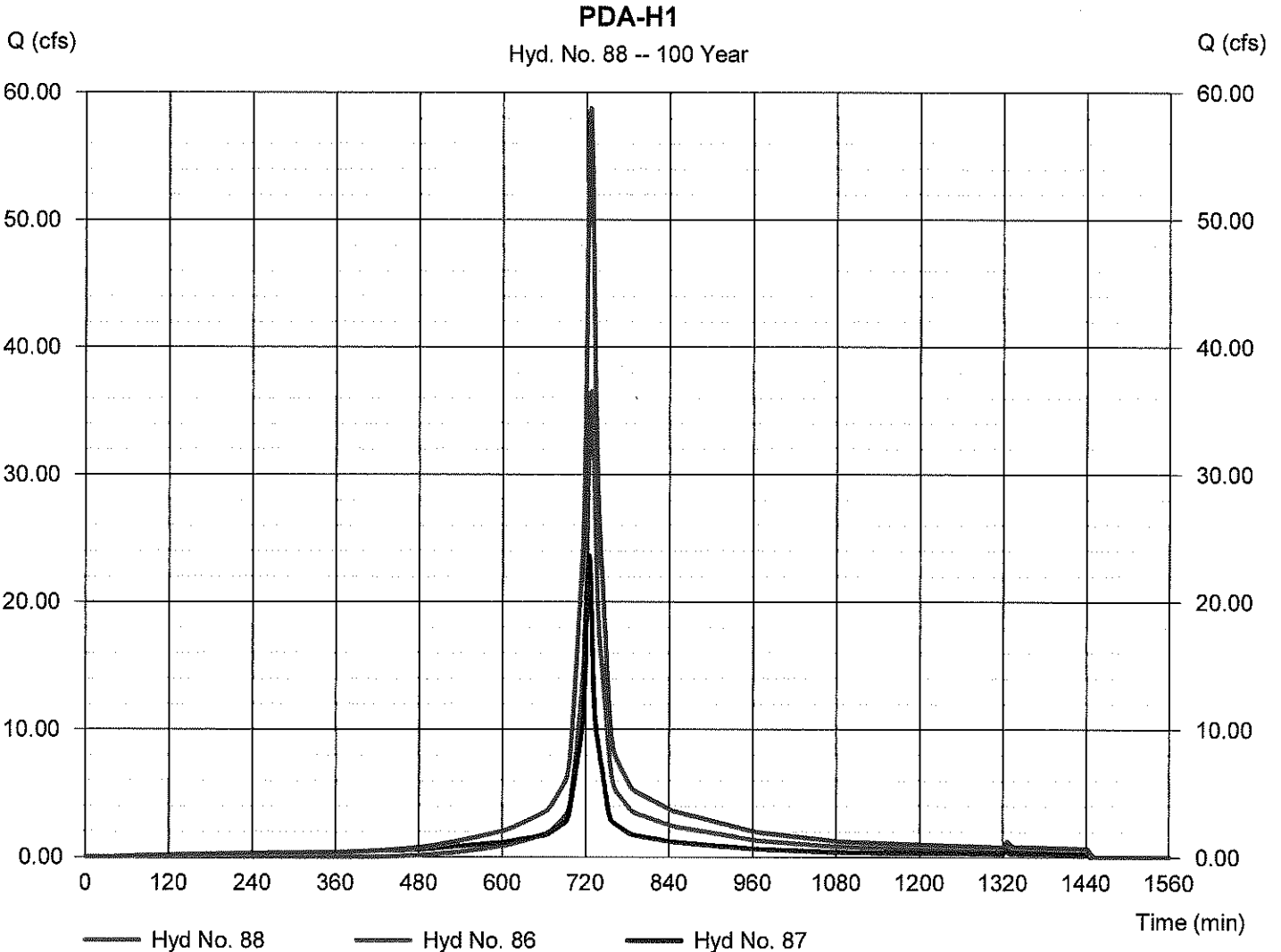
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Hyd. No. 88

PDA-H1

Hydrograph type	= Combine	Peak discharge	= 58.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 209,824 cuft
Inflow hyds.	= 86, 87	Contrib. drain. area	= 10.610 ac



Hydrograph Report

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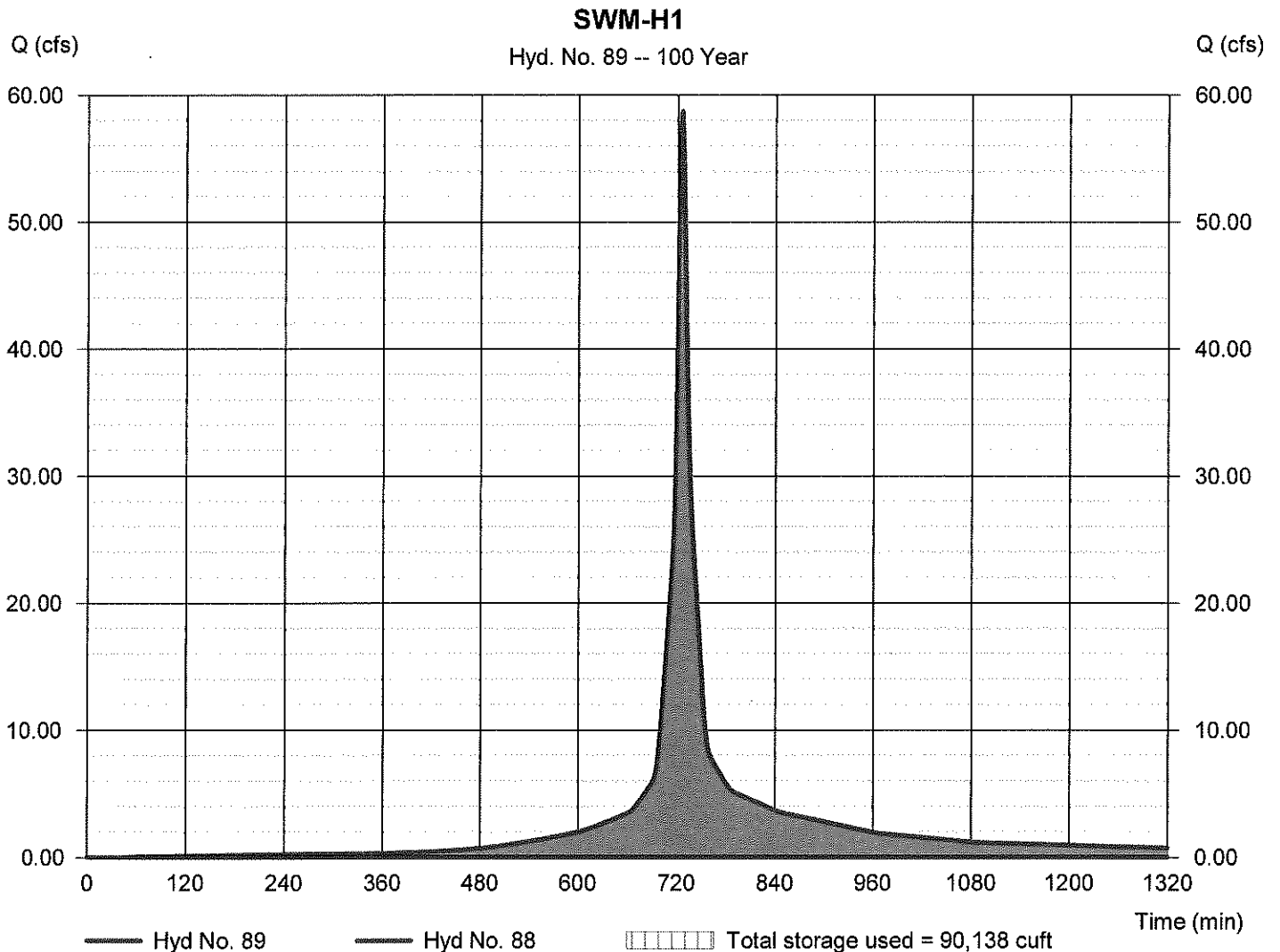
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Hyd. No. 89

SWM-H1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 788 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 88 - PDA-H1	Max. Elevation	= 599.70 ft
Reservoir name	= SWM-H1	Max. Storage	= 90,138 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

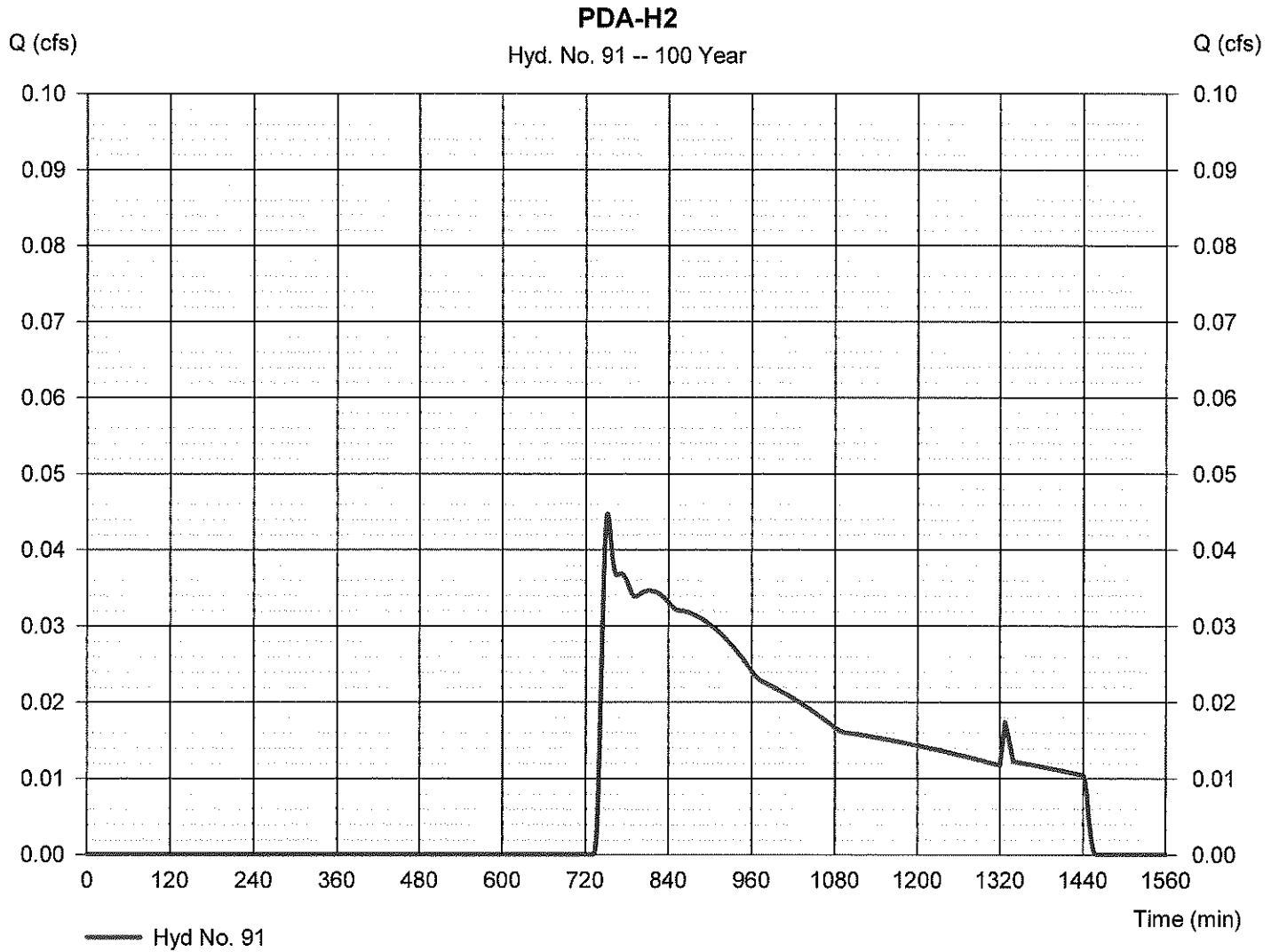
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 91

PDA-H2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.045 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 867 cuft
Drainage area	= 0.760 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

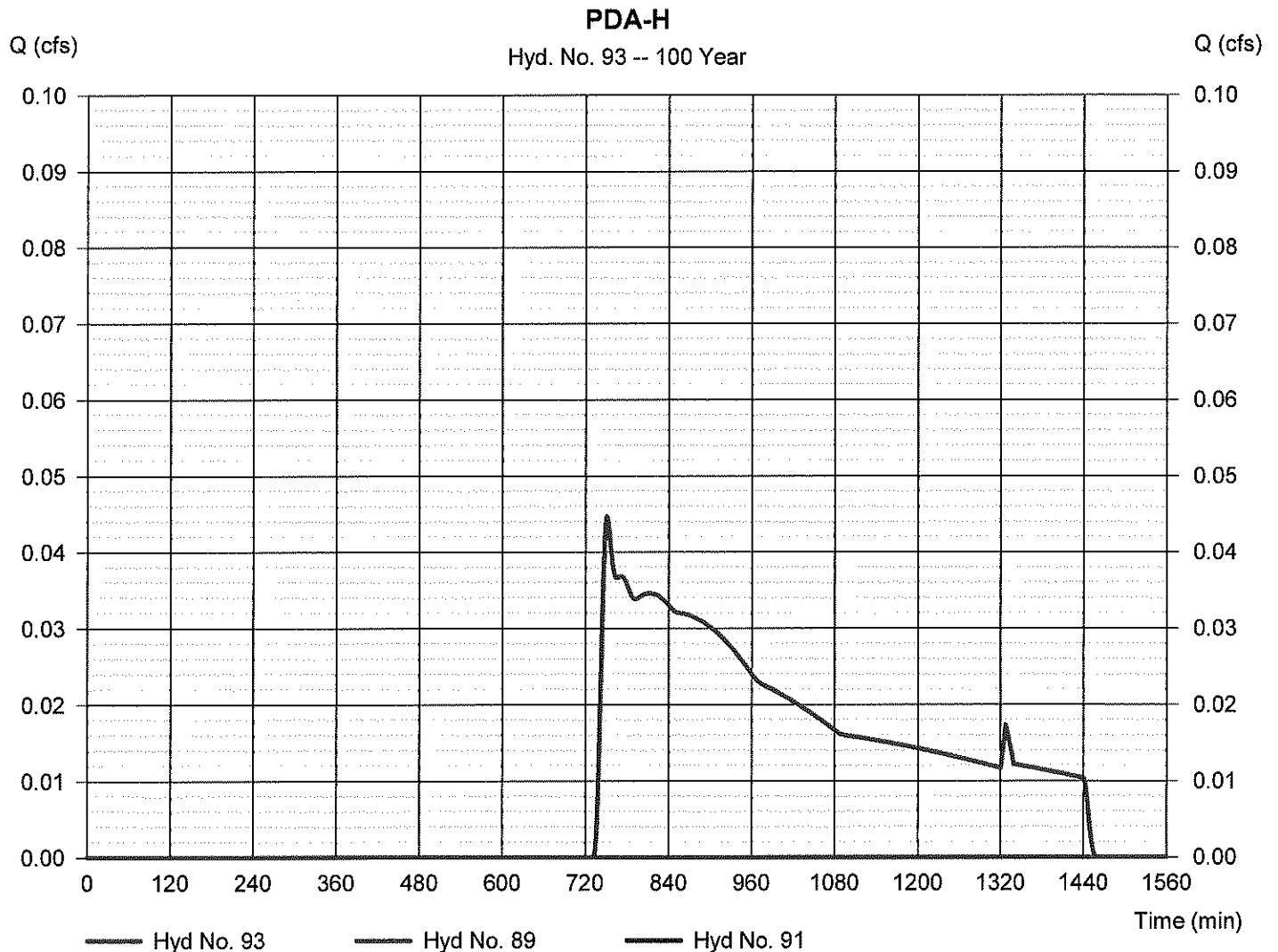
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 93

PDA-H

Hydrograph type	= Combine	Peak discharge	= 0.045 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 867 cuft
Inflow hyds.	= 89, 91	Contrib. drain. area	= 0.760 ac



— Hyd. No. 93 — Hyd. No. 89 — Hyd. No. 91

Hydrograph Report

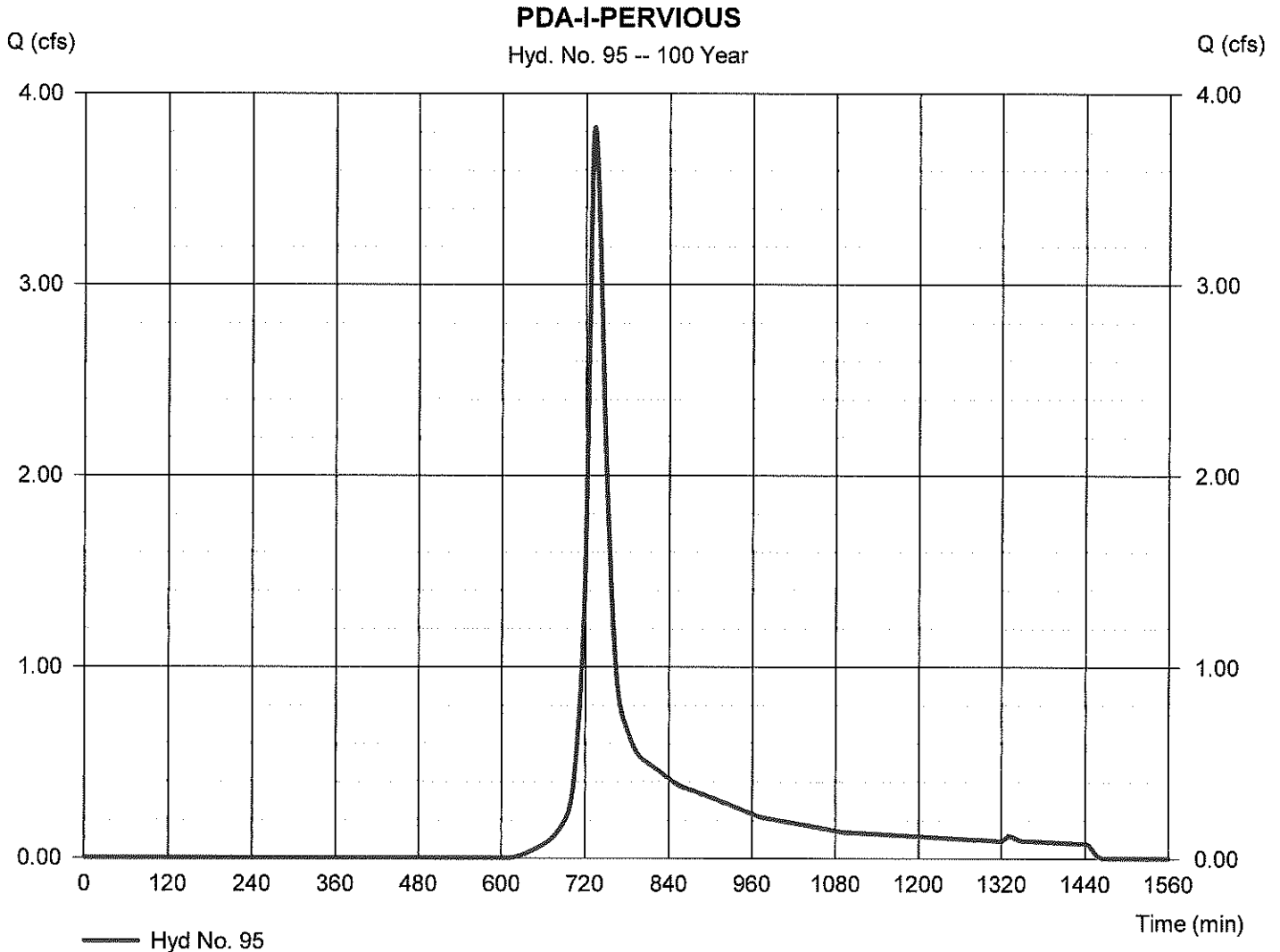
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 95

PDA-I-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.823 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 16,344 cuft
Drainage area	= 1.610 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.10 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

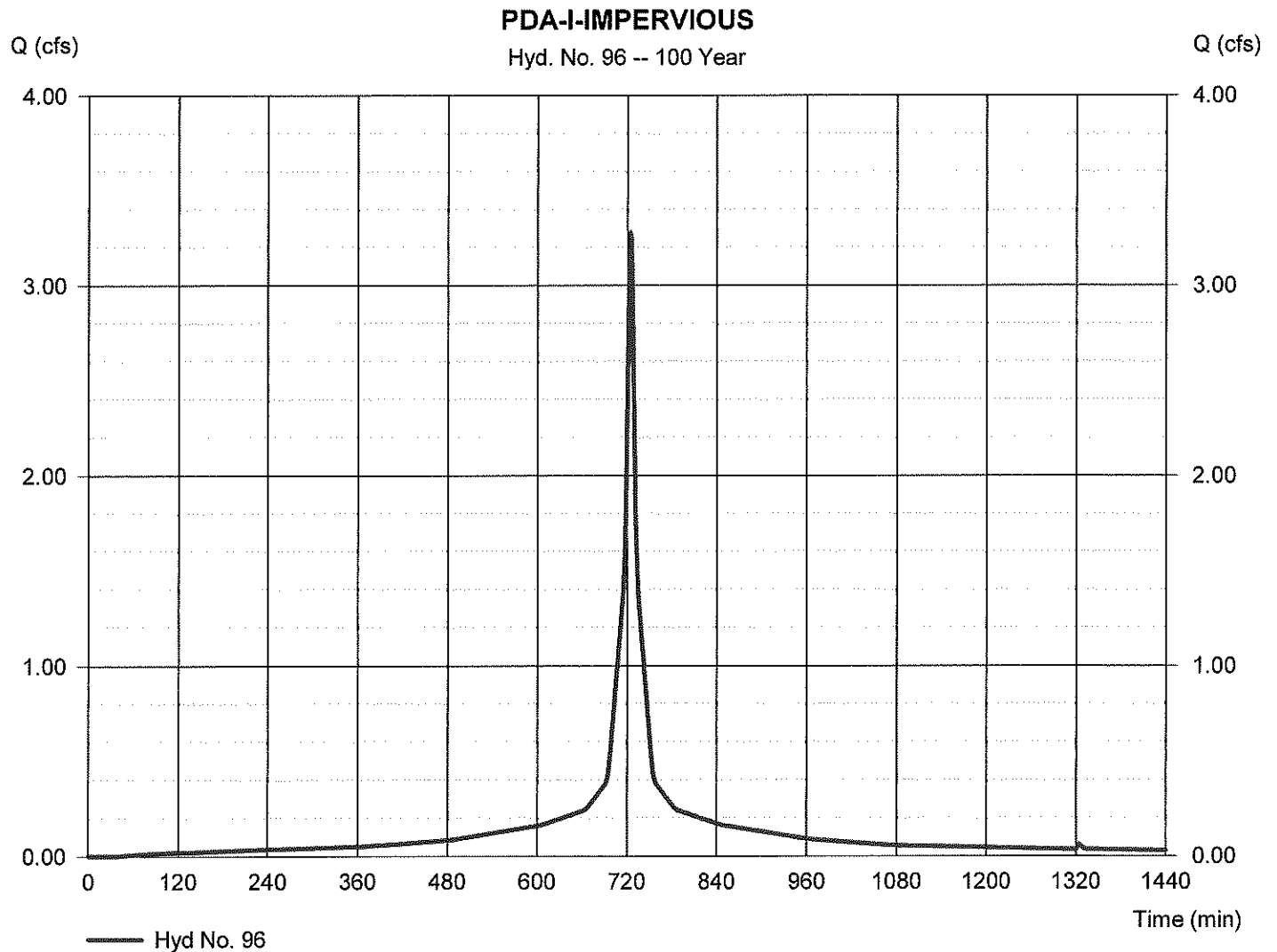
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Monday, 11 / 25 / 2019

Hyd. No. 96

PDA-I-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.279 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 11,703 cuft
Drainage area	= 0.430 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.51 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

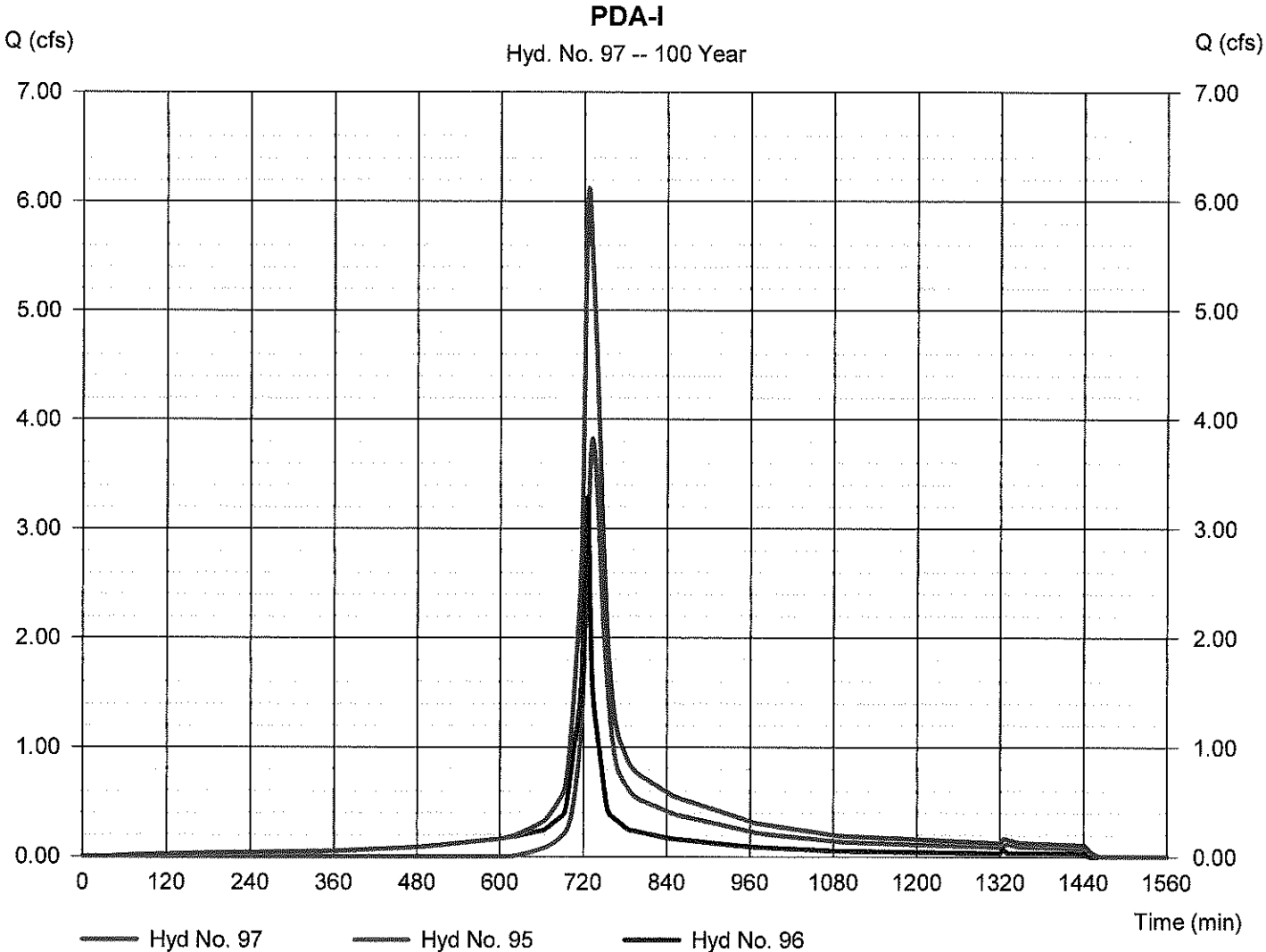
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Monday, 11 / 25 / 2019

Hyd. No. 97

PDA-I

Hydrograph type	= Combine	Peak discharge	= 6.116 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 28,048 cuft
Inflow hyds.	= 95, 96	Contrib. drain. area	= 2.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

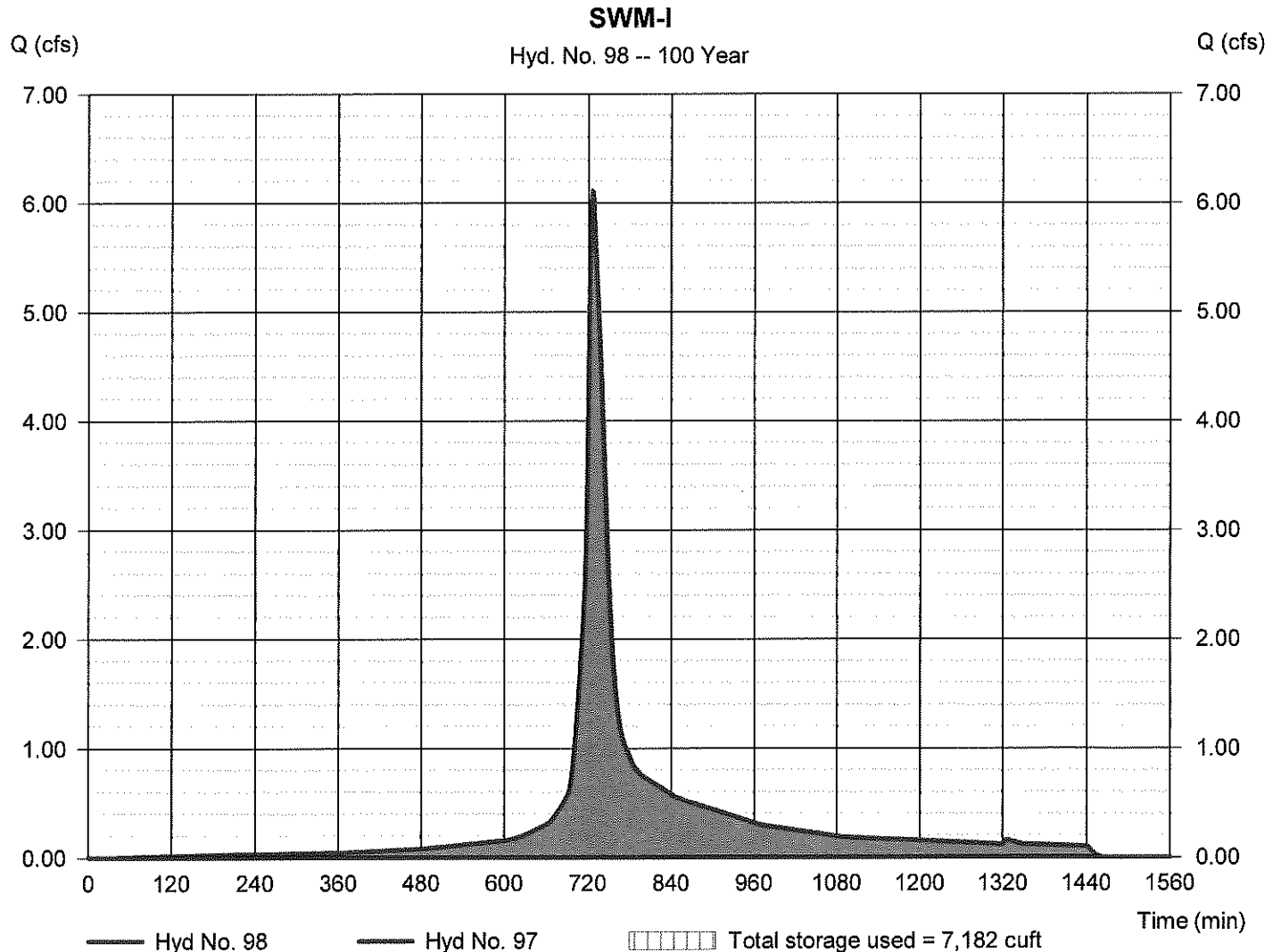
Monday, 11 / 25 / 2019

Hyd. No. 98

SWM-I

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 97 - PDA-I	Max. Elevation	= 605.29 ft
Reservoir name	= SWM-I	Max. Storage	= 7,182 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



APPENDIX E –
STORM SEWER SIZING CALCULATIONS



25-Year Storm Pipe Computation

BHT ANDOVER
Project No. 0119134

November 14, 2019

Run	Drainage Area				Runoff				Pipe Data										
	Loc	From	To	TOTAL DRAINAGE AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	RUNOFF COEFFICIENT (C) PERVIOUS	RUNOFF COEFFICIENT (C) IMPERVIOUS	WEIGHTED RUNOFF	CA	TC (min)	I (in/hr)	Q (cfs)	Cum. Q (cfs)	Pipe Size (in)	Pipe Slope (ft/ft)	n	Pipe Cap. (cfs)	V Velocity (ft/sec)
Lawn Area	A7	A-6		3451.00	3451.00	0.00	0.20	0.99	0.20	0.02	6.00	5.70	0.08	0.08	15	0.0220	0.015	8.3	6.7
Lawn Area	A6	A5		1829.00	1829.00	0.00	0.20	0.99	0.20	0.01	6.00	5.70	0.05	0.14	15	0.0220	0.015	8.3	6.7
Lawn Area	A5	A4		1848	1849.00	0.00	0.20	0.99	0.20	0.01	6.00	5.70	0.05	0.19	15	0.0220	0.015	8.3	6.7
Lawn Area	A4	A3		1802	1802.00	0.00	0.20	0.99	0.20	0.01	6.00	5.70	0.05	0.23	15	0.0185	0.015	7.5	6.2
Lawn Area	A3	A2		1167	1167.00	0.00	0.20	0.99	0.20	0.01	6.00	5.70	0.03	0.26	15	0.0110	0.015	5.8	4.8
Lawn Area	A2	A1		3148	3148.00	0.00	0.20	0.99	0.20	0.01	6.00	5.70	0.08	0.25	15	0.0110	0.011	8.0	5.5

Notes:

- 1) Discharge estimated by Rational Method.
- 2) Runoff coefficients determined from field observations and parameter tables in *Hydraulic Engineering Systems* (N. Hwang and R. J. Houghtalen, Prentice-Hall, Inc., 1996).
- 3) Storm duration assumed to be equal to time of concentration.
- 4) Time of concentration estimated from Manning's formula for pipe flow and Time of Flow Curves for sheet flow (J.L. Quinn, Burlington Co. Engineer, 8/28/82).
- 5) Storm intensity estimated from Rainfall Intensity - Duration Curve, 25 Year Storm.
- 6) Pipe selection by diameter (in).
- 7) U.N.O., all pipe to be HDPE, with Manning's n equal to 0.015
- 8) All full pipe discharges and velocities estimated using Manning's formula.
- 9) $V_{1/4w}$ equals water velocity when depth to diameter ratio equals 0.25 (1/4 full). $V_{1/4w}$ estimated using circular channel ratios.
- 10) Slope of pipes designed at 0.45% Min.

Run		Drainage Area										Runoff					Pipe Data			
Loc.	From	To	TOTAL DRAINAGE AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	RUNOFF COEFFICIENT (C) PERVIOUS	RUNOFF COEFFICIENT (C) IMPERVIOUS	WEIGHTED RUNOFF	CA	TC (min)	L (ft)	Q (cfs)	Cum. Q (cfs)	Pipe Size (in)	Pipe Slope (ft/ft)	n	Pipe Cap. (cfs)	V. velocity (ft/sec)		
Lawn Area	A12	A11	39444.00	34194.00	5250.00	0.20	0.99	0.31	0.28	5.00	5.70	1.58	1.58	15	0.0100	0.015	5.6	4.5		
Parking Lot	A11	A10	35109.00	0.00	35109.00	0.20	0.99	0.99	0.80	5.00	5.70	4.55	6.12	18	0.0100	0.015	9.1	5.1		
Lawn Area	A10	A9	0	0.00	0.00	0.20	0.99	0.00	0.00	5.00	5.70	0.00	6.12	18	0.0100	0.015	9.1	5.1		
Lawn Area	A9	A8	0	0.00	0.00	0.20	0.99	0.00	0.00	5.00	5.70	0.00	6.12	18	0.0100	0.015	9.1	5.1		

Notes:

- 1) Discharge estimated by Rational Method.
- 2) Runoff coefficients determined from field observations and parameter tables in *Hydraulic Engineering Systems* (N. Hwang and R.J. Houghalen, Prentice-Hall, Inc., 1996).
- 3) Storm duration assumed to be equal to time of concentration.
- 4) Time of concentration estimated from Rainfall Intensity - Duration Curve, 25 Year Storm.
- 5) Storm Intensity estimated from Rainfall Intensity - Duration Curve, 25 Year Storm.
- 6) Pipe selection by diameter (in).
- 7) U.N.Q., all pipe to be HDPE, with Manning's n equal to 0.015
- 8) All full pipe discharges and velocities estimated using Manning's formula.
- 9) $V_{14.4m}$ equals water velocity when depth to diameter ratio equals 0.25 (1/4 full). $V_{14.4m}$ estimated using circular channel ratios.
- 10) Slope of pipes designed at 0.45% Min.

25-Year Storm Pipe Computation

BHT ANDOVER
Project No. 0119134

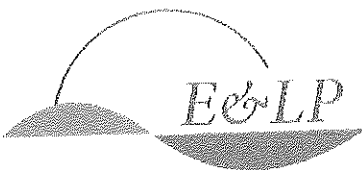
November 11, 2019

Run	Drainage Area										Runoff				Pipe Data			
	From	To	TOTAL DRAINAGE AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	RUNOFF COEFFICIENT (C) PERVIOUS	RUNOFF COEFFICIENT (C) IMPERVIOUS	WEIGHTED RUNOFF	CA	TC (min)	L (in/hr)	Q (cfs)	Qun Q (cfs)	Pipe Size (in)	Pipe Slope (ft/ft)	n	Pipe Cap. (cfs)	V velocity (ft/sec)
Lawn Area	G4	G3	65659.00	44678.00	20981.00	0.20	0.99	0.45	0.68	6.00	5.70	3.89	3.89	15	0.0100	0.015	5.6	4.5
Lawn Area	G3	G2	28243.00	21177.00	7066.00	0.20	0.99	0.40	0.26	6.00	5.70	1.47	5.36	15	0.0100	0.015	5.6	4.5
Lawn Area	G2	G1	106437	81990.00	24447.00	0.20	0.99	0.38	0.93	6.00	5.70	5.31	10.67	24	0.0100	0.015	18.6	6.2

- Notes:**
- 1) Discharge estimated by Rational Method.
 - 2) Runoff coefficients determined from field observations and parameter tables in *Hydraulic Engineering Systems* (N. Hwang and R.J. Houghtalen, Prentice-Hall, Inc., 1996).
 - 3) Storm duration assumed to be equal to time of concentration.
 - 4) Time of concentration estimated from Manning's formula for pipe flow and Time of Flow Curves for sheet flow (J.L. Quin, Burlington Co. Engineer, 8/28/82).
 - 5) Storm intensity estimated from Rainfall Intensity - Duration Curve, 25 Year Storm.
 - 6) Pipe selection by diameter (in).
 - 7) U.N.O., all pipe to be HDPE with Manning's n equal to 0.015
 - 8) All full pipe discharges and velocities estimated using Manning's formula
 - 9) $V_{14.4}$ equals water velocity when depth to diameter ratio equals 0.25 (1/4 full). $V_{14.4}$ estimated using circular channel ratios
 - 10) Slope of pipes designed at 0.45% Min.



APPENDIX F –
WATER QUALITY STORM HYDROLOGIC ANALYSIS
AND RUNOFF QUALITY CALCULATIONS



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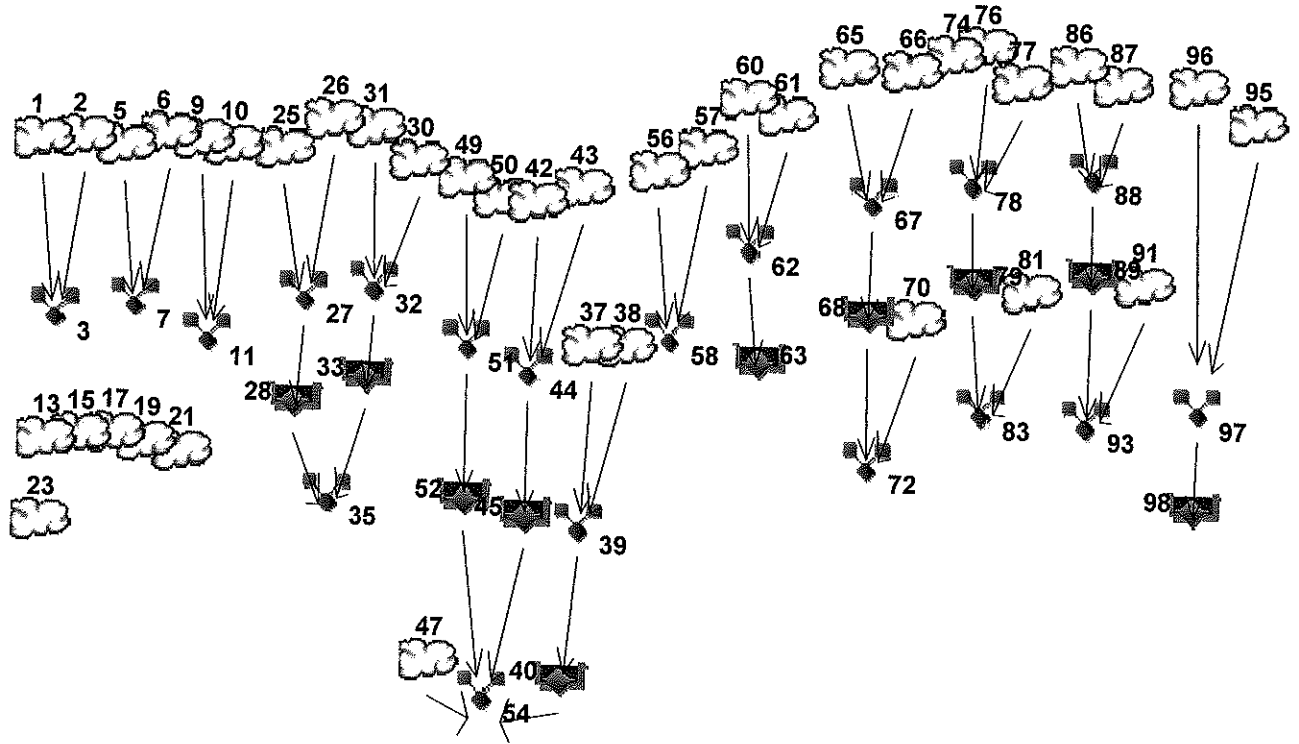
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Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020



Legend

Hyd.	Origin	Description
1	SCS Runoff	SOA-A-PERVIOUS
2	SCS Runoff	SOA-A-IMPVIOUS
3	Combine	SOA-A
5	SCS Runoff	SOA-B-PERVIOUS
6	SCS Runoff	SOA-B-IMPVIOUS
7	Combine	SOA-B
9	SCS Runoff	SOA-C-PERVIOUS
10	SCS Runoff	SOA-C-IMPVIOUS
11	Combine	SOA-C
13	SCS Runoff	SOA-D
15	SCS Runoff	SOA-E
17	SCS Runoff	SOA-F
19	SCS Runoff	SOA-G
21	SCS Runoff	SOA-H
23	SCS Runoff	SOA-I
25	SCS Runoff	POA-A1-PERVIOUS
26	SCS Runoff	POA-A1-IMPVIOUS
27	Combine	POA-A1
28	Reservoir	SWM-A1
30	SCS Runoff	POA-A2-PERVIOUS
31	SCS Runoff	POA-A2-IMPVIOUS
32	Combine	POA-A2
33	Reservoir	SWM-A2
35	Combine	POA-A
37	SCS Runoff	POA-B1-PERVIOUS
38	SCS Runoff	POA-B1-IMPVIOUS
39	Combine	POA-B1
40	Reservoir	SWM-B1
42	SCS Runoff	POA-B2-PERVIOUS
43	SCS Runoff	POA-B2-IMPVIOUS
44	Combine	POA-B2
45	Reservoir	SWM-B2
47	SCS Runoff	POA-B3
49	SCS Runoff	POA-B4-PERVIOUS
50	SCS Runoff	POA-B4-IMPVIOUS
51	Combine	POA-B4
52	Reservoir	SWM-B4
54	Combine	POA-B
56	SCS Runoff	POA-C-PERVIOUS
57	SCS Runoff	POA-C-IMPVIOUS
58	Combine	POA-C
60	SCS Runoff	POA-D-PERVIOUS
61	SCS Runoff	POA-D-IMPVIOUS
62	Combine	POA-D
63	Reservoir	SWM-D
65	SCS Runoff	POA-E1-PERVIOUS
66	SCS Runoff	POA-E1-IMPVIOUS
67	Combine	POA-E1
68	Reservoir	SWM-E1
70	SCS Runoff	POA-E2
72	Combine	POA-E
74	SCS Runoff	POA-F
76	SCS Runoff	POA-G1-PERVIOUS
77	SCS Runoff	POA-G1-IMPVIOUS
78	Combine	POA-G1
79	Reservoir	SWM-G1
81	SCS Runoff	POA-G2
83	Combine	POA-G
85	SCS Runoff	POA-H1-PERVIOUS
87	SCS Runoff	POA-H1-IMPVIOUS
88	Combine	POA-H1
89	Reservoir	SWM-H1
91	SCS Runoff	POA-H2
93	Combine	POA-H
95	SCS Runoff	POA-I-PERVIOUS
96	SCS Runoff	POA-I-IMPVIOUS
97	Combine	POA-I
98	Reservoir	SWM-I

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	----	0.000	----	----	----	----	----	----	----	EDA - A: PERVIOUS
2	SCS Runoff	----	2.932	----	----	----	----	----	----	----	EDA-A:IMPERVIOUS
3	Combine	1, 2	2.932	----	----	----	----	----	----	----	EDA-A
5	SCS Runoff	----	0.000	----	----	----	----	----	----	----	EDA-B: PERVIOUS
6	SCS Runoff	----	3.728	----	----	----	----	----	----	----	EDA-B: IMPERVIOUS
7	Combine	5, 6	3.728	----	----	----	----	----	----	----	EDA-B
9	SCS Runoff	----	0.086	----	----	----	----	----	----	----	EDA-C: PERVIOUS
10	SCS Runoff	----	3.104	----	----	----	----	----	----	----	EDA-C:IMPERVIOUS
11	Combine	9, 10	3.104	----	----	----	----	----	----	----	EDA-C
13	SCS Runoff	----	0.929	----	----	----	----	----	----	----	EDA-D
15	SCS Runoff	----	1.100	----	----	----	----	----	----	----	EDA-E
17	SCS Runoff	----	0.198	----	----	----	----	----	----	----	EDA-F
19	SCS Runoff	----	0.086	----	----	----	----	----	----	----	EDA-G
21	SCS Runoff	----	0.000	----	----	----	----	----	----	----	EDA-H
23	SCS Runoff	----	0.000	----	----	----	----	----	----	----	EDA-I
25	SCS Runoff	----	0.001	----	----	----	----	----	----	----	PDA-A1-PERVIOUS
26	SCS Runoff	----	10.06	----	----	----	----	----	----	----	PDA-A1-IMPERVIOUS
27	Combine	25, 26	10.06	----	----	----	----	----	----	----	PDA-A1
28	Reservoir	27	0.000	----	----	----	----	----	----	----	SWM-A1
30	SCS Runoff	----	1.314	----	----	----	----	----	----	----	PDA-A2-PERVIOUS
31	SCS Runoff	----	1.676	----	----	----	----	----	----	----	PDA-A2-IMPERVIOUS
32	Combine	30, 31	2.956	----	----	----	----	----	----	----	PDA-A2
33	Reservoir	32	0.000	----	----	----	----	----	----	----	SWM-A2
35	Combine	28, 33,	0.000	----	----	----	----	----	----	----	PDA-A
37	SCS Runoff	----	3.495	----	----	----	----	----	----	----	PDA-B1-PERVIOUS
38	SCS Runoff	----	9.353	----	----	----	----	----	----	----	PDA-B1-IMPERVIOUS
39	Combine	37, 38	12.56	----	----	----	----	----	----	----	PDA-B1
40	Reservoir	39	0.000	----	----	----	----	----	----	----	SWM-B1

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
42	SCS Runoff	----	0.163	----	----	----	----	----	----	----	PDA-B2-PERVIOUS
43	SCS Runoff	----	7.120	----	----	----	----	----	----	----	PDA-B2-IMPERVIOUS
44	Combine	42, 43	7.124	----	----	----	----	----	----	----	PDA-B2
45	Reservoir	44	0.000	----	----	----	----	----	----	----	SWM-B2
47	SCS Runoff	----	0.000	----	----	----	----	----	----	----	PDA-B3
49	SCS Runoff	----	0.314	----	----	----	----	----	----	----	PDA-B4-PERVIOUS
50	SCS Runoff	----	2.235	----	----	----	----	----	----	----	PDA-B4-IMPERVIOUS
51	Combine	49, 50	2.426	----	----	----	----	----	----	----	PDA-B4
52	Reservoir	51	0.000	----	----	----	----	----	----	----	SWM-B4
54	Combine	40, 45, 47, 52,	0.000	----	----	----	----	----	----	----	PDA-B
56	SCS Runoff	----	0.002	----	----	----	----	----	----	----	PDA-C-PERVIOUS
57	SCS Runoff	----	0.186	----	----	----	----	----	----	----	PDA-C-IMPERVIOUS
58	Combine	56, 57	0.186	----	----	----	----	----	----	----	PDA-C
60	SCS Runoff	----	7.542	----	----	----	----	----	----	----	PDA-D-PERVIOUS
61	SCS Runoff	----	10.09	----	----	----	----	----	----	----	PDA-D-IMPERVIOUS
62	Combine	60, 61	16.57	----	----	----	----	----	----	----	PDA-D
63	Reservoir	62	0.000	----	----	----	----	----	----	----	SWM-D
65	SCS Runoff	----	2.135	----	----	----	----	----	----	----	PDA-E1-PERVIOUS
66	SCS Runoff	----	2.080	----	----	----	----	----	----	----	PDA-E1-IMPERVIOUS
67	Combine	65, 66	4.173	----	----	----	----	----	----	----	PDA-E1
68	Reservoir	67	0.000	----	----	----	----	----	----	----	SWM-E1
70	SCS Runoff	----	0.074	----	----	----	----	----	----	----	PDA-E2
72	Combine	68, 70,	0.074	----	----	----	----	----	----	----	PDA-E
74	SCS Runoff	----	0.224	----	----	----	----	----	----	----	PDA-F
76	SCS Runoff	----	2.117	----	----	----	----	----	----	----	PDA-G1-PERVIOUS
77	SCS Runoff	----	5.339	----	----	----	----	----	----	----	PDA-G1-IMPERVIOUS
78	Combine	76, 77	7.072	----	----	----	----	----	----	----	PDA-G1
79	Reservoir	78	0.000	----	----	----	----	----	----	----	SWM-G1

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
81	SCS Runoff	----	0.110	----	----	----	----	----	----	----	PDA-G2
83	Combine	79, 81,	0.110	----	----	----	----	----	----	----	PDA-G
86	SCS Runoff	----	1.312	----	----	----	----	----	----	----	PDA-H1-PERVIOUS
87	SCS Runoff	----	9.622	----	----	----	----	----	----	----	PDA-H1-IMPERVIOUS
88	Combine	86, 87	9.885	----	----	----	----	----	----	----	PDA-H1
89	Reservoir	88	0.000	----	----	----	----	----	----	----	SWM-H1
91	SCS Runoff	----	0.000	----	----	----	----	----	----	----	PDA-H2
93	Combine	89, 91,	0.000	----	----	----	----	----	----	----	PDA-H
95	SCS Runoff	----	0.000	----	----	----	----	----	----	----	PDA-I-PERVIOUS
96	SCS Runoff	----	1.335	----	----	----	----	----	----	----	PDA-I-IMPERVIOUS
97	Combine	95, 96	1.335	----	----	----	----	----	----	----	PDA-I
98	Reservoir	97	0.000	----	----	----	----	----	----	----	SWM-I

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	0.000	1	n/a	0	-----	-----	-----	EDA - A: PERVIOUS	
2	SCS Runoff	2.932	1	74	5,483	-----	-----	-----	EDA-A:IMPERVIOUS	
3	Combine	2.932	1	74	5,483	1, 2	-----	-----	EDA-A	
5	SCS Runoff	0.000	1	n/a	0	-----	-----	-----	EDA-B: PERVIOUS	
6	SCS Runoff	3.728	1	80	8,863	-----	-----	-----	EDA-B: IMPERVIOUS	
7	Combine	3.728	1	80	8,863	5, 6	-----	-----	EDA-B	
9	SCS Runoff	0.086	1	106	182	-----	-----	-----	EDA-C: PERVIOUS	
10	SCS Runoff	3.104	1	65	3,873	-----	-----	-----	EDA-C:IMPERVIOUS	
11	Combine	3.104	1	65	4,055	9, 10	-----	-----	EDA-C	
13	SCS Runoff	0.929	1	73	1,543	-----	-----	-----	EDA-D	
15	SCS Runoff	1.100	1	75	1,963	-----	-----	-----	EDA-E	
17	SCS Runoff	0.198	1	76	367	-----	-----	-----	EDA-F	
19	SCS Runoff	0.086	1	107	160	-----	-----	-----	EDA-G	
21	SCS Runoff	0.000	1	n/a	0	-----	-----	-----	EDA-H	
23	SCS Runoff	0.000	1	n/a	0	-----	-----	-----	EDA-I	
25	SCS Runoff	0.001	1	121	1	-----	-----	-----	PDA-A1-PERVIOUS	
26	SCS Runoff	10.06	1	65	12,548	-----	-----	-----	PDA-A1-IMPERVIOUS	
27	Combine	10.06	1	65	12,549	25, 26	-----	-----	PDA-A1	
28	Reservoir	0.000	1	67	0	27	591.84	9,151	SWM-A1	
30	SCS Runoff	1.314	1	66	1,497	-----	-----	-----	PDA-A2-PERVIOUS	
31	SCS Runoff	1.676	1	65	2,091	-----	-----	-----	PDA-A2-IMPERVIOUS	
32	Combine	2.956	1	66	3,589	30, 31	-----	-----	PDA-A2	
33	Reservoir	0.000	1	92	0	32	600.31	2,517	SWM-A2	
35	Combine	0.000	1	172	0	28, 33,	-----	-----	PDA-A	
37	SCS Runoff	3.495	1	71	5,390	-----	-----	-----	PDA-B1-PERVIOUS	
38	SCS Runoff	9.353	1	68	13,685	-----	-----	-----	PDA-B1-IMPERVIOUS	
39	Combine	12.56	1	69	19,075	37, 38	-----	-----	PDA-B1	
40	Reservoir	0.000	1	71	0	39	600.38	13,310	SWM-B1	
Hydrologic Calculations_WQ.gpw				Return Period: 1 Year			Monday, 11 / 25 / 2019			

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	
42	SCS Runoff	0.163	1	110	374	----	----	----	PDA-B2-PERVIOUS	
43	SCS Runoff	7.120	1	75	13,991	----	----	----	PDA-B2-IMPERVIOUS	
44	Combine	7.124	1	75	14,365	42, 43	----	----	PDA-B2	
45	Reservoir	0.000	1	75	0	44	597.26	9,278	SWM-B2	
47	SCS Runoff	0.000	1	n/a	0	----	----	----	PDA-B3	
49	SCS Runoff	0.314	1	69	455	----	----	----	PDA-B4-PERVIOUS	
50	SCS Runoff	2.235	1	65	2,788	----	----	----	PDA-B4-IMPERVIOUS	
51	Combine	2.426	1	66	3,243	49, 50	----	----	PDA-B4	
52	Reservoir	0.000	1	73	0	51	595.41	2,643	SWM-B4	
54	Combine	0.000	1	84	0	40, 45, 47, 52,	----	----	PDA-B	
56	SCS Runoff	0.002	1	108	2	----	----	----	PDA-C-PERVIOUS	
57	SCS Runoff	0.186	1	65	232	----	----	----	PDA-C-IMPERVIOUS	
58	Combine	0.186	1	65	234	56, 57	----	----	PDA-C	
60	SCS Runoff	7.542	1	69	9,734	----	----	----	PDA-D-PERVIOUS	
61	SCS Runoff	10.09	1	65	12,587	----	----	----	PDA-D-IMPERVIOUS	
62	Combine	16.57	1	66	22,321	60, 61	----	----	PDA-D	
63	Reservoir	0.000	1	73	0	62	597.70	18,560	SWM-D	
65	SCS Runoff	2.135	1	66	2,438	----	----	----	PDA-E1-PERVIOUS	
66	SCS Runoff	2.080	1	65	2,595	----	----	----	PDA-E1-IMPERVIOUS	
67	Combine	4.173	1	66	5,033	65, 66	----	----	PDA-E1	
68	Reservoir	0.000	1	84	0	67	612.50	4,436	SWM-E1	
70	SCS Runoff	0.074	1	68	100	----	----	----	PDA-E2	
72	Combine	0.074	1	68	100	68, 70,	----	----	PDA-E	
74	SCS Runoff	0.224	1	68	306	----	----	----	PDA-F	
76	SCS Runoff	2.117	1	68	2,661	----	----	----	PDA-G1-PERVIOUS	
77	SCS Runoff	5.339	1	65	6,661	----	----	----	PDA-G1-IMPERVIOUS	
78	Combine	7.072	1	66	9,322	76, 77	----	----	PDA-G1	
79	Reservoir	0.000	1	223	0	78	596.58	7,224	SWM-G1	
Hydrologic Calculations_WQ.gpw					Return Period: 1 Year			Monday, 11 / 25 / 2019		

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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
81	SCS Runoff	0.110	1	68	151	----	----	----	PDA-G2
83	Combine	0.110	1	68	151	79, 81,	----	----	PDA-G
86	SCS Runoff	1.312	1	74	2,367	----	----	----	PDA-H1-PERVIOUS
87	SCS Runoff	9.622	1	65	12,006	----	----	----	PDA-H1-IMPERVIOUS
88	Combine	9.885	1	65	14,373	86, 87	----	----	PDA-H1
89	Reservoir	0.000	1	n/a	0	88	597.54	10,566	SWM-H1
91	SCS Runoff	0.000	1	n/a	0	----	----	----	PDA-H2
93	Combine	0.000	1	n/a	0	89, 91,	----	----	PDA-H
95	SCS Runoff	0.000	1	n/a	0	----	----	----	PDA-I-PERVIOUS
96	SCS Runoff	1.335	1	65	1,665	----	----	----	PDA-I-IMPERVIOUS
97	Combine	1.335	1	65	1,665	95, 96	----	----	PDA-I
98	Reservoir	0.000	1	67	0	97	604.73	947	SWM-I

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

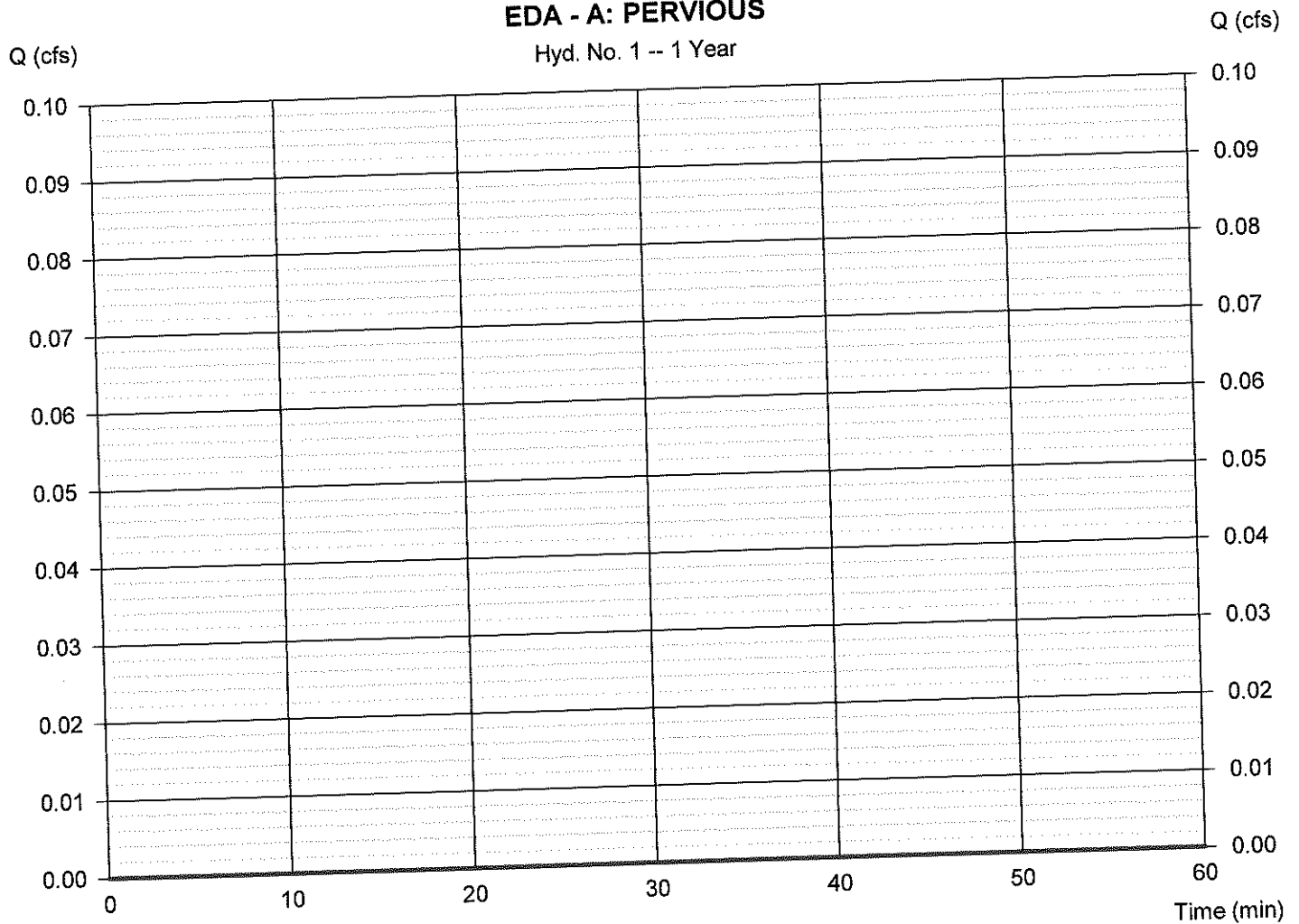
Hyd. No. 1

EDA - A: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 13.470 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.70 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors	Shape factors	= 484

EDA - A: PERVIOUS

Hyd. No. 1 -- 1 Year



— Hyd No. 1

TR55 Tc Worksheet

Hyd. No. 1

EDA - A: PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 16.00	0.00	0.00	
Travel Time (min)	= 9.29	+ 0.00	+ 0.00	= 9.29
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	274.00	479.00	
Watercourse slope (%)	= 0.00	4.20	0.50	
Surface description	= Paved	Unpaved	Unpaved	
Average velocity (ft/s)	= 0.00	3.31	1.14	
Travel Time (min)	= 0.00	+ 1.38	+ 7.00	= 8.38
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				17.70 min

Hydrograph Report

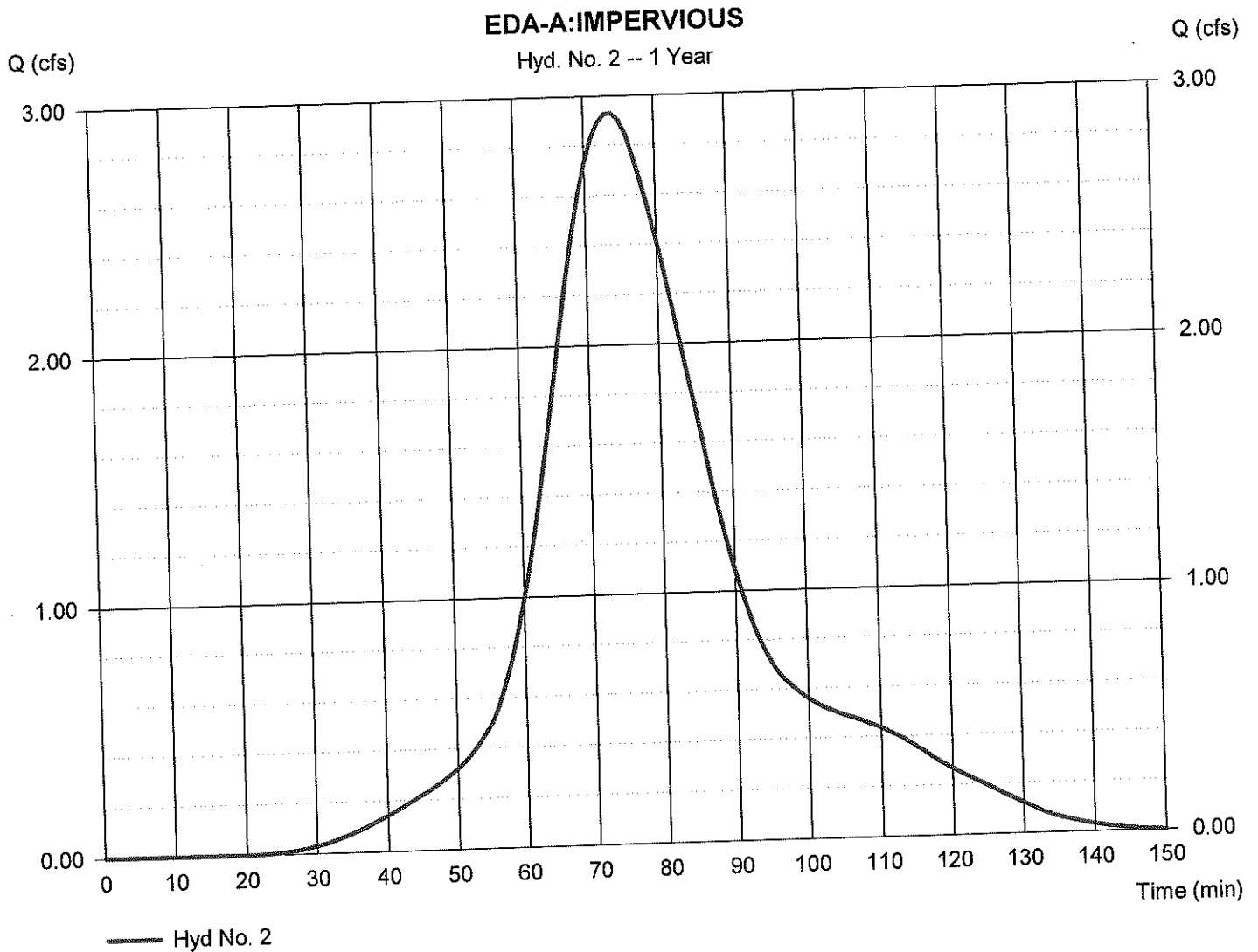
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 2

EDA-A:IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.932 cfs
Storm frequency	= 1 yrs	Time to peak	= 74 min
Time interval	= 1 min	Hyd. volume	= 5,483 cuft
Drainage area	= 1.460 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.60 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25inShapefactors	Shape factors	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 2

EDA-A:IMPERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 0.40	0.00	0.00	
Travel Time (min)	= 2.29	+ 0.00	+ 0.00	= 2.29
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	509.00	600.00	
Watercourse slope (%)	= 0.00	0.20	0.60	
Surface description	= Paved	Paved	Unpaved	
Average velocity (ft/s)	=0.00	0.91	1.25	
Travel Time (min)	= 0.00	+ 9.33	+ 8.00	= 17.33
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	(0)0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				19.60 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

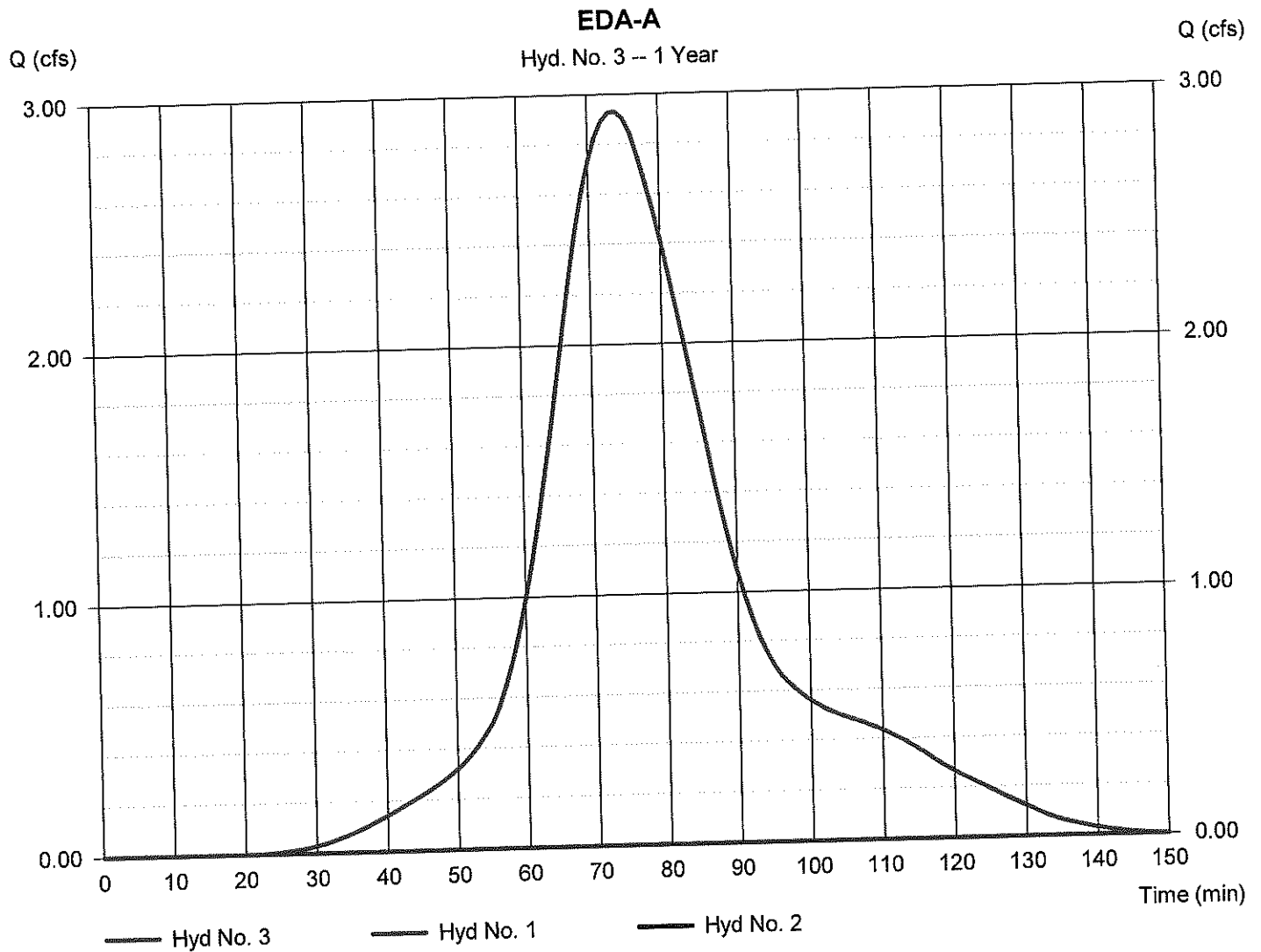
Monday, 11 / 25 / 2019

Hyd. No. 3

EDA-A

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

Peak discharge = 2.932 cfs
 Time to peak = 74 min
 Hyd. volume = 5,483 cuft
 Contrib. drain. area = 14.930 ac



Hydrograph Report

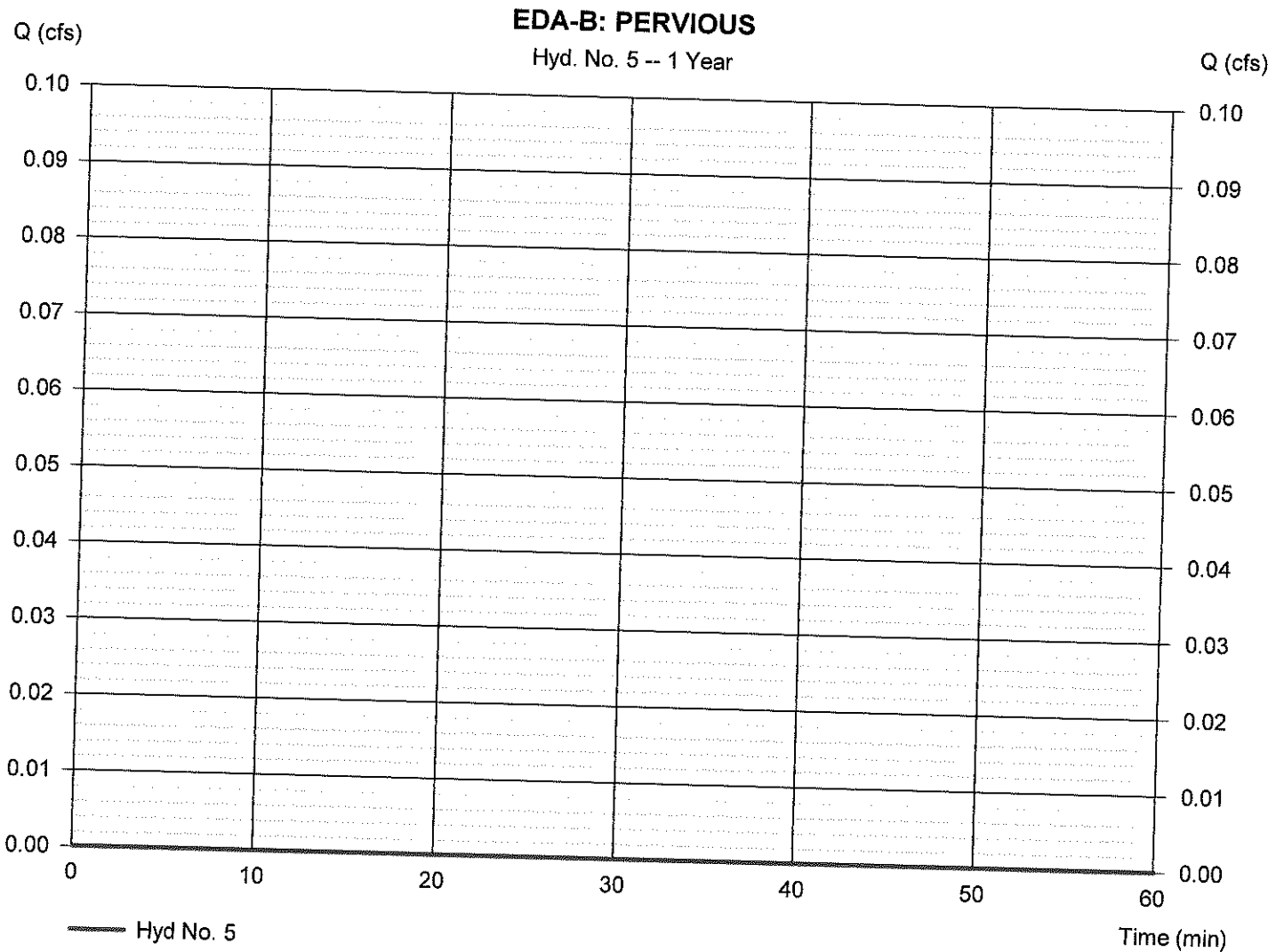
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 5

EDA-B: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 15.680 ac	Curve number	= 47
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 31.40 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in Storm	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 5

EDA-B: PERVIOUS

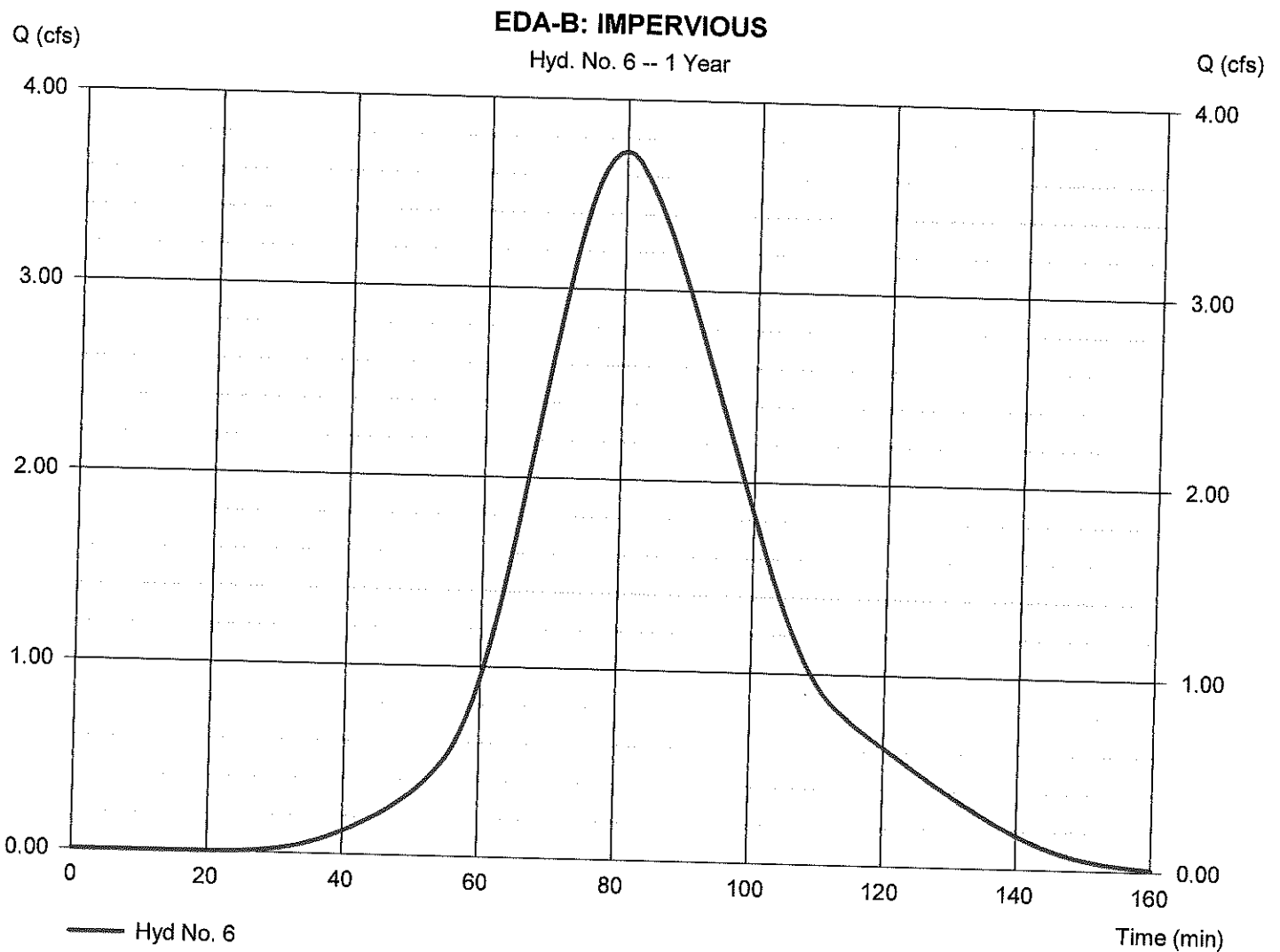
<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 7.30	0.00	0.00	
Travel Time (min)	= 12.71	+ 0.00	+ 0.00	= 12.71
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	704.00	818.00	
Watercourse slope (%)	= 0.00	4.90	0.30	
Surface description	= Paved	Unpaved	Unpaved	
Average velocity (ft/s)	=0.00	3.57	0.88	
Travel Time (min)	= 0.00	+ 3.29	+ 15.43	= 18.71
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				31.40 min

Hydrograph Report

Hyd. No. 6

EDA-B: IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.728 cfs
Storm frequency	= 1 yrs	Time to peak	= 80 min
Time interval	= 1 min	Hyd. volume	= 8,863 cuft
Drainage area	= 2.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29.70 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors	Shape factors	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 6

EDA-B: IMPERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 0.10	0.00	0.00	
Travel Time (min)	= 3.99	+ 0.00	+ 0.00	= 3.99
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	1303.00	98.00	
Watercourse slope (%)	= 0.00	0.20	0.30	
Surface description	= Paved	Paved	Unpaved	
Average velocity (ft/s)	=0.00	0.91	0.88	
Travel Time (min)	= 0.00	+ 23.89	+ 1.85	= 25.74
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				29.70 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

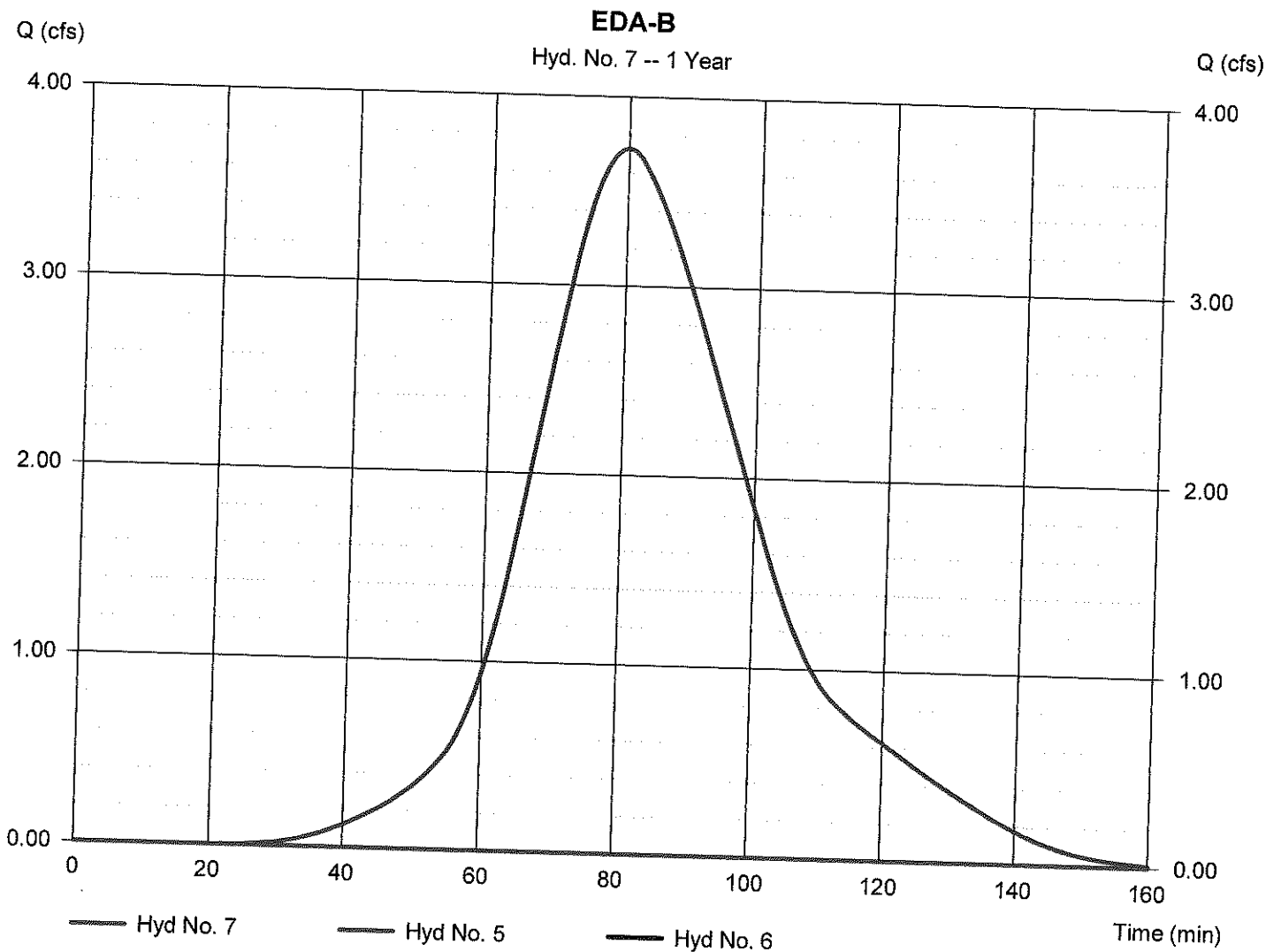
Monday, 11 / 25 / 2019

Hyd. No. 7

EDA-B

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 5, 6

Peak discharge = 3.728 cfs
Time to peak = 80 min
Hyd. volume = 8,863 cuft
Contrib. drain. area = 18.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

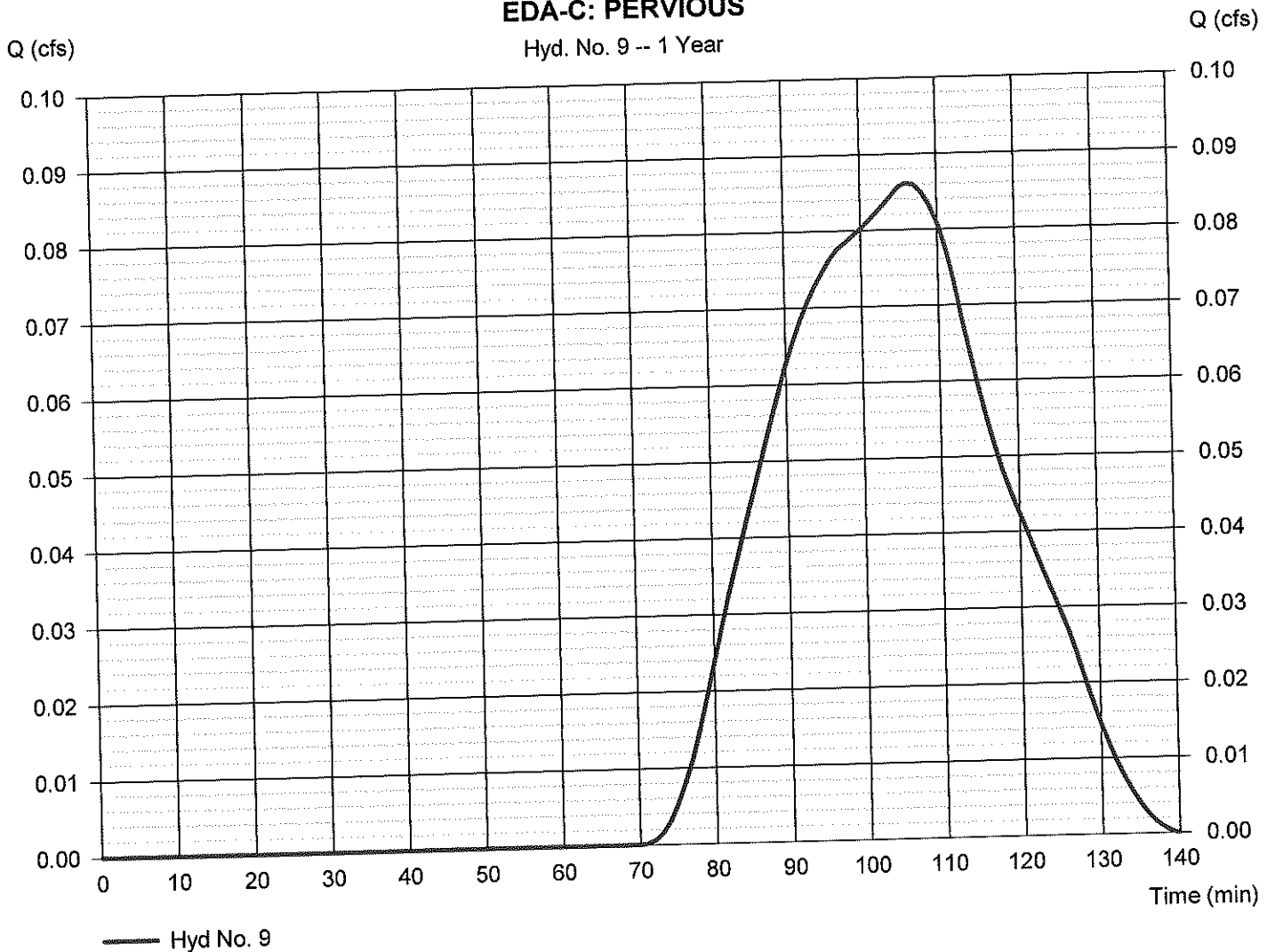
Hyd. No. 9

EDA-C: PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.086 cfs
Storm frequency	= 1 yrs	Time to peak	= 106 min
Time interval	= 1 min	Hyd. volume	= 182 cuft
Drainage area	= 3.770 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in Storm	Shape factor	= 484

EDA-C: PERVIOUS

Hyd. No. 9 -- 1 Year



— Hyd No. 9

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 9

EDA-C: PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 12.10	0.00	0.00	
Travel Time (min)	= 10.39	+ 0.00	+ 0.00	= 10.39
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	73.00	265.00	
Watercourse slope (%)	= 0.00	12.00	1.70	
Surface description	= Paved	Unpaved	Unpaved	
Average velocity (ft/s)	=0.00	5.59	2.10	
Travel Time (min)	= 0.00	+ 0.22	+ 2.10	= 2.32
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				12.70 min

Hydrograph Report

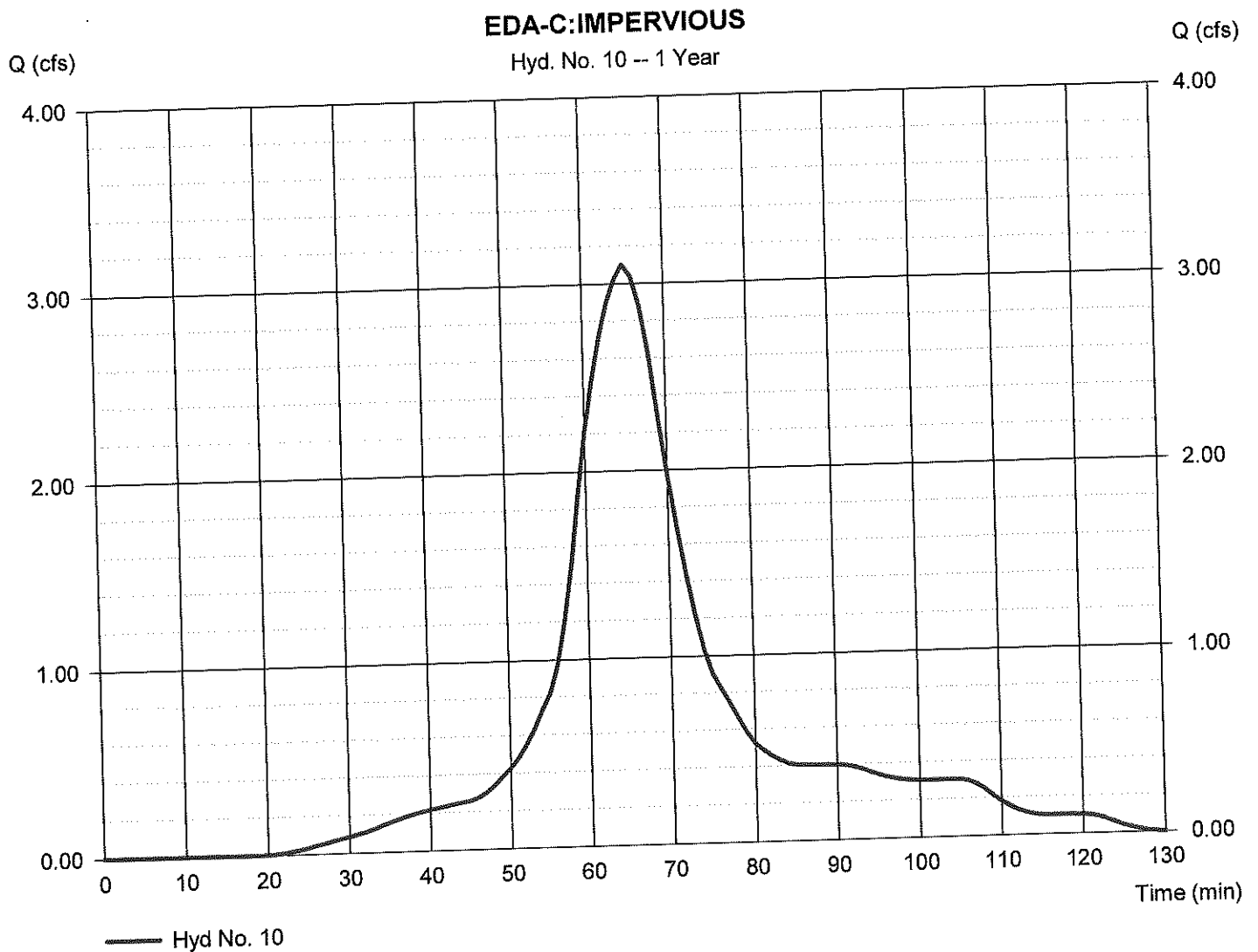
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 10

EDA-C:IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.104 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 3,873 cuft
Drainage area	= 1.000 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors		= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

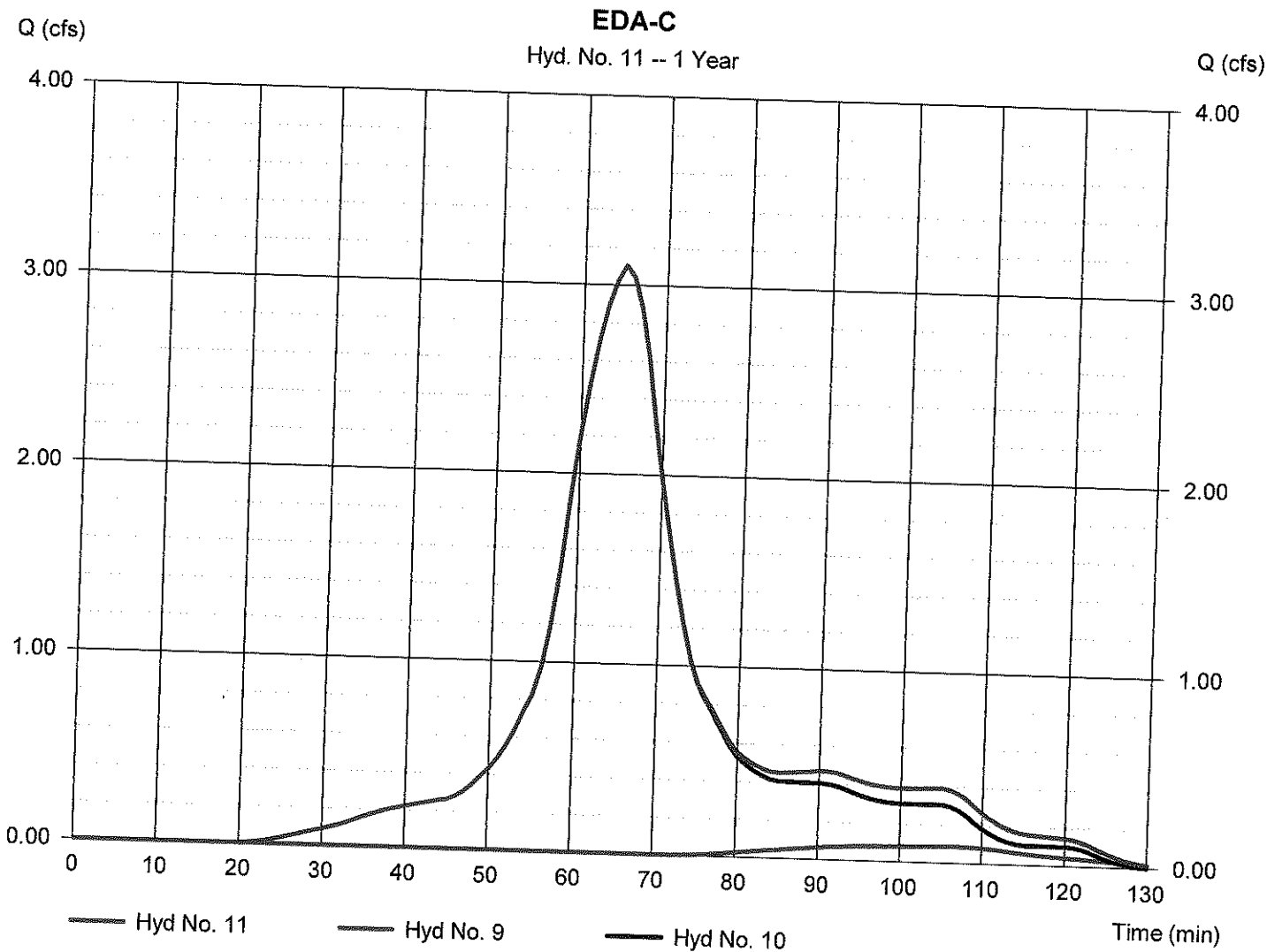
Monday, 11 / 25 / 2019

Hyd. No. 11

EDA-C

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 9, 10

Peak discharge = 3.104 cfs
Time to peak = 65 min
Hyd. volume = 4,055 cuft
Contrib. drain. area = 4.770 ac



Hydrograph Report

Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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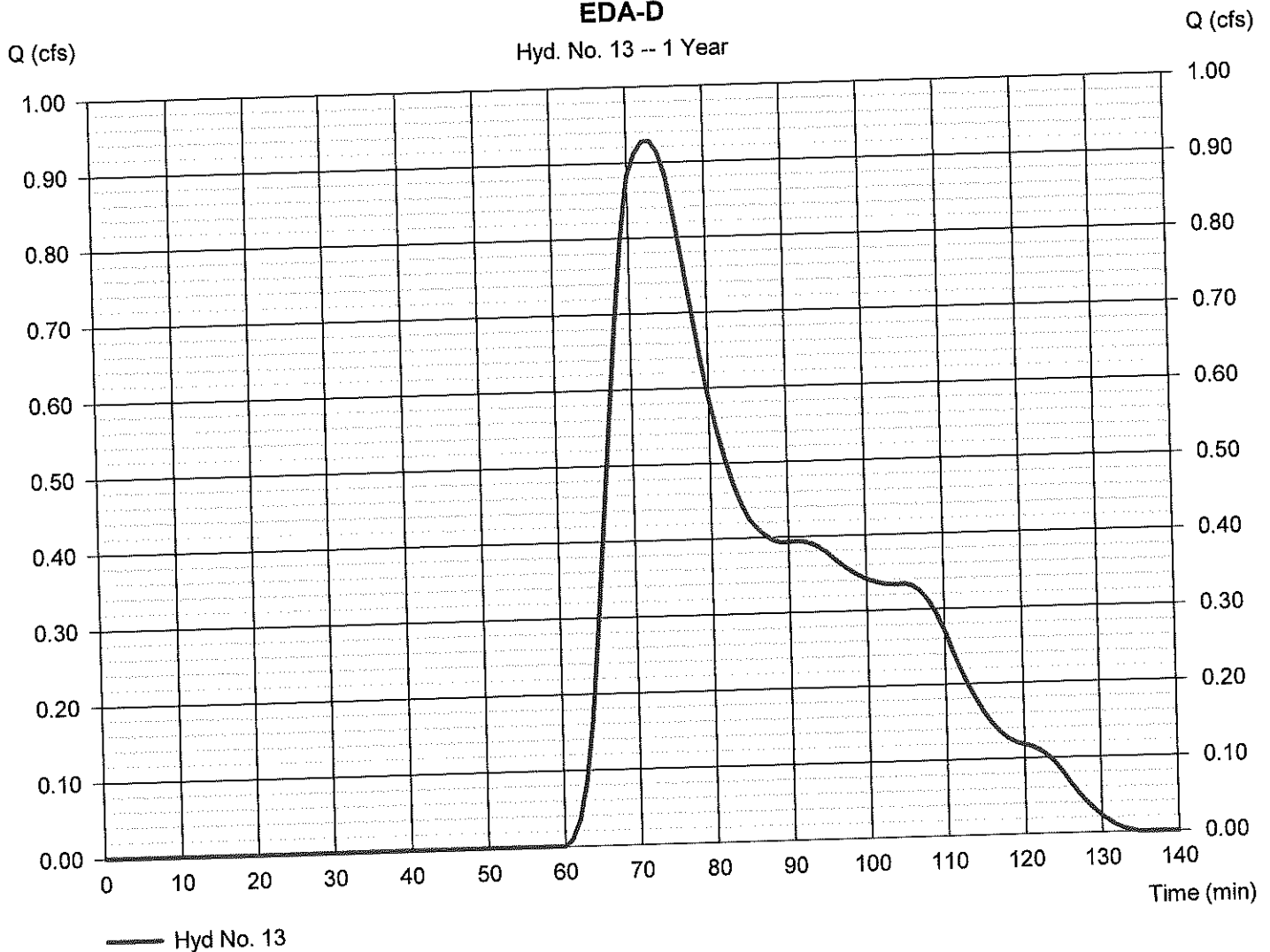
Hyd. No. 13

EDA-D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.929 cfs
Storm frequency	= 1 yrs	Time to peak	= 73 min
Time interval	= 1 min	Hyd. volume	= 1,543 cuft
Drainage area	= 3.640 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors	Shapefactors	= 484

EDA-D

Hyd. No. 13 -- 1 Year



TR55 Tc Worksheet

Hyd. No. 13

EDA-D

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.000	0.000	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 21.20	0.00	0.00	
Travel Time (min)	= 8.30	+ 0.00	+ 0.00	= 8.30
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	288.00	0.00	
Watercourse slope (%)	= 0.00	3.00	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	2.79	0.00	
Travel Time (min)	= 0.00	+ 1.72	+ 0.00	= 1.72
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				10.00 min

Hydrograph Report

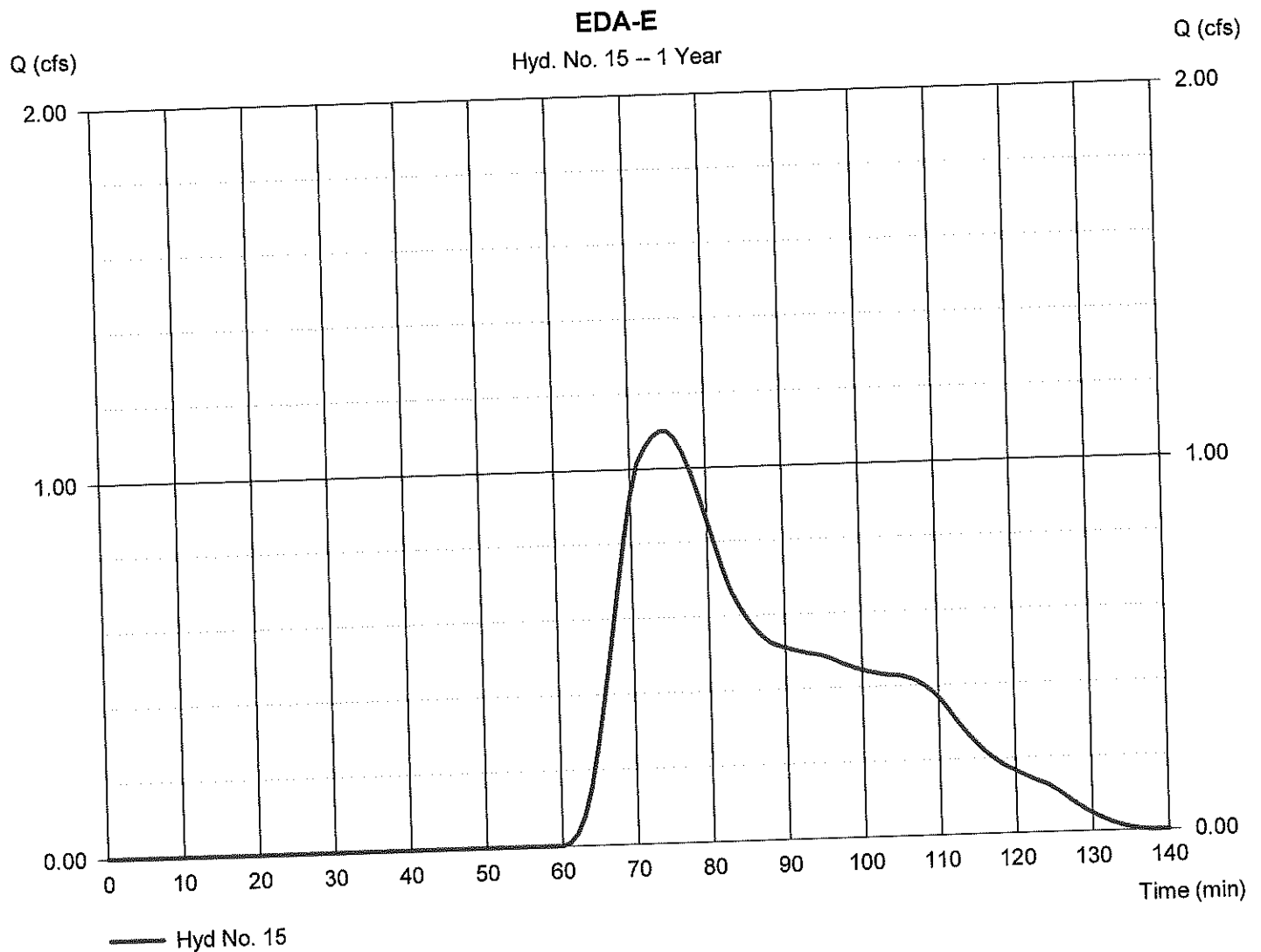
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 15

EDA-E

Hydrograph type	= SCS Runoff	Peak discharge	= 1.100 cfs
Storm frequency	= 1 yrs	Time to peak	= 75 min
Time interval	= 1 min	Hyd. volume	= 1,963 cuft
Drainage area	= 4.550 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25inShapefactors	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 15

EDA-E

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 12.40	0.00	0.00	
Travel Time (min)	= 10.29	+ 0.00	+ 0.00	= 10.29
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	257.00	0.00	
Watercourse slope (%)	= 0.00	5.30	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	3.71	0.00	
Travel Time (min)	= 0.00	+ 1.15	+ 0.00	= 1.15
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	(0)0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				11.40 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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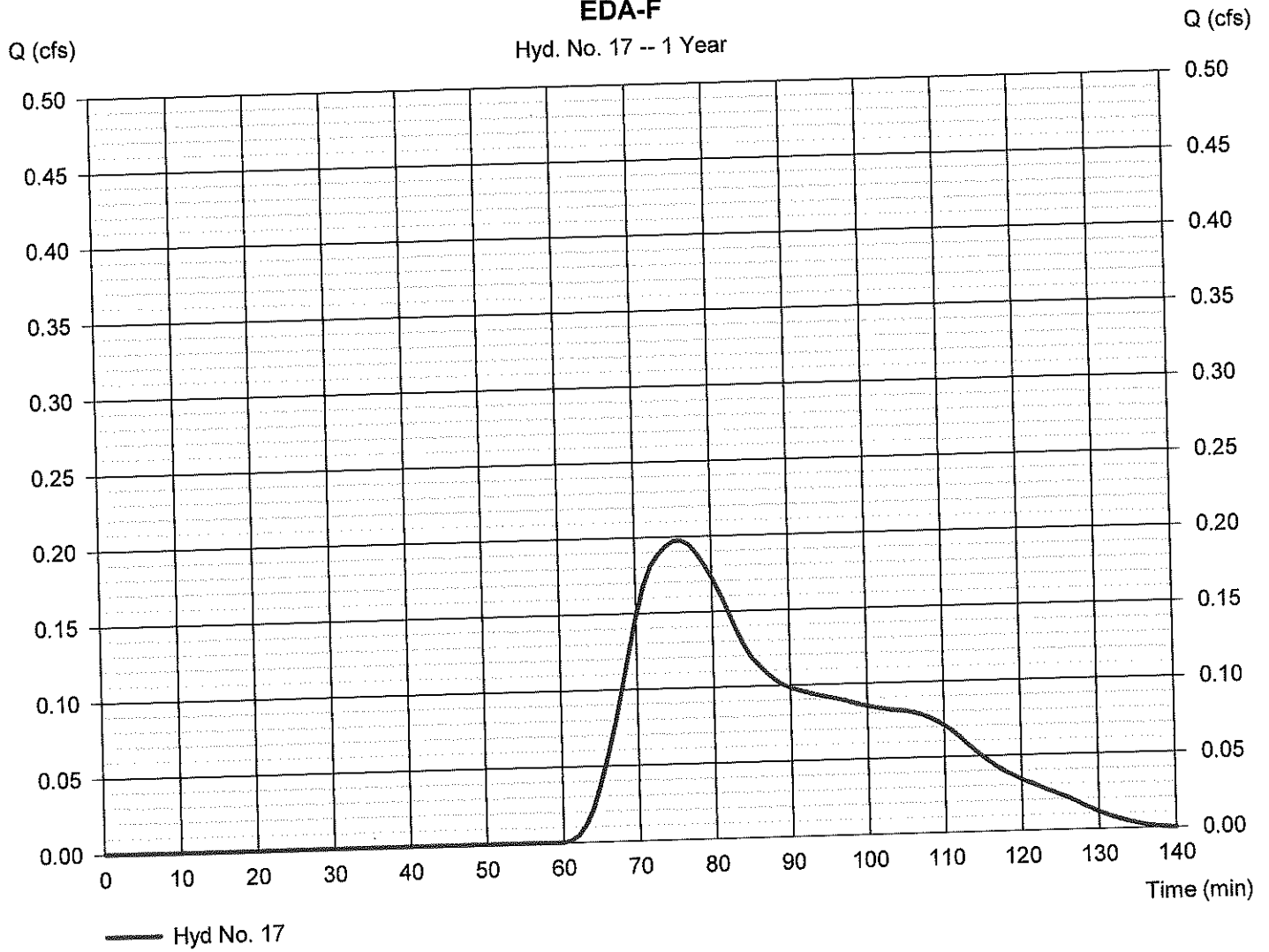
Hyd. No. 17

EDA-F

Hydrograph type	= SCS Runoff	Peak discharge	= 0.198 cfs
Storm frequency	= 1 yrs	Time to peak	= 76 min
Time interval	= 1 min	Hyd. volume	= 367 cuft
Drainage area	= 0.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.70 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in Storm	Shape factor	= 484

EDA-F

Hyd. No. 17 -- 1 Year



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 17

EDA-F

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow							
Manning's n-value	= 0.400		0.240		0.011		
Flow length (ft)	= 51.0		49.0		0.0		
Two-year 24-hr precip. (in)	= 3.24		3.24		0.00		
Land slope (%)	= 16.30		3.20		0.00		
Travel Time (min)	= 5.38	+	6.64	+	0.00	=	12.02
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		62.00		0.00		
Watercourse slope (%)	= 0.00		1.00		0.00		
Surface description	= Paved		Unpaved		Paved		
Average velocity (ft/s)	=0.00		1.61		0.00		
Travel Time (min)	= 0.00	+	0.64	+	0.00	=	0.64
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	{{0}}0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							12.70 min

Hydrograph Report

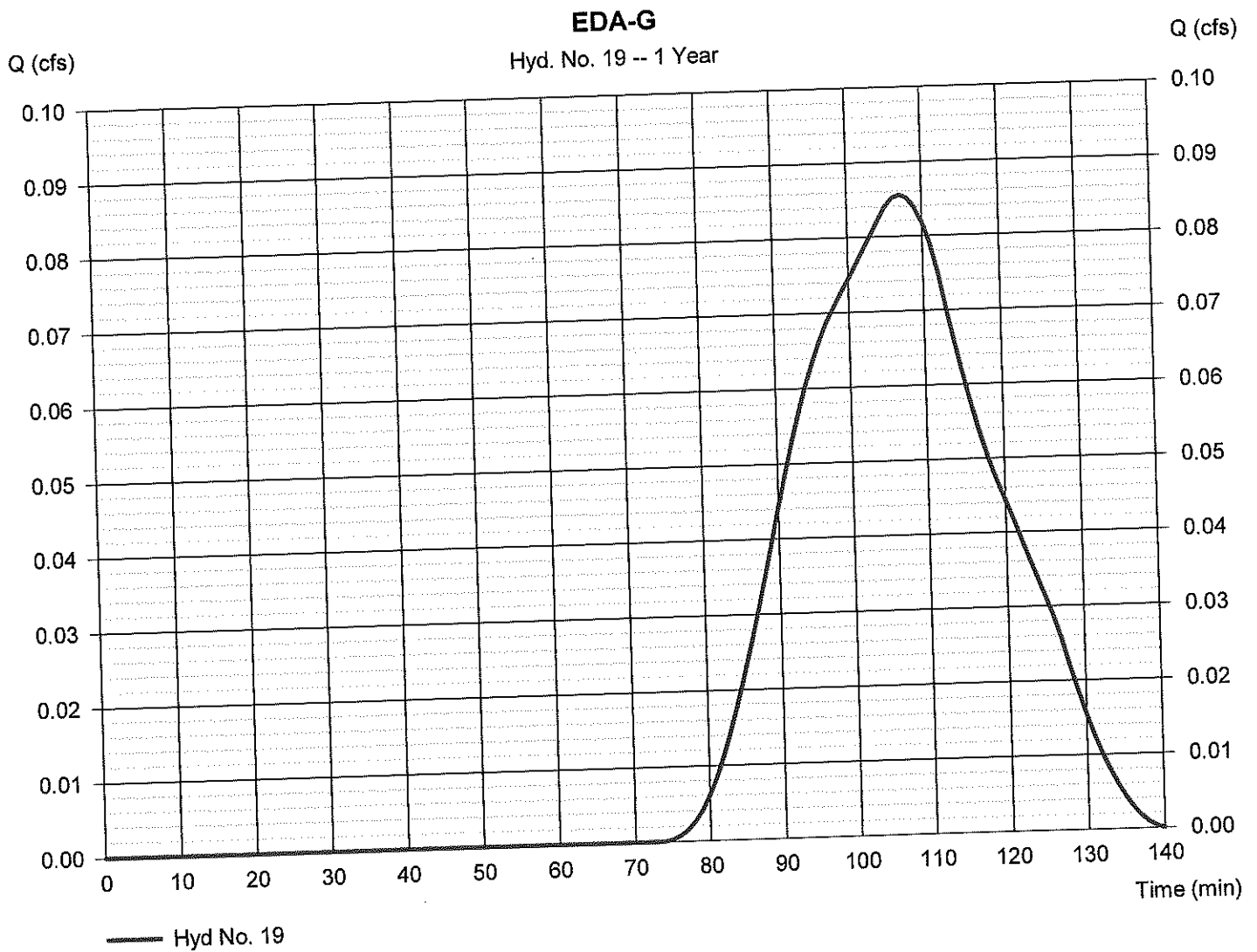
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 19

EDA-G

Hydrograph type	= SCS Runoff	Peak discharge	= 0.086 cfs
Storm frequency	= 1 yrs	Time to peak	= 107 min
Time interval	= 1 min	Hyd. volume	= 160 cuft
Drainage area	= 4.980 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.60 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25inShapefacts	Shape	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 19

EDA-G

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 10.50	0.00	0.00	
Travel Time (min)	= 10.99	+ 0.00	+ 0.00	= 10.99
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	159.00	276.00	
Watercourse slope (%)	= 0.00	12.20	6.70	
Surface description	= Paved	Unpaved	Unpaved	
Average velocity (ft/s)	=0.00	5.64	4.18	
Travel Time (min)	= 0.00	+ 0.47	+ 1.10	= 1.57
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				12.60 min

Hydrograph Report

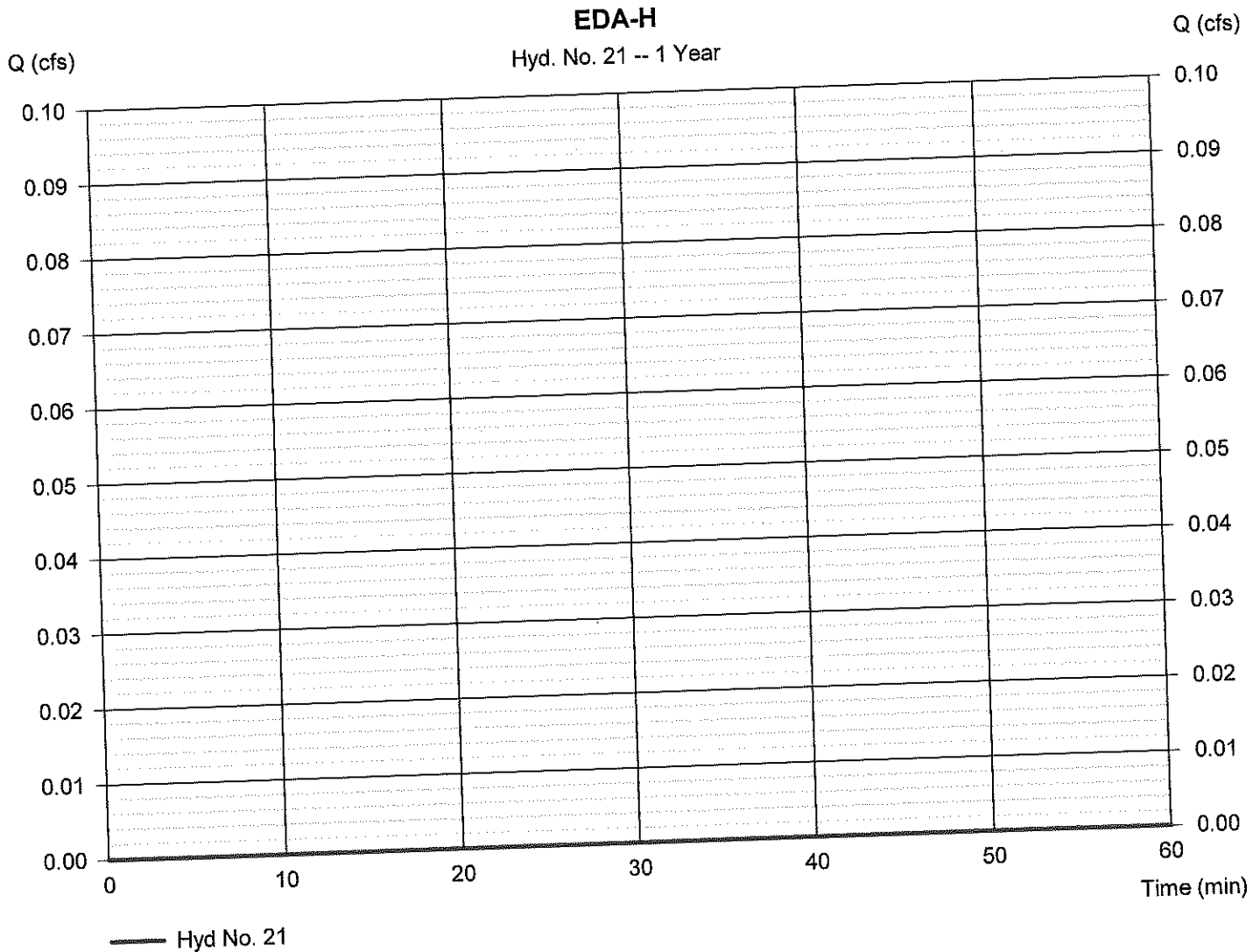
Monday, 11 / 25 / 2019

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 21

EDA-H

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 12.100 ac	Curve number	= 37
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 33.50 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefcts	Shapefcts	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 21

EDA-H

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.150	0.011	
Flow length (ft)	= 32.0	68.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	3.24	0.00	
Land slope (%)	= 3.00	0.10	0.00	
Travel Time (min)	= 7.29	+ 23.71	+ 0.00	= 31.00
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	452.00	
Watercourse slope (%)	= 0.00	0.00	3.40	
Surface description	= Paved	Paved	Unpaved	
Average velocity (ft/s)	=0.00	0.00	2.98	
Travel Time (min)	= 0.00	+ 0.00	+ 2.53	= 2.53
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				33.50 min

Hydrograph Report

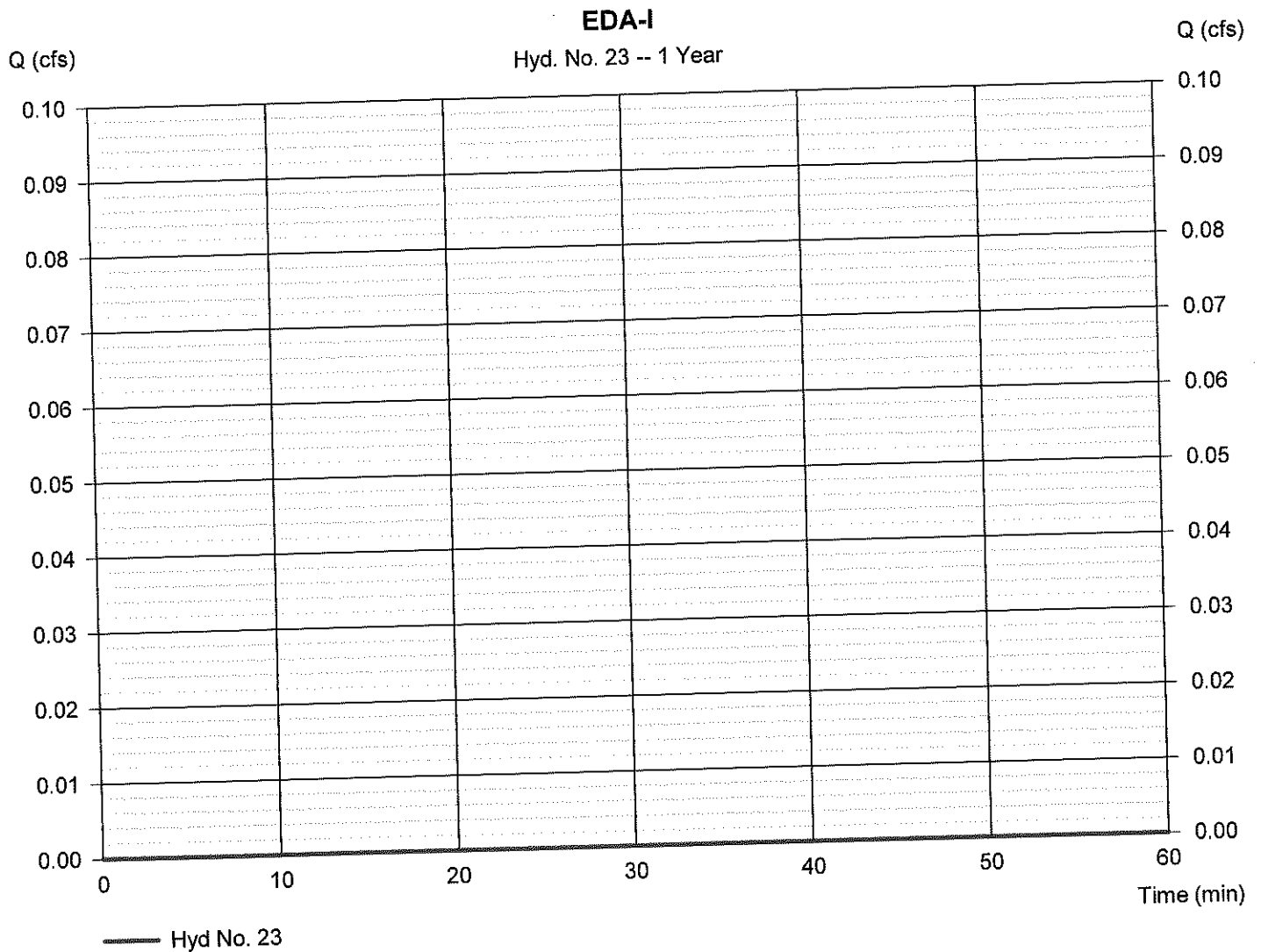
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 23

EDA-I

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 1.050 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefcts	Shapefcts	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 23

EDA-I

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 1.90	0.00	0.00	
Travel Time (min)	= 21.78	+ 0.00	+ 0.00	= 21.78
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	97.00	0.00	
Watercourse slope (%)	= 0.00	13.80	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	5.99	0.00	
Travel Time (min)	= 0.00	+ 0.27	+ 0.00	= 0.27
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				22.10 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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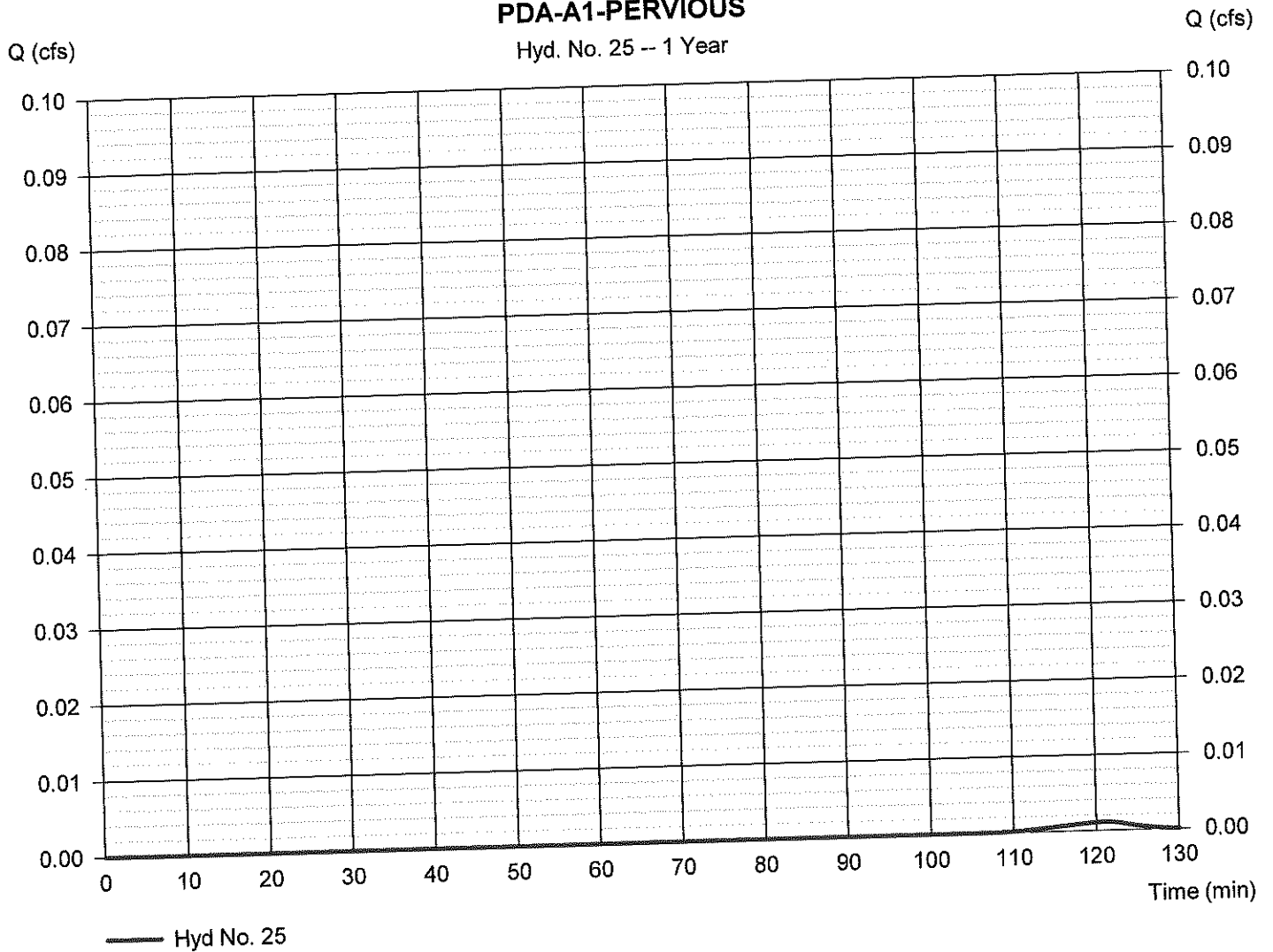
Hyd. No. 25

PDA-A1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 121 min
Time interval	= 1 min	Hyd. volume	= 1 cuft
Drainage area	= 1.880 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors	Shape factors	= 484

PDA-A1-PERVIOUS

Hyd. No. 25 -- 1 Year



Hydrograph Report

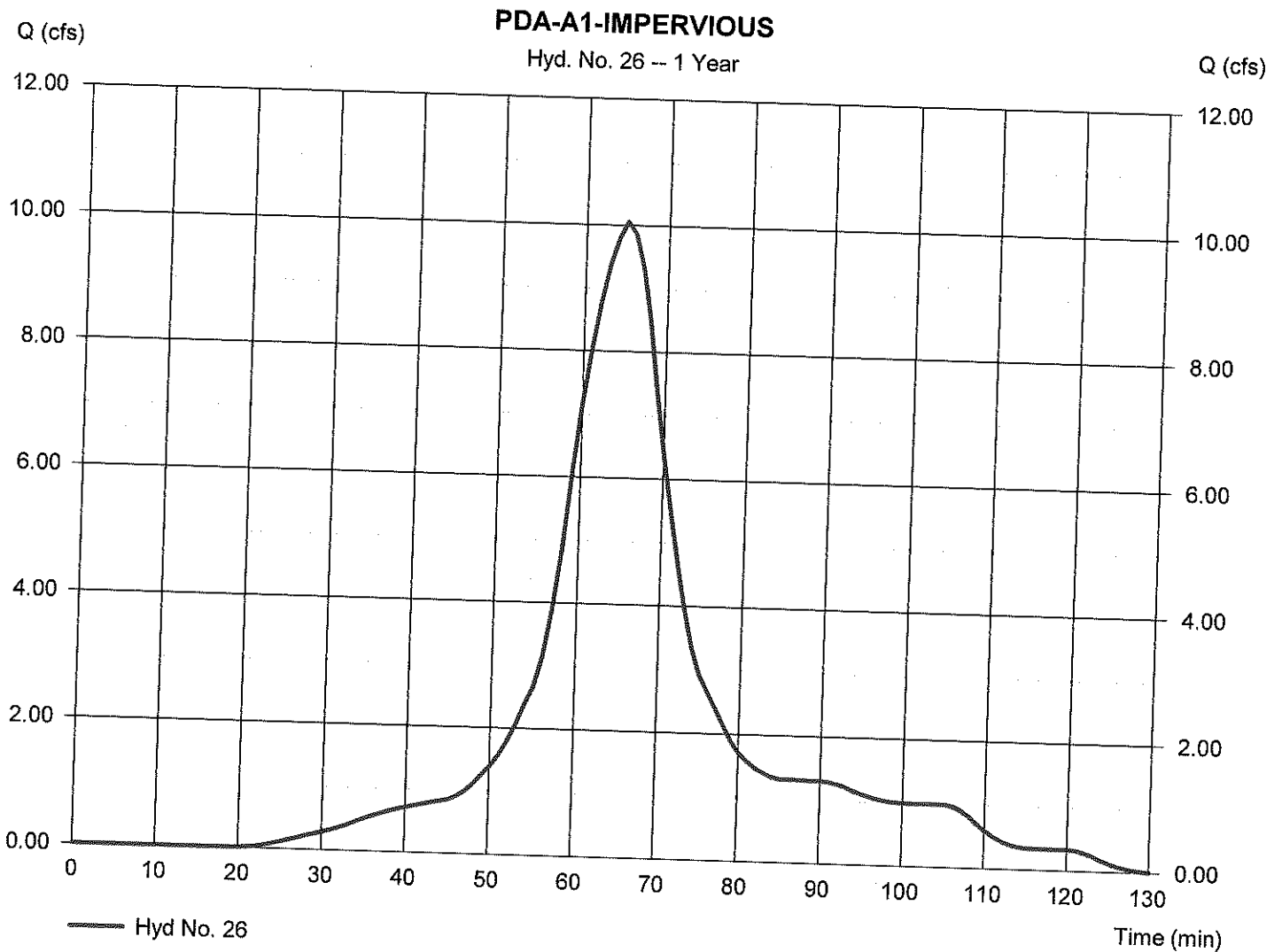
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 26

PDA-A1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 10.06 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 12,548 cuft
Drainage area	= 3.240 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25inShapefactors		= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

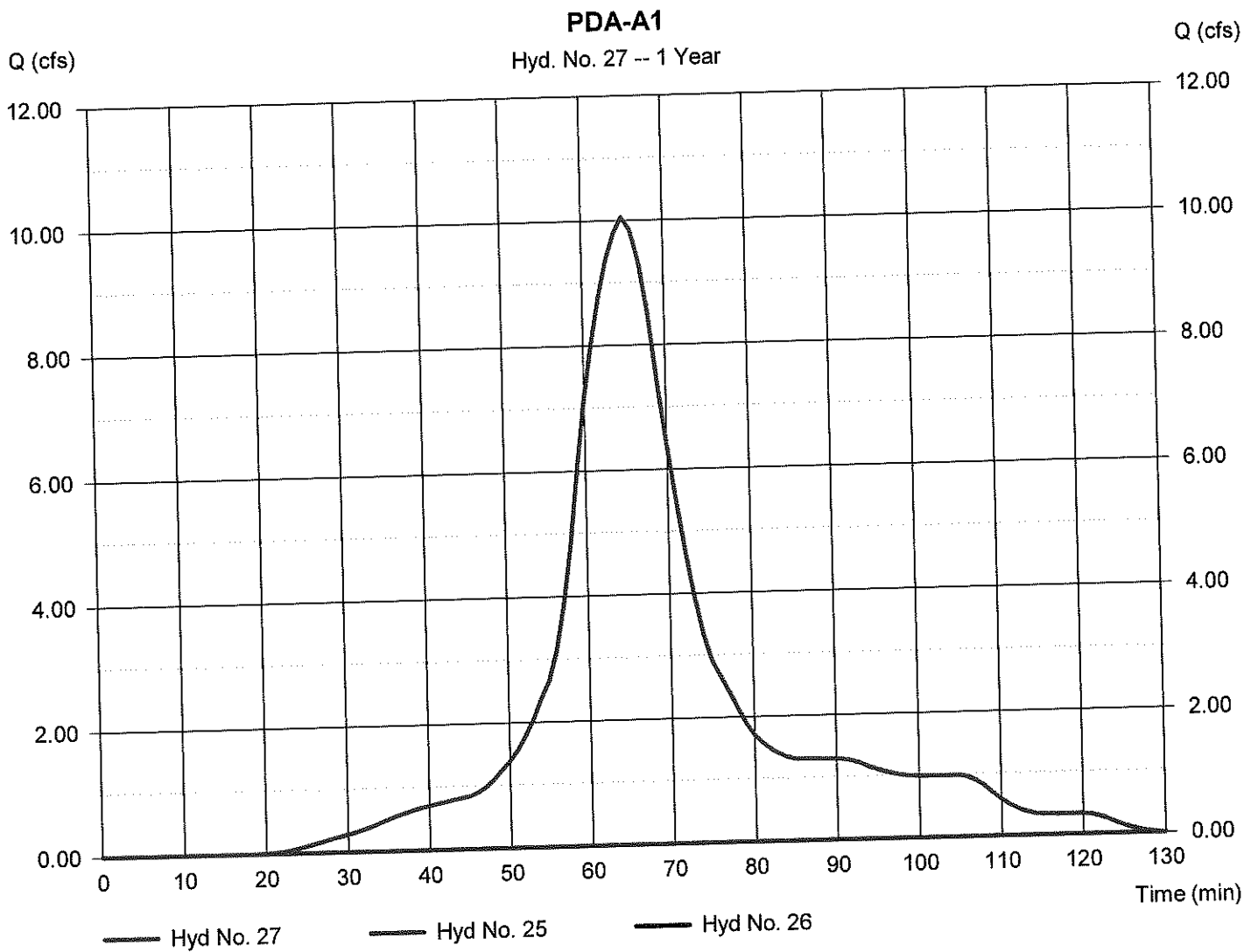
Monday, 11 / 25 / 2019

Hyd. No. 27

PDA-A1

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyds. = 25, 26

Peak discharge = 10.06 cfs
 Time to peak = 65 min
 Hyd. volume = 12,549 cuft
 Contrib. drain. area = 5.120 ac



Hydrograph Report

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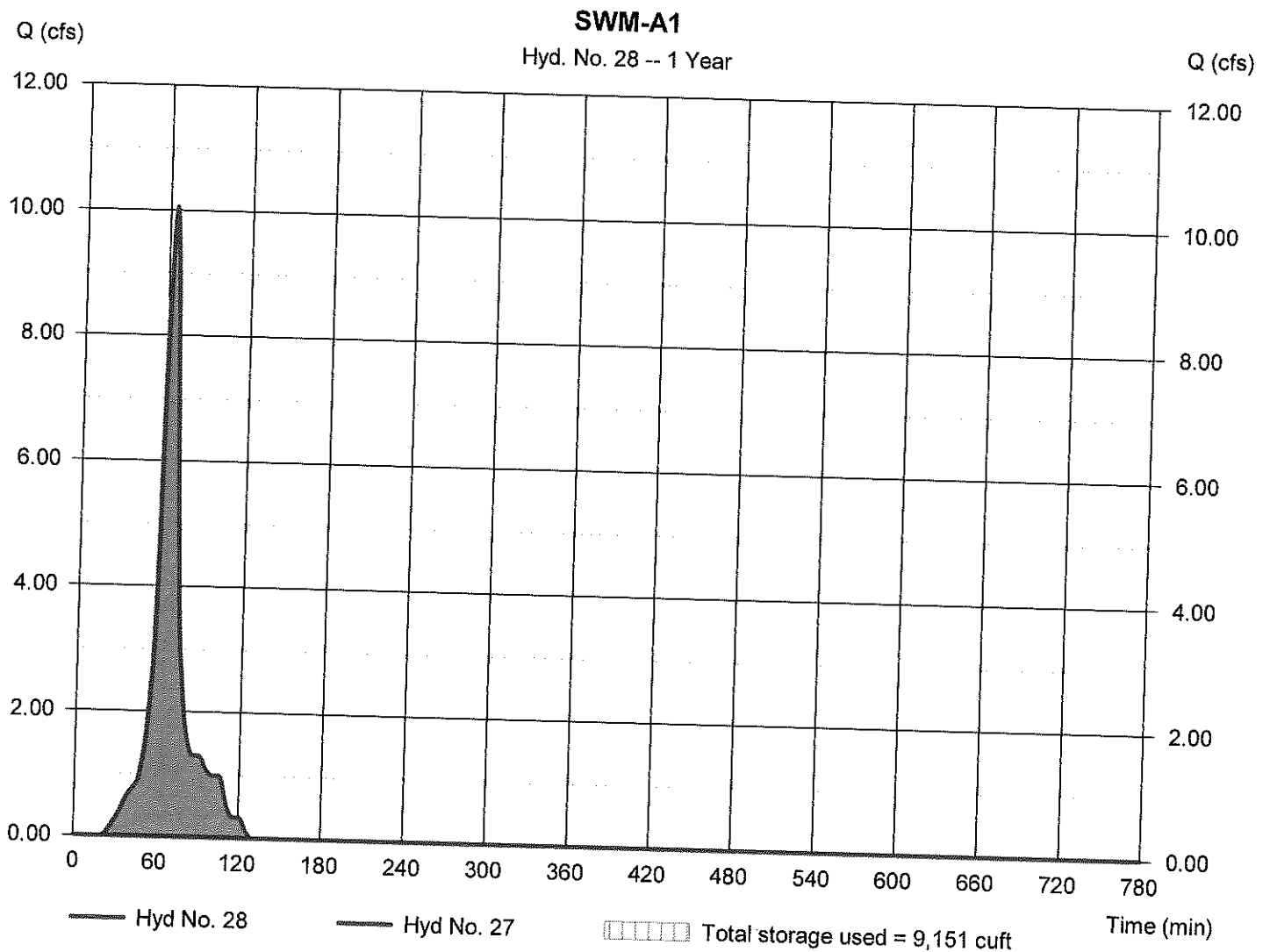
Monday, 11 / 25 / 2019

Hyd. No. 28

SWM-A1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 67 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 27 - PDA-A1	Max. Elevation	= 591.84 ft
Reservoir name	= SWM-A1	Max. Storage	= 9,151 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Monday, 11 / 25 / 2019

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Pond No. 1 - SWM-A1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 591.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	591.00	10,042	0	0
1.00	592.00	11,757	10,887	10,887
2.00	593.00	13,529	12,631	23,519
3.00	594.00	15,357	14,431	37,950
4.00	595.00	17,241	16,288	54,238
5.00	596.00	19,182	18,201	72,439

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	= 0	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)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 595.50	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)	= 5.000 (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 (lc) and submergence (s).

Stage / Storage / Discharge Table

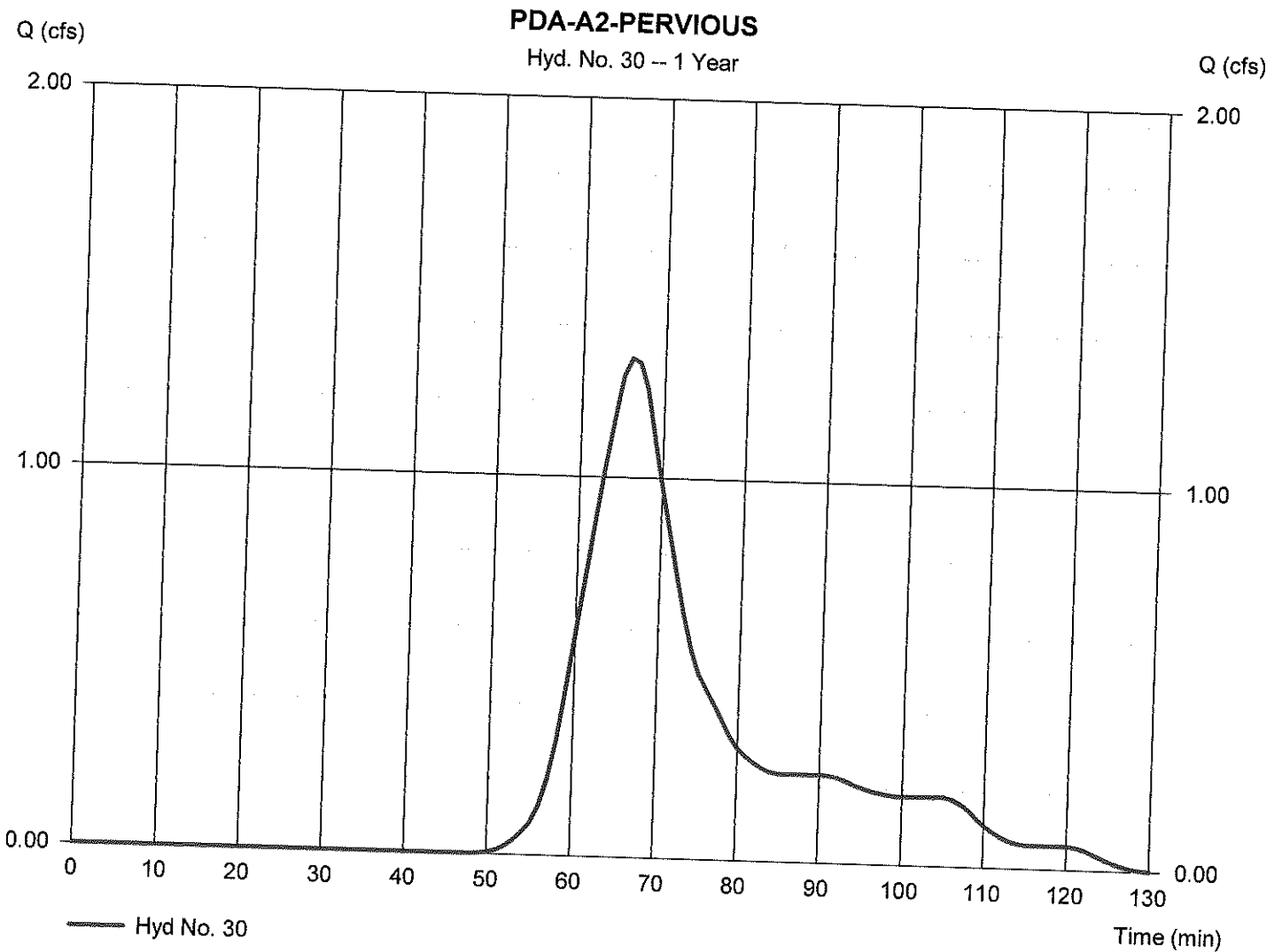
Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	591.00	---	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	10,887	592.00	---	---	---	---	0.00	---	---	---	1.361	---	1.361
2.00	23,519	593.00	---	---	---	---	0.00	---	---	---	1.566	---	1.566
3.00	37,950	594.00	---	---	---	---	0.00	---	---	---	1.777	---	1.777
4.00	54,238	595.00	---	---	---	---	0.00	---	---	---	1.995	---	1.995
5.00	72,439	596.00	---	---	---	---	9.19	---	---	---	2.220	---	11.41

Hydrograph Report

Hyd. No. 30

PDA-A2-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.314 cfs
Storm frequency	= 1 yrs	Time to peak	= 66 min
Time interval	= 1 min	Hyd. volume	= 1,497 cuft
Drainage area	= 0.810 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25inShapefactors	Shape factors	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

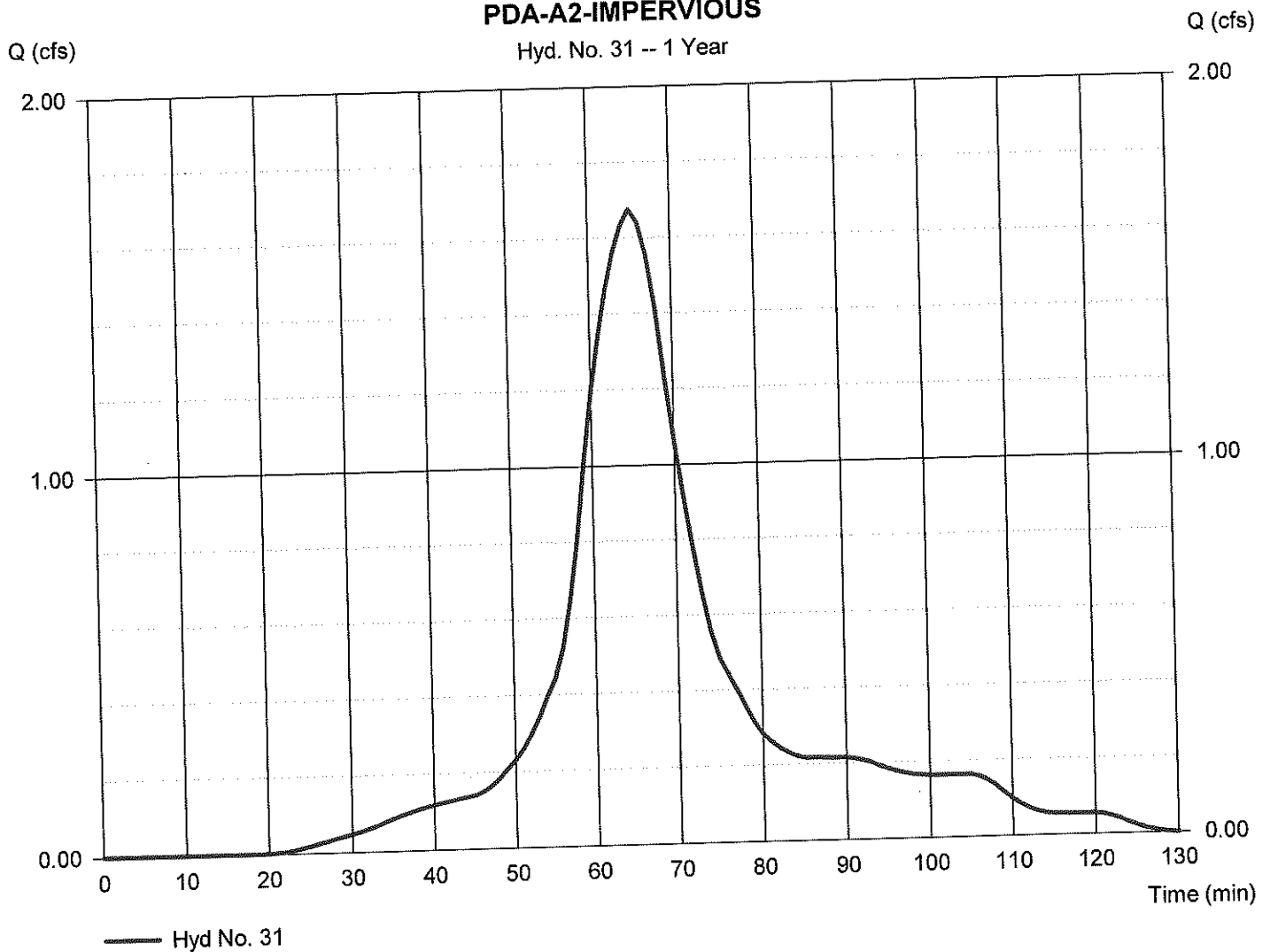
Hyd. No. 31

PDA-A2-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.676 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 2,091 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors	Shape factors	= 484

PDA-A2-IMPERVIOUS

Hyd. No. 31 -- 1 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

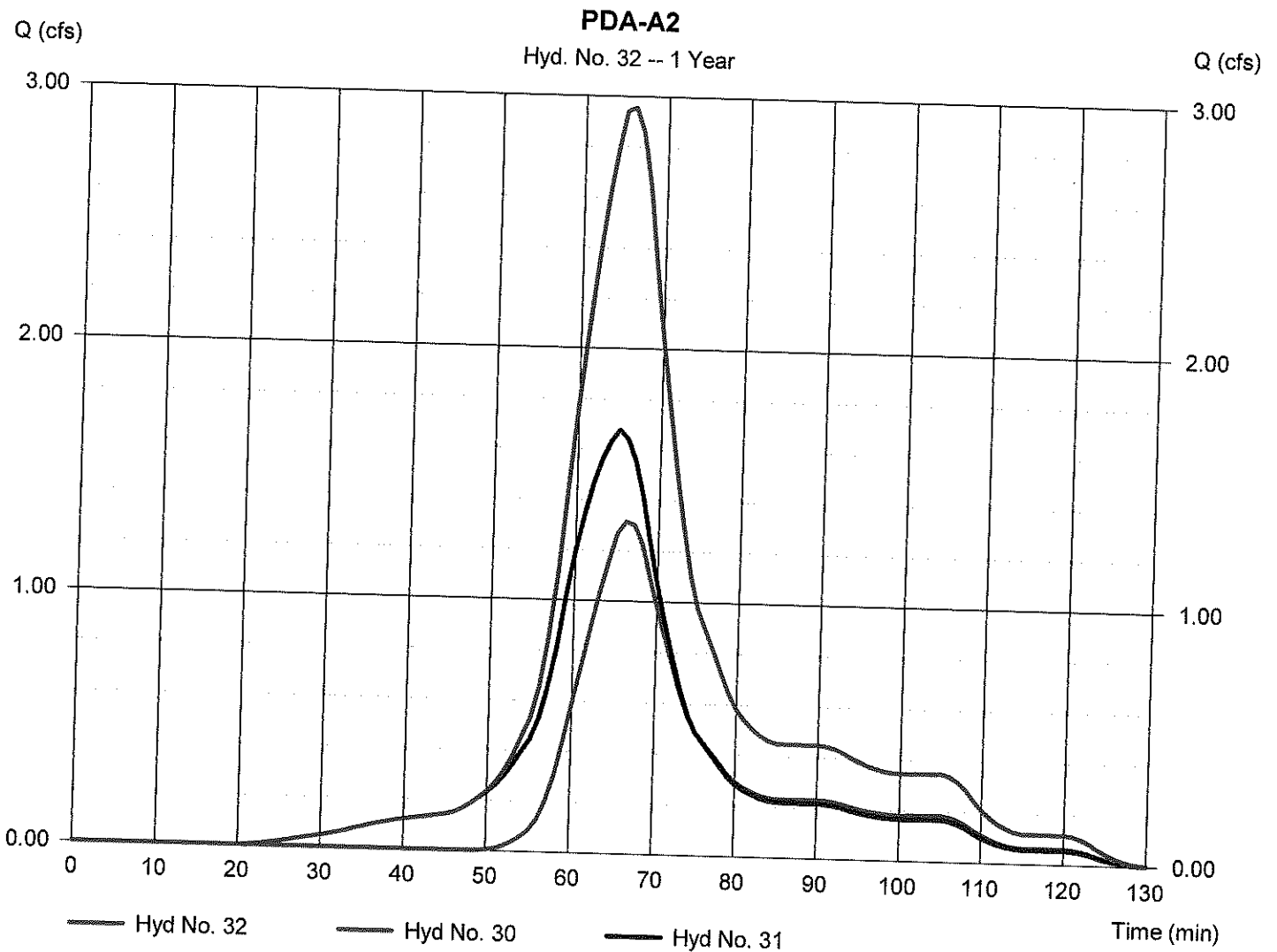
Monday, 11 / 25 / 2019

Hyd. No. 32

PDA-A2

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 30, 31

Peak discharge = 2.956 cfs
Time to peak = 66 min
Hyd. volume = 3,589 cuft
Contrib. drain. area = 1.350 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

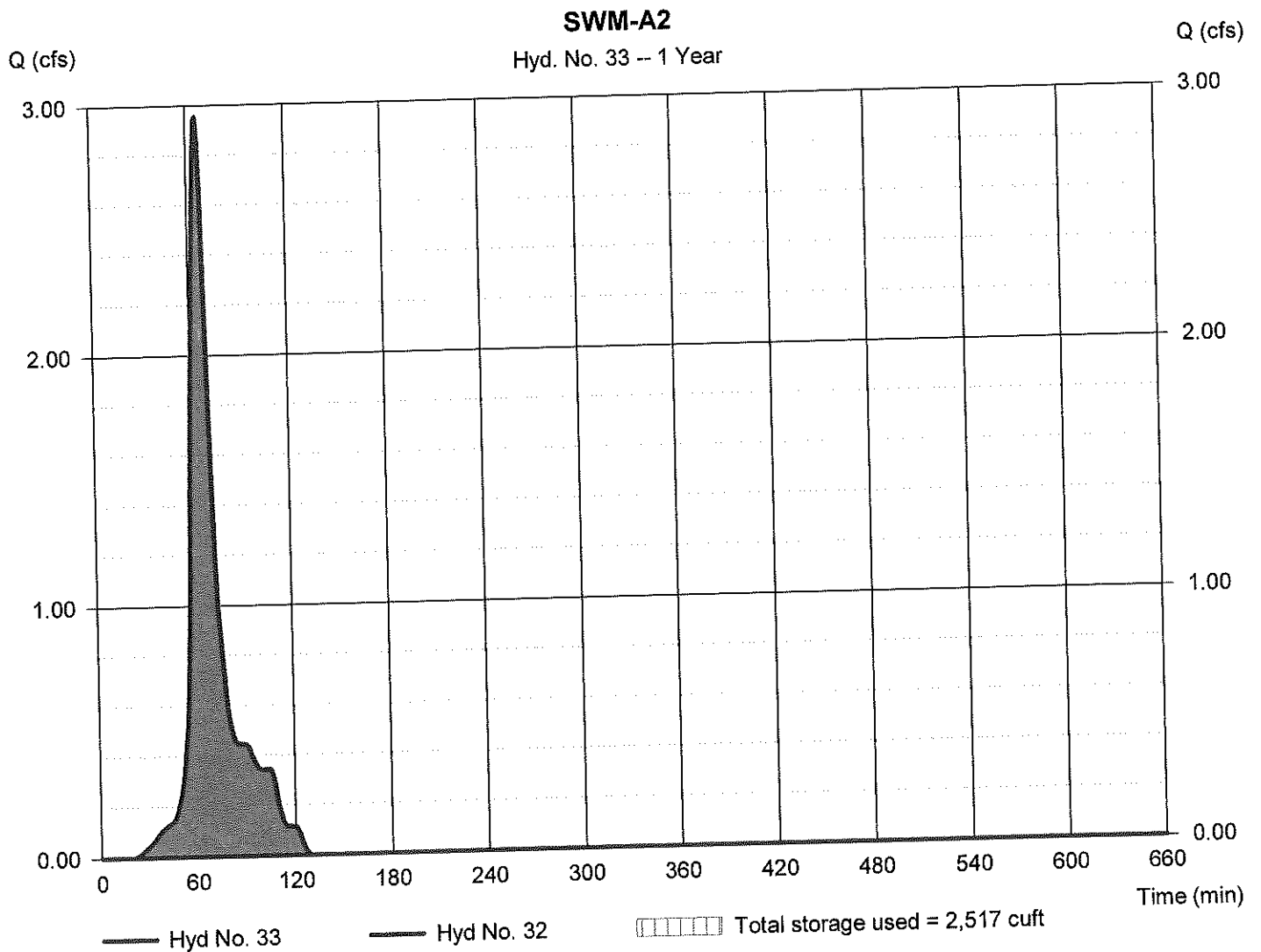
Monday, 11 / 25 / 2019

Hyd. No. 33

SWM-A2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 92 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - PDA-A2	Max. Elevation	= 600.31 ft
Reservoir name	= SWM-A2	Max. Storage	= 2,517 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Pond No. 3 - SWM-A2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 600.00 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	600.00	20,000	0	0
2.00	602.00	20,000	15,998	15,998

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	600.00	---	---	---	---	---	---	---	---	0.000	---	0.000
2.00	15,998	602.00	---	---	---	---	---	---	---	---	2.315	---	2.315

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

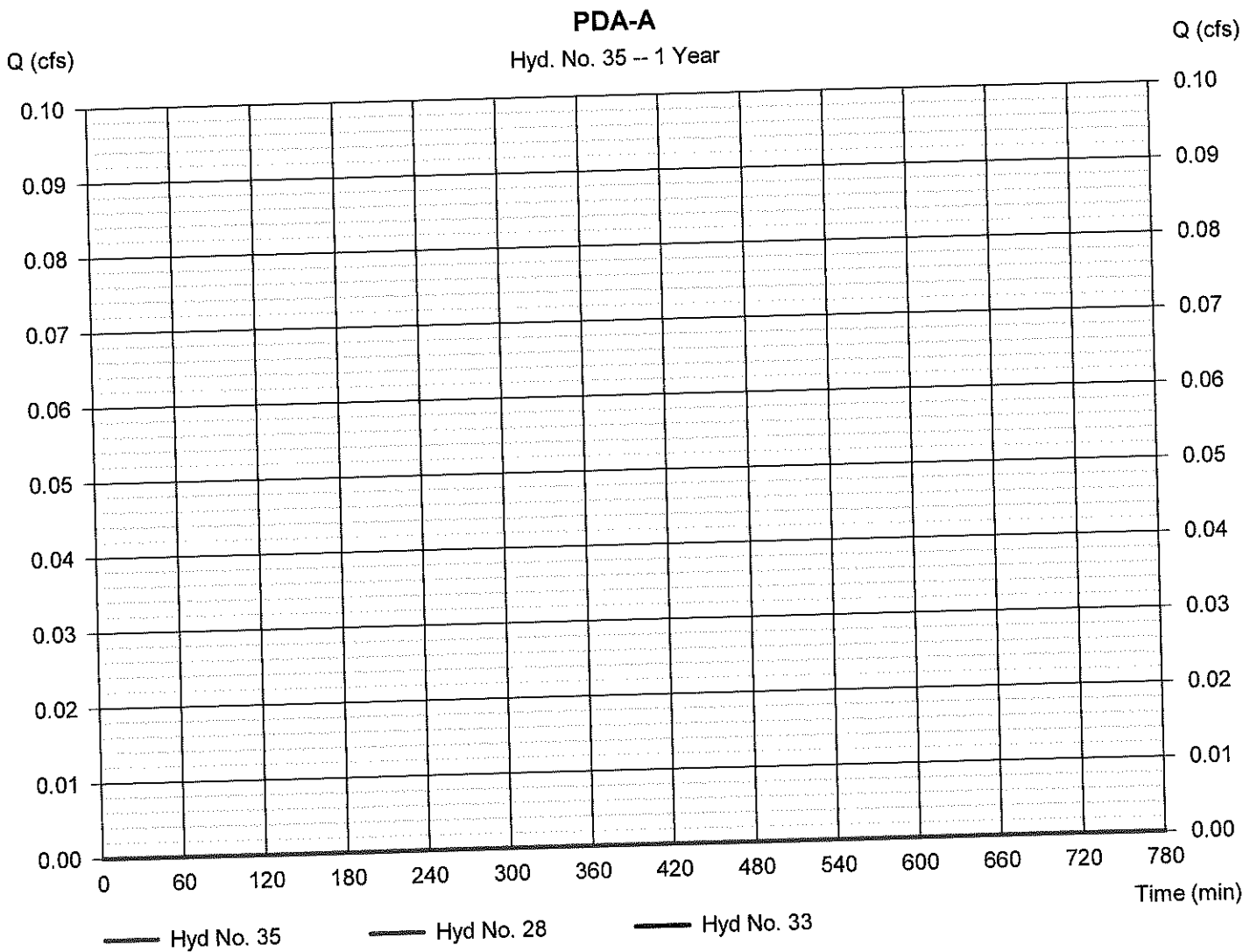
Monday, 11 / 25 / 2019

Hyd. No. 35

PDA-A

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyds. = 28, 33

Peak discharge = 0.000 cfs
 Time to peak = 172 min
 Hyd. volume = 0 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

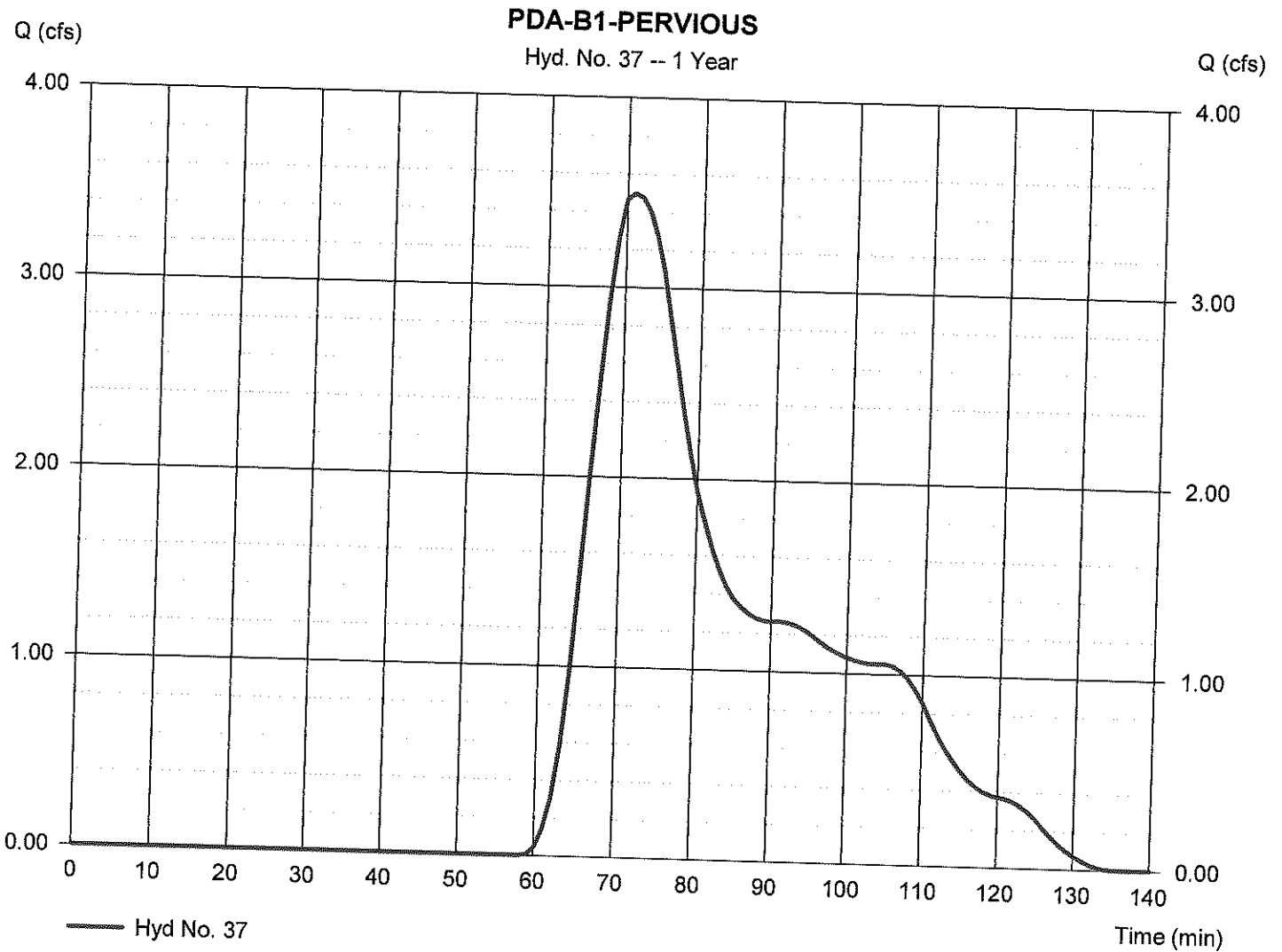
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 37

PDA-B1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.495 cfs
Storm frequency	= 1 yrs	Time to peak	= 71 min
Time interval	= 1 min	Hyd. volume	= 5,390 cuft
Drainage area	= 9.720 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefcts	Shapefcts	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 37

PDA-B1-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 0.20	0.00	0.00	
Travel Time (min)	= 3.02	+ 0.00	+ 0.00	= 3.02
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	458.00	0.00	
Watercourse slope (%)	= 0.00	0.30	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	1.11	0.00	
Travel Time (min)	= 0.00	+ 6.86	+ 0.00	= 6.86
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				9.90 min

Hydrograph Report

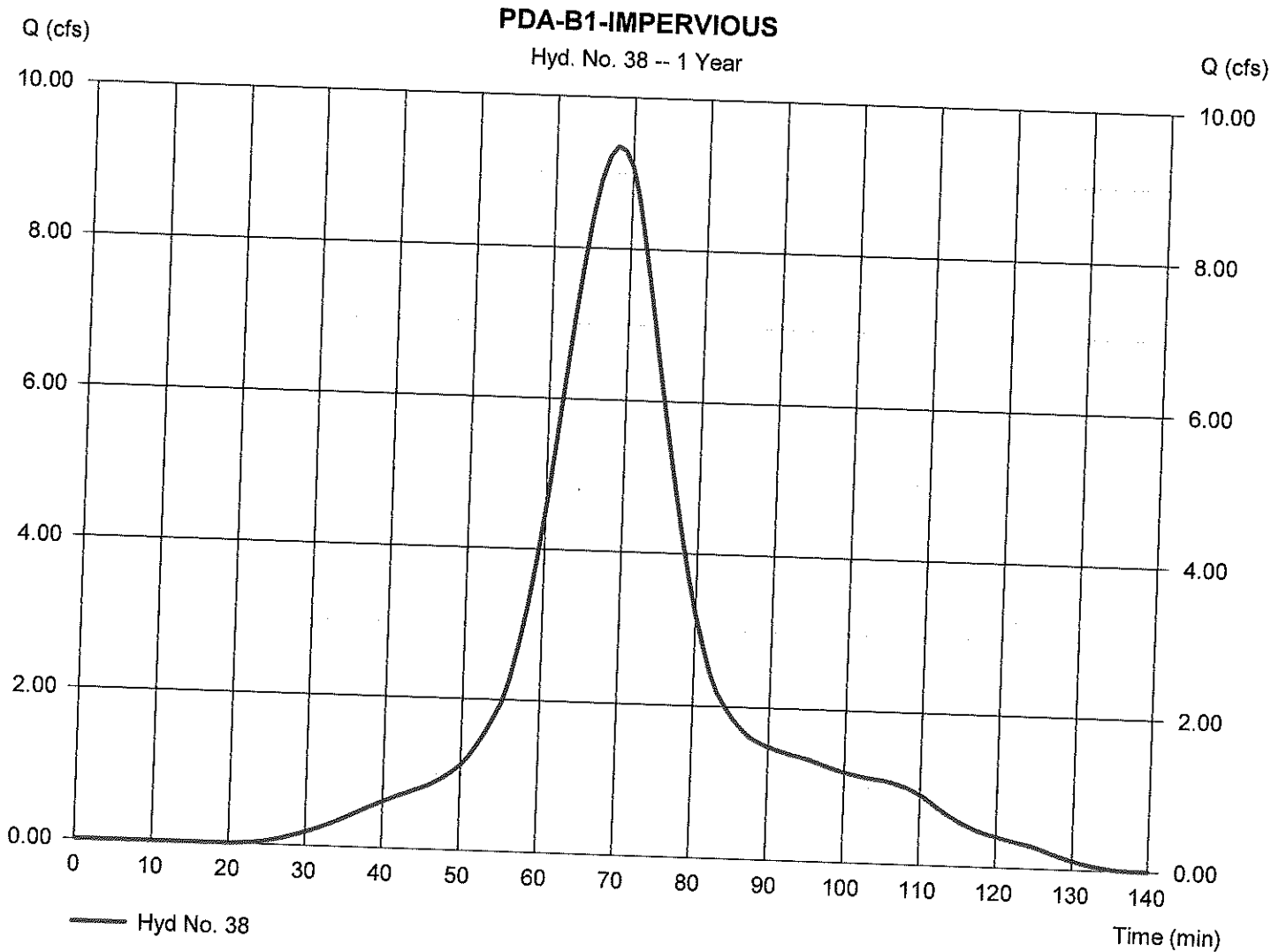
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 38

PDA-B1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 9.353 cfs
Storm frequency	= 1 yrs	Time to peak	= 68 min
Time interval	= 1 min	Hyd. volume	= 13,685 cuft
Drainage area	= 3.580 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in Storm	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 38

PDA-B1-IMPERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.150	0.011	
Flow length (ft)	= 44.0	56.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	3.24	0.00	
Land slope (%)	= 0.90	3.60	0.00	
Travel Time (min)	= 0.86	+ 4.84	+ 0.00	= 5.70
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	442.00	
Watercourse slope (%)	= 0.00	0.00	0.50	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=0.00	0.00	1.44	
Travel Time (min)	= 0.00	+ 0.00	+ 5.12	= 5.12
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				10.80 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

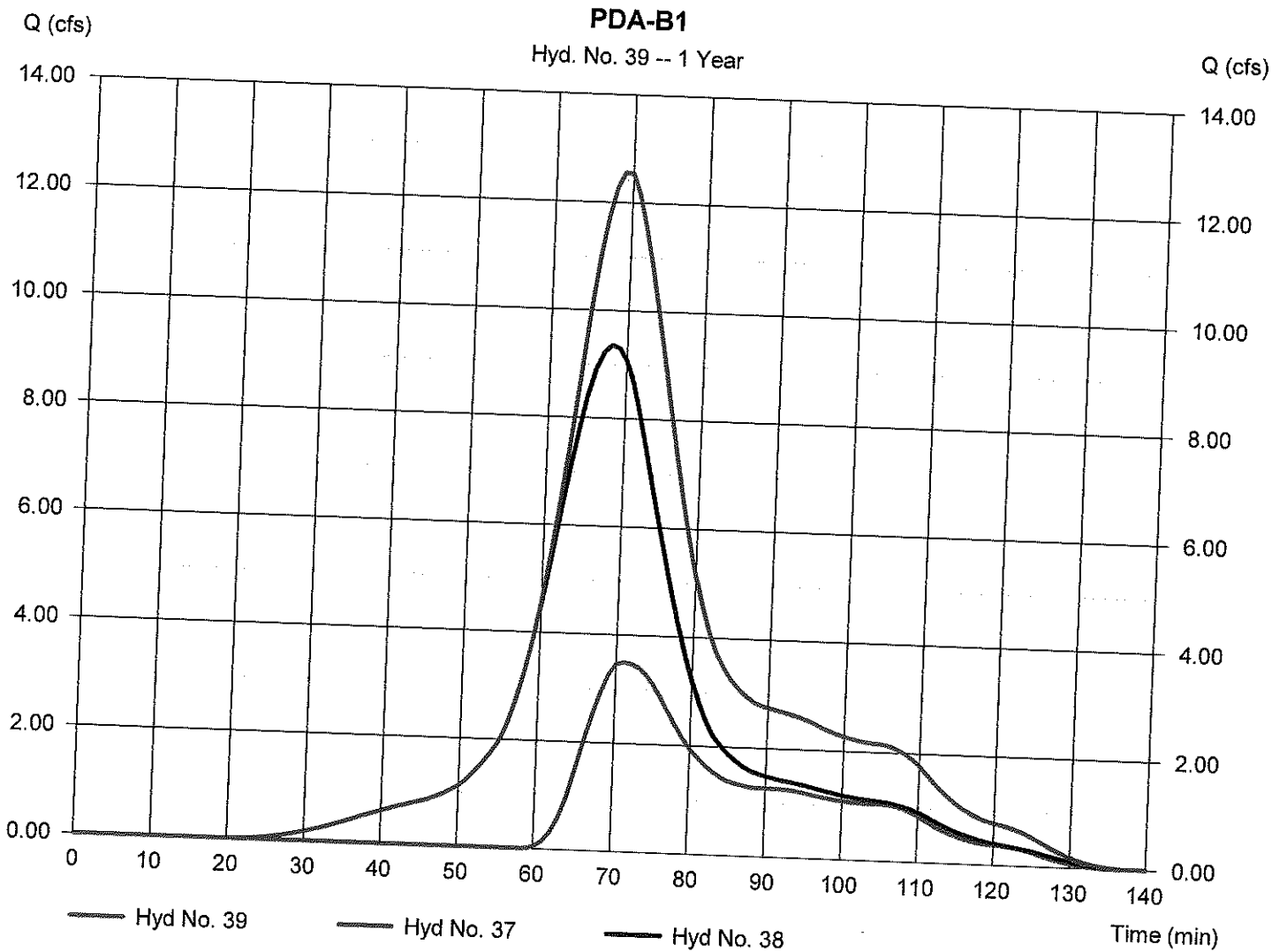
Monday, 11 / 25 / 2019

Hyd. No. 39

PDA-B1

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 37, 38

Peak discharge = 12.56 cfs
Time to peak = 69 min
Hyd. volume = 19,075 cuft
Contrib. drain. area = 13.300 ac



Hydrograph Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

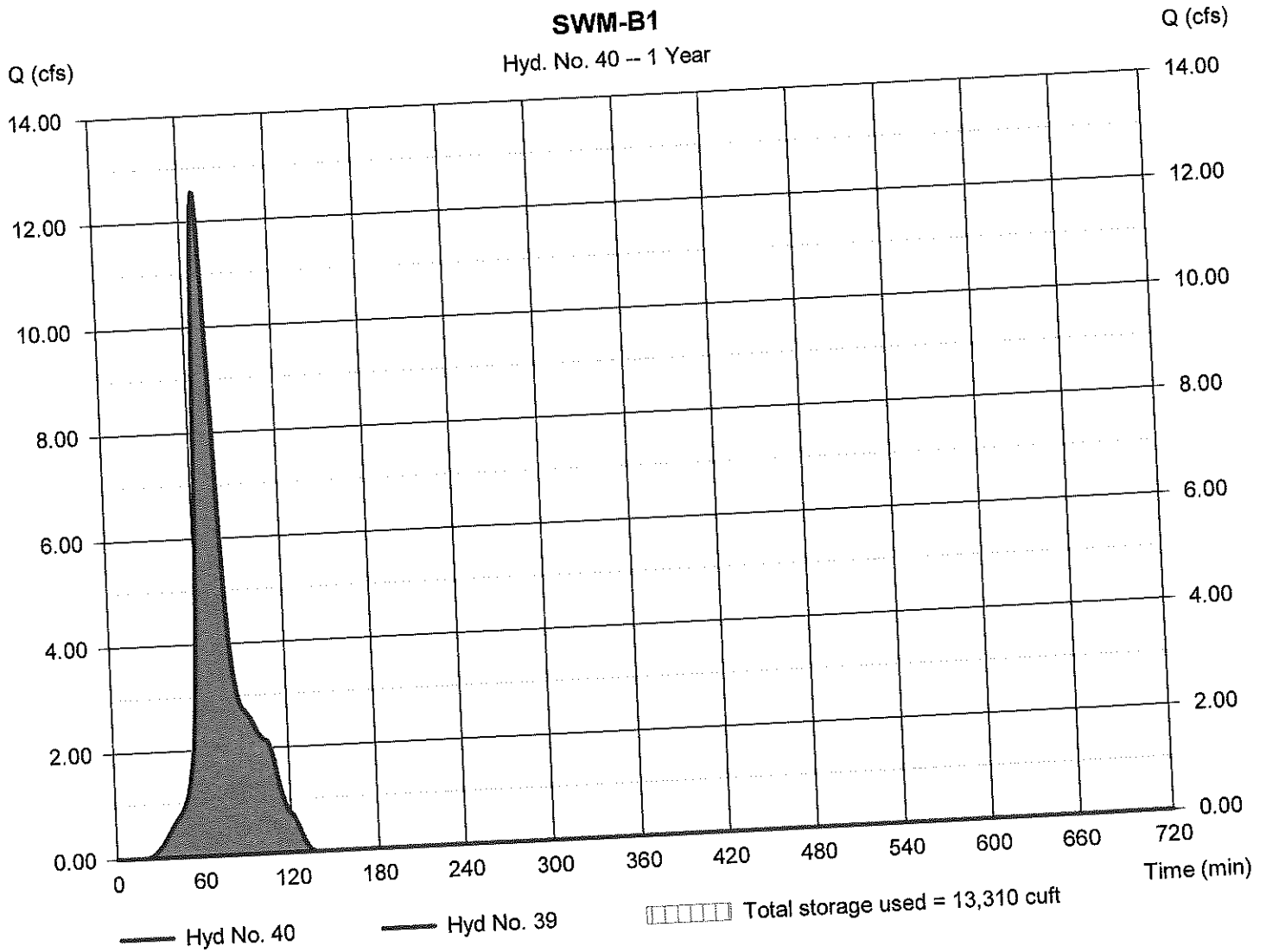
Hyd. No. 40

SWM-B1

Hydrograph type = Reservoir
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyd. No. = 39 - PDA-B1
 Reservoir name = SWM-B1

Peak discharge = 0.000 cfs
 Time to peak = 71 min
 Hyd. volume = 0 cuft
 Max. Elevation = 600.38 ft
 Max. Storage = 13,310 cuft

Storage indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

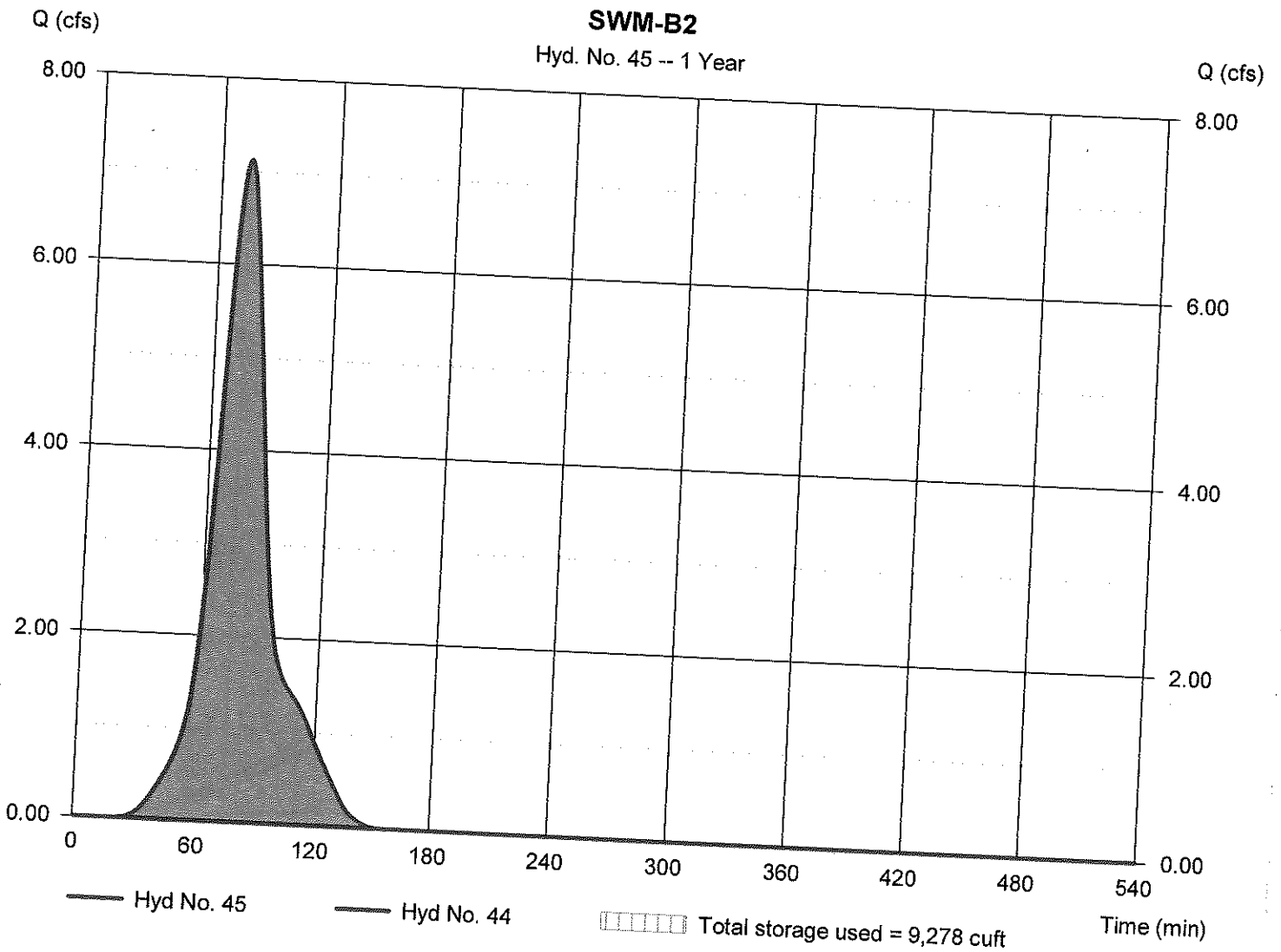
Monday, 11 / 25 / 2019

Hyd. No. 45

SWM-B2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 75 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 44 - PDA-B2	Max. Elevation	= 597.26 ft
Reservoir name	= SWM-B2	Max. Storage	= 9,278 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Monday, 11 / 25 / 2019

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Pond No. 5 - SWM-B2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 597.10 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	597.10	147,346	0	0
1.50	598.60	147,346	88,399	88,399

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	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	n/a
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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	597.10	---	---	---	---	---	---	---	---	0.000	---	0.000
1.50	88,399	598.60	---	---	---	---	---	---	---	---	17.054	---	17.05

Hydrograph Report

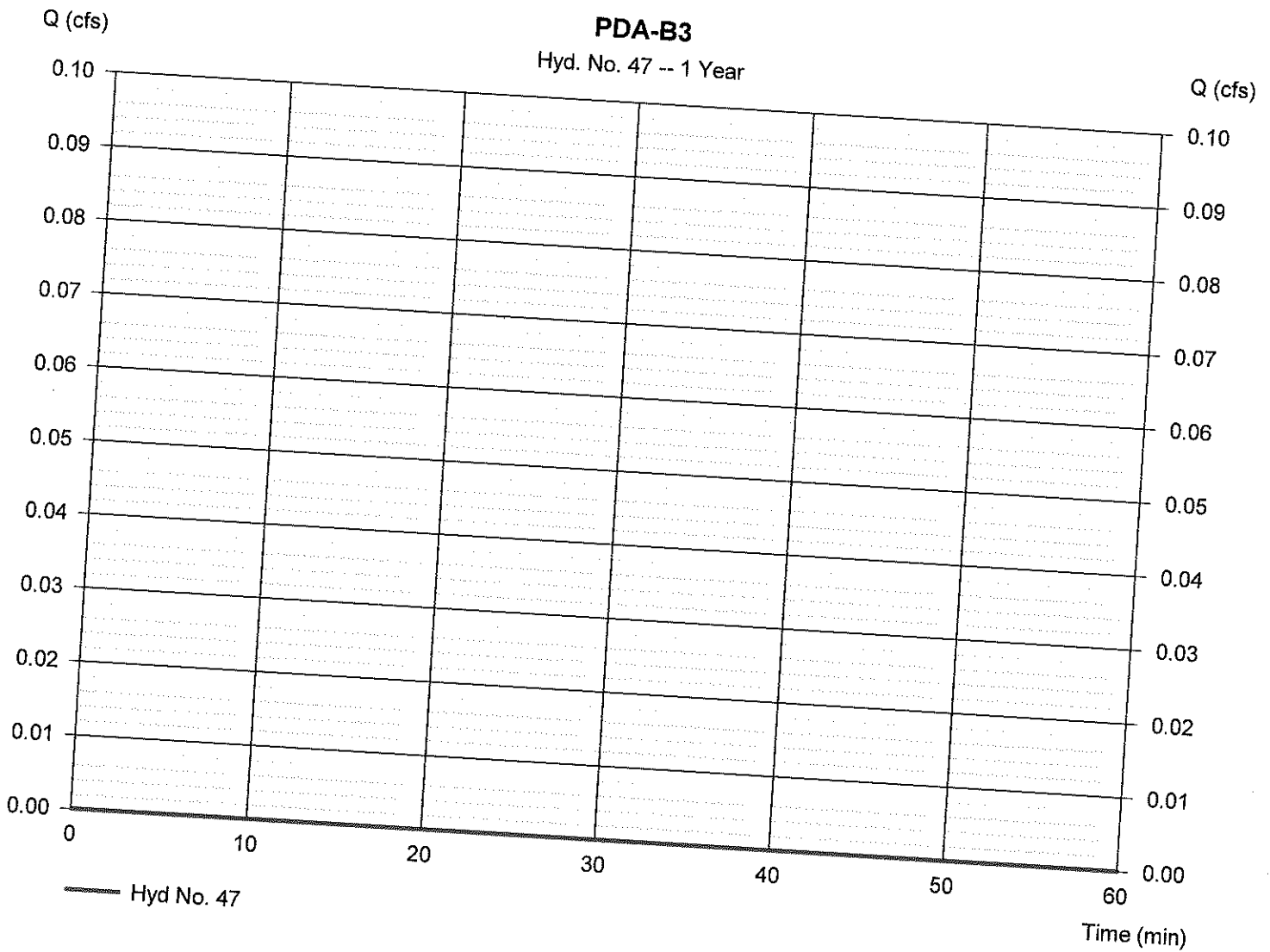
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 47

PDA-B3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.230 ac	Curve number	= 53
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in2hr.storm		= 484



Hydrograph Report

Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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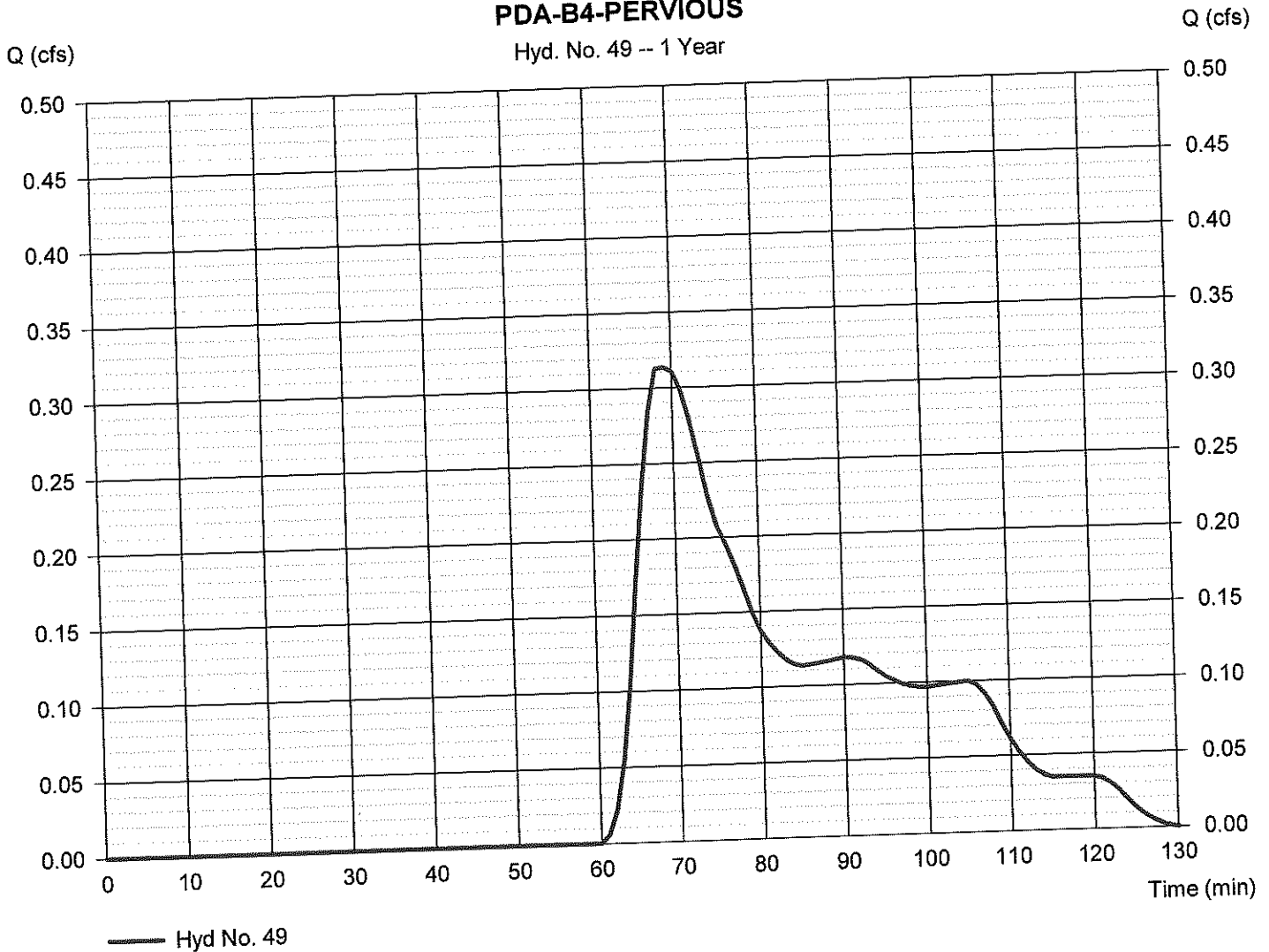
Hyd. No. 49

PDA-B4-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.314 cfs
Storm frequency	= 1 yrs	Time to peak	= 69 min
Time interval	= 1 min	Hyd. volume	= 455 cuft
Drainage area	= 1.040 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in	Shape factor	= 484

PDA-B4-PERVIOUS

Hyd. No. 49 -- 1 Year



Hydrograph Report

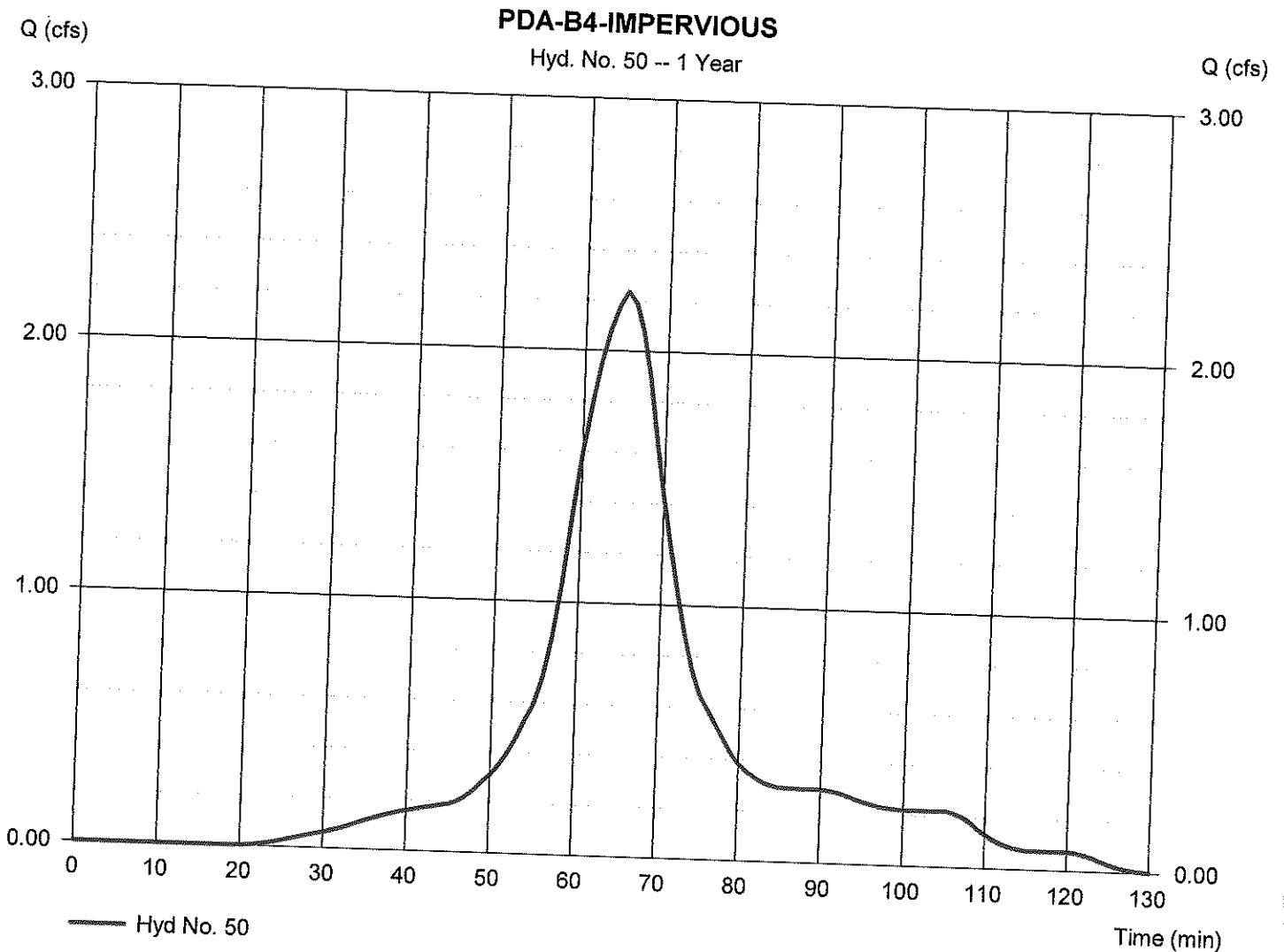
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 50

PDA-B4-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.235 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 2,788 cuft
Drainage area	= 0.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

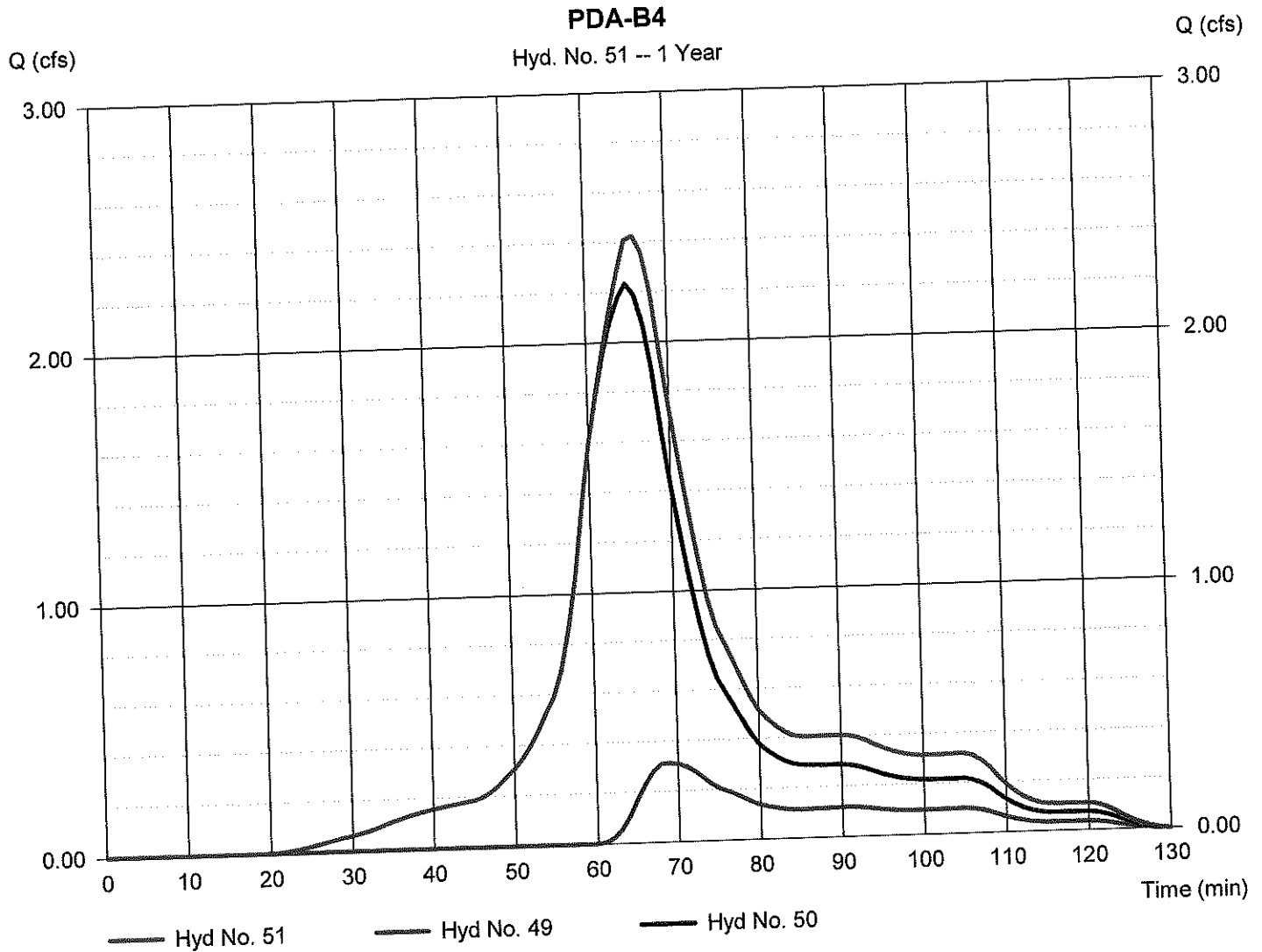
Monday, 11 / 25 / 2019

Hyd. No. 51

PDA-B4

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyds. = 49, 50

Peak discharge = 2.426 cfs
 Time to peak = 66 min
 Hyd. volume = 3,243 cuft
 Contrib. drain. area = 1.760 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

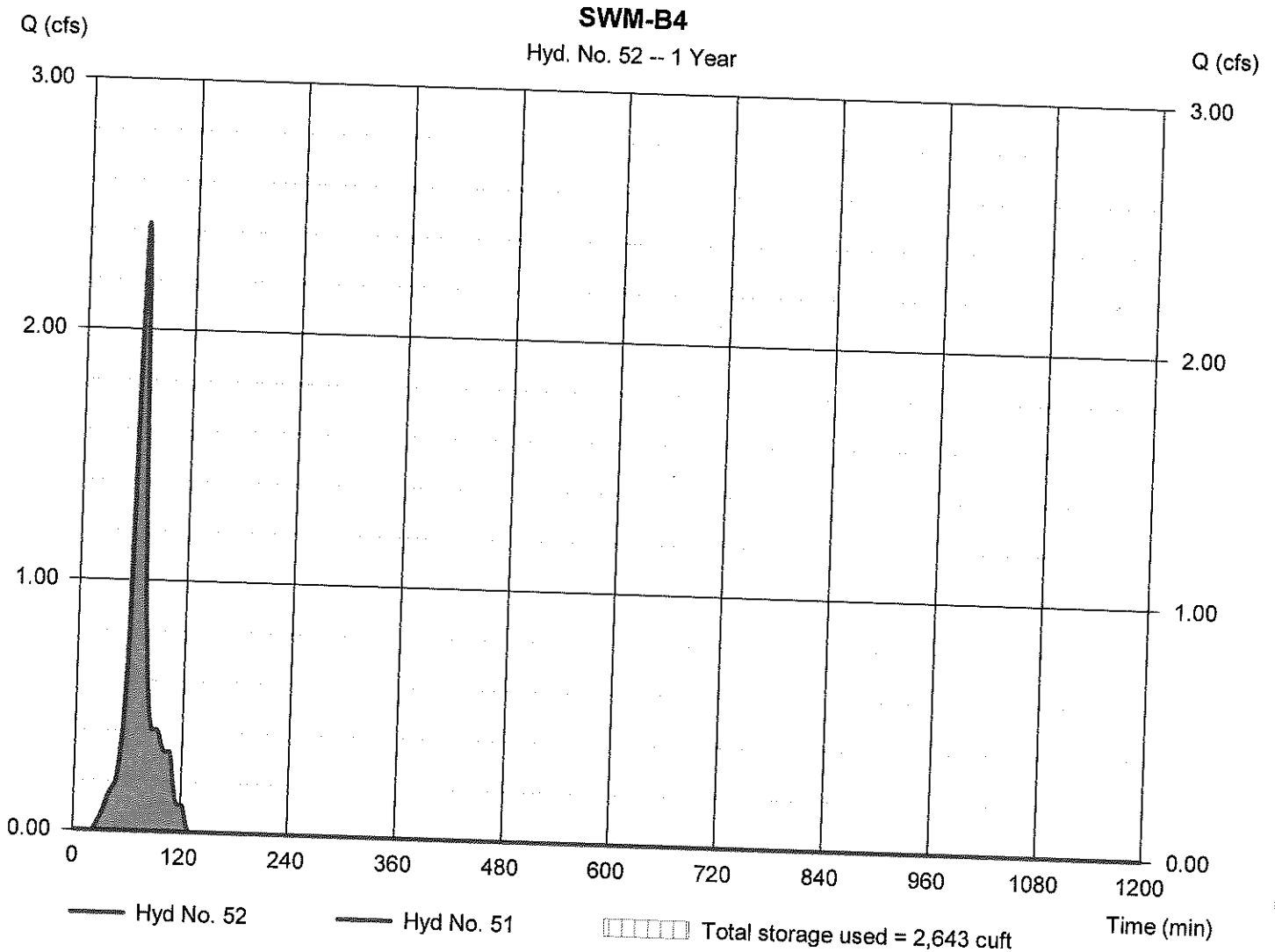
Monday, 11 / 25 / 2019

Hyd. No. 52

SWM-B4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 73 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 51 - PDA-B4	Max. Elevation	= 595.41 ft
Reservoir name	= SWM-B4	Max. Storage	= 2,643 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Pond No. 2 - SWM-B4

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 595.00 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	595.00	16,286	0	0
4.00	599.00	16,286	26,055	26,055

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)	= 1.00	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil. (In/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	595.00	---	---	---	---	---	---	---	---	0.000	---	0.000
4.00	26,055	599.00	---	---	---	---	---	---	---	---	1.885	---	1.885

Hydrograph Report

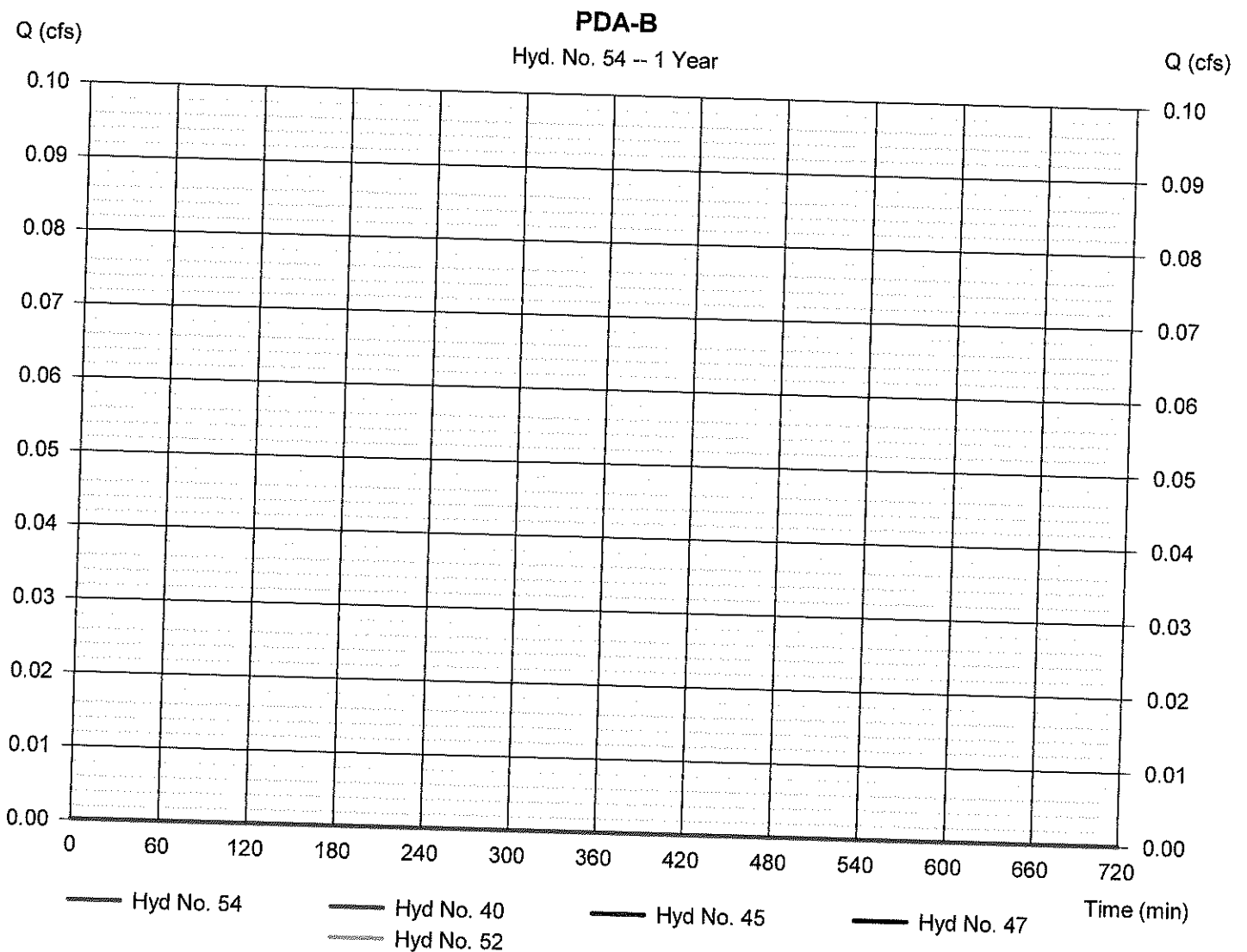
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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Hyd. No. 54

PDA-B

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 84 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 40, 45, 47, 52	Contrib. drain. area	= 0.230 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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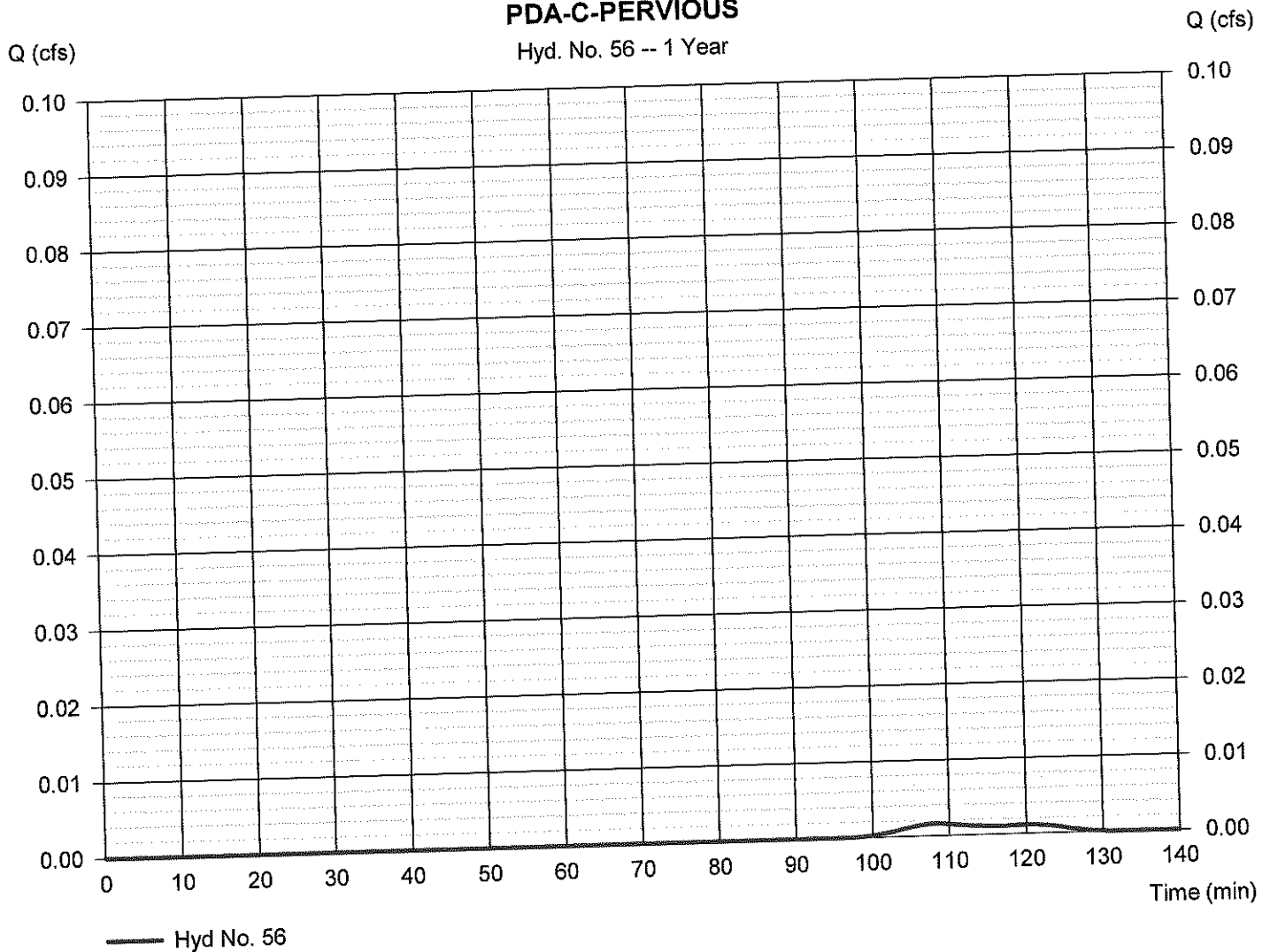
Hyd. No. 56

PDA-C-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 1 yrs	Time to peak	= 108 min
Time interval	= 1 min	Hyd. volume	= 2 cuft
Drainage area	= 0.520 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors	Shapefactors	= 484

PDA-C-PERVIOUS

Hyd. No. 56 -- 1 Year



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 56

PDA-C-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 6.00	0.00	0.00	
Travel Time (min)	= 6.27	+ 0.00	+ 0.00	= 6.27
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	102.00	0.00	
Watercourse slope (%)	= 0.00	3.00	0.00	
Surface description	= Paved	Unpaved	Paved	
Average velocity (ft/s)	=0.00	2.79	0.00	
Travel Time (min)	= 0.00	+ 0.61	+ 0.00	= 0.61
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				6.90 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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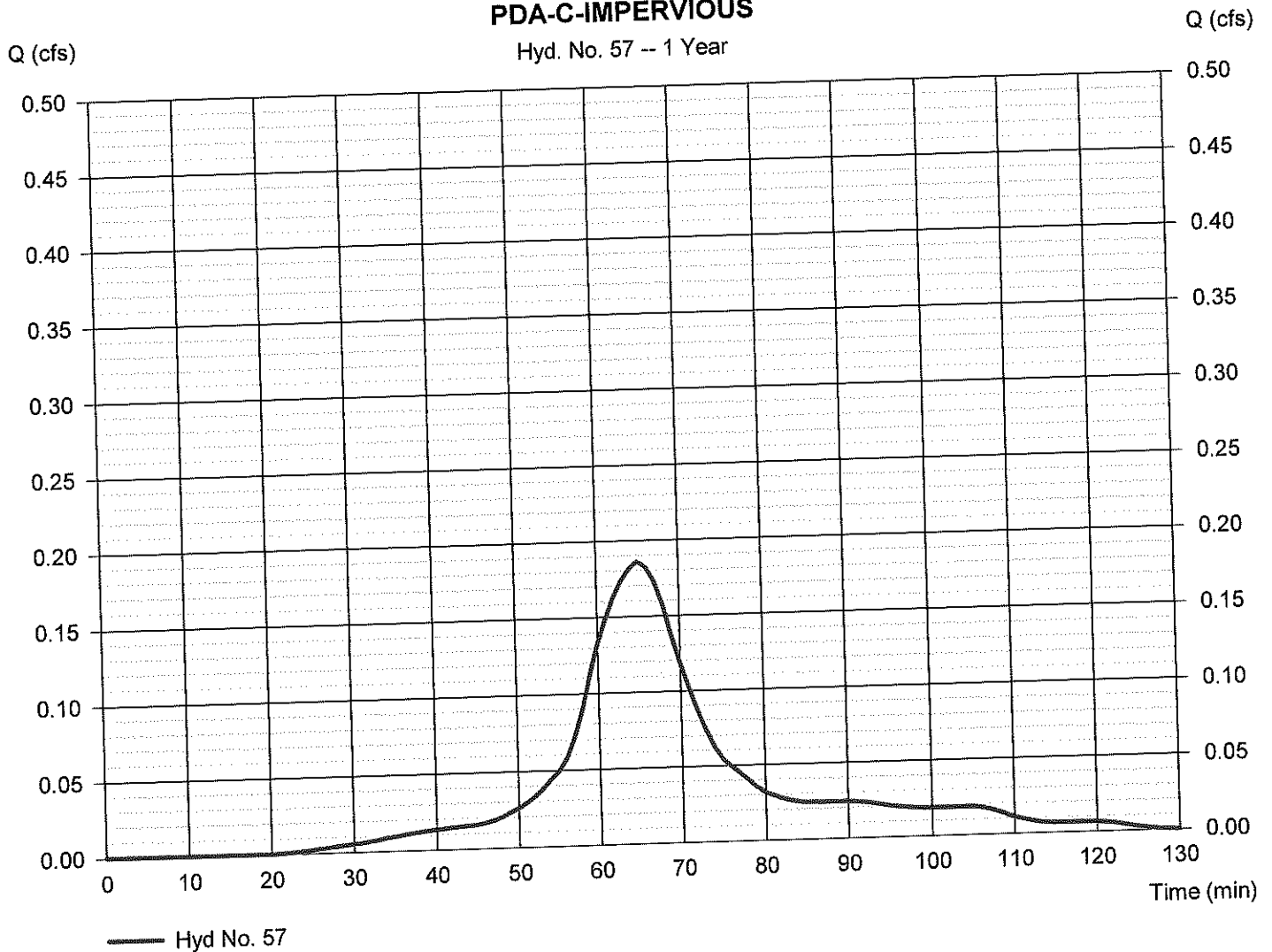
Hyd. No. 57

PDA-C-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.186 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 232 cuft
Drainage area	= 0.060 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.50 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefcts		= 484

PDA-C-IMPERVIOUS

Hyd. No. 57 -- 1 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

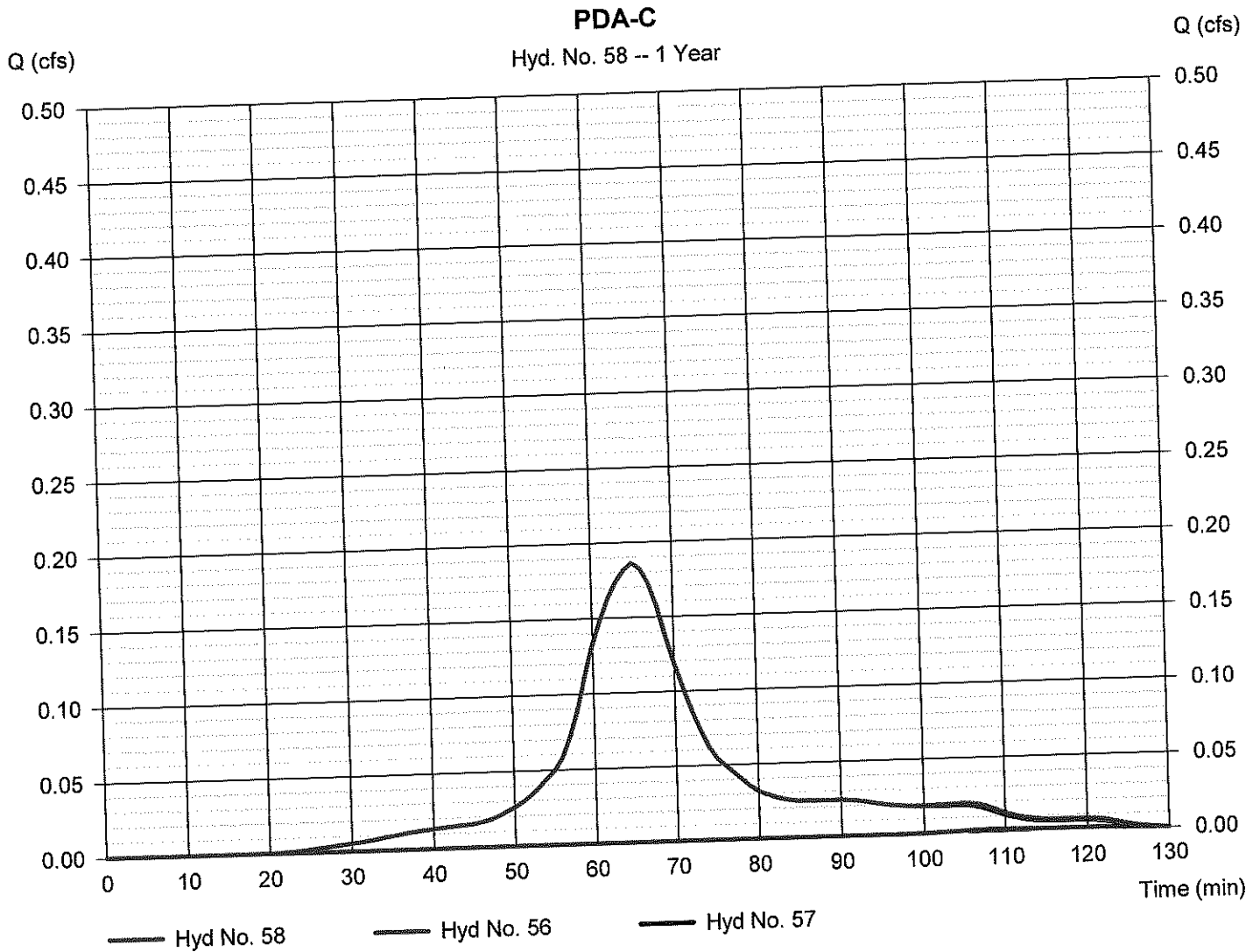
Monday, 11 / 25 / 2019

Hyd. No. 58

PDA-C

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 56, 57

Peak discharge = 0.186 cfs
Time to peak = 65 min
Hyd. volume = 234 cuft
Contrib. drain. area = 0.580 ac

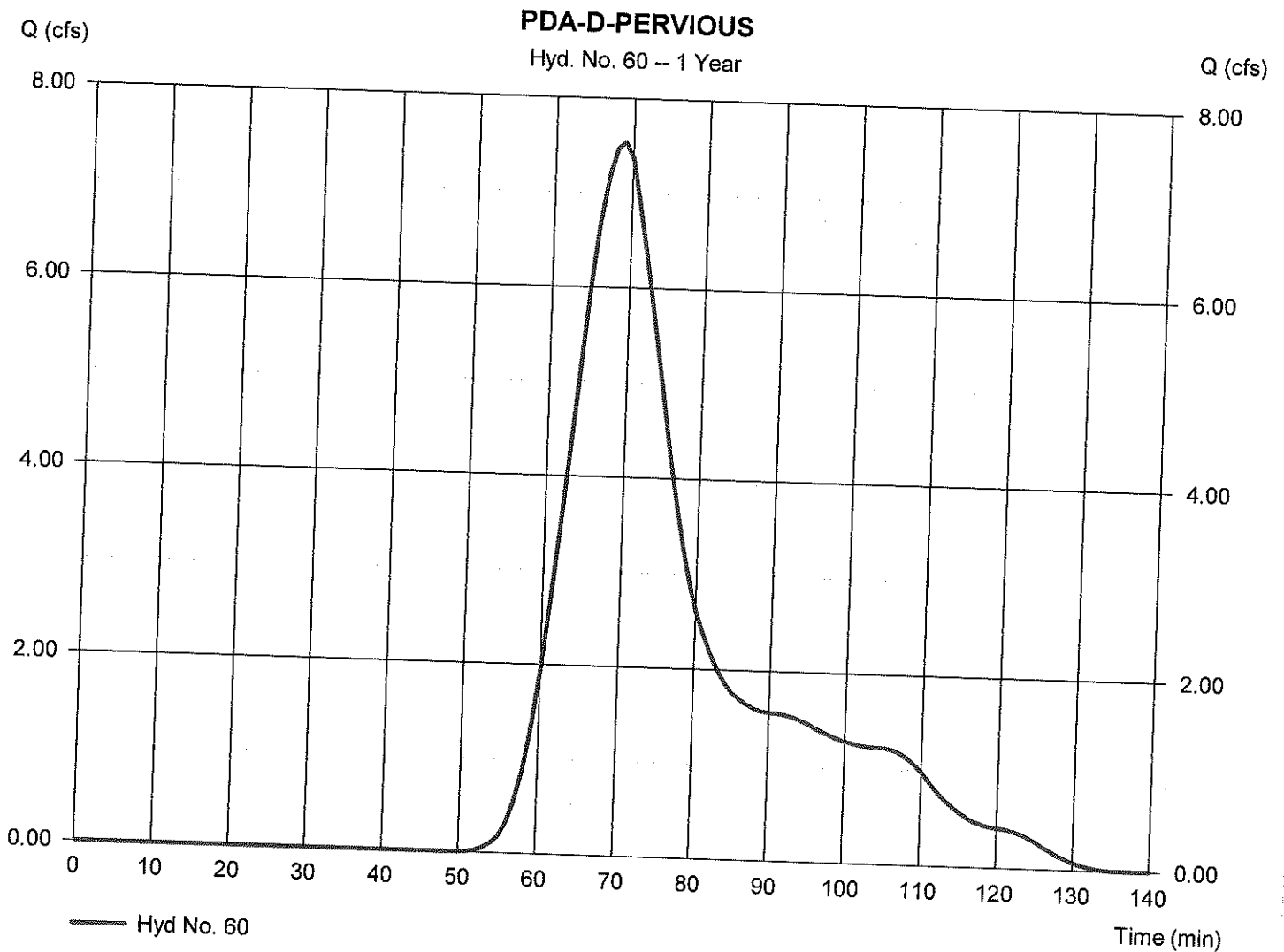


Hydrograph Report

Hyd. No. 60

PDA-D-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 7.542 cfs
Storm frequency	= 1 yrs	Time to peak	= 69 min
Time interval	= 1 min	Hyd. volume	= 9,734 cuft
Drainage area	= 5.970 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 60

PDA-D-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 51.0	49.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	3.24	0.00	
Land slope (%)	= 40.00	4.60	0.00	
Travel Time (min)	= 3.76	+ 0.49	+ 0.00	= 4.24
Shallow Concentrated Flow				
Flow length (ft)	= 456.00	149.00	202.00	
Watercourse slope (%)	= 3.40	1.30	0.70	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=3.75	2.32	1.70	
Travel Time (min)	= 2.03	+ 1.07	+ 1.98	= 5.08
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				9.30 min

Hydrograph Report

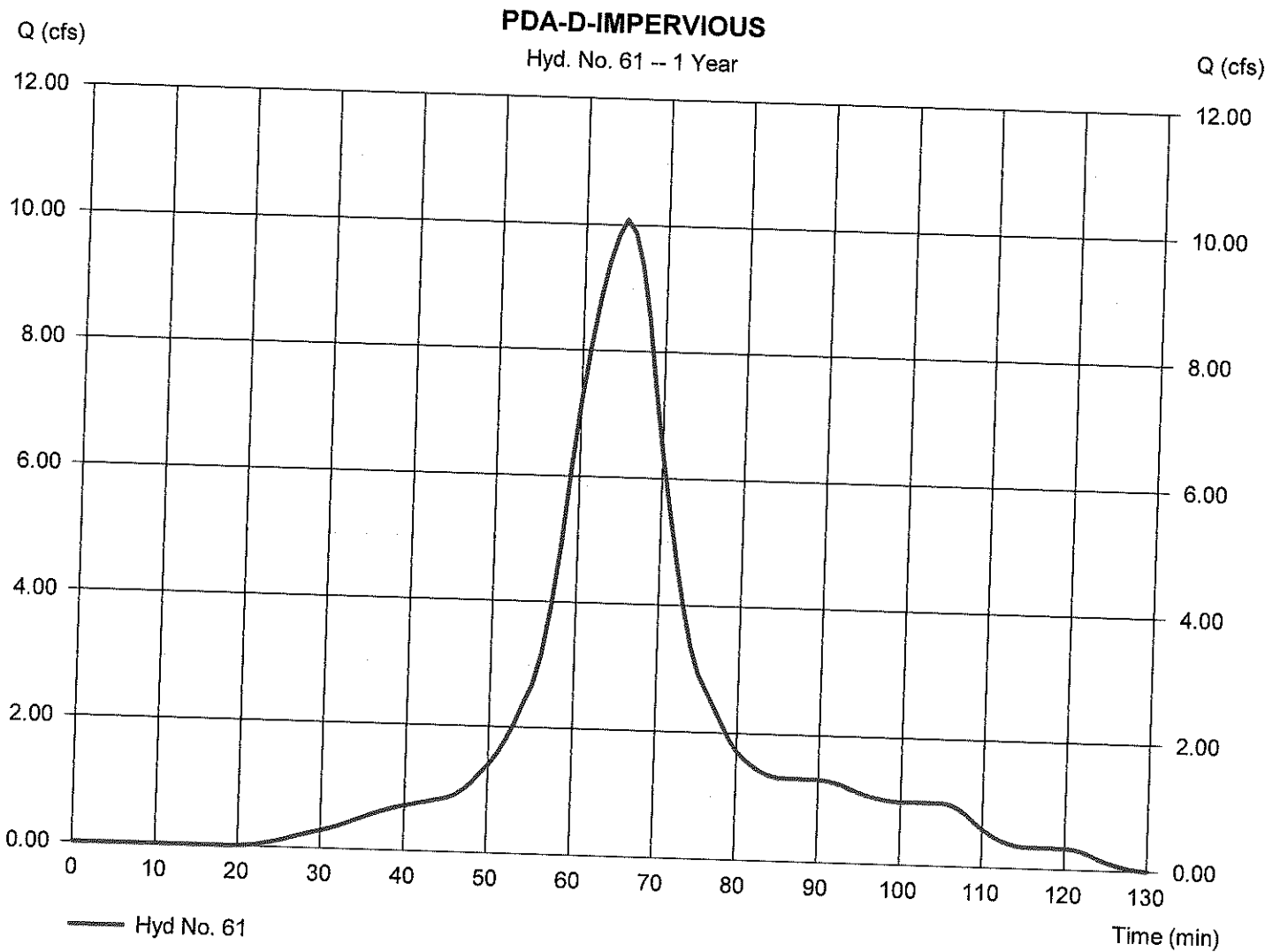
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 61

PDA-D-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 10.09 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 12,587 cuft
Drainage area	= 3.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in Storm	Number of cells	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

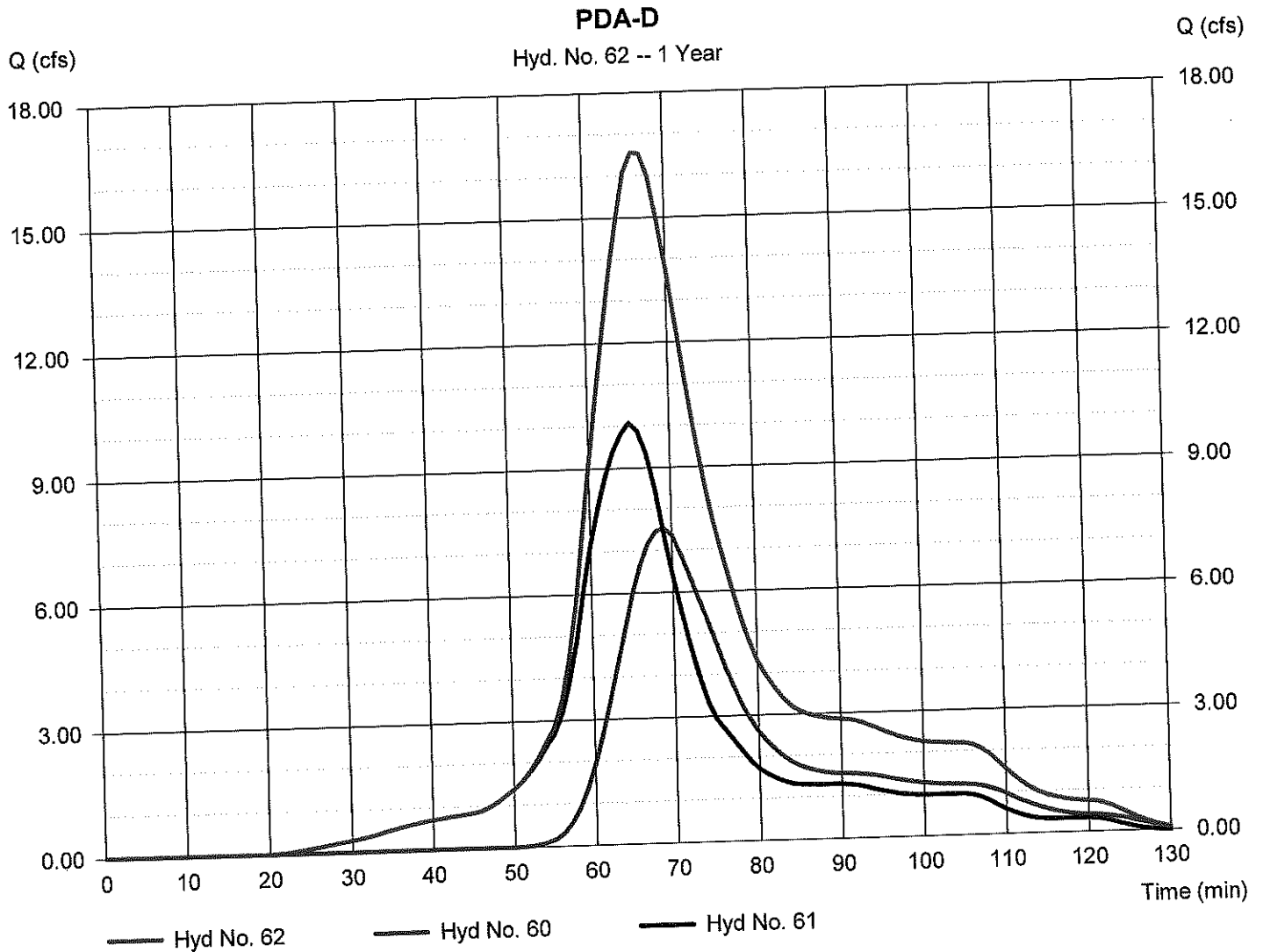
Monday, 11 / 25 / 2019

Hyd. No. 62

PDA-D

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyds. = 60, 61

Peak discharge = 16.57 cfs
 Time to peak = 66 min
 Hyd. volume = 22,321 cuft
 Contrib. drain. area = 9.220 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

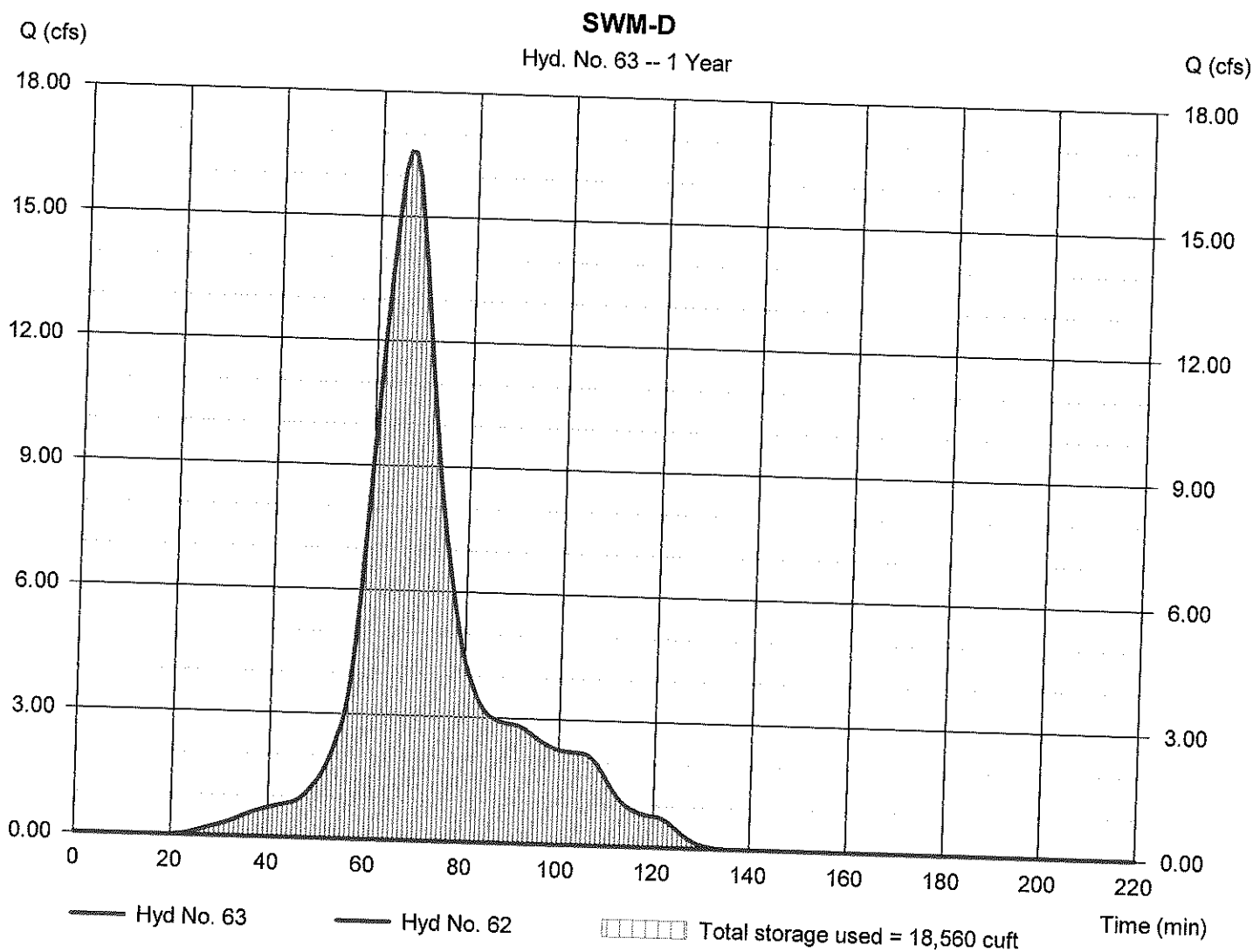
Monday, 11 / 25 / 2019

Hyd. No. 63

SWM-D

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 73 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 62 - PDA-D	Max. Elevation	= 597.70 ft
Reservoir name	= SWM-D	Max. Storage	= 18,560 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Pond No. 7 - SWM-D

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 597.00 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	597.00	65,978	0	0
4.50	601.50	65,978	118,749	118,749

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	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	n/a
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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil. (in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	597.00	---	---	---	---	---	---	---	---	0.000	---	0.000
4.50	118,749	601.50	---	---	---	---	---	---	---	---	7.636	---	7.636

Hydrograph Report

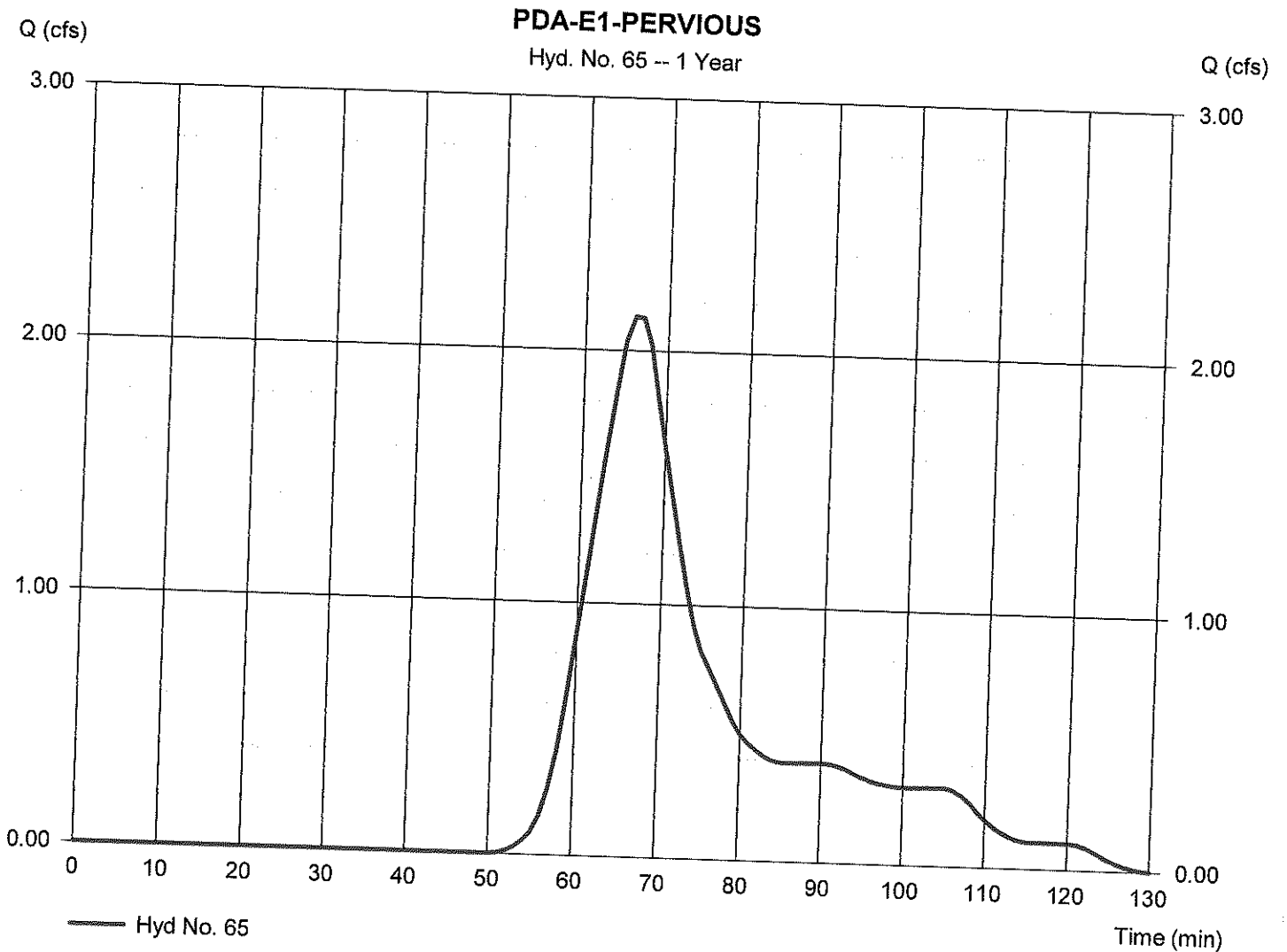
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Monday, 11 / 25 / 2019

Hyd. No. 65

PDA-E1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.135 cfs
Storm frequency	= 1 yrs	Time to peak	= 66 min
Time interval	= 1 min	Hyd. volume	= 2,438 cuft
Drainage area	= 1.450 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefcts		= 484



Hydrograph Report

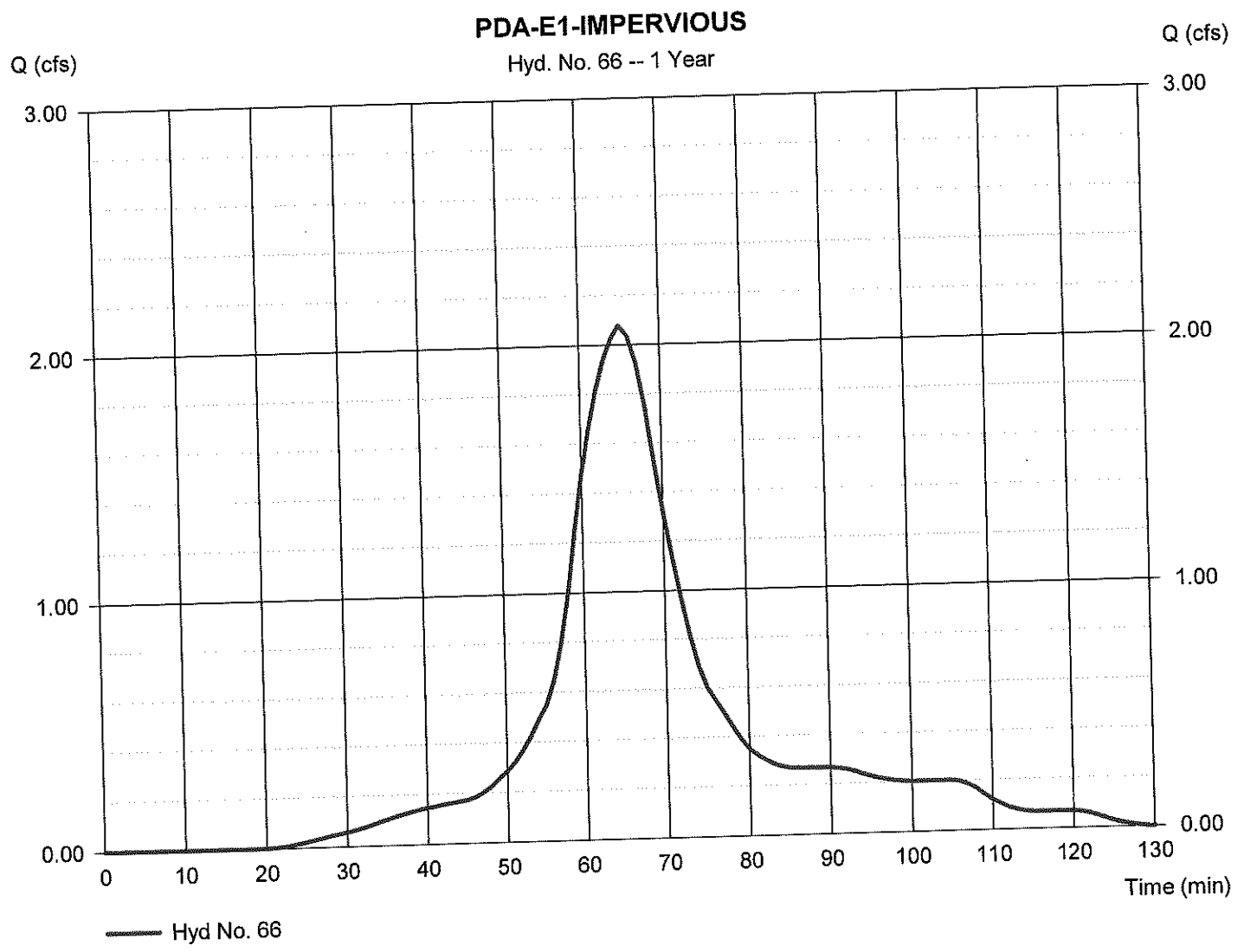
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Monday, 11 / 25 / 2019

Hyd. No. 66

PDA-E1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.080 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 2,595 cuft
Drainage area	= 0.670 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25inShapefactors		= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

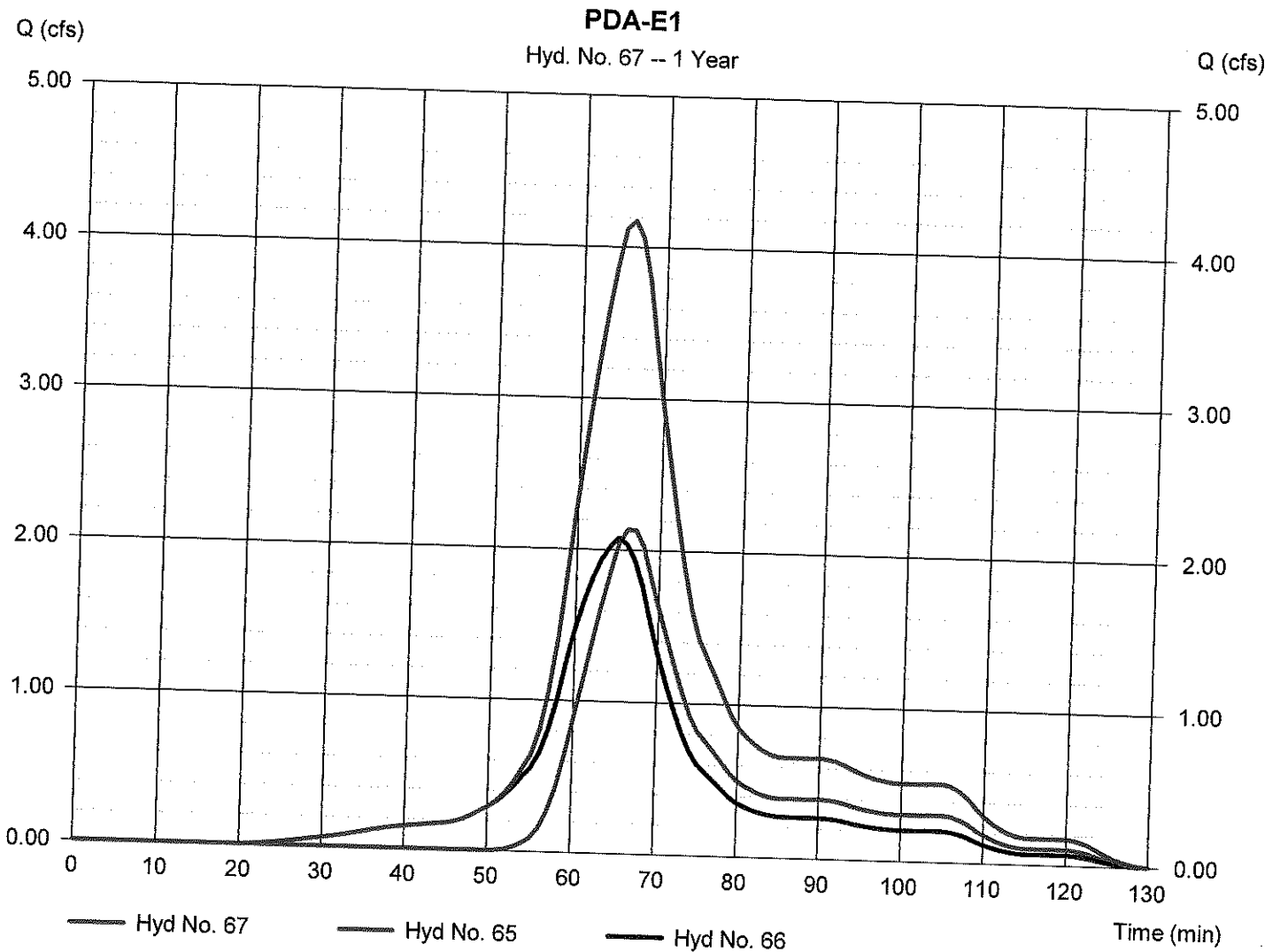
Monday, 11 / 25 / 2019

Hyd. No. 67

PDA-E1

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 65, 66

Peak discharge = 4.173 cfs
Time to peak = 66 min
Hyd. volume = 5,033 cuft
Contrib. drain. area = 2.120 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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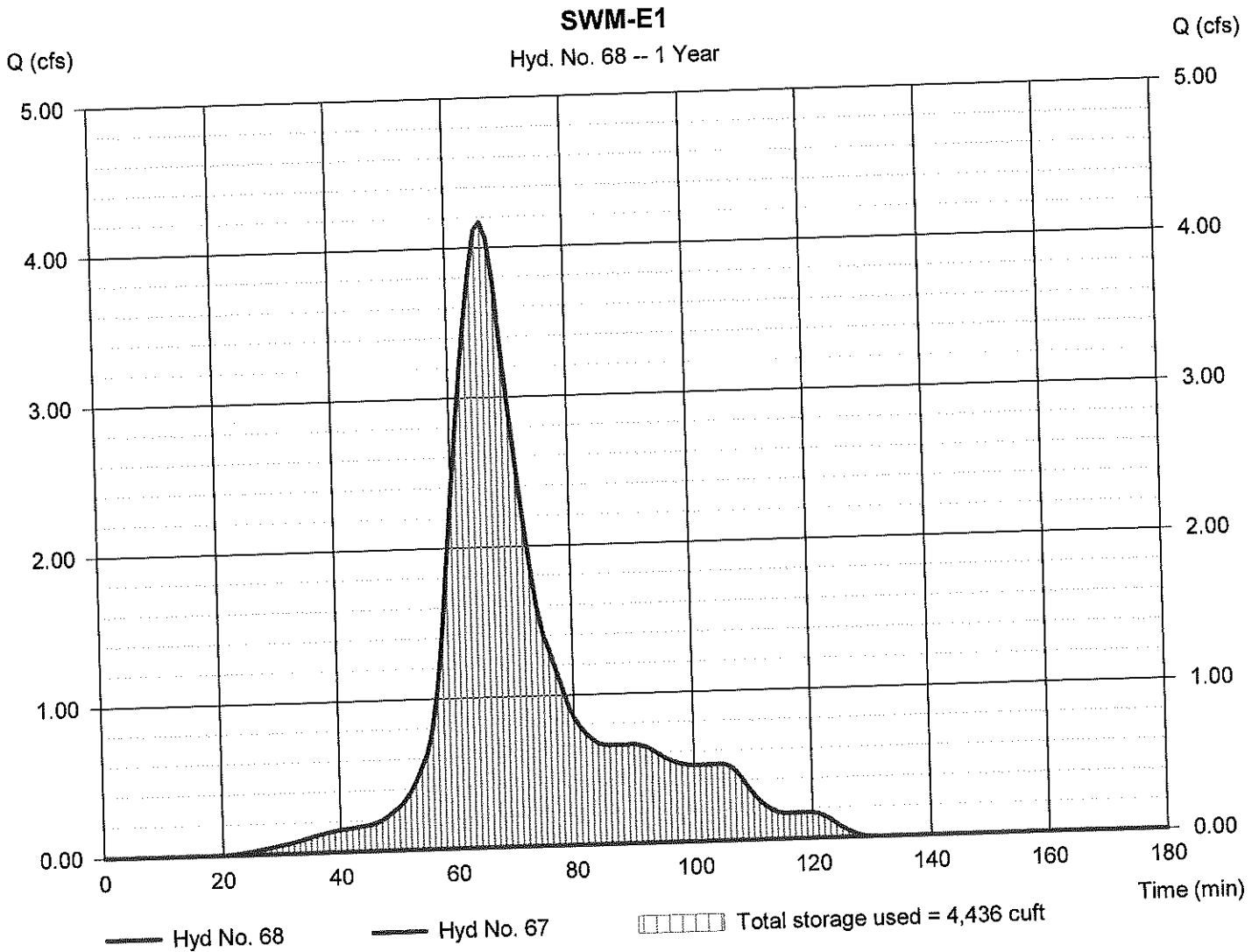
Hyd. No. 68

SWM-E1

Hydrograph type = Reservoir
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyd. No. = 67 - PDA-E1
 Reservoir name = SWM-E1

Peak discharge = 0.000 cfs
 Time to peak = 84 min
 Hyd. volume = 0 cuft
 Max. Elevation = 612.50 ft
 Max. Storage = 4,436 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Pond No. 8 - SWM-E1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 611.50 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	611.50	11,063	0	0
7.00	618.50	11,063	30,974	30,974

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	= 0	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	611.50	---	---	---	---	---	---	---	---	0.000	---	0.000
7.00	30,974	618.50	---	---	---	---	---	---	---	---	1.280	---	1.280

Hydrograph Report

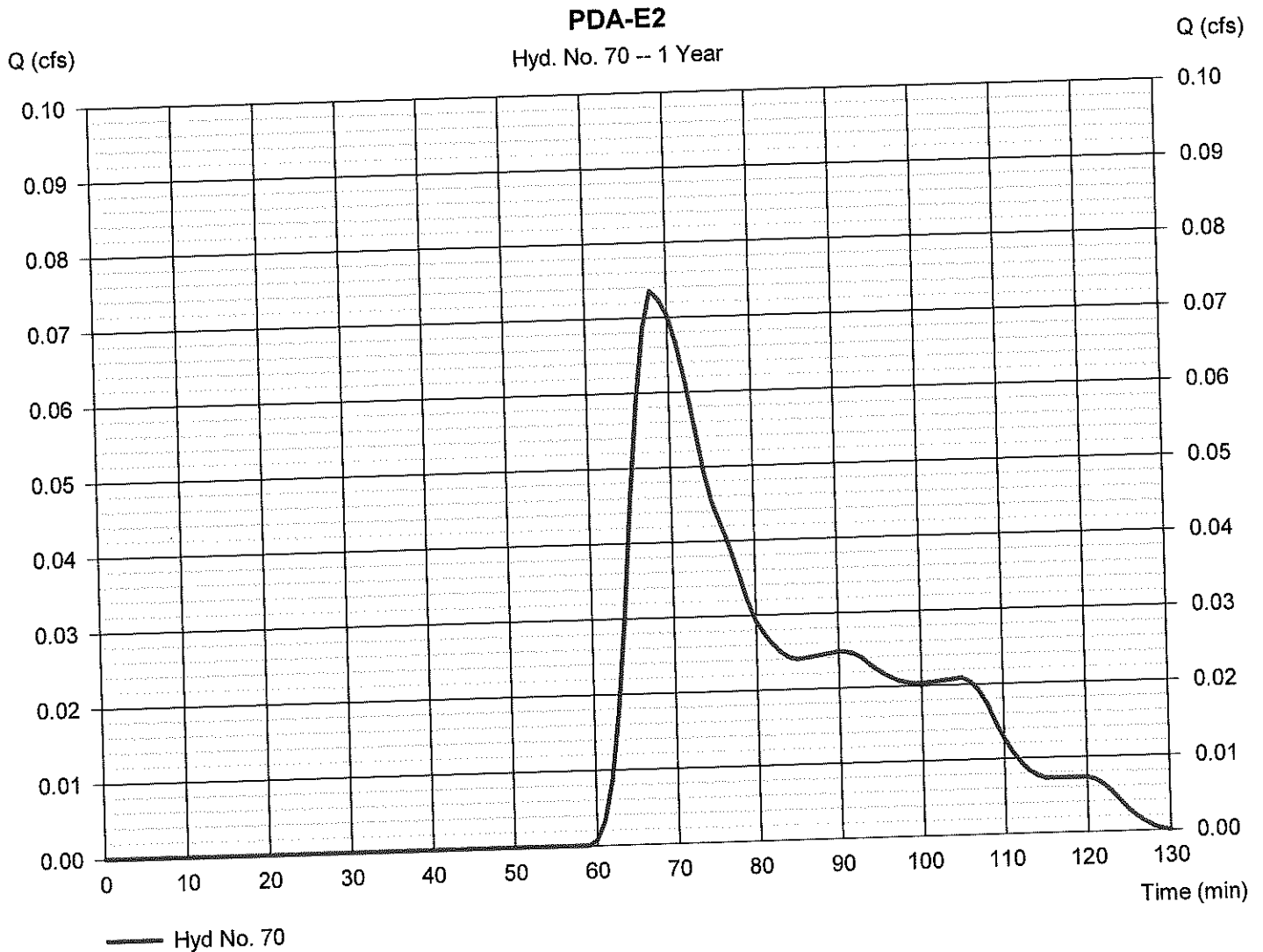
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Monday, 11 / 25 / 2019

Hyd. No. 70

PDA-E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.074 cfs
Storm frequency	= 1 yrs	Time to peak	= 68 min
Time interval	= 1 min	Hyd. volume	= 100 cuft
Drainage area	= 0.200 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefcts		= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

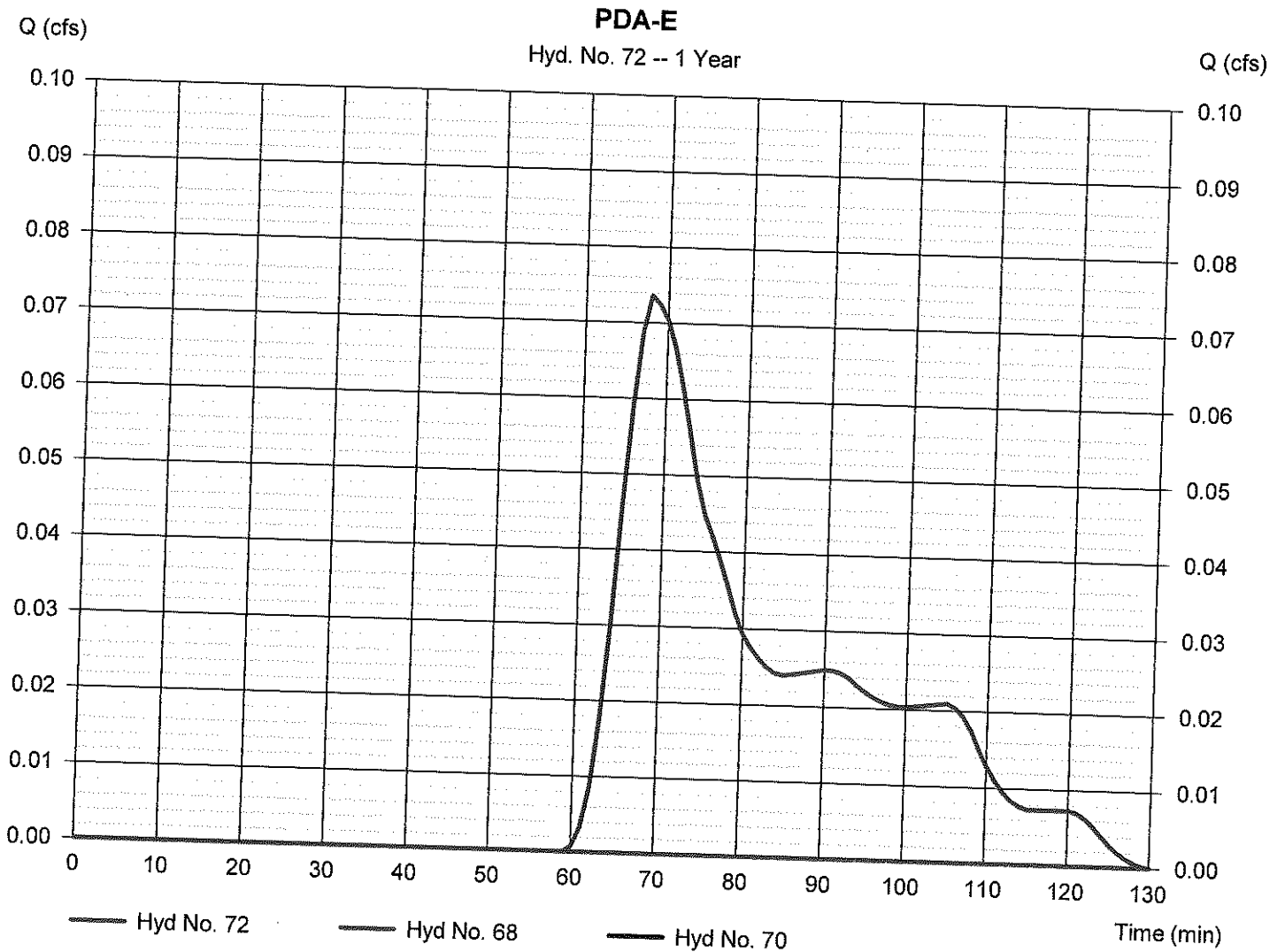
Monday, 11 / 25 / 2019

Hyd. No. 72

PDA-E

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 68, 70

Peak discharge = 0.074 cfs
Time to peak = 68 min
Hyd. volume = 100 cuft
Contrib. drain. area = 0.200 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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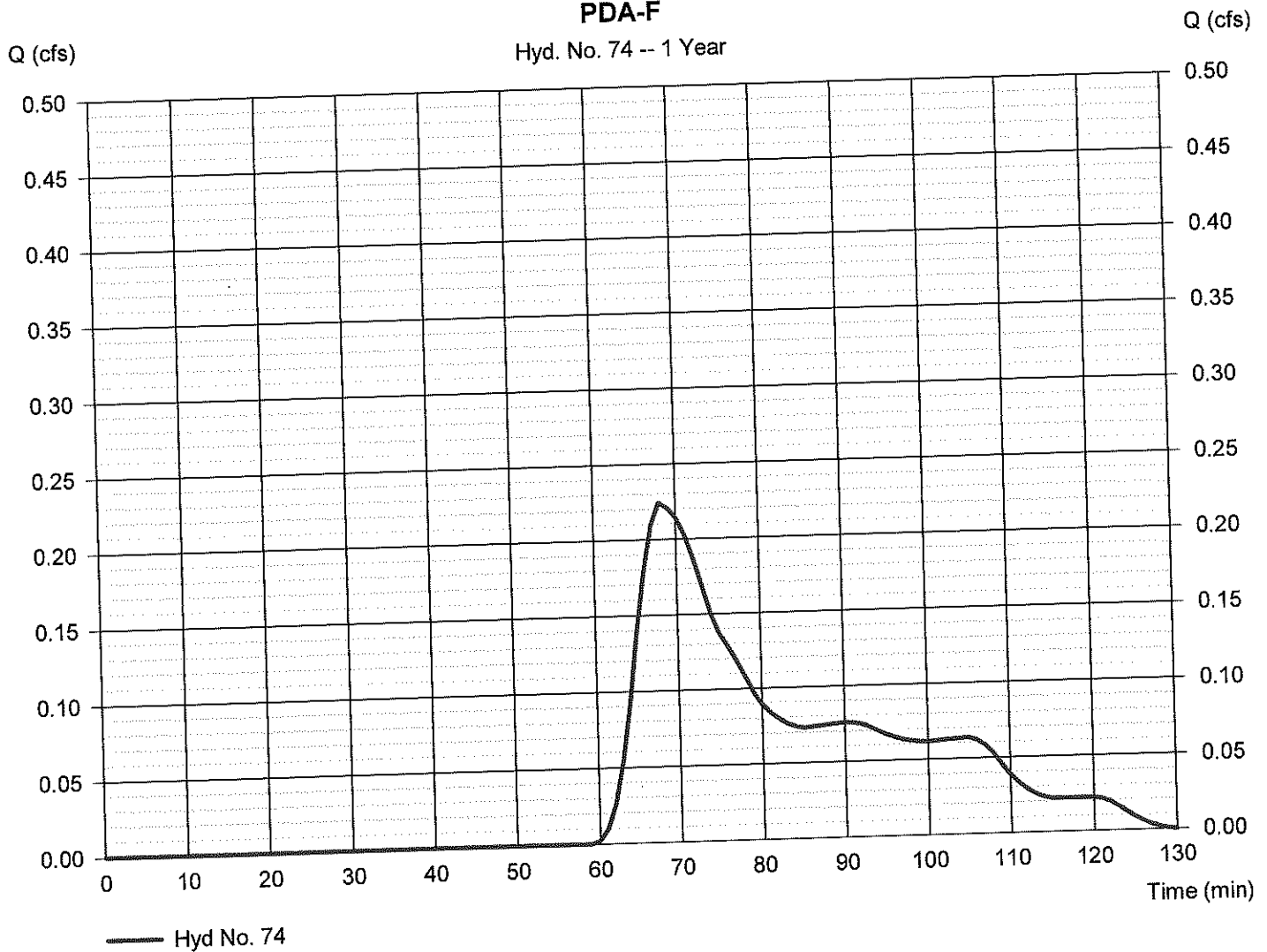
Hyd. No. 74

PDA-F

Hydrograph type	= SCS Runoff	Peak discharge	= 0.224 cfs
Storm frequency	= 1 yrs	Time to peak	= 68 min
Time interval	= 1 min	Hyd. volume	= 306 cuft
Drainage area	= 0.610 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in Storm	Shaper factor	= 484

PDA-F

Hyd. No. 74 -- 1 Year

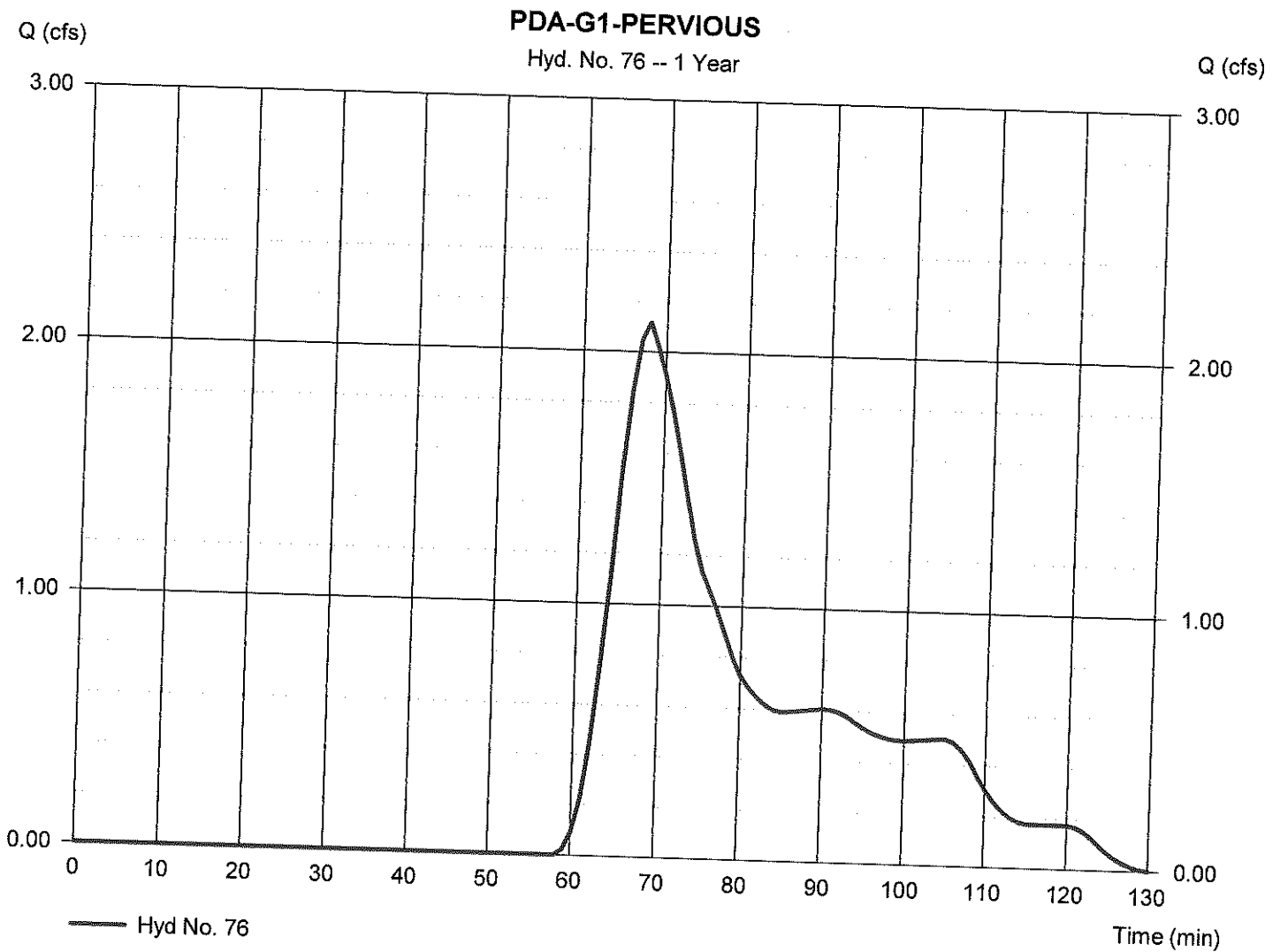


Hydrograph Report

Hyd. No. 76

PDA-G1-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.117 cfs
Storm frequency	= 1 yrs	Time to peak	= 68 min
Time interval	= 1 min	Hyd. volume	= 2,661 cuft
Drainage area	= 4.110 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in	Shape factor	= 484



Hydrograph Report

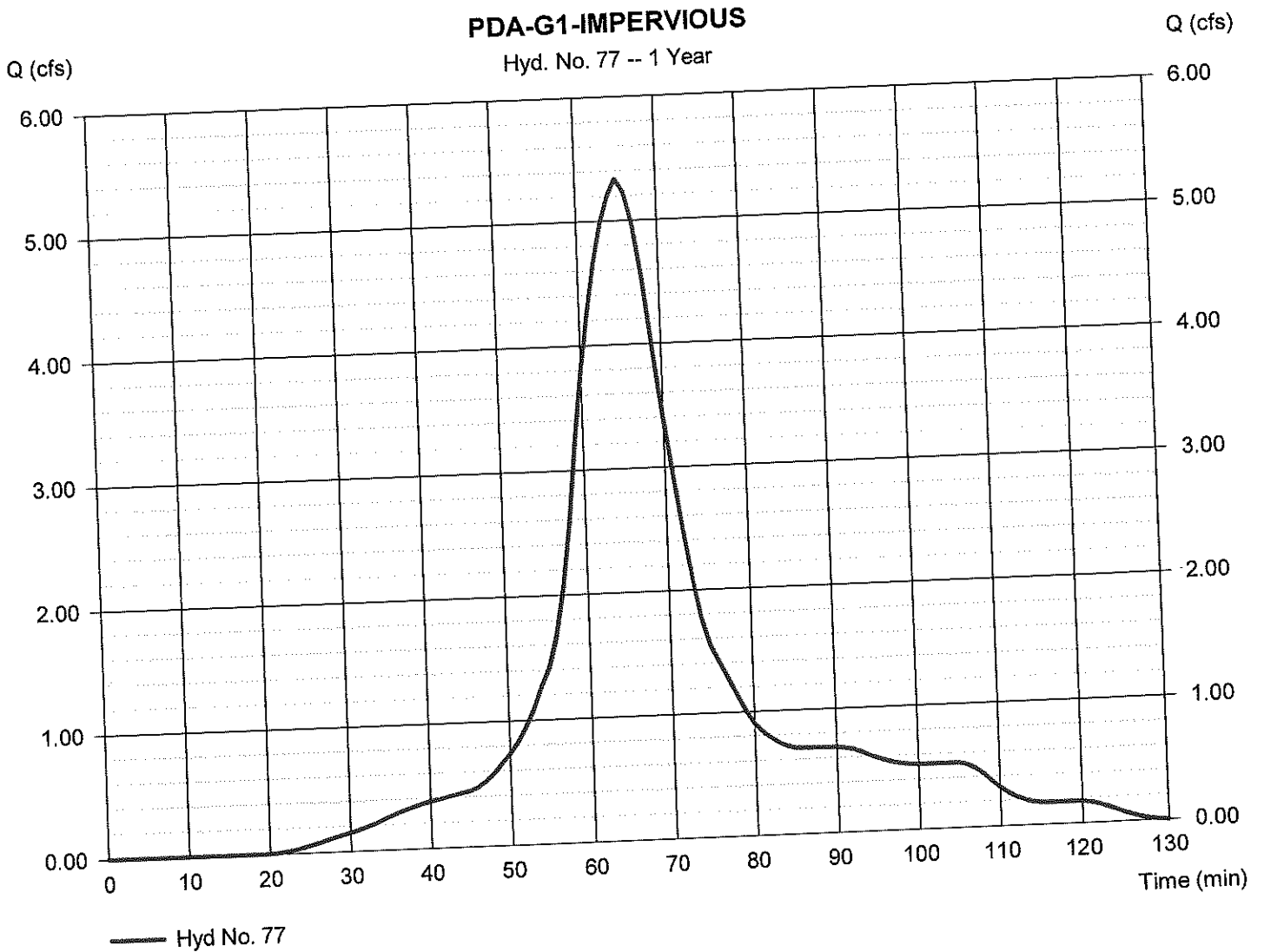
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 77

PDA-G1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 5.339 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 6,661 cuft
Drainage area	= 1.720 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors		= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 86

PDA-H1-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 1.50	0.00	0.00	
Travel Time (min)	= 1.35	+ 0.00	+ 0.00	= 1.35
Shallow Concentrated Flow				
Flow length (ft)	= 485.00	316.00	83.00	
Watercourse slope (%)	= 0.90	0.80	0.20	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=1.93	1.82	0.91	
Travel Time (min)	= 4.19	+ 2.90	+ 1.52	= 8.61
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				10.00 min

Hydrograph Report

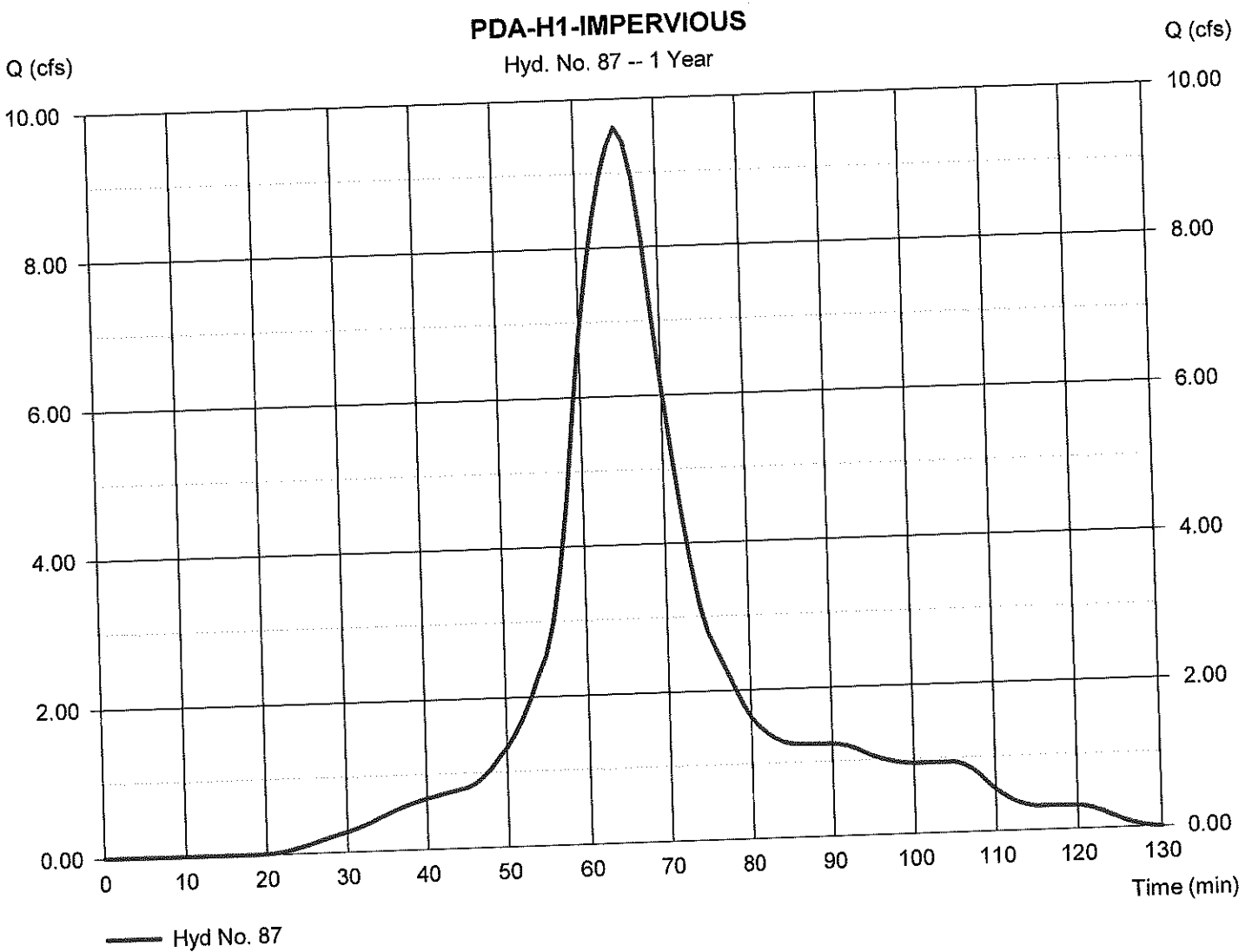
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Monday, 11 / 25 / 2019

Hyd. No. 87

PDA-H1-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 9.622 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 12,006 cuft
Drainage area	= 3.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in\Shapefactors		= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 91

PDA-H2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 9.70	0.00	0.00	
Travel Time (min)	= 11.35	+ 0.00	+ 0.00	= 11.35
Shallow Concentrated Flow				
Flow length (ft)	= 26.00	0.00	0.00	
Watercourse slope (%)	= 33.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=9.27	0.00	0.00	
Travel Time (min)	= 0.05	+ 0.00	+ 0.00	= 0.05
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	{{0}}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				11.40 min

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

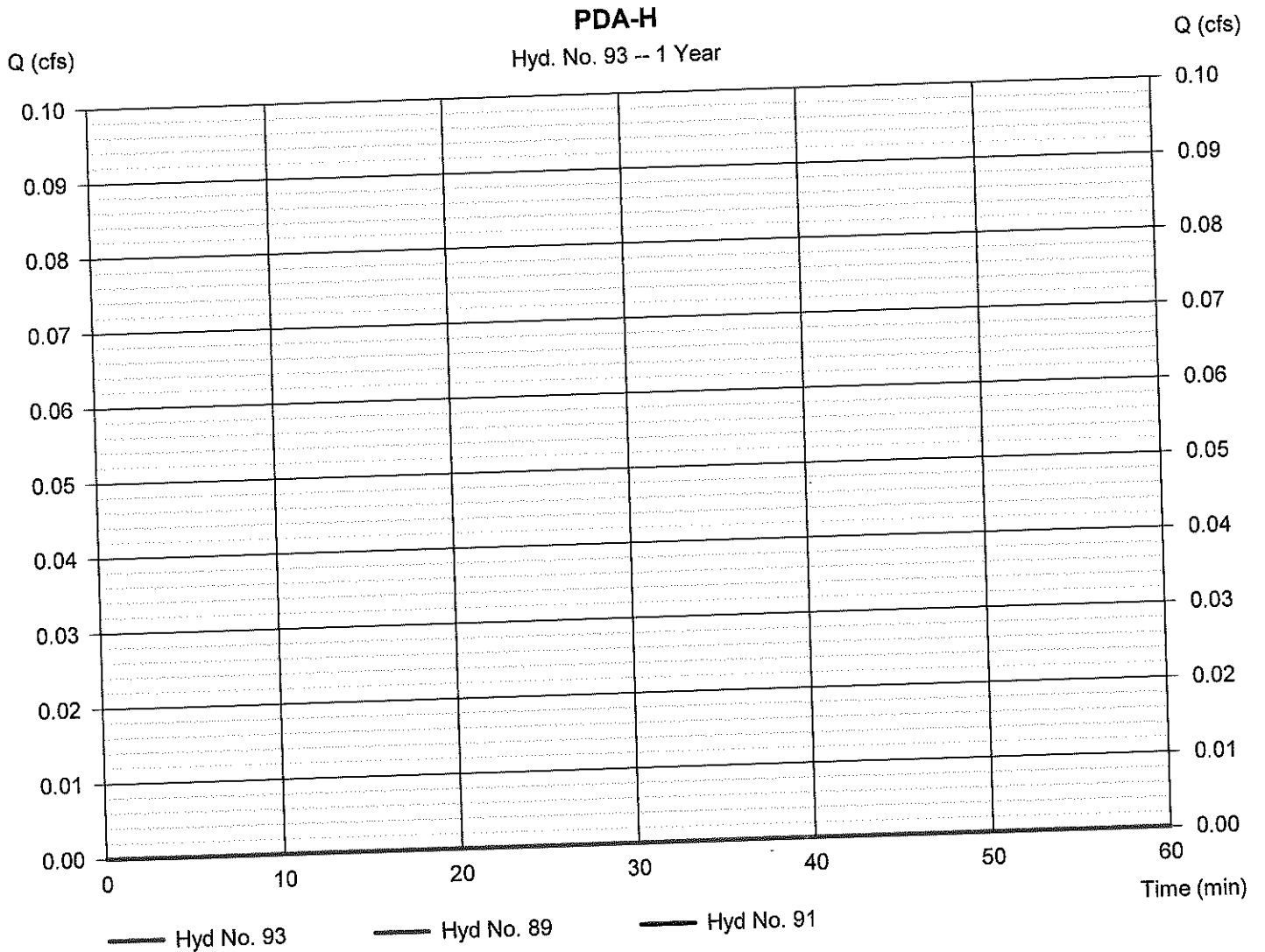
Monday, 11 / 25 / 2019

Hyd. No. 93

PDA-H

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 89, 91

Peak discharge = 0.000 cfs
Time to peak = n/a
Hyd. volume = 0 cuft
Contrib. drain. area = 0.760 ac

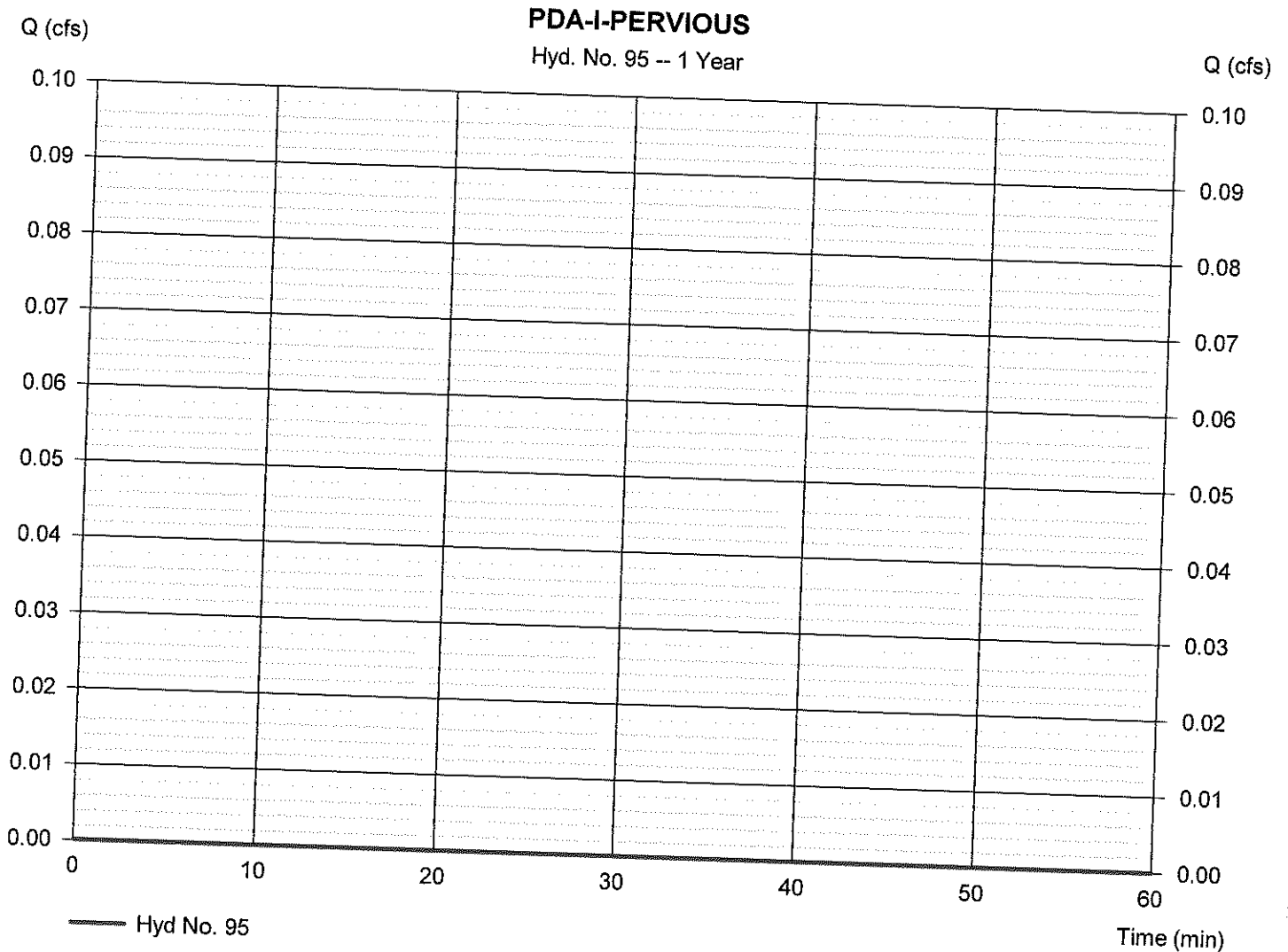


Hydrograph Report

Hyd. No. 95

PDA-I-PERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 1.610 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.10 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in2hr.prf	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 95
PDA-I-PERVIOUS

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.24	0.00	0.00	
Land slope (%)	= 6.80	0.00	0.00	
Travel Time (min)	= 13.08	+ 0.00	+ 0.00	= 13.08
Shallow Concentrated Flow				
Flow length (ft)	= 121.00	141.00	37.00	
Watercourse slope (%)	= 0.85	0.50	1.10	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 1.87	1.44	2.13	
Travel Time (min)	= 1.08	+ 1.63	+ 0.29	= 3.00
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	{0}0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				16.10 min

Hydrograph Report

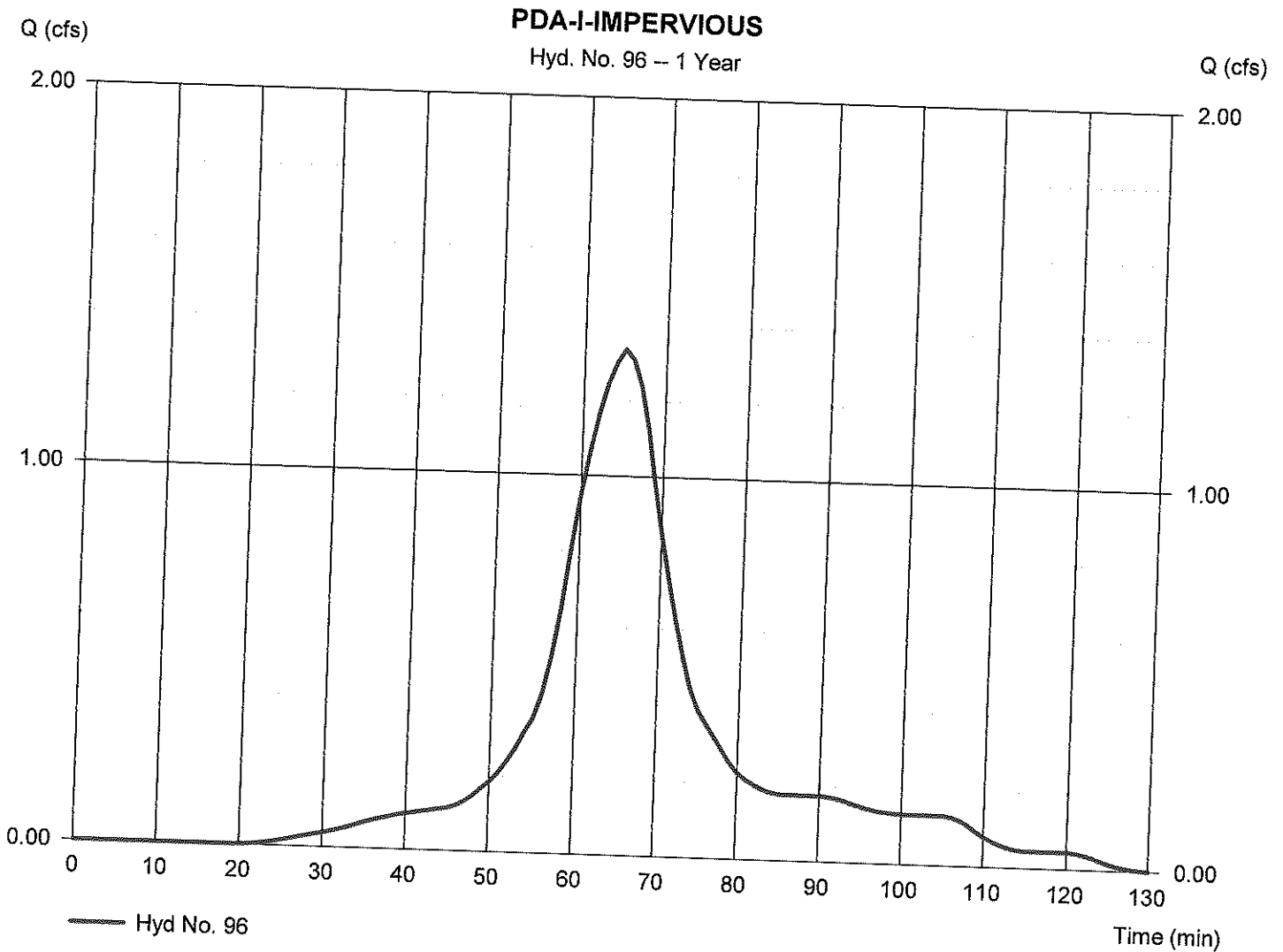
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 11 / 25 / 2019

Hyd. No. 96

PDA-I-IMPERVIOUS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.335 cfs
Storm frequency	= 1 yrs	Time to peak	= 65 min
Time interval	= 1 min	Hyd. volume	= 1,665 cuft
Drainage area	= 0.430 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= R:\Hydroflow Standards\1.25in Storm	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

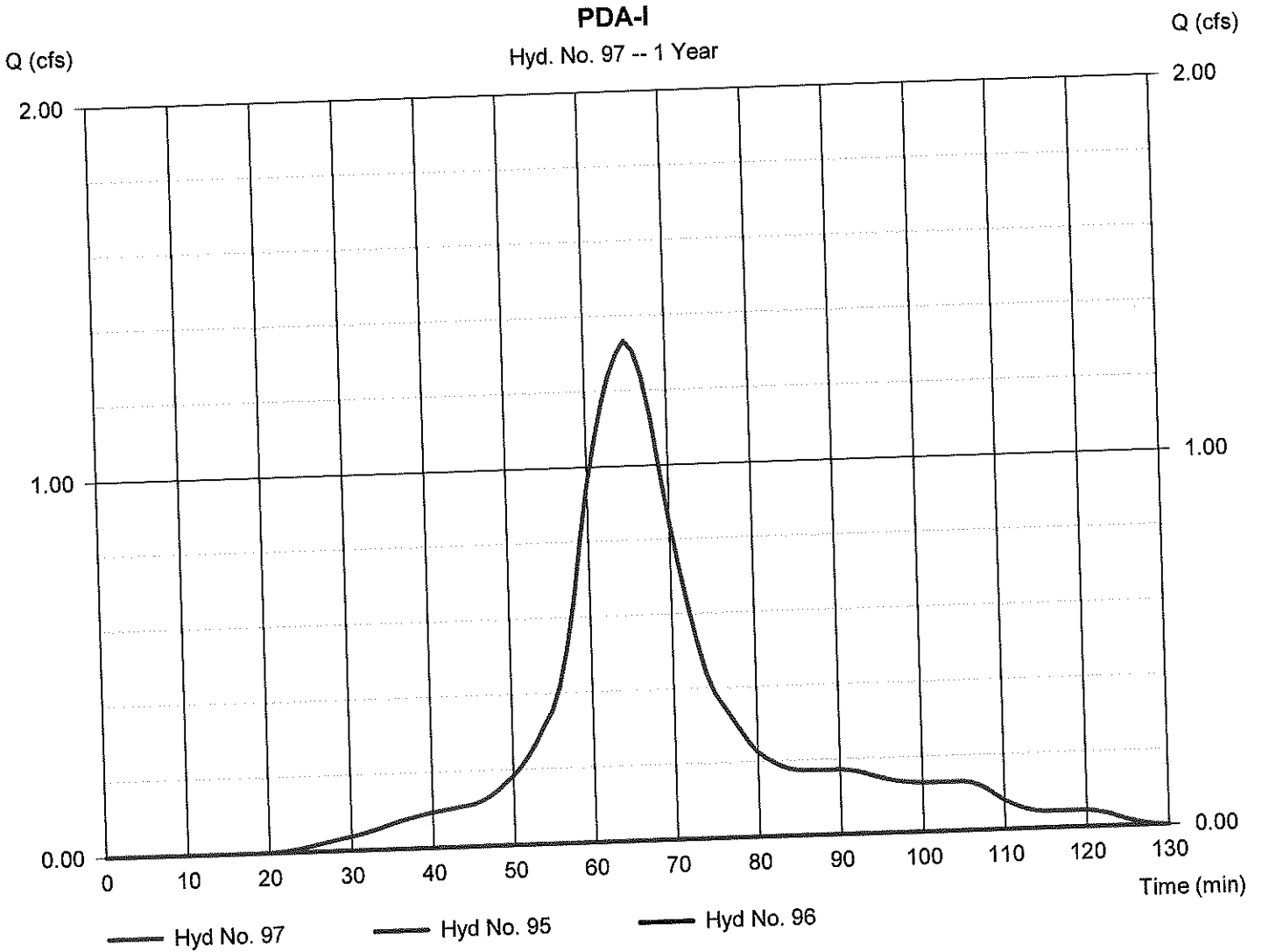
Monday, 11 / 25 / 2019

Hyd. No. 97

PDA-I

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 95, 96

Peak discharge = 1.335 cfs
Time to peak = 65 min
Hyd. volume = 1,665 cuft
Contrib. drain. area = 2.040 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

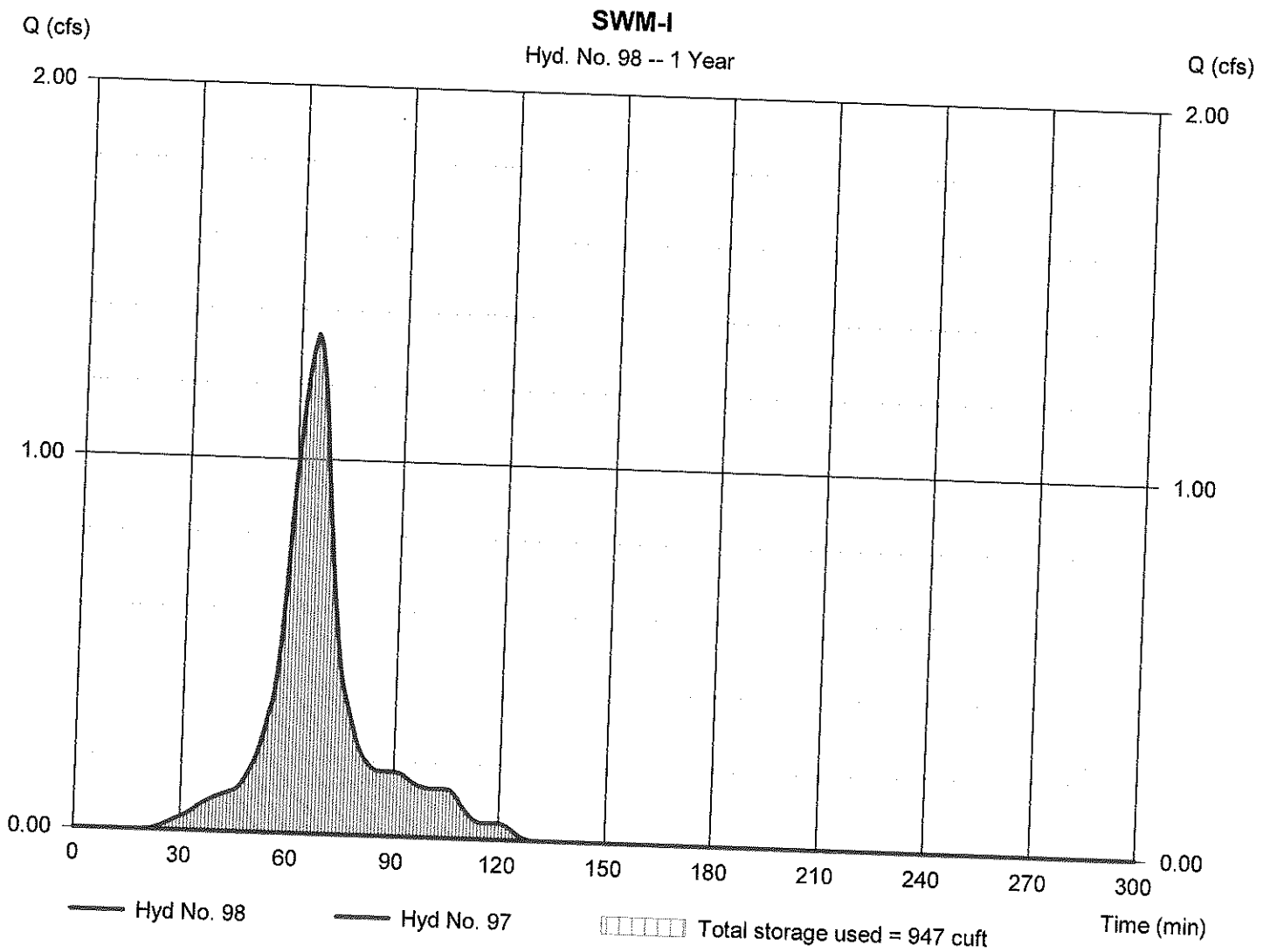
Monday, 11 / 25 / 2019

Hyd. No. 98

SWM-I

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 67 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 97 - PDA-I	Max. Elevation	= 604.73 ft
Reservoir name	= SWM-I	Max. Storage	= 947 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Monday, 11 / 25 / 2019

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Pond No. 11 - SWM-I

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 604.65 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	604.65	28,171	0	0
0.75	605.40	28,171	8,450	8,450

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	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	n/a
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

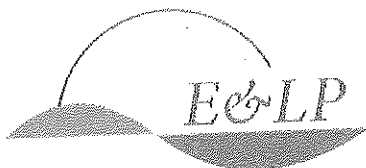
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	604.65	---	---	---	---	---	---	---	---	0.000	---	0.000
0.75	8,450	605.40	---	---	---	---	---	---	---	---	3.261	---	3.261

APPENDIX G –
GROUNDWATER RECHARGE CALCULATIONS



New Jersey
Groundwater
Recharge
Spreadsheet
Version 2/3/2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓ SUSSEX CO., ANDOVER TWP
Average Annual P (in) 43.9
Climatic Factor 1.60

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	4.82	Impervious areas	Urban Land*	0.0	-
2	31.47	Open space	Sandy Land	17.2	1,961,434
3	4.84	Open space	Hazen	16.1	282,196
4	4.79	Woods	Hazen	16.4	285,054
5	19.03	Woods	Sandy Land	17.7	1,219,933
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	65.0			15.9	3,749,618

Project Name: Stickles Pond Road
Description: Site Filtration
Analysis Date: 10/25/19

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	20.58	Impervious areas	Urban Land*	0.0	-
2	20.19	Gravel, dirt	Hazen	10.5	769,982
3	12.39	Gravel, dirt	Sandy Land	11.0	496,712
4	4.52	Open space	Hazen	16.1	263,539
5	5.62	Open space	Sandy Land	17.2	350,278
6	1.24	Woods	Hazen	16.4	73,793
7	0.41	Woods	Sandy Land	17.7	26,293
8					
9					
10					
11					
12					
13					
14					
15					
Total =	65.0			8.4	1,980,596

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	8,4
Post-Development Annual Recharge Deficit=	1,768,031	Total	896,465

Recharge Efficiency Parameters Calculations (area averages)	
RWC= #N/A (in)	DRWC= #N/A (in)
ERWC= #N/A (in)	EDRWC= #N/A (in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name **Stickles Pond Road** **Description** **Recharge Calculations** **Analysis Date** **10/25/19** **BMP or LID Type** **Above-Ground SWM-A1**

Recharge BMP Input Parameters			Root Zone Water Capacity Calculated Parameters			Recharge Design Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value	Parameter	Symbol	Value
BMP Area	ABMP	10042.0	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.36	Inches of Runoff to capture	Qdesign	2.71
BMP Effective Depth, this is the design variable	dBMP	60.0	ERWC Modified to consider DEXC	EDRWC	0.36	Inches of Rainfall to capture	Pdesign	2.94
Upper level of the BMP surface (negative if above ground)	dBMPu	-60.0	Empty Portion of RWC under Infil. BMP	RERWC	0.29	Recharge Provided Avg. over Imp. Area		32.5
Depth of lower surface of BMP, must be >= dBMPu	DEXC	0.0				Runoff Captured Avg. over Imp. Area		34.0
Post-development Land Segment Location of BMP	SegBMP	0						
Input Zero if Location is distributed or undetermined								

Parameters from Annual Recharge Worksheet			BMP Calculated Size Parameters			System Performance Calculated Parameters		
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	ABMP/Aimp	Ratio	0.07	Annual BMP Recharge Volume	395,315	Annual BMP Recharge Efficiency
Post-D ImperVIOUS Area (or target ImperVIOUS Area)	Aimp	146,019	BMP Volume	VBMP	50,210	Avg BMP Recharge Efficiency	95.4%	% Infiltration Recharged
Root Zone Water Capacity	RWC	1.82				% Rainfall became Runoff	77.5%	%
RWC Modified to consider DEXC	DRWC	1.82				% Runoff Infiltrated	100.0%	%
Climatic Factor	C-factor	1.60				% Runoff Recharged	15.5%	%
Average Annual P over Imp. Area	Pavg	43.9				% Rainfall Recharged	12.1%	%
Recharge Requirement	dr	23.7						

Root Zone Water Capacity Calculated Parameters
 Above-Ground SWM-A1
 Empty Portion of RWC under Post-D Natural Recharge: 0.36
 ERWC Modified to consider DEXC: 0.36
 Empty Portion of RWC under Infil. BMP: 0.29

BMP Calculated Size Parameters
 ABMP/Aimp: 0.07
 BMP Volume: 50,210

System Performance Calculated Parameters
 Annual BMP Recharge Volume: 395,315
 Avg BMP Recharge Efficiency: 95.4%
 % Rainfall became Runoff: 77.5%
 % Runoff Infiltrated: 100.0%
 % Runoff Recharged: 15.5%
 % Rainfall Recharged: 12.1%

RECHARGE DESIGN PARAMETERS
 Qdesign: 2.71
 Pdesign: 2.94
 Recharge Provided Avg. over Imp. Area: 32.5
 Runoff Captured Avg. over Imp. Area: 34.0

CALCULATION CHECK MESSAGES
 Volume Balance -> Solve Problem to satisfy Annual Recharge
 dBMP Check -> OK
 DEXC Check -> OK
 BMP Location -> Location is selected as distributed or undetermined

OTHER NOTES
 Pdesign is accurate only after BMP dimensions are updated to make "recharge volumes" deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "imperVIOUS areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other classes.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed imperVIOUS area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement, set Vdef to your target value and Aimp to imperVIOUS area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

Project Name
248 Stuckles Pond Road

Description
Recharge Calculations

Analysis Date
10/25/19

BMP or LID Type
Pervious Pavement System -SWM-B1

Recharge BMP Input Parameters			Root Zone Water Capacity Calculated Parameters			Recharge Design Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value	Parameter	Symbol	Value
BMP Area	ABMP	181206.0	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.36	Inches of Runoff to capture	Qdesign	2.71
BMP Effective Depth, this is the design variable Upper level of the BMP surface (negative if above ground)	dBMP	9.6	ERWC Modified to consider dEXC	EDRWc	0.18	Inches of Rainfall to capture	Pdesign	2.94
Depth of lower surface of BMP must be = dBMPu	dBMPu	0.0	Empty Portion of RWC under Infil.	RERWC	0.15	Recharge Provided Avg. over Imp. Area		22.6
Post-development Land Segment Location of BMP	dEXC	24.0				Runoff Captured Avg. over Imp. Area		34.0
	SegBMP	0						

Input: Zero if Location is distributed or undetermined

BMP Calculated Size Parameters		
ABMP/AImp	Ratio	1.16
BMP Volume	VBMP	144,965

CALCULATION CHECK MESSAGES
 Volume Balance -> Solve Problem to satisfy Annual Recharge
 dBMP Check -> OK
 dEXC Check -> OK

Parameters from Annual Recharge Worksheet			System Performance Calculated Parameters		
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	Annual BMP Recharge Volume		293,295
Post-D Impervious Area (or target Impervious Area)	AImp	155,850	Avg BMP Recharge Efficiency		66.3%
Root Zone Water Capacity	RWC	1.82	%Rainfall became Runoff		77.5%
RWC Modified to consider dEXC	DRWC	0.89	%Runoff Infiltrated		100.0%
Climatic Factor	C-factor	1.60	%Runoff Recharged		11.5%
Average Annual P	Pavg	43.9	%Rainfall Recharged		8.9%
Recharge Requirement over Imp. Area	df	23.7			

OTHER NOTES
 Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP. make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select 'Impervious areas' RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "AImp" from the "Annual Recharge" sheet to "Vdef" and "AImp" on this page. This allows solution for a single BMP to handle the entire recharge requirement, set Vdef to your target value and AImp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & AImp" button.

Project Name
248 Stickers Pond Road

Description
Recharge Calculations

Analysis Date
10/25/19

BMP or LID Type
Pervious Pavement System -SWM-B2

Recharge BMP Input Parameters			Root Zone Water Capacity Calculated Parameters			Recharge Design Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value	Parameter	Symbol	Value
BMP Area	ABMP	147346.0	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.36	Inches of Runoff to capture	Qdesign	2.71
BMP Effective Depth, this is the design variable Upper level of the BMP surface (negative if above ground)	dBMP	7.2	ERWC Modified to consider dEXC	EDRWC	0.23	Inches of Rainfall to capture	Pdesign	2.94
Depth of lower surface of BMP, must be => dBMPu	dBMPu	0.0	Empty Portion of RWC under Infil.	RERWC	0.19	Recharge Provided Avg. over Imp. Area		22.6
Post-development Land Segment Location of BMP	dEXC	18.0				Runoff Captured Avg. over Imp. Area		34.0
	SegBMP	0						

Parameters from Annual Recharge Worksheet			BMP Calculated Size Parameters			System Performance Calculated Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value	Parameter	Symbol	Value
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	Annual BMP Recharge Volume		302,858	Annual BMP Recharge Volume		302,858
Post-D Impervious Area (or target Impervious Area)	AImp	160,542	Avg BMP Recharge Efficiency		66.5%	Avg BMP Recharge Efficiency		66.5%
Root Zone Water Capacity	RWC	1.82	%Rainfall became Runoff		77.5%	%Rainfall became Runoff		77.5%
RWC Modified to consider dEXC	DRWC	1.13	%Runoff infiltrated		100.0%	%Runoff infiltrated		100.0%
Climatic Factor	C-factor	1.60	%Runoff Recharged		11.9%	%Runoff Recharged		11.9%
Average Annual P over Imp. Area	Pavg	43.9	%Rainfall Recharged		9.2%	%Rainfall Recharged		9.2%
Recharge Requirement	df	23.7						

Calculation Check Messages
 Volume Balance -> Solve Problem to satisfy Annual Recharge
 dBMP Check -> OK
 dEXC Check -> OK
 BMP Location -> Location is selected as distributed or undetermined

OTHER NOTES
 Design is accurate only after BMP dimensions are updated to make each volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "AImp" from the "Annual Recharge" sheet to "Vdef" and "AImp" on this page. This allows solution for a single BMP to handle the entire recharge requirement, set Vdef to your target value and AImp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & AImp" button.

Project Name 248 Stickers Pond Road **Description** Recharge Calculations **Analysis Date** 10/25/19 **BMP or LID Type** BMP or LID Type

Recharge BMP Input Parameters		Root Zone Water Capacity Calculated Parameters		Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	16298.0	sq ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.36	in
BMP Effective Depth, this is the design variable	dBMP	19.2	in	ERWC Modified to consider dEXC	EDRWc	0.04	in
Upper level of the BMP surface (negative if above ground)	dBMPu	0.0	in	Empty Portion of RWC under Infil. BMP	RERWC	0.03	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	48.0	in				
Post-development Land Segment Location of BMP	SegBMP	0	unitless				
Input: Zero if location is distributed or undetermined							

Parameters from Annual Recharge Worksheet		BMP Calculated Size Parameters		System Performance Calculated Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	cu ft	Annual BMP Recharge Volume	ABMP/Almp	0.52	unitless
Post-D Impervious Area (or target Impervious Area)	Almp	31,392	sq ft	Avg BMP Recharge Efficiency	VBMP	26,058	cu ft
Root Zone Water Capacity	RWC	1.82	in	%Rainfall became Runoff		77.5%	%
RWC Modified to consider dEXC	DRWC	0.21	in	%Runoff infiltrated		100.0%	%
Climatic Factor	C-factor	1.60	no units	%Runoff Recharged		3.4%	%
Average Annual P	Pavg	43.9	in	%Rainfall Recharged		2.6%	%
Recharge Requirement over Imp. Area	dr	23.7	in				

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	2.71	in
Inches of Rainfall to capture	Pdesign	2.94	in
Recharge Provided Avg. over Imp. Area		32.7	in
Runoff Captured Avg. over Imp. Area		34.0	in

CALCULATION CHECK MESSAGES

Volume Balance -> Solve Problem to satisfy Annual Recharge
 dBMP Check -> OK
 dEXC Check -> OK

BMP Location -> Location is selected as distributed or undetermined

OTHER NOTES

Design is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For hard Segment Location of BMP if you select "Impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other cases.

Recharge Requirement over Imp. Area: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Almp" from the "Annual Recharge" sheet to "Vdef" and "Almp" on this page. This allows solution for a single BMP to handle the entire recharge requirement, set Vdef to your target value and Almp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Almp" button.

Project Name
248 Sticks Pond Road

Description
Recharge Calculations

Analysis Date
10/25/19

BMP or LID Type
Above-Ground Infiltration Basin -SWM-G1

Recharge BMP Input Parameters			Root Zone Water Capacity Calculated Parameters			Recharge Design Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value	Parameter	Symbol	Value
BMP Area	ABMP	65978.0	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.36	Inches of Runoff to capture	Qdesign	2.71
BMP Effective Depth, this is the design variable Upper level of the BMP surface (negative if above ground)	dBMP	21.6	ERWC Modified to consider dEXC	EDRWc	0.04	Inches of Rainfall to capture	Pdesign	2.94
Depth of lower surface of BMP must be >= dBMPu	dBMPu	0.0	Empty Portion of RWC under Infil. BMP	RERWC	0.03	Recharge Provided Avg. over Imp. Area		32.9
Post-development Land Segment Location of BMP	dEXC	54.0				Runoff Captured Avg. over Imp. Area		34.0
	SegBMP	0						

Input Zero if location is distributed or undetermined

BMP Calculated Size Parameters			System Performance Calculated Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value
ABMP/Aimp	Aratio	0.53	Annual BMP Recharge Volume		342,303
BMP Volume	VBMP	118,760	Avg BMP Recharge Efficiency		96.6%

CALCULATION CHECK MESSAGES
 Volume Balance -> Solve Problem to satisfy Annual Recharge
 dBMP Check -> OK
 dEXC Check -> OK
 BMP Location -> Location is selected as distributed or undetermined

Parameters from Annual Recharge Worksheet			Recharge Design Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	Inches of Runoff to capture	Qdesign	2.71
Post-D Impervious Area (or target Impervious Area)	Aimp	124,969	Inches of Rainfall to capture	Pdesign	2.94
Root Zone Water Capacity	RWC	1.82	Recharge Provided Avg. over Imp. Area		32.9
RWC Modified to consider dEXC	DRWC	0.18	Runoff Captured Avg. over Imp. Area		34.0
Climatic Factor	C-factor	1.60			
Average Annual P	Pavg	43.9			
Recharge Requirement over Imp. Area	dr	23.7			

OTHER NOTES
 Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP. make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "Impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

Project Name
248 Stuckles Pond Road

Description
Recharge Calculations

Analysis Date
10/25/19

BMP or LID Type
Above-Ground Infiltration basin - SWM-G1

Recharge BMP Input Parameters			Root Zone Water Capacity Calculated Parameters			Recharge Design Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value	Parameter	Symbol	Value
BMP Area	ABMP	3696.0	Empty Portion of RWIC under Post-D Natural Recharge	ERWIC	0.36	Inches of Runoff to capture	Qdesign	2.71
BMP Effective Depth, this is the design variable Upper level of the BMP surface (negative if above ground)	dBMP	76.8	ERWIC Modified to consider dEXC	EDRWIC	0.36	Inches of Rainfall to capture	Pdesign	2.94
Depth of lower surface of BMP, must be >= dBMPu	dBMPu	-76.8	Empty Portion of RWIC under Infiltr. BMP	RERWIC	0.29	Recharge Provided Avg. over Imp. Area		32.9
Post-development Land Segment Location of BMP	dEXC	0.0				Runoff Captured Avg. over Imp. Area		34.0
	SegBMP	0						

Input Zero if location is distributed or undetermined

BMP Calculated Size Parameters		
ABMP/Aimp	Aratio	0.05
BMP Volume	VBMP	23,654

CALCULATION CHECK MESSAGES
 Volume Balance -> Solve Problem to satisfy Annual Recharge
 dBMP Check -> OK
 dEXC Check -> OK

Parameters from Annual Recharge Worksheet			System Performance Calculated Parameters		
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	Annual BMP Recharge Volume	205,586	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	74,926	Avg BMP Recharge Efficiency	96.7%	Represents % Infiltration Recharged
Root Zone Water Capacity	RWC	1.82	%Rainfall became Runoff	77.5%	%
RWIC Modified to consider dEXC	DRWC	1.82	%Runoff Infiltrated	100.0%	%
Climatic Factor	C-factor	1.60	%Runoff Recharged	8.1%	%
Average Annual P	Pavg	43.9	%Rainfall Recharged	6.3%	%
Recharge Requirement over Imp. Area	df	23.7			

OTHER NOTES
 Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "Impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

Project Name
248 Stickers Pond Road

Description
Recharge Calculations

Analysis Date
10/25/19

BMP or LID Type
Previous Pavement System - SWM-H1

Recharge BMP Input Parameters	Symbol	Value	Unit
BMP Area	ABMP	92166.0	sq-ft
BMP Effective Depth, this is the design variable Upper level of the BMP surface (negative if above ground)	dBMP	12.0	in
Depth of lower surface of BMP, must be >= dBMP	dBMPu	0.0	in
Post-development Land Segment Location of BMP	dEXC	30.0	in
Input Zero if Location is distributed or undetermined	SegBMP	0	unless

Root Zone Water Capacity Calculated Parameters	Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC		0.36	in
ERWC Modified to consider dEXC	EDRWC		0.13	in
Empty Portion of RWC under Infil. BMP	RERWC		0.11	in

Recharge Design Parameters	Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign		2.71	in
Inches of Rainfall to capture	Pdesign		2.94	in
Recharge Provided Avg. over Imp. Area			28.5	in
Runoff Captured Avg. over Imp. Area			34.0	in

Calculation Check Messages
 Volume Balance -> Solve Problem to satisfy Annual Recharge
 dBMP Check -> OK
 dEXC Check -> OK
 BMP Location -> Location is selected as distributed or undetermined

Parameters from Annual Recharge Worksheet	Symbol	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	cu-ft
Post-D Impervious Area (or target Impervious Area)	Aimp	134,912	sq-ft
Root Zone Water Capacity	RWC	1.82	in
RWC Modified to consider dEXC	DRWC	0.66	in
Climatic Factor	C-factor	1.60	no units
Average Annual P over Imp. Area	Pavg	43.9	in
Recharge Requirement	dr	23.7	in

System Performance Calculated Parameters	Parameter	Value	Unit
Annual BMP Recharge Volume	Annual BMP Recharge Volume	320,752	cu-ft
Avg BMP Recharge Efficiency	Avg BMP Recharge Efficiency	83.8%	Recharges % Infiltration Recharged
%Rainfall became Runoff	%Rainfall became Runoff	77.5%	%
%Runoff infiltrated	%Runoff infiltrated	100.0%	%
%Runoff Recharged	%Runoff Recharged	12.5%	%
%Rainfall Recharged	%Rainfall Recharged	9.8%	%

OTHER NOTES
 *design is accurate only after BMP dimensions are updated to make each volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP. make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses. To solve for a smaller BMP or a LID-BMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

Project Name
248 Stickers Pond Road

Description
Recharge Calculations

Analysis Date
10/25/19

BMP or LID Type
Previous Pavement System - SWM-I

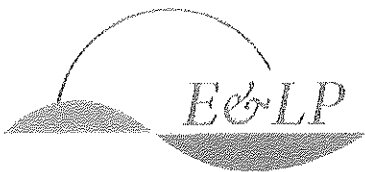
Recharge BMP Input Parameters			Root Zone Water Capacity Calculated Parameters			Recharge Design Parameters		
Parameter	Symbol	Value	Parameter	Symbol	Value	Parameter	Symbol	Value
BMP Area	ABMP	28171.0	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.36	Inches of Runoff to capture	Qdesign	271
BMP Effective Depth, this is the design variable	dBMP	3.6	ERWC Modified to consider dEXC	EDRWWC	0.29	Inches of Rainfall to capture	Pdesign	294
Upper level of the BMP surface (negative if above ground)	dBMPu	0.0	Empty Portion of RWC under Infil. BMP	RERWC	0.26	Recharge Provided Avg. over Imp. Area		14.1
Depth of lower surface of BMP, must be = dBMPu	dEXC	9.0				Runoff Captured Avg. over Imp. Area		34.0
Post-development Land Segment Location of BMP								
Input Zero if Location is distributed or undetermined	SegBMP	0						

Parameters from Annual Recharge Worksheet			BMP Calculated Size Parameters			CALCULATION CHECK MESSAGES		
Post-D Deficit Recharge (or desired recharge volume)	Vdef	1,768,031	ABMP/Aimp	Aratio	1.51	Volume Balance -> Solve Problem to satisfy Annual Recharge		
Post-D Impervious Area (or target impervious Area)	Aimp	18,700	BMP Volume	V/BMP	8,451	dBMP Check -> OK		
Root Zone Water Capacity	RWC	1.82	System Performance Calculated Parameters			dEXC Check -> OK		
RWC Modified to consider dEXC	DRWC	1.47	Annual BMP Recharge Volume		22,004	BMP Location -> Location is selected as distributed or undetermined		
Climatic Factor	C-factor	1.60	Avg BMP Recharge Efficiency		41.5%			
Average Annual P	Pavg	43.9	%Rainfall became Runoff		77.5%			
Recharge Requirement over Imp. Area	dr	23.7	%Runoff Infiltrated		100.0%			
			%Runoff Recharged		0.9%			
			%Rainfall Recharged		0.7%			

OTHER NOTES
 Design is accurate only after BMP dimensions are updated to make each volume deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-I-MP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

APPENDIX H –
ON SITE SOIL TESTING



Engineering & Land Planning Associates

Project:	BHT Andover	Date:	10/22/2019
Location:	BHT Andover	Sample:	In Place
Test By:	Annika Asplund	Log Number:	SL-1
		Depth:	48"

				<u>Disturbed</u>	
L=	4.500	T1=	117	Tube Weight	686
H1=	6.000	T2=	311	Gross Weight	1,034
H2=	4.500	T3=	330	Net Weight	348
r=	1.125	T4=	346	Sample Vol. (in ³)	17.88328125
R=	1.125	T5=	419	(cm ³)	293.1069797
		T(sec.)=	419	Bulk Density	1.187279813
		T(min.)=	6.98		
Soil Permeability:			<u>11.12</u>		
Soil Class:			<u>K4</u>		

$$K(\text{in/hr}) = 60 \text{ min/hr} \times \frac{L(\text{in})}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right) \quad [\text{Equation 4}]$$

Where:

- K = permeability of the soil sample, in inches per hour;
- L = length of the soil core, in inches;
- T = time required for the water level to drop from H₁ to H₂ during the final test interval, in minutes,;
- r = radius of the standpipe, in centimeters or inches;
- R = radius of the soil core, in the same units as "r";
- H₁ = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
- H₂ = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r²/R² is omitted from the equation.]

Engineering & Land Planning Associates

Project:	BHT Andover	Date:	10/22/2019
Location:	BHT Andover	Sample:	In Place
Test By:	Kevin Meininger	Log Number:	SL- 6
		Depth:	48"

L=	4.000	T1=	15	<u>Disturbed</u>	
H1=	5.000	T2=	16	Tube Weight	694
H2=	4.000	T3=	23	Gross Weight	1,083
r=	1.125	T4=	23	Net Weight	389
R=	1.125	T5=	23	Sample Vol. (in ³)	15.89625
		T(sec.)=	23	(cm ³)	260.5395375
		T(min.)=	0.38	Bulk Density	1.493055541

Soil Permeability: 139.71

Soil Class: K5

$$K(\text{in/hr}) = 60 \text{ min/hr} \times \frac{L(\text{in})}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right) \quad [\text{Equation 4}]$$

Where:

- K = permeability of the soil sample, in inches per hour;
- L = length of the soil core, in inches;
- T = time required for the water level to drop from H₁ to H₂ during the final test interval, in minutes,;
- r = radius of the standpipe, in centimeters or inches;
- R = radius of the soil core, in the same units as "r";
- H₁ = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
- H₂ = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r²/R² is omitted from the equation.]

Engineering & Land Planning Associates

Project:	BHT Andover	Date:	10/22/2019
Location:	BHT Andover	Sample:	In Place
Test By:	Kevin Meininger	Log Number:	SL-7
		Depth:	30"

				<u>Disturbed</u>	
L=	3.250	T1=	68	Tube Weight	694
H1=	5.500	T2=	69	Gross Weight	975
H2=	3.250	T3=	116	Net Weight	281
r=	1.125	T4=	115	Sample Vol. (in ³)	12.91570313
R=	1.125	T5=	117	(cm ³)	211.6883742
		T(sec.)=	117	Bulk Density	1.327422921
		T(min.)=	1.95		
Soil Permeability:			<u>52.61</u>		
Soil Class:			<u>K5</u>		

$$K(\text{in/hr}) = 60 \text{ min/hr} \times \frac{L(\text{in})}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right) \quad [\text{Equation 4}]$$

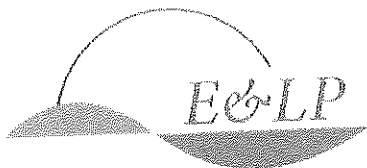
Where:

- K = permeability of the soil sample, in inches per hour;
- L = length of the soil core, in inches;
- T = time required for the water level to drop from H₁ to H₂ during the final test interval, in minutes,;
- r = radius of the standpipe, in centimeters or inches;
- R = radius of the soil core, in the same units as "r";
- H₁ = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
- H₂ = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r²/R² is omitted from the equation.]



APPENDIX J –
LOW IMPACT DEVELOPMENT CHECKLIST



New Jersey Stormwater Best Management Practices Manual

February 2004

A P P E N D I X A

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: Andover Township

County: Sussex County Date: 10/28/2019

Review board or agency: Planning Board of Andover Township

Proposed land development name: 248 Stickles Pond Road

Lot(s): 1 Block(s): 151

Project or application number: _____

Applicant's name: BHT Properties Group, C/O Ram Adar

Applicant's address: 5081 SW 48th Street, 1023, Davie, Florida 33314

Telephone: 305-433-7805 Fax: _____

Email address: _____

Designer's name: Wayne Ingram, Engineering & Land Planning Associates, Inc

Designer's address: 140 West Main Street, High Bridge, NJ 08829

Telephone: 908-238-0544 Fax: _____

Email address: Wayne@elp-inc.com

Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

N.J.A.C. 7:8 - June 20, 2016

Do regulations include nonstructural requirements? Yes: No:

If yes, briefly describe: Protect areas that provide water quality benefits, minimize impervious surfaces, maximize the protection of natural drainage features and vegetation, minimize land disturbance and soil compaction (N.J.A.C. 7:8-5.3).

List LID-BMPs prohibited by local regulations: N/A

Pre-design meeting held? Yes: Date: _____ No:

Meeting held with: X

Pre-design site walk held? Yes: Date: _____ No:

Site walk held with: _____

Other agencies with stormwater review jurisdiction:

Name: Andover Township Planning Board

Required approval: Preliminary and Final Major Site Plan

Name: Sussex County Soil Conservation District

Required approval: Soil Erosion & Sediment Control Plan Certification

Name: NJ DEP

Required approval: Wetland General Permit, Wetland LOI, Flood Hazard Area Permit

Part 3: Nonstructural Strategies and LID-BMPs in Design

3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

A. Has an inventory of existing site vegetation been performed? Yes: _____ No: X

If yes, was this inventory a factor in the site's layout and design? Yes: _____ No: _____

B. Does the site design utilize any of the following nonstructural LID-BMPs?

Preservation of natural areas? Yes: X No: _____ If yes, specify % of site: _____

Native ground cover? Yes: X No: _____ If yes, specify % of site: _____

Vegetated buffers? Yes: X No: _____ If yes, specify % of site: _____

C. Do the land development regulations require these nonstructural LID-BMPs?

Preservation of natural areas? Yes: _____ No: X If yes, specify % of site: _____

Native ground cover? Yes: _____ No: X If yes, specify % of site: _____

Vegetated buffers? Yes: _____ No: X If yes, specify % of site: _____

D. If vegetated filter strips or buffers are utilized, specify their functions:

Reduce runoff volume increases through lower runoff coefficient: Yes: _____ No: X

Reduce runoff pollutant loads through runoff treatment: Yes: _____ No: X

Maintain groundwater recharge by preserving natural areas: Yes: X No: _____

3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed? Yes: X No:

If yes, were these inventories factors in the site's layout and design? Yes: X No:

B. Does the development's design utilize any of the following nonstructural LID-BMPs?

Restrict permanent site disturbance by land owners? Yes: No: X

If yes, how:

Restrict temporary site disturbance during construction? Yes: X No:

If yes, how: Access to the property is limited to the construction entrance only. The
limit of disturbance will be fenced to prevent encroachment by equipment or materials.

Consider soils and slopes in selecting disturbance limits? Yes: X No:

If yes, how: Slope disturbance was limited to the greatest extents possible, while also
proposing a safe design.

C. Specify percentage of site to be cleared: ±55% of Regraded: ±45% of
Disturbed Area Disturbed area

D. Specify percentage of cleared areas done so for buildings: ±1% of Disturbed Area

For driveways and parking: ±30% of For roadways: N/A
Disturbed Area

E. What design criteria and/or site changes would be required to reduce the percentages in C and D above?

In order to reduce the percentages listed in C and D, the project scope would need to be significantly reduced.

F. Specify site's hydrologic soil group (HSG) percentages:

HSG A: 40% HSG B: _____ HSG C: _____ HSG D: 60%

G. Specify percentage of each HSG that will be permanently disturbed:

HSG A: 95% HSG B: _____ HSG C: _____ HSG D: 87%

H. Locating site disturbance within areas with less permeable soils (HSG C and D) and minimizing disturbance within areas with greater permeable soils (HSG A and B) can help maintain groundwater recharge rates and reduce runoff volume increases. In light of the HSG percentages in F and G above, what other practical measures if any can be taken to achieve this?

To compensate for the permanent disturbance to hydrologic soil group A and D, measures have been taken to maintain groundwater recharge: Nine sections of pervious gravel pavement systems and two above-ground infiltration basins have been proposed to compensate the groundwater recharge deficit generated by the proposed development.

I. Does the site include Karst topography?

Yes: _____ No: X

If yes, discuss measures taken to limit Karst impacts:

3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: 4.44 Acres Proposed: 20.15 Acres

B. Specify maximum site impervious coverage allowed by regulations: 60.50 Acres
(4% of Total Site Area)

C. Compare proposed street cartway widths with those required by regulations:

Type of Street	Proposed Cartway Width (feet)	Required Cartway Width (feet)
Residential access – low intensity		
Residential access – medium intensity		
Residential access – high intensity with parking		
Residential access – high intensity without parking		
Neighborhood		
Minor collector – low intensity without parking		
Minor collector – with one parking lane		
Minor collector – with two parking lanes		
Minor collector – without parking		
Major collector		

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: 9'x18' Regulations: 9'x18'

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: 11 Parking Spaces Regulations: 11 Parking Spaces

F. Specify percentage of total site impervious cover created by buildings:

By driveways and parking: 19% By roadways: n/a

G. What design criteria and/or site changes would be required to reduce the percentages in F above?

In order to reduce the percentages listed above, the project scope would need
to be significantly reduced.

H. Specify percentage of total impervious area that will be unconnected:

Total site: 17% Buildings: _____ Driveways and parking: _____ Roads: _____

I. Specify percentage of total impervious area that will be porous:

Total site: 32% Buildings: 0% Driveways and parking: 32% Roads: _____

J. Specify percentage of total building roof area that will be vegetated: 0%

K. Specify percentage of total parking area located beneath buildings: 0%

L. Specify percentage of total parking located within multi-level parking deck: 0%

3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: 5% Vegetated swale: 2% Natural channel: _____

Stormwater management facility: 93% Other: _____

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

In order to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages, the project would need to be significantly altered. Due to the existing topography, and proposed scope of work, additional vegetated swales are not suitable.

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: _____

In order to reduce the overland flow slopes, a larger disturbance would be required. Due to the presence of wetlands with transition areas and the encroachment of floodway, the site slope need to be maximized to the most practical extent.

Increase overland flow roughness: The project would need need to be significantly modified in order to increase overland flow roughness. Due to the proposed use, it is impractical

to make any modifications without affecting the layout and usability of the facilities.

3.5 Preventative Source Controls

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

Specify the number of trash receptacles provided: 1 for building

Specify the spacing between the trash receptacles: N/A

Compare trash receptacles proposed with those required by regulations:

Proposed: N/A Regulations: N/A

B. Pet Waste Stations

Specify the number of pet waste stations provided: N/A

Specify the spacing between the pet waste stations: N/A

Compare pet waste stations proposed with those required by regulations:

Proposed: N/A Regulations: N/A

C. Inlets, Trash Racks, and Other Devices that Prevent Discharge of Large Trash and Debris

Specify percentage of total inlets that comply with the NJPDES storm drain inlet criteria: 5 Inlets

D. Maintenance

Specify the frequency of the following maintenance activities:

Street sweeping: Proposed: N/A Regulations: N/A

Litter collection: Proposed: Per Township Regulations: N/A

Identify other stormwater management measures on the site that prevent discharge of large trash and debris:

Inlet silt sacks and NJDEPS-approved inlets grates.

