STORMWATER MANAGEMENT REPORT

Prepared for:

CSH Old Tappan, LLC

Proposed Assisted Living Facility
Block 1606, Lot 3
244 Old Tappan Road (C.R. 116)
Borough of Old Tappan
Bergen County, NJ

Prepared by:

DYNAMIC ENGINEERING

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May 2021
Revised September 2022
DEC# 1423-99-006

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I. INTRODUCTION

The intent of this study is to analyze the stormwater drainage conditions that will occur as a result of the proposed assisted living and memory care building, parking facilities, and associated site improvements for the site located at 244 Old Tappan in the Borough of Old Tappan, Bergen County, New Jersey and specifically identified as Block 1606, Lot 3 on the Borough of Old Tappan Tax Maps. The majority of the site is undeveloped and contains wooded and wetlands areas. The southern portion of the site is partially developed with a barn, frame dwelling, and gravel drive.

Under proposed conditions, the site will be developed to contain one (1) assisted living and memory care building with surface level parking and associated driveway, as shown on the accompanying engineering drawings. The western portion of the lot, approximately 1.8 acres, is to remain undisturbed.

II. EXISTING DRAINAGE CONDITIONS

The overall subject site consists of 5.46 acres and contains wooded areas, wetlands, and two existing structures along the Old Tappan Road frontage.

Based on the Bergen County Soil Survey, the soil types native to the site include:

SOIL TYPE (SYMBOL)	SOIL TYPE (NAME)	HYDROLOGIC SOIL GROUP
DuuB	Dunellen-Urban land complex, 3 to 8 percent slopes	A
DuuC	Dunellen-Urban land complex, 8 to 15 percent slopes	A
RkrC	Riverhead sandy loam, 8 to 15 percent slopes	B

The site has been evaluated using the TR-55 'Urban Hydrology for Small Watersheds' standards and with the following existing drainage sub-watershed areas as depicted on the Existing Drainage Area Map:

EX-DA 1 DET.:

This study area includes the central portion of the subject property, consisting primarily of undisturbed wooded areas. Runoff generated by this area flows towards an existing depression where it is temporarily stored until it spills over and flows towards the northeast corner of the subject site, to be identified as Point of Analysis 1 (POA #1). Soils within this area belong to hydrologic group B and the time of concentration was calculated to be 16.6 minutes. The Runoff Curve Numbers, included within the Appendix of this Report, were chosen to best reflect the existing site conditions as outlined in the USDA's "Urban Hydrology for Small Watersheds: TR-55".

EX-DA 1 UNDET.:

This study area includes the northeastern portion of the subject property, consisting primarily of undisturbed wooded areas. Runoff generated by this area flows overland towards the northeast corner of the subject site, identified as Point of Analysis 1 (POA #1). Soils within this area belong to hydrologic group B and the time of concentration was calculated to be 22.2 minutes. The Runoff Curve Numbers, included within the Appendix of this Report, were chosen to best reflect the existing site conditions as outlined in the USDA's "Urban Hydrology for Small Watersheds: TR-55".

EX-DA 2:

This study area includes the western and southern majorities of the subject property, consisting primarily of undisturbed wooded areas and two (2) existing structures. The stormwater runoff generated from this area ultimately flows towards the existing on-site wetlands areas along the western property line, to be identified as Point of Analysis 2 (POA #2). The Runoff Curve Numbers, included within the Appendix of this Report, were chosen to best reflect the existing site conditions as outlined in the USDA's "Urban Hydrology for Small Watersheds: TR-55". This drainage area includes two (2) subareas identified as EX-DA-2A and EX-DA-2B, described below:

EX DA-2A: This subarea consists of the southern portion of the subject site, which is comprised of primarily wooded areas and the existing frame dwelling and barn. Runoff generated by this area flows in a southwesterly direction towards the Old Tappan Road right-of-way, is collected by existing inlets within the right-of-way, and is ultimately discharged to the wetlands areas along the western property line of the subject site. This area falls within the limits of disturbance and is subject to the runoff quantity reduction criteria set forth by the Borough of Old Tappan and NJAC 7:8. Soils within this area belong to hydrologic soil groups A and B and the time of concentration was calculated to be 18.0 minutes.

EX DA-2B: This subarea consists of the western portions of Existing Drainage Area 2, which is comprised of primarily wooded and wetlands areas. Runoff generated by this area flows towards the wetlands area, which is considered POA #2. This subarea contains areas to remain undisturbed, and is therefore exempt from the reduction criteria set forth by the Borough of Old Tappan and NJAC 7:8. Soils within this area belong to hydrologic soil groups A and B and the time of concentration was calculated to be 13.8 minutes.

III. PROPOSED DRAINAGE CONDITIONS

Under proposed conditions, the site will be developed with an assisted living and memory care building, surface level parking and associated site improvements. The existing stone dwelling will be relocated off the property and across the street for the Borough's use. The proposed improvements will result in an overall increase in impervious coverage of approximately 74,000 SF (1.7 acres). The proposed design serves to match the existing drainage patterns to the maximum extent practical. The site has been evaluated using the TR-55 'Urban Hydrology for Small Watersheds' standards and with the following proposed drainage sub-watershed areas as depicted on the Proposed Drainage Area Map:

PR-DA 1:

This area includes the majority of the subject site within the limits of development, consisting of the proposed parking areas, sidewalks, and landscaped areas. The stormwater generated from this area is collected by proposed on-site inlets and is conveyed to a proposed above-ground detention basin with sand filter (Basin #1) near the northern property line. The runoff is either infiltrated or detained and released at a controlled rate to POA #1. Soils within this study area belong to hydrologic groups A and B and the minimum time of concentration of 6 minutes was utilized for this area.

PR-DA 1 UNDET:

This area includes a portion of wooded and open space areas along the eastern and northern property lines. The stormwater generated from this area flows overland in a northeasterly direction and contributes to POA #1. A minimum time of concentration of 6 minutes has been utilized for this drainage area. Soils within this study area belong to hydrologic groups A and B.

PR-BUILDING-N:

This area includes the northern roof area of the proposed building. The stormwater generated from this area is collected and conveyed to the proposed above-ground detention basin with sand filter (Basin #1) near the northern property line of the site. The minimum time of concentration of 6 minutes has been utilized for this drainage area.

PR-DA 2:

This study area consists of wetlands to remain undisturbed and landscaped areas along the Old Tappan Road frontage. Runoff generated by the landscaped areas flows in a southwesterly direction before flowing into the existing conveyance system within the Old Tappan Road right-of-way. There it is captured by existing inlets and ultimately conveyed to the isolated wetlands in the northwest portion of the site (POA #2). Soils from this area belong to hydrologic soil groups A and B, and the runoff curve numbers, included within the Appendix of this Report, were chosen to best reflect the proposed site conditions as outlined in the USDA's "Urban

Hydrology for Small Watersheds: TR-55." The time of concentration was calculated to be 15.2 minutes.

PR-BUILDING-S:

This area includes the southern roof area of the proposed building. The stormwater generated from this area is collected and conveyed to the proposed above-ground bioretention/detention basin (Basin #2) near the southwestern property line of the site. The minimum time of concentration of 6 minutes has been utilized for this drainage area.

IV. DESIGN METHODOLOGY

The primary design constraints for this project are based on requirements established in the Borough of Old Tappan Land Development Ordinance, New Jersey Soil Erosion and Sediment Control Standards, and NJAC 7:8. More specifically, the stormwater management design will serve to maintain existing drainage patterns to the maximum extent practical and reduce proposed runoff rates when compared to pre-development runoff rates for disturbed areas. The proposed project will disturb more than 1 acre of land and impervious surface coverage will be increased by more than ¼ acre when compared to existing conditions. As a result, the project meets the definition of a "major development" as defined NJAC 7:8. Furthermore, the project has been designed to meet green infrastructure, groundwater recharge, and water quality standards, as well as the allowable post-development peak flow rates for the disturbed area of 50%, 75% and 80% for the 2-, 10- and 100- year storms set forth by the Borough of Old Tappan and NJAC 7:8.

In order to prepare the stormwater calculations for the project, extensive initial investigation of the property and topographic survey was performed. Schwanewede/Hals Engineering was contracted to prepare an ALTA/NSPS Land Title Survey of the existing site. Based on a review of the existing site conditions and the Survey, the Drainage Area Maps for the existing and proposed conditions as defined within this report were established. The grading plan within the accompanying engineering drawings was developed for the proposed site improvements with consideration to the existing drainage patterns.

The 2-, 10- and 100-year quantity design storms are based upon the New Jersey 24 Hour Rainfall Frequency Data for Bergen County as published by the NOAA Atlas 14 Type D rainfall distribution. Curve number calculations have been included within the Appendix and are based upon hydrologic soil groups A and B. Pervious and impervious areas were modeled separately as recommended within the NJDEP Stormwater Management Best Management Practices (BMP) Manual.

The Borough of Old Tappan and NJDEP flow reduction requirements are as follows:

2-year:	50% reduction (50% of Existing)
10-year:	25% reduction (75% of Existing)
100-year:	20% reduction (80% of Existing)

V. DETENTION/INFILTRATION BASIN #1

The stormwater runoff generated by PR-DA 1 and PR-Building-N is collected by various proposed on-site inlets and conveyed to the aboveground basin located near the northern property line. The basin has been designed to accommodate the 100-year design storm, providing a maximum storage of approximately 56,500 cubic feet, and includes a sand filter to provide water quality treatment, designed in accordance with the New Jersey Stormwater Best Management Practices Manual (BMP). Runoff generated by the Water Quality Design Storm is allowed to pass through the sand filter and infiltrate into the underlying soils. Runoff volume generated by larger storm events is detained and released at a controlled rate to POA #1 through the use of an outlet control structure. Associated calculations are included in the Appendix of this report and details have been provided on the accompanying engineering drawings.

VI. BIORETENTION/DETENTION BASIN #2

The stormwater runoff generated by PR-Building-S is collected by the proposed roof leaders and conveyed through a 15" HDPE pipe to the aboveground bioretention/detention basin located near the southwestern property line. The basin has been designed to accommodate the 100-year design storm, providing a maximum storage of approximately 12,300 cubic feet. The basin has been designed as a small-scale bioretention basin to provide water quality treatment, designed in accordance with the New Jersey Stormwater Best Management Practices Manual (BMP). The roof runoff from the building is considered to be clean; however, the volume generated by the Water Quality design storm is treated and infiltrated into the underlaying soils. Runoff volume generated by larger storm events is detained and released at a controlled rate to POA #2. Associated calculations are included in the Appendix of this report and details have been provided on the accompanying engineering drawings.

VII. WATER QUANTITY

As required by the Borough of Old Tappan Land Use Ordinance and NJAC 7:8, the proposed development is subject to runoff quantity reduction requirements. Two methods which may be used to achieve the runoff quantity reductions are the following:

1. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the two-, 10-, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
2. Design stormwater management measures so that the post-construction peak runoff rates for the two-, 10-, and 100-year storm events are 50, 75, and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed;

The two aforementioned points of analysis have been used to analyze and ensure the satisfaction of the runoff quantity requirements using one of the above methods. POA #1 was analyzed using method 2 described above. The following table demonstrates the results of these calculations:

POA-1 (CFS)				
	Existing	Allowable	Proposed	Reduction
2-Year	0.58	0.29	0.17	70.7%
10-Year	1.71	1.28	0.55	67.8%
25-Year	2.52	N/S	0.83	67.1%
100-Year	3.85	3.08	1.25	67.5%

POA #2 was analyzed using method 1 described above. The following table represents the results of these calculations:

POA-2 (CFS)		
	Existing	Proposed
2-Year	1.37	1.14
10-Year	4.48	3.54
25-Year	6.82	5.29
100-Year	10.76	8.19

As indicated above, the peak flows for each point of analysis have been reduced when compared to existing conditions as required, thus meeting the requirements set forth in the Borough ordinance and N.J.A.C. 7:8.

VIII. WATER QUALITY

The development proposes more than one-quarter (1/4) acre of motor vehicle-traveled surface coverage and is therefore required to meet the 80% TSS removal rate requirement set forth by the Borough of Old Tappan and NJAC 7:8. Areas within Proposed Drainage Area 1 Undet. and Proposed Drainage Area 2 do not contain motor vehicle surfaces; therefore, runoff generated by these areas is are not required to be treated for water quality per NJAC 7:8.

Runoff generated by Proposed Drainage Area 1 and Building-N is conveyed to Basin 1, which includes a sand filter designed in accordance with the NJDEP BMP Manual to provide 80% TSS removal. Runoff generated by the Water Quality Design Storm is allowed to pass through the sand filter and infiltrate into the underlying soils. Runoff generated by larger storm events is detained and released at a controlled rate to POA #1 through the use of an outlet control structure.

Runoff generated by Building-S is conveyed to Basin 2, which has been designed as a small-scale bioretention basin to provide water quality treatment, designed in accordance with the NJDEP BMP Manual to provide 80% TSS removal. The runoff from the building roof is considered clean by NJAC 7:8 prior to entering the basin; however, the runoff is treated for an additional 80% TSS removal and infiltrated into the underlaying soils. The maximum storage depth above the basin bottom of 1' is provided in accordance with the BMP manual and the basin is equipped with an outlet control structure to detain and release runoff from larger storm events at a controlled rate to POA #2.

IX. GROUNDWATER RECHARGE

As mentioned above, the project is considered a "major development" under the guidelines set forth by the Borough of Old Tappan and NJAC 7:8, and is therefore subject to groundwater recharge requirements set forth in same. The proposed improvements implement the previously mentioned sand filter within Basin 1, which has been designed to provide approximately 108,000 cubic feet of annual recharge volume, thus satisfying the groundwater recharge requirements.

Bioretention/detention Basin 2 has been designed to provide additional infiltration and further peak flow runoff quantity reduction under proposed conditions. Runoff generated by drainage area Building-S is conveyed to Basin 2 and allowed to infiltrate into the ground. Approximately 268,800 cubic feet of additional groundwater recharge is provided; therefore, providing a total of 376,800 cubic feet of annual recharge volume and surpassing the minimum requirement.

X. CONCLUSION

The proposed development has been designed with provisions for the safe and efficient control of stormwater runoff in a manner that will not adversely impact the existing drainage patterns, adjacent roadways, or adjacent parcels.

The stormwater management design reduces peak flow rates for the proposed development area and meets the minimum peak flow reduction for the 2, 10 and 100-year storm frequencies and/or reduces runoff to be under the curve of the existing hydrographs at all times as required by the Borough of Old Tappan and NJAC 7:8.

The water quality TSS removal requirements and groundwater recharge requirements have been satisfied by use of a sand filter and a bioretention basin, to achieve the 80% TSS required removal rate under post-development conditions.

APPENDIX

USGS MAP

DYNAMIC ENGINEERING

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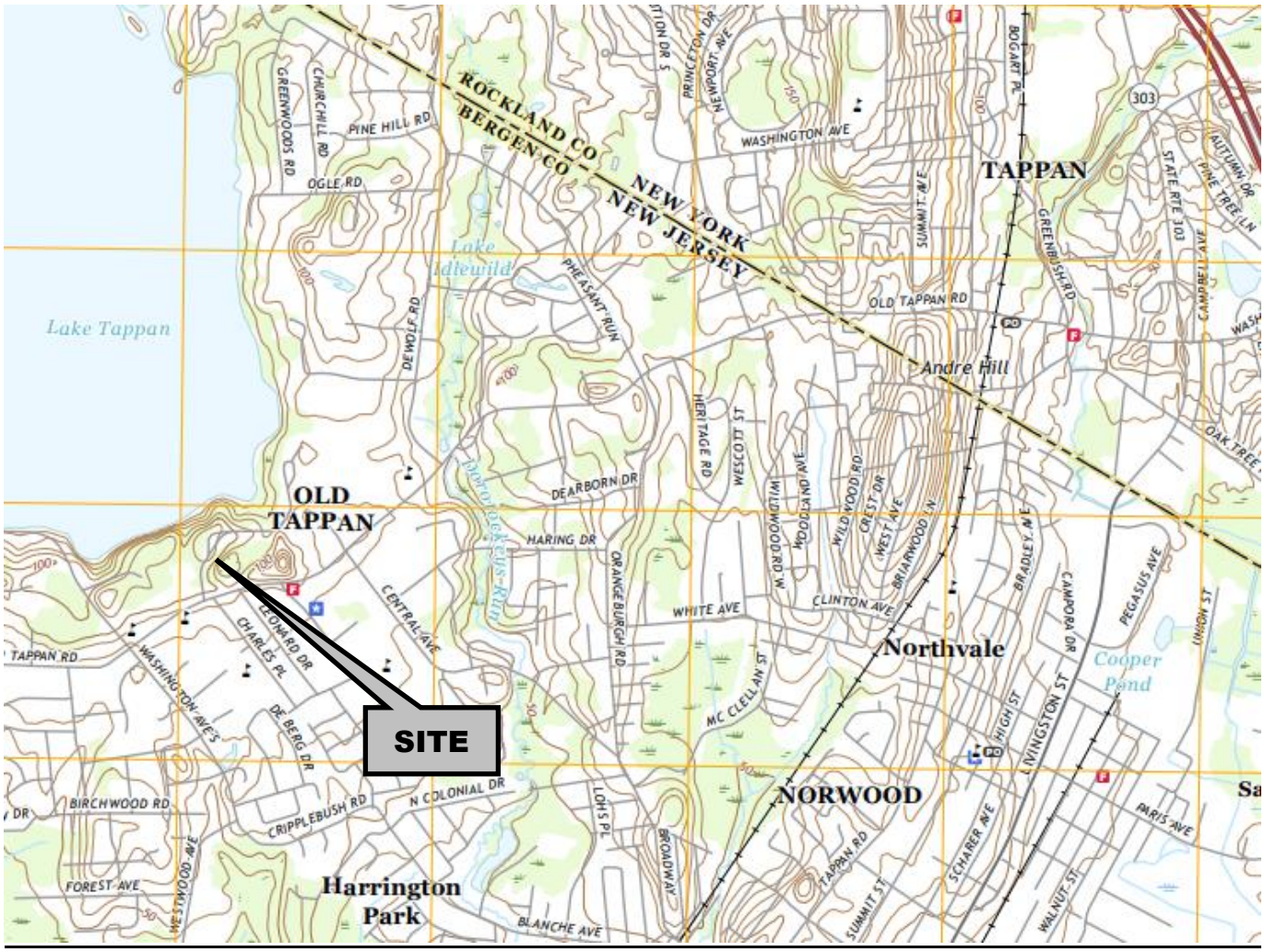
USGS Map

Nyack Quad



CONDUIT OUTLET PROTECTION CALCULATIONS

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 3/23/2022
Project: CSH Old Tappan
Project No: 1423-99-006

Calculated By: GL
Checked By: DRL

Conduit Outlet Protection Calculations

Rip Rap Pad # 10

Design Parameters:

Design Storm Flow for 25 Year, Q	3.43	cfs
Vertical Dimension of Outlet Pipe, D_o	18	in
Horizontal Dimension of Outlet Pipe, W_o	18	in
Tailwater Depth, TW[1]	0.25	ft

Apron Dimension Calculations:

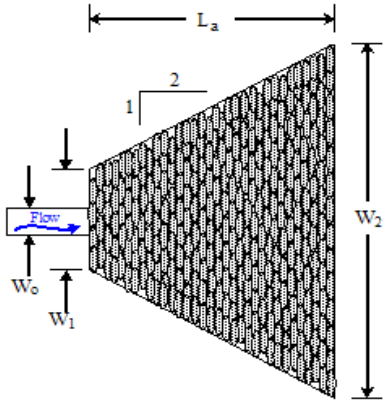
Unit Dicharge, $q = Q/D_o$ = 2.29 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 13.86 ft or **L_a = 14 ft**

Width, $W_1 = 3W_o$ = 4.5 ft or **W_1 = 5 ft**

Width, $W_2 = 3W_o + L_a$ = 18.36 ft or **W_2 = 19 ft**

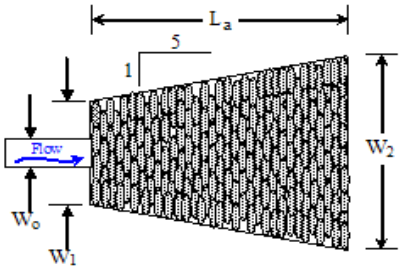


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 2.88 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

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(908) 879-9229

Date: 3/23/2022
Project: CSH Old Tappan
Project No: 1423-99-006

Calculated By: GL
Checked By: DRL

Conduit Outlet Protection Calculations

Rip Rap Pad # 20

Design Parameters:

Design Storm Flow for 25 Year, Q	7.31	cfs
Vertical Dimension of Outlet Pipe, D_o	24	in
Horizontal Dimension of Outlet Pipe, W_o	24	in
Tailwater Depth, TW[1]	0.25	ft

Apron Dimension Calculations:

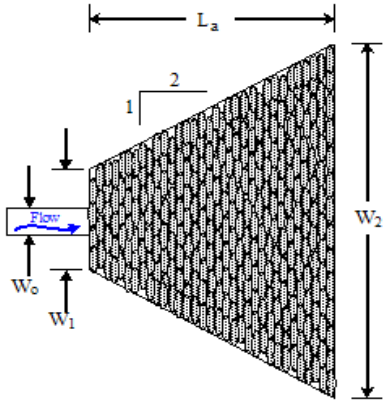
Unit Dicharge, $q = Q/D_o$ = 3.66 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 18.65 ft or **L_a = 19 ft**

Width, $W_1 = 3W_o$ = 6. ft or **W_1 = 6 ft**

Width, $W_2 = 3W_o + L_a$ = 24.65 ft or **W_2 = 25 ft**

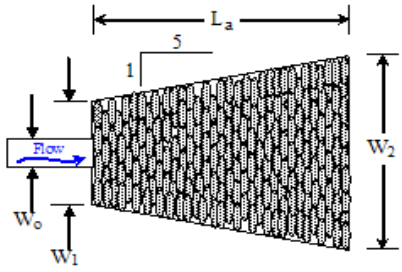


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 5.38 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 9/1/2022
Project: CSH Old Tappan
Project No: 1423-99-006

Calculated By: GL
Checked By: DRL

Conduit Outlet Protection Calculations

Rip Rap Pad # 42

Design Parameters:

Design Storm Flow for 25 Year, Q	2.76	cfs
Vertical Dimension of Outlet Pipe, D_o	15	in
Horizontal Dimension of Outlet Pipe, W_o	15	in
Tailwater Depth, TW[1]	0.26	ft

Apron Dimension Calculations:

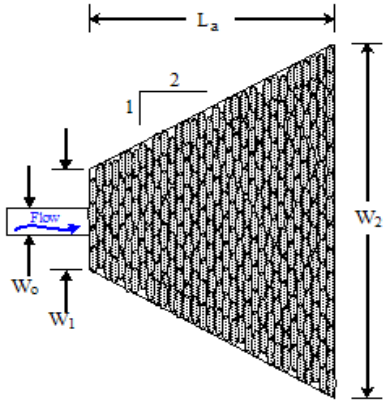
Unit Dicharge, $q = Q/D_o$ = 2.21 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 12.3 ft or **L_a = 13 ft**

Width, $W_1 = 3W_o$ = 3.75 ft or **W_1 = 4 ft**

Width, $W_2 = 3W_o + L_a$ = 16.05 ft or **W_2 = 17 ft**

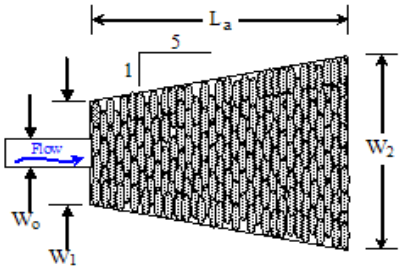


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 2.65 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

SOIL SURVEY

Map Scale: 1:1,480 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Bergen County, New Jersey
Survey Area Data: Version 17, Jun 1, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 7, 2013—Feb 26, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DuuB	Dunellen-Urban land complex, 3 to 8 percent slopes	A	1.1	19.3%
DuuC	Dunellen-Urban land complex, 8 to 15 percent slopes	A	0.2	4.0%
RkrC	Riverhead sandy loam, 8 to 15 percent slopes	B	4.5	76.5%
UdkttB	Udorthents, loamy, 0 to 8 percent slopes, frequently flooded	D	0.0	0.2%
Totals for Area of Interest			**5.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

RUNOFF CURVE NUMBER (CN) CALCULATIONS

DYNAMIC ENGINEERING

EXISTING DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER(CN) CALCULATIONS

Project: Capital Seniors Housing - Old Tappan
Job #: 1423-99-006
Location: 24 Old Tappan Rd, Old Tappan, NJ

Computed By: CP
Checked By: DRL
Date: 4/14/2021

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG A - Open Space Area (acre)	HSG A - Open Space Area (sf)	Curve Number (CN) Used	HSG A - Wooded Area (acre)	HSG A - Wooded Area (sf)	Curve Number (CN) Used	HSG B - Open Space Area (acre)	HSG B - Open Space Area (sf)	Curve Number (CN) Used	HSG B - Wooded Area (acre)	HSG B - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total Pervious Area (acres)	Total Area (acres)	TC (Min.)
EX-DA 1 DET.	0.00	-	98	0.00		68	0.00	-	45	0.00		79	0.97	42,329	66	66	0.97	0.97	16.6
EX-DA 1 UNDET.	0.00	-	98	0.00		68	0.00	-	45	0.00		79	1.24	54,217	66	66	1.24	1.24	22.2
EX-DA 2A	0.12	5,176	98	0.50	21,642	68	0.58	25,207	45	0.00		79	0.20	8,719	66	57	1.28	1.39	18.0
EX-DA 2B	0.00		98	0.00		68	0.19	8,203	45	0.00		79	1.66	72,479	66	64	1.85	1.85	13.8
Total	**0.12**	**5176.00**		**0.50**	**21642.00**		**0.77**	**33410.00**		**0.00**	**0.00**		**4.08**	**177744.00**			**5.34**	**5.46**	

Per Bergen County Soil Survey -	DuuB	HSG	A	Hazen-Paulins Kill complex
Per Bergen County Soil Survey -	DuuC	HSG	A	Washington silt loam
Per Bergen County Soil Survey -	RkrC	HSG	B	Rock outcrop-Farmington-Galway complex

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)
Impervious Surface	98	98
Woods (poor)	45	66
Open Space (poor)	68	79

DYNAMIC ENGINEERING

Proposed Drainage Area Summary and Average Curve Number(CN) Calculations

Project: Capital Seniors Housing - Old Tappan
Job #: 1423-99-006
Location: 24 Old Tappan Rd, Old Tappan, NJ

Computed By: GL
Checked By: DRL
Date: 9/1/2022

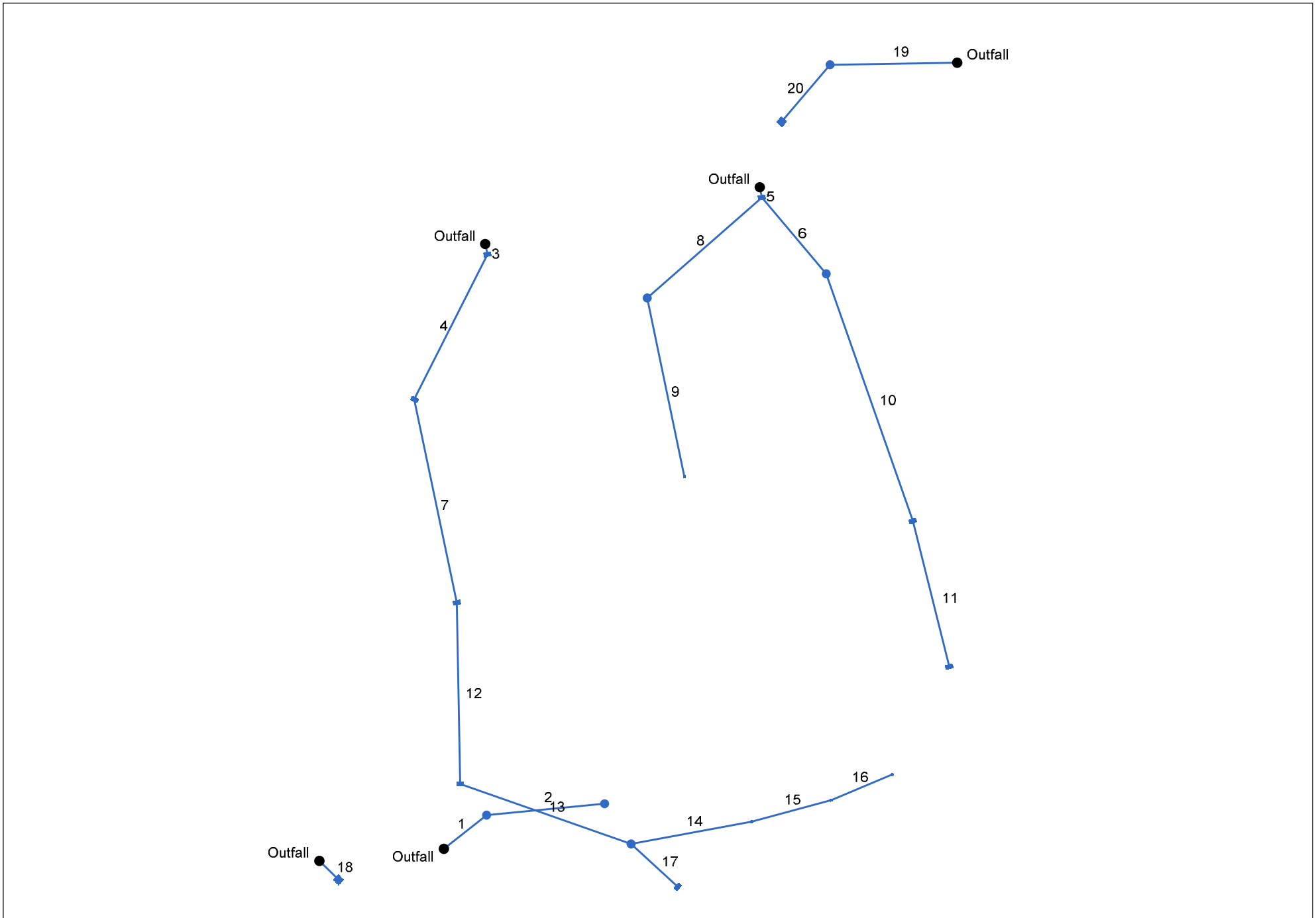
Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG A - Open Space Area (acre)	HSG A - Open Space Area (sf)	Curve Number (CN) Used	HSG A - Wooded Area (acre)	HSG A - Wooded Area (sf)	Curve Number (CN) Used	HSG B - Open Space Area (acre)	HSG B - Open Space Area (sf)	Curve Number (CN) Used	HSG B - Wooded Area (acre)	HSG B - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total Pervious Area (acres)	Total Area (acres)	TC (Min.)
PR-DA 1	0.96	41,609	98	0.32	13,870	68	0.00	-	45	0.76	33,264	79	0.00	-	66	76	1.08	2.04	6.0
PR-DA 1 UD	0.00	-	98	0.00		68	0.00	-	45	0.00	-	79	0.30	12,944	66	66	0.30	0.30	6.0
PR-DA 2	0.11	4,606	98	0.36	15,747	68	0.25	10,779	45	0.00	-	79	1.70	74,165	66	64	2.31	2.42	15.2
PR-BUILDING-N	0.36	15,707	98	0.00		68	0.00	-	45	0.00	-	79	0.00	-	66	N/A	0.00	0.36	6.0
PR-BUILDING-S	0.35	15,230	98	0.00	-	68	0.00	-	45	0.00	-	79	0.00	-	66	N/A	0.00	0.35	6.0
Total	**1.77**	**77152.00**		**0.68**	**29617.00**		**0.25**	**10779.00**		**0.76**	**33264.00**		**2.00**	**87109.00**			**3.69**	**5.46**	

Per Bergen County Soil Survey -	DuuB	HSG	A	Hazen-Paulins Kill comple
Per Bergen County Soil Survey -	DuuC	HSG	A	Washington silt loam
Per Bergen County Soil Survey -	RkrC	HSG	B	Rock outcrop-Farmington-Galway comple

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)
Impervious Surface	98	98
Woods (poor)	45	66
Open Space (poor)	68	79

PIPE SIZING CALCULATIONS

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: 2022-09-02 - Old Tappan Pipe Sizing.stm	Number of lines: 20	Date: 9/2/2022

Report

Line No.	Line ID	Inlet ID	Drng Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc (min)	i Sys (in/hr)	Line Size (in)	Line Length (ft)	Line Slope (%)	Line Type	Capac Full (cfs)	Flow Rate (cfs)	Vel Ave (ft/s)
1	41 to 42	41	0.00	0.00	0.00	0.35	0.0	6.5	7.98	15	30.729	0.29	Cir	3.77	2.76	3.76
2	40 to 41	40	0.35	0.99	0.35	0.35	6.0	6.0	8.25	15	66.843	0.30	Cir	3.81	2.86	3.42
3	21 to 20	21	0.31	0.74	0.23	0.92	6.0	16.5	4.90	24	6.000	0.67	Cir	20.18	4.52	4.20
4	22 to 21	22	0.25	0.95	0.24	0.69	6.0	15.5	5.08	24	91.863	0.29	Cir	13.40	3.52	3.57
5	11 to 10	11	0.25	0.80	0.20	0.66	6.0	15.3	5.12	18	6.000	0.50	Cir	8.13	3.37	4.16
6	12 to 11	12	0.16	0.99	0.16	0.43	6.0	9.7	6.55	18	56.317	0.30	Cir	6.32	2.79	3.44
7	23 to 22	23	0.18	0.91	0.16	0.45	6.0	14.4	5.29	18	117.447	0.30	Cir	6.27	2.41	3.28
8	30 to 11	30	0.00	0.00	0.00	0.03	0.0	11.0	6.15	12	86.083	0.50	Cir	2.82	0.21	2.03
9	31 to 30	31	0.06	0.56	0.03	0.03	6.0	6.0	8.25	12	103.123	0.50	Cir	2.83	0.28	2.22
10	13 to 12	13	0.19	0.76	0.14	0.27	6.0	7.7	7.36	18	148.133	0.30	Cir	6.26	1.98	3.12
11	14 to 13	14	0.16	0.78	0.12	0.12	6.0	6.0	8.25	15	85.091	0.31	Cir	3.85	1.03	2.66
12	24 to 23	24	0.10	0.63	0.06	0.29	6.0	13.0	5.60	18	102.613	0.30	Cir	6.32	1.63	2.69
13	25 to 24	25	0.00	0.00	0.00	0.23	0.0	11.3	6.05	18	102.163	0.30	Cir	6.30	1.38	2.47
14	26 to 25	26	0.04	0.29	0.01	0.09	6.0	9.3	6.70	15	68.948	0.30	Cir	3.85	0.58	2.27
15	27 to 26	27	0.06	0.38	0.02	0.08	6.0	7.7	7.34	15	46.620	0.30	Cir	3.82	0.55	2.22
16	28 to 27	28	0.07	0.75	0.05	0.05	6.0	6.0	8.25	15	37.304	0.29	Cir	3.79	0.44	2.07
17	29 to 25	29	0.20	0.70	0.14	0.14	6.0	6.0	8.25	12	35.725	0.28	Cir	2.11	1.16	2.69
18	OCS-2 to 43	OCS-2	0.00	0.00	0.00	0.00	0.0	0.0	0.00	15	15.212	3.29	Cir	12.64	0.01	0.88
19	50 to Exist. MH 100	50	0.00	0.00	0.00	0.00	0.0	4.1	0.00	15	71.711	0.29	Cir	3.77	0.21	1.67
20	OCS-1 to HW-1	OCS-1	0.00	0.00	0.00	0.00	0.0	0.0	0.00	15	42.222	0.26	Cir	3.56	0.21	1.59

Project File: 2022-09-02 - Old Tappan Pipe Sizing.stm | Number of lines: 20 | Date: 9/2/2022

NOTES: Intensity = 41.42 / (Inlet time + 3.70) ^ 0.71 -- Return period = 25 Yrs. ; ** Critical depth

TIME OF CONCENTRATION (Tc) CALCULATIONS

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 4/30/2021
Project: CSH - Old Tappan
Project No: 1423-99-006

Calculated By: DRL
Checked By: DTS

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA-1 DET.

- ***Sheet Flow*:**

		AB						
1.	Surface Description	Woods, Dense Underbrush						
2.	Manning's Roughness Coefficient, n	0.8						
3.	Flow Length, L { *total L ≤ 100 ft* }	100.0 ft						
4.	Two-Year 24-hour Rainfall, p_2 for . . . Bergen County	3.34 in		3.34 in		3.34 in		
5.	Land Slope, s *(ft/ft)*	0.150 ft/ft						
6.	Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.272 hr	+	0.000 hr	+	0.000 hr	=	0.272 hr

- ***Shallow Concentrated Flow*:**

		BC						
7.	Surface Description	Unpaved						
8.	Flow Length, L	90.0 ft						
9.	Watercourse Slope, s	0.110 ft/ft						
10.	Average velocity, V { *see Figure 3.1)*	5.35 ft/s						
11.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.005 hr	+	0.000 hr	+	0.000 hr	=	0.005 hr

- ***Channel Flow*:**

12.	Pipe Diameter, D							
13.	Cross-Sectional Flow Area, A							
14.	Wetted Perimeter, p_w							
15.	Hydraulic Radius, $r = A / p_w$							
16.	Channel Slope, s							
17.	Pipe Material							
18.	Manning's Roughness Coefficient, n							
19.	Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$							
20.	Flow Length, L							
21.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+	0.000 hr	+	0.000 hr	=	0.000 hr
22.	Watershed or subarea Time of Concentration, T_c { *add T_t in steps 6, 11 and 21* }							0.277 hr
								16.6 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 4/14/2021
Project: CSH - Old Tappan
Project No: 1423-99-006

Calculated By: DRL
Checked By: DTS

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA-1 UNDET.

- ***Sheet Flow*:**

		AB				
1.	Surface Description	Woods, Dense Underbrush				
2.	Manning's Roughness Coefficient, n	0.8				
3.	Flow Length, L { total $L \le 100$ ft }	100.0 ft				
4.	Two-Year 24-hour Rainfall, p_2 for . . . Bergen County	3.34 in	3.34 in	3.34 in		
5.	Land Slope, s (ft/ft)	0.080 ft/ft				
6.	Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.350 hr	+ 0.000 hr	+ 0.000 hr	=	0.350 hr

- ***Shallow Concentrated Flow*:**

		BC				
7.	Surface Description	Unpaved				
8.	Flow Length, L	290.0 ft				
9.	Watercourse Slope, s	0.065 ft/ft				
10.	Average velocity, V { see Figure 3.1)	4.11 ft/s				
11.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.020 hr	+ 0.000 hr	+ 0.000 hr	=	0.020 hr

- ***Channel Flow*:**

12.	Pipe Diameter, D					
13.	Cross-Sectional Flow Area, A					
14.	Wetted Perimeter, p_w					
15.	Hydraulic Radius, $r = A / p_w$					
16.	Channel Slope, s					
17.	Pipe Material					
18.	Manning's Roughness Coefficient, n					
19.	Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$					
20.	Flow Length, L					
21.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22.	Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.370 hr
						22.2 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 4/30/2021
Project: CSH - Old Tappan
Project No: 1423-99-006

Calculated By: CMP
Checked By: KHC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA-2A

- ***Sheet Flow*:**

		AB				
1.	Surface Description	Woods, Dense Underbrush				
2.	Manning's Roughness Coefficient, n	0.8				
3.	Flow Length, L { *total* $L \le 100$ *ft* }	100.0 ft				
4.	Two-Year 24-hour Rainfall, p_2 for . . . Bergen County	3.34 in	3.34 in	3.34 in		
5.	Land Slope, s *(ft/ft)*	0.121 ft/ft				
6.	Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.297 hr	+ 0.000 hr	+ 0.000 hr	=	0.297 hr

- ***Shallow Concentrated Flow*:**

		BC				
7.	Surface Description	Unpaved				
8.	Flow Length, L	51.9 ft				
9.	Watercourse Slope, s	0.164 ft/ft				
10.	Average velocity, V { *see Figure 3.1)*	6.53 ft/s				
11.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.002 hr	+ 0.000 hr	+ 0.000 hr	=	0.002 hr

- ***Channel Flow*:**

12.	Pipe Diameter, D					
13.	Cross-Sectional Flow Area, A					
14.	Wetted Perimeter, p_w					
15.	Hydraulic Radius, $r = A / p_w$					
16.	Channel Slope, s					
17.	Pipe Material					
18.	Manning's Roughness Coefficient, n					
19.	Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$					
20.	Flow Length, L					
21.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22.	Watershed or subarea Time of Concentration, T_c { *add* T_t *in steps 6, 11 and 21* }					0.299 hr
						18.0 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 4/30/2021
Project: CSH - Old Tappan
Project No: 1423-99-006

Calculated By: CMP
Checked By: KHC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA-2B

		AB				
• *Sheet Flow*:						
1. Surface Description		Woods, Dense Underbrush				
2. Manning's Roughness Coefficient, n		0.8				
3. Flow Length, L { *total L ≤ 100 ft* }		85.0 ft				
4. Two-Year 24-hour Rainfall, p_2 for . . .	Bergen County	3.34 in				
5. Land Slope, s *(ft/ft)*		0.166 ft/ft				
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$		0.230 hr	+ 0.000 hr	+ 0.000 hr	=	0.230 hr
• *Shallow Concentrated Flow*:						
7. Surface Description						
8. Flow Length, L						
9. Watercourse Slope, s						
10. Average velocity, V { *see Figure 3.1)*						
11. Travel Time, $T_t = \frac{L}{3600\,V}$		0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
• *Channel Flow*:						
12. Pipe Diameter, D						
13. Cross-Sectional Flow Area, A						
14. Wetted Perimeter, p_w						
15. Hydraulic Radius, $r = A / p_w$						
16. Channel Slope, s						
17. Pipe Material						
18. Manning's Roughness Coefficient, n						
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$						
20. Flow Length, L						
21. Travel Time, $T_t = \frac{L}{3600\,V}$		0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22. Watershed or subarea Time of Concentration, T_c { *add T_t in steps 6, 11 and 21* }						0.230 hr
						13.8 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 12/9/2021
Project: CSH Old Tappan NJ
Project No: 1423-99-006

Calculated By: JD
Checked By: KHC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: PR-DA 1

• Sheet Flow:

	AB				
1. Surface Description	Dense Grasses				
2. Manning's Roughness Coefficient, n	0.24				
3. Flow Length, L { total $L \le 100$ ft }	54.0 ft				
4. Two-Year 24-hour Rainfall, p_2 for Bergen County	3.34 in				
5. Land Slope, s (ft/ft)	0.151 ft/ft				
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.063 hr	+ 0.000 hr	+ 0.000 hr	+ 0.000 hr	= 0.063 hr

• Shallow Concentrated Flow:

7. Surface Description					
8. Flow Length, L					
9. Watercourse Slope, s					
10. Average velocity, V { see Figure 3.1)					
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	+ 0.000 hr	= 0.000 hr

• Channel Flow:

	BC	CD	DE	EF	
12. Pipe Diameter, D	15 in	18 in	24 in	24 in	
13. Cross-Sectional Flow Area, A	1.227 sf	1.767 sf	3.142 sf	3.142 sf	
14. Wetted Perimeter, p_w	3.9 ft	4.7 ft	6.3 ft	6.3 ft	
15. Hydraulic Radius, $r = A / p_w$	0.3 ft	0.4 ft	0.5 ft	0.5 ft	
16. Channel Slope, s	0.003 ft/ft	0.003 ft/ft	0.003 ft/ft	0.0083 ft/ft	
17. Pipe Material	HDPE	HDPE	HDPE	HDPE	
18. Manning's Roughness Coefficient, n	0.010	0.010	0.010	0.010	
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$	3.76 ft/s	4.24 ft/s	5.14 ft/s	8.55 ft/s	
20. Flow Length, L	153.0	322.0	87.0	6.0	
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.011 hr	+ 0.021 hr	+ 0.005 hr	+ 0.000 hr	= 0.037 hr
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.101 hr
					6.0 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 4/30/2021
Project: CSH - Old Tappan
Project No: 1423-99-006

Calculated By: CMP
Checked By: KHC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: PR-DA 2

		AB				
• *Sheet Flow*:						
1. Surface Description		Woods, Dense Underbrush				
2. Manning's Roughness Coefficient, n		0.8				
3. Flow Length, L { *total L ≤ 100 ft* }		96.0 ft				
4. Two-Year 24-hour Rainfall, p_2 for . . .	Bergen County	3.34 in				
5. Land Slope, s *(ft/ft)*		0.166 ft/ft				
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$		0.253 hr	+ 0.000 hr	+ 0.000 hr	=	0.253 hr
• *Shallow Concentrated Flow*:						
7. Surface Description						
8. Flow Length, L						
9. Watercourse Slope, s						
10. Average velocity, V { *see Figure 3.1)*						
11. Travel Time, $T_t = \frac{L}{3600\,V}$		0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
• *Channel Flow*:						
12. Pipe Diameter, D						
13. Cross-Sectional Flow Area, A						
14. Wetted Perimeter, p_w						
15. Hydraulic Radius, $r = A / p_w$						
16. Channel Slope, s						
17. Pipe Material						
18. Manning's Roughness Coefficient, n						
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$						
20. Flow Length, L						
21. Travel Time, $T_t = \frac{L}{3600\,V}$		0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22. Watershed or subarea Time of Concentration, T_c { *add T_t in steps 6, 11 and 21* }						0.253 hr
						15.2 min

HYDROGRAPH SUMMARY REPORTS – EXISTING VS PROPOSED CONDITIONS 2-YR, 10-YR, 25-YR, & 100-YR

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

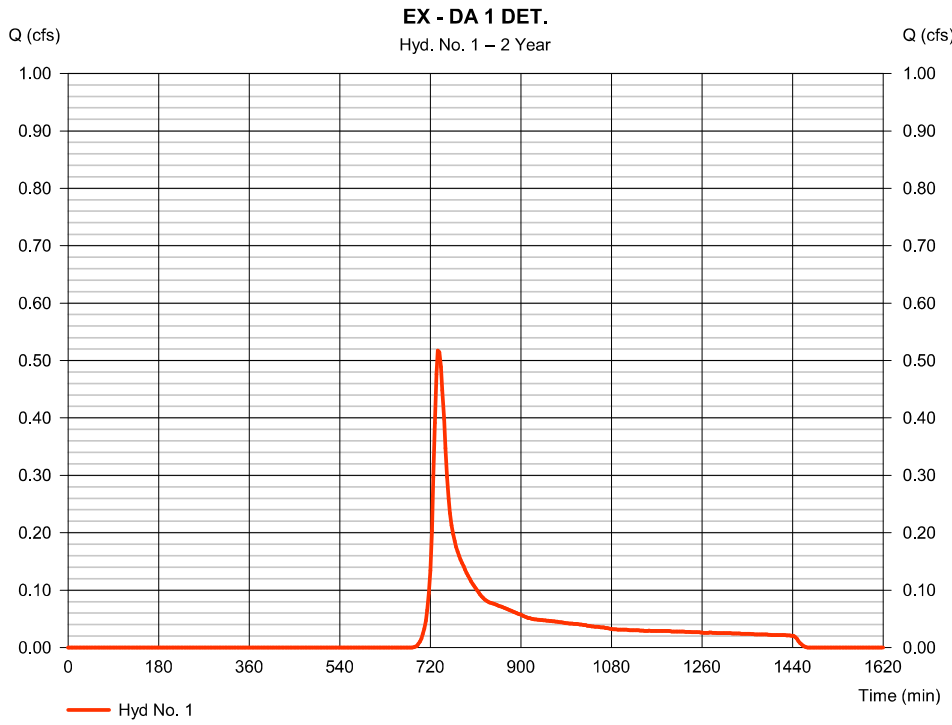
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.517	3	735	2,847	-----	----	-----	EX - DA 1 DET.
2	Reservoir	0.000	3	786	0	1	85.90	433	EXIST. DEPRESSION
4	SCS Runoff	0.579	3	741	3,441	-----	----	-----	EX-DA 1 UNDET.
5	Combine	0.579	3	741	3,441	2, 4	----	-----	EX-DA 1 (POA 1)
7	SCS Runoff	0.270	3	735	1,454	-----	----	-----	EX-DA 2A IMP.
8	SCS Runoff	0.231	3	741	1,938	-----	----	-----	EX-DA 2A PERV
9	Combine	0.474	3	738	3,392	7, 8	----	-----	EX-DA 2A
11	SCS Runoff	0.925	3	732	4,633	-----	----	-----	EX-DA 2B
13	Combine	1.371	3	735	8,025	9, 11,	----	-----	EX-DA 2 (POA 2)
15	Combine	1.911	3	735	11,466	5, 13,	----	-----	Overall Existing
19	SCS Runoff	0.970	3	726	3,965	-----	----	-----	PROP BUILDING N
21	SCS Runoff	2.586	3	726	10,574	-----	----	-----	PROP DA-1 IMP.
22	SCS Runoff	1.361	3	729	4,938	-----	----	-----	PROP DA-1 PER
23	Combine	3.910	3	726	15,512	21, 22	----	-----	PROP DA-1
25	Combine	4.880	3	726	19,477	19, 23,	----	-----	BASIN 1
26	Reservoir	0.000	3	738	0	25	85.59	7,319	BASIN 1
28	SCS Runoff	0.167	3	729	667	-----	----	-----	PROP DA-1 UNDET.
30	Combine	0.167	3	729	667	26, 28,	----	-----	PROP (POA 1)
32	SCS Runoff	0.090	3	735	485	-----	----	-----	PROP DA-2 IMP.
33	SCS Runoff	1.060	3	738	6,147	-----	----	-----	PROP DA-2 PER.
34	Combine	1.143	3	738	6,632	32, 33	----	-----	PROP DA-2
36	SCS Runoff	0.943	3	726	3,855	-----	----	-----	PROP BUILDING S
37	Reservoir	0.000	3	843	0	36	88.76	1,278	BASIN 2
39	Combine	1.143	3	738	6,632	34, 37,	----	-----	PROP (POA 2)
41	Combine	1.256	3	735	7,299	30, 39,	----	-----	Overall Proposed

Hydrograph Report

Hyd. No. 1

EX - DA 1 DET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.517 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 2,847 cuft
Drainage area	= 0.970 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 16.60 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



Hydrograph Report

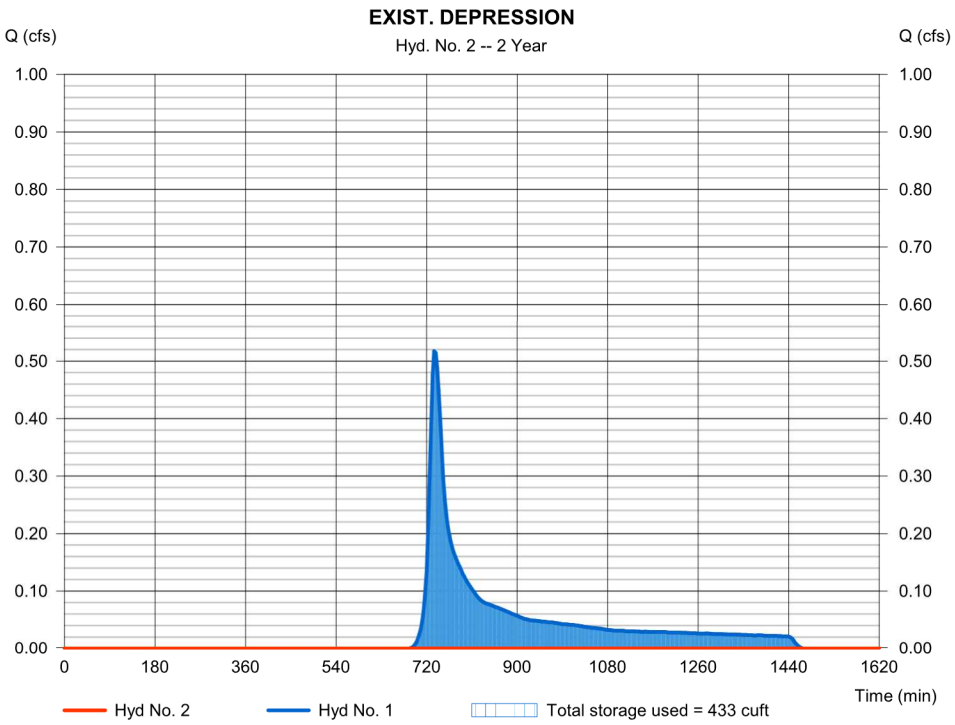
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Hyd. No. 2

EXIST. DEPRESSION

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 786 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - EX - DA 1 DET.	Max. Elevation	= 85.90 ft
Reservoir name	= Exist. Depression	Max. Storage	= 433 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Pond No. 1 - Exist. Depression

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 85.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	85.50	00	0	0
0.50	86.00	3,218	536	536
1.50	87.00	5,730	4,414	4,950
2.50	88.00	9,392	7,485	12,435

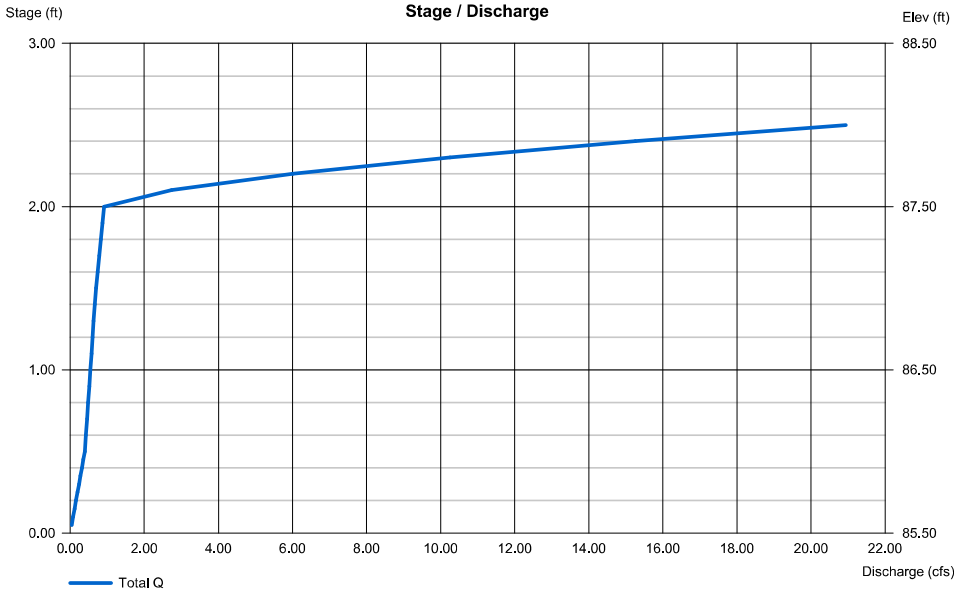
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.00
Span (in)	= 80.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 87.50	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 3.50	0.00	0.00	n/a
N-Value	= .030	.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)	= 87.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.250 (by Contour)			
TW Elev. (ft)	= 0.00			

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

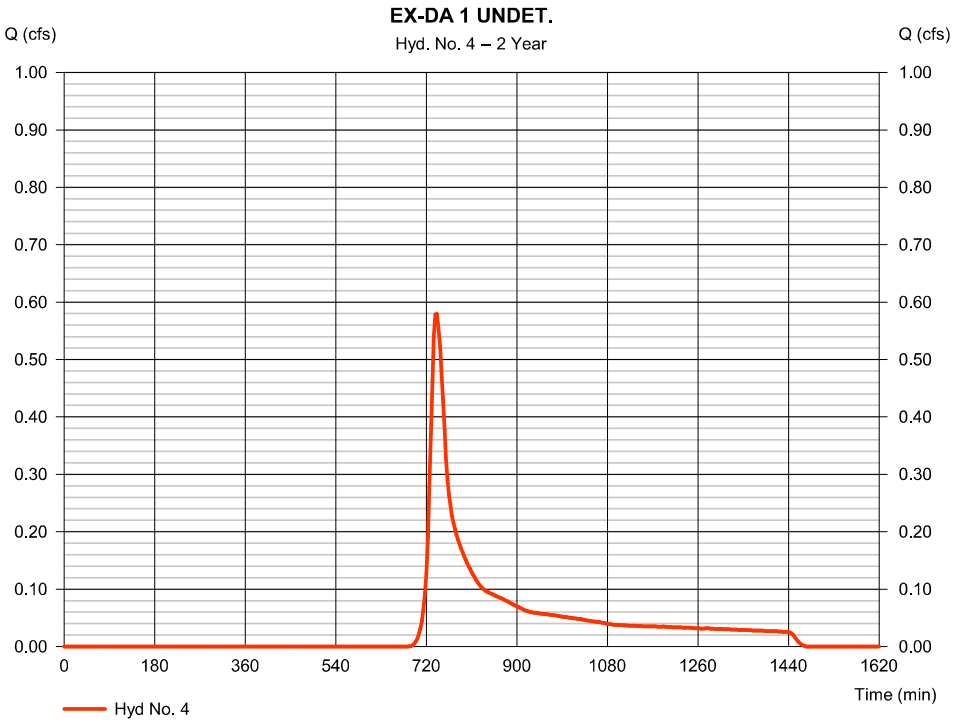


Hydrograph Report

Hyd. No. 4

EX-DA 1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.579 cfs
Storm frequency	= 2 yrs	Time to peak	= 741 min
Time interval	= 3 min	Hyd. volume	= 3,441 cuft
Drainage area	= 1.240 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

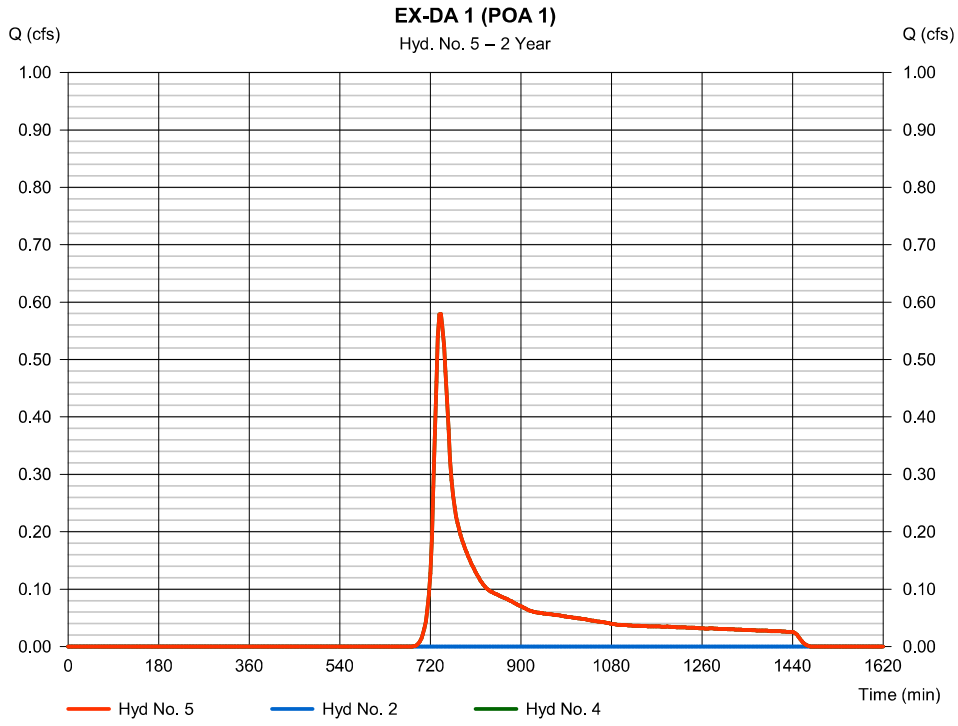


Hydrograph Report

Hyd. No. 5

EX-DA 1 (POA 1)

Hydrograph type	= Combine	Peak discharge	= 0.579 cfs
Storm frequency	= 2 yrs	Time to peak	= 741 min
Time interval	= 3 min	Hyd. volume	= 3,441 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.240 ac

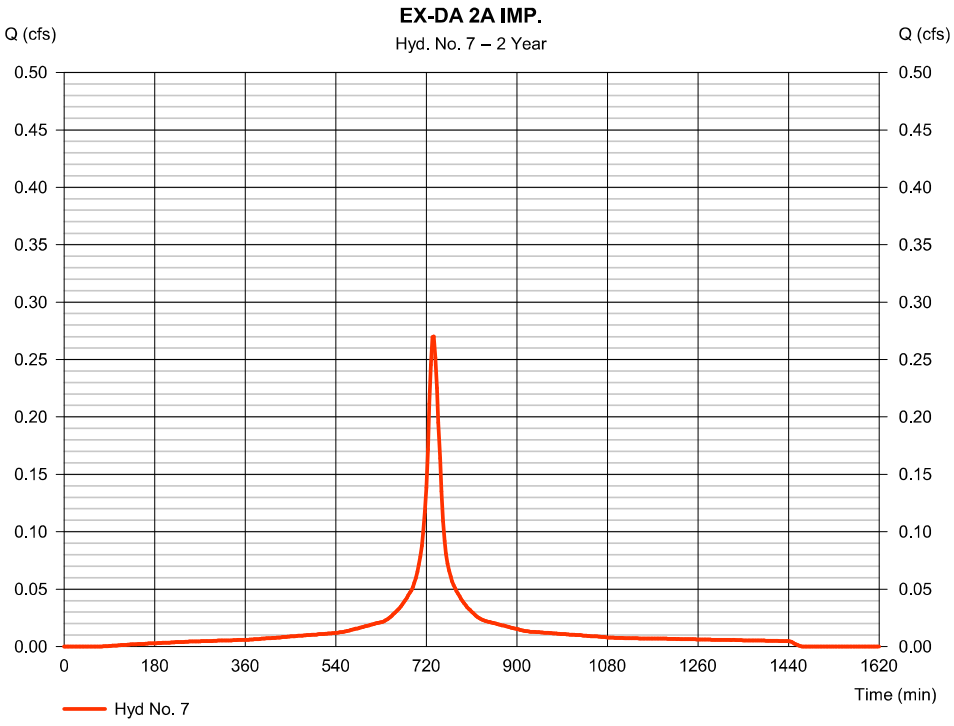


Hydrograph Report

Hyd. No. 7

EX-DA 2A IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.270 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 1,454 cuft
Drainage area	= 0.120 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

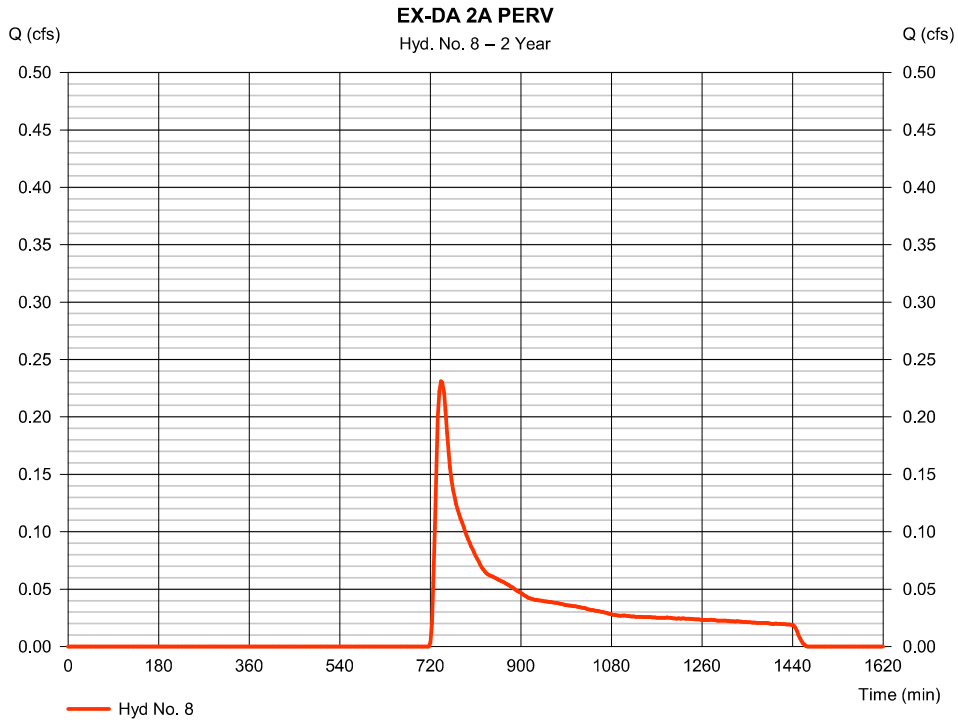


Hydrograph Report

Hyd. No. 8

EX-DA 2A PERV

Hydrograph type	= SCS Runoff	Peak discharge	= 0.231 cfs
Storm frequency	= 2 yrs	Time to peak	= 741 min
Time interval	= 3 min	Hyd. volume	= 1,938 cuft
Drainage area	= 1.280 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

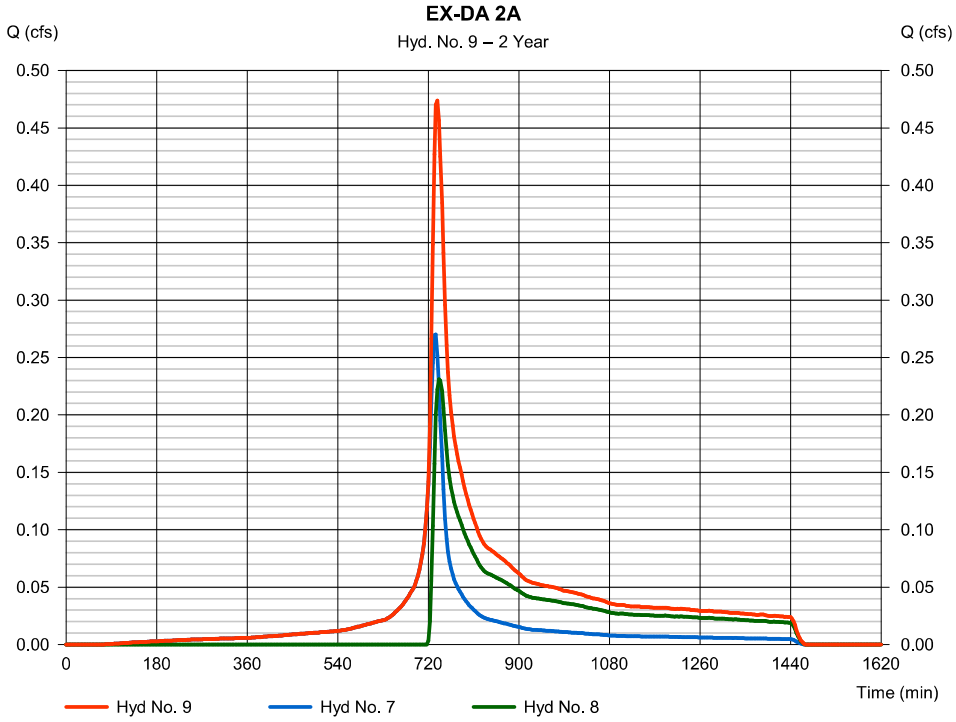


Hydrograph Report

Hyd. No. 9

EX-DA 2A

Hydrograph type	= Combine	Peak discharge	= 0.474 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 3,392 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 1.400 ac

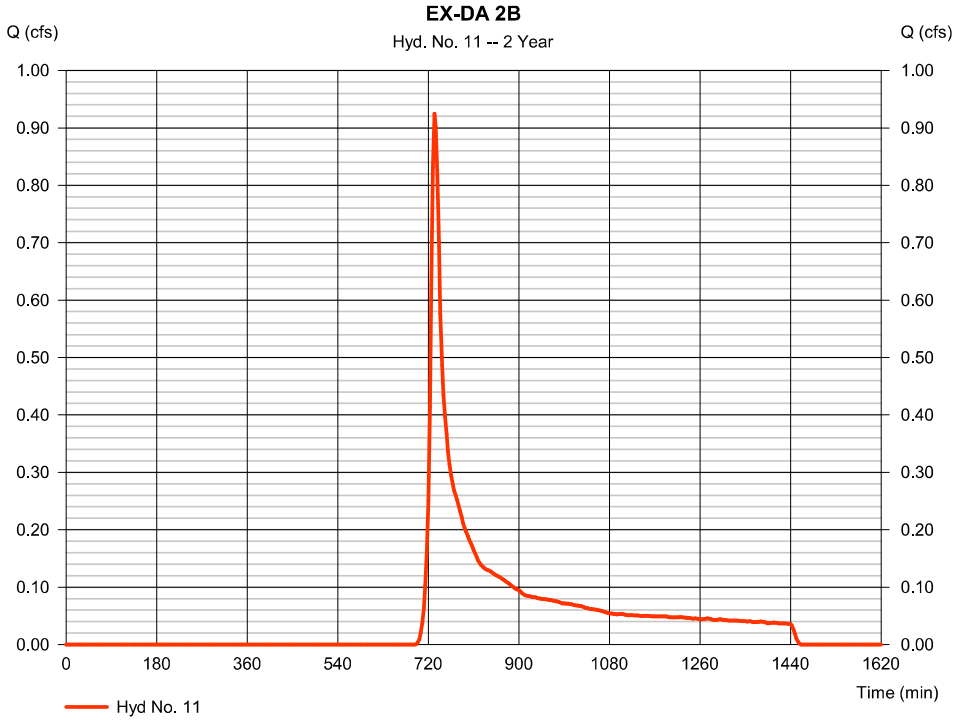


Hydrograph Report

Hyd. No. 11

EX-DA 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.925 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 4,633 cuft
Drainage area	= 1.850 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.80 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

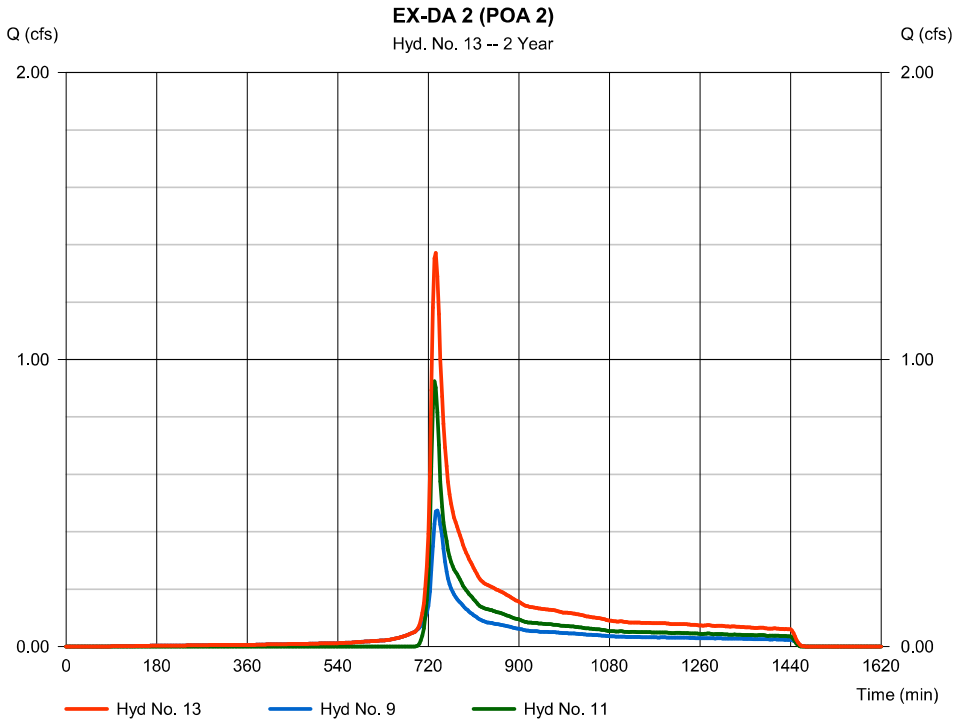


Hydrograph Report

Hyd. No. 13

EX-DA 2 (POA 2)

Hydrograph type	= Combine	Peak discharge	= 1.371 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 8,025 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.850 ac

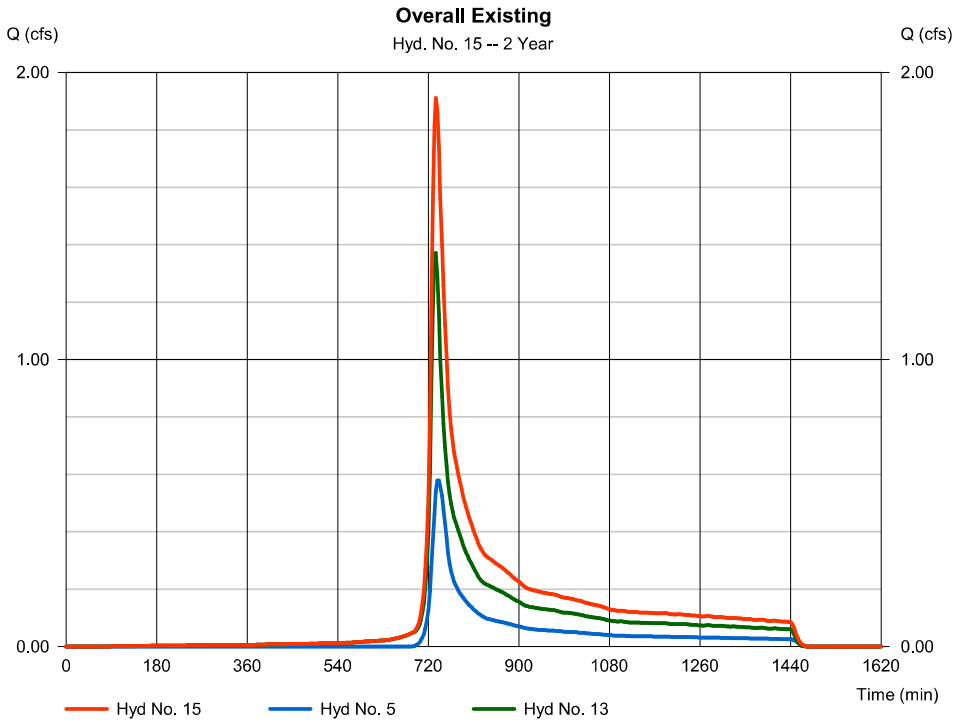


Hydrograph Report

Hyd. No. 15

Overall Existing

Hydrograph type	= Combine	Peak discharge	= 1.911 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 11,466 cuft
Inflow hyds.	= 5, 13	Contrib. drain. area	= 0.000 ac

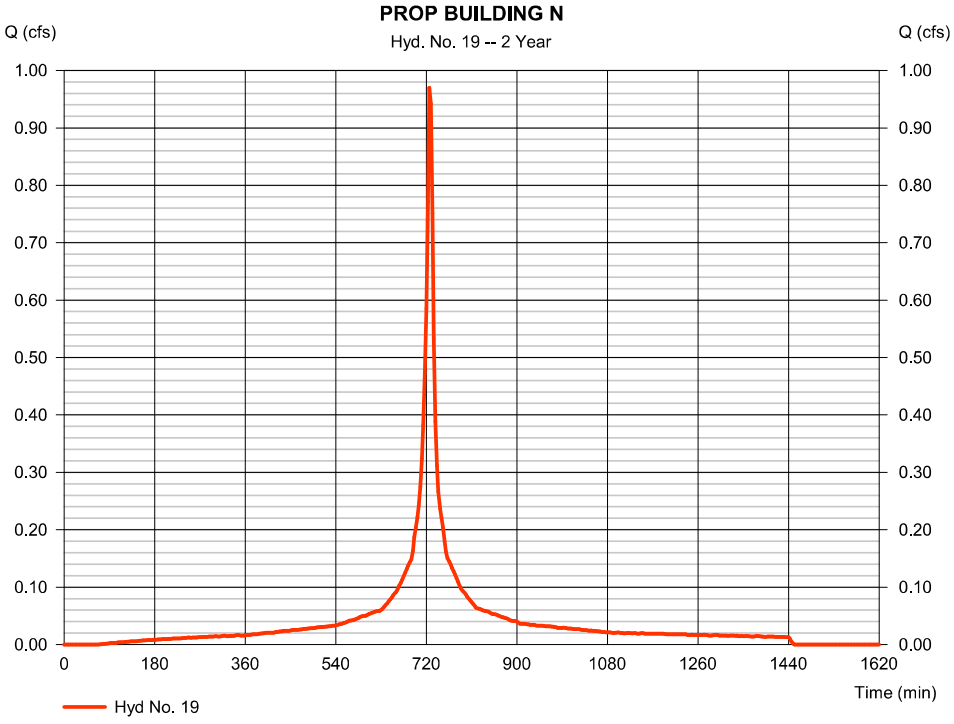


Hydrograph Report

Hyd. No. 19

PROP BUILDING N

Hydrograph type	= SCS Runoff	Peak discharge	= 0.970 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 3,965 cuft
Drainage area	= 0.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

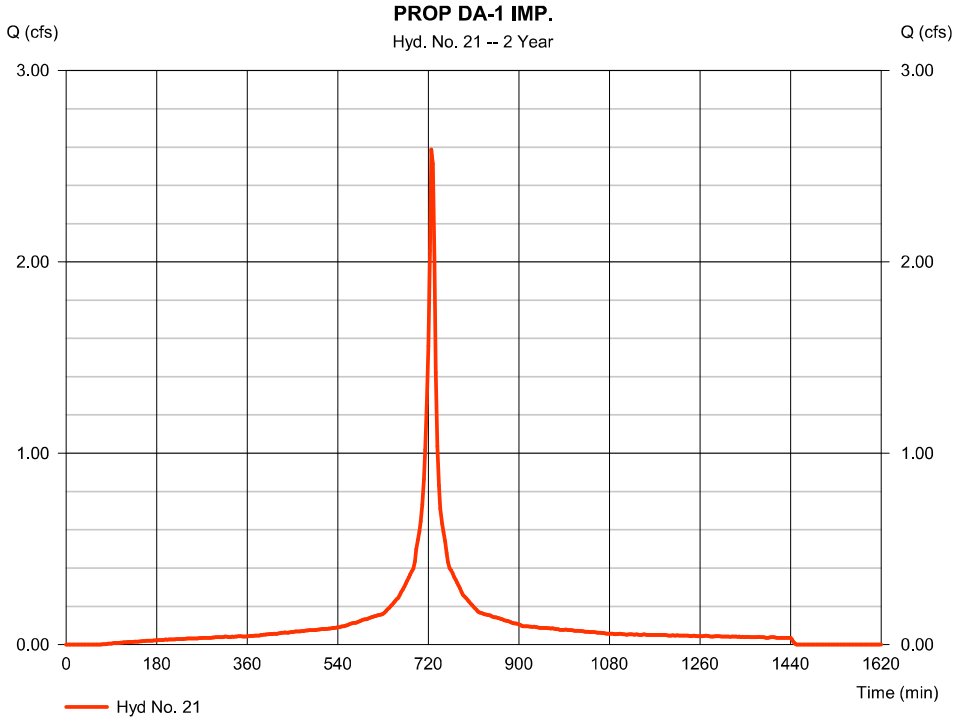


Hydrograph Report

Hyd. No. 21

PROP DA-1 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 2.586 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 10,574 cuft
Drainage area	= 0.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

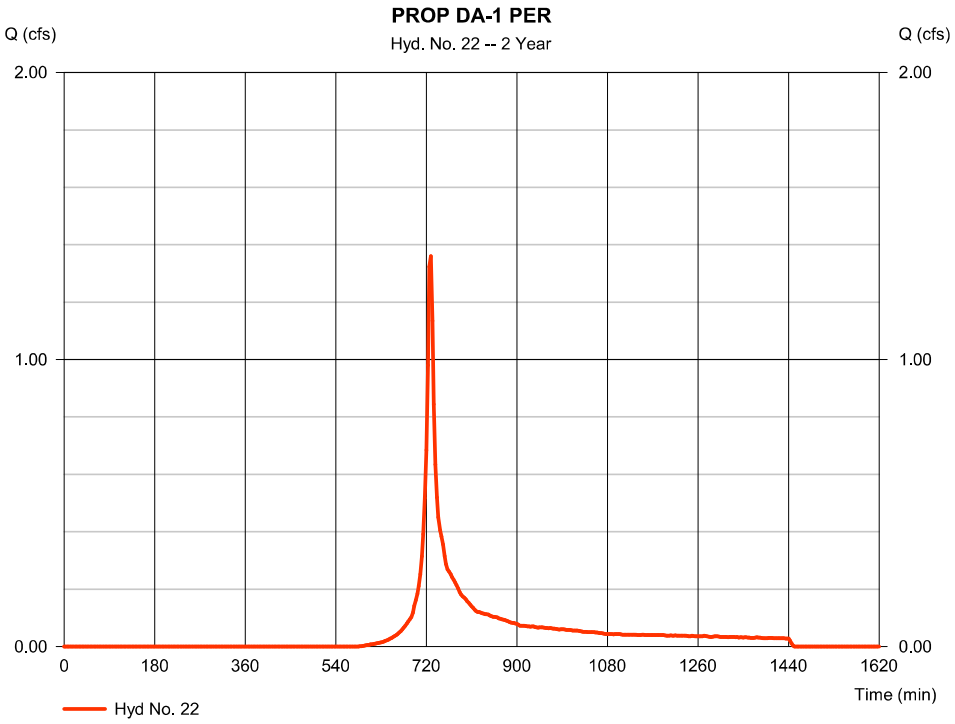


Hydrograph Report

Hyd. No. 22

PROP DA-1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 1.361 cfs
Storm frequency	= 2 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 4,938 cuft
Drainage area	= 1.080 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

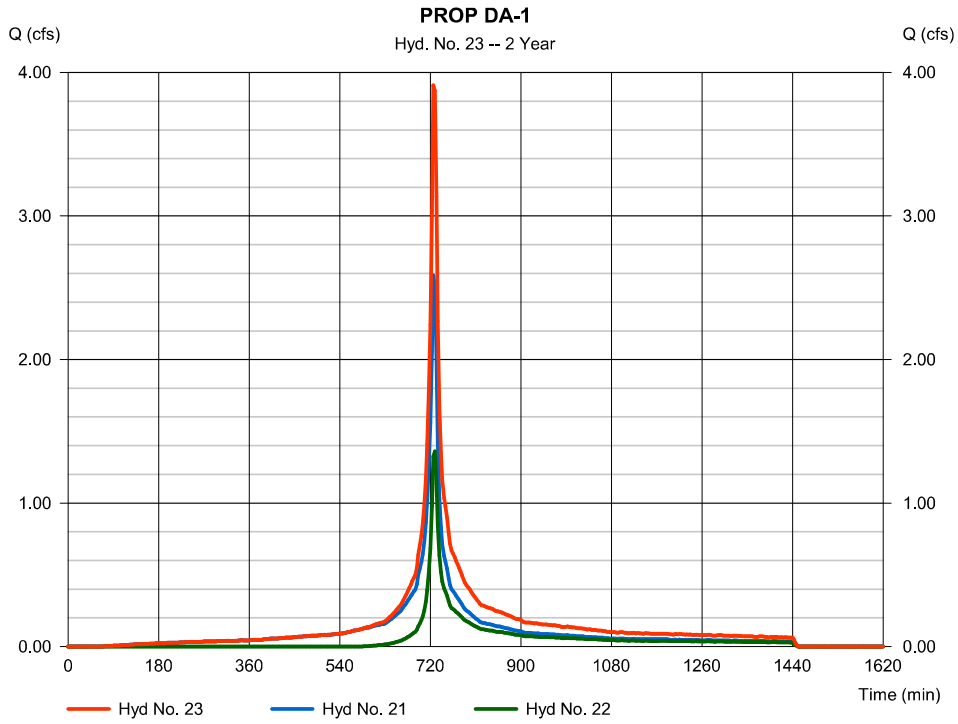


Hydrograph Report

Hyd. No. 23

PROP DA-1

Hydrograph type	= Combine	Peak discharge	= 3.910 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 15,512 cuft
Inflow hyds.	= 21, 22	Contrib. drain. area	= 2.040 ac

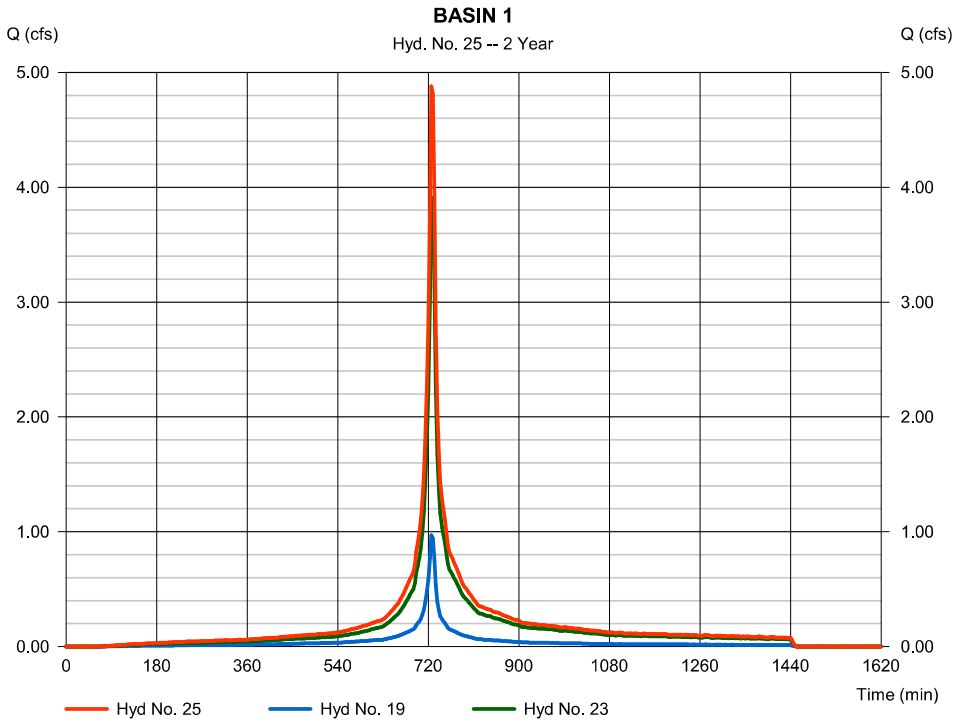


Hydrograph Report

Hyd. No. 25

BASIN 1

Hydrograph type	= Combine	Peak discharge	= 4.880 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 19,477 cuft
Inflow hyds.	= 19, 23	Contrib. drain. area	= 0.360 ac



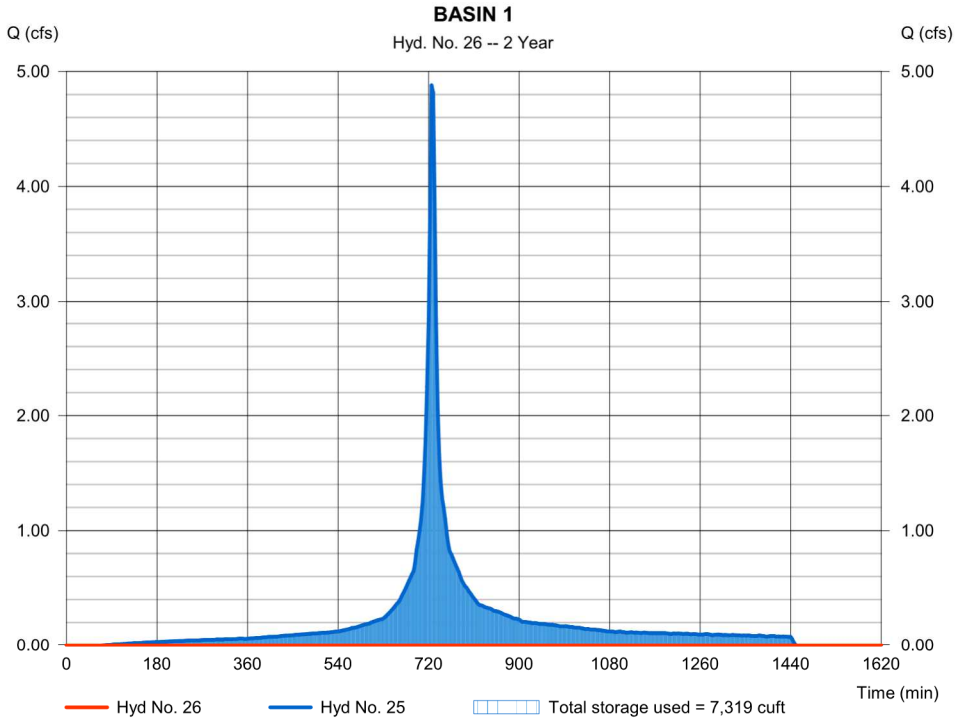
Hydrograph Report

Hyd. No. 26

BASIN 1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 25 - BASIN 1	Max. Elevation	= 85.59 ft
Reservoir name	= Pond 1	Max. Storage	= 7,319 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - Pond 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 84.25 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	84.25	1,523	0	0
0.75	85.00	6,061	2,655	2,655
1.75	86.00	9,856	7,881	10,537
2.75	87.00	10,648	10,248	20,785
3.75	88.00	11,477	11,059	31,844
4.75	89.00	12,333	11,901	43,745
5.75	90.00	13,295	12,810	56,555

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.75	7.00	0.00
Span (in)	= 15.00	2.75	7.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 82.61	85.60	86.85	0.00
Length (ft)	= 38.00	0.50	0.50	0.00
Slope (%)	= 0.30	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	Yes

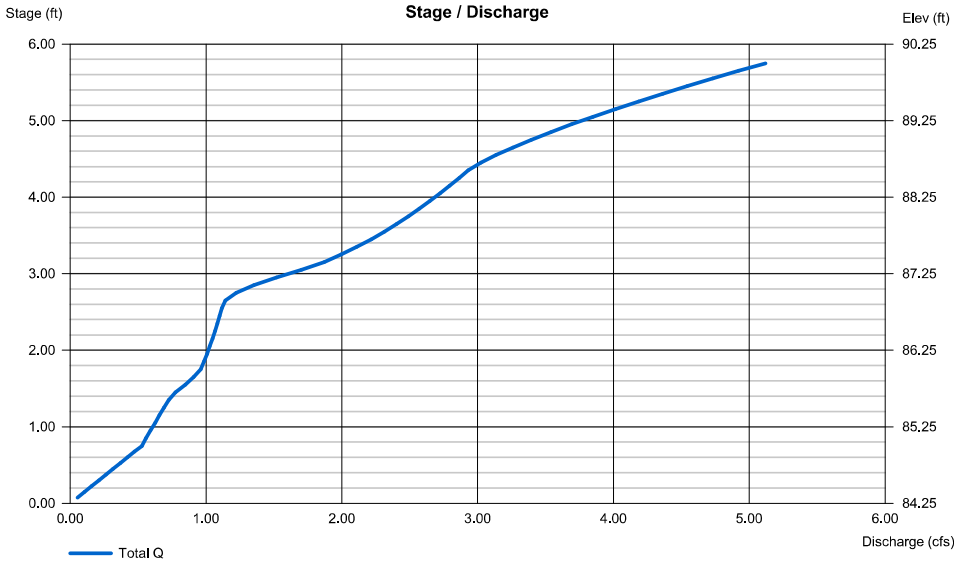
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.25	Inactive	Inactive	Inactive
Crest El. (ft)	= 88.60	89.70	94.50	94.50
Weir Coeff.	= 3.33	2.61	3.33	3.33
Weir Type	= Rect	Rect	Rect	Rect
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 3.750 (by Contour)

TW Elev. (ft) = 0.00

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

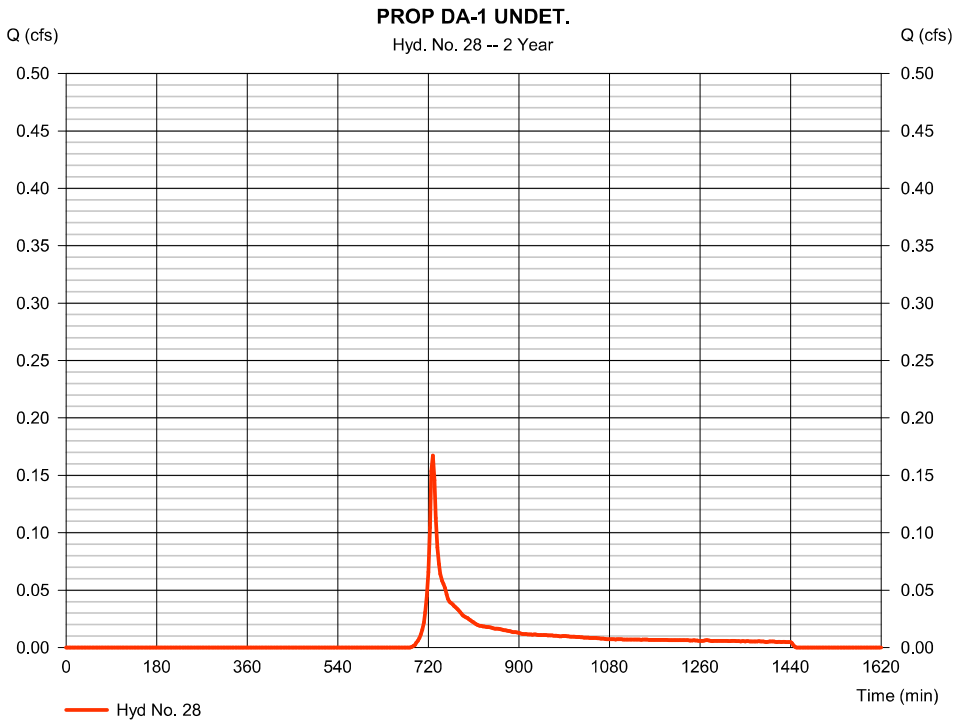


Hydrograph Report

Hyd. No. 28

PROP DA-1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.167 cfs
Storm frequency	= 2 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 667 cuft
Drainage area	= 0.250 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

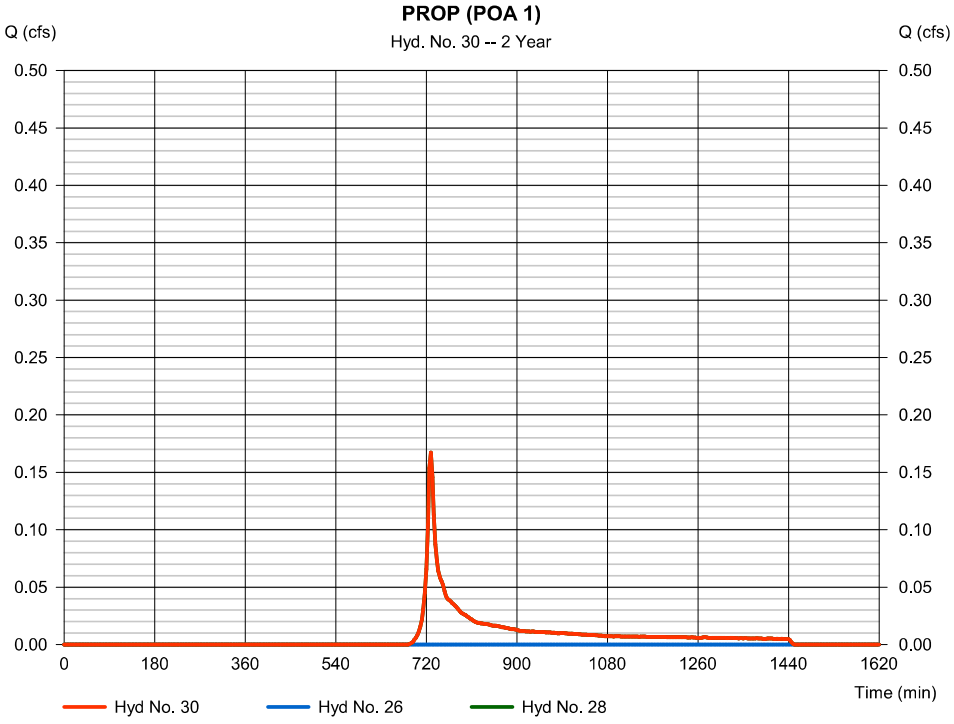


Hydrograph Report

Hyd. No. 30

PROP (POA 1)

Hydrograph type	= Combine	Peak discharge	= 0.167 cfs
Storm frequency	= 2 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 667 cuft
Inflow hyds.	= 26, 28	Contrib. drain. area	= 0.250 ac

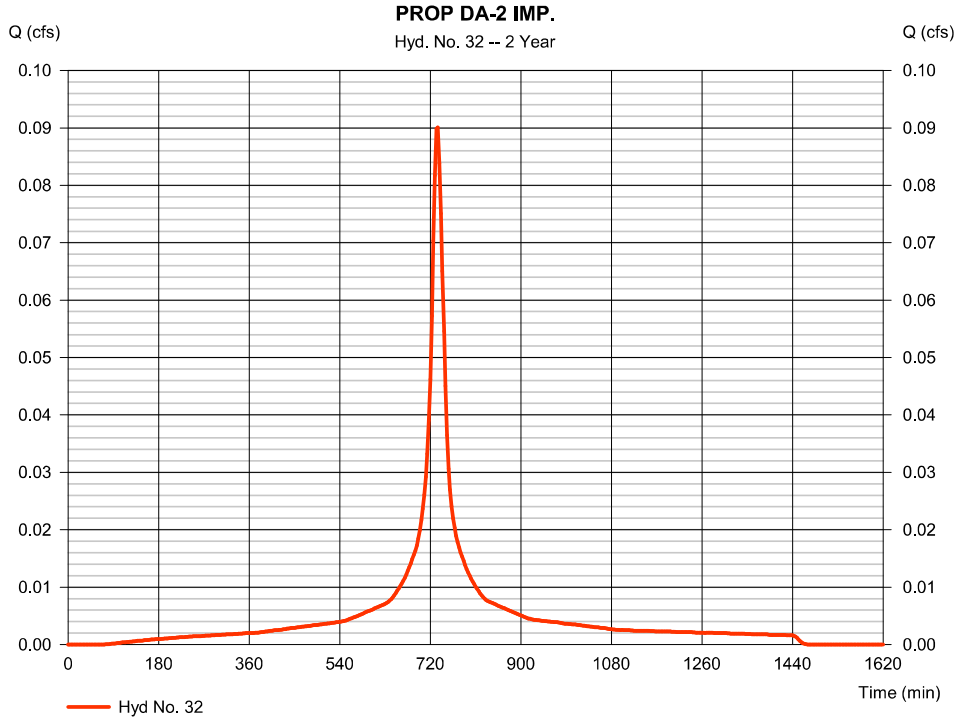


Hydrograph Report

Hyd. No. 32

PROP DA-2 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.090 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 485 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

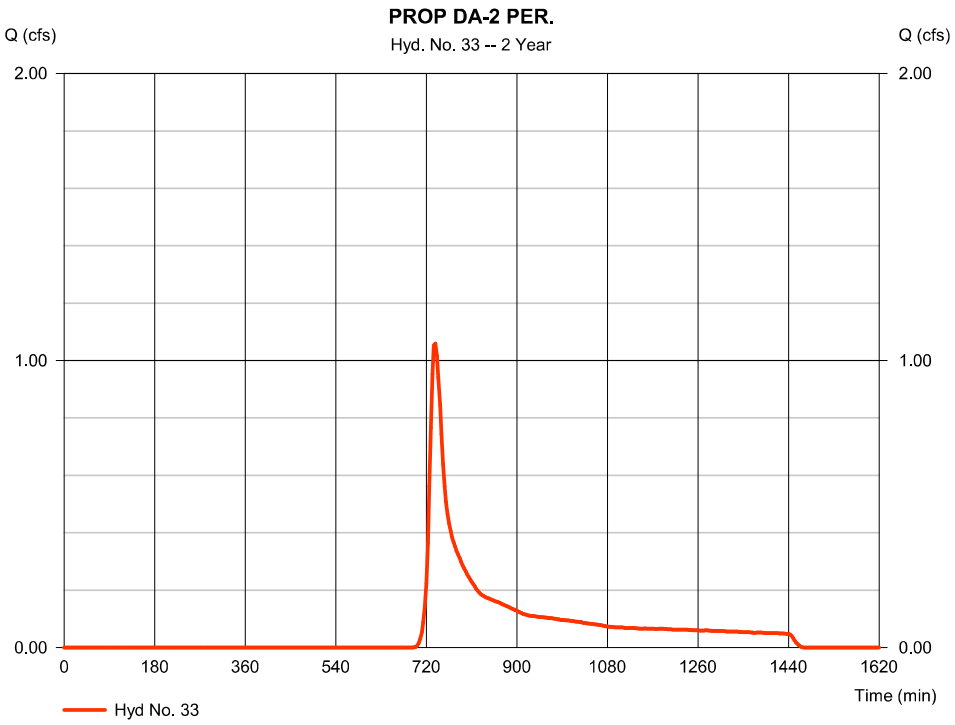


Hydrograph Report

Hyd. No. 33

PROP DA-2 PER.

Hydrograph type	= SCS Runoff	Peak discharge	= 1.060 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 6,147 cuft
Drainage area	= 2.380 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

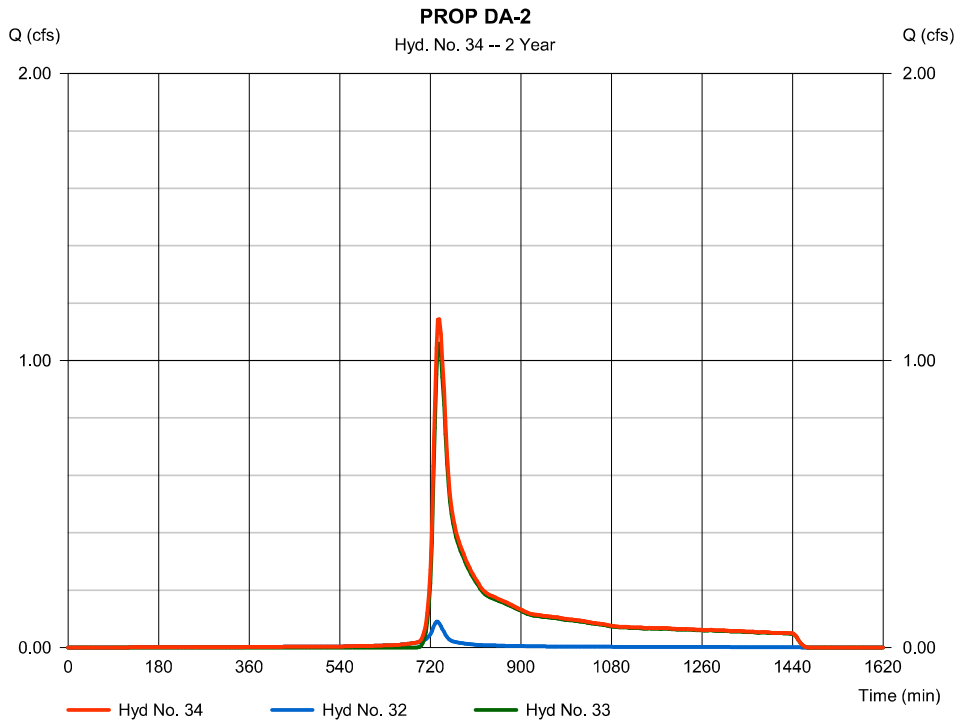


Hydrograph Report

Hyd. No. 34

PROP DA-2

Hydrograph type	= Combine	Peak discharge	= 1.143 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 6,632 cuft
Inflow hyds.	= 32, 33	Contrib. drain. area	= 2.420 ac

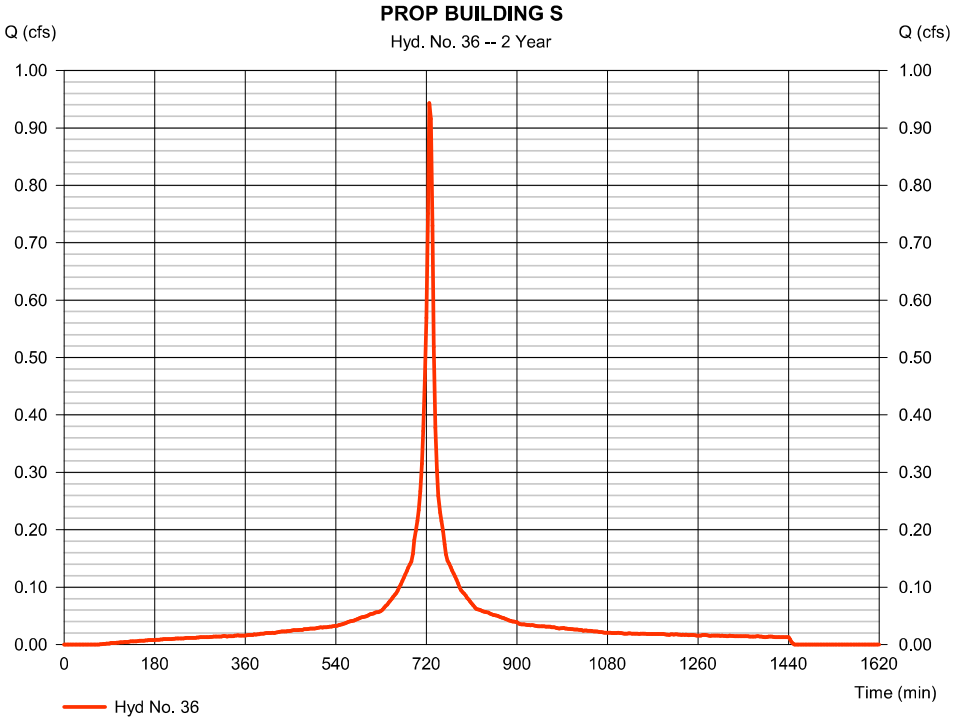


Hydrograph Report

Hyd. No. 36

PROP BUILDING S

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.943 cfs
Storm frequency	=	2 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	3,855 cuft
Drainage area	=	0.350 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.47 in	Distribution	=	Custom
Storm duration	=	P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	=	484



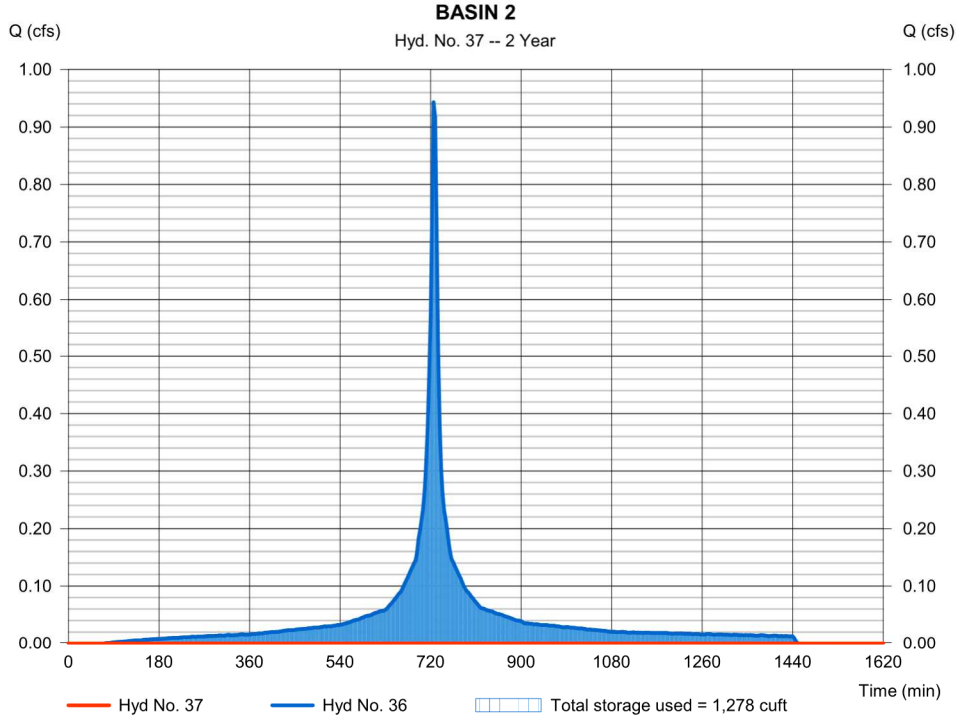
Hydrograph Report

Hyd. No. 37

BASIN 2

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	843 min
Time interval	=	3 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	36 - PROP BUILDING S	Max. Elevation	=	88.76 ft
Reservoir name	=	Pond 2	Max. Storage	=	1,278 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 4 - Pond 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 88.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	88.50	4,341	0	0
0.50	89.00	5,522	2,460	2,460
1.50	90.00	6,764	6,132	8,591
2.00	90.50	8,170	3,728	12,319

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	0.00	0.00
Span (in)	= 15.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 88.50	89.50	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

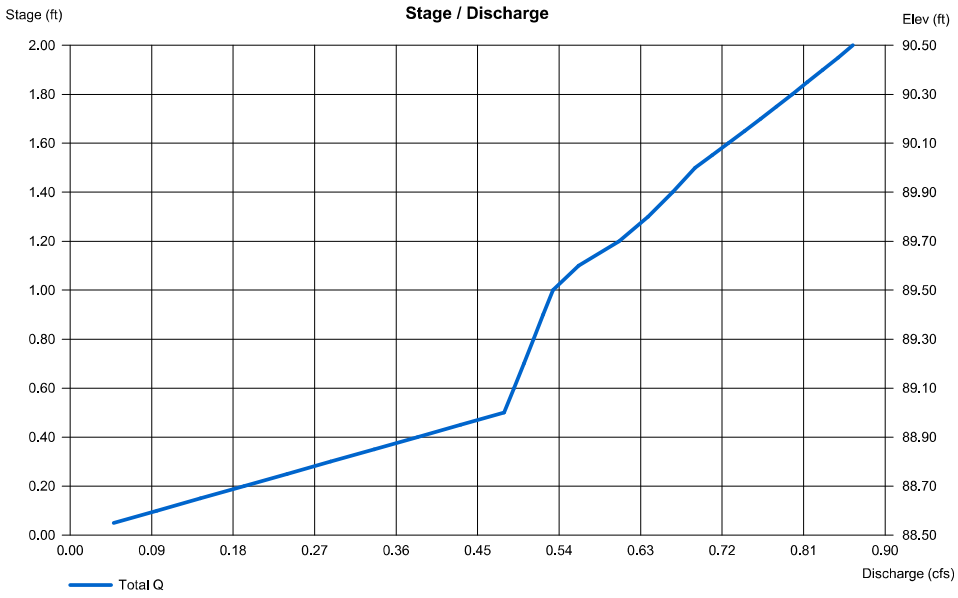
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 90.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 3.750 (by Contour)

TW Elev. (ft) = 0.00

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

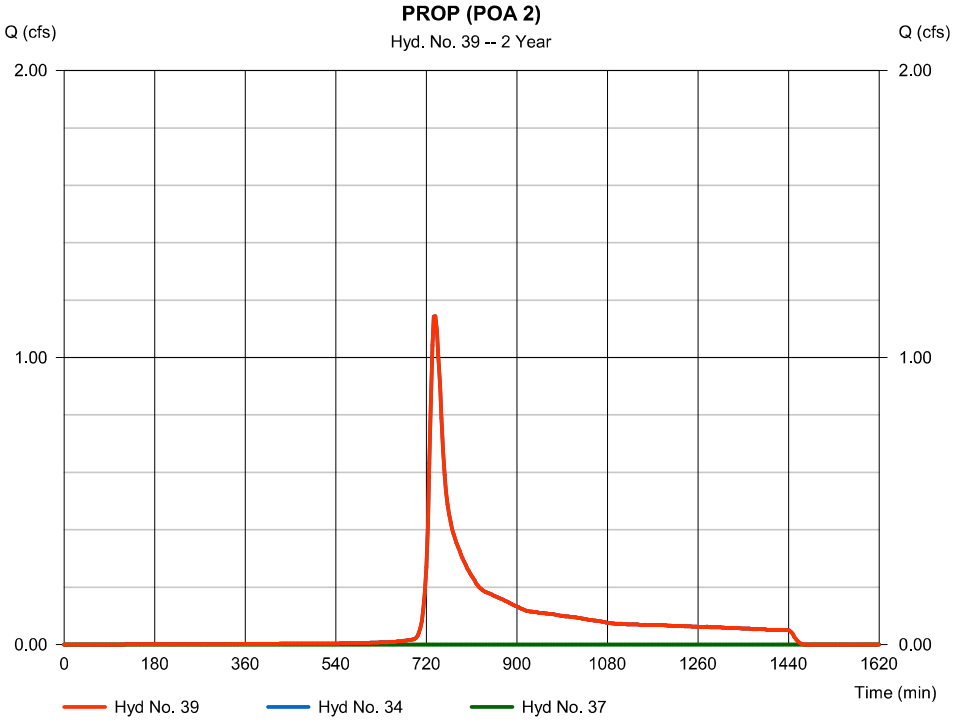


Hydrograph Report

Hyd. No. 39

PROP (POA 2)

Hydrograph type	= Combine	Peak discharge	= 1.143 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 6,632 cuft
Inflow hyds.	= 34, 37	Contrib. drain. area	= 0.000 ac



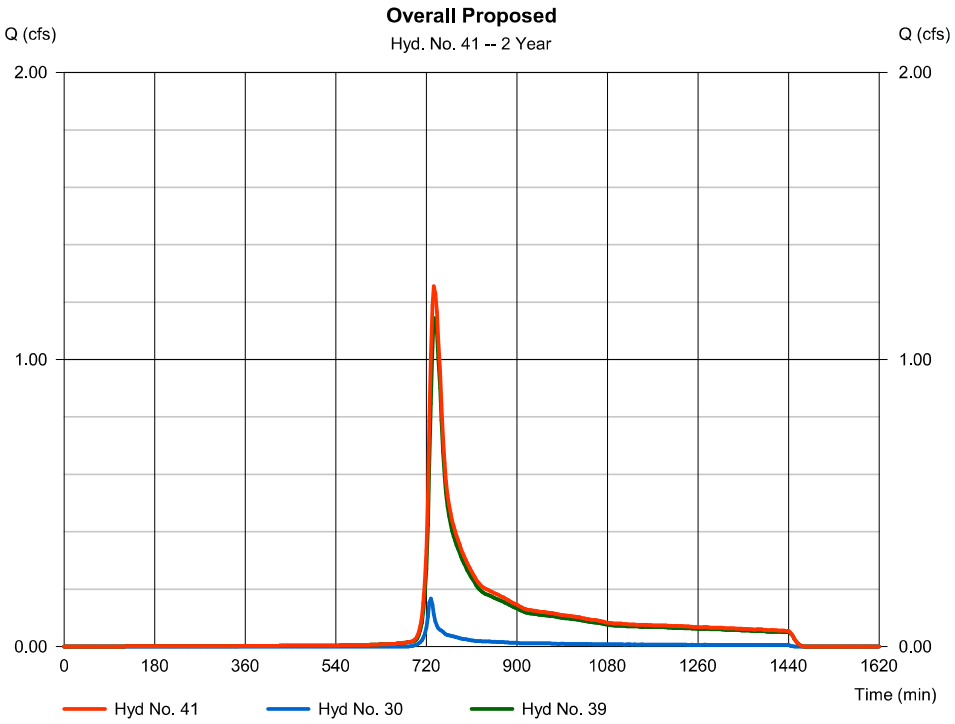
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Hyd. No. 41

Overall Proposed

Hydrograph type	= Combine	Peak discharge	= 1.256 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 7,299 cuft
Inflow hyds.	= 30, 39	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

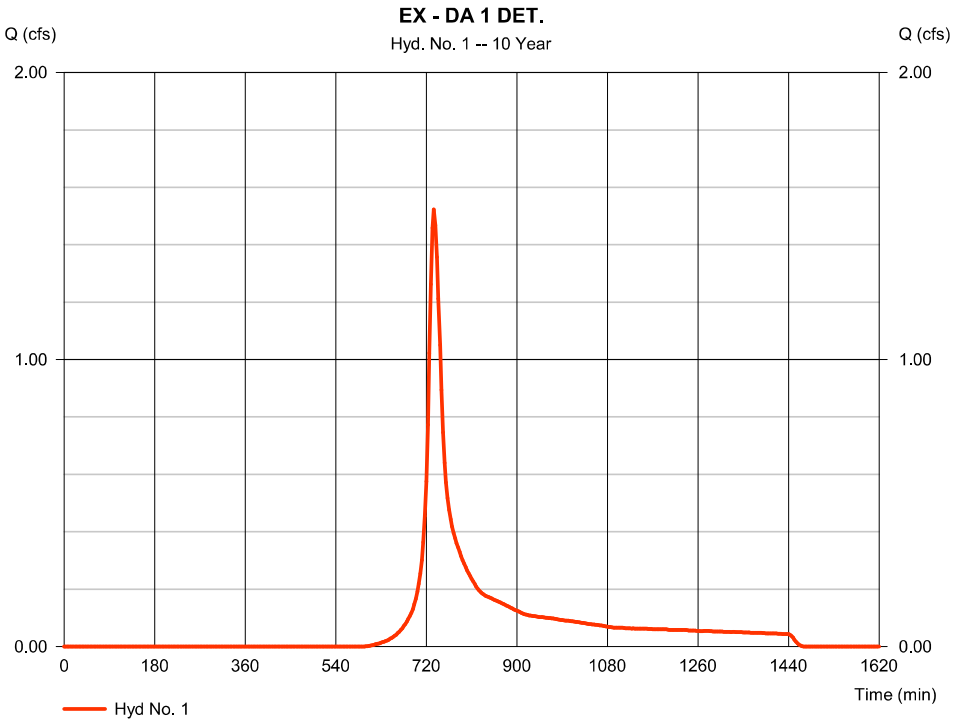
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.523	3	735	7,385	-----	-----	-----	EX - DA 1 DET.
2	Reservoir	0.000	3	717	0	1	86.30	1,868	EXIST. DEPRESSION
4	SCS Runoff	1.707	3	738	8,926	-----	-----	-----	EX-DA 1 UNDET.
5	Combine	1.707	3	738	8,926	2, 4	-----	-----	EX-DA 1 (POA 1)
7	SCS Runoff	0.426	3	735	2,337	-----	-----	-----	EX-DA 2A IMP.
8	SCS Runoff	1.213	3	735	6,453	-----	-----	-----	EX-DA 2A PERV
9	Combine	1.640	3	735	8,790	7, 8	-----	-----	EX-DA 2A
11	SCS Runoff	2.932	3	732	12,579	-----	-----	-----	EX-DA 2B
13	Combine	4.484	3	732	21,369	9, 11,	-----	-----	EX-DA 2 (POA 2)
15	Combine	6.022	3	735	30,295	5, 13,	-----	-----	Overall Existing
19	SCS Runoff	1.531	3	726	6,374	-----	-----	-----	PROP BUILDING N
21	SCS Runoff	4.082	3	726	16,997	-----	-----	-----	PROP DA-1 IMP.
22	SCS Runoff	2.949	3	729	10,667	-----	-----	-----	PROP DA-1 PER
23	Combine	7.019	3	726	27,664	21, 22	-----	-----	PROP DA-1
25	Combine	8.550	3	726	34,038	19, 23,	-----	-----	BASIN 1
26	Reservoir	0.156	3	783	1,833	25	86.33	13,955	BASIN 1
28	SCS Runoff	0.476	3	729	1,730	-----	-----	-----	PROP DA-1 UNDET.
30	Combine	0.551	3	729	3,564	26, 28,	-----	-----	PROP (POA 1)
32	SCS Runoff	0.142	3	735	779	-----	-----	-----	PROP DA-2 IMP.
33	SCS Runoff	3.400	3	735	16,689	-----	-----	-----	PROP DA-2 PER.
34	Combine	3.542	3	735	17,468	32, 33	-----	-----	PROP DA-2
36	SCS Runoff	1.488	3	726	6,197	-----	-----	-----	PROP BUILDING S
37	Reservoir	0.000	3	735	0	36	88.91	2,025	BASIN 2
39	Combine	3.542	3	735	17,468	34, 37,	-----	-----	PROP (POA 2)
41	Combine	3.961	3	735	21,031	30, 39,	-----	-----	Overall Proposed

Hydrograph Report

Hyd. No. 1

EX - DA 1 DET.

Hydrograph type	= SCS Runoff	Peak discharge	= 1.523 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 7,385 cuft
Drainage area	= 0.970 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 16.60 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



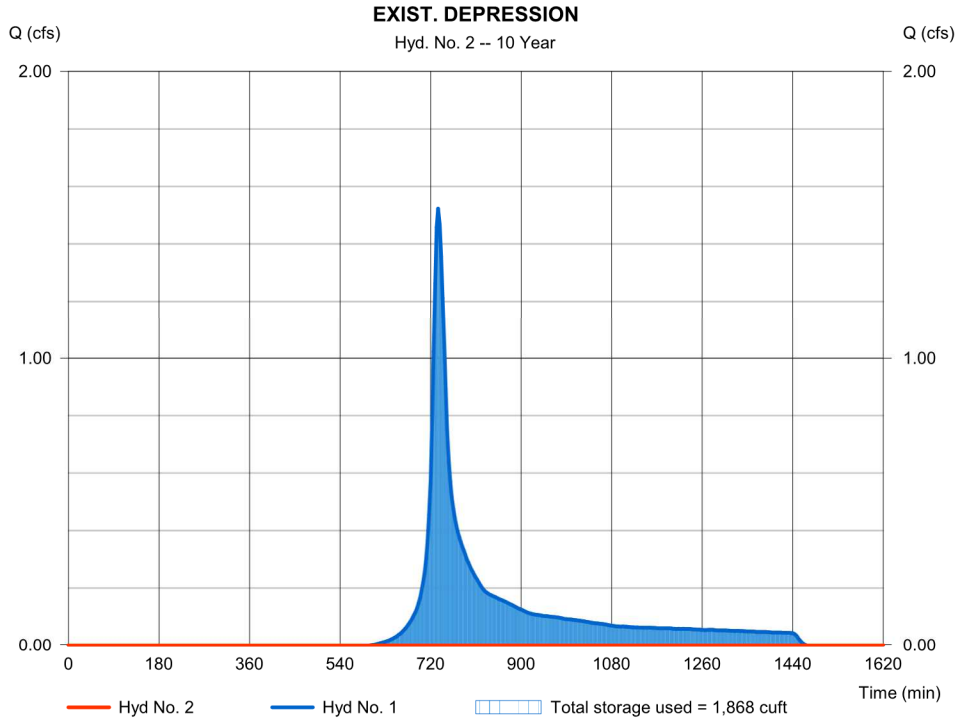
Hydrograph Report

Hyd. No. 2

EXIST. DEPRESSION

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - EX - DA 1 DET.	Max. Elevation	= 86.30 ft
Reservoir name	= Exist. Depression	Max. Storage	= 1,868 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

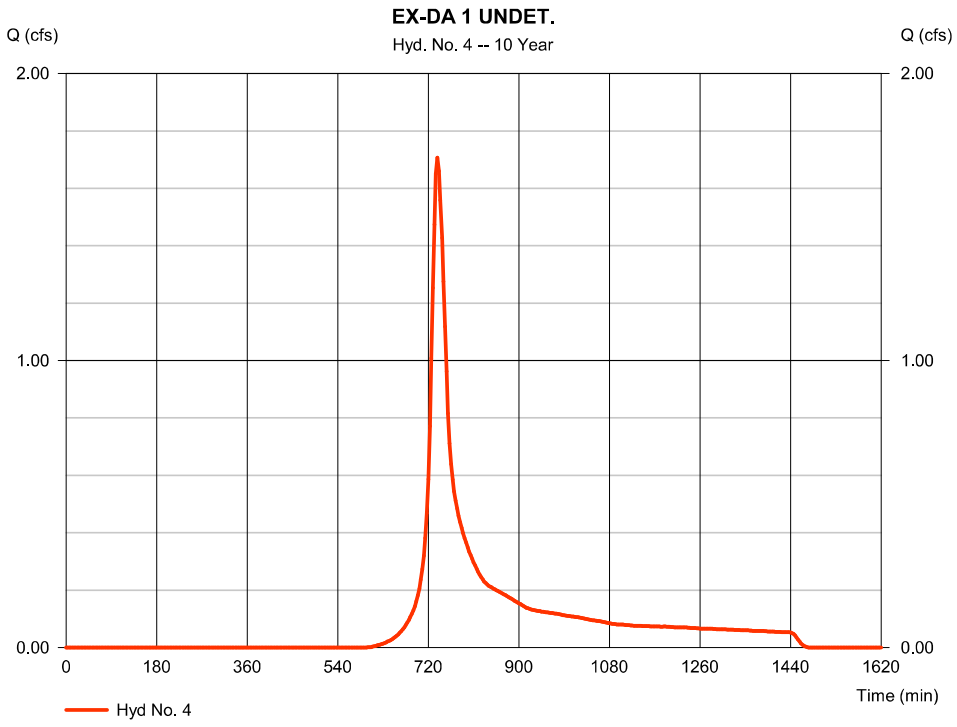


Hydrograph Report

Hyd. No. 4

EX-DA 1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 1.707 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 8,926 cuft
Drainage area	= 1.240 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

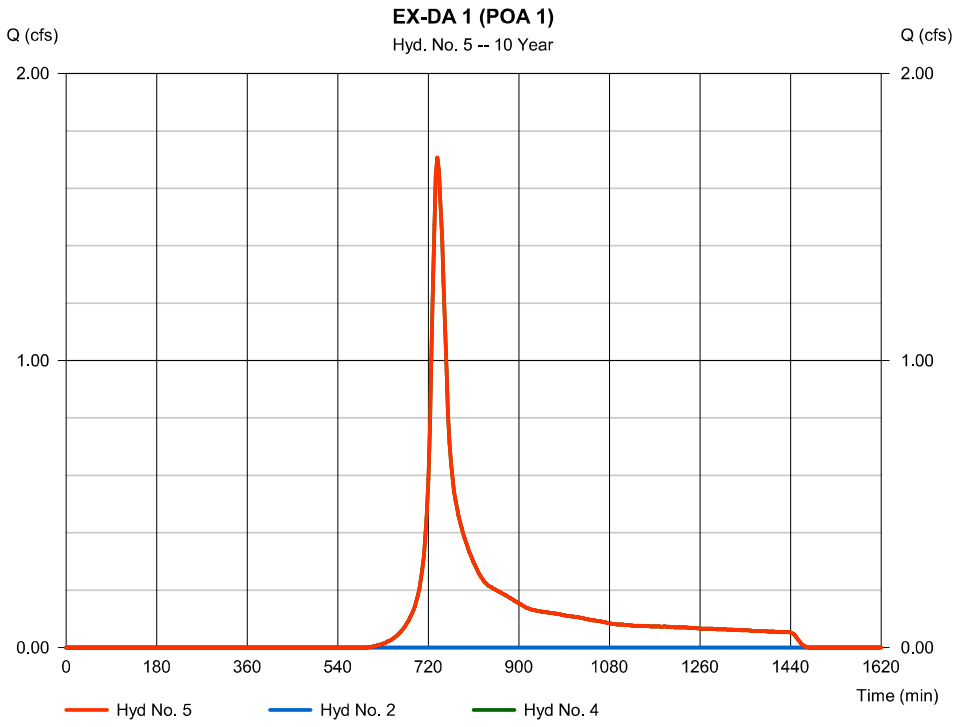


Hydrograph Report

Hyd. No. 5

EX-DA 1 (POA 1)

Hydrograph type	= Combine	Peak discharge	= 1.707 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 8,926 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.240 ac

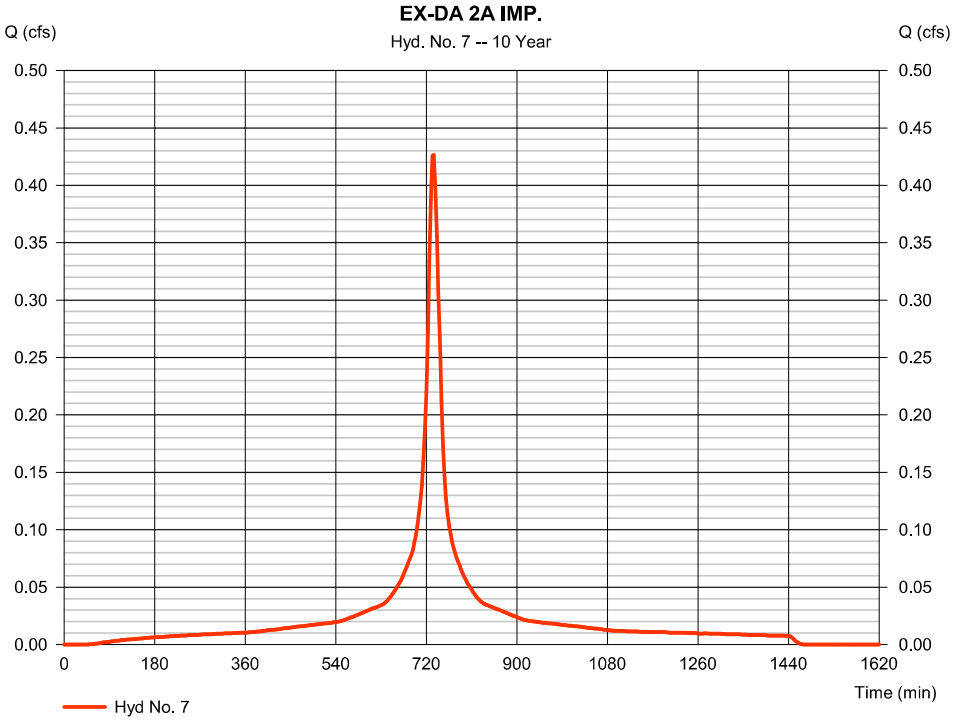


Hydrograph Report

Hyd. No. 7

EX-DA 2A IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.426 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 2,337 cuft
Drainage area	= 0.120 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

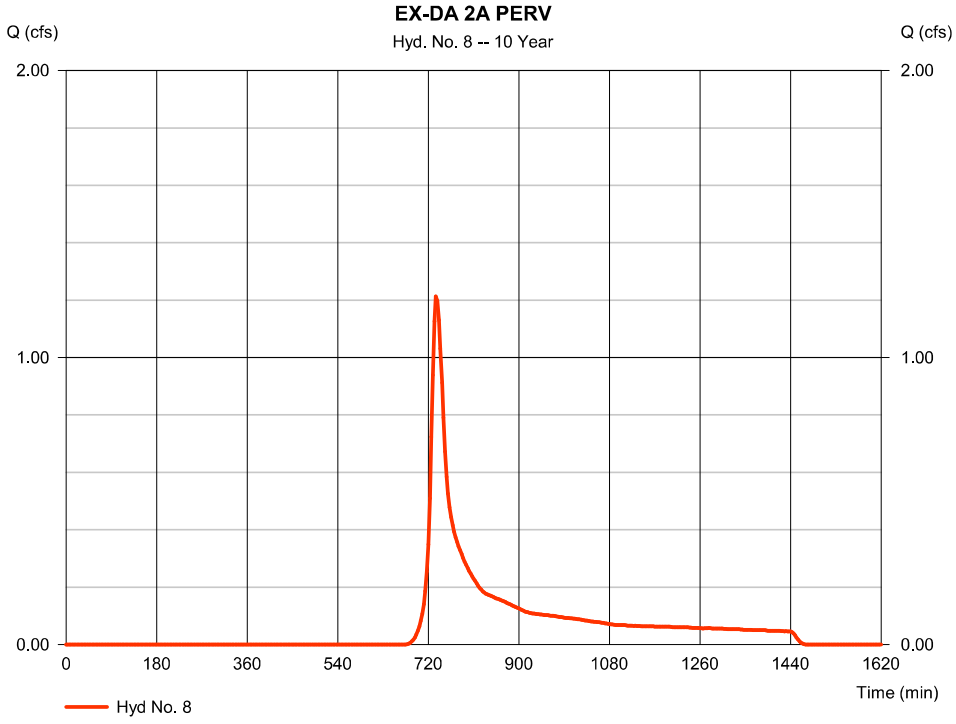


Hydrograph Report

Hyd. No. 8

EX-DA 2A PERV

Hydrograph type	= SCS Runoff	Peak discharge	= 1.213 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 6,453 cuft
Drainage area	= 1.280 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

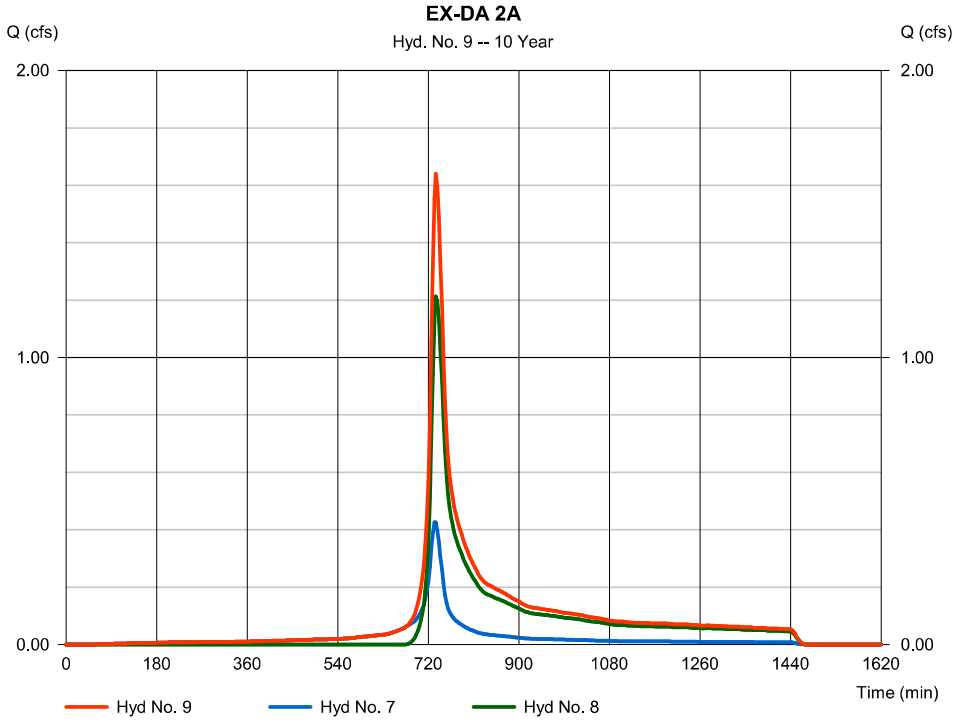


Hydrograph Report

Hyd. No. 9

EX-DA 2A

Hydrograph type	= Combine	Peak discharge	= 1.640 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 8,790 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 1.400 ac

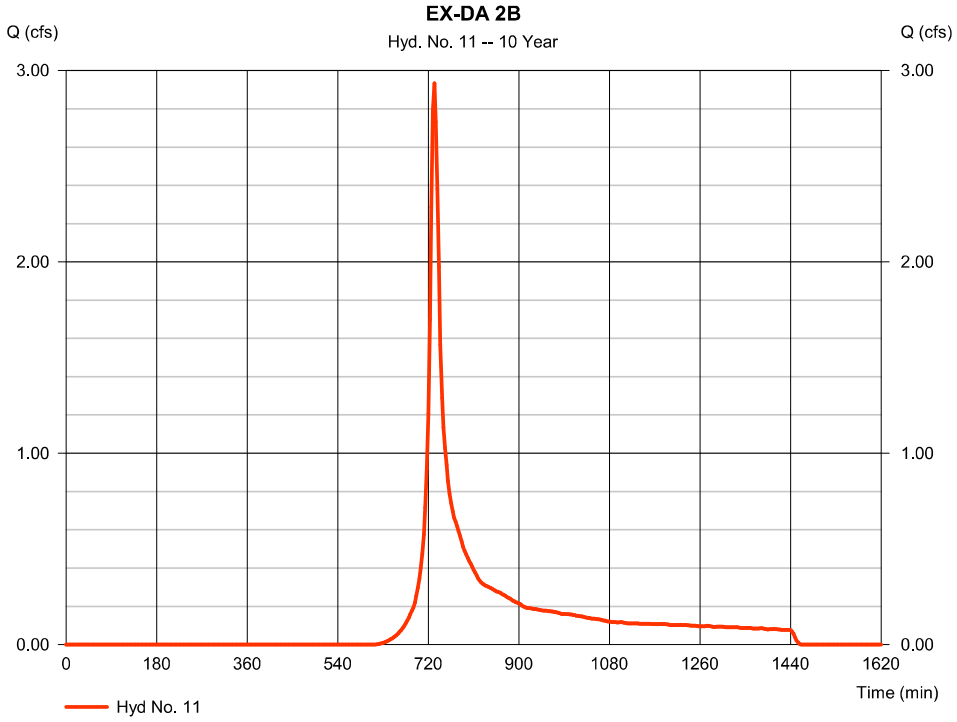


Hydrograph Report

Hyd. No. 11

EX-DA 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.932 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 12,579 cuft
Drainage area	= 1.850 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.80 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

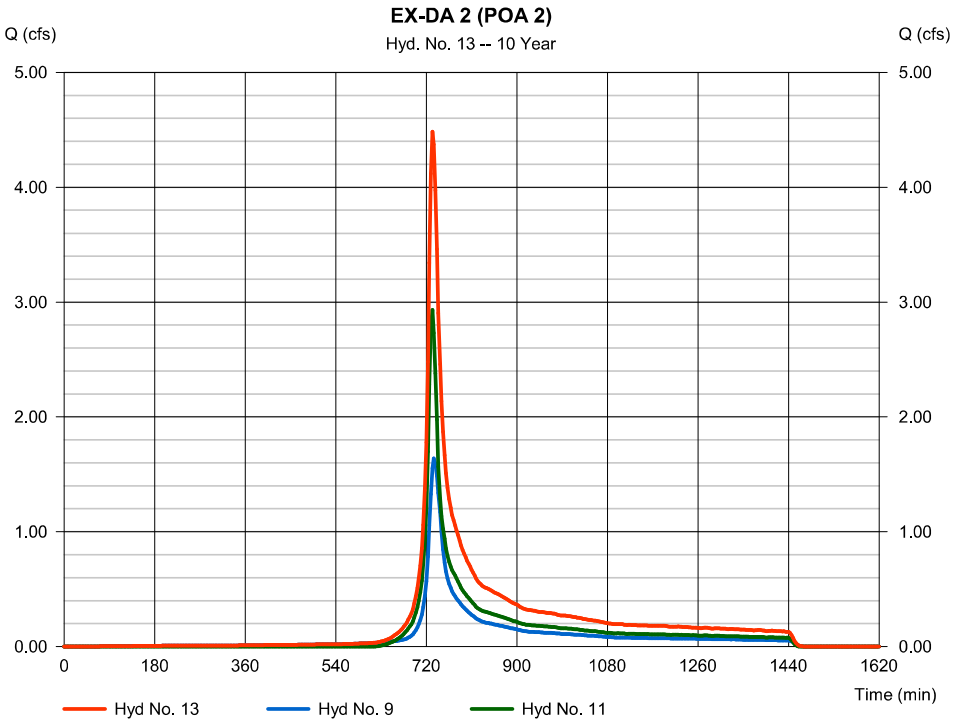


Hydrograph Report

Hyd. No. 13

EX-DA 2 (POA 2)

Hydrograph type	= Combine	Peak discharge	= 4.484 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 21,369 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.850 ac

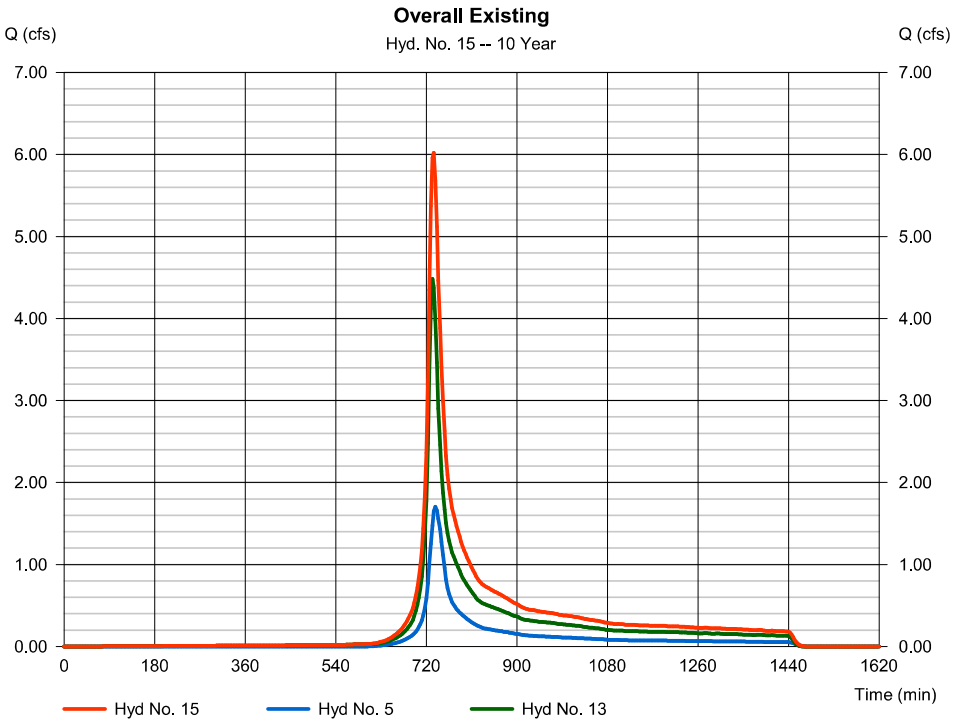


Hydrograph Report

Hyd. No. 15

Overall Existing

Hydrograph type	= Combine	Peak discharge	= 6.022 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 30,295 cuft
Inflow hyds.	= 5, 13	Contrib. drain. area	= 0.000 ac

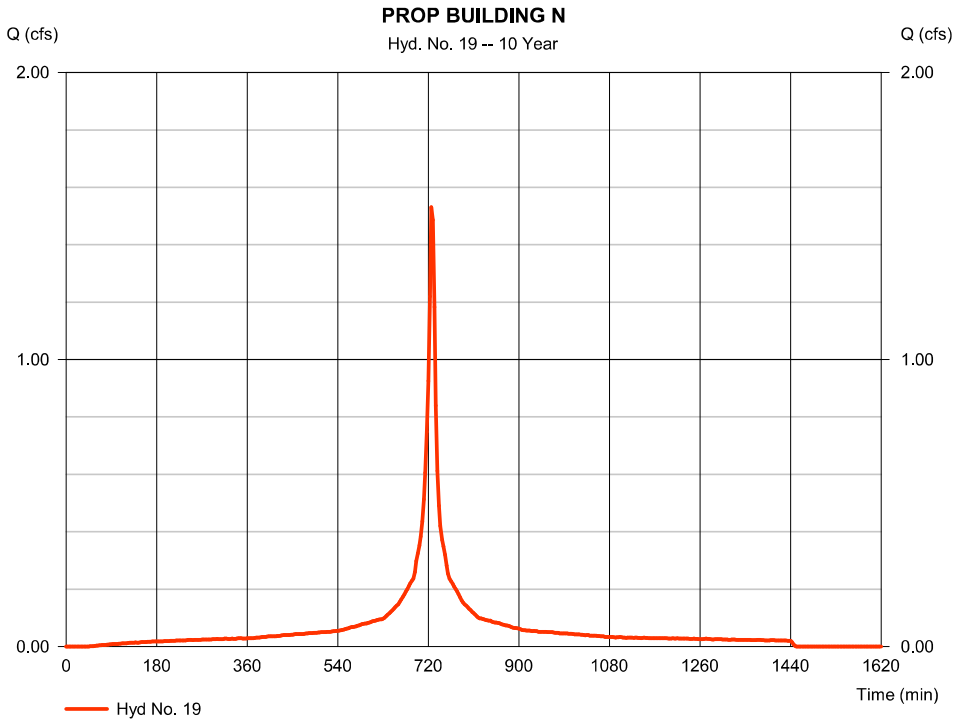


Hydrograph Report

Hyd. No. 19

PROP BUILDING N

Hydrograph type	= SCS Runoff	Peak discharge	= 1.531 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 6,374 cuft
Drainage area	= 0.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

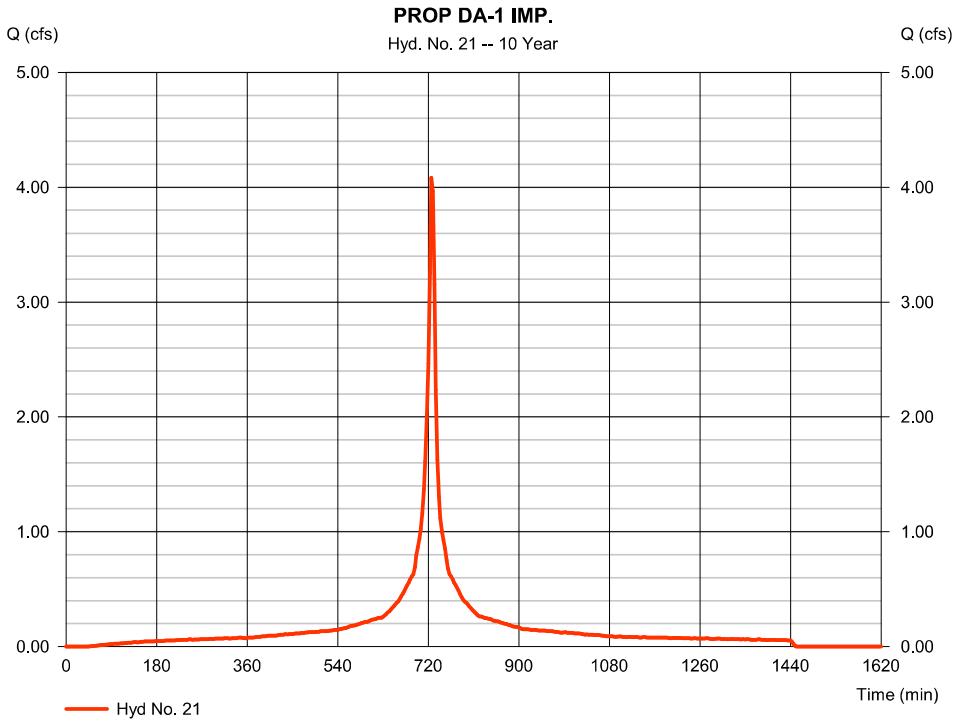


Hydrograph Report

Hyd. No. 21

PROP DA-1 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 4.082 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 16,997 cuft
Drainage area	= 0.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

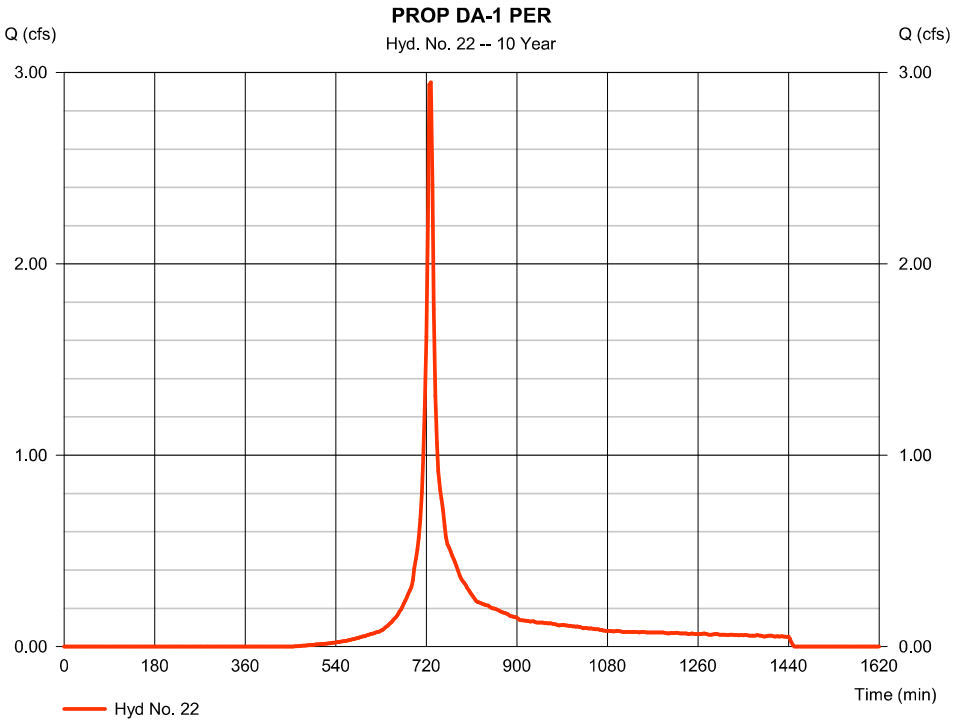


Hydrograph Report

Hyd. No. 22

PROP DA-1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 2.949 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 10,667 cuft
Drainage area	= 1.080 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

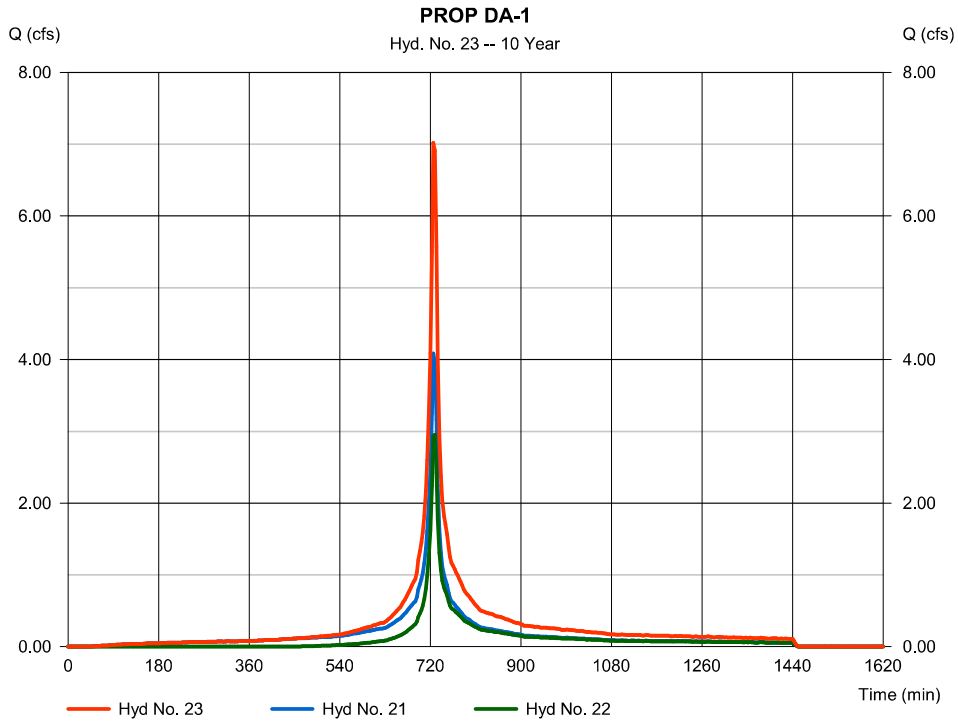


Hydrograph Report

Hyd. No. 23

PROP DA-1

Hydrograph type	= Combine	Peak discharge	= 7.019 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 27,664 cuft
Inflow hyds.	= 21, 22	Contrib. drain. area	= 2.040 ac

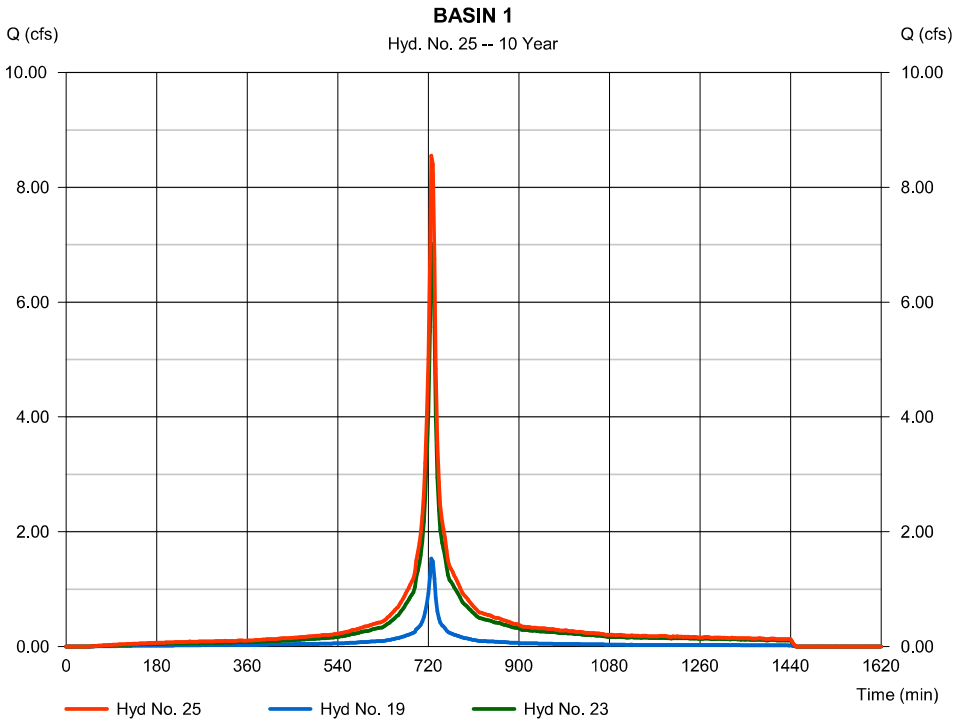


Hydrograph Report

Hyd. No. 25

BASIN 1

Hydrograph type	= Combine	Peak discharge	= 8.550 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 34,038 cuft
Inflow hyds.	= 19, 23	Contrib. drain. area	= 0.360 ac



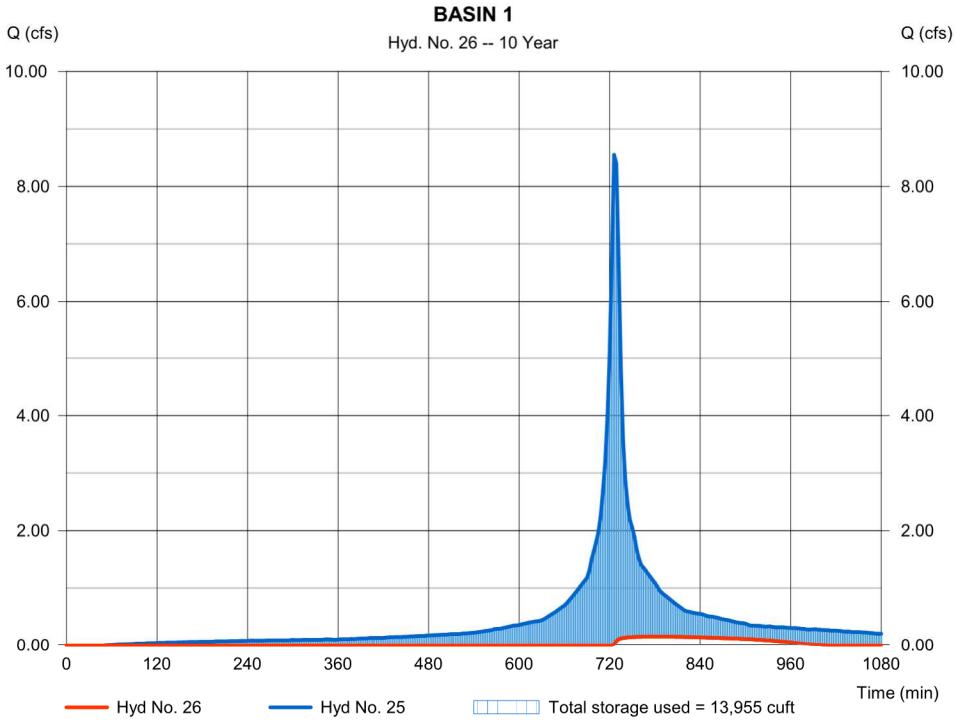
Hydrograph Report

Hyd. No. 26

BASIN 1

Hydrograph type	= Reservoir	Peak discharge	= 0.156 cfs
Storm frequency	= 10 yrs	Time to peak	= 783 min
Time interval	= 3 min	Hyd. volume	= 1,833 cuft
Inflow hyd. No.	= 25 - BASIN 1	Max. Elevation	= 86.33 ft
Reservoir name	= Pond 1	Max. Storage	= 13,955 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

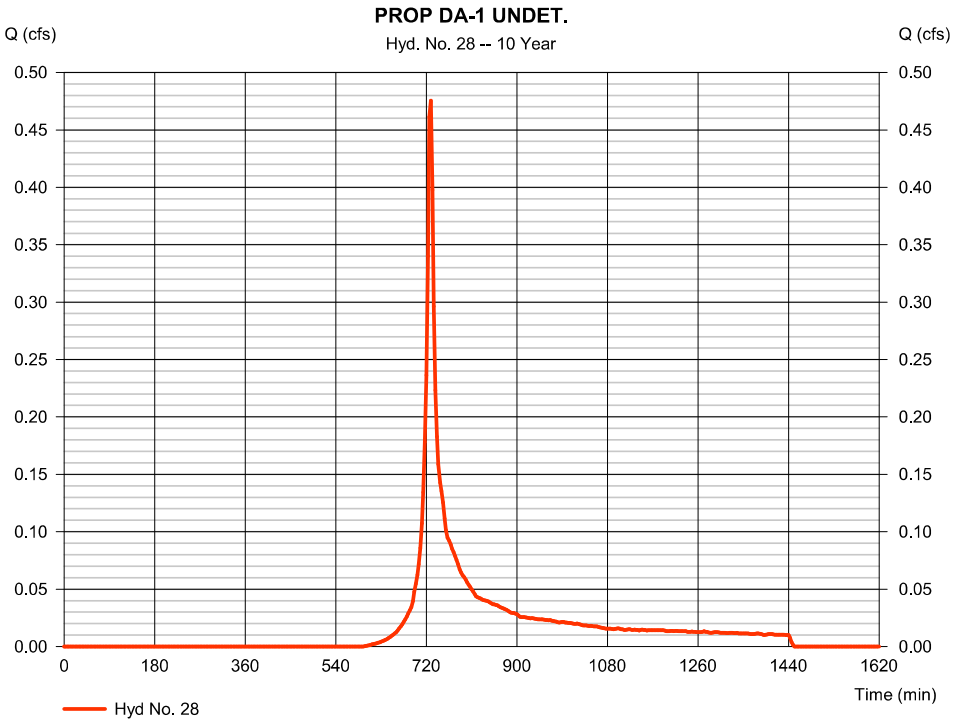


Hydrograph Report

Hyd. No. 28

PROP DA-1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.476 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 1,730 cuft
Drainage area	= 0.250 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

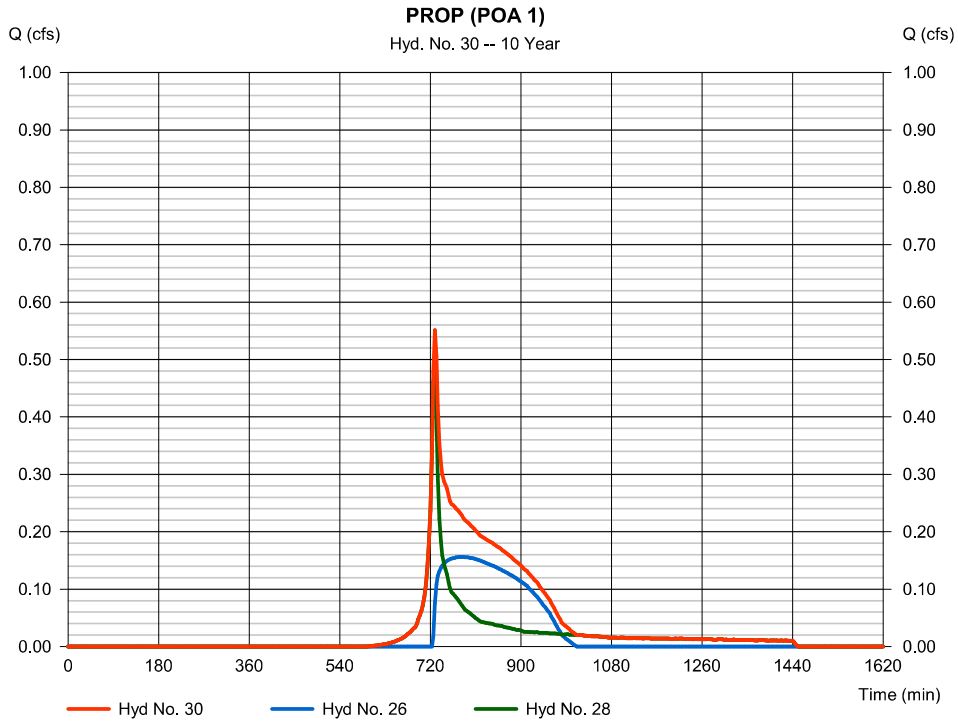


Hydrograph Report

Hyd. No. 30

PROP (POA 1)

Hydrograph type	= Combine	Peak discharge	= 0.551 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 3,564 cuft
Inflow hyds.	= 26, 28	Contrib. drain. area	= 0.250 ac

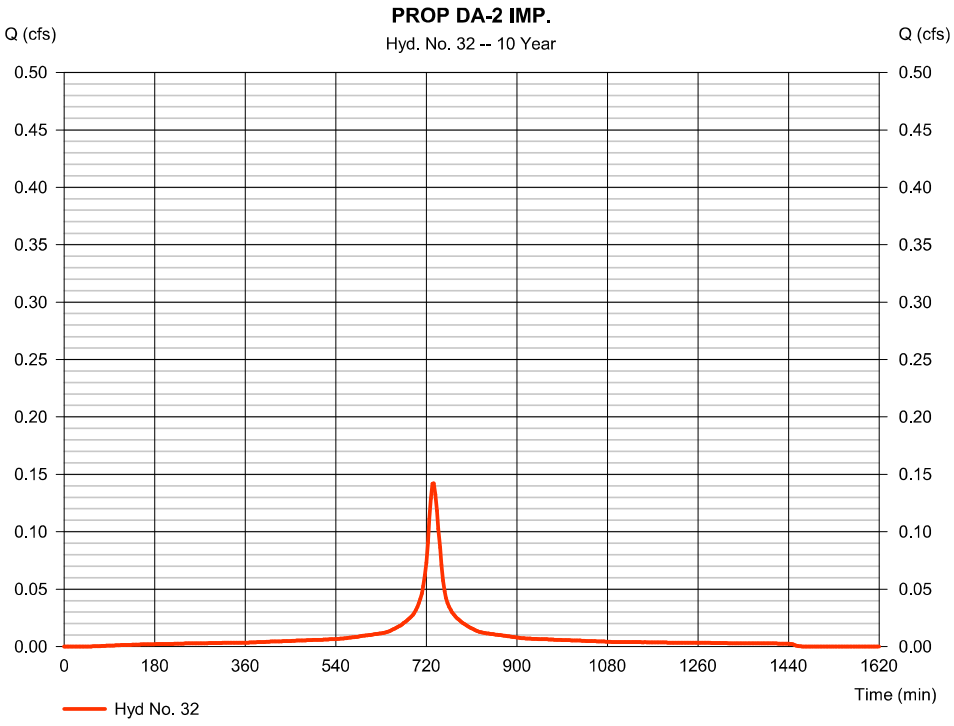


Hydrograph Report

Hyd. No. 32

PROP DA-2 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.142 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 779 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

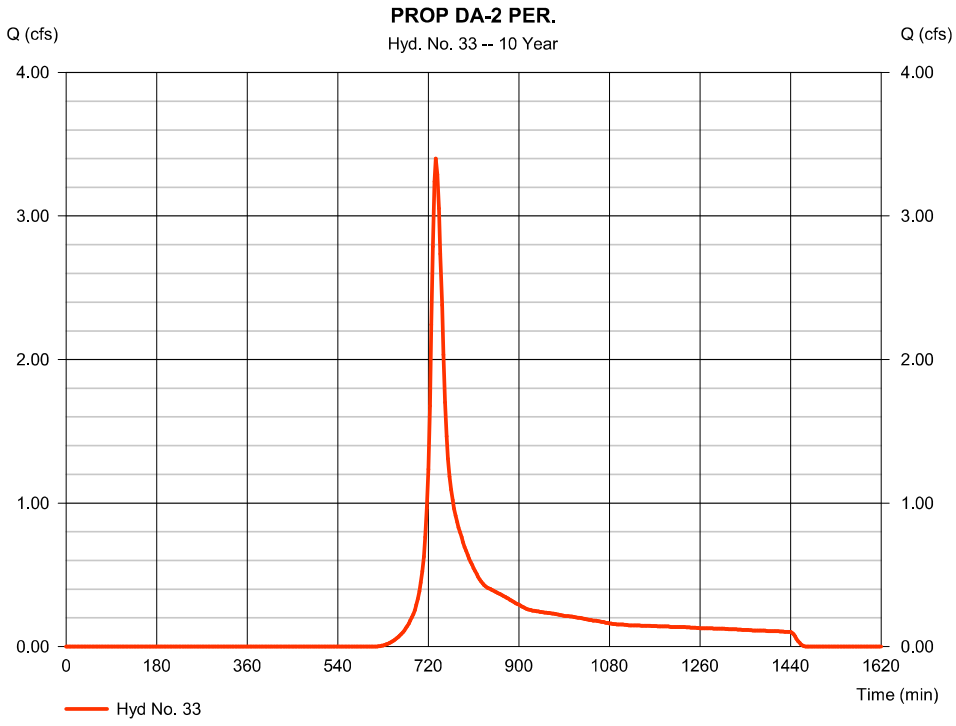


Hydrograph Report

Hyd. No. 33

PROP DA-2 PER.

Hydrograph type	= SCS Runoff	Peak discharge	= 3.400 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 16,689 cuft
Drainage area	= 2.380 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

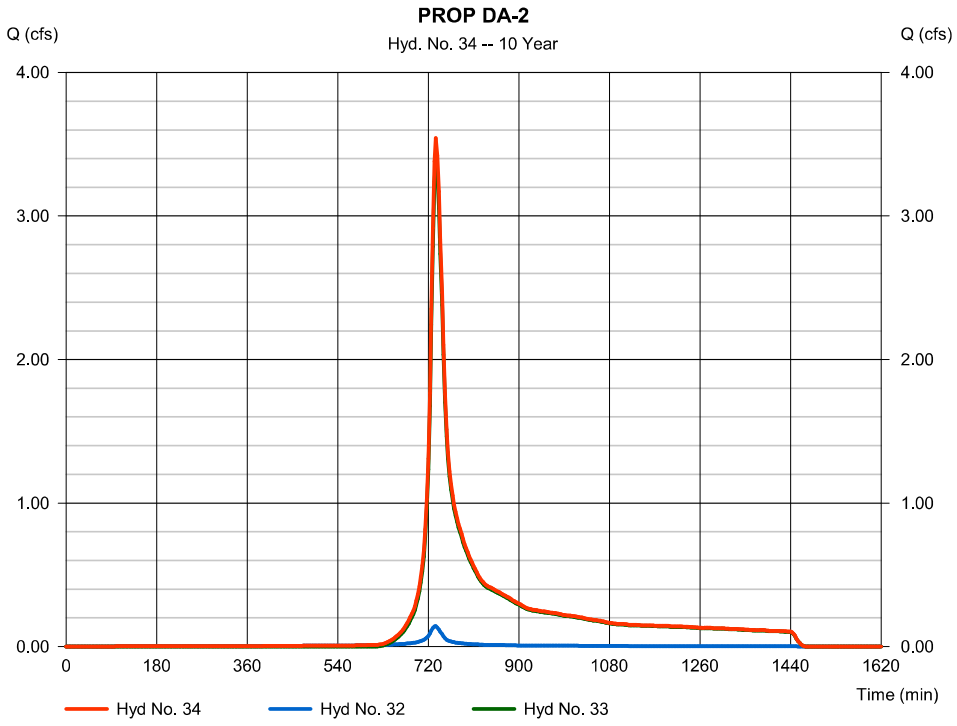


Hydrograph Report

Hyd. No. 34

PROP DA-2

Hydrograph type	= Combine	Peak discharge	= 3.542 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 17,468 cuft
Inflow hyds.	= 32, 33	Contrib. drain. area	= 2.420 ac

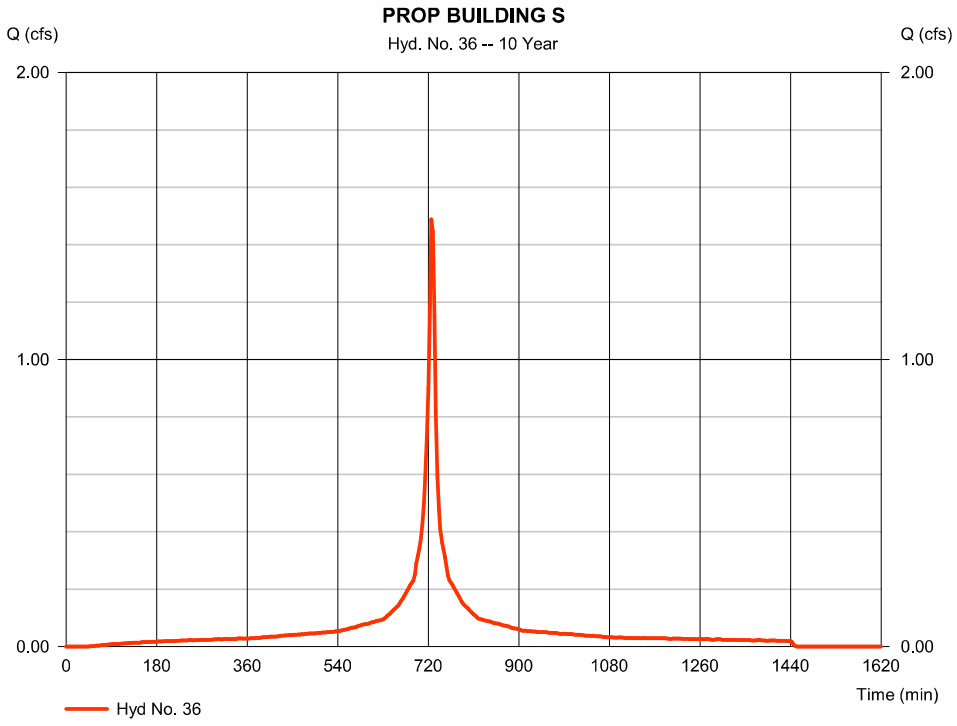


Hydrograph Report

Hyd. No. 36

PROP BUILDING S

Hydrograph type	= SCS Runoff	Peak discharge	= 1.488 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 6,197 cuft
Drainage area	= 0.350 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.44 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



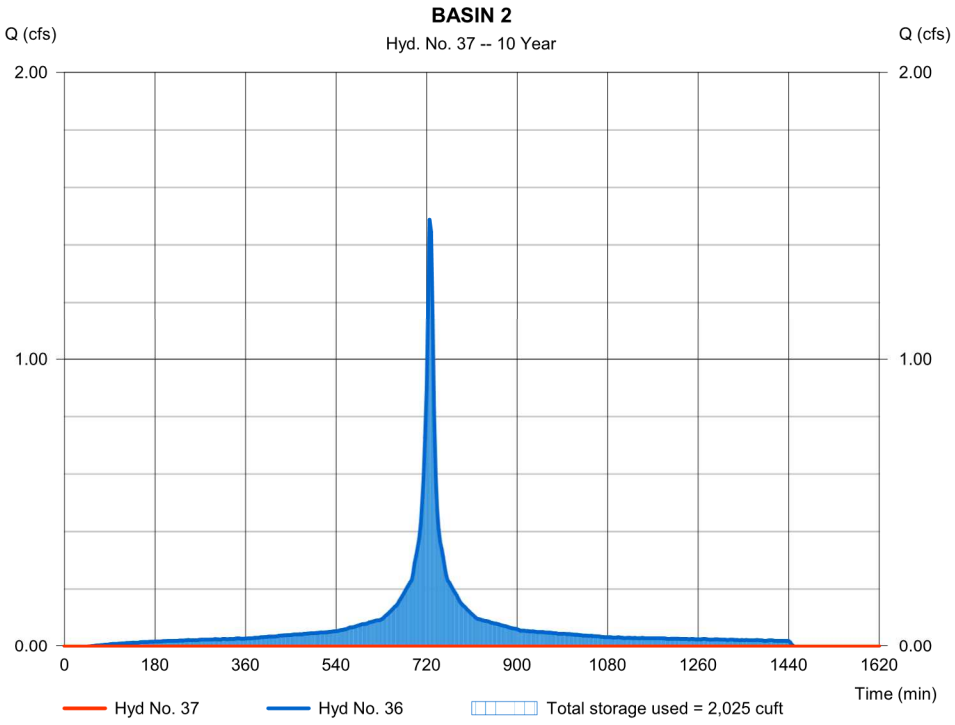
Hydrograph Report

Hyd. No. 37

BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 36 - PROP BUILDING S	Max. Elevation	= 88.91 ft
Reservoir name	= Pond 2	Max. Storage	= 2,025 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

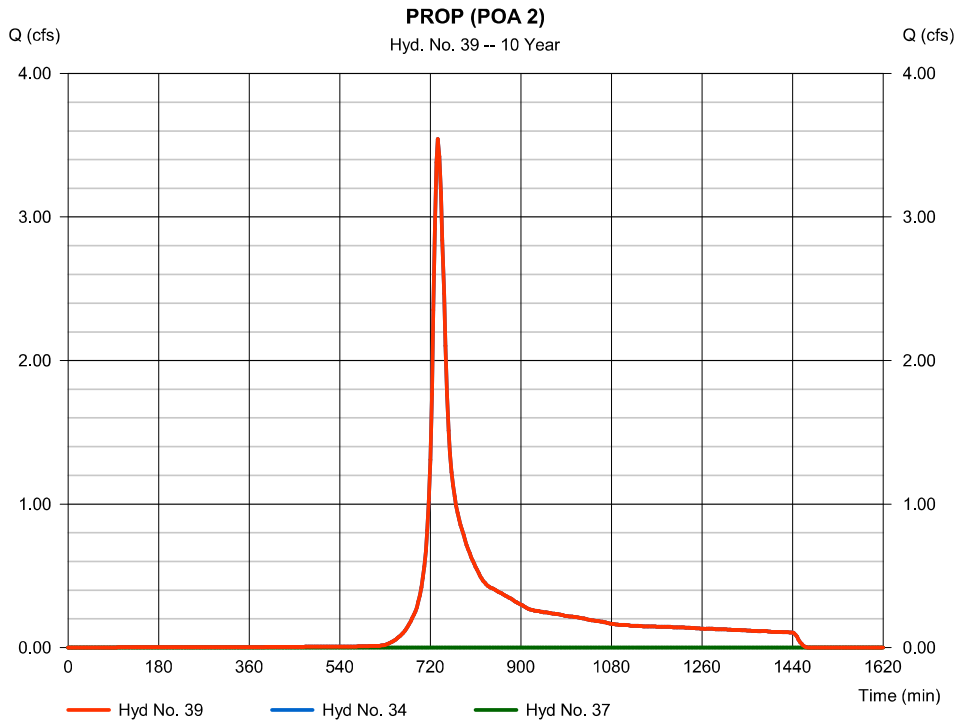


Hydrograph Report

Hyd. No. 39

PROP (POA 2)

Hydrograph type	= Combine	Peak discharge	= 3.542 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 17,468 cuft
Inflow hyds.	= 34, 37	Contrib. drain. area	= 0.000 ac



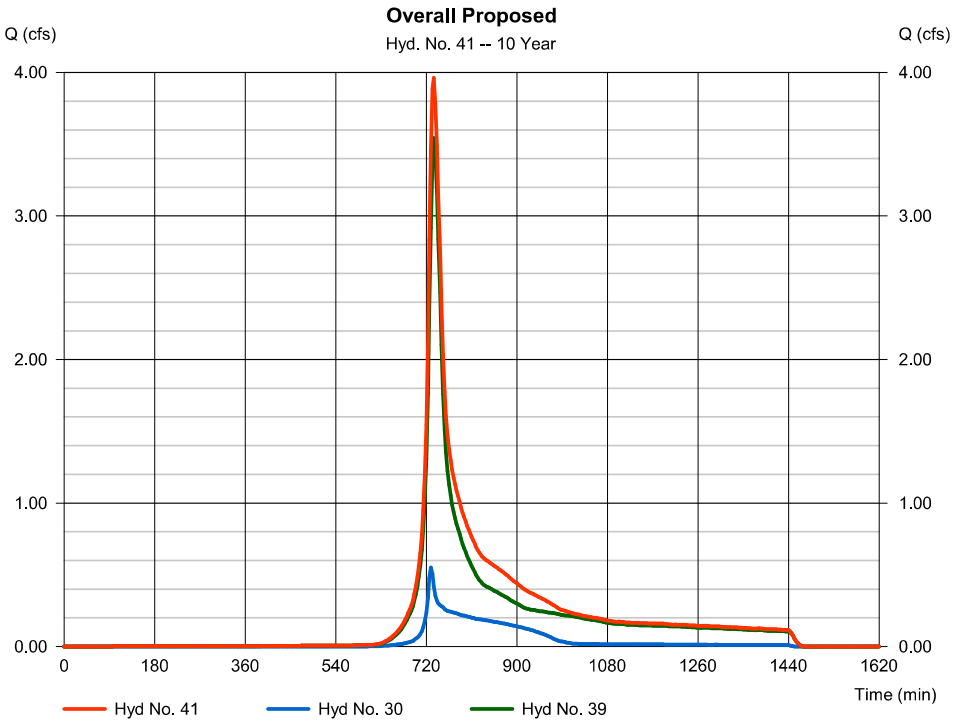
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Hyd. No. 41

Overall Proposed

Hydrograph type	= Combine	Peak discharge	= 3.961 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 21,031 cuft
Inflow hyds.	= 30, 39	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

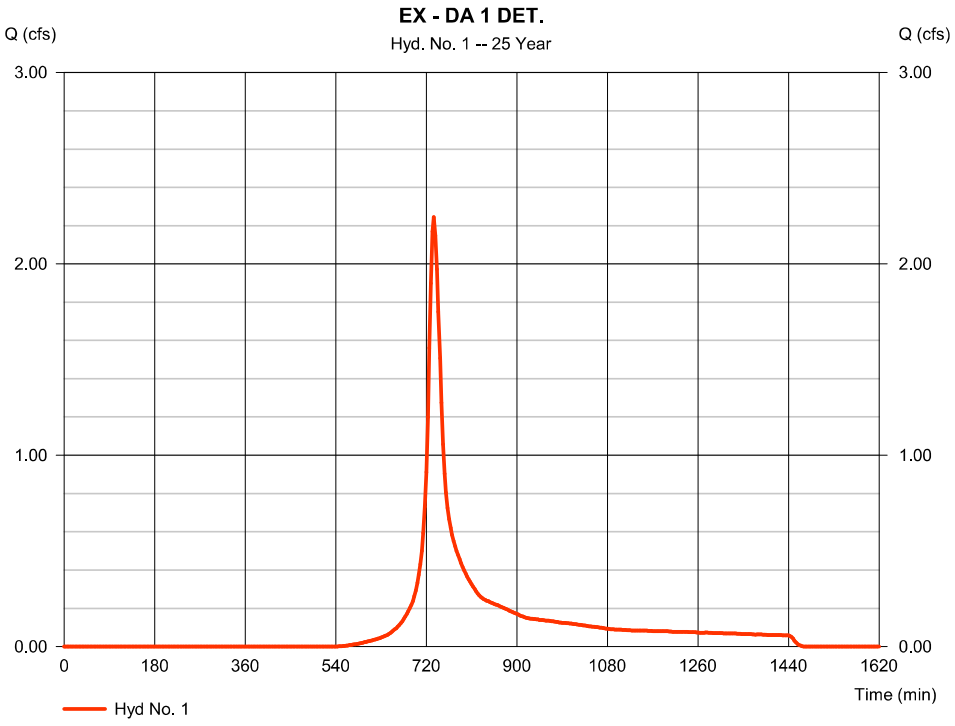
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.245	3	735	10,702	-----	----	-----	EX - DA 1 DET.
2	Reservoir	0.000	3	663	0	1	86.60	3,173	EXIST. DEPRESSION
4	SCS Runoff	2.517	3	738	12,935	-----	----	-----	EX-DA 1 UNDET.
5	Combine	2.517	3	738	12,935	2, 4	----	-----	EX-DA 1 (POA 1)
7	SCS Runoff	0.524	3	735	2,889	-----	----	-----	EX-DA 2A IMP.
8	SCS Runoff	2.013	3	735	10,046	-----	----	-----	EX-DA 2A PERV
9	Combine	2.536	3	735	12,935	7, 8	----	-----	EX-DA 2A
11	SCS Runoff	4.393	3	732	18,485	-----	----	-----	EX-DA 2B
13	Combine	6.822	3	732	31,421	9, 11,	----	-----	EX-DA 2 (POA 2)
15	Combine	9.042	3	735	44,356	5, 13,	----	-----	Overall Existing
19	SCS Runoff	1.880	3	726	7,879	-----	----	-----	PROP BUILDING N
21	SCS Runoff	5.013	3	726	21,011	-----	----	-----	PROP DA-1 IMP.
22	SCS Runoff	4.009	3	726	14,573	-----	----	-----	PROP DA-1 PER
23	Combine	9.022	3	726	35,583	21, 22	----	-----	PROP DA-1
25	Combine	10.90	3	726	43,462	19, 23,	----	-----	BASIN 1
26	Reservoir	0.209	3	792	3,629	25	86.81	18,851	BASIN 1
28	SCS Runoff	0.695	3	729	2,508	-----	----	-----	PROP DA-1 UNDET.
30	Combine	0.832	3	729	6,137	26, 28,	----	-----	PROP (POA 1)
32	SCS Runoff	0.175	3	735	963	-----	----	-----	PROP DA-2 IMP.
33	SCS Runoff	5.115	3	735	24,524	-----	----	-----	PROP DA-2 PER.
34	Combine	5.289	3	735	25,487	32, 33	----	-----	PROP DA-2
36	SCS Runoff	1.828	3	726	7,660	-----	----	-----	PROP BUILDING S
37	Reservoir	0.000	3	786	0	36	89.01	2,491	BASIN 2
39	Combine	5.289	3	735	25,487	34, 37,	----	-----	PROP (POA 2)
41	Combine	5.884	3	735	31,624	30, 39,	----	-----	Overall Proposed

Hydrograph Report

Hyd. No. 1

EX - DA 1 DET.

Hydrograph type	= SCS Runoff	Peak discharge	= 2.245 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 10,702 cuft
Drainage area	= 0.970 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 16.60 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



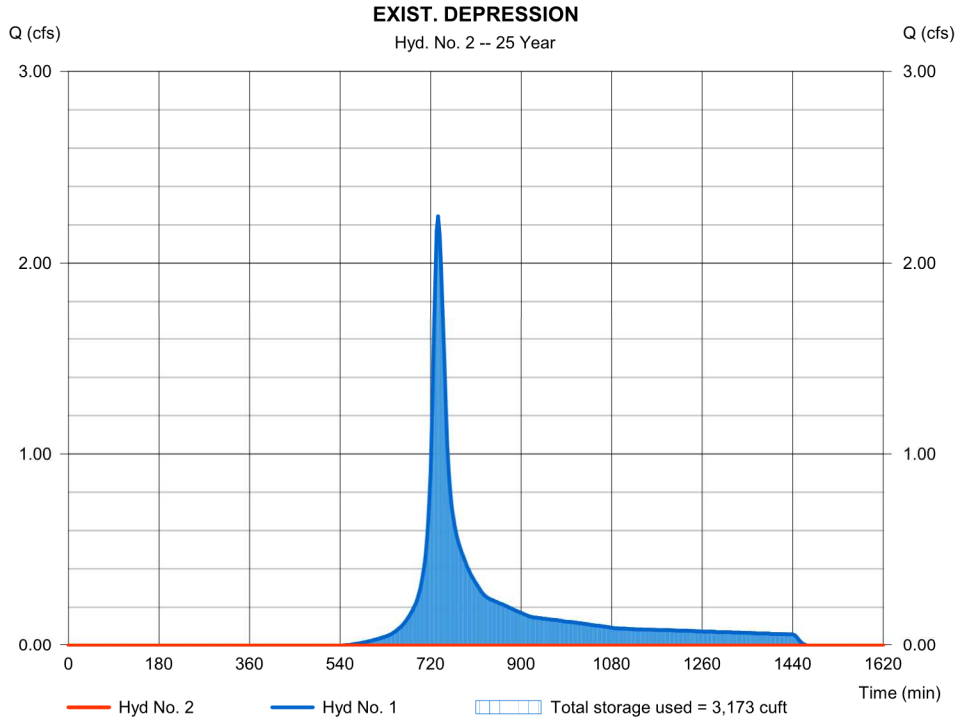
Hydrograph Report

Hyd. No. 2

EXIST. DEPRESSION

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 663 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - EX - DA 1 DET.	Max. Elevation	= 86.60 ft
Reservoir name	= Exist. Depression	Max. Storage	= 3,173 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

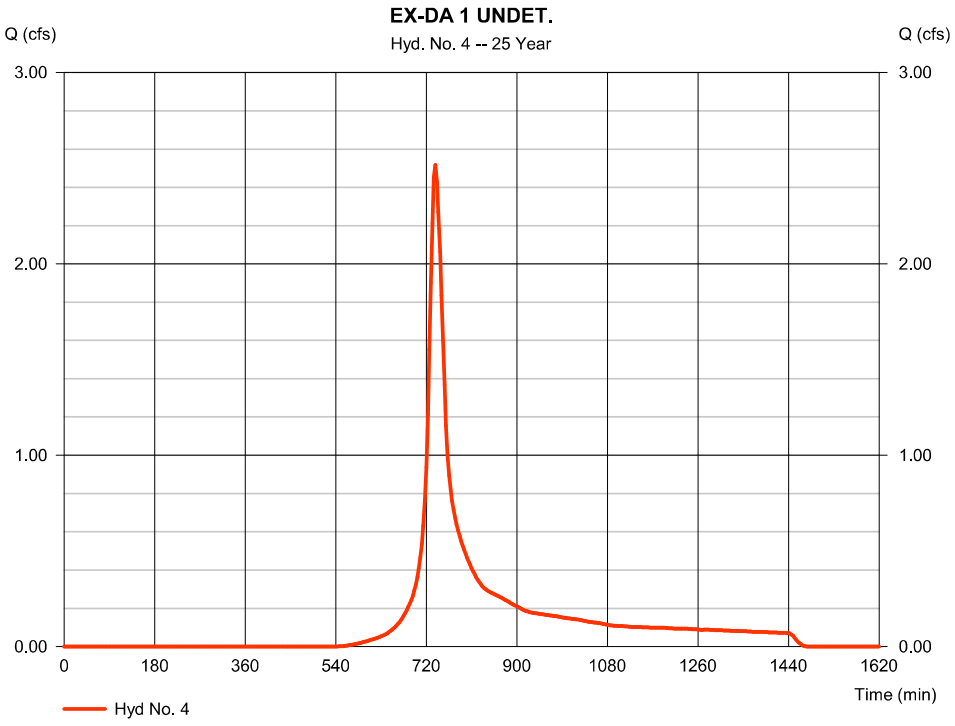


Hydrograph Report

Hyd. No. 4

EX-DA 1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 2.517 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 12,935 cuft
Drainage area	= 1.240 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

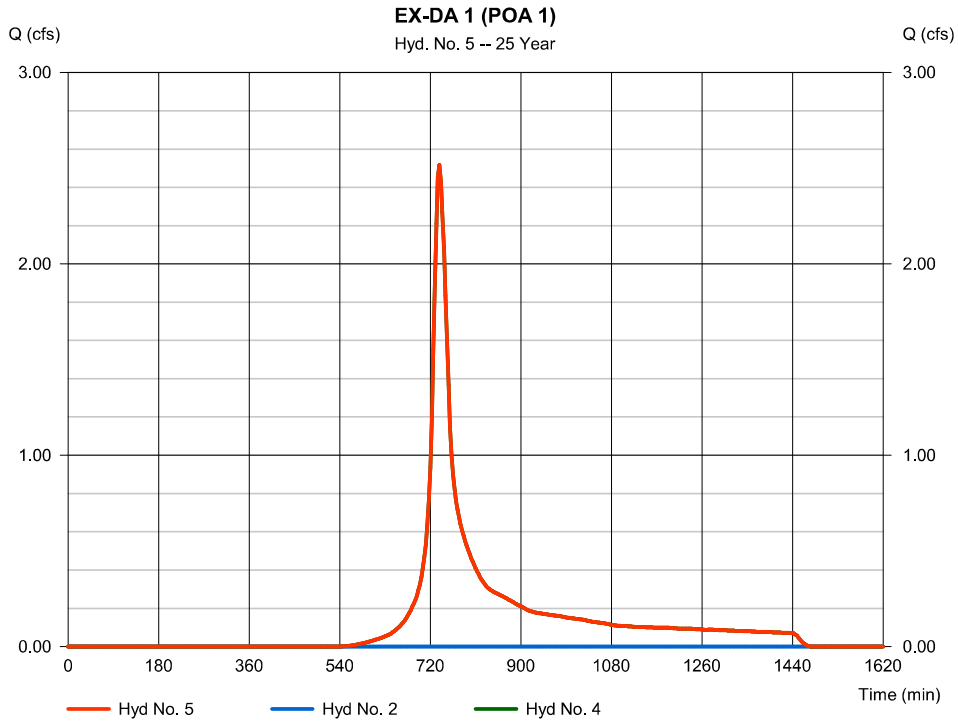


Hydrograph Report

Hyd. No. 5

EX-DA 1 (POA 1)

Hydrograph type	= Combine	Peak discharge	= 2.517 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 12,935 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.240 ac

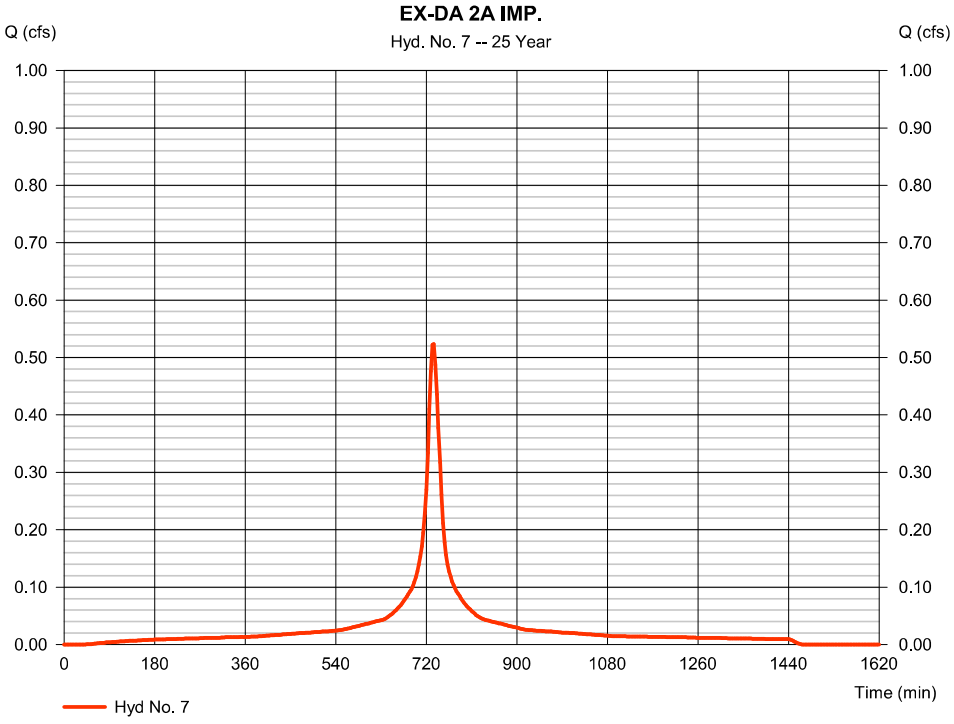


Hydrograph Report

Hyd. No. 7

EX-DA 2A IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.524 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 2,889 cuft
Drainage area	= 0.120 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

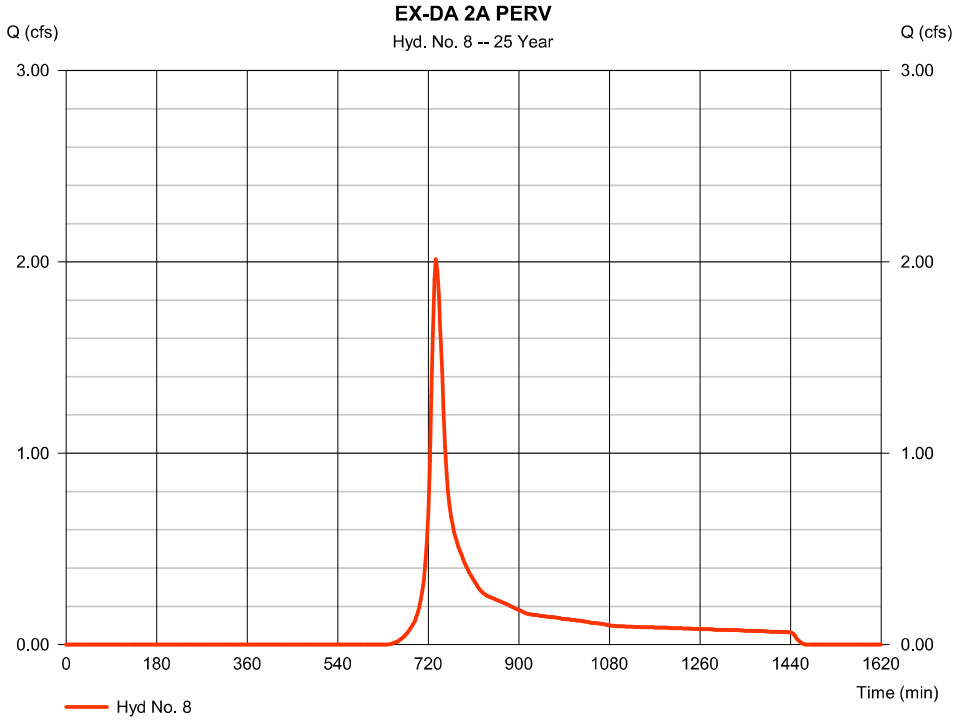


Hydrograph Report

Hyd. No. 8

EX-DA 2A PERV

Hydrograph type	= SCS Runoff	Peak discharge	= 2.013 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 10,046 cuft
Drainage area	= 1.280 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

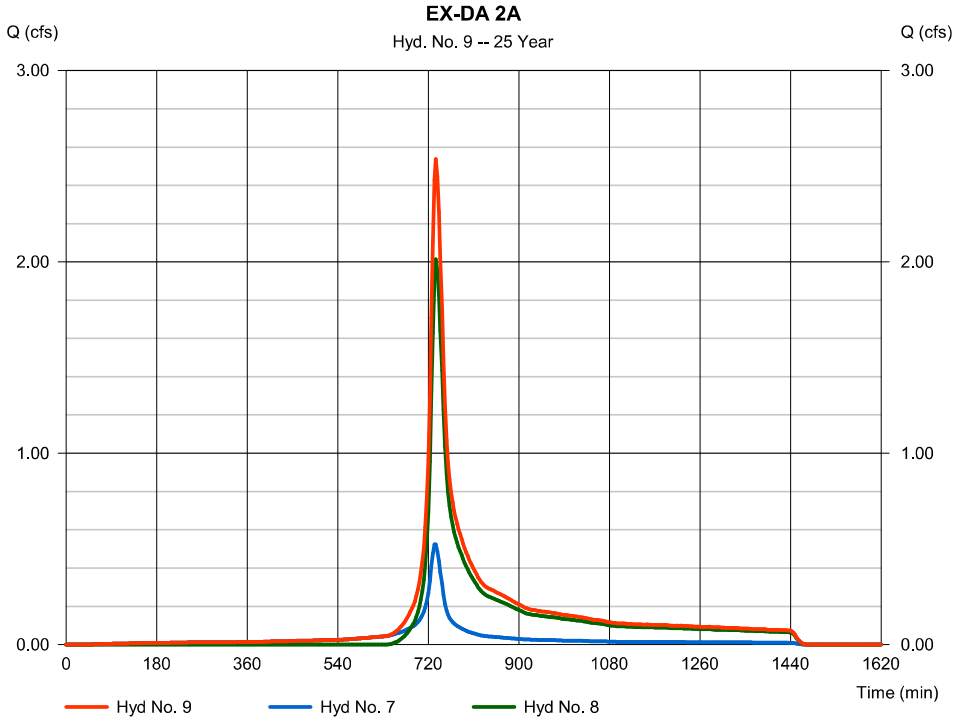


Hydrograph Report

Hyd. No. 9

EX-DA 2A

Hydrograph type	= Combine	Peak discharge	= 2.536 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 12,935 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 1.400 ac

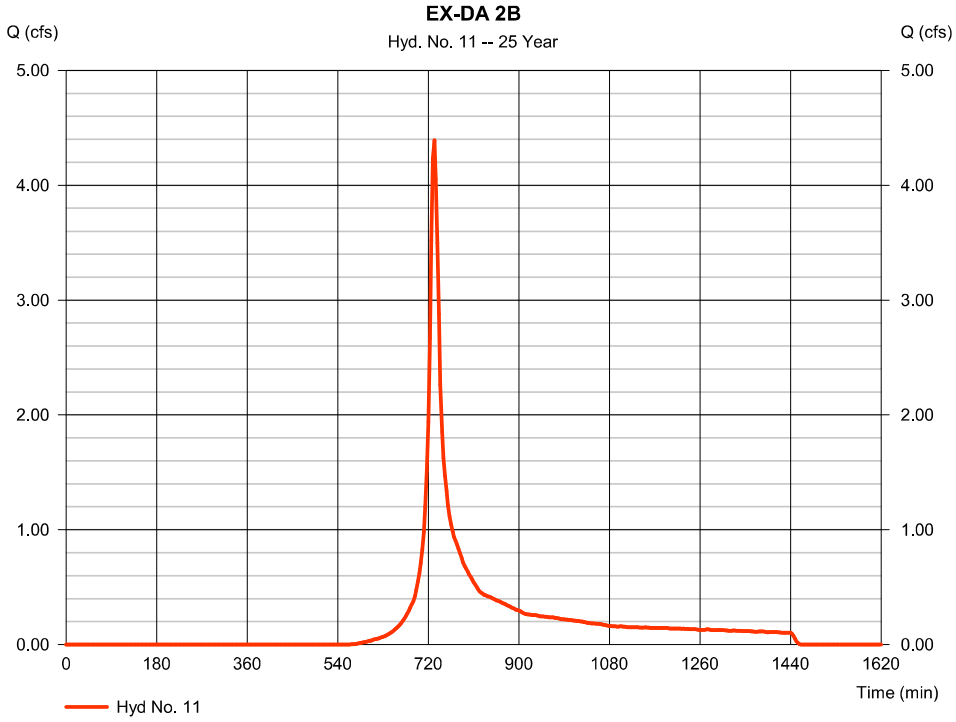


Hydrograph Report

Hyd. No. 11

EX-DA 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 4.393 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 18,485 cuft
Drainage area	= 1.850 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.80 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

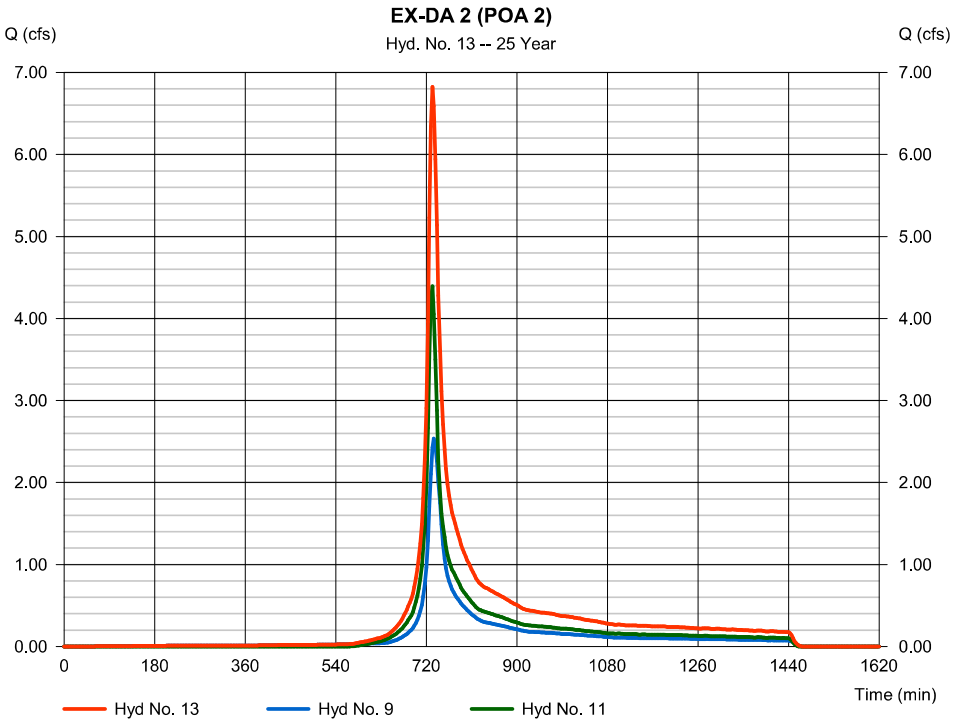


Hydrograph Report

Hyd. No. 13

EX-DA 2 (POA 2)

Hydrograph type	= Combine	Peak discharge	= 6.822 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 31,421 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.850 ac

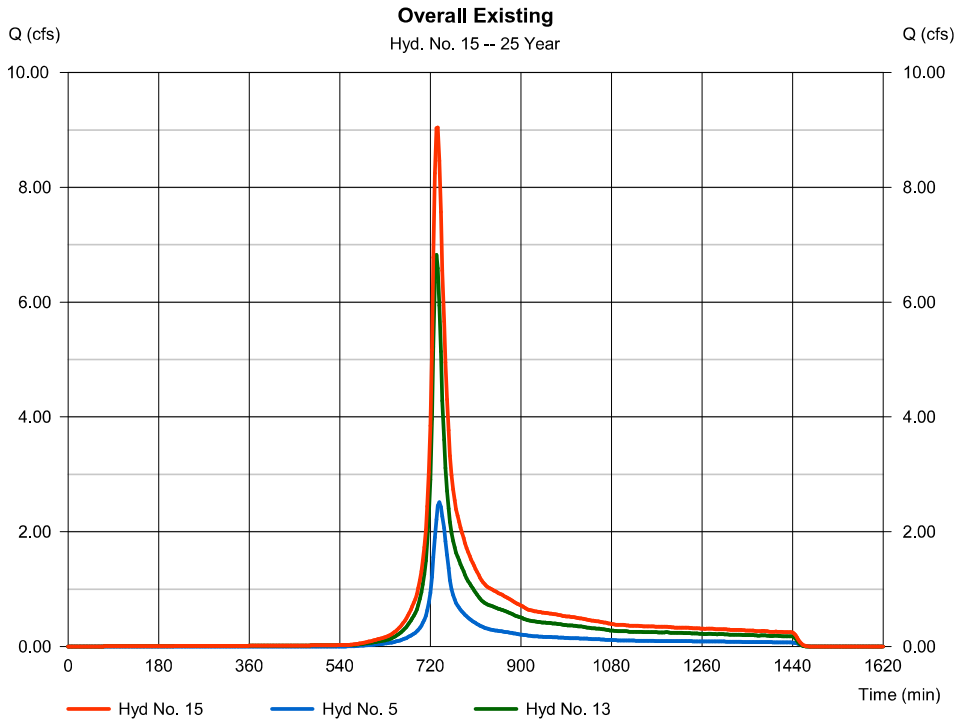


Hydrograph Report

Hyd. No. 15

Overall Existing

Hydrograph type	= Combine	Peak discharge	= 9.042 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 44,356 cuft
Inflow hyds.	= 5, 13	Contrib. drain. area	= 0.000 ac

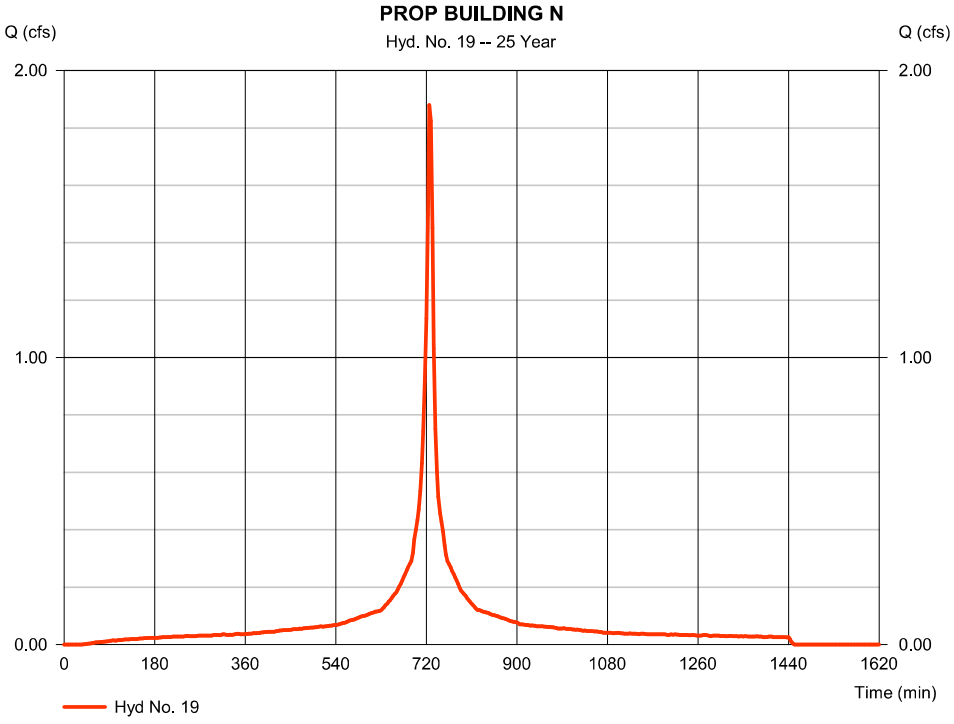


Hydrograph Report

Hyd. No. 19

PROP BUILDING N

Hydrograph type	= SCS Runoff	Peak discharge	= 1.880 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 7,879 cuft
Drainage area	= 0.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

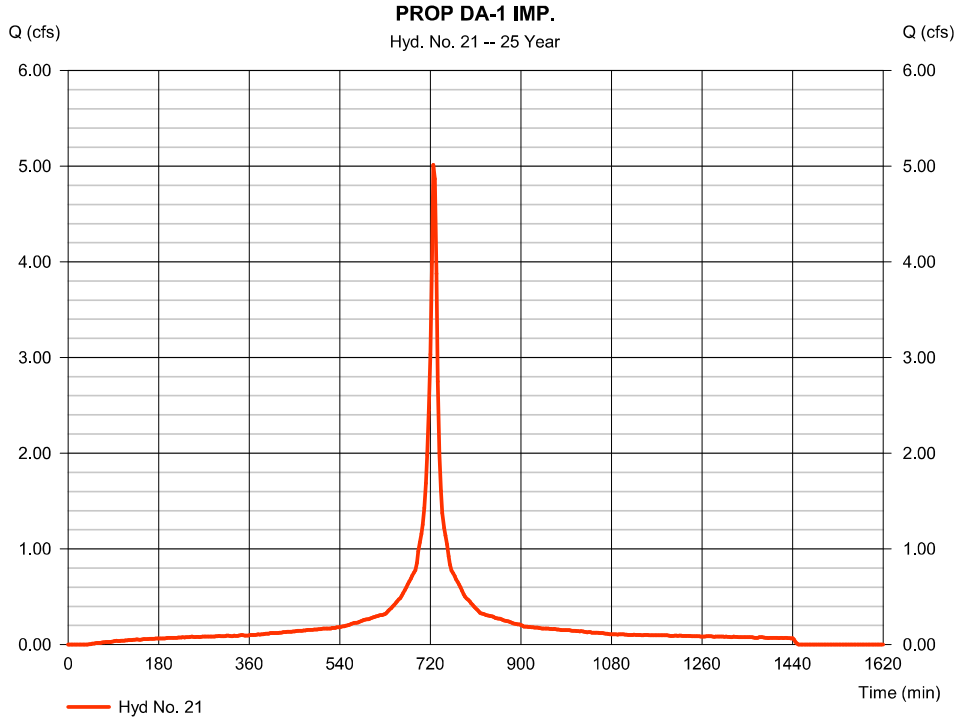


Hydrograph Report

Hyd. No. 21

PROP DA-1 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 5.013 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 21,011 cuft
Drainage area	= 0.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

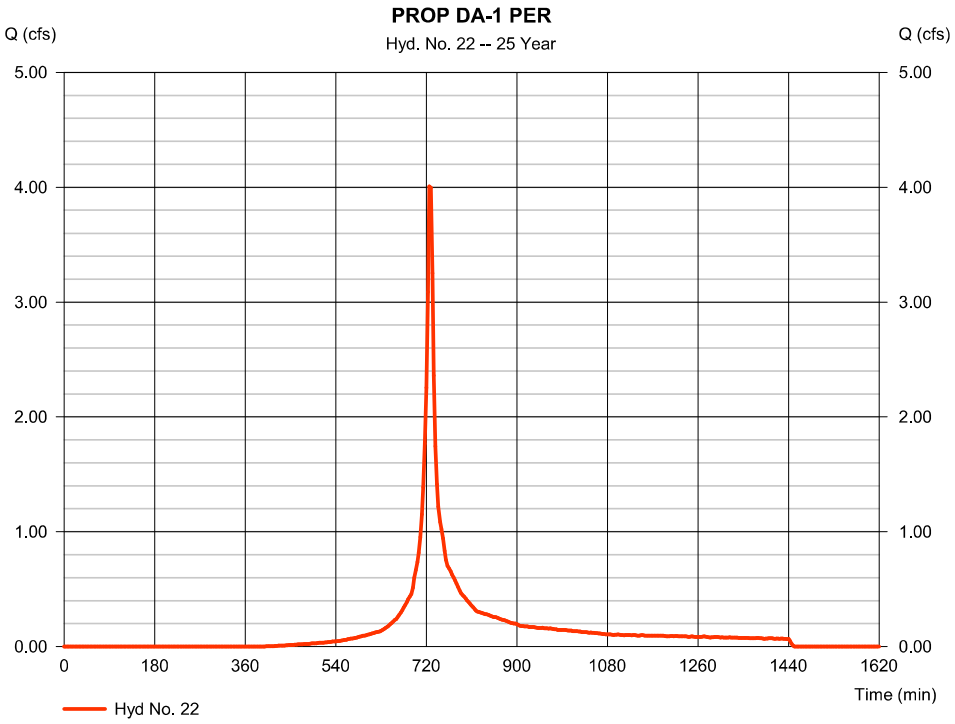


Hydrograph Report

Hyd. No. 22

PROP DA-1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 4.009 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 14,573 cuft
Drainage area	= 1.080 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

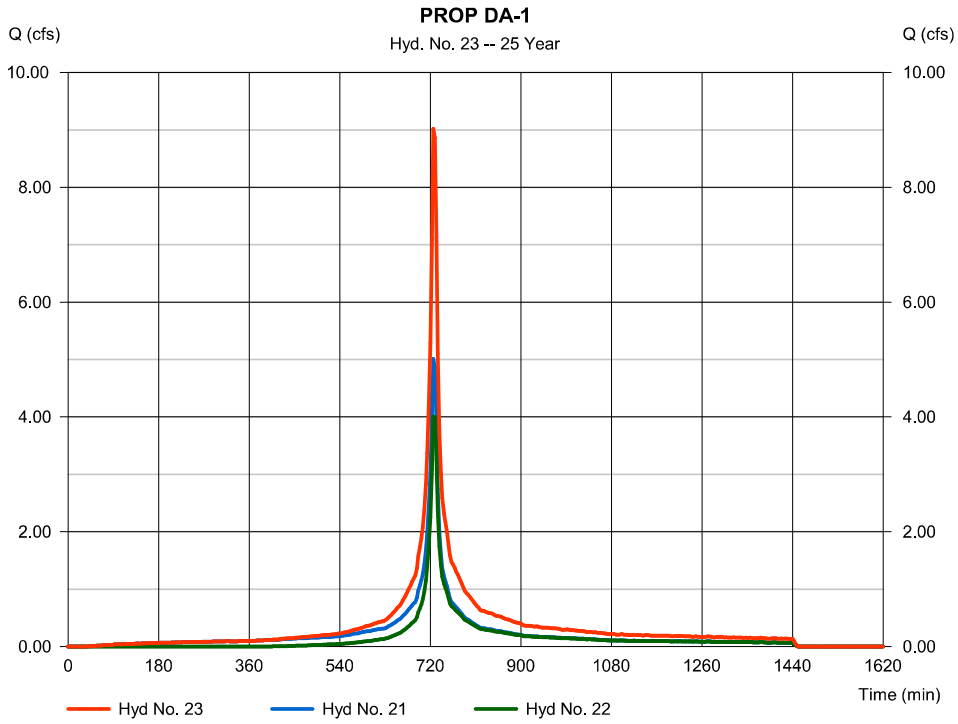


Hydrograph Report

Hyd. No. 23

PROP DA-1

Hydrograph type	= Combine	Peak discharge	= 9.022 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 35,583 cuft
Inflow hyds.	= 21, 22	Contrib. drain. area	= 2.040 ac

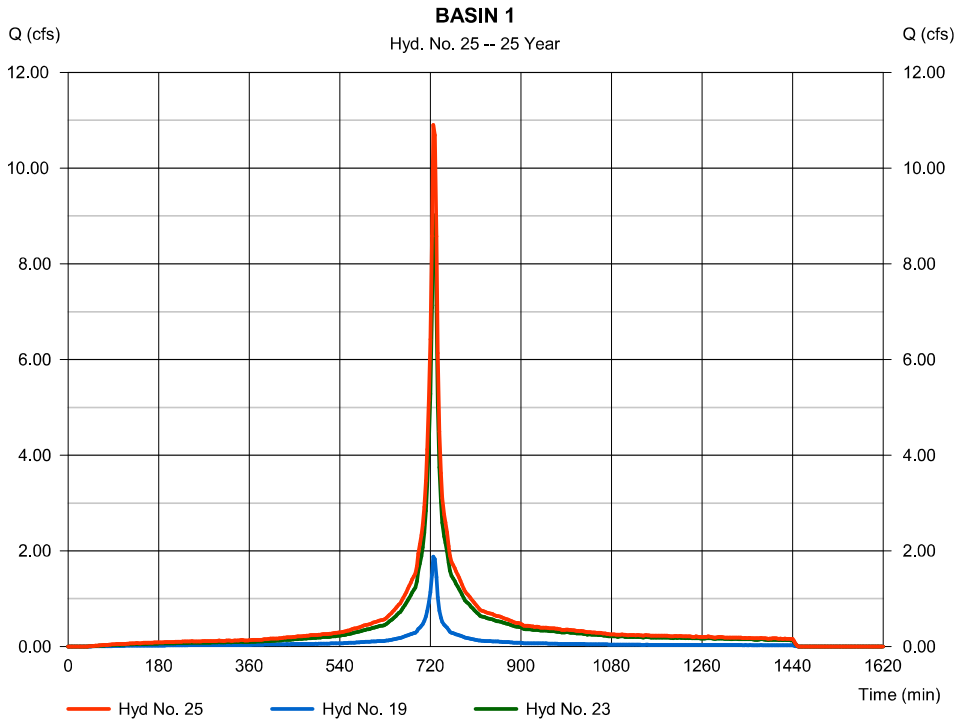


Hydrograph Report

Hyd. No. 25

BASIN 1

Hydrograph type	= Combine	Peak discharge	= 10.90 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 43,462 cuft
Inflow hyds.	= 19, 23	Contrib. drain. area	= 0.360 ac



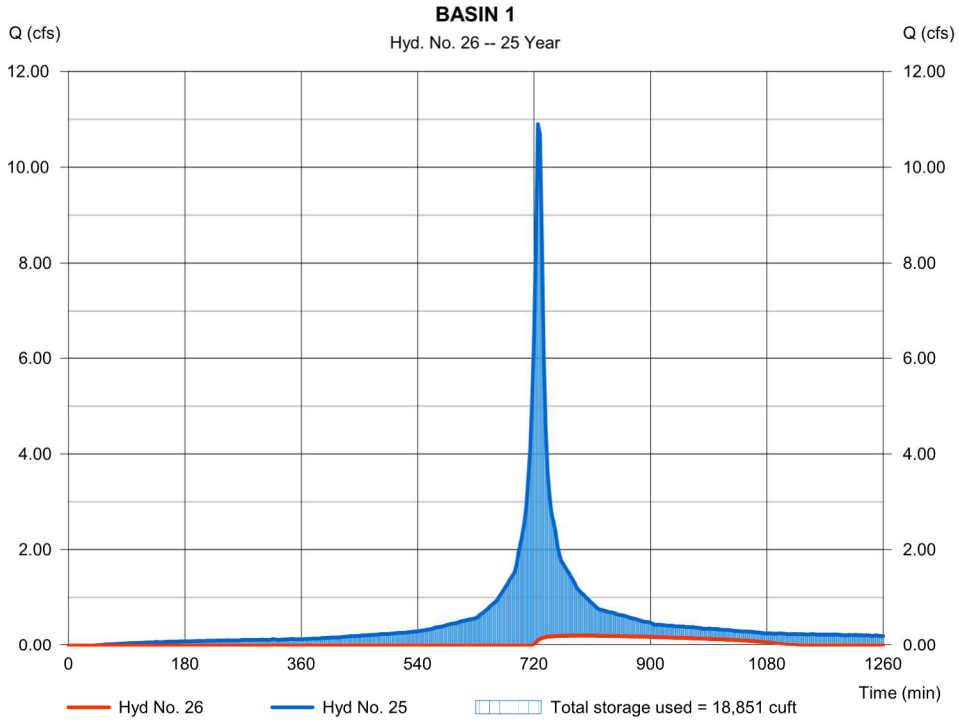
Hydrograph Report

Hyd. No. 26

BASIN 1

Hydrograph type	= Reservoir	Peak discharge	= 0.209 cfs
Storm frequency	= 25 yrs	Time to peak	= 792 min
Time interval	= 3 min	Hyd. volume	= 3,629 cuft
Inflow hyd. No.	= 25 - BASIN 1	Max. Elevation	= 86.81 ft
Reservoir name	= Pond 1	Max. Storage	= 18,851 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

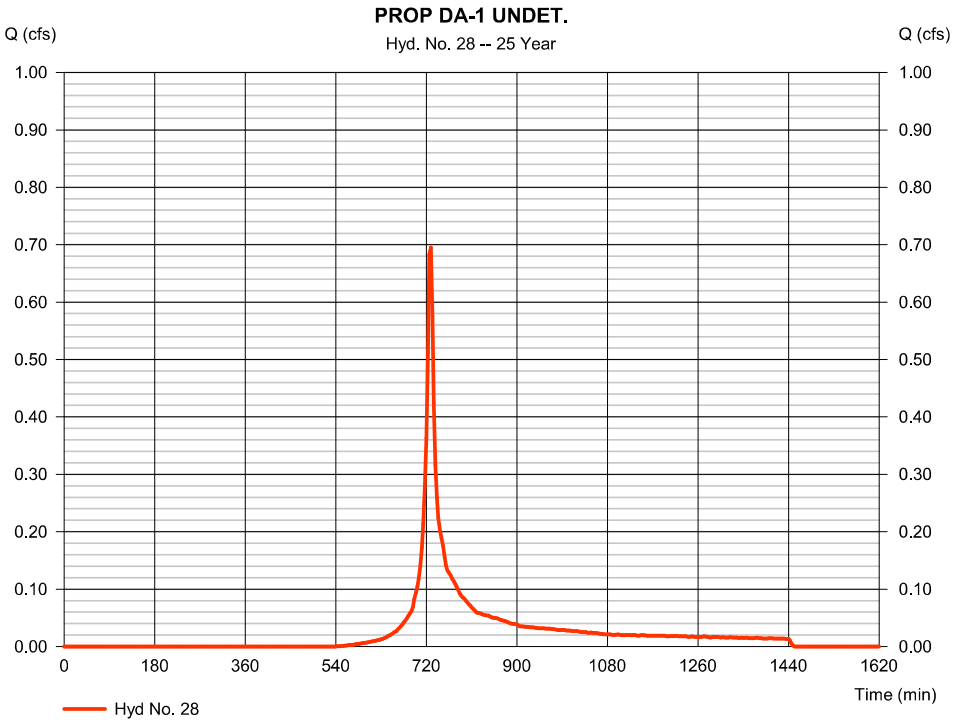


Hydrograph Report

Hyd. No. 28

PROP DA-1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.695 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 2,508 cuft
Drainage area	= 0.250 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

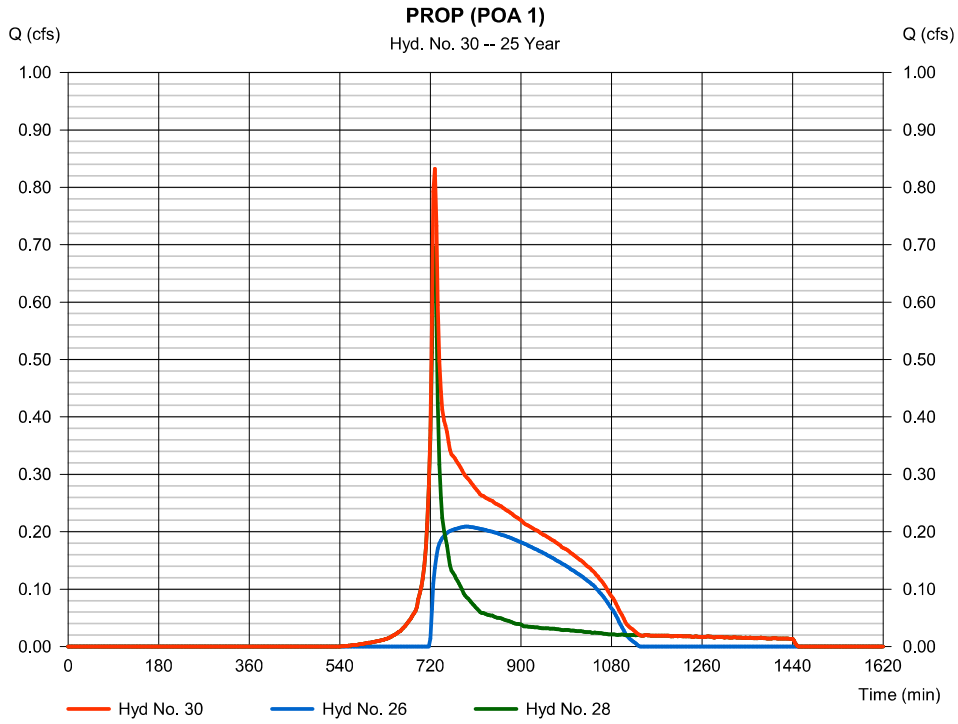


Hydrograph Report

Hyd. No. 30

PROP (POA 1)

Hydrograph type	= Combine	Peak discharge	= 0.832 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 6,137 cuft
Inflow hyds.	= 26, 28	Contrib. drain. area	= 0.250 ac

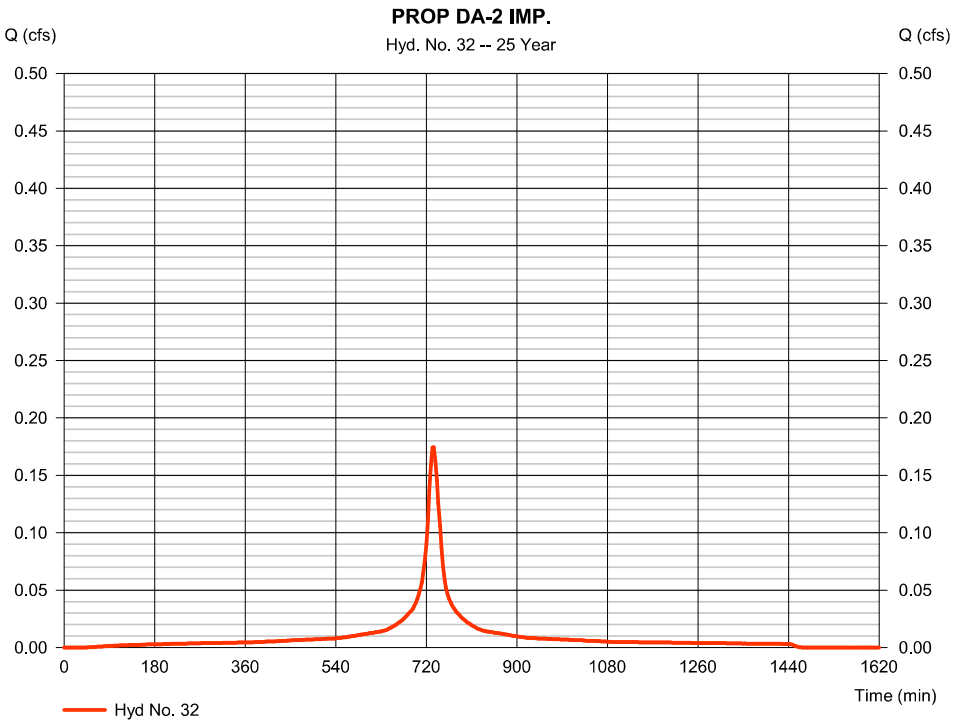


Hydrograph Report

Hyd. No. 32

PROP DA-2 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.175 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 963 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

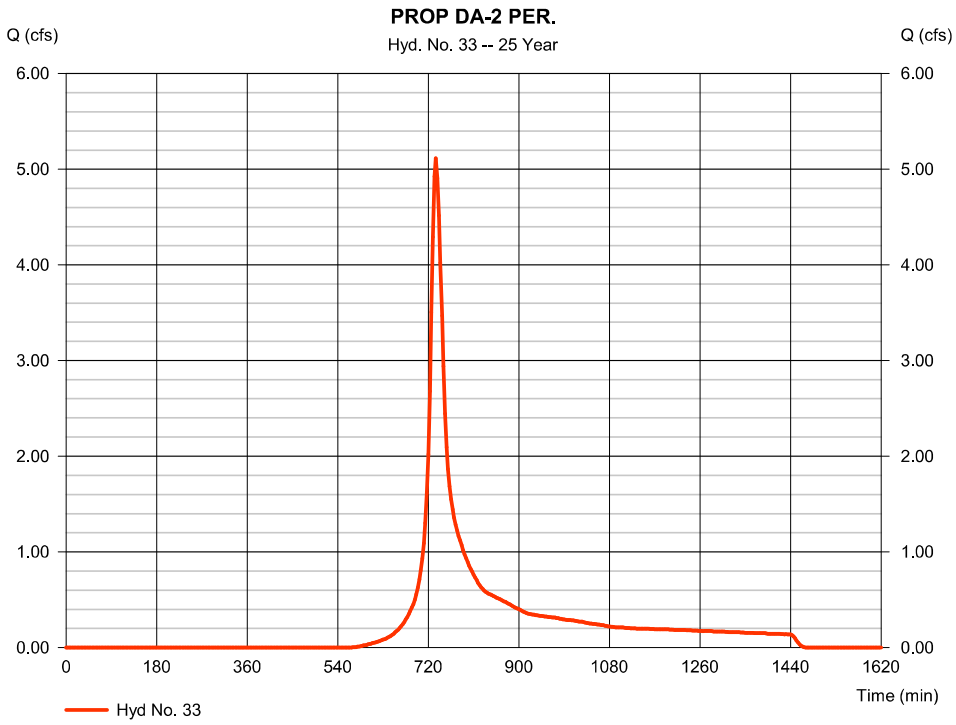


Hydrograph Report

Hyd. No. 33

PROP DA-2 PER.

Hydrograph type	= SCS Runoff	Peak discharge	= 5.115 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 24,524 cuft
Drainage area	= 2.380 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

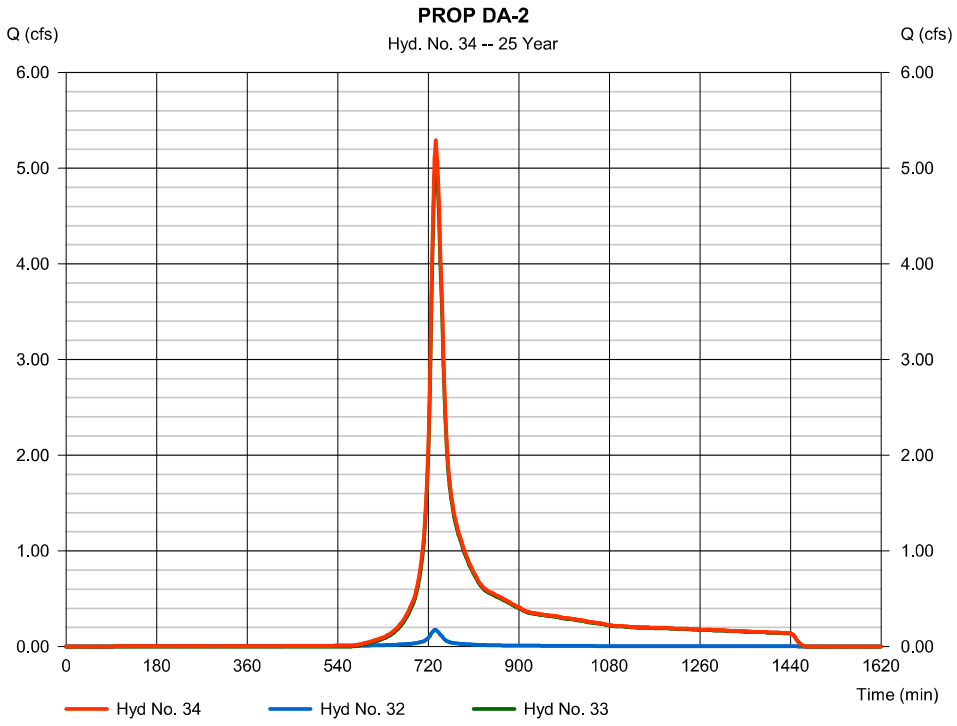


Hydrograph Report

Hyd. No. 34

PROP DA-2

Hydrograph type	= Combine	Peak discharge	= 5.289 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 25,487 cuft
Inflow hyds.	= 32, 33	Contrib. drain. area	= 2.420 ac

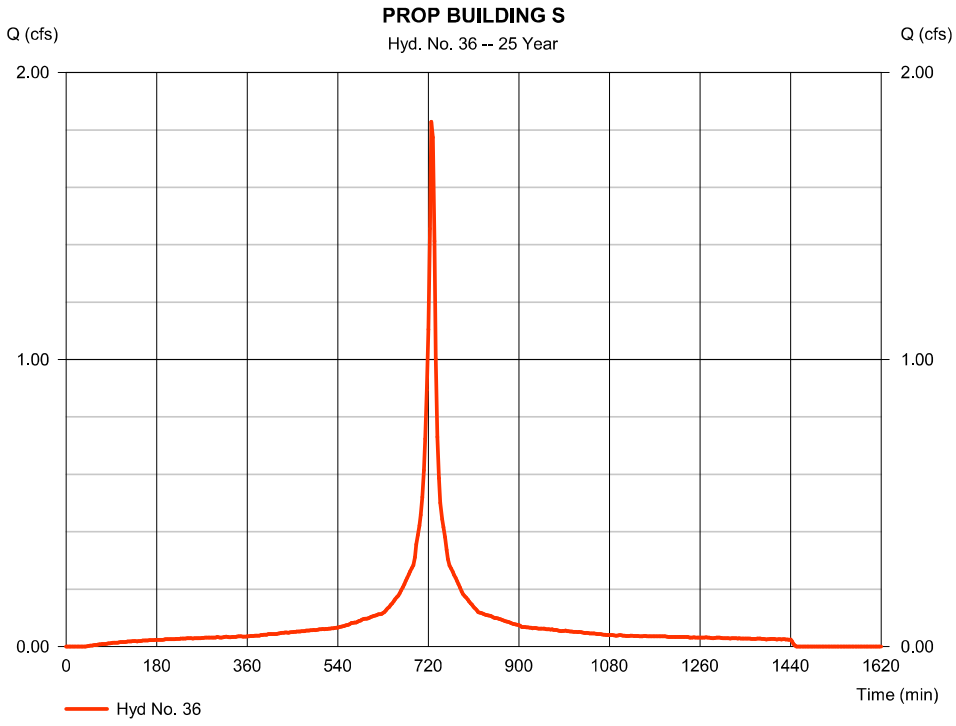


Hydrograph Report

Hyd. No. 36

PROP BUILDING S

Hydrograph type	= SCS Runoff	Peak discharge	= 1.828 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 7,660 cuft
Drainage area	= 0.350 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.67 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



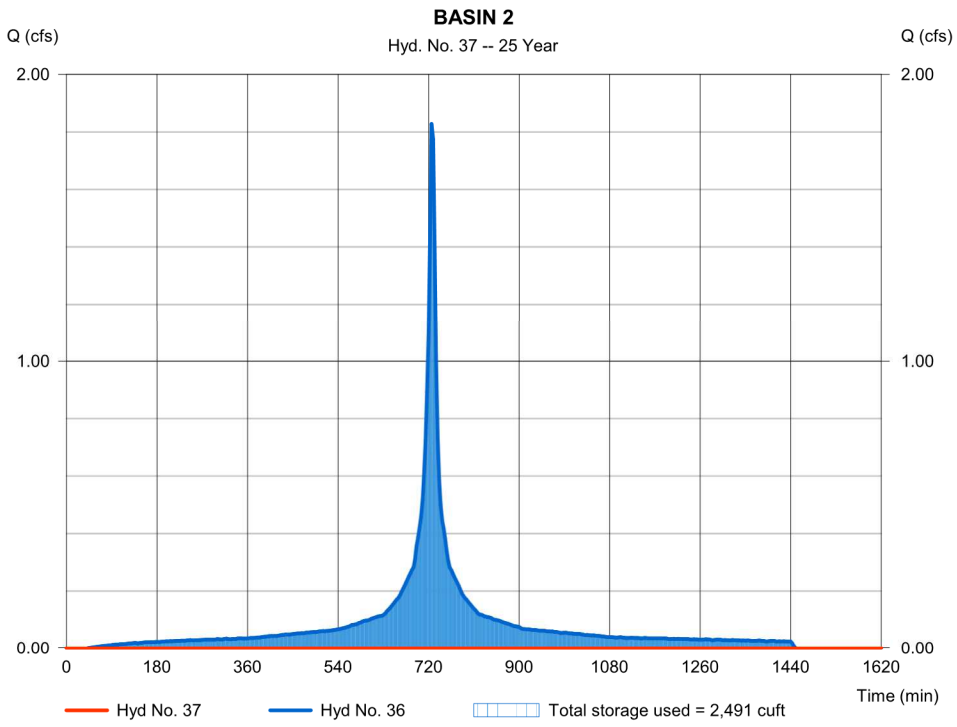
Hydrograph Report

Hyd. No. 37

BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 786 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 36 - PROP BUILDING S	Max. Elevation	= 89.01 ft
Reservoir name	= Pond 2	Max. Storage	= 2,491 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

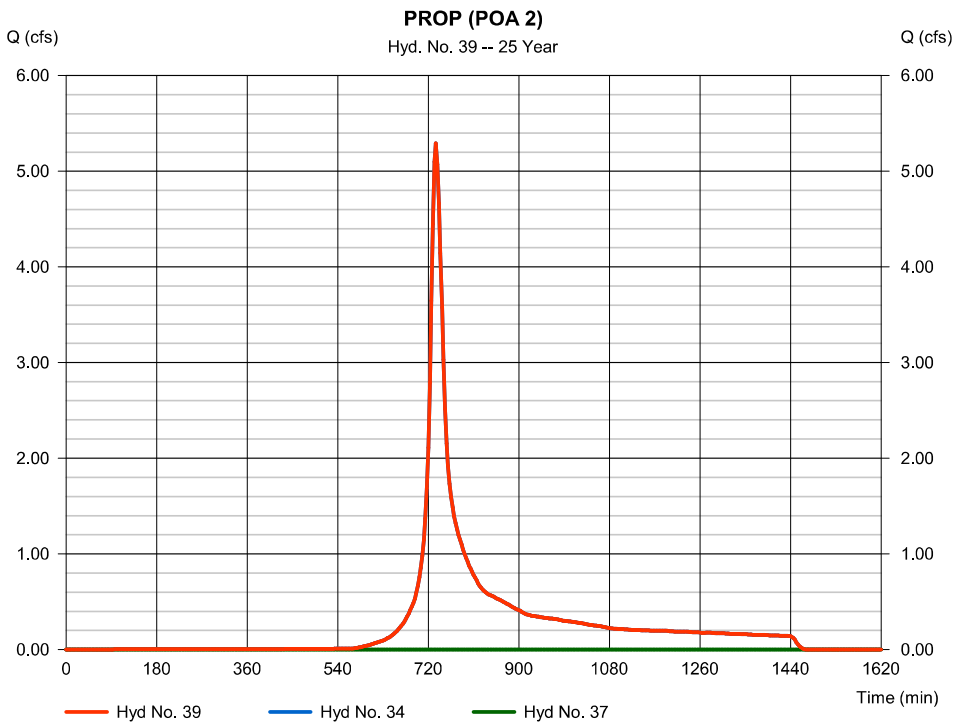


Hydrograph Report

Hyd. No. 39

PROP (POA 2)

Hydrograph type	= Combine	Peak discharge	= 5.289 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 25,487 cuft
Inflow hyds.	= 34, 37	Contrib. drain. area	= 0.000 ac



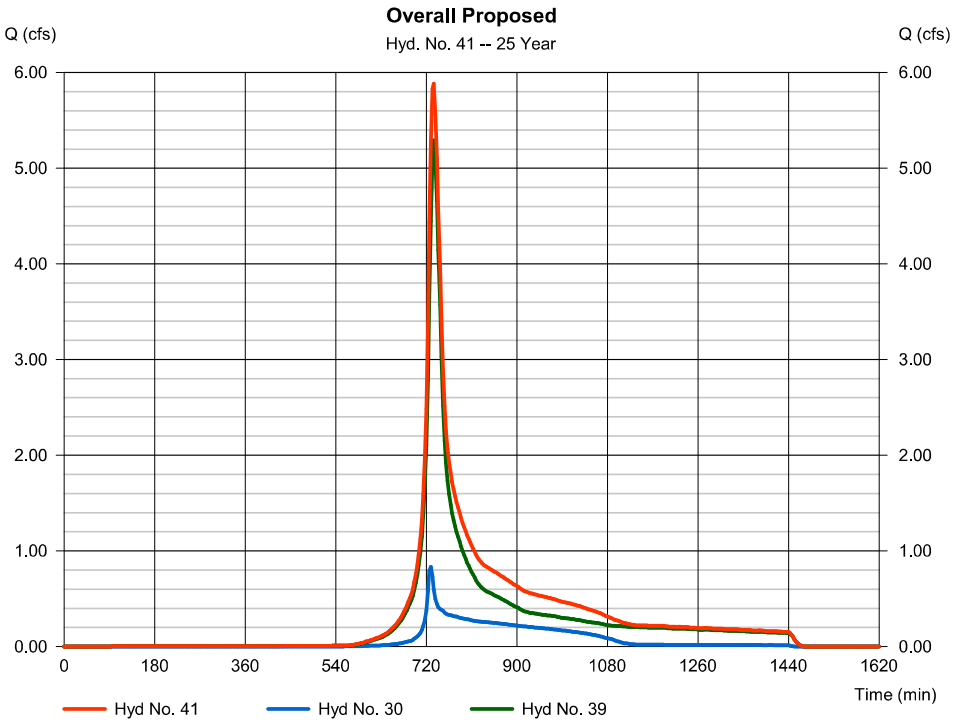
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Hyd. No. 41

Overall Proposed

Hydrograph type	= Combine	Peak discharge	= 5.884 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 31,624 cuft
Inflow hyds.	= 30, 39	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

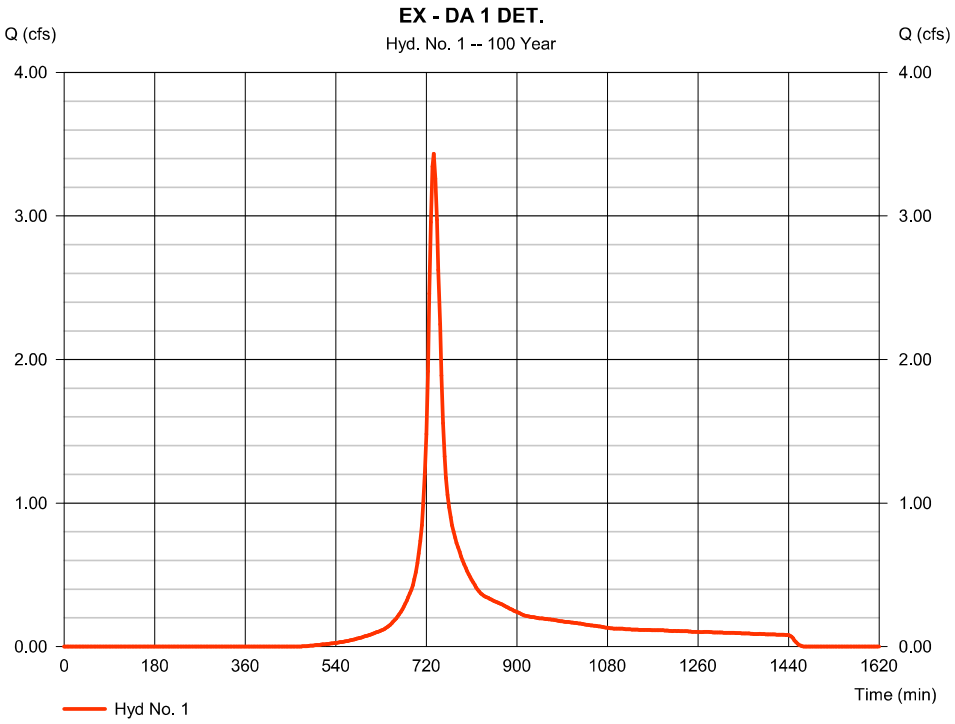
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.433	3	735	16,265	-----	----	-----	EX - DA 1 DET.
2	Reservoir	0.000	3	1080	0	1	87.07	5,502	EXIST. DEPRESSION
4	SCS Runoff	3.852	3	738	19,658	-----	----	-----	EX-DA 1 UNDET.
5	Combine	3.852	3	738	19,658	2, 4	----	-----	EX-DA 1 (POA 1)
7	SCS Runoff	0.674	3	735	3,742	-----	----	-----	EX-DA 2A IMP.
8	SCS Runoff	3.399	3	735	16,358	-----	----	-----	EX-DA 2A PERV
9	Combine	4.073	3	735	20,100	7, 8	----	-----	EX-DA 2A
11	SCS Runoff	6.819	3	732	28,479	-----	----	-----	EX-DA 2B
13	Combine	10.76	3	732	48,580	9, 11,	----	-----	EX-DA 2 (POA 2)
15	Combine	14.20	3	732	68,237	5, 13,	----	-----	Overall Existing
19	SCS Runoff	2.419	3	726	10,205	-----	----	-----	PROP BUILDING N
21	SCS Runoff	6.450	3	726	27,214	-----	----	-----	PROP DA-1 IMP.
22	SCS Runoff	5.699	3	726	20,873	-----	----	-----	PROP DA-1 PER
23	Combine	12.15	3	726	48,087	21, 22	----	-----	PROP DA-1
25	Combine	14.57	3	726	58,292	19, 23,	----	-----	BASIN 1
26	Reservoir	0.917	3	777	10,046	25	87.40	25,202	BASIN 1
28	SCS Runoff	1.055	3	729	3,811	-----	----	-----	PROP DA-1 UNDET.
30	Combine	1.250	3	729	13,856	26, 28,	----	-----	PROP (POA 1)
32	SCS Runoff	0.225	3	735	1,247	-----	----	-----	PROP DA-2 IMP.
33	SCS Runoff	7.968	3	735	37,783	-----	----	-----	PROP DA-2 PER.
34	Combine	8.192	3	735	39,031	32, 33	----	-----	PROP DA-2
36	SCS Runoff	2.351	3	726	9,922	-----	----	-----	PROP BUILDING S
37	Reservoir	0.000	3	723	0	36	89.14	3,334	BASIN 2
39	Combine	8.192	3	735	39,031	34, 37,	----	-----	PROP (POA 2)
41	Combine	9.170	3	735	52,887	30, 39,	----	-----	Overall Proposed

Hydrograph Report

Hyd. No. 1

EX - DA 1 DET.

Hydrograph type	= SCS Runoff	Peak discharge	= 3.433 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 16,265 cuft
Drainage area	= 0.970 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 16.60 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



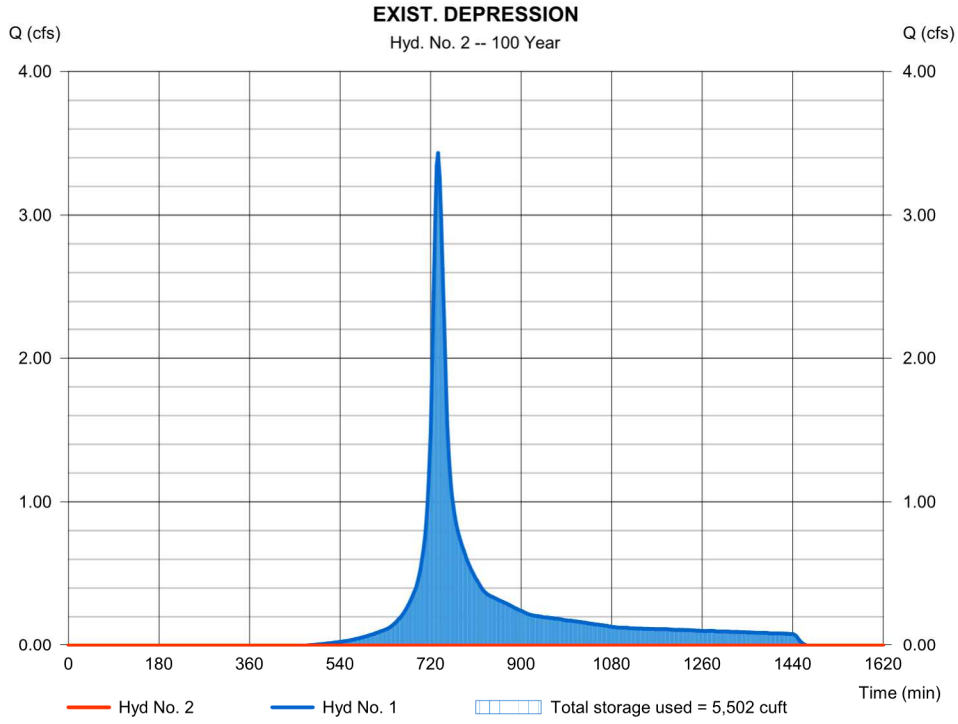
Hydrograph Report

Hyd. No. 2

EXIST. DEPRESSION

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 1080 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - EX - DA 1 DET.	Max. Elevation	= 87.07 ft
Reservoir name	= Exist. Depression	Max. Storage	= 5,502 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

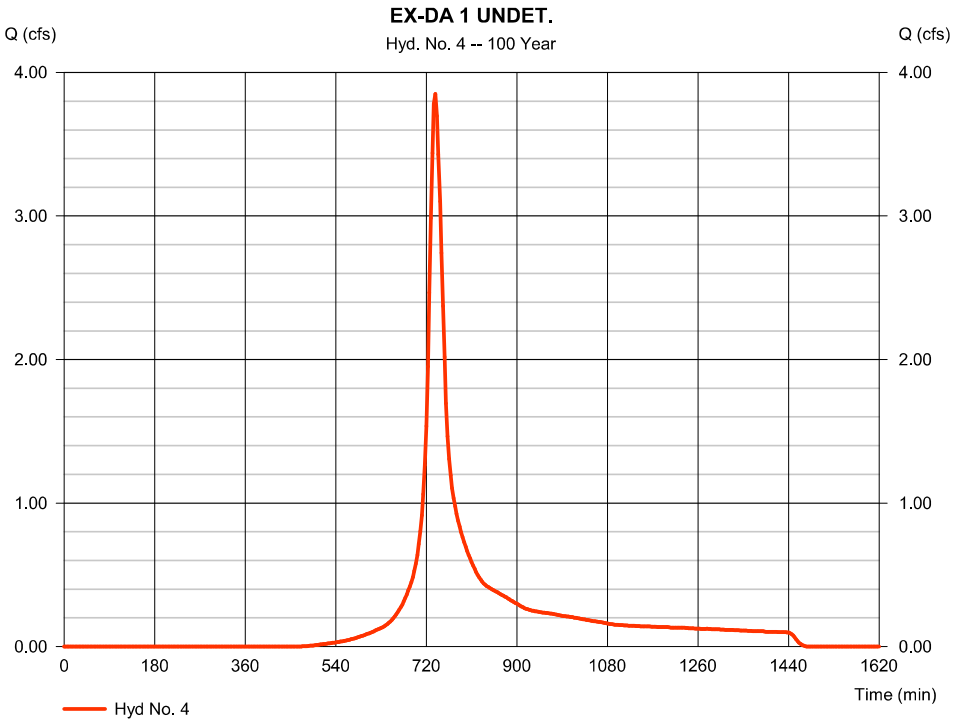


Hydrograph Report

Hyd. No. 4

EX-DA 1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 3.852 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 19,658 cuft
Drainage area	= 1.240 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

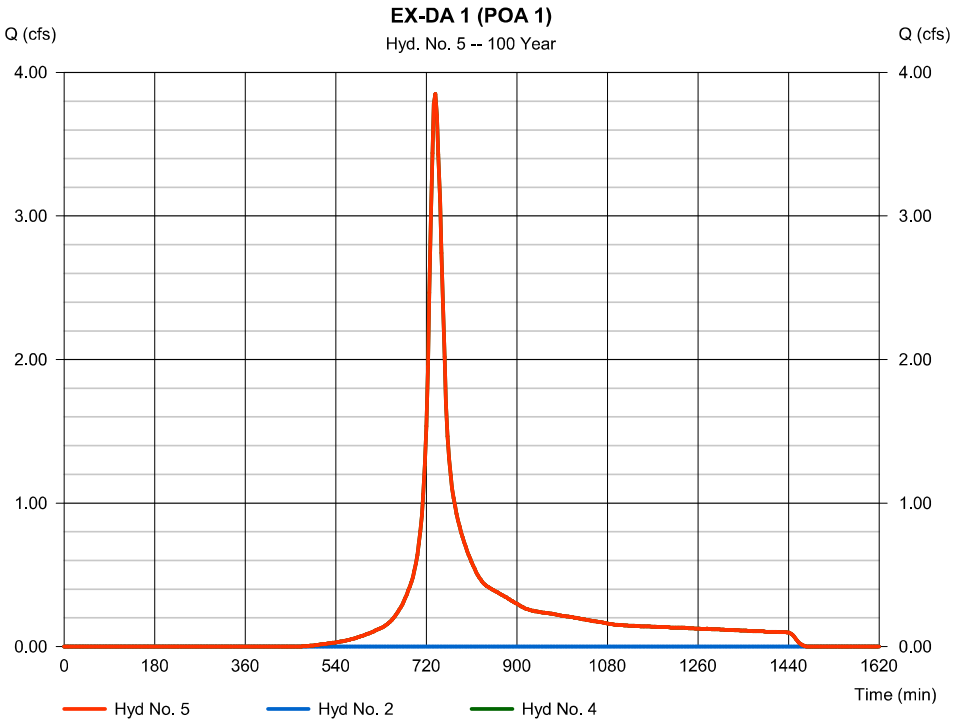


Hydrograph Report

Hyd. No. 5

EX-DA 1 (POA 1)

Hydrograph type	= Combine	Peak discharge	= 3.852 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 3 min	Hyd. volume	= 19,658 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.240 ac

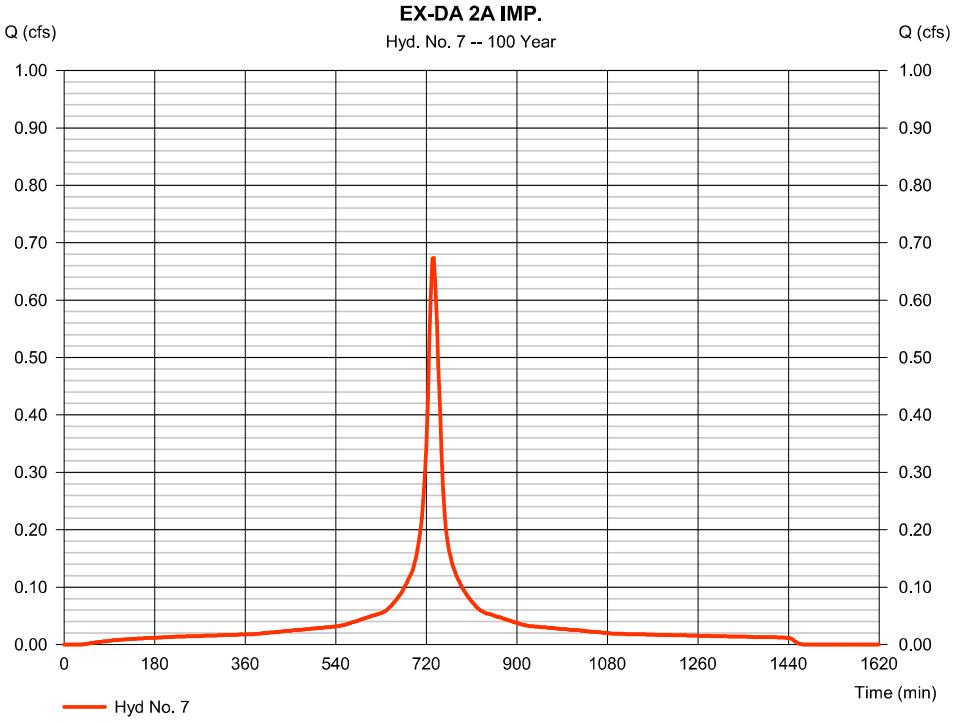


Hydrograph Report

Hyd. No. 7

EX-DA 2A IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.674 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 3,742 cuft
Drainage area	= 0.120 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

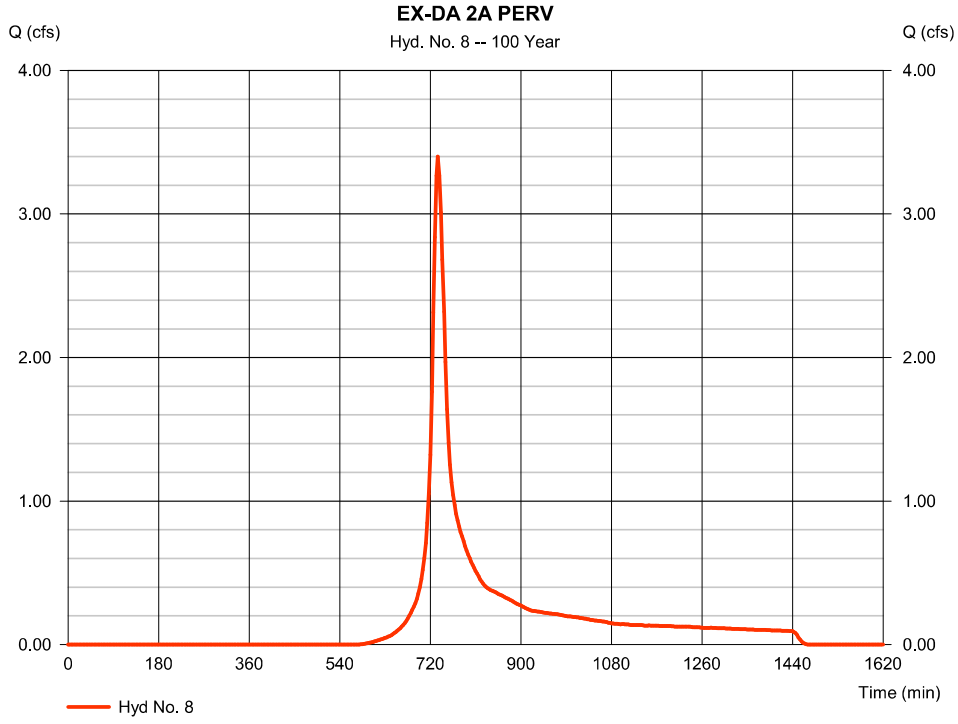


Hydrograph Report

Hyd. No. 8

EX-DA 2A PERV

Hydrograph type	= SCS Runoff	Peak discharge	= 3.399 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 16,358 cuft
Drainage area	= 1.280 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

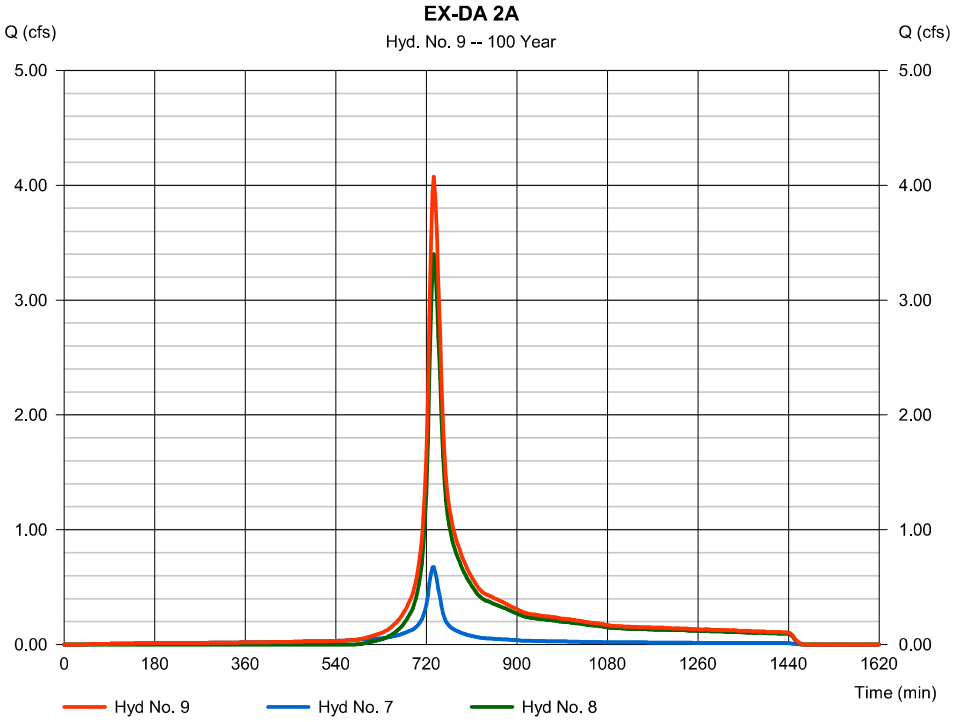


Hydrograph Report

Hyd. No. 9

EX-DA 2A

Hydrograph type	= Combine	Peak discharge	= 4.073 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 20,100 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 1.400 ac

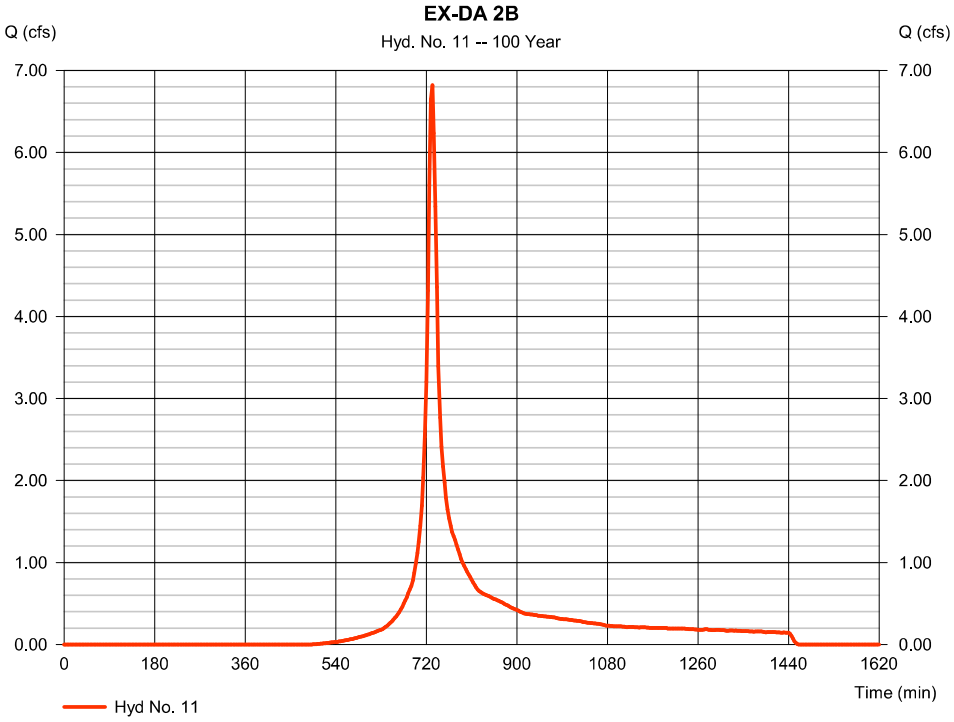


Hydrograph Report

Hyd. No. 11

EX-DA 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 6.819 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 28,479 cuft
Drainage area	= 1.850 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.80 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

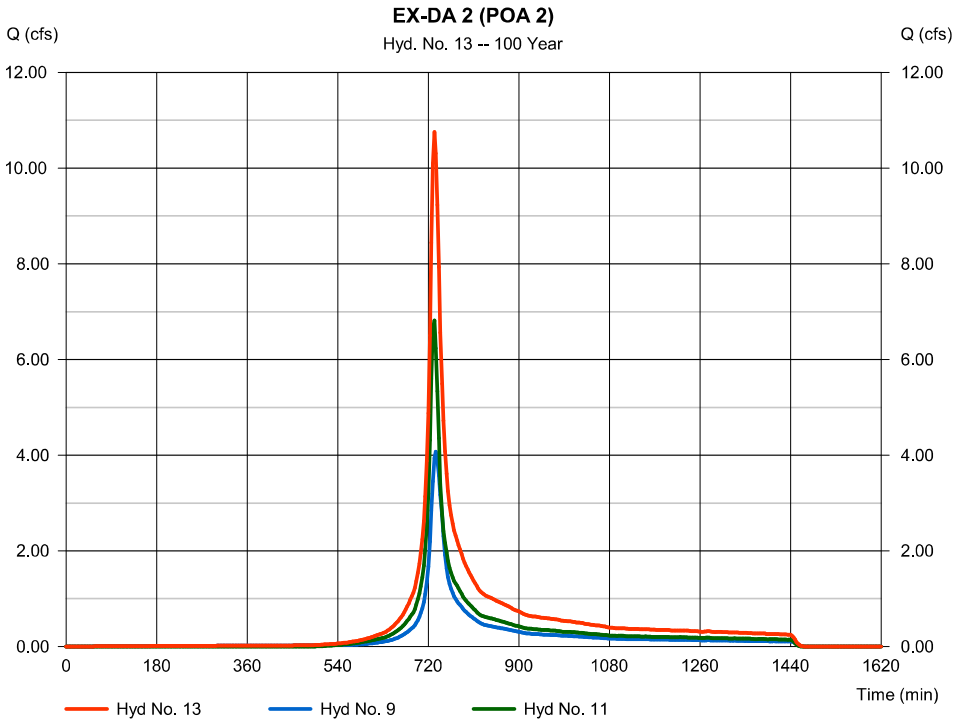


Hydrograph Report

Hyd. No. 13

EX-DA 2 (POA 2)

Hydrograph type	= Combine	Peak discharge	= 10.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 48,580 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.850 ac

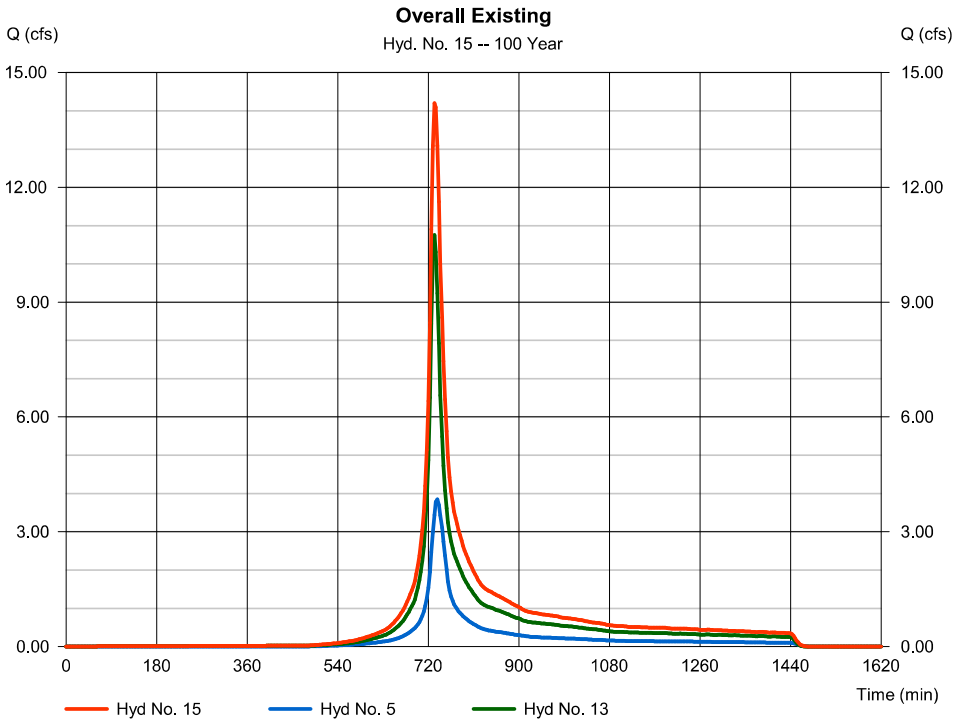


Hydrograph Report

Hyd. No. 15

Overall Existing

Hydrograph type	= Combine	Peak discharge	= 14.20 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 68,237 cuft
Inflow hyds.	= 5, 13	Contrib. drain. area	= 0.000 ac

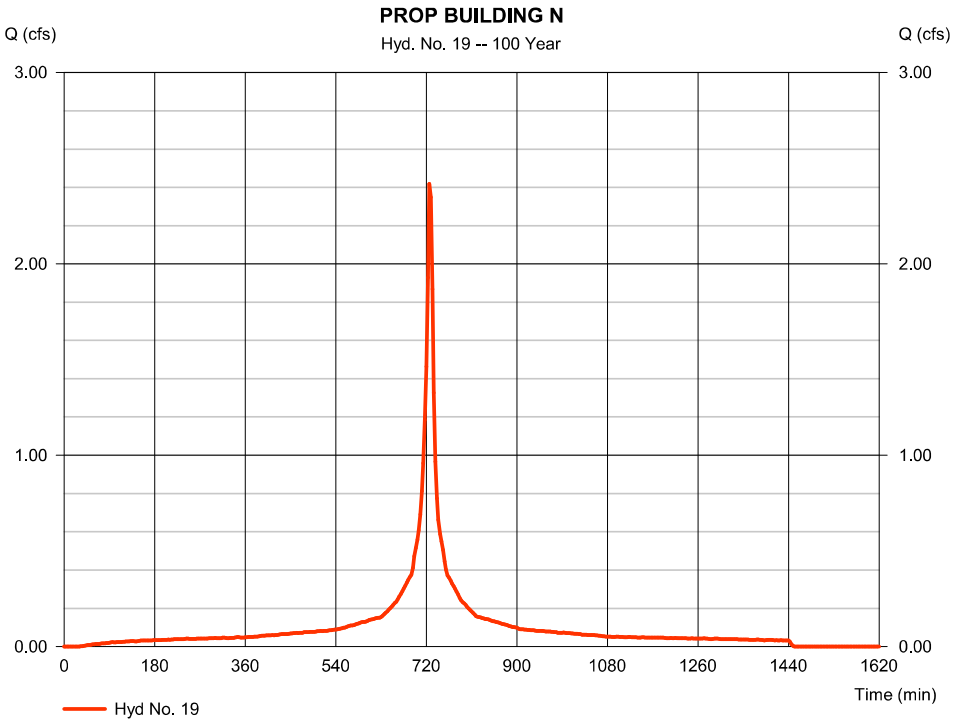


Hydrograph Report

Hyd. No. 19

PROP BUILDING N

Hydrograph type	= SCS Runoff	Peak discharge	= 2.419 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 10,205 cuft
Drainage area	= 0.360 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

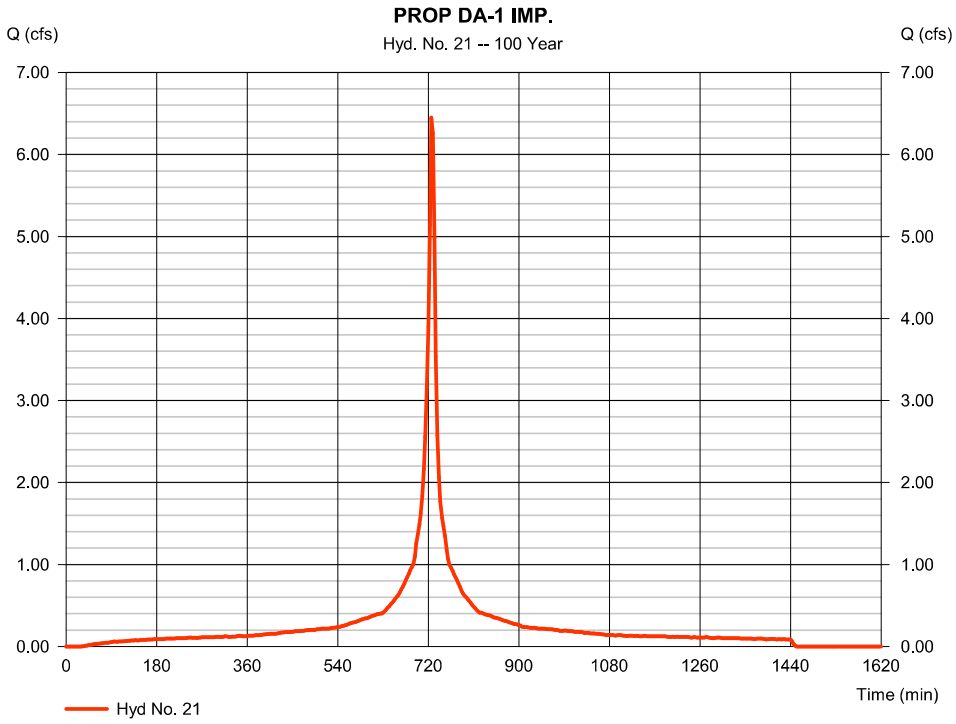


Hydrograph Report

Hyd. No. 21

PROP DA-1 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 6.450 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 27,214 cuft
Drainage area	= 0.960 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

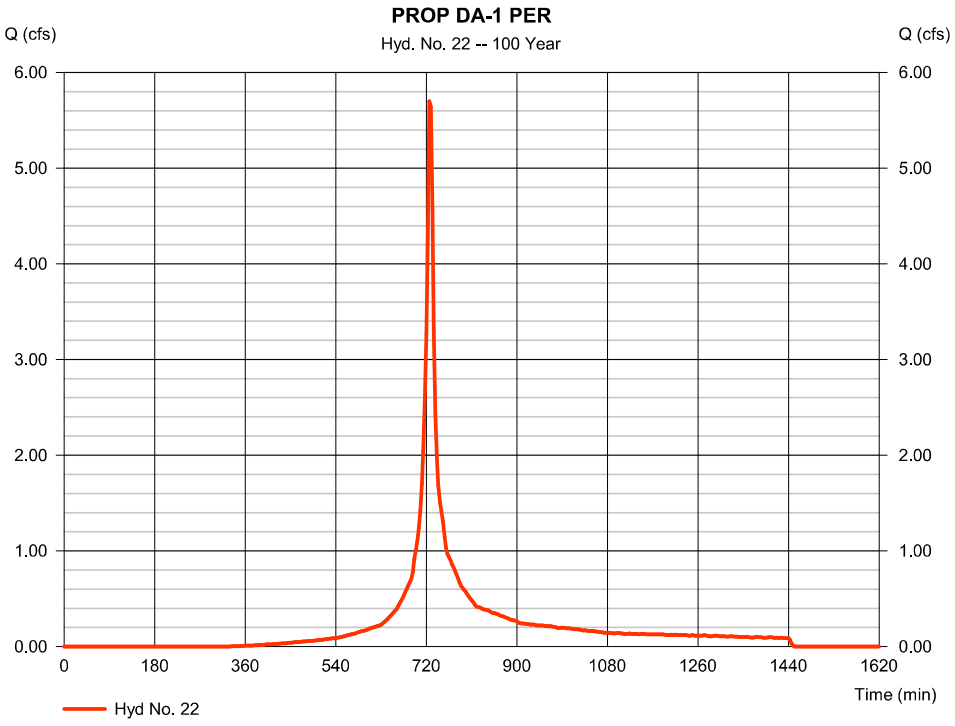


Hydrograph Report

Hyd. No. 22

PROP DA-1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 5.699 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 20,873 cuft
Drainage area	= 1.080 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

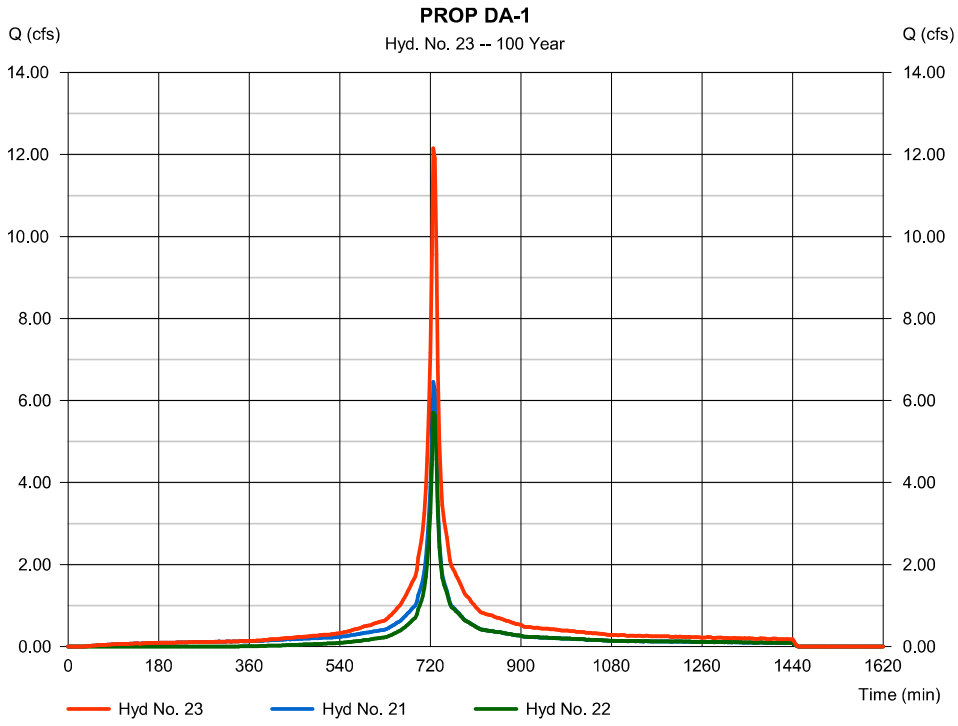


Hydrograph Report

Hyd. No. 23

PROP DA-1

Hydrograph type	= Combine	Peak discharge	= 12.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 48,087 cuft
Inflow hyds.	= 21, 22	Contrib. drain. area	= 2.040 ac

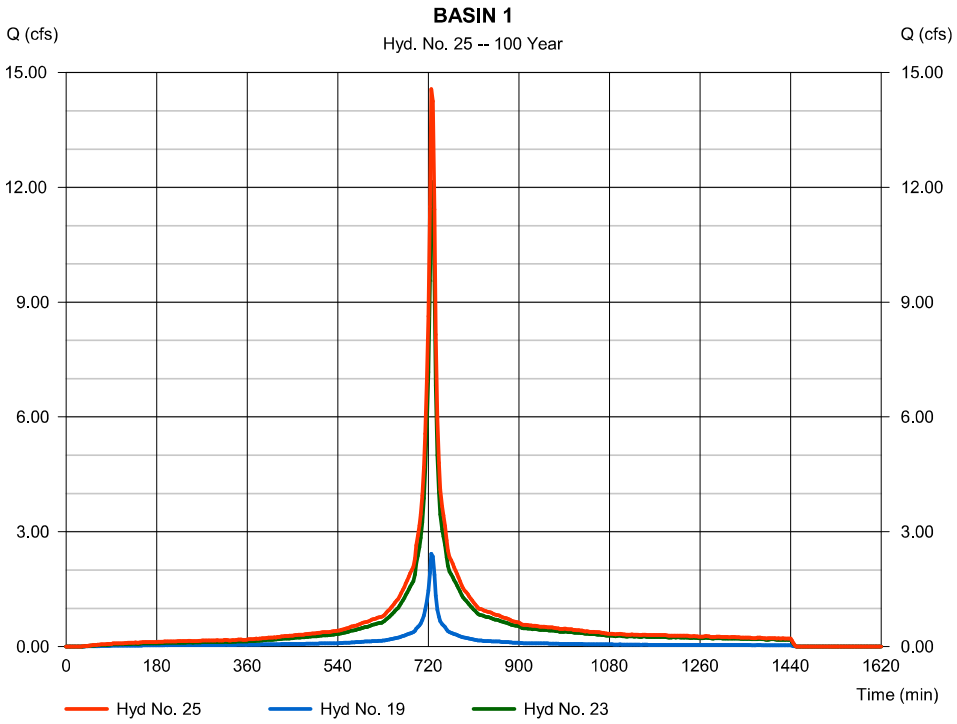


Hydrograph Report

Hyd. No. 25

BASIN 1

Hydrograph type	= Combine	Peak discharge	= 14.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 58,292 cuft
Inflow hyds.	= 19, 23	Contrib. drain. area	= 0.360 ac



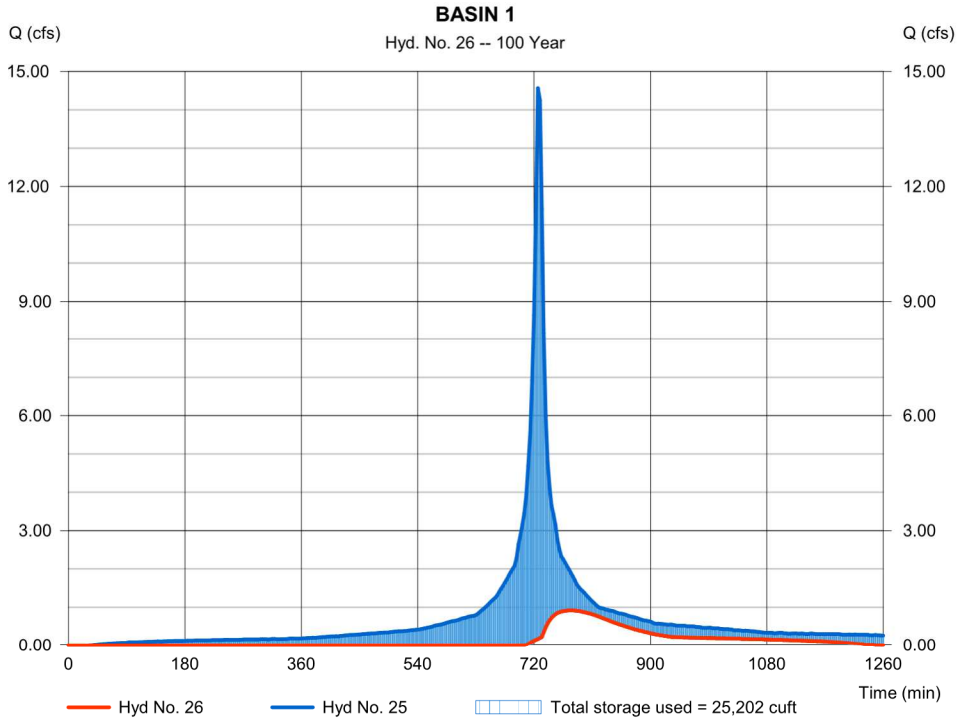
Hydrograph Report

Hyd. No. 26

BASIN 1

Hydrograph type	= Reservoir	Peak discharge	= 0.917 cfs
Storm frequency	= 100 yrs	Time to peak	= 777 min
Time interval	= 3 min	Hyd. volume	= 10,046 cuft
Inflow hyd. No.	= 25 - BASIN 1	Max. Elevation	= 87.40 ft
Reservoir name	= Pond 1	Max. Storage	= 25,202 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

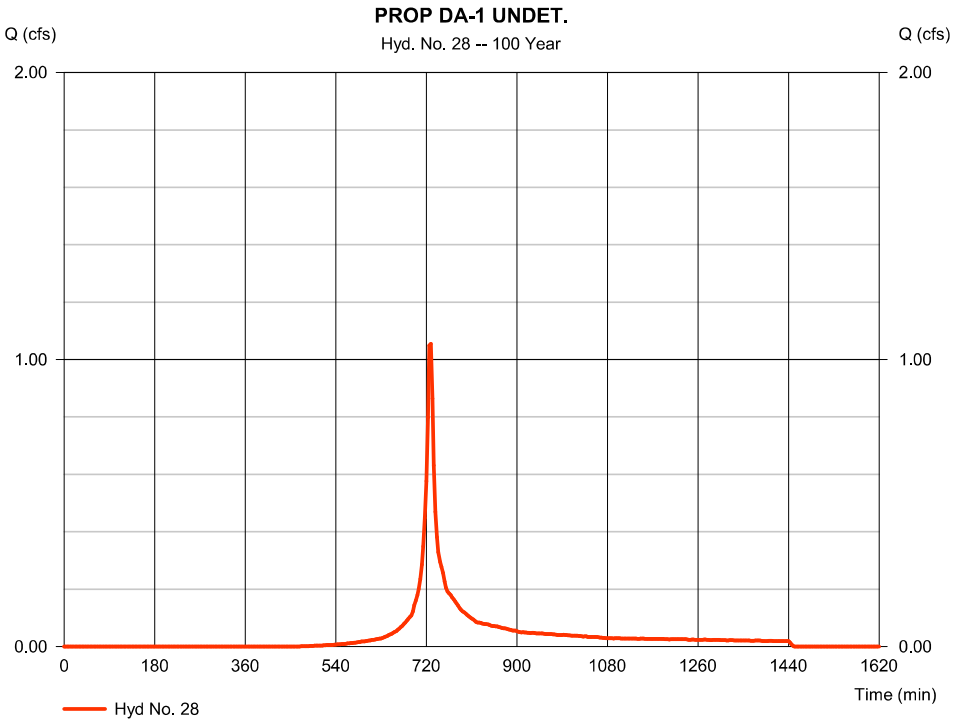


Hydrograph Report

Hyd. No. 28

PROP DA-1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 1.055 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 3,811 cuft
Drainage area	= 0.250 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

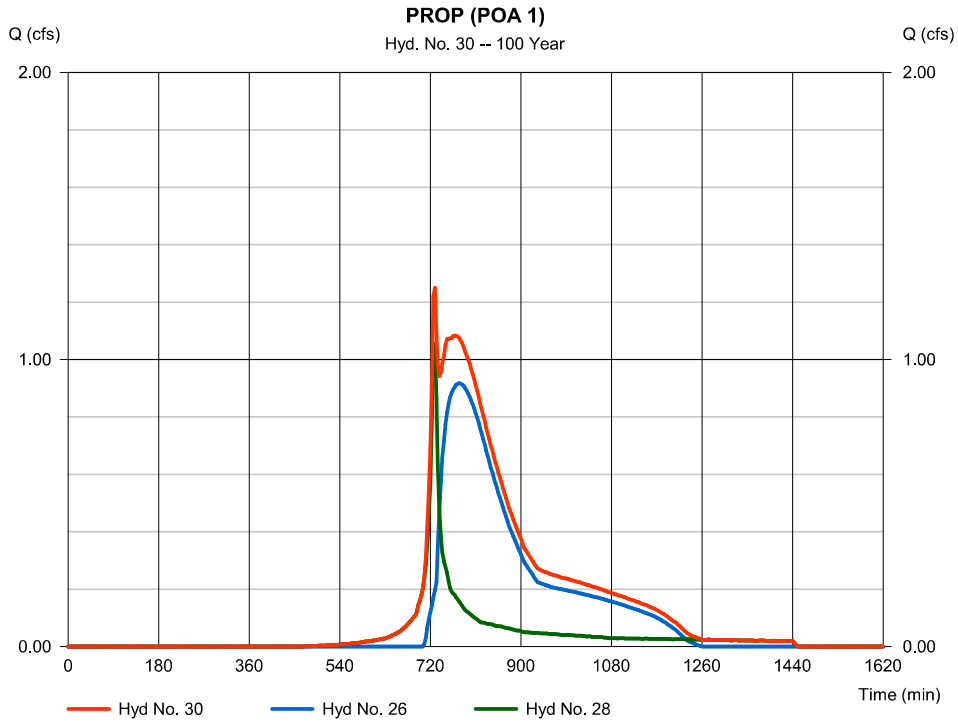


Hydrograph Report

Hyd. No. 30

PROP (POA 1)

Hydrograph type	= Combine	Peak discharge	= 1.250 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 3 min	Hyd. volume	= 13,856 cuft
Inflow hyds.	= 26, 28	Contrib. drain. area	= 0.250 ac

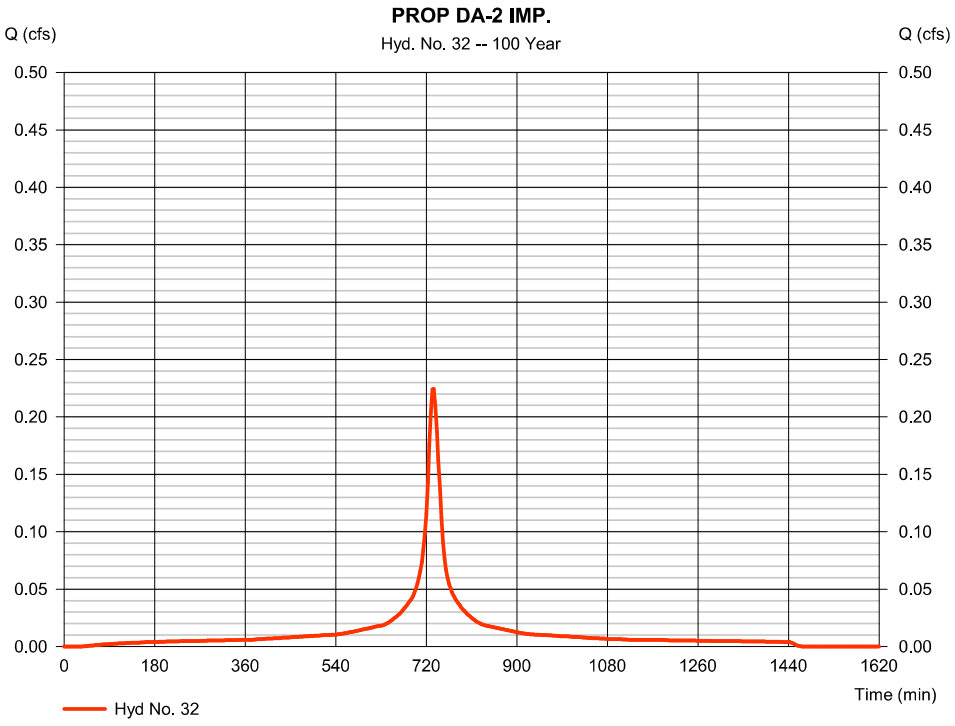


Hydrograph Report

Hyd. No. 32

PROP DA-2 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.225 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 1,247 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

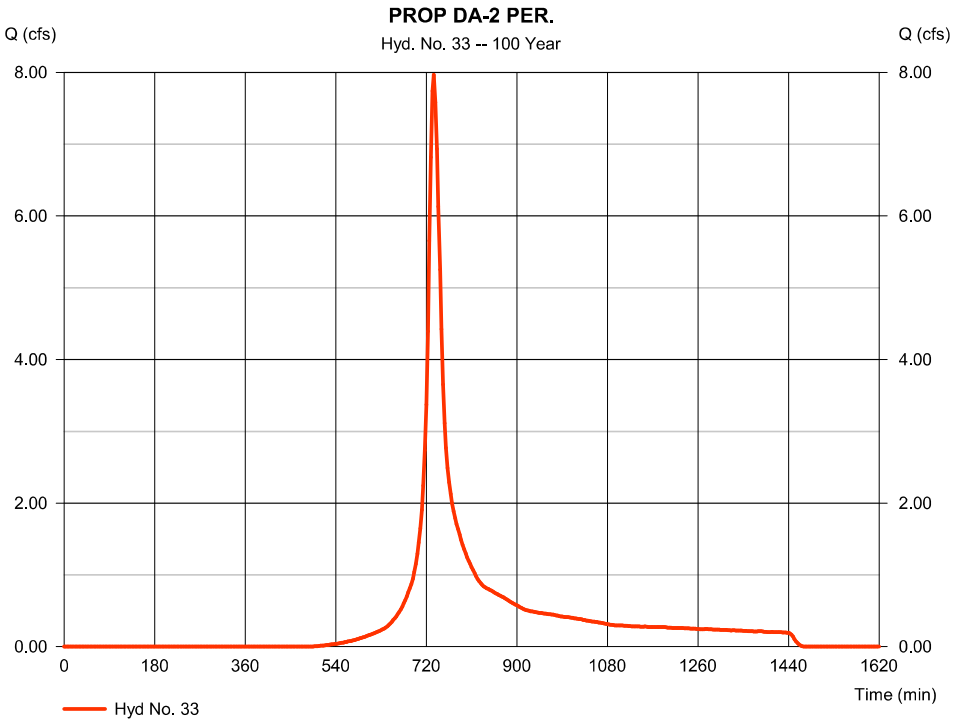


Hydrograph Report

Hyd. No. 33

PROP DA-2 PER.

Hydrograph type	= SCS Runoff	Peak discharge	= 7.968 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 37,783 cuft
Drainage area	= 2.380 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

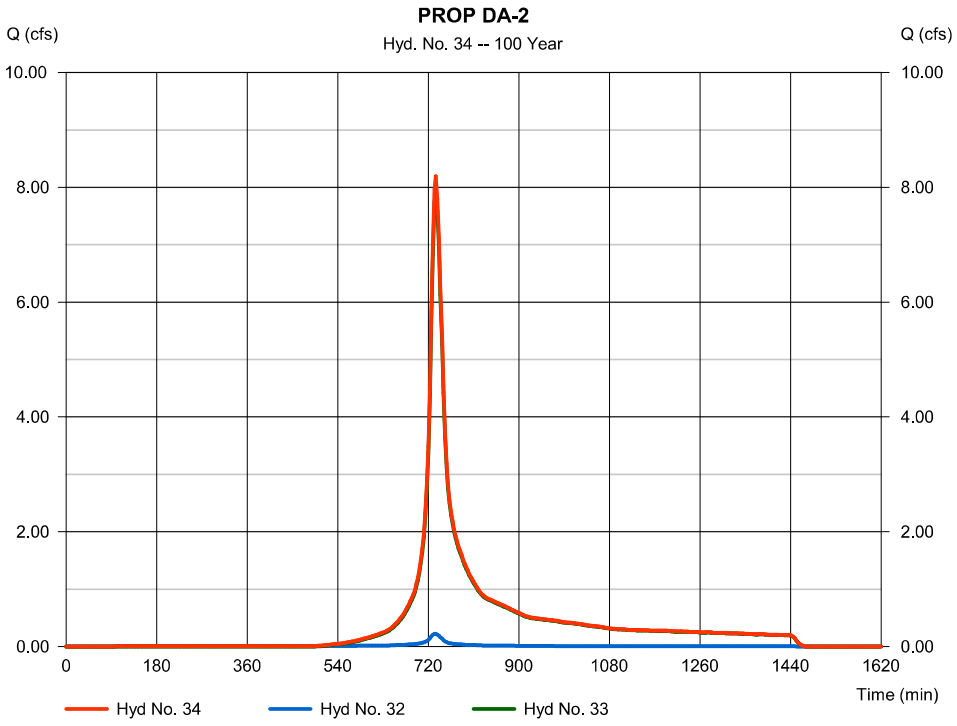


Hydrograph Report

Hyd. No. 34

PROP DA-2

Hydrograph type	= Combine	Peak discharge	= 8.192 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 39,031 cuft
Inflow hyds.	= 32, 33	Contrib. drain. area	= 2.420 ac

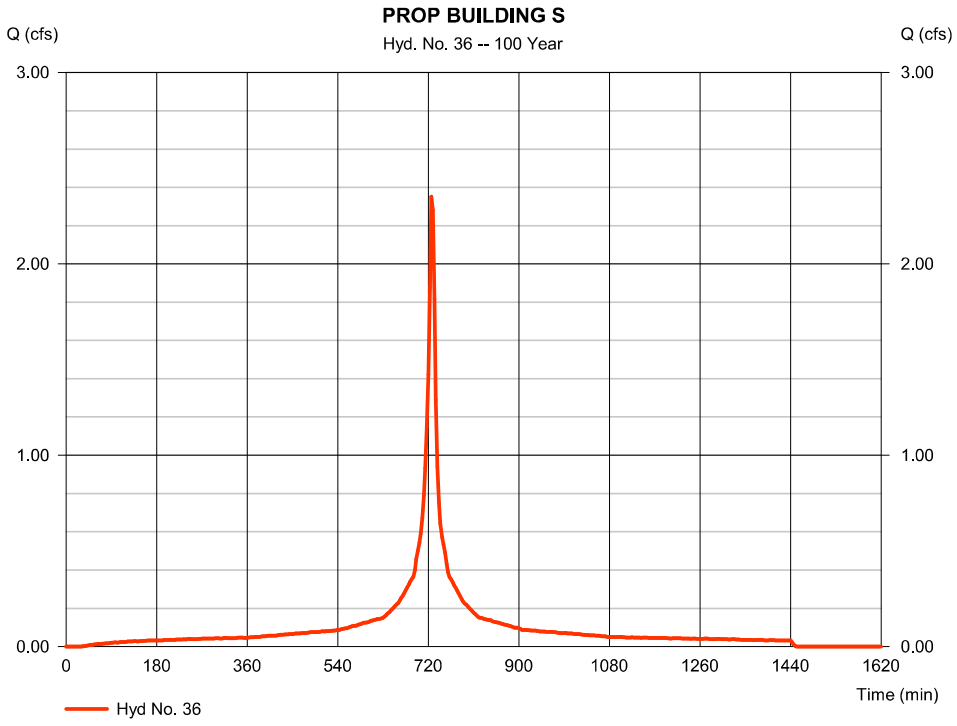


Hydrograph Report

Hyd. No. 36

PROP BUILDING S

Hydrograph type	= SCS Runoff	Peak discharge	= 2.351 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 9,922 cuft
Drainage area	= 0.350 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.57 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



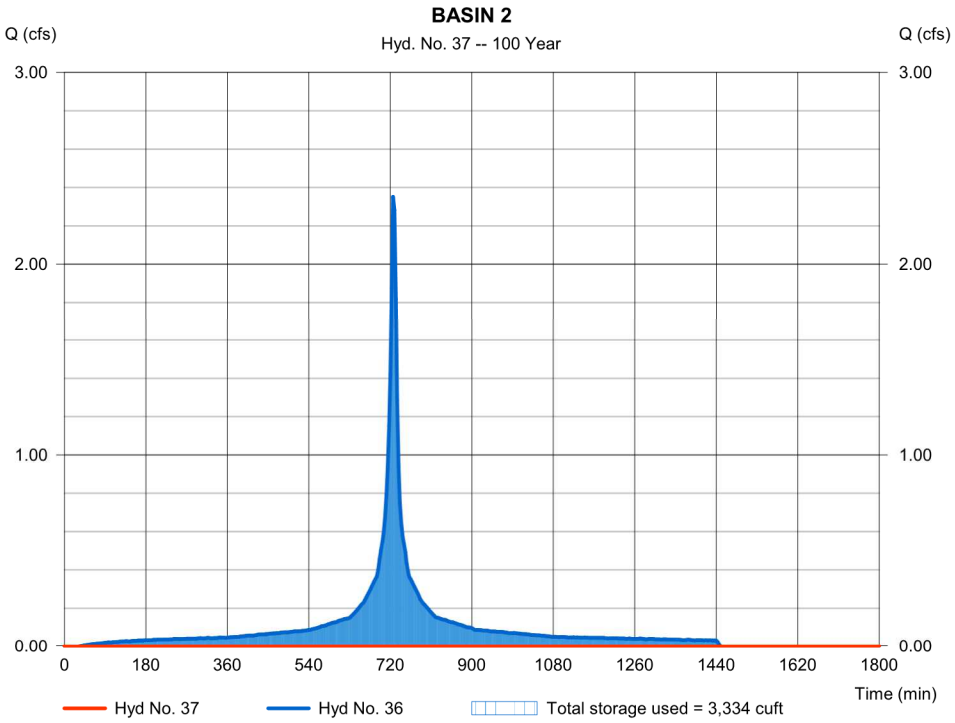
Hydrograph Report

Hyd. No. 37

BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 36 - PROP BUILDING S	Max. Elevation	= 89.14 ft
Reservoir name	= Pond 2	Max. Storage	= 3,334 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

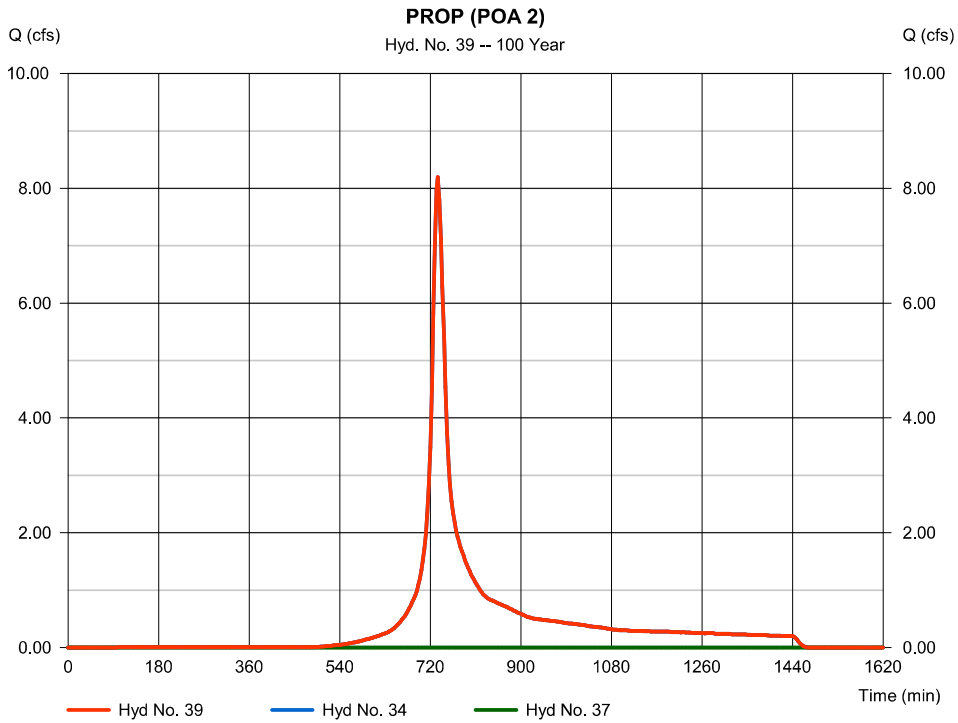


Hydrograph Report

Hyd. No. 39

PROP (POA 2)

Hydrograph type	= Combine	Peak discharge	= 8.192 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 39,031 cuft
Inflow hyds.	= 34, 37	Contrib. drain. area	= 0.000 ac

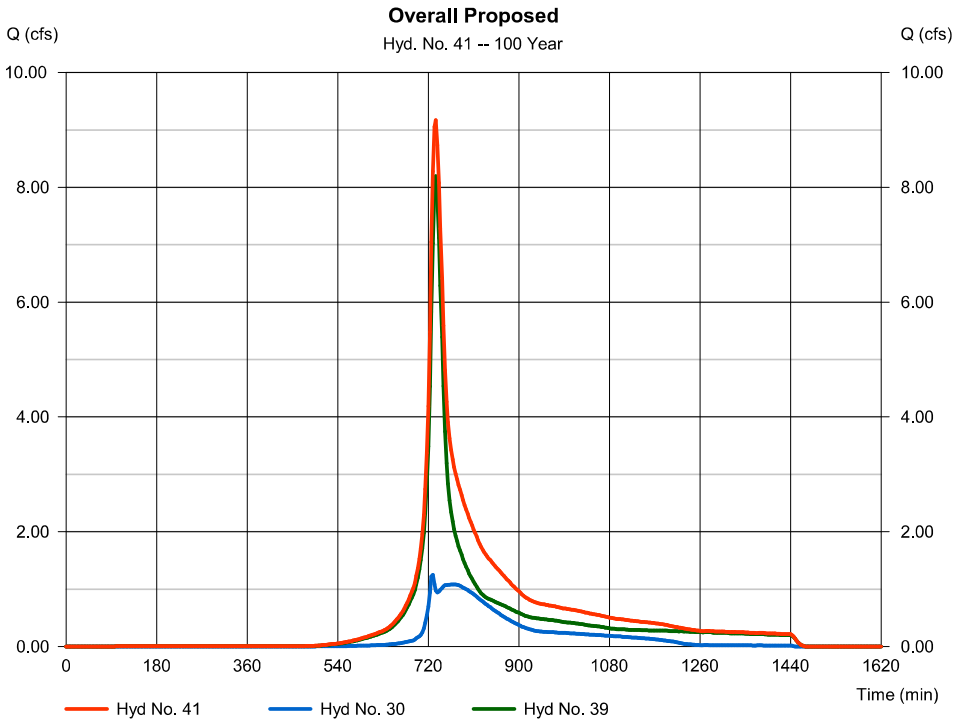


Hydrograph Report

Hyd. No. 41

Overall Proposed

Hydrograph type	= Combine	Peak discharge	= 9.170 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 52,887 cuft
Inflow hyds.	= 30, 39	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	20.4657	3.8000	0.7101	------
2	24.4188	3.9000	0.7130	------
3	0.0000	0.0000	0.0000	------
5	29.1858	3.6000	0.7038	------
10	34.7403	3.7000	0.7099	------
25	41.4212	3.7000	0.7099	------
50	47.0297	3.7000	0.7122	------
100	51.4499	3.6000	0.7089	------

File name: Old Tappan.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.37	3.17	2.55	2.16	1.88	1.68	1.52	1.40	1.29	1.21	1.13	1.07
2	5.14	3.74	3.00	2.54	2.22	1.98	1.79	1.65	1.52	1.42	1.34	1.26
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.42	4.65	3.73	3.15	2.76	2.46	2.23	2.05	1.90	1.77	1.66	1.57
10	7.48	5.42	4.34	3.67	3.21	2.86	2.59	2.38	2.20	2.05	1.93	1.82
25	8.92	6.46	5.18	4.38	3.82	3.41	3.09	2.84	2.63	2.45	2.30	2.17
50	10.07	7.29	5.84	4.93	4.31	3.84	3.48	3.19	2.95	2.76	2.59	2.44
100	11.19	8.09	6.48	5.47	4.78	4.26	3.86	3.54	3.28	3.06	2.87	2.71

Tc = time in minutes. Values may exceed 60.

PROJECTS\1423 Capitol Seniors Housing\99-006 Old Tappan\Design\Drainage\2021-04 Drainage\IDF\Old Tappan.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.47	0.00	0.00	5.44	6.67	0.00	8.57
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.47	0.00	0.00	5.44	6.67	0.00	8.57

HYDROGRAPH SUMMARY REPORTS –WATER QUALITY DESIGN STORM

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

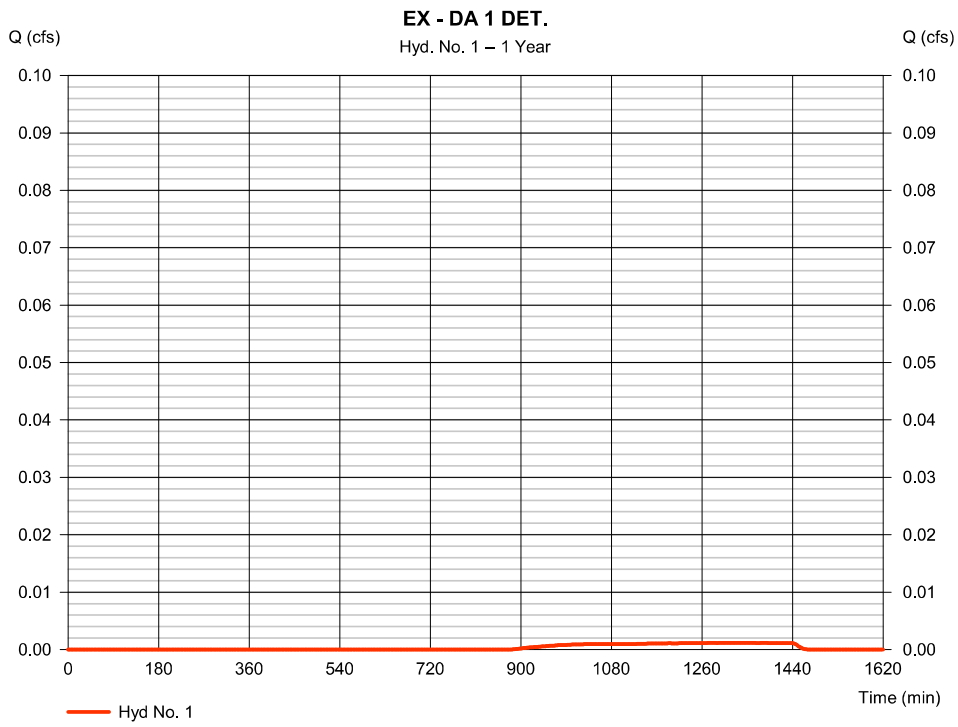
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.001	3	1278	33	-----	-----	-----	EX - DA 1 DET.
2	Reservoir	0.000	3	954	0	1	85.50	1.58	EXIST. DEPRESSION
4	SCS Runoff	0.001	3	1335	39	-----	-----	-----	EX-DA 1 UNDET.
5	Combine	0.001	3	1335	39	2, 4	-----	-----	EX-DA 1 (POA 1)
7	SCS Runoff	0.092	3	735	465	-----	-----	-----	EX-DA 2A IMP.
8	SCS Runoff	0.000	3	n/a	0	-----	-----	-----	EX-DA 2A PERV
9	Combine	0.092	3	735	465	7, 8	-----	-----	EX-DA 2A
11	SCS Runoff	0.001	3	1431	18	-----	-----	-----	EX-DA 2B
13	Combine	0.092	3	735	483	9, 11,	-----	-----	EX-DA 2 (POA 2)
15	Combine	0.092	3	735	522	5, 13,	-----	-----	Overall Existing
19	SCS Runoff	0.330	3	726	1,267	-----	-----	-----	PROP BUILDING N
21	SCS Runoff	0.879	3	726	3,380	-----	-----	-----	PROP DA-1 IMP.
22	SCS Runoff	0.037	3	735	371	-----	-----	-----	PROP DA-1 PER
23	Combine	0.887	3	726	3,751	21, 22	-----	-----	PROP DA-1
25	Combine	1.217	3	726	5,018	19, 23,	-----	-----	BASIN 1
26	Reservoir	0.000	3	741	0	25	84.71	1,626	BASIN 1
28	SCS Runoff	0.000	3	1272	8	-----	-----	-----	PROP DA-1 UNDET.
30	Combine	0.000	3	1272	8	26, 28,	-----	-----	PROP (POA 1)
32	SCS Runoff	0.031	3	735	155	-----	-----	-----	PROP DA-2 IMP.
33	SCS Runoff	0.001	3	1440	24	-----	-----	-----	PROP DA-2 PER.
34	Combine	0.031	3	735	179	32, 33	-----	-----	PROP DA-2
36	SCS Runoff	0.320	3	726	1,232	-----	-----	-----	PROP BUILDING S
37	Reservoir	0.000	3	792	0	36	88.59	425	BASIN 2
39	Combine	0.031	3	735	179	34, 37,	-----	-----	PROP (POA 2)
41	Combine	0.031	3	735	187	30, 39,	-----	-----	Overall Proposed

Hydrograph Report

Hyd. No. 1

EX - DA 1 DET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1278 min
Time interval	= 3 min	Hyd. volume	= 33 cuft
Drainage area	= 0.970 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 16.60 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484



Hydrograph Report

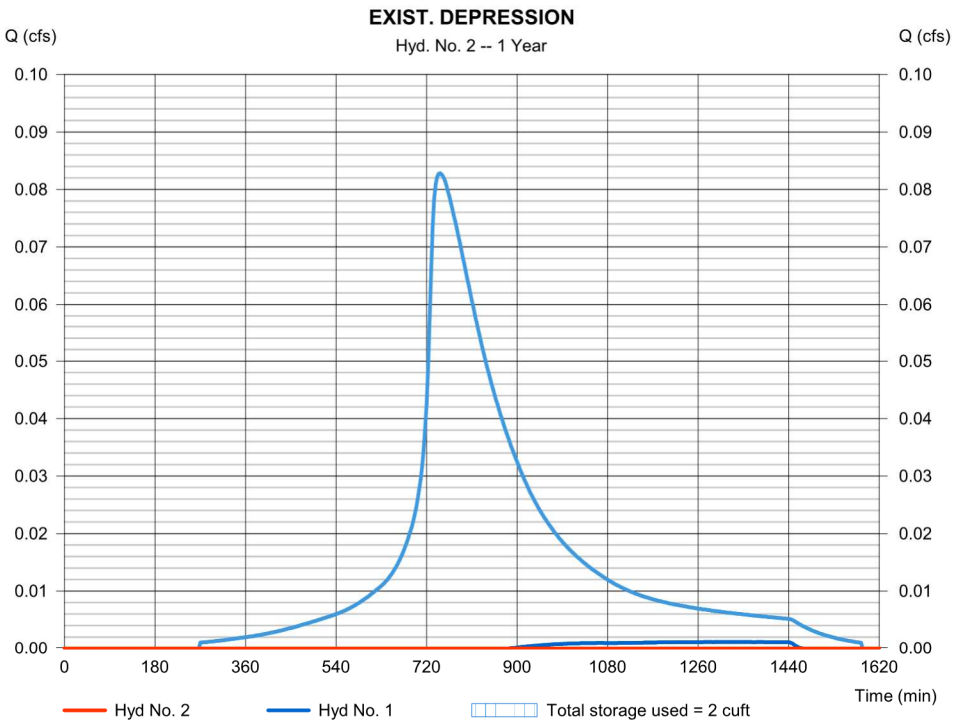
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Hyd. No. 2

EXIST. DEPRESSION

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 954 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - EX - DA 1 DET.	Max. Elevation	= 85.50 ft
Reservoir name	= Exist. Depression	Max. Storage	= 2 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Pond No. 1 - Exist. Depression

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 85.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	85.50	00	0	0
0.50	86.00	3,218	536	536
1.50	87.00	5,730	4,414	4,950
2.50	88.00	9,392	7,485	12,435

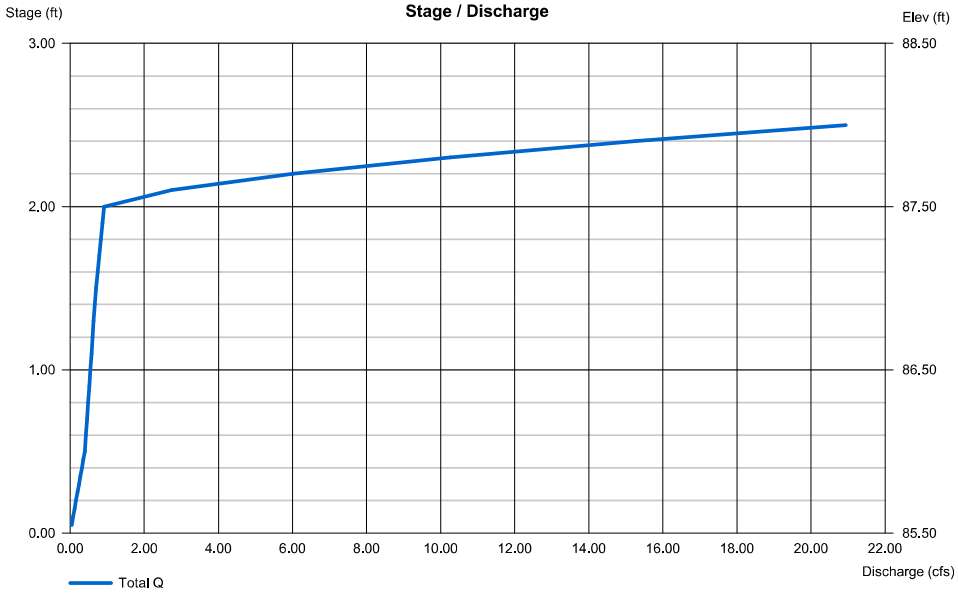
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.00
Span (in)	= 80.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 87.50	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 3.50	0.00	0.00	n/a
N-Value	= .030	.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)	= 87.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 5.250 (by Contour)			
TW Elev. (ft)	= 0.00			

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

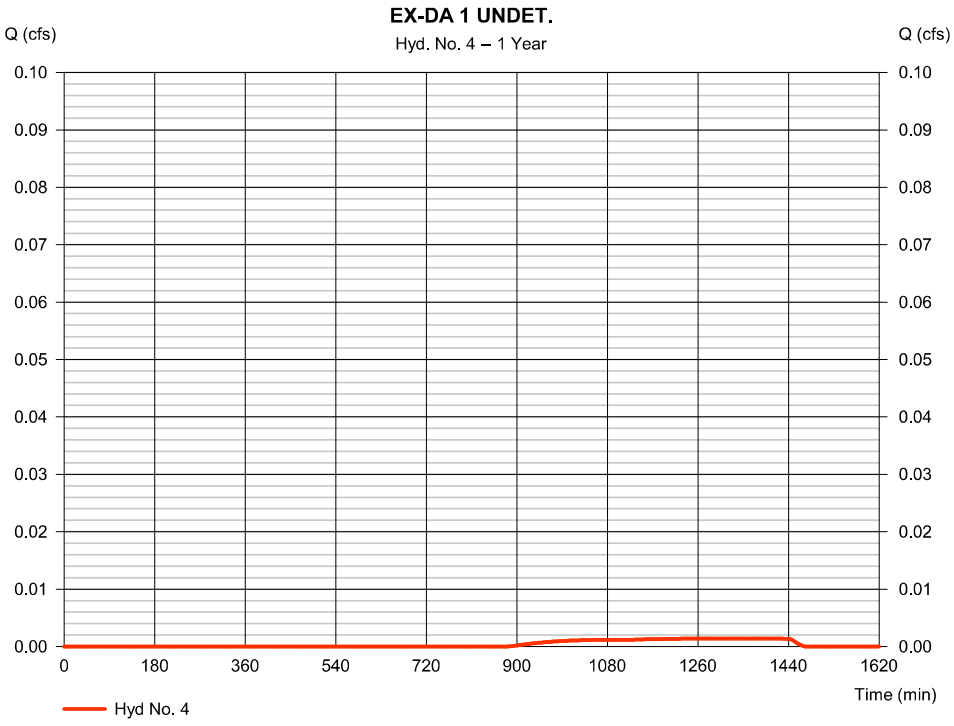


Hydrograph Report

Hyd. No. 4

EX-DA 1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1335 min
Time interval	= 3 min	Hyd. volume	= 39 cuft
Drainage area	= 1.240 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

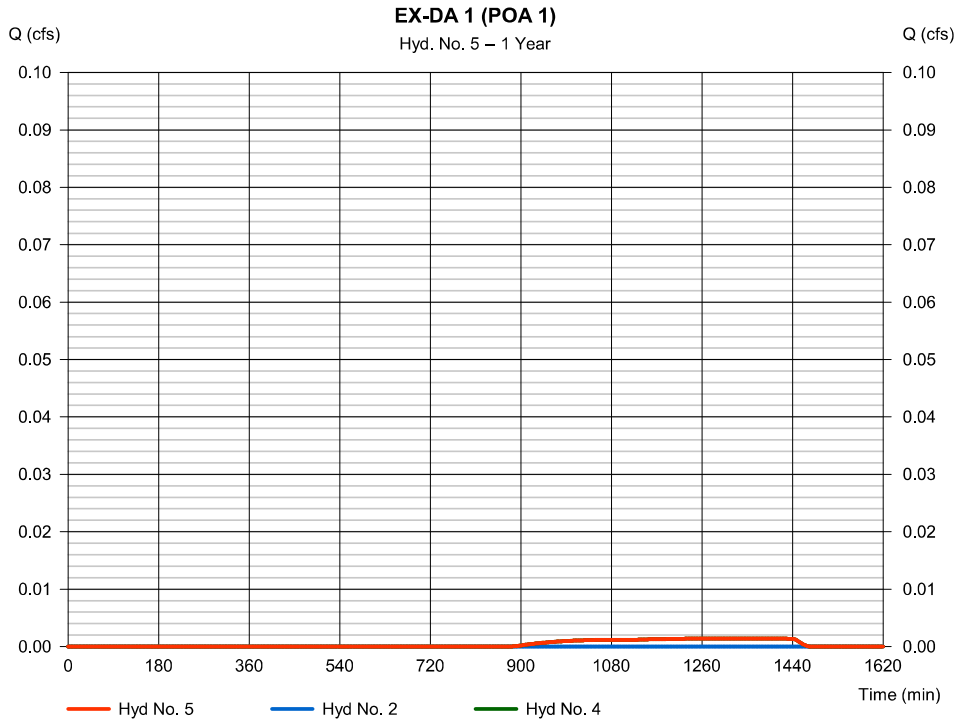


Hydrograph Report

Hyd. No. 5

EX-DA 1 (POA 1)

Hydrograph type	= Combine	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1335 min
Time interval	= 3 min	Hyd. volume	= 39 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.240 ac

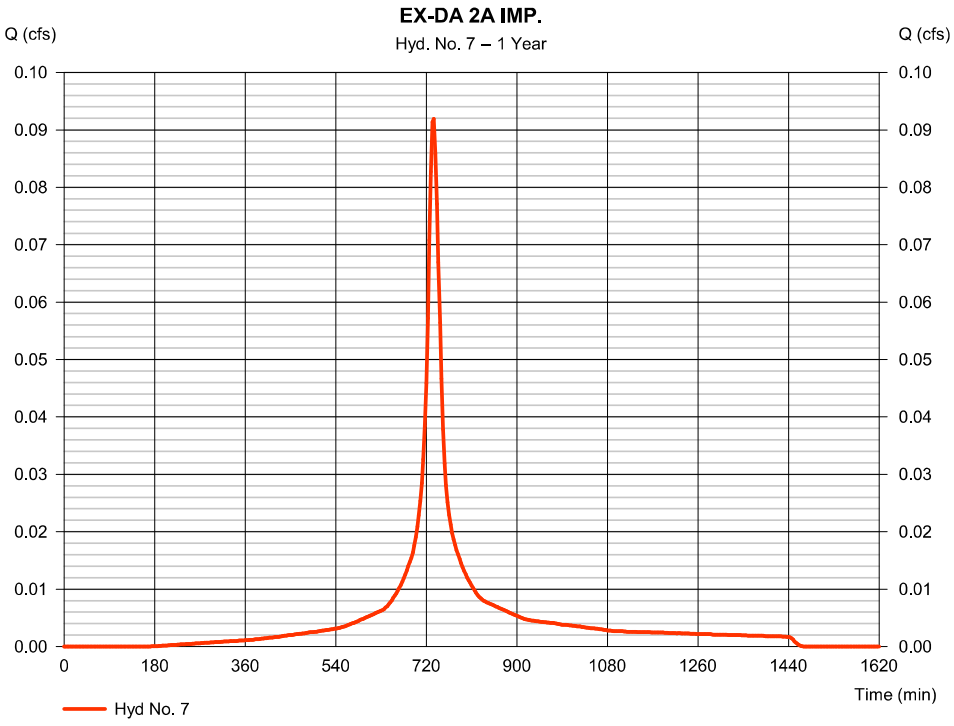


Hydrograph Report

Hyd. No. 7

EX-DA 2A IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.092 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 465 cuft
Drainage area	= 0.120 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

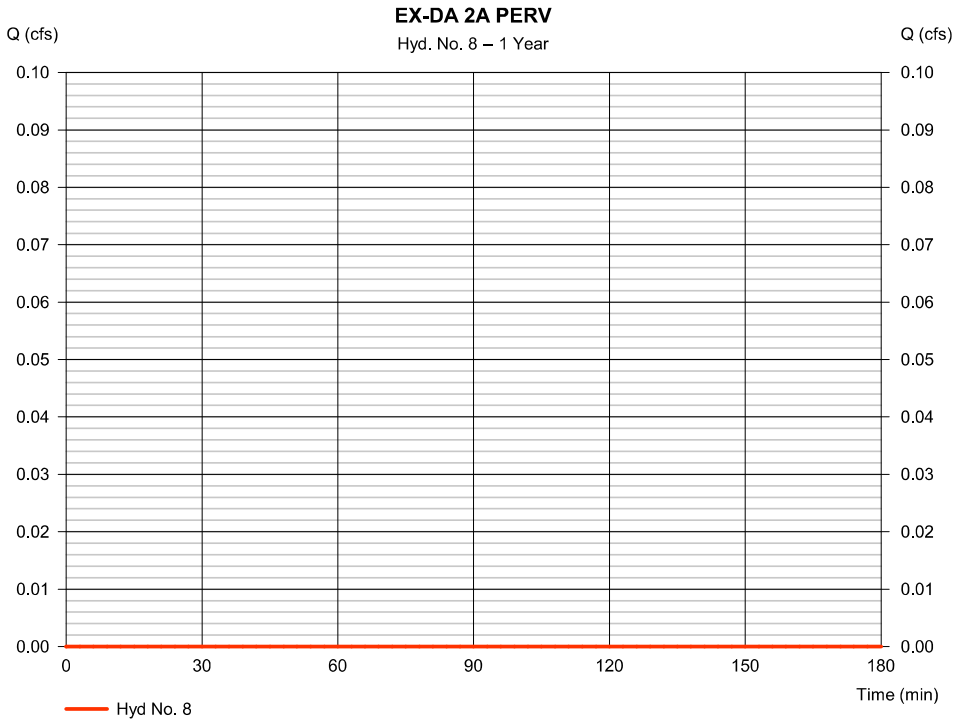


Hydrograph Report

Hyd. No. 8

EX-DA 2A PERV

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 3 min	Hyd. volume	= 0 cuft
Drainage area	= 1.280 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

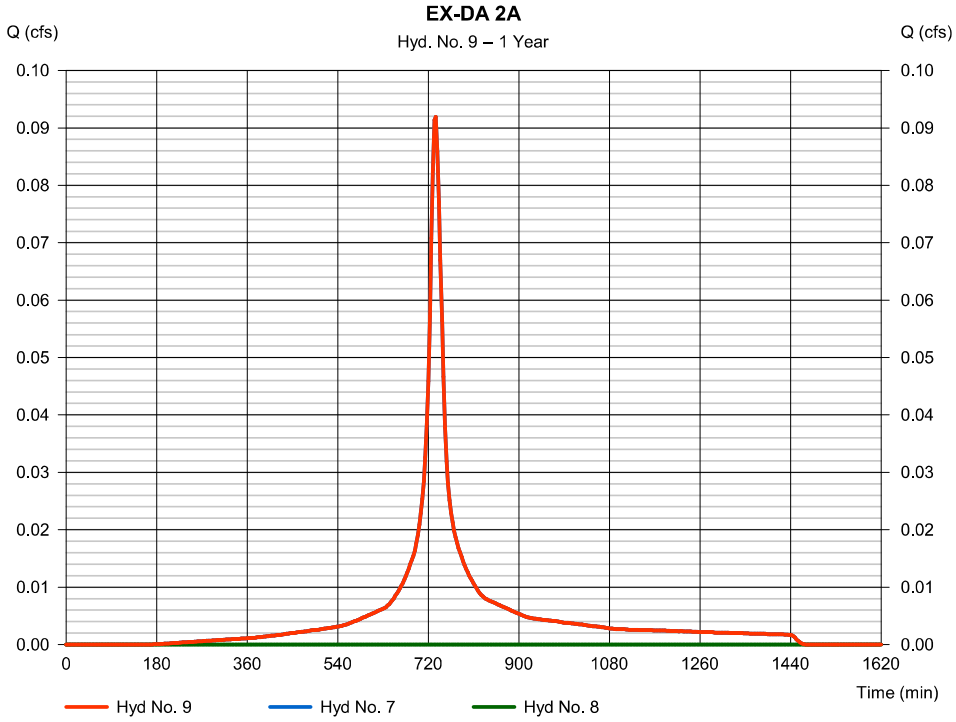


Hydrograph Report

Hyd. No. 9

EX-DA 2A

Hydrograph type	= Combine	Peak discharge	= 0.092 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 465 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 1.400 ac

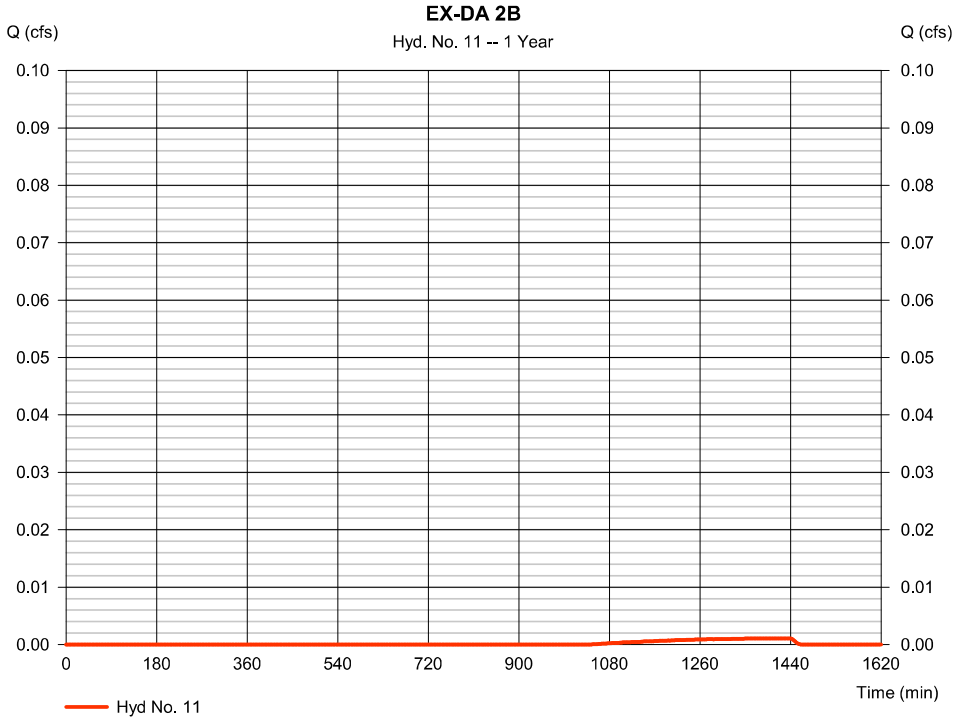


Hydrograph Report

Hyd. No. 11

EX-DA 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1431 min
Time interval	= 3 min	Hyd. volume	= 18 cuft
Drainage area	= 1.850 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.80 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

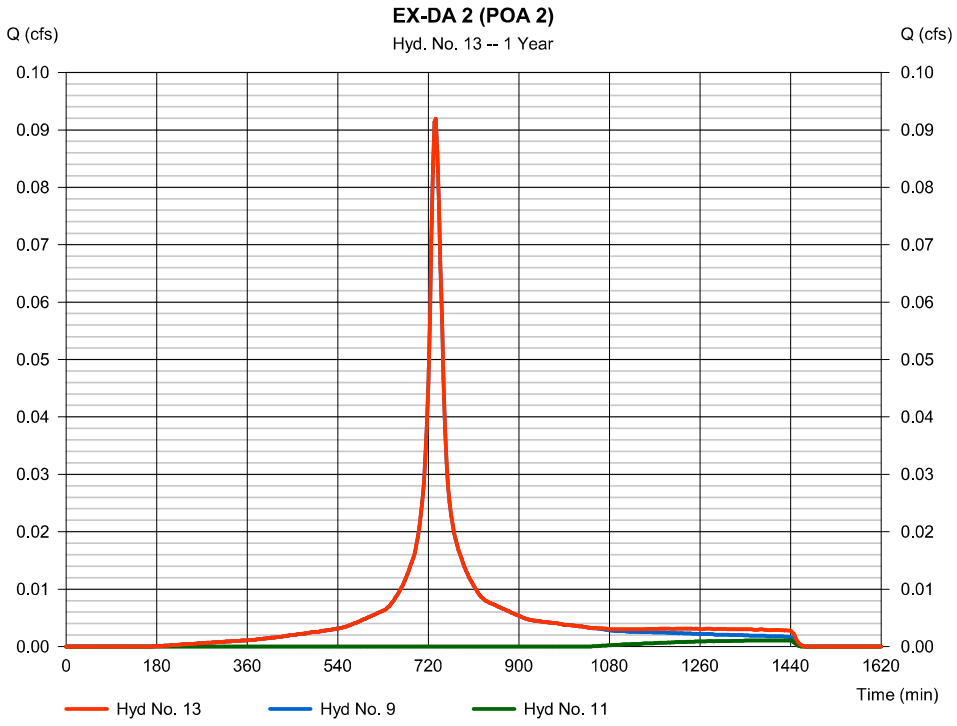


Hydrograph Report

Hyd. No. 13

EX-DA 2 (POA 2)

Hydrograph type	= Combine	Peak discharge	= 0.092 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 483 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.850 ac

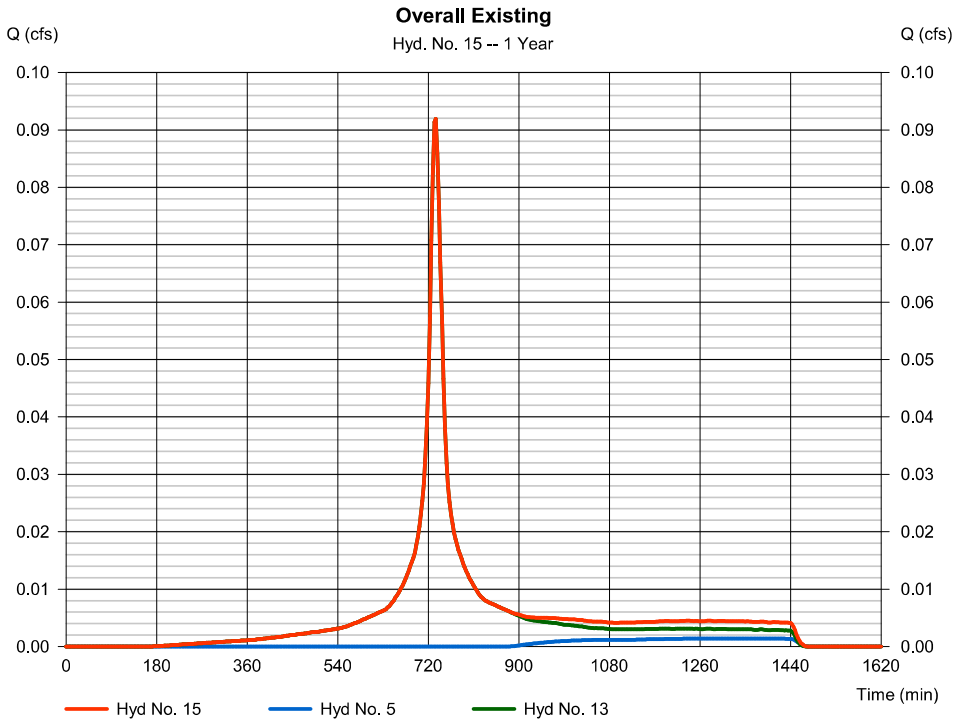


Hydrograph Report

Hyd. No. 15

Overall Existing

Hydrograph type	= Combine	Peak discharge	= 0.092 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 522 cuft
Inflow hyds.	= 5, 13	Contrib. drain. area	= 0.000 ac

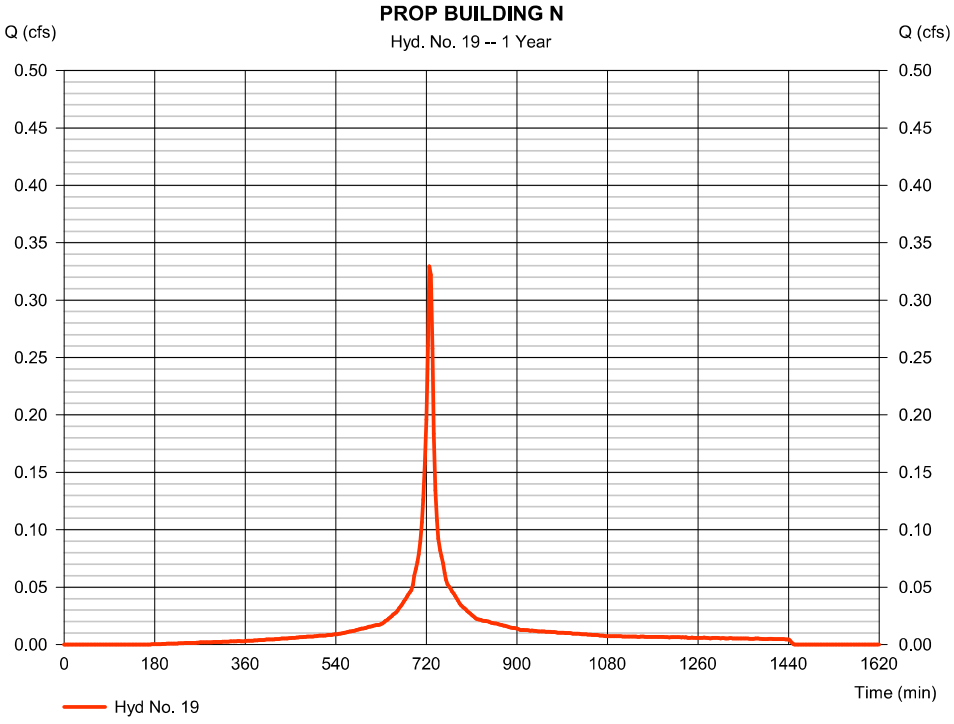


Hydrograph Report

Hyd. No. 19

PROP BUILDING N

Hydrograph type	= SCS Runoff	Peak discharge	= 0.330 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 1,267 cuft
Drainage area	= 0.360 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	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

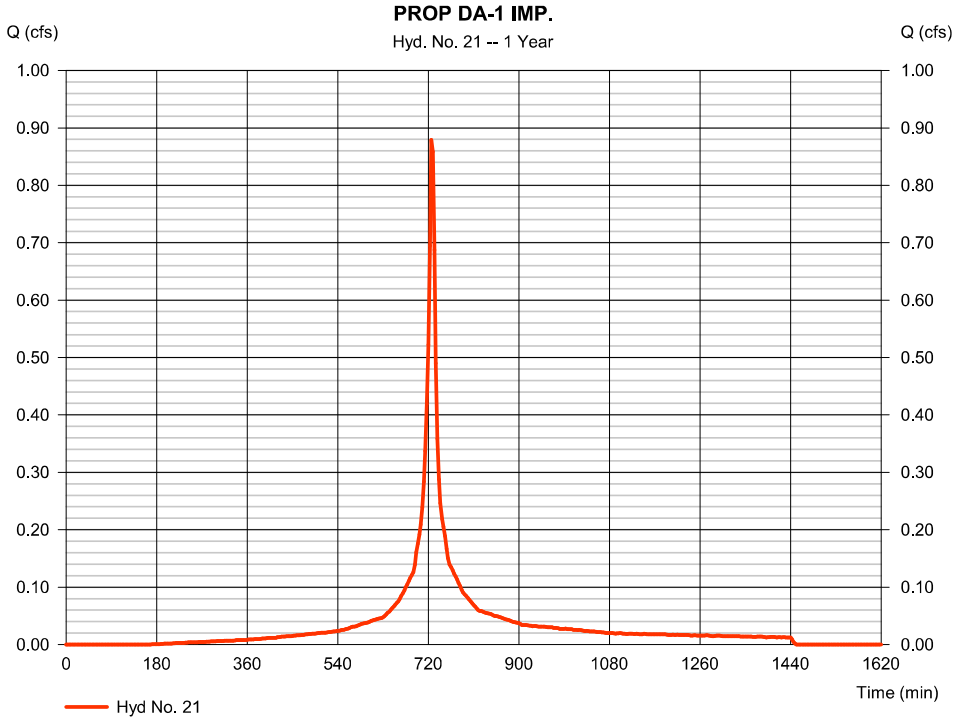


Hydrograph Report

Hyd. No. 21

PROP DA-1 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.879 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 3,380 cuft
Drainage area	= 0.960 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	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

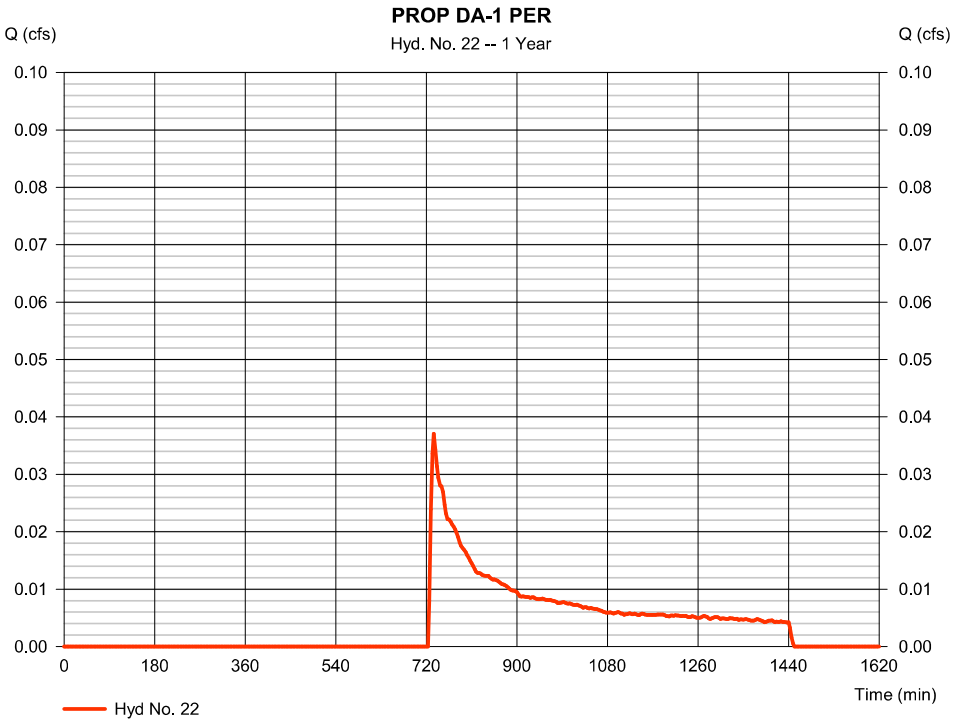


Hydrograph Report

Hyd. No. 22

PROP DA-1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.037 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 371 cuft
Drainage area	= 1.080 ac	Curve number	= 76
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	= P:\Engineering Reference Materials\General Engineering References\Stormwater Shapefiles	Shape factor	= 484

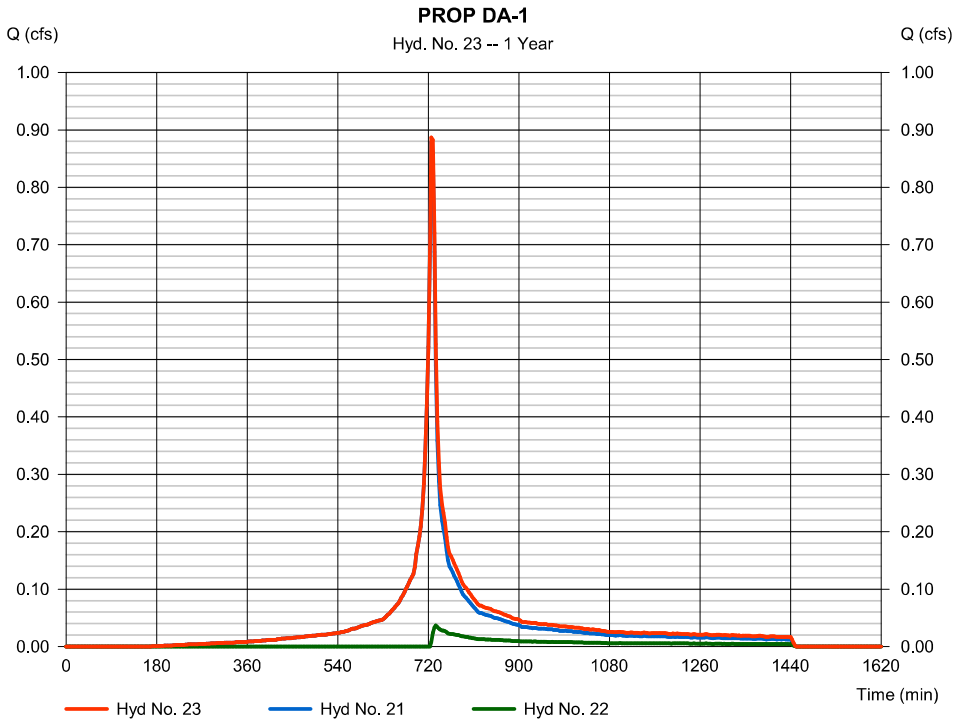


Hydrograph Report

Hyd. No. 23

PROP DA-1

Hydrograph type	= Combine	Peak discharge	= 0.887 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 3,751 cuft
Inflow hyds.	= 21, 22	Contrib. drain. area	= 2.040 ac

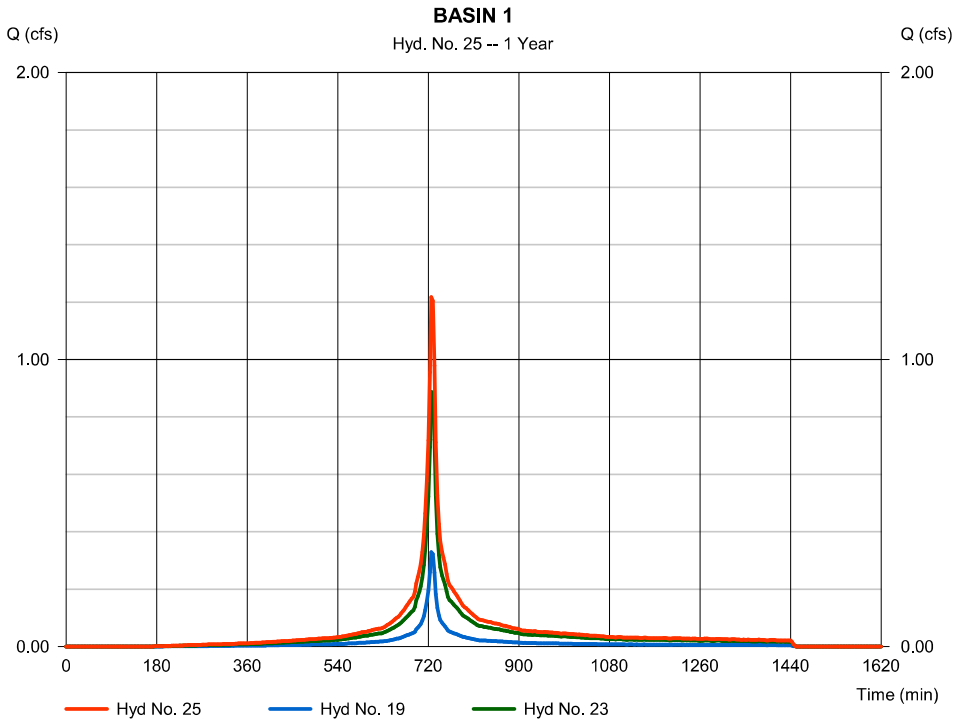


Hydrograph Report

Hyd. No. 25

BASIN 1

Hydrograph type	= Combine	Peak discharge	= 1.217 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 5,018 cuft
Inflow hyds.	= 19, 23	Contrib. drain. area	= 0.360 ac



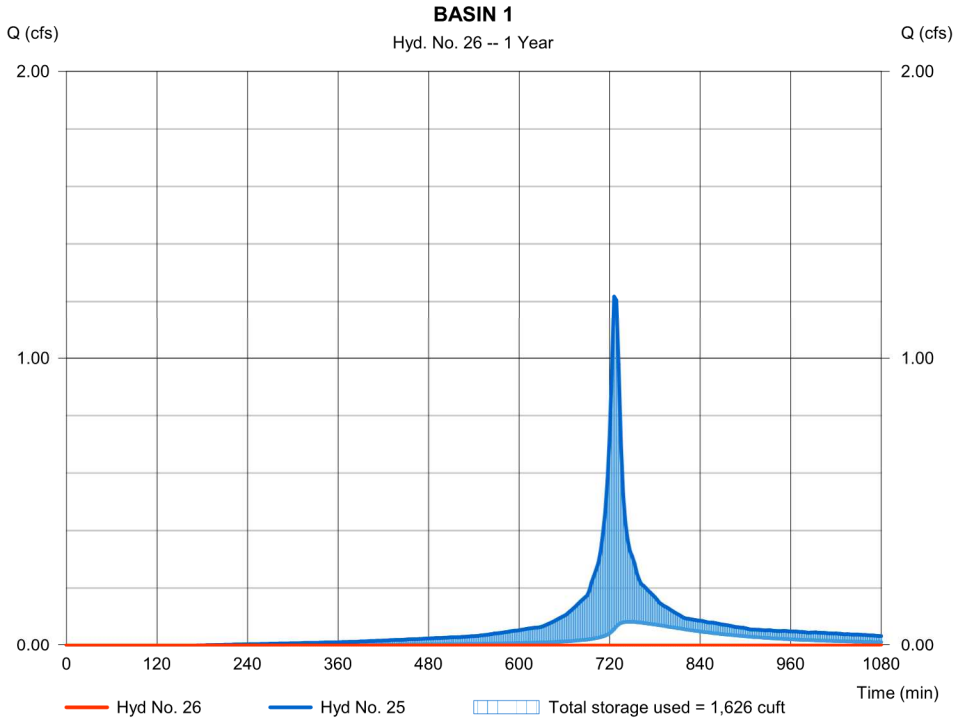
Hydrograph Report

Hyd. No. 26

BASIN 1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 741 min
Time interval	= 3 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 25 - BASIN 1	Max. Elevation	= 84.71 ft
Reservoir name	= Pond 1	Max. Storage	= 1,626 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - Pond 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 84.25 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	84.25	1,523	0	0
0.75	85.00	6,061	2,655	2,655
1.75	86.00	9,856	7,881	10,537
2.75	87.00	10,648	10,248	20,785
3.75	88.00	11,477	11,059	31,844
4.75	89.00	12,333	11,901	43,745
5.75	90.00	13,295	12,810	56,555

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.75	7.00	0.00
Span (in)	= 15.00	2.75	7.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 82.61	85.60	86.85	0.00
Length (ft)	= 38.00	0.50	0.50	0.00
Slope (%)	= 0.30	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	Yes

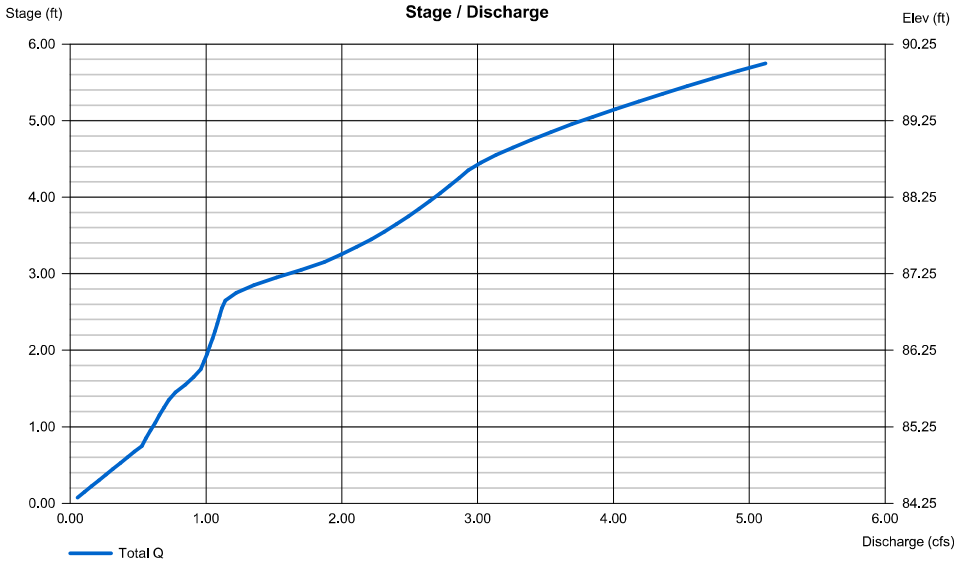
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.25	Inactive	Inactive	Inactive
Crest El. (ft)	= 88.60	89.70	94.50	94.50
Weir Coeff.	= 3.33	2.61	3.33	3.33
Weir Type	= Rect	Rect	Rect	Rect
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 3.750 (by Contour)

TW Elev. (ft) = 0.00

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

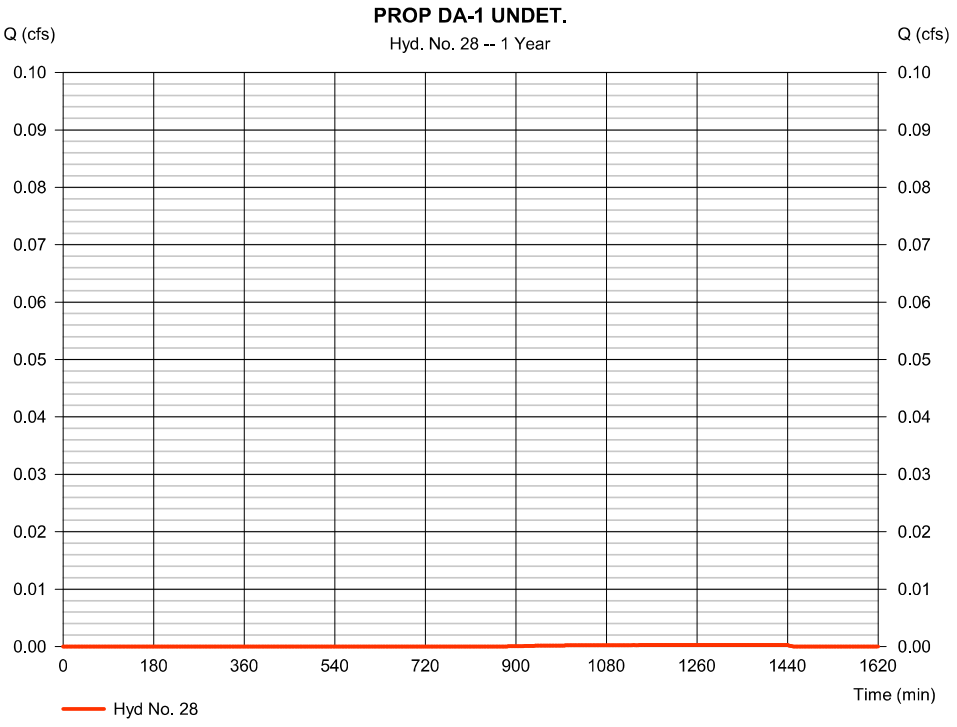


Hydrograph Report

Hyd. No. 28

PROP DA-1 UNDET.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1272 min
Time interval	= 3 min	Hyd. volume	= 8 cuft
Drainage area	= 0.250 ac	Curve number	= 66
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	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

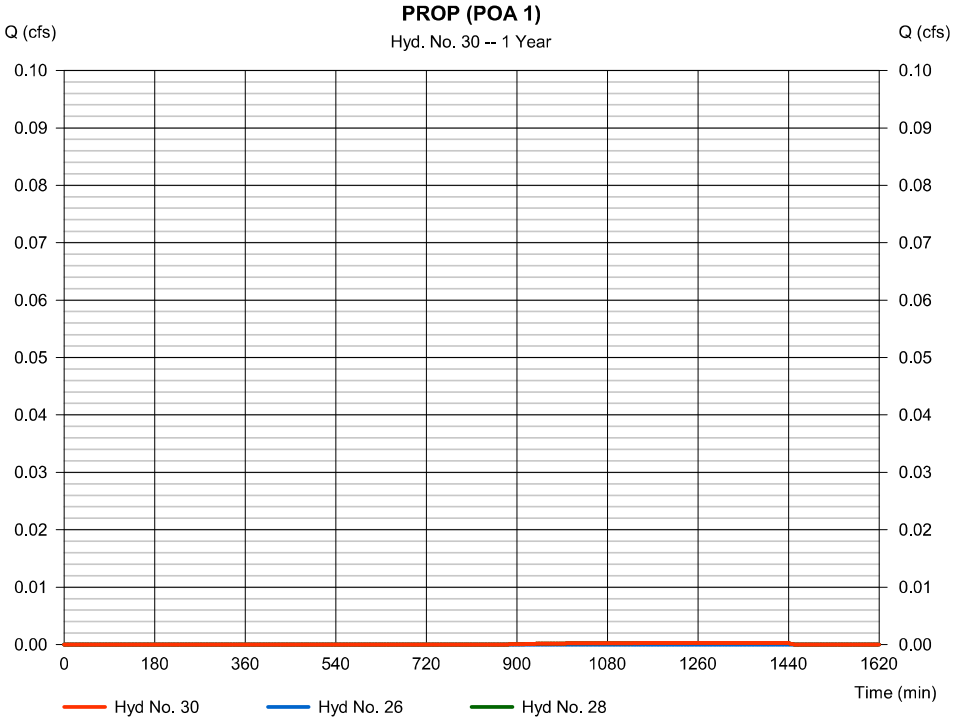


Hydrograph Report

Hyd. No. 30

PROP (POA 1)

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1272 min
Time interval	= 3 min	Hyd. volume	= 8 cuft
Inflow hyds.	= 26, 28	Contrib. drain. area	= 0.250 ac

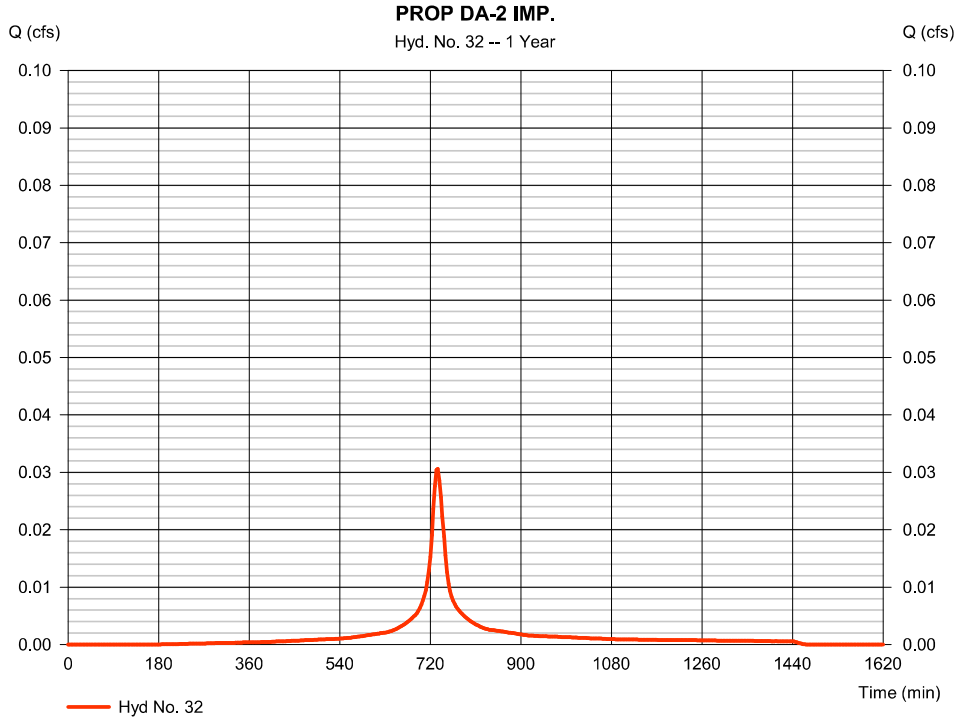


Hydrograph Report

Hyd. No. 32

PROP DA-2 IMP.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.031 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 155 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

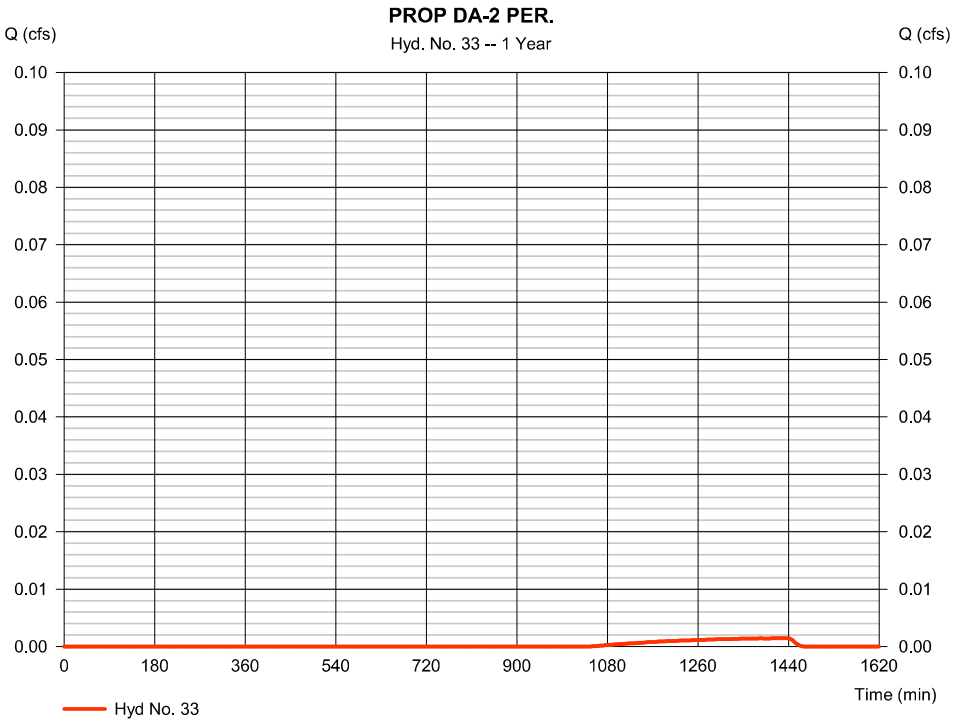


Hydrograph Report

Hyd. No. 33

PROP DA-2 PER.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1440 min
Time interval	= 3 min	Hyd. volume	= 24 cuft
Drainage area	= 2.380 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	= 484

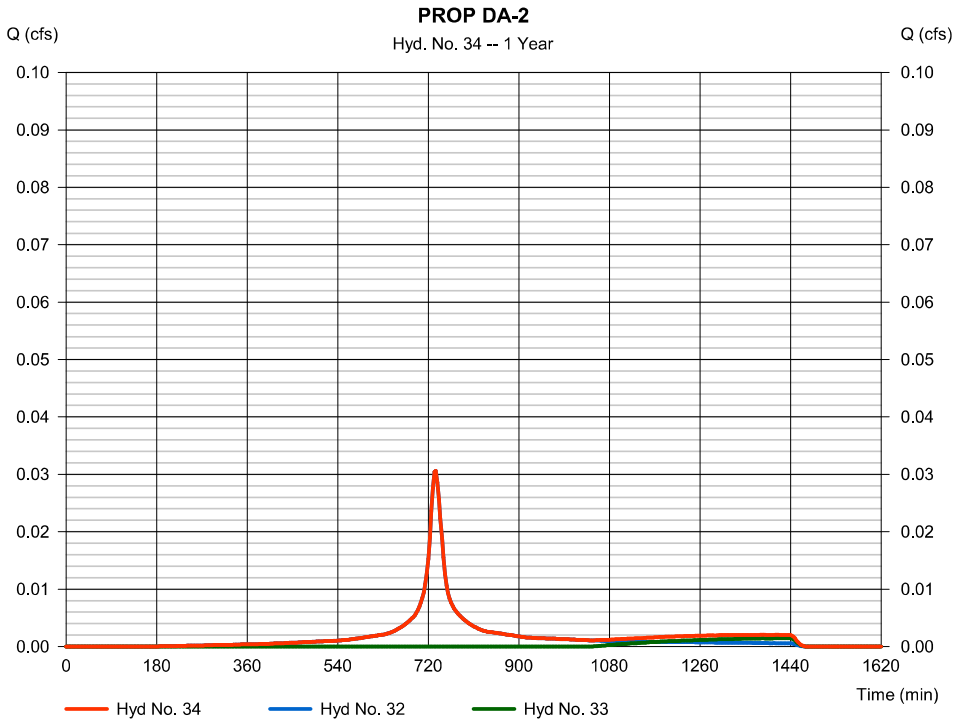


Hydrograph Report

Hyd. No. 34

PROP DA-2

Hydrograph type	= Combine	Peak discharge	= 0.031 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 179 cuft
Inflow hyds.	= 32, 33	Contrib. drain. area	= 2.420 ac

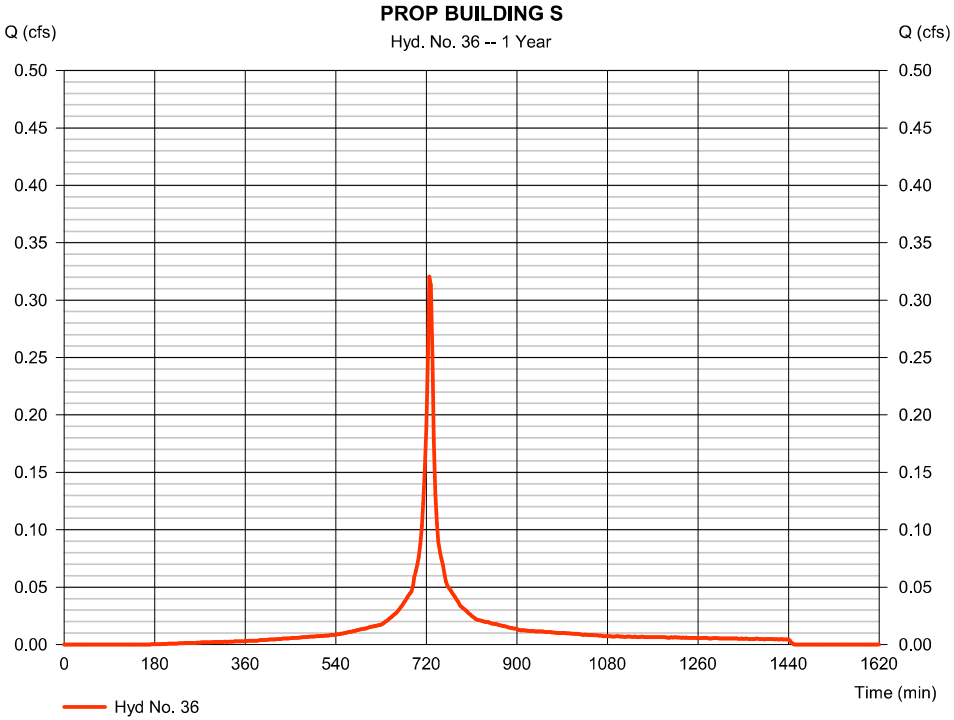


Hydrograph Report

Hyd. No. 36

PROP BUILDING S

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.320 cfs
Storm frequency	=	1 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	1,232 cuft
Drainage area	=	0.350 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	=	P:\Engineering Reference Materials\General Engineering References\Stormwater	Shape factor	=	484



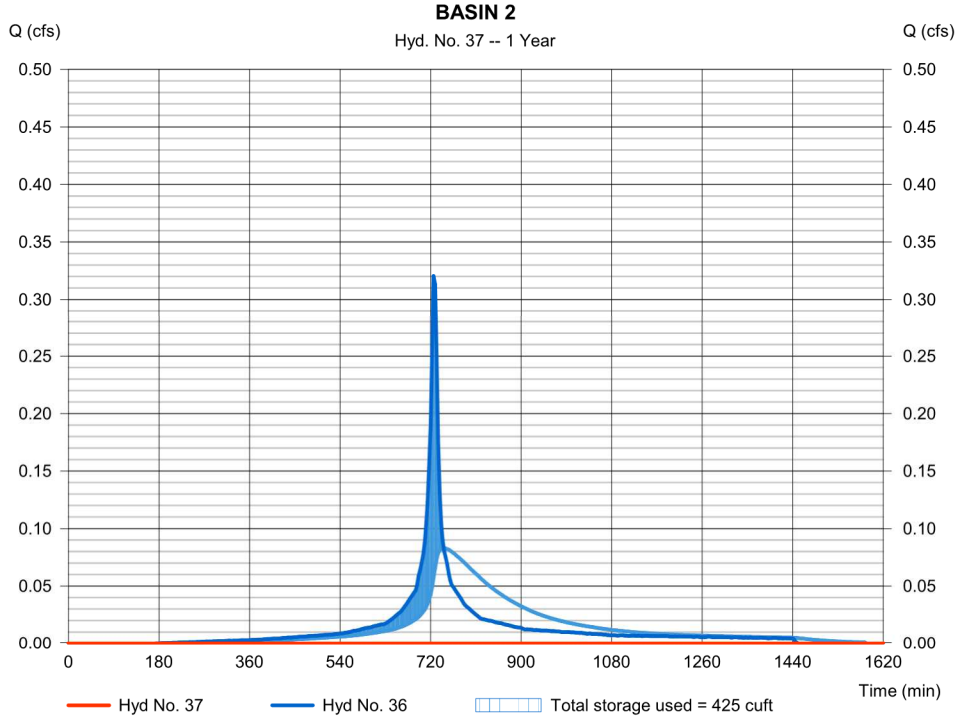
Hydrograph Report

Hyd. No. 37

BASIN 2

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	792 min
Time interval	=	3 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	36 - PROP BUILDING S	Max. Elevation	=	88.59 ft
Reservoir name	=	Pond 2	Max. Storage	=	425 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Pond No. 4 - Pond 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 88.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	88.50	4,341	0	0
0.50	89.00	5,522	2,460	2,460
1.50	90.00	6,764	6,132	8,591
2.00	90.50	8,170	3,728	12,319

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	0.00	0.00
Span (in)	= 15.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 88.50	89.50	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

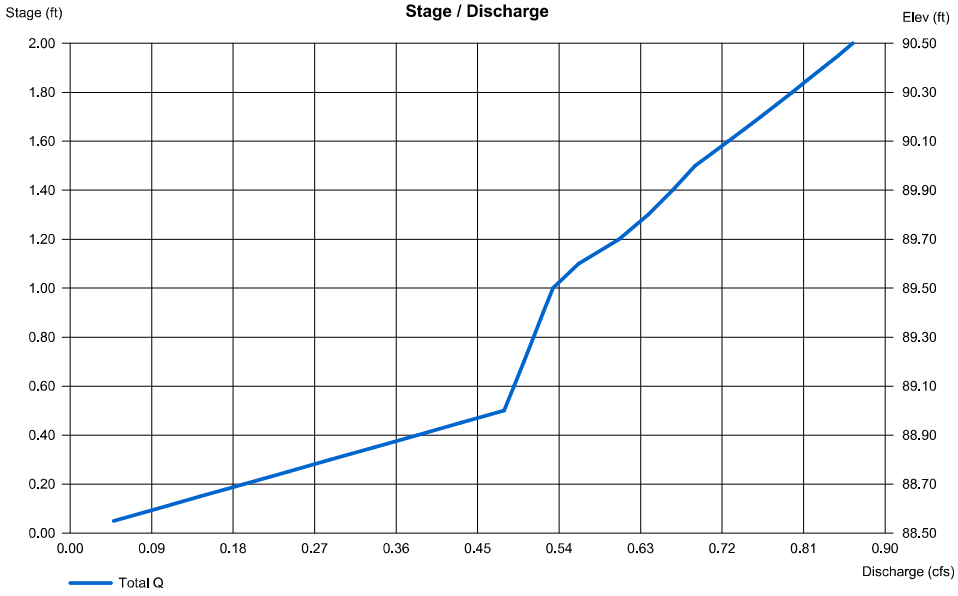
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 90.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 3.750 (by Contour)

TW Elev. (ft) = 0.00

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



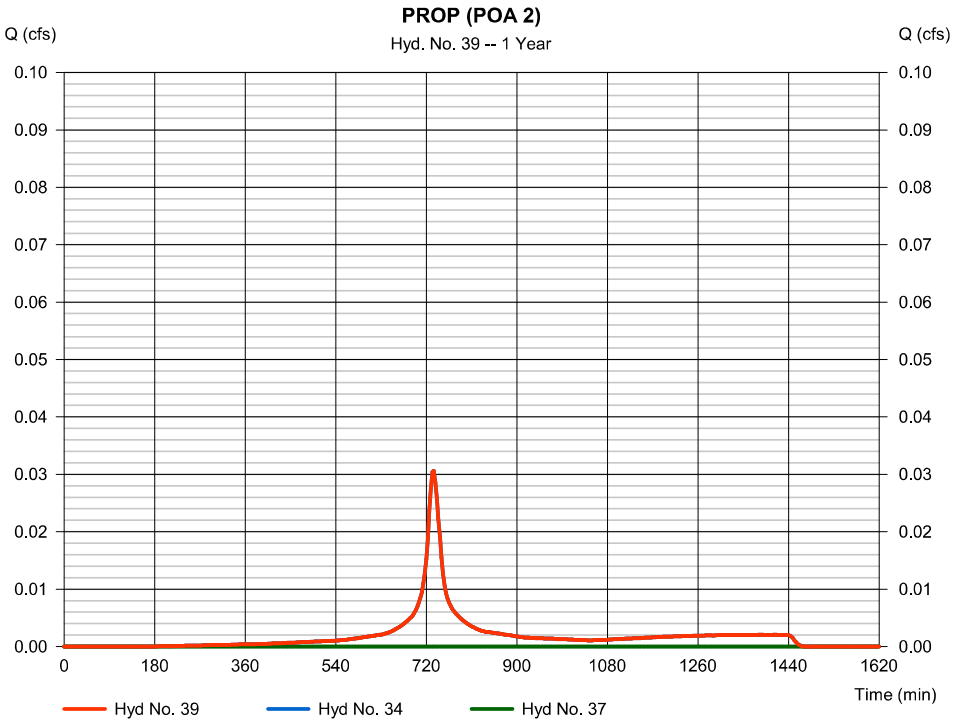
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Thursday, 09 / 1 / 2022

Hyd. No. 39

PROP (POA 2)

Hydrograph type	= Combine	Peak discharge	= 0.031 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 179 cuft
Inflow hyds.	= 34, 37	Contrib. drain. area	= 0.000 ac

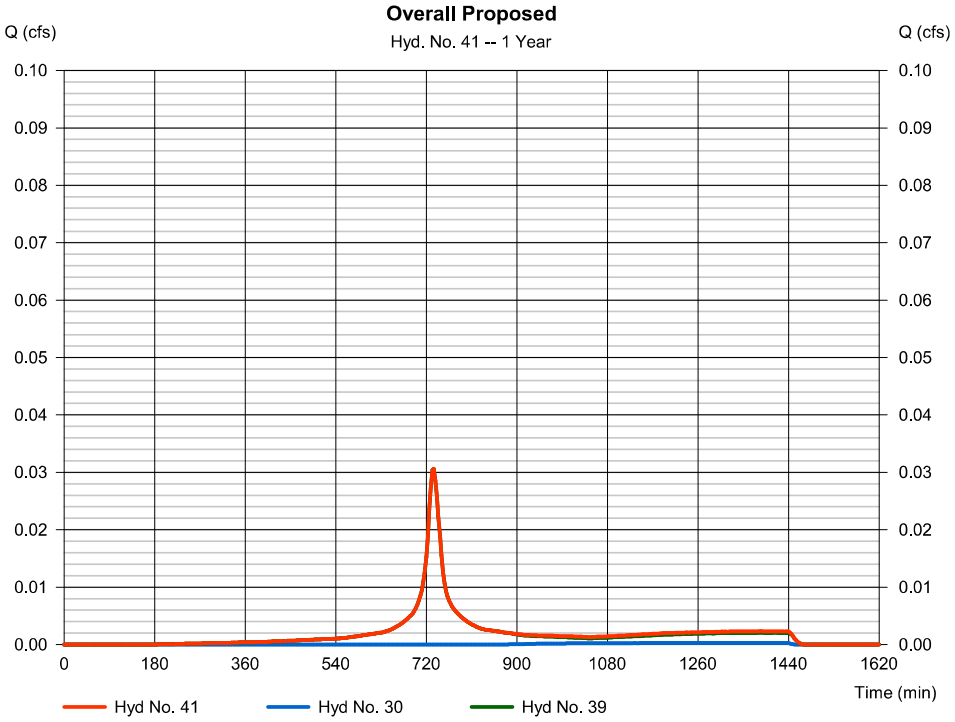


Hydrograph Report

Hyd. No. 41

Overall Proposed

Hydrograph type	= Combine	Peak discharge	= 0.031 cfs
Storm frequency	= 1 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 187 cuft
Inflow hyds.	= 30, 39	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	20.4657	3.8000	0.7101	------
2	24.4188	3.9000	0.7130	------
3	0.0000	0.0000	0.0000	------
5	29.1858	3.6000	0.7038	------
10	34.7403	3.7000	0.7099	------
25	41.4212	3.7000	0.7099	------
50	47.0297	3.7000	0.7122	------
100	51.4499	3.6000	0.7089	------

File name: Old Tappan.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.37	3.17	2.55	2.16	1.88	1.68	1.52	1.40	1.29	1.21	1.13	1.07
2	5.14	3.74	3.00	2.54	2.22	1.98	1.79	1.65	1.52	1.42	1.34	1.26
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.42	4.65	3.73	3.15	2.76	2.46	2.23	2.05	1.90	1.77	1.66	1.57
10	7.48	5.42	4.34	3.67	3.21	2.86	2.59	2.38	2.20	2.05	1.93	1.82
25	8.92	6.46	5.18	4.38	3.82	3.41	3.09	2.84	2.63	2.45	2.30	2.17
50	10.07	7.29	5.84	4.93	4.31	3.84	3.48	3.19	2.95	2.76	2.59	2.44
100	11.19	8.09	6.48	5.47	4.78	4.26	3.86	3.54	3.28	3.06	2.87	2.71

Tc = time in minutes. Values may exceed 60.

PROJECTS\1423 Capitol Seniors Housing\99-006 Old Tappan\Design\Drainage\2021-04 Drainage\IDF\Old Tappan.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.47	0.00	0.00	5.44	6.67	0.00	8.57
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.47	0.00	0.00	5.44	6.67	0.00	8.57

GROUNDWATER RECHARGE SPREADSHEET

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
BERGEN CO., OLD TAPPAN BORO	49.2	1.59

Project Name:	CSH Old Tappan
Description:	Proposed Assisted Living
Analysis Date:	05/04/21

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.12	Impervious areas	Dunellen	0.0	-
2	0.5	Open space	Dunellen	16.4	29,739
3	0.77	Woods	Dunellen	16.7	46,704
4	4.08	Woods	Riverhead	16.7	247,620
5					
6					
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	5.5			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				16.3	324,062

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.88	Impervious areas	Riverhead	0.0	-
2	0.59	Open space	Dunellen	16.4	35,092
3	0.11	Woods	Dunellen	16.7	6,672
4	0.94	Open space	Riverhead	16.4	55,910
5	1.95	Woods	Riverhead	16.7	118,348
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	5.5			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				10.9	216,022

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	81,893
Post-Development Annual Recharge Deficit=	***108,041***	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)

RWC=	4.41	(in)	DRWC=	4.41	(in)
ERWC =	0.90	(in)	EDRWC=	0.90	(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	Description	Analysis Date	BMP or LID Type
CSH Old Tappan	Proposed Assisted Living	05/04/21	Basin 1

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	1377.2	sq.ft
BMP Effective Depth, this is the design variable	dBMP	16.2	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-16.2	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	0.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	4	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.87	in
ERWC Modified to consider dEXC	EDRWC	0.87	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.68	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.28	in
Inches of Rainfall to capture	Pdesign	0.37	in
Recharge Provided Avg. over Imp. Area		15.8	in
Runoff Captured Avg. over imp. Area		16.7	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.02	unitless
BMP Volume	VBMP	1,859	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> OK
dBMP Check---> OK
dEXC Check---> OK
BMP Location---> OK

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	108,041	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	81,893	sq.ft
Root Zone Water Capacity	RWC	4.24	in
RWC Modified to consider dEXC	DRWC	4.24	in
Climatic Factor	C-factor	1.59	no units
Average Annual P	Pavg	49.2	in
Recharge Requirement over Imp. Area	dr	15.8	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		108,041	cu.ft
Avg BMP Recharge Efficiency		94.6%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.5%	%
%Runoff Infiltrated		43.3%	%
%Runoff Recharged		41.0%	%
%Rainfall Recharged		32.2%	%

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 sensetive 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-IMP 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 clik the "Default Vdef & Aimp" button.

Project Name	Description	Analysis Date	BMP or LID Type
CSH Old Tappan	Proposed Assisted Living	09/01/22	Basin 2

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	3427.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	12.0	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-12.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	0.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	2	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.06	in
ERWC Modified to consider dEXC	EDRWC	1.06	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.83	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.28	in
Inches of Rainfall to capture	Pdesign	0.37	in
Recharge Provided Avg. over Imp. Area		15.8	in
Runoff Captured Avg. over imp. Area		16.7	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.04	unitless
BMP Volume	VBMP	3,427	cu.ft

Parameters from Annual Recharge Worksheet

Parameter	Symbol	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	Vdef	108,041	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	81,893	sq.ft
Root Zone Water Capacity	RWC	5.19	in
RWC Modified to consider dEXC	DRWC	5.19	in
Climatic Factor	C-factor	1.59	no units
Average Annual P	Pavg	49.2	in
Recharge Requirement over Imp. Area	dr	15.8	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		268,839	cu.ft
Avg BMP Recharge Efficiency		94.6%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.5%	%
%Runoff Infiltrated		107.8%	%
%Runoff Recharged		101.9%	%
%Rainfall Recharged		80.1%	%

CALCULATION CHECK MESSAGES

Volume Balance-> **Solve Problem to satisfy Annual Recharge**
dBMP Check---> **OK**
dEXC Check---> **OK**
BMP Location---> **OK**

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 sensetive 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-IMP 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 clik the "Default Vdef & Aimp" button.

SAND FILTER CALCULATIONS

DYNAMIC ENGINEERING

Sand Filter Sizing Calculations

Project:	CSH Old Tappan	Calctulated By:	DRL
Municipality:	Old Tappan	Checked By:	DTS
Job #:	1423-99-006	Date:	3/23/2022

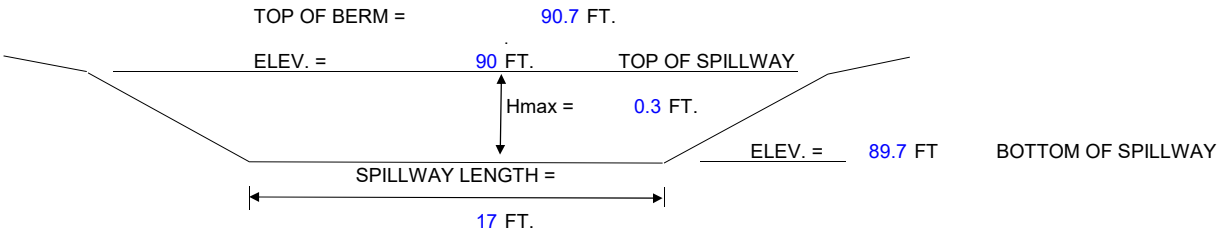
Basin 1

Design Storm Analyzed:	1-Year Water Quality
Tributary Drainage Area (AC):	2.44
Water Quality Design Storm Runoff Volume (CFS):	6,269
Required Forebay Storage - Total (cu ft):	627
Proposed Forebay Volume - Total (cu ft):	840
Proposed Sand Filter Storage Depth (ft):	1.35
2' Max Storage Depth for WQDS	
Min. Sand Surface Area per GWR Spreadsheet (SF):	1,377
Proposed Sand Filter Surface Area (SF):	4,170
Drain Time = (WQDS Volume)/(Sand Surface Area)(Sand Permeability)	< 36 Hours
Proposed Drain Time:	9.0 <36 Hours

EMERGENCY SPILLWAY CALCULATIONS

EMERGENCY SPILLWAY CALCULATIONS

Detention Basin with Sand Filter 1



- **Spillway Capacity:**

Spillway calculation based on weir equation: Q = CLH**3/2

'C' = weir coefficient: Use 2.61

Qmax through spillway = 7.3

Spillway designed to pass 100 year flow

100-year flow = 14.57 CFS HEADWATER DEPTH = 0.48 FT.

ALLOWABLE HEADWATER DEPTH = 0.3 FT. WHICH IS GREATER THAN REQUIERED THEREFORE WEIR HAS CAPACITY

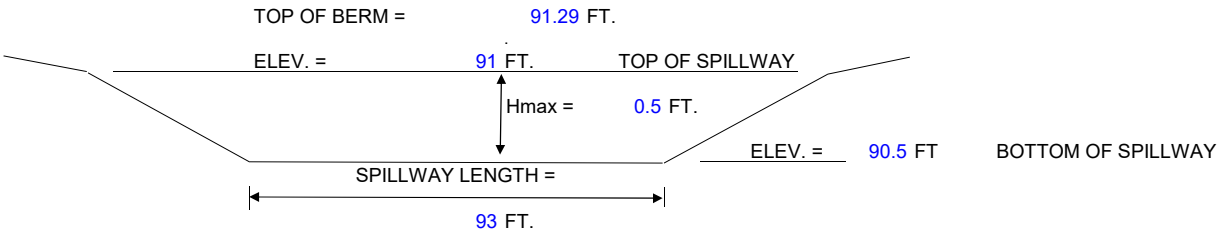
FREEBOARD FOR 100-YR = 0.52 FT.

Flow Velocity = 1.80 FPS (Less than 2.0 FPS OK)

*Rock Chute to be provided downstream of the spillway in accordance with the Soil Erosion and Sedmient Standards.

EMERGENCY SPILLWAY CALCULATIONS

Bioretention/Detention Basin 2



- **Spillway Capacity:**

Spillway calculation based on weir equation: Q = CLH**3/2

'C' = weir coefficient: Use 2.61

Qmax through spillway = 85.8

Spillway designed to pass 100 year flow

100-year flow = 2.35 CFS HEADWATER DEPTH = 0.05 FT.

ALLOWABLE HEADWATER DEPTH = 0.5 FT. WHICH IS GREATER THAN REQUIERED THEREFORE WEIR HAS CAPACITY

FREEBOARD FOR 100-YR = 0.74 FT.

Flow Velocity = 0.56 FPS (Less than 2.0 FPS OK)

*Rock Chute to be provided downstream of the spillway in accordance with the Soil Erosion and Sedmient Standards.

ANTI-SEEP COLLAR DESIGN CALCULATIONS

DYNAMIC ENGINEERING

Anti Seep Collar Design

Based on Standards for Soil Erosion and Sediment Control in New Jersey , July 2013

Project:	CSH Old Tappan	Computed By:	DRL
Job #:	1423-99-006	Checked By:	DTS
Location:	Old Tappan, NJ	Date:	3/1/2022

Basin Name: **Basin A**

The length of the seepage = (L+2*n*V), where:

V = Vertical projection and minimum horizontal projection of the antiseep collar (ft)
L = Length (ft) of the conduit within the zone of saturation, measured from the downstream side of the riser to the tow drain or point where the phreatic line intercepts the conduit, whichever is shorter.
n = Number of antiseep collars

Note : Antiseep collars should be equally spaced along the part of the barrel within the saturated zone at distances of not more that 25 feet.

Proposed Anti Seep Collar

V =	1.00	feet
L =	38.00	feet
n =	3.00	collars

Collar spacing = 12.67 feet

Spacing is less than 25 FT, therefore design is OK

Length of seepage = 44 feet

Ratio of length of seepage to L = 1.158

Ratio is greater than 1.15, therefore design is OK

Therefore, use antiseep collars with min. vertical and horizontal projection of **1.00** **feet and spacing of** **13** **feet.**

SCOUR HOLE SIZING CALCULATIONS

DYNAMIC ENGINEERING

SCOUR HOLE DESIGN

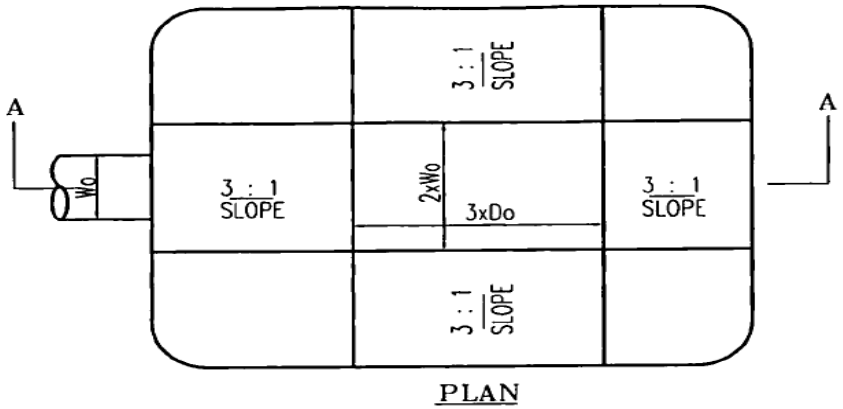
Project:	CSH Old Tappan
Job #:	1423-99-006
Location:	Old Tappan, NJ
Design Storm:	100
Computed By:	GL
Checked By:	DRL
Date:	8/30/2022

Discharge not in Basin, Therefore Tailwater is less than 0.5 x Do

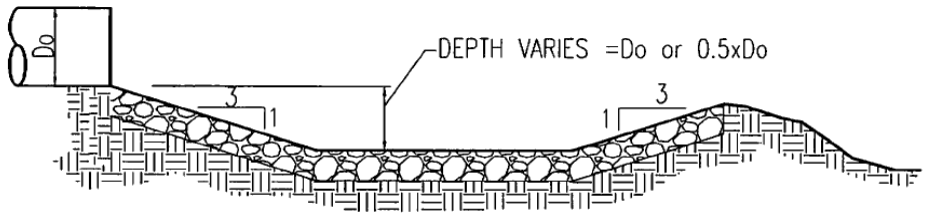
Discharge Point	Basin B
Q (100-yr storm cfs)	**0.08**
Inside Height of Outlet Culvert, Do (in)	**15**
Inside Height of Outlet Culvert, Do (ft)	1.3
Tailwater (ft), Tw	0.25
Length of Apron, L (ft)	**3.75**
Width of Culvert, Wo(in)	**15**
Width of Culvert, Wo(ft)	**1.3**
Width of Apron, W(ft)	**2.50**
Where Y = 1/2 Do, Y(ft)	**0.625**
Median Stone Diameter, D50 (ft)	**0.00**
Where Y = Do, Y(ft)	**1.250**
Median Stone Diameter, D50 (ft)	**0.001**

Note: Use D50 of 3 inches minimum

Equations used:
L=3*Do
W=2*Wo
Tw=0.2*Do (If Tw cannot be computed)
Where Y=1/2 Do
D50=(0.0125/Tw)*(q^1.33)
Where Y=Do
D50=(0.0082/Tw)*(q^1.33)



PLAN



SECTION A–A

Notes:
1. The use of scour holes shall comply with county or local ordinances which would restrict the use of such devices due to the possible problems with mosquito breeding.
2. No bends or curves at the intersection of the conduit and apron or scour hole will be permitted.
3. There shall be no over fall from the end of the apron to the receiving material.
4. The thickness of the riprap lining, filter, and quality shall meet the requirements in the Riprap Standard Section of the Standards for Soil Erosion Control in New Jersey.

BERGEN COUNTY LID CHECKLIST

APPENDIX H:

LOW IMPACT DEVELOPMENT (LID) CHECKLIST

Please fill out this checklist for identifying Low Impact Development Activities incorporated into the proposed land development.

Part 1 - Vegetation and landscaping

1. Has an inventory of existing site vegetation been performed? YES
If yes, was the inventory a factor in the site's layout and design? YES
2. Does the site utilize any of these non-structural LID-BMPs:
a. Preservation of natural areas: YES If yes, specify location WEST and % of site 27%
b. Use of native ground cover: YES If yes, specify location WEST and % of site 27%
c. Use of vegetated buffers: YES If yes, specify location WEST and % of site 27%
3. Specify percentage of total building roof area that will be vegetated: 0%.
4. How many trees will be planted on site? 167 How many deciduous 82 coniferous 85
How many trees will be removed? 203
How many *street* trees will be planted? 9 What types: ARMSTRONG RED MAPLE

Part 2 – Minimizing site disturbance

5. Have inventories of existing site soils and slopes been performed? YES If yes, were the inventories a factor in the site's layout and design? YES. Please explain PROPOSE TO SUPPLEMENT AND MAINTAIN EXISTING VEGETATION TO MAXIMUM EXTENT POSSIBLE
6. Explain how site disturbance will be minimized during construction phases
USE OF PROPOSED RETAINING WALLS TO MINIMIZE DISTURBANCE; WETLAND/VETATED AREA IS BEING PRESERVED
7. Specify the percent of site to be cleared: 72%. For buildings: 18%. For driveways 19%.
Specify % of site to be re-graded: 34%.
8. Specify the site's hydrologic soil group (HSG) percentages:
HSG A: 23% HSG B: 77% HSG C: _____ HSG D: _____
9. Specify percentage of each HSG that will be permanently disturbed:
HSG A: 100% HSG B: 57% HSG C: _____ HSG D: _____

10. Explain how site disturbance will be minimized within areas with greater permeable soils (HSG A and B) to maintain groundwater recharge rates and reduce stormwater volume increases.
THE ENTIRE SITE IS COMPRISED OF TYPES A AND B SOILS; OVERALL DISTURBANCE IS MINIMIZED

Part 3 – Impervious area management

11. Specify the following with regards to impervious coverage:
a. Maximum site impervious coverage (%) permitted by local regulations 30%
b. Existing (%) (pre-project) impervious coverage at the site: 2%
c. Proposed (%) impervious coverage for the site: 33%
d. Is the site designed to achieve minimum impervious coverage? YES
12. Specify percentage of parking area that will be porous: 0%. Please explain which site areas will be porous: _____
13. Provide the following with regards to the number of parking spaces:
a. The number of parking spaces required by local regulations for the development 42 (RSIS)
b. The number of parking spaces being provided 46
c. Is the site designed to minimize the number of parking spaces to reduce impervious surface? YES
14. Specify the following with regard to the size of parking stalls:
a. The size of parking spaces required by local regulations 10'X20'
b. The size of parking stalls being provided 10'X20'
15. Specify percentage of total parking area that will be:
a. Located beneath buildings 0
b. Within a multi-level parking deck 0
c. Only for compact cars 0
16. Specify the number of parking spaces provided for bicycle parking 0

Part 4 - Circulation Improvements

17. Explain how the project will impair or improve vehicular traffic flow? _____
NO REDUCTION IN LEVEL OF SERVICE FOR OLD TAPPAN ROAD
18. Provide the pre-project Level of Service (LOS) A Post-project LOS A

19. Explain how roadway safety and the pedestrian environment will be improved for each of the following:
a. Placement and type of intersection signals N/A
b. Pedestrian features PROP. CROSSWALK AND ACCESSIBLE RAMPS AT DRIVEWAY APRON IMPROVE EXISTING PEDESTRIAN FEATURES
c. Sidewalk replacement PROP. CROSSWALK AND ACCESSIBLE RAMPS AT DRIVEWAY APRON IMPROVE EXISTING PEDESTRIAN FEATURES
d. Access control PROPOSED STOP BAR AND SIGN AT ACCESS DRIVEWAY
e. Aesthetic treatments ENHANCED LANDSCAPING ALONG OLD TAPPAN ROAD FRONTAGE
f. Improved sight distance N/A
g. Street and sidewalk lighting N/A
h. Pedestrian- and bicyclist-activated signals N/A
i. Landscaped planters N/A
j. Bus pullout lanes and transit shelters N/A
20. Explain how bicycle use will be promoted for the development. Will bicycle accessories (bike racks, secure storage, showers, etc.) be provided? NO; NOT APPLICABLE FOR THE PROPOSED USE
21. Explain how public transit will be promoted for the development N/A
22. Will Transportation Demand Management techniques be provided? Please explain:
A PRIVATE VAN SERVICE WILL BE USED ON SITE TO TRANSPORT RESIDENTS IN GROUPS TO FURTHER REDUCE INDIVIDUAL TRIPS ON SITE

Part 5 – Source Control and Pollution Prevention

23. Specify number of outdoor trash receptacles provided 1. Number of recycling receptacles provided 0.
24. Is a recycling plan being submitted NO?
25. Identify stormwater management measures on the site that prevent discharge of large trash and debris.
PROPOSED ONSITE INLETS AND ABOVEGROUND BASINS WITH TRASH RACKS COLLECT RUNOFF AND PREVENT LARGE TRASH AND DEBRIS FROM LEAVING THE SITE

Part 6 – Energy and Environmental Control

26. Indicate what is being done to reduce the site's contribution to the urban heat island effect (i.e., light-colored/high albedo pavement surface with a minimum albedo of 0.3; use of porous pavement; substantial increase of tree canopy) PROPOSED PAVEMENT IS MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE; PRESERVATION OF NATURAL AREAS IS MAXIMIZED
27. Will outdoor lighting fixtures be installed with energy-efficient fixtures in conformance with the Bergen County Land Development Regulations and as outlined by the International Dark Sky Association (IDSA) www.darksy.org to preserve and protect the nighttime environment? Please explain.
YES; FULL CUTOFF FIXTURES PROPOSED TO REDUCE GLARE AND LIGHT SPILLOVER
28. What percentage of the total electricity for the site will be from renewable sources? TBD. Please explain

Part 7 – Construction Materials

29. Is there a plan for the processing, transportation and disposal of waste? Provide a description of all material being disposed and location of disposal.
SOLID WASTE WILL BE STORED WITHIN AN ON-SITE TRASH ENCLOSURE AND WILL BE REMOVED REGULARLY BY LOCAL WASTE MANAGEMENT
30. What percentage of non-hazardous construction and demolition debris from the project will be recycled?
TBD Salvaged back into the site? TBD

Part 8 – Community

31. Explain how meaningful public input was incorporated into the project. Provide evidence of how community values (historic preservation, cultural, neighborhood preservation, environmental) were integrated into the design process.
THE APPLICANT IS WORKING CLOSELY WITH THE RESIDENTS OF THE TOWNSHIP TO MAKE ARCHITECTURAL DESIGN DECISIONS AND TO PROVIDE SITE FEATURES WHICH WILL MINIMIZE NEGATIVE IMPACTS TO THE ADJACENT LOT OWNERS.
32. Explain how the project is consistent with the Bergen County Master Plan
THE PROPOSED PROJECT FITS IN WITH THE CHARACTER OF THE NEIGHBORHOOD AND TOWNSHIP

Part 9 – Narrative

33. In narrative form, provide an overall description of the LID-BMP approach to stormwater management and strategies incorporated into the proposed site design. Attach additional pages as necessary.

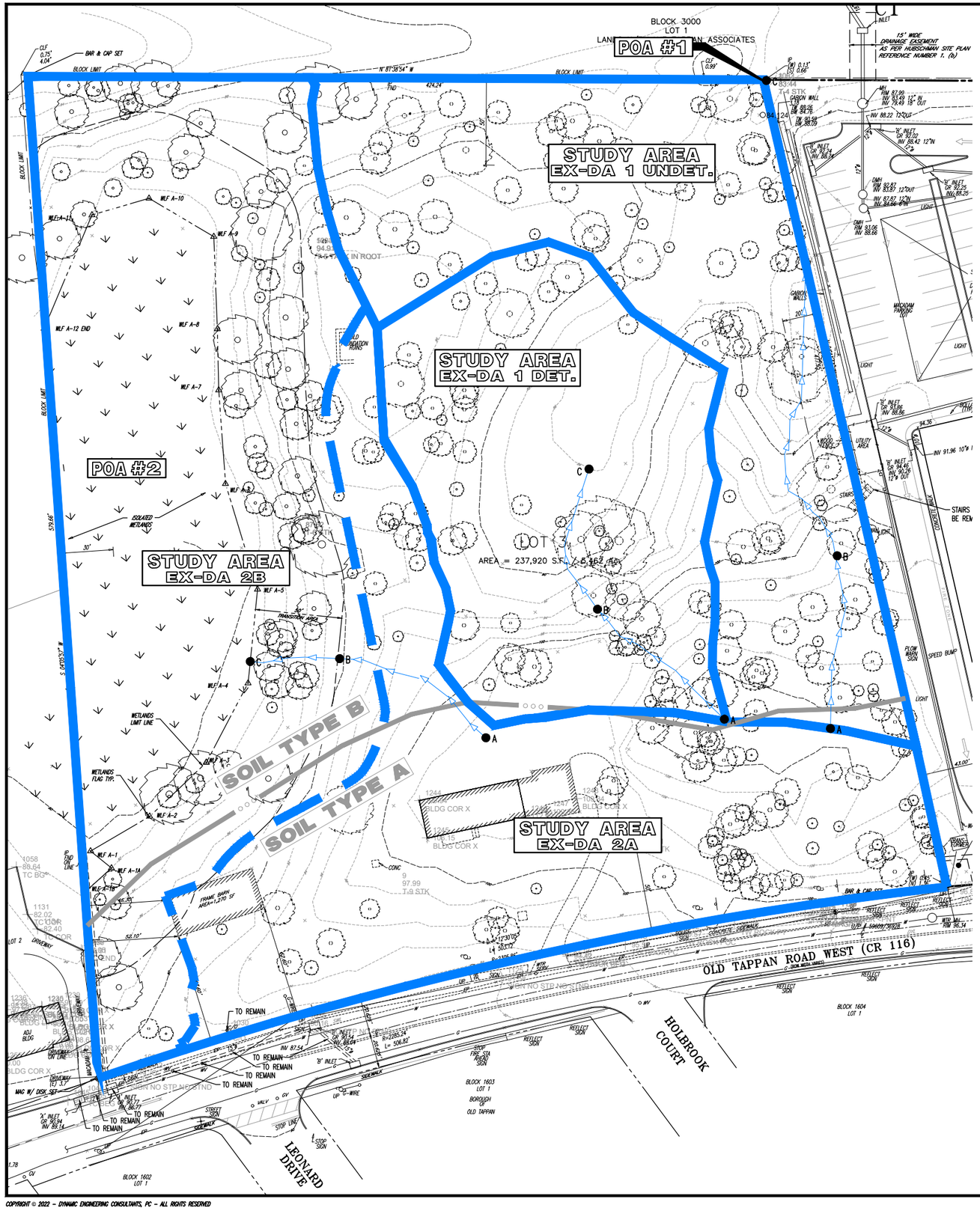
THROUGH LIMITING THE PROPOSED DISTURBANCE TO THE AREA OF PREVIOUS DISTURBANCE, THIS PROJECT IS ABLE TO PERSERVE NATURAL AREAS TO THE MAXIMUM EXTENT POSSIBLE. THE PROJECT ALSO PROPOSES TO MAINTAIN EXISTING DRAINAGE AND GRADING CONDITIONS TO THE MAXIMUM EXTENT POSSIBLE.

Part 10 – Compliance with Non-structural Requirements of NJDEP Stormwater Management Rules

N.J.A.C. 7:8-5.3(b)

No.	Nonstructural Strategy	Yes	No
1	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss. *Please explain*: PROP. SCOUR HOLE AT THE DISCHARGE POINT DOWNSTREAM OF THE ABOVEGROUND BASIN	X	
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces. *Please explain:* IMPERVIOUS SURFACES ARE MINIMUZED AND NATURAL/LANDSCAPED AREAS ARE MAXIMIZED	X	
3.	Maximize the protection of natural drainage features and vegetation. *Please explain*: EXISTING WETLANDS/VEGETATED AREA IS REMAINING UNDISTURBED	X	
4.	Minimize the decrease in pre-construction time of concentration. *Please explain*: EXTENSIVE LANDSCAPE PLAN TO PROVIDE SUPPLEMENTAL VEGETATION AND MINIMAL DISTURBANCE TO NATURAL AREAS	X	
5.	Minimize land disturbance including clearing and grading. *Please explain*: VETEGATED/WETLANDS AREA IS NOT BEING DISTURBED. PROPOSED RETAINING WALLS MINIMIZE DISTURBANCE FOR GRADING/CLEARING	X	
6.	Minimize soil compaction. *Please explain*: USE OF RETAINING WALLS MINIMIZES DISTURBED/COMPACTED SOILS	X	
7.	Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides. *Please explain*: PLEASE REFER TO LANDSCAPE PLAN PREPARED BY LONGSTONE GARDENS.	X	
8.	Provide vegetated open-channel conveyance systems that discharge into and through stable vegetated areas. *Please explain*:		X
9.	Provide preventative source controls. *Please explain*: PROPOSED STORM DRAIN INLETS PREVENT LARGE DEPRIS FROM FLOWING INTO THE DOWNSTREAM CONVEYANCE SYSTEM	X	

DRAINAGE AREA MAPS



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DYNAMIC ENGINEERING CONSULTANTS, PC

REV.	DATE	COMMENTS	
9	08/30/23	REVISED PER BOROUGH COMMENTS	JD
8	07/11/23	REVISED PER BOROUGH COMMENTS	GL
7	06/15/23	REVISED PER COUNTY COMMENTS	GL
6	05/02/23	REVISED PER BOROUGH & SCD COMMENTS	GL
5	03/16/23	NEW REV PER BOROUGH COMMENTS	JD
4	02/01/23	REVISED PER SCD COMMENTS	JD
3	12/20/21	REVISED PER SCD & COUNTY COMMENTS	MS
2	08/20/21	REVISED PER BOROUGH COMMENTS	GL
1	07/29/21	REVISED PER SCD & COUNTY COMMENTS	GL

THIS PLAN SET IS FOR PERMITTING PURPOSES ONLY AND MAY NOT BE USED FOR CONSTRUCTION

DRAWN BY: CMP | DESIGNED BY: ____ | CHECKED BY: DTS | APPROVED BY: ____

PROJECT: CSH OLD TAPPAN, LLC
PROPOSED ASSISTED LIVING FACILITY
BLOCK 3000, LOT 1
244 OLD TAPPAN ROAD
BOROUGH OF OLD TAPPAN, BERGEN COUNTY, NEW JERSEY

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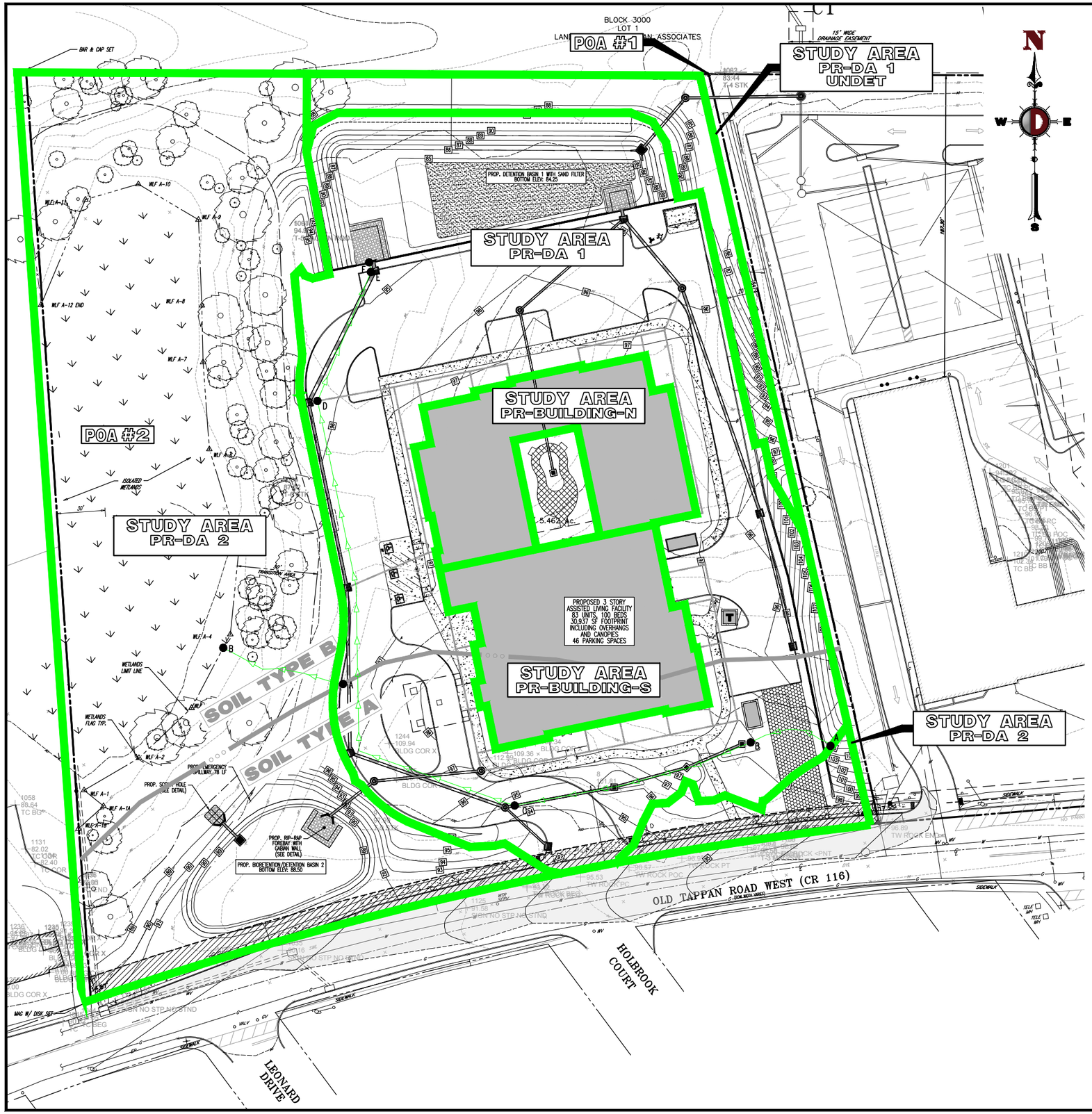
DANIEL T. SEHNAL
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 53572

JOSEPH G. JAWORSKI
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 36618

TITLE: EXISTING DRAINAGE AREA MAP

SCALE: (H) 1" = 30' (V) | DATE: 05/18/2021
PROJECT No: 1423-99-006

SHEET No: 1 OF 3 | Rev. #: 9



GRAPHIC SCALE

−30 0 15 30 60 120

(IN FEET)
1 INCH = 30 FT.

Plotted: 09/01/22 – 6:47 PM, By: gbittmann
File: P:\DEC\PC PROJECTS\1423 Capitol Seniors Housing\99-006 Old Tappan\Dwg\DA Maps\D1423990006PDAM3.dwg, ---> 02 PROPOSED DRAINAGE AREA MAP

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REV.	DATE	COMMENTS	BY
9	08/30/22	REVISED PER BOROUGH COMMENTS	JD
8	07/11/22	REVISED PER BOROUGH COMMENTS	GL
7	06/15/22	REVISED PER COUNTY COMMENTS	GL
6	05/02/22	REVISED PER BOROUGH & SCD COMMENTS	GL
5	03/16/22	NEW REV PER BOROUGH COMMENTS	JD
4	02/01/22	REVISED PER SCD COMMENTS	JD
3	12/20/21	REVISED PER SCD & COUNTY COMMENTS	MS
2	08/30/21	REVISED PER SCD & COUNTY COMMENTS	GL
1	07/29/21	REVISED PER SCD & COUNTY COMMENTS	GL

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DRAWN BY: CMP | DESIGNED BY: ____ | CHECKED BY: DTS | APPROVED BY: ____

PROJECT: CSH OLD TAPPAN, LLC
PROPOSED ASSISTED LIVING FACILITY
BLOCK 3000, LOT 1
244 OLD TAPPAN ROAD
BOROUGH OF OLD TAPPAN, BERGEN COUNTY, NEW JERSEY

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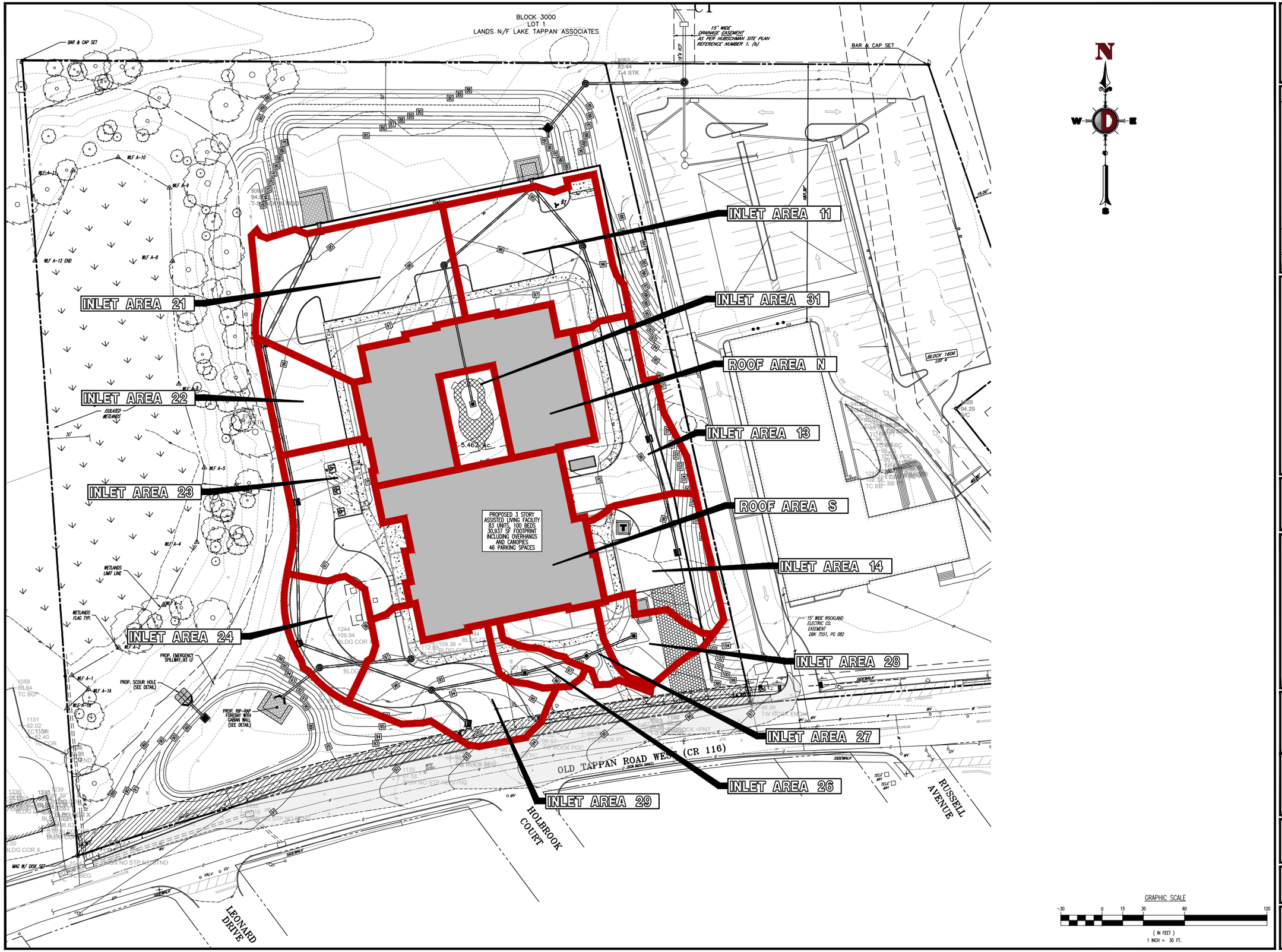
NEW JERSEY LICENSE No. 53572

JOSEPH G. JAWORSKI
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 36618

TITLE: PROPOSED DRAINAGE AREA MAP

SCALE: (H) 1" = 30' (V) | DATE: 05/18/2021
PROJECT No: 1423-99-006

SHEET No: 2 OF 3 | Rev. #: 9



REV.	DATE	COMMENTS	BY
9	08/30/22	REVISED PER BOROUGH COMMENTS	JD
8	07/11/22	REVISED PER BOROUGH COMMENTS	GL
7	06/15/22	REVISED PER COUNTY COMMENTS	GL
6	05/02/22	REVISED PER BOROUGH & SCD COMMENTS	GL
5	03/16/22	NEW REV PER BOROUGH COMMENTS	JD
4	02/01/22	REVISED PER SCD COMMENTS	JD
3	12/20/21	REVISED PER UPDATED LAYOUT	MS
2	09/10/21	REVISED PER SCD & COUNTY COMMENTS	GL
1	07/29/21	REVISED PER SCD & COUNTY COMMENTS	GL

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PROJECT: CSH OLD TAPPAN, LLC
PROPOSED ASSISTED LIVING FACILITY
BLOCK 1606, LOT 3
244 OLD TAPPAN ROAD
BOROUGH OF OLD TAPPAN, BERGEN COUNTY, NEW JERSEY

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TITLE: INLET AREA MAP

SCALE: (H) 1"=30' (V), | DATE: 05/18/2021
PROJECT No: 1423-99-006

SHEET No: 3 OF 3 | Rev. #: 9

Plotted: 09/02/22 – 11:01 AM, By: glattmann
File: P:\DEOPC PROJECTS\1423 Capitol Seniors Housing\99-006 Old Tappan\Dwg\DA Maps\D142399006IDAM9.dwg, ---> 03 INLET AREA MAP

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