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Tarheel Lodging Redevelopment

Town of Chapel Hill

Orange County, North Carolina

GENERAL PROJECT DESCRIPTION AND SUPPLEMENTAL STORMWATER MANAGEMENT CALCULATIONS

Prepared By:

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5/31/19

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NC License #042486

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General Project Description/Stormwater Management

GENERAL PROJECT DESCRIPTION

The subject property is located within in the Town of Chapel Hill's Blue Hill (formerly Ephesus Fordham) District along 15/501 (Fordham Boulevard). The site is located at and address of 1740 & 1742 Fordham Boulevard. The existing site consists of a restaurant (Hong Kong Buffet) and hotel (Quality Inn). Tarheel Lodging, LLC & Unicorn Group Fifteen, LLC proposes to redevelop the existing parcels (PIN: 9799460556, 9799368876 & 9799461879). The proposed development will consist of a phased development. Phase 1 consists of the demolition and removal of all existing buildings and infrastructure within the existing restaurant parcel, while maintaining operation of the existing hotel during construction. Phase 1 includes the construction of a 95-Room Hotel development. The construction will also include the installation of landscaping, lighting, stormwater management and utilities necessary to support the development. Phase 2 consists of the demolition and removal of all existing buildings and infrastructure within the existing Quality Inn hotel parcel. Phase 2 includes the construction of a mixed-use development consisting of multifamily and an office development. Access to the site will be provided by the construction of two (2) public roadways. Pertinent data characterizing the existing and proposed site conditions are shown on the accompanying Blue Hill District Permit Plans.

STORMWATER MANAGEMENT

The pre-development condition of the site consists of two (3) points of interest. The existing site is located within the Cape Fear river basin and includes an impervious surface area of approximately 147,877 square feet. POI#1 is the existing storm conveyance system, located within the Novus Lane right of way (currently under construction), that ultimately drains into the NCDOT drainage system within the US 15/501 right of way, to the south of the proposed (currently under construction) Hillstone multifamily development. The Novus Lane collection system ultimately conveys to a point of interest located within the NCDOT drainage system along the US 15/501 right of way, to the south of the proposed (currently under construction) Hillstone multifamily development. A major portion of the stormwater runoff from the subject site will ultimately drain to this area. POI#2 is the existing off-site drainage pipe to the north of the subject property (within the Jiffy Lube development). A portion of the stormwater runoff from the subject site will ultimately drain to this low lying area. POI#3 is also part of the existing storm conveyance system within the Novus Lane right of way and ultimately drains to the south into the Novus Lane collection system as described above for POI#1. POI#1 and POI#3 converge to the south of the development adjacent to the Rams Plaza / Service Road drainage system. The Hillstone development has incorporated the additional flow associated with the subject development within the stormwater conveyance system. All points of interest and drainage areas have been depicted on the Pre- and Post-development Drainage Area Plans. Due to the existing site consisting of predominantly impervious surfaces, an assumed time of concentration of 5.0 minutes has been utilized. Hydrographs have been generated for the 1-, 2-, and 25-year storm events.

The post development condition maintains the same points of interest. The overall development proposes an increase in net land area impervious surface coverage by approximately 29,499 SF (total: 177,376 SF), and an increase in overall parcel impervious surface coverage by approximately 74,741 SF (total: 222,618 SF).

Proposed Underground Basin – A proposed underground basin, consisting of three (3) 42-inch perforated HDPE pipes has been incorporated into the development plans. This will capture a portion of the Phase 1 parking lot and roof areas and convey the runoff through the underground storage pipe system. This runoff is conveyed to the outlet structure that is proposed as part of Storm Manhole #4. This system will capture the post-development flows and release the peak flow to at or below the corresponding pre-development peak flows rates for POI#1.

The stormwater management analysis has been analyzed in accordance with the Town of Chapel Hill's Design Manual and NCDENR Stormwater BMP Manual requirements. The post-development conditions provide stormwater runoff rate control to reduce the post-development peak flows rates for the 1-, 2-, and 25-year storm events to be at or below the corresponding pre-development peak flow rates. Please refer to the attached Jordan Falls Lake Stormwater Accounting Tool for documentation concerning the nutrient loading analysis associated with the development.

The SCS Method was utilized for calculating the peak runoff rates and generating hydrographs for the pre-development and post-development areas as defined in the computer watershed software "Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2015®. The hydrographs were generated based upon the precipitation intensities provided by NOAA Atlas 14, Volume 2, Version 3 for each corresponding storm event.

STORMWATER CONVEYANCE

The storm drainage system was designed to intercept runoff at topographic low points and areas of significant runoff quantities and convey the stormwater runoff to the existing roadway stormwater conveyance facilities that surround the development. StormCAD Version 8i® has been utilized for designing the stormwater conveyance system. Conveyance design precipitation amounts are based upon NOAA Atlas 14, Volume 2, Version 3 for the 10- and 25-year storm events. The storm drainage analysis includes the conveyance through the subject development and the adjacent development's conveyance system as the adjacent development's conveyance piping network was increased in capacity to support the proposed overall development.

STORMWATER ANALYSIS SUMMARY (PEAK FLOW)

Peak Discharge Flowrates, Q (cfs)

Point of Interest: POI#1

Design Storm	Pre-development (cfs)	Phase 1 Post-development		Phase 2 Post-development	
		w/ Mitigation (cfs)	Δ(PRE)-(POST w/Mitigation) (cfs)	w/ Mitigation (cfs)	Δ(PRE)-(POST w/Mitigation) (cfs)
1-yr, 24-hr	20.47	16.35	-4.12	13.99	-6.48
2-yr, 24-hr	25.70	22.13	-3.57	18.68	-7.02
25-yr, 24-hr	47.20	43.78	-3.42	35.91	-11.29

Peak Discharge Flowrates, Q *(cfs)*

Point of Interest: POI#2

Design Storm	Pre-development (cfs)	Phase 1 Post-development		Phase 2 Post-development	
		w/out Mitigation (cfs)	Δ(PRE)-(POST w/Mitigation) (cfs)	w/ Mitigation (cfs)	Δ(PRE)-(POST w/Mitigation) (cfs)
1-yr, 24-hr	0.675	0.675	0.000	0.357	-0.293
2-yr, 24-hr	0.904	0.904	0.000	0.462	-0.454
25-yr, 24-hr	1.889	1.889	0.000	0.901	-0.918

Peak Discharge Flowrates, Q *(cfs)*

Point of Interest: POI#3

Design Storm	Pre-development (cfs)	Phase 1 Post-development		Phase 2 Post-development	
		w/out Mitigation (cfs)	Δ(PRE)-(POST w/Mitigation) (cfs)	w/ Mitigation (cfs)	Δ(PRE)-(POST w/Mitigation) (cfs)
1-yr, 24-hr	0.300	0.300	0.000	5.886	+5.586
2-yr, 24-hr	0.402	0.402	0.000	7.197	+6.795
25-yr, 24-hr	0.840	0.840	0.000	12.60	+11.76

Peak Discharge Flowrates, Q *(cfs)*

TOTAL DEVELOPMENT

Design Storm	Pre-development	Phase 1 Post-development		Phase 2 Post-development	
		w/ Mitigation	$\Delta_{(PRE)-(POST\ w/Mitigation)}$	w/ Mitigation	$\Delta_{(PRE)-(POST\ w/Mitigation)}$
	(cfs)	*(cfs)*	*(cfs)*	*(cfs)*	*(cfs)*
1-yr, 24-hr	21.45	17.32	-4.13	19.98	-1.47
2-yr, 24-hr	27.01	23.41	-3.60	26.02	-0.99
25-yr, 24-hr	49.93	46.42	-3.51	48.81	-1.12

Runoff Volumes *(ft^3)*

Point of Analysis (POA) or Basin ID	2-Yr, 24-hr Storm (Phase 2)		
	Pre-development	Post-development	$\Delta_{(PRE)-(POST)}$
	(ft^3)	(ft^3)	(ft^3)
1	54,748	48,484	-6,264
2	1,835	953	-882
3	815	16,216	+15,401
Total	57,398	65,653	+8,255

WATER QUALITY ANALYSIS SUMMARY

Filterra – Six (6) proposed Filterra biofiltration devices have been incorporated throughout the site. These systems will capture a portion of the overall drainage areas and treat the flow through a high-flow media at a rate of 140 inches per hour. Each sub-watershed area has been depicted on the Water Quality Drainage Area Plan and have been designed in accordance with the NCDEQ Stormwater Design Manual. The total drainage area to these water quality units is 115,127 SF. This treats the required 50% of parcel area impervious as part of the overall development (222,618 x 50% = 111,309 SF).

Water Quality Areas (ft^2)

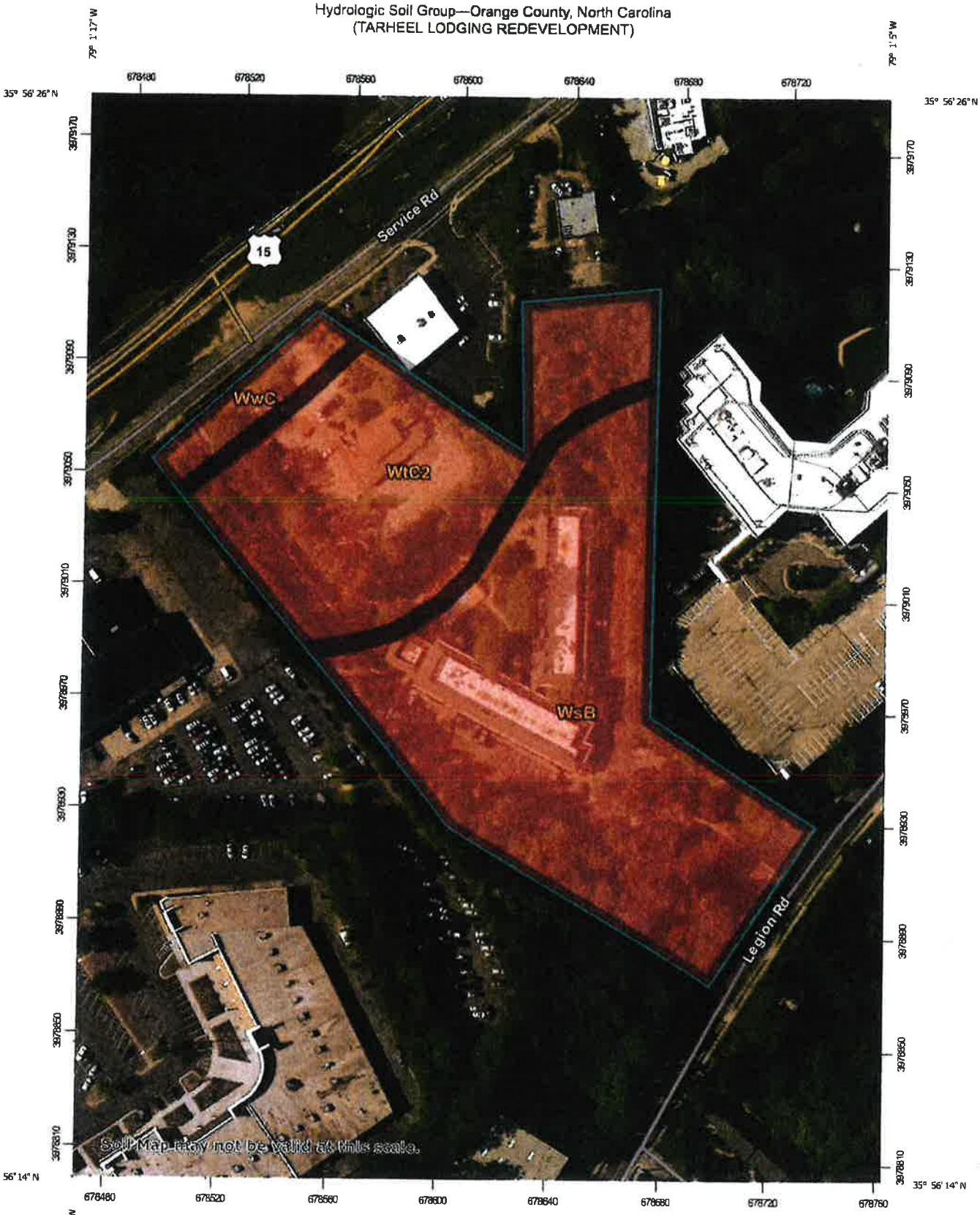
Water Quality Unit	Water Quality Unit Summary		
	Drainage Area	Vault size	Media Size
	(ft^2)	(ft)	(ft^2)
1	10,935	5x15	4x12
2	38,507	11x15	10x12*
3	15,986	7x15	6x12
4	14,306	7x13	6x10
5	21,090	8x16	7x13
6	14,303	7x15	6x12
TOTAL	115,127	N/A	N/A

*Sized utilizing the NCDEQ Stormater BMP manual sizing (non-standard size)

U:\Accounts\RKINV\RKINV18001 - Hotel Site Chapel Hill\ANALYTICAL\CALCULATIONS\STORMWATER\20190521 - Rev 4\Stormwater Report - 20190531.docx

SOILS MAP

Hydrologic Soil Group—Orange County, North Carolina
(TARHEEL LODGING REDEVELOPMENT)



Map Scale: 1:1,880 if printed on A portrait (8.5" x 11") sheet.

N

0 25 50 100 150 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
WsB	White Store loam, 2 to 6 percent slopes	D	4.1	58.2%
WtC2	White Store clay loam, 6 to 15 percent slopes, moderately eroded	D	2.6	36.6%
WwC	White Store-Urban land complex, 2 to 8 percent slopes	D	0.4	5.2%
Totals for Area of Interest			**7.0**	**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.

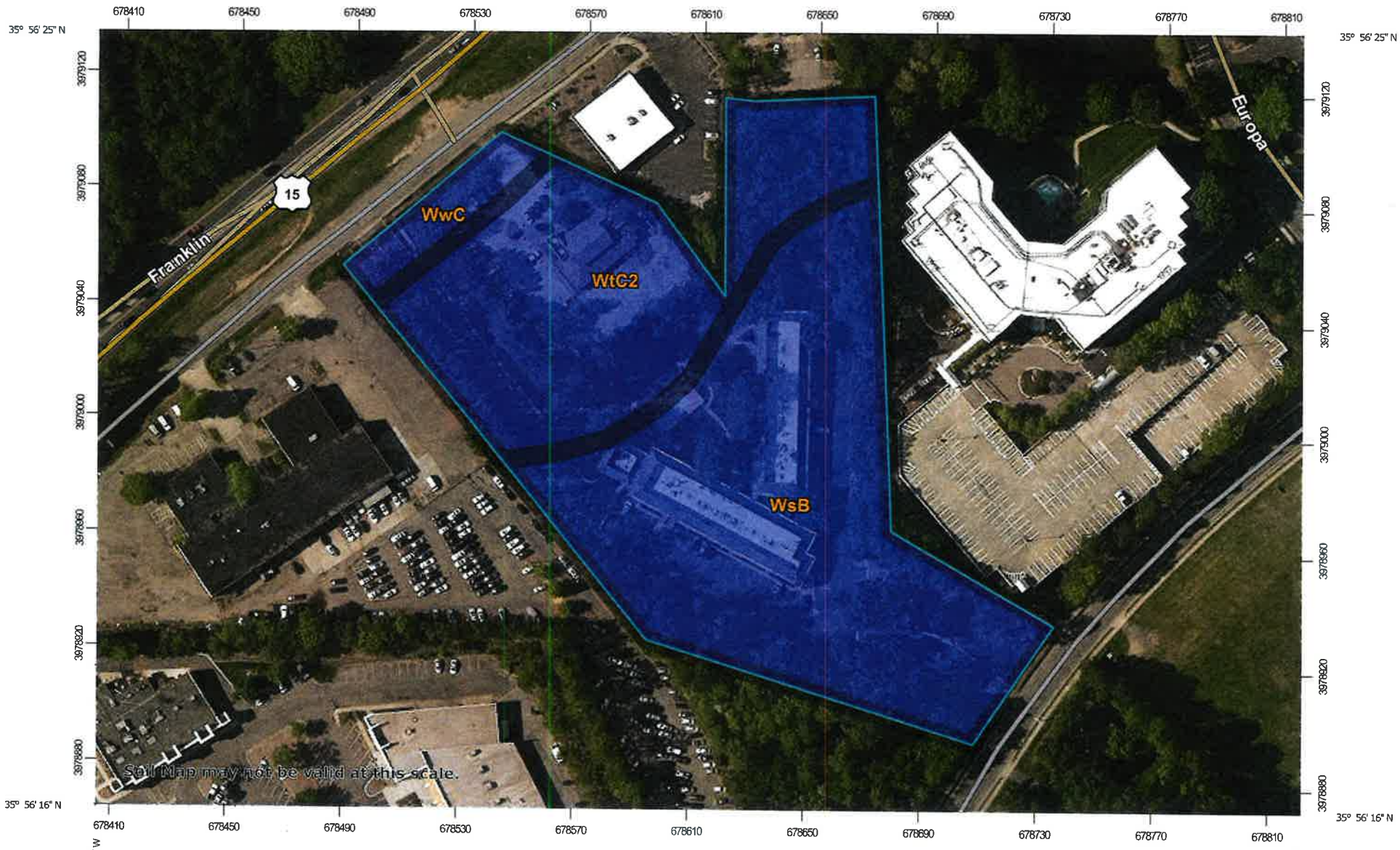
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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.

Depth to a Selected Soil Restrictive Layer: Lithic bedrock—Orange County, North Carolina
(Depth to Bedrock)



Map Scale: 1:1,900 if printed on A landscape (11" x 8.5") sheet.

N

0 25 50 100 150 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- 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 1:20,000.

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: Orange County, North Carolina
Survey Area Data: Version 17, Oct 2, 2017

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

Date(s) aerial images were photographed: Apr 27, 2014—May 6, 2014

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.

Depth to a Selected Soil Restrictive Layer: Lithic bedrock

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
WsB	White Store loam, 2 to 6 percent slopes	>200	3.9	57.7%
WtC2	White Store clay loam, 6 to 15 percent slopes, moderately eroded	>200	2.6	37.3%
WwC	White Store-Urban land complex, 2 to 8 percent slopes	>200	0.3	4.9%
Totals for Area of Interest			**6.8**	**100.0%**

Description

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to the user selected type of restrictive layer as described in for each map unit. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Restriction Kind: Lithic bedrock

Aggregation Method: Dominant Component

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

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

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

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

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

Tie-break Rule: Lower

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

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Depth to Water Table—Orange County, North Carolina
(Depth to Water Table)

Map Scale: 1:1,900 if printed on A landscape (11" x 8.5") sheet.

N

0 25 50 100 150 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- 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 1:20,000.

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: Orange County, North Carolina
Survey Area Data: Version 17, Oct 2, 2017

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

Date(s) aerial images were photographed: Apr 27, 2014—May 6, 2014

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.

Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
WsB	White Store loam, 2 to 6 percent slopes	38	3.9	57.7%
WtC2	White Store clay loam, 6 to 15 percent slopes, moderately eroded	38	2.6	37.3%
WwC	White Store-Urban land complex, 2 to 8 percent slopes	38	0.3	4.9%
Totals for Area of Interest			**6.8**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

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

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

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

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

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

Tie-break Rule: Lower

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

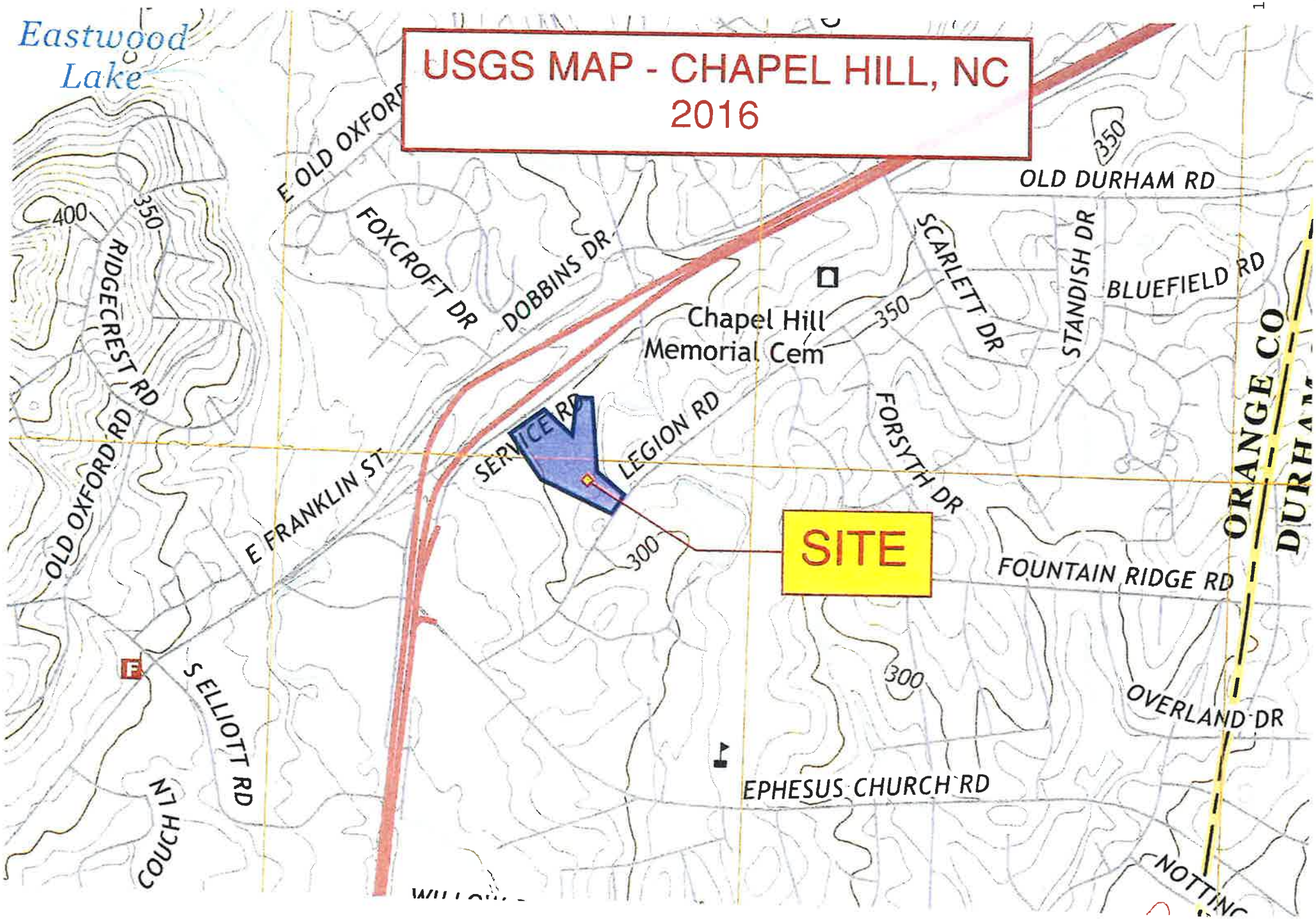
Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Beginning Month: January

Ending Month: December

USGS MAP


USGS MAP - CHAPEL HILL, NC
2016
Eastwood Lake
E OLD OXFORD
FOXCROFT DR
DOBBINS DR
RIDGECREST RD
OLD OXFORD RD
400
350
Chapel Hill Memorial Cem
SCARLETT DR
STANDISH DR
BLUEFIELD RD
OLD DURHAM RD
350
SERVICE RD
LEGION RD
FORSYTH DR
E FRANKLIN ST
300
SITE
FOUNTAIN RIDGE RD
ORANGE CO
DURHAM
S ELLIOTT RD
COUCH LN
300
OVERLAND DR
EPHESUS CHURCH RD
NOTTING

NOAA Atlas 14, Volume 2, Version 3
Location name: Chapel Hill, North Carolina, USA*
Latitude: 35.8908°, Longitude: -79.0582°
Elevation: 354.67 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.93 (4.52-5.40)	5.81 (5.33-6.36)	6.68 (6.13-7.31)	7.39 (6.76-8.06)	8.11 (7.38-8.84)	8.63 (7.82-9.40)	9.08 (8.20-9.90)	9.48 (8.50-10.3)	9.89 (8.80-10.8)	10.2 (9.00-11.2)
10-min	3.94 (3.61-4.31)	4.65 (4.26-5.08)	5.36 (4.91-5.85)	5.91 (5.40-6.44)	6.47 (5.89-7.05)	6.87 (6.23-7.49)	7.22 (6.51-7.87)	7.51 (6.73-8.20)	7.82 (6.95-8.55)	8.05 (7.09-8.81)
15-min	3.28 (3.01-3.59)	3.90 (3.57-4.26)	4.52 (4.14-4.94)	4.98 (4.56-5.44)	5.46 (4.97-5.96)	5.80 (5.26-6.32)	6.08 (5.49-6.63)	6.32 (5.66-6.90)	6.56 (5.84-7.17)	6.74 (5.93-7.37)
30-min	2.25 (2.06-2.46)	2.69 (2.47-2.94)	3.21 (2.94-3.51)	3.61 (3.30-3.94)	4.05 (3.68-4.41)	4.37 (3.96-4.76)	4.66 (4.20-5.08)	4.92 (4.41-5.37)	5.22 (4.64-5.71)	5.46 (4.80-5.97)
60-min	1.40 (1.29-1.53)	1.69 (1.55-1.85)	2.06 (1.89-2.25)	2.35 (2.15-2.56)	2.69 (2.45-2.94)	2.96 (2.68-3.22)	3.21 (2.89-3.50)	3.45 (3.09-3.76)	3.75 (3.33-4.09)	3.98 (3.51-4.36)
2-hr	0.838 (0.764-0.922)	1.01 (0.924-1.11)	1.24 (1.14-1.37)	1.43 (1.30-1.57)	1.66 (1.50-1.82)	1.85 (1.66-2.02)	2.03 (1.81-2.22)	2.21 (1.96-2.41)	2.44 (2.14-2.67)	2.62 (2.29-2.88)
3-hr	0.594 (0.544-0.652)	0.717 (0.658-0.788)	0.885 (0.810-0.971)	1.03 (0.935-1.12)	1.20 (1.09-1.31)	1.34 (1.21-1.47)	1.49 (1.33-1.63)	1.63 (1.45-1.78)	1.82 (1.60-1.99)	1.99 (1.72-2.18)
6-hr	0.358 (0.329-0.392)	0.432 (0.397-0.472)	0.533 (0.489-0.583)	0.619 (0.566-0.676)	0.730 (0.663-0.794)	0.821 (0.741-0.894)	0.914 (0.817-0.993)	1.01 (0.893-1.10)	1.14 (0.993-1.24)	1.25 (1.07-1.36)
12-hr	0.211 (0.194-0.230)	0.254 (0.234-0.277)	0.315 (0.289-0.343)	0.368 (0.337-0.400)	0.438 (0.397-0.475)	0.497 (0.447-0.537)	0.557 (0.497-0.601)	0.620 (0.547-0.669)	0.708 (0.613-0.764)	0.784 (0.668-0.847)
24-hr	0.123 (0.116-0.132)	0.149 (0.140-0.159)	0.186 (0.174-0.199)	0.215 (0.201-0.230)	0.255 (0.237-0.272)	0.286 (0.266-0.306)	0.318 (0.294-0.340)	0.351 (0.324-0.376)	0.396 (0.364-0.425)	0.431 (0.395-0.465)
2-day	0.072 (0.067-0.077)	0.087 (0.081-0.093)	0.108 (0.101-0.115)	0.124 (0.116-0.132)	0.145 (0.135-0.155)	0.163 (0.151-0.174)	0.180 (0.167-0.193)	0.198 (0.182-0.212)	0.222 (0.204-0.239)	0.241 (0.221-0.260)
3-day	0.051 (0.048-0.054)	0.061 (0.057-0.065)	0.075 (0.071-0.081)	0.087 (0.081-0.093)	0.102 (0.095-0.109)	0.114 (0.106-0.122)	0.126 (0.116-0.135)	0.138 (0.127-0.149)	0.155 (0.143-0.167)	0.169 (0.154-0.182)
4-day	0.040 (0.038-0.043)	0.048 (0.045-0.052)	0.059 (0.056-0.063)	0.068 (0.064-0.073)	0.080 (0.074-0.086)	0.089 (0.083-0.096)	0.099 (0.091-0.106)	0.109 (0.100-0.117)	0.122 (0.112-0.132)	0.133 (0.121-0.144)
7-day	0.026 (0.025-0.028)	0.031 (0.030-0.034)	0.038 (0.036-0.041)	0.044 (0.041-0.046)	0.051 (0.048-0.054)	0.057 (0.053-0.061)	0.063 (0.058-0.067)	0.069 (0.064-0.074)	0.077 (0.071-0.083)	0.084 (0.077-0.090)
10-day	0.021 (0.020-0.022)	0.025 (0.024-0.027)	0.030 (0.028-0.032)	0.034 (0.032-0.036)	0.039 (0.037-0.042)	0.043 (0.041-0.046)	0.048 (0.044-0.051)	0.052 (0.048-0.055)	0.058 (0.053-0.062)	0.062 (0.057-0.067)
20-day	0.014 (0.013-0.015)	0.017 (0.016-0.018)	0.020 (0.019-0.021)	0.022 (0.021-0.023)	0.025 (0.024-0.027)	0.028 (0.026-0.029)	0.030 (0.028-0.032)	0.033 (0.031-0.035)	0.036 (0.034-0.039)	0.039 (0.036-0.042)
30-day	0.012 (0.011-0.012)	0.014 (0.013-0.014)	0.016 (0.015-0.017)	0.018 (0.017-0.019)	0.020 (0.019-0.021)	0.022 (0.020-0.023)	0.023 (0.022-0.025)	0.025 (0.023-0.027)	0.027 (0.026-0.029)	0.029 (0.027-0.031)
45-day	0.010 (0.009-0.010)	0.012 (0.011-0.012)	0.013 (0.013-0.014)	0.015 (0.014-0.015)	0.016 (0.015-0.017)	0.018 (0.017-0.018)	0.019 (0.018-0.020)	0.020 (0.019-0.021)	0.022 (0.020-0.023)	0.023 (0.021-0.024)
60-day	0.009 (0.009-0.009)	0.010 (0.010-0.011)	0.012 (0.011-0.012)	0.013 (0.012-0.013)	0.014 (0.013-0.015)	0.015 (0.014-0.016)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.018 (0.017-0.019)	0.019 (0.018-0.020)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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NOAA Atlas 14, Volume 2, Version 3
Location name: Chapel Hill, North Carolina, USA*
Latitude: 35.8908°, Longitude: -79.0582°
Elevation: 354.67 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.411 (0.377-0.450)	0.484 (0.444-0.530)	0.557 (0.511-0.609)	0.616 (0.563-0.672)	0.676 (0.615-0.737)	0.719 (0.652-0.783)	0.757 (0.683-0.825)	0.790 (0.708-0.862)	0.824 (0.733-0.901)	0.852 (0.750-0.932)
10-min	0.657 (0.602-0.718)	0.775 (0.710-0.847)	0.893 (0.818-0.975)	0.985 (0.900-1.07)	1.08 (0.981-1.18)	1.15 (1.04-1.25)	1.20 (1.08-1.31)	1.25 (1.12-1.37)	1.30 (1.16-1.43)	1.34 (1.18-1.47)
15-min	0.821 (0.752-0.898)	0.974 (0.893-1.06)	1.13 (1.03-1.23)	1.25 (1.14-1.36)	1.37 (1.24-1.49)	1.45 (1.31-1.58)	1.52 (1.37-1.66)	1.58 (1.42-1.72)	1.64 (1.46-1.79)	1.68 (1.48-1.84)
30-min	1.13 (1.03-1.23)	1.34 (1.23-1.47)	1.60 (1.47-1.75)	1.80 (1.65-1.97)	2.02 (1.84-2.21)	2.18 (1.98-2.38)	2.33 (2.10-2.54)	2.46 (2.20-2.68)	2.61 (2.32-2.85)	2.73 (2.40-2.98)
60-min	1.40 (1.29-1.53)	1.69 (1.55-1.85)	2.06 (1.89-2.25)	2.35 (2.15-2.56)	2.69 (2.45-2.94)	2.96 (2.68-3.22)	3.21 (2.89-3.50)	3.45 (3.09-3.76)	3.75 (3.33-4.09)	3.98 (3.51-4.36)
2-hr	1.68 (1.53-1.84)	2.02 (1.85-2.22)	2.49 (2.27-2.73)	2.86 (2.60-3.14)	3.33 (3.01-3.64)	3.70 (3.33-4.05)	4.05 (3.62-4.44)	4.41 (3.92-4.83)	4.87 (4.28-5.33)	5.25 (4.57-5.76)
3-hr	1.78 (1.63-1.96)	2.15 (1.98-2.37)	2.66 (2.43-2.92)	3.08 (2.81-3.37)	3.61 (3.27-3.94)	4.04 (3.64-4.41)	4.46 (3.99-4.88)	4.90 (4.35-5.35)	5.48 (4.80-5.99)	5.96 (5.17-6.54)
6-hr	2.14 (1.97-2.35)	2.58 (2.38-2.83)	3.19 (2.93-3.49)	3.71 (3.39-4.04)	4.37 (3.97-4.75)	4.92 (4.44-5.35)	5.47 (4.89-5.95)	6.04 (5.35-6.57)	6.81 (5.94-7.41)	7.47 (6.43-8.14)
12-hr	2.54 (2.34-2.77)	3.06 (2.82-3.33)	3.79 (3.49-4.13)	4.43 (4.05-4.82)	5.27 (4.79-5.72)	5.98 (5.39-6.47)	6.71 (5.98-7.24)	7.47 (6.59-8.06)	8.53 (7.39-9.21)	9.45 (8.05-10.2)
24-hr	2.96 (2.77-3.16)	3.57 (3.35-3.82)	4.46 (4.18-4.76)	5.16 (4.83-5.51)	6.11 (5.69-6.53)	6.86 (6.38-7.33)	7.62 (7.07-8.16)	8.41 (7.77-9.02)	9.50 (8.73-10.2)	10.4 (9.47-11.2)
2-day	3.46 (3.24-3.69)	4.16 (3.90-4.45)	5.16 (4.84-5.52)	5.94 (5.55-6.35)	6.98 (6.50-7.46)	7.80 (7.25-8.35)	8.64 (8.00-9.26)	9.49 (8.75-10.2)	10.7 (9.79-11.5)	11.6 (10.6-12.5)
3-day	3.66 (3.43-3.91)	4.40 (4.12-4.70)	5.43 (5.09-5.80)	6.24 (5.83-6.67)	7.33 (6.82-7.83)	8.18 (7.60-8.76)	9.06 (8.38-9.72)	9.96 (9.18-10.7)	11.2 (10.3-12.1)	12.2 (11.1-13.1)
4-day	3.86 (3.62-4.13)	4.63 (4.34-4.95)	5.70 (5.34-6.08)	6.53 (6.11-6.98)	7.67 (7.14-8.21)	8.57 (7.95-9.18)	9.48 (8.77-10.2)	10.4 (9.61-11.2)	11.7 (10.7-12.6)	12.8 (11.6-13.8)
7-day	4.44 (4.18-4.72)	5.29 (4.99-5.64)	6.43 (6.06-6.85)	7.33 (6.90-7.81)	8.56 (8.03-9.13)	9.53 (8.91-10.2)	10.5 (9.80-11.3)	11.6 (10.7-12.4)	13.0 (11.9-13.9)	14.1 (12.9-15.1)
10-day	5.04 (4.77-5.36)	5.99 (5.66-6.37)	7.20 (6.79-7.65)	8.14 (7.66-8.65)	9.41 (8.84-10.0)	10.4 (9.74-11.1)	11.4 (10.7-12.2)	12.5 (11.6-13.3)	13.9 (12.8-14.8)	14.9 (13.8-16.0)
20-day	6.75 (6.38-7.14)	7.96 (7.53-8.42)	9.40 (8.88-9.94)	10.5 (9.95-11.2)	12.1 (11.4-12.8)	13.3 (12.5-14.1)	14.5 (13.6-15.5)	15.8 (14.7-16.8)	17.5 (16.2-18.7)	18.8 (17.4-20.1)
30-day	8.38 (7.94-8.86)	9.86 (9.34-10.4)	11.5 (10.8-12.1)	12.7 (12.0-13.4)	14.3 (13.5-15.1)	15.6 (14.7-16.5)	16.8 (15.8-17.8)	18.1 (16.9-19.2)	19.8 (18.4-21.0)	21.0 (19.5-22.4)
45-day	10.7 (10.2-11.2)	12.5 (11.9-13.1)	14.3 (13.6-15.0)	15.7 (14.9-16.5)	17.5 (16.6-18.4)	18.9 (17.9-19.9)	20.3 (19.1-21.3)	21.6 (20.4-22.8)	23.4 (21.9-24.7)	24.8 (23.1-26.2)
60-day	12.8 (12.3-13.4)	14.9 (14.3-15.6)	16.9 (16.1-17.7)	18.3 (17.5-19.2)	20.2 (19.3-21.2)	21.7 (20.6-22.8)	23.1 (21.9-24.2)	24.4 (23.1-25.7)	26.2 (24.7-27.6)	27.5 (25.9-29.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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PHASE 1 STORMWATER ANALYSIS

POINT OF INTEREST #1

COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Pre-Development POI#1	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	3.19	312.62
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	2.76	231.84
		TOTAL:	5.95	544.46

C (weighted)	Total (C) / Total (B)	544.46 / 5.95	91.5059	Use C =	**92**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

Hydrograph Report

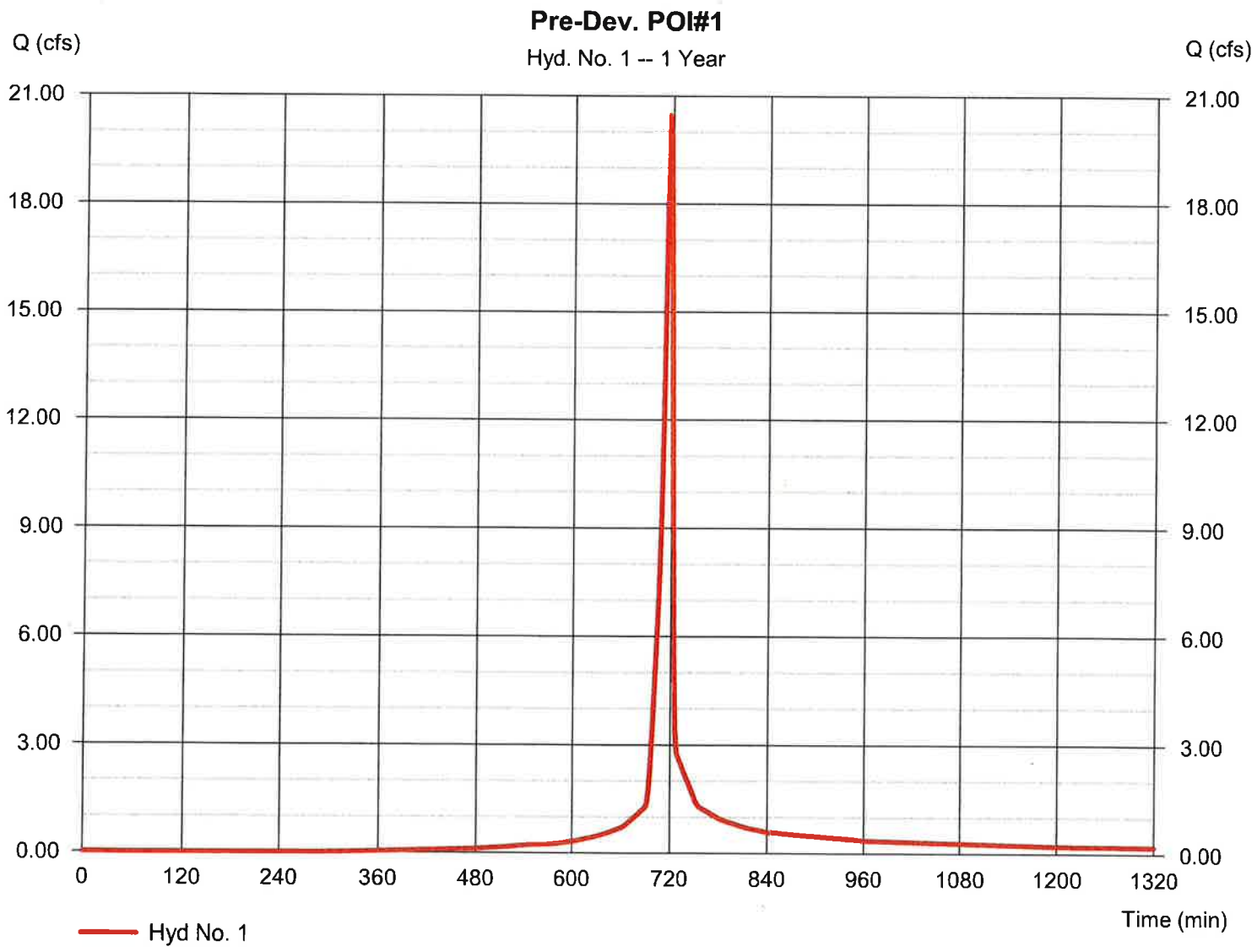
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 1

Pre-Dev. POI#1

Hydrograph type	= SCS Runoff	Peak discharge	= 20.47 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 42,995 cuft
Drainage area	= 5.950 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.790 x 80) + (3.190 x 98)] / 5.950



Hydrograph Report

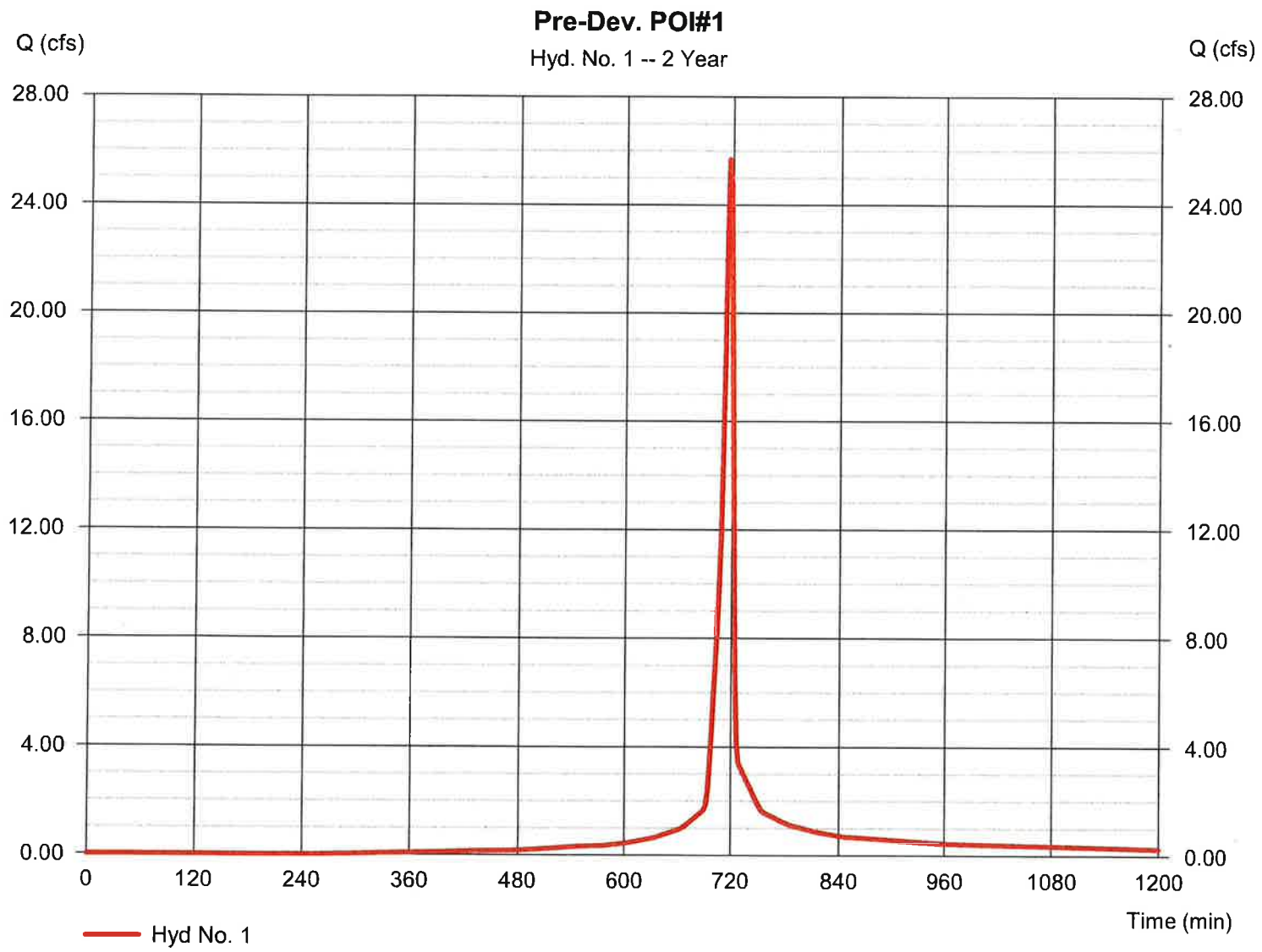
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 1

Pre-Dev. POI#1

Hydrograph type	= SCS Runoff	Peak discharge	= 25.70 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 54,748 cuft
Drainage area	= 5.950 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.790 x 80) + (3.190 x 98)] / 5.950



Hydrograph Report

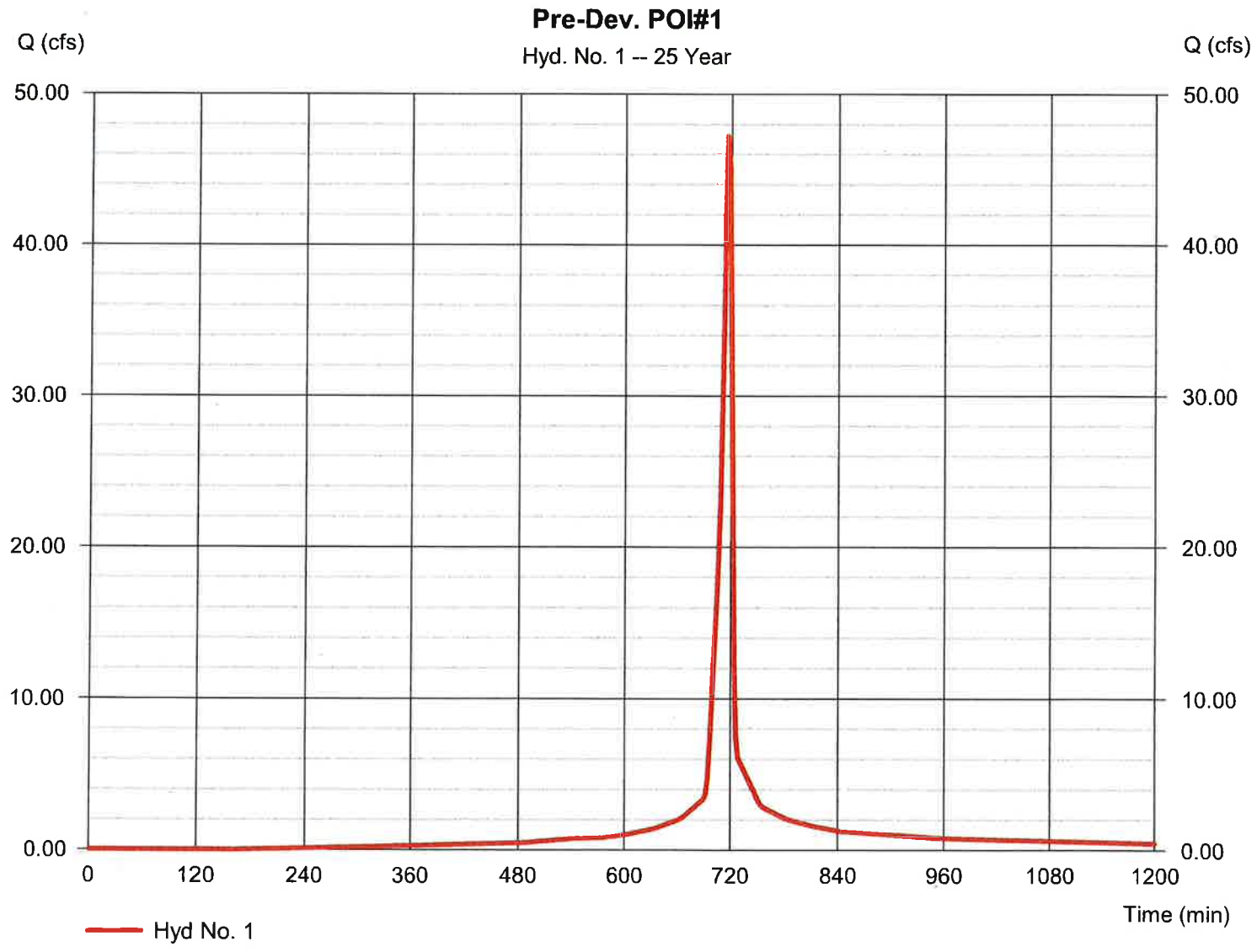
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 1

Pre-Dev. POI#1

Hydrograph type	= SCS Runoff	Peak discharge	= 47.20 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 104,840 cuft
Drainage area	= 5.950 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.790 x 80) + (3.190 x 98)] / 5.950



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Post-Development POI#1 (unmanaged)	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	2.25	220.50
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	2.20	184.80
		TOTAL:	4.45	405.3

C (weighted)	Total (C) / Total (B)	405.3 / 4.45	91.0787	Use C =	**91**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

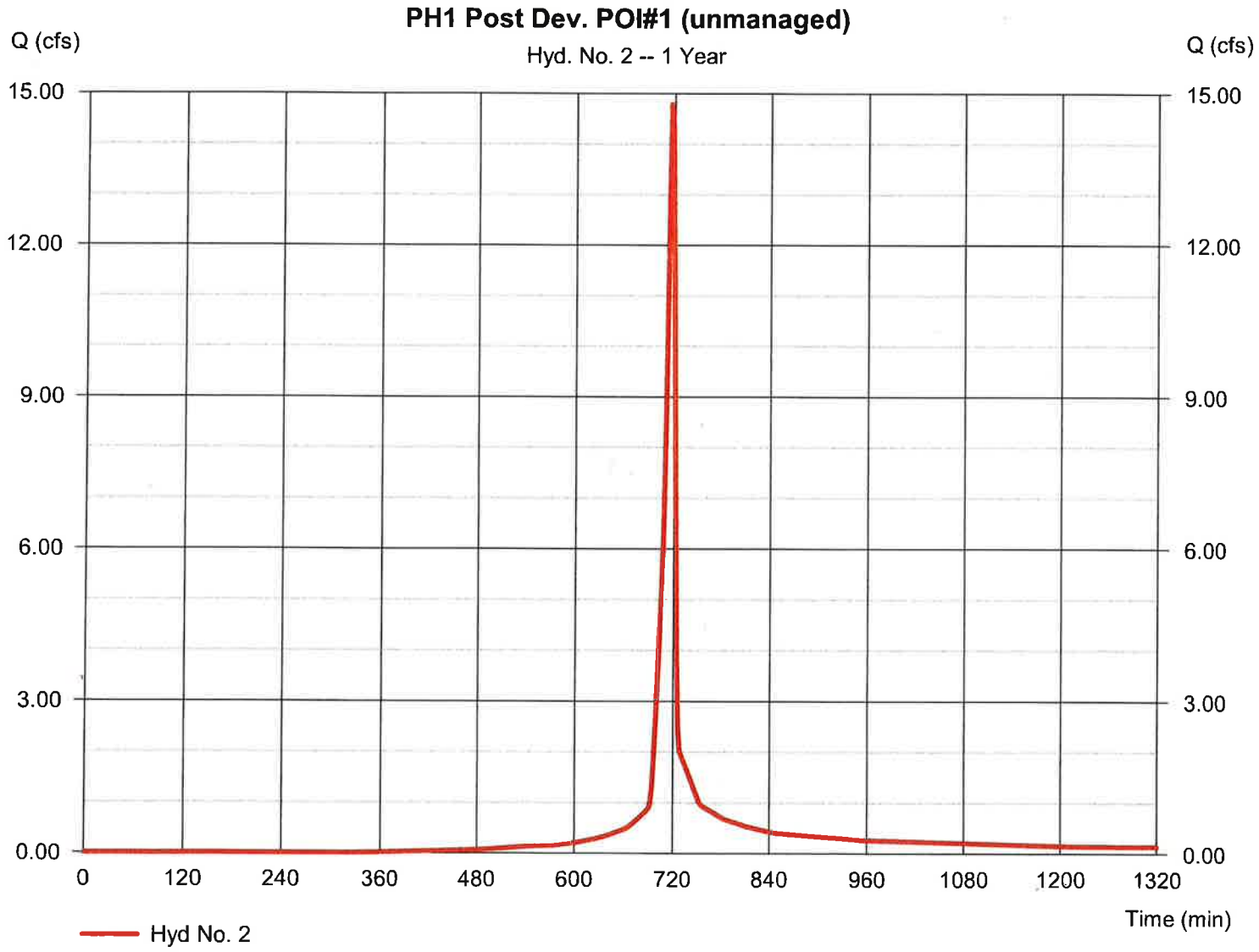
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 2

PH1 Post Dev. POI#1 (unmanaged)

Hydrograph type	= SCS Runoff	Peak discharge	= 14.80 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 30,802 cuft
Drainage area	= 4.450 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



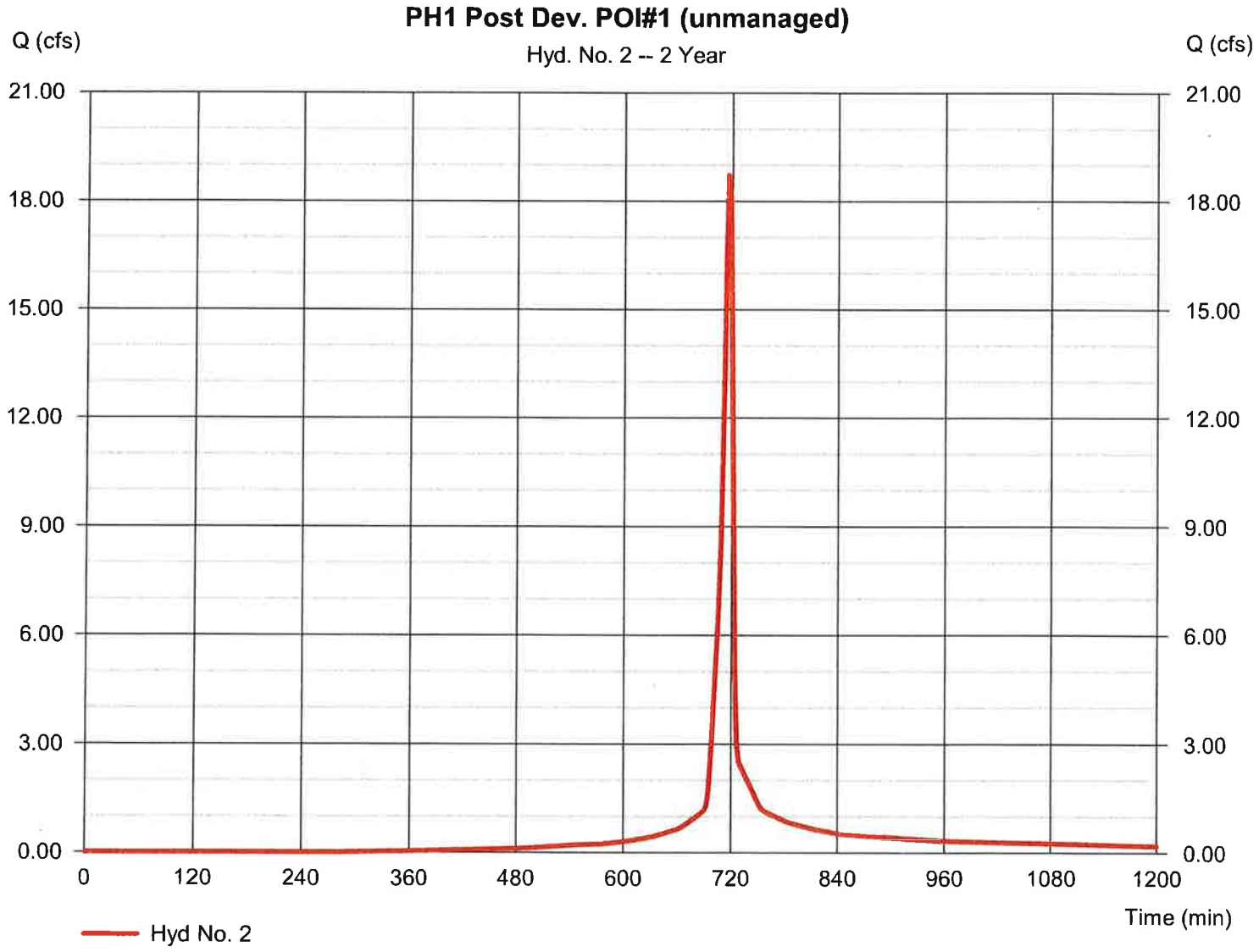
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 2

PH1 Post Dev. POI#1 (unmanaged)

Hydrograph type	= SCS Runoff	Peak discharge	= 18.72 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 39,487 cuft
Drainage area	= 4.450 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



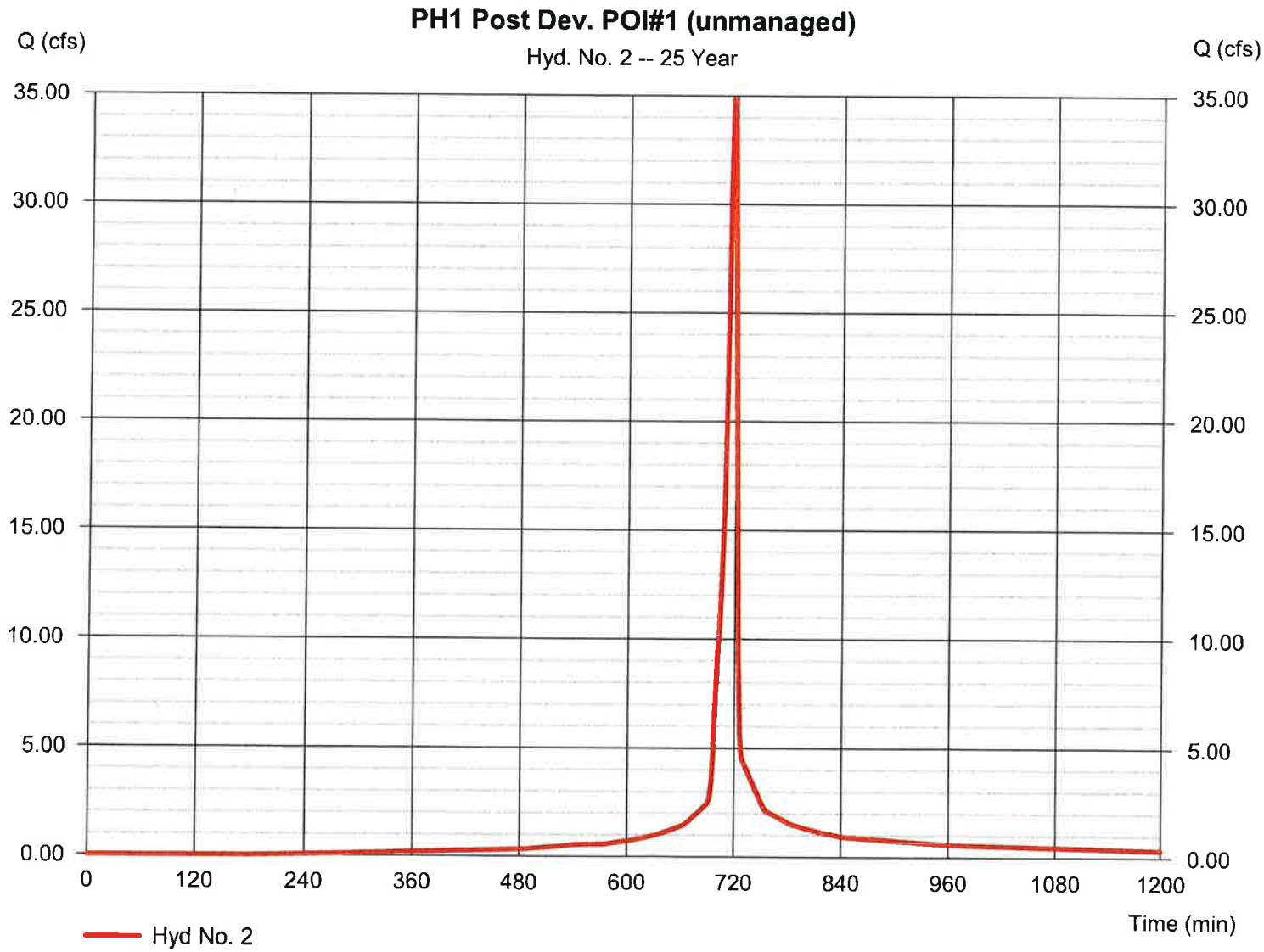
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 2

PH1 Post Dev. POI#1 (unmanaged)

Hydrograph type	= SCS Runoff	Peak discharge	= 34.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 76,703 cuft
Drainage area	= 4.450 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Post-Development POI#1 (Basin Inflow)	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	1.19	116.62
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.31	26.04
		TOTAL:	1.5	142.66

C (weighted)	Total (C) / Total (B)	142.66 / 1.5	95.1067	Use C =	**95**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

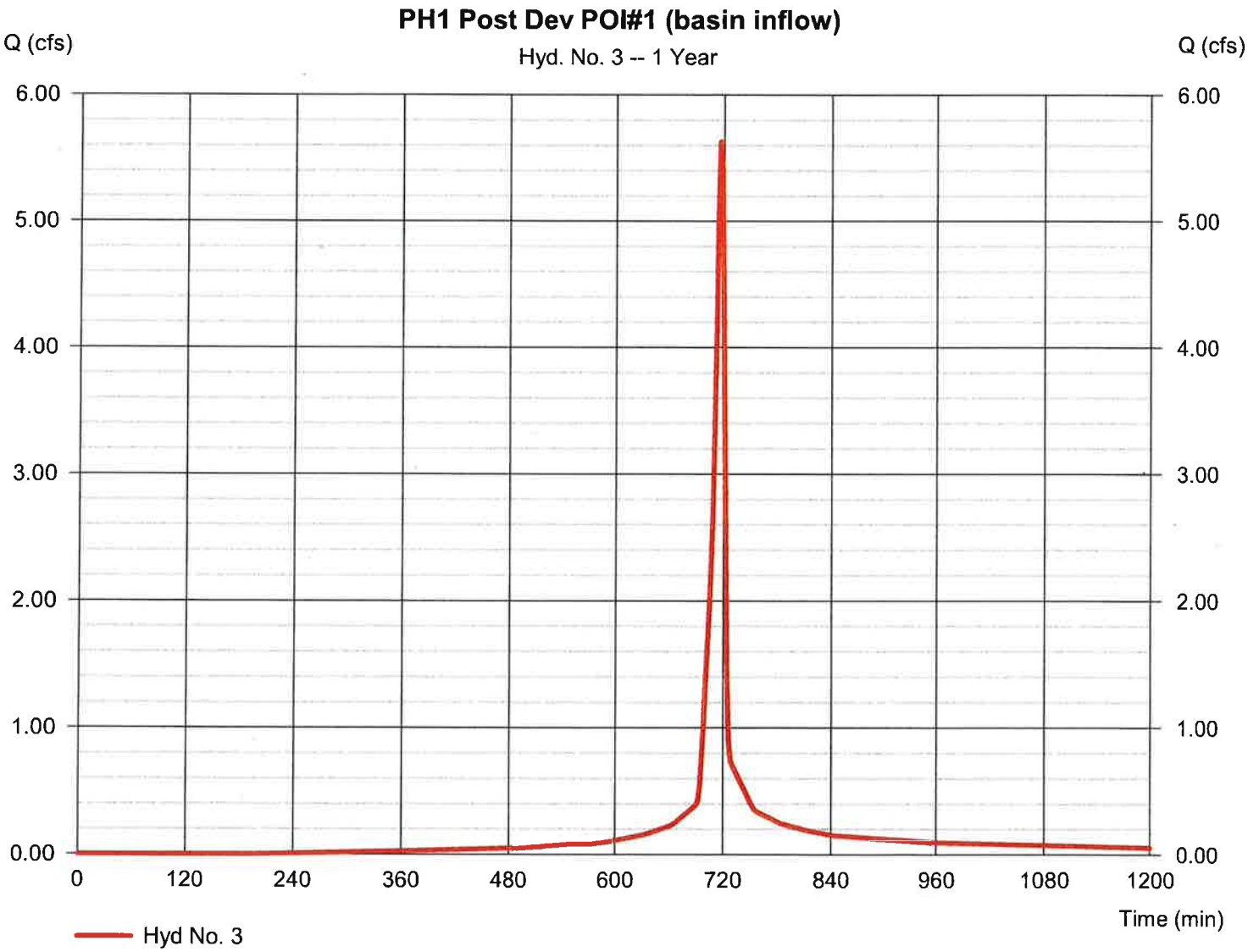
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 3

PH1 Post Dev POI#1 (basin inflow)

Hydrograph type	= SCS Runoff	Peak discharge	= 5.635 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 12,304 cuft
Drainage area	= 1.500 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



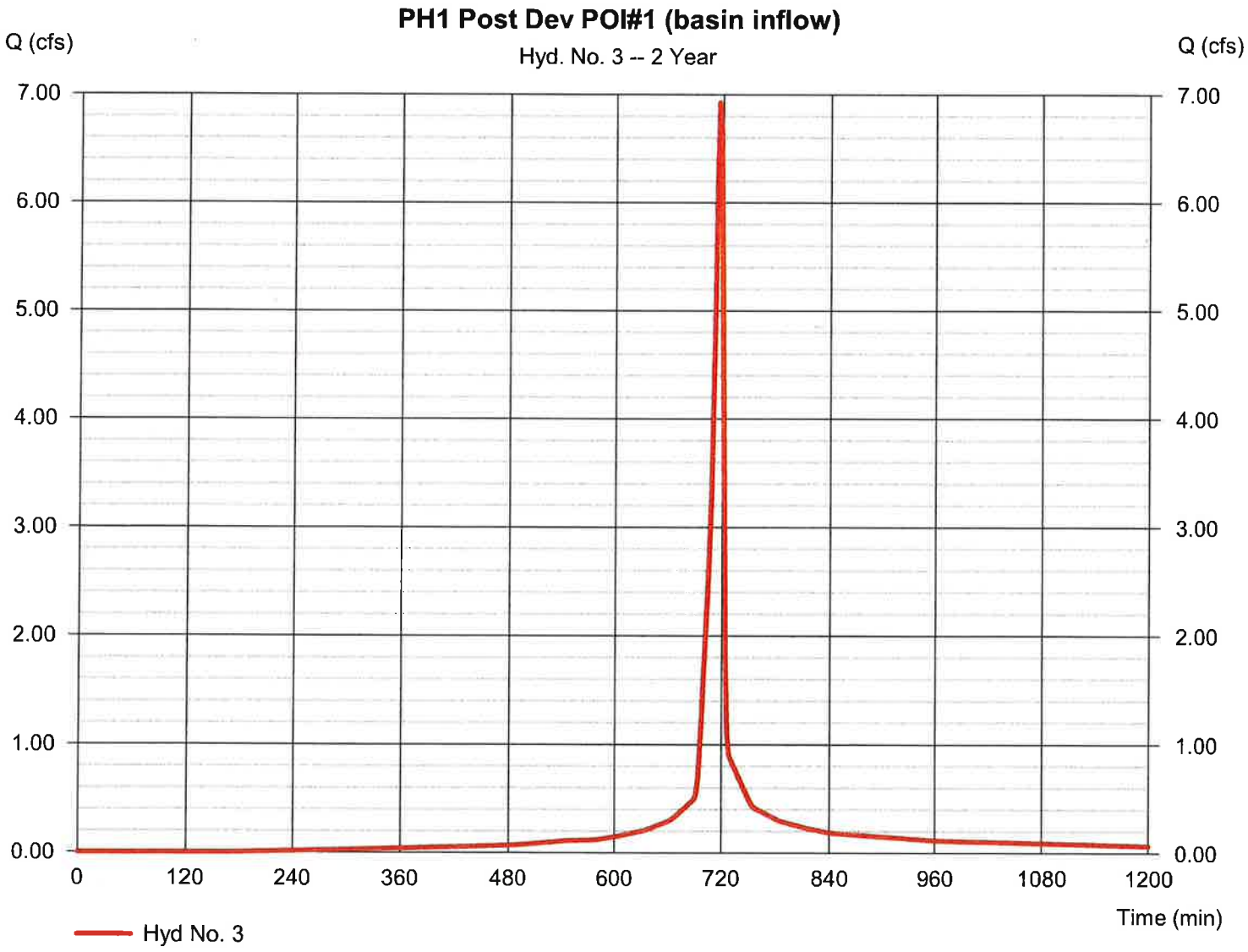
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 3

PH1 Post Dev POI#1 (basin inflow)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.932 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 15,354 cuft
Drainage area	= 1.500 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



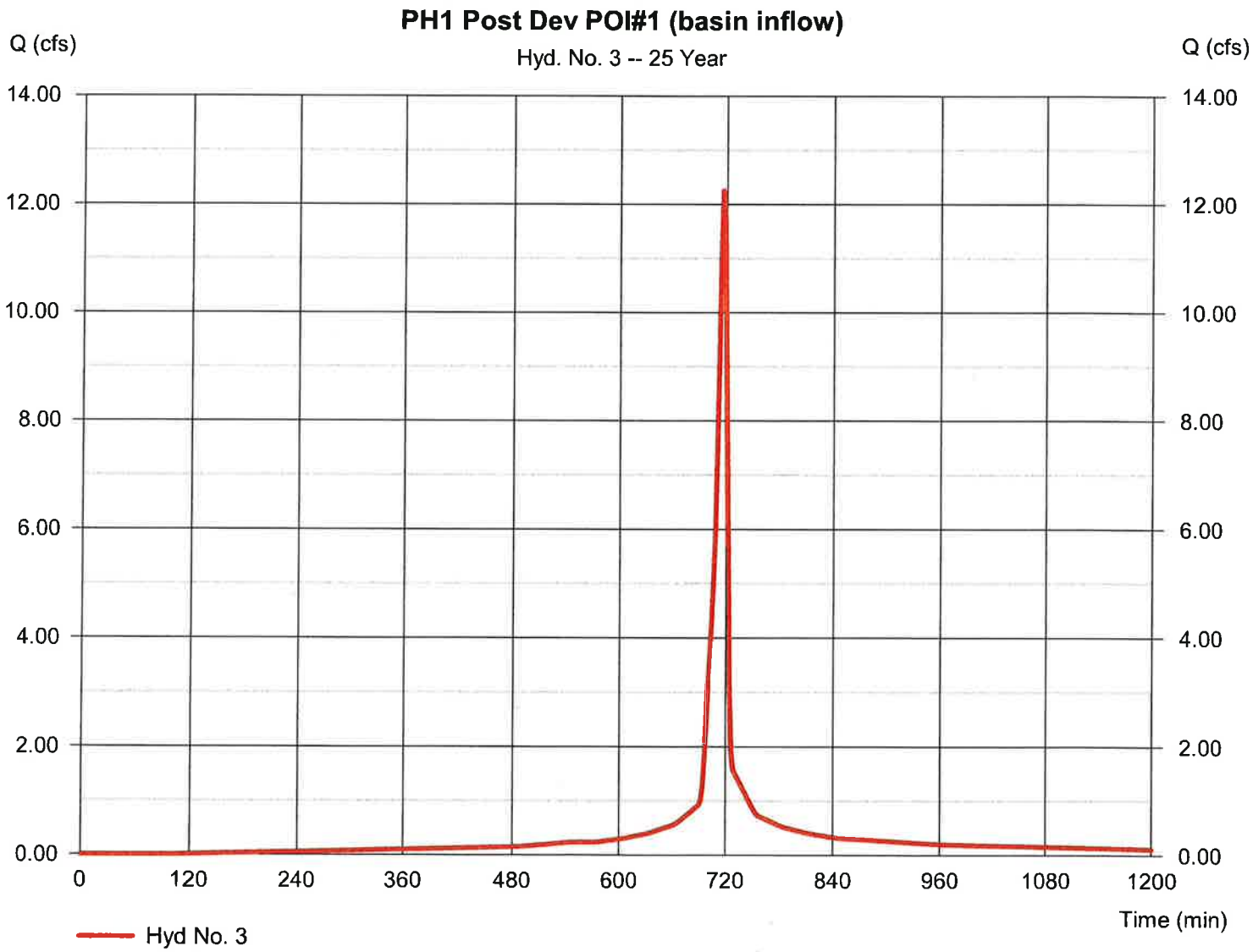
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 3

PH1 Post Dev POI#1 (basin inflow)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.26 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 28,182 cuft
Drainage area	= 1.500 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Pond No. 1 - UG Basin #1

Pond Data

UG Chambers -Invert elev. = 294.00 ft, Rise x Span = 3.50 x 3.50 ft, Barrel Len = 126.00 ft, No. Barrels = 3, Slope = 0.50%, Headers = Yes
Encasement -Invert elev. = 294.00 ft, Width = 5.50 ft, Height = 4.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	294.00	n/a	0	0
0.51	294.51	n/a	274	274
1.03	295.03	n/a	722	996
1.54	295.54	n/a	854	1,850
2.05	296.05	n/a	897	2,746
2.57	296.57	n/a	898	3,645
3.08	297.08	n/a	857	4,502
3.59	297.59	n/a	750	5,252
4.10	298.10	n/a	547	5,799
4.62	298.62	n/a	464	6,264
5.13	299.13	n/a	464	6,728

Culvert / Orifice Structures

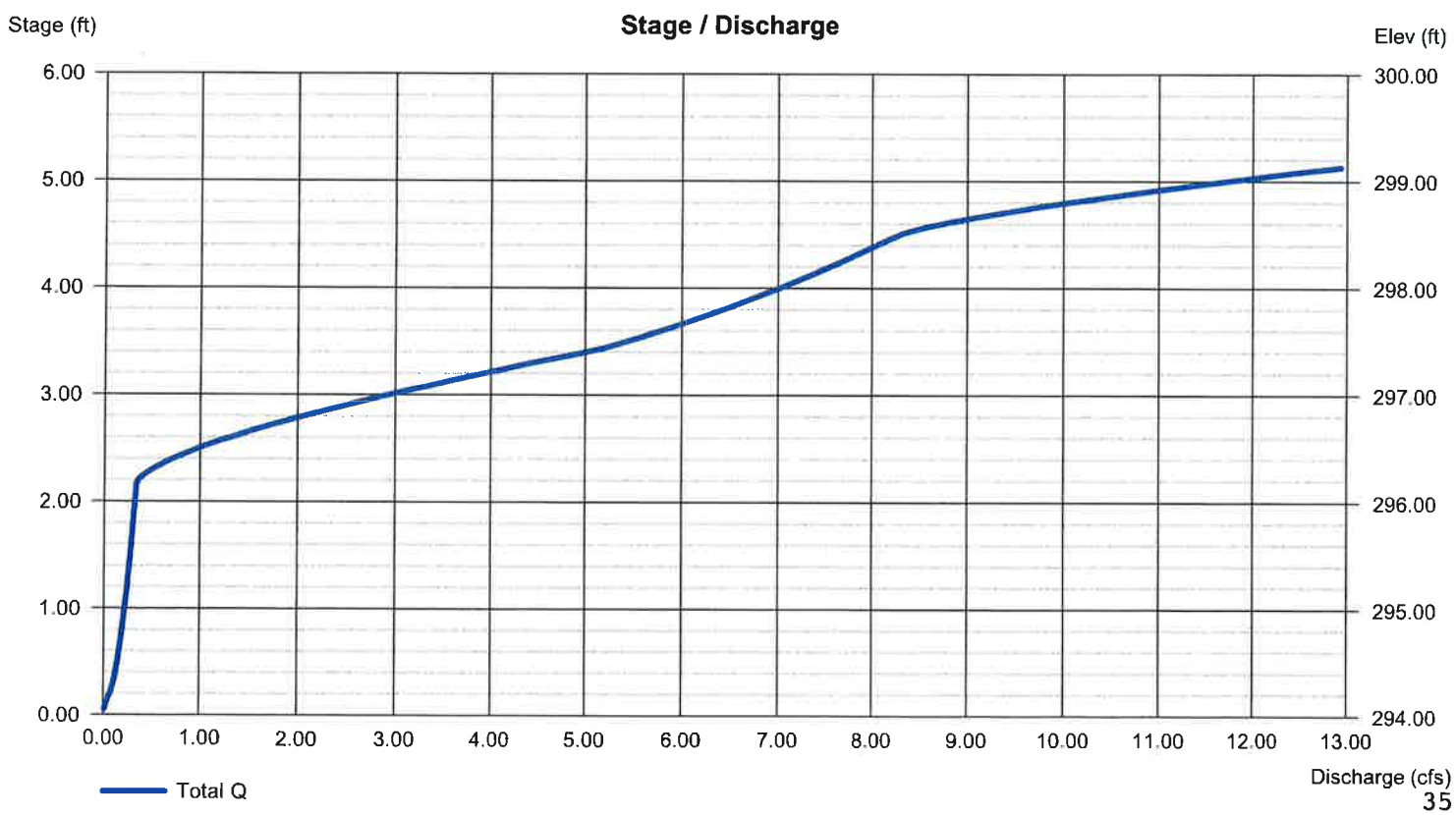
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	3.00	15.00	0.00
Span (in)	= 24.00	3.00	12.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 294.00	294.00	296.17	0.00
Length (ft)	= 115.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	2.00	0.00	0.00
Crest El. (ft)	= 301.00	298.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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



Hydrograph Report

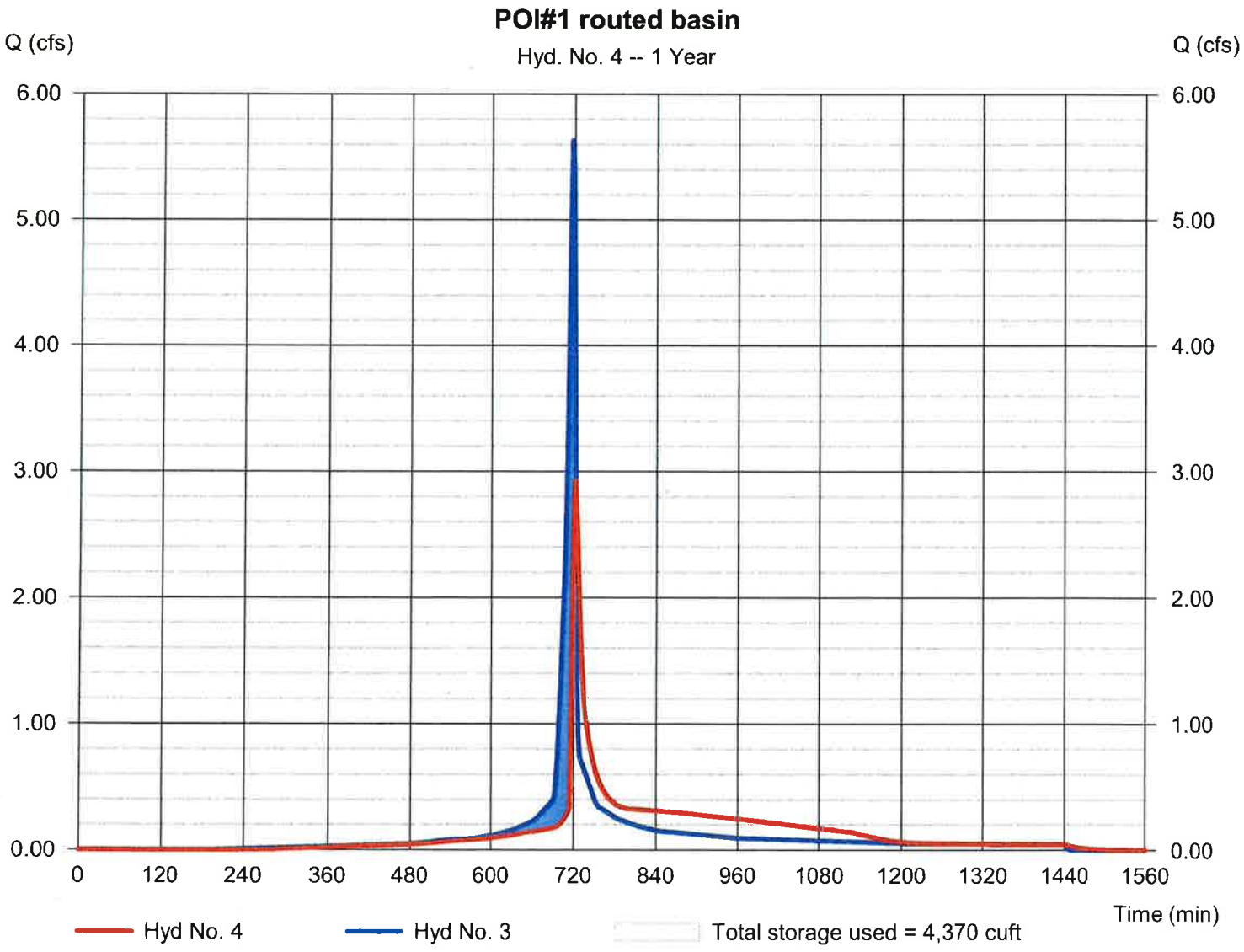
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 4

POI#1 routed basin

Hydrograph type	= Reservoir	Peak discharge	= 2.929 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 12,299 cuft
Inflow hyd. No.	= 3 - PH1 Post Dev POI#1 (basin flow)	Max. Elevation	= 297.01 ft
Reservoir name	= UG Basin #1	Max. Storage	= 4,370 cuft

Storage Indication method used.



Hydrograph Report

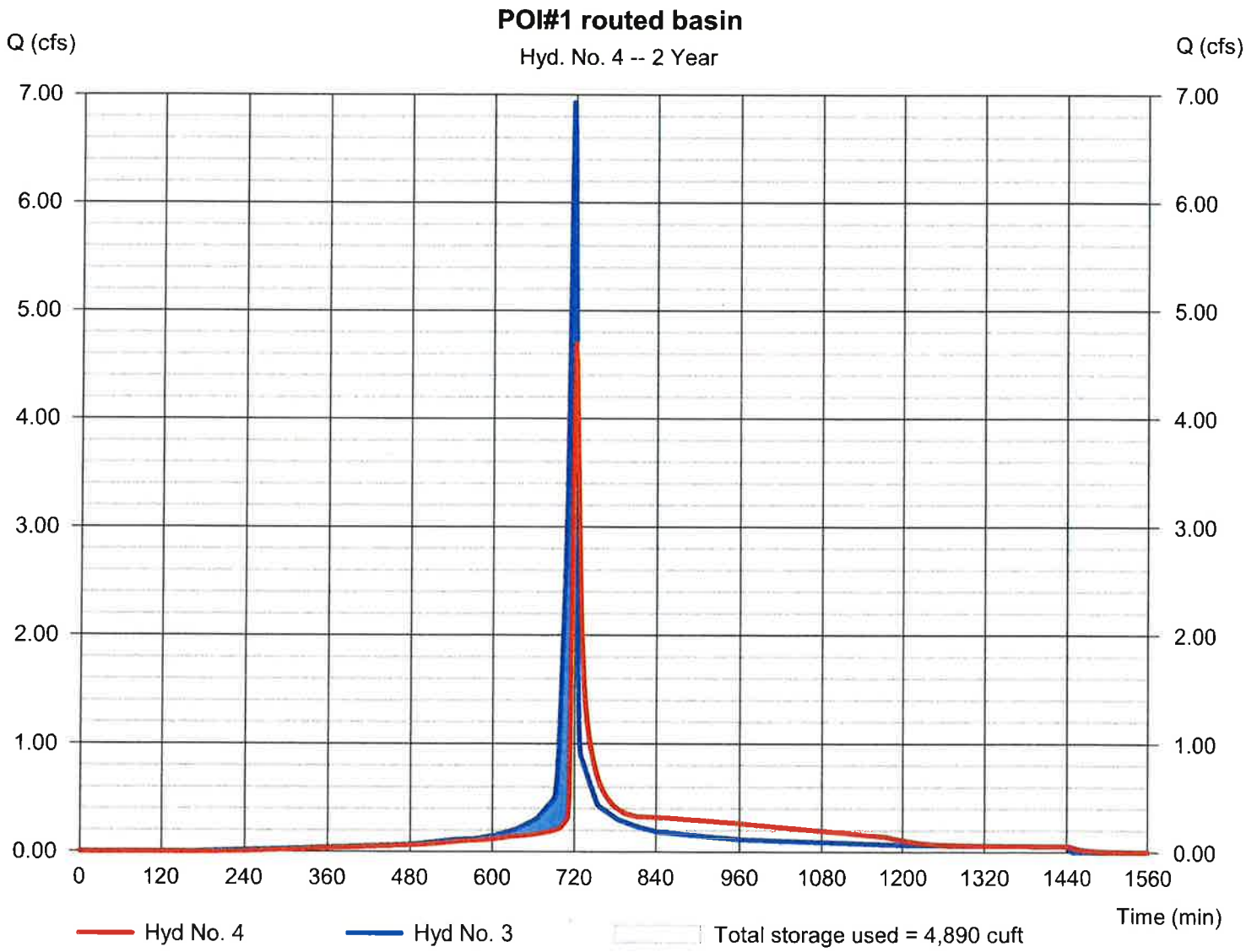
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 4

POI#1 routed basin

Hydrograph type	= Reservoir	Peak discharge	= 4.696 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 15,349 cuft
Inflow hyd. No.	= 3 - PH1 Post Dev POI#1 (basin flow)	Max. Elevation	= 297.36 ft
Reservoir name	= UG Basin #1	Max. Storage	= 4,890 cuft

Storage Indication method used.



Hydrograph Report

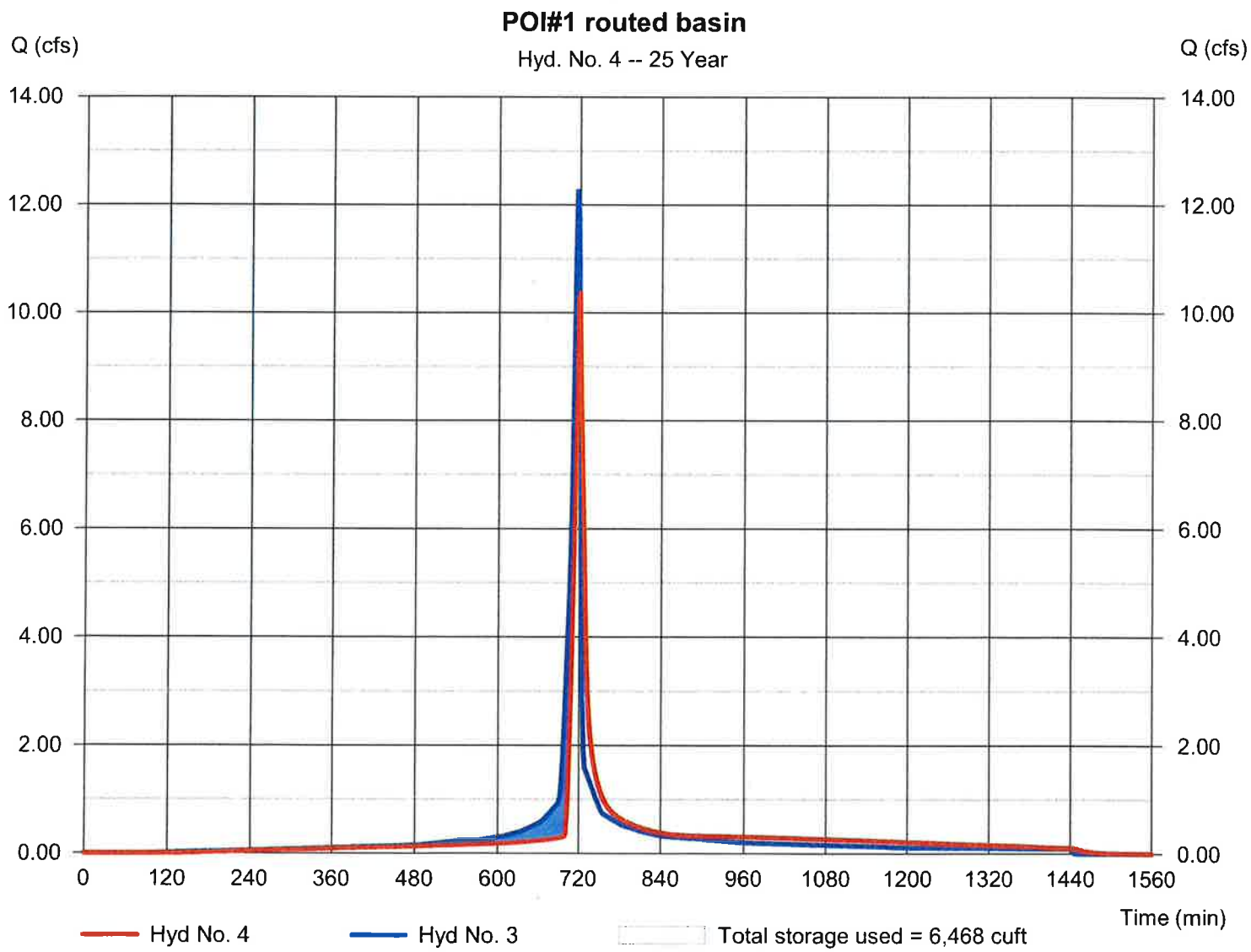
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 4

POI#1 routed basin

Hydrograph type	= Reservoir	Peak discharge	= 10.38 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 28,177 cuft
Inflow hyd. No.	= 3 - PH1 Post Dev POI#1 (basin flow)	Max. Elevation	= 298.93 ft
Reservoir name	= UG Basin #1	Max. Storage	= 6,468 cuft

Storage Indication method used.



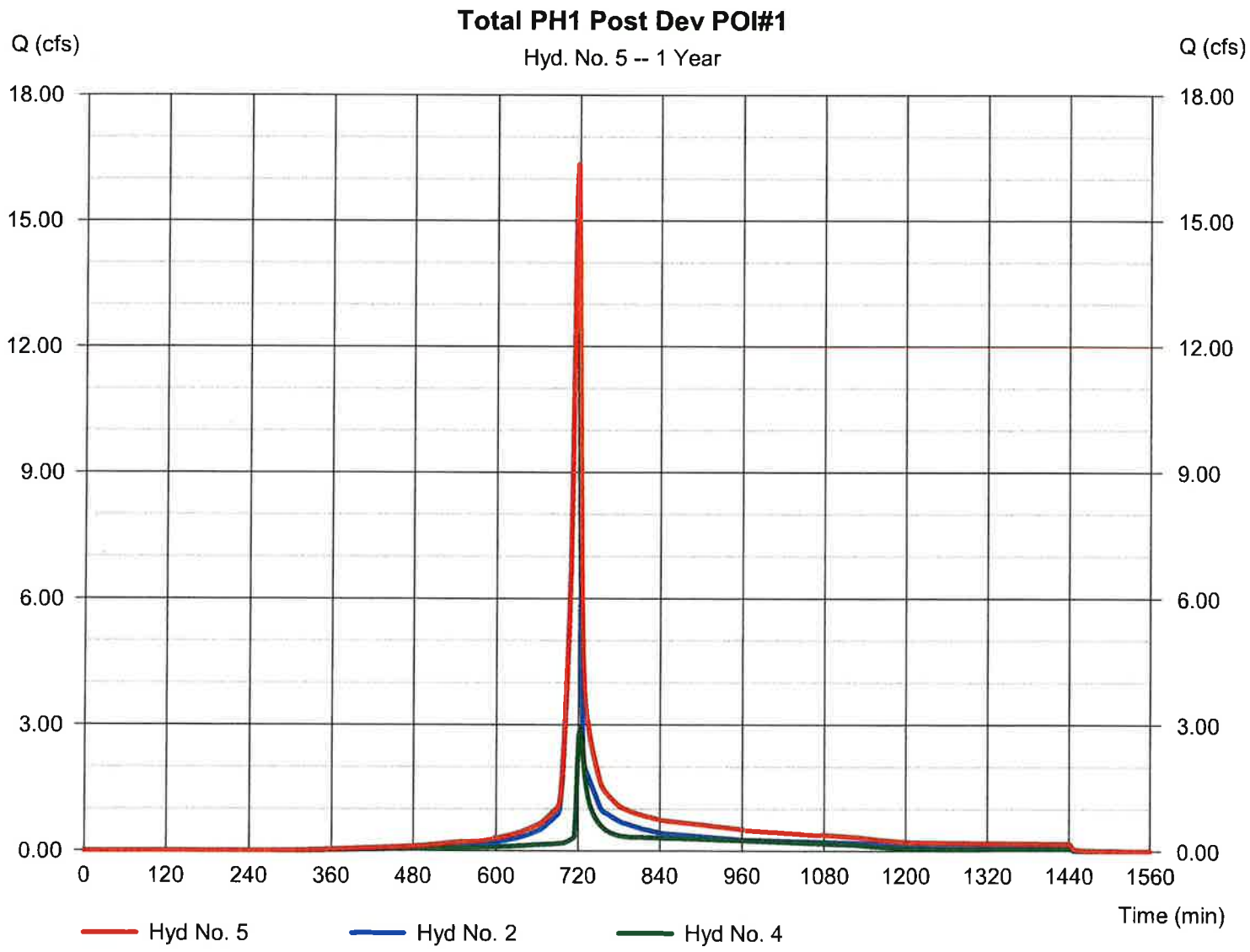
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 5

Total PH1 Post Dev POI#1

Hydrograph type	= Combine	Peak discharge	= 16.35 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 43,101 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 4.450 ac



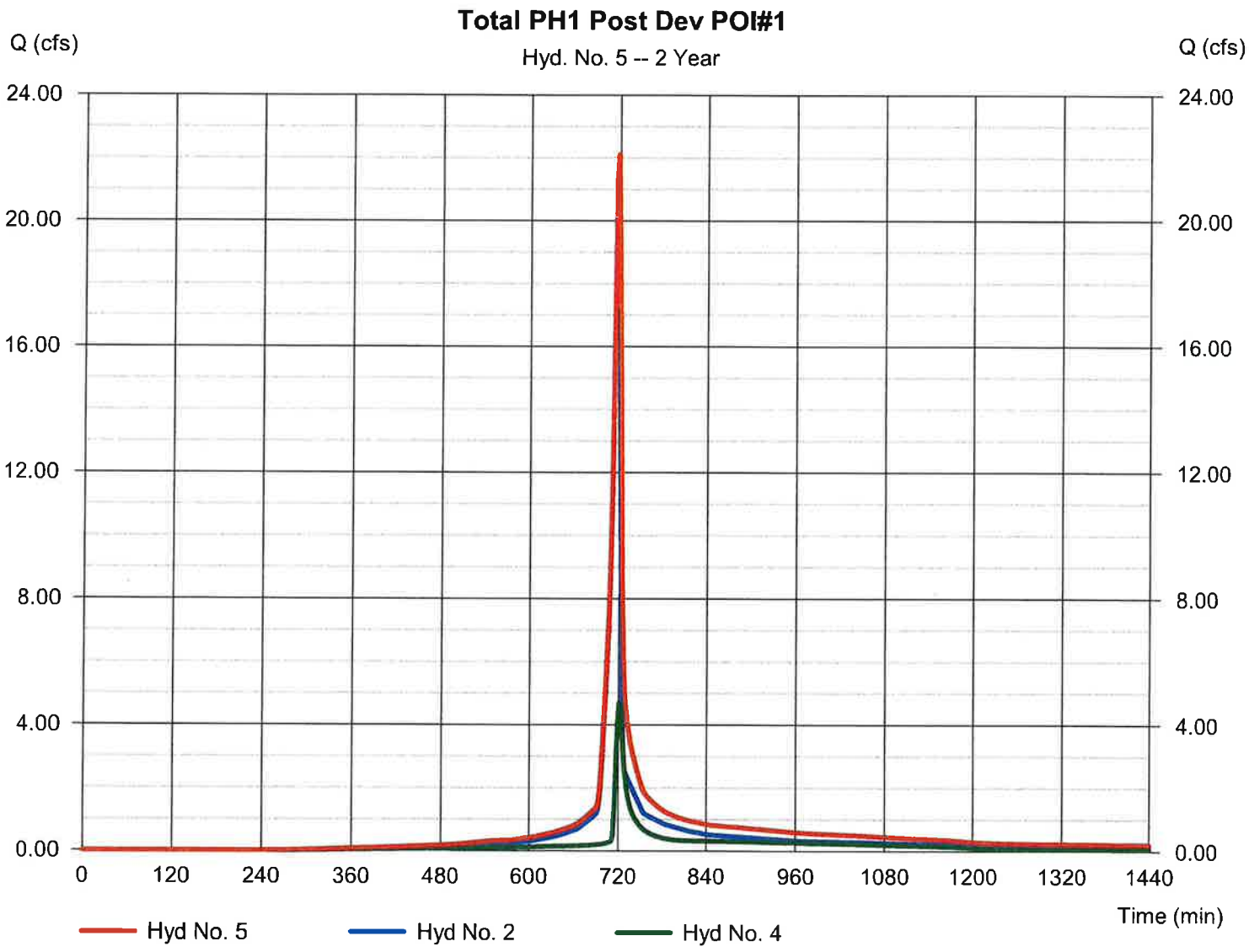
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 5

Total PH1 Post Dev POI#1

Hydrograph type	= Combine	Peak discharge	= 22.13 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 54,836 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 4.450 ac



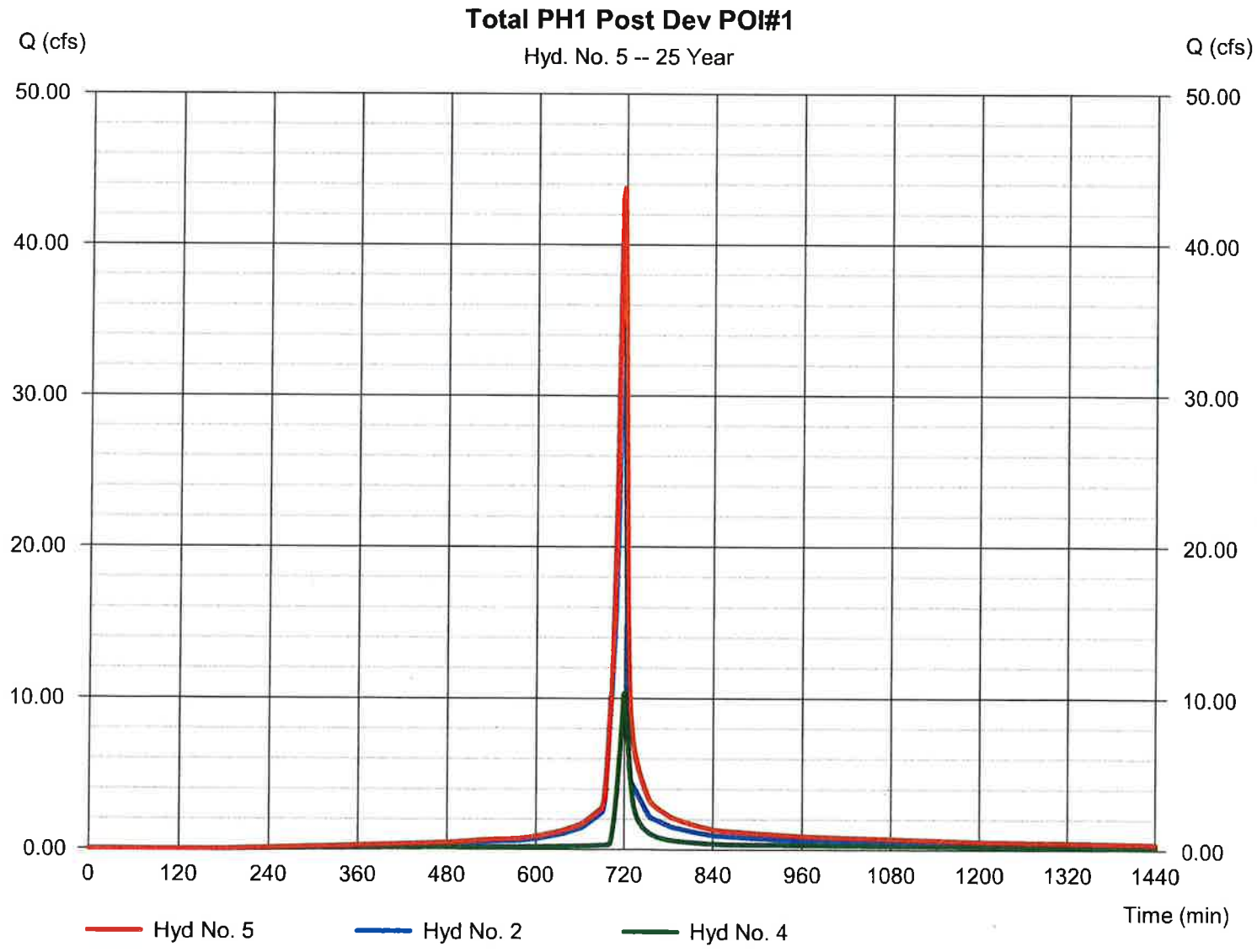
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 5

Total PH1 Post Dev POI#1

Hydrograph type	= Combine	Peak discharge	= 43.78 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 104,880 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 4.450 ac



POINT OF INTEREST #2

COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Pre-Development POI#2	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98		
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.27	22.68
		TOTAL:	0.27	22.68

C (weighted)	Total (C) / Total (B)	22.68 / 0.27	84.0000	Use C =	**84**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

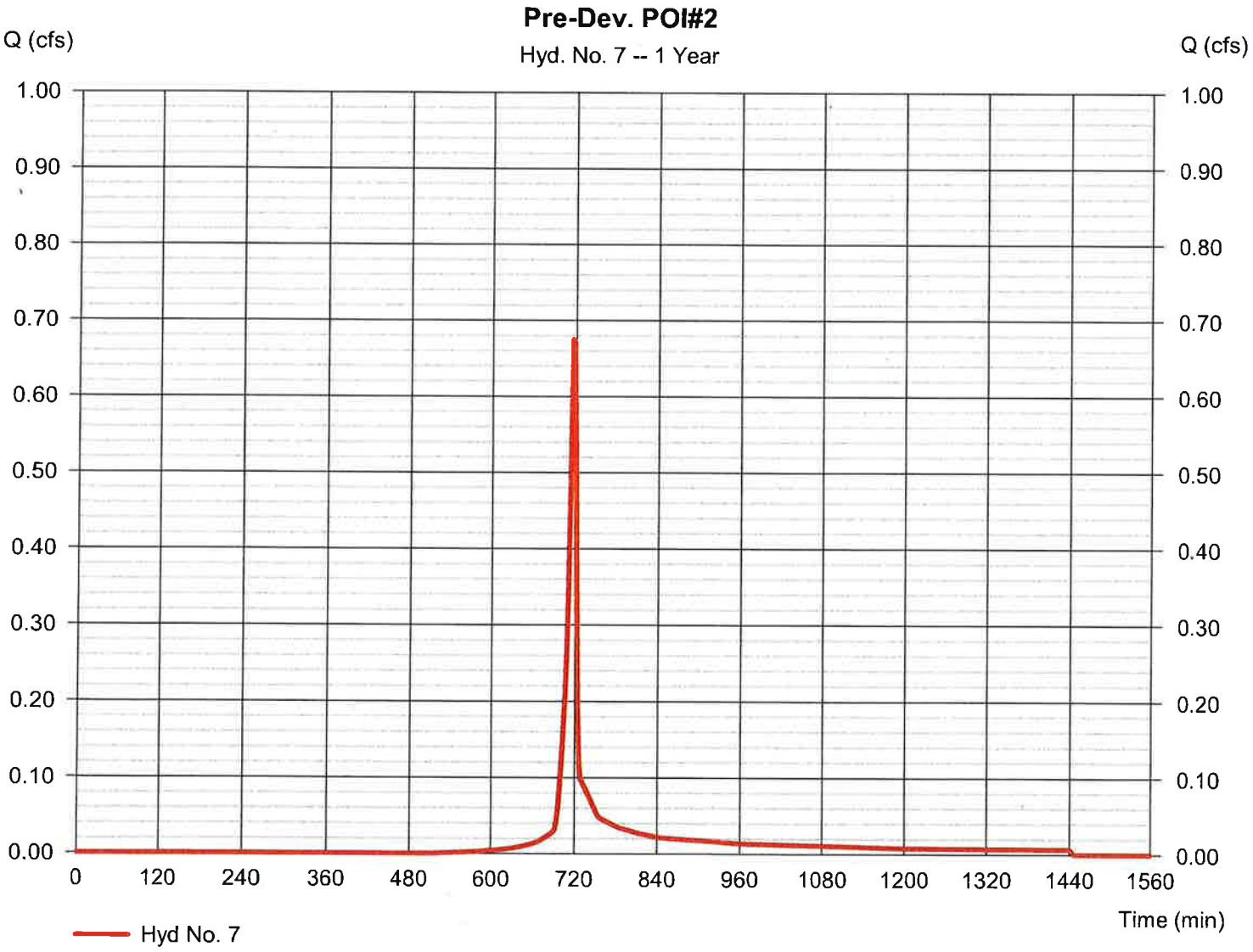
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 7

Pre-Dev. POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.675 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,363 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



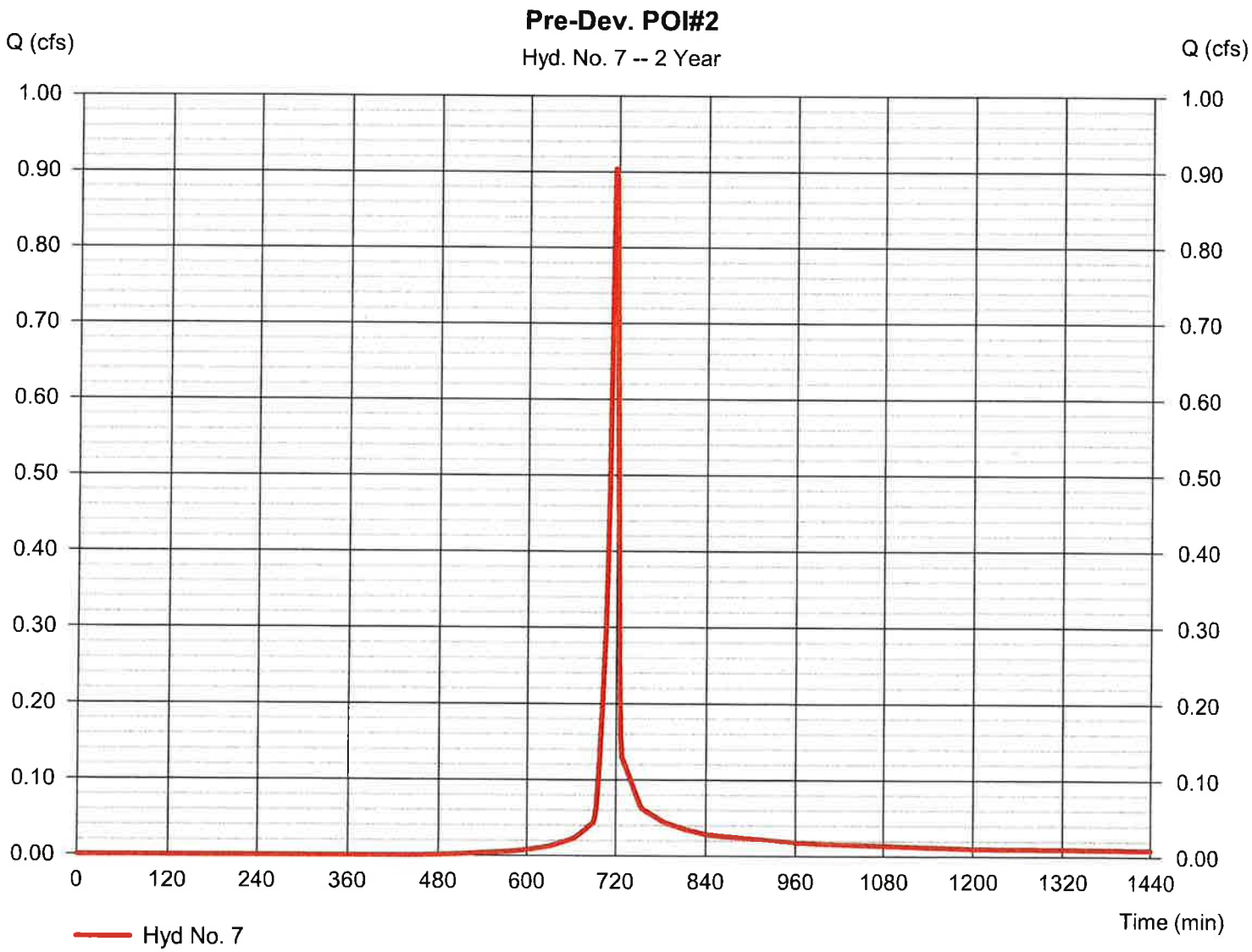
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 7

Pre-Dev. POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.904 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,835 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



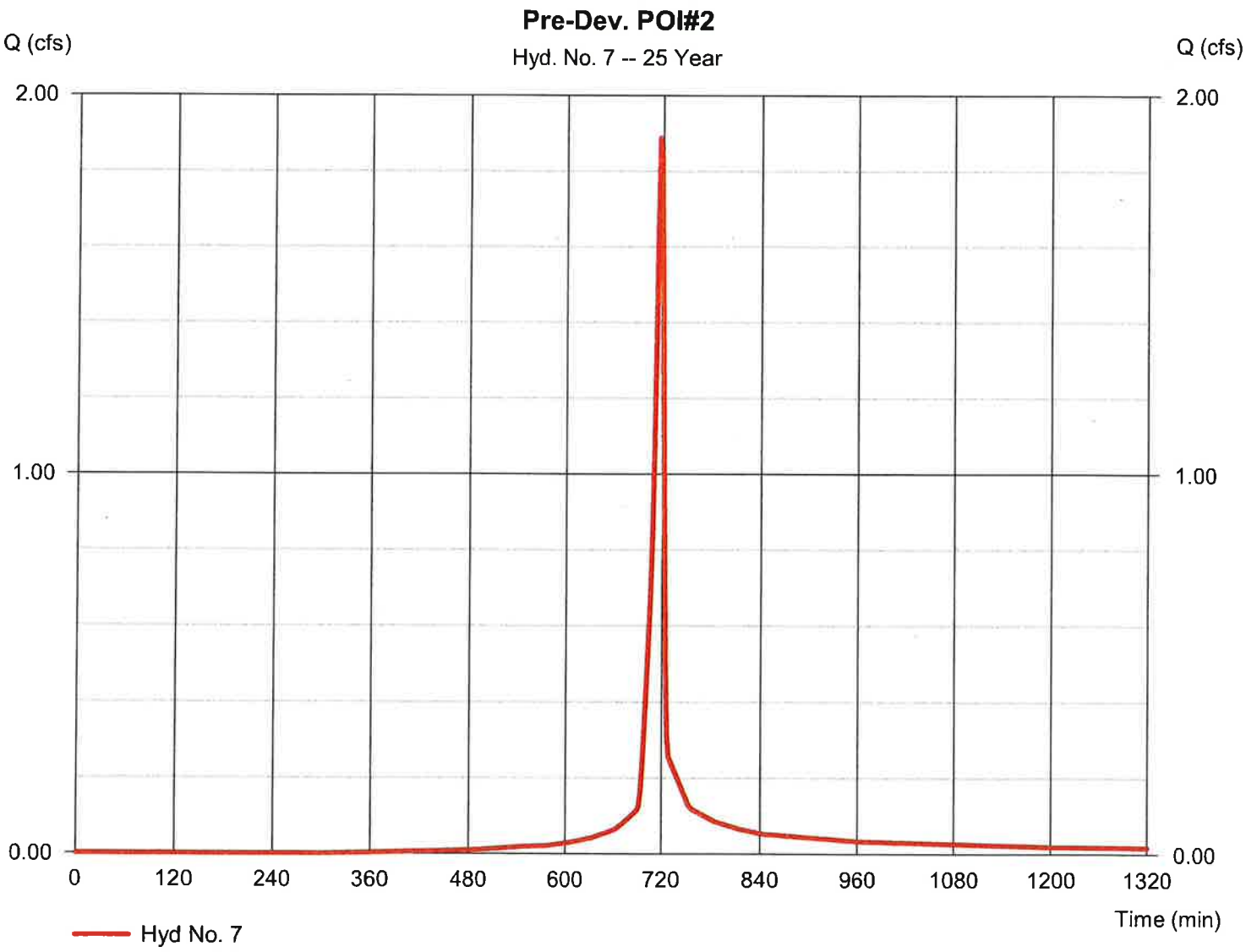
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 7

Pre-Dev. POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.889 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 3,951 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Post-Development POI#2	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98		
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.27	22.68
		TOTAL:	0.27	22.68

C (weighted)	Total (C) / Total (B)	22.68 / 0.27	84.0000	Use C =	**84**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

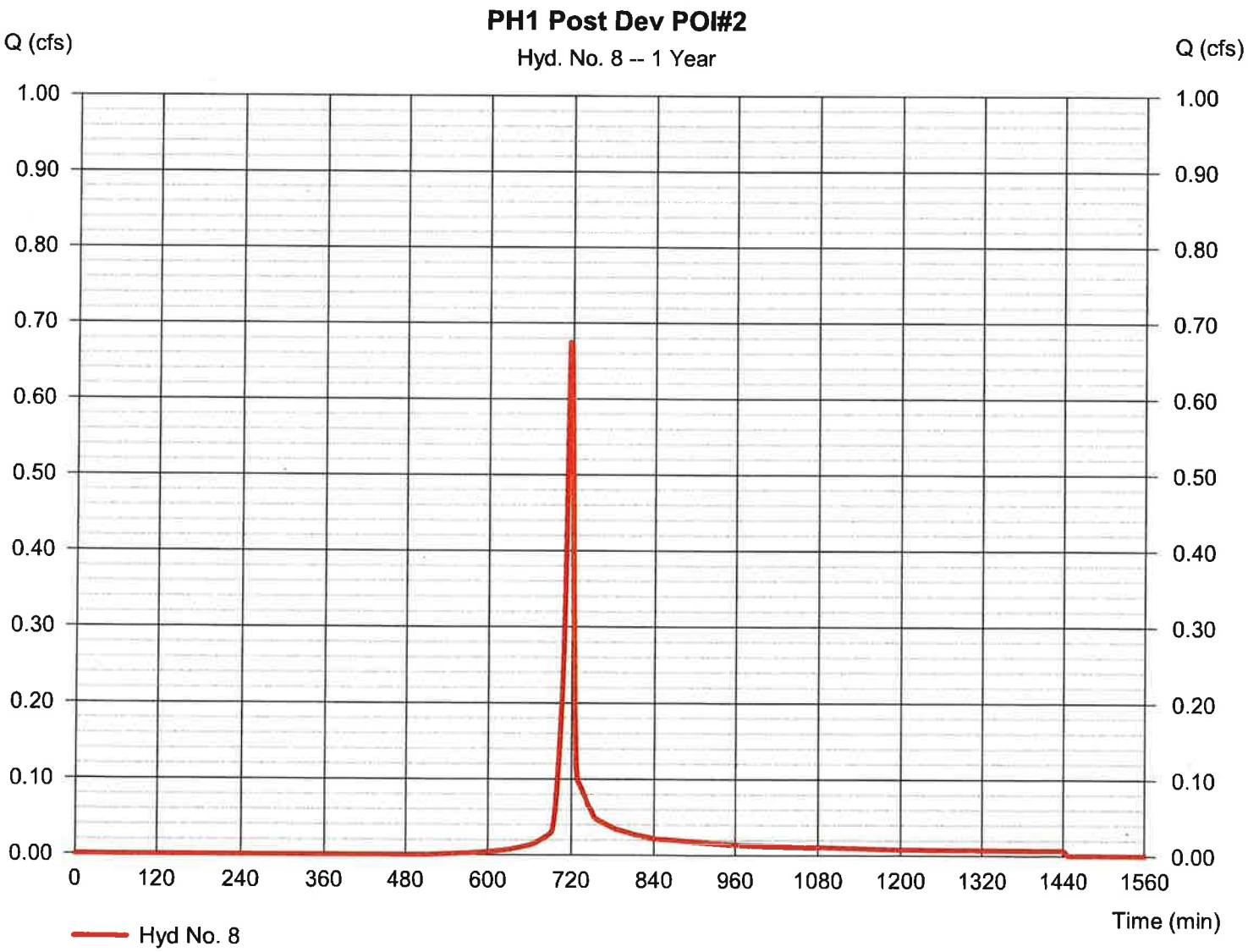
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 8

PH1 Post Dev POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.675 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,363 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



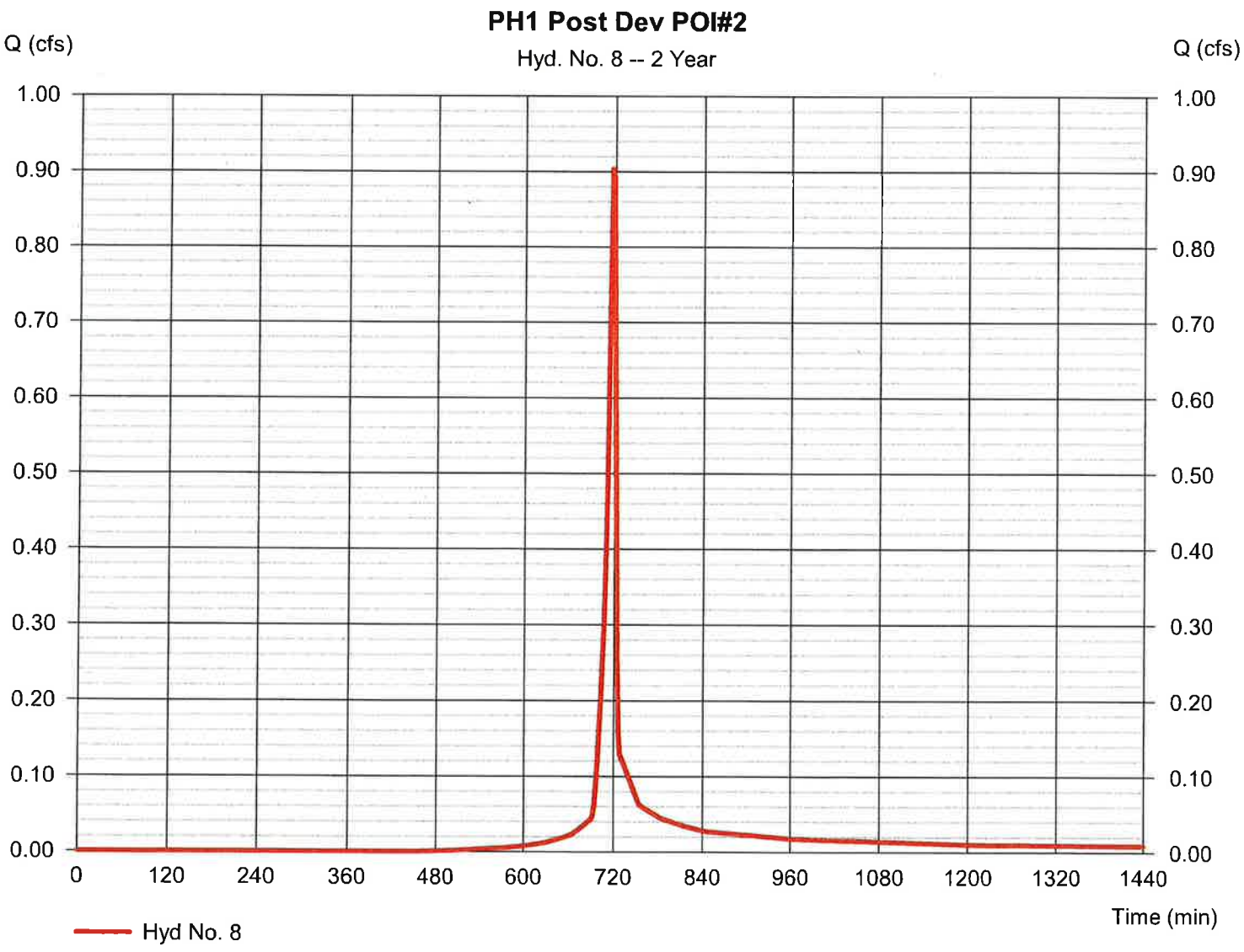
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 8

PH1 Post Dev POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.904 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,835 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



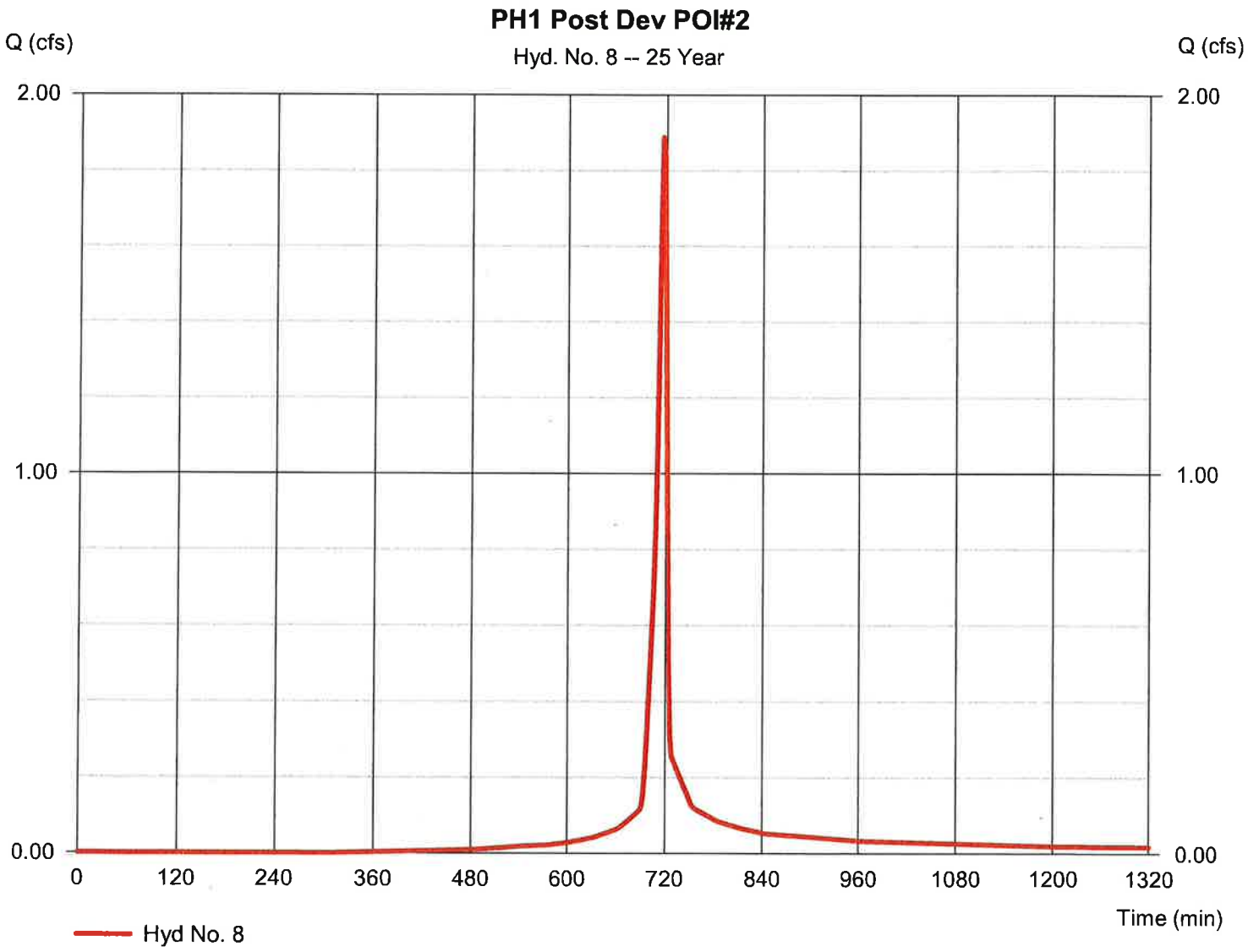
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 8

PH1 Post Dev POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.889 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 3,951 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



POINT OF INTEREST #3

COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Pre-Development POI#3	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98		
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.12	10.08
		TOTAL:	0.12	10.08

C (weighted)	Total (C) / Total (B)	10.08 / 0.12	84.0000	Use C =	**84**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

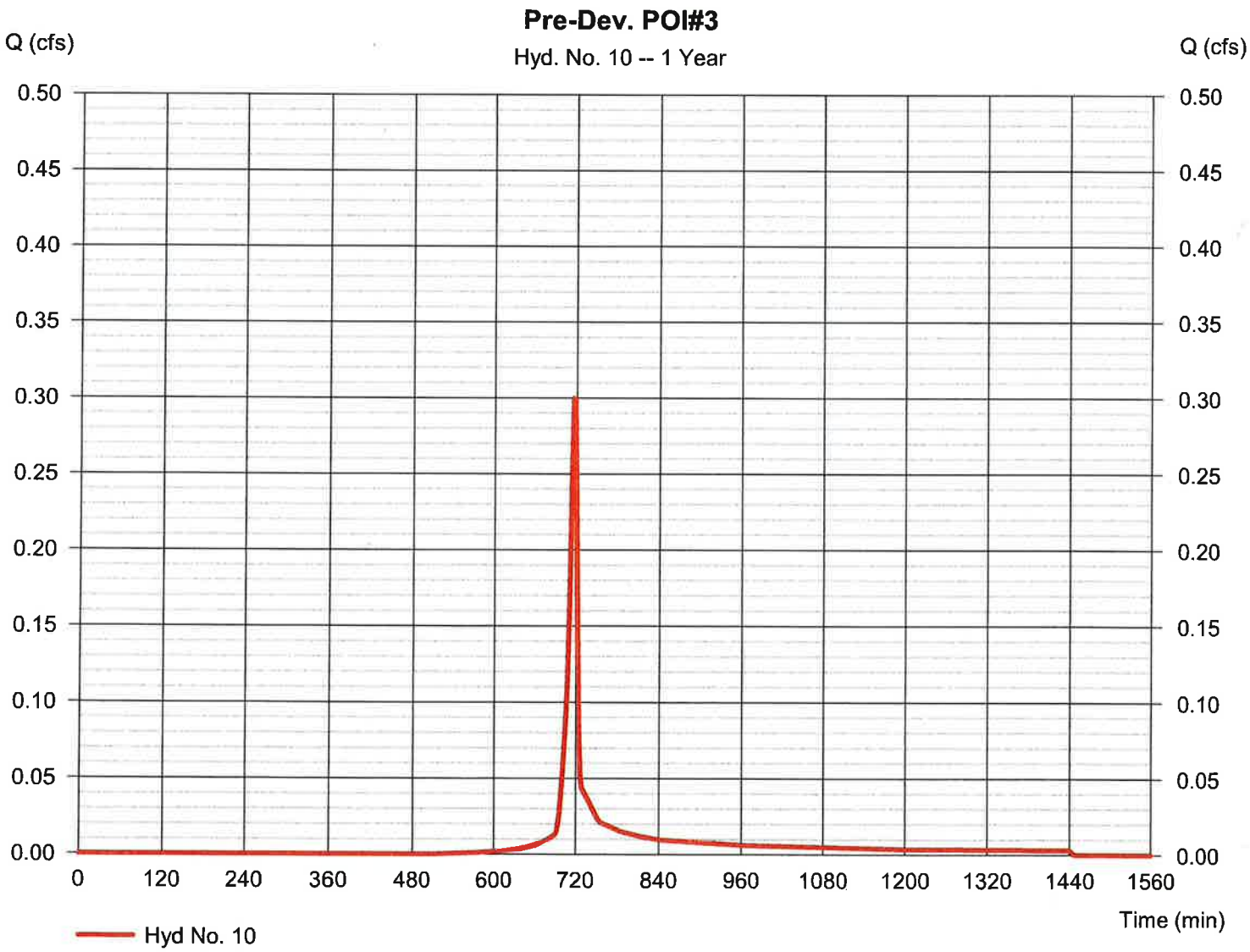
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 10

Pre-Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.300 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 606 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



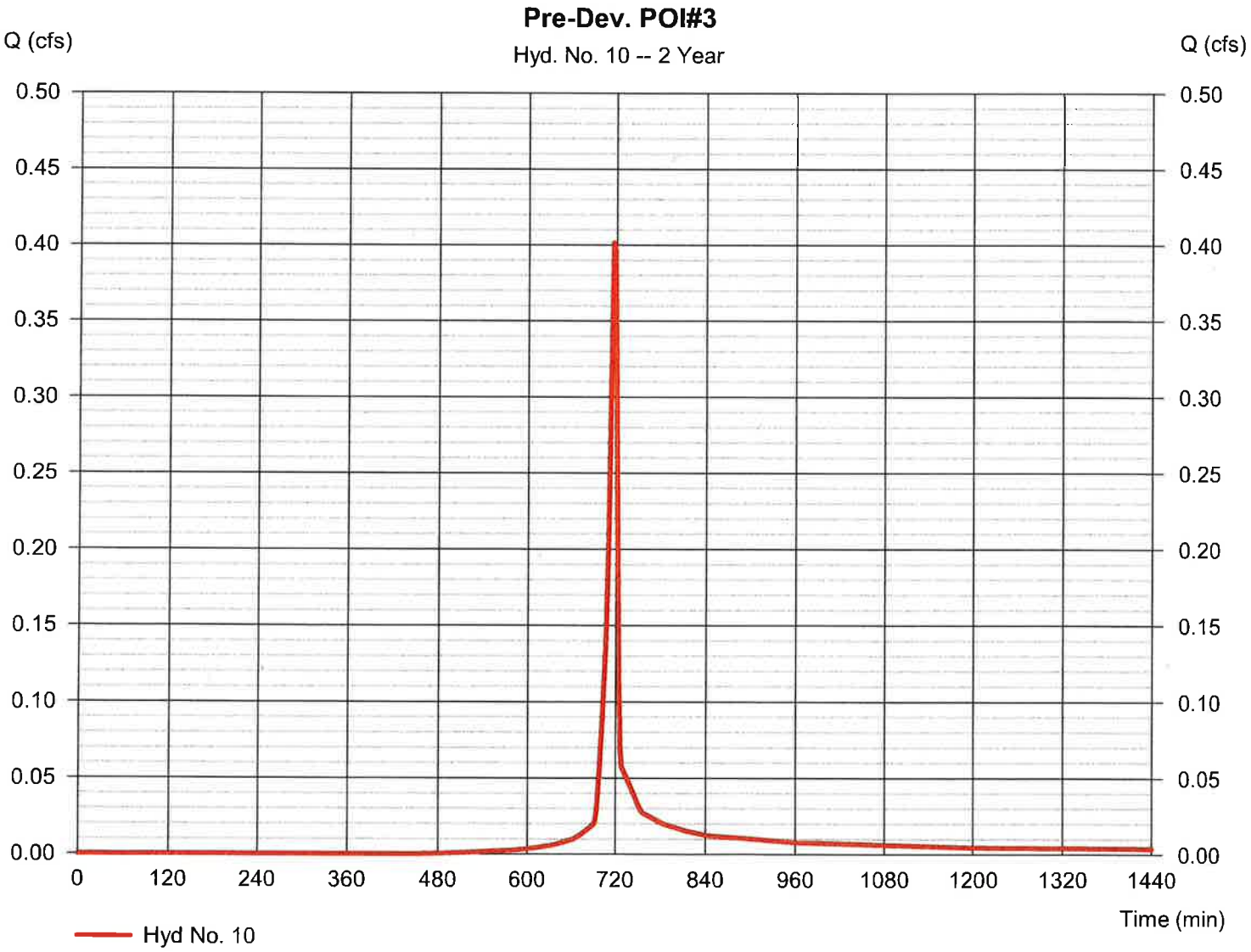
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 10

Pre-Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.402 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 815 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



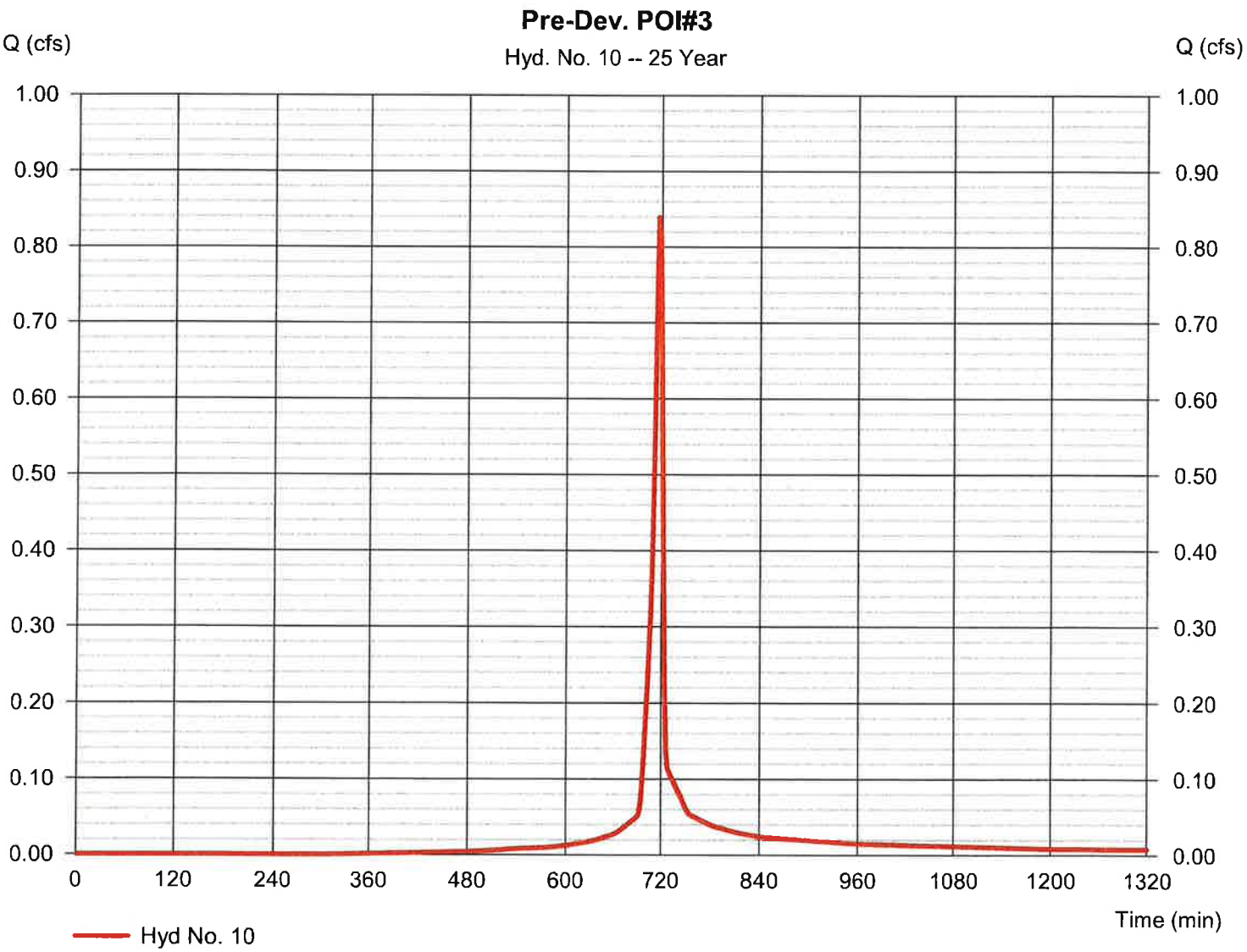
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 10

Pre-Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.840 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,756 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Post-Development POI#3	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98		
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.12	10.08
		TOTAL:	0.12	10.08

C (weighted)	Total (C) / Total (B)	10.08 / 0.12	84.0000	Use C =	**84**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

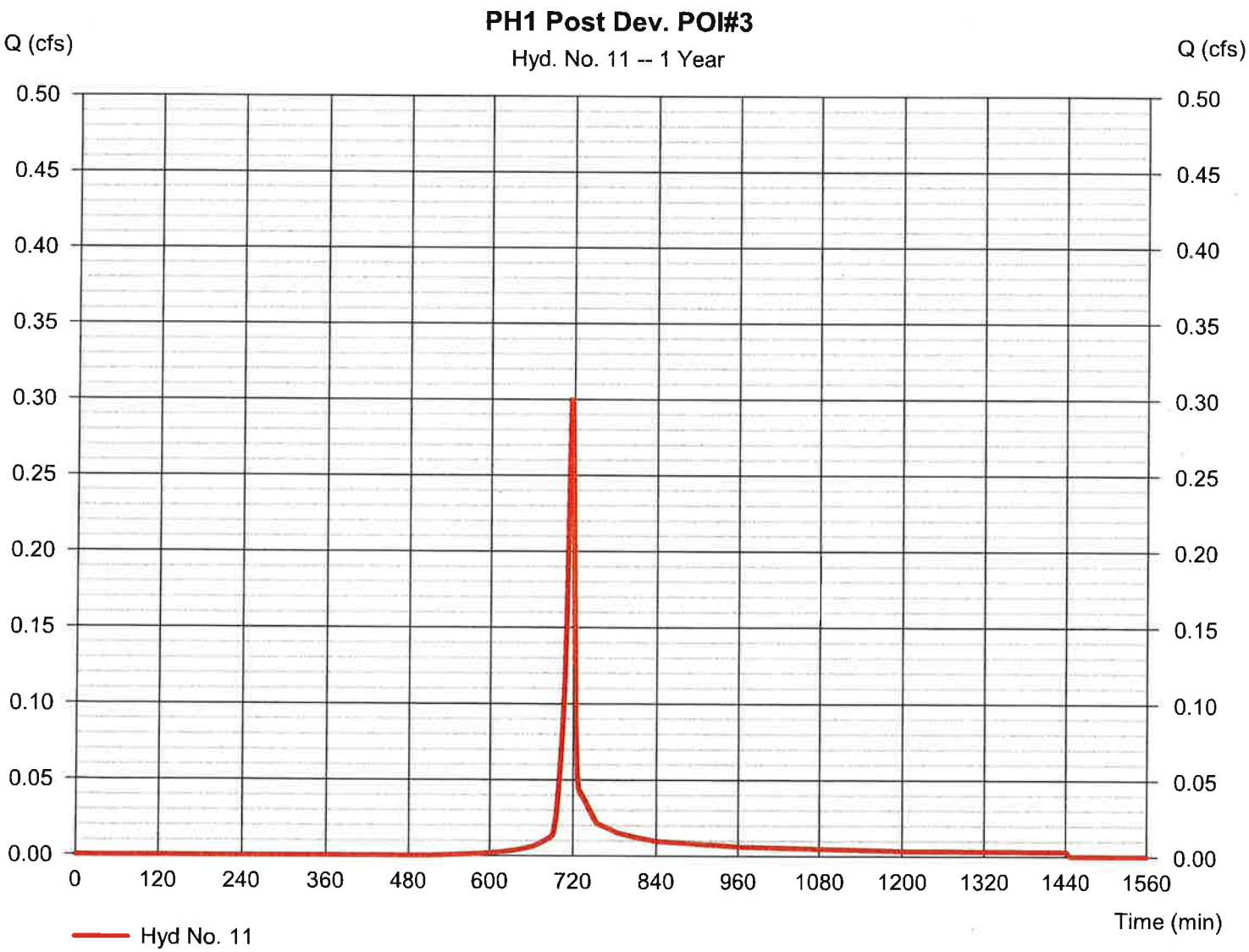
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 11

PH1 Post Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.300 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 606 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



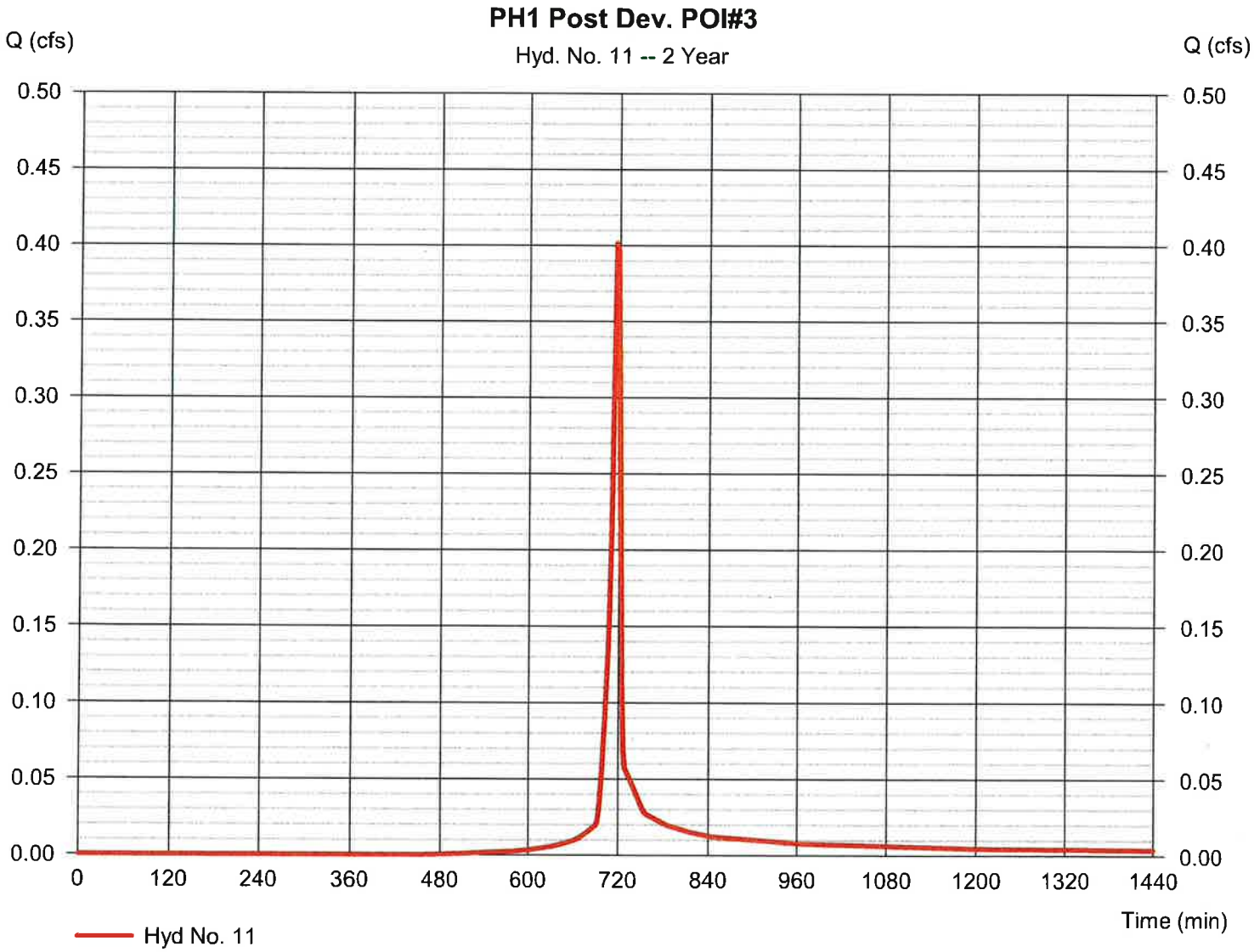
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 11

PH1 Post Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.402 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 815 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



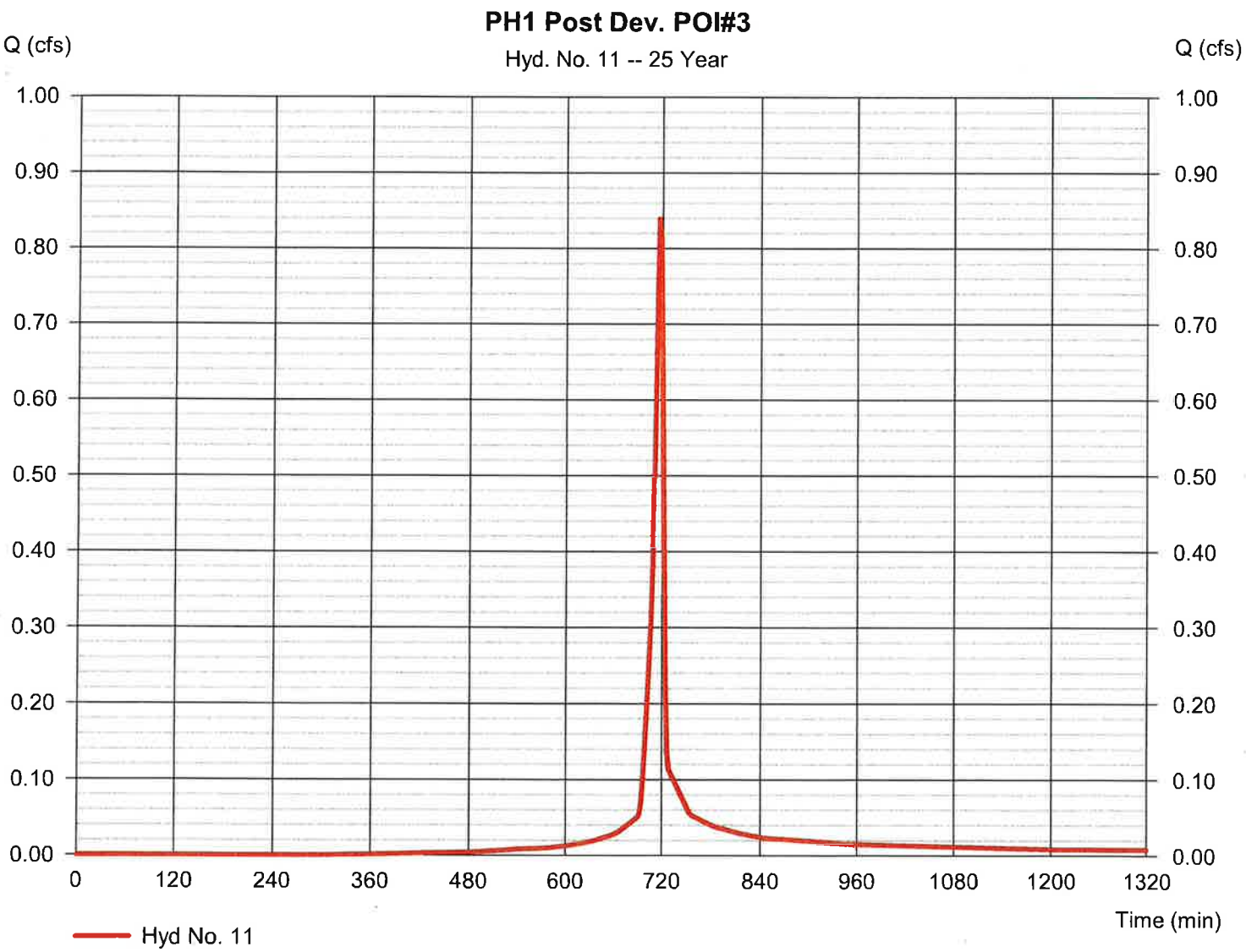
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 11

PH1 Post Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.840 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,756 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TOTAL SUMMATION PEAK FLOW

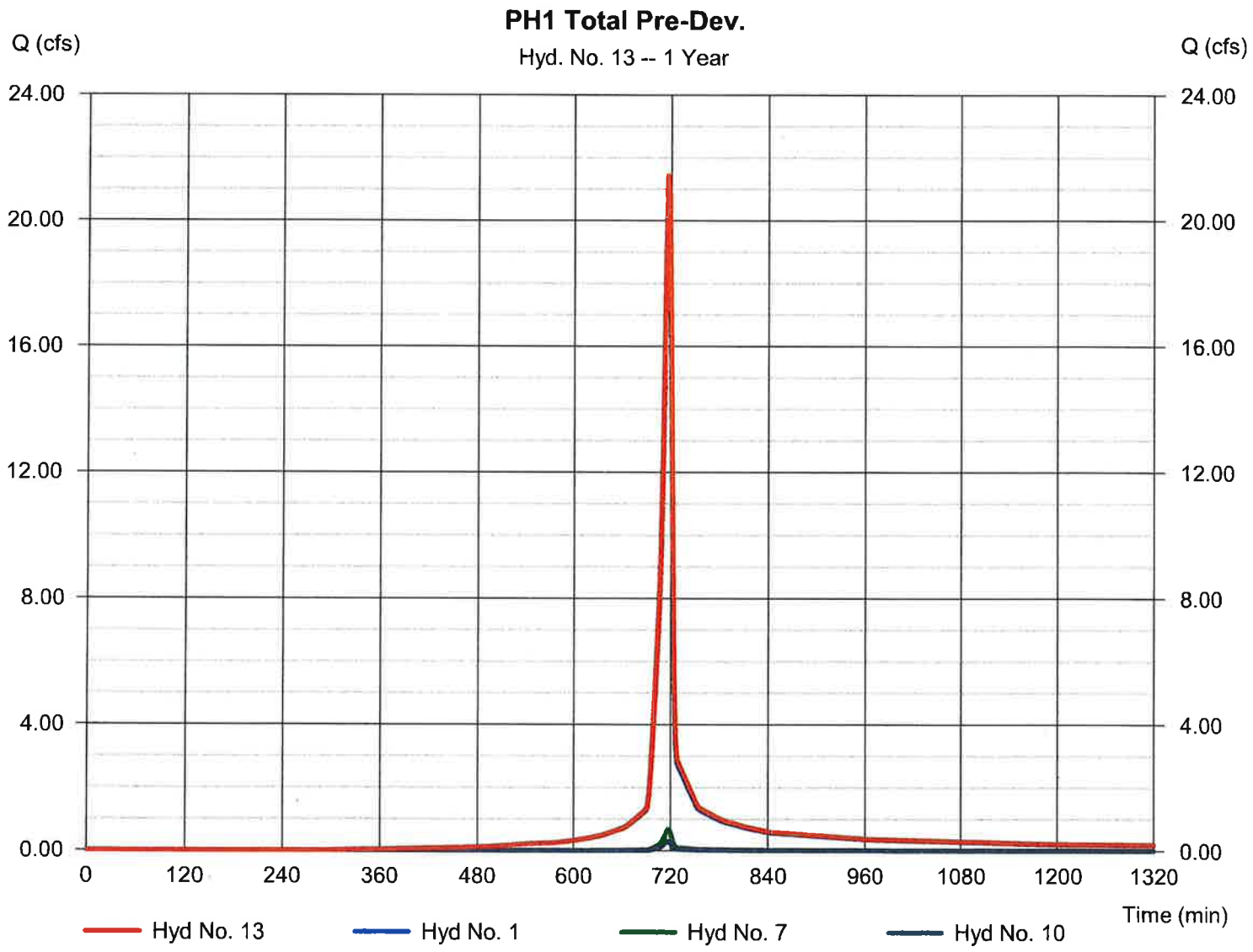
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 13

PH1 Total Pre-Dev.

Hydrograph type	= Combine	Peak discharge	= 21.45 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 44,964 cuft
Inflow hyds.	= 1, 7, 10	Contrib. drain. area	= 6.340 ac



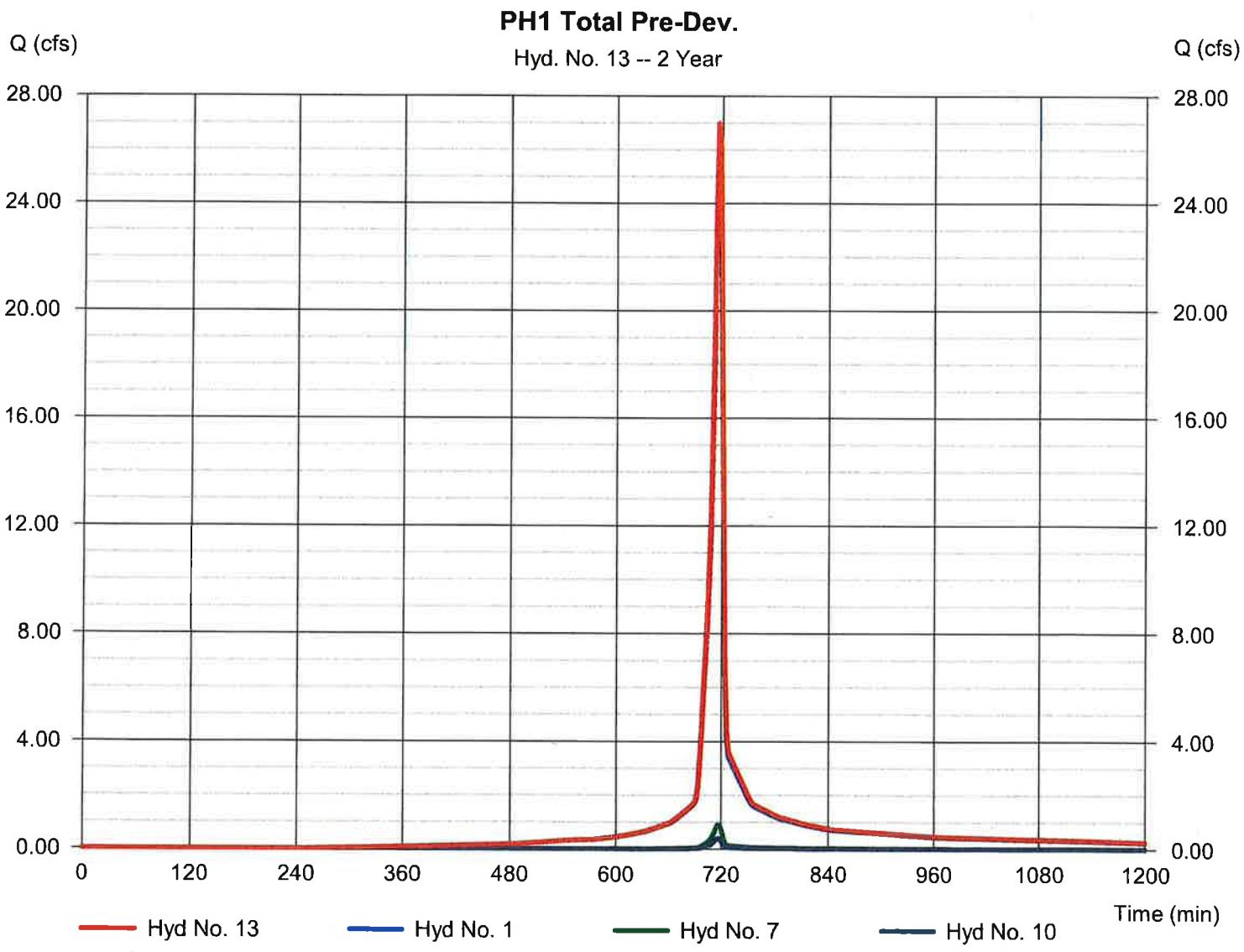
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 13

PH1 Total Pre-Dev.

Hydrograph type	= Combine	Peak discharge	= 27.01 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 57,398 cuft
Inflow hyds.	= 1, 7, 10	Contrib. drain. area	= 6.340 ac



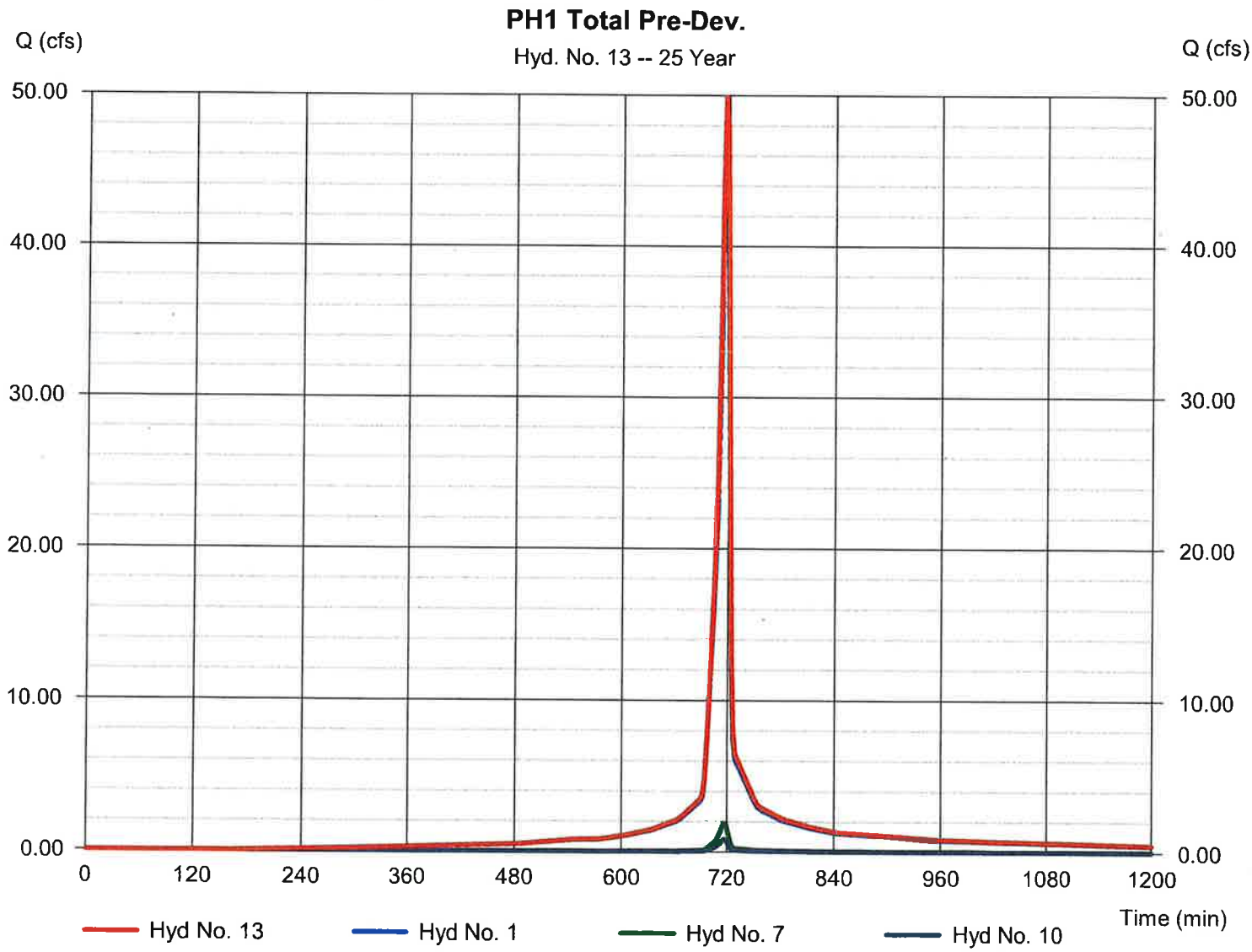
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 13

PH1 Total Pre-Dev.

Hydrograph type	= Combine	Peak discharge	= 49.93 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 110,546 cuft
Inflow hyds.	= 1, 7, 10	Contrib. drain. area	= 6.340 ac



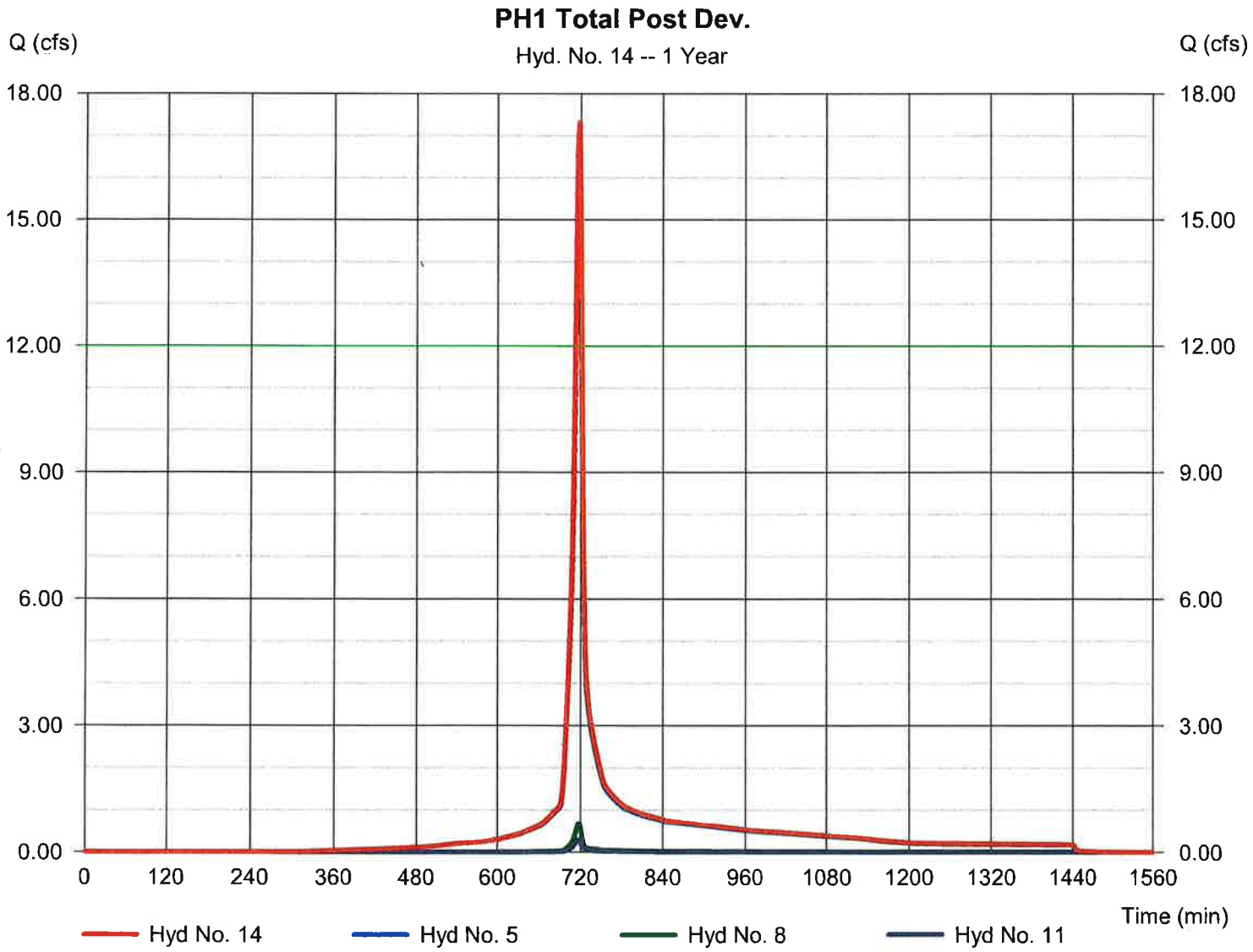
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 14

PH1 Total Post Dev.

Hydrograph type	= Combine	Peak discharge	= 17.32 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 45,070 cuft
Inflow hyds.	= 5, 8, 11	Contrib. drain. area	= 0.390 ac



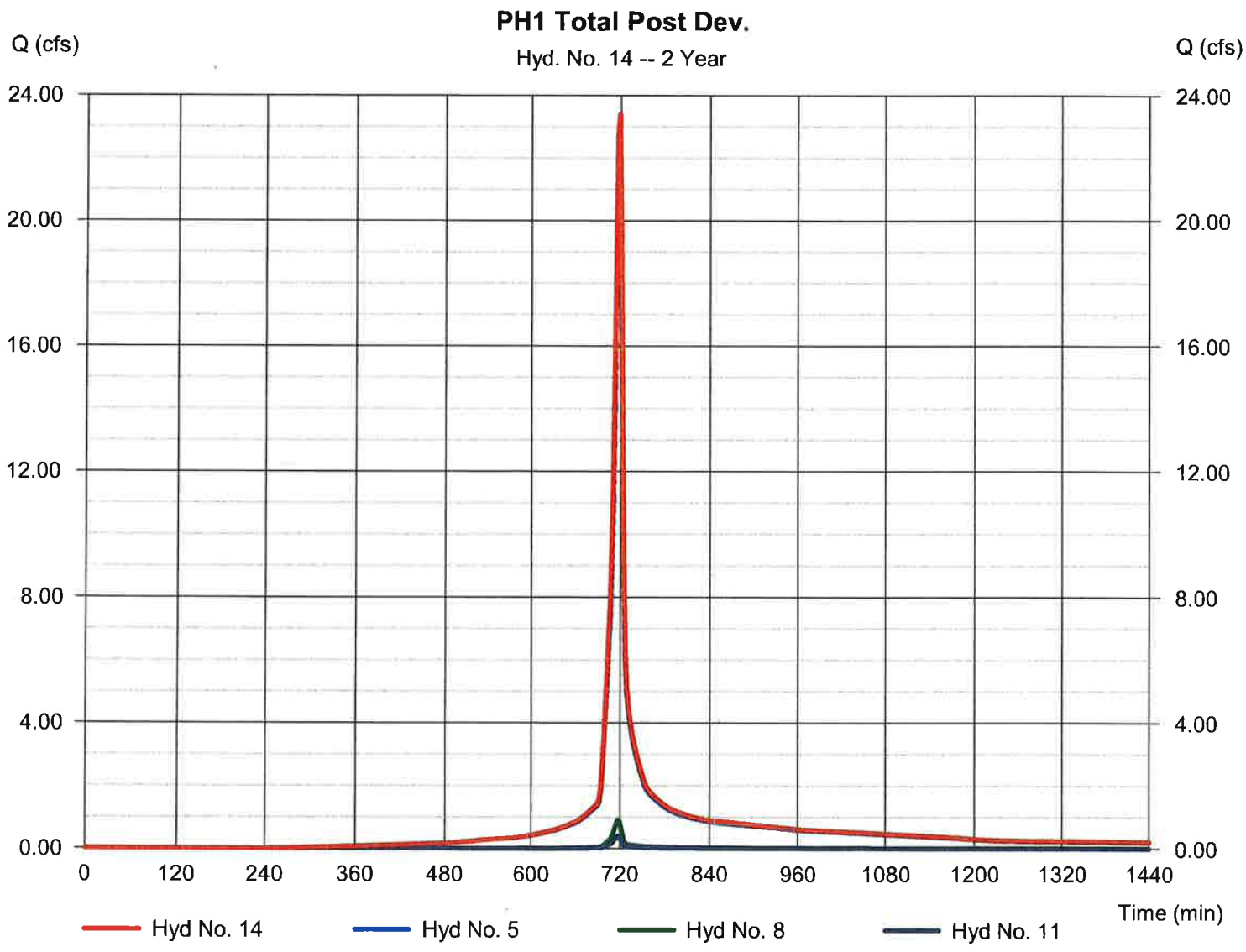
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 14

PH1 Total Post Dev.

Hydrograph type	= Combine	Peak discharge	= 23.41 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 57,486 cuft
Inflow hyds.	= 5, 8, 11	Contrib. drain. area	= 0.390 ac



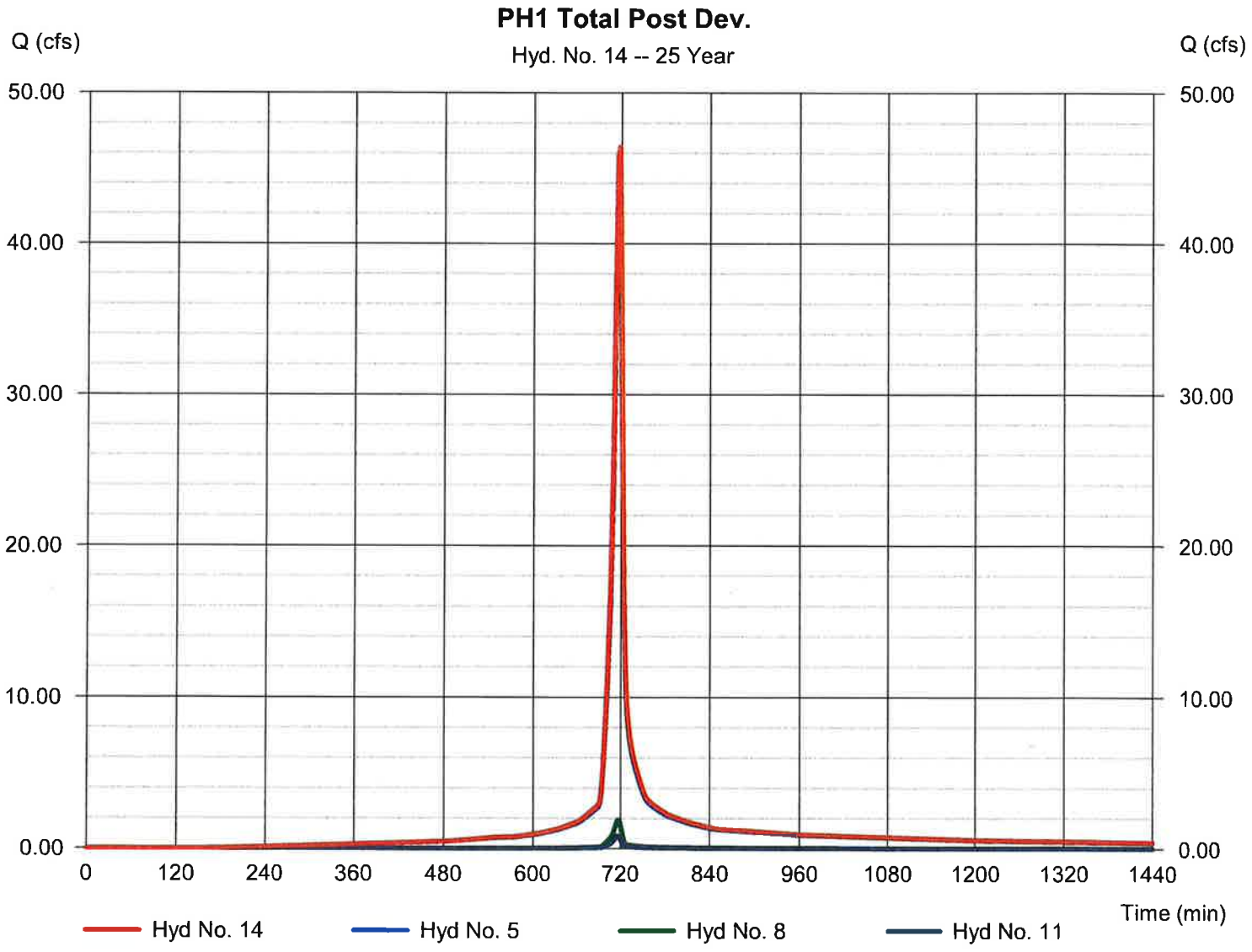
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 14

PH1 Total Post Dev.

Hydrograph type	= Combine	Peak discharge	= 46.42 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 110,586 cuft
Inflow hyds.	= 5, 8, 11	Contrib. drain. area	= 0.390 ac



PHASE 2 STORMWATER ANALYSIS

POINT OF INTEREST #1

COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Pre-Development POI#1	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	3.19	312.62
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	2.76	231.84
		TOTAL:	5.95	544.46

C (weighted)	Total (C) / Total (B)	544.46 / 5.95	91.5059	Use C =	**92**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

Hydrograph Report

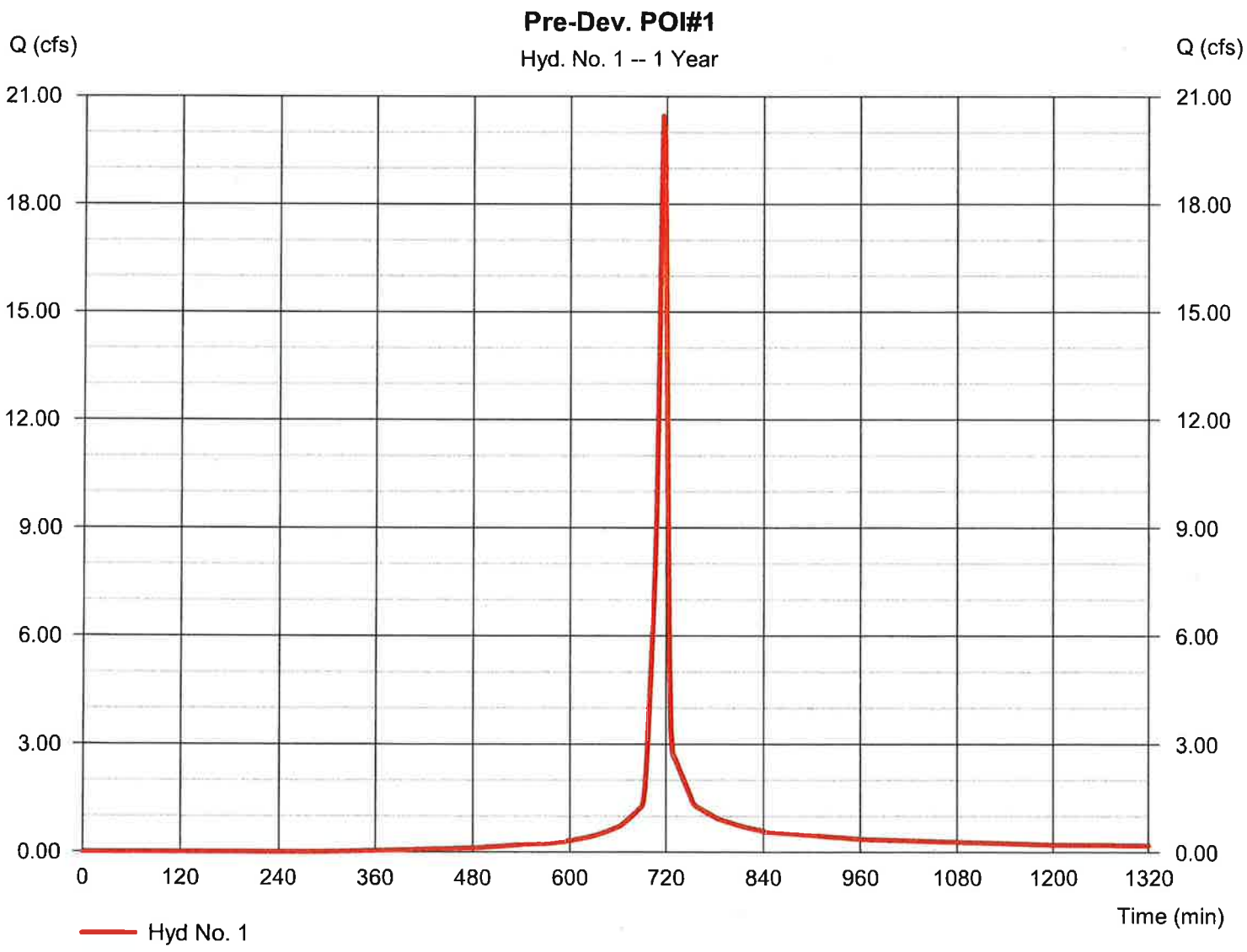
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 1

Pre-Dev. POI#1

Hydrograph type	= SCS Runoff	Peak discharge	= 20.47 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 42,995 cuft
Drainage area	= 5.950 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.790 x 80) + (3.190 x 98)] / 5.950



Hydrograph Report

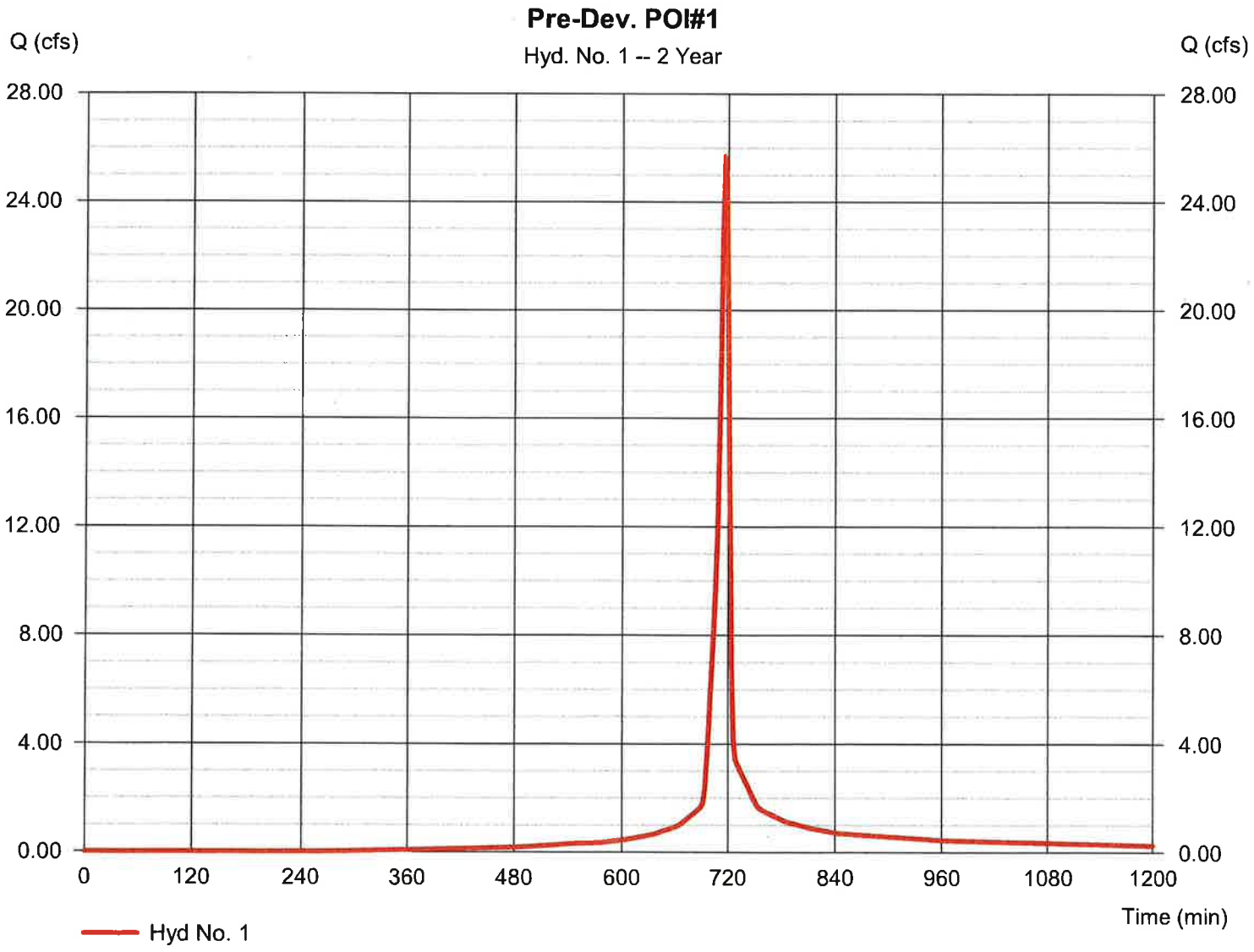
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 1

Pre-Dev. POI#1

Hydrograph type	= SCS Runoff	Peak discharge	= 25.70 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 54,748 cuft
Drainage area	= 5.950 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.790 x 80) + (3.190 x 98)] / 5.950



Hydrograph Report

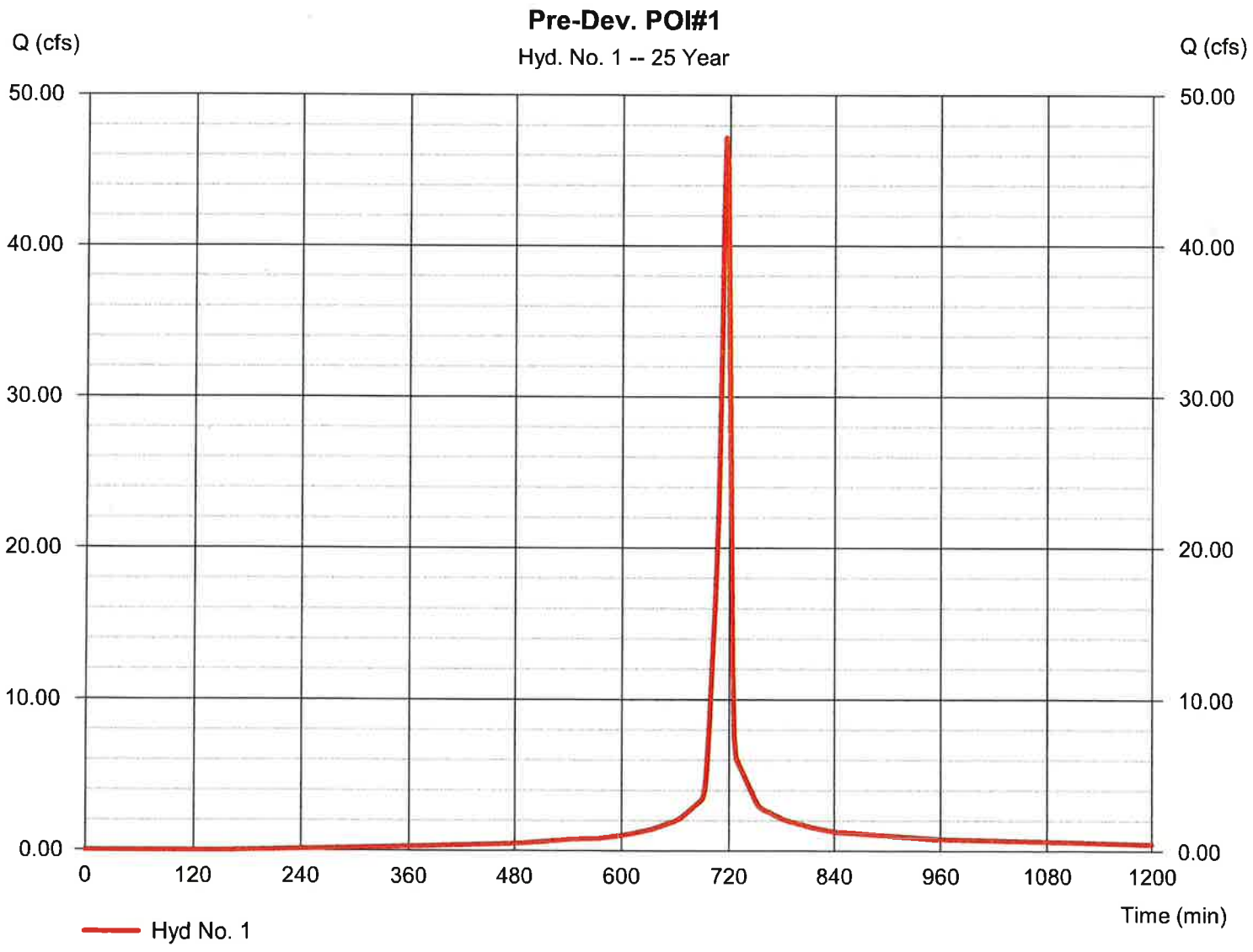
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 1

Pre-Dev. POI#1

Hydrograph type	= SCS Runoff	Peak discharge	= 47.20 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 104,840 cuft
Drainage area	= 5.950 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.790 x 80) + (3.190 x 98)] / 5.950



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 2	SHEET NO:	1
LOCATION	Post-Development POI#1 (unmanaged)	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	2.32	227.36
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.75	63.00
		TOTAL:	3.07	290.36

C (weighted)	Total (C) / Total (B)	290.36 / 3.07	94.5798	Use C =	**95**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

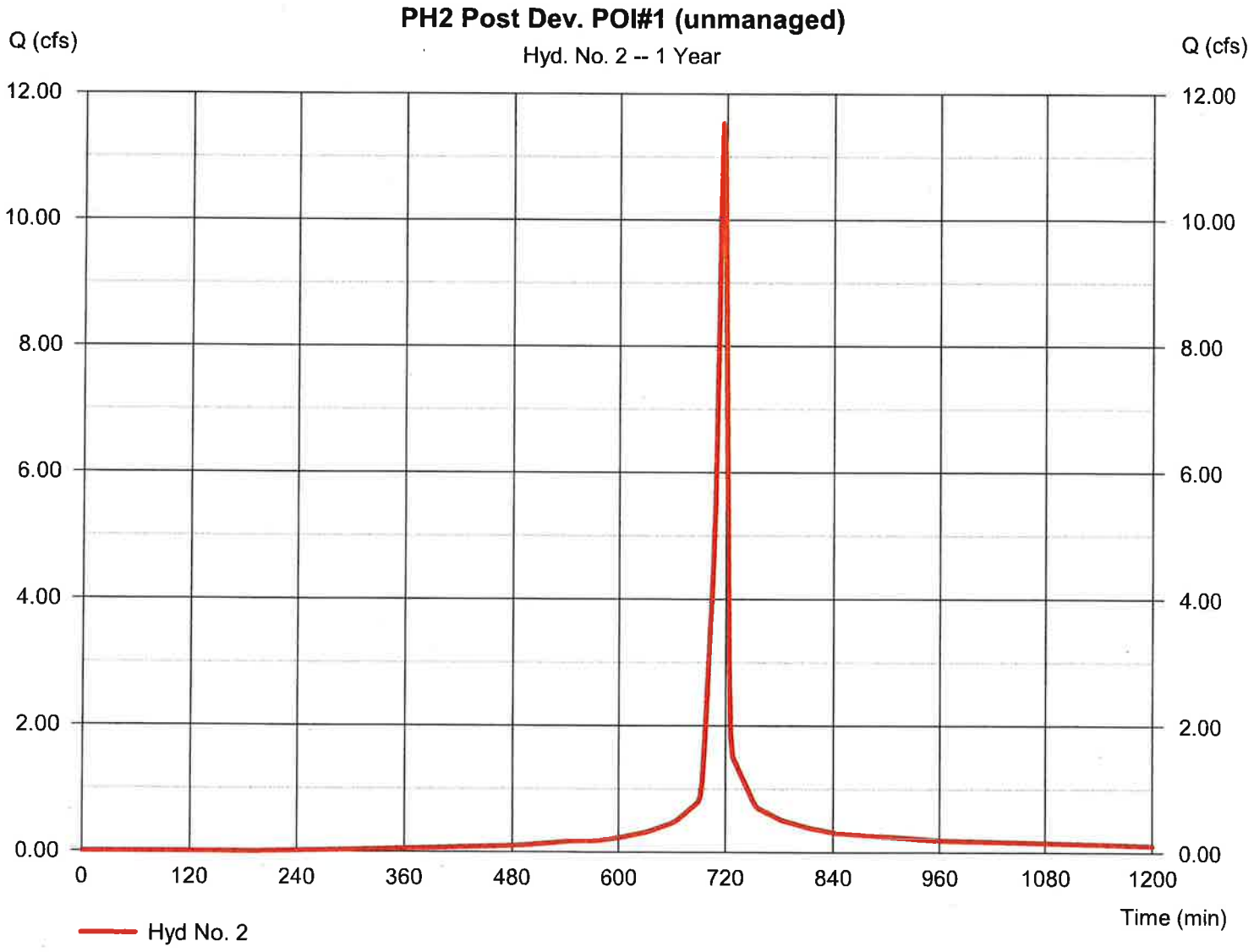
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 2

PH2 Post Dev. POI#1 (unmanaged)

Hydrograph type	= SCS Runoff	Peak discharge	= 11.53 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 25,182 cuft
Drainage area	= 3.070 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



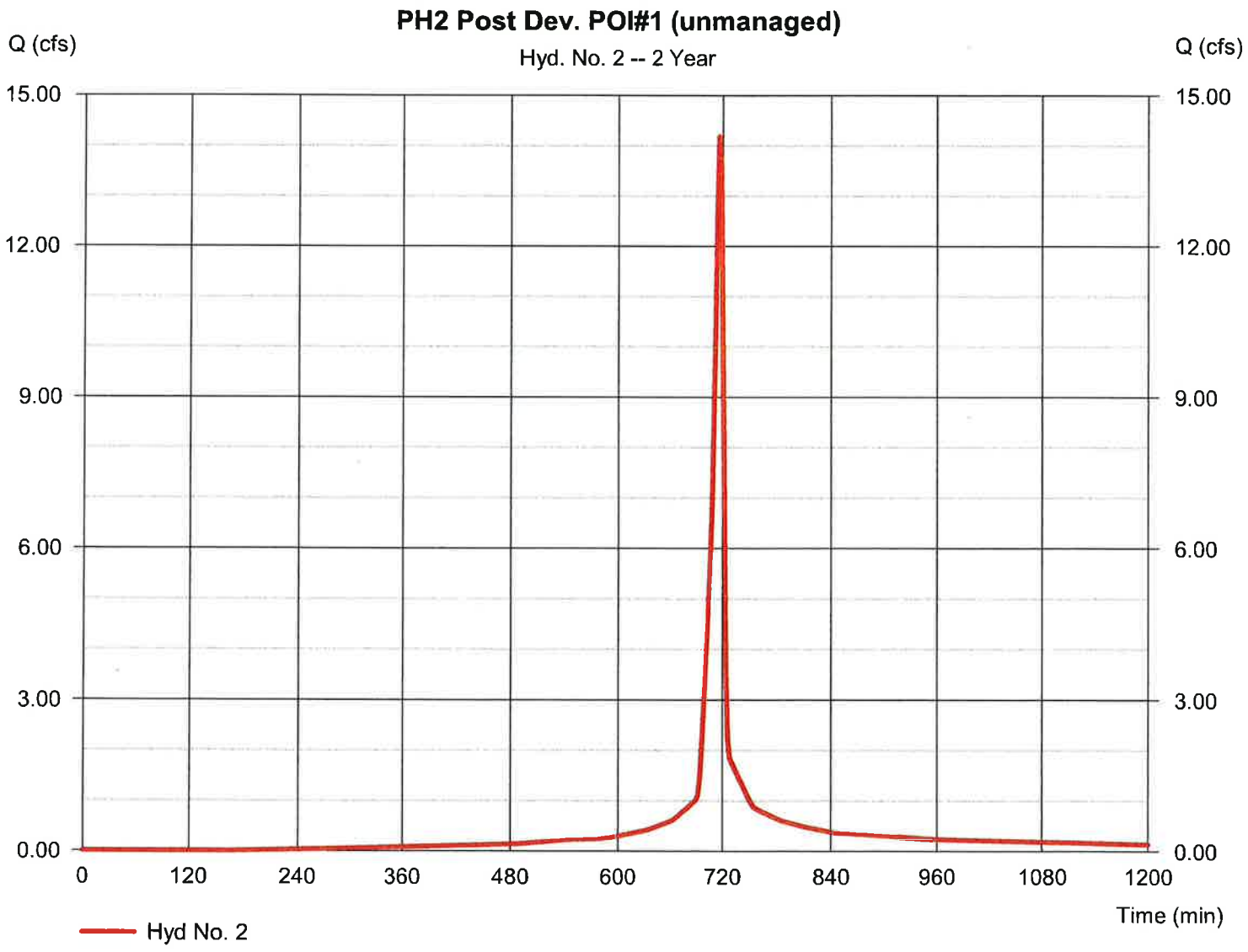
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 2

PH2 Post Dev. POI#1 (unmanaged)

Hydrograph type	= SCS Runoff	Peak discharge	= 14.19 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 31,425 cuft
Drainage area	= 3.070 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



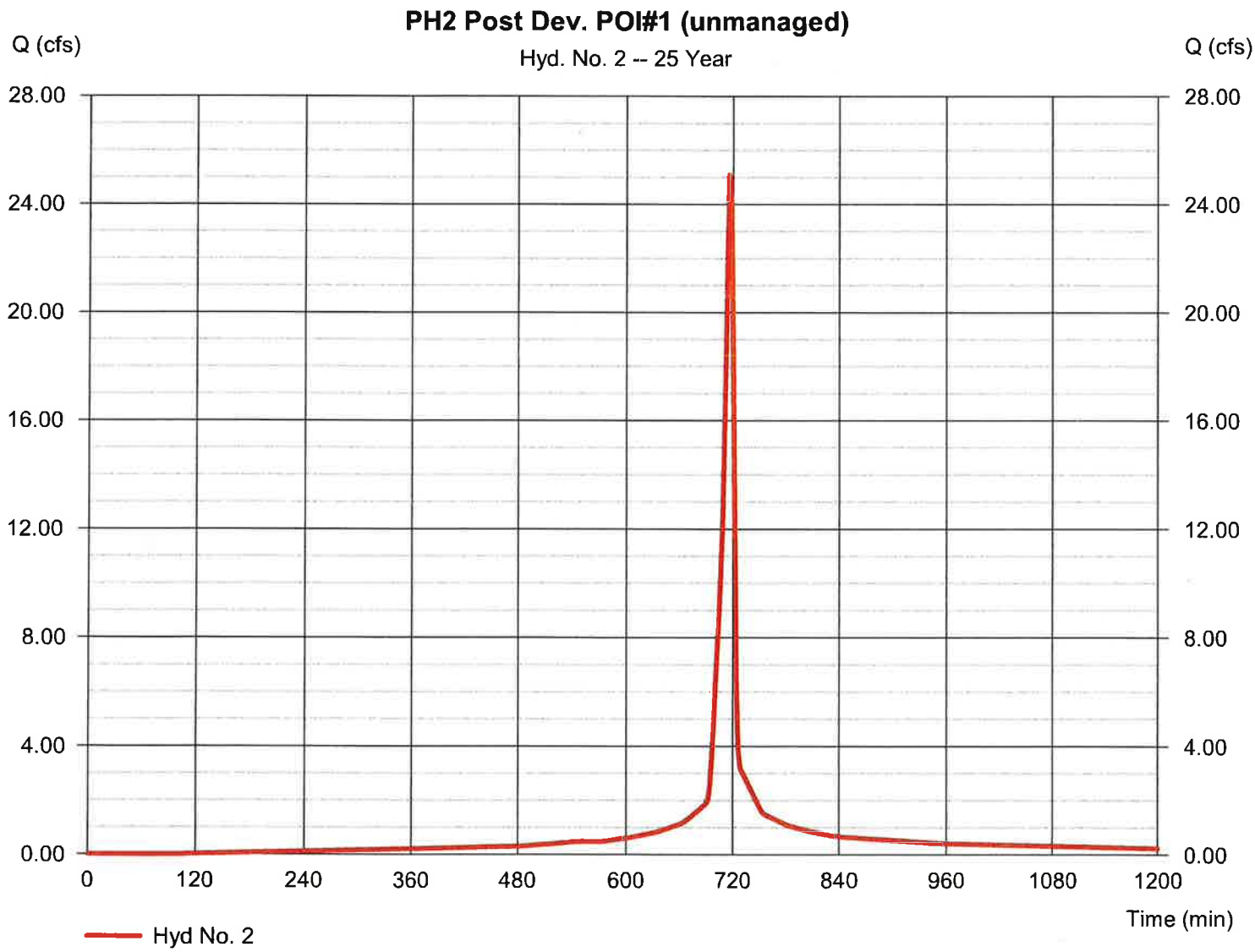
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 2

PH2 Post Dev. POI#1 (unmanaged)

Hydrograph type	= SCS Runoff	Peak discharge	= 25.09 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 57,679 cuft
Drainage area	= 3.070 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 2	SHEET NO:	1
LOCATION	Post-Development POI#1 (Basin Inflow)	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	1.38	135.24
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.23	19.32
		TOTAL:	1.61	154.56

C (weighted)	Total (C) / Total (B)	154.56 / 1.61	96.0000	Use C =	**96**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

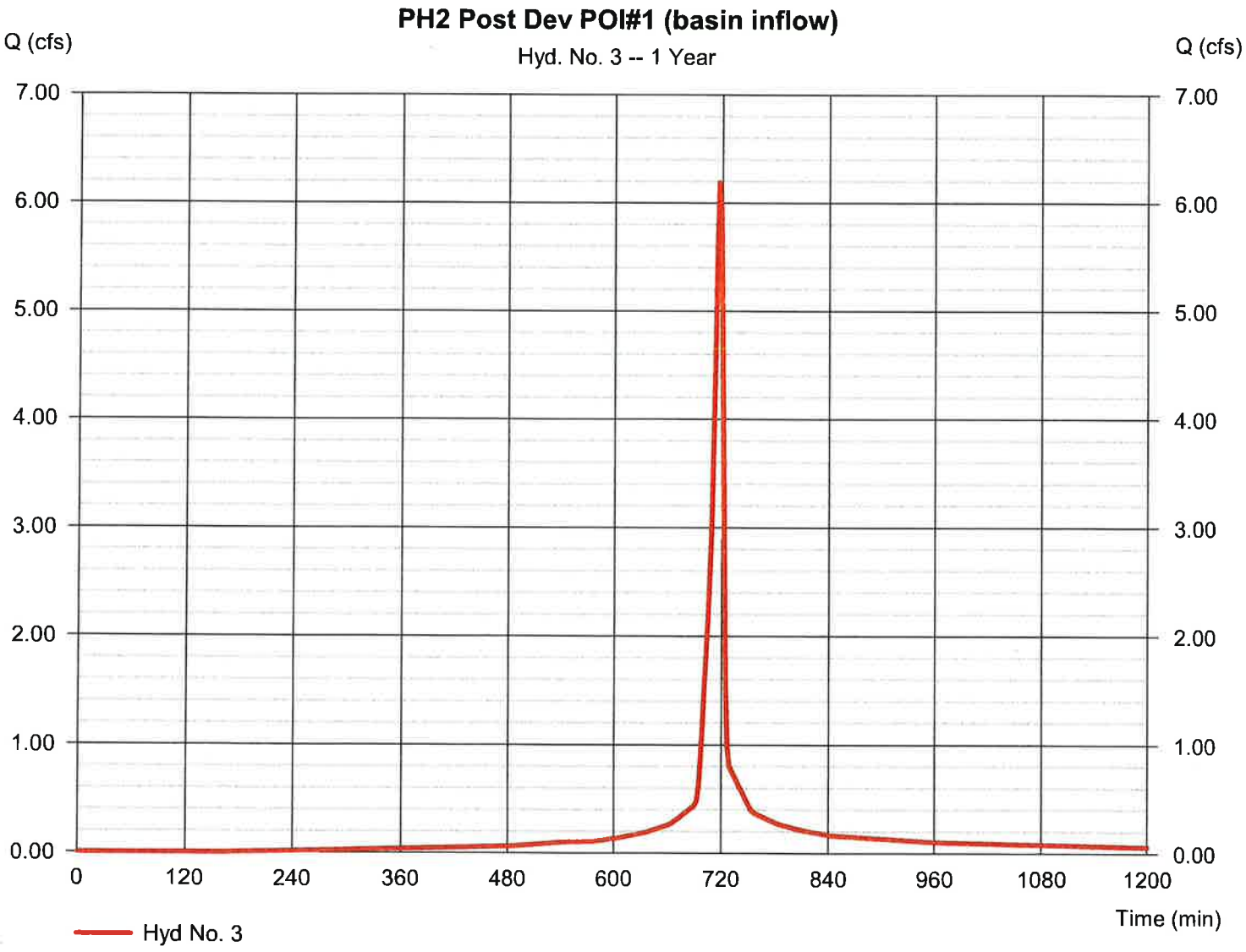
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 3

PH2 Post Dev POI#1 (basin inflow)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.194 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 13,767 cuft
Drainage area	= 1.610 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



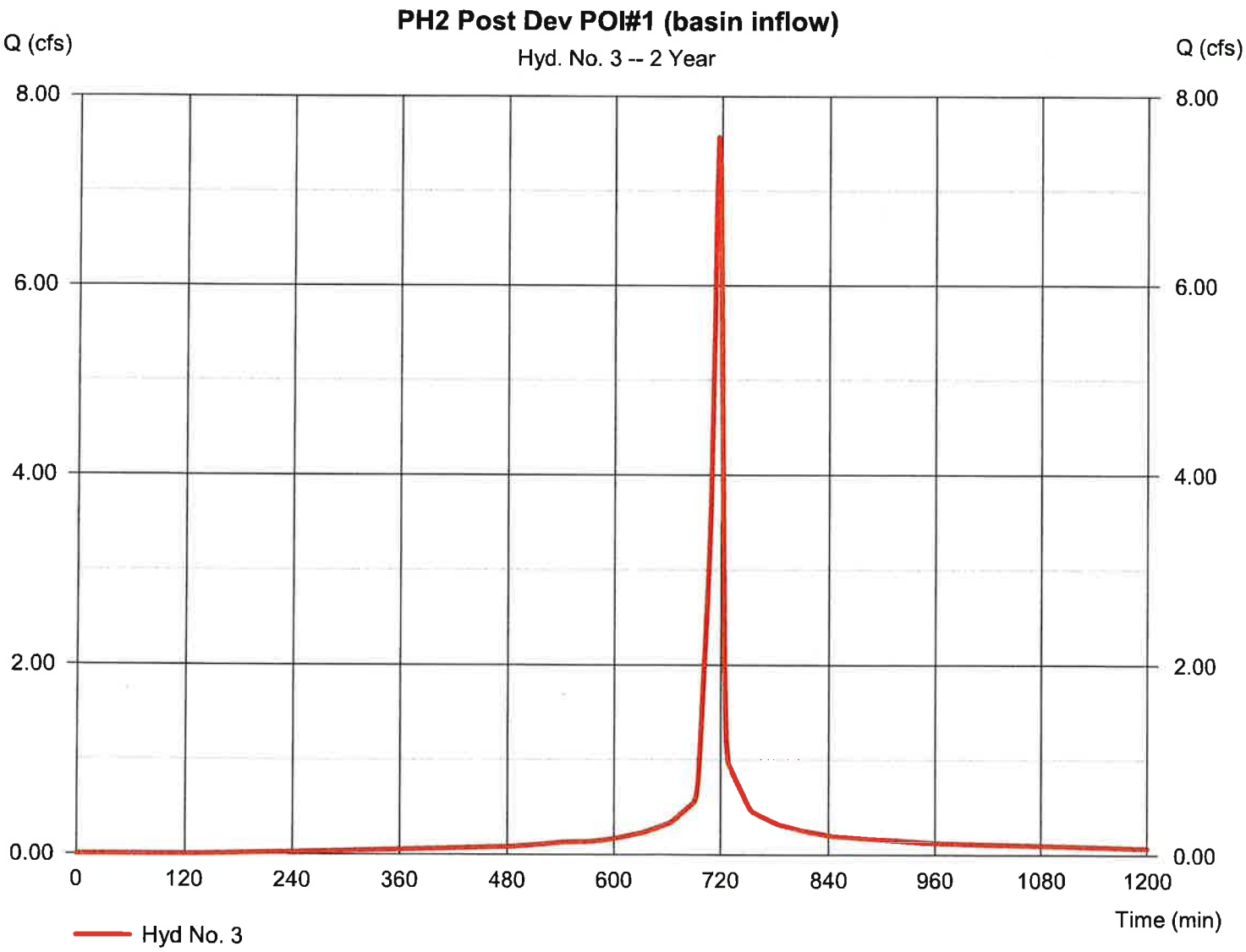
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 3

PH2 Post Dev POI#1 (basin inflow)

Hydrograph type	= SCS Runoff	Peak discharge	= 7.573 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 17,064 cuft
Drainage area	= 1.610 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



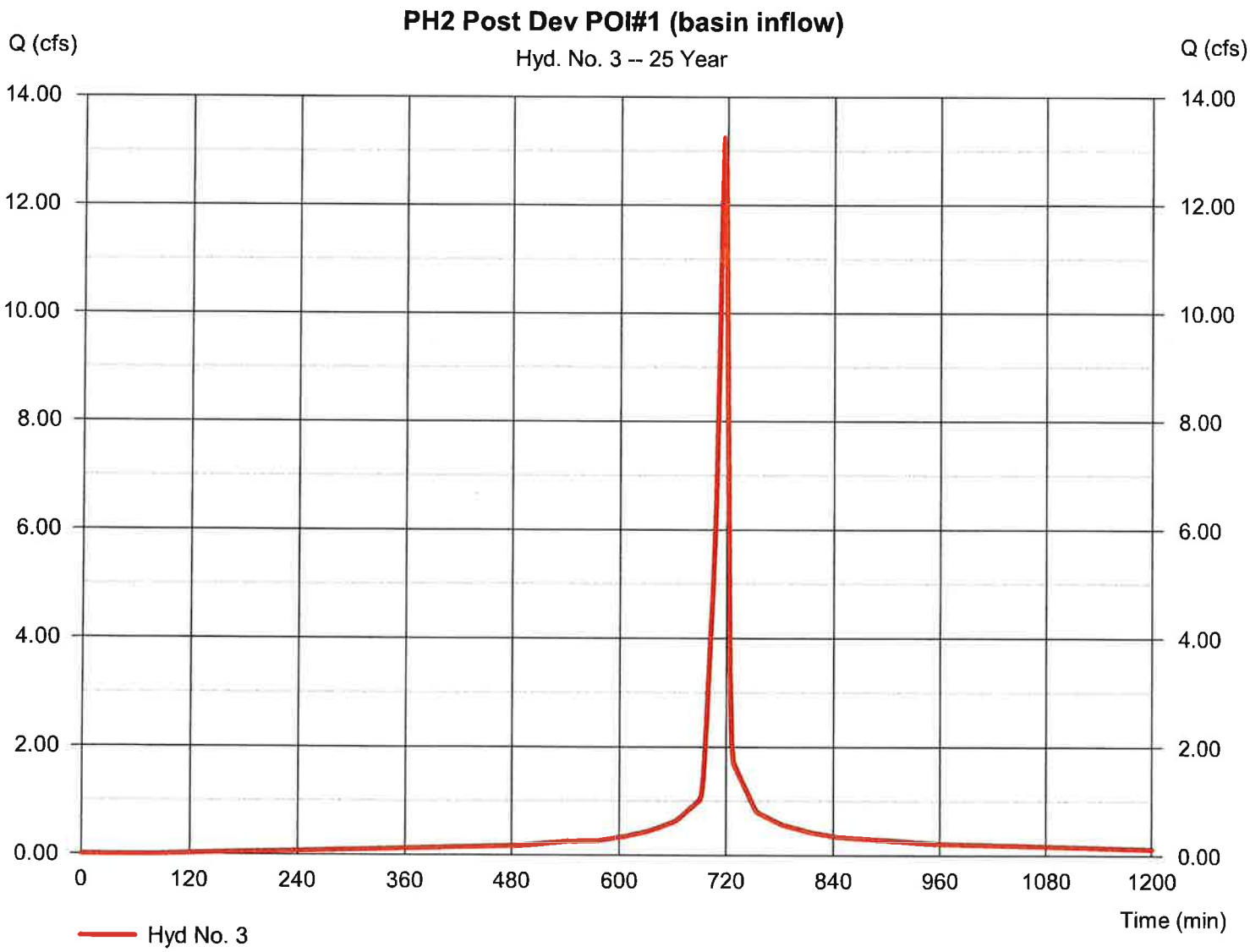
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 3

PH2 Post Dev POI#1 (basin inflow)

Hydrograph type	= SCS Runoff	Peak discharge	= 13.25 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 30,885 cuft
Drainage area	= 1.610 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Pond No. 1 - UG Basin #1

Pond Data

UG Chambers -Invert elev. = 294.00 ft, Rise x Span = 3.50 x 3.50 ft, Barrel Len = 126.00 ft, No. Barrels = 3, Slope = 0.50%, Headers = Yes
Encasement -Invert elev. = 294.00 ft, Width = 5.50 ft, Height = 4.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	294.00	n/a	0	0
0.51	294.51	n/a	274	274
1.03	295.03	n/a	722	996
1.54	295.54	n/a	854	1,850
2.05	296.05	n/a	897	2,746
2.57	296.57	n/a	898	3,645
3.08	297.08	n/a	857	4,502
3.59	297.59	n/a	750	5,252
4.10	298.10	n/a	547	5,799
4.62	298.62	n/a	464	6,264
5.13	299.13	n/a	464	6,728

Culvert / Orifice Structures

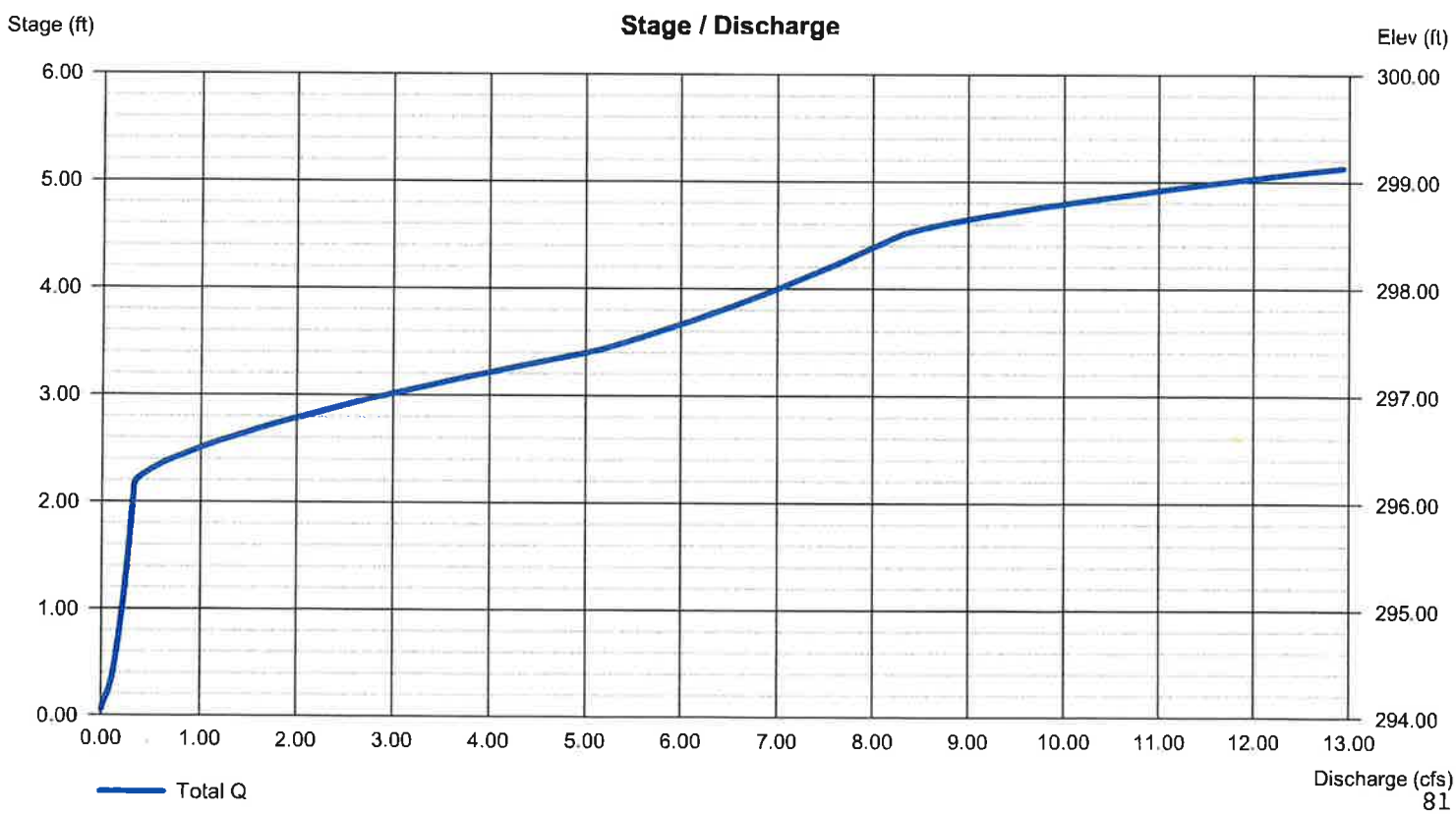
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	3.00	15.00	0.00
Span (in)	= 24.00	3.00	12.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 294.00	294.00	296.17	0.00
Length (ft)	= 115.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	2.00	0.00	0.00
Crest El. (ft)	= 301.00	298.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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



Hydrograph Report

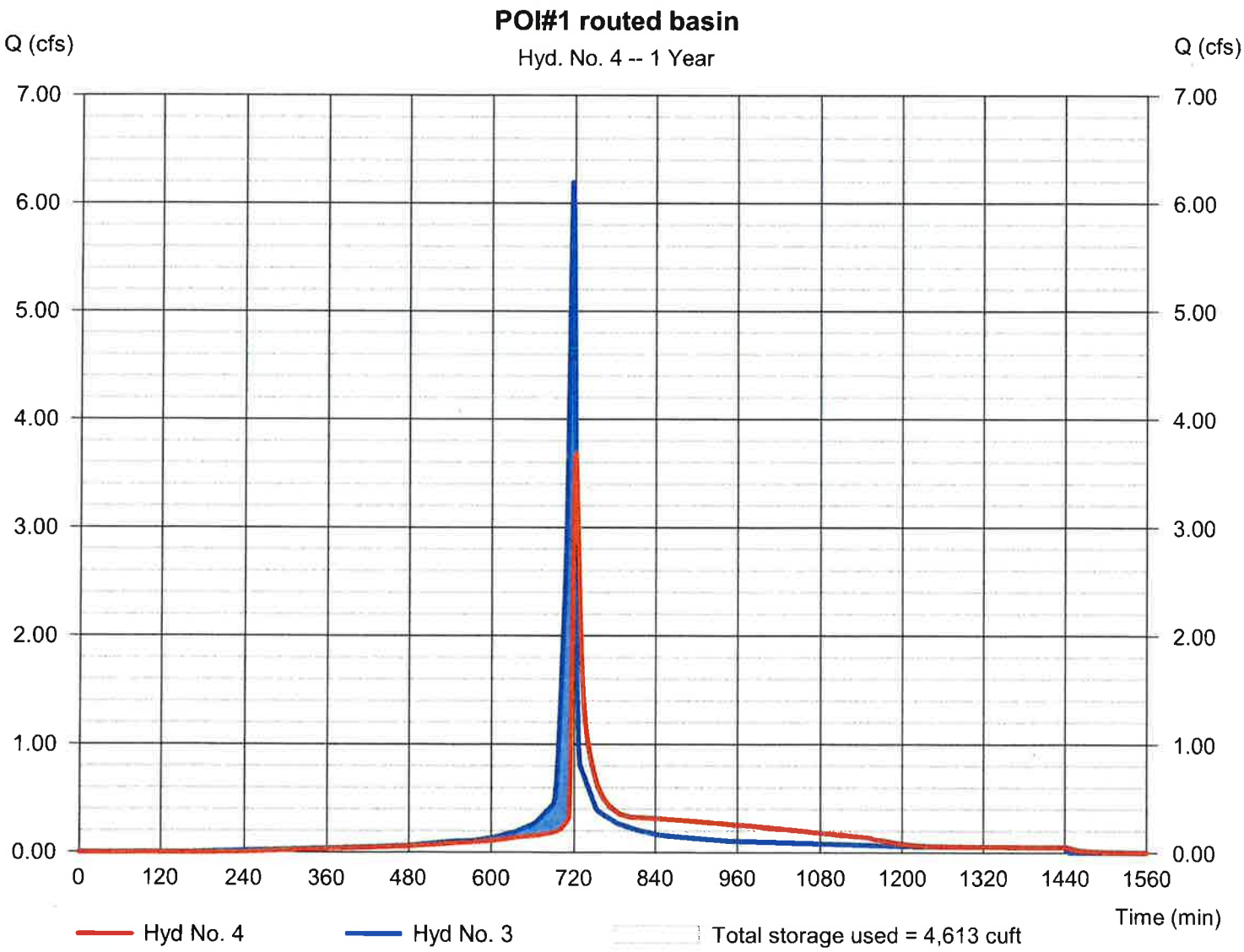
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 4

POI#1 routed basin

Hydrograph type	= Reservoir	Peak discharge	= 3.687 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 13,762 cuft
Inflow hyd. No.	= 3 - PH2 Post Dev POI#1 (basin inflow)	Max. Elevation	= 297.19 ft
Reservoir name	= UG Basin #1	Max. Storage	= 4,613 cuft

Storage Indication method used.



Hydrograph Report

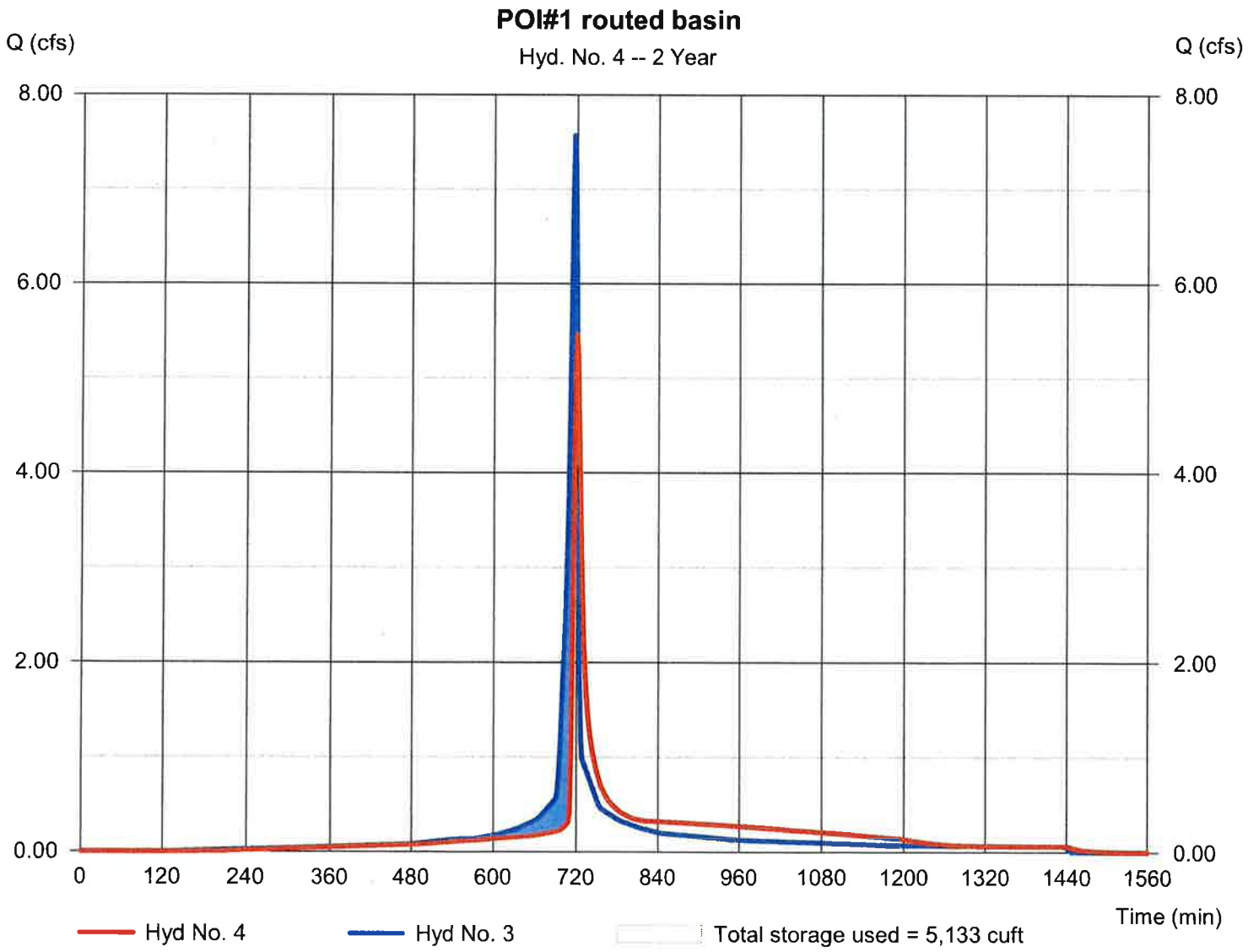
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 4

POI#1 routed basin

Hydrograph type	= Reservoir	Peak discharge	= 5.462 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 17,059 cuft
Inflow hyd. No.	= 3 - PH2 Post Dev POI#1 (basin full)	Max. Elevation	= 297.52 ft
Reservoir name	= UG Basin #1	Max. Storage	= 5,133 cuft

Storage Indication method used.



Hydrograph Report

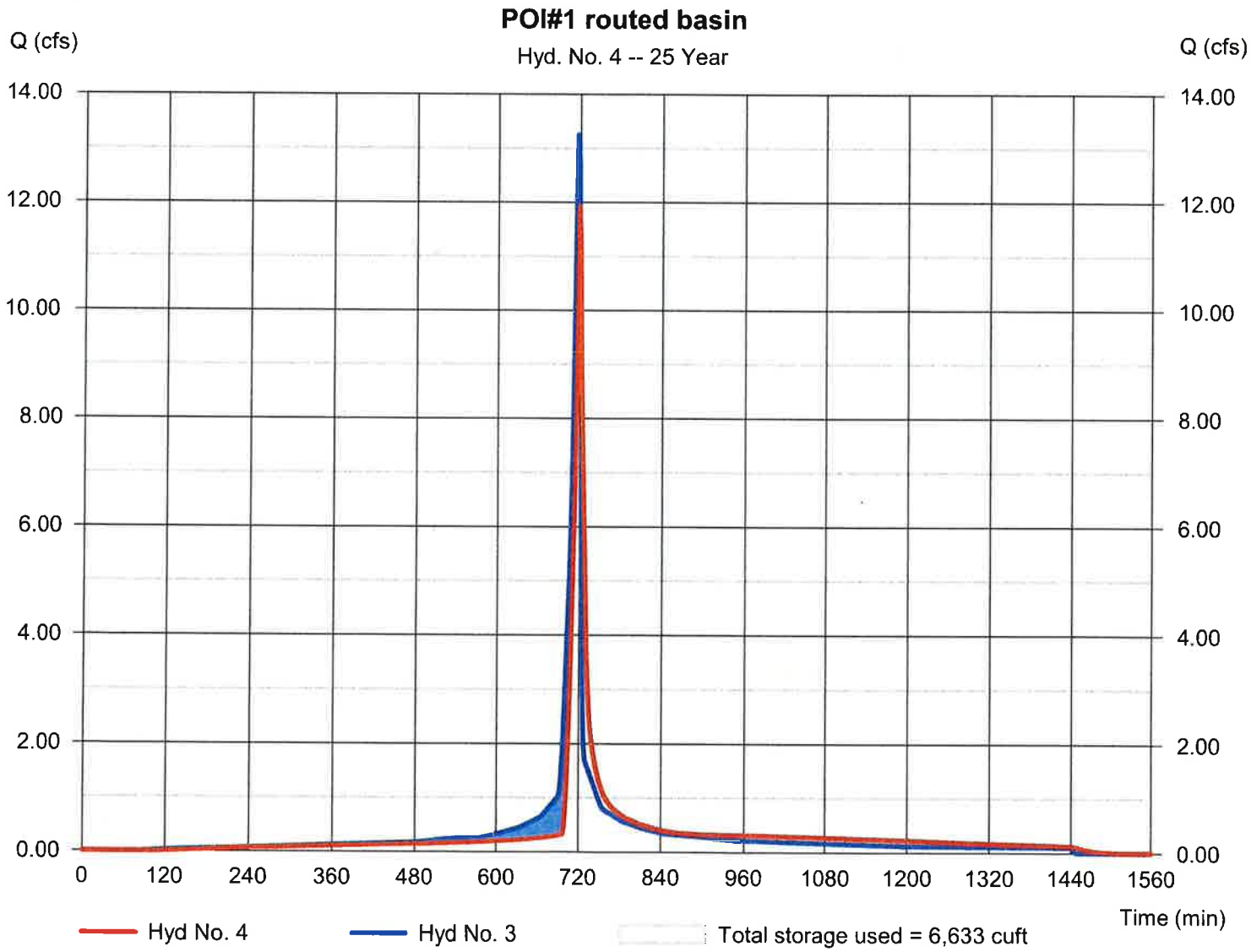
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 4

POI#1 routed basin

Hydrograph type	= Reservoir	Peak discharge	= 11.93 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 30,880 cuft
Inflow hyd. No.	= 3 - PH2 Post Dev POI#1 (basin flow)	Max. Elevation	= 299.07 ft
Reservoir name	= UG Basin #1	Max. Storage	= 6,633 cuft

Storage Indication method used.



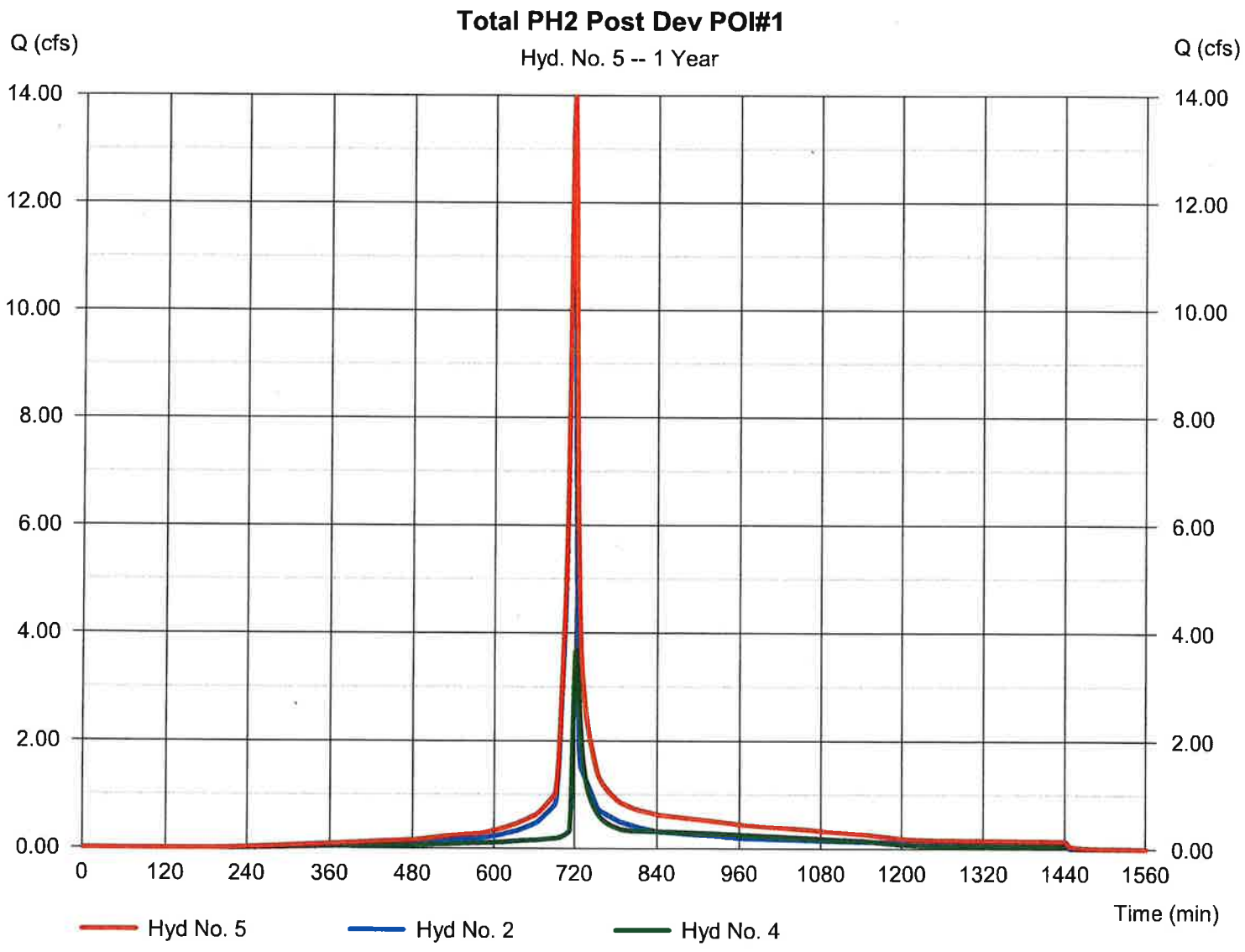
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 5

Total PH2 Post Dev POI#1

Hydrograph type	= Combine	Peak discharge	= 13.99 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 38,945 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 3.070 ac



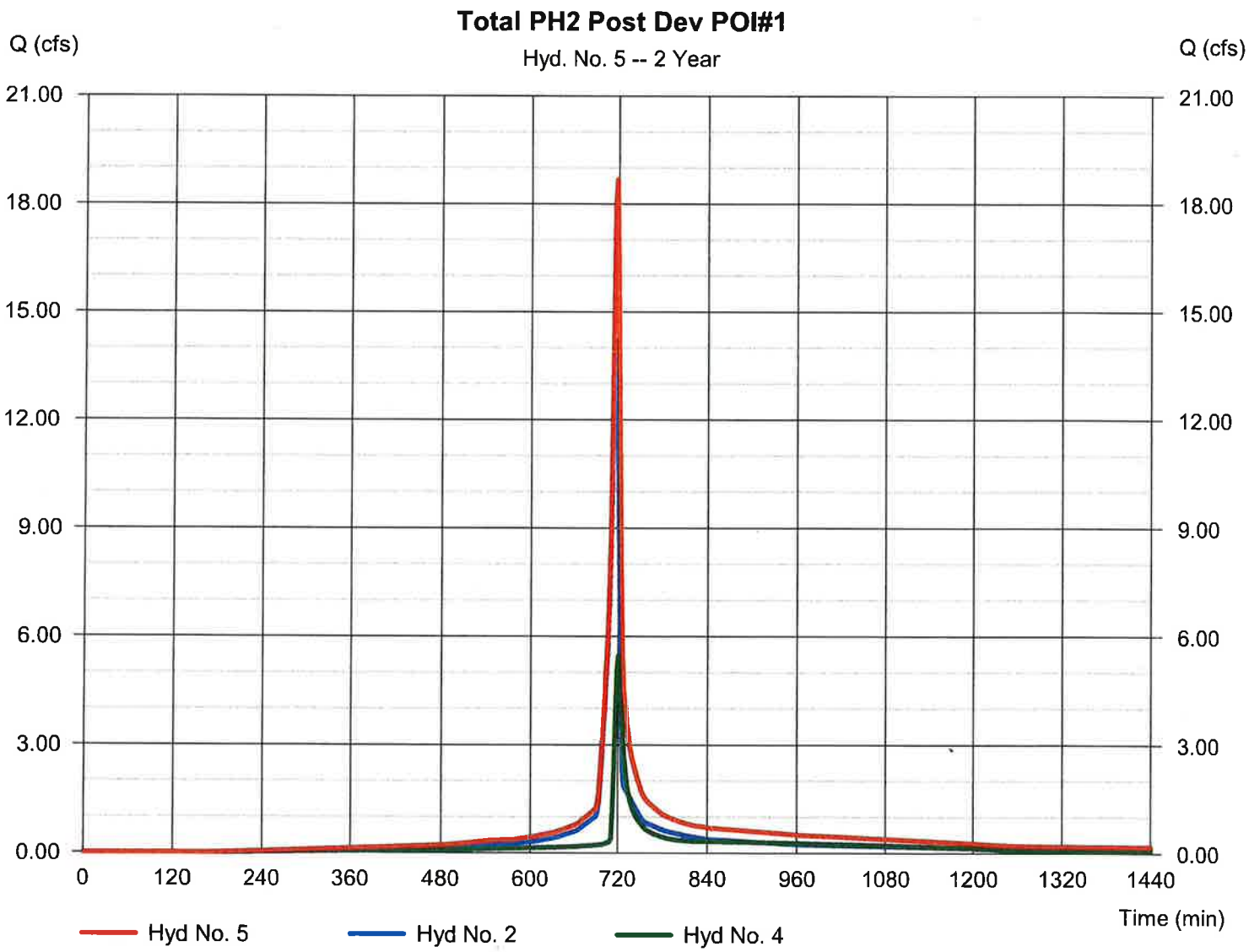
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 5

Total PH2 Post Dev POI#1

Hydrograph type	= Combine	Peak discharge	= 18.68 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 48,484 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 3.070 ac



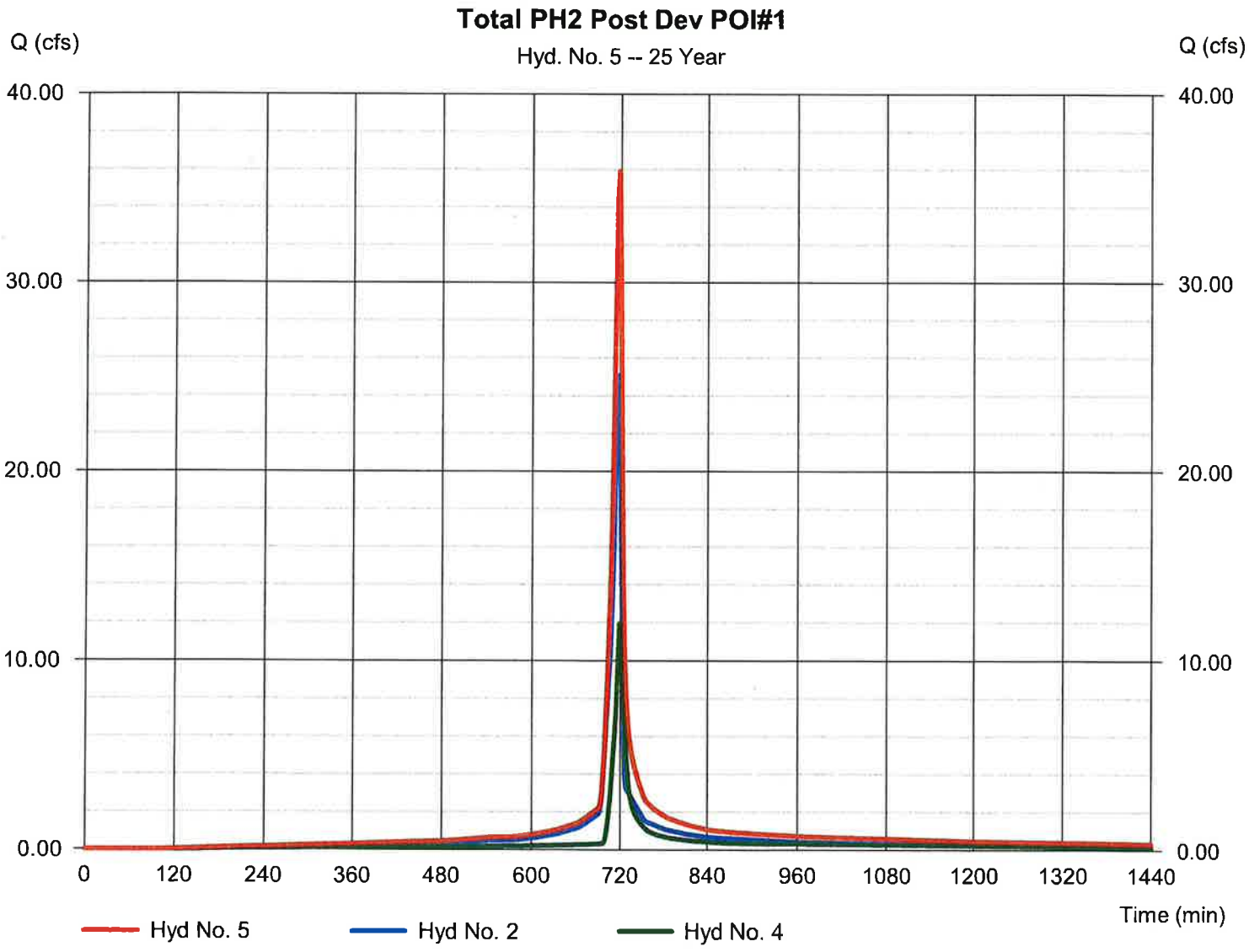
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 5

Total PH2 Post Dev POI#1

Hydrograph type	= Combine	Peak discharge	= 35.91 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 88,559 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 3.070 ac



POINT OF INTEREST #2

COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Pre-Development POI#2	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98		
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.27	22.68
		TOTAL:	0.27	22.68

C (weighted)	Total (C) / Total (B)	22.68 / 0.27	84.0000	Use C =	**84**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

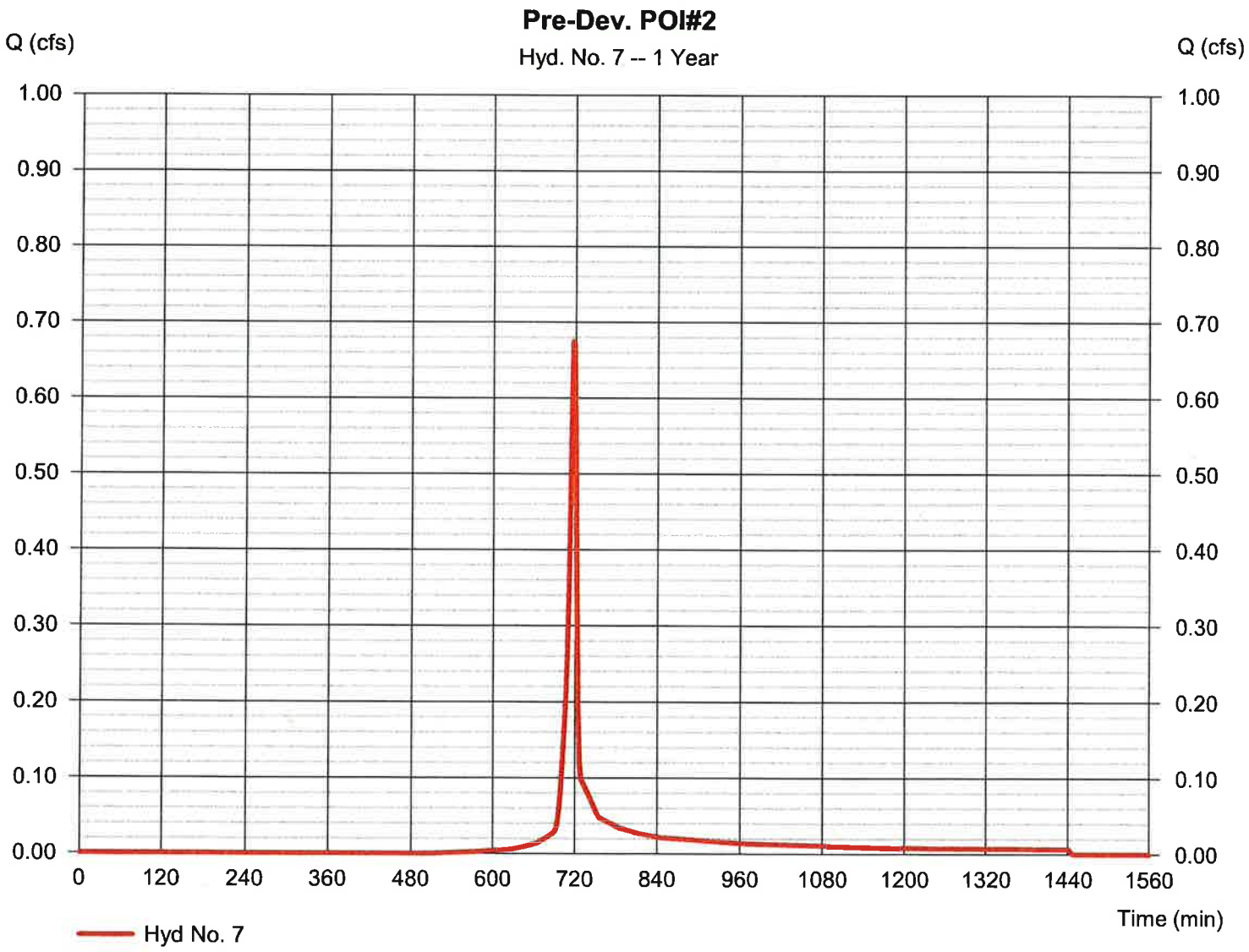
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 7

Pre-Dev. POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.675 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,363 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



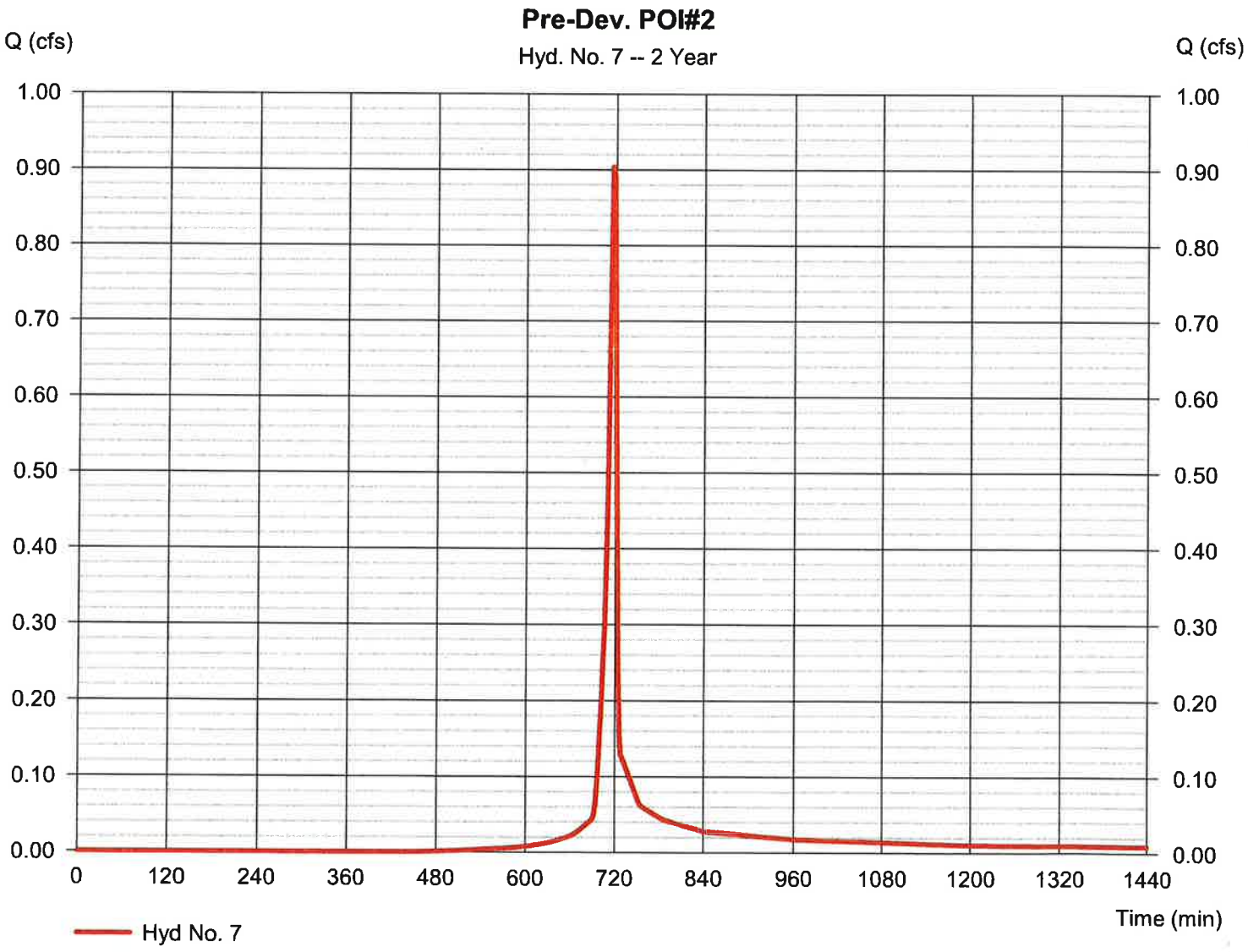
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 7

Pre-Dev. POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.904 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,835 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



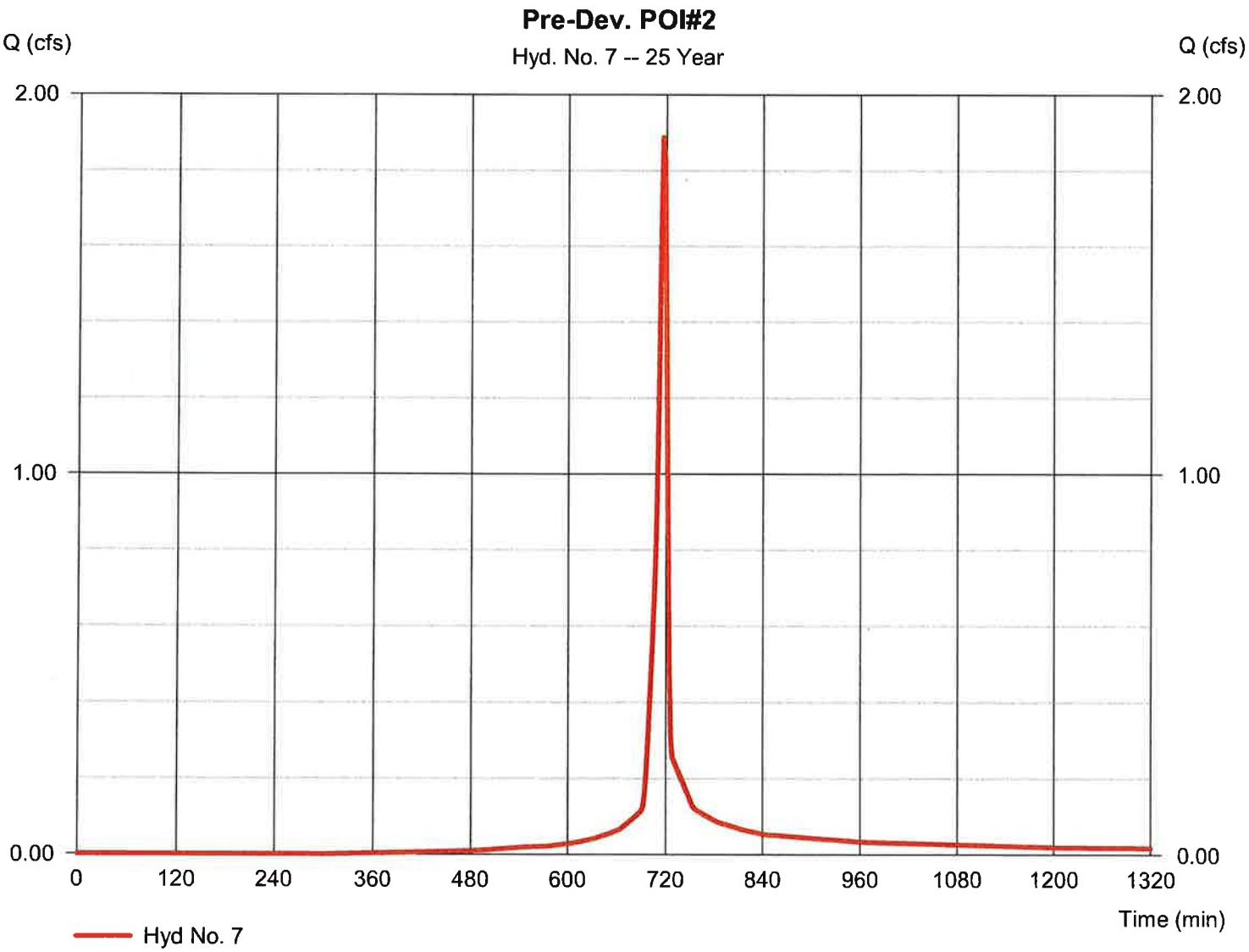
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 7

Pre-Dev. POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.889 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 3,951 cuft
Drainage area	= 0.270 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 2	SHEET NO:	1
LOCATION	Post-Development POI#2	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	0.03	2.94
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.09	7.56
		TOTAL:	0.12	10.5

C (weighted)	Total (C) / Total (B)	10.5 / 0.12	87.5000	Use C =	**88**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

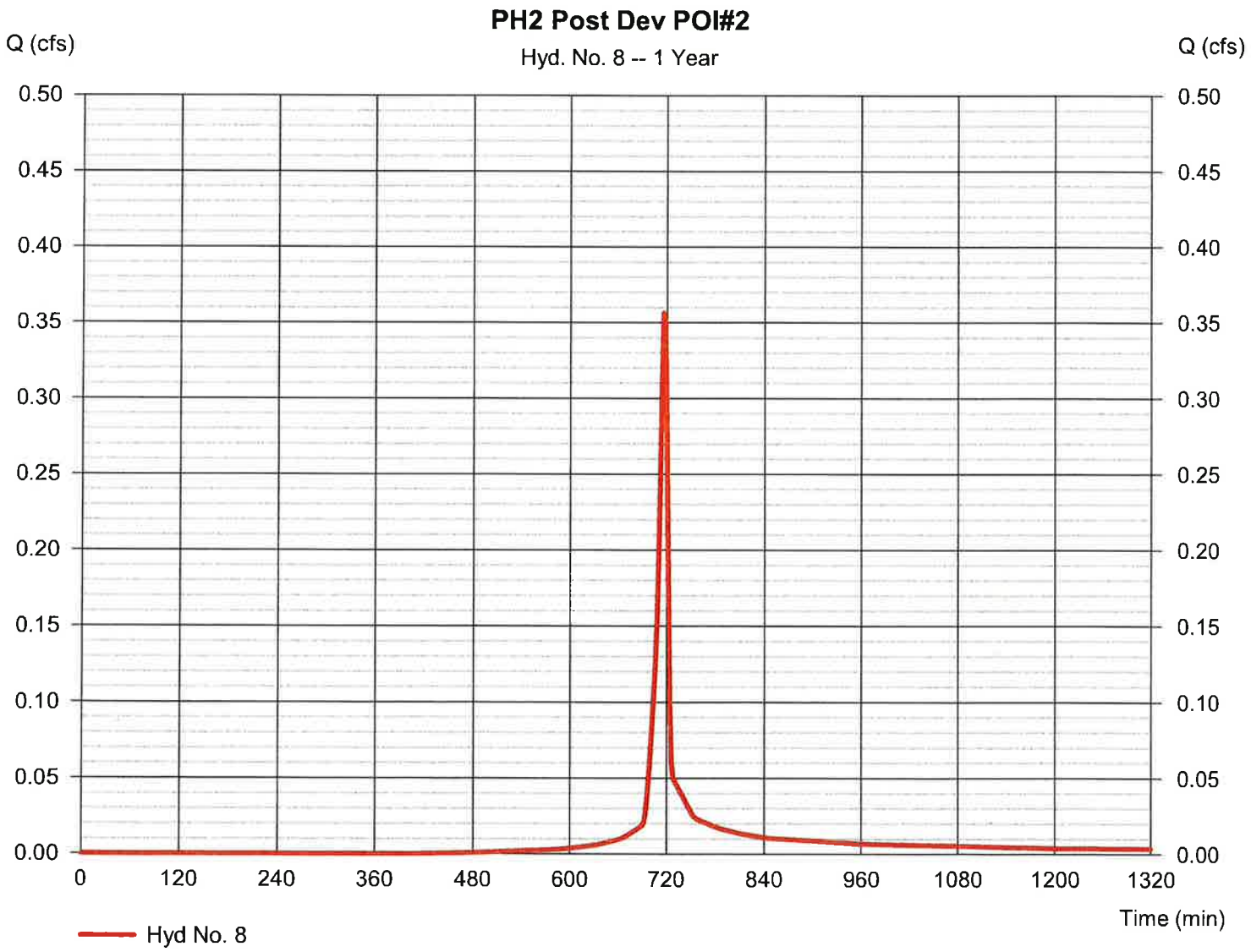
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 8

PH2 Post Dev POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.357 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 728 cuft
Drainage area	= 0.120 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



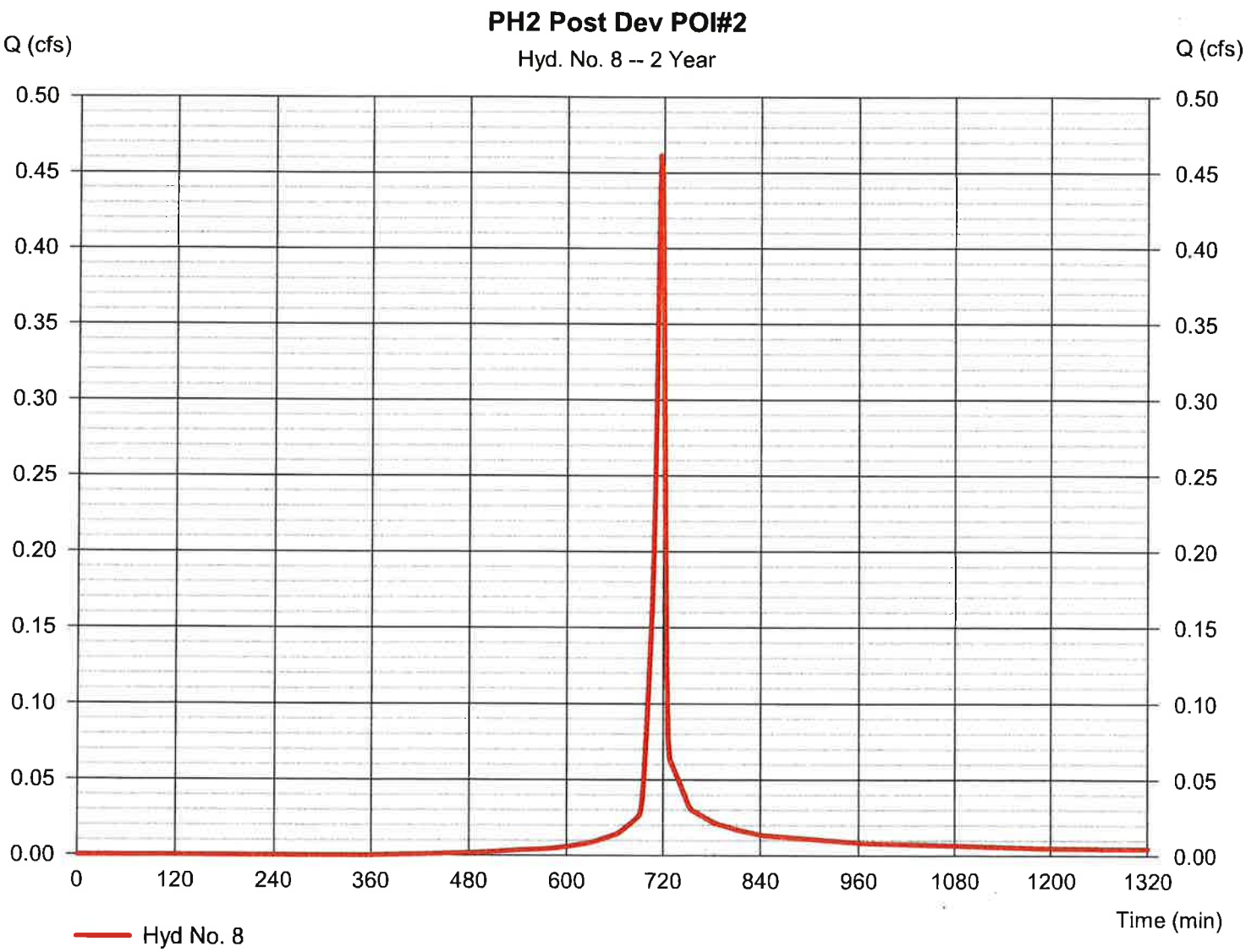
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 8

PH2 Post Dev POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.462 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 953 cuft
Drainage area	= 0.120 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



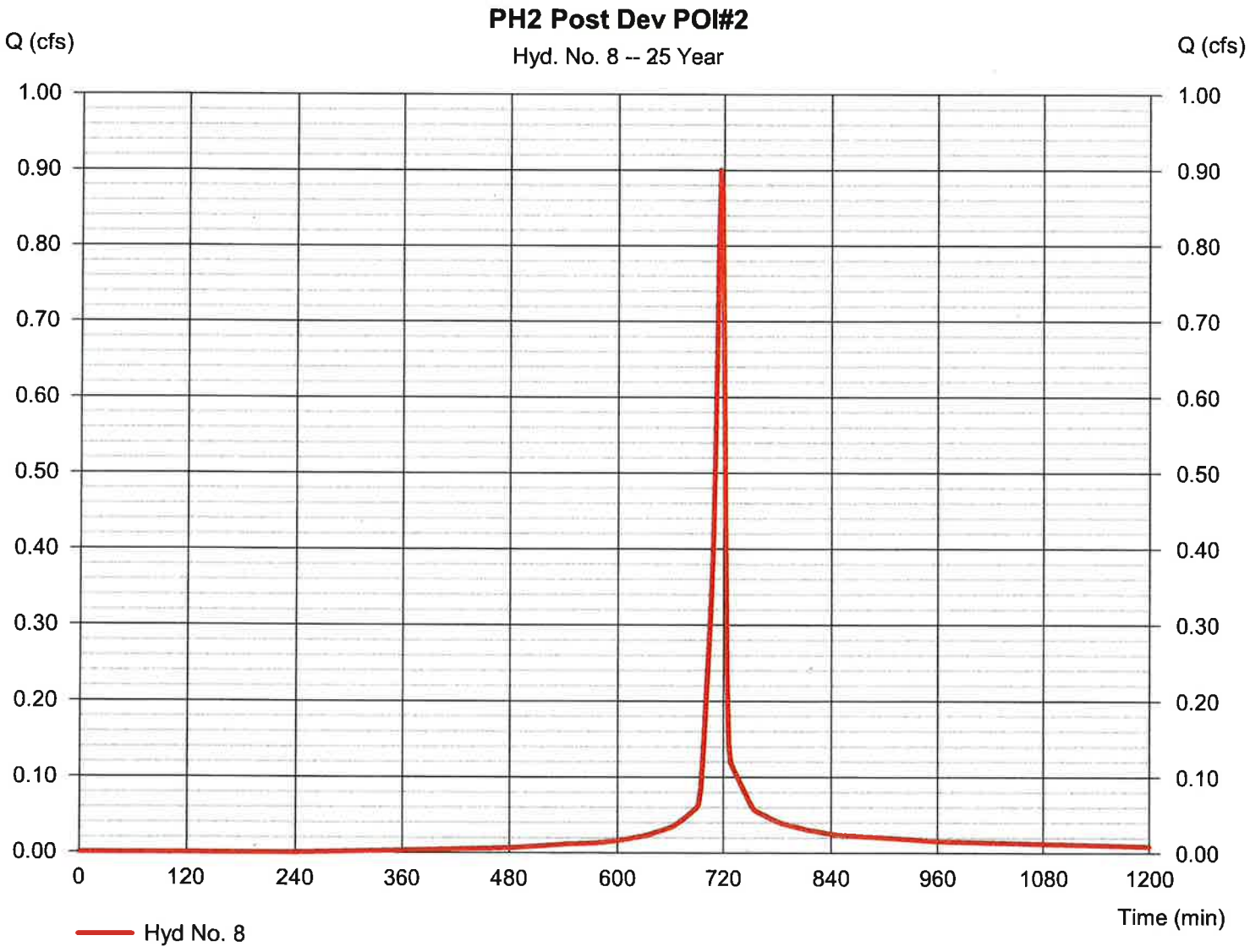
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 8

PH2 Post Dev POI#2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.901 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,932 cuft
Drainage area	= 0.120 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



POINT OF INTEREST #3

COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 1	SHEET NO:	1
LOCATION	Pre-Development POI#3	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98		
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.12	10.08
		TOTAL:	0.12	10.08

C (weighted)	Total (C) / Total (B)	10.08 / 0.12	84.0000	Use C =	**84**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

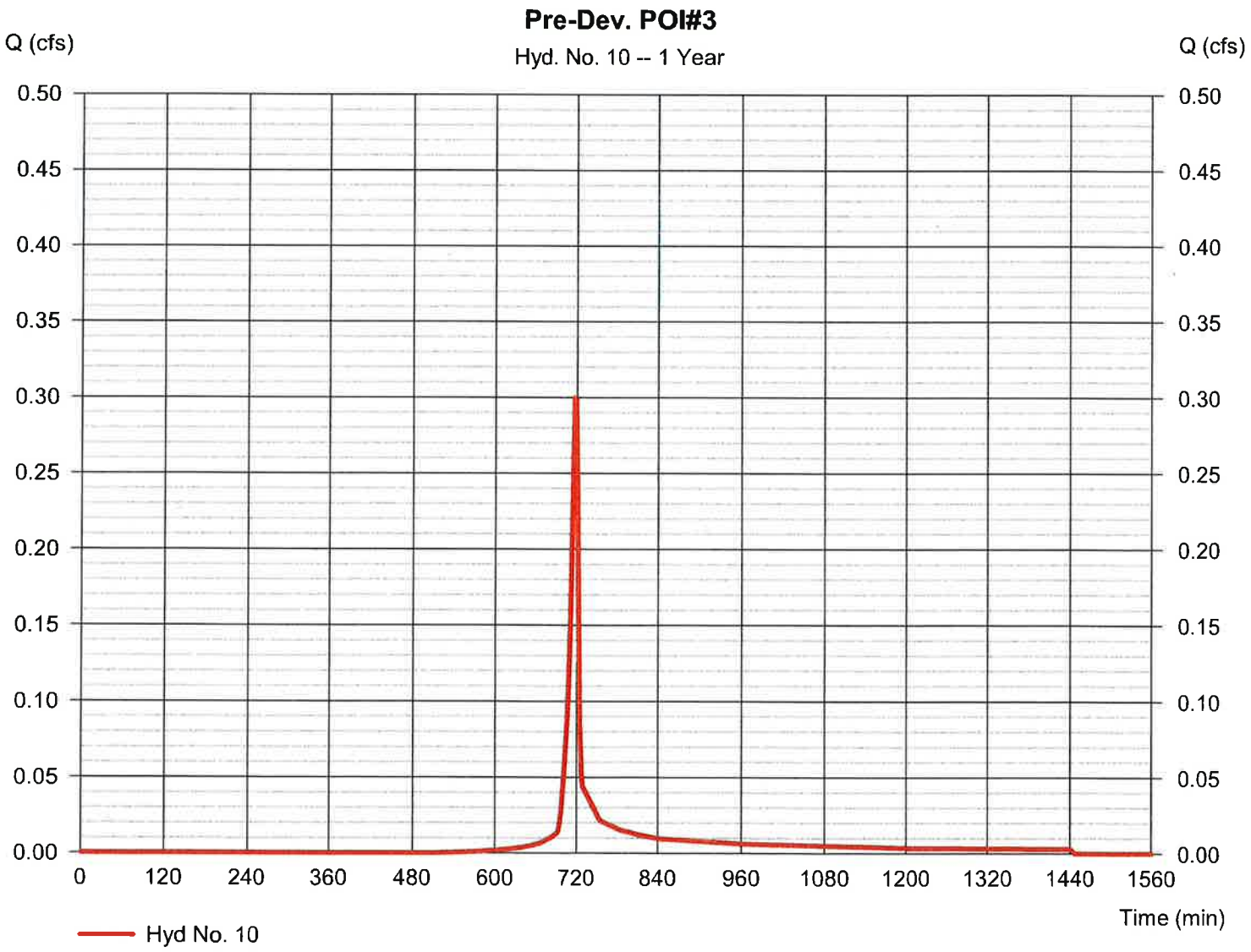
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 10

Pre-Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.300 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 606 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



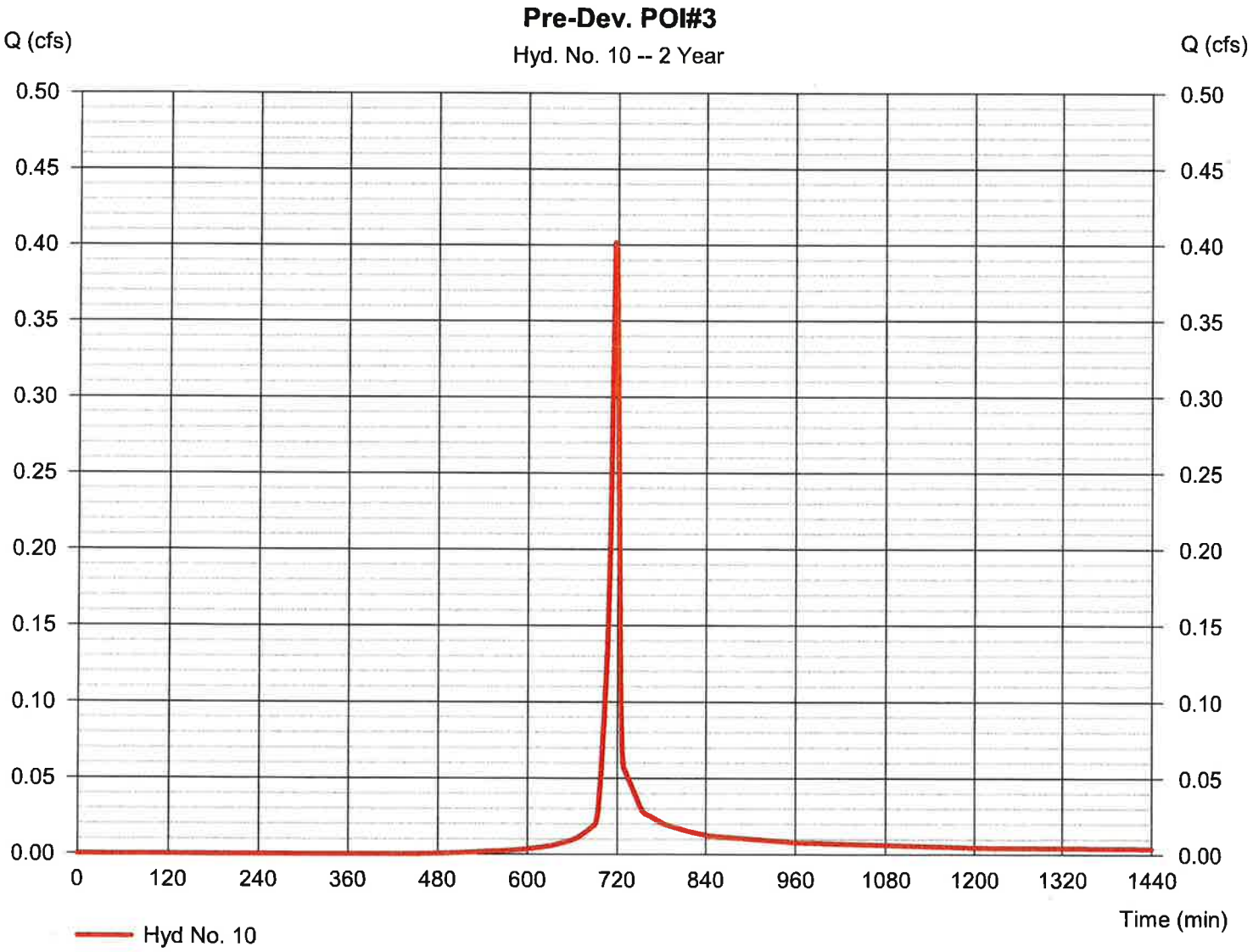
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 10

Pre-Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.402 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 815 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



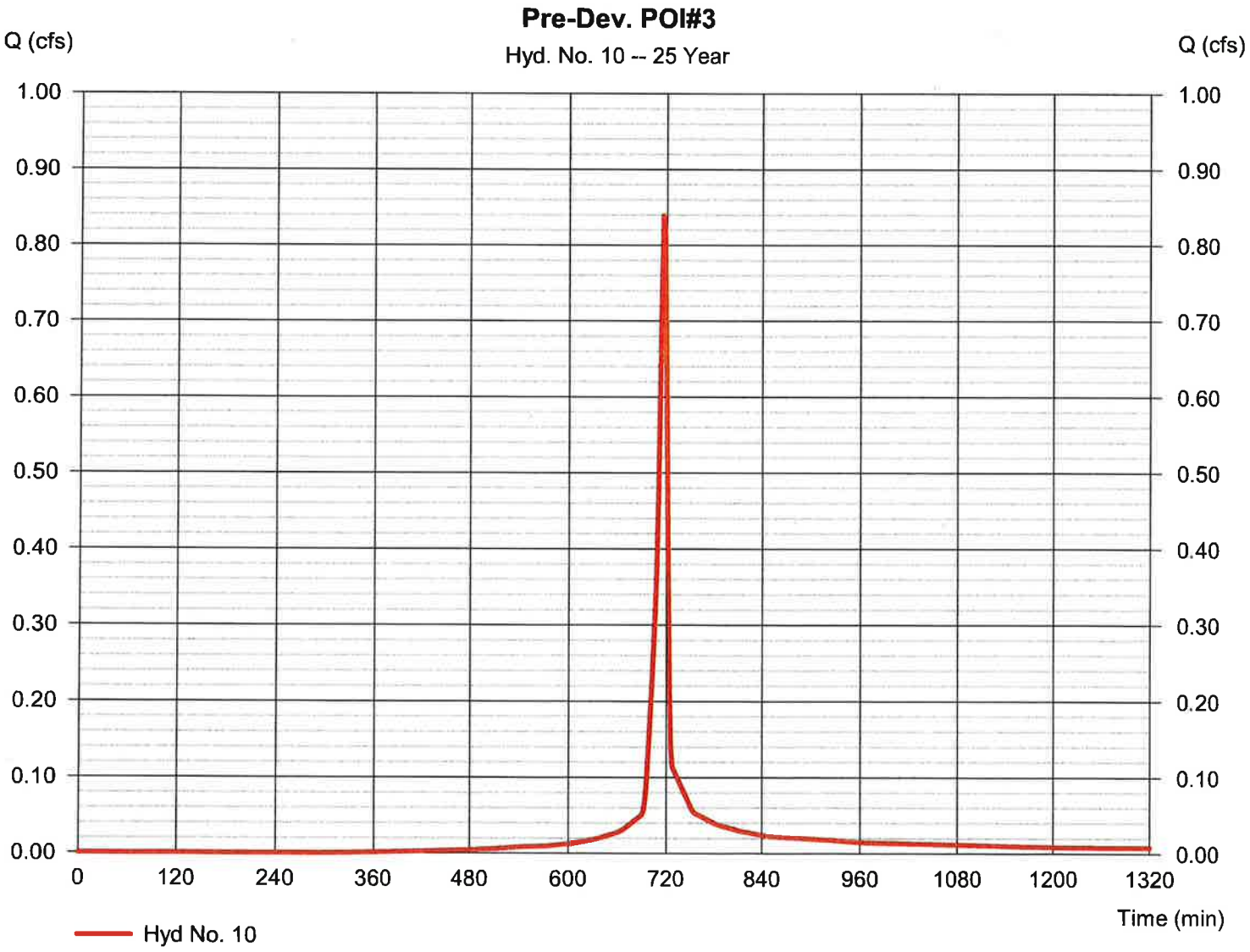
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 10

Pre-Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.840 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,756 cuft
Drainage area	= 0.120 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



COMPUTATION SHEET : RUNOFF CURVE NUMBER (CN)

PROJECT:	Quality Inn Redevelopment	DATE:	5/29/2019
	1740 Fordham Blvd.	BY:	JJB
		CHECKED BY:	JJB
	Phase 2	SHEET NO:	1
LOCATION	Post-Development POI#3	REVISION:	3

SOIL GROUP	LAND USE DESCRIPTION	CN (A)	% OF AREA (ACRE) (B)	PRODUCT (A*B) (C)
D	IMPERVIOUS	98	1.260	123.48
	PERVIOUS			
D	*Lawn, Dense Soil Avg 2-7%*	84	0.270	22.68
		TOTAL:	1.53	146.16

C (weighted)	Total (C) / Total (B)	146.16 / 1.53	95.5294	Use C =	**96**

Notes:

Time of Concentration = 5 minutes (Asssumed, actual is less)

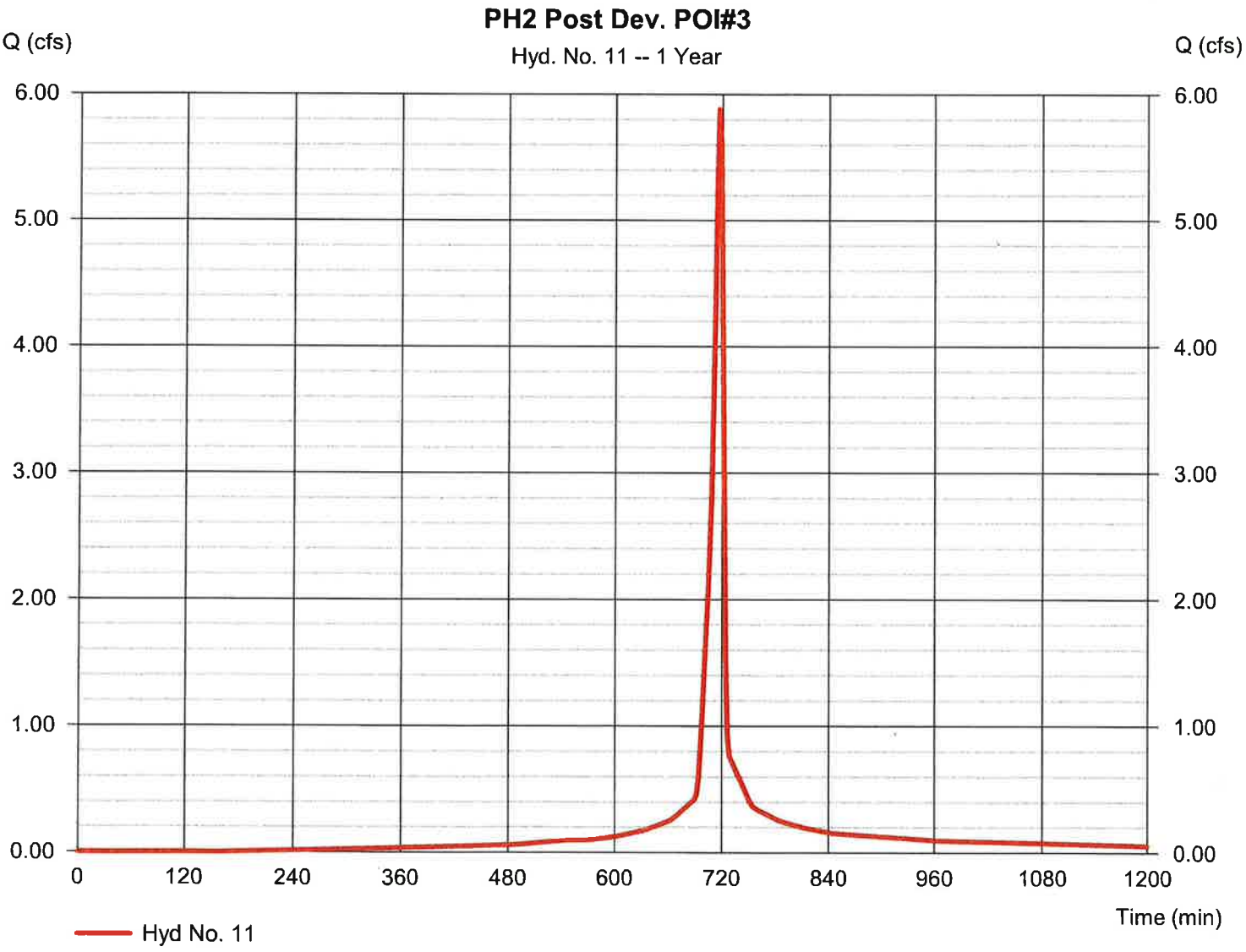
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 11

PH2 Post Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 5.886 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 13,083 cuft
Drainage area	= 1.530 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



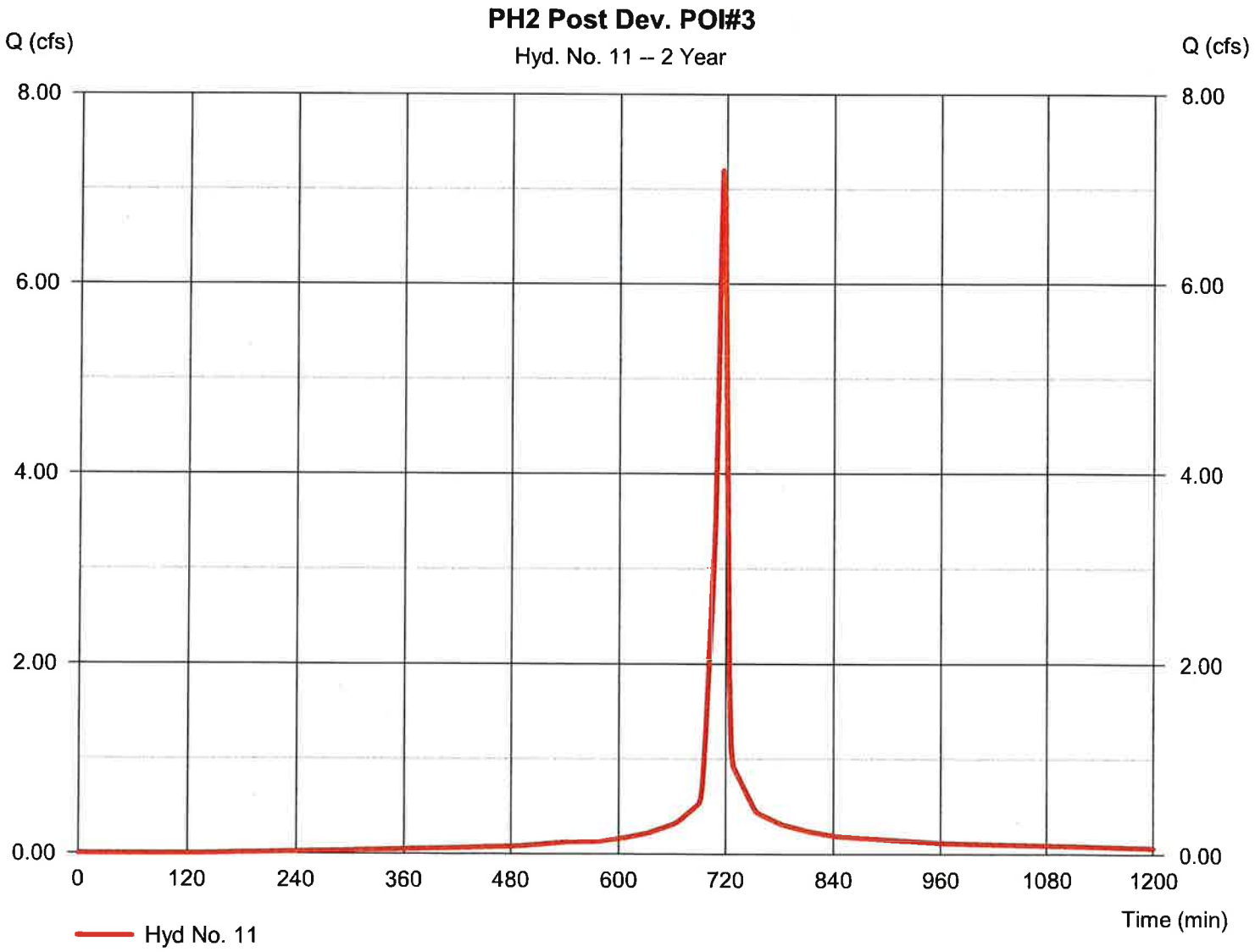
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 11

PH2 Post Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 7.197 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 16,216 cuft
Drainage area	= 1.530 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



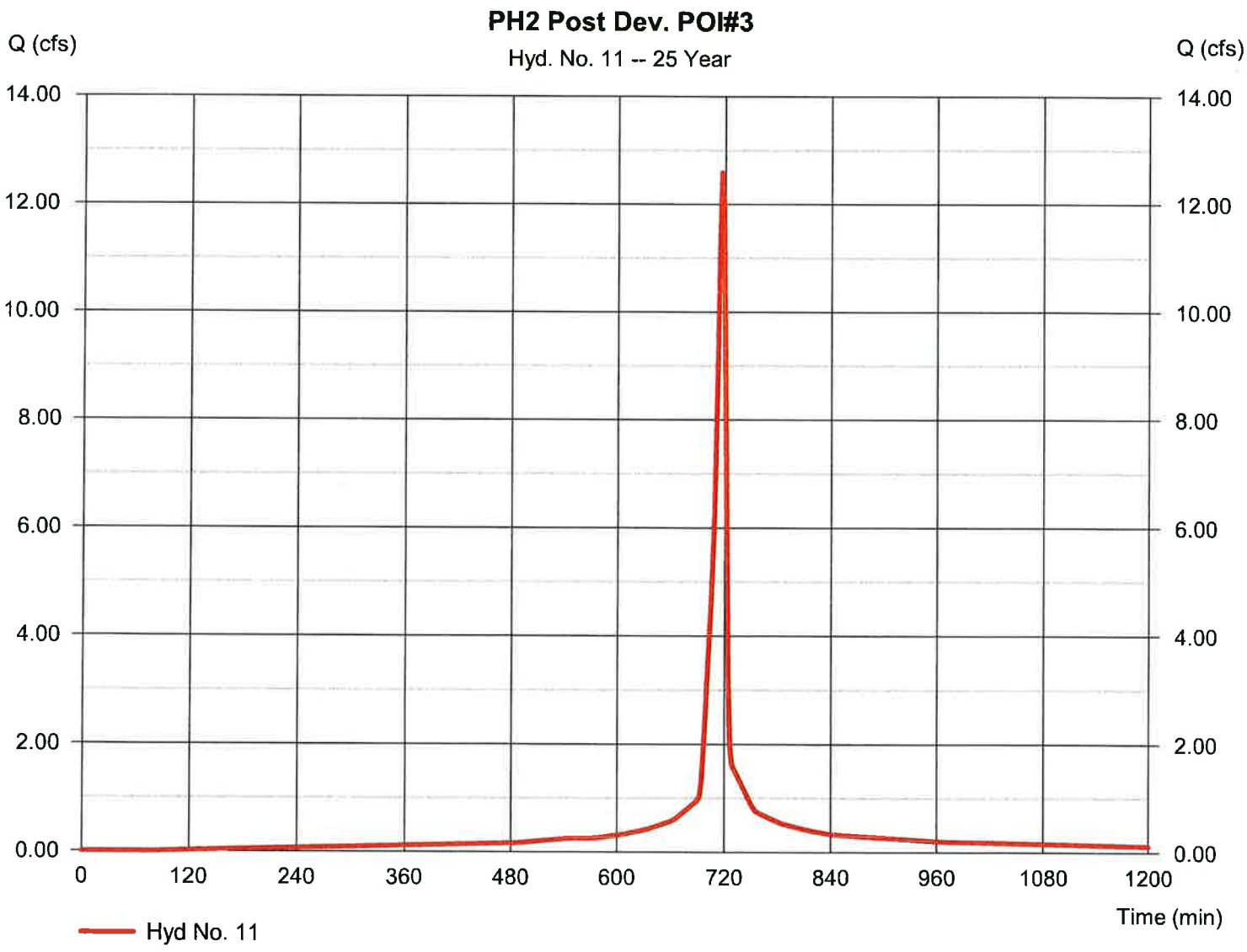
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 11

PH2 Post Dev. POI#3

Hydrograph type	= SCS Runoff	Peak discharge	= 12.60 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 29,350 cuft
Drainage area	= 1.530 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TOTAL SUMMATION PEAK FLOW

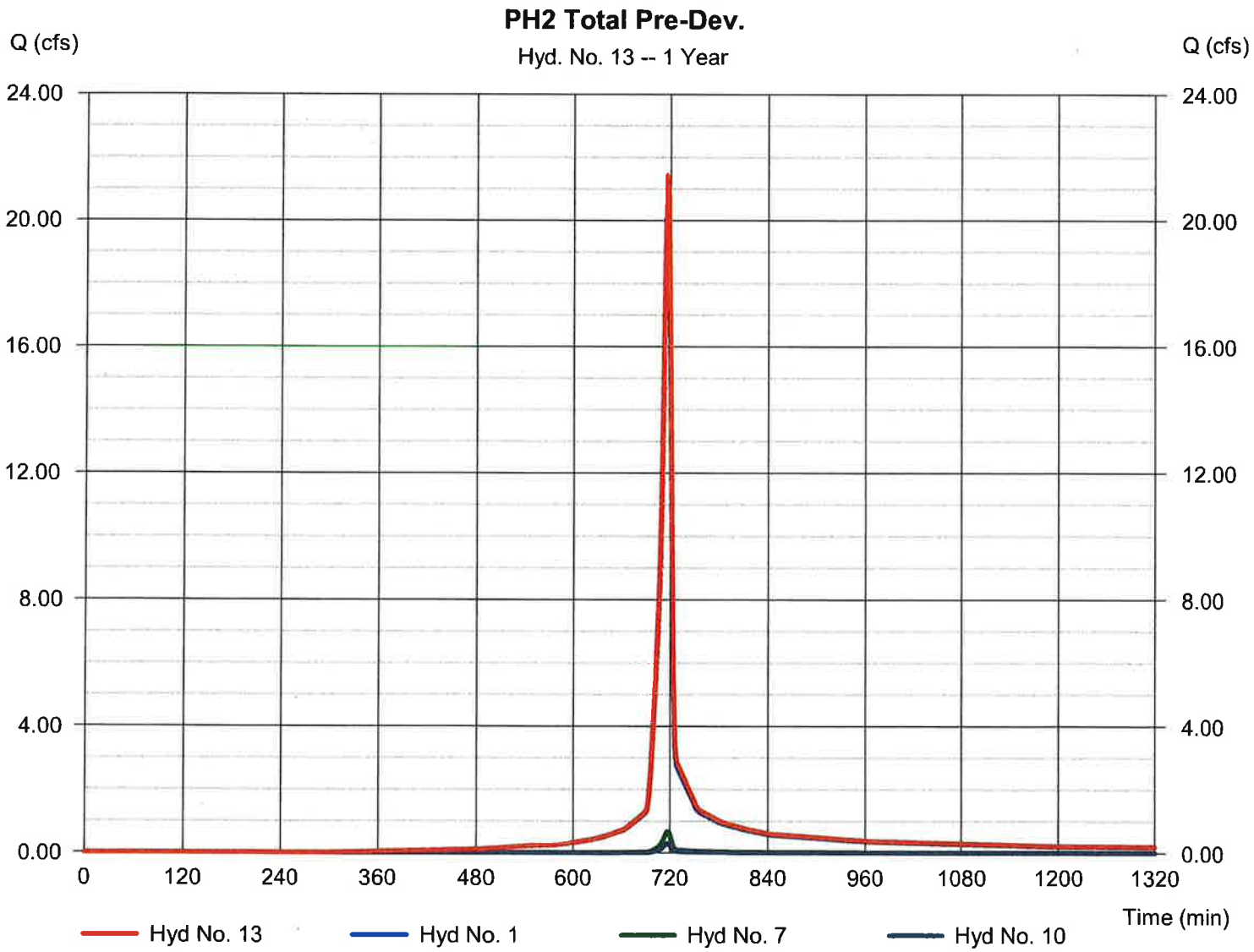
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 13

PH2 Total Pre-Dev.

Hydrograph type	= Combine	Peak discharge	= 21.45 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 44,964 cuft
Inflow hyds.	= 1, 7, 10	Contrib. drain. area	= 6.340 ac



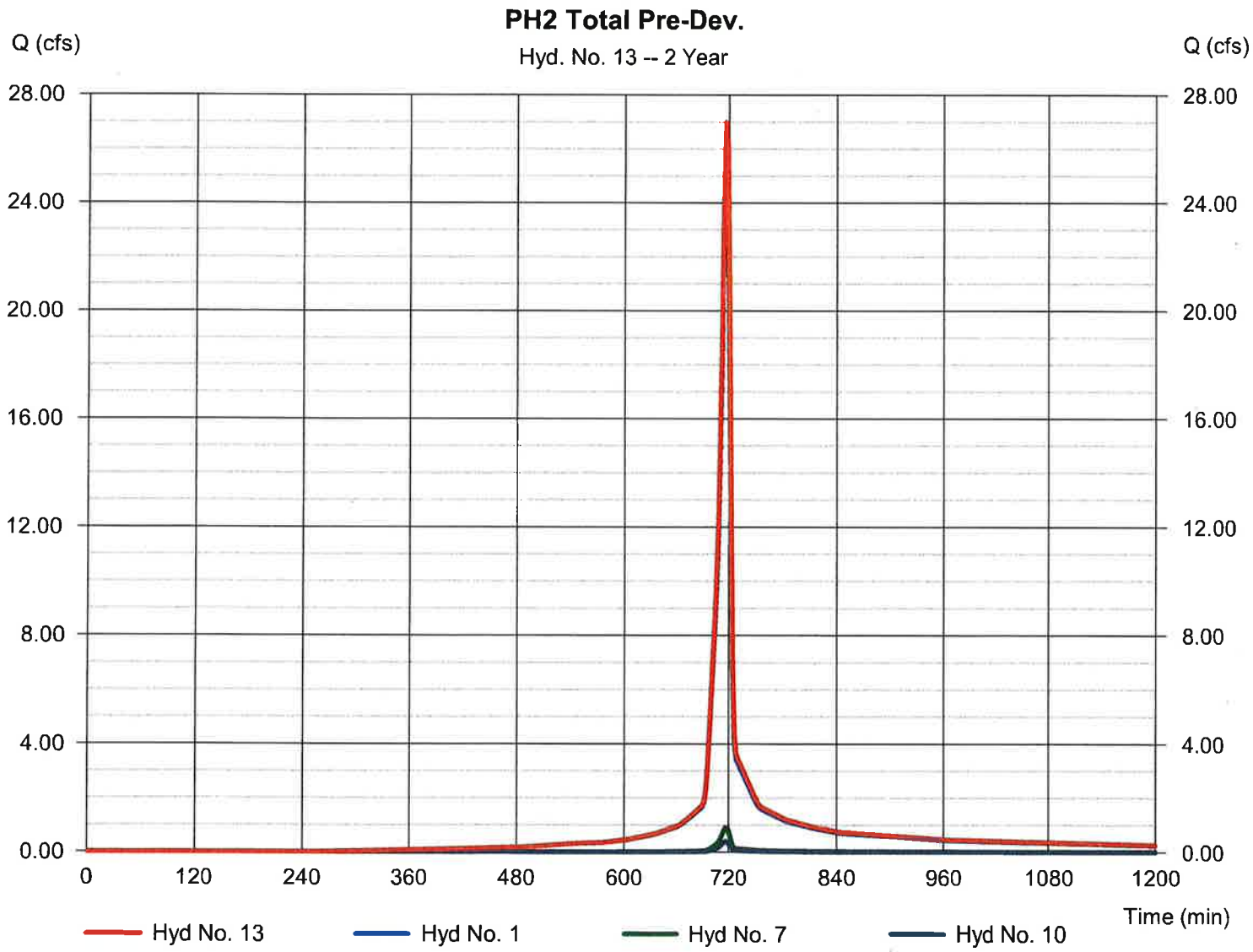
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 13

PH2 Total Pre-Dev.

Hydrograph type	= Combine	Peak discharge	= 27.01 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 57,398 cuft
Inflow hyds.	= 1, 7, 10	Contrib. drain. area	= 6.340 ac



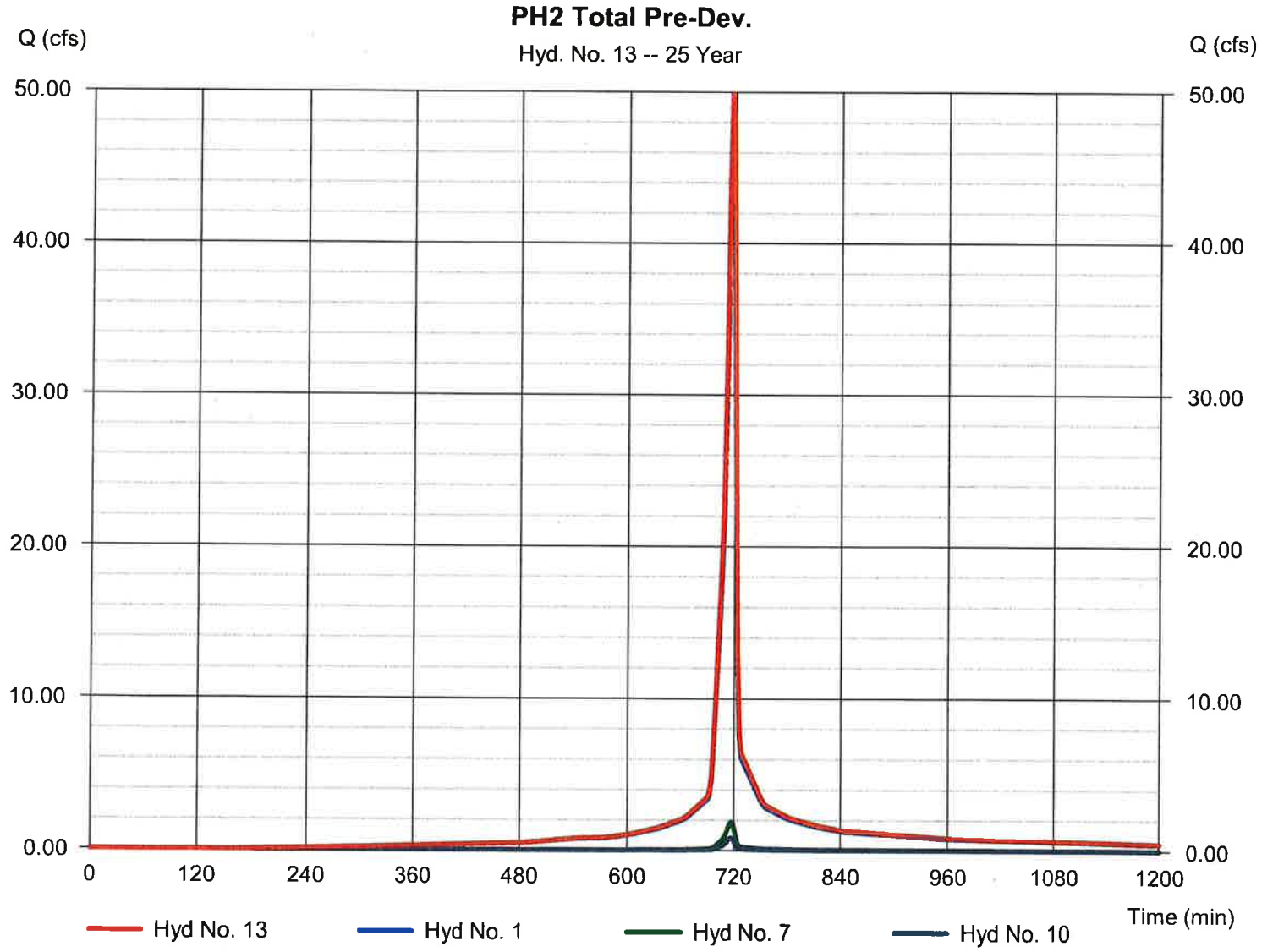
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Hyd. No. 13

PH2 Total Pre-Dev.

Hydrograph type	= Combine	Peak discharge	= 49.93 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 110,546 cuft
Inflow hyds.	= 1, 7, 10	Contrib. drain. area	= 6.340 ac



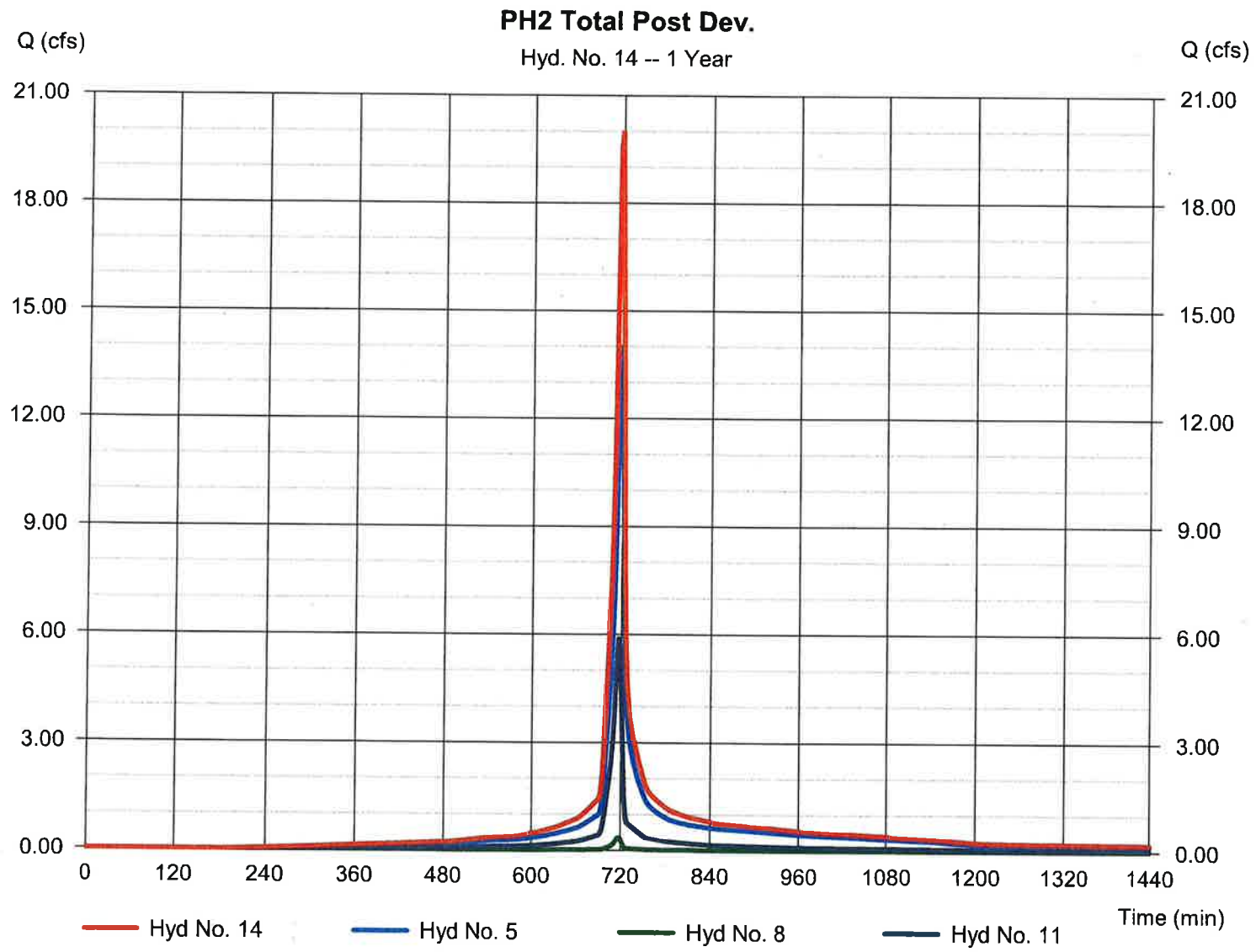
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 14

PH2 Total Post Dev.

Hydrograph type	= Combine	Peak discharge	= 19.98 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 52,756 cuft
Inflow hyds.	= 5, 8, 11	Contrib. drain. area	= 1.650 ac



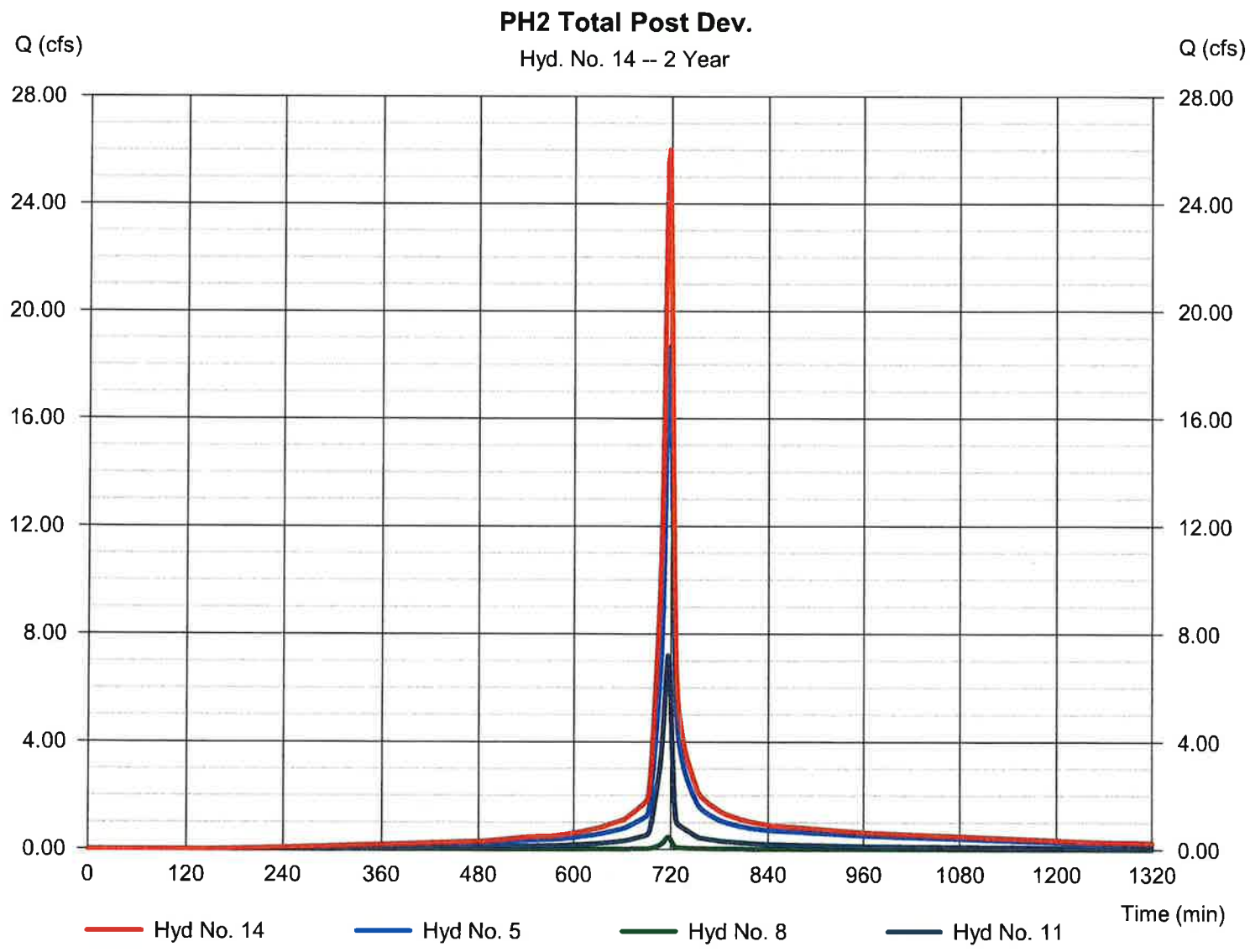
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 14

PH2 Total Post Dev.

Hydrograph type	= Combine	Peak discharge	= 26.02 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 65,653 cuft
Inflow hyds.	= 5, 8, 11	Contrib. drain. area	= 1.650 ac



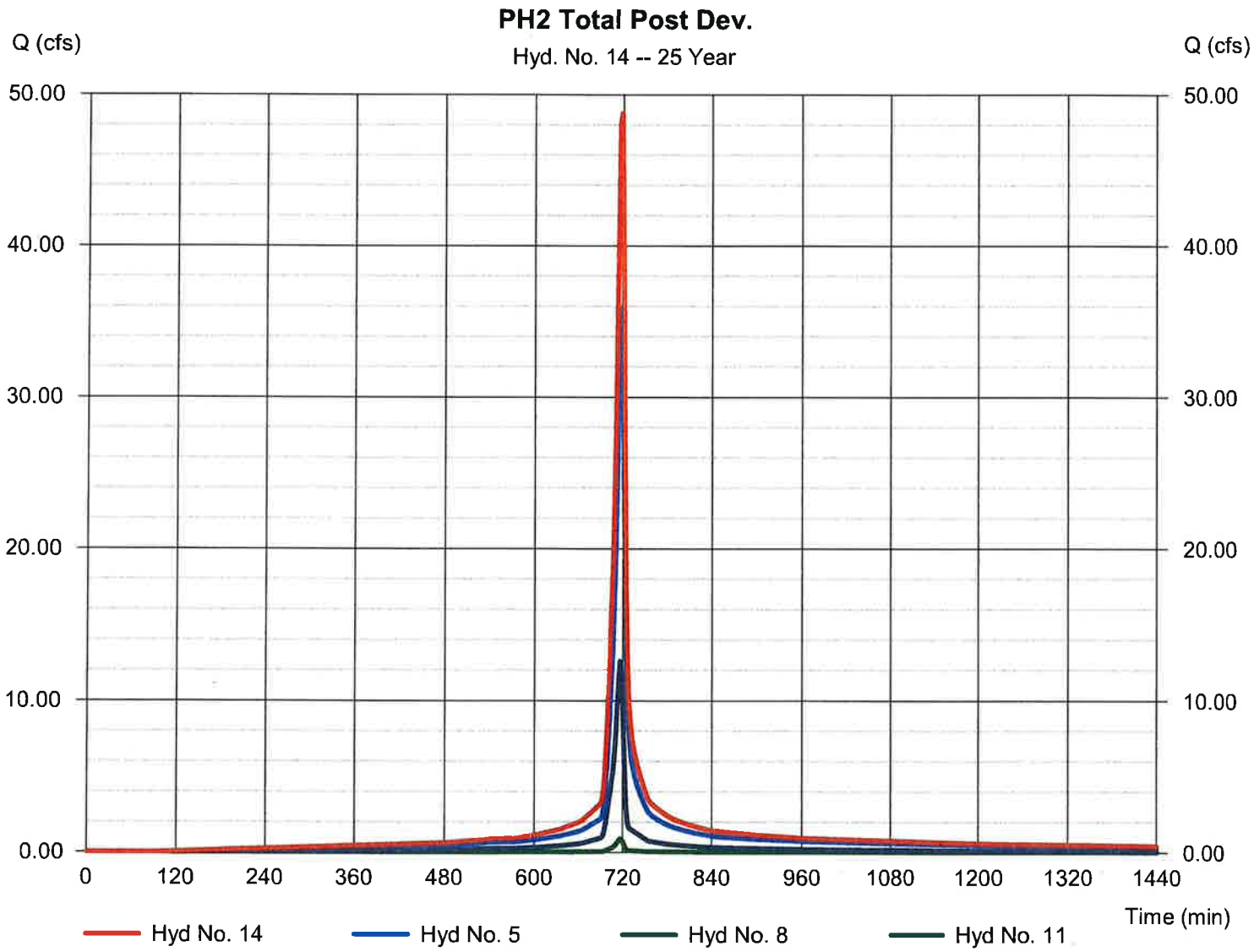
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 05 / 31 / 2019

Hyd. No. 14

PH2 Total Post Dev.

Hydrograph type	= Combine	Peak discharge	= 48.81 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 119,842 cuft
Inflow hyds.	= 5, 8, 11	Contrib. drain. area	= 1.650 ac



STORMWATER MANAGEMENT SUMMARY

Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Wednesday, 05 / 29 / 2019

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	64.4792	12.8000	0.8932	--------
2	71.4314	12.7000	0.8735	--------
3	0.0000	0.0000	0.0000	--------
5	73.9364	12.8000	0.8351	--------
10	72.4410	12.3000	0.8009	--------
25	66.7543	11.5000	0.7522	--------
50	57.7473	10.2000	0.6988	--------
100	51.6854	9.2000	0.6559	--------

File name: SampleFHA.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	4.93	3.95	3.31	2.85	2.51	2.25	2.04	1.87	1.72	1.60	1.49	1.40
2	5.81	4.67	3.93	3.40	3.00	2.69	2.44	2.24	2.07	1.92	1.80	1.69
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	6.68	5.43	4.60	4.01	3.56	3.21	2.93	2.69	2.50	2.33	2.19	2.06
10	7.39	6.03	5.13	4.48	3.99	3.61	3.30	3.05	2.83	2.65	2.49	2.35
25	8.10	6.64	5.68	4.98	4.46	4.05	3.72	3.44	3.21	3.01	2.84	2.69
50	8.62	7.07	6.06	5.34	4.80	4.37	4.03	3.74	3.50	3.30	3.12	2.96
100	9.07	7.44	6.39	5.65	5.10	4.66	4.31	4.01	3.77	3.56	3.37	3.21

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.96	3.57	0.00	3.30	5.16	6.11	6.80	7.62
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
Huff-1st	0.00	0.00	0.00	2.75	0.00	0.00	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	3.90	0.00	6.00	7.10

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	20.47	2	716	42,995	------	------	------	Pre-Dev. POI#1
2	SCS Runoff	14.80	2	716	30,802	------	------	------	PH1 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	5.635	2	716	12,304	------	------	------	PH1 Post Dev POI#1 (basin inflow)
4	Reservoir	2.929	2	722	12,299	3	297.01	4,370	POI#1 routed basin
5	Combine	16.35	2	718	43,101	2, 4	------	------	Total PH1 Post Dev POI#1
7	SCS Runoff	0.675	2	716	1,363	------	------	------	Pre-Dev. POI#2
8	SCS Runoff	0.675	2	716	1,363	------	------	------	PH1 Post Dev POI#2
10	SCS Runoff	0.300	2	716	606	------	------	------	Pre-Dev. POI#3
11	SCS Runoff	0.300	2	716	606	------	------	------	PH1 Post Dev. POI#3
13	Combine	21.45	2	716	44,964	1, 7, 10,	------	------	PH1 Total Pre-Dev.
14	Combine	17.32	2	718	45,070	5, 8, 11,	------	------	PH1 Total Post Dev.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	25.70	2	716	54,748	------	------	------	Pre-Dev. POI#1
2	SCS Runoff	18.72	2	716	39,487	------	------	------	PH1 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	6.932	2	716	15,354	------	------	------	PH1 Post Dev POI#1 (basin inflow)
4	Reservoir	4.696	2	720	15,349	3	297.36	4,890	POI#1 routed basin
5	Combine	22.13	2	718	54,836	2, 4	------	------	Total PH1 Post Dev POI#1
7	SCS Runoff	0.904	2	716	1,835	------	------	------	Pre-Dev. POI#2
8	SCS Runoff	0.904	2	716	1,835	------	------	------	PH1 Post Dev POI#2
10	SCS Runoff	0.402	2	716	815	------	------	------	Pre-Dev. POI#3
11	SCS Runoff	0.402	2	716	815	------	------	------	PH1 Post Dev. POI#3
13	Combine	27.01	2	716	57,398	1, 7, 10,	------	------	PH1 Total Pre-Dev.
14	Combine	23.41	2	718	57,486	5, 8, 11,	------	------	PH1 Total Post Dev.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	47.20	2	716	104,840	------	------	------	Pre-Dev. POI#1
2	SCS Runoff	34.88	2	716	76,703	------	------	------	PH1 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	12.26	2	716	28,182	------	------	------	PH1 Post Dev POI#1 (basin inflow)
4	Reservoir	10.38	2	720	28,177	3	298.93	6,468	POI#1 routed basin
5	Combine	43.78	2	718	104,880	2, 4	------	------	Total PH1 Post Dev POI#1
7	SCS Runoff	1.889	2	716	3,951	------	------	------	Pre-Dev. POI#2
8	SCS Runoff	1.889	2	716	3,951	------	------	------	PH1 Post Dev POI#2
10	SCS Runoff	0.840	2	716	1,756	------	------	------	Pre-Dev. POI#3
11	SCS Runoff	0.840	2	716	1,756	------	------	------	PH1 Post Dev. POI#3
13	Combine	49.93	2	716	110,546	1, 7, 10,	------	------	PH1 Total Pre-Dev.
14	Combine	46.42	2	718	110,586	5, 8, 11,	------	------	PH1 Total Post Dev.

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	20.47	25.70	-------	-------	-------	47.20	-------	-------	Pre-Dev. POI#1
2	SCS Runoff	------	14.80	18.72	-------	-------	-------	34.88	-------	-------	PH1 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	------	5.635	6.932	-------	-------	-------	12.26	-------	-------	PH1 Post Dev POI#1 (basin inflow)
4	Reservoir	3	2.929	4.696	-------	-------	-------	10.38	-------	-------	POI#1 routed basin
5	Combine	2, 4	16.35	22.13	-------	-------	-------	43.78	-------	-------	Total PH1 Post Dev POI#1
7	SCS Runoff	------	0.675	0.904	-------	-------	-------	1.889	-------	-------	Pre-Dev. POI#2
8	SCS Runoff	------	0.675	0.904	-------	-------	-------	1.889	-------	-------	PH1 Post Dev POI#2
10	SCS Runoff	------	0.300	0.402	-------	-------	-------	0.840	-------	-------	Pre-Dev. POI#3
11	SCS Runoff	------	0.300	0.402	-------	-------	-------	0.840	-------	-------	PH1 Post Dev. POI#3
13	Combine	1, 7, 10,	21.45	27.01	-------	-------	-------	49.93	-------	-------	PH1 Total Pre-Dev.
14	Combine	5, 8, 11,	17.32	23.41	-------	-------	-------	46.42	-------	-------	PH1 Total Post Dev.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	20.47	2	716	42,995	------	------	------	Pre-Dev. POI#1
2	SCS Runoff	11.53	2	716	25,182	------	------	------	PH2 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	6.194	2	716	13,767	------	------	------	PH2 Post Dev POI#1 (basin inflow)
4	Reservoir	3.687	2	722	13,762	3	297.19	4,613	POI#1 routed basin
5	Combine	13.99	2	718	38,945	2, 4	------	------	Total PH2 Post Dev POI#1
7	SCS Runoff	0.675	2	716	1,363	------	------	------	Pre-Dev. POI#2
8	SCS Runoff	0.357	2	716	728	------	------	------	PH2 Post Dev POI#2
10	SCS Runoff	0.300	2	716	606	------	------	------	Pre-Dev. POI#3
11	SCS Runoff	5.886	2	716	13,083	------	------	------	PH2 Post Dev. POI#3
13	Combine	21.45	2	716	44,964	1, 7, 10,	------	------	PH2 Total Pre-Dev.
14	Combine	19.98	2	718	52,756	5, 8, 11,	------	------	PH2 Total Post Dev.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	25.70	2	716	54,748	------	------	------	Pre-Dev. POI#1
2	SCS Runoff	14.19	2	716	31,425	------	------	------	PH2 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	7.573	2	716	17,064	------	------	------	PH2 Post Dev POI#1 (basin inflow)
4	Reservoir	5.462	2	720	17,059	3	297.52	5,133	POI#1 routed basin
5	Combine	18.68	2	718	48,484	2, 4	------	------	Total PH2 Post Dev POI#1
7	SCS Runoff	0.904	2	716	1,835	------	------	------	Pre-Dev. POI#2
8	SCS Runoff	0.462	2	716	953	------	------	------	PH2 Post Dev POI#2
10	SCS Runoff	0.402	2	716	815	------	------	------	Pre-Dev. POI#3
11	SCS Runoff	7.197	2	716	16,216	------	------	------	PH2 Post Dev. POI#3
13	Combine	27.01	2	716	57,398	1, 7, 10,	------	------	PH2 Total Pre-Dev.
14	Combine	26.02	2	718	65,653	5, 8, 11,	------	------	PH2 Total Post Dev.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	47.20	2	716	104,840	------	------	------	Pre-Dev. POI#1
2	SCS Runoff	25.09	2	716	57,679	------	------	------	PH2 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	13.25	2	716	30,885	------	------	------	PH2 Post Dev POI#1 (basin inflow)
4	Reservoir	11.93	2	718	30,880	3	299.07	6,633	POI#1 routed basin
5	Combine	35.91	2	718	88,559	2, 4	------	------	Total PH2 Post Dev POI#1
7	SCS Runoff	1.889	2	716	3,951	------	------	------	Pre-Dev. POI#2
8	SCS Runoff	0.901	2	716	1,932	------	------	------	PH2 Post Dev POI#2
10	SCS Runoff	0.840	2	716	1,756	------	------	------	Pre-Dev. POI#3
11	SCS Runoff	12.60	2	716	29,350	------	------	------	PH2 Post Dev. POI#3
13	Combine	49.93	2	716	110,546	1, 7, 10,	------	------	PH2 Total Pre-Dev.
14	Combine	48.81	2	718	119,842	5, 8, 11,	------	------	PH2 Total Post Dev.

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	20.47	25.70	-------	-------	-------	47.20	-------	-------	Pre-Dev. POI#1
2	SCS Runoff	------	11.53	14.19	-------	-------	-------	25.09	-------	-------	PH2 Post Dev. POI#1 (unmanaged)
3	SCS Runoff	------	6.194	7.573	-------	-------	-------	13.25	-------	-------	PH2 Post Dev POI#1 (basin inflow)
4	Reservoir	3	3.687	5.462	-------	-------	-------	11.93	-------	-------	POI#1 routed basin
5	Combine	2, 4	13.99	18.68	-------	-------	-------	35.91	-------	-------	Total PH2 Post Dev POI#1
7	SCS Runoff	------	0.675	0.904	-------	-------	-------	1.889	-------	-------	Pre-Dev. POI#2
8	SCS Runoff	------	0.357	0.462	-------	-------	-------	0.901	-------	-------	PH2 Post Dev POI#2
10	SCS Runoff	------	0.300	0.402	-------	-------	-------	0.840	-------	-------	Pre-Dev. POI#3
11	SCS Runoff	------	5.886	7.197	-------	-------	-------	12.60	-------	-------	PH2 Post Dev. POI#3
13	Combine	1, 7, 10,	21.45	27.01	-------	-------	-------	49.93	-------	-------	PH2 Total Pre-Dev.
14	Combine	5, 8, 11,	19.98	26.02	-------	-------	-------	48.81	-------	-------	PH2 Total Post Dev.

STORMWATER CONVEYANCE SUMMARY

FlexTable: Catch Basin Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Length (ft)	Width (ft)	Inlet	Flow (Captured) (cfs)	Hydraulic Grade Line (In) (ft)	Spread / Top Width (ft)	Gutter Type	Flow (Known) (cfs)	Notes
HSTONE INL-7	297.57	291.79	12.00	4.00	Std. Inlet	7.49	298.09	18	Catalog Gutter	0.00	
IN-2	298.85	292.28	6.00	4.00	Std. Inlet	0.35	299.02	5	Catalog Gutter	0.00	
IN-3	301.80	293.22	6.00	4.00	Std. Inlet	0.39	299.76	5	Catalog Gutter	0.00	
IN-6	304.85	297.18	6.00	4.00	Std. Inlet	0.45	300.88	6	Catalog Gutter	0.00	
IN-7	304.70	297.85	6.00	4.00	Std. Inlet	0.42	301.14	6	Catalog Gutter	0.00	
IN-9	303.00	299.23	6.00	4.00	Std. Inlet	1.06	302.03	4	Catalog Gutter	0.00	
IN-10	302.60	299.45	6.00	4.00	Std. Inlet	0.69	302.13	4	Catalog Gutter	0.00	
IN-2A	299.00	292.61	6.00	4.00	Std. Inlet	0.46	298.88	6	Catalog Gutter	0.00	
HSTONE INL-2	307.75	300.87	6.00	4.00	Std. Inlet	1.71	304.20	8	Catalog Gutter	0.00	
HSTONE INL-2A	310.10	301.35	6.00	4.00	Std. Inlet	0.51	305.53	6	Catalog Gutter	0.00	
IN-15	309.28	301.79	6.00	4.00	Std. Inlet	1.20	306.40	4	Catalog Gutter	0.00	
IN-16	309.28	302.00	6.00	4.00	Std. Inlet	0.84	307.66	4	Catalog Gutter	0.00	
IN-17	307.30	303.30	6.00	4.00	Std. Inlet	1.17	306.88	4	Catalog Gutter	0.00	
FILTERRA #4	316.55	309.40	6.00	4.00	CH Grate Inlet	2.94	310.37	16	User Defined	0.00	
BLDG#3 PARKING DECK ROOF DRAIN	308.50	300.00			CH Grate Inlet	5.23	301.90	23	User Defined	0.00	
SW BLDG#3 ROOF DRAIN	304.50	292.82			CH Grate Inlet	3.85	298.91	18	User Defined	0.00	
HSTONE CB Europa	317.10	310.40	6.00	4.00	Std. Inlet	0.00	311.08	0	Catalog Gutter	1.93	Q=0.95x8.11x0.25
YI-2	301.00	298.50			CH Grate Inlet	0.30	298.79	6	User Defined	0.00	
IN-5/FILTERRA#2	299.50	294.50	6.00	8.00	Std. Inlet	5.14	298.76	15	Catalog Gutter	0.00	
YI-3	300.50	298.15			CH Grate Inlet	0.12	298.77	1	User Defined	0.00	
YI-4	303.80	300.00			CH Grate Inlet	0.59	300.30	4	User Defined	0.00	
YI-5	303.40	300.40			CH Grate Inlet	0.00	301.08	0	User Defined	0.00	
HOTEL ROOF DRAIN	301.70	299.20			CH Grate Inlet	1.95	300.49	13	User Defined	0.00	
BLDG#2 ROOF DRAIN	304.40	301.00			CH Grate Inlet	2.87	302.08	14	User Defined	0.00	
SE BLDG#3 ROOF DRAIN	313.00	308.67			CH Grate Inlet	3.76	309.90	16	User Defined	0.00	
BLDG#5 ROOF DRAIN	318.50	310.00			CH Grate Inlet	2.56	310.68	13	User Defined	0.00	
HSTONE YI-3	288.50	285.18	6.00	4.00	CH Grate Inlet	0.33	288.45	5	User Defined	0.00	
HSTONE YI-2	292.96	286.00	6.00	4.00	CH Grate Inlet	0.47	289.98	6	User Defined	0.00	
HSTONE YI-1	296.63	287.77	6.00	4.00	CH Grate Inlet	2.88	292.10	16	User Defined	0.00	
HSTONE INL-10	301.34	289.76	6.00	4.00	Std. Inlet	0.54	294.93	7	Catalog Gutter	0.00	
HSTONE INL-9	301.76	298.07	6.00	4.00	Std. Inlet	0.67	298.38	8	Catalog Gutter	0.00	
HSTONE INL-3	307.73	300.64	6.00	4.00	Std. Inlet	0.62	303.21	8	Catalog Gutter	0.00	
HSTONE INL-3	276.75	272.03	6.00	4.00	Std. Inlet	4.36	275.35	17	Catalog Gutter	0.00	
HSTONE INL-2A	277.79	273.42	4.00	3.00	NCDOT	2.13	277.49	9	User Defined	0.00	
HSTONE INL-2	278.34	273.75	4.00	3.00	NCDOT	3.17	278.98	11	User Defined	0.00	
HSTONE YI-4	280.58	273.10	6.00	4.00	CH Grate Inlet	1.98	276.75	13	User Defined	0.00	
HSTONE INL-15	284.13	276.76	4.00	3.00	NCDOT	2.12	280.26	9	User Defined	0.00	
HSTONE INL-14	289.44	282.21	4.00	3.00	NCDOT	2.61	284.97	10	User Defined	0.00	
HSTONE INL-13	294.38	284.00	4.00	3.00	NCDOT	0.74	288.42	5	User Defined	0.00	
HSTONE INL-12	297.93	285.50	4.00	3.00	NCDOT	0.27	290.27	4	User Defined	0.00	
HSTONE INL-11	298.70	294.34	4.00	3.00	NCDOT	1.01	294.75	8	User Defined	0.00	

FlexTable: Catch Basin Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Length (ft)	Width (ft)	Inlet	Flow (Captured) (cfs)	Hydraulic Grade Line (In) (ft)	Spread / Top Width (ft)	Gutter Type	Flow (Known) (cfs)	Notes
HSTONE INL-8A	297.71	288.27	6.00	4.00	Std. Inlet	0.99	291.38	4	Catalog Gutter	0.00	
HSTONE INL-8B	299.37	290.80	6.00	4.00	Std. Inlet	1.92	293.66	9	Catalog Gutter	0.00	
HSTONE INL-8	297.57	291.69	12.00	4.00	CH Grate Inlet	2.57	296.64	13	User Defined	0.00	
HSTONE INL-6	297.71	292.00	6.00	4.00	Std. Inlet	0.12	292.24	3	Catalog Gutter	0.00	
NW BLDG#3 ROOF DRAIN	308.50	304.50			CH Grate Inlet	2.14	305.18	13	User Defined	0.00	

FlexTable: Conduit Table

Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)
HSTONE INL-7	291.86	HSTONE INL-8	291.69	30	0.006	Circle	24.0	0.013	31.53	10.04	17.06
STMH-3	298.56	IN-7	297.85	142	0.005	Circle	24.0	0.013	8.98	2.86	16.01
IN-7	297.85	IN-6	297.70	30	0.005	Circle	24.0	0.013	10.88	3.46	16.13
IN-6	297.18	IN-3	294.41	113	0.025	Circle	24.0	0.013	11.20	3.56	35.50
STMH-4	294.00	IN-3	293.42	76	0.008	Circle	24.0	0.013	10.27	3.27	19.75
IN-3	293.22	IN-2	292.48	61	0.012	Circle	24.0	0.013	21.52	6.85	24.93
IN-2A	292.61	IN-2	292.48	26	0.005	Circle	24.0	0.013	4.25	1.35	16.03
IN-2	292.28	HSTONE INL-7	292.06	43	0.005	Circle	24.0	0.013	25.34	8.07	16.19
STMH-5	304.00	IN-9	299.75	97	0.044	Circle	18.0	0.013	2.93	8.65	21.96
IN-10	299.65	IN-9	299.50	26	0.006	Circle	18.0	0.013	0.69	0.39	7.92
IN-9	299.50	STMH-3	298.56	187	0.005	Circle	18.0	0.013	4.48	2.54	7.44
HSTONE INL-2	300.87	HSTONE INL-3	300.74	33	0.004	Circle	18.0	0.013	10.68	6.05	6.61
IN-16	306.90	IN-15	306.42	24	0.020	Circle	18.0	0.013	3.40	6.87	15.01
IN-15	302.13	HSTONE INL-2A	301.45	67	0.010	Circle	18.0	0.013	9.13	5.17	10.59
HSTONE INL-2A	301.35	HSTONE INL-2	300.97	76	0.005	Circle	18.0	0.013	9.47	5.36	7.43
FILTERRA #4	309.40	STMH-5	304.00	55	0.098	Circle	18.0	0.013	2.94	11.53	32.91
SW BLDG#3 ROOF DRAIN	292.82	IN-2A	292.71		0.005	Circle	24.0	0.020	3.85	1.22	10.20
BLDG#3 PARKING DECK ROOF DRAIN	300.00	STMH-3	298.56		0.029	Circle	18.0	0.020	5.23	2.96	11.70
HSTONE CB Europa	310.40	STMH-2	307.75	43	0.061	Circle	15.0	0.013	1.93	8.81	15.98
YI-2	298.50	YI-3	298.15	35	0.010	Circle	12.0	0.020	0.30	2.04	2.31
YI-3	298.15	UG BASIN	297.04	111	0.010	Circle	12.0	0.020	0.42	2.25	2.32
IN-5/FILTERRA#2	294.50	UG BASIN	294.47	3	0.010	Circle	24.0	0.020	5.14	1.63	14.70
YI-4	300.00	CO-1	298.34	35	0.047	Circle	15.0	0.020	0.59	4.19	9.14
CO-1	298.34	UG BASIN	297.00	115	0.012	Circle	18.0	0.020	3.44	4.10	7.37
YI-5	300.40	IN-6	300.30	5	0.020	Circle	12.0	0.020	0.00	0.00	3.27
HOTEL ROOF DRAIN	299.20	BEND	298.68	52	0.010	Circle	10.0	0.020	1.95	3.57	1.42
BEND	298.68	FILTERRA #1	298.65	3	0.010	Circle	10.0	0.020	1.93	3.54	1.42
FILTERRA #1	295.57	UG BASIN	294.93	64	0.010	Circle	12.0	0.020	1.93	2.46	2.32
BLDG#2 ROOF DRAIN	301.00	FILTERRA #3	300.95	5	0.010	Circle	10.0	0.020	2.87	5.25	1.42
FILTERRA #3	298.42	CO-1	298.34		0.009	Circle	15.0	0.020	2.86	3.59	4.07
SE BLDG#3 ROOF DRAIN	308.67	FILTERRA #5	308.64	3	0.010	Circle	10.0	0.020	3.76	6.89	1.42
FILTERRA #5	306.09	IN-15	305.77	16	0.020	Circle	15.0	0.013	3.76	7.08	9.14
BLDG#5 ROOF DRAIN	310.00	FILTERRA #6	309.94	3	0.020	Circle	15.0	0.020	2.56	4.66	5.94
FILTERRA #6	307.42	IN-16	307.00	16	0.026	Circle	15.0	0.013	2.56	7.05	10.47
HSTONE YI-3	285.18	TO RAMS PLAZA	276.29	41	0.217	Circle	24.0	0.013	18.41	25.20	105.34
HSTONE INL-8	291.84	HSTONE INL-8B	290.90	161	0.006	Circle	30.0	0.013	33.61	6.85	31.34
HSTONE YI-2	286.00	HSTONE YI-3	285.28	73	0.010	Circle	24.0	0.020	18.26	5.81	14.58
HSTONE YI-1	287.77	HSTONE YI-2	286.20	114	0.014	Circle	24.0	0.020	18.06	5.75	17.29
HSTONE INL-10	289.76	HSTONE YI-1	287.97	180	0.010	Circle	24.0	0.020	16.21	5.16	14.66
HSTONE INL-9	298.07	HSTONE INL-10	297.75	29	0.011	Circle	18.0	0.013	0.67	3.43	10.93
HSTONE MH 6	291.49	HSTONE INL-10	289.96	152	0.010	Circle	24.0	0.013	15.49	4.93	22.67

FlexTable: Conduit Table

Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)
HSTONE INL-3	300.64	HSTONE MH 6	300.42	43	0.005	Circle	18.0	0.013	11.11	6.29	7.51
HSTONE INL-6	292.00	HSTONE INL-8A	291.49	33	0.015	Circle	15.0	0.013	0.12	2.35	8.03
HSTONE INL-8A	288.27	HSTONE INL-12	287.12	47	0.024	Circle	30.0	0.013	35.40	13.36	63.95
HSTONE INL-8B	290.80	HSTONE INL-8A	290.37	81	0.005	Circle	30.0	0.013	34.74	7.08	29.88
HSTONE INL-3	272.03	EW-1	271.64	31	0.013	Circle	36.0	0.013	48.66	11.28	74.93
HSTONE INL-2A	273.42	HSTONE INL-3	272.17	43	0.029	Circle	30.0	0.013	43.82	8.93	70.18
HSTONE YI-4	273.10	HSTONE INL-3	272.50	53	0.011	Circle	24.0	0.013	1.98	0.63	23.98
HSTONE INL-2	273.75	HSTONE INL-2A	273.44	18	0.018	Circle	30.0	0.013	42.20	8.60	54.43
HSTONE INL-15	276.77	HSTONE INL-2	273.91	130	0.022	Circle	30.0	0.013	39.99	8.15	60.83
SAND FILTER	296.00	HSTONE MH 6	291.69	102	0.042	Circle	18.0	0.013	4.41	9.61	21.62
HSTONE INL-14	282.21	HSTONE INL-15	279.35	123	0.023	Circle	30.0	0.013	38.46	13.41	62.66
HSTONE INL-13	284.00	HSTONE INL-14	282.41	125	0.013	Circle	30.0	0.013	36.63	7.46	46.13
HSTONE INL-12	285.50	HSTONE INL-13	284.30	120	0.010	Circle	30.0	0.013	36.36	7.41	41.02
HSTONE INL-11	294.34	HSTONE INL-12	293.52	87	0.009	Circle	15.0	0.013	1.01	3.75	6.27
NW BLDG#3 ROOF DRAIN	304.50	IN-7	301.00	25	0.140	Circle	18.0	0.020	2.14	8.78	25.55
STMH-2	307.60	STMH-1	305.28	27	0.085	Circle	18.0	0.013	1.93	9.67	30.58
STMH-1	302.56	IN-15	302.23	55	0.006	Circle	18.0	0.013	2.83	1.60	8.16
IN-17	303.30	STMH-1	302.66		0.005	Circle	24.0	0.020	1.17	0.37	10.03

FlexTable: Manhole Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Headloss Method
STMH-5	308.00	304.00	2.93	304.71	AASHTO
STMH-2	313.10	307.60	1.93	308.24	AASHTO
STMH-4	301.00	293.80	10.27	300.53	AASHTO
STMH-3	307.10	298.56	8.98	301.57	AASHTO
CO-1	302.26	298.34	3.44	299.24	AASHTO
FILTERRA #1	301.00	295.57	1.93	299.41	AASHTO
FILTERRA #3	303.00	298.42	2.86	299.42	AASHTO
FILTERRA #5	310.67	306.09	3.76	307.16	AASHTO
FILTERRA #6	312.00	307.42	2.56	308.35	AASHTO
SAND FILTER	306.00	292.80	4.41	296.92	AASHTO
HSTONE MH 6	306.40	291.49	15.49	295.85	AASHTO
STMH-1	311.40	302.56	2.83	306.84	AASHTO

FlexTable: Outfall Table

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
UG BASIN	299.50	294.47	298.74	298.74	5.13
UG BASIN	300.20	297.04	298.74	298.74	0.41
UG BASIN	301.00	297.00	298.74	298.74	3.37
UG BASIN	300.00	294.93	298.74	298.74	1.89
TO RAMS PLAZA	281.50	276.29		278.29	18.39
EW-1	276.72	271.30		273.40	48.60

FlexTable: Catchment Table

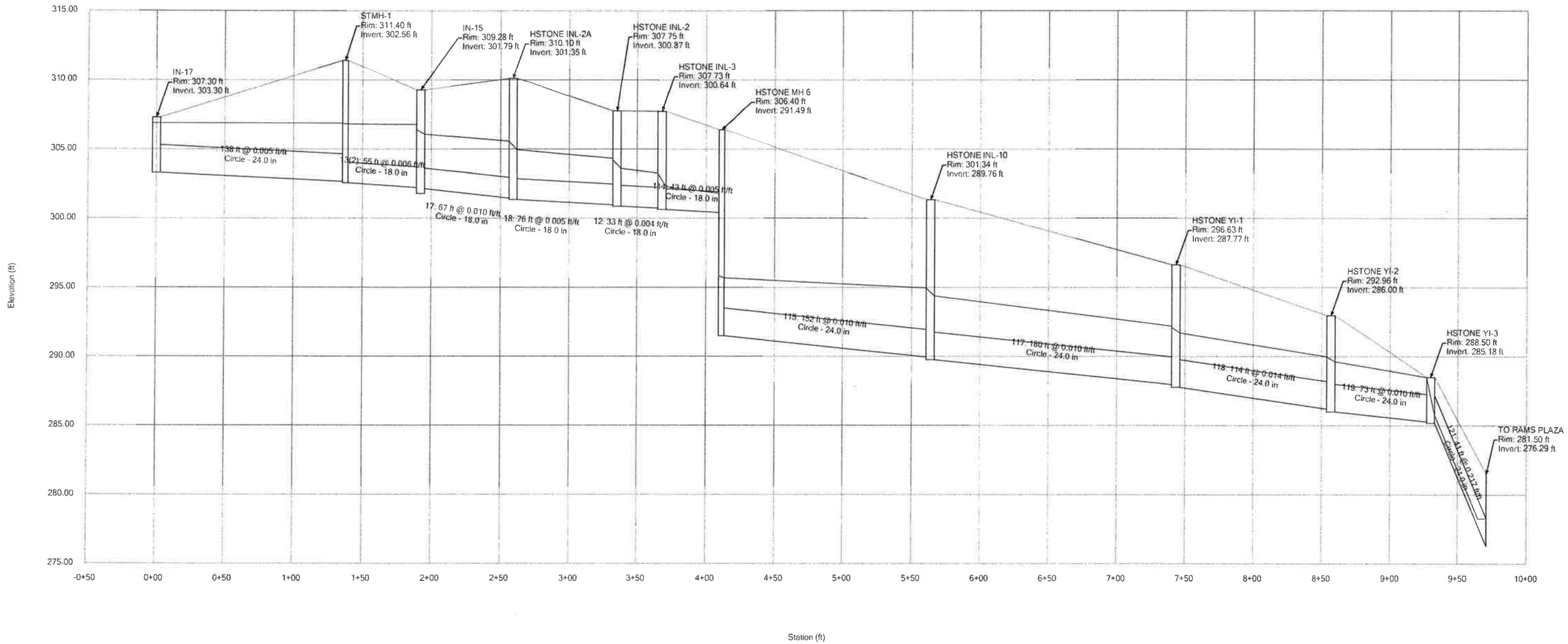
Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
CM-7	HSTONE INL-7	0.457	0.860	5.000	3.21
CM-2	IN-2	0.019	0.960	5.000	0.15
CM-3	IN-3	0.083	0.860	5.000	0.58
CM-6	IN-6	0.161	0.870	5.000	1.15
CM-7	IN-7	0.153	0.800	5.000	1.00
CM-YI-4	YI-4	0.076	0.950	5.000	0.59
CM-9	IN-9	0.169	0.770	5.000	1.06
CM-10	IN-10	0.105	0.800	5.000	0.69
CM-13	HSTONE INL-2	0.073	0.800	5.000	0.48
CM-14	HSTONE INL-2A	0.238	0.900	5.000	1.75
CM-15	IN-15	0.159	0.920	5.000	1.20
CM-16	IN-16	0.136	0.760	5.000	0.84
CM-17	IN-17	0.173	0.830	5.000	1.17
CM-2A	IN-2A	0.153	0.930	5.000	1.16
CM-YI-1	FILTERRA #4	0.414	0.870	5.000	2.94
SW Portion of BLDG3	SW BLDG#3 ROOF DRAIN	0.490	0.960	5.000	3.85
Parking Deck	BLDG#3 PARKING DECK ROOF DRAIN	0.667	0.960	5.000	5.23
CM-YI-2	YI-2	0.040	0.930	5.000	0.30
CM-5	IN-5/FILTERRA#2	0.698	0.900	5.000	5.14
CM-YI-3	YI-3	0.016	0.950	5.000	0.12
HOTEL ROOF DRAIN	HOTEL ROOF DRAIN	0.251	0.950	5.000	1.95
BLDG#2 ROOF DRAIN	BLDG#2 ROOF DRAIN	0.369	0.950	5.000	2.87
BLDG#5 ROOF DRAIN	BLDG#5 ROOF DRAIN	0.330	0.950	5.000	2.56
SE BLDG#3 ROOF DRAIN	SE BLDG#3 ROOF DRAIN	0.484	0.950	5.000	3.76
EX. CM-10	HSTONE INL-10	0.287	0.820	5.000	1.92
EX. CM-9	HSTONE INL-9	0.229	0.800	5.000	1.50

FlexTable: Catchment Table

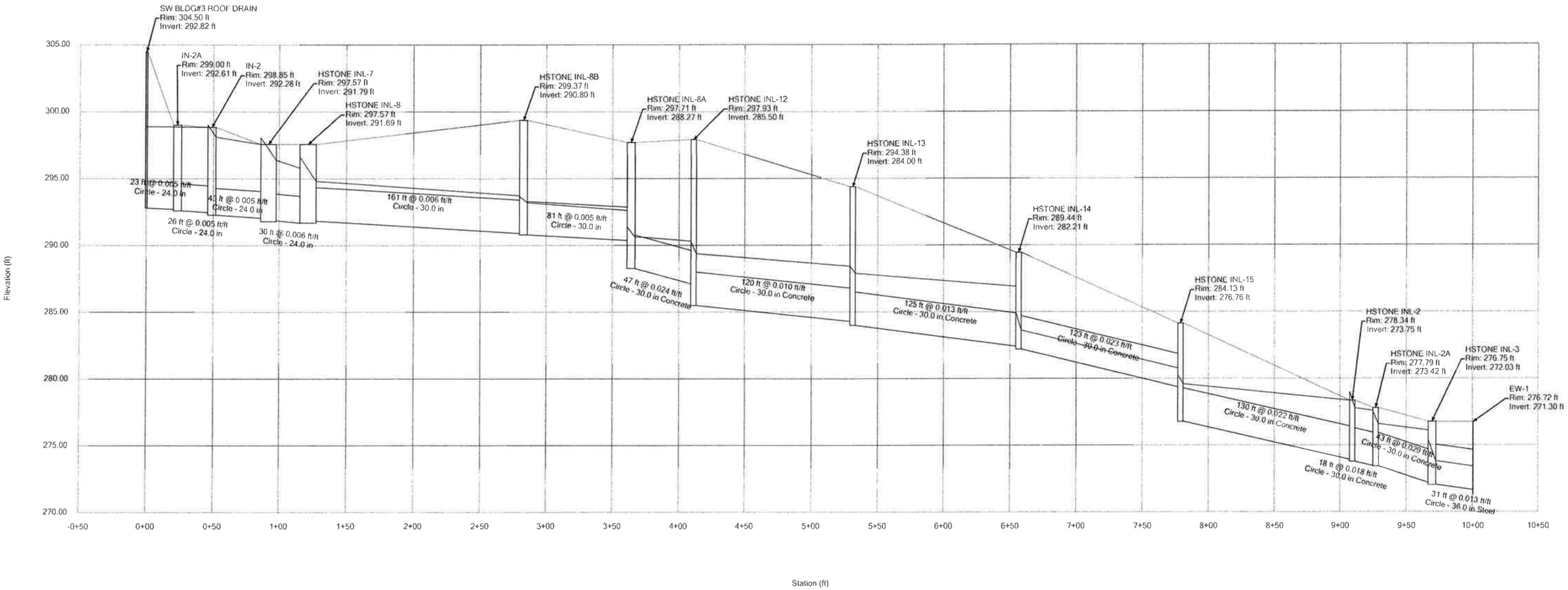
Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
EX. CM-3	HSTONE INL-3	0.330	0.960	5.000	2.59
EX. CM-2A	HSTONE INL-2A	0.035	0.740	5.000	0.21
EX. CM-2	HSTONE INL-2	1.120	0.550	5.000	5.04
EX. CM-15	HSTONE INL-15	0.180	0.800	5.000	1.18
EX. CM-14	HSTONE INL-14	0.675	0.930	5.000	5.13
EX. CM-13	HSTONE INL-13	0.145	0.810	5.000	0.96
EX. CM-11	HSTONE INL-11	0.149	0.830	5.000	1.01
EX. CM-10	HSTONE INL-8B	0.287	0.820	5.000	1.92
EX. CM-8A	HSTONE INL-8A	0.146	0.830	5.000	0.99
EX. CM-8	HSTONE INL-8	0.168	0.860	5.000	1.18
EX. CM-6	HSTONE INL-6	0.188	0.075	5.000	0.12
EX. CM-3	HSTONE INL-3	0.317	0.810	5.000	2.10
EX. CM-12	HSTONE INL-12	0.042	0.850	5.000	0.29
EX. YI CM-4	HSTONE YI-4	0.403	0.600	5.000	1.98
EX. YI CM-3	HSTONE YI-3	0.069	0.590	5.000	0.33
EX. YI CM-2	HSTONE YI-2	0.088	0.660	5.000	0.47
EX. YI CM-1	HSTONE YI-1	0.446	0.790	5.000	2.88
NW Portion of BLDG3	NW BLDG#3 ROOF DRAIN	0.276	0.950	5.000	2.14

Profile Report

Engineering Profile - IN17 - RAMS PLAZA (StormCAD (25-YR).stsw)

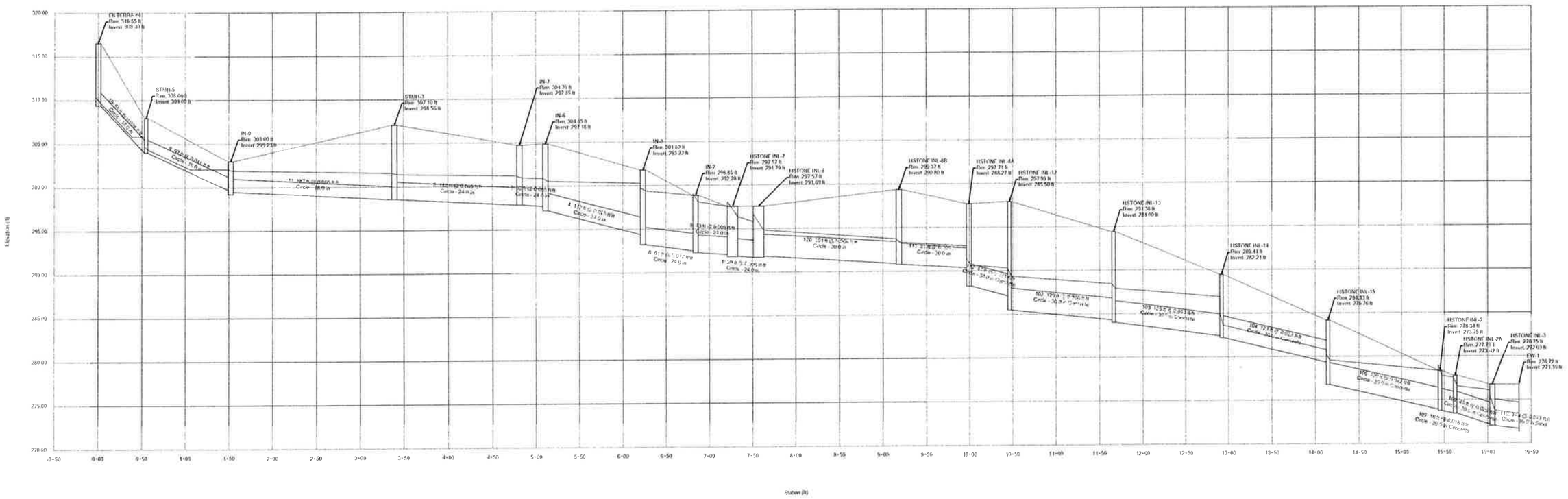


Profile Report
Engineering Profile - IN-2A TO RAMS PLAZA (StormCAD (25-YR).stsw)



Profile Report

Engineering Profile - FILTERR#4 TO RAMS PLAZA (StormCAD (25-YR).stsw)



FlexTable: Catch Basin Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Length (ft)	Width (ft)	Inlet	Flow (Captured) (cfs)	Hydraulic Grade Line (In) (ft)	Spread / Top Width (ft)	Gutter Type	Flow (Known) (cfs)	Notes
HSTONE INL-7	297.57	291.79	12.00	4.00	Std. Inlet	6.70	297.35	16	Catalog Gutter	0.00	
IN-2	298.85	292.28	6.00	4.00	Std. Inlet	0.33	298.86	4	Catalog Gutter	0.00	
IN-3	301.80	293.22	6.00	4.00	Std. Inlet	0.37	299.67	5	Catalog Gutter	0.00	
IN-6	304.85	297.18	6.00	4.00	Std. Inlet	0.43	300.65	6	Catalog Gutter	0.00	
IN-7	304.70	297.85	6.00	4.00	Std. Inlet	0.40	300.86	5	Catalog Gutter	0.00	
IN-9	303.00	299.23	6.00	4.00	Std. Inlet	0.97	301.58	4	Catalog Gutter	0.00	
IN-10	302.60	299.45	6.00	4.00	Std. Inlet	0.63	301.67	4	Catalog Gutter	0.00	
IN-2A	299.00	292.61	6.00	4.00	Std. Inlet	0.43	298.87	6	Catalog Gutter	0.00	
HSTONE INL-2	307.75	300.87	6.00	4.00	Std. Inlet	1.54	303.78	7	Catalog Gutter	0.00	
HSTONE INL-2A	310.10	301.35	6.00	4.00	Std. Inlet	0.49	304.89	6	Catalog Gutter	0.00	
IN-15	309.28	301.79	6.00	4.00	Std. Inlet	1.09	305.62	4	Catalog Gutter	0.00	
IN-16	309.28	302.00	6.00	4.00	Std. Inlet	0.77	307.61	4	Catalog Gutter	0.00	
IN-17	307.30	303.30	6.00	4.00	Std. Inlet	1.07	306.06	4	Catalog Gutter	0.00	
FILTERRA #4	316.55	309.40	6.00	4.00	CH Grate Inlet	2.68	310.33	15	User Defined	0.00	
BLDG#3 PARKING DECK ROOF DRAIN	308.50	300.00			CH Grate Inlet	4.77	301.47	22	User Defined	0.00	
SW BLDG#3 ROOF DRAIN	304.50	292.82			CH Grate Inlet	3.50	298.90	17	User Defined	0.00	
HSTONE CB Europa	317.10	310.40	6.00	4.00	Std. Inlet	0.00	311.08	0	Catalog Gutter	1.93	Q=0.95x8.11x0.25
YI-2	301.00	298.50			CH Grate Inlet	0.28	298.79	5	User Defined	0.00	
IN-5/FILTERRA#2	299.50	294.50	6.00	8.00	Std. Inlet	4.68	298.75	14	Catalog Gutter	0.00	
YI-3	300.50	298.15			CH Grate Inlet	0.11	298.77	1	User Defined	0.00	
YI-4	303.80	300.00			CH Grate Inlet	0.54	300.29	4	User Defined	0.00	
YI-5	303.40	300.40			CH Grate Inlet	0.00	300.81	0	User Defined	0.00	
HOTEL ROOF DRAIN	301.70	299.20			CH Grate Inlet	1.78	300.29	12	User Defined	0.00	
BLDG#2 ROOF DRAIN	304.40	301.00			CH Grate Inlet	2.61	302.01	13	User Defined	0.00	
SE BLDG#3 ROOF DRAIN	313.00	308.67			CH Grate Inlet	3.43	309.82	15	User Defined	0.00	
BLDG#5 ROOF DRAIN	318.50	310.00			CH Grate Inlet	2.34	310.65	12	User Defined	0.00	
HSTONE YI-3	288.50	285.18	6.00	4.00	CH Grate Inlet	0.30	288.29	5	User Defined	0.00	
HSTONE YI-2	292.96	286.00	6.00	4.00	CH Grate Inlet	0.43	289.77	5	User Defined	0.00	
HSTONE YI-1	296.63	287.77	6.00	4.00	CH Grate Inlet	2.62	291.61	15	User Defined	0.00	
HSTONE INL-10	301.34	289.76	6.00	4.00	Std. Inlet	0.51	294.09	6	Catalog Gutter	0.00	
HSTONE INL-9	301.76	298.07	6.00	4.00	Std. Inlet	0.64	298.37	8	Catalog Gutter	0.00	
HSTONE INL-3	307.73	300.64	6.00	4.00	Std. Inlet	0.59	302.95	7	Catalog Gutter	0.00	
HSTONE INL-3	276.75	272.03	6.00	4.00	Std. Inlet	3.84	275.08	15	Catalog Gutter	0.00	
HSTONE INL-2A	277.79	273.42	4.00	3.00	NCDOT	1.93	277.12	8	User Defined	0.00	
HSTONE INL-2	278.34	273.75	4.00	3.00	NCDOT	2.94	278.39	10	User Defined	0.00	
HSTONE YI-4	280.58	273.10	6.00	4.00	CH Grate Inlet	1.80	276.75	12	User Defined	0.00	
HSTONE INL-15	284.13	276.76	4.00	3.00	NCDOT	1.95	279.99	8	User Defined	0.00	
HSTONE INL-14	289.44	282.21	4.00	3.00	NCDOT	2.44	284.81	10	User Defined	0.00	
HSTONE INL-13	294.38	284.00	4.00	3.00	NCDOT	0.69	288.07	5	User Defined	0.00	
HSTONE INL-12	297.93	285.50	4.00	3.00	NCDOT	0.25	289.65	4	User Defined	0.00	
HSTONE INL-11	298.70	294.34	4.00	3.00	NCDOT	0.92	294.73	8	User Defined	0.00	

FlexTable: Catch Basin Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Length (ft)	Width (ft)	Inlet	Flow (Captured) (cfs)	Hydraulic Grade Line (In) (ft)	Spread / Top Width (ft)	Gutter Type	Flow (Known) (cfs)	Notes
HSTONE INL-8A	297.71	288.27	6.00	4.00	Std. Inlet	0.90	290.67	4	Catalog Gutter	0.00	
HSTONE INL-8B	299.37	290.80	6.00	4.00	Std. Inlet	1.75	293.48	8	Catalog Gutter	0.00	
HSTONE INL-8	297.57	291.69	12.00	4.00	CH Grate Inlet	2.32	296.08	12	User Defined	0.00	
HSTONE INL-6	297.71	292.00	6.00	4.00	Std. Inlet	0.11	292.61	3	Catalog Gutter	0.00	
NW BLDG#3 ROOF DRAIN	308.50	304.50			CH Grate Inlet	1.95	305.15	13	User Defined	0.00	

FlexTable: Conduit Table

Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)
HSTONE INL-7	291.86	HSTONE INL-8	291.69	30	0.006	Circle	24.0	0.013	29.25	9.31	17.06
STMH-3	298.56	IN-7	297.85	142	0.005	Circle	24.0	0.013	8.11	2.58	16.01
IN-7	297.85	IN-6	297.70	30	0.005	Circle	24.0	0.013	9.79	3.12	16.13
IN-6	297.18	IN-3	294.41	113	0.025	Circle	24.0	0.013	10.09	3.21	35.50
STMH-4	294.00	IN-3	293.42	76	0.008	Circle	24.0	0.013	10.27	3.27	19.75
IN-3	293.22	IN-2	292.48	61	0.012	Circle	24.0	0.013	20.39	6.49	24.93
IN-2A	292.61	IN-2	292.48	26	0.005	Circle	24.0	0.013	3.88	1.24	16.03
IN-2	292.28	HSTONE INL-7	292.06	43	0.005	Circle	24.0	0.013	23.82	7.58	16.19
STMH-5	304.00	IN-9	299.75	97	0.044	Circle	18.0	0.013	2.67	8.42	21.96
IN-10	299.65	IN-9	299.50	26	0.006	Circle	18.0	0.013	0.63	0.35	7.92
IN-9	299.50	STMH-3	298.56	187	0.005	Circle	18.0	0.013	4.07	2.30	7.44
HSTONE INL-2	300.87	HSTONE INL-3	300.74	33	0.004	Circle	18.0	0.013	9.74	5.51	6.61
IN-16	306.90	IN-15	306.42	24	0.020	Circle	18.0	0.013	3.10	6.69	15.01
IN-15	302.13	HSTONE INL-2A	301.45	67	0.010	Circle	18.0	0.013	8.37	4.74	10.59
HSTONE INL-2A	301.35	HSTONE INL-2	300.97	76	0.005	Circle	18.0	0.013	8.68	4.91	7.43
FILTERRA #4	309.40	STMH-5	304.00	55	0.098	Circle	18.0	0.013	2.68	11.22	32.91
SW BLDG#3 ROOF DRAIN	292.82	IN-2A	292.71		0.005	Circle	24.0	0.020	3.50	1.12	10.20
BLDG#3 PARKING DECK ROOF DRAIN	300.00	STMH-3	298.56		0.029	Circle	18.0	0.020	4.77	6.28	11.70
HSTONE CB Europa	310.40	STMH-2	307.75	43	0.061	Circle	15.0	0.013	1.93	8.81	15.98
YI-2	298.50	YI-3	298.15	35	0.010	Circle	12.0	0.020	0.28	1.98	2.31
YI-3	298.15	UG BASIN	297.04	111	0.010	Circle	12.0	0.020	0.39	2.19	2.32
IN-5/FILTERRA#2	294.50	UG BASIN	294.47	3	0.010	Circle	24.0	0.020	4.68	1.49	14.70
YI-4	300.00	CO-1	298.34	35	0.047	Circle	15.0	0.020	0.54	4.07	9.14
CO-1	298.34	UG BASIN	297.00	115	0.012	Circle	18.0	0.020	3.13	4.00	7.37
YI-5	300.40	IN-6	300.30	5	0.020	Circle	12.0	0.020	0.00	0.00	3.27
HOTEL ROOF DRAIN	299.20	BEND	298.68	52	0.010	Circle	10.0	0.020	1.78	3.26	1.42
BEND	298.68	FILTERRA #1	298.65	3	0.010	Circle	10.0	0.020	1.76	3.22	1.42
FILTERRA #1	295.57	UG BASIN	294.93	64	0.010	Circle	12.0	0.020	1.76	2.24	2.32
BLDG#2 ROOF DRAIN	301.00	FILTERRA #3	300.95	5	0.010	Circle	10.0	0.020	2.61	4.79	1.42
FILTERRA #3	298.42	CO-1	298.34		0.009	Circle	15.0	0.020	2.61	3.52	4.07
SE BLDG#3 ROOF DRAIN	308.67	FILTERRA #5	308.64	3	0.010	Circle	10.0	0.020	3.43	6.28	1.42
FILTERRA #5	306.09	IN-15	305.77	16	0.020	Circle	15.0	0.013	3.42	6.91	9.14
BLDG#5 ROOF DRAIN	310.00	FILTERRA #6	309.94	3	0.020	Circle	15.0	0.020	2.34	4.55	5.94
FILTERRA #6	307.42	IN-16	307.00	16	0.026	Circle	15.0	0.013	2.33	6.87	10.47
HSTONE YI-3	285.18	TO RAMS PLAZA	276.29	41	0.217	Circle	24.0	0.013	17.08	24.66	105.34
HSTONE INL-8	291.84	HSTONE INL-8B	290.90	161	0.006	Circle	30.0	0.013	31.09	6.33	31.34
HSTONE YI-2	286.00	HSTONE YI-3	285.28	73	0.010	Circle	24.0	0.020	16.97	5.40	14.58
HSTONE YI-1	287.77	HSTONE YI-2	286.20	114	0.014	Circle	24.0	0.020	16.81	5.35	17.29
HSTONE INL-10	289.76	HSTONE YI-1	287.97	180	0.010	Circle	24.0	0.020	15.18	4.83	14.66
HSTONE INL-9	298.07	HSTONE INL-10	297.75	29	0.011	Circle	18.0	0.013	0.64	3.38	10.93
HSTONE MH 6	291.49	HSTONE INL-10	289.96	152	0.010	Circle	24.0	0.013	14.52	4.62	22.67

FlexTable: Conduit Table

Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)
HSTONE INL-3	300.64	HSTONE MH 6	300.42	43	0.005	Circle	18.0	0.013	10.14	5.74	7.51
HSTONE INL-6	292.00	HSTONE INL-8A	291.49	33	0.015	Circle	15.0	0.013	0.11	2.28	8.03
HSTONE INL-8A	288.27	HSTONE INL-12	287.12	47	0.024	Circle	30.0	0.013	32.72	13.11	63.95
HSTONE INL-8B	290.80	HSTONE INL-8A	290.37	81	0.005	Circle	30.0	0.013	32.06	6.79	29.88
HSTONE INL-3	272.03	EW-1	271.64	31	0.013	Circle	36.0	0.013	44.66	11.06	74.93
HSTONE INL-2A	273.42	HSTONE INL-3	272.17	43	0.029	Circle	30.0	0.013	40.44	8.24	70.18
HSTONE YI-4	273.10	HSTONE INL-3	272.50	53	0.011	Circle	24.0	0.013	1.80	0.57	23.98
HSTONE INL-2	273.75	HSTONE INL-2A	273.44	18	0.018	Circle	30.0	0.013	38.99	7.94	54.43
HSTONE INL-15	276.77	HSTONE INL-2	273.91	130	0.022	Circle	30.0	0.013	36.99	7.54	60.83
SAND FILTER	296.00	HSTONE MH 6	291.69	102	0.042	Circle	18.0	0.013	4.41	9.61	21.62
HSTONE INL-14	282.21	HSTONE INL-15	279.35	123	0.023	Circle	30.0	0.013	35.60	13.17	62.66
HSTONE INL-13	284.00	HSTONE INL-14	282.41	125	0.013	Circle	30.0	0.013	33.93	6.91	46.13
HSTONE INL-12	285.50	HSTONE INL-13	284.30	120	0.010	Circle	30.0	0.013	33.61	6.85	41.02
HSTONE INL-11	294.34	HSTONE INL-12	293.52	87	0.009	Circle	15.0	0.013	0.92	3.65	6.27
NW BLDG#3 ROOF DRAIN	304.50	IN-7	301.00	25	0.140	Circle	18.0	0.020	1.95	8.55	25.55
STMH-2	307.60	STMH-1	305.28	27	0.085	Circle	18.0	0.013	1.93	9.67	30.58
STMH-1	302.56	IN-15	302.23	55	0.006	Circle	18.0	0.013	2.74	1.55	8.16
IN-17	303.30	STMH-1	302.66		0.005	Circle	24.0	0.020	1.07	0.34	10.03

FlexTable: Catchment Table

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
CM-7	HSTONE INL-7	0.457	0.860	5.000	2.93
CM-2	IN-2	0.019	0.960	5.000	0.14
CM-3	IN-3	0.083	0.860	5.000	0.53
CM-6	IN-6	0.161	0.870	5.000	1.04
CM-7	IN-7	0.153	0.800	5.000	0.91
CM-YI-4	YI-4	0.076	0.950	5.000	0.54
CM-9	IN-9	0.169	0.770	5.000	0.97
CM-10	IN-10	0.105	0.800	5.000	0.63
CM-13	HSTONE INL-2	0.073	0.800	5.000	0.44
CM-14	HSTONE INL-2A	0.238	0.900	5.000	1.60
CM-15	IN-15	0.159	0.920	5.000	1.09
CM-16	IN-16	0.136	0.760	5.000	0.77
CM-17	IN-17	0.173	0.830	5.000	1.07
CM-2A	IN-2A	0.153	0.930	5.000	1.06
CM-YI-1	FILTERRA #4	0.414	0.870	5.000	2.68
SW Portion of BLDG3	SW BLDG#3 ROOF DRAIN	0.490	0.960	5.000	3.50
Parking Deck	BLDG#3 PARKING DECK ROOF DRAIN	0.667	0.960	5.000	4.77
CM-YI-2	YI-2	0.040	0.930	5.000	0.28
CM-5	IN-5/FILTERRA#2	0.698	0.900	5.000	4.68
CM-YI-3	YI-3	0.016	0.950	5.000	0.11
HOTEL ROOF DRAIN	HOTEL ROOF DRAIN	0.251	0.950	5.000	1.78
BLDG#2 ROOF DRAIN	BLDG#2 ROOF DRAIN	0.369	0.950	5.000	2.61
BLDG#5 ROOF DRAIN	BLDG#5 ROOF DRAIN	0.330	0.950	5.000	2.34
SE BLDG#3 ROOF DRAIN	SE BLDG#3 ROOF DRAIN	0.484	0.950	5.000	3.43
EX. CM-10	HSTONE INL-10	0.287	0.820	5.000	1.75
EX. CM-9	HSTONE INL-9	0.229	0.800	5.000	1.36

FlexTable: Catchment Table

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
EX. CM-3	HSTONE INL-3	0.330	0.960	5.000	2.36
EX. CM-2A	HSTONE INL-2A	0.035	0.740	5.000	0.19
EX. CM-2	HSTONE INL-2	1.120	0.550	5.000	4.59
EX. CM-15	HSTONE INL-15	0.180	0.800	5.000	1.07
EX. CM-14	HSTONE INL-14	0.675	0.930	5.000	4.68
EX. CM-13	HSTONE INL-13	0.145	0.810	5.000	0.87
EX. CM-11	HSTONE INL-11	0.149	0.830	5.000	0.92
EX. CM-10	HSTONE INL-8B	0.287	0.820	5.000	1.75
EX. CM-8A	HSTONE INL-8A	0.146	0.830	5.000	0.90
EX. CM-8	HSTONE INL-8	0.168	0.860	5.000	1.08
EX. CM-6	HSTONE INL-6	0.188	0.075	5.000	0.11
EX. CM-3	HSTONE INL-3	0.317	0.810	5.000	1.91
EX. CM-12	HSTONE INL-12	0.042	0.850	5.000	0.27
EX. YI CM-4	HSTONE YI-4	0.403	0.600	5.000	1.80
EX. YI CM-3	HSTONE YI-3	0.069	0.590	5.000	0.30
EX. YI CM-2	HSTONE YI-2	0.088	0.660	5.000	0.43
EX. YI CM-1	HSTONE YI-1	0.446	0.790	5.000	2.62
NW Portion of BLDG3	NW BLDG#3 ROOF DRAIN	0.276	0.950	5.000	1.95

FlexTable: Manhole Table

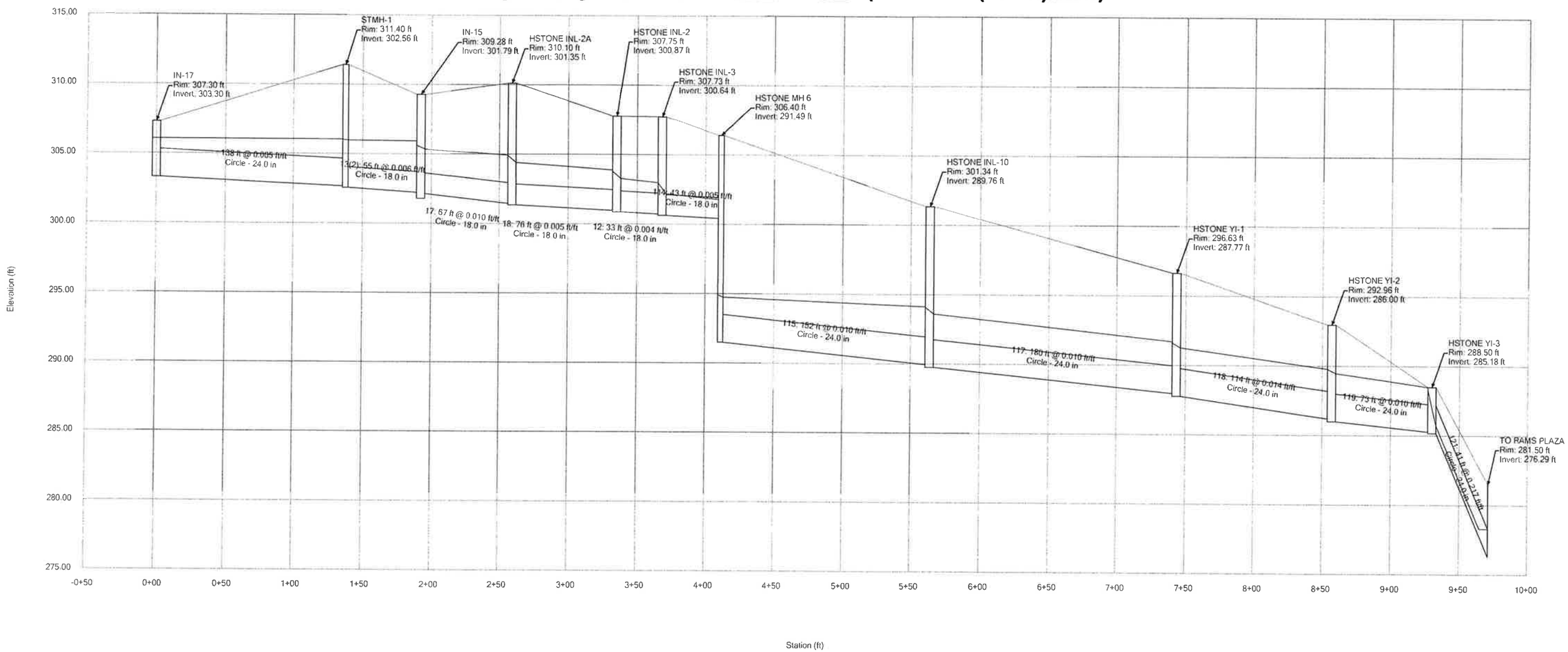
Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Headloss Method
STMH-5	308.00	304.00	2.67	304.67	AASHTO
STMH-2	313.10	307.60	1.93	318.30	AASHTO
STMH-4	301.00	293.80	10.27	300.37	AASHTO
STMH-3	307.10	298.56	8.11	301.21	AASHTO
CO-1	302.26	298.34	3.13	299.19	AASHTO
FILTERRA #1	301.00	295.57	1.76	299.29	AASHTO
FILTERRA #3	303.00	298.42	2.61	299.37	AASHTO
FILTERRA #5	310.67	306.09	3.42	306.81	AASHTO
FILTERRA #6	312.00	307.42	2.33	308.28	AASHTO
SAND FILTER	306.00	292.80	4.41	296.92	AASHTO
HSTONE MH 6	306.40	291.49	14.52	294.91	AASHTO
STMH-1	311.40	302.56	2.74	306.02	AASHTO

FlexTable: Outfall Table

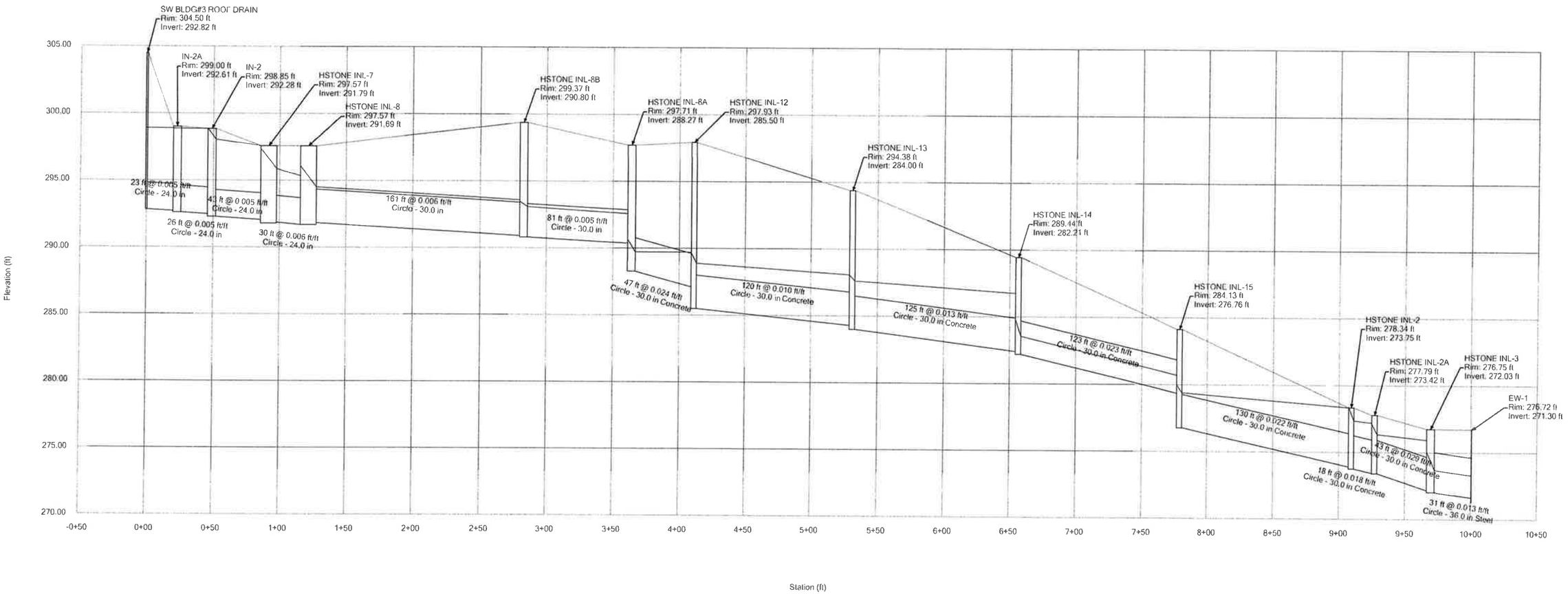
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
UG BASIN	299.50	294.47	298.74	298.74	4.67
UG BASIN	300.20	297.04	298.74	298.74	0.37
UG BASIN	301.00	297.00	298.74	298.74	3.07
UG BASIN	300.00	294.93	298.74	298.74	1.72
TO RAMS PLAZA	281.50	276.29		278.29	17.07
EW-1	276.72	271.30		273.31	44.61

Profile Report

Engineering Profile - IN17 - RAMS PLAZA (StormCAD (10-YR).stsw)

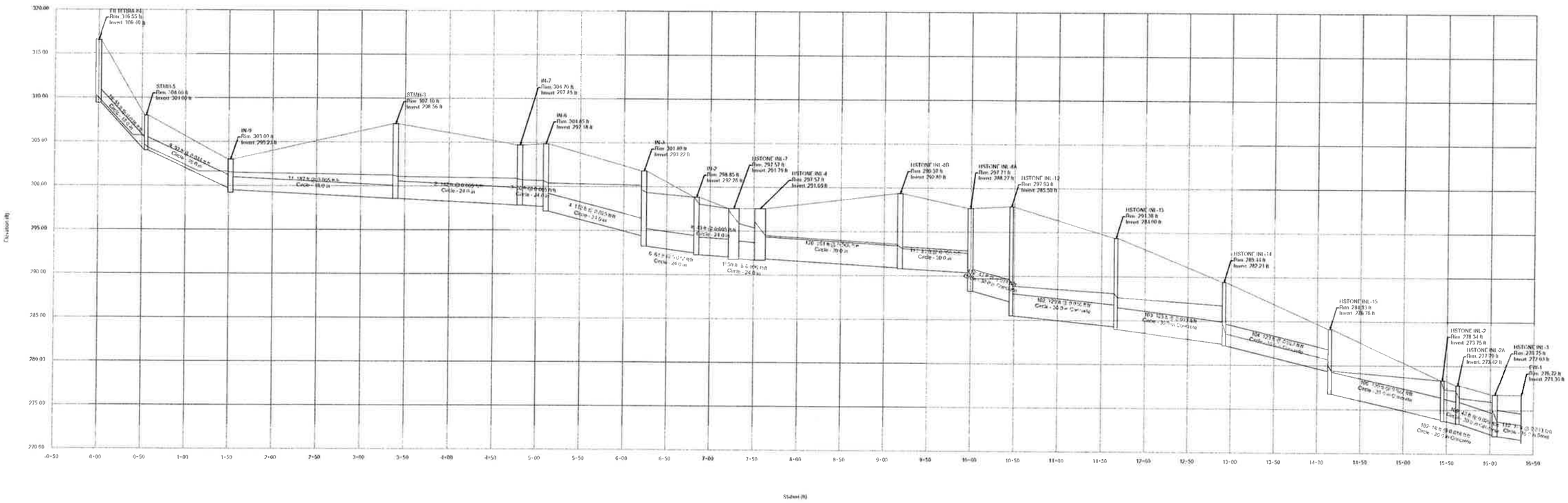


Profile Report
Engineering Profile - IN-2A TO RAMS PLAZA (StormCAD (10-YR).stsw)



Profile Report

Engineering Profile - FILTERR#4 TO RAMS PLAZA (StormCAD (10-YR).stsw)



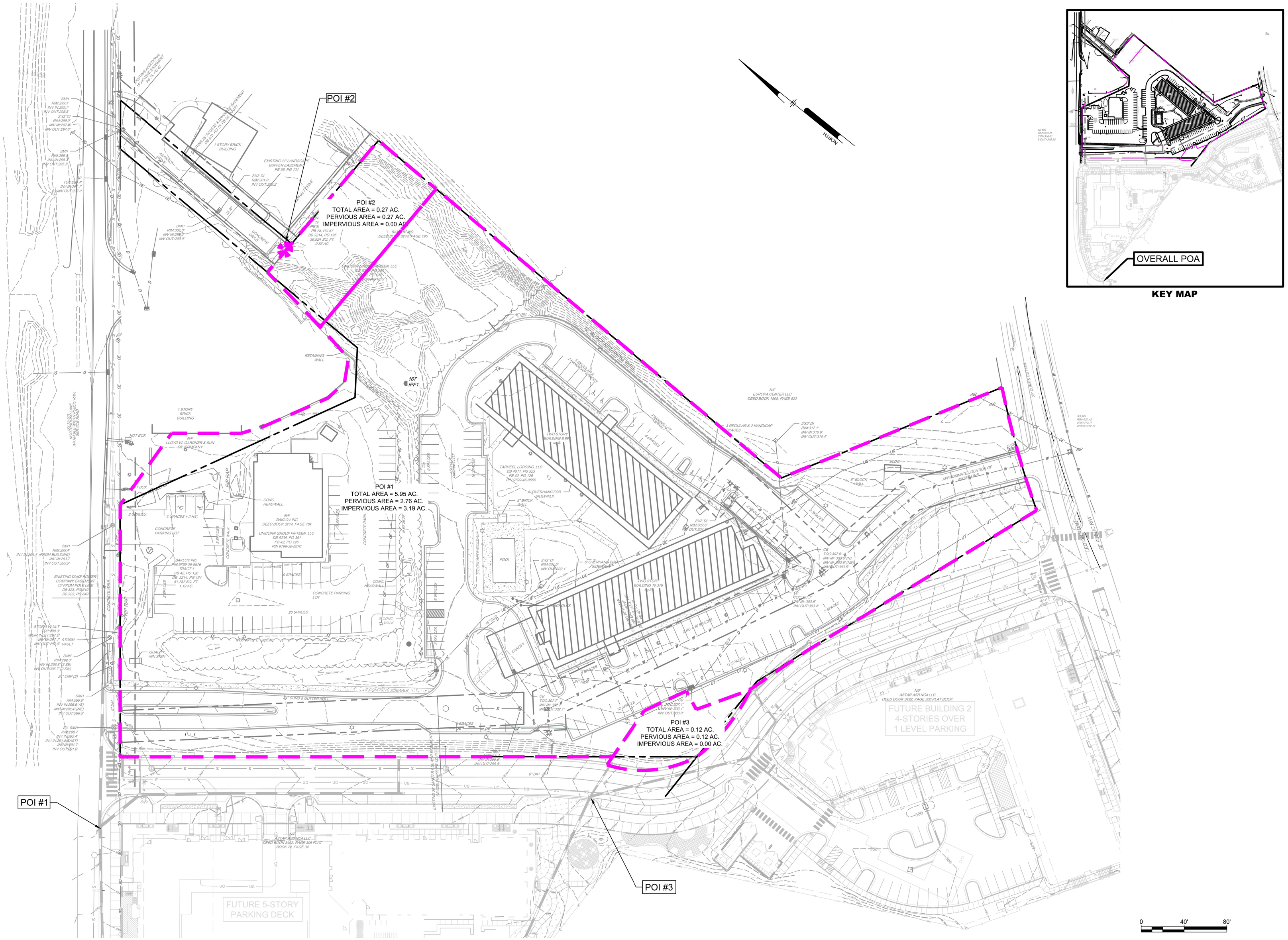
FlexTable: Catch Basin Table 4 in per hour Storm

Label	Elevation (Rim) (ft)	Width (ft)	Inlet	Flow (Captured) (cfs)	Hydraulic Grade Line (In) (ft)	Gutter Type	Flow (Known) (cfs)	Spread / Top Width (ft)
HSTONE INL-7	297.57	4.00	Std. Inlet	6.70	297.35	Catalog Gutter	0.00	16
IN-2	298.85	4.00	Std. Inlet	0.33	298.86	Catalog Gutter	0.00	4
IN-3	301.80	4.00	Std. Inlet	0.37	299.67	Catalog Gutter	0.00	5
IN-6	304.85	4.00	Std. Inlet	0.43	300.65	Catalog Gutter	0.00	6
IN-7	304.70	4.00	Std. Inlet	0.40	300.86	Catalog Gutter	0.00	5
IN-9	303.00	4.00	Std. Inlet	0.97	301.58	Catalog Gutter	0.00	4
IN-10	302.60	4.00	Std. Inlet	0.63	301.67	Catalog Gutter	0.00	4
IN-2A	299.00	4.00	Std. Inlet	0.43	298.87	Catalog Gutter	0.00	6
HSTONE INL-2	307.75	4.00	Std. Inlet	1.54	303.81	Catalog Gutter	0.00	7
HSTONE INL-2A	310.10	4.00	Std. Inlet	0.49	304.93	Catalog Gutter	0.00	6
IN-15	309.28	4.00	Std. Inlet	1.09	305.66	Catalog Gutter	0.00	4
IN-16	309.28	4.00	Std. Inlet	0.77	307.61	Catalog Gutter	0.00	4
IN-17	307.30	4.00	Std. Inlet	1.17	306.09	Catalog Gutter	0.00	4
FILTERRA #4	316.55	4.00	CH Grate Inlet	2.68	310.33	User Defined	0.00	15
BLDG#3 PARKING DECK ROOF DRAIN	308.50		CH Grate Inlet	4.77	301.47	User Defined	0.00	22
SW BLDG#3 ROOF DRAIN	304.50		CH Grate Inlet	3.50	298.90	User Defined	0.00	17
HSTONE CB Europa	317.10	4.00	Std. Inlet	0.00	311.05	Catalog Gutter	1.75	0
YI-2	301.00		CH Grate Inlet	0.28	298.79	User Defined	0.00	5
IN-5/FILTERRA#2	299.50	8.00	Std. Inlet	4.68	298.75	Catalog Gutter	0.00	14
YI-3	300.50		CH Grate Inlet	0.11	298.77	User Defined	0.00	1
YI-4	303.80		CH Grate Inlet	0.54	300.29	User Defined	0.00	4
YI-5	303.40		CH Grate Inlet	0.00	300.81	User Defined	0.00	0
HOTEL ROOF DRAIN	301.70		CH Grate Inlet	1.78	300.29	User Defined	0.00	12
BLDG#2 ROOF DRAIN	304.40		CH Grate Inlet	2.61	302.01	User Defined	0.00	13
SE BLDG#3 ROOF DRAIN	313.00		CH Grate Inlet	3.43	309.82	User Defined	0.00	15

FlexTable: Catch Basin Table

Label	Elevation (Rim) (ft)	Width (ft)	Inlet	Flow (Captured) (cfs)	Hydraulic Grade Line (In) (ft)	Gutter Type	Flow (Known) (cfs)	Spread / Top Width (ft)
BLDG#5 ROOF DRAIN	318.50		CH Grate Inlet	2.34	310.65	User Defined	0.00	12
HSTONE YI-3	288.50	4.00	CH Grate Inlet	0.30	288.33	User Defined	0.00	5
HSTONE YI-2	292.96	4.00	CH Grate Inlet	0.43	289.18	User Defined	0.00	5
HSTONE YI-1	296.63	4.00	CH Grate Inlet	2.62	290.09	User Defined	0.00	15
HSTONE INL-10	301.34	4.00	Std. Inlet	0.51	291.61	Catalog Gutter	0.00	6
HSTONE INL-9	301.76	4.00	Std. Inlet	0.64	298.37	Catalog Gutter	0.00	8
HSTONE INL-3	307.73	4.00	Std. Inlet	0.59	302.97	Catalog Gutter	0.00	7
HSTONE INL-3	276.75	4.00	Std. Inlet	3.84	275.08	Catalog Gutter	0.00	15
HSTONE INL-2A	277.79	3.00	NCDOT	1.93	277.12	User Defined	0.00	8
HSTONE INL-2	278.34	3.00	NCDOT	2.94	278.39	User Defined	0.00	10
HSTONE YI-4	280.58	4.00	CH Grate Inlet	1.80	276.75	User Defined	0.00	12
HSTONE INL-15	284.13	3.00	NCDOT	1.95	279.99	User Defined	0.00	8
HSTONE INL-14	289.44	3.00	NCDOT	2.44	284.81	User Defined	0.00	10
HSTONE INL-13	294.38	3.00	NCDOT	0.69	288.07	User Defined	0.00	5
HSTONE INL-12	297.93	3.00	NCDOT	0.25	289.65	User Defined	0.00	4
HSTONE INL-11	298.70	3.00	NCDOT	0.92	294.73	User Defined	0.00	8
HSTONE INL-8A	297.71	4.00	Std. Inlet	0.90	290.67	Catalog Gutter	0.00	4
HSTONE INL-8B	299.37	4.00	Std. Inlet	1.75	293.48	Catalog Gutter	0.00	8
HSTONE INL-8	297.57	4.00	CH Grate Inlet	2.32	296.08	User Defined	0.00	12
HSTONE INL-6	297.71	4.00	Std. Inlet	0.11	292.61	Catalog Gutter	0.00	3
NW BLDG#3 ROOF DRAIN	308.50		CH Grate Inlet	1.95	305.15	User Defined	0.00	13

DRAINAGE AREA PLANS



NOT FOR CONSTRUCTION

Pennoni
Firm License F-1267
PENNONI ASSOCIATES INC.
5430 Wade Park Boulevard, #106
Raleigh, NC 27607
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ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

TARHEEL LODGING REDEVELOPMENT

1742 FORDHAM BLVD.
CHAPEL HILL, NC

PRE-DEVELOPMENT DRAINAGE AREA MAP

TARHEEL LODGING, LLC & UNICORN GROUP FIFTEEN, LLC
6110 FALCON BRIDGE ROAD
CHAPEL HILL, NC 27517

NO.	DATE	REVISIONS	BY
-	-	-	-
-	-	-	-
5	05/28/2019	REV. PER TOWN COMMENTS	S4K
4	04/08/2019	REV. PER TOWN COMMENTS	CSB
3	08/14/2018	REV. PER TOWN COMMENTS	CSB
2	07/20/2018	REV. PER COMPLETENESS REVIEW	CSB
1	07/09/2018	REV. PER TOWN & OWASA COMMENTS	CSB

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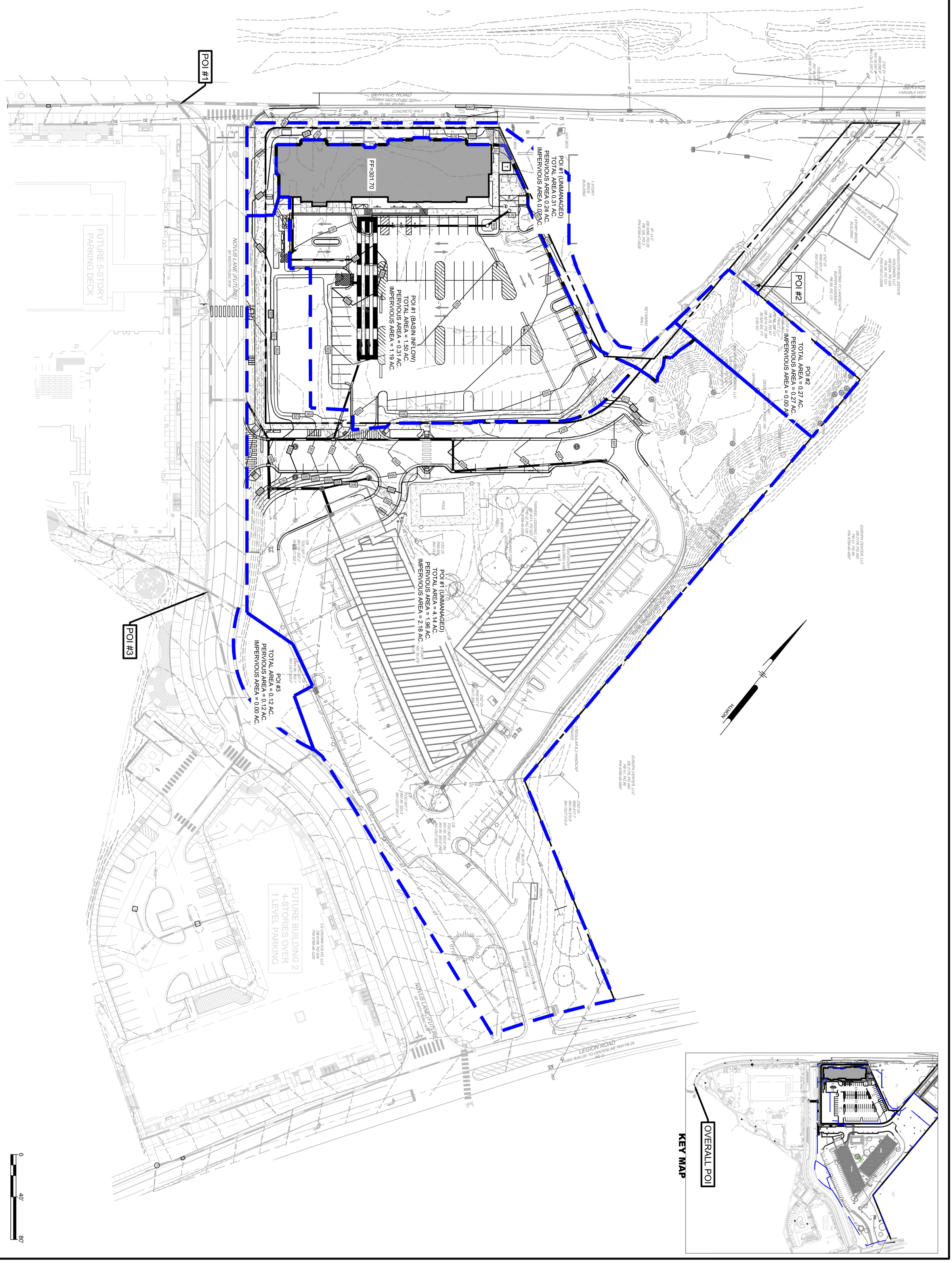
PROJECT	RKINV18001
DATE	2018/05/23
DRAWING SCALE	AS SHOWN
DRAWN BY	CSB
APPROVED BY	JJB

CS9201

SHEET 1 OF 5

U:\Accounts\RKINV\RKINV18001 - Hotel Site Chapel Hill\DESIGN\CS\RKINV18001-CS-BASEMAP.dwg PLOTTED: 6/5/2019 8:55 AM, BY: Scott Knisell PLOTSTYLE: Pennoni NCS.ctb PROJECT STATUS: ---



NOT FOR CONSTRUCTION

0 40' 80'

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DATE	NO.	REVISIONS	BY
.	.	.	.
.	.	.	.
05/28/2019	5	REV. PER TOWN COMMENTS	SAK
04/08/2019	4	REV. PER TOWN COMMENTS	CSB
09/14/2018	3	REV. PER TOWN COMMENTS	CSB
07/20/2018	2	REV. PER COMPLETENESS REVIEW	CSB
07/09/2018	1	REV. PER TOWN & OWASA COMMENTS	CSB

PROJECT RKINV18001
DATE 2018/05/23
DRAWING SCALE AS SHOWN
DRAWN BY CSB
APPROVED BY JJB

CS9202

SHEET 2 OF 5

TARHEEL LODGING REDEVELOPMENT

1742 FORDHAM BLVD.
CHAPEL HILL, NC

POST-DEVELOPMENT DRAINAGE AREA MAP (PHASE 1)

TARHEEL LODGING, LLC & UNICORN GROUP FIFTEEN, LLC

6110 FALCON BRIDDGE ROAD
CHAPEL HILL, NC 27517

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

Pennoni
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