# TOWN OF ASHLAND CITY
# Planning Commission Meeting
# February 03, 2020 5:30 PM
# Agenda

**Chairwoman:** Melody Sleeper
**Committee Members**: Steve Allen, Justin Bell, Lisa Walker, Alberto Santacruz, Steven Stratton, Lisa Walker, Hadley Williams

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**CALL TO ORDER**

**ROLL CALL**

**APPROVAL OF AGENDA**

**APPROVAL OF MINUTES**

Planning Commission Meeting Minutes 1-6-2020

**PUBLIC FORUM:**

**OLD BUSINESS:**

2. Reclassification of Property Under the Zoning Ordinance Request: Hwy 12 and Caldwell Road Map 64 Parcel 11.01: R-1 to C-1

**NEW BUSINESS:**

3. Subdivision Application: Eleanor Village: 3454 Bell Street (13 Lots)
4. Landscape Ordinance Discussion

**OTHER.**

**ADJOURNMENT**

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*Those with disabilities who require certain accommodations in order to allow them to observe and/or participate in this meeting, or who have questions regarding the accessibility of the meeting, should contact the ADA Coordinator at 615-792-6455, M-F 8:00 AM – 4:00 PM. The town will make reasonable accommodations for those persons.*

# TOWN OF ASHLAND CITY
# Planning Commission Meeting
# January 06, 2020 5:30 PM
# Minutes

**CALL TO ORDER**
Chairwoman Melody Sleeper called the meeting to order at 6:01 p.m.

**ROLL CALL**
PRESENT
Chairwoman Melody Sleeper
Committee Member Steve Allen
Committee Member Justin Bell
Committee Member Alberto Santacruz
Committee Member Steven Stratton
Committee Member Hadley Williams
Committee Member Lisa Walker

**APPROVAL OF AGENDA**
A motion was made by Committee Member Allen, seconded by Committee Member Walker, to approve the agenda. All approved by voice vote.

**APPROVAL OF MINUTES**
1. 12-2-19 Planning Commission Minutes
   A motion was made by Committee Member Allen, seconded by Committee Member Stratton, to approve the 12-2-19 meeting minutes. All approved by voice vote.

**PUBLIC FORUM:**
None.

**NEW BUSINESS:**
2. Annual Training
   Mr. Bret Smith stepped forward and allowed the committee members to step down and take a quick break in order for them to get comfortable in the audience so everyone can view the slide show. Mr. Smith explained the difference in the invasive species of trees in the American Nursery Standards. He explained that the committees should look at horizontal landscapes in buffers versus closures in landscaping plans. Mr. Smith explained that in Middle Tennessee we are limited as to what will grow in the area. Mr. Jay Easter explained the strong central leader is what allows the growth of a strong central tree. He further explained a three-inch caliber tree may not be the same in quality. This is mainly because what is delivered may not be what was envisioned, although it meets the standard of the American Nursery Standards. Mr. Smith questioned if the landscape architect goes out and inspects currently. Mr. McClain stated it would be a good idea to require that, but we do not have verbiage that allows us to hold a landscaping bond which could hold up the certificate of occupancy. Mr. Smith explained TDOT has a Landscape Design Guideline that is available on their website that will help to describe the shapes of plants. He further explained the various shapes and some of the pros and cons to using them. Committee Member Walker asked why TDOT will not allow us to put flowering plants in the right of way, but they allow these elaborate plans for the exchanges. Mr. Smith stated sometimes it just depends on the question that was asked and who you asked. He further suggested to reach out to Mr. Mike McClainihan to see if he can help with this; however, it may require a maintenance agreement to be signed. He further stated the other thing to keep in mind is the speed of the road and the breakaway. Mr. Smith stated the crepe myrtles are actually a great plant for the medians because they are drought resistant and tend to grow

back. Mr. Smith explained to keep in mind that landscape calculations should be easy to manage. He showed an example of what a difficult calculation looks like and further commented that the new Hampton Inn development landscape architect did a good job on the calculations to make it easy to understand. Mr. Smith explained allowing existing trees toward requirements and why this is a good idea. Mr. Smith explained why it is important to define where the water, sewer, and electric will need to be in a new design so that it makes it easier for the landscape design to make an elegant design on the front end. After much discussion Planning Committee Member Stratton stated he would like to further address residential landscaping at the next meeting.

**OTHER.**
None.

**ADJOURNMENT**
A motion was made by Committee Member Williams, seconded by Committee Member Walker to adjourn. All approved and the meeting adjourned at 7:40 p.m.

_____ _____

MAYOR STEVE ALLEN CITY RECORDER KELLIE REED, CMFO, CMC

# Ashland City Fire, Building & Life Safety Department

101 Court Street
Ashland City TN 37015
Fire & Life Safety: (615) 792-4531 – Building Codes (615) 792-6455


## Application for Reclassification of Property Under the Zoning Ordinance

**Application Fee: $100.00**

Application is hereby made to the Mayor and City Council, which first must be reviewed by the City Planning Commission, to reclassify the property described below now in a R1 - C1 district.

DESCRIPTION OF PROPERTY (Attach Map): Map 64 Parcel 11.01
2.47 Acres with ~~600~~ 400 LF of Hwy 12 Frontage and 400 LF of Caldwell Rd frontage + Access

REASON FOR RECLASSIFICATION REQUEST Construction Equipment Rental Services

Address: _____

NOTE:

1. All applications for rezoning must be turned into City Hall no later than thirty (30) days prior to the upcoming planning commission meeting, if they are to be entertained at said meeting.
2. An accurate graphic plat prepared and stamped by a registered design professional and a legal description of property to be rezoned must be submitted to the Building Official prior to consideration by the City Commissioners. In certain circumstances (i.e. large annexation requests having irregular boundaries) these legal descriptions must be submitted prior to planning commission consideration.
3. The applicant will submit the names and addresses of all owners of adjacent property within 1,000 feet. The applicant must also submit a map showing the property within 200 feet of said property.

[signature] 10-31-19
Applicant Signature Date


Revisions:

Date: December 31, 2019

# Highway 12 & Caldwell Road

Tax Map 11.01, Parcels 64

Ashland City, Cheatham County, Tennessee

Option C
Multi-Tenant
Office
Building

1

1 0f 1

Fire, Building & Life Safety Department

# Ashland City Fire, Building & Life Safety Department

101 Court Street
Ashland City TN 37015
Fire & Life Safety: (615) 792-4531 – Building Codes (615) 792-6455

## SUBDIVISON APPLICATION

**APPLICANT NAME:** ELEANOR VILLAGE, LLC

**ADDRESS:** 3494 BELL ST.
ASHLAND CITY, TN 37015

**TELEPHONE:** (615) 584-4140

**PROJECT NAME:** ELEANOR VILLAGE

**NUMBER OF LOTS:** 13

**PLANNING COMMISSION FEES:** $250.00

Minor Subdivision (Four lots or less): $150.00
Plat Amendment: $150.00
Major Subdivision: $250.00

*Note: Mylar shall be presented at the time of Final Subdivision Plat Approval and must be signed by all parties except for Secretary of the Planning Commission.*

Having submitted plans for review by the Ashland City Planning Commission, I understand that I am responsible for all review fees incurred by the Town of Ashland City. I understand that the fee paid at the time of submittal is not applicable for the fees incurred through review. With my signature, I verify that I fully understand that I am responsible for said fees, and that I have received a copy of Ordinance #165.

Applicant's Signature

1-3-2020
Date

HARPETH CIVIL

DRAINAGE REPORT FOR:

# ELEANOR VILLAGE SUBDIVISION

ASHLAND CITY, TENNESSEE

MAP 55E, GR A, PAR 15


Original Issuance: December 23, 2019

**PREPARED BY:**

HARPETH CIVIL, INC.

179 BELLE FOREST CIR., STE. 204E

NASHVILLE, TN. 37221

**PREPARED FOR:**

DAKOTA WIND PROPERTIES, LLC

1152 DUNCANWOOD DRIVE

NASHVILLE, TN. 37204

HARPETH CIVIL

## TABLE OF CONTENTS



## APPENDIX

## ABSTRACT

This analysis has been prepared for the purpose of determining the pre vs. post-development stormwater flow characteristics for the proposed single-family residential subdivision located in Ashland City, Tennessee. The parcel is bounded by Forrest Street to the south, Poole Street to the east, and Gallaher Street to the west. The lot configuration, as prepared by others, indicates the creation of 13 new lots, all of which will already have access to one of the three adjacent public right of ways.

Because no additional roadway infrastructure is needed to serve the proposed development, the baseline for the proposed hydrologic conditions considers only a change in land use from undeveloped to single-family residential with an average lot area of 0.5 acres.

The detention basins have been sized to attenuate stormwater runoff from the proposed development to meet the pre-development target flows as shown in the following sections of this report.

## EXISTING CONDITIONS SUMMARY

The 8.15-acre parcel to be subdivided is bounded by Forrest Street to the south, Poole Street to the east, and Gallaher Street to the west. Stormwater runoff drains primarily from north to south with a drainage divide located in the central portion of the property.

Stormwater runoff to the west of the interior drainage divide discharges to an existing natural swale which flows southwesterly towards an existing 36" concrete storm pipe at the intersection of Gallaher Street and Forrest Street. This is considered Outfall 1.

Stormwater runoff to the east of the interior drainage divide sheet flows through an open grassed area before entering the roadside ditch and discharging to an existing 15" concrete storm pipe at the intersection of Poole Street and Forrest Street. This is considered outfall 2.

Based on data collected from NRCS web soil survey, the underlying soil conditions consist primarily of Hawthorne Gravelly Silt Loam, 5 to 12 percent slopes and 12 to 20 percent slopes of which are classified in the hydrologic soil group B for having moderate infiltration rate when thoroughly wet. The northwesterly most portion of the drainage basin does contain a pocket of Humphreys gravelly silt loam, 2 to 5 percent slopes which is classified in the hydrologic soil group A for having high infiltration rate when thoroughly wet.

Utilizing the characters indicated above, the hydrologic conditions for the existing drainage basins have been analyzed for the 2-year through 100-year design storm events with rainfall runoff data assumed from the Metro Nashville Stormwater Management Manual Volume 2. The results of the predevelopment flows can be found in the Appendix section of this report.

## PROPOSED CONDITIONS SUMMARY

Once the pre-development peak flows to Outfalls 1 and 2 were determined, these values are used as a target condition for the post-development drainage design and analysis.

As shown on the drainage exhibits included in the appendix of this report, the natural drainage features of the proposed subdivision will remain and be utilized to the advantage of the stormwater management plan. Runoff to the west of the interior drainage divide will be collected into Detention Basin 1 before discharging to Outfall 1. This detention area will include the construction of earthen berm and outlet pipe to attenuate the stormwater runoff and reduce peak discharge from the proposed development. The detention outlet is designed as such to ensure the 100-year design storm ponded area is within the section of land designate as "Open Area". This will ensure stormwater ponded volume does not encroach on the buildable lots area.

The area east of the interior drainage divide will continue to sheet flow to the southwest as in the existing condition before enter Detention Basin 2 and ultimately discharging to Outfall 2. Detention Basin 2 will consist of the construction of an earthen berm along the frontage of proposed Lot 4 at the intersection of Poole Street and Forrest Street in combination with excavation on the interior site of the basin to provide additional volume.

Utilizing rainfall runoff data from Metro Nashville Stormwater Management Manual Volume 2, the post-development conditions are analyzed to include the routing of stormwater through the proposed detention basins to determine the overall post-development flows. It should be noted that the drainage basin boundaries and time of concentration values did not change in the post-development condition. The only revised variable was the land use from undeveloped grassy areas to single-family residential with average lot areas of 0.50-acres. The detention outlet flows were combined with the bypass flows from the roadside ditches and compared to the pre-development flows at Outfalls 1 and 2.

The table below provides a pre vs. post development summary of the stormwater runoff for the 2-year through 100-year design storm events.

**PRE. VS. POST DEVELOPMENT COMPARISON TABLE**

| | OUTFALL 1 | | | OUTFALL 2 | | |
|---|---|---|---|---|---|---|
| **STORM EVENT** | **EXISTING** | **PROP. P-1** | **DIFF.** | **EXISTING** | **PROPOSED** | **DIFF.** |
| **2-YEAR** | 12.19 | 12.09 | **-0.10** | 3.58 | 3.47 | **-0.11** |
| **5-YEAR** | 22.83 | 20.06 | **-2.77** | 6.57 | 5.90 | **-0.67** |
| **10-YEAR** | 30.47 | 24.81 | **-5.66** | 8.71 | 7.66 | **-1.05** |
| **25-YEAR** | 40.69 | 30.59 | **-10.10** | 11.55 | 9.31 | **-2.24** |
| **50-YEAR** | 48.57 | 35.81 | **-12.76** | 13.77 | 11.29 | **-2.48** |
| **100-YEAR** | 56.71 | 46.55 | **-10.16** | 16.03 | 14.82 | **-1.21** |

As shown in the table above, the post-development flows were decreased in each of the design storm events. Additional details for the assumed variables and calculations can be found in the appendix of this report.

# APPENDIX A

## NRCS SOILS DATA AND MAP


Map Scale: 1:2,160 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

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

**Soil Rating Lines**

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

**Soil Rating Points**

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

**Water Features**

Streams and Canals

**Transportation**

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

**Background**

Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Cheatham County, Tennessee
Survey Area Data: Version 13, Sep 16, 2019

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

Date(s) aerial images were photographed: May 12, 2015—Oct 3, 2017

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

# Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| HaC | Hawthorne gravelly silt loam, 5 to 12 percent slopes | B | 5.3 | 47.8% |
| HaD | Hawthorne gravelly silt loam, 12 to 20 percent slopes | B | 4.9 | 43.4% |
| HuB | Humphreys gravelly silt loam, 2 to 5 percent slopes | A | 1.0 | 8.8% |
| **Totals for Area of Interest** | | | **11.2** | **100.0%** |

## Description

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

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

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

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

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

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

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

## Rating Options

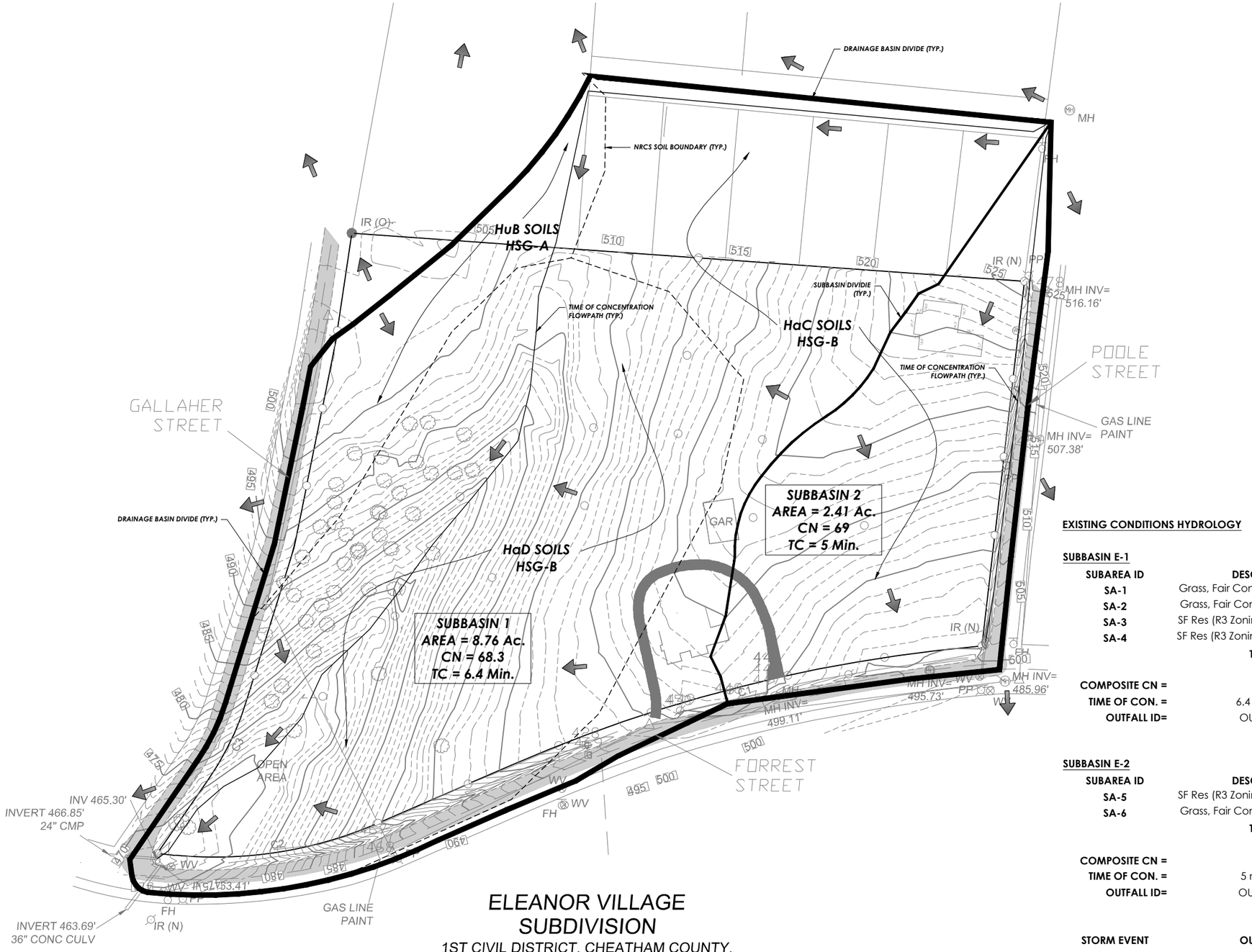
*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

# APPENDIX B

## EXISTING CONDITIONS HYDROLOGIC ANALYSIS




# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15

Tennessee811
Know what's below. Call before you dig.

## EXISTING CONDITIONS HYDROLOGY

**SUBBASIN E-1**

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-1 | Grass, Fair Cond (Undev.) - HSG A | 31,075 | 0.71 | 49 |
| SA-2 | Grass, Fair Cond (Undev.) - HSG B | 262,428 | 6.02 | 69 |
| SA-3 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 76,160 | 1.75 | 75 |
| SA-4 | SF Res (R3 Zoning 0.25 Ac.) - HSG A | 11,987 | 0.28 | 61 |
| | TOTAL | 381,650 | 8.76 | |

| | | |
|---|---|---|
| COMPOSITE CN = | 68 | |
| TIME OF CON. = | 6.4 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| OUTFALL ID= | OUTFALL 1 | |

**SUBBASIN E-2**

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-5 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 6,332 | 0.15 | 75 |
| SA-6 | Grass, Fair Cond (Undev.) - HSG B | 98,632 | 2.26 | 69 |
| | TOTAL | 104,964 | 2.41 | |

| | | |
|---|---|---|
| COMPOSITE CN = | 69 | |
| TIME OF CON. = | 5 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| OUTFALL ID= | OUTFALL 2 | |

**PEAK FLOW (CFS)**

| STORM EVENT | OUTFALL 1 | OUTFALL 2 |
|---|---|---|
| 2-YEAR | 12.19 | 3.58 |
| 5-YEAR | 22.83 | 6.57 |
| 10-YEAR | 30.47 | 8.71 |
| 25-YEAR | 40.69 | 11.55 |
| 50-YEAR | 48.57 | 13.77 |
| 100-YEAR | 56.71 | 16.03 |

SCALE: 1" = 50'
0 50 100 150

**PRELIMINARY - NOT FOR CONSTRUCTION**

| | | | |
|---|---|---|---|
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |

**ELEANOR VILLAGE SUBDIVISION**
FORREST STREET / GALLAHER STREET / POOLE STREET
ASHLAND CITY, CHEATHAM COUNTY, TENNESSEE

HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM

HCI PN 0517-19A

**EXISTING CONDITIONS DRAINAGE EXHIBIT**

**D-1.0**

**EXISTING CONDITIONS HYDROLOGY**

**SUBBASIN E-1**

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| **SA-1** | Grass, Fair Cond (Undev.) - HSG A | 31,075 | 0.71 | 49 |
| **SA-2** | Grass, Fair Cond (Undev.) - HSG B | 262,428 | 6.02 | 69 |
| **SA-3** | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 76,160 | 1.75 | 75 |
| **SA-4** | SF Res (R3 Zoning 0.25 Ac.) - HSG A | 11,987 | 0.28 | 61 |
| | **TOTAL** | **381,650** | **8.76** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 68 | |
| **TIME OF CON. =** | 6.4 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 1 | |

**SUBBASIN E-2**

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| **SA-5** | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 6,332 | 0.15 | 75 |
| **SA-6** | Grass, Fair Cond (Undev.) - HSG B | 98,632 | 2.26 | 69 |
| | **TOTAL** | **104,964** | **2.41** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 69 | |
| **TIME OF CON. =** | 5 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 2 | |

| | **PEAK FLOW (CFS)** | |
|---|---|---|
| **STORM EVENT** | **OUTFALL 1** | **OUTFALL 2** |
| **2-YEAR** | 12.19 | 3.58 |
| **5-YEAR** | 22.83 | 6.57 |
| **10-YEAR** | 30.47 | 8.71 |
| **25-YEAR** | 40.69 | 11.55 |
| **50-YEAR** | 48.57 | 13.77 |
| **100-YEAR** | 56.71 | 16.03 |

# Watershed Model Schematic




**Legend**

| Hyd. | Origin | Description |
|---|---|---|
| 1 | SCS Runoff | Subbasin E-1 |
| 2 | SCS Runoff | Subbasin E-2 |

# Hydrograph Return Period Recap



| Hyd. No. | Hydrograph type (origin) | Inflow hyd(s) | Peak Outflow (cfs) | | | | | | | | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | |
| 1 | SCS Runoff | ------ | ------- | 12.19 | ------- | 22.83 | 30.47 | 40.69 | 48.57 | 56.71 | Subbasin E-1 |
| 2 | SCS Runoff | ------ | ------- | 3.581 | ------- | 6.571 | 8.708 | 11.55 | 13.77 | 16.03 | Subbasin E-2 |

# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 12.19 | 2 | 718 | 24,986 | ------ | ------ | ------ | Subbasin E-1 |
| 2 | SCS Runoff | 3.581 | 2 | 718 | 7,289 | ------ | ------ | ------ | Subbasin E-2 |

# Hydrograph Report

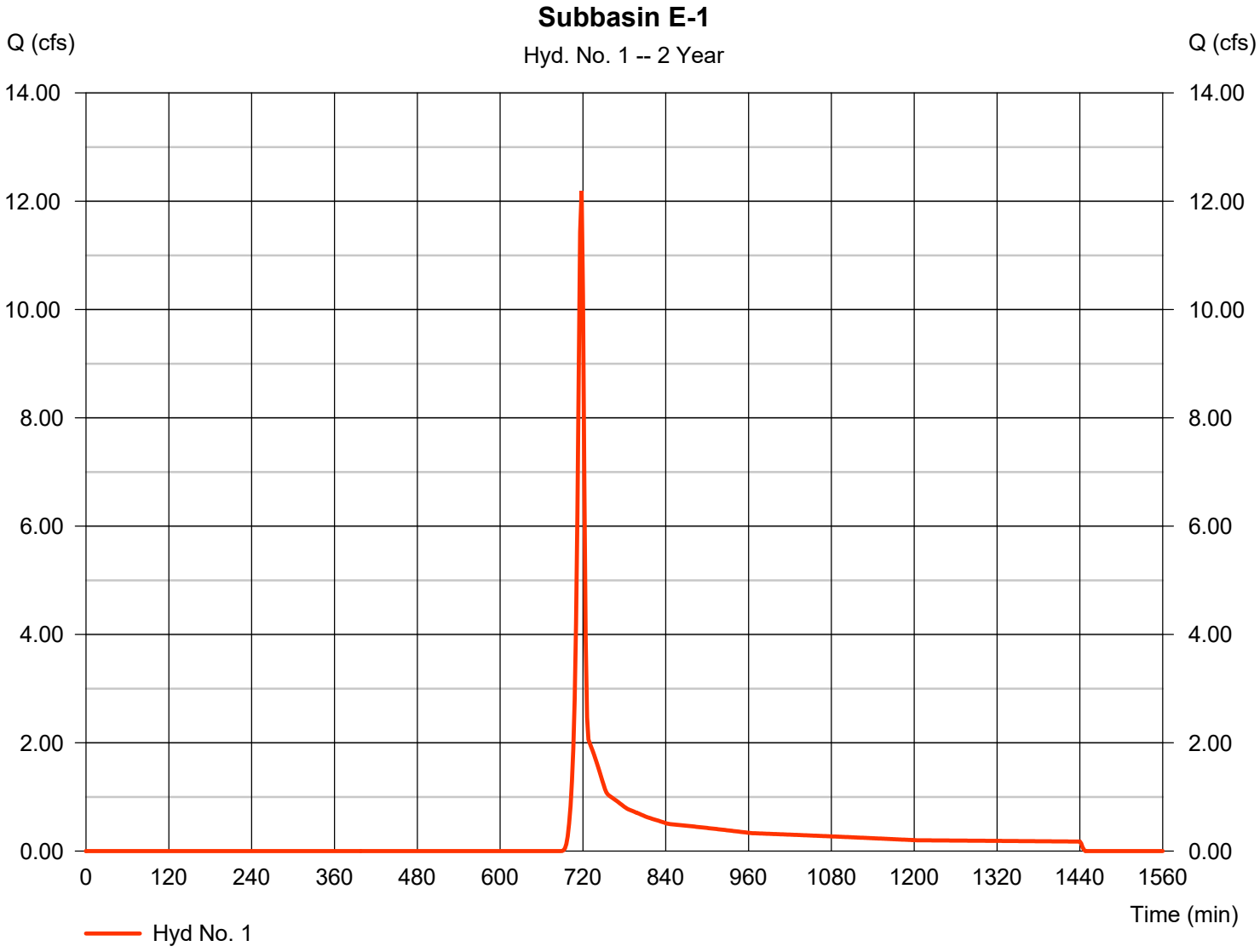


## Hyd. No. 1

Subbasin E-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 12.19 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 24,986 cuft |
| Drainage area | = 8.760 ac | Curve number | = 68* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 6.40 min |
| Total precip. | = 3.39 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.710 x 49) + (6.020 x 69) + (1.750 x 75) + (0.280 x 61)] / 8.760



# TR55 Tc Worksheet

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

## Hyd. No. 1

Subbasin E-1

| Description | A | | B | | C | | Totals |
|---|---|---|---|---|---|---|---|
| **Sheet Flow** | | | | | | | |
| Manning's n-value | = 0.240 | | 0.011 | | 0.011 | | |
| Flow length (ft) | = 15.0 | | 0.0 | | 0.0 | | |
| Two-year 24-hr precip. (in) | = 3.39 | | 0.00 | | 0.00 | | |
| Land slope (%) | = 2.00 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 3.04** | **+** | **0.00** | **+** | **0.00** | **=** | **3.04** |
| **Shallow Concentrated Flow** | | | | | | | |
| Flow length (ft) | = 165.00 | | 0.00 | | 0.00 | | |
| Watercourse slope (%) | = 1.20 | | 0.00 | | 0.00 | | |
| Surface description | = Unpaved | | Paved | | Paved | | |
| Average velocity (ft/s) | =1.77 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 1.56** | **+** | **0.00** | **+** | **0.00** | **=** | **1.56** |
| **Channel Flow** | | | | | | | |
| X sectional flow area (sqft) | = 3.00 | | 50.00 | | 0.00 | | |
| Wetted perimeter (ft) | = 5.50 | | 36.90 | | 0.00 | | |
| Channel slope (%) | = 5.90 | | 5.50 | | 0.00 | | |
| Manning's n-value | = 0.025 | | 0.035 | | 0.035 | | |
| Velocity (ft/s) | =9.64 | | | | | | |
| | | | 12.24 | | | | |
| | | | | | 0.00 | | |
| Flow length (ft) | ({0})455.0 | | 775.0 | | 0.0 | | |
| **Travel Time (min)** | **= 0.79** | **+** | **1.06** | **+** | **0.00** | **=** | **1.84** |

**Total Travel Time, Tc ..... 6.40 min**

# Hydrograph Report

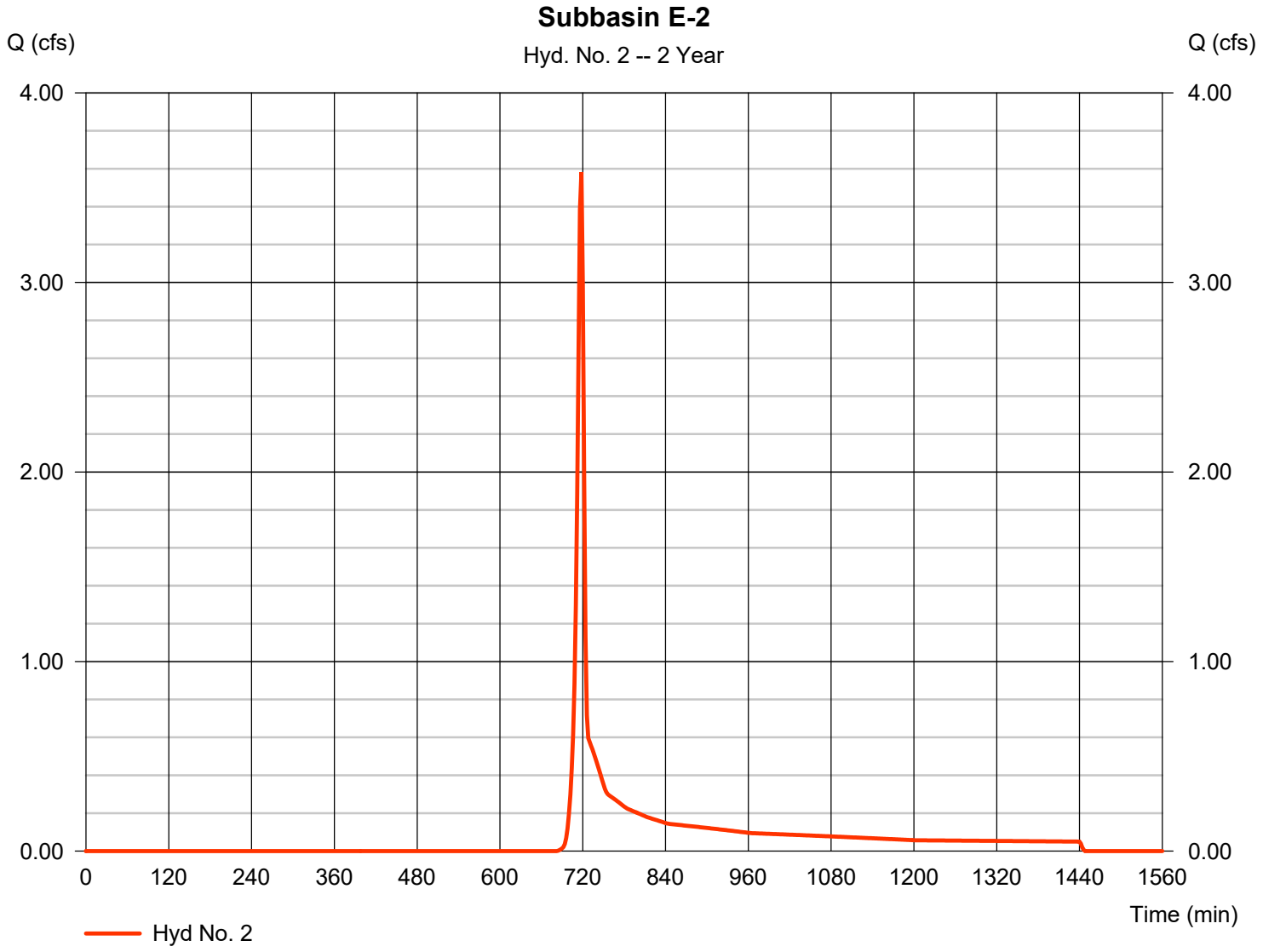


## Hyd. No. 2

Subbasin E-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 3.581 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 7,289 cuft |
| Drainage area | = 2.410 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 3.90 min |
| Total precip. | = 3.39 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 69)] / 2.410



# TR55 Tc Worksheet



## Hyd. No. 2

Subbasin E-2

| Description | A | | B | | C | | Totals |
|---|---|---|---|---|---|---|---|
| **Sheet Flow** | | | | | | | |
| Manning's n-value | = 0.240 | | 0.011 | | 0.011 | | |
| Flow length (ft) | = 15.0 | | 0.0 | | 0.0 | | |
| Two-year 24-hr precip. (in) | = 3.39 | | 0.00 | | 0.00 | | |
| Land slope (%) | = 2.00 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 3.04** | **+** | **0.00** | **+** | **0.00** | **=** | **3.04** |
| **Shallow Concentrated Flow** | | | | | | | |
| Flow length (ft) | = 0.00 | | 0.00 | | 0.00 | | |
| Watercourse slope (%) | = 0.00 | | 0.00 | | 0.00 | | |
| Surface description | = Paved | | Paved | | Paved | | |
| Average velocity (ft/s) | =0.00 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 0.00** | **+** | **0.00** | **+** | **0.00** | **=** | **0.00** |
| **Channel Flow** | | | | | | | |
| X sectional flow area (sqft) | = 3.00 | | 0.00 | | 0.00 | | |
| Wetted perimeter (ft) | = 5.50 | | 0.00 | | 0.00 | | |
| Channel slope (%) | = 7.10 | | 0.00 | | 0.00 | | |
| Manning's n-value | = 0.025 | | 0.015 | | 0.015 | | |
| Velocity (ft/s) | =10.58 | | | | | | |
| | | | 0.00 | | | | |
| | | | | | 0.00 | | |
| Flow length (ft) | ({0})530.0 | | 0.0 | | 0.0 | | |
| **Travel Time (min)** | **= 0.83** | **+** | **0.00** | **+** | **0.00** | **=** | **0.83** |

**Total Travel Time, Tc ..... 3.90 min**

# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 22.83 | 2 | 718 | 45,684 | ------ | ------ | ------ | Subbasin E-1 |
| 2 | SCS Runoff | 6.571 | 2 | 718 | 13,142 | ------ | ------ | ------ | Subbasin E-2 |

# Hydrograph Report

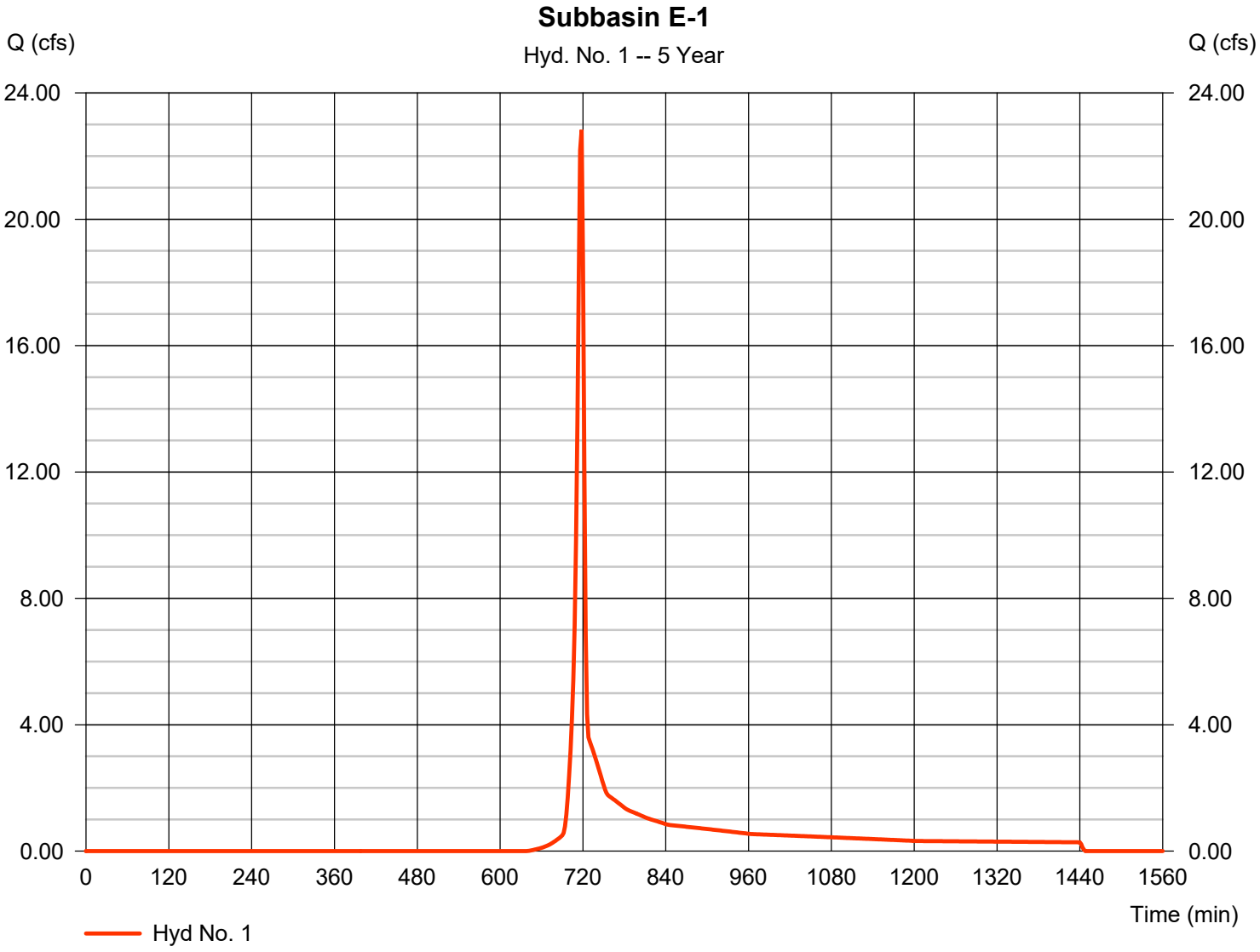


## Hyd. No. 1

Subbasin E-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 22.83 cfs |
| Storm frequency | = | 5 yrs | Time to peak | = | 718 min |
| Time interval | = | 2 min | Hyd. volume | = | 45,684 cuft |
| Drainage area | = | 8.760 ac | Curve number | = | 68* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | TR55 | Time of conc. (Tc) | = | 6.40 min |
| Total precip. | = | 4.50 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.710 x 49) + (6.020 x 69) + (1.750 x 75) + (0.280 x 61)] / 8.760



# Hydrograph Report

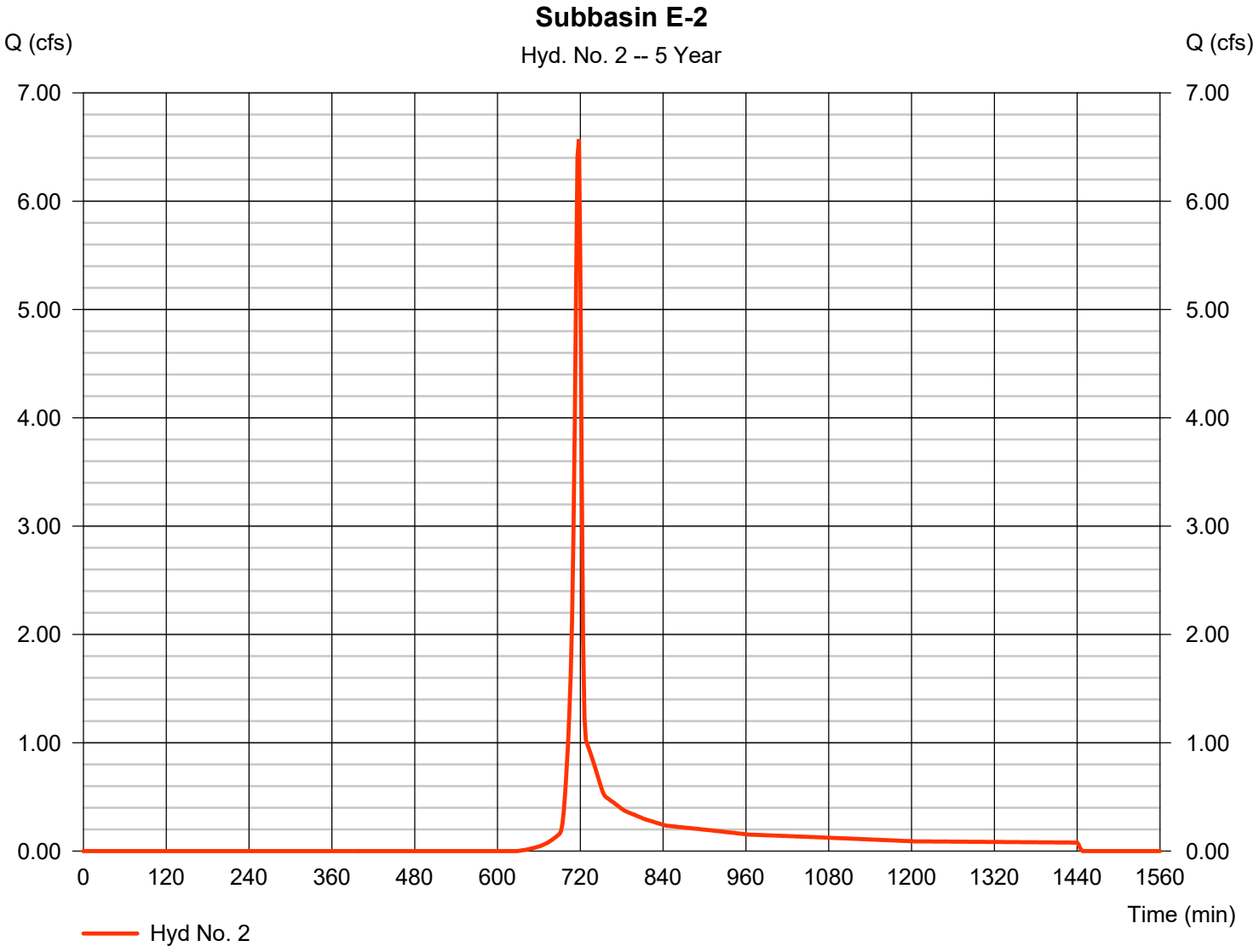


## Hyd. No. 2

Subbasin E-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 6.571 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 13,142 cuft |
| Drainage area | = 2.410 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 3.90 min |
| Total precip. | = 4.50 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 69)] / 2.410



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 30.47 | 2 | 718 | 60,964 | ------ | ------ | ------ | Subbasin E-1 |
| 2 | SCS Runoff | 8.708 | 2 | 718 | 17,438 | ------ | ------ | ------ | Subbasin E-2 |

# Hydrograph Report

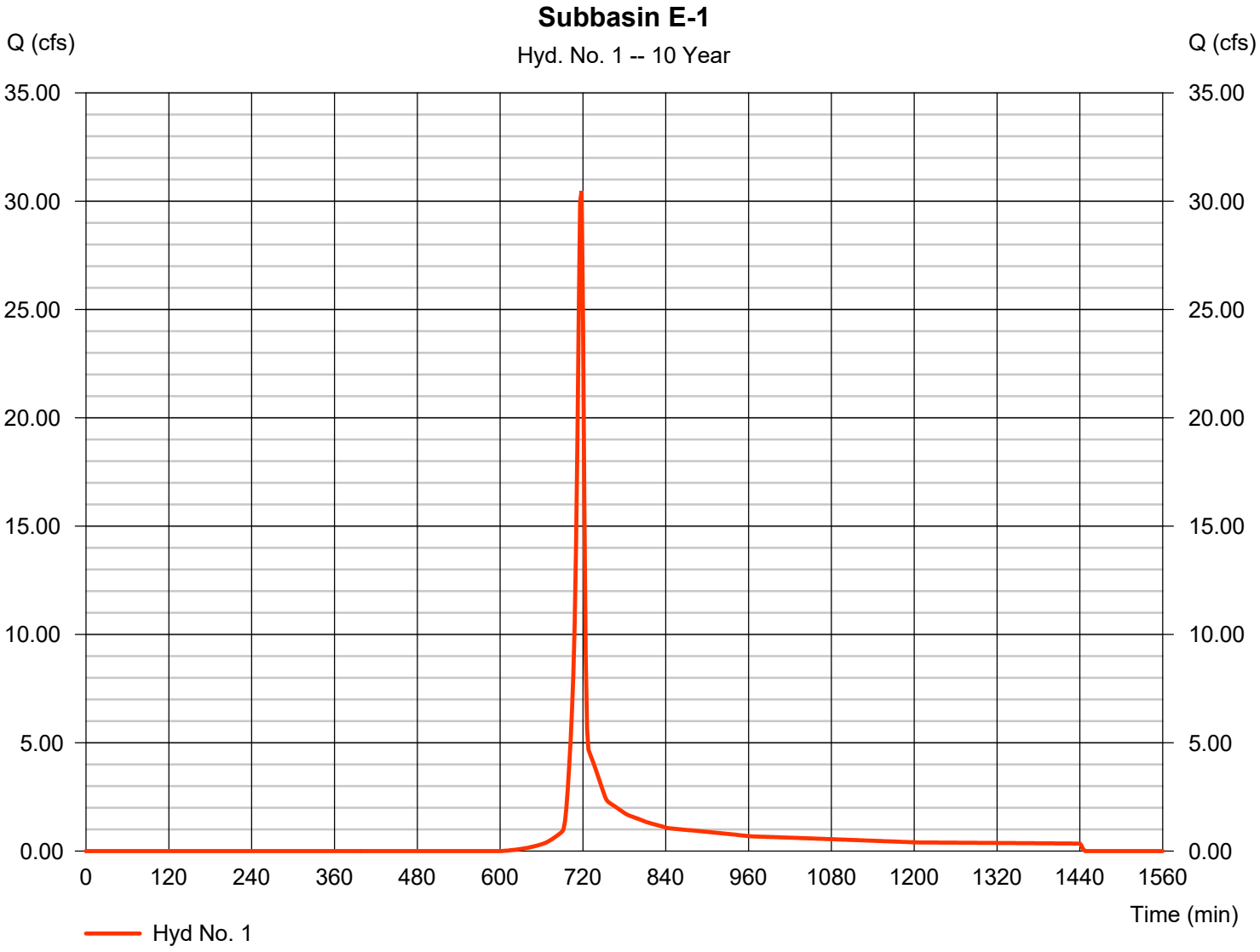


## Hyd. No. 1

Subbasin E-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 30.47 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 718 min |
| Time interval | = | 2 min | Hyd. volume | = | 60,964 cuft |
| Drainage area | = | 8.760 ac | Curve number | = | 68* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | TR55 | Time of conc. (Tc) | = | 6.40 min |
| Total precip. | = | 5.23 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.710 x 49) + (6.020 x 69) + (1.750 x 75) + (0.280 x 61)] / 8.760



# Hydrograph Report

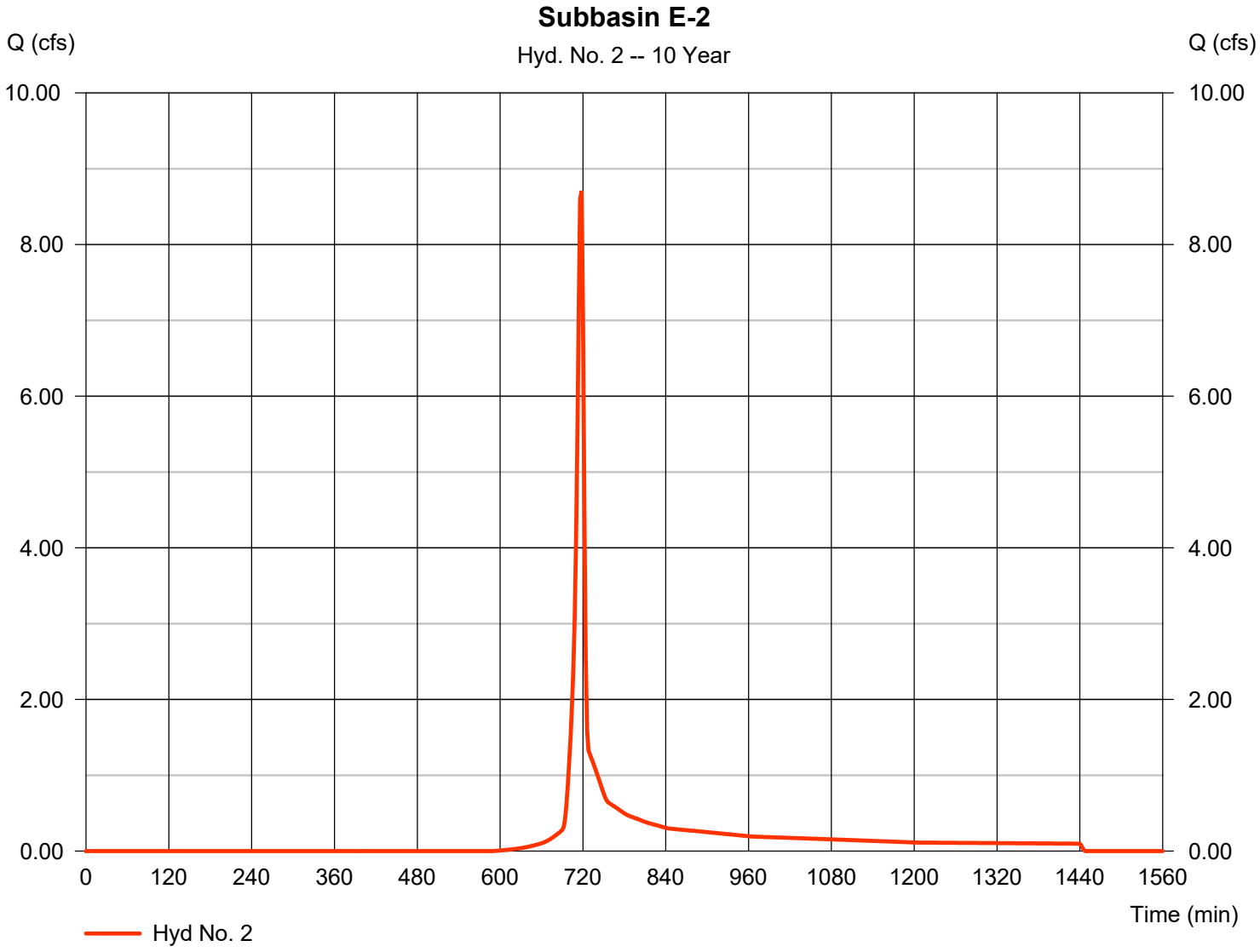


## Hyd. No. 2

Subbasin E-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 8.708 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 718 min |
| Time interval | = | 2 min | Hyd. volume | = | 17,438 cuft |
| Drainage area | = | 2.410 ac | Curve number | = | 69* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | TR55 | Time of conc. (Tc) | = | 3.90 min |
| Total precip. | = | 5.23 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 69)] / 2.410



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 40.69 | 2 | 718 | 81,811 | ------ | ------ | ------ | Subbasin E-1 |
| 2 | SCS Runoff | 11.55 | 2 | 718 | 23,276 | ------ | ------ | ------ | Subbasin E-2 |

# Hydrograph Report

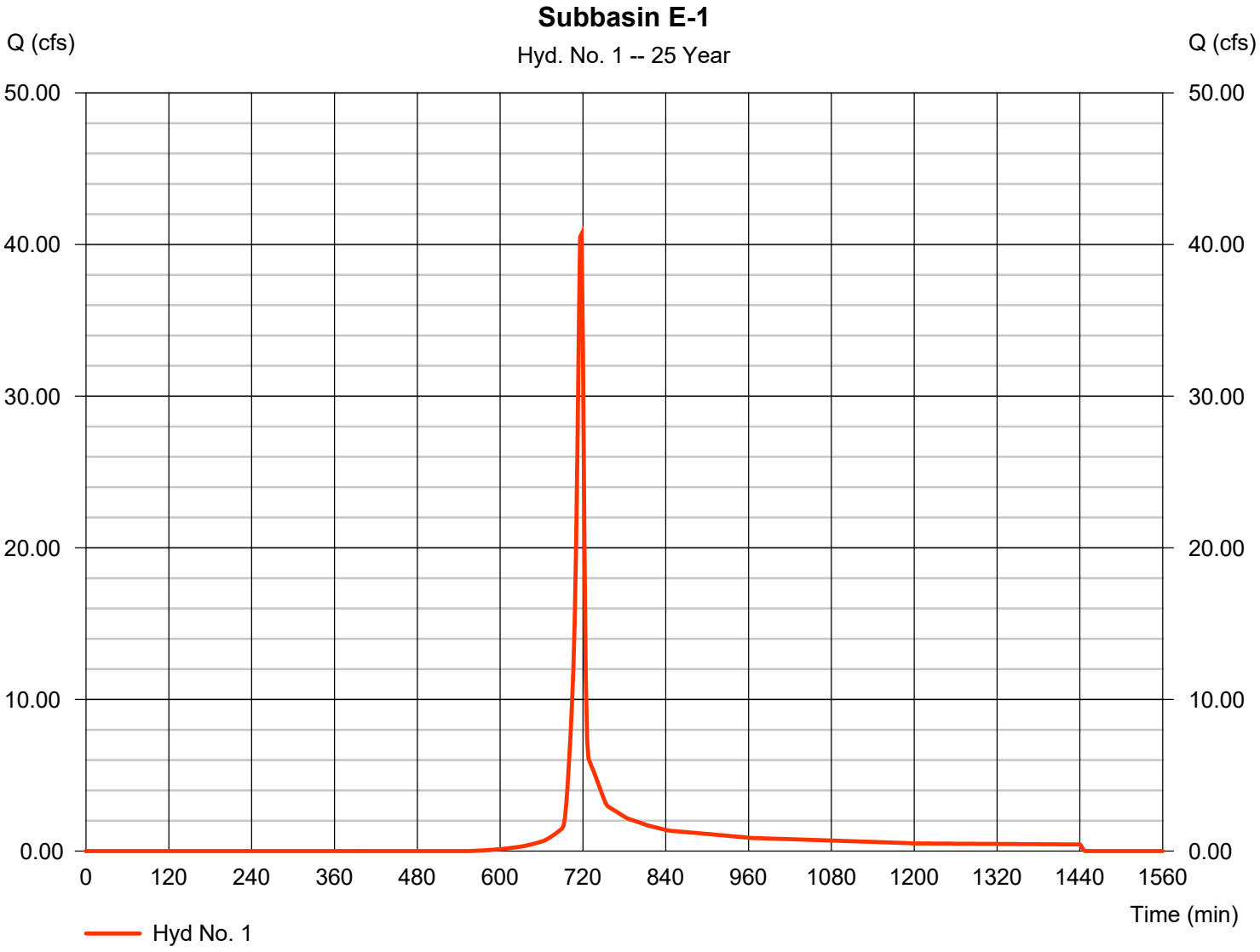


## Hyd. No. 1

Subbasin E-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 40.69 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 81,811 cuft |
| Drainage area | = 8.760 ac | Curve number | = 68* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 6.40 min |
| Total precip. | = 6.16 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.710 x 49) + (6.020 x 69) + (1.750 x 75) + (0.280 x 61)] / 8.760



# Hydrograph Report

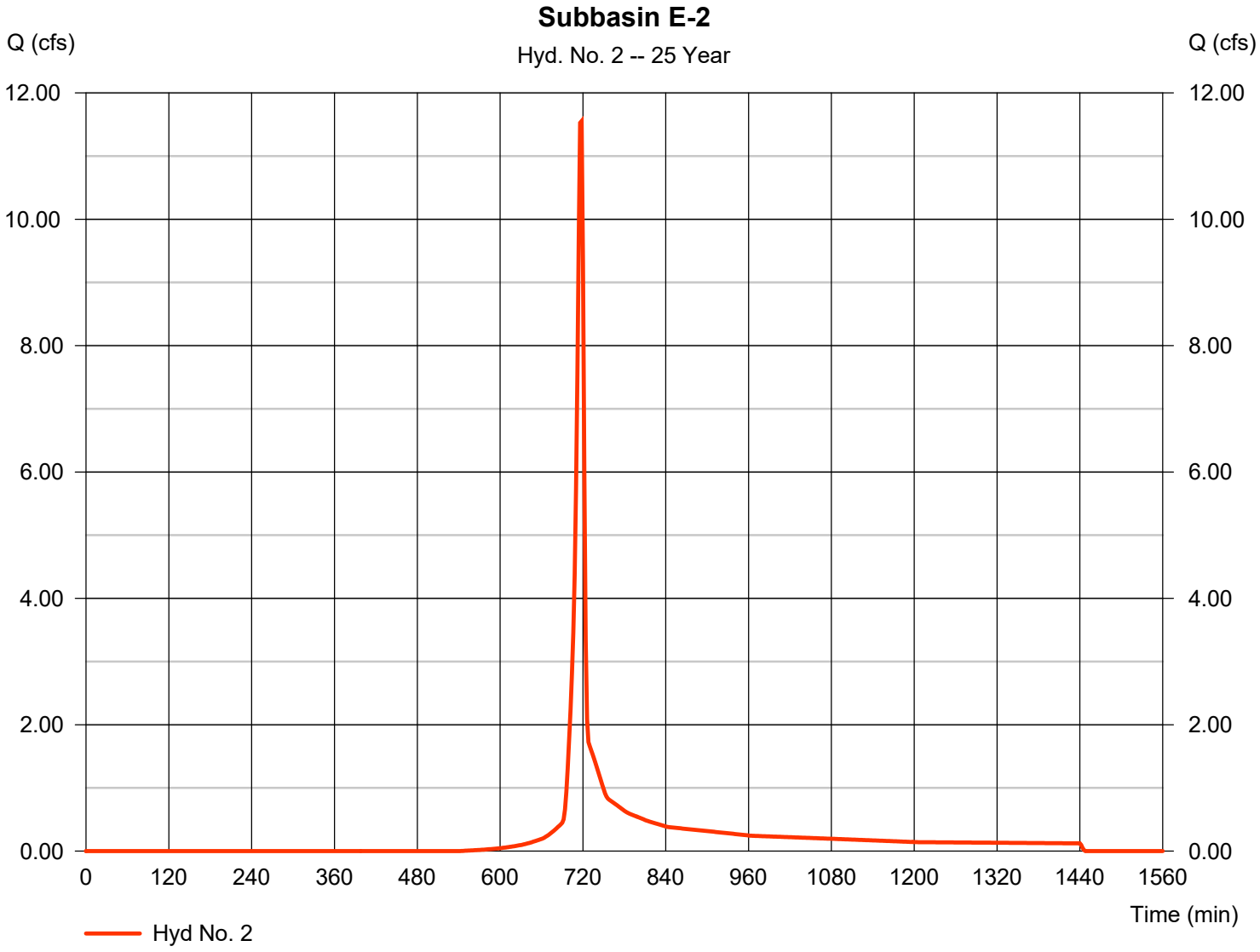


## Hyd. No. 2

Subbasin E-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 11.55 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 23,276 cuft |
| Drainage area | = 2.410 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 3.90 min |
| Total precip. | = 6.16 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 69)] / 2.410



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 48.57 | 2 | 716 | 98,056 | ------ | ------ | ------ | Subbasin E-1 |
| 2 | SCS Runoff | 13.77 | 2 | 716 | 27,814 | ------ | ------ | ------ | Subbasin E-2 |

# Hydrograph Report

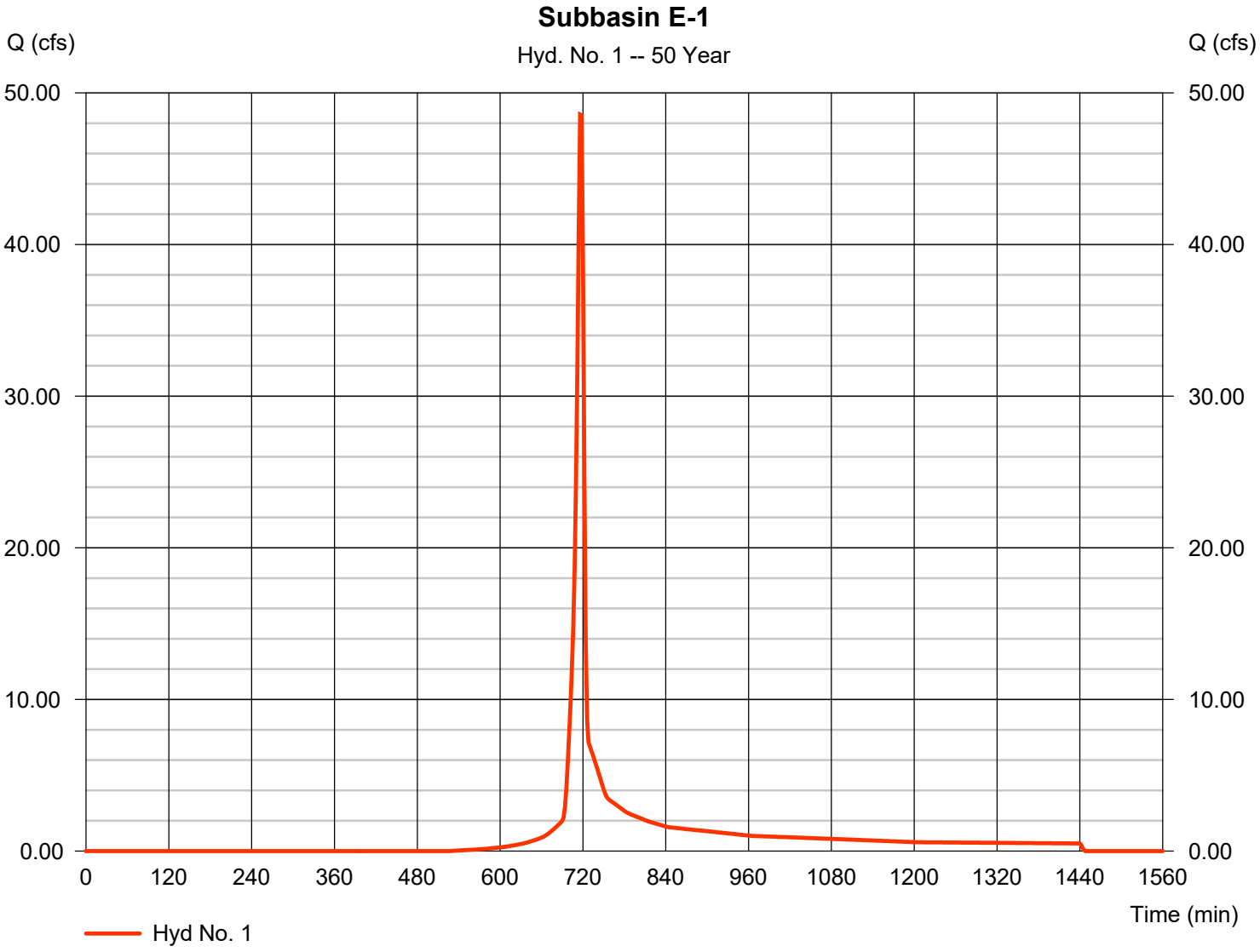


## Hyd. No. 1

Subbasin E-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 48.57 cfs |
| Storm frequency | = 50 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 98,056 cuft |
| Drainage area | = 8.760 ac | Curve number | = 68* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 6.40 min |
| Total precip. | = 6.85 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.710 x 49) + (6.020 x 69) + (1.750 x 75) + (0.280 x 61)] / 8.760



# Hydrograph Report

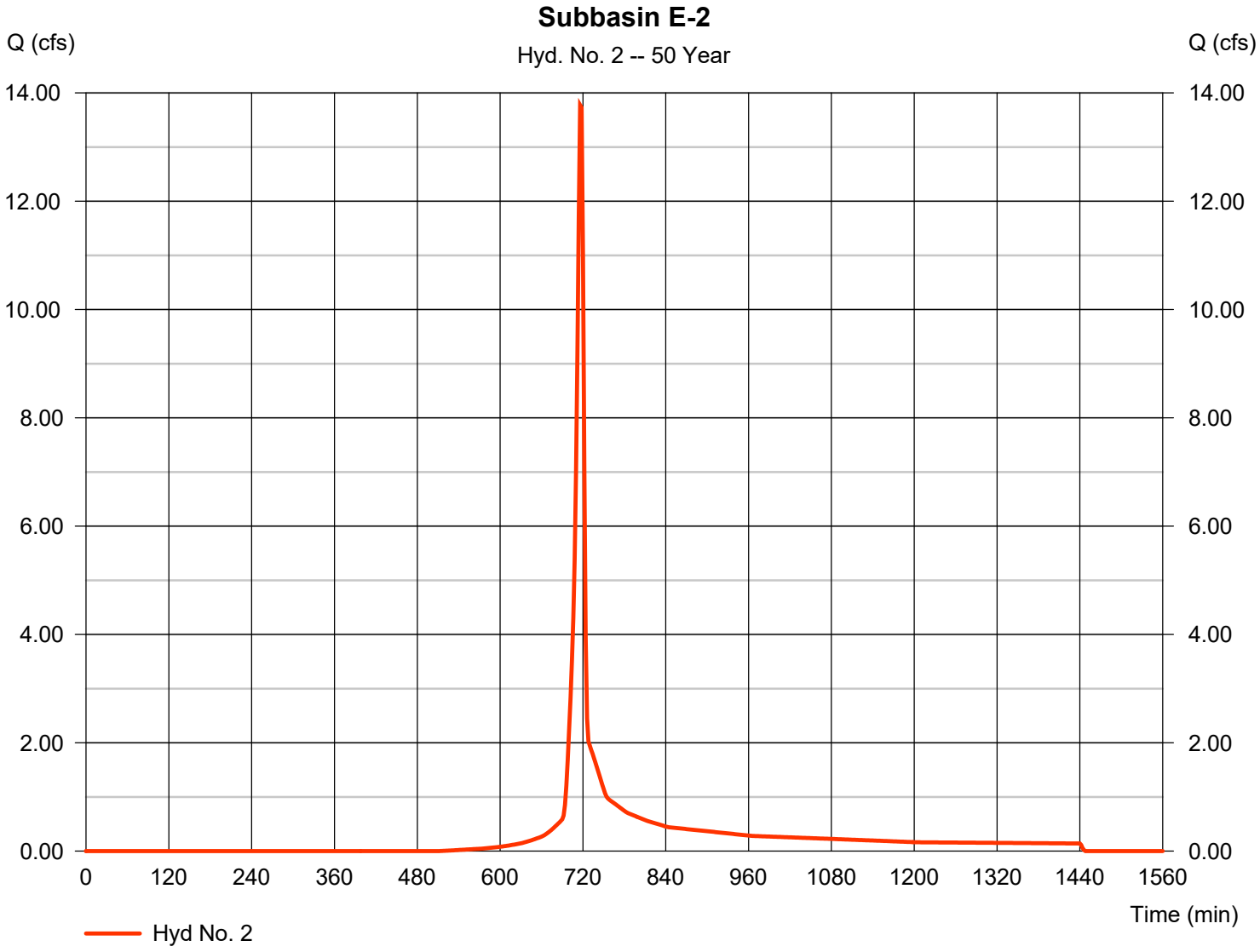


## Hyd. No. 2

Subbasin E-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 13.77 cfs |
| Storm frequency | = 50 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 27,814 cuft |
| Drainage area | = 2.410 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 3.90 min |
| Total precip. | = 6.85 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 69)] / 2.410



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 56.71 | 2 | 716 | 114,584 | ------ | ------ | ------ | Subbasin E-1 |
| 2 | SCS Runoff | 16.03 | 2 | 716 | 32,422 | ------ | ------ | ------ | Subbasin E-2 |

# Hydrograph Report

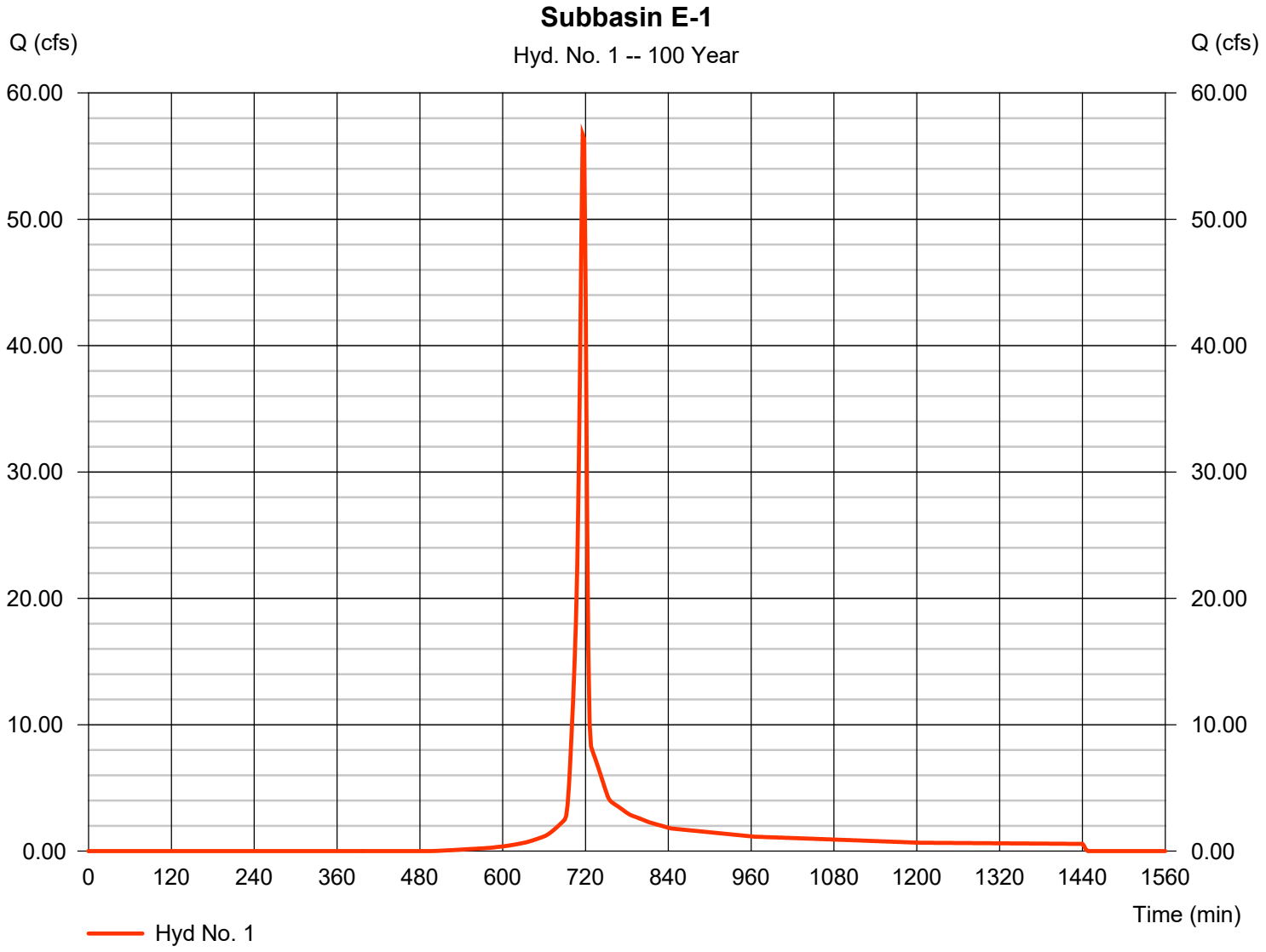


## Hyd. No. 1

Subbasin E-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 56.71 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 114,584 cuft |
| Drainage area | = | 8.760 ac | Curve number | = | 68* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | TR55 | Time of conc. (Tc) | = | 6.40 min |
| Total precip. | = | 7.53 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.710 x 49) + (6.020 x 69) + (1.750 x 75) + (0.280 x 61)] / 8.760



# Hydrograph Report

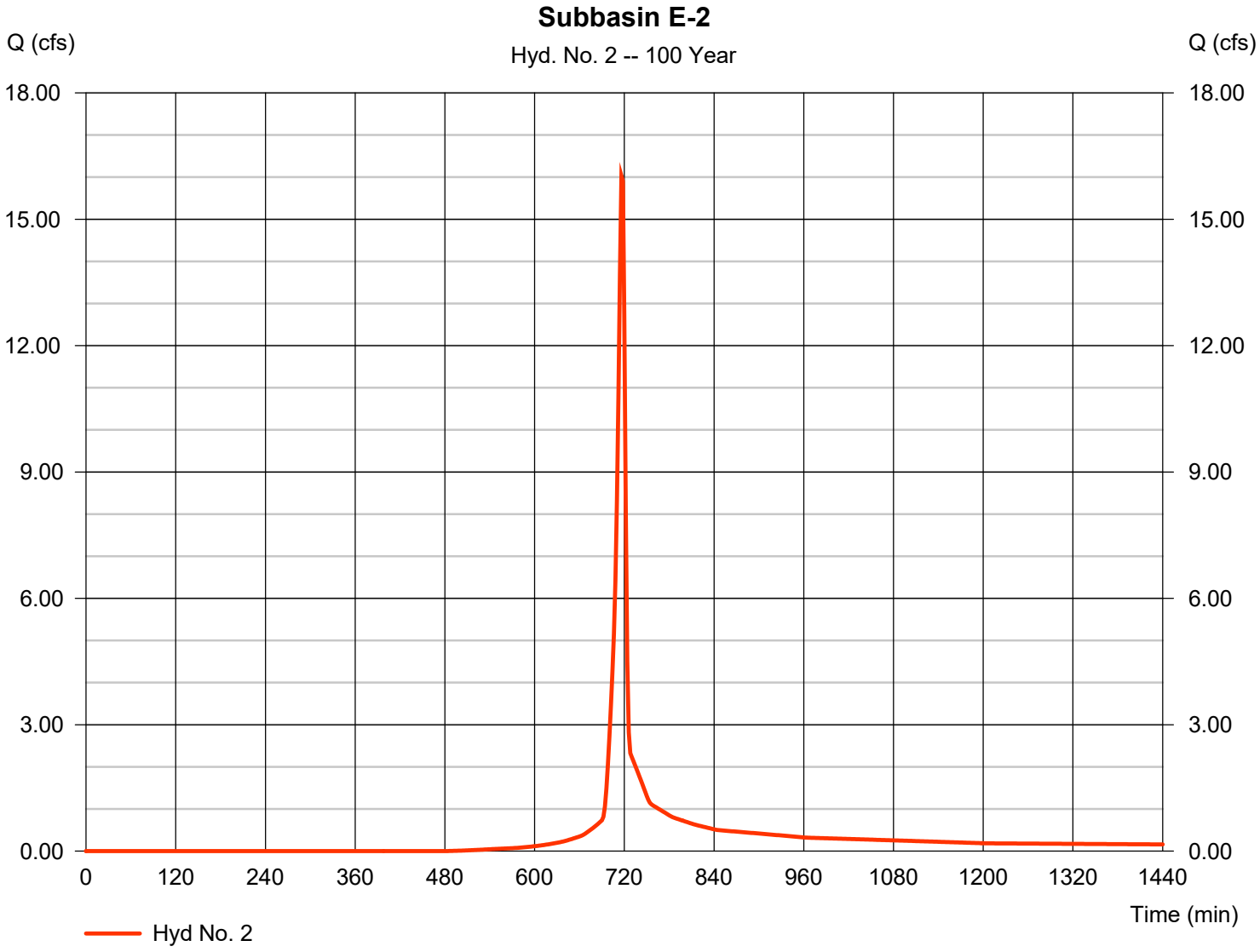


## Hyd. No. 2

Subbasin E-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 16.03 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 32,422 cuft |
| Drainage area | = | 2.410 ac | Curve number | = | 69* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | TR55 | Time of conc. (Tc) | = | 3.90 min |
| Total precip. | = | 7.53 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 69)] / 2.410



# Hydraflow Rainfall Report



| Return Period (Yrs) | Intensity-Duration-Frequency Equation Coefficients (FHA) | | | |
|---|---|---|---|---|
| | B | D | E | (N/A) |
| 1 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 2 | 69.8703 | 13.1000 | 0.8658 | -------- |
| 3 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 5 | 79.2597 | 14.6000 | 0.8369 | -------- |
| 10 | 88.2351 | 15.5000 | 0.8279 | -------- |
| 25 | 102.6072 | 16.5000 | 0.8217 | -------- |
| 50 | 114.8193 | 17.2000 | 0.8199 | -------- |
| 100 | 127.1596 | 17.8000 | 0.8186 | -------- |

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 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 5.69 | 4.61 | 3.89 | 3.38 | 2.99 | 2.69 | 2.44 | 2.24 | 2.07 | 1.93 | 1.81 | 1.70 |
| 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 | 6.57 | 5.43 | 4.65 | 4.08 | 3.65 | 3.30 | 3.02 | 2.79 | 2.59 | 2.42 | 2.27 | 2.15 |
| 10 | 7.24 | 6.04 | 5.21 | 4.59 | 4.12 | 3.74 | 3.43 | 3.17 | 2.95 | 2.77 | 2.60 | 2.46 |
| 25 | 8.25 | 6.95 | 6.03 | 5.34 | 4.80 | 4.38 | 4.02 | 3.73 | 3.48 | 3.26 | 3.07 | 2.91 |
| 50 | 9.04 | 7.65 | 6.66 | 5.92 | 5.34 | 4.87 | 4.49 | 4.16 | 3.88 | 3.65 | 3.44 | 3.25 |
| 100 | 9.83 | 8.36 | 7.30 | 6.50 | 5.87 | 5.36 | 4.94 | 4.59 | 4.29 | 4.03 | 3.80 | 3.60 |

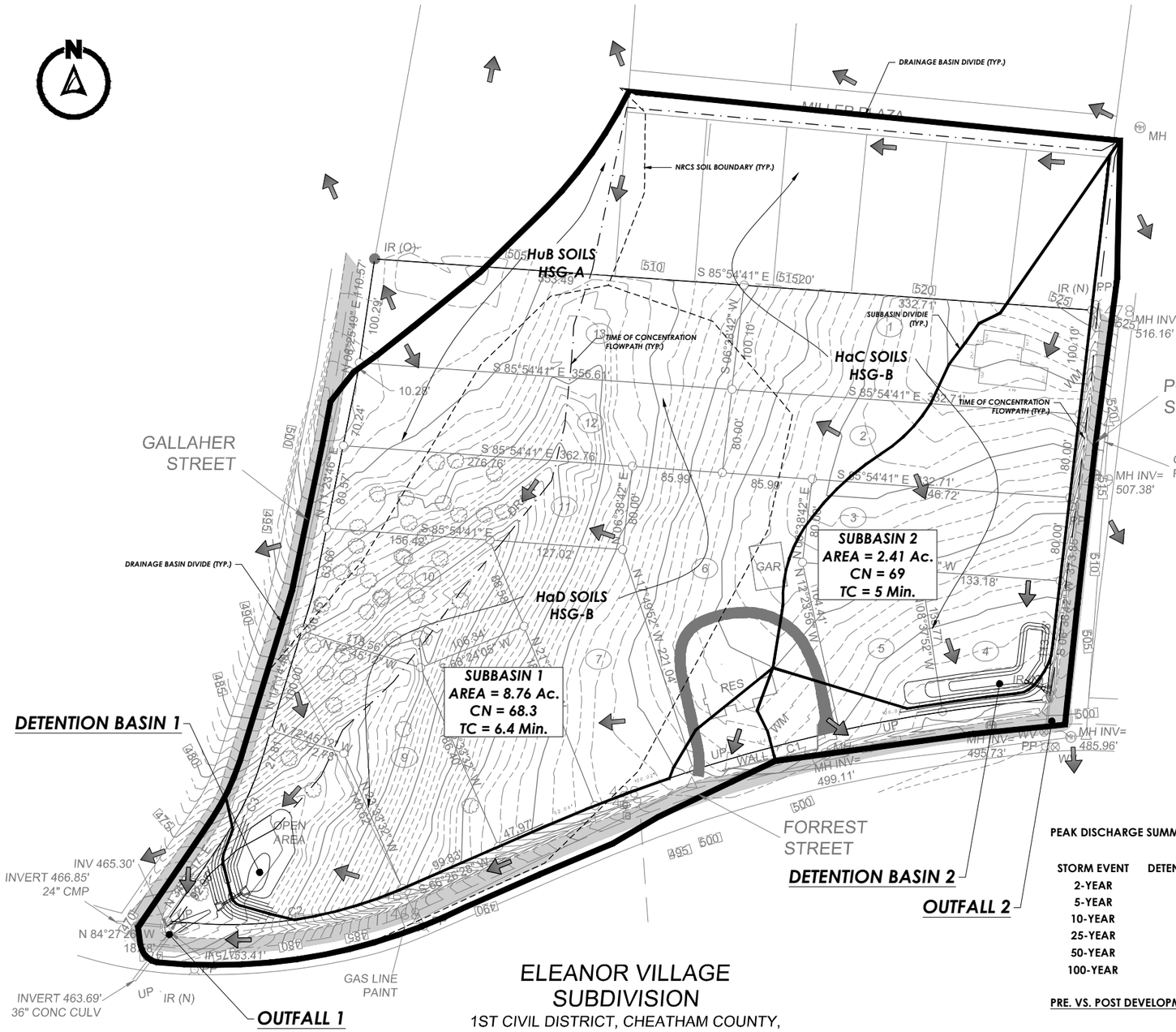
Tc = time in minutes. Values may exceed 60.

Precip. file name: C:\Users\Daniel Smola\OneDrive - N A\Autodesk\Civil\Hydrology Data\TN - Metro Nashville.pcp

| Storm Distribution | Rainfall Precipitation Table (in) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
| SCS 24-hour | 0.00 | 3.39 | 0.00 | 4.50 | 5.23 | 6.16 | 6.85 | 7.53 |
| SCS 6-Hr | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-1st | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-2nd | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-3rd | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-4th | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-Indy | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Custom | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# APPENDIX C

## PROPOSED CONDITIONS HYDROLOGIC ANALYSIS




# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15

Tennessee811 Know what's below. Call before you dig.

SCALE: 1" = 50'

0 50 100 150

## PROPOSED CONDITIONS HYDROLOGY

### SUBBASIN P-1 - DETENTION BASIN 1

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-1 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 72,113 | 1.66 | 75 |
| SA-2 | SF Res (R3 Zoning 0.50 Ac.) - HSG A | 42,790 | 0.98 | 54 |
| SA-3 | SF Res (R3 Zoning 0.50 Ac.) - HSG B | 233,997 | 5.37 | 70 |
| | **TOTAL** | **348,900** | **8.01** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 69 | |
| **TIME OF CON. =** | 6.4 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 1 | |

### SUBBASIN P-2 - BYPASS

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-4 | Public ROW (Open Ditches) - HSG B | 32,479 | 0.75 | 89 |
| | **TOTAL** | **32,479** | **0.75** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 89 | |
| **TIME OF CON. =** | 5 Minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 1 | |

### SUBBASIN P-3 - DTENTION BASIN 2

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-5 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 6,500 | 0.15 | 75 |
| SA-6 | SF Res (R3 Zoning 0.50 Ac.) - HSG B | 81,760 | 1.88 | 70 |
| | **TOTAL** | **88,260** | **2.03** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 70 | |
| **TIME OF CON. =** | 5 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 2 | |

### SUBBASIN P-4 - BYPASS

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-7 | Public ROW (Open Ditches) - HSG B | 16,722 | 0.38 | 89 |
| | **TOTAL** | **16,722** | **0.38** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 89 | |
| **TIME OF CON. =** | 5 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 2 | |

### PEAK DISCHARGE SUMMARY TABLE (CFS)

| | OUTFALL 1 | | | OUTFALL 2 | | |
|---|---|---|---|---|---|---|
| **STORM EVENT** | **DETENTION DISCHARGE** | **BYPASS** | **TOTAL** | **DETENTION DISCHARGE** | **BYPASS** | **TOTAL** |
| **2-YEAR** | 9.31 | 2.78 | 12.09 | 2.06 | 1.41 | 3.47 |
| **5-YEAR** | 16.08 | 3.98 | 20.06 | 3.88 | 2.02 | 5.90 |
| **10-YEAR** | 20.04 | 4.77 | 24.81 | 5.24 | 2.42 | 7.66 |
| **25-YEAR** | 24.82 | 5.77 | 30.59 | 6.39 | 2.92 | 9.31 |
| **50-YEAR** | 29.30 | 6.51 | 35.81 | 7.99 | 3.30 | 11.29 |
| **100-YEAR** | 39.32 | 7.23 | 46.55 | 11.15 | 3.67 | 14.82 |

### PRE. VS. POST DEVELOPMENT COMPARISON TABLE

| | OUTFALL 1 | | | OUTFALL 2 | | |
|---|---|---|---|---|---|---|
| **STORM EVENT** | **EXISTING** | **PROP. P-1** | **DIFF.** | **EXISTING** | **PROPOSED** | **DIFF.** |
| **2-YEAR** | 12.19 | | | 3.58 | 3.47 | **-0.11** |
| **5-YEAR** | 22.83 | 20.06 | **-2.77** | 6.57 | 5.90 | **-0.67** |
| **10-YEAR** | 30.47 | 24.81 | **-5.66** | 8.71 | 7.66 | **-1.05** |
| **25-YEAR** | 40.69 | 30.59 | **-10.10** | 11.55 | 9.31 | **-2.24** |
| **50-YEAR** | 48.57 | 35.81 | **-12.76** | 13.77 | 11.29 | **-2.48** |
| **100-YEAR** | 56.71 | 46.55 | **-10.16** | 16.03 | 14.82 | **-1.21** |

***PRELIMINARY - NOT FOR CONSTRUCTION***

DATE: -
DRW: - CHK: -
DESCRIPTION: -

DATE: -
DRW: - CHK: -
DESCRIPTION: -

DATE: -
DRW: - CHK: -
DESCRIPTION: -

DATE: -
DRW: - CHK: -
DESCRIPTION: -

DATE: -
DRW: - CHK: -
DESCRIPTION: -

***ELEANOR VILLAGE SUBDIVISION***
***FORREST STREET / GALLAHER STREET / POOLE STREET***
***ASHLAND CITY, CHEATHAM COUNTY, TENNESSEE***

HARPETH CIVIL
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***EXISTING CONDITIONS DRAINAGE EXHIBIT***

***D-1.0***

## PROPOSED CONDITIONS HYDROLOGY

### SUBBASIN P-1 - DETENTION BASIN 1

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-1 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 72,113 | 1.66 | 75 |
| SA-2 | SF Res (R3 Zoning 0.50 Ac.) - HSG A | 42,790 | 0.98 | 54 |
| SA-3 | SF Res (R3 Zoning 0.50 Ac.) - HSG B | 233,997 | 5.37 | 70 |
| | **TOTAL** | **348,900** | **8.01** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 69 | |
| **TIME OF CON. =** | 6.4 minutes | TR55 (SEE |
| **OUTFALL ID=** | OUTFALL 1 | HYDRAFLOWS |

### SUBBASIN P-2 - BYPASS

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-4 | Public ROW (Open Ditches) - HSG B | 32,479 | 0.75 | 89 |
| | **TOTAL** | **32,479** | **0.75** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 89 | |
| **TIME OF CON. =** | 5 Minutes | TR55 (SEE |
| **OUTFALL ID=** | OUTFALL 1 | HYDRAFLOWS |

### SUBBASIN P-3 - DTENTION BASIN 2

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-5 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 6,500 | 0.15 | 75 |
| SA-6 | SF Res (R3 Zoning 0.50 Ac.) - HSG B | 81,760 | 1.88 | 70 |
| | **TOTAL** | **88,260** | **2.03** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 70 | |
| **TIME OF CON. =** | 5 minutes | TR55 (SEE |
| **OUTFALL ID=** | OUTFALL 2 | HYDRAFLOWS |

### SUBBASIN P-4 - BYPASS

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-7 | Public ROW (Open Ditches) - HSG B | 16,722 | 0.38 | 89 |
| | **TOTAL** | **16,722** | **0.38** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 89 | |
| **TIME OF CON. =** | 5 minutes | TR55 (SEE |
| **OUTFALL ID=** | OUTFALL 2 | HYDRAFLOWS |

**PEAK DISCHARGE SUMMARY TABLE (CFS)**

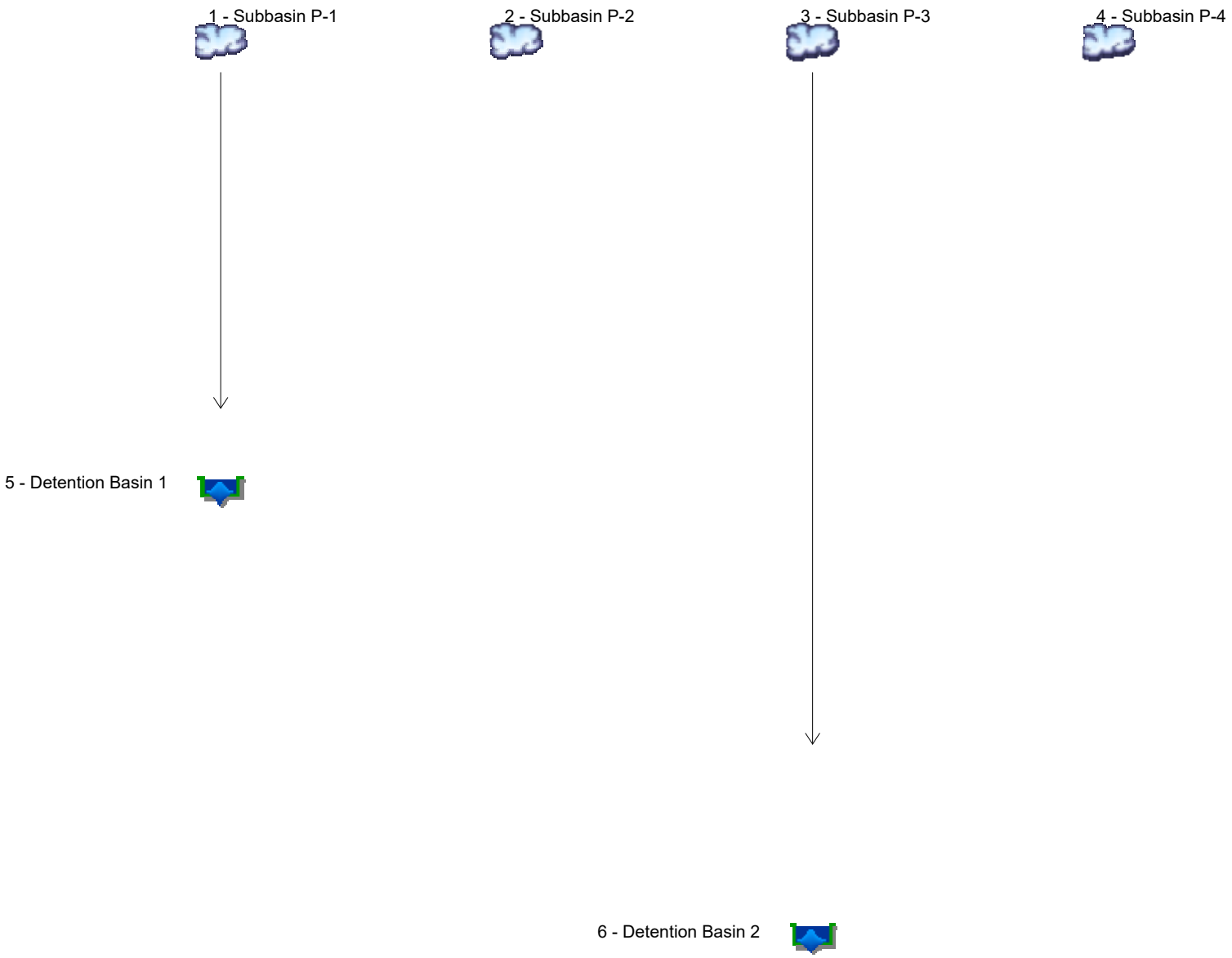
| | OUTFALL 1 | | | OUTFALL 2 | | |
|---|---|---|---|---|---|---|
| **STORM EVENT** | **DETENTION DISCHARGE** | **BYPASS** | **TOTAL** | **DETENTION DISCHARGE** | **BYPASS** | **TOTAL** |
| **2-YEAR** | 9.31 | 2.78 | 12.09 | 2.06 | 1.41 | 3.47 |
| **5-YEAR** | 16.08 | 3.98 | 20.06 | 3.88 | 2.02 | 5.90 |
| **10-YEAR** | 20.04 | 4.77 | 24.81 | 5.24 | 2.42 | 7.66 |
| **25-YEAR** | 24.82 | 5.77 | 30.59 | 6.39 | 2.92 | 9.31 |
| **50-YEAR** | 29.30 | 6.51 | 35.81 | 7.99 | 3.30 | 11.29 |
| **100-YEAR** | 39.32 | 7.23 | 46.55 | 11.15 | 3.67 | 14.82 |

**PRE. VS. POST DEVELOPMENT COMPARISON TABLE**

| | OUTFALL 1 | | | OUTFALL 2 | | |
|---|---|---|---|---|---|---|
| **STORM EVENT** | **EXISTING** | **PROP. P-1** | **DIFF.** | **EXISTING** | **PROPOSED** | **DIFF.** |
| **2-YEAR** | 12.19 | 12.09 | **-0.10** | 3.58 | 3.47 | **-0.11** |
| **5-YEAR** | 22.83 | 20.06 | **-2.77** | 6.57 | 5.90 | **-0.67** |
| **10-YEAR** | 30.47 | 24.81 | **-5.66** | 8.71 | 7.66 | **-1.05** |
| **25-YEAR** | 40.69 | 30.59 | **-10.10** | 11.55 | 9.31 | **-2.24** |
| **50-YEAR** | 48.57 | 35.81 | **-12.76** | 13.77 | 11.29 | **-2.48** |
| **100-YEAR** | 56.71 | 46.55 | **-10.16** | 16.03 | 14.82 | **-1.21** |

# Watershed Model Schematic






## Legend

| Hyd. | Origin | Description |
|---|---|---|
| 1 | SCS Runoff | Subbasin P-1 |
| 2 | SCS Runoff | Subbasin P-2 |
| 3 | SCS Runoff | Subbasin P-3 |
| 4 | SCS Runoff | Subbasin P-4 |
| 5 | Reservoir | Detention Basin 1 |
| 6 | Reservoir | Detention Basin 2 |

# Hydrograph Return Period Recap



| Hyd. No. | Hydrograph type (origin) | Inflow hyd(s) | Peak Outflow (cfs) | | | | | | | | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | |
| 1 | SCS Runoff | ------ | ------- | 12.32 | ------- | 22.60 | 29.95 | 39.74 | 47.38 | 55.14 | Subbasin P-1 |
| 2 | SCS Runoff | ------ | ------- | 2.782 | ------- | 3.984 | 4.772 | 5.772 | 6.509 | 7.233 | Subbasin P-2 |
| 3 | SCS Runoff | ------ | ------- | 3.212 | ------- | 5.782 | 7.608 | 10.04 | 11.95 | 13.86 | Subbasin P-3 |
| 4 | SCS Runoff | ------ | ------- | 1.410 | ------- | 2.019 | 2.418 | 2.924 | 3.298 | 3.665 | Subbasin P-4 |
| 5 | Reservoir | 1 | ------- | 9.314 | ------- | 16.08 | 20.04 | 24.82 | 29.30 | 39.32 | Detention Basin 1 |
| 6 | Reservoir | 3 | ------- | 2.364 | ------- | 3.884 | 5.242 | 6.393 | 7.986 | 11.15 | Detention Basin 2 |

# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 12.32 | 2 | 718 | 25,074 | ------ | ------ | ------ | Subbasin P-1 |
| 2 | SCS Runoff | 2.782 | 2 | 716 | 5,757 | ------ | ------ | ------ | Subbasin P-2 |
| 3 | SCS Runoff | 3.212 | 2 | 718 | 6,500 | ------ | ------ | ------ | Subbasin P-3 |
| 4 | SCS Runoff | 1.410 | 2 | 716 | 2,917 | ------ | ------ | ------ | Subbasin P-4 |
| 5 | Reservoir | 9.314 | 2 | 720 | 25,073 | 1 | 470.09 | 2,323 | Detention Basin 1 |
| 6 | Reservoir | 2.364 | 2 | 720 | 6,497 | 3 | 500.17 | 631 | Detention Basin 2 |

# Hydrograph Report

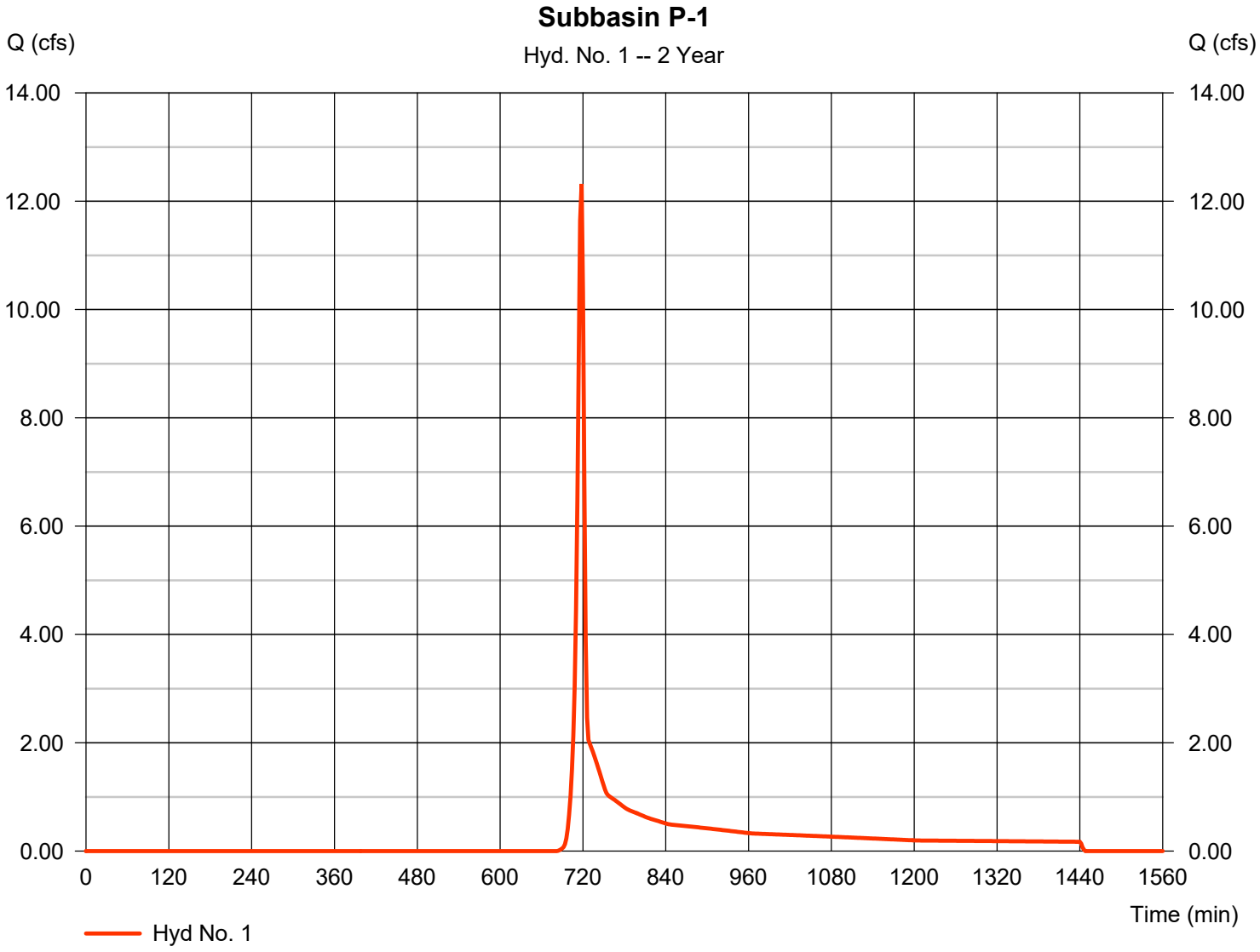


## Hyd. No. 1

Subbasin P-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 12.32 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 25,074 cuft |
| Drainage area | = 8.290 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 6.40 min |
| Total precip. | = 3.39 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(1.660 x 75) + (0.980 x 54) + (5.370 x 70) + (0.280 x 61)] / 8.290



# TR55 Tc Worksheet



## Hyd. No. 1

Subbasin P-1

| Description | A | | B | | C | | Totals |
|---|---|---|---|---|---|---|---|
| **Sheet Flow** | | | | | | | |
| Manning's n-value | = 0.240 | | 0.011 | | 0.011 | | |
| Flow length (ft) | = 15.0 | | 0.0 | | 0.0 | | |
| Two-year 24-hr precip. (in) | = 3.39 | | 0.00 | | 0.00 | | |
| Land slope (%) | = 2.00 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 3.04** | **+** | **0.00** | **+** | **0.00** | **=** | **3.04** |
| **Shallow Concentrated Flow** | | | | | | | |
| Flow length (ft) | = 165.00 | | 0.00 | | 0.00 | | |
| Watercourse slope (%) | = 1.20 | | 0.00 | | 0.00 | | |
| Surface description | = Unpaved | | Paved | | Paved | | |
| Average velocity (ft/s) | =1.77 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 1.56** | **+** | **0.00** | **+** | **0.00** | **=** | **1.56** |
| **Channel Flow** | | | | | | | |
| X sectional flow area (sqft) | = 3.00 | | 50.00 | | 0.00 | | |
| Wetted perimeter (ft) | = 5.50 | | 36.90 | | 0.00 | | |
| Channel slope (%) | = 5.90 | | 5.50 | | 0.00 | | |
| Manning's n-value | = 0.025 | | 0.035 | | 0.035 | | |
| Velocity (ft/s) | =9.64 | | | | | | |
| | | | 12.24 | | | | |
| | | | | | 0.00 | | |
| Flow length (ft) | ({0})455.0 | | 775.0 | | 0.0 | | |
| **Travel Time (min)** | **= 0.79** | **+** | **1.06** | **+** | **0.00** | **=** | **1.84** |

**Total Travel Time, Tc ..... 6.40 min**

# Hydrograph Report

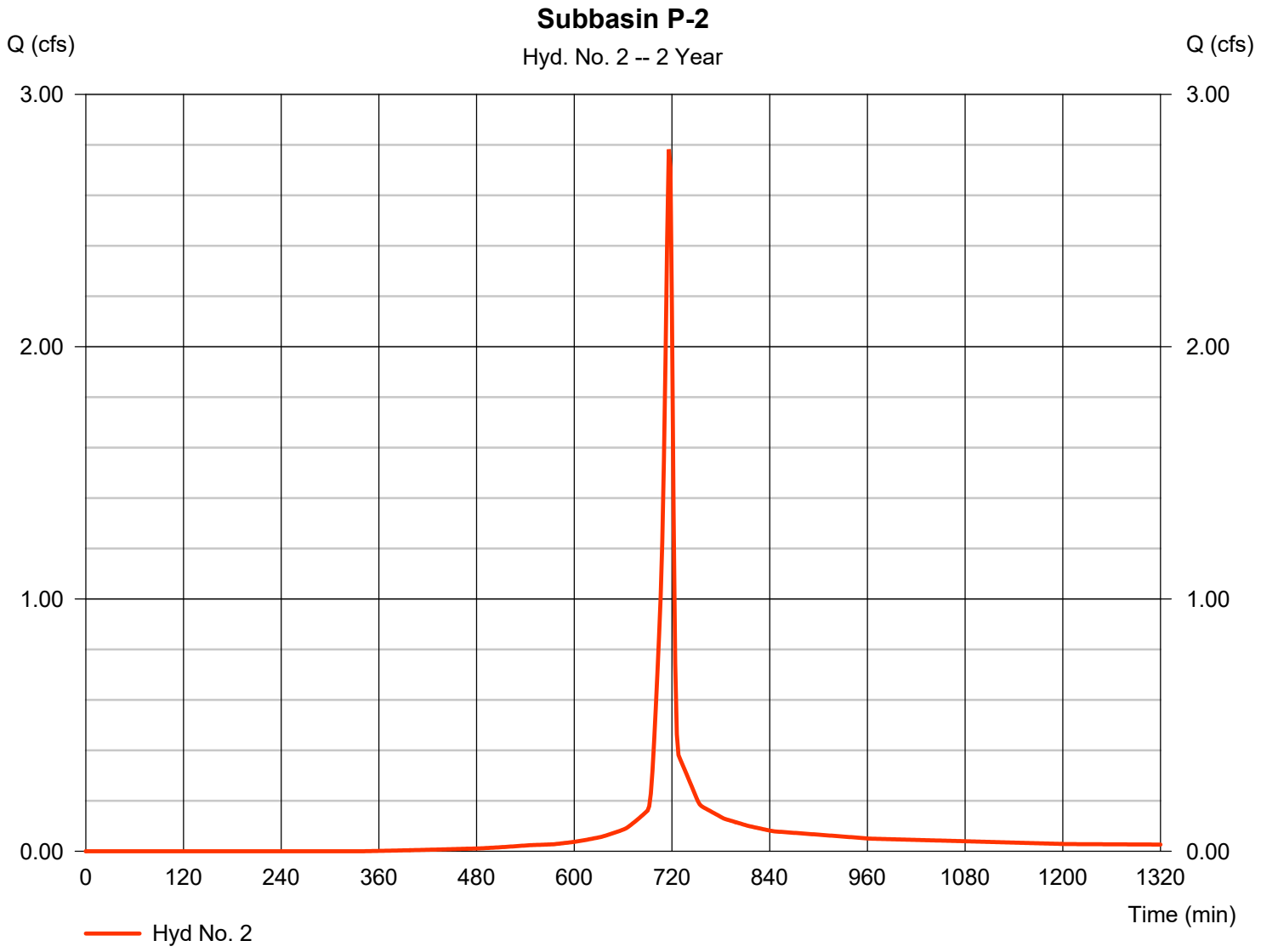


## Hyd. No. 2

Subbasin P-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 2.782 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 5,757 cuft |
| Drainage area | = | 0.750 ac | Curve number | = | 89* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.39 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 70)] / 0.750



# Hydrograph Report

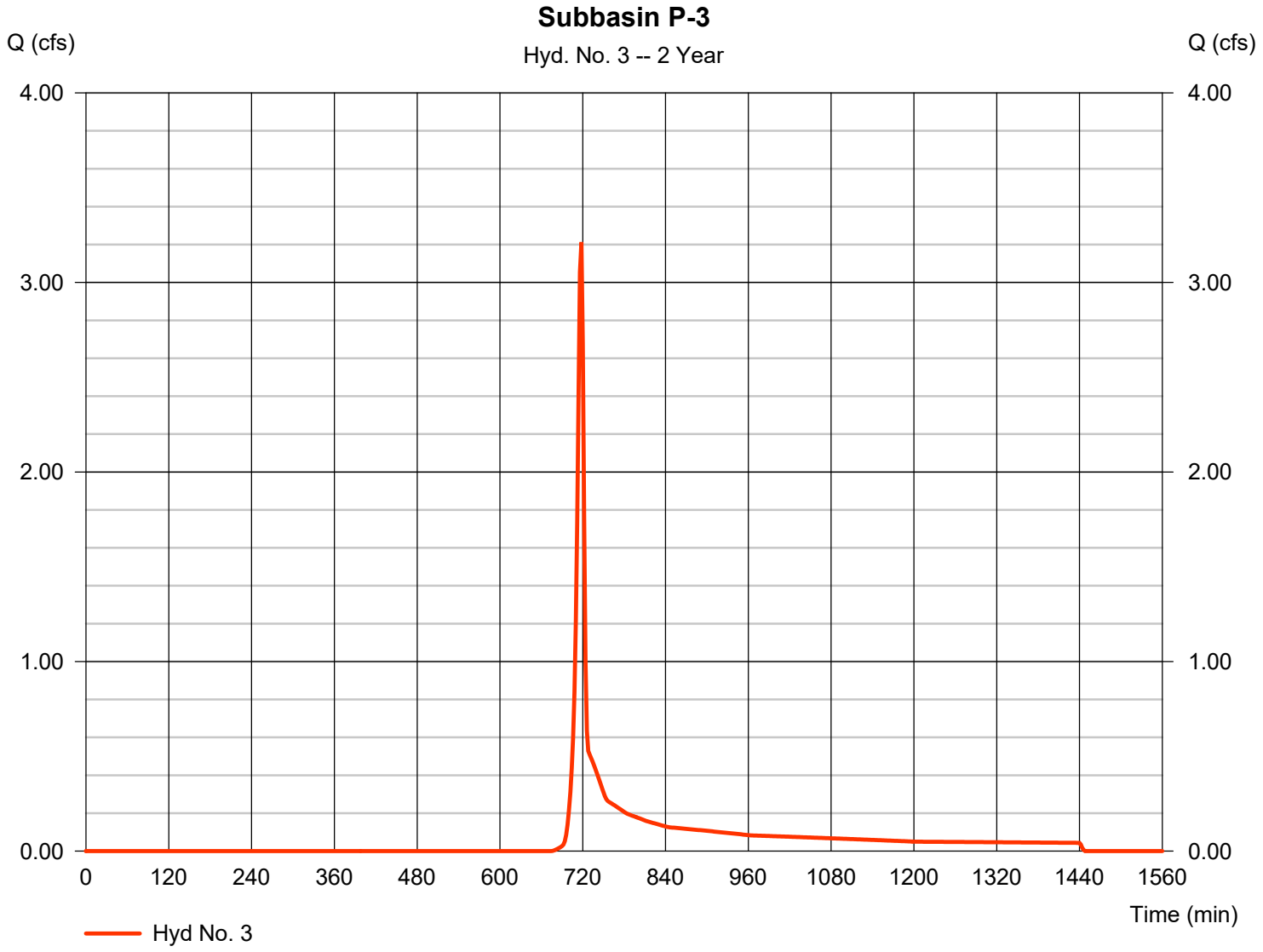


## Hyd. No. 3

Subbasin P-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 3.212 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 718 min |
| Time interval | = | 2 min | Hyd. volume | = | 6,500 cuft |
| Drainage area | = | 2.030 ac | Curve number | = | 70* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.39 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (1.880 x 70)] / 2.030



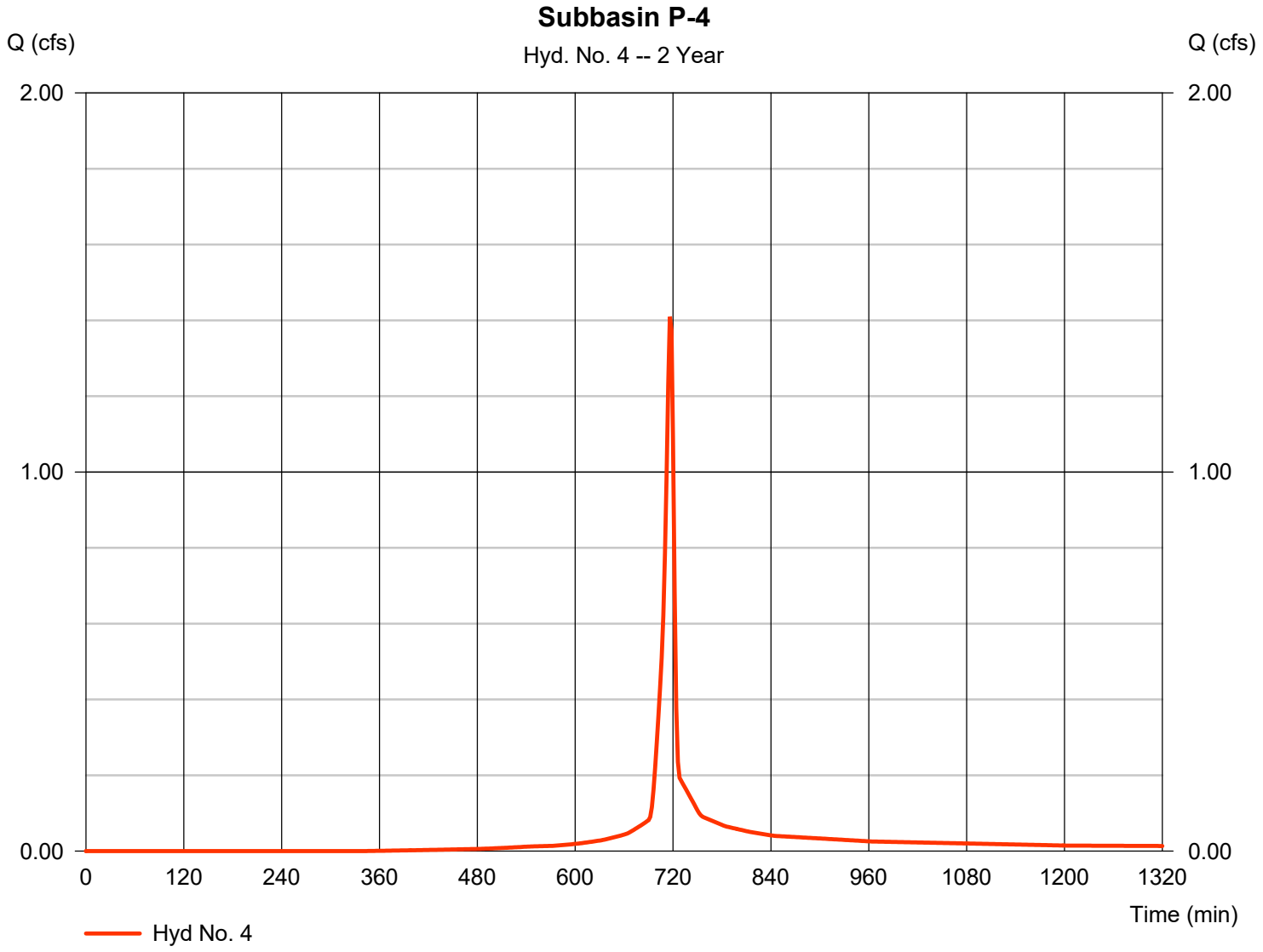
# Hydrograph Report



## Hyd. No. 4

Subbasin P-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 1.410 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 2,917 cuft |
| Drainage area | = | 0.380 ac | Curve number | = | 89 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.39 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



# Hydrograph Report

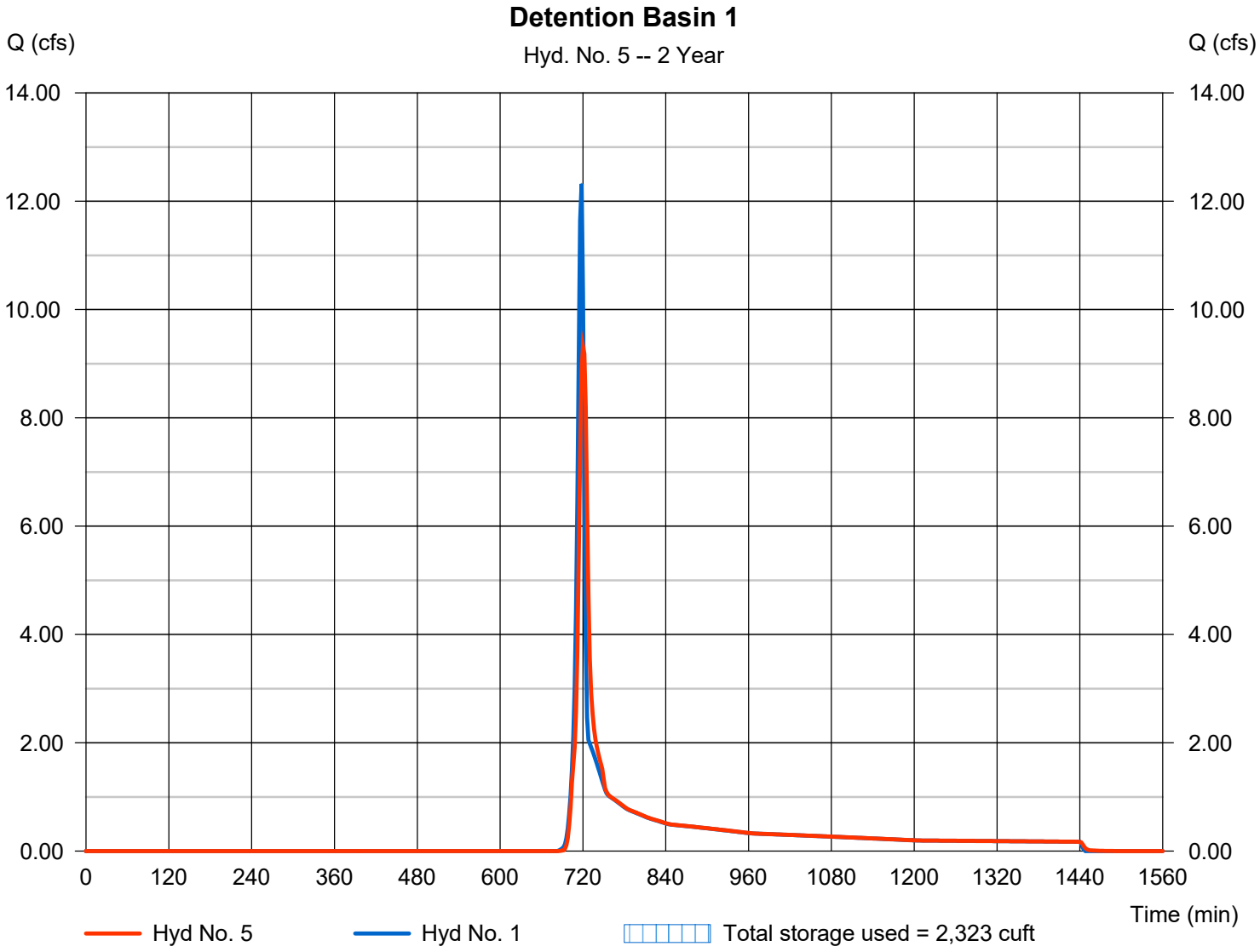


## Hyd. No. 5

Detention Basin 1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 9.314 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 25,073 cuft |
| Inflow hyd. No. | = | 1 - Subbasin P-1 | Max. Elevation | = | 470.09 ft |
| Reservoir name | = | Detention Basin 1 | Max. Storage | = | 2,323 cuft |

Storage Indication method used.



# Pond Report



## Pond No. 1 - Detention Basin 1

### Pond Data

**Contours -**User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 468.50 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 468.50 | 00 | 0 | 0 |
| 0.50 | 469.00 | 561 | 140 | 140 |
| 1.50 | 470.00 | 3,171 | 1,866 | 2,006 |
| 2.50 | 471.00 | 4,241 | 3,706 | 5,712 |
| 3.50 | 472.00 | 6,165 | 5,203 | 10,915 |
| 4.00 | 472.50 | 7,153 | 3,330 | 14,245 |
| 4.50 | 473.00 | 8,383 | 3,884 | 18,129 |
| 5.00 | 473.50 | 9,880 | 4,566 | 22,695 |

### Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|---|---|---|---|---|
| **Rise (in)** | = 24.00 | 0.00 | 0.00 | 0.00 |
| **Span (in)** | = 24.00 | 0.00 | 0.00 | 0.00 |
| **No. Barrels** | = 1 | 0 | 0 | 0 |
| **Invert El. (ft)** | = 468.50 | 0.00 | 0.00 | 0.00 |
| **Length (ft)** | = 15.00 | 0.00 | 0.00 | 0.00 |
| **Slope (%)** | = 2.50 | 0.00 | 0.00 | n/a |
| **N-Value** | = .024 | .013 | .013 | n/a |
| **Orifice Coeff.** | = 0.60 | 0.60 | 0.60 | 0.60 |
| **Multi-Stage** | = n/a | No | No | No |

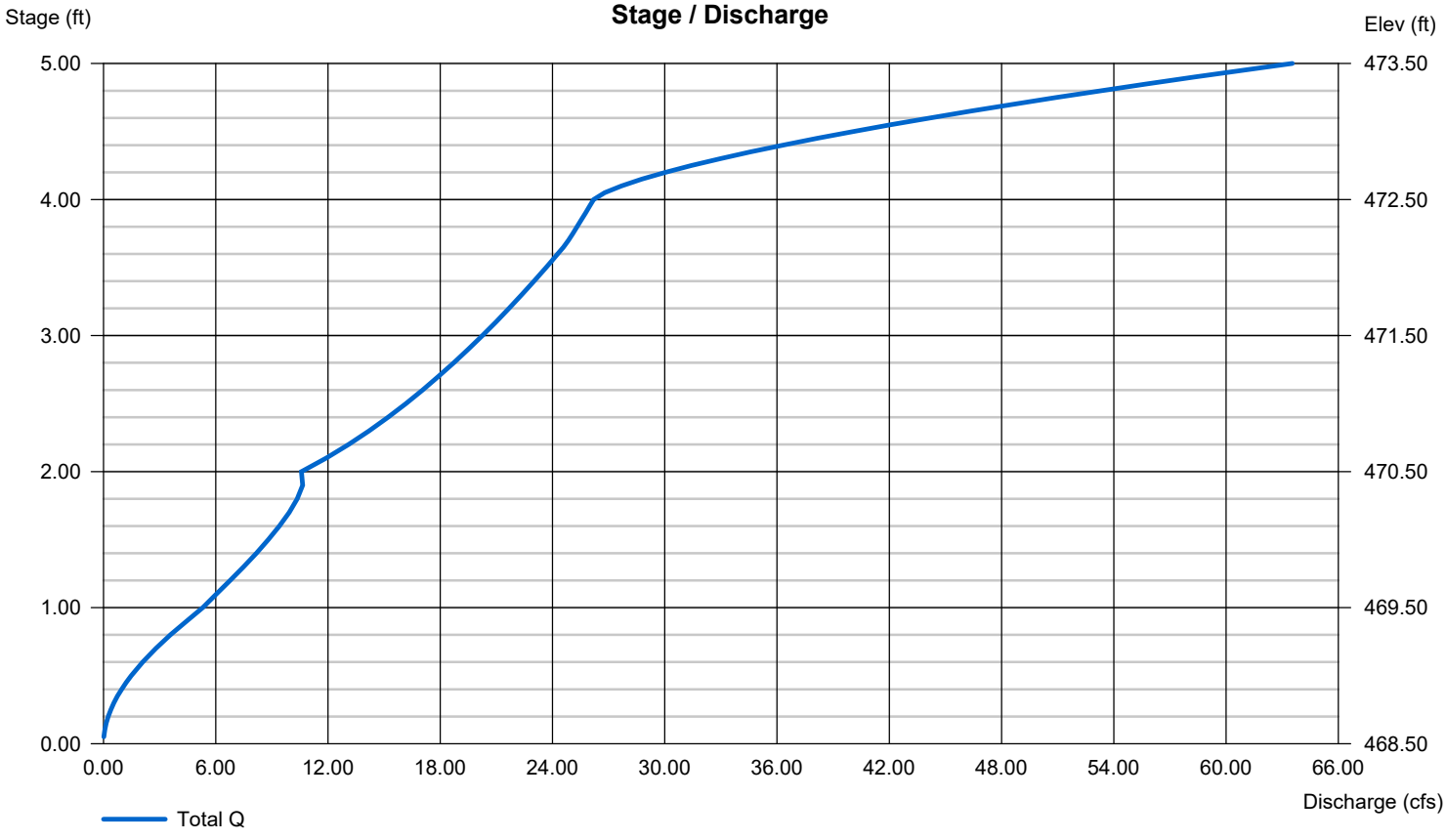
### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| **Crest Len (ft)** | = 10.00 | 0.00 | 0.00 | 0.00 |
| **Crest El. (ft)** | = 472.50 | 0.00 | 0.00 | 0.00 |
| **Weir Coeff.** | = 3.33 | 3.33 | 3.33 | 3.33 |
| **Weir Type** | = Rect | --- | --- | --- |
| **Multi-Stage** | = No | No | No | No |

**Exfil.(in/hr)** = 0.000 (by Wet area)

**TW Elev. (ft)** = 0.00

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



# Hydrograph Report

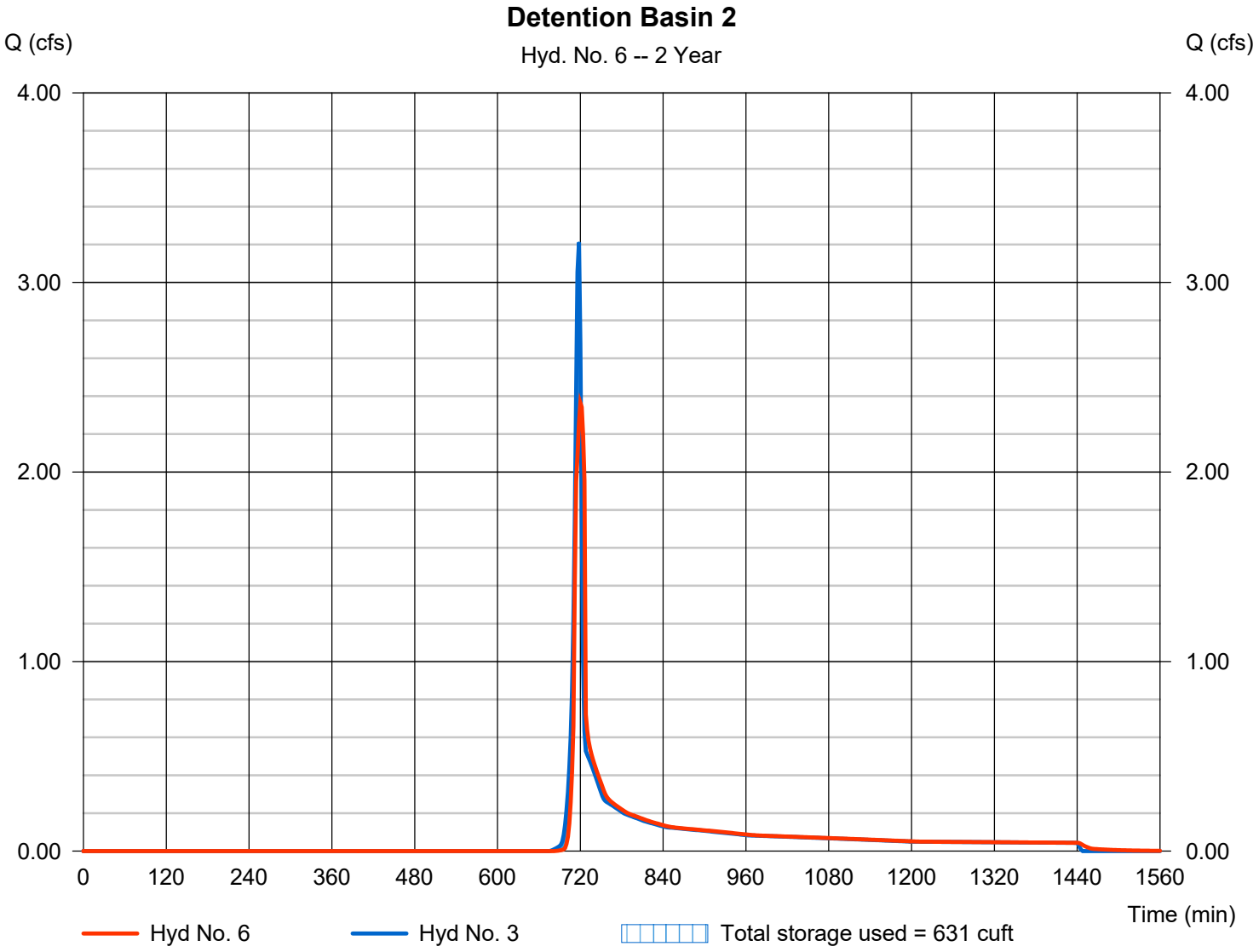


## Hyd. No. 6

Detention Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 2.364 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 6,497 cuft |
| Inflow hyd. No. | = | 3 - Subbasin P-3 | Max. Elevation | = | 500.17 ft |
| Reservoir name | = | Detention Basin 2 | Max. Storage | = | 631 cuft |

Storage Indication method used.



# Pond Report



## Pond No. 2 - Detention Basin 2

### Pond Data

**Contours -**User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 499.20 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 499.20 | 00 | 0 | 0 |
| 0.50 | 500.00 | 1,282 | 321 | 321 |
| 1.50 | 501.00 | 2,381 | 1,832 | 2,152 |
| 2.00 | 501.50 | 3,089 | 1,368 | 3,520 |
| 2.50 | 502.00 | 3,794 | 1,721 | 5,240 |
| 3.00 | 502.50 | 4,716 | 2,128 | 7,368 |

### Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|---|---|---|---|---|
| **Rise (in)** | = 15.00 | 0.00 | 0.00 | 0.00 |
| **Span (in)** | = 15.00 | 0.00 | 0.00 | 0.00 |
| **No. Barrels** | = 1 | 0 | 0 | 0 |
| **Invert El. (ft)** | = 499.20 | 0.00 | 0.00 | 0.00 |
| **Length (ft)** | = 14.00 | 0.00 | 0.00 | 0.00 |
| **Slope (%)** | = 1.40 | 0.00 | 0.00 | n/a |
| **N-Value** | = .024 | .013 | .013 | n/a |
| **Orifice Coeff.** | = 0.60 | 0.60 | 0.60 | 0.60 |
| **Multi-Stage** | = n/a | No | No | No |

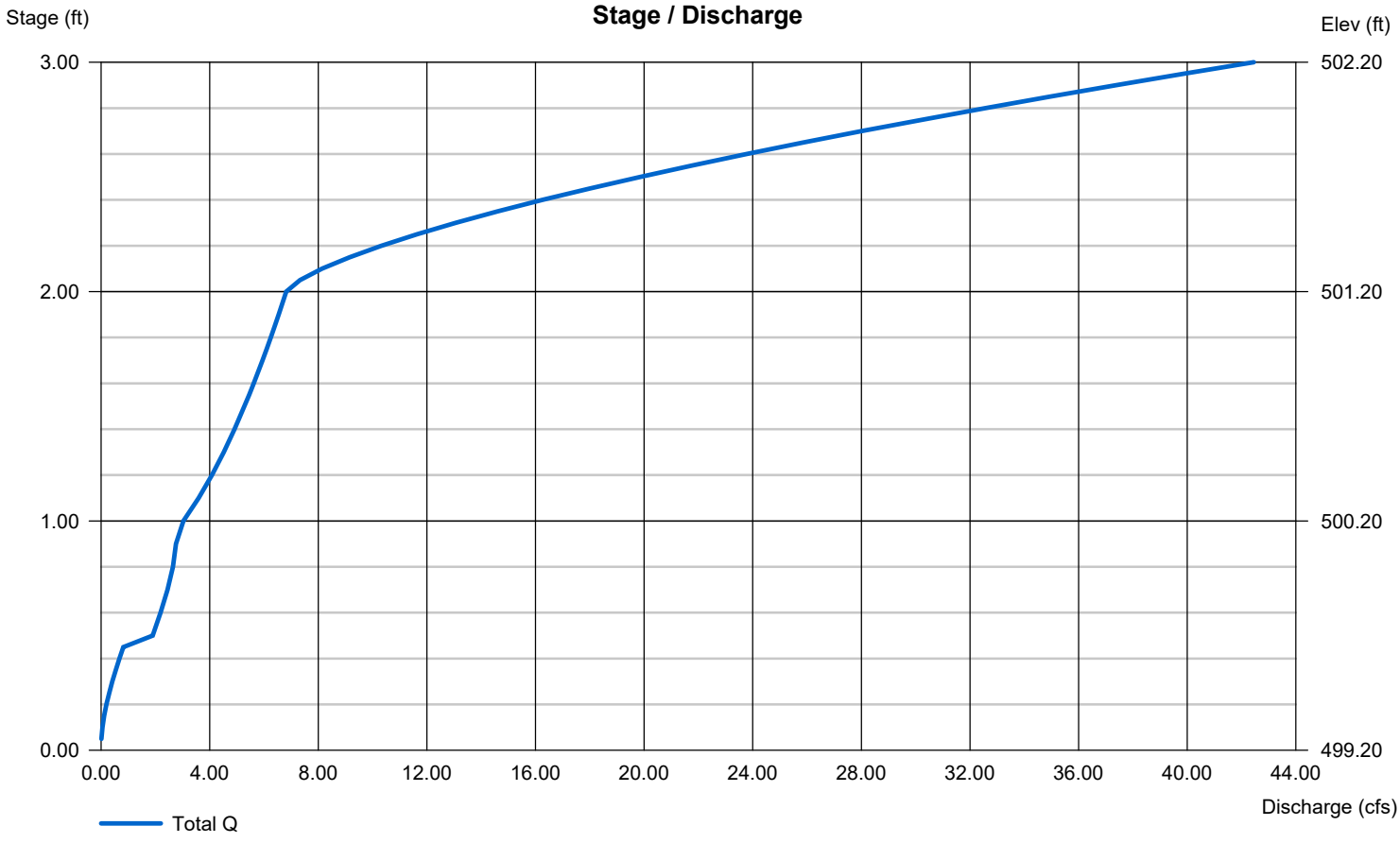
### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| **Crest Len (ft)** | = 10.00 | 0.00 | 0.00 | 0.00 |
| **Crest El. (ft)** | = 501.50 | 0.00 | 0.00 | 0.00 |
| **Weir Coeff.** | = 3.33 | 3.33 | 3.33 | 3.33 |
| **Weir Type** | = Rect | --- | --- | --- |
| **Multi-Stage** | = No | No | No | No |

**Exfil.(in/hr)** = 0.000 (by Wet area)

**TW Elev. (ft)** = 0.00

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



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 22.60 | 2 | 718 | 45,208 | ------ | ------ | ------ | Subbasin P-1 |
| 2 | SCS Runoff | 3.984 | 2 | 716 | 8,410 | ------ | ------ | ------ | Subbasin P-2 |
| 3 | SCS Runoff | 5.782 | 2 | 718 | 11,563 | ------ | ------ | ------ | Subbasin P-3 |
| 4 | SCS Runoff | 2.019 | 2 | 716 | 4,261 | ------ | ------ | ------ | Subbasin P-4 |
| 5 | Reservoir | 16.08 | 2 | 720 | 45,207 | 1 | 470.99 | 5,682 | Detention Basin 1 |
| 6 | Reservoir | 3.884 | 2 | 722 | 11,560 | 3 | 500.66 | 1,529 | Detention Basin 2 |

# Hydrograph Report

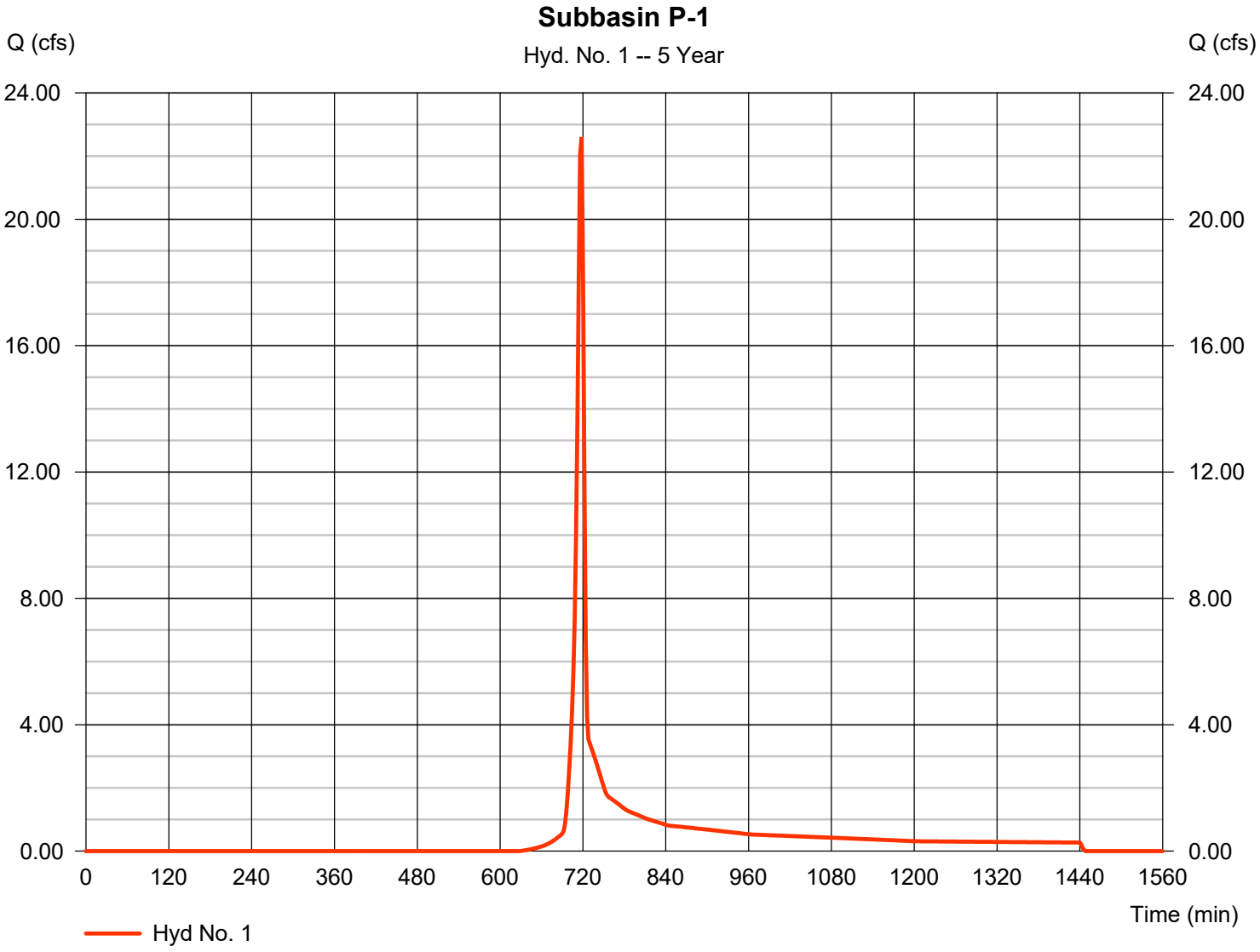


## Hyd. No. 1

Subbasin P-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 22.60 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 45,208 cuft |
| Drainage area | = 8.290 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 6.40 min |
| Total precip. | = 4.50 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(1.660 x 75) + (0.980 x 54) + (5.370 x 70) + (0.280 x 61)] / 8.290



# Hydrograph Report

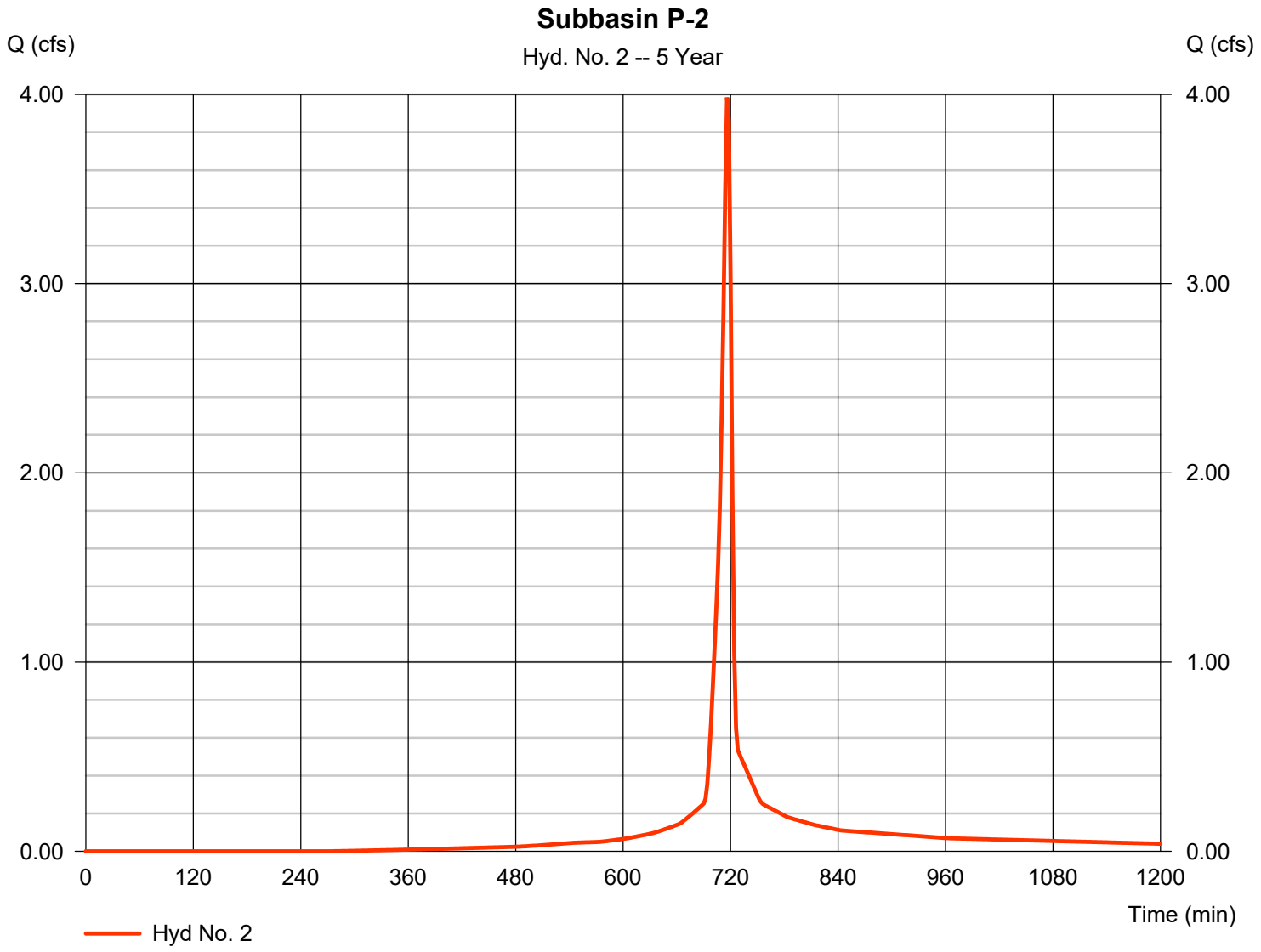


## Hyd. No. 2

Subbasin P-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 3.984 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 8,410 cuft |
| Drainage area | = 0.750 ac | Curve number | = 89* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 4.50 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 70)] / 0.750



# Hydrograph Report

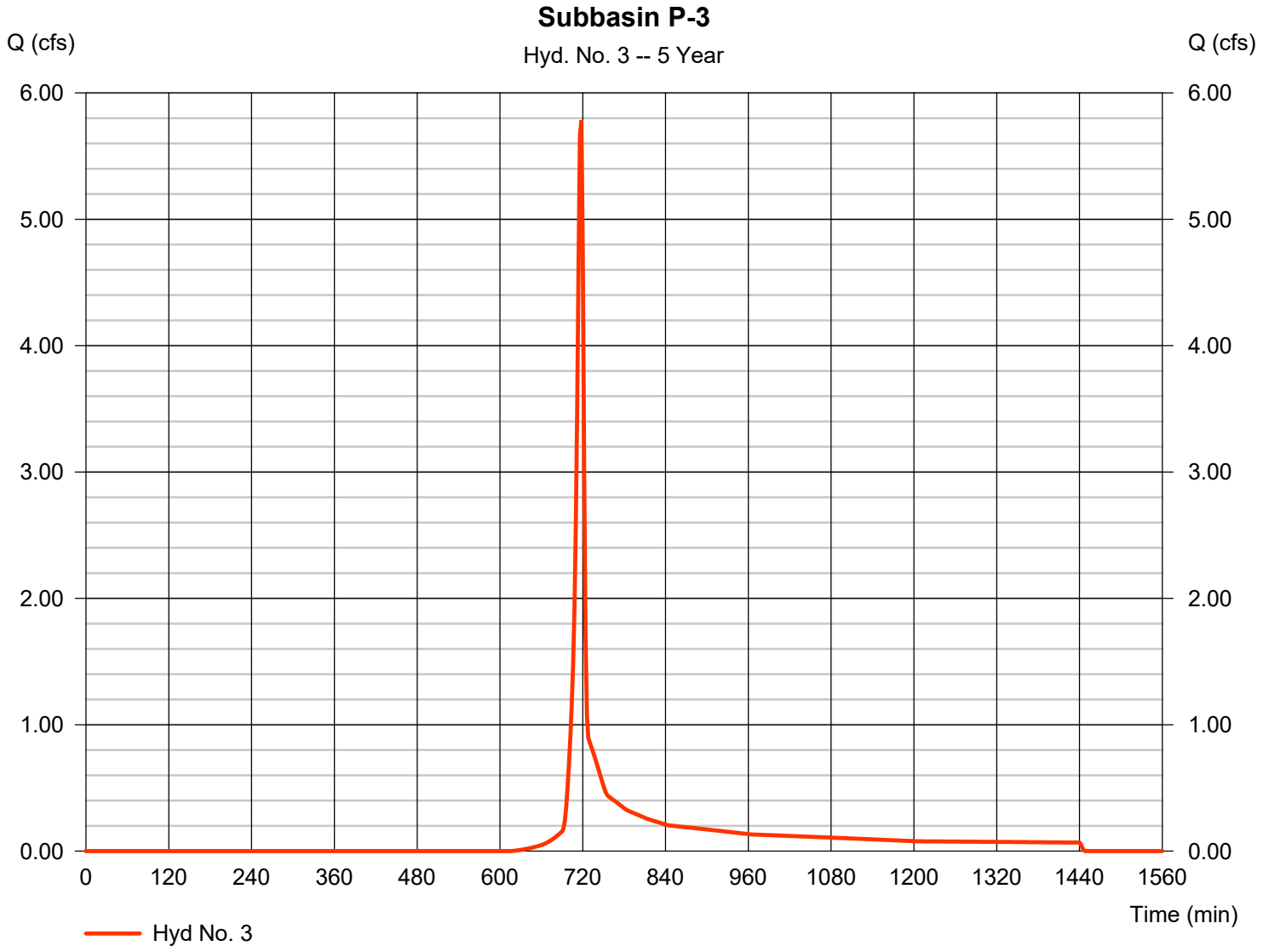


## Hyd. No. 3

Subbasin P-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 5.782 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 11,563 cuft |
| Drainage area | = 2.030 ac | Curve number | = 70* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 4.50 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (1.880 x 70)] / 2.030



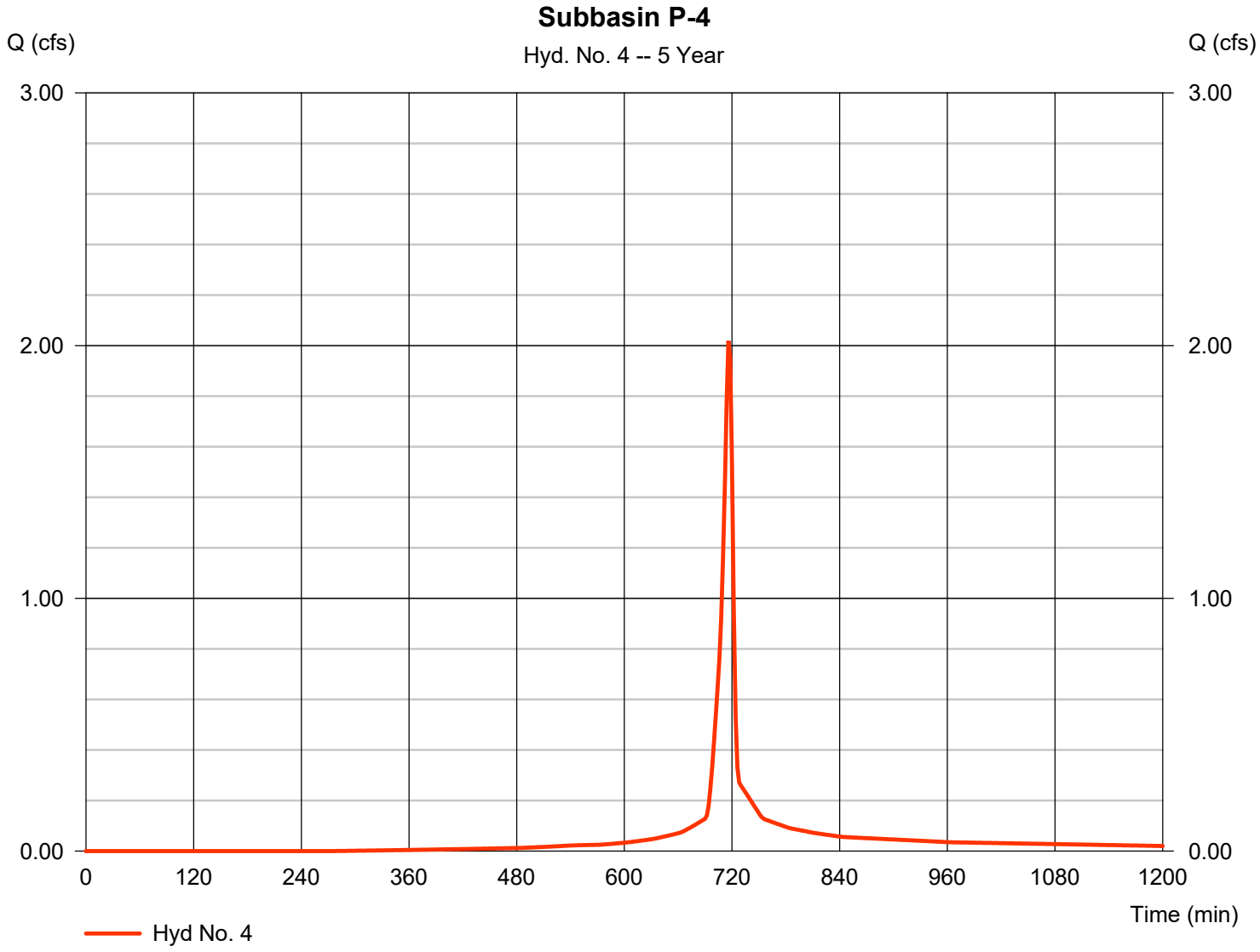
# Hydrograph Report



## Hyd. No. 4

Subbasin P-4

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.019 cfs |
| Storm frequency | = 5 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 4,261 cuft |
| Drainage area | = 0.380 ac | Curve number | = 89 |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 4.50 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |



# Hydrograph Report

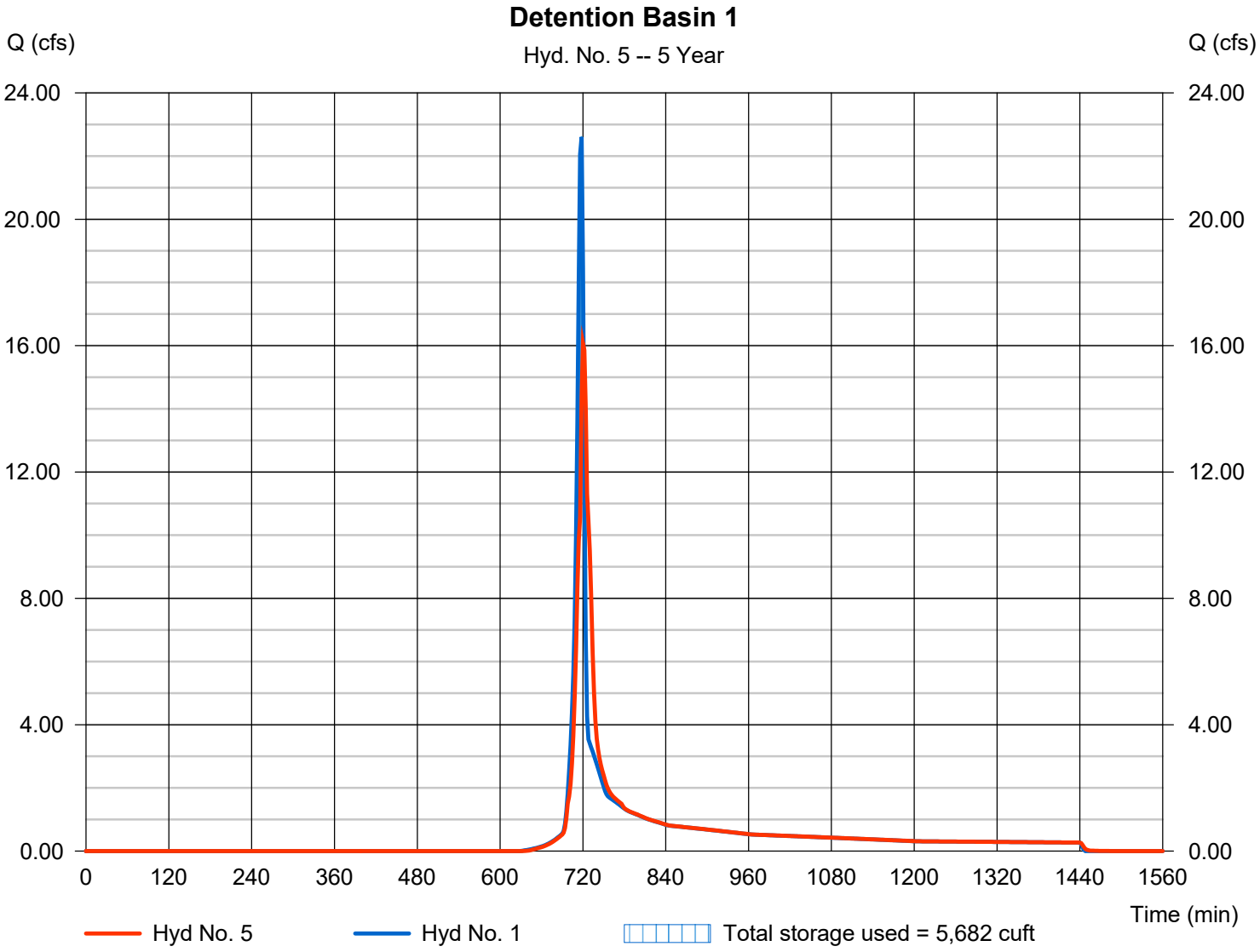


## Hyd. No. 5

Detention Basin 1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 16.08 cfs |
| Storm frequency | = | 5 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 45,207 cuft |
| Inflow hyd. No. | = | 1 - Subbasin P-1 | Max. Elevation | = | 470.99 ft |
| Reservoir name | = | Detention Basin 1 | Max. Storage | = | 5,682 cuft |

Storage Indication method used.



# Hydrograph Report

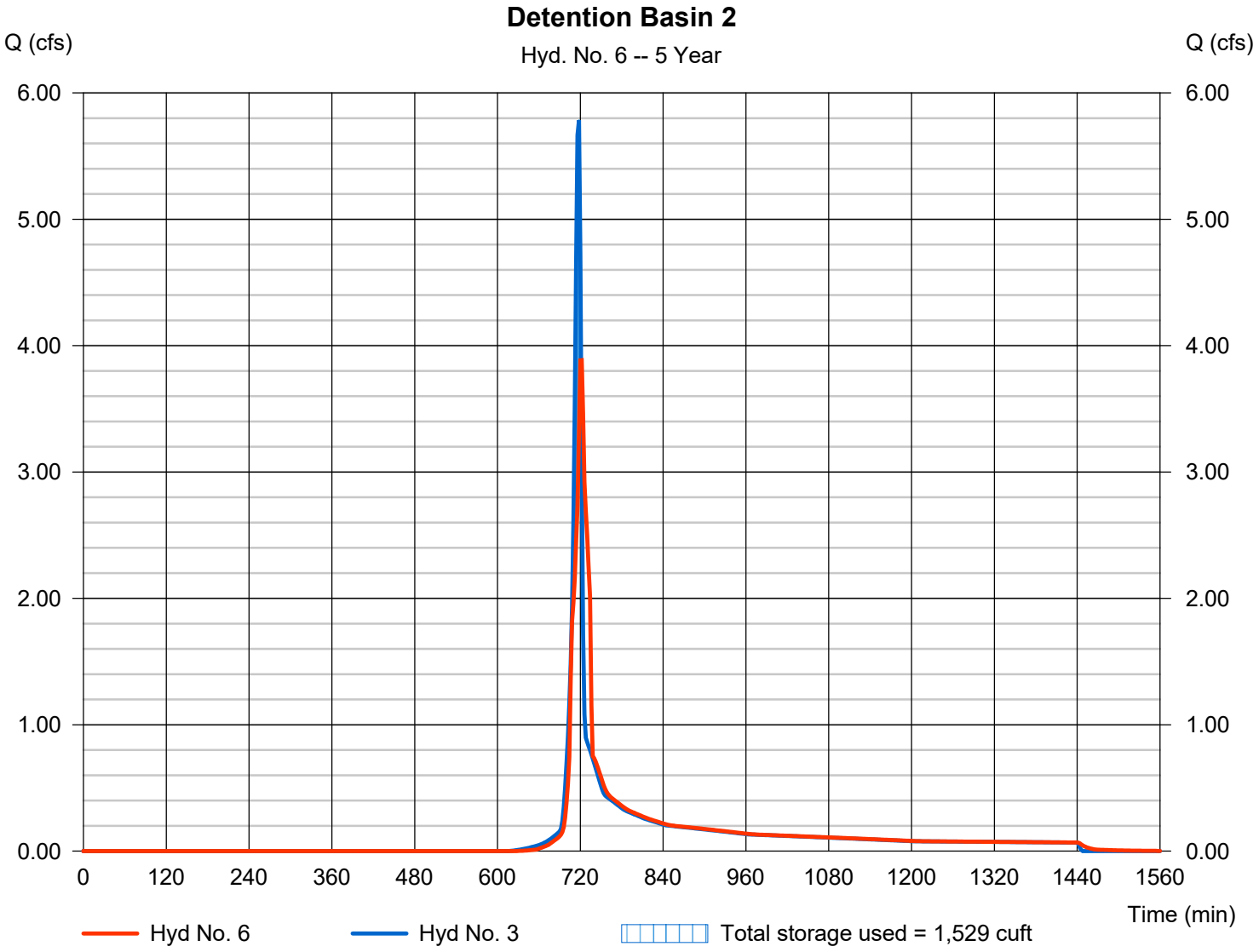


## Hyd. No. 6

Detention Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 3.884 cfs |
| Storm frequency | = | 5 yrs | Time to peak | = | 722 min |
| Time interval | = | 2 min | Hyd. volume | = | 11,560 cuft |
| Inflow hyd. No. | = | 3 - Subbasin P-3 | Max. Elevation | = | 500.66 ft |
| Reservoir name | = | Detention Basin 2 | Max. Storage | = | 1,529 cuft |

Storage Indication method used.



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 29.95 | 2 | 718 | 59,982 | ------ | ------ | ------ | Subbasin P-1 |
| 2 | SCS Runoff | 4.772 | 2 | 716 | 10,190 | ------ | ------ | ------ | Subbasin P-2 |
| 3 | SCS Runoff | 7.608 | 2 | 718 | 15,257 | ------ | ------ | ------ | Subbasin P-3 |
| 4 | SCS Runoff | 2.418 | 2 | 716 | 5,163 | ------ | ------ | ------ | Subbasin P-4 |
| 5 | Reservoir | 20.04 | 2 | 720 | 59,981 | 1 | 471.47 | 8,164 | Detention Basin 1 |
| 6 | Reservoir | 5.242 | 2 | 720 | 15,254 | 3 | 500.99 | 2,135 | Detention Basin 2 |

# Hydrograph Report

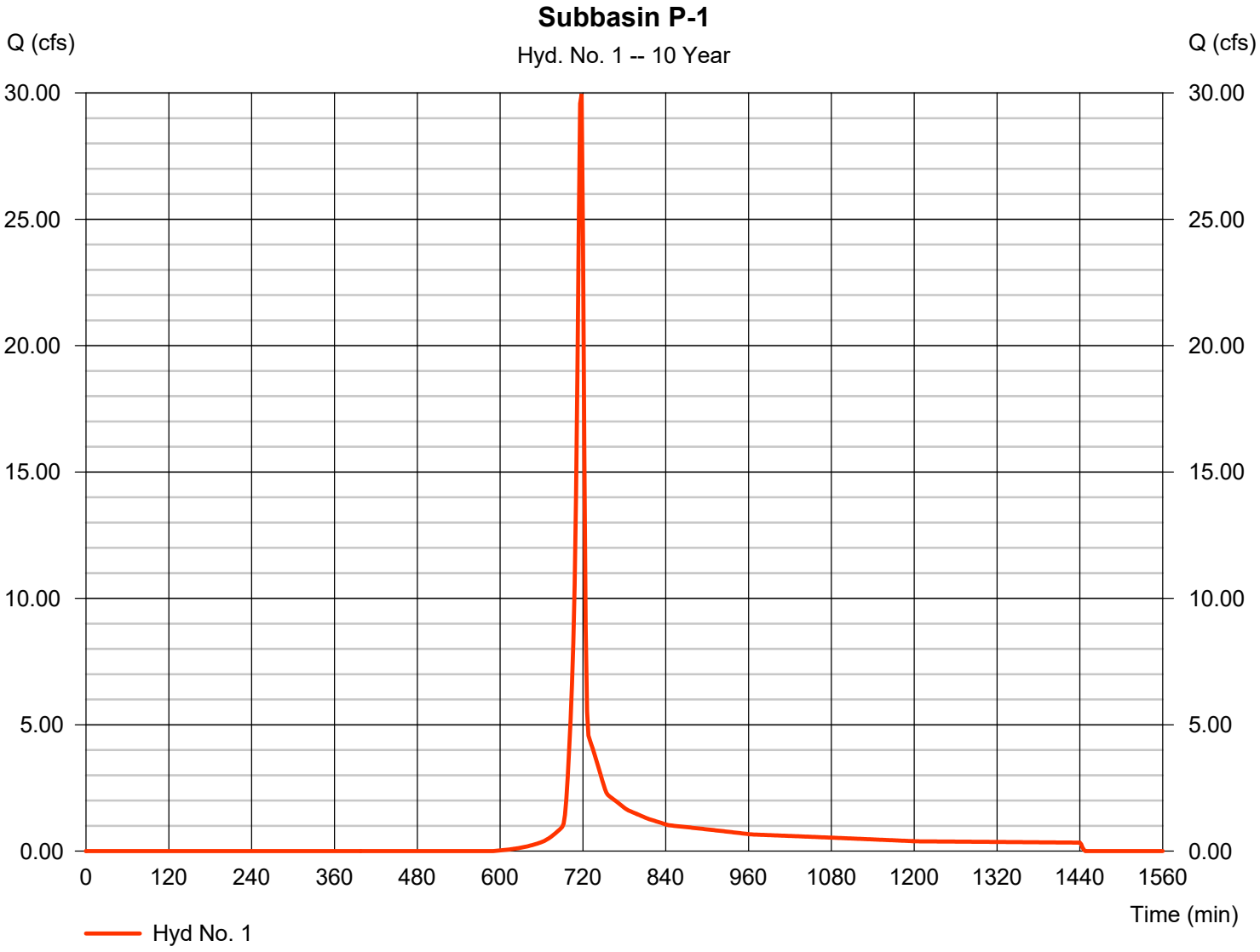


## Hyd. No. 1

Subbasin P-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 29.95 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 718 min |
| Time interval | = | 2 min | Hyd. volume | = | 59,982 cuft |
| Drainage area | = | 8.290 ac | Curve number | = | 69* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | TR55 | Time of conc. (Tc) | = | 6.40 min |
| Total precip. | = | 5.23 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(1.660 x 75) + (0.980 x 54) + (5.370 x 70) + (0.280 x 61)] / 8.290



# Hydrograph Report

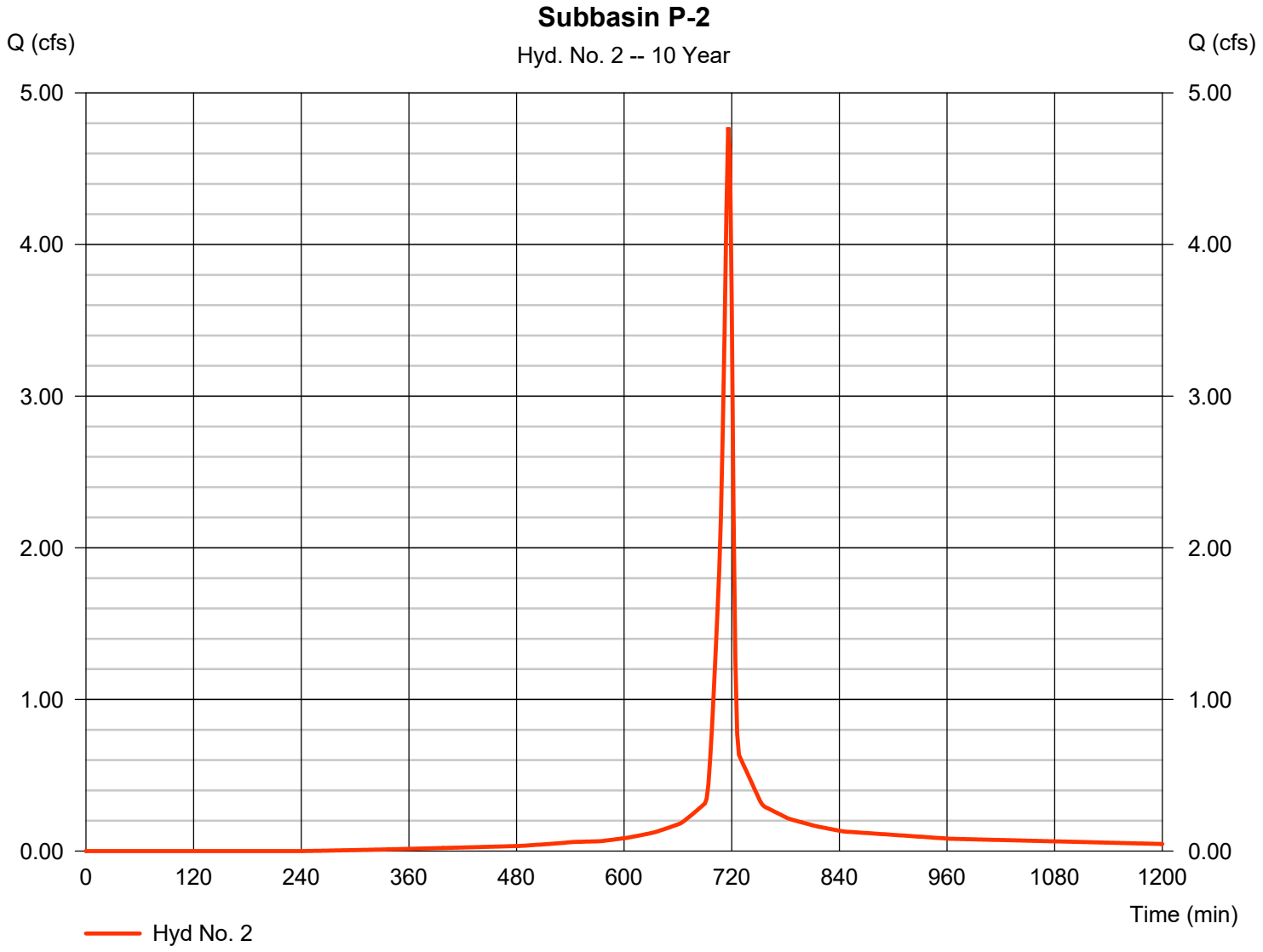


## Hyd. No. 2

Subbasin P-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 4.772 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 10,190 cuft |
| Drainage area | = 0.750 ac | Curve number | = 89* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 5.23 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 70)] / 0.750



# Hydrograph Report

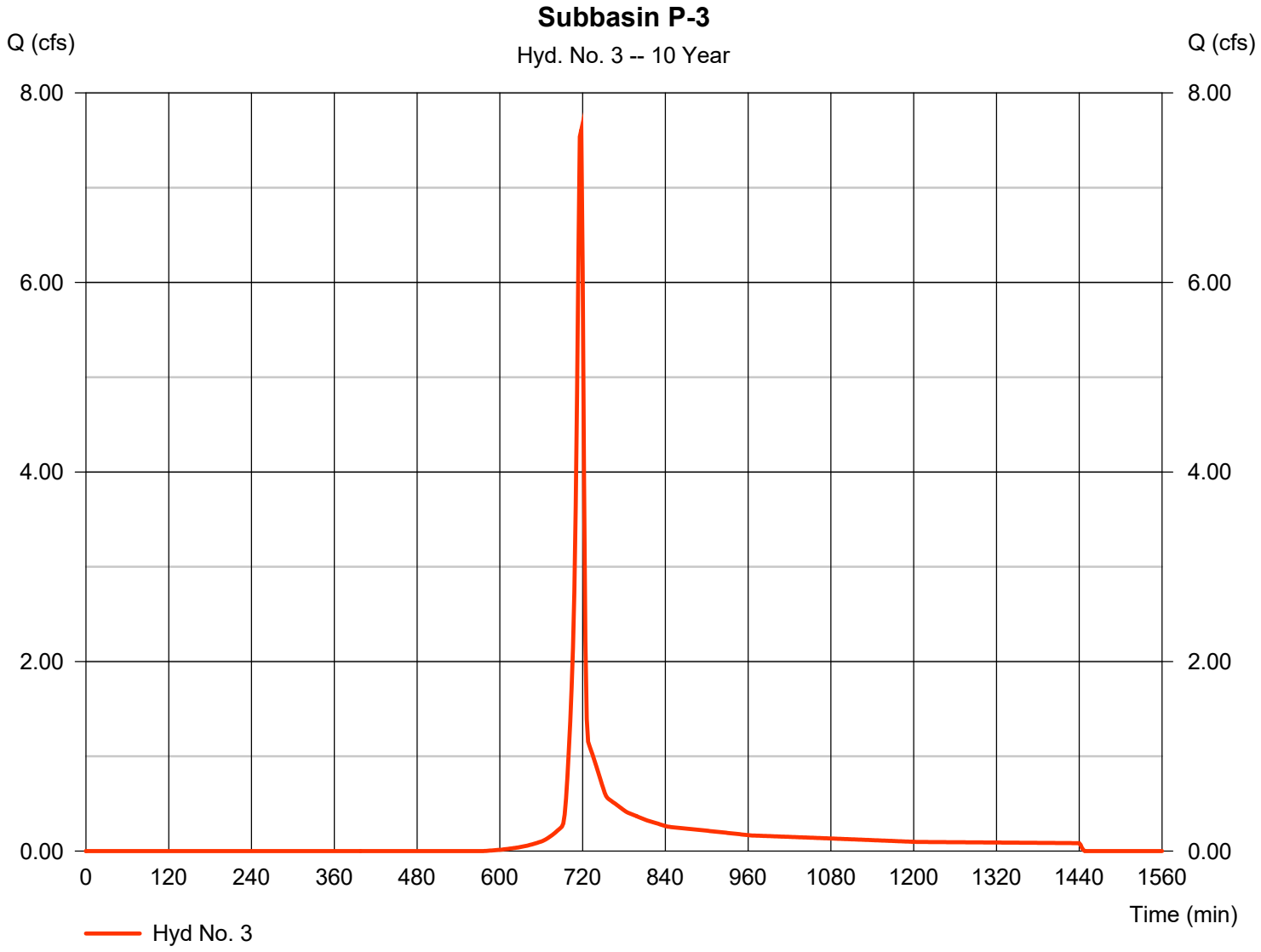


## Hyd. No. 3

Subbasin P-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 7.608 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 15,257 cuft |
| Drainage area | = 2.030 ac | Curve number | = 70* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 5.23 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (1.880 x 70)] / 2.030



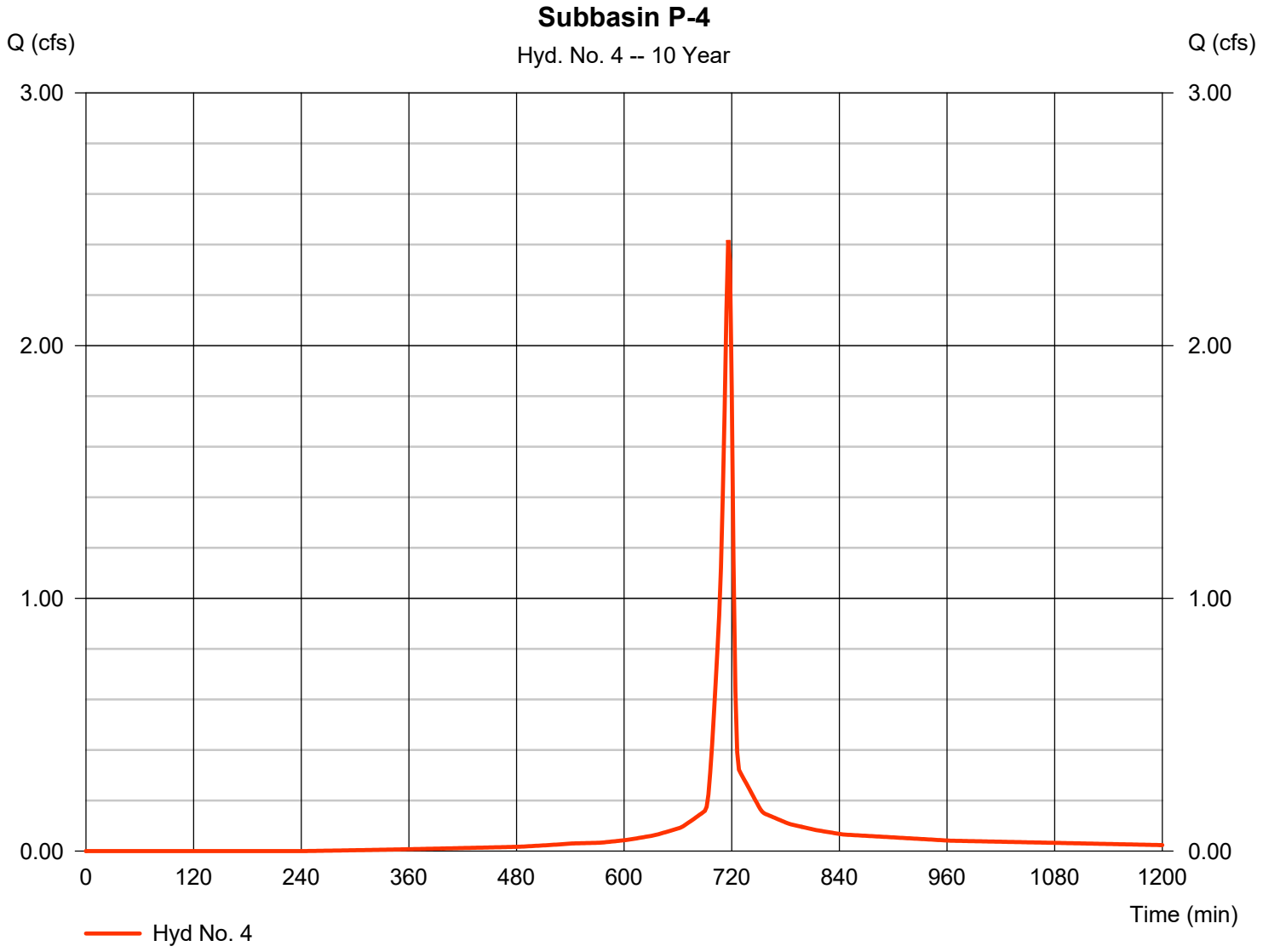
# Hydrograph Report



## Hyd. No. 4

Subbasin P-4

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.418 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 5,163 cuft |
| Drainage area | = 0.380 ac | Curve number | = 89 |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 5.23 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |



# Hydrograph Report

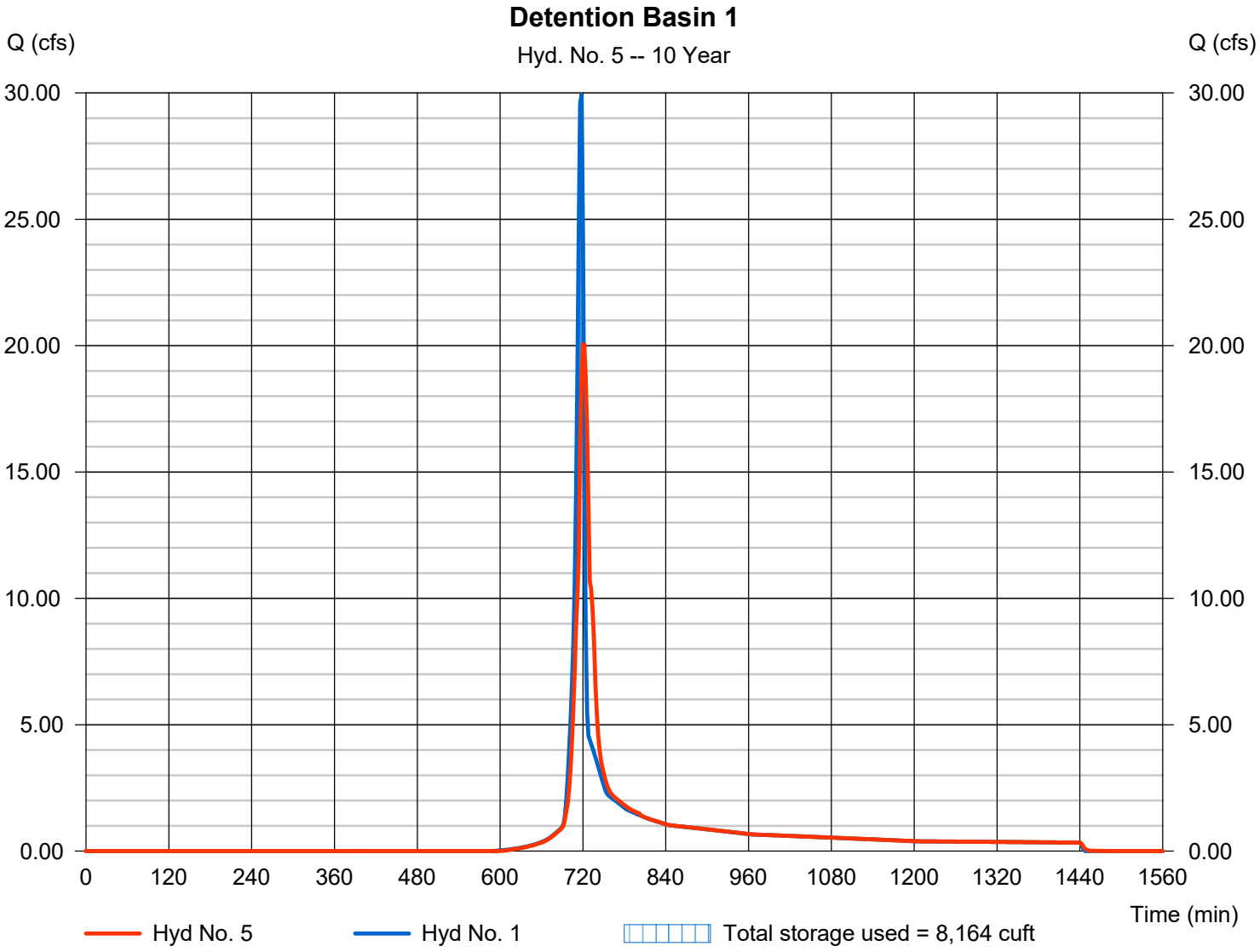


## Hyd. No. 5

Detention Basin 1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 20.04 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 59,981 cuft |
| Inflow hyd. No. | = | 1 - Subbasin P-1 | Max. Elevation | = | 471.47 ft |
| Reservoir name | = | Detention Basin 1 | Max. Storage | = | 8,164 cuft |

Storage Indication method used.



# Hydrograph Report

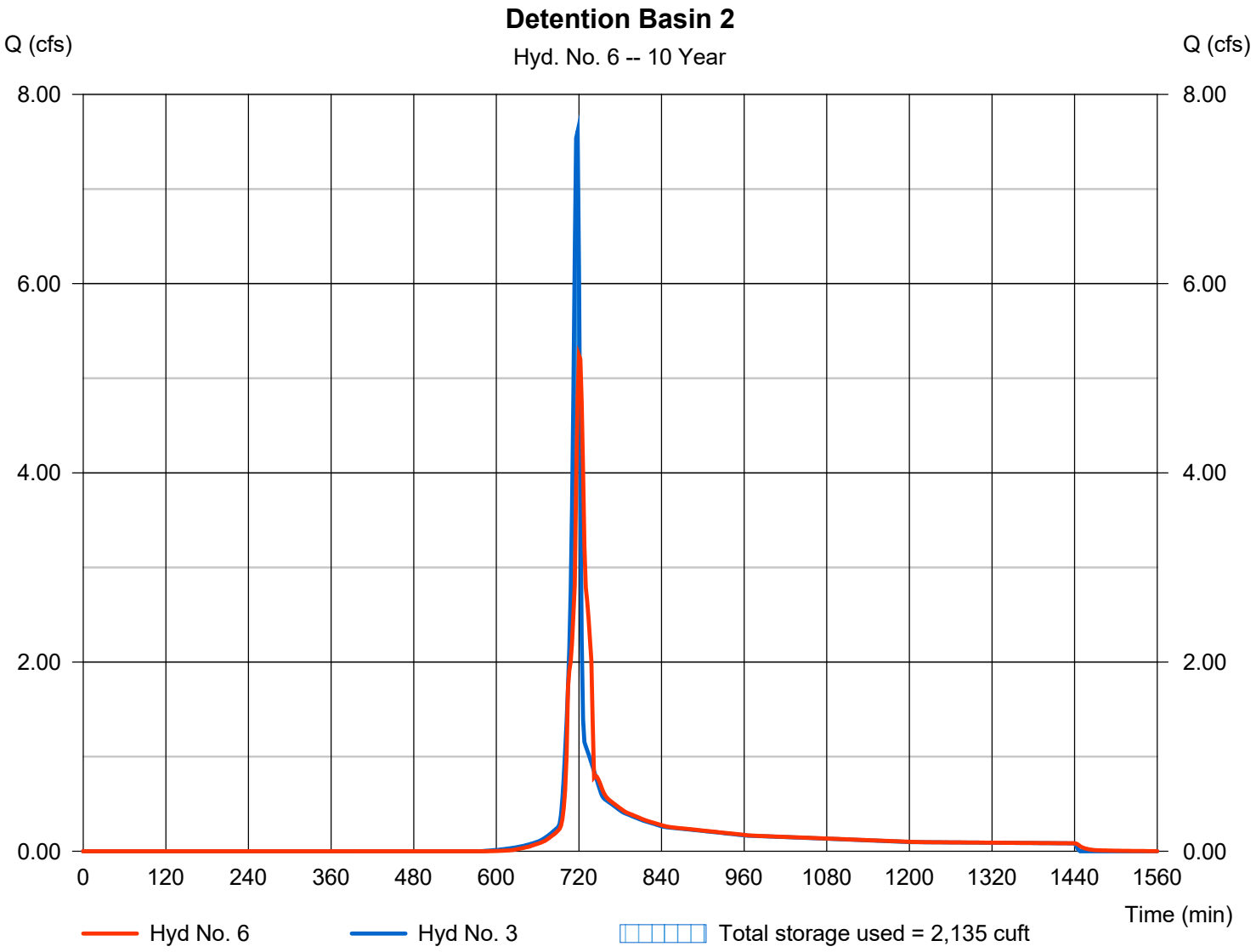


## Hyd. No. 6

Detention Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 5.242 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 15,254 cuft |
| Inflow hyd. No. | = | 3 - Subbasin P-3 | Max. Elevation | = | 500.99 ft |
| Reservoir name | = | Detention Basin 2 | Max. Storage | = | 2,135 cuft |

Storage Indication method used.



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 39.74 | 2 | 718 | 80,067 | ------ | ------ | ------ | Subbasin P-1 |
| 2 | SCS Runoff | 5.772 | 2 | 716 | 12,482 | ------ | ------ | ------ | Subbasin P-2 |
| 3 | SCS Runoff | 10.04 | 2 | 716 | 20,260 | ------ | ------ | ------ | Subbasin P-3 |
| 4 | SCS Runoff | 2.924 | 2 | 716 | 6,324 | ------ | ------ | ------ | Subbasin P-4 |
| 5 | Reservoir | 24.82 | 2 | 722 | 80,066 | 1 | 472.19 | 12,207 | Detention Basin 1 |
| 6 | Reservoir | 6.393 | 2 | 722 | 20,257 | 3 | 501.35 | 3,108 | Detention Basin 2 |

# Hydrograph Report

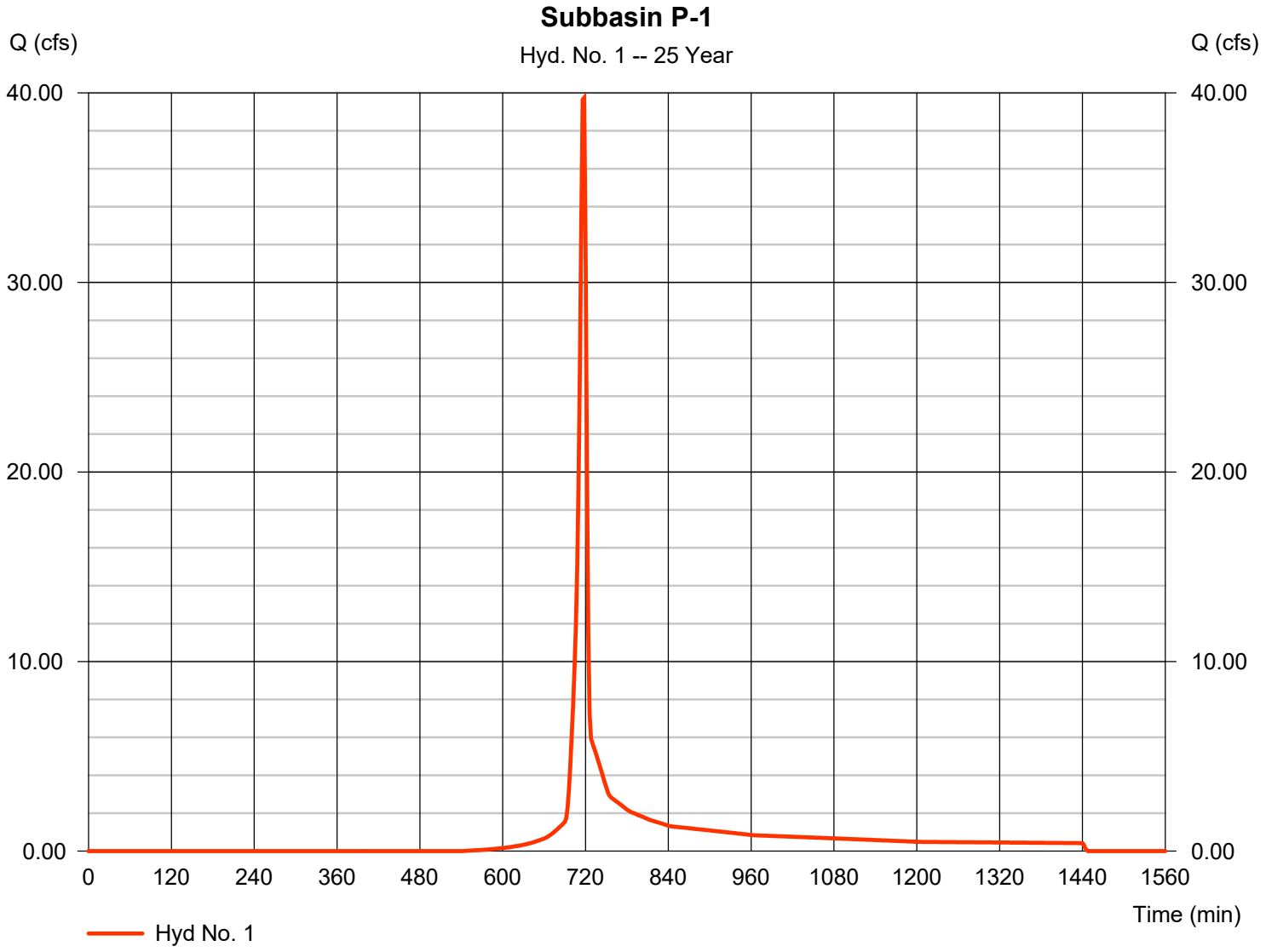


## Hyd. No. 1

Subbasin P-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 39.74 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 718 min |
| Time interval | = 2 min | Hyd. volume | = 80,067 cuft |
| Drainage area | = 8.290 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 6.40 min |
| Total precip. | = 6.16 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(1.660 x 75) + (0.980 x 54) + (5.370 x 70) + (0.280 x 61)] / 8.290



# Hydrograph Report

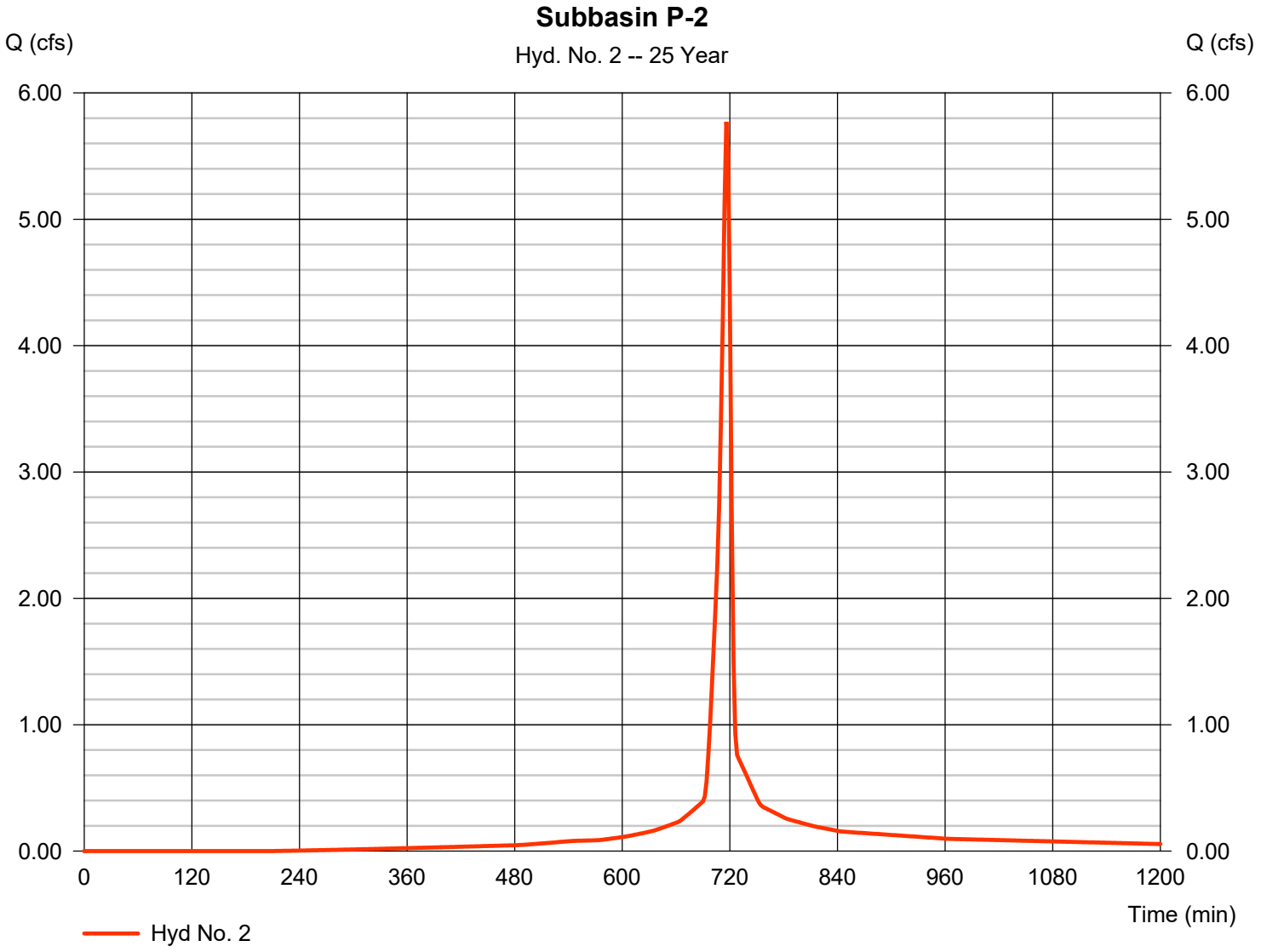


## Hyd. No. 2

Subbasin P-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 5.772 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 12,482 cuft |
| Drainage area | = 0.750 ac | Curve number | = 89* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 6.16 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 70)] / 0.750



# Hydrograph Report

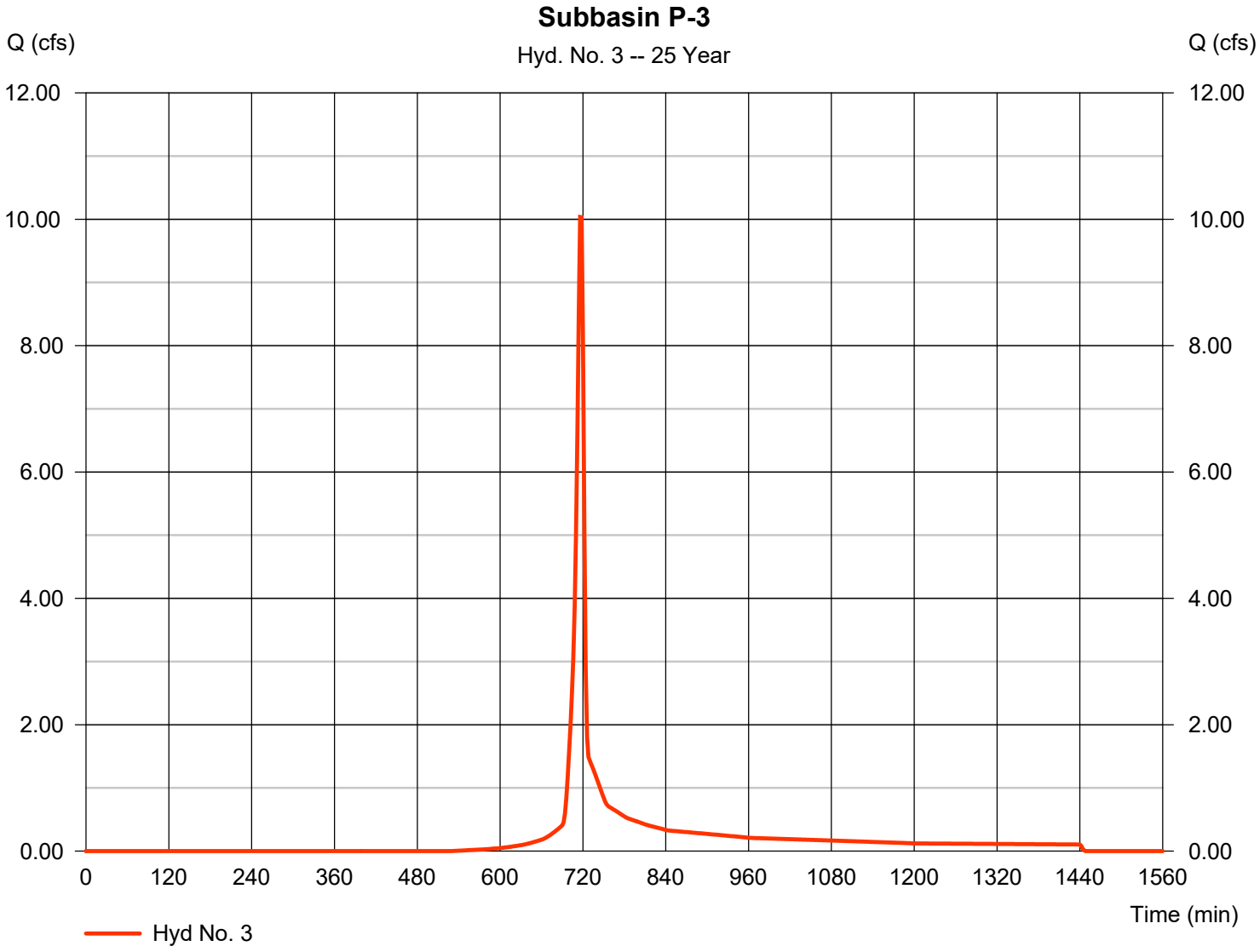


## Hyd. No. 3

Subbasin P-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 10.04 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 20,260 cuft |
| Drainage area | = 2.030 ac | Curve number | = 70* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 6.16 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(0.150 x 75) + (1.880 x 70)] / 2.030



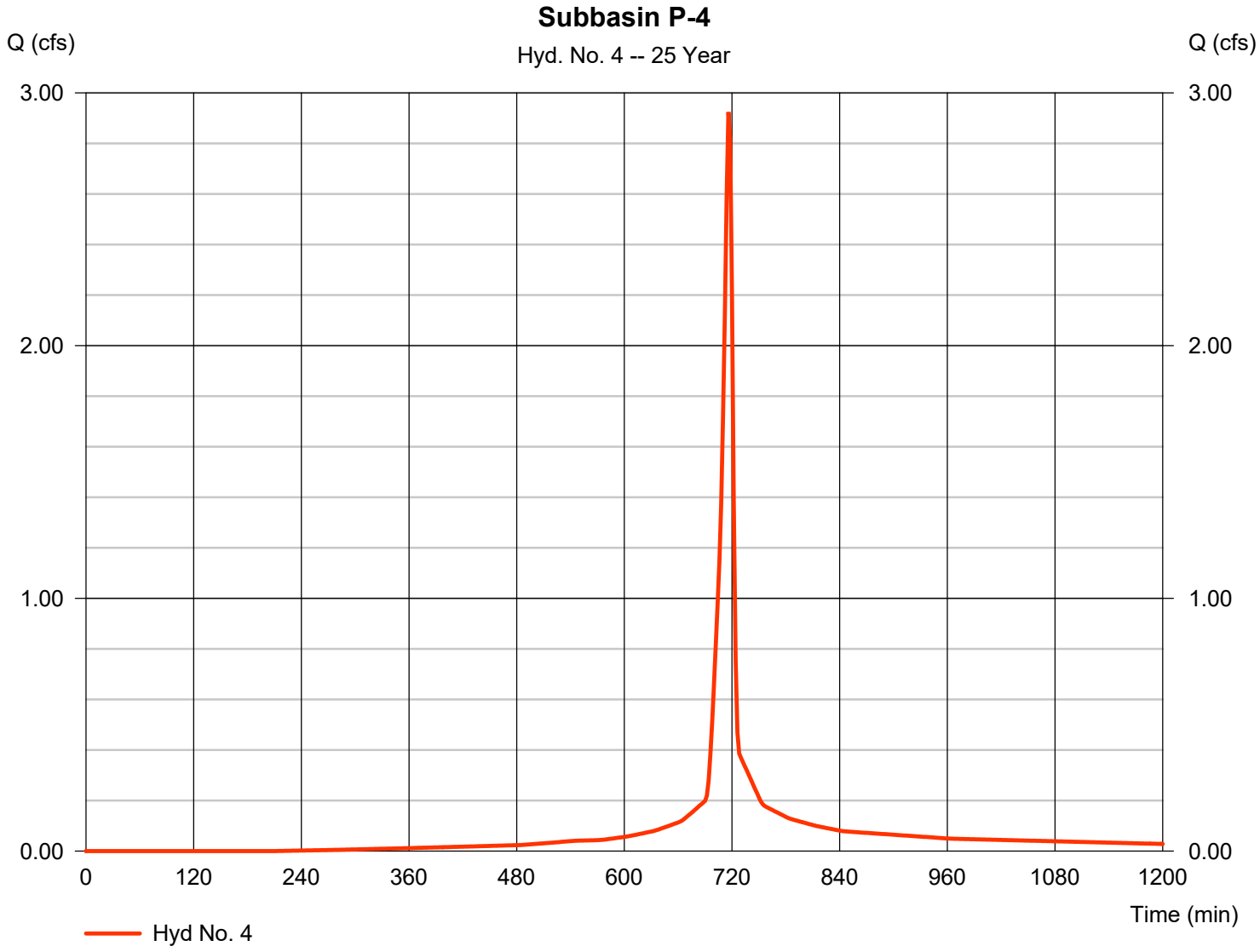
# Hydrograph Report



## Hyd. No. 4

Subbasin P-4

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.924 cfs |
| Storm frequency | = 25 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 6,324 cuft |
| Drainage area | = 0.380 ac | Curve number | = 89 |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 6.16 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |



# Hydrograph Report

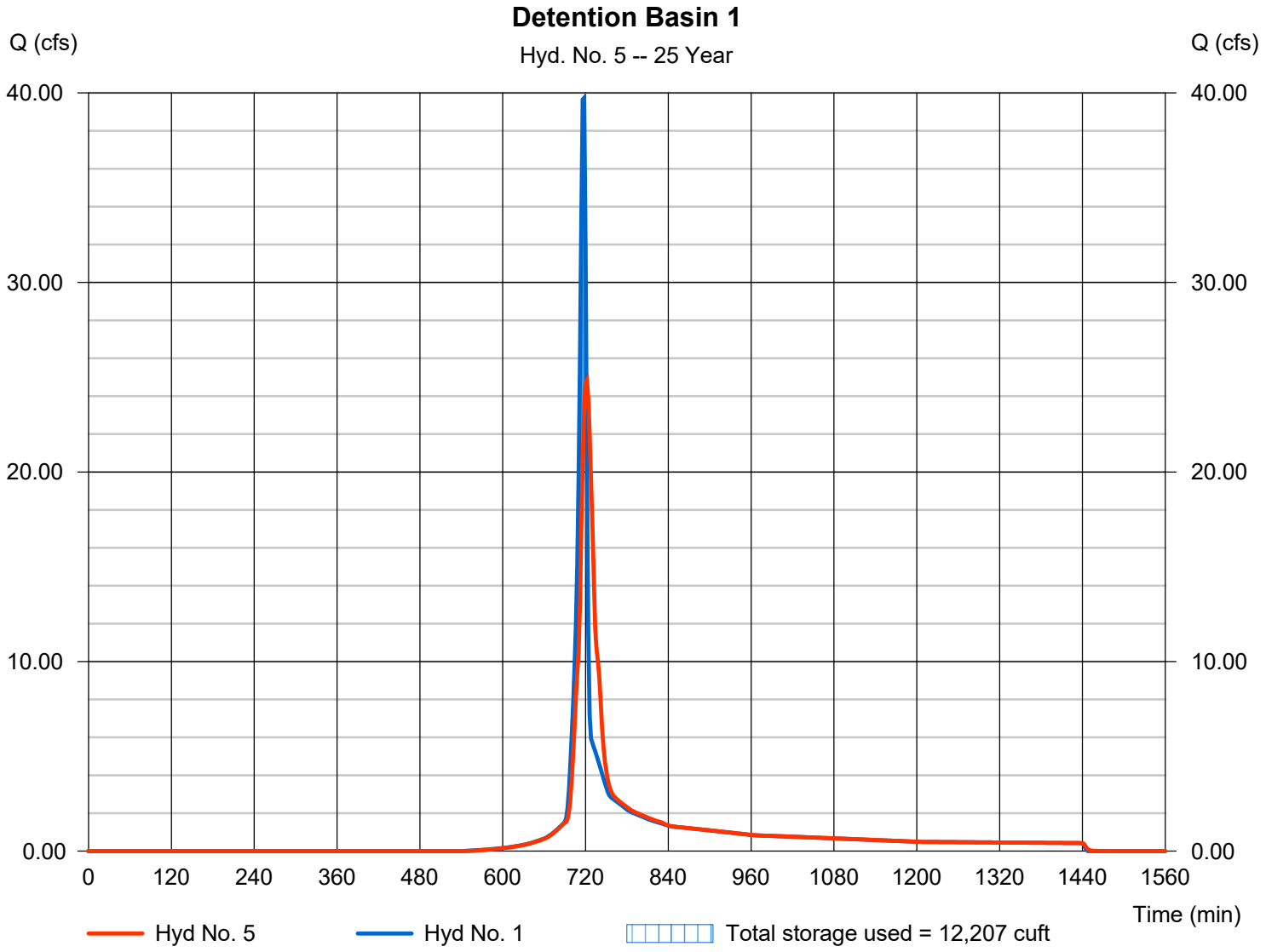


## Hyd. No. 5

Detention Basin 1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 24.82 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 722 min |
| Time interval | = | 2 min | Hyd. volume | = | 80,066 cuft |
| Inflow hyd. No. | = | 1 - Subbasin P-1 | Max. Elevation | = | 472.19 ft |
| Reservoir name | = | Detention Basin 1 | Max. Storage | = | 12,207 cuft |

Storage Indication method used.



# Hydrograph Report

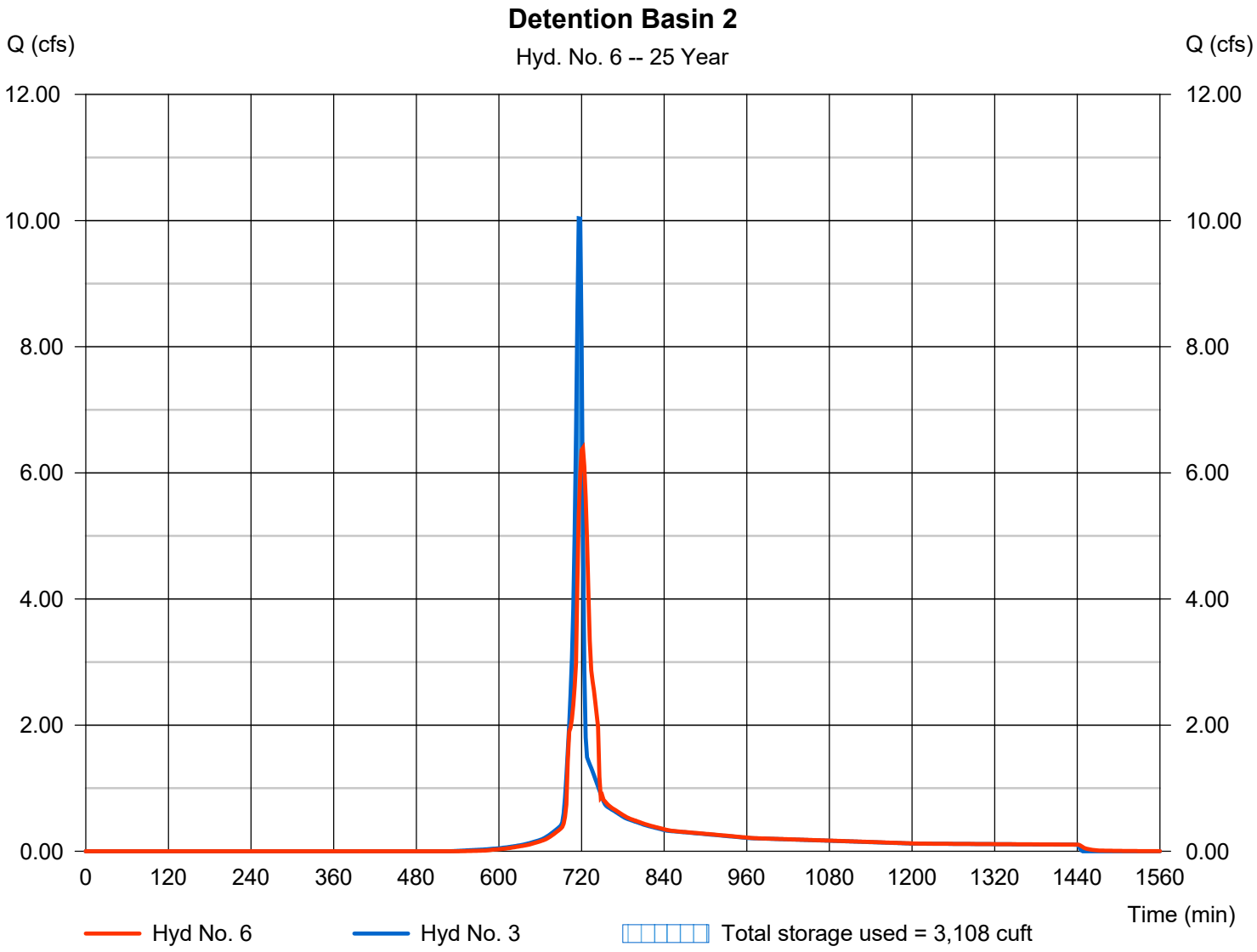


## Hyd. No. 6

Detention Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 6.393 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 722 min |
| Time interval | = | 2 min | Hyd. volume | = | 20,257 cuft |
| Inflow hyd. No. | = | 3 - Subbasin P-3 | Max. Elevation | = | 501.35 ft |
| Reservoir name | = | Detention Basin 2 | Max. Storage | = | 3,108 cuft |

Storage Indication method used.



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 47.38 | 2 | 716 | 95,676 | ------ | ------ | ------ | Subbasin P-1 |
| 2 | SCS Runoff | 6.509 | 2 | 716 | 14,195 | ------ | ------ | ------ | Subbasin P-2 |
| 3 | SCS Runoff | 11.95 | 2 | 716 | 24,138 | ------ | ------ | ------ | Subbasin P-3 |
| 4 | SCS Runoff | 3.298 | 2 | 716 | 7,192 | ------ | ------ | ------ | Subbasin P-4 |
| 5 | Reservoir | 29.30 | 2 | 722 | 95,675 | 1 | 472.67 | 15,572 | Detention Basin 1 |
| 6 | Reservoir | 7.986 | 2 | 720 | 24,136 | 3 | 501.59 | 3,831 | Detention Basin 2 |

# Hydrograph Report

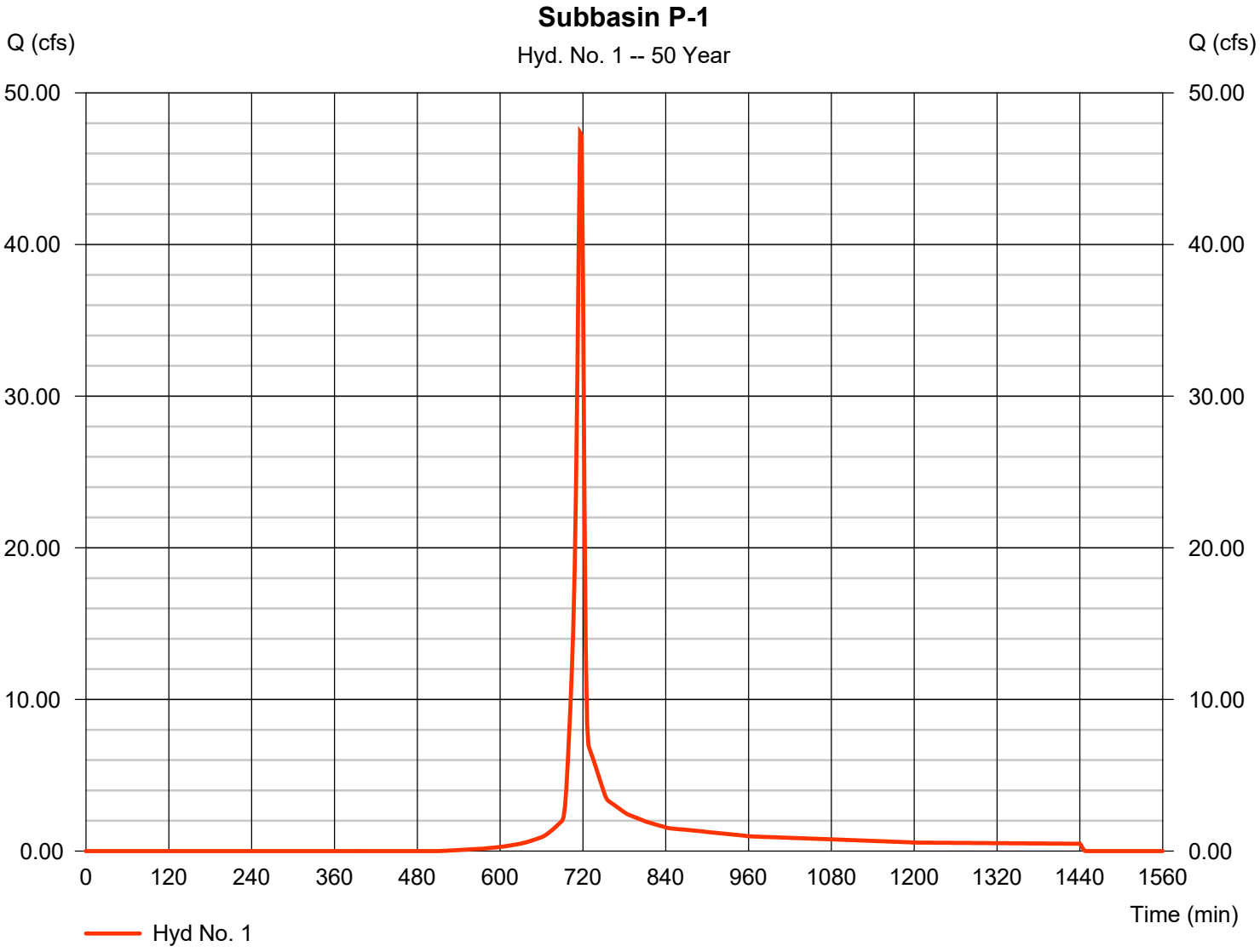


## Hyd. No. 1

Subbasin P-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 47.38 cfs |
| Storm frequency | = 50 yrs | Time to peak | = 716 min |
| Time interval | = 2 min | Hyd. volume | = 95,676 cuft |
| Drainage area | = 8.290 ac | Curve number | = 69* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = TR55 | Time of conc. (Tc) | = 6.40 min |
| Total precip. | = 6.85 in | Distribution | = Type II |
| Storm duration | = 24 hrs | Shape factor | = 484 |

* Composite (Area/CN) = [(1.660 x 75) + (0.980 x 54) + (5.370 x 70) + (0.280 x 61)] / 8.290



# Hydrograph Report

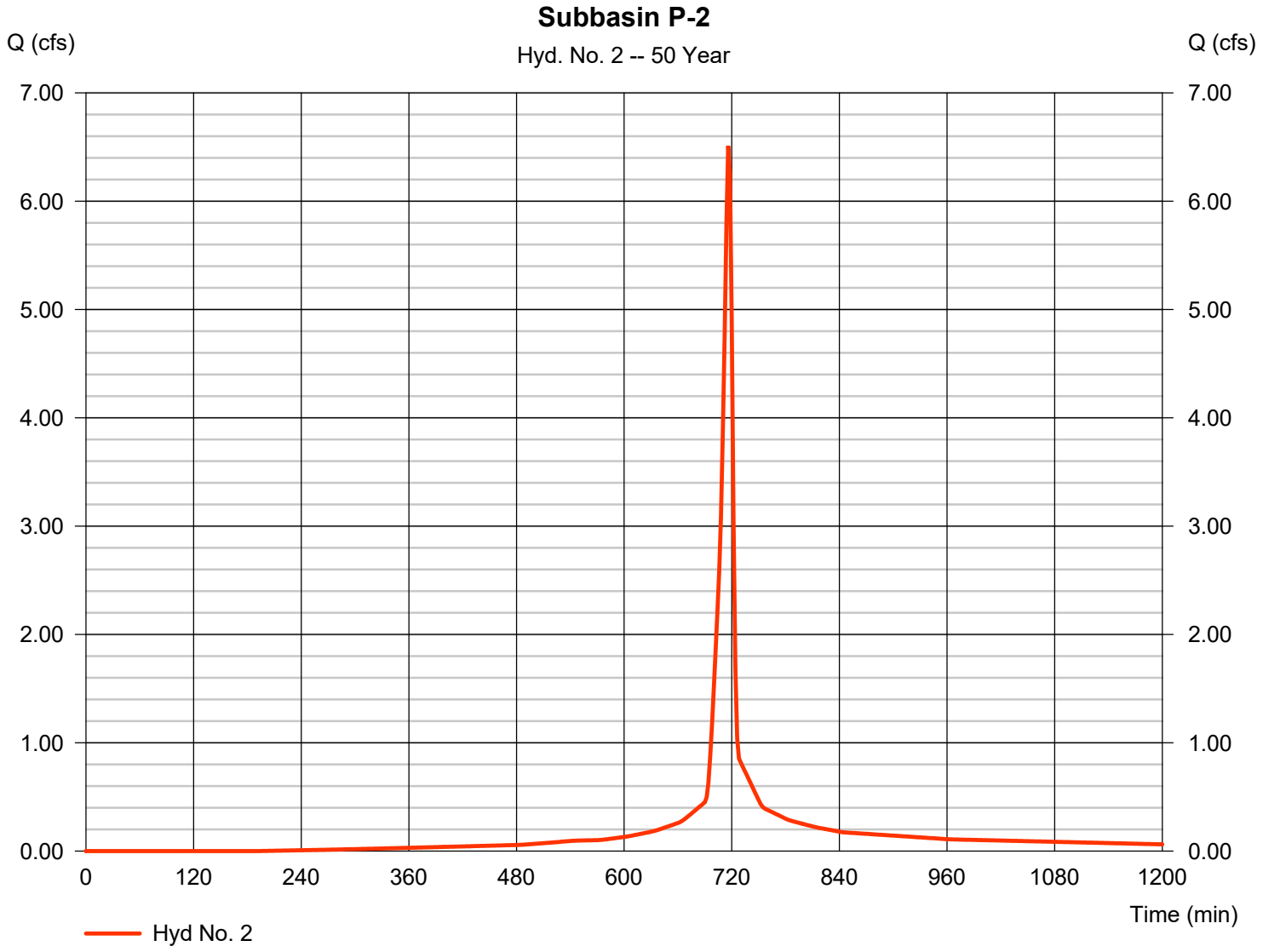


## Hyd. No. 2

Subbasin P-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 6.509 cfs |
| Storm frequency | = | 50 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 14,195 cuft |
| Drainage area | = | 0.750 ac | Curve number | = | 89* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.85 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 70)] / 0.750



# Hydrograph Report

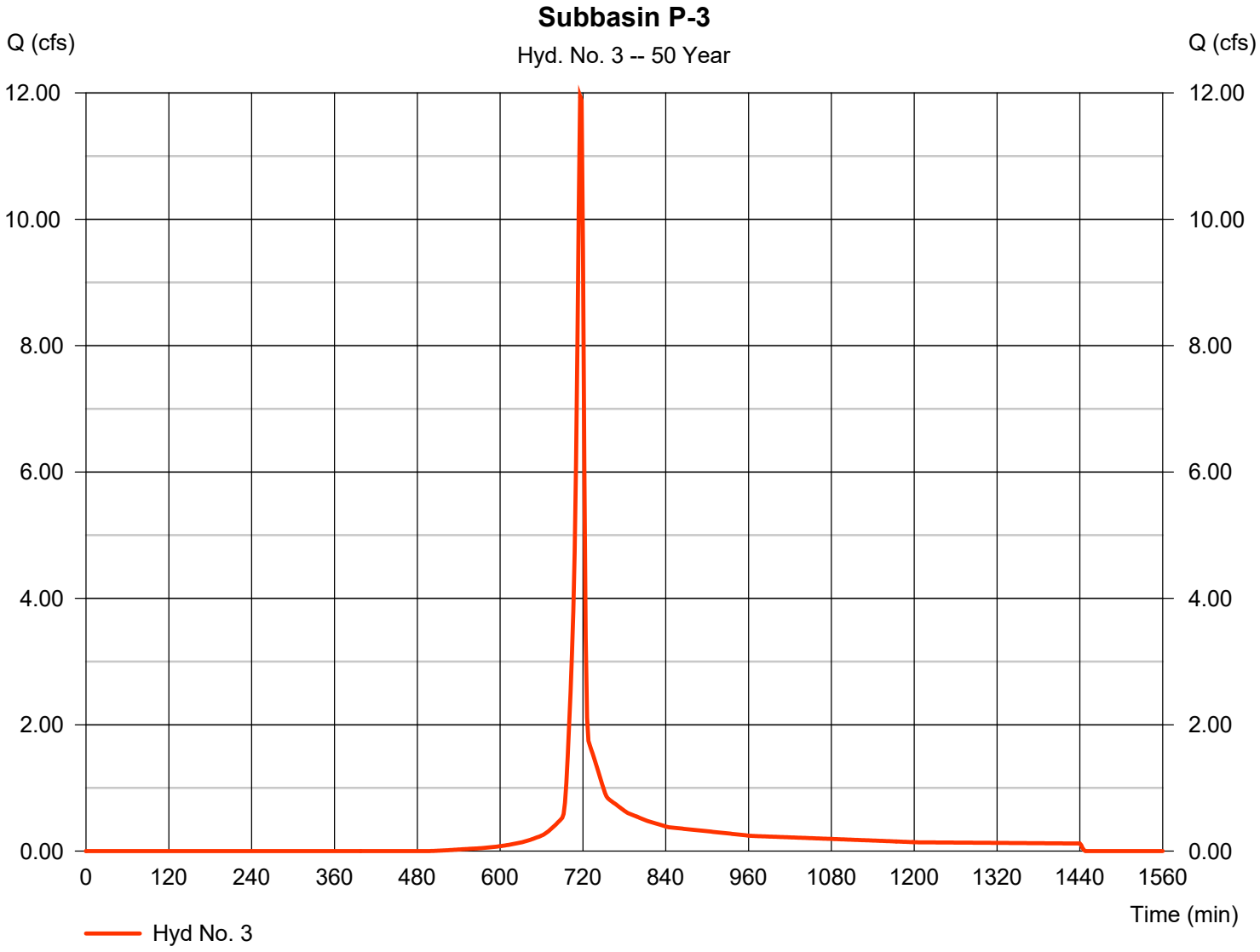


## Hyd. No. 3

Subbasin P-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 11.95 cfs |
| Storm frequency | = | 50 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 24,138 cuft |
| Drainage area | = | 2.030 ac | Curve number | = | 70* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.85 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (1.880 x 70)] / 2.030



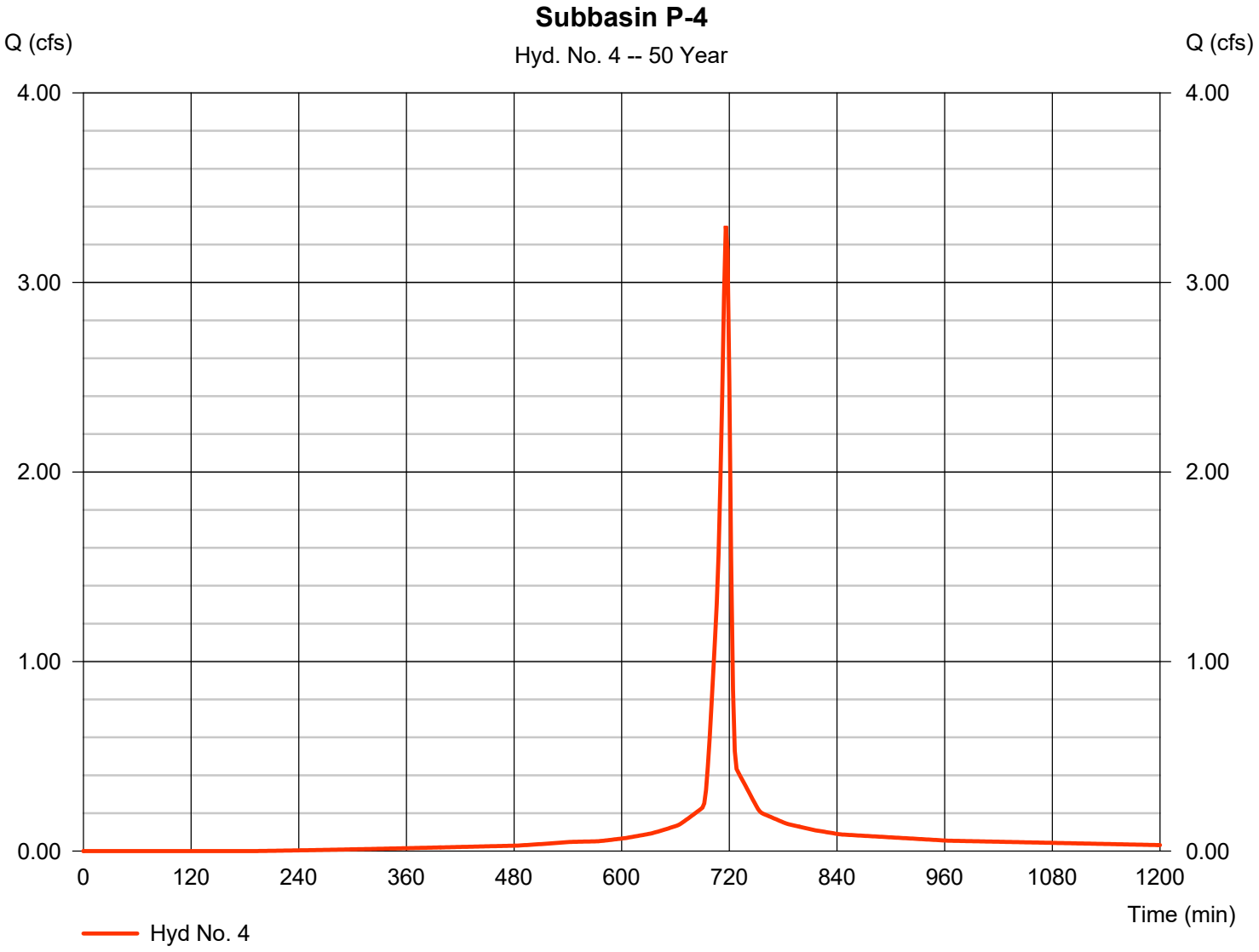
# Hydrograph Report



## Hyd. No. 4

Subbasin P-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 3.298 cfs |
| Storm frequency | = | 50 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 7,192 cuft |
| Drainage area | = | 0.380 ac | Curve number | = | 89 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.85 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



# Hydrograph Report

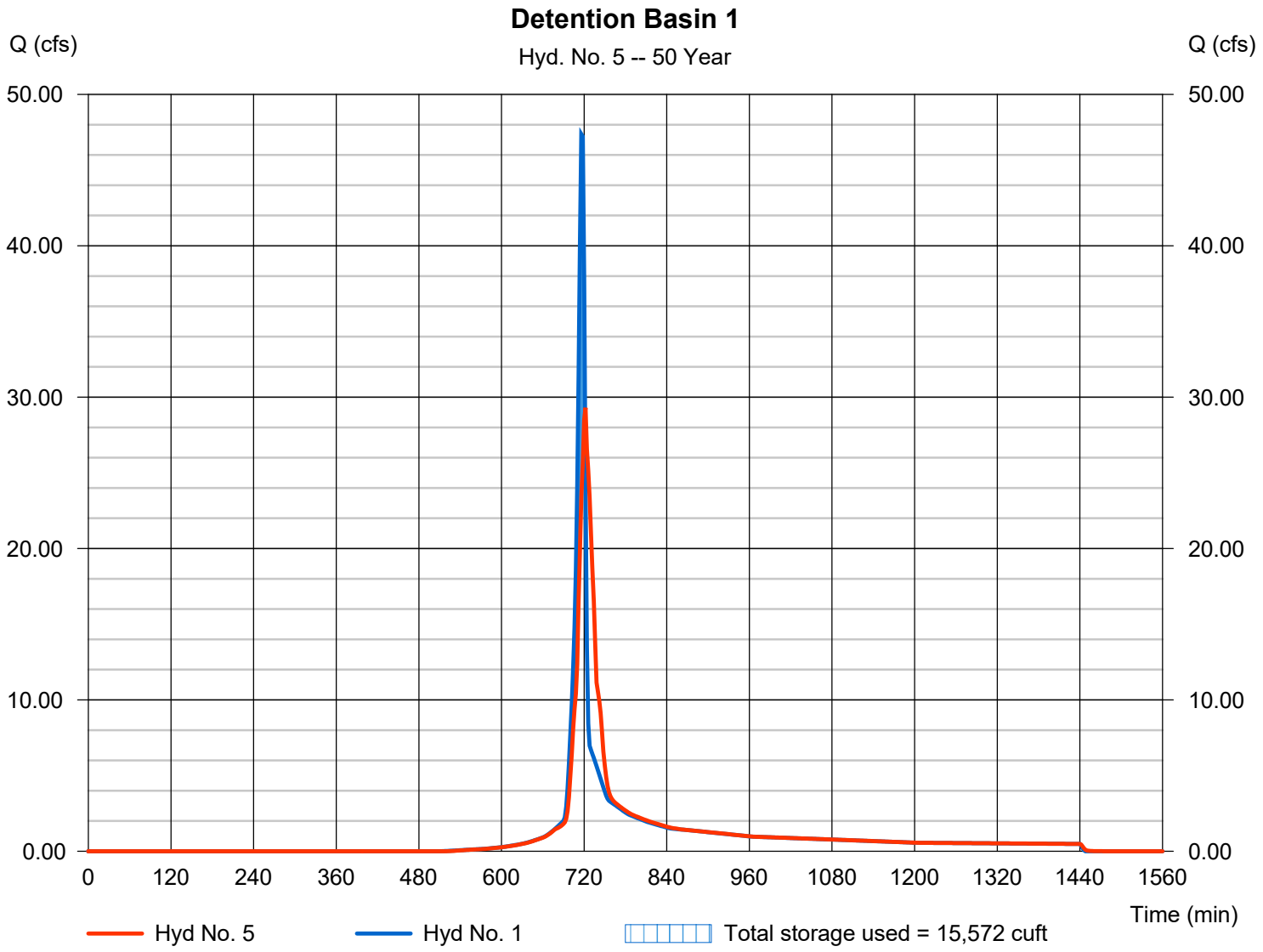


## Hyd. No. 5

Detention Basin 1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 29.30 cfs |
| Storm frequency | = | 50 yrs | Time to peak | = | 722 min |
| Time interval | = | 2 min | Hyd. volume | = | 95,675 cuft |
| Inflow hyd. No. | = | 1 - Subbasin P-1 | Max. Elevation | = | 472.67 ft |
| Reservoir name | = | Detention Basin 1 | Max. Storage | = | 15,572 cuft |

Storage Indication method used.



# Hydrograph Report

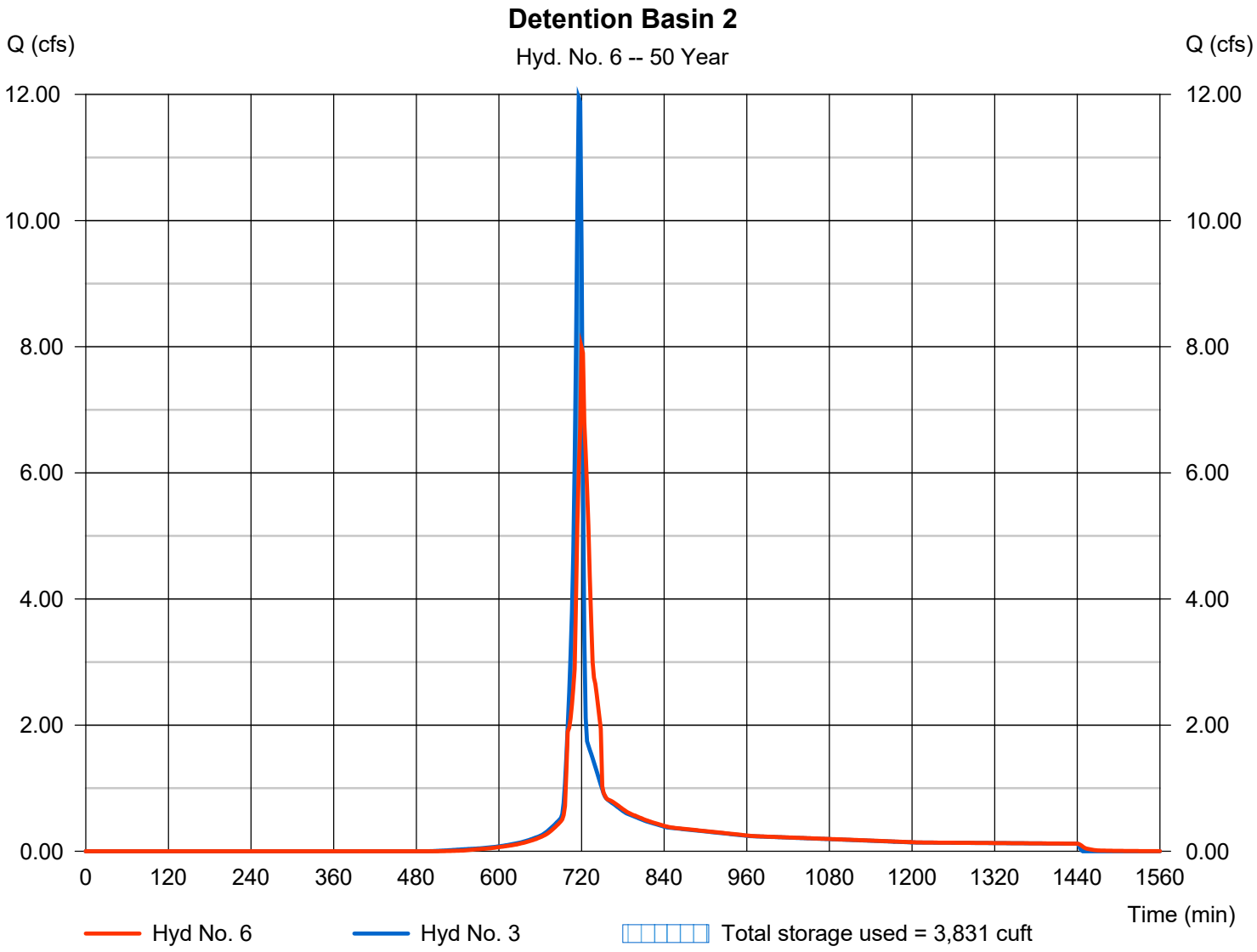


## Hyd. No. 6

Detention Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 7.986 cfs |
| Storm frequency | = | 50 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 24,136 cuft |
| Inflow hyd. No. | = | 3 - Subbasin P-3 | Max. Elevation | = | 501.59 ft |
| Reservoir name | = | Detention Basin 2 | Max. Storage | = | 3,831 cuft |

Storage Indication method used.



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 55.14 | 2 | 716 | 111,527 | ------ | ------ | ------ | Subbasin P-1 |
| 2 | SCS Runoff | 7.233 | 2 | 716 | 15,891 | ------ | ------ | ------ | Subbasin P-2 |
| 3 | SCS Runoff | 13.86 | 2 | 716 | 28,070 | ------ | ------ | ------ | Subbasin P-3 |
| 4 | SCS Runoff | 3.665 | 2 | 716 | 8,052 | ------ | ------ | ------ | Subbasin P-4 |
| 5 | Reservoir | 39.32 | 2 | 720 | 111,526 | 1 | 472.98 | 17,977 | Detention Basin 1 |
| 6 | Reservoir | 11.15 | 2 | 720 | 28,067 | 3 | 501.73 | 4,316 | Detention Basin 2 |

# Hydrograph Report

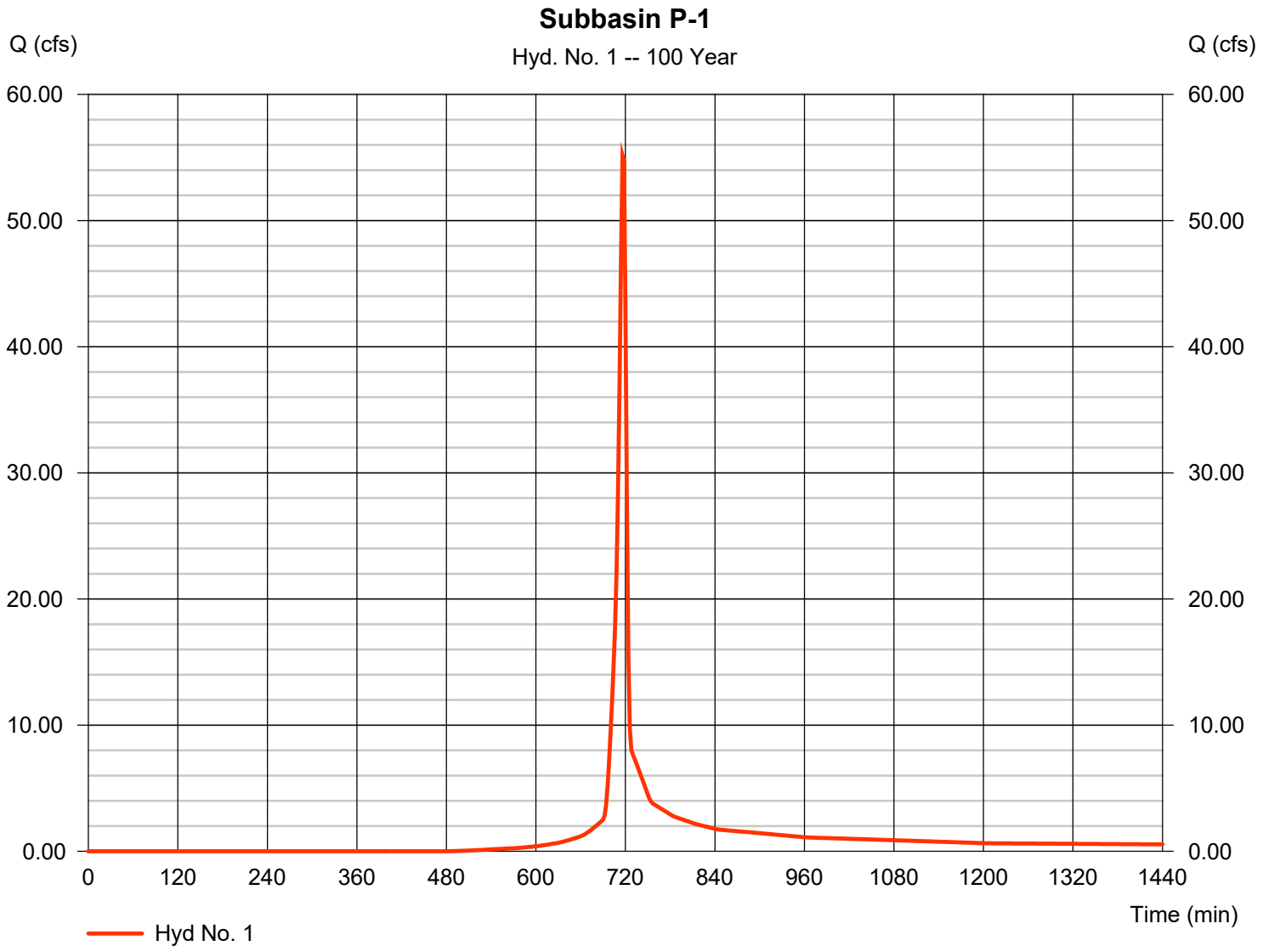


## Hyd. No. 1

Subbasin P-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 55.14 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 111,527 cuft |
| Drainage area | = | 8.290 ac | Curve number | = | 69* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | TR55 | Time of conc. (Tc) | = | 6.40 min |
| Total precip. | = | 7.53 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(1.660 x 75) + (0.980 x 54) + (5.370 x 70) + (0.280 x 61)] / 8.290



# Hydrograph Report

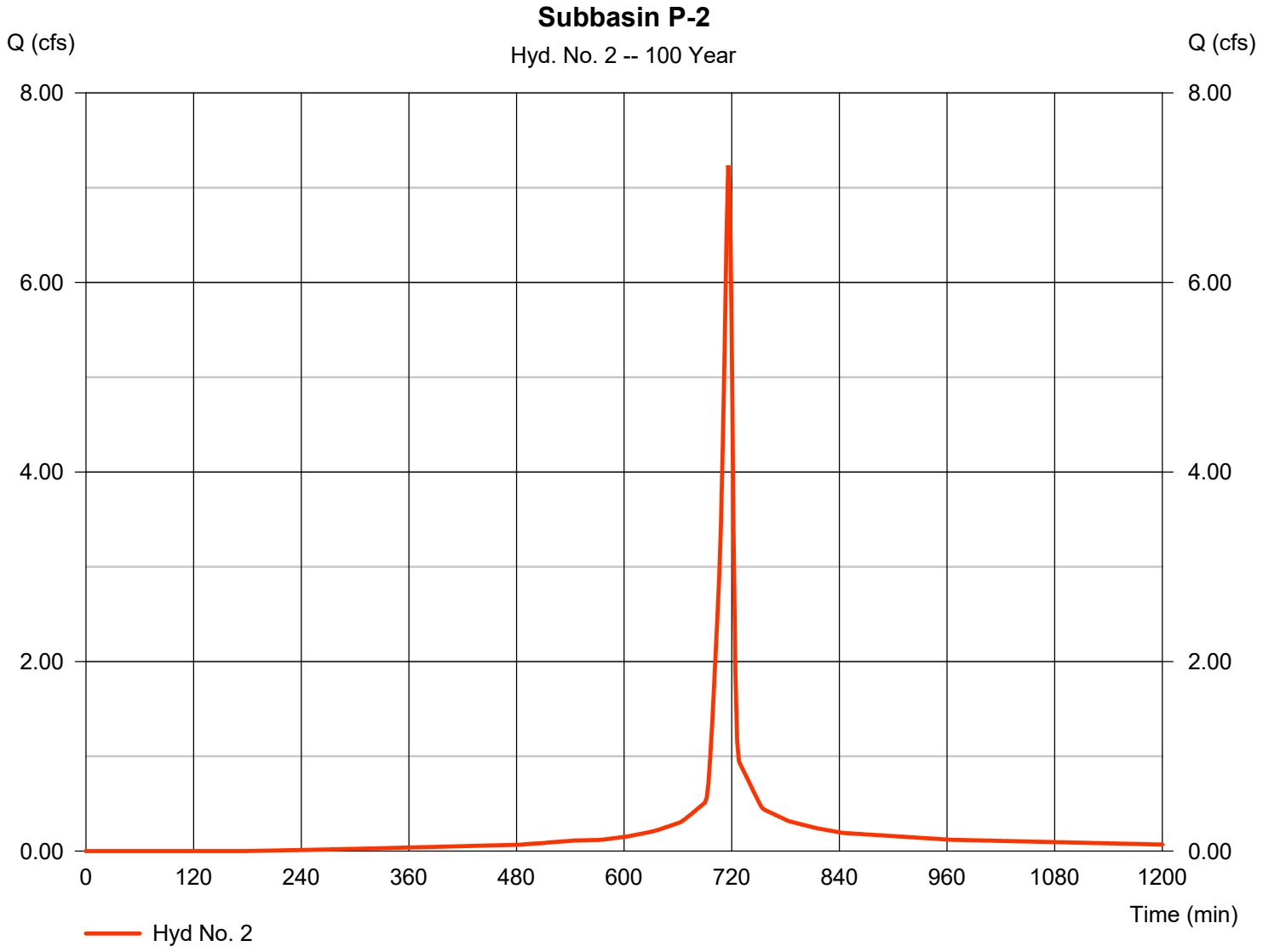


## Hyd. No. 2

Subbasin P-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 7.233 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 15,891 cuft |
| Drainage area | = | 0.750 ac | Curve number | = | 89* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.53 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (2.260 x 70)] / 0.750



# Hydrograph Report

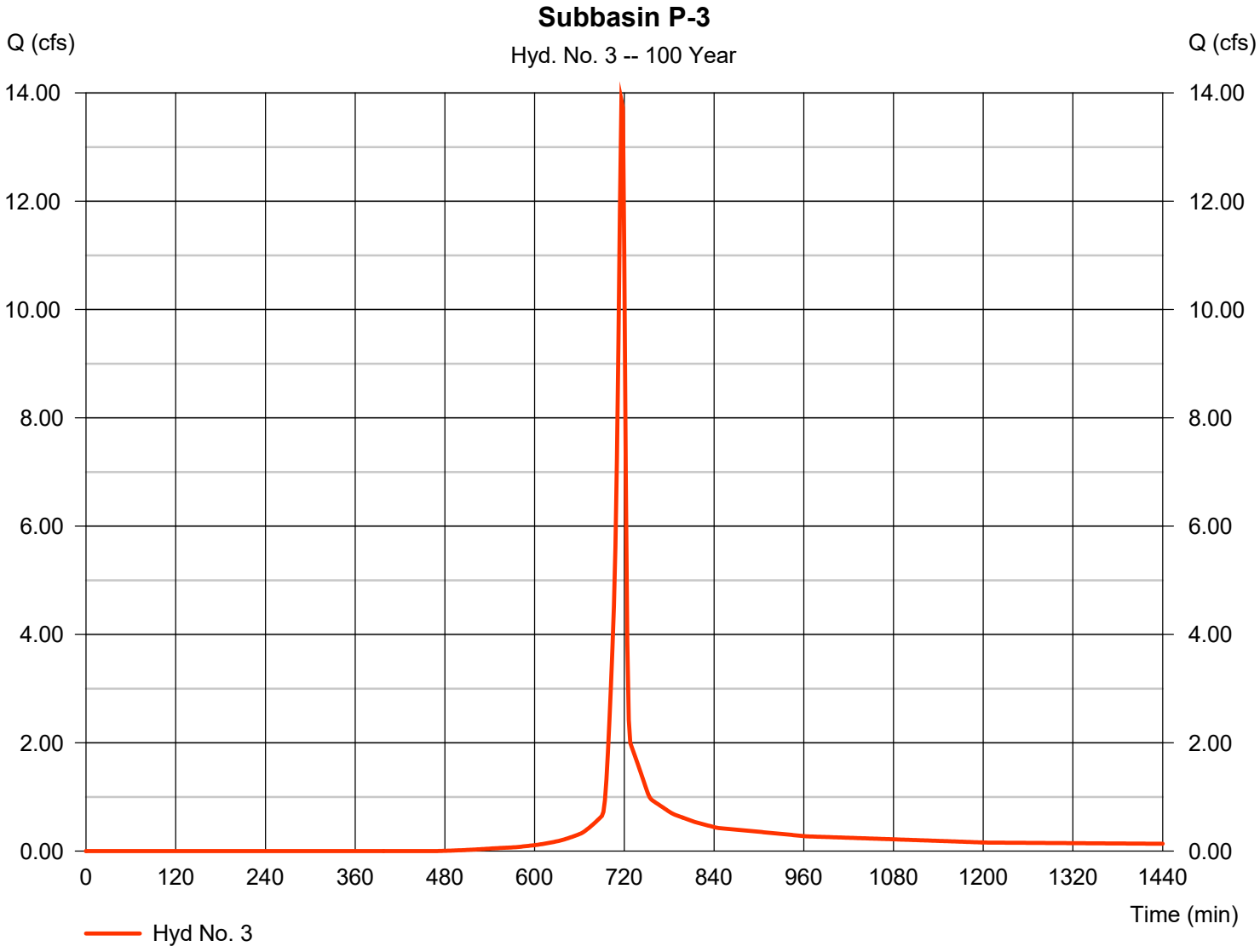


## Hyd. No. 3

Subbasin P-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 13.86 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 28,070 cuft |
| Drainage area | = | 2.030 ac | Curve number | = | 70* |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.53 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |

* Composite (Area/CN) = [(0.150 x 75) + (1.880 x 70)] / 2.030



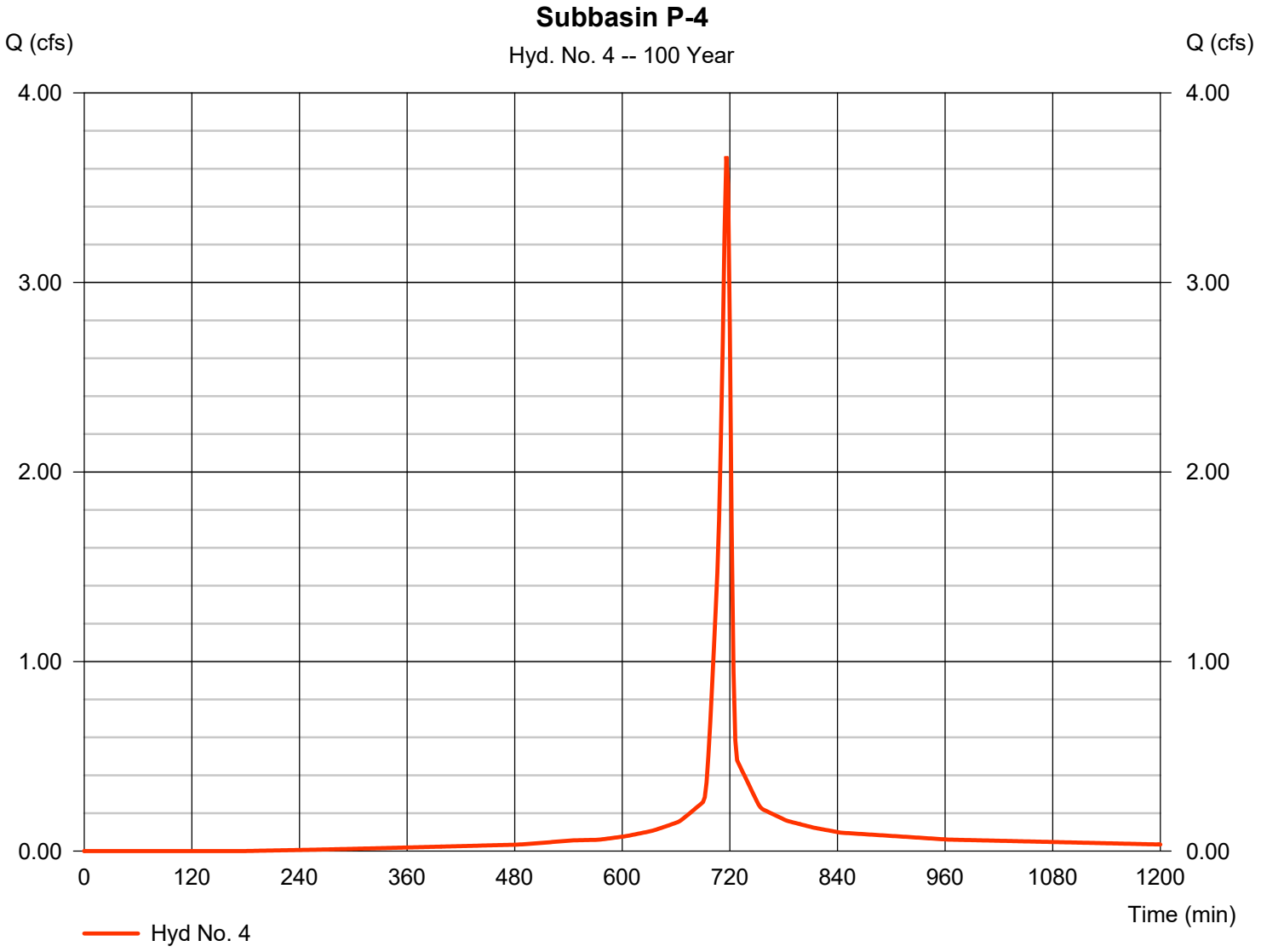
# Hydrograph Report



## Hyd. No. 4

Subbasin P-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 3.665 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 716 min |
| Time interval | = | 2 min | Hyd. volume | = | 8,052 cuft |
| Drainage area | = | 0.380 ac | Curve number | = | 89 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.53 in | Distribution | = | Type II |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



# Hydrograph Report

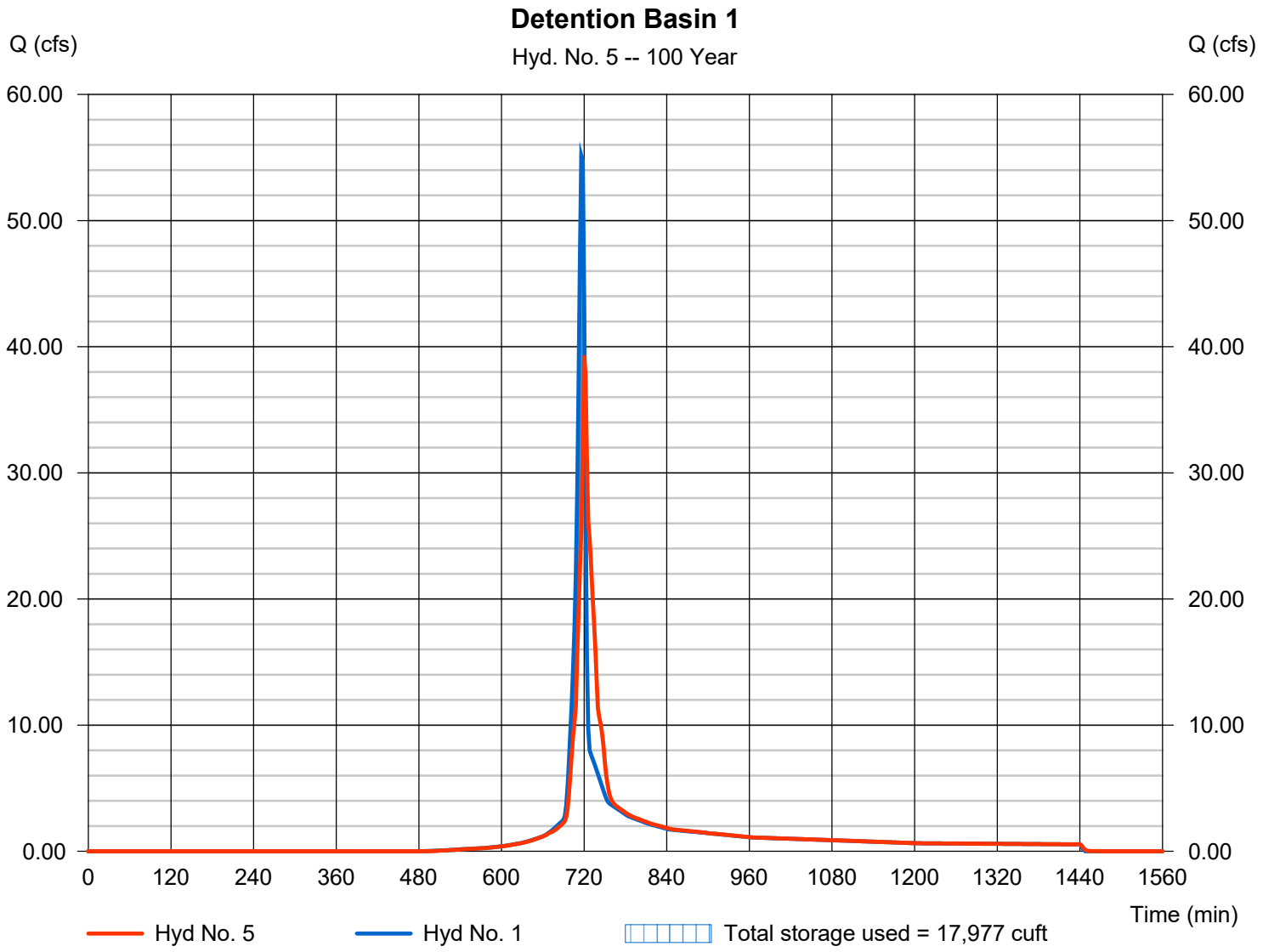


## Hyd. No. 5

Detention Basin 1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 39.32 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 111,526 cuft |
| Inflow hyd. No. | = | 1 - Subbasin P-1 | Max. Elevation | = | 472.98 ft |
| Reservoir name | = | Detention Basin 1 | Max. Storage | = | 17,977 cuft |

Storage Indication method used.



# Hydrograph Report

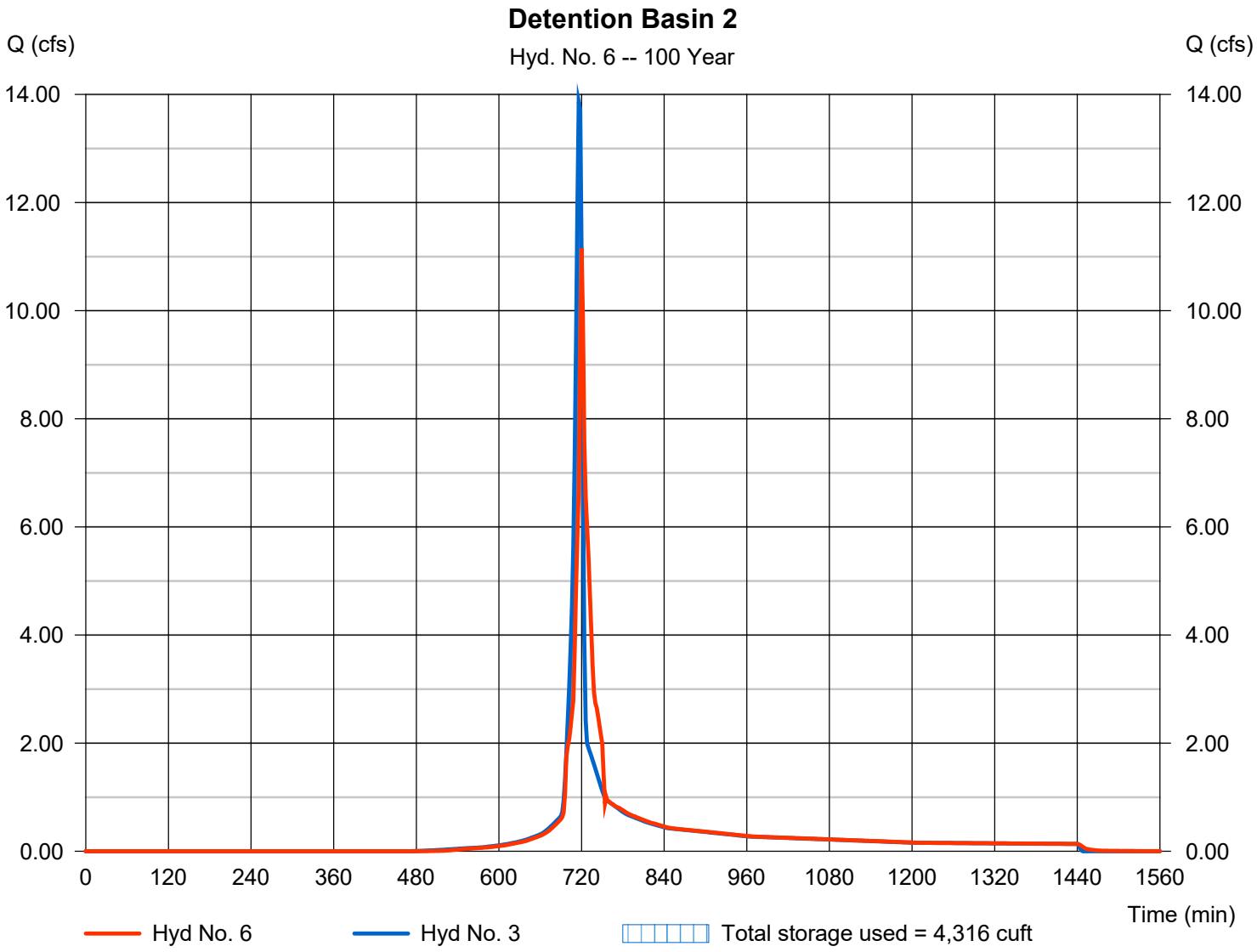


## Hyd. No. 6

Detention Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 11.15 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 720 min |
| Time interval | = | 2 min | Hyd. volume | = | 28,067 cuft |
| Inflow hyd. No. | = | 3 - Subbasin P-3 | Max. Elevation | = | 501.73 ft |
| Reservoir name | = | Detention Basin 2 | Max. Storage | = | 4,316 cuft |

Storage Indication method used.



# Hydraflow Rainfall Report



| Return Period (Yrs) | Intensity-Duration-Frequency Equation Coefficients (FHA) | | | |
|---|---|---|---|---|
| | B | D | E | (N/A) |
| 1 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 2 | 69.8703 | 13.1000 | 0.8658 | -------- |
| 3 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 5 | 79.2597 | 14.6000 | 0.8369 | -------- |
| 10 | 88.2351 | 15.5000 | 0.8279 | -------- |
| 25 | 102.6072 | 16.5000 | 0.8217 | -------- |
| 50 | 114.8193 | 17.2000 | 0.8199 | -------- |
| 100 | 127.1596 | 17.8000 | 0.8186 | -------- |

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 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 5.69 | 4.61 | 3.89 | 3.38 | 2.99 | 2.69 | 2.44 | 2.24 | 2.07 | 1.93 | 1.81 | 1.70 |
| 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 | 6.57 | 5.43 | 4.65 | 4.08 | 3.65 | 3.30 | 3.02 | 2.79 | 2.59 | 2.42 | 2.27 | 2.15 |
| 10 | 7.24 | 6.04 | 5.21 | 4.59 | 4.12 | 3.74 | 3.43 | 3.17 | 2.95 | 2.77 | 2.60 | 2.46 |
| 25 | 8.25 | 6.95 | 6.03 | 5.34 | 4.80 | 4.38 | 4.02 | 3.73 | 3.48 | 3.26 | 3.07 | 2.91 |
| 50 | 9.04 | 7.65 | 6.66 | 5.92 | 5.34 | 4.87 | 4.49 | 4.16 | 3.88 | 3.65 | 3.44 | 3.25 |
| 100 | 9.83 | 8.36 | 7.30 | 6.50 | 5.87 | 5.36 | 4.94 | 4.59 | 4.29 | 4.03 | 3.80 | 3.60 |

Tc = time in minutes. Values may exceed 60.

Precip. file name: C:\Users\Daniel Smola\OneDrive - N A\Autodesk\Civil\Hydrology Data\TN - Metro Nashville.pcp

| Storm Distribution | Rainfall Precipitation Table (in) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
| SCS 24-hour | 0.00 | 3.39 | 0.00 | 4.50 | 5.23 | 6.16 | 6.85 | 7.53 |
| SCS 6-Hr | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-1st | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-2nd | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-3rd | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-4th | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-Indy | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Custom | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

HARPETH CIVIL

NARRATIVE AND SUPPORTING CALCULATIONS FOR PUBLIC WATER AND SEWER IMPROVEMENTS FOR:

# ELEANOR VILLAGE SUBDIVISION

ASHLAND CITY, TENNESSEE

MAP 55E, GR A, PAR 15


Original Issuance: December 23, 2019

**PREPARED BY:**

HARPETH CIVIL, INC.

179 BELLE FOREST CIR., STE. 204E

NASHVILLE, TN. 37221

**PREPARED FOR:**

DAKOTA WIND PROPERTIES, LLC

1152 DUNCANWOOD DRIVE

NASHVILLE, TN. 37204

HARPETH CIVIL

## TABLE OF CONTENTS



## APPENDIX

## ABSTRACT

The scope of this report is limited to the hydraulic analysis of the proposed 6" public water line extension and separate Low-Pressure Sewer (LPS) extensions as shown on the civil engineering project documents. The proposed utility extensions are necessary to provide a point for water and sewer connection to a public system for a portion of the proposed lots of Eleanor Village Subdivision.

The existing 8.1acre parcel is currently bounded to the east by Poole Street, to the south by Forrest Street, and to the west by Gallaher Street. Poole Street currently provides points of connection to the public system for sewer and water service to proposed Lots 1-4. Forrest Street provides points of connection to the public system for water service to Lots 5-9 and sewer services to Lots 5-6. Gallaher Street is without a point of connection to the public system for water and sewer along the parcel frontage.

**Design Summary - Low-Pressure Sewer (LPS)**

To provide sanitary sewer services to Lots 10-13 on Gallaher Street and Lots 7-9 on Forrest Street, the extension of the adjacent public sanitary sewer as a gravity system was investigated and discussed on-site with Ashland City Public Works representative Kevin Lee.

During the on-site meeting the feasibility of providing a public extension of the sanitary sewer main to the south on Smith Street was rejected due to known utility conflict at the intersection of Gallaher Street and Forrest Street, a substantial drainage culvert crossing, and the likelihood of grade challenges that would reduce the feasibility of gravity flow. For this reason, it was determined a more direct point of connection to the public sanitary main approximately 150 feet north on Gallaher Street for Lots 10-13 and a connection to the public sanitary main on Forrest Street in front Lot 6 for Lots 7-9 would be most desirable. However, this path would also provide grade challenges that prevent a gravity flow extension. Due to the parcels location and that all adjacent land has been previously developed, it was recommended the proposed extensions consist of a Low-Pressure System Sewer System (LPS) to accommodate the connection of future EOne Grinder Pumps as single-family residential structures are constructed.

The Low-Pressure Sewer System (LPS) followed the design methodologies reflected in the LPS Design Manual issued by city approved provider Environment One Corporation and included design flows established by the Tennessee Department of Environment and Conservation (TDEC) for single-family residential development. The LPS system includes the construction of a single PVC force-main that extends from the point of connection at the existing public sanitary manhole to the frontage of the proposed lots requiring sanitary sewer service. A check valve assembly will be installed within a below grade enclosure at the frontage of the lot which will serve as a point of connection from the grinder pump of the future residence.

Based on design methodologies, the force-main sizing considers the statistical likelihood of multiple pumps running at any given time and the size of the force main is adjusted to provide the desired velocity range. As reflected on the calculation included in Appendix B, the Gallaher Street and Forrest Street force-mails are 2.0 inches and 1.5 inches respectively.

**Design Summary – Water Distribution System**

As discussed in the Abstract section of this report, Lots 10-13 along Gallaher Street will require the extension of the public water main to provide service for the future single-family home sites. Based upon discussions held on-site with Ashland City Public Works representative Kevin Lee, it was determined the city would prefer the 6 inch public extension provide a looped connection from the existing system approximately 100 feet north of the subject property on Gallaher Street to the existing system located at the intersection of Gallaher Street and Forrest Street.

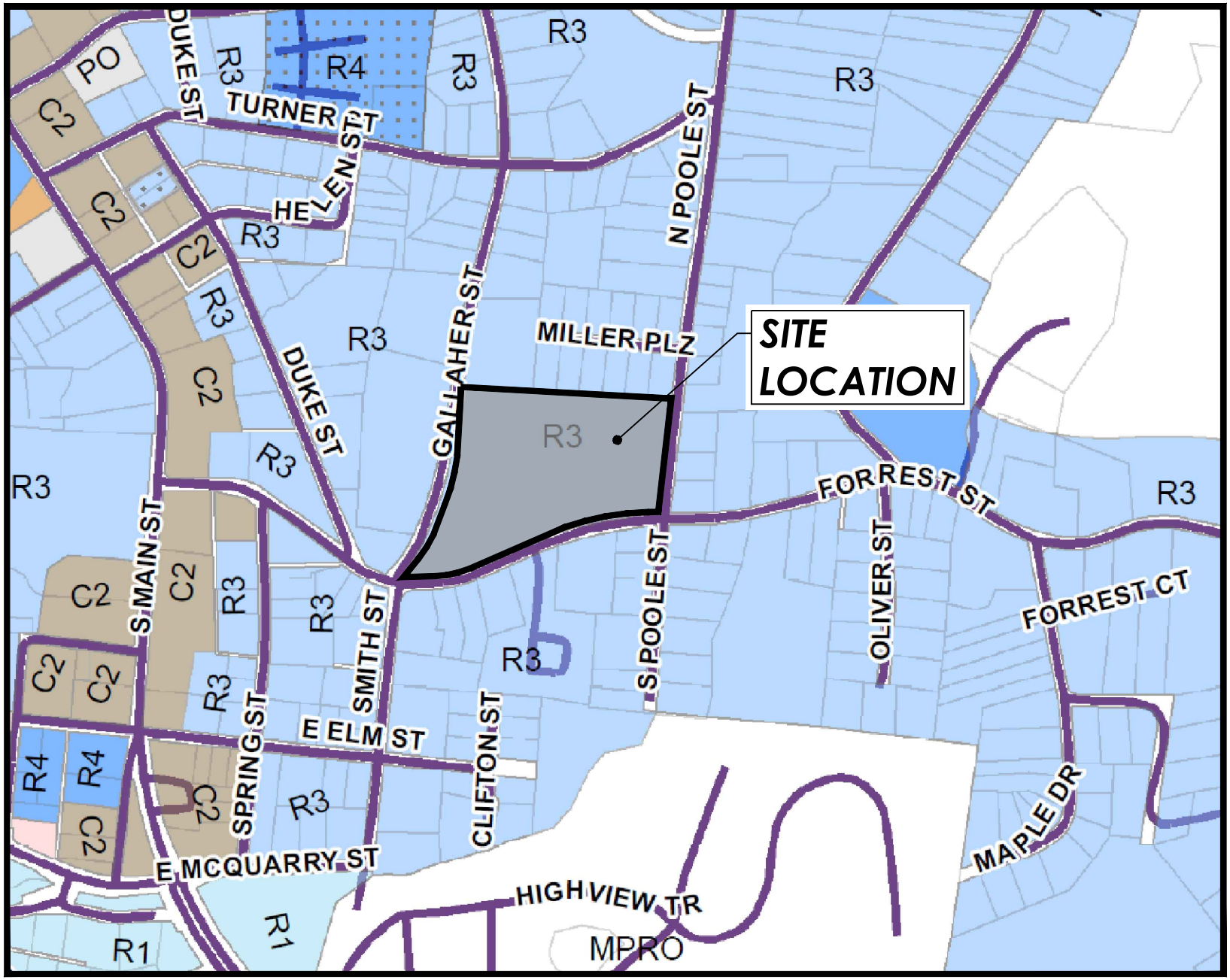
The looped connection will include the construction of approximately 870 linear feet of 6 inch water line along the east side of Gallaher Road within the public right-of-way. The extension will also include the installation of a new public fire hydrant along the east side of Gallaher Street near the midpoint of the extension.

Fire hydrant flow tests were performed by Hethcoat & Davis and the results of which are included in Appendix C of this report. The hydrants tested were located approximately 200 feet north of the subject parcel on Gallaher Street and near the intersection of Gallaher Street and Forrest Street, both of which are located to either end of the public extension.

The results of the flow test are utilized along with field collected survey information and geometric design data as input variables into EPANet 2 Water Supply Analysis software. The results indicate sufficient pressure and flow along the proposed extension including at the proposed fire hydrant which achieves 750 GPM at 33.6 PSI, which is in excess the minimum city allowable of 750 GPM at 20 psi. Calculation results are included in Appendix C of this report.

# APPENDIX A

## Site Location Map




***SITE LOCATION MAP***

***(NOT TO SCALE)***

# APPENDIX B

## LOW-PRESSURE SEWER SYSTEM (LPS) CALCULATIONS

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
Daniel Smola, P.E.

Eleanor Village Sibdivision - Gallaher Street
Ashland City, Cheatham County, Tennessee

December 18, 2019

| Zone Number | Connects to Zone | Number of Pumps in Zone | Accum Pumps in Zone | Gals/day per Pump | Max Flow Per Pump (gpm) | Max Sim Ops | Max Flow (GPM) | Pipe Size (inches) | Max Velocity (FPS) | Length of Main this Zone | Friction Loss Factor (ft/100 ft) | Friction Loss This Zone | Accum Fric Loss (feet) | Max Main Elevation | Minimum Pump Elevation | Static Head (feet) | Total Dynamic Head (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| This spreadsheet was calculated using pipe diameters for: SDR21PVC | | | | | | | | | | | Friction loss calculations were based on a Constant for inside roughness "C" of: 150 | | | | | | |
| 1.00 | 1.00 | 4 | 4 | 350 | 11.00 | 3 | 33.00 | 2.00 | 2.92 | 450.00 | 1.54 | 6.94 | 6.94 | 503.50 | 478.00 | 25.50 | 32.44 |



Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR)

Prepared By:
Daniel Smola, P.E.

Eleanor Village Sibdivision - Gallaher Street
Ashland City, Cheatham County, Tennessee

December 18, 2019

| Zone Number | Connects to Zone | Accumulated Total of Pumps this Zone | Pipe Size (inches) | Gallons per 100 lineal feet | Length of Zone | Capacity of Zone | Average Daily Flow | Average Fluid Changes per Day | Average Retention Time (Hr) | Accumulated Retention Time (Hr) |
|---|---|---|---|---|---|---|---|---|---|---|
| This spreadsheet was calculated using pipe diameters for: SDR21PVC | | | | | | | | Gals per Day per Dwelling | | 200 |
| 1.00 | 1.00 | 4 | 2.00 | 18.84 | 450.00 | 84.79 | 1,400 | 16.51 | 1.45 | 1.45 |



Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
Daniel Smola, P.E.

Eleanor Village Sibdivision - Forrest Street
Ashland City, Cheatham County, Tennessee

December 18, 2019

| Zone Number | Connects to Zone | Number of Pumps in Zone | Accum Pumps in Zone | Gals/day per Pump | Max Flow Per Pump (gpm) | Max Sim Ops | Max Flow (GPM) | Pipe Size (inches) | Max Velocity (FPS) | Length of Main this Zone | Friction Loss Factor (ft/100 ft) | Friction Loss This Zone | Accum Fric Loss (feet) | Max Main Elevation | Minimum Pump Elevation | Static Head (feet) | Total Dynamic Head (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| This spreadsheet was calculated using pipe diameters for: SDR21PVC | | | | | | | | | | | Friction loss calculations were based on a Constant for inside roughness "C" of: 150 | | | | | | |
| 1.00 | 1.00 | 3 | 3 | 350 | 11.00 | 2 | 22.00 | 1.50 | 3.04 | 340.00 | 2.15 | 7.32 | 7.32 | 506.00 | 473.00 | 33.00 | 40.32 |



Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR)

Prepared By:
Daniel Smola, P.E.

Eleanor Village Sibdivision - Forrest Street
Ashland City, Cheatham County, Tennessee

December 18, 2019

| Zone Number | Connects to Zone | Accumulated Total of Pumps this Zone | Pipe Size (inches) | Gallons per 100 lineal feet | Length of Zone | Capacity of Zone | Average Daily Flow | Average Fluid Changes per Day | Average Retention Time (Hr) | Accumulated Retention Time (Hr) |
|---|---|---|---|---|---|---|---|---|---|---|
| This spreadsheet was calculated using pipe diameters for: SDR21PVC | | | | | | | | Gals per Day per Dwelling | | 200 |
| 1.00 | 1.00 | 3 | 1.50 | 12.07 | 340.00 | 41.04 | 1,050 | 25.59 | 0.94 | 0.94 |



Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One

# APPENDIX C

## WATER DISTRIBUTION SYSTEM CALCULATIONS

HETHCOAT & DAVIS, INC.
278 Franklin Road
Building 4, Suite 200
Brentwood, TN 37027
Phone: (615) 577-4300
Fax: (615) 577-4303

December 9, 2019

# MEMORANDUM

From: Hunter Patton, E.I.

To: Daniel Smola, P.E., President, Harpeth Civil, Inc.

**Re: Flow Test – 115 Forrest Street**

---

Two (2) one-hydrant fire flow tests were performed on December 6, 2019 for 115 Forrest Street in Ashland City, TN. The flow tests started at approximately 10:15 A.M., CST. The two tests were executed by Hunter Patton (H&D). The two hydrants analyzed in the tests are described as follows:

Flow Hydrant #1 – Location shown on attached map

Flow Hydrant #2 – Location shown on attached map

Results were as follows:

Flow Hydrant #1 – Static Pressure = 39 psi
Residual Pressure = 38 psi
Flow (Q) = 638 GPM

Flow Hydrant #2 – Static Pressure = 52 psi
Residual Pressure = 24 psi
Flow (Q) = 494 GPM

It should be noted that the results provided are instantaneous readings and H&D cannot ensure that it represents actual hydrant flow conditions over any period of time. Again, the pressures stated above are at the point of connection to the Ashland City Water system and does not include losses that may occur due to metering, backflow prevention or multiple story construction.

Please advise if you have questions or require additional information.


d St
Turner St
Helen St
Gallaher St
Duke St
Miller Plaza
N Poole St
Bell St
100
Forrest St
Clark Cir
S Poole St
Oliver St
E Elm St
Spring St
Smith St
N
300'
0
300'
600'
GRAPHIC SCALE
FILE NO.

# Hydrant Flow Test Report

**Test Date** 12/6/2019 **Test Time** 10:15 PM

## Location

115 Forrest Street
Ashland City, TN

## Tested by

Hunter Patton - H&D

## Notes

Flow Hydrant #1

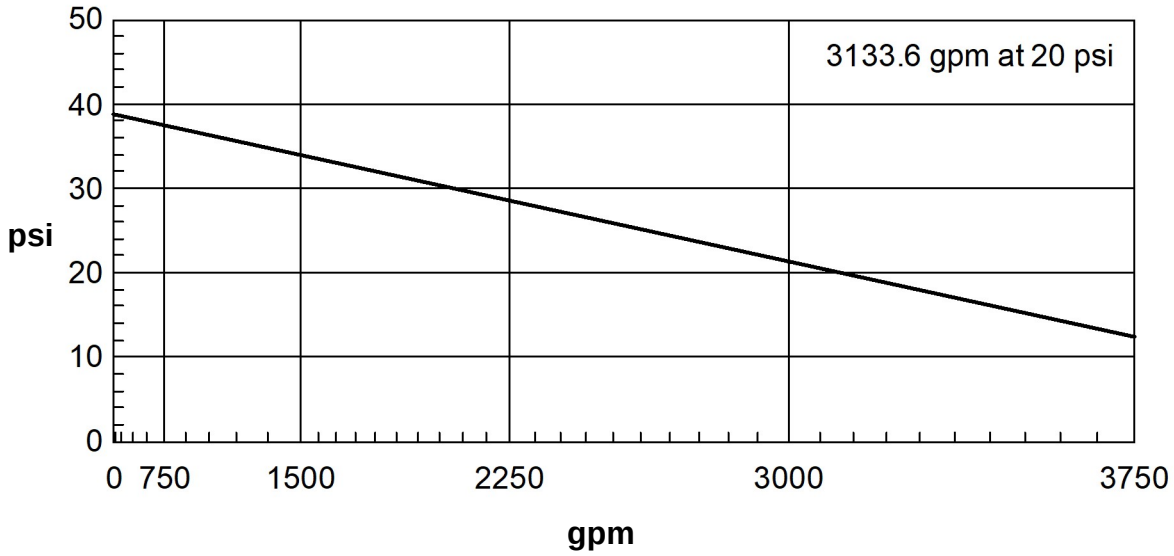
## Read Hydrant

39 psi **static pressure**
38 psi **residual pressure**
498 ft **hydrant elevation**

## Flow Hydrant(s)

| Outlet | Elev | Size | C | Pitot Pressure | Flow |
|---|---|---|---|---|---|
| #1 | 498 | 2 | 1.38 | 15 | 638 gpm |

## Flow Graph



# Hydrant Flow Test Report

**Test Date** 12/6/2019 **Test Time** 10:45 PM

## Location

115 Forrest Street
Ashland City, TN

## Tested by

Hunter Patton - H&D

## Notes

Flow Hydrant #2

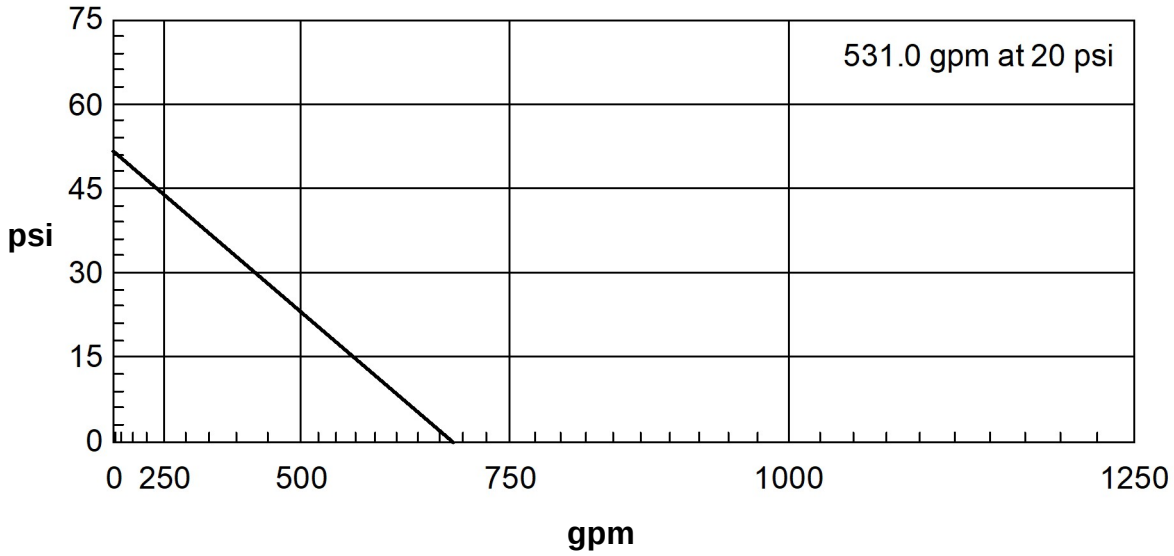
## Read Hydrant

52 psi **static pressure**
24 psi **residual pressure**
469 ft **hydrant elevation**

## Flow Hydrant(s)

| Outlet | Elev | Size | C | Pitot Pressure | Flow |
|---|---|---|---|---|---|
| #1 | 469 | 2 | 1.38 | 9 | 494 gpm |

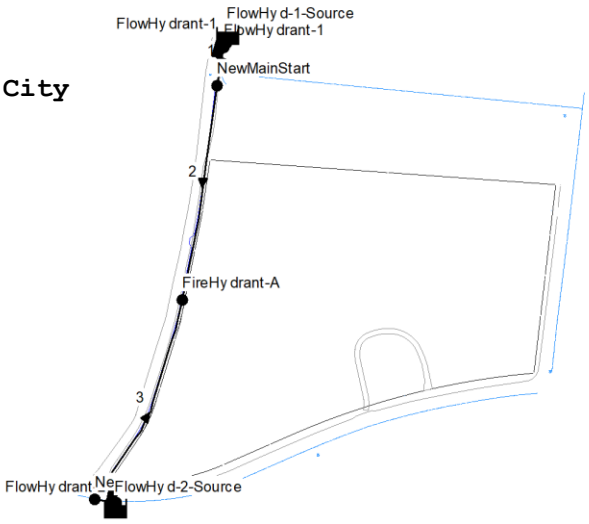
## Flow Graph



```
******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.0                             *
******************************************************************

Input File: Gallaher Street.net

Eleanor Village Subdivision - Ashland City
```




Link - Node Table:

| Link ID | Start Node | End Node | Length ft | Diameter in | |
|---|---|---|---|---|---|
| 2 | NewMainStart | FireHydrant-A | 435.42 | 6 | |
| 3 | FireHydrant-A | NewMainEnd | 433.10 | 6 | |
| 1 | FlowHydrant-1 | NewMainStart | 100 | 6 | |
| NewMainEnd | NewMainEnd | FlowHydrant-2 | 100 | 6 | |
| FlowHydrant-1 | FlowHyd-1-Source | FlowHydrant-1 | #N/A | #N/A | Pump |
| FlowHydrant-2 | FlowHyd-2-Source | FlowHydrant-2 | #N/A | #N/A | Pump |

Node Results:

| Node ID | Demand GPM | Head ft | Pressure psi | Quality | |
|---|---|---|---|---|---|
| NewMainStart | 0.00 | 584.02 | 36.40 | 0.00 | |
| NewMainEnd | 0.00 | 575.46 | 46.56 | 0.00 | |
| FireHydrant-A | 750.00 | 573.68 | 33.66 | 0.00 | |
| FlowHydrant-1 | 0.00 | 586.39 | 38.30 | 0.00 | |
| FlowHydrant-2 | 0.00 | 575.87 | 46.31 | 0.00 | |
| FlowHyd-1-Source | -540.47 | 498.00 | 0.00 | 0.00 | Reservoir |
| FlowHyd-2-Source | -209.53 | 469.00 | 0.00 | 0.00 | Reservoir |

**Link Results:**

| Link ID | Flow GPM | Velocity fps | Unit Headloss ft/Kft | Status |
|---|---|---|---|---|
| 2 | 540.47 | 6.13 | 23.73 | Open |
| 3 | -209.53 | 2.38 | 4.10 | Open |
| 1 | 540.47 | 6.13 | 23.73 | Open |
| NewMainEnd | -209.53 | 2.38 | 4.10 | Open |
| FlowHydrant-1 | 540.47 | 0.00 | -88.39 | Open Pump |
| FlowHydrant-2 | 209.53 | 0.00 | -106.87 | Open Pump |

# PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR
# ELEANOR VILLAGE SUBDIVISION
## ASHLAND CITY
## CHEATHAM COUNTY, TENNESSEE
### (MAP 55E, GR A, PAR 15 / CURRENTLY ZONED R-3)

**FEMA NOTE:**

1. THE PROPERTY IS LOCATED IN AREAS DESIGNATED AS "ZONE X" (AREAS TO BE DETERMINED OUTSIDE OF THE 0.2% ANNUAL RISK FLOODPLAIN) AS NOTED ON THE CURRENT FEMA COMMUNITY PANEL:

**MAP NUMBER: 47021C0170D** **EFFECTIVE DATE: SEPTEMBER 17, 2010**

**WATER AND SEWER AS-BUILT NOTE:**

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH AS-BUILT SURVEY INFORMATION SEALED BY A TENNESSEE REGISTERED LAND SURVEYOR INCLUDING THE ACTUAL FIELD ANGLES BETWEEN LINES, DEPTH TO TOP OF PIPE, AND REFLECT ALL ALIGNMENT AND GRADE CHANGES.

THE DEVELOPER'S ENGINEER SHALL PROVIDE A COMPLETE SET OF RECORD DRAWINGS ON MOIST ERASABLE CRONAFLEX MYLAR REPRODUCTIONS IN REVERSE, OR THE ORIGINAL DRAWINGS ON K & E PLAT 1 HERCULENE DRAFTING FILM OR EQUAL, UPON COMPLETION OF CONSTRUCTION AND THEY SHALL INCLUDE:
1. ACTUAL FIELD ANGLES BETWEEN LINES
2. THE DEPTH TO TOP OF THE END OF THE SERVICE LINE
3. REFLECT ALL ALIGNMENT AND GRADE CHANGES.

THIS ITEM MUST BE SUBMITTED PRIOR TO ACCEPTANCE OF THE SEWERS AND WATER MAIN INTO THE PUBLIC SYSTEM AND CONNECTION BEING MADE THERETO.

**STORMWATER AS-BUILT NOTE:**

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH AS-BUILT SURVEY INFORMATION SEALED BY A TENNESSEE REGISTERED LAND SURVEYOR IN DWG FILE FORMAT ASSOCIATED TO TENNESSEE STATE PLANE NAD83 HORIZONTAL DATUM AND USGS NAVD88 VERTICAL DATUM.

THE SURVEY INFORMATION SHALL INCLUDE:
- FINAL SPOT SHOTS AND TOPOGRAPHY FOR DETENTION BASIN VOLUMES
- DETENTION BASIN TOP OF BERM & OVERFLOW ELEVATIONS
- PIPE INVERTS, SIZES, TYPES, AND SLOPES

**ADA NOTES:**

1. ALL CONSTRUCTION ACTIVITIES SHALL BE COMPLETED IN FULL COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA), 2010 ADA STANDARDS FOR ACCESSIBILITY DESIGN ADOPTED BY METRO.
2. THE CONTRACTOR SHALL ASSURE THAT ALL SERVICES PROVIDED UNDER THE CONSTRUCTION CONTRACT SHALL BE COMPLETED IN FULL COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA), 2010 DESIGN STANDARDS FOR ACCESSIBLE DESIGN.

**TDEC CGP NOTE:**

I HEREBY CERTIFY THAT THIS PROJECT DOES **NOT** REQUIRE COVERAGE UNDER A TENNESSEE CONSTRUCTION GENERAL PERMIT. THE TOTAL DISTURBED AREA IS: **0.86 ACRES**.

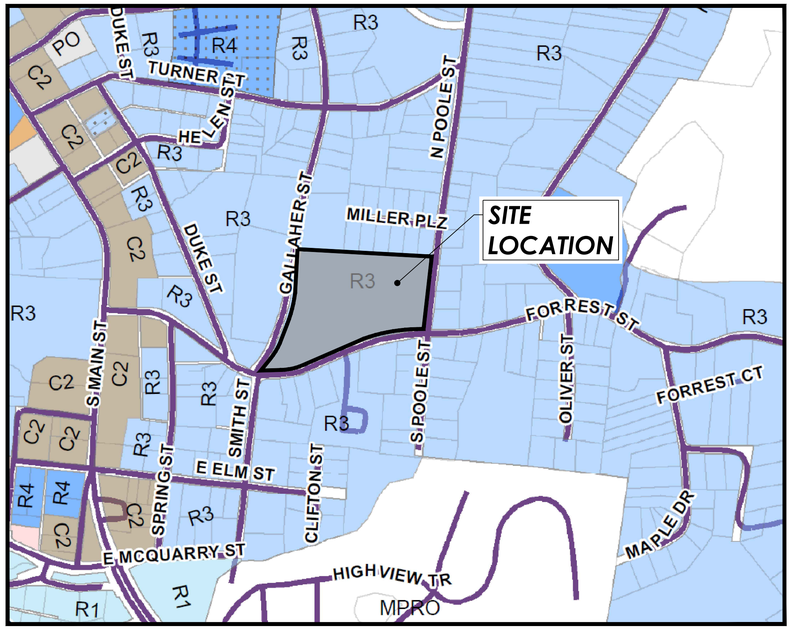
CHECK ALL THAT APPLY: THIS SITE DISCHARGES INTO WATERS IDENTIFIED BY TDEC AS:

☐ IMPAIRED FOR SILTATION ☐ IMPAIRED FOR HABITAT ALTERATION ☐ EXCEPTIONAL

12/20/2019

PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF TENNESSEE DATE

CIRCLE ONE: DEVELOPER (PROJECT ENGINEER) OTHER_____




***SITE LOCATION MAP***
***(NOT TO SCALE)***

**SHEET LIST TABLE**

| SHEET NUMBER | SHEET TITLE |
|---|---|
| C-0.0 | COVER SHEET |
| C-0.1 | EXISTING CONDITIONS |
| C-1.0 | OVERALL GRADING AND DRAINAGE PLAN |
| C-1.1 | ENLARGED GRADING AND DRAINAGE PLAN |
| C-1.2 | GRADING AND DRAIANGE DETAILS AND NOTES |
| C-2.0 | PHASED EPSC PLAN - INITIAL CONDITIONS |
| C-2.1 | PHASED EPSC PLAN - INTERM. & FINAL CONDITIONS |
| C-2.2 | EPSC DETAILS AND NOTES |
| C-3.0 | OVERALL SEWER PLAN |
| C-3.1 | ENLARGED SEWER PLAN -LPS MAIN A |
| C-3.2 | ENLARGED SEWER PLAN - LPS MAIN B |
| C-3.3 | SANITARY SEWER DETAILS AND NOTES |
| C-4.0 | OVERALL WATER PLAN AND NOTES |
| C-4.1 | ENLARGED WATER PLAN |
| C-4.2 | PUBLIC WATER LINE DETAILS |
| D-1.0 | EXISTING CONDITIONS DRAINAGE EXHIBIT |
| D-1.1 | PROPOSED CONDITIONS DRAINAGE EXHIBIT |

Tennessee811
Know what's below. Call before you dig.


**DEVELOPER INFORMATION:**
DAKOTA WIND PROPERTIES, LLC.
1152 DUNCANWOOD DRIVE
NASHVILLE, TN 37204

**CIVIL ENGINEER INFORMATION:**
HARPETH CIVIL, INC.
179 BELLE FOREST CIRCLE, SUITE 204E
NASHVILLE, TENNESSEE, 37221
615-730-3502

**LAND SURVEYOR INFORMATION:**
CHANDLER SURVEYING
3421 COOPER NICHOLSON ROAD
PLEASANT VIEW, TN. 37146
615-746-5900


12-23-2019

| | |
|---|---|
| DATE: | 12/23/2019 |
| DRW: DS | CHK: DS |
| DESCRIPTION: | ISSUED FOR PERMIT |
| DATE: | - |
| DRW: - | CHK: - |
| DESCRIPTION: | - |
| DATE: | - |
| DRW: - | CHK: - |
| DESCRIPTION: | - |
| DATE: | - |
| DRW: - | CHK: - |
| DESCRIPTION: | - |
| DATE: | - |
| DRW: - | CHK: - |
| DESCRIPTION: | - |

PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR
ELEANOR VILLAGE SUBDIVISION
ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE


HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM


HCI PN 0517-19A

COVER SHEET

C-0.0


| Lot Description | Sq. Feet | Acres |
|---|---|---|
| 1 | 33271.5 | 0.76 |
| 2 | 26590.7 | 0.61 |
| 3 | 19718.0 | 0.45 |
| 4 | 14297.2 | 0.33 |
| 5 | 15679.3 | 0.36 |
| 6 | 43052.4 | 0.99 |
| 7 | 26579.0 | 0.61 |
| 8 | 19061.0 | 0.44 |
| 9 | 25917.7 | 0.59 |
| 10 | 20372.4 | 0.47 |
| 11 | 22385.9 | 0.51 |
| 12 | 28727.5 | 0.66 |
| 13 | 35504.9 | 0.82 |
| OPEN AREA | 23691.6 | 0.54 |

## LEGEND

These standard symbols will be found in the drawing.

| Symbol | Description |
|---|---|
| WV | WATER VALVE WV |
| WM | WATER METER WM |
| | IRON ROD (NEW) I.R. (N) |
| | IRON ROD (OLD) I.R. (O) |
| FH | FIRE HYDRANT FH |
| MH | SEWER MANHOLE MH |
| PP | POWER POLE PP |
| | APPROXIMATE WATER LINE |
| | APPROXIMATE SEWER LINE |
| TOB | TOP OF BANK |
| GV | GAS VALVE |
| | UTILITY POLE |

| CURVE | RADIUS | ARC LENGTH | CHORD BEARING | CHORD LENGTH | DELTA ANGLE |
|---|---|---|---|---|---|
| C1 | 1520.99' | 496.30' | S 75°47'20" W | 494.10' | 18°41'43.96" |
| C2 | 415.62' | 211.10' | S 80°59'31" W | 208.84' | 29°06'05.94" |
| C3 | 289.06' | 87.24' | N 25°53'32" E | 86.91' | 17°17'28.80" |

# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15


***SURVEY PREPARED BY:***

CHANDLER SURVEYING
3421 COOPER NICHOLSON ROAD
PLEASANT VIEW, TN. 37146
(615) 746-5900 FAX (615) 746-6420
email: chandlersurv@yahoo.com


| | |
|---|---|
| DATE: | 12/23/2019 |
| DRW: DS | CHK: DS |
| DESCRIPTION: | |
| ISSUED FOR PERMIT | |
| DATE: | - |
| DRW: - | CHK: - |
| DESCRIPTION: | |
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| DRW: - | CHK: - |
| DESCRIPTION: | |
| - | |
| DATE: | - |
| DRW: - | CHK: - |
| DESCRIPTION: | |
| - | |
| DATE: | - |
| DRW: - | CHK: - |
| DESCRIPTION: | |
| - | |

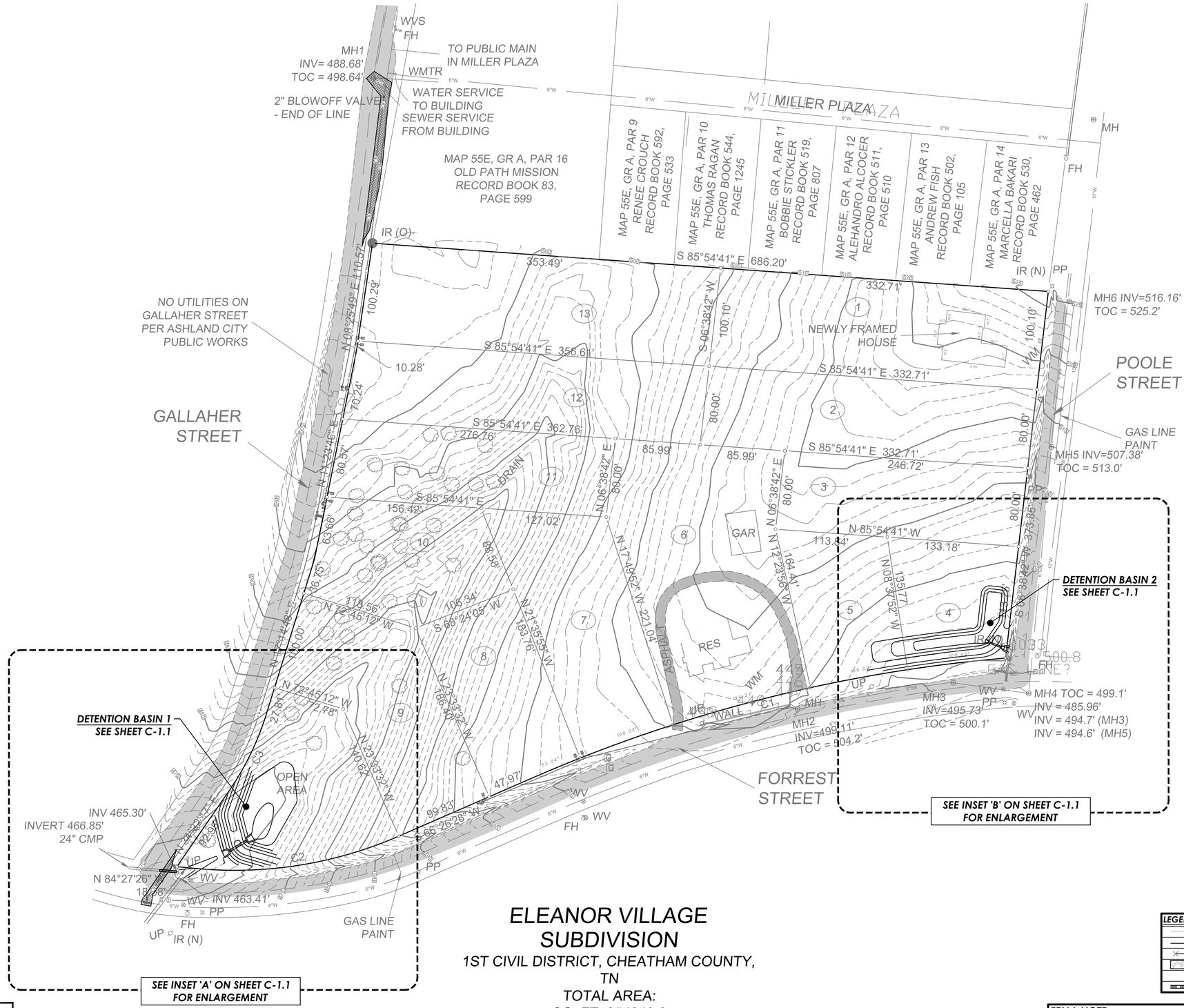
**PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR**
**ELEANOR VILLAGE SUBDIVISION**
**ASHLAND CITY**
**CHEATHAM COUNTY, TENNESSEE**


HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM


HCI PN 0517-19A

**EXISTING CONDITIONS**

**C-0.1**




# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15

SCALE: 1" = 50'

0 50 100 150

**LEGEND**

| | |
|---|---|
| 100 | EXISTING CONTOUR |
| 100 | PROPOSED CONTOUR |
| 100.0 | PROPOSED SPOT ELEVATION |
| | PROPOSED RIP RAP |
| | PROPOSED CONCRETE DEADWALL |
| | PROPOSED STORM PIPE |

**FEMA NOTE:**

1. THE PROPERTY IS LOCATED IN AREAS DESIGNATED AS "ZONE X" (AREAS TO BE DETERMINED OUTSIDE OF THE 0.2% ANNUAL RISK FLOODPLAIN) AS NOTED ON THE CURRENT FEMA COMMUNITY PANEL:

**MAP NUMBER: 47021C0170D** **EFFECTIVE DATE: SEPTEMBER 17, 2010**

Tennessee811
Know what's below. Call before you dig.

DANIEL JUSTIN SMITH
REGISTERED
LICENSED PROFESSIONAL ENGINEER
12-23-2019

| | | | |
|---|---|---|---|
| DATE: | 12/23/2019 | | |
| DRW: | DS | CHK: | DS |
| DESCRIPTION: | | | |
| ISSUED FOR PERMIT | | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | | | |
| - | | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | | | |
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| DESCRIPTION: | | | |
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| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | | | |
| - | | | |

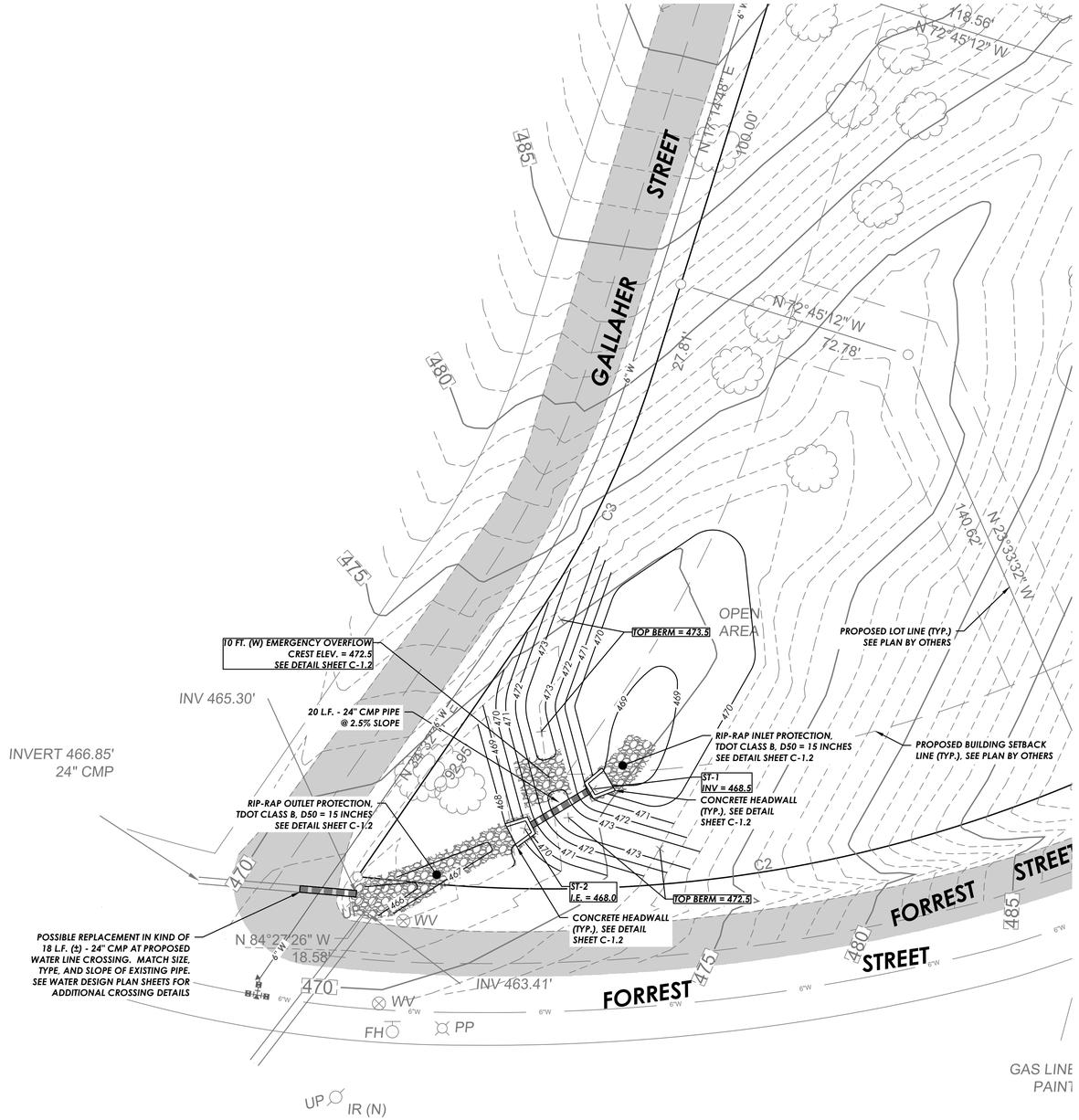
**PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR**
**ELEANOR VILLAGE SUBDIVISION**
ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE


HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM


HCI PN 0517-19A

**OVERALL GRADING AND DRAINAGE PLAN**

**C-1.0**




## INSET 'A'
### DETENTION BASIN 1 ENLARGEMENT

## INSET 'B'
### DETENTION BASIN 2 ENLARGEMENT

SCALE: 1" = 50'

0 50 100 150

**LEGEND**

| | |
|---|---|
| 100 | EXISTING CONTOUR |
| 100 | PROPOSED CONTOUR |
| 100.0 | PROPOSED SPOT ELEVATION |
| | PROPOSED RIP RAP |
| | PROPOSED CONCRETE DEADWALL |
| | PROPOSED STORM PIPE |

Tennessee811
Know what's below. Call before you dig.

DANIEL JUSTIN SMITH — REGISTERED ENGINEER — STATE OF TENNESSEE
12-23-2019

| | | | |
|---|---|---|---|
| DATE: | 12/23/2019 | | |
| DRW: | DS | CHK: | DS |
| DESCRIPTION: | ISSUED FOR PERMIT | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: | - | | |

# PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR ELEANOR VILLAGE SUBDIVISION
ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE


HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
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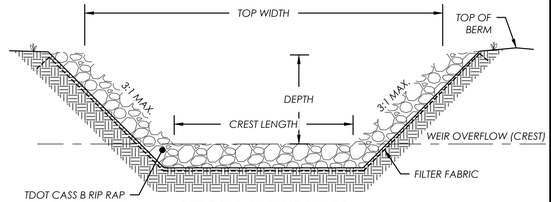
HCI PN 0517-19A

**ENLARGED GRADING AND DRAINAGE PLAN**

**C-1.1**



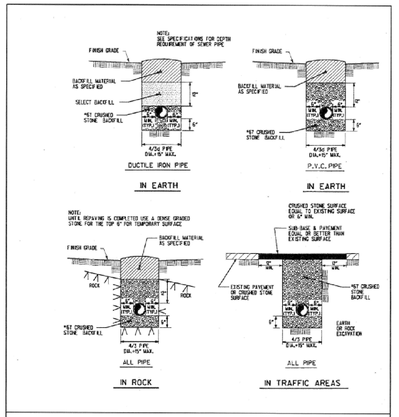

DETENTION BASIN OVERFLOW WEIR
TYPICAL SECTION VIEW

| DETENTION BASIN ID | CREST LENGTH (FT) | DEPTH (FT) | TOP WIDTH (FT) |
|---|---|---|---|
| 1 | 10.0 | 1.0 | 16.0 |
| 2 | 10.0 | 1.0 | 16.0 |

NOTES:
1. RIP SHALL BE TDOT CLASS B OR APPROVED EQUAL.
2. CONFIRM WEIR OVERFLOW ELEVATION AND CREST LENGTH WITH THE GRADING AND DRAINAGE PLANS.
3. PROVIDE FILTER FABRIC BENEATH RIP RAP AND KEY EDGES 6 - 10" ALONG THE PERIMETER.

N.T.S

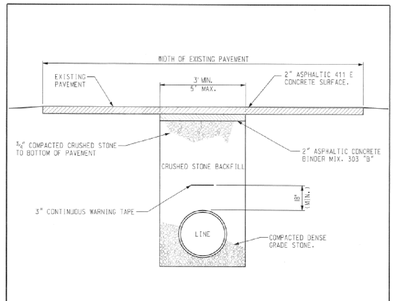
## DETENTION BASIN OVERFLOW WEIR




## STANDARD GRAVITY SEWER BEDDING AND BACKFILLING

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

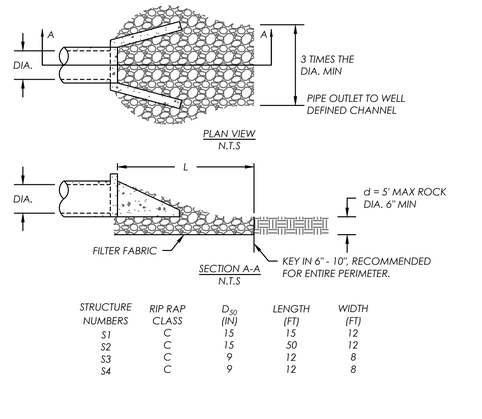

HKA
ENGINEERS, ROONCE & ASSOCIATES, INC.
Civil Engineering • Surveying
5343 Perimeter Hill Drive, Suite 212
Nashville, Tennessee 37211 (615) 333-7200


## ASPHALT PAVEMENT REPLACEMENT DETAIL

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE


HKA
ENGINEERS, ROONCE & ASSOCIATES, INC.
Civil Engineering • Surveying
5343 Perimeter Hill Drive, Suite 212
Nashville, Tennessee 37211 (615) 333-7200

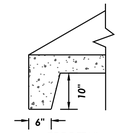




| STRUCTURE NUMBERS | RIP RAP CLASS | $D_{50}$ (IN) | LENGTH (FT) | WIDTH (FT) |
|---|---|---|---|---|
| S1 | C | 15 | 15 | 12 |
| S2 | C | 15 | 50 | 12 |
| S3 | C | 9 | 12 | 8 |
| S4 | C | 9 | 12 | 8 |

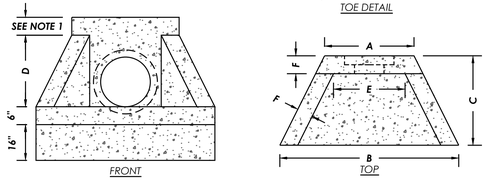
N.T.S

## RIP RAP OUTLET PROTECTION (TCP-25)

NOTES:
1. FOR PIPE DIA.:
   1.1. 12, 15", AND 18", 0" HEIGHT
   1.2. 24", 30", 36", AND 42", 6" HEIGHT
   1.3. 48", 54", AND 60", 6" - 24" HEIGHT
2. PIPE OPENING IN FACE OF WALL WILL EQUAL PIPE I.D.
3. CONTRACTOR SHALL ENSURE PIPE OUT HAS SMOOTH CLEAN GROUTED FINISH AT FACE OF HEADWALL.




TOE DETAIL




| PIPE DIA. | 12", 15", & 18" | 24" | 30", 36", & 42" | 48", 54" & 60" |
|---|---|---|---|---|
| A | 32" | 48" | 80" | 97.25" |
| B | 48" | 72" | 102" | 120" |
| C | 30" | 44" | 54" | 56" |
| D | 26" | 36" | 54" | 60" |
| E | 24" | 36" | 64" | 83" |
| F | 6" | 8" | 8" | 8" |
| MAX. OPENING | 26" | 32" | 55" | 78" |
| WT. / LB. | 1.38 | 3.10 | 8.10 | 11.40 |

N.T.S

## PRECAST CONCRETE HEADWALL

## GENERAL GRADING NOTES:

1. ALL UNSUITABLE SUBSURFACE MATERIAL IS TO BE EXCAVATED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS OR THE RECOMMENDATIONS OF THE CONTRACTORS TENNESSEE REGISTERED GEOTECHNICAL ENGINEER. UNSUITABLE MATERIAL IS TO BE STOCKPILED, REMOVED, AND PROPERLY DISPOSED OF OFF-SITE. EXCAVATED AREAS ARE TO BE BACK FILLED WITH APPROVED MATERIALS AND COMPACTED AS INDICATED ON THESE PLANS AND SPECIFICATIONS OR THE RECOMMENDATIONS OF THE CONTRACTORS GEOTECHNICAL ENGINEER.
2. THE CONTRACTOR SHALL NOT STOCK PILE DEBRIS AND/OR SOIL NEAR ENVIRONMENTALLY SENSITIVE AREAS (I.E. STREAM BUFFERS, WETLANDS, AREAS OF EXCESSIVE SLOPE, PROTECTED TREES OR THEIR RESPECTIVE CANOPY DRIP LINES, ETC...).
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING TRENCH EXCAVATIONS AGAINST COLLAPSE AND SHALL PROVIDE BRACING, SHEETING, OR SHORING WHERE NECESSARY. DEWATERING METHODS SHALL BE USED AS REQUIRED TO KEEP TRENCHES DRY WHILE PIPE AND APPURTENANCES ARE BEING INSTALLED.
4. ALL NECESSARY FILL AND EMBANKMENT THAT IS PLACED DURING CONSTRUCTION SHALL CONSIST OF MATERIAL SPECIFIED BY THE CONTRACTORS TENNESSEE REGISTERED GEOTECHNICAL ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL CONSTRUCTION ACTIVITIES, WHICH INCLUDE BUT ARE NOT LIMITED TO EARTHWORK ACTIVITIES, SUB GRADE PREPARATION, ETC. CONFORM TO THE STRICTER OF THE GEOTECHNICAL RECOMMENDATIONS OR TDOT (TENNESSEE DEPARTMENT OF TRANSPORTATION) STANDARDS AND SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (LATEST EDITION).
5. THE CONTRACTOR SHALL NOTIFY THE OWNER AND ENGINEER OF RECORD IMMEDIATELY IF UNSUITABLE SOIL IS ENCOUNTERED DURING EXCAVATION. UNSUITABLE SOIL SHALL NOT BE USED ON-SITE WITHOUT A WRITTEN RECOMMENDATION BY THE CONTRACTORS TENNESSEE REGISTERED GEOTECHNICAL ENGINEER AND CONSENT GRANTED IN WRITING BY THE OWNER AND THE ENGINEER OF RECORD.
6. REFER TO THE PROJECT EPSC (EROSION PREVENTION AND SEDIMENT CONTROL PLANS) PLANS FOR ADDITIONAL INFORMATION.
7. ALL MATERIALS SHALL CONFORM TO TDOT STANDARDS.
8. PROPOSED SPOT ELEVATIONS REPRESENT FINISHED PAVEMENT OR GROUND SURFACE GRADE UNLESS OTHERWISE NOTED ON THE DRAWINGS.
9. THE CONTRACTOR SHALL STABILIZE ALL DISTURBED GROUND BY SEEDING / MULCHING, SODDING, OR OTHER APPROVED MATERIAL IN ACCORDANCE WITH TDEC (TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION) VOLUME 4 HANDBOOK. DISTURBED AREAS SHALL BE STABILIZED WITHIN ONE WEEK (OR SOONER) FOLLOWING CONSTRUCTION OF THE UNDERLYING ACTIVITY. THE CONTRACTOR SHALL MAINTAIN SUCH AREAS BY REPAIRING AND WATER SOD OR SEEDED AREAS UNTIL THE AREA IS STABLE AND EROSION FREE.
10. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PREVENT EROSION. ANY DAMAGE FROM FAILURE TO ADEQUATELY STABILIZE, PROTECT, AND MAINTAIN THESE AREAS SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE ENGINEER OF RECORD OR THE OWNER ARE RESPONSIBLE FOR THE MEANS AND METHODS OF ADEQUATELY STABILIZING THE PROJECT.
11. THE CONTRACTOR SHALL NOT ALTER THE EXISTING HISTORICAL DRAINAGE PATTERNS IN REGARDS TO THE EXISTING PAVING CROSS SECTIONS, SIDEWALKS AND GRASS SWALES ON OR ADJACENT TO THE PROJECT UNLESS OTHERWISE DEPICTED ON THE CONSTRUCTIONS PLANS OR AS REQUIRED BY LOCAL AGENCIES.
12. ALL UNDERGROUND UTILITIES INCLUDING BUT NOT LIMITED TO WATER MAINS AND SERVICES, SEWER MAINS AND SERVICES, GAS, POWER, CONDUIT, DATA / COMMUNICATIONS, ETC... SHALL BE INSTALLED PRIOR TO PAVEMENT CONSTRUCTION. CONTRACTOR TO COORDINATE INSTALLATION OF ANY ADDITIONAL CONDUIT LOCATIONS WITH THE OWNER.
13. ALL MATERIALS AND CONSTRUCTION PROCEDURES SHALL BE IN ACCORDANCE WITH THE MORE STRICT LOCAL AGENCY OR TDOT STANDARD AND SPECIFICATIONS.
14. JOINTS OF THE STORM SEWER SHALL BE STAGGERED FOR CROSSINGS OF THE SANITARY SEWER WITH LESS THAN 18" VERTICAL CLEARANCE SO THAT PIPE BELL IS NOT LOCATED AT THE CROSSING.

Tennessee811
Know what's below. Call before you dig.

DANIEL JUSTIN SMITH — REGISTERED ENGINEER — STATE OF TENNESSEE
12-23-2019

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# PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR ELEANOR VILLAGE SUBDIVISION
ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE


HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM


HCI PN 0517-19A

GRADING AND DRAIANGE DETAILS AND NOTES

C-1.2

## *EROSION PREVENTION AND SEDIMENT CONTROL NOTES:*

1. *EROSION PREVENTION AND SEDIMENT CONTROL MEASURES TO BE SELECTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION (TDEC) EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.*
2. *SITE EROSION CONTROLS SHALL BE CHECKED DAILY AND WITHIN 24 HOURS AFTER EACH RAINFALL EVENT GREATER THAN OR EQUAL TO 0.5 INCHES OF CONTINUOUS RAINFALL. EROSION CONTROLS SHALL BE REPAIRED IMMEDIATELY.*
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5. *CONTROL OF OTHER SITE WASTE SUCH AS DISCARDED BUILDING MATERIALS, CHEMICALS, LITTER, AND SANITARY WASTES THAT MAY CAUSE ADVERSE IMPACTS TO WATER QUALITY IS ALSO REQUIRED.*
6. *INLET PROTECTION TO BE REMOVED AFTER FINAL SITE STABILIZATION.*
7. *AN ON-SITE COPY OF THE EPSC PLANS SHALL BE KEPT CURRENT AND AVAILABLE TO THOSE RESPONSIBLE FOR EROSION PREVENTION AND SEDIMENT CONTROL MEASURES AND INSPECTION.*
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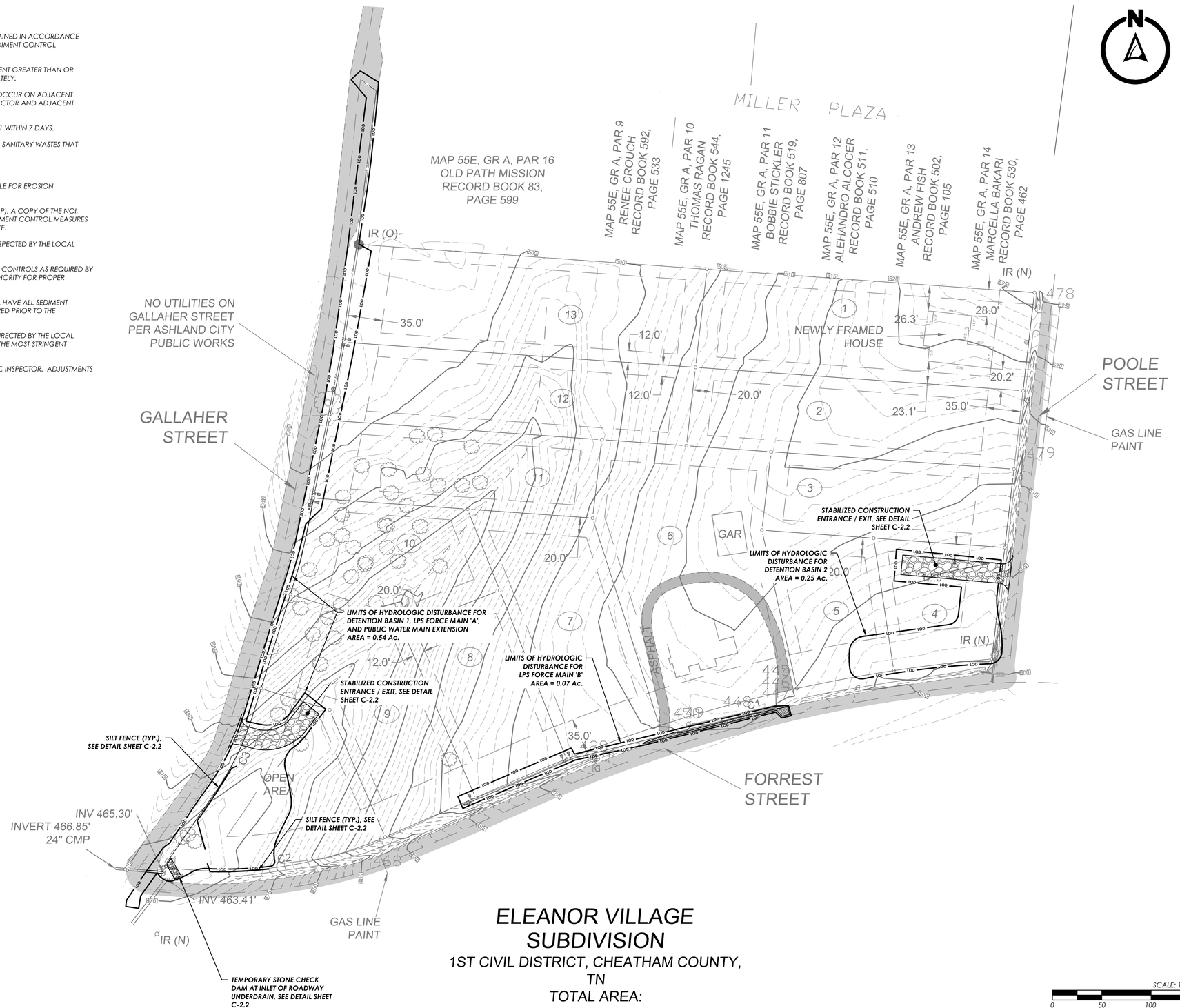
**TOTAL HYDROLOGICALLY DISTURBED AREA = 0.86 Ac.**




# *ELEANOR VILLAGE SUBDIVISION*

*1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN*

*TOTAL AREA:*

*SQ. FT. 354849.0*

*AC 8.15*

SCALE: 1" = 50'

0 50 100 150

**NOTE:**
**EPSC MEASURES HAVE BEEN SIZED FOR THE 2-YEAR 24-HOUR STORM EVENT.**

Tennessee811
Know what's below. Call before you dig.

DANIEL JUSTIN SMITH
LICENSED PROFESSIONAL ENGINEER
12-23-2019

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***PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR ELEANOR VILLAGE SUBDIVISION***
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***PHASED EPSC PLAN - INITIAL CONDITIONS***

**C-2.0**

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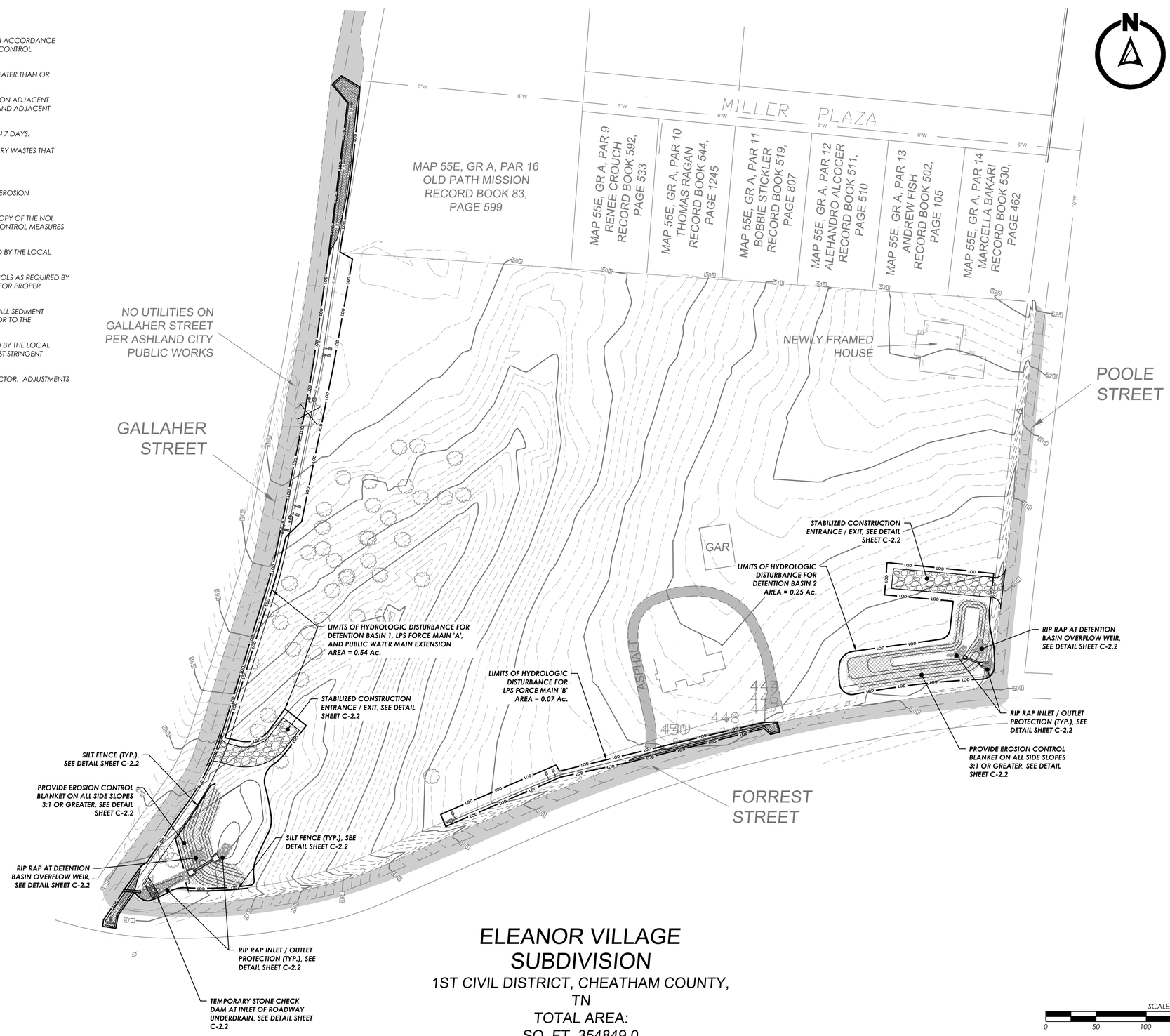


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*TOTAL AREA:*

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*AC 8.15*

*SCALE: 1" = 50'*

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REGISTERED
ENGINEER
12-23-2019

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*CHEATHAM COUNTY, TENNESSEE*


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*HCI PN* *0517-19A*

***PHASED EPSC PLAN - INTERM. & FINAL CONDITIONS***

**C-2.1**

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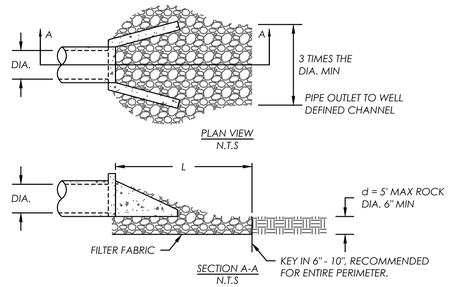
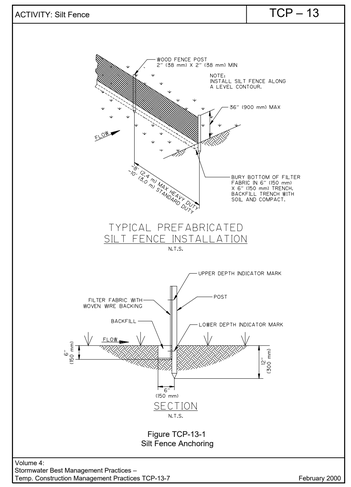



| STRUCTURE NUMBERS | RIP RAP CLASS | $D_{50}$ (IN) | LENGTH (FT) | WIDTH (FT) |
|---|---|---|---|---|
| S1 | C | 15 | 15 | 12 |
| S2 | C | 15 | 50 | 12 |
| S3 | C | 9 | 12 | 8 |
| S4 | C | 9 | 12 | 8 |

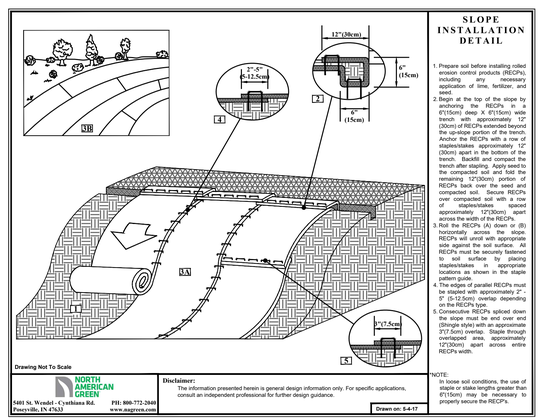
N.T.S

## RIP RAP OUTLET PROTECTION (TCP-25)



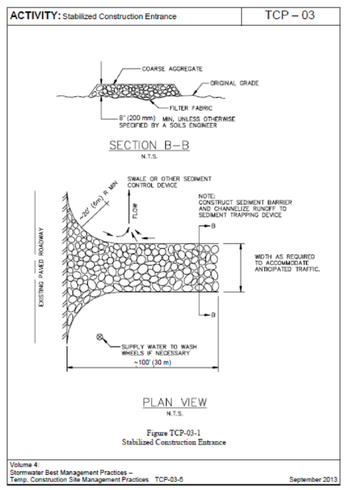

N.T.S

## SILT FENCE (TCP-13)




N.T.S

## TCP-12 - EROSION CONTROL NETTING




N.T.S

## STABILIZED CONSTRUCTION ENTRANCE (TCP-03)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**PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR**
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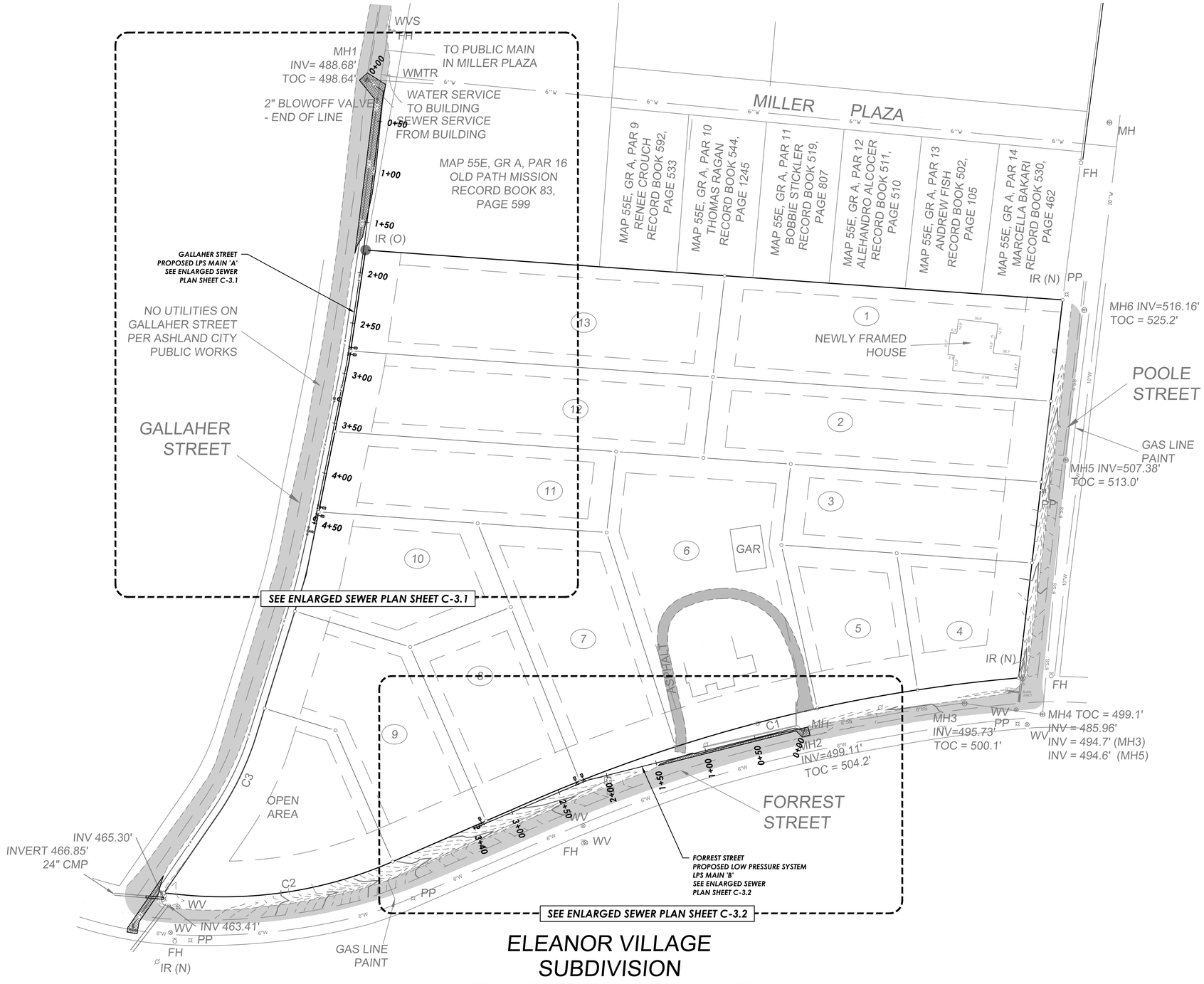
HCI PN 0517-19A

**EPSC DETAILS**

**C-2.2**




# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15

SCALE: 1" = 50'

0 50 100 150

Tennessee811 Know what's below. Call before you dig.

DANIEL JUSTIN SMITH — REGISTERED PROFESSIONAL ENGINEER — STATE OF TENNESSEE — 12-23-2019

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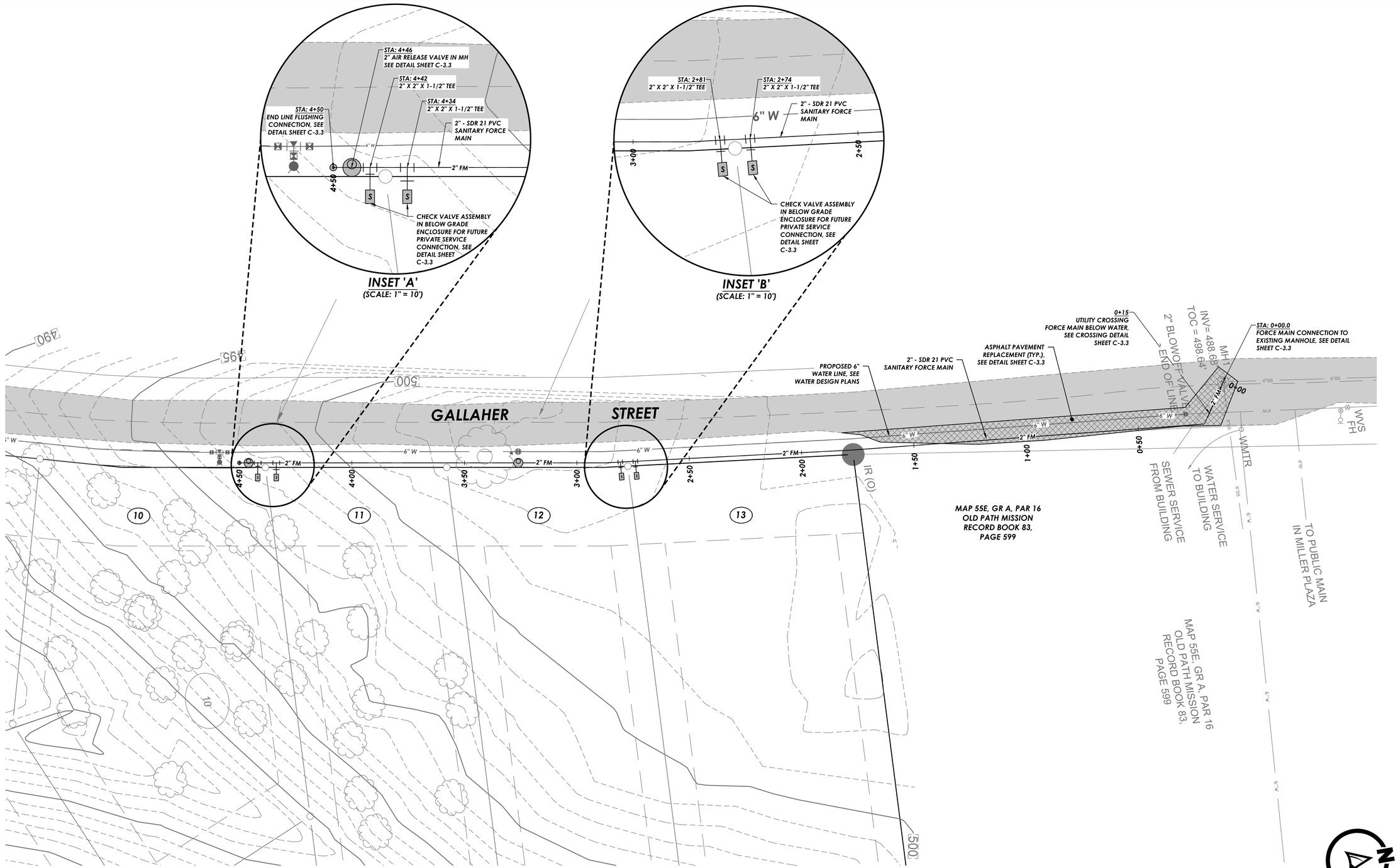
OVERALL SEWER PLAN

C-3.0




Tennessee811
Know what's below.
Call before you dig.

**LEGEND**

| | |
|---|---|
| 100 | EXISTING CONTOUR |
| FM | PROPOSED SDR-21 PVC LPS FORCE MAIN |
| S | PROPOSED CHECK VALVE ASSEMBLE IN SUBGRADE ENCLOSURE |
| | PROPOSED ASPHALT PAVEMENT REPLACEMENT |
| # | PROPOSED LOT NUMBER |
| | PROPOSED 2" AIR RELEASE VALVE ASSEMBLY IN MANHOLE |

12-23-2019

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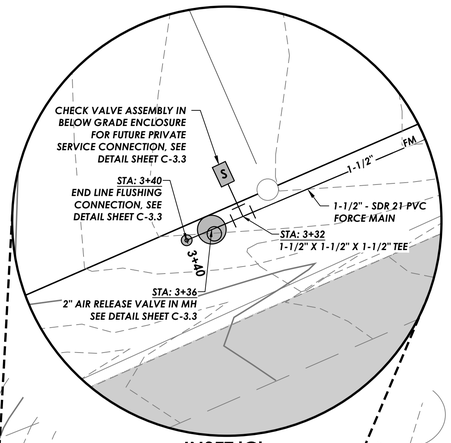
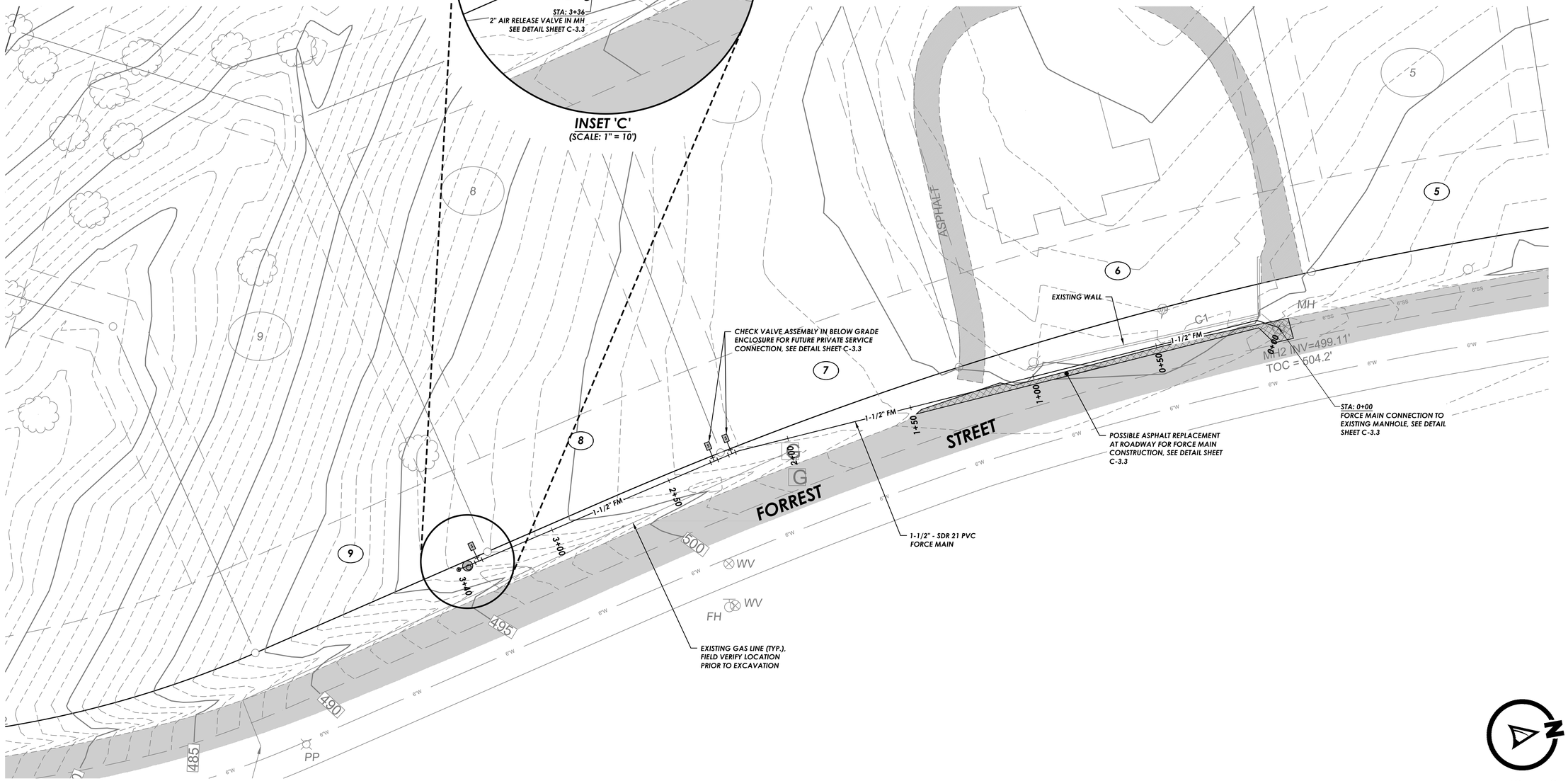
**ENLARGED SEWER PLAN -LPS MAIN A**

**C-3.1**




**INSET 'C'**
(SCALE: 1" = 10')




SCALE: 1" = 20'
0 20 40 60

**LEGEND**

| | |
|---|---|
| 100 | EXISTING CONTOUR |
| FM | PROPOSED SDR-21 PVC LPS FORCE MAIN |
| 5 | PROPOSED CHECK VALVE ASSEMBLE IN SUBGRADE ENCLOSURE |
| | PROPOSED ASPHALT PAVEMENT REPLACEMENT |
| 8 | PROPOSED LOT NUMBER |
| | PROPOSED 2" AIR RELEASE VALVE ASSEMBLY IN MANHOLE |

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DANIEL JUSTIN SMITH
LICENSED PROFESSIONAL ENGINEER
STATE OF TENNESSEE
120129
12-23-2019

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SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM

HCI PN 0517-19A

**ENLARGED SEWER PLAN - LPS MAIN B**

**C-3.2**

## ASHLAND CITY UTILITY NOTES:

1. ALL APPLICABLE FEDERAL AND STATE LAWS, MUNICIPAL ORDINANCES, AND THE RULES AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION OVER CONSTRUCTION OF THE PROJECT SHALL APPLY TO THE CONSTRUCTION THROUGHOUT.
2. SIZES AND LOCATIONS OF ALL WATER AND SEWER LINES AND APPURTENANCES, AND ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PLANS APPROVED BY THE TOWN.
3. PERMITS FOR PAVEMENTS CUTS OR CROSSINGS OF PUBLIC ROADS, INCLUDING ANY SPECIAL BACKFILL AND PAVEMENT REPAIR REQUIRED BY THE AGENCY HAVING JURISDICTION, ARE THE RESPONSIBILITY OF THE DEVELOPER. A BOND MAY BE REQUIRED FROM THE DEVELOPER TO COVER ALL COSTS OF REPAIR AND MAINTENANCE FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE OF THE PROJECT FOR ALL WORK PERFORMED IN EXISTING RIGHT-OF-WAYS OF ALL ROAD.
4. IF CONSTRUCTION HAS NOT STARTED WITHIN ONE (1) YEAR FROM THE DATE OF APPROVAL, UTILITY PLANS SHALL BE RESUBMITTED TO RENEW APPROVAL. RENEWAL IS NOT GUARANTEED.
5. THE CONTRACTORS NAME, PROJECT COST, AND ESTIMATING WORKING TIME FOR EACH PROJECT SHALL BE SUBMITTED TO THE TOWN. THE TOWN WILL BE REIMBURSED FOR EACH DAY THAT AN INSPECTOR IS REQUIRED ON THE JOB SITE UNTIL COMPLETION OF THE PROJECT.
6. LABORATORY TEST REPORTS SHALL BE PROVIDED ON ALL PIPE TO ASSURE THAT IT MEETS THE REQUIREMENTS OF THE TOWN'S SPECIFICATIONS.
7. SHOP DRAWINGS FOR UTILITY MATERIALS SHALL BE SUBMITTED TO THE TOWN OF ASHLAND CITY FOR REVIEW AFTER BEING THOROUGHLY CHECKED BY THE CONTRACTOR AND STAMPED WITH HIS APPROVAL.
8. THE TOWN RESERVES THE RIGHT TO RELOCATE WATER AND SEWER LINES ON THE CONSTRUCTION PLANS TO FACILITATE MAINTENANCE.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND VERIFYING THE ELEVATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR SHALL PROVIDE A SET OF CONSTRUCTION CUT SHEETS TO THE PRECONSTRUCTION MEETING AND THE CUT SHEETS SHALL INCLUDE THE STATIONS OF ALL PROPOSED SERVICE CONNECTIONS.

## GENERAL UTILITY NOTES:

1. THE CONTRACTOR WILL PROVIDE ALL NECESSARY PROTECTIVE MEASURES TO SAFEGUARD EXISTING UTILITIES FROM DAMAGE DURING THE CONSTRUCTION OF THIS PROJECT. IN THE EVENT THAT SPECIAL EQUIPMENT IS REQUIRED TO WORK OVER OR AROUND THE EXISTING UTILITIES, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE SUCH EQUIPMENT. THE COST OF PROTECTING UTILITIES FROM DAMAGE AND FURNISHING OF ANY REQUIRED SPECIAL EQUIPMENT WILL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS OF CONSTRUCTION. 3. THE CONTRACTOR SHALL NOTIFY EACH INDIVIDUAL UTILITY OWNER OF HIS PLAN OF OPERATION IN THE AREA OF THEIR RESPECTIVE UTILITIES, PRIOR TO COMMENCEMENT OF WORK THE CONTRACTOR SHALL CONTACT EACH UTILITY OWNERS AND REQUEST THEM TO PROPERLY LOCATE THEIR RESPECTIVE UTILITIES ON THE GROUND. THIS NOTIFICATION SHALL BE GIVEN AT LEAST THREE (3) BUSINESS DAYS PRIOR TO COMMENCEMENT OF OPERATIONS AROUND THE UTILITY.
2. EXISTING UTILITY LINES SHOWN ARE APPROXIMATE LOCATIONS ONLY AND SHALL BE FIELD VERIFIED PRIOR TO ANY CONSTRUCTION. IF UPON FIELD LOCATION, ANY DEVIATIONS FROM THE SHOWN DESIGN LOCATIONS SHALL BE REPORTED TO THE OWNER OR ENGINEER PRIOR TO CONSTRUCTION.
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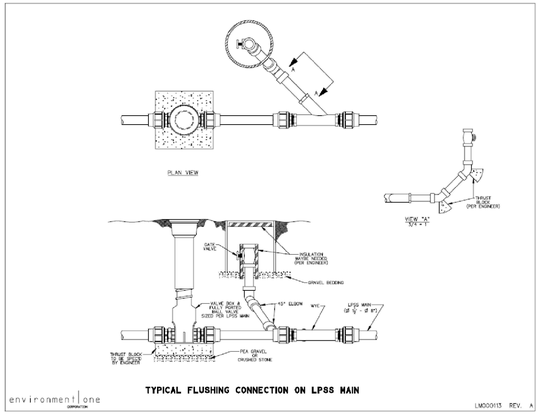
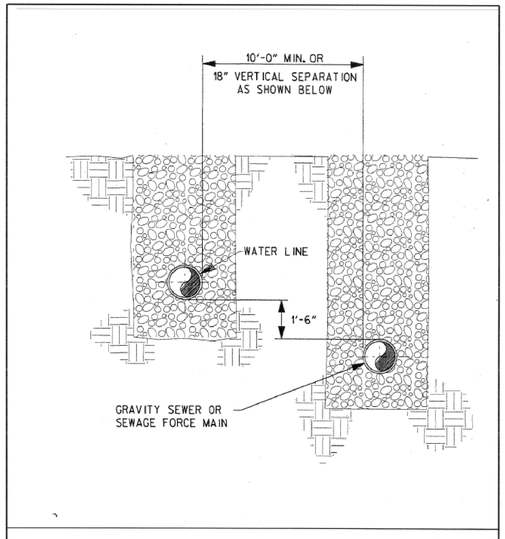
4. ALL UNDERGROUND UTILITIES (WATER, SANITARY SEWER, STORM SEWER, ELECTRICAL CONDUITS, IRRIGATION SLEEVES, ETC..) SHALL BE IN PLACE PRIOR TO THE PLACEMENT OF ALL BASE COURSE MATERIAL.
5. THE UTILITY CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ALL TAP AND TIE-IN FEES REQUIRED, AS WELL AS COST OF THE UNDERGROUND SERVICE CONNECTIONS TO THEIR FACILITIES.
6. THOSE UTILITY OWNERS WHO PARTICIPATE IN THE "TENNESSEE ONE CALL" SYSTEM CAN BE NOTIFIED TOLL FREE AT 1-800-351-1111.
7. ALL SEWER AND WATER CONNECTIONS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS OUTLINED BY THE TOWN OF ASHLAND CITY STANDARD SPECIFICATIONS AND INSTALLATION GUIDELINES FOR THE CONSTRUCTION OF PUBLIC INFRASTRUCTURE (LATEST EDITION).
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REIMBURSING THE TOWN OF ASHLAND CITY DEPARTMENT OF PUBLIC WORKS FOR THE COST OF INSPECTION.
9. THE CONTRACTOR SHALL NOTIFY THE TOWN OF ASHLAND CITY PUBLIC WORKS DEPARTMENT AND ARRANGE INSPECTION PRIOR TO BEGINNING.
10. COORDINATES AND DIMENSIONS SHOWN ARE TO CENTERLINE OF PIPE, OR FITTING, OR TO CENTERLINE OF MANHOLE.
11. THE MINIMUM HORIZONTAL SEPARATION BETWEEN THE CLOSEST TWO POINTS OF THE WATER AND SEWER LINES SHALL BE 10'. THE MINIMUM VERTICAL SEPARATION BETWEEN THE CLOSEST TWO POINTS OF THE WATER AND SEWER LINES SHALL BE 18".



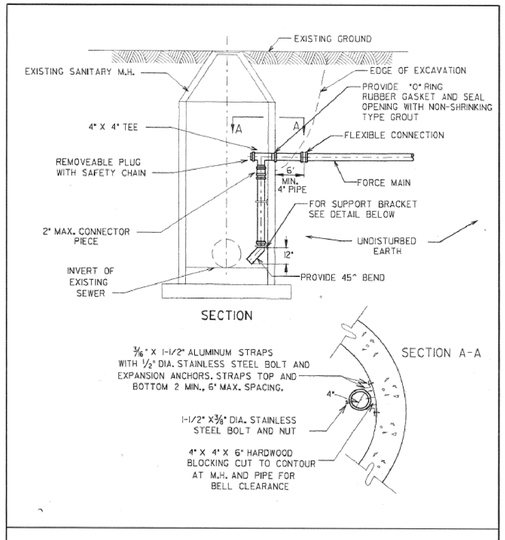

**TYPICAL FLUSHING CONNECTION ON LPSS MAIN**




## PIPELINE SEPARATION DETAIL

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

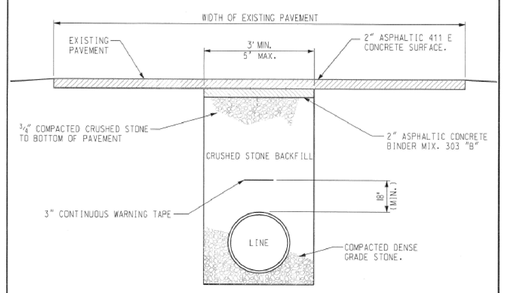
HKA
HIGHERS, KOONCE & ASSOCIATES, INC.
Civil and Environmental Engineering
3343 Perimeter Hill Drive Suite 212
Nashville, Tennessee 37211 (615) 333-7200




## FORCE MAIN-TO-MANHOLE CONNECTION

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

HKA
HIGHERS, KOONCE & ASSOCIATES, INC.
Civil and Environmental Engineering
3343 Perimeter Hill Drive Suite 212
Nashville, Tennessee 37211 (615) 333-7200




NOTE:

EDGE OF PAVEMENT TO BE TRIMMED A MINIMUM OF 12" BEYOND EACH SIDE OF TRENCH WIDTH TO OBTAIN NEAT LINES. BINDER MIX TO BE PLACED AS A TEMPORARY SURFACE WITHIN 48 HOURS OF MAKING ROAD CROSSING.

## ASPHALT PAVEMENT REPLACEMENT DETAIL

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

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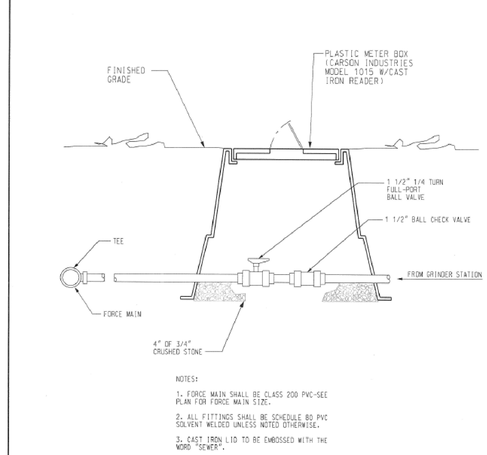
HIGHERS, KOONCE & ASSOCIATES, INC.
Civil and Environmental Engineering
3343 Perimeter Hill Drive Suite 212
Nashville, Tennessee 37211 (615) 333-7200




NOTES:

1. FORCE MAIN SHALL BE CLASS 200 PVC-SEE PLAN FOR FORCE MAIN SIZE.
2. ALL FITTINGS SHALL BE SCHEDULE 80 PVC SOLVENT WELDED UNLESS NOTED OTHERWISE.
3. CAST IRON L10 TO BE EMBOSSED WITH THE WORD "SEWER".

## FORCE MAIN SERVICE CONNECTION

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

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HIGHERS, KOONCE & ASSOCIATES, INC.
Civil and Environmental Engineering
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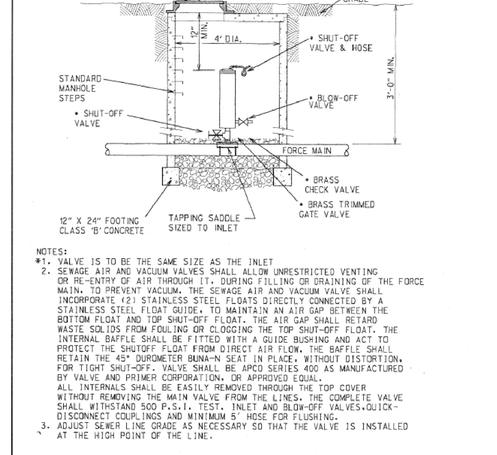


NOTES:
*1. VALVE IS TO BE THE SAME SIZE AS THE INLET
2. SEWAGE AIR AND VACUUM VALVES SHALL ALLOW UNRESTRICTED VENTING OR RE-ENTRY OF AIR THROUGH IT, DURING FILLING OR DRAINING OF THE FORCE MAIN. TO PREVENT VACUUM. THE SEWAGE AIR AND VACUUM VALVE SHALL INCORPORATE (2) STAINLESS STEEL FLOATS DIRECTLY CONNECTED BY A STAINLESS STEEL FLOAT GUIDE, TO MAINTAIN AN AIR GAP BETWEEN THE BOTTOM FLOAT AND TOP SHUT-OFF FLOAT. THE AIR GAP SHALL RETARD WASTE SOLIDS FROM FOULING OR CLOGGING THE TOP SHUT-OFF FLOAT. THE INTERNAL BAFFLE SHALL BE FITTED WITH A GUIDE BUSHING AND ACT TO PROTECT THE SHUTOFF FLOAT FROM DIRECT AIR FLOW. THE BAFFLE SHALL RETAIN THE 45* DUROMETER BUNA-N SEAT IN PLACE. WITHOUT DISTORTION. FOR TIGHT SHUT-OFF. VALVE SHALL BE APCO SERIES 400 AS MANUFACTURED BY VALVE AND PRIMER CORPORATION, OR APPROVED EQUAL.
ALL INTERNALS SHALL BE EASILY REMOVED THROUGH THE TOP COVER WITHOUT REMOVING THE MAIN VALVE FROM THE LINES. THE COMPLETE VALVE SHALL WITHSTAND 500 P.S.I. TEST. INLET AND BLOW-OFF VALVES.QUICK-DISCONNECT COUPLINGS AND MINIMUM 5' HOSE FOR FLUSHING.
3. ADJUST SEWER LINE GRADE AS NECESSARY SO THAT THE VALVE IS INSTALLED AT THE HIGH POINT OF THE LINE.

## SANITARY FORCE MAIN AIR RELEASE VALVE

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

HKA
HIGHERS, KOONCE & ASSOCIATES, INC.
Civil and Environmental Engineering
3343 Perimeter Hill Drive Suite 212
Nashville, Tennessee 37211 (615) 333-7200

DANIEL JUSTIN SMITH
REGISTERED
ENGINEER
12-23-2019

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# PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR ELEANOR VILLAGE SUBDIVISION

ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE

HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM

HCI PN 0517-19A

SANITARY SEWER DETAILS AND NOTES

C-3.3

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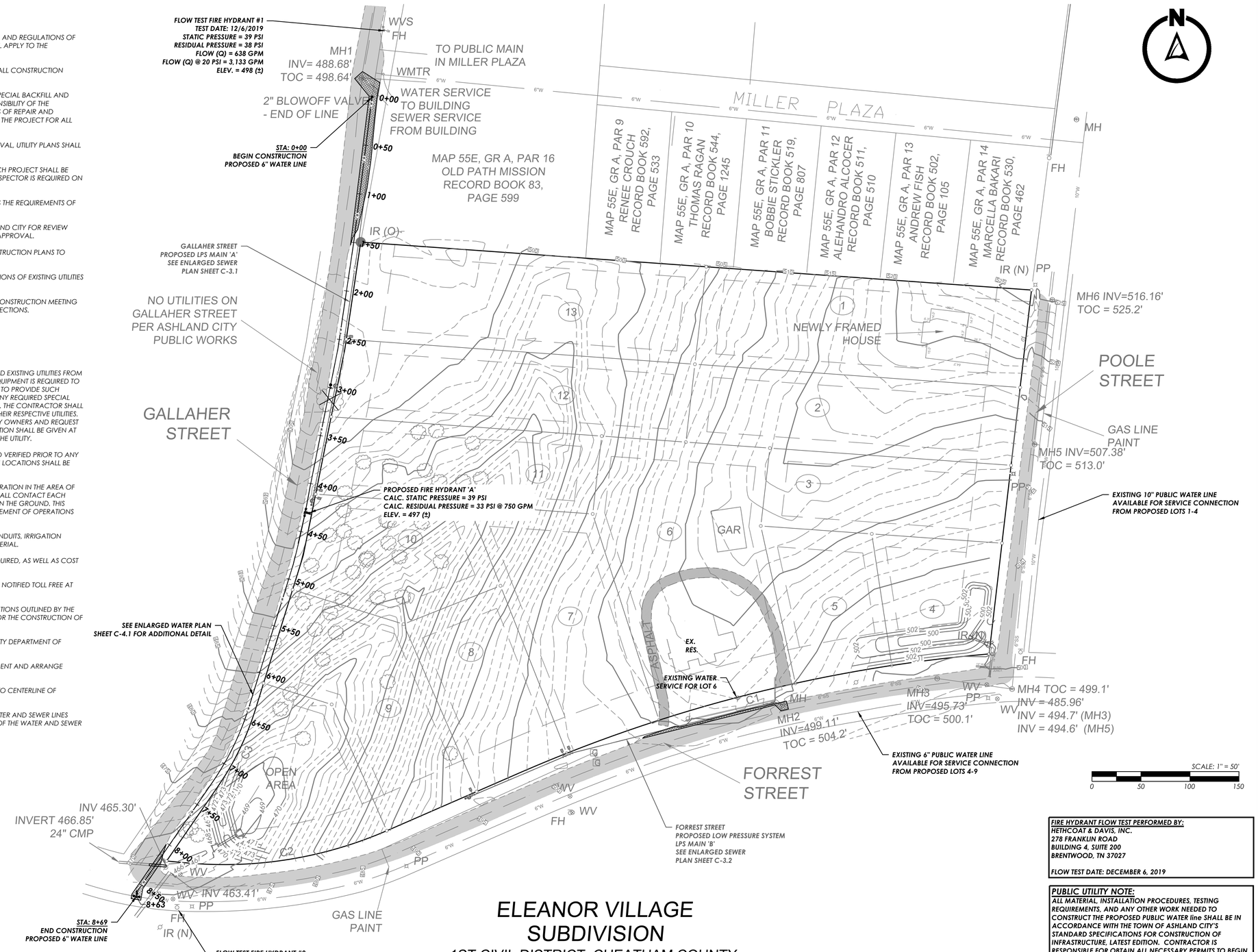


# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15

**FIRE HYDRANT FLOW TEST PERFORMED BY:**
HETHCOAT & DAVIS, INC.
278 FRANKLIN ROAD
BUILDING 4, SUITE 200
BRENTWOOD, TN 37027

FLOW TEST DATE: DECEMBER 6, 2019

**PUBLIC UTILITY NOTE:**
ALL MATERIAL, INSTALLATION PROCEDURES, TESTING REQUIREMENTS, AND ANY OTHER WORK NEEDED TO CONSTRUCT THE PROPOSED PUBLIC WATER line SHALL BE IN ACCORDANCE WITH THE TOWN OF ASHLAND CITY'S STANDARD SPECIFICATIONS FOR CONSTRUCTION OF INFRASTRUCTURE, LATEST EDITION. CONTRACTOR IS RESPONSIBLE FOR OBTAIN ALL NECESSARY PERMITS TO BEGIN AND COMPLETE THE WORK AND SHALL COORDINATE DIRECTLY WITH THE TOWN OF ASHLAND CITY PUBLIC WORKS DEPARTMENT.



Tennessee811
Know what's below. Call before you dig.

DANIEL JUSTIN SMITH
LICENSED PROFESSIONAL ENGINEER
12-23-2019

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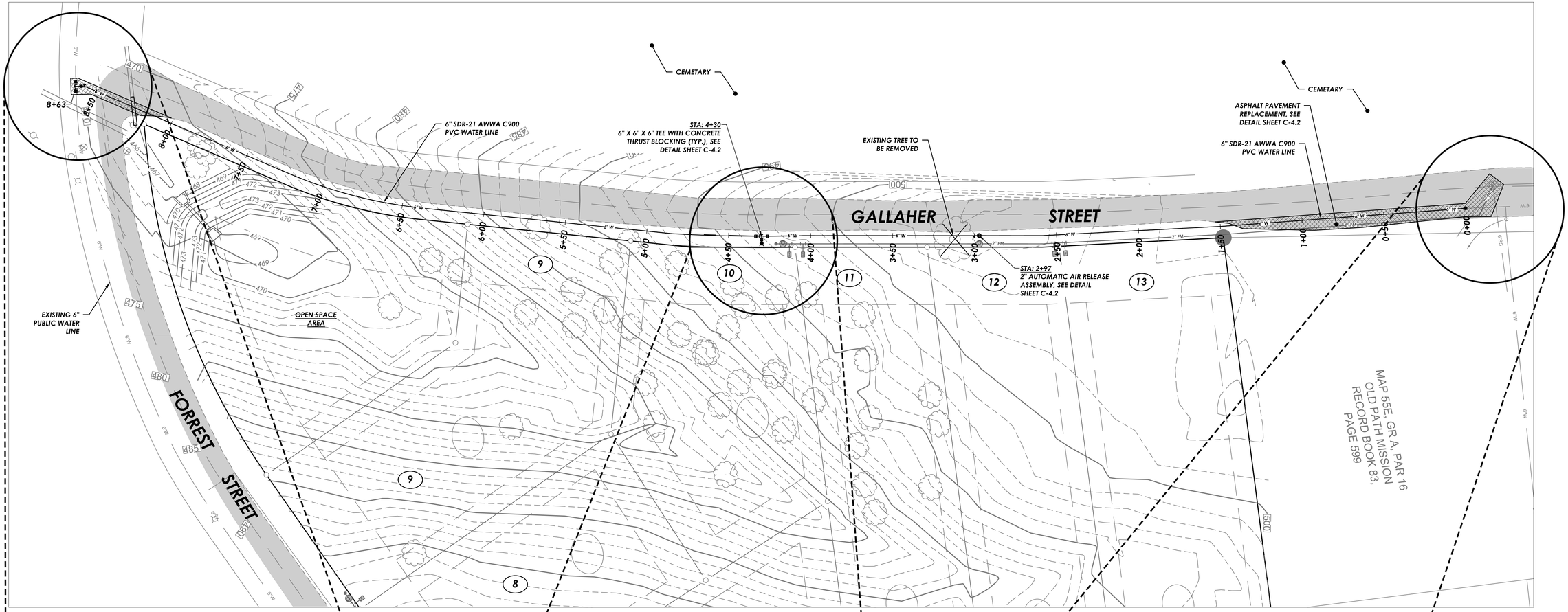
**PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR**
**ELEANOR VILLAGE SUBDIVISION**
ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE

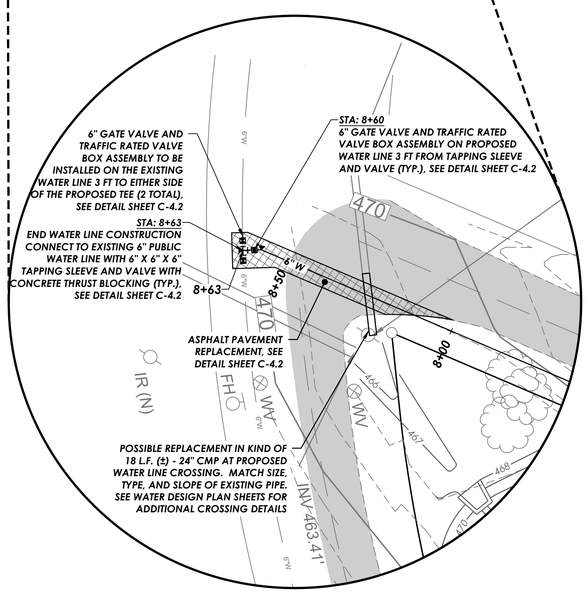
HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM

HCI PN 0517-19A

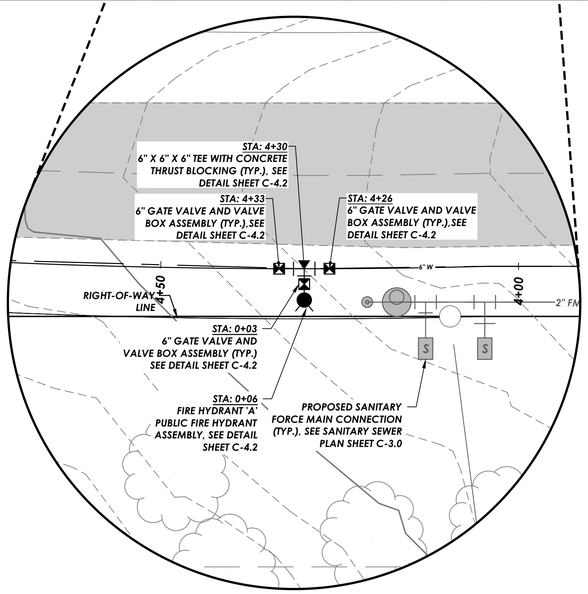
**OVERALL WATER PLAN AND NOTES**

**C-4.0**




**INSET 'C'**
*(SCALE: 1" = 10')*




**INSET 'B'**
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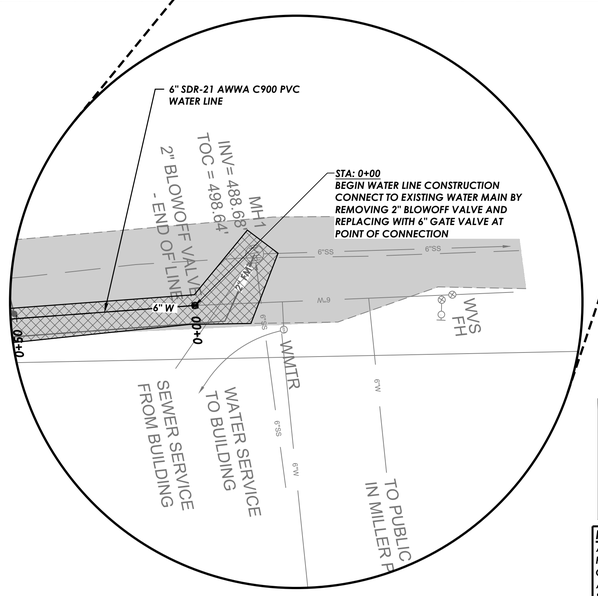


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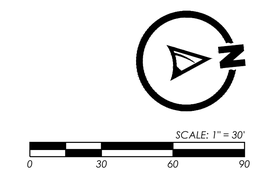


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DANIEL JUSTIN SMITH
LICENSED PROFESSIONAL ENGINEER
STATE OF TENNESSEE
12-23-2019


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# PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR ELEANOR VILLAGE SUBDIVISION

ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE


HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
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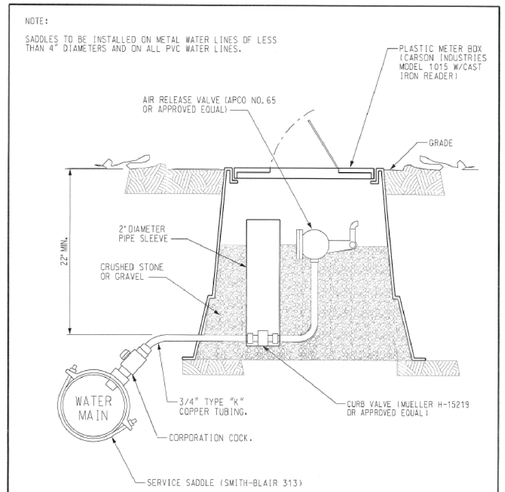
HCI PN 0517-19A

**PUBLIC WATER PLAN**

**C-4.1**




## AUTOMATIC AIR RELEASE ASSEMBLY DETAIL

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

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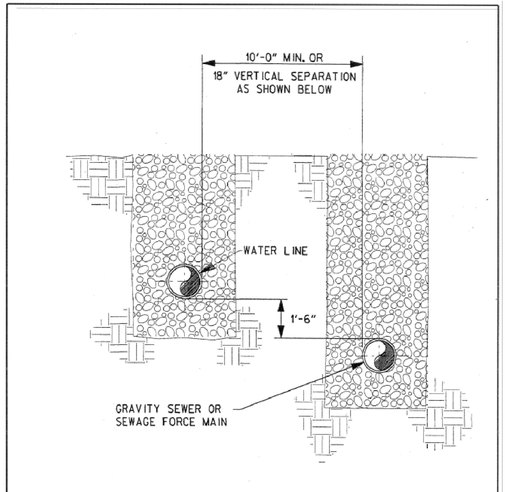
Civil and Environmental Engineering
3343 Perimeter Hill Drive Suite 212
Nashville, Tennessee 37211 (615) 333-7200




## PIPELINE SEPARATION DETAIL

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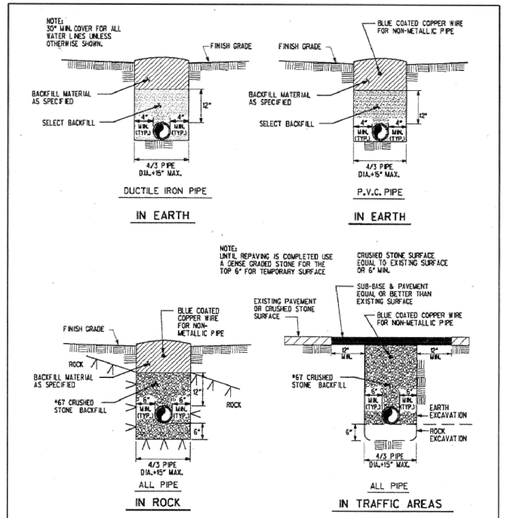
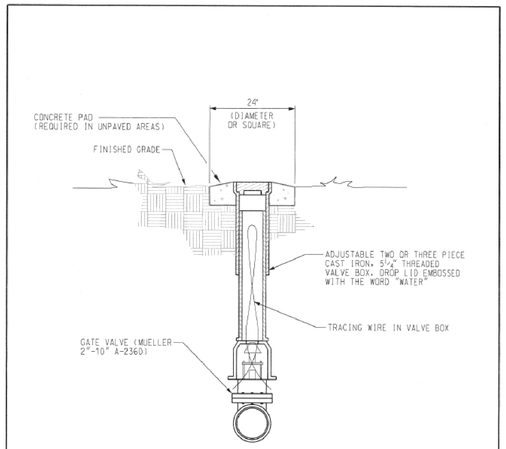



## STANDARD WATER MAIN BEDDING AND BACKFILLING

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

HIGHERS, KOONCE & ASSOCIATES, INC.
Civil and Environmental Engineering
3343 Perimeter Hill Drive Suite 212
Nashville, Tennessee 37211 (615) 333-7200




## TYPICAL VALVE BOX SETTING

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

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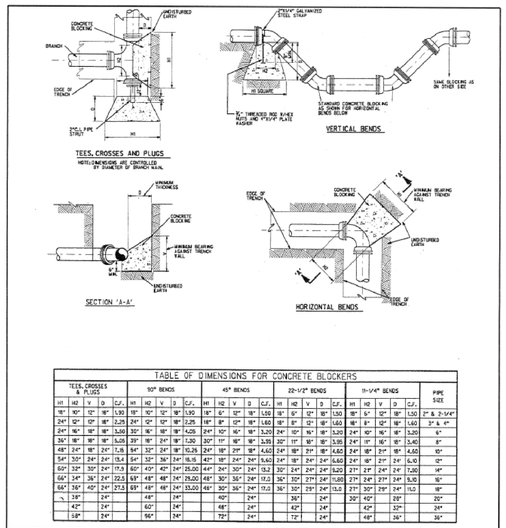


TABLE OF DIMENSIONS FOR CONCRETE BLOCKERS

| TEES, CROSSES & PLUGS | | | | 90° BENDS | | | | 45° BENDS | | | | 22-1/2° BENDS | | | | 11-1/4° BENDS | | | | PIPE SIZE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H1 | H2 | V | D | C.Y. | H1 | H2 | V | D | C.Y. | H1 | H2 | V | D | C.Y. | H1 | H2 | V | D | C.Y. | |
| 18" | 30" | 12" | 18" | 1.30 | 18" | 12" | 12" | 18" | 1.30 | 18" | 6" | 12" | 18" | 1.30 | 18" | 6" | 12" | 18" | 1.30 | 2" & 2-1/2" |
| 24" | 12" | 12" | 18" | 2.25 | 24" | 12" | 12" | 18" | 2.25 | 18" | 8" | 12" | 18" | 1.60 | 18" | 8" | 12" | 18" | 1.60 | 3" & 4" |
| 24" | 18" | 18" | 18" | 3.20 | 30" | 18" | 18" | 18" | 4.05 | 24" | 10" | 18" | 18" | 3.20 | 24" | 10" | 18" | 18" | 3.20 | 6" |
| 36" | 18" | 18" | 18" | 5.05 | 39" | 18" | 24" | 18" | 5.20 | 30" | 11" | 18" | 18" | 3.95 | 24" | 11" | 18" | 18" | 3.40 | 8" |
| 48" | 24" | 18" | 24" | 11.15 | 54" | 32" | 24" | 18" | 10.25 | 24" | 18" | 24" | 18" | 4.60 | 24" | 18" | 24" | 18" | 4.60 | 10" |
| 54" | 30" | 24" | 24" | 13.4 | 54" | 32" | 36" | 24" | 18.15 | 42" | 18" | 24" | 24" | 9.60 | 24" | 18" | 24" | 24" | 6.60 | 24" | 18" | 24" | 6.40 | 12" |
| 60" | 32" | 30" | 24" | 17.3 | 60" | 42" | 42" | 24" | 25.00 | 44" | 24" | 30" | 24" | 13.2 | 30" | 24" | 24" | 24" | 8.20 | 27" | 24" | 24" | 7.60 | 14" |
| 66" | 34" | 36" | 24" | 22.5 | 69" | 48" | 48" | 24" | 33.00 | 48" | 30" | 36" | 24" | 17.0 | 36" | 30" | 27" | 24" | 11.86 | 27" | 24" | 27" | 9.45 | 16" |
| 66" | 36" | 42" | 24" | 27.3 | 69" | 48" | 48" | 24" | 33.00 | 48" | 30" | 36" | 24" | 17.0 | 36" | 30" | 29" | 24" | 13.0 | 27" | 30" | 29" | 24" | 11.5 | 18" |
| - | 38" | | 24" | - | | 48" | | 24" | - | | 40" | | 24" | - | | 36" | | 24" | - | | 30" | 42" | | 28" | - | 20" |
| | 42" | | 24" | | | 60" | | 24" | | | 48" | | 24" | | | 42" | | 24" | | | | 42" | | 32" | | 24" |
| | 48" | | 24" | | | 66" | | 24" | | | 72" | | 24" | | | 72" | | 24" | | | | 48" | | 36" | | 30" |

## TYPICAL CONCRETE THRUST BLOCKING DETAILS

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
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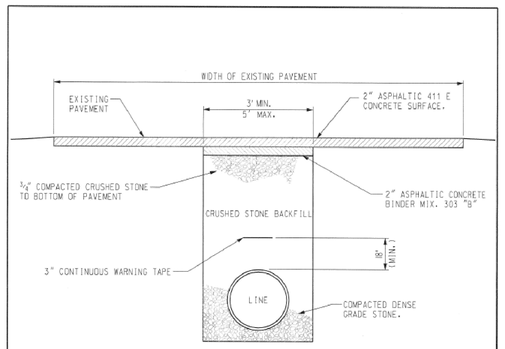
Nashville, Tennessee 37211 (615) 333-7200




NOTE:
EDGE OF PAVEMENT TO BE TRIMMED A MINIMUM OF 12" BEYOND EACH SIDE OF TRENCH WIDTH TO OBTAIN NEAT LINES. BINDER MIX TO BE PLACED AS A TEMPORARY SURFACE WITHIN 48 HOURS OF MAKING ROAD CROSSING.

## ASPHALT PAVEMENT REPLACEMENT DETAIL

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

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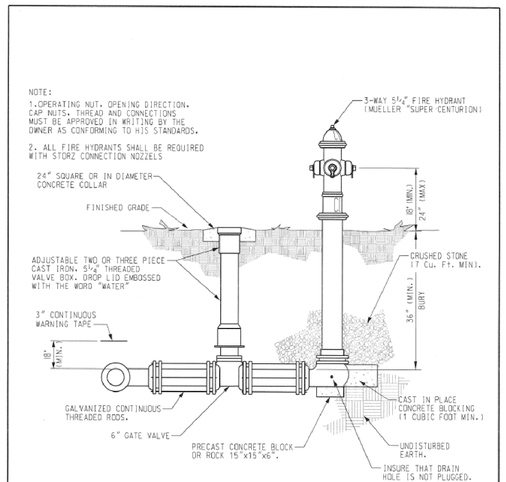


## FIRE HYDRANT WITH VALVE DETAIL

STANDARD WATER AND SEWER SYSTEM DETAILS
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ASHLAND CITY, TENNESSEE

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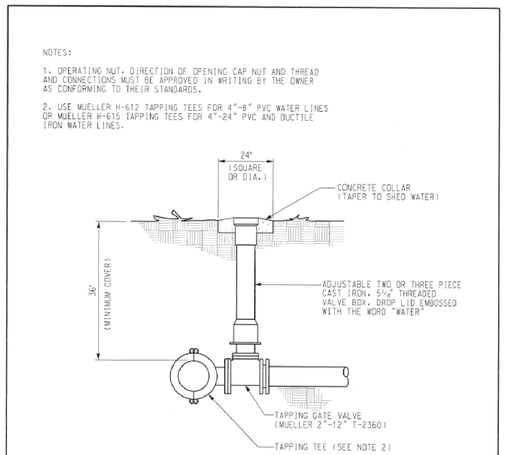


## TAPPING SLEEVE & VALVE DETAIL

STANDARD WATER AND SEWER SYSTEM DETAILS
THE TOWN OF
ASHLAND CITY, TENNESSEE

HIGHERS, KOONCE & ASSOCIATES, INC.
Civil and Environmental Engineering
3343 Perimeter Hill Drive Suite 212
Nashville, Tennessee 37211 (615) 333-7200

12/23/2019

| | | | |
|---|---|---|---|
| DATE: | | | 12/23/2019 |
| DRW: | DS | CHK: | DS |
| DESCRIPTION: | | | |
| ISSUED FOR PERMIT | | | |
| DATE: | | | - |
| DRW: | - | CHK: | - |
| DESCRIPTION: | | | |
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| DESCRIPTION: | | | |
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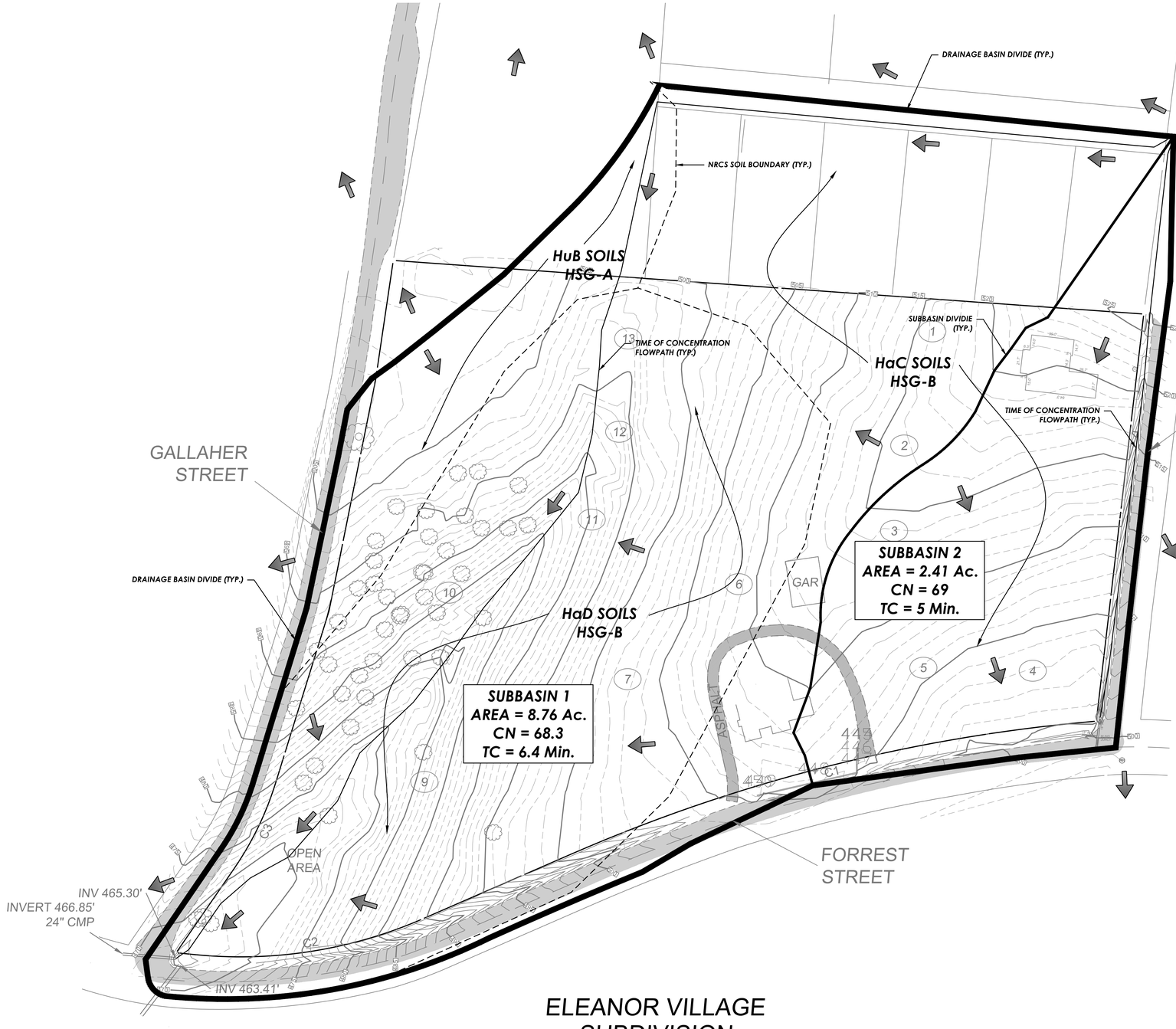
**PUBLIC UTILITY AND DRAINAGE IMPROVEMENTS FOR**
**ELEANOR VILLAGE SUBDIVISION**
ASHLAND CITY
CHEATHAM COUNTY, TENNESSEE

HARPETH CIVIL
CIVIL ENGINEERS
179 BELLE FOREST CIR.
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM

HCI PN 0517-19A

PUBLIC WATER PLAN

C-4.2




# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15

Tennessee811 Know what's below. Call before you dig.

## EXISTING CONDITIONS HYDROLOGY

**SUBBASIN E-1**

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-1 | Grass, Fair Cond (Undev.) - HSG A | 31,075 | 0.71 | 49 |
| SA-2 | Grass, Fair Cond (Undev.) - HSG B | 262,428 | 6.02 | 69 |
| SA-3 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 76,160 | 1.75 | 75 |
| SA-4 | SF Res (R3 Zoning 0.25 Ac.) - HSG A | 11,987 | 0.28 | 61 |
| | TOTAL | 381,650 | 8.76 | |

| | | |
|---|---|---|
| COMPOSITE CN = | 68 | |
| TIME OF CON. = | 6.4 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| OUTFALL ID= | OUTFALL 1 | |

**SUBBASIN E-2**

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-5 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 6,332 | 0.15 | 75 |
| SA-6 | Grass, Fair Cond (Undev.) - HSG B | 98,632 | 2.26 | 69 |
| | TOTAL | 104,964 | 2.41 | |

| | | |
|---|---|---|
| COMPOSITE CN = | 69 | |
| TIME OF CON. = | 5 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| OUTFALL ID= | OUTFALL 2 | |

**PEAK FLOW (CFS)**

| STORM EVENT | OUTFALL 1 | OUTFALL 2 |
|---|---|---|
| 2-YEAR | 12.19 | 3.58 |
| 5-YEAR | 22.83 | 6.57 |
| 10-YEAR | 30.47 | 8.71 |
| 25-YEAR | 40.69 | 11.55 |
| 50-YEAR | 48.57 | 13.77 |
| 100-YEAR | 56.71 | 16.03 |

SCALE: 1" = 50'

0 50 100 150

12-23-2019

| | | | |
|---|---|---|---|
| DATE: | 12/23/2019 | | |
| DRW: | DS | CHK: | DS |
| DESCRIPTION: ISSUED FOR PERMIT | | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: - | | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: - | | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: - | | | |
| DATE: | - | | |
| DRW: | - | CHK: | - |
| DESCRIPTION: - | | | |

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CHEATHAM COUNTY, TENNESSEE

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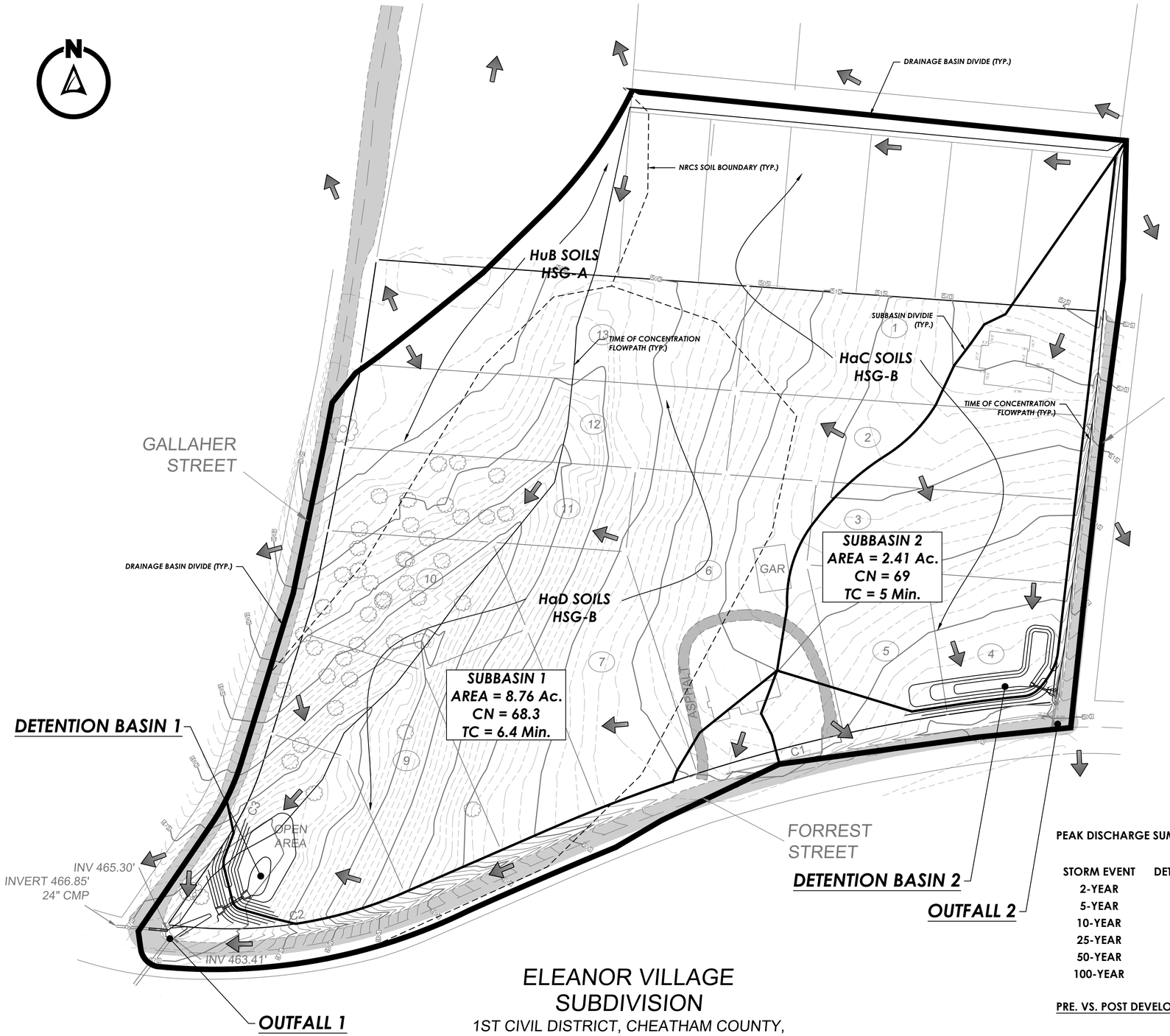
SUITE 204 E
NASHVILLE, TN. 37221
(615) 730-3502
WWW.HARPETHCIVIL.COM

HCI PN 0517-19A

**EXISTING CONDITIONS DRAINAGE EXHIBIT**

**D-1.0**




# ELEANOR VILLAGE SUBDIVISION

1ST CIVIL DISTRICT, CHEATHAM COUNTY, TN

TOTAL AREA:

SQ. FT. 354849.0

AC 8.15

SCALE: 1" = 50'

0 50 100 150

Tennessee811 Know what's below. Call before you dig.

## PROPOSED CONDITIONS HYDROLOGY

### SUBBASIN P-1 - DETENTION BASIN 1

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-1 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 72,113 | 1.66 | 75 |
| SA-2 | SF Res (R3 Zoning 0.50 Ac.) - HSG A | 42,790 | 0.98 | 54 |
| SA-3 | SF Res (R3 Zoning 0.50 Ac.) - HSG B | 233,997 | 5.37 | 70 |
| | **TOTAL** | **348,900** | **8.01** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 69 | |
| **TIME OF CON. =** | 6.4 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 1 | |

### SUBBASIN P-2 - BYPASS

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-4 | Public ROW (Open Ditches) - HSG B | 32,479 | 0.75 | 89 |
| | **TOTAL** | **32,479** | **0.75** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 89 | |
| **TIME OF CON. =** | 5 Minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 1 | |

### SUBBASIN P-3 - DTENTION BASIN 2

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-5 | SF Res (R3 Zoning 0.25 Ac.) - HSG B | 6,500 | 0.15 | 75 |
| SA-6 | SF Res (R3 Zoning 0.50 Ac.) - HSG B | 81,760 | 1.88 | 70 |
| | **TOTAL** | **88,260** | **2.03** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 70 | |
| **TIME OF CON. =** | 5 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 2 | |

### SUBBASIN P-4 - BYPASS

| SUBAREA ID | DESCRIPTION | S.F. | Ac. | CN |
|---|---|---|---|---|
| SA-7 | Public ROW (Open Ditches) - HSG B | 16,722 | 0.38 | 89 |
| | **TOTAL** | **16,722** | **0.38** | |

| | | |
|---|---|---|
| **COMPOSITE CN =** | 89 | |
| **TIME OF CON. =** | 5 minutes | TR55 (SEE HYDRAFLOWS REPORT) |
| **OUTFALL ID=** | OUTFALL 2 | |

### PEAK DISCHARGE SUMMARY TABLE (CFS)

| | OUTFALL 1 | | | OUTFALL 2 | | |
|---|---|---|---|---|---|---|
| **STORM EVENT** | **DETENTION DISCHARGE** | **BYPASS** | **TOTAL** | **DETENTION DISCHARGE** | **BYPASS** | **TOTAL** |
| **2-YEAR** | 9.31 | 2.78 | 12.09 | 2.06 | 1.41 | 3.47 |
| **5-YEAR** | 16.08 | 3.98 | 20.06 | 3.88 | 2.02 | 5.90 |
| **10-YEAR** | 20.04 | 4.77 | 24.81 | 5.24 | 2.42 | 7.66 |
| **25-YEAR** | 24.82 | 5.77 | 30.59 | 6.39 | 2.92 | 9.31 |
| **50-YEAR** | 29.30 | 6.51 | 35.81 | 7.99 | 3.30 | 11.29 |
| **100-YEAR** | 39.32 | 7.23 | 46.55 | 11.15 | 3.67 | 14.82 |

### PRE. VS. POST DEVELOPMENT COMPARISON TABLE

| | OUTFALL 1 | | | OUTFALL 2 | | |
|---|---|---|---|---|---|---|
| **STORM EVENT** | **EXISTING** | **PROP. P-1** | **DIFF.** | **EXISTING** | **PROPOSED** | **DIFF.** |
| **2-YEAR** | 12.19 | | | 3.58 | 3.47 | **-0.11** |
| **5-YEAR** | 22.83 | 20.06 | **-2.77** | 6.57 | 5.90 | **-0.67** |
| **10-YEAR** | 30.47 | 24.81 | **-5.66** | 8.71 | 7.66 | **-1.05** |
| **25-YEAR** | 40.69 | 30.59 | **-10.10** | 11.55 | 9.31 | **-2.24** |
| **50-YEAR** | 48.57 | 35.81 | **-12.76** | 13.77 | 11.29 | **-2.48** |
| **100-YEAR** | 56.71 | 46.55 | **-10.16** | 16.03 | 14.82 | **-1.21** |

12-23-2019

| | |
|---|---|
| DATE: | 12/23/2019 |
| DRW: DS | CHK: DS |
| DESCRIPTION: | ISSUED FOR PERMIT |

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HCI PN 0517-19A

**PROPOSED CONDITIONS DRAINAGE EXHIBIT**

**D-1.1**