

## Storm Water Report

# 301 Broadway Mixed Use

301 Broadway Street  
Eagle, Colorado

### Prepared for:

NEO Studio  
3560 Walnut St. Unit A  
Denver, Colorado 80205

This report has been prepared by the staff of DCI Engineers under the direction of the undersigned professional engineer whose stamp and signature appears hereon.

### Prepared by:



707 W. 2<sup>nd</sup> Avenue • Spokane, WA 99201  
Tele: (509) 455-4448 • FAX: (509) 455-7492

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*The methods, descriptions, and design calculations shown in this design report conform to the Town of Eagle Drainage Design Criteria unless noted otherwise and are under the jurisdiction of the Town of Eagle relative to the collection, treatment, and disposal of the stormwater runoff.*

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## **Basis of Design of Storm Water System**

### **1.0 INTRODUCTION**

The proposed 301 Broadway Mixed Use Project is in downtown Eagle, Colorado, approximately 1/2 of a mile south of the Interstate 70 exit. The Project is located on the corner of Third Street and Broadway Street. The Property is approximately 0.28 acres. It is bordered by Third Street residence to the north, a gravel alley to the west, a commercial building to the south and Broadway Street to the east. The Project is a proposed mixed use commercial-residential with commercial on the ground floor and smaller residential units on the upper levels. This report addresses the stormwater generated runoff from the proposed development and connection to the existing Town stormwater infrastructure prior to being released to the Eagle River.

### **2.0 EXISTING LAND USE**

The Property is currently existing as a commercial building. Most of the property contains the building and associated parking, surrounded on (2) sides by concrete sidewalks. The majority of the site is impervious surface.

### **3.0 DRAINAGE BASINS**

The downtown core of Eagle allows zero setback building construction, and therefore the proposed building is designed to be built to each property line, on all sides. The proposed drainage will be collected on the roof and piped to a discharge point on the southern edge of the proposed building. The runoff will connect to an existing stormwater curb inlet along Broadway Street. The existing curb inlet connects to an 18" RCP storm pipe that travels to the 30" RCP storm collector in Broadway Street. This pipe crosses Highway 6 and then discharges into the Eagle River.

### **4.0 HYDROLOGY – PEAK FLOW DETERMINATION**

Peak flows have been calculated using the SCS method for Type II rainfall. The Town of Eagle Drainage Design Criteria was reviewed to adhere to the standards. A 10-, 25- and 100-year storm event were analyzed per Public Works Design Manual and the 2020 ordinance suggesting a 10 year storm event for design consideration. Rainfall intensities were taken from NOAA Atlas 14 and the precipitation tables are included in Appendix III. Soil classification types were found in the "Web Soil Survey" prepared by the U.S. Department of Agriculture Soil Conservation Service (NRCS). A summary and map of the soils may be found in Appendix IV. The entire site is comprised of Type B soils, which have moderate infiltration rates, are well drained and have moderate water transmission rates.

Developed Peak Flows were determined utilizing the SCS method. The specific developed drainage basins were given runoff curve numbers (RCN) representative of their relative impervious areas. Since the entire site is impervious in both its existing and developed conditions, just one set of calculations was generated, using a RCN of 98. All runoff calculations can be seen in Appendix V. The developed stormwater runoff was calculated as 0.61, 0.74 and 0.94 cfs for the 10-, 25- and 100- year events respectively.

## 5.0 HYDRAULICS – CULVERTS

The existing stormwater infrastructure in Broadway Street is a 30" RCP storm main. A 90% full 30" RCP pipe at 0.5% can convey 30.9 cfs (Manning's Equation- Appendix VI). The proposed Project will introduce 0.61 additional cfs (10-year event) to the Town system, approximately a 2.0% increase. In the event the Town's storm system becomes inundated with runoff, the Town's curbed street system will provide sufficient volume to carry the 100-year event (per 2002 Master Drainage Study).

## 6.0 SEDIMENT AND EROSION CONTROL

A sediment and erosion control plan have been developed for the project to limit the transport of sediments and contaminants to the Town facilities and the Eagle River. Devices to be used during construction to prevent sediment laden runoff from leaving the site include stabilized construction entrances, excelsior wattles and inlet protection.

## Appendix I

### Project Location Map



## Appendix II

### Post-Development Basin Map







## Appendix III

### Precipitation Data



NOAA Atlas 14, Volume 8, Version 2  
Location name: Eagle, Colorado, USA\*  
Latitude: 39.6522°, Longitude: -106.8272°  
Elevation: 6603 ft\*\*  
\* source: ESRI Maps  
\*\* source: USGS



## POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

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### PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.103 (0.085-0.129)	0.155 (0.127-0.193)	0.237 (0.193-0.297)	0.304 (0.247-0.383)	0.395 (0.304-0.520)	0.464 (0.347-0.623)	0.531 (0.381-0.739)	0.598 (0.408-0.865)	0.685 (0.446-1.03)	0.749 (0.474-1.16)
10-min	0.151 (0.124-0.188)	0.226 (0.185-0.282)	0.347 (0.283-0.434)	0.446 (0.361-0.561)	0.579 (0.445-0.761)	0.679 (0.509-0.912)	0.778 (0.559-1.08)	0.876 (0.597-1.27)	1.00 (0.652-1.51)	1.10 (0.694-1.69)
15-min	0.184 (0.151-0.229)	0.276 (0.226-0.344)	0.423 (0.345-0.530)	0.544 (0.440-0.684)	0.706 (0.543-0.928)	0.828 (0.620-1.11)	0.948 (0.681-1.32)	1.07 (0.728-1.54)	1.22 (0.796-1.84)	1.34 (0.846-2.06)
30-min	0.255 (0.209-0.317)	0.349 (0.286-0.435)	0.504 (0.411-0.630)	0.632 (0.512-0.796)	0.810 (0.626-1.07)	0.948 (0.712-1.28)	1.09 (0.782-1.52)	1.23 (0.838-1.78)	1.41 (0.921-2.13)	1.55 (0.984-2.40)
60-min	0.331 (0.272-0.412)	0.422 (0.346-0.526)	0.573 (0.468-0.717)	0.702 (0.569-0.884)	0.884 (0.685-1.17)	1.03 (0.774-1.39)	1.17 (0.847-1.64)	1.32 (0.908-1.93)	1.53 (1.00-2.32)	1.69 (1.07-2.61)
2-hr	0.408 (0.337-0.504)	0.495 (0.408-0.612)	0.643 (0.528-0.798)	0.772 (0.629-0.963)	0.957 (0.750-1.26)	1.11 (0.842-1.48)	1.26 (0.920-1.75)	1.42 (0.987-2.05)	1.65 (1.09-2.46)	1.83 (1.17-2.78)
3-hr	0.471 (0.390-0.578)	0.550 (0.455-0.676)	0.687 (0.566-0.848)	0.808 (0.661-1.00)	0.986 (0.779-1.29)	1.13 (0.868-1.51)	1.29 (0.945-1.78)	1.45 (1.01-2.08)	1.68 (1.12-2.49)	1.86 (1.20-2.81)
6-hr	0.603 (0.503-0.735)	0.678 (0.565-0.827)	0.811 (0.673-0.993)	0.932 (0.768-1.15)	1.11 (0.888-1.45)	1.27 (0.979-1.67)	1.43 (1.06-1.95)	1.60 (1.13-2.27)	1.85 (1.25-2.71)	2.05 (1.34-3.05)
12-hr	0.751 (0.630-0.908)	0.858 (0.719-1.04)	1.04 (0.869-1.26)	1.20 (0.996-1.47)	1.43 (1.15-1.83)	1.62 (1.26-2.11)	1.82 (1.36-2.44)	2.02 (1.44-2.81)	2.31 (1.57-3.32)	2.54 (1.67-3.71)
24-hr	0.917 (0.774-1.10)	1.06 (0.893-1.27)	1.30 (1.09-1.56)	1.50 (1.25-1.82)	1.80 (1.44-2.27)	2.03 (1.59-2.61)	2.27 (1.71-3.01)	2.52 (1.81-3.46)	2.87 (1.96-4.06)	3.14 (2.08-4.52)
2-day	1.10 (0.934-1.31)	1.25 (1.06-1.49)	1.52 (1.28-1.81)	1.75 (1.47-2.10)	2.09 (1.70-2.62)	2.36 (1.87-3.01)	2.65 (2.01-3.47)	2.95 (2.14-3.99)	3.37 (2.33-4.71)	3.70 (2.48-5.25)
3-day	1.21 (1.03-1.43)	1.38 (1.18-1.64)	1.68 (1.42-1.99)	1.93 (1.63-2.30)	2.30 (1.87-2.86)	2.60 (2.06-3.28)	2.91 (2.22-3.78)	3.23 (2.35-4.34)	3.69 (2.57-5.11)	4.04 (2.73-5.68)
4-day	1.30 (1.12-1.54)	1.49 (1.27-1.76)	1.80 (1.53-2.13)	2.06 (1.75-2.46)	2.45 (2.00-3.04)	2.76 (2.20-3.48)	3.09 (2.36-3.99)	3.42 (2.50-4.57)	3.89 (2.72-5.35)	4.26 (2.89-5.95)
7-day	1.55 (1.34-1.82)	1.74 (1.50-2.04)	2.06 (1.77-2.43)	2.34 (1.99-2.77)	2.74 (2.25-3.36)	3.06 (2.45-3.81)	3.39 (2.61-4.34)	3.74 (2.75-4.92)	4.21 (2.97-5.72)	4.58 (3.14-6.32)
10-day	1.76 (1.52-2.06)	1.96 (1.69-2.29)	2.30 (1.97-2.69)	2.58 (2.21-3.04)	2.99 (2.47-3.65)	3.32 (2.67-4.11)	3.66 (2.84-4.65)	4.02 (2.97-5.25)	4.50 (3.20-6.07)	4.89 (3.36-6.68)
20-day	2.35 (2.04-2.72)	2.60 (2.26-3.01)	3.02 (2.61-3.50)	3.37 (2.90-3.93)	3.87 (3.21-4.65)	4.26 (3.45-5.19)	4.65 (3.63-5.82)	5.06 (3.78-6.51)	5.62 (4.02-7.43)	6.04 (4.20-8.13)
30-day	2.84 (2.48-3.27)	3.15 (2.75-3.63)	3.66 (3.18-4.22)	4.08 (3.52-4.73)	4.65 (3.88-5.55)	5.10 (4.15-6.17)	5.54 (4.35-6.87)	5.99 (4.50-7.63)	6.59 (4.74-8.63)	7.04 (4.93-9.38)
45-day	3.48 (3.05-3.99)	3.87 (3.39-4.44)	4.50 (3.92-5.16)	5.00 (4.34-5.77)	5.68 (4.74-6.70)	6.18 (5.04-7.41)	6.68 (5.26-8.19)	7.16 (5.40-9.02)	7.78 (5.63-10.1)	8.24 (5.81-10.9)
60-day	4.04 (3.55-4.61)	4.50 (3.95-5.14)	5.22 (4.57-5.98)	5.80 (5.04-6.67)	6.55 (5.48-7.68)	7.10 (5.81-8.46)	7.63 (6.02-9.29)	8.13 (6.14-10.2)	8.76 (6.36-11.2)	9.20 (6.52-12.0)

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

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### PF graphical

## Appendix IV


### Soils Summary

Soil Map—Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties  
(301 Broadway)



## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### 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: Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties

Survey Area Data: Version 15, Aug 29, 2024

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

Date(s) aerial images were photographed: Sep 5, 2021—Sep 7, 2021

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.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
26	Dahlquist-Southace complex, 6 to 12 percent slopes	0.3	100.0%
<b>Totals for Area of Interest</b>		<b>0.3</b>	<b>100.0%</b>



## Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties

### 26—Dahlquist-Southace complex, 6 to 12 percent slopes

#### Map Unit Setting

*National map unit symbol:* jq5d

*Elevation:* 6,200 to 7,400 feet

*Mean annual precipitation:* 12 to 16 inches

*Mean annual air temperature:* 42 to 46 degrees F

*Frost-free period:* 75 to 95 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Dahlquist and similar soils:* 50 percent

*Southace and similar soils:* 40 percent

*Minor components:* 10 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Dahlquist

##### Setting

*Landform:* Terraces, alluvial fans

*Landform position (three-dimensional):* Riser

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Mixed alluvium

##### Typical profile

*H1 - 0 to 6 inches:* cobbly sandy loam

*H2 - 6 to 13 inches:* very cobbly sandy clay loam

*H3 - 13 to 23 inches:* very cobbly sandy loam

*H4 - 23 to 60 inches:* extremely cobbly sandy loam

##### Properties and qualities

*Slope:* 6 to 12 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water*

*(Ksat):* Moderately high to high (0.20 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 15 percent

*Available water supply, 0 to 60 inches:* Low (about 3.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* B

*Ecological site:* R048AY303CO - Loamy Slopes  
*Other vegetative classification:* LOAMY SLOPES (null\_31)  
*Hydric soil rating:* No

## Description of Southace

### Setting

*Landform:* Terraces, alluvial fans  
*Landform position (three-dimensional):* Riser  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Mixed alluvium

### Typical profile

*H1 - 0 to 10 inches:* very stony sandy loam  
*H2 - 10 to 22 inches:* extremely stony sandy loam  
*H3 - 22 to 60 inches:* extremely stony loamy coarse sand

### Properties and qualities

*Slope:* 6 to 12 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 6.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Very low (about 2.0 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7s  
*Hydrologic Soil Group:* A  
*Ecological site:* R048AY287CO - Stony Foothills  
*Other vegetative classification:* Stony Foothills (null\_81)  
*Hydric soil rating:* No

## Minor Components

### Other soils

*Percent of map unit:* 10 percent  
*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties  
Survey Area Data: Version 15, Aug 29, 2024

## Appendix V

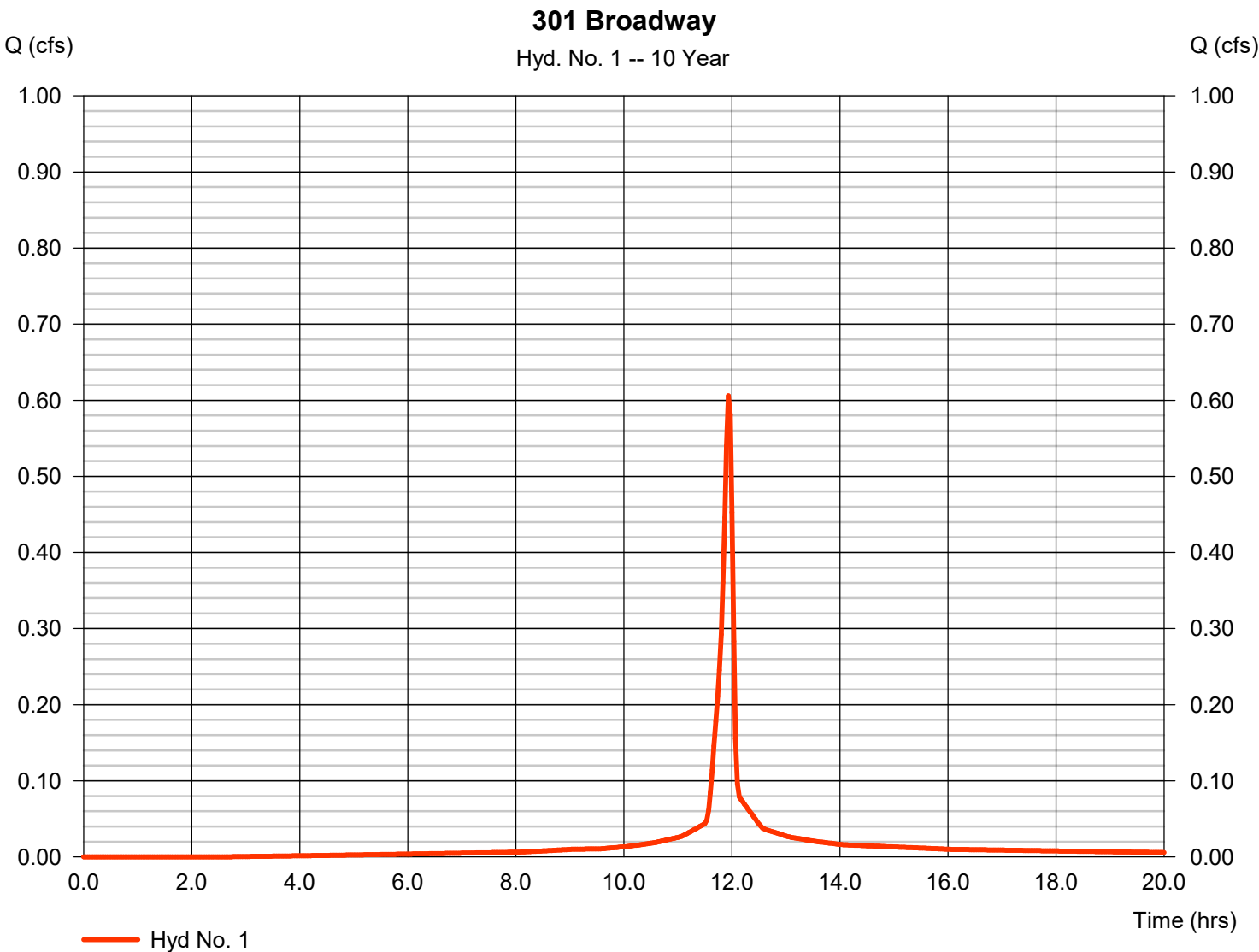
### Developed Flow Rate Calculations

# Hydrograph Report

## Hyd. No. 1

301 Broadway

Hydrograph type	= SCS Runoff	Peak discharge	= 0.606 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,351 cuft
Drainage area	= 0.310 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

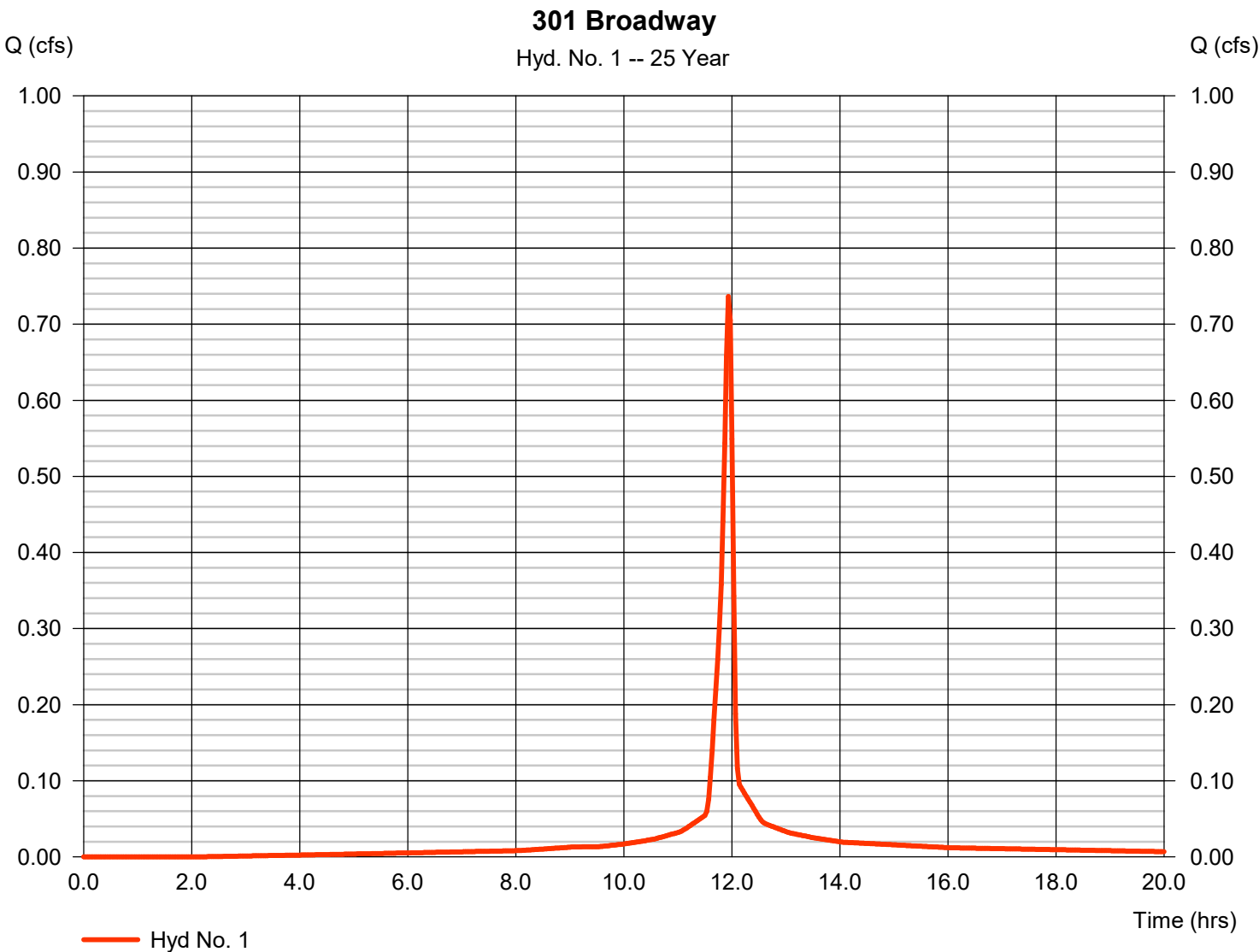


# Hydrograph Report

## Hyd. No. 1

301 Broadway

Hydrograph type	= SCS Runoff	Peak discharge	= 0.737 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,663 cuft
Drainage area	= 0.310 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

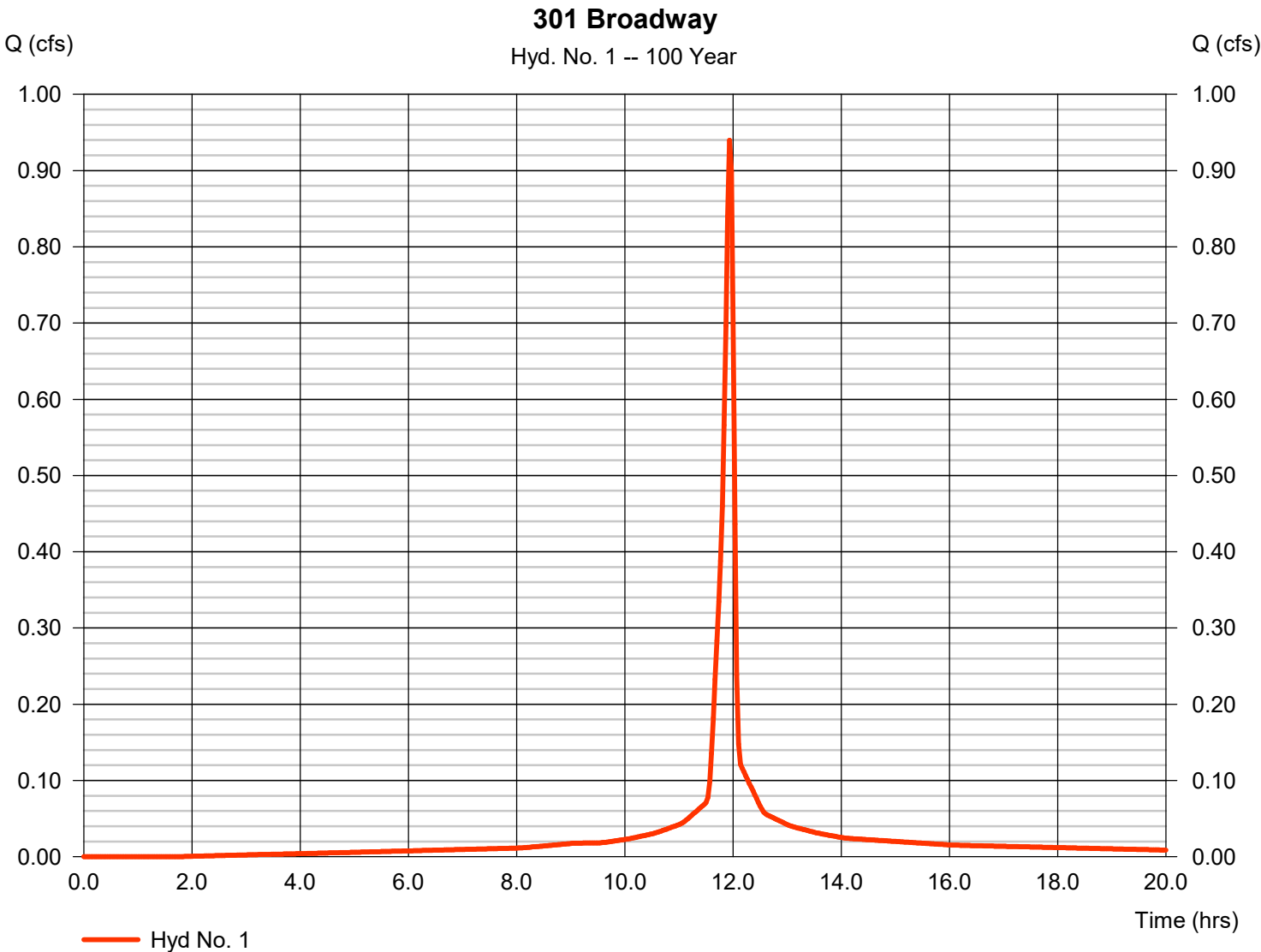


# Hydrograph Report

## Hyd. No. 1

301 Broadway

Hydrograph type	= SCS Runoff	Peak discharge	= 0.940 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 2,154 cuft
Drainage area	= 0.310 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484





## Appendix VI

### Culvert Calculations

# Channel Report

## 301 Broadway

### Circular

Diameter (ft) = 2.50

Invert Elev (ft) = 100.00  
Slope (%) = 0.50  
N-Value = 0.013

### Calculations

Compute by: Q vs Depth  
No. Increments = 10

### Highlighted

Depth (ft) = 2.25  
Q (cfs) = 30.92  
Area (sqft) = 4.66  
Velocity (ft/s) = 6.64  
Wetted Perim (ft) = 6.25  
Crit Depth, Yc (ft) = 1.90  
Top Width (ft) = 1.50  
EGL (ft) = 2.94

