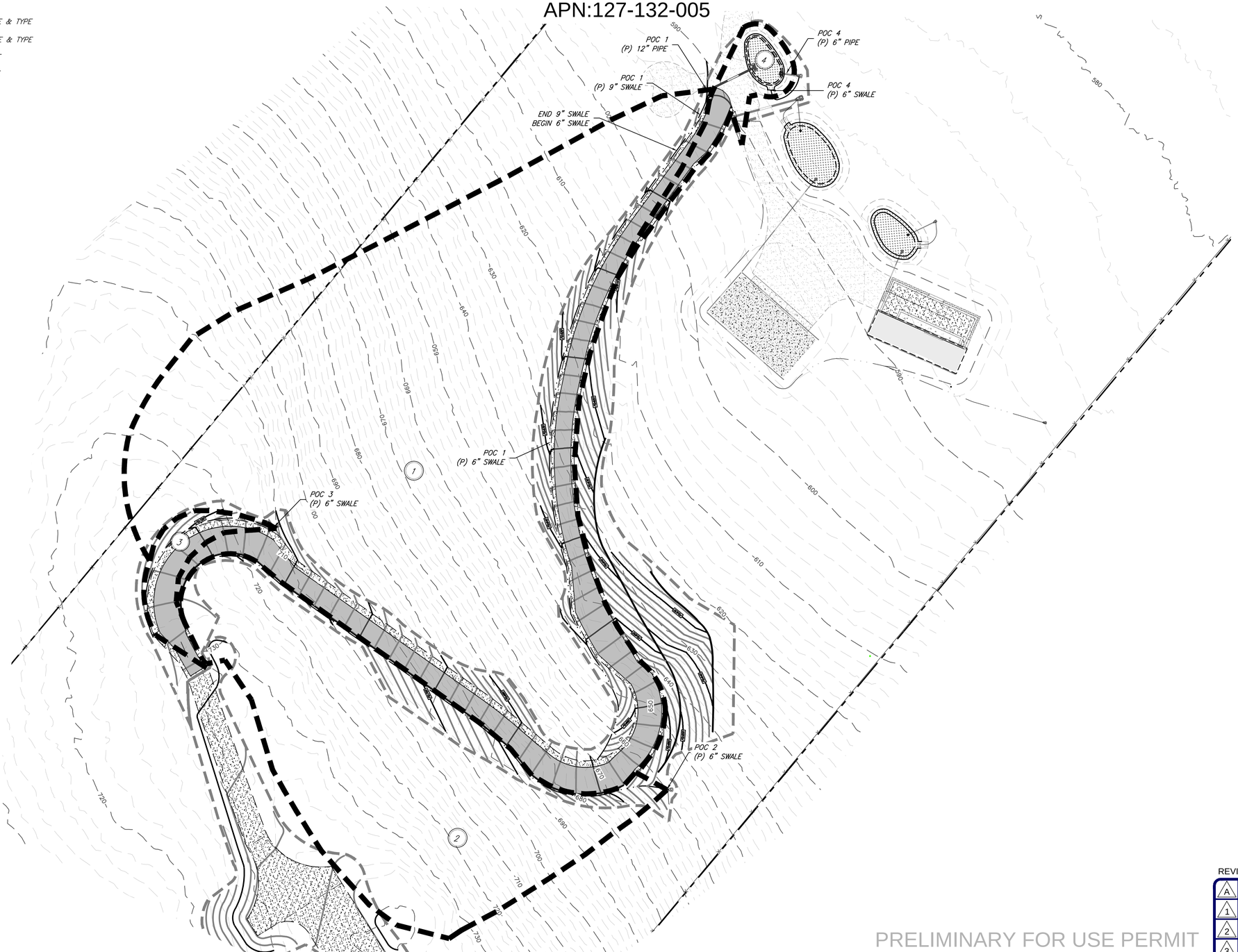
LANDS OF MCLAUGHLIN & KONOLIGE

HYDROLOGY MAP-10 YEAR STORM EVENT

5575 LOVALL VALLEY ROAD, NAPA
APN:050-361-013-000
5302 LOVALL VALLEY ROAD, SONOMA
APN:127-132-005

LEGEND

- RECORD BOUNDARY LINE
- (E) FLOWLINE
- (P) FLOWLINE
- LIMITS OF 10 YEAR STORM EVENT TRIBUTARY
- EXISTING MINOR CONTOUR
- 100 EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 100 PROPOSED MAJOR CONTOUR
- PER PLAN (E) CULVERT/STORMDRAIN W/SIZE & TYPE
- PER PLAN (P) CULVERT/STORMDRAIN W/SIZE & TYPE
- (E) ASPHALT CONCRETE SURFACE
- (P) ASPHALT CONCRETE SURFACE
- (E) GRAVEL SURFACE
- (P) GRAVEL SURFACE
- (E) CONCRETE SURFACE
- (P) CONCRETE SURFACE



NORTH

GRAPHIC SCALE
30 0 30
(IN FEET)
1 inch = 30 ft.

PRELIMINARY FOR USE PERMIT

REVISION BLOCK

A	PLAN CHECK #1	01/27/20
1		
2		
3		

LANDS OF MCLAUGHLIN & KONOLIGE
HYDROLOGY MAP-10 YEAR STORM
5575 LOVAL VALLEY ROAD
NAPA, CALIFORNIA
APN: 050-361-013-000

H1 OF 1

HOGAN LAND SERVICES
A CALIFORNIA CORPORATION
1702 4TH STREET
SANTA ROSA, CA 95404
TEL (707) 544-2104
FAX (707) 522-2105
www.hoganls.com

REGISTERED PROFESSIONAL ENGINEER DANIEL P. BYRNE III No. 80078 CIVIL STATE OF CALIFORNIA

THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECTION AT THE REQUEST OF JANET MCLAUGHLIN IN SEPTEMBER 2018

PRELIMINARY

DANIEL P. BYRNE III R.C.E. 80078

DRN:	AC	CHK:	DB3	P.M:	JC
DATE:	2/1/21	JOB #:	3567		

Drainage Analysis – Lands of McLaughlin & Konolige

Prepared July 9, 2020

Site:
5575 Lovall Valley Road
Napa, California
APN: 050-361-013-000
HLS Project # 3567

Owners:
Janet Mclaughlin & Kurt Konolige
865 College Ave
Menlo Park, CA 94025
(650) 796-1228

Analysis Prepared by:
Hogan Land Services, Inc.
1702 4th Street
Santa Rosa, CA 95404
Jim Conklin, EIT
jconklin@hoganls.com
707-544-2104

Preliminary

07/13/2020 8:46:24 AM

PREPARED: May 21, 2020

SUBJECT: 10-Year event hydrology calculations and reasoning for drainage network sizing capacity and velocity

PROJECT: Drainage Analysis – Lands of McLaughlin & Konolige

ADDRESS: 5575 Lovall Valley Road, Napa California

APN: 050-361-013-000

REFERENCES:

1. Napa County Road & Street Standards, by Napa County, Revised February 4, 2020.

PROJECT DESCRIPTION:
The subject parcel is located at 5575 Lovall Valley Road in Napa California. Existing onsite infrastructure consists of, gravel driveway, gravel parking area, barn, shed, and existing dirt road. The development under B19-00701 include existing common drive improvements, main residence, and a residential gravel driveway. The proposed development project under this permit includes a residential fire safe AC driveway to replace the existing dirt road. This road will serve as residential access to the future residential development on the Sonoma county side under separate future development. Topography of the area consists of moderate to steep slopes (10-50%) with most of the lot vegetated with native trees and grasses. This drainage analysis evaluates the potential drainage impacts of the proposed development under this permit.

EXISTING AND PROPOSED DRAINAGE PATTERN:
Runoff from the site sheet flows north-east across the subject parcel before converging at the existing unnamed blue line creek onsite (See attached watershed exhibit). Flow within the unnamed blue line creek eventually discharges to Huichica Creek. The proposed development includes rock lined swales along the proposed driveway and retaining walls and a culvert to discharge to the bioretention facility for treatment and retention. The discharge will then return to sheet flow towards the unnamed blue line creek onsite. The overall drainage pattern will remain unchanged from pre to post conditions with all runoff from the site converging at the unnamed blue line creek onsite and eventually converge with Huichica Creek.

DESIGN REQUIREMENTS:
The parcel lies within Napa County and is subject to BASMAA requirements (See associated Stormwater Control Plan). This analysis focuses strictly on the 10-year event sizing of the proposed improvements. BASMAA requirements are addressed within the Stormwater Control Plan.

EXISTING ON-SITE AND OFF-SITE CONDITIONS & IMPACTS OF DEVELOPMENT:
The drainage pattern at a regional scale remains unchanged from pre to post development conditions. The proposed bioretention facility will mitigate storm water level increases and pollutant increases projected for the development. (See Stormwater Control Plan)

DESIGN CRITERIA & ASSUMPTIONS:
This evaluation is based on the policies and procedures detailed in Napa County Road & Street Standards, Revised September 2017, issued by Napa County. The hydraulic design of the individual drainage improvements is based on the rational formula (Q = C I A) and is based on the 10-year, 10-minute initial time of concentration

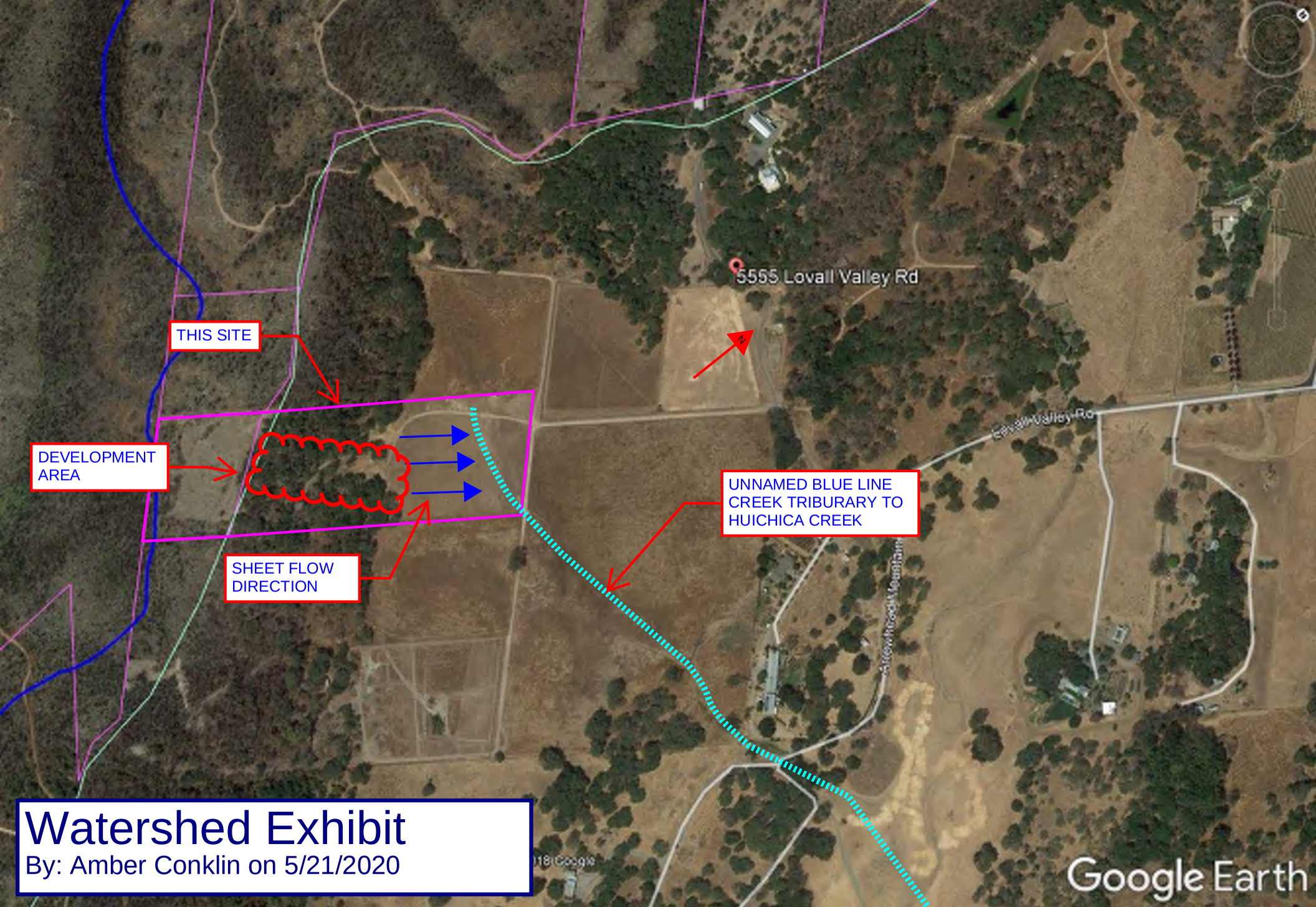
storm. A mean annual precipitation of 35 was used resulting in a 60-min rainfall of 1.10 inches. Volume capture and treatment requirements are addressed within associated Stormwater Control Plan. Minor landscape area drains were evaluated only for the worst case run within network. The worst-case pipe sizing and slope is then conservatively used throughout the network.

METHODOLOGIES USED:
Rational Formula calculations for the 10-year storm are included based on the composite runoff coefficients for each tributary for sizing of the individual drainage improvements. The calculation spreadsheets are attached with this submittal.

100 YEAR STORM IMPACT AND FLOODING CONCERNS:
The parcel lies outside of the 100-year flood zone therefore flooding is not expected. A 100-year storm event would likely result in overflow of the culverts and swales and runoff returns to sheet flow downhill.

CONCLUSION:
The calculations and analysis provided herein is based upon the Napa County Road & Street Standards and generally accepted engineering principals. The proposed drainage improvements for the development have been sized to accommodate the 10-year storm event. Drainage network calculations are based on free flow and should be routinely inspected by the property owner.

ATTACHMENTS:
- Rational Method Spreadsheet with Composite Runoff Coefficient Calculations
- Swale and Pipe Hydraulic Calculations
- 10-Yr Post-Development Watershed Map



Watershed Exhibit

By: Amber Conklin on 5/21/2020

Storm Frequency	10	Mean Precipitation	35

Post-Development - Tributary 1						Time of Concentration		Intensity	Runnoff Coefficient		Total Area			Flow	
Tributary	Point of Conc.	Area (ac.)	Avg. Slope %	Length	Velocity fps	Travel Time (sec.)	Total Time	I	C_comp	ΔA	A	ΔAC	∑ΔAC	Q (cfs)	
1	POC 1	1.67				INITIAL	10	2.60	0.60	1.67	1.67	1.00	1.00	2.60	Total Flow CFS

Storm Frequency	10	Mean Precipitation	35

Post-Development - Tributary 2						Time of Concentration		Intensity	Runnoff Coefficient		Total Area			Flow	
Tributary	Point of Conc.	Area (ac.)	Avg. Slope %	Length	Velocity fps	Travel Time (sec.)	Total Time	I	C_comp	ΔA	A	ΔAC	∑ΔAC	Q (cfs)	
2	POC 2	0.65				INITIAL	10	2.60	0.60	0.65	0.65	0.39	0.39	1.01	Total Flow CFS

Storm Frequency	10	Mean Precipitation	35

Post-Development - Tributary 3						Time of Concentration		Intensity	Runnoff Coefficient		Total Area			Flow	
Tributary	Point of Conc.	Area (ac.)	Avg. Slope %	Length	Velocity fps	Travel Time (sec.)	Total Time	I	C_comp	ΔA	A	ΔAC	∑ΔAC	Q (cfs)	
3	POC 3	0.06				INITIAL	10	2.60	0.40	0.06	0.06	0.02	0.02	0.06	Total Flow CFS

Storm Frequency	10	Mean Precipitation	35

Post-Development - Tributary 4						Time of Concentration		Intensity	Runnoff Coefficient		Total Area			Flow	
Tributary	Point of Conc.	Area (ac.)	Avg. Slope %	Length	Velocity fps	Travel Time (sec.)	Total Time	I	C_comp	ΔA	A	ΔAC	∑ΔAC	Q (cfs)	
4	POC 4	0.06				INITIAL	10	2.60	0.40	0.06	0.06	0.02	0.02	0.06	Total Flow CFS

POC / Design		Tributaries Receiving	Total Q (cfs)
POC 1	6" SWALE	1 & 3	2.66
	9" SWALE	1 & 3	2.66
	12" PIPE	1 & 3	2.66
POC 2	6" SWALE	2	1.01
POC 3	6" SWALE	3	0.06
POC 4	6" SWALE	1, 3, & 4	2.72
	6" PIPE	1, 3, & 4	2.72

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, May 28 2020

POC 1 - (P) 12 INCH PIPE

Circular

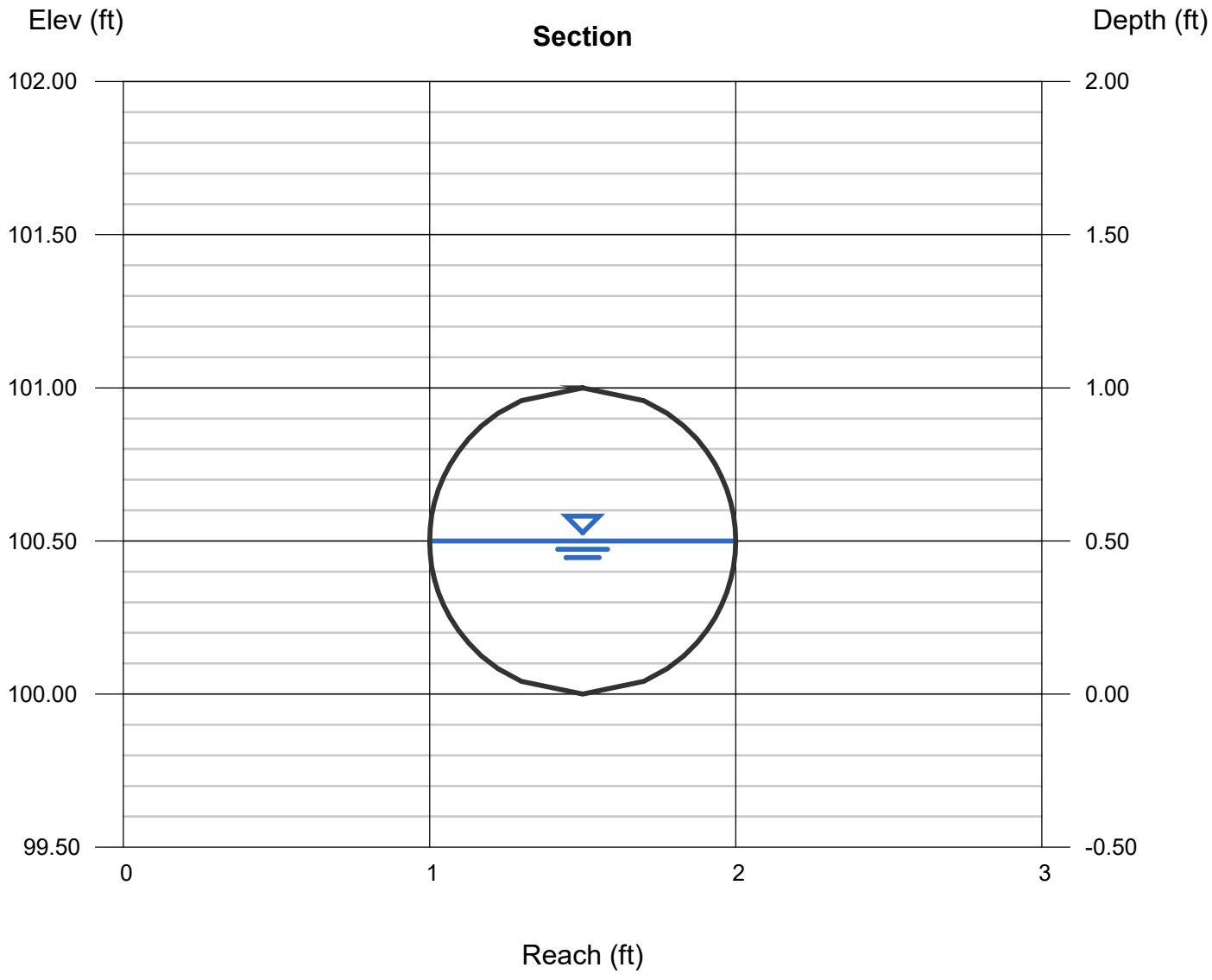
Diameter (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.66

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 2.660
Area (sqft)	= 0.39
Velocity (ft/s)	= 6.74
Wetted Perim (ft)	= 1.57
Crit Depth, Yc (ft)	= 0.70
Top Width (ft)	= 1.00
EGL (ft)	= 1.21



Channel Report

POC 1 - (P) 9 INCH ROCK LINED SWALE

Triangular

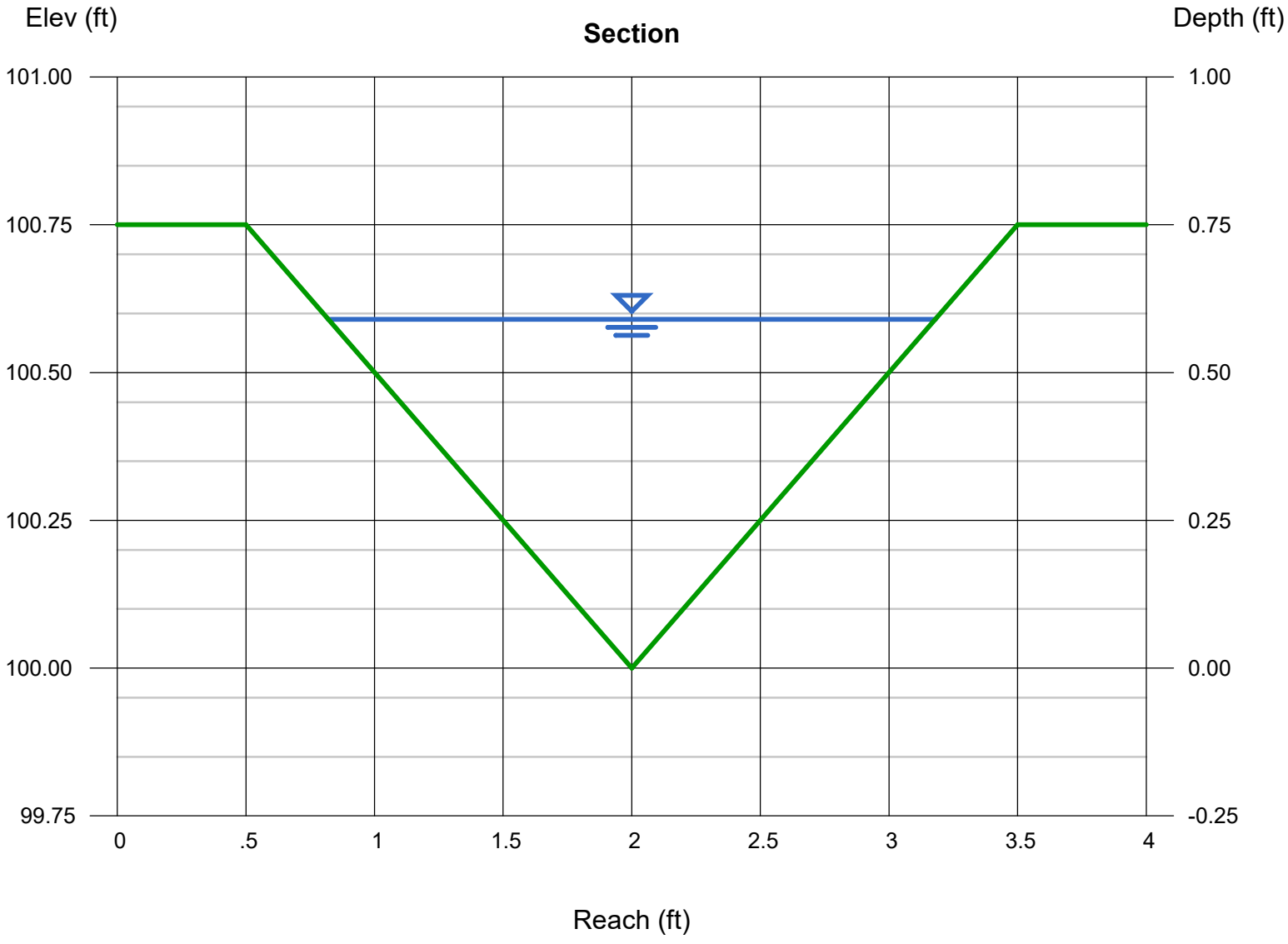
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 0.75
Invert Elev (ft)	= 100.00
Slope (%)	= 5.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.66

Highlighted

Depth (ft)	= 0.59
Q (cfs)	= 2.660
Area (sqft)	= 0.70
Velocity (ft/s)	= 3.82
Wetted Perim (ft)	= 2.64
Crit Depth, Yc (ft)	= 0.65
Top Width (ft)	= 2.36
EGL (ft)	= 0.82



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, May 28 2020

POC 1 - (P) 6 INCH ROCK LINED SWALE

Triangular

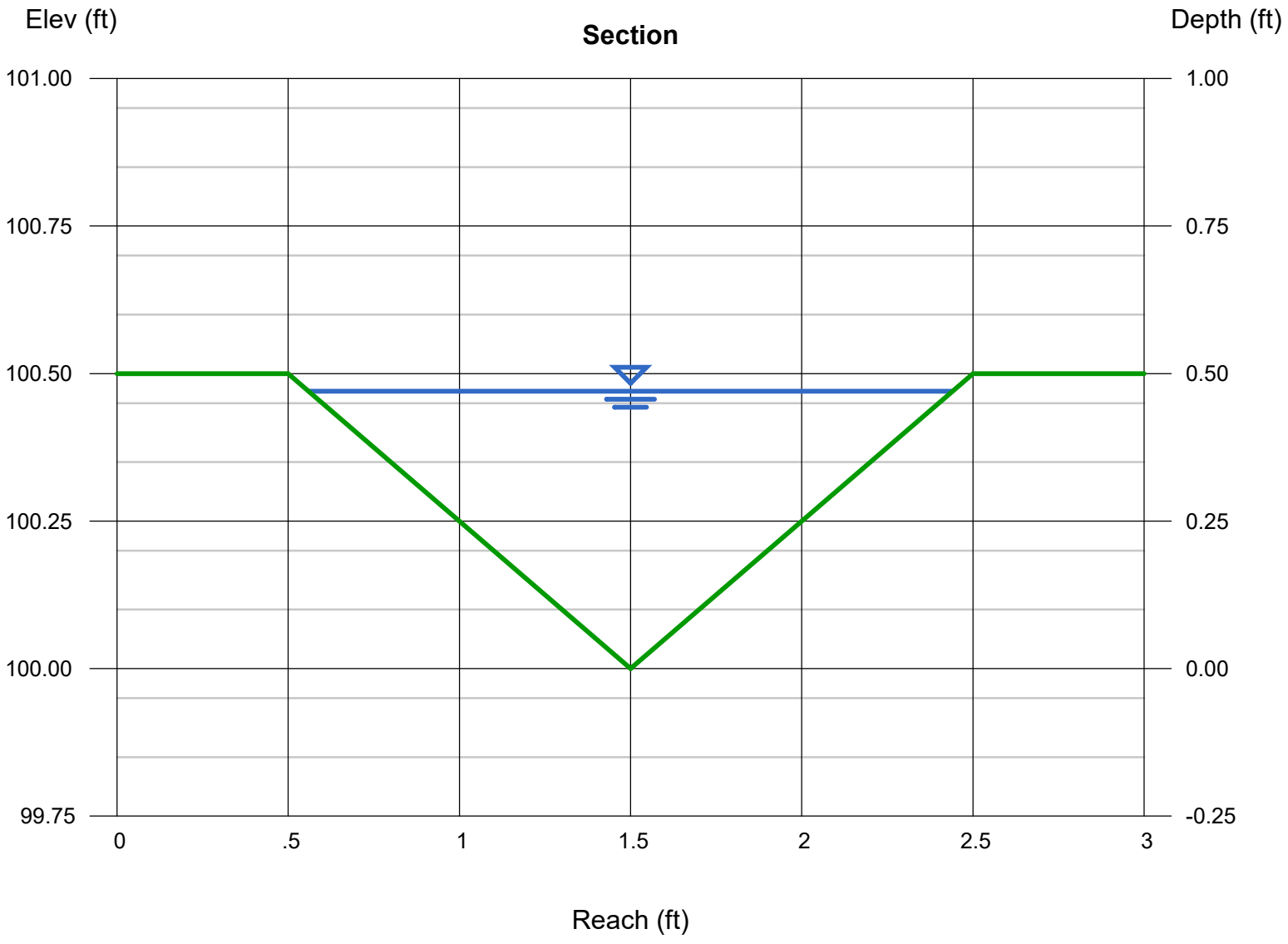
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 18.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.66

Highlighted

Depth (ft)	= 0.47
Q (cfs)	= 2.660
Area (sqft)	= 0.44
Velocity (ft/s)	= 6.02
Wetted Perim (ft)	= 2.10
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 1.88
EGL (ft)	= 1.03



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jul 8 2020

POC 2 - (P) 6 INCH ROCK LINED SWALE

Triangular

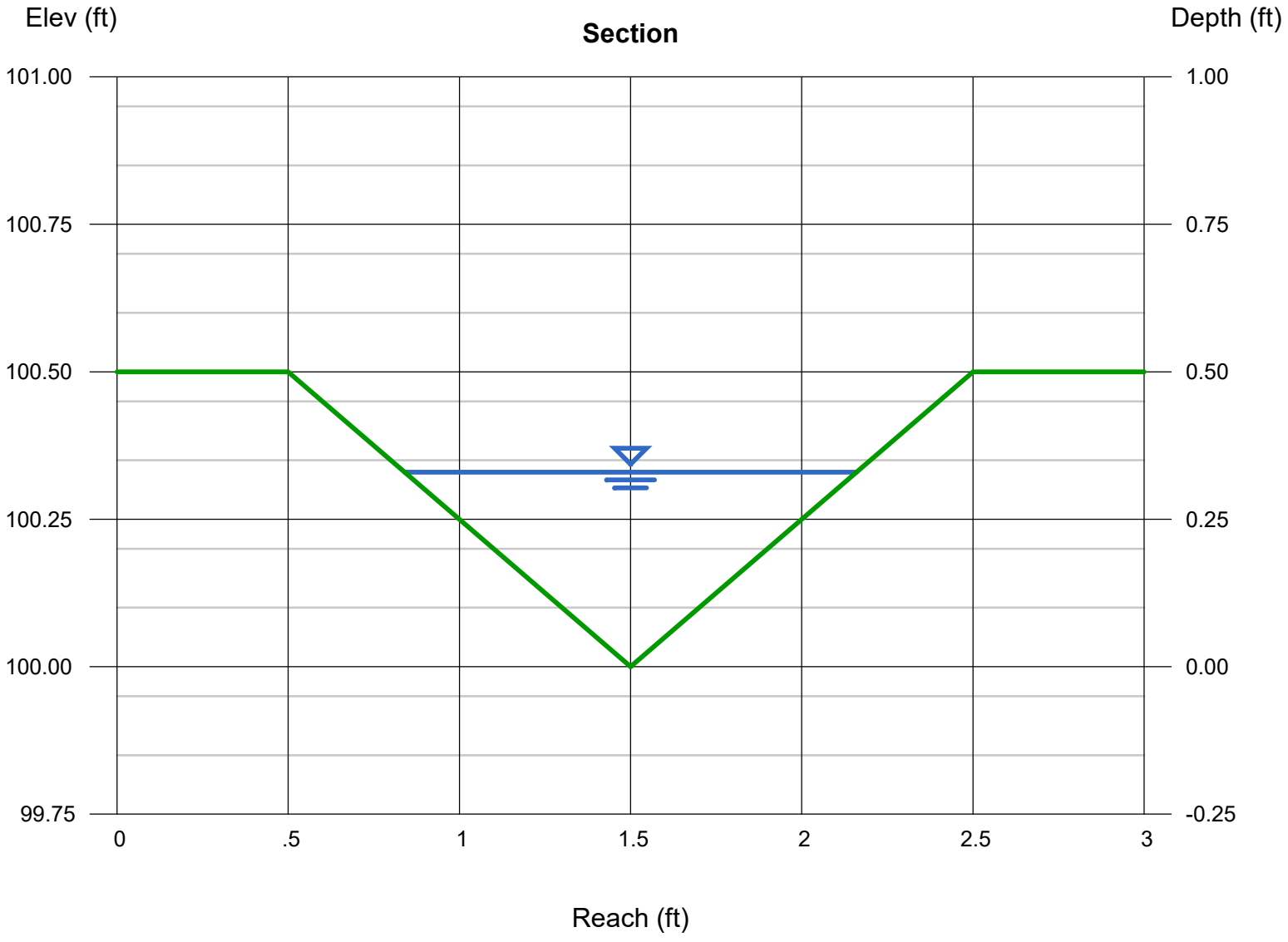
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 18.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.01

Highlighted

Depth (ft)	= 0.33
Q (cfs)	= 1.010
Area (sqft)	= 0.22
Velocity (ft/s)	= 4.64
Wetted Perim (ft)	= 1.48
Crit Depth, Yc (ft)	= 0.44
Top Width (ft)	= 1.32
EGL (ft)	= 0.66



Channel Report

POC 3 - (P) 6 INCH ROCK LINED SWALE

Triangular

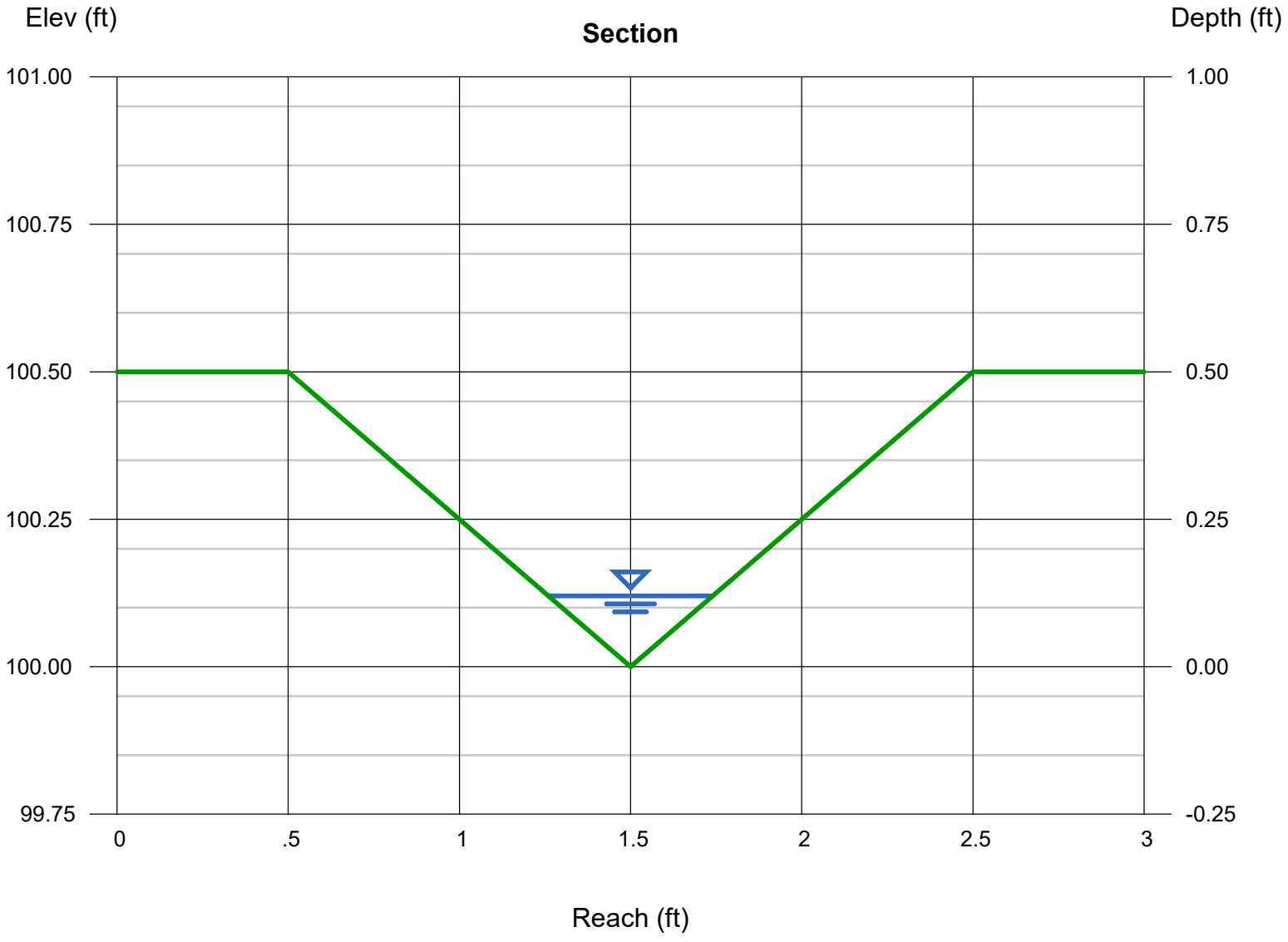
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 18.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.06

Highlighted

Depth (ft)	= 0.12
Q (cfs)	= 0.060
Area (sqft)	= 0.03
Velocity (ft/s)	= 2.08
Wetted Perim (ft)	= 0.54
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 0.48
EGL (ft)	= 0.19



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jul 8 2020

POC 4 - (P) 6 INCH PIPE

Circular

Diameter (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 5.00
N-Value	= 0.012

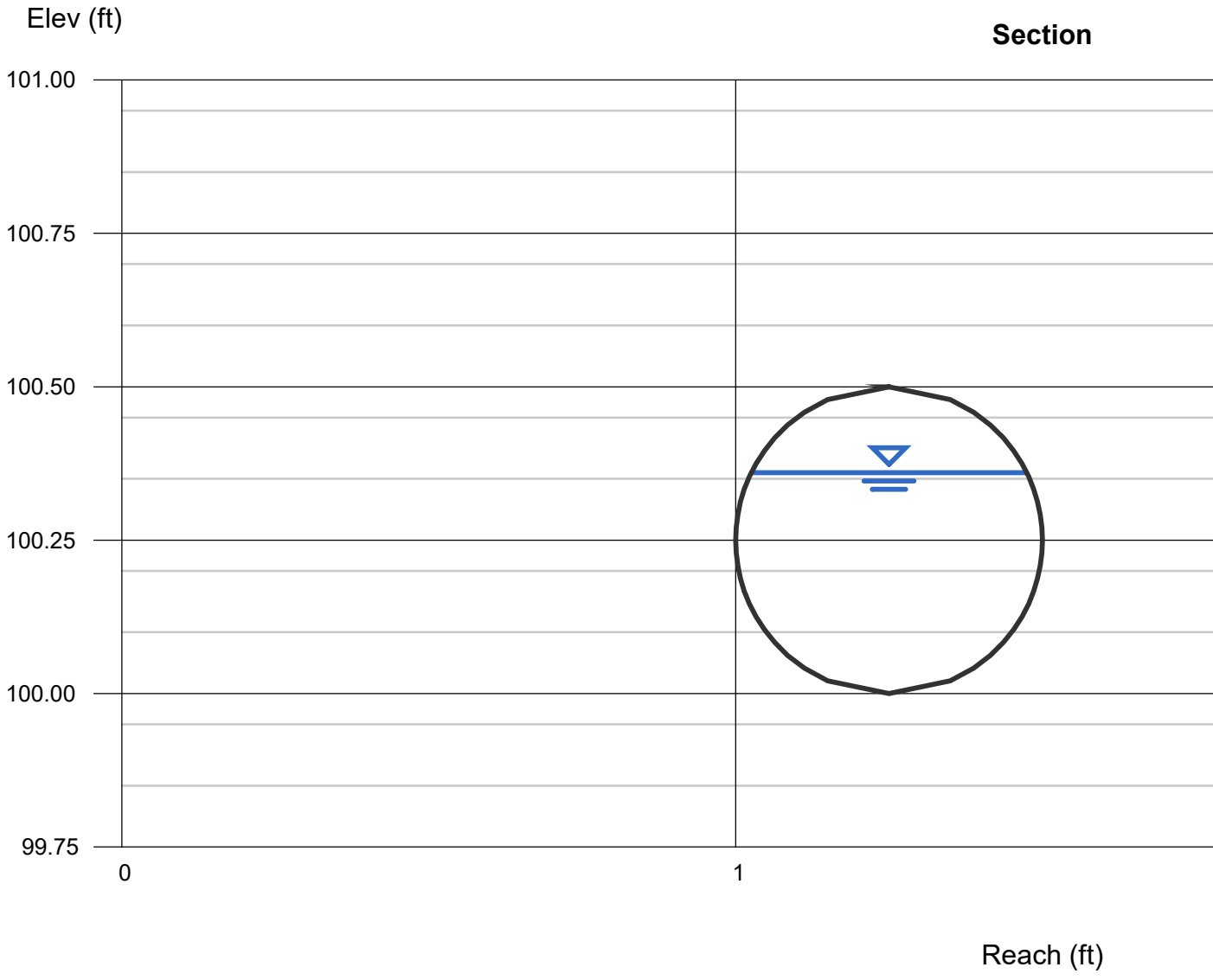
Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.15

Highlighted

Depth (ft)	= 0.36
Q (cfs)	= 1.150
Area (sqft)	= 0.15
Velocity (ft/s)	= 7.58
Wetted Perim (ft)	= 1.02
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 0.45
EGL (ft)	= 1.25

Total flow: **2.72 cfs**
Inlet will handle: **1.63 cfs**
Pipe will handle: **1.15 cfs**
Remaining flow: **1.57 cfs**
See next calculation



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jul 8 2020

POC 4 - (P) 6 INCH ROCK LINED SWALE

Triangular

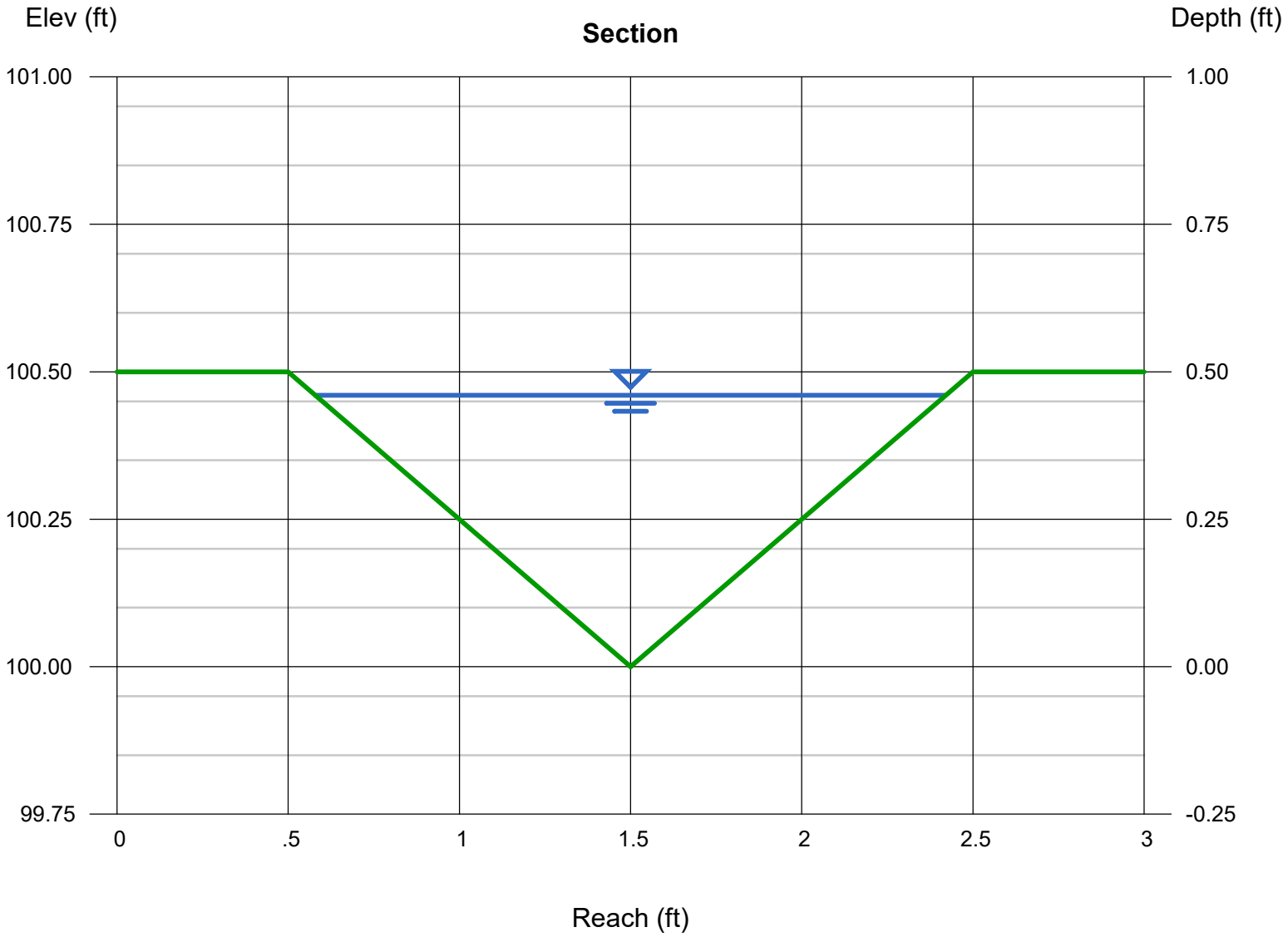
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 7.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.57

Highlighted

Depth (ft)	= 0.46
Q (cfs)	= 1.570
Area (sqft)	= 0.42
Velocity (ft/s)	= 3.71
Wetted Perim (ft)	= 2.06
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 1.84
EGL (ft)	= 0.67



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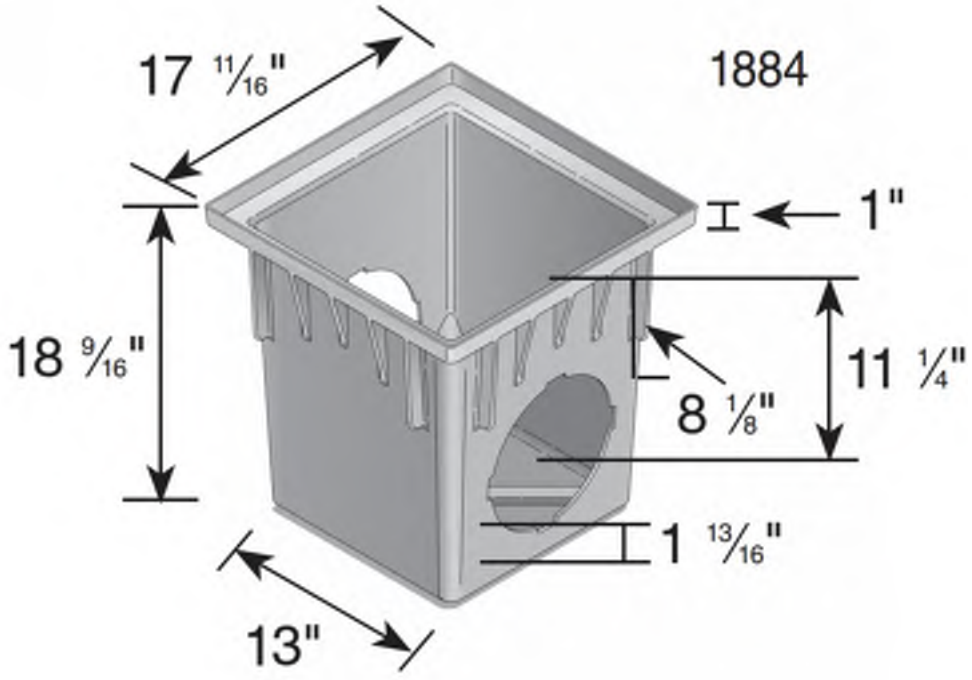
559.562.9888 phone 800.992.9949 toll free www.ndspro.com

18" CATCH BASIN

Part #: 1882, 1884

18" Catch Basin		
Grate Number(s)	**Description**	**Flow Rate with ½" Head**
1810, 1811, 1812	18" x 18" Square Grate	264.03 GPM
1813	18" x 18" Cast Iron Square Grate	338.65 GPM
1815	18" Square Galvanized Steel Grate	731.13 GPM
1881, 1891	18" x 18" Atrium Grate	273.49 GPM

OUTLET FLOW CAPACITIES	
Part #	**Flow Rate per Outlet**
1242, 1243 (with reducer ring)	102.50 GPM
1245 (with reducer ring)	Top: 97.53 GPM Middle: 103.88 GPM Bottom: 107.24 GPM
1266 (with reducer ring)	349.48 GPM
1888	439.80 GPM
1889	336.87 GPM



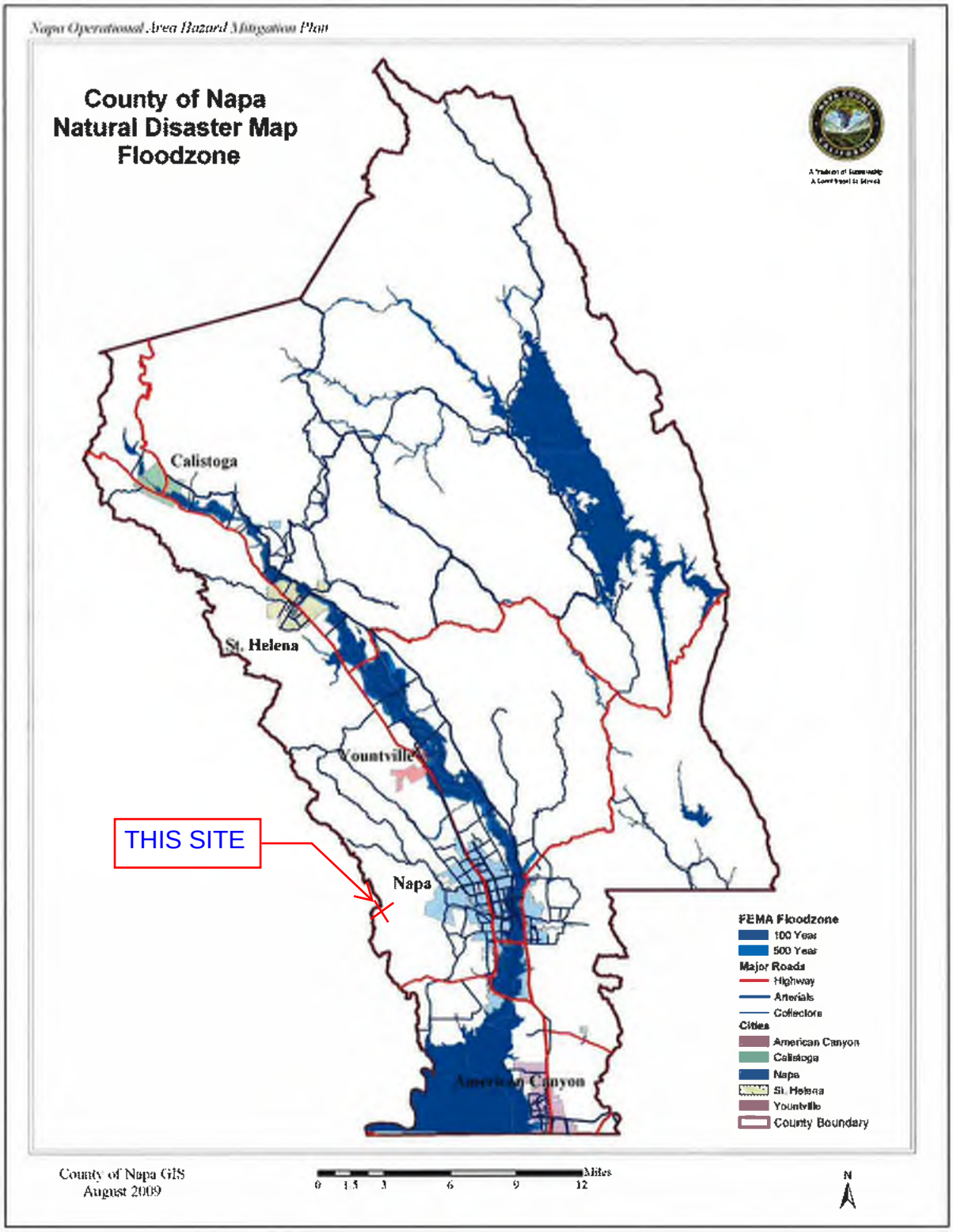


Figure 2-15: Napa County Flood Zone Map

Napa County Baseline Data Report

LEGEND

Precipitation

- 0.0 - 15.0 in/yr
- 15.1 - 25.0 in/yr
- 25.1 - 35.0 in/yr
- 35.1 - 45.0 in/yr
- 45.1 - 75.0 in/yr

- Lakes
- Streams
- Major Roads

Jones & Stokes | EDAW

Isohyetal Map

Napa County

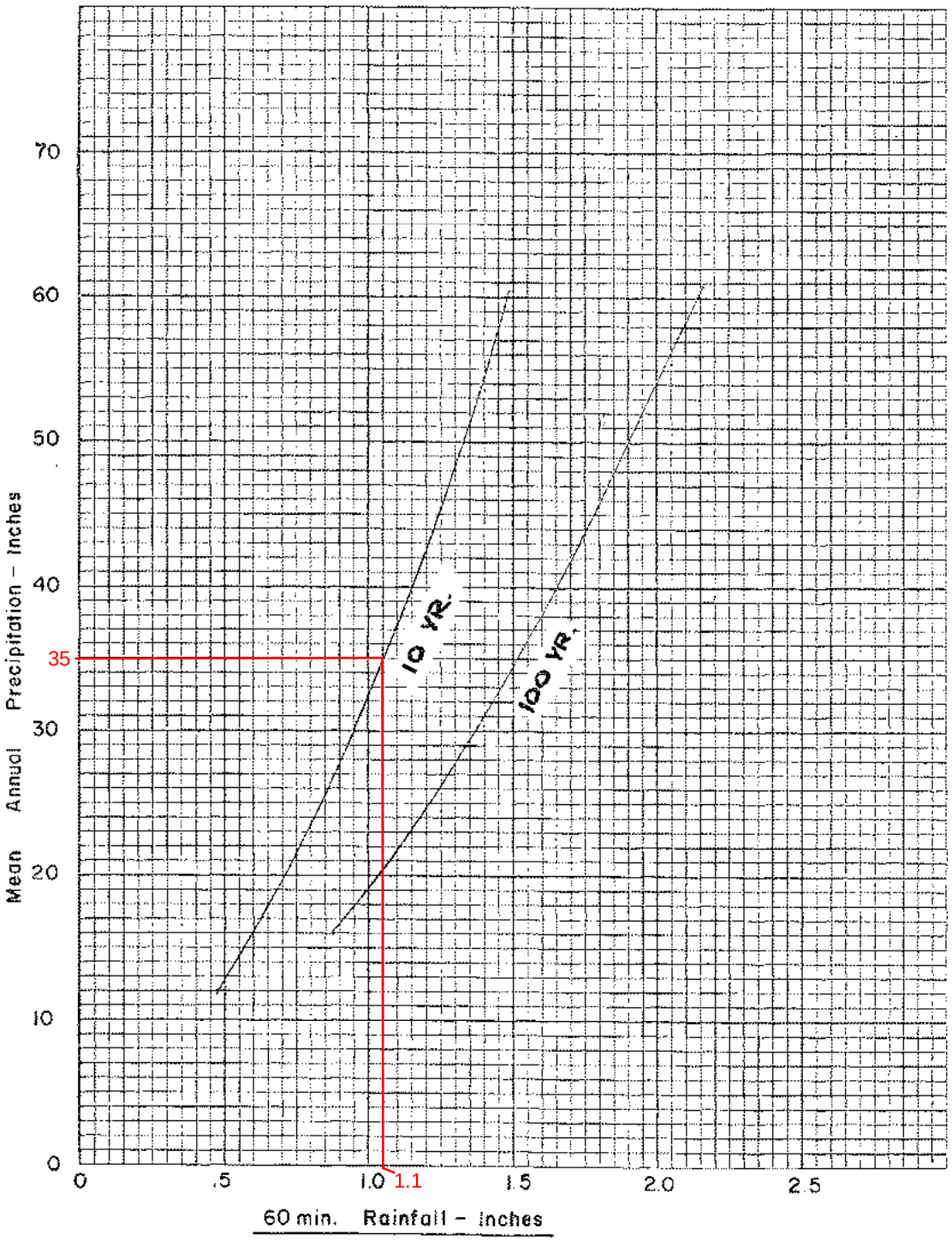
1 inch = 22,000 feet

16,000 8,000 0 16,000 32,000 Feet

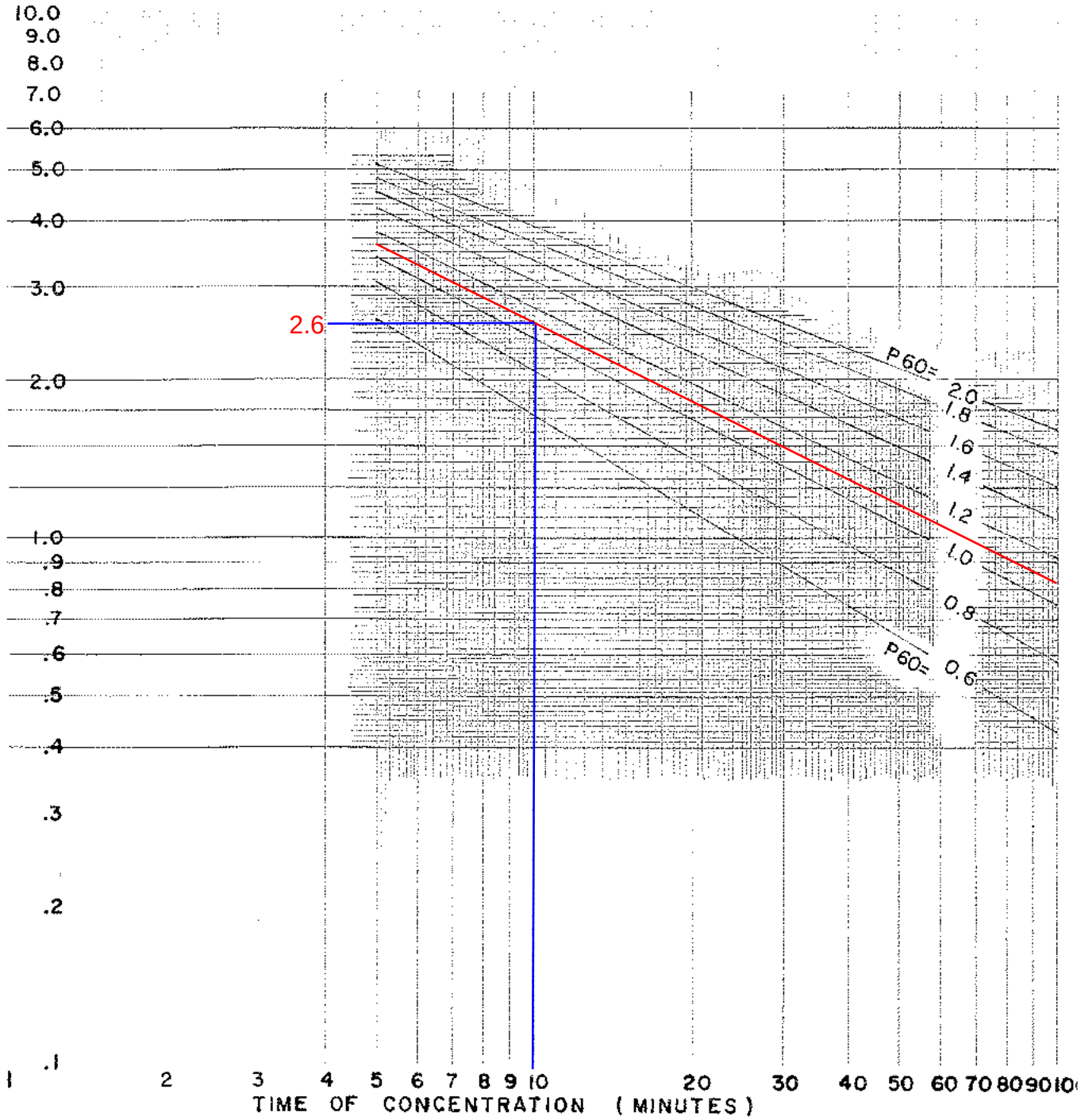
Horizontal Datum: NAD 83,
CA State Plane Coordinates, Zone II, feet
Source: Napa County, 2004; DHI 2005;
Jones & Stokes 2005

J:\GIS\PROJECTS\NAPA_CO\03559_950\ARCMAP\REPORT_AQ_20051114\MAP_3_2_AQ_ISOHYETAL.MXD (11-14-05)

MEAN ANNUAL PRECIPITATION VS. 60 MINUTE RAINFALL



INTENSITY – DURATION CHART



Based on figure 7-8II.6 (-8-64)
State of California
Division of Highways
Planning Manual

RUNOFF COEFFICIENT FOR DEVELOPED AREAS

Type of Development	Coefficient	
	Mild Slope	*Steep Slope*
Low Density Residential 1-3 Units/Acre	0.40	0.60
Medium Density Residential 4-9 Units/Acre	0.45	0.65
High Density Residential 10 or more Units/Acre	0.60	0.75
Limited Industrial	0.60	0.80
Industrial	0.75	0.90
Commercial	0.80	0.90
Schools	0.45	0.65
Parks	0.25	0.50

FIGURE 3.1

Recommended Permissible Velocities for Unlined Channels

Types of Material in Excavation Section	Permissible Velocity (FT/Sec)	
	Intermittent Flow	*Sustained Flow*
Fine Sand (Noncolloidal)	2.5	2.5
Sandy Loam (Noncolloidal)	2.5	2.5
Silt Loam (Noncolloidal)	3.0	3.0
Fin Loam	3.5	3.5
Volcanic Ash	4.0	3.5
Fine Gravel	5.0	4.0
Stiff Clay (Colloidal)	6.0	4.5
Graded Material (Noncolloidal)		
Loam to Gravel	6.5	5.0
Silt to Gravel	7.0	5.5
Gravel	7.5	6.0
Coarse Gravel	8.0	6.5
Gravel to Cobbles (Under 6 inches)	9.0	7.0
Gravel to Cobbles (Under 8 inches)	10.0	8.0

FIGURE 5