

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Michelli Crest & Bright Angel Way MSM Date: 04/29/2025

Location of Development: a) Descriptive (Cross Streets) North/South: Michelli Crest Way

East/West: Bright Angel

b) Section: 25 Township: 19S Range: 59E

c) APN : 126-25-601-002

Name of Owner: Jeffrey Foutz

Telephone No.: 702-643-4478 Fax No.: _____ E-Mail Address: jeff@able-electriclv.com

Address: 5841 E. Charleston Blvd, Ste. 230-305 Las Vegas, NV 89142

Contact Person-Name: Timoteo S. Moreno, P.E. Telephone No.: 702-682-7041

* E-Mail Address: tim@morenopec.com Fax No.: _____

Firm: Moreno PEC

Address: _____

Type of Land Development/Land Disturbance Process:

<input type="checkbox"/>	Rezoning	<input type="checkbox"/>	Subdivision Map	<input type="checkbox"/>	Clearing and Grading Only
<input type="checkbox"/>	Parcel Map	<input type="checkbox"/>	Planned Unit Development	<input type="checkbox"/>	Other (Please specify below)
<input type="checkbox"/>	Large Parcel Map	<input type="checkbox"/>	Building Permit	<input checked="" type="checkbox"/>	

1. Total Owned Land Area: At Site: 2.06 Acres Being Developed/Disturbed: 2.06 Acres

2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? **Yes**** ☒ **No**

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? **Yes**** ☒ **No**

4. Proposed type of development (Residential, Commercial, Etc.): Residential

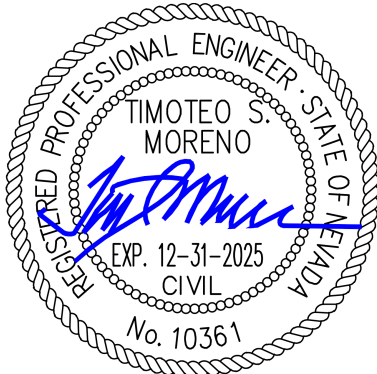
5. Approximate upstream land area which drains to the subject site: 8.83 Ac

6. Has the site drainage been evaluated in the past? **YES** **NO** If yes, please identify documentation: _____

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: _____

Bright Angel Way R.O.W. and East of Proposed Lot 1

8. Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal 04/29/2025

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

***New Required Field**

****Review and concurrence of the Clark County Regional Flood Control District is required.**

	Revision	Date

Local Entity File No. _____

REFERENCE:

STANDARD FORM 1

Cross Section for Section B - 10 yr - Michelli Crest (Developed)

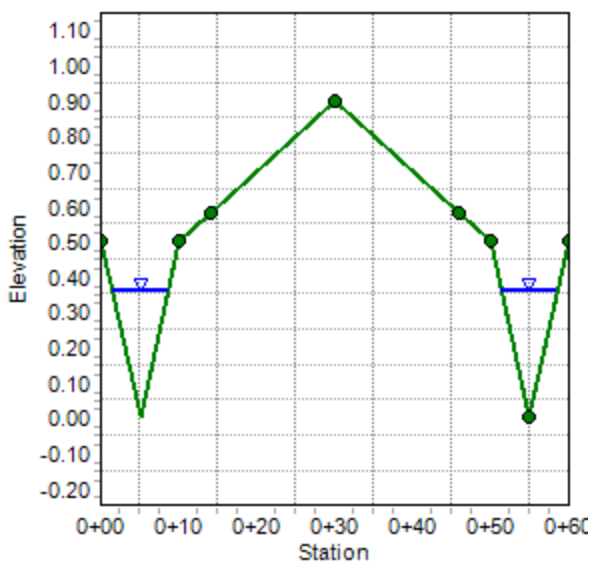
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.36	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Project Description

Manning Formula

Normal Depth

Section Definitions

Roughness Segment Definitions

Options

Pavlovskii's Method

Worksheet for Section B - 10 yr - Michelli Crest (Developed)

Results

Normal Depth		0.36	ft
Elevation Range	0.00 to 0.90 ft		
Flow Area		2.66	ft ²
Wetted Perimeter		14.66	ft
Hydraulic Radius		0.18	ft
Top Width		14.58	ft
Normal Depth		0.36	ft
Critical Depth		0.33	ft
Critical Slope		0.02408	ft/ft
Velocity		1.88	ft/s
Velocity Head		0.05	ft
Specific Energy		0.42	ft
Froude Number		0.78	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.33	ft
Channel Slope	1.40	%
Critical Slope	0.02408	ft/ft

Messages

Notes

XOFF5 + UOFF2

Cross Section for Section B - 10 yr - Michelli Crest (Existing)

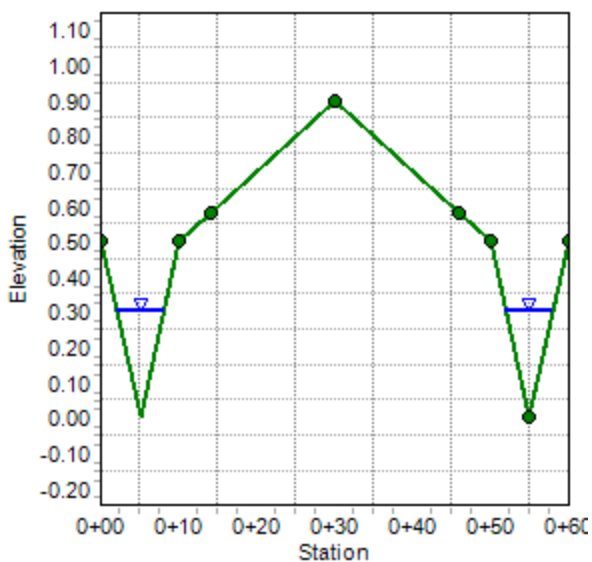
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.30	ft
Discharge	3.00	ft ³ /s

Cross Section Image



Project Description

Input Data

0+00.0	0.50
0+05.0	0.00
0+10.0	0.50
0+14.0	0.58
0+30.0	0.90
0+46.0	0.58
0+50.0	0.50
0+55.0	0.00
0+60.0	0.50

(0+00.0, 0.50)	(0+10.0, 0.50)	0.030
(0+10.0, 0.50)	(0+14.0, 0.58)	0.030
(0+14.0, 0.58)	(0+30.0, 0.90)	0.025
(0+30.0, 0.90)	(0+46.0, 0.58)	0.016
(0+46.0, 0.58)	(0+50.0, 0.50)	0.025
(0+50.0, 0.50)	(0+55.0, 0.00)	0.030
(0+55.0, 0.00)	(0+60.0, 0.50)	0.030

Options

Bentley Systems, Inc. Haestad Methods Software Center Master V8i (SELECTseries 1) [08.11.01.03]
4/25/2025 7:38:39 AM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for Section B - 10 yr - Michelli Crest (Existing)

Results

Normal Depth		0.30	ft
Elevation Range	0.00 to 0.90 ft		
Flow Area		1.82	ft ²
Wetted Perimeter		12.11	ft
Hydraulic Radius		0.15	ft
Top Width		12.05	ft
Normal Depth		0.30	ft
Critical Depth		0.27	ft
Critical Slope		0.02578	ft/ft
Velocity		1.65	ft/s
Velocity Head		0.04	ft
Specific Energy		0.34	ft
Froude Number		0.75	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.27	ft
Channel Slope	1.40	%
Critical Slope	0.02578	ft/ft

Messages

Notes

XOFF5 + XOFF2

Cross Section for Section B - 10 yr - Michelli Crest (Interim)

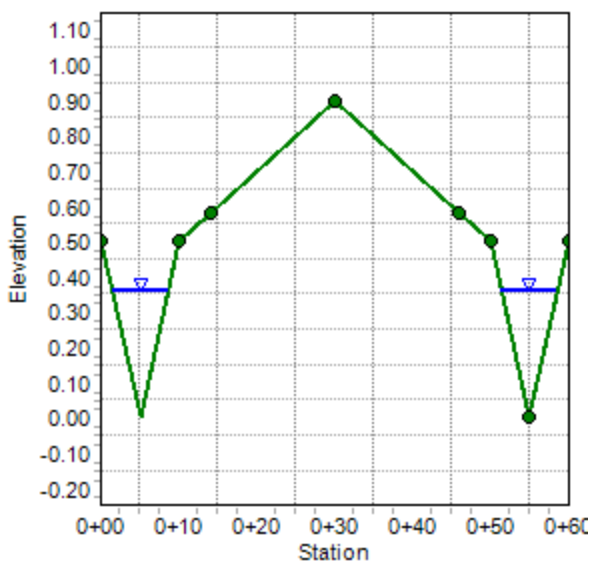
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.36	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for Section B - 10 yr - Michelli Crest (Interim)

Results

Normal Depth		0.36	ft
Elevation Range	0.00 to 0.90 ft		
Flow Area		2.66	ft ²
Wetted Perimeter		14.66	ft
Hydraulic Radius		0.18	ft
Top Width		14.58	ft
Normal Depth		0.36	ft
Critical Depth		0.33	ft
Critical Slope		0.02408	ft/ft
Velocity		1.88	ft/s
Velocity Head		0.05	ft
Specific Energy		0.42	ft
Froude Number		0.78	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.33	ft
Channel Slope	1.40	%
Critical Slope	0.02408	ft/ft

Messages

Notes

XOFF5 + XOFF2

Cross Section for Section B - 10 yr - Michelli Crest STD. 60' R/W -

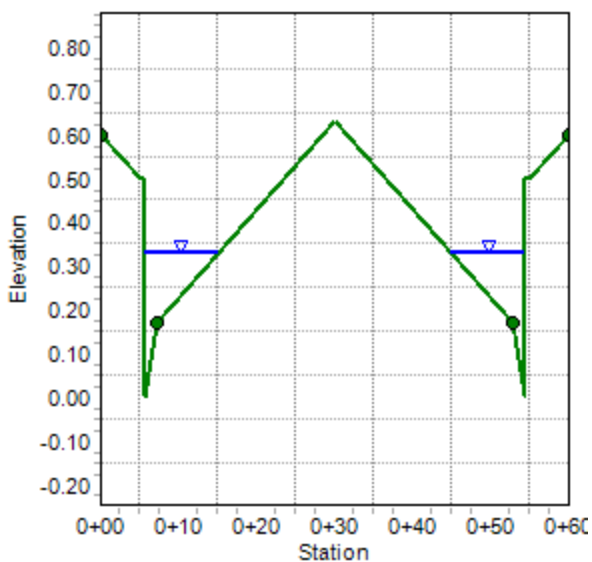
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.33	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for Section B - 10 yr - Michelli Crest STD. 60' R/W -

Results

Normal Depth		0.33	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		2.01	ft ²
Wetted Perimeter		19.67	ft
Hydraulic Radius		0.10	ft
Top Width		18.99	ft
Normal Depth		0.33	ft
Critical Depth		0.36	ft
Critical Slope		0.00744	ft/ft
Velocity		2.48	ft/s
Velocity Head		0.10	ft
Specific Energy		0.43	ft
Froude Number		1.35	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.36	ft
Channel Slope	1.40	%
Critical Slope	0.00744	ft/ft

Cross Section for Section A - 100 yr - Michelli Crest (Developed)

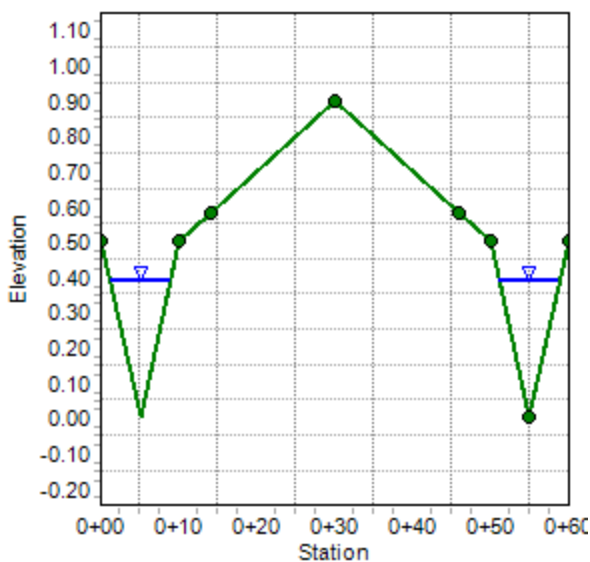
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.39	ft
Discharge	6.00	ft ³ /s

Cross Section Image



Worksheet for Section B - 100 yr - Michelli Crest STD. 60' R/W -

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.40 %
Discharge 35.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 0.60)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section B - 100 yr - Michelli Crest STD. 60' R/W -

Results

Normal Depth		0.56	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		9.41	ft ²
Wetted Perimeter		50.60	ft
Hydraulic Radius		0.19	ft
Top Width		49.57	ft
Normal Depth		0.56	ft
Critical Depth		0.63	ft
Critical Slope		0.00585	ft/ft
Velocity		3.72	ft/s
Velocity Head		0.21	ft
Specific Energy		0.78	ft
Froude Number		1.50	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.56	ft
Critical Depth	0.63	ft
Channel Slope	1.40	%
Critical Slope	0.00585	ft/ft

Cross Section for Section B - 100 yr - Michelli Crest (Existing)

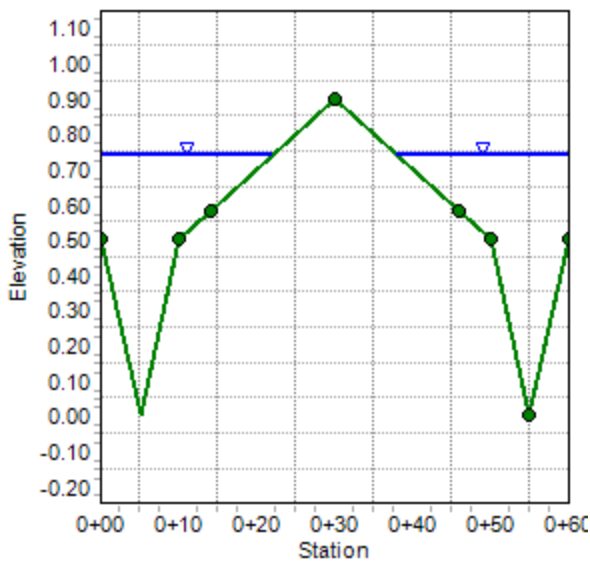
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.74	ft
Discharge	36.00	ft ³ /s

Cross Section Image



Worksheet for Section B - 100 yr - Michelli Crest (Existing)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Discharge	36.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.0	0.50
0+05.0	0.00
0+10.0	0.50
0+14.0	0.58
0+30.0	0.90
0+46.0	0.58
0+50.0	0.50
0+55.0	0.00
0+60.0	0.50

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.0, 0.50)	(0+10.0, 0.50)	0.030
(0+10.0, 0.50)	(0+14.0, 0.58)	0.030
(0+14.0, 0.58)	(0+30.0, 0.90)	0.025
(0+30.0, 0.90)	(0+46.0, 0.58)	0.016
(0+46.0, 0.58)	(0+50.0, 0.50)	0.025
(0+50.0, 0.50)	(0+55.0, 0.00)	0.030
(0+55.0, 0.00)	(0+60.0, 0.50)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for Section B - 100 yr - Michelli Crest (Existing)

Results

Normal Depth		0.74	ft
Elevation Range	0.00 to 0.90 ft		
Flow Area		12.63	ft ²
Wetted Perimeter		44.47	ft
Hydraulic Radius		0.28	ft
Top Width		43.89	ft
Normal Depth		0.74	ft
Critical Depth		0.72	ft
Critical Slope		0.01607	ft/ft
Velocity		2.85	ft/s
Velocity Head		0.13	ft
Specific Energy		0.87	ft
Froude Number		0.94	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.74	ft
Critical Depth	0.72	ft
Channel Slope	1.40	%
Critical Slope	0.01607	ft/ft

Messages

Notes

XOFF5 + XOFF2

Cross Section for Section B - 100 yr - Michelli Crest (Interim)

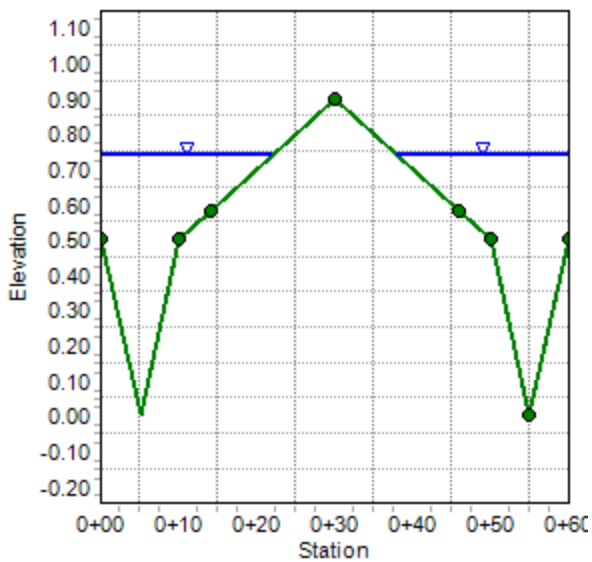
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.74	ft
Discharge	36.00	ft ³ /s

Cross Section Image



Project Description

Normal Depth

Section Definitions

Pavlovskii's Method

Worksheet for Section B - 100 yr - Michelli Crest (Interim)

Results

Normal Depth		0.74	ft
Elevation Range	0.00 to 0.90 ft		
Flow Area		12.63	ft ²
Wetted Perimeter		44.47	ft
Hydraulic Radius		0.28	ft
Top Width		43.89	ft
Normal Depth		0.74	ft
Critical Depth		0.72	ft
Critical Slope		0.01607	ft/ft
Velocity		2.85	ft/s
Velocity Head		0.13	ft
Specific Energy		0.87	ft
Froude Number		0.94	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.74	ft
Critical Depth	0.72	ft
Channel Slope	1.40	%
Critical Slope	0.01607	ft/ft

Messages

Notes

XOFF5 + XOFF2

Cross Section for Section B - 100 yr - Michelli Crest STD. 60' R/W -

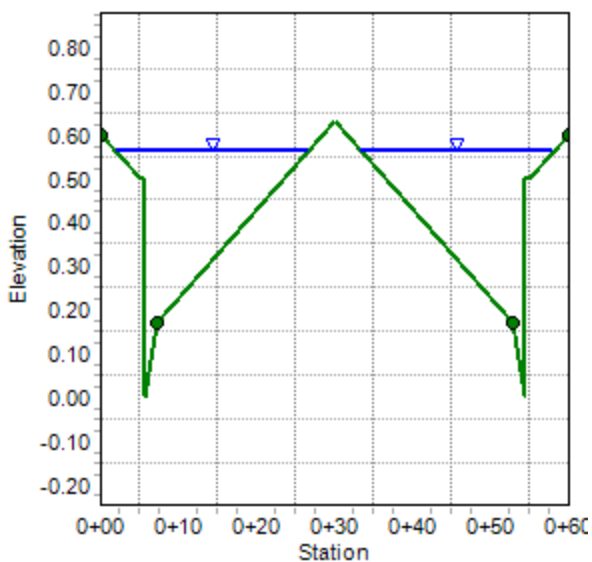
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40	%
Normal Depth	0.56	ft
Discharge	35.00	ft ³ /s

Cross Section Image



Worksheet for Section B - 100 yr - Michelli Crest STD. 60' R/W -

Results

Normal Depth		0.56	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		9.41	ft ²
Wetted Perimeter		50.60	ft
Hydraulic Radius		0.19	ft
Top Width		49.57	ft
Normal Depth		0.56	ft
Critical Depth		0.63	ft
Critical Slope		0.00585	ft/ft
Velocity		3.72	ft/s
Velocity Head		0.21	ft
Specific Energy		0.78	ft
Froude Number		1.50	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.56	ft
Critical Depth	0.63	ft
Channel Slope	1.40	%
Critical Slope	0.00585	ft/ft

Cross Section for Section C - 100 yr - Bright Angel Way STD. 60' R/W -

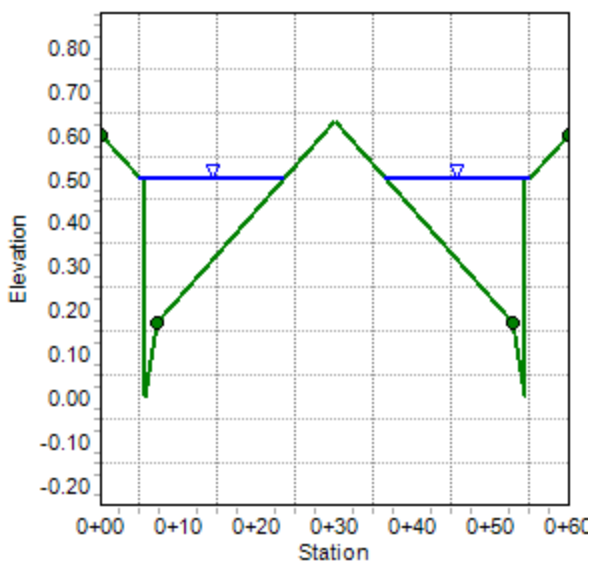
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.30	%
Normal Depth	0.50	ft
Discharge	37.00	ft ³ /s

Cross Section Image



Worksheet for Section C - 100 yr - Bright Angel Way STD. 60' R/W -

Results

Normal Depth		0.50	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		6.82	ft ²
Wetted Perimeter		38.70	ft
Hydraulic Radius		0.18	ft
Top Width		37.67	ft
Normal Depth		0.50	ft
Critical Depth		0.64	ft
Critical Slope		0.00596	ft/ft
Velocity		5.43	ft/s
Velocity Head		0.46	ft
Specific Energy		0.96	ft
Froude Number		2.25	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.64	ft
Channel Slope	3.30	%
Critical Slope	0.00596	ft/ft