Appendix B – Hydraulic Calculations

- Normal Depth Calculations – Proposed Conditions Street Sections
- Normal Depth Calculations - Onsite Sections
- Emergency Overflow Calculations
- Trench Drain Calculations
- HEC-RAS Proposed Conditions Analysis (SiriusAve.prj) (On Data CD)
    - Proposed Conditions Report
    - Summary Tables
    - Reach Profile
    - Cross Sections
    - Lateral Weir Summary Tables
- Finished Floor Elevation Table

Worksheet for ST1.5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.41 %
Discharge	2,543.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+15.67	2,110.93
0+15.67	2,106.93
0+25.67	2,106.73
0+26.17	2,106.23
0+27.72	2,106.36
0+46.41	2,106.81
0+67.42	2,106.20
0+67.46	2,106.66
0+71.50	2,107.12
0+81.85	2,102.45
0+87.55	2,102.45
0+98.18	2,108.42

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+15.67, 2,110.93)	(0+26.17, 2,106.23)	0.013
(0+26.17, 2,106.23)	(0+67.42, 2,106.20)	0.016
(0+67.42, 2,106.20)	(0+71.50, 2,107.12)	0.013
(0+71.50, 2,107.12)	(0+87.55, 2,102.45)	0.025
(0+87.55, 2,102.45)	(0+98.18, 2,108.42)	0.038

Options

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

Results

Normal Depth	6.84 ft
Roughness Coefficient	0.022
Elevation	2,109.29 ft
Elevation Range	2,102.45 to 2,110.93 ft
Flow Area	276.3 ft²

Worksheet for ST1.5

Results	
Wetted Perimeter	88.99 ft
Hydraulic Radius	3.10 ft
Top Width	82.51 ft
Normal Depth	6.84 ft
Critical Depth	6.58 ft
Critical Slope	0.53 %
Velocity	9.20 ft/s
Velocity Head	1.32 ft
Specific Energy	8.16 ft
Froude Number	0.887
Flow Type	Subcritical

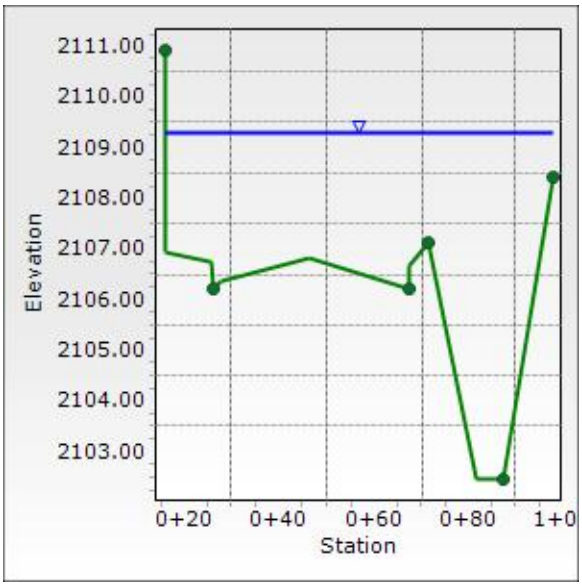
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.84 ft
Critical Depth	6.58 ft
Channel Slope	0.41 %
Critical Slope	0.53 %

XS for ST1.5

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.41 %
Normal Depth	6.84 ft
Discharge	2,543.00 cfs



Worksheet for RA - Rigel 100-Yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.45 %
Discharge	136.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+55.00	0.50
0+55.00	0.50
0+60.00	0.60
0+60.00	3.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 3.60)	0.016

Options

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

Results

Normal Depth	0.96 ft
Roughness Coefficient	0.016
Elevation	0.96 ft

Worksheet for RA - Rigel 100-Yr

Results	
Elevation Range	0.00 to 3.60 ft
Flow Area	33.2 ft²
Wetted Perimeter	61.79 ft
Hydraulic Radius	0.54 ft
Top Width	60.00 ft
Normal Depth	0.96 ft
Critical Depth	0.95 ft
Critical Slope	0.48 %
Velocity	4.12 ft/s
Velocity Head	0.26 ft
Specific Energy	1.23 ft
Froude Number	0.976
Flow Type	Subcritical

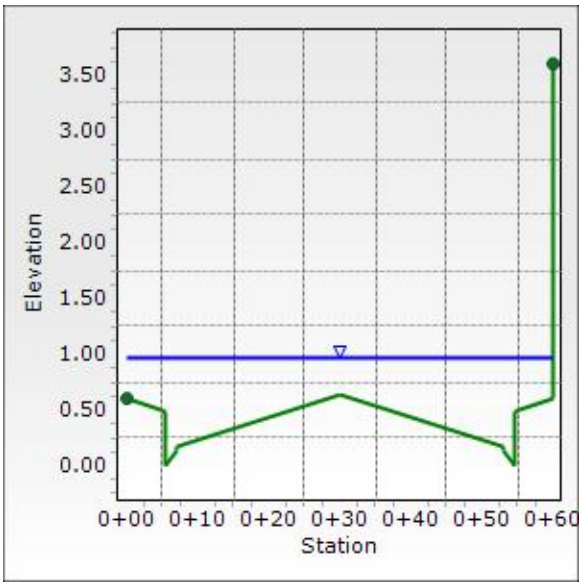
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.96 ft
Critical Depth	0.95 ft
Channel Slope	0.45 %
Critical Slope	0.48 %

Cross Section for RA - Rigel 100-Yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.45 %
Normal Depth	0.96 ft
Discharge	136.50 cfs



Worksheet for RA-1 - Rigel 100-Yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.68 %
Discharge	139.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.90
0+05.00	2.80
0+05.50	2.78
0+05.50	2.30
0+07.00	2.43
0+07.00	2.47
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+55.00	0.50
0+60.00	0.60
0+60.00	3.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.90)	(0+60.00, 3.60)	0.016

Options

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

Results

Normal Depth	1.45 ft
Roughness Coefficient	0.016
Elevation	1.45 ft
Elevation Range	0.00 to 3.60 ft
Flow Area	23.4 ft²
Wetted Perimeter	33.97 ft
Hydraulic Radius	0.69 ft

Worksheet for RA-1 - Rigel 100-Yr

Results	
Top Width	32.56 ft
Normal Depth	1.45 ft
Critical Depth	1.58 ft
Critical Slope	0.43 %
Velocity	5.97 ft/s
Velocity Head	0.55 ft
Specific Energy	2.00 ft
Froude Number	1.242
Flow Type	Supercritical

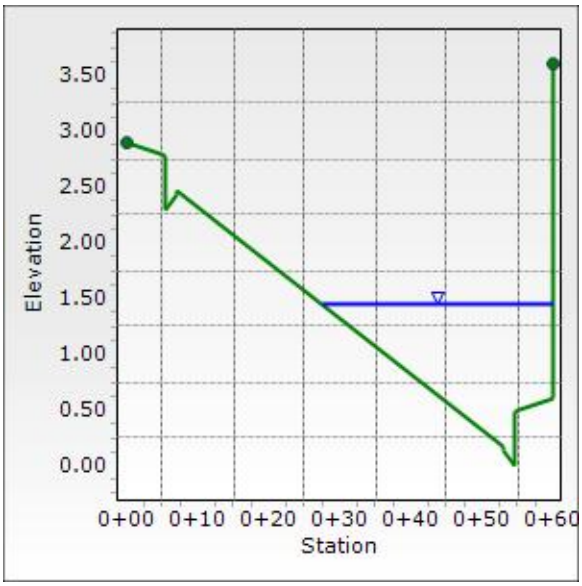
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.45 ft
Critical Depth	1.58 ft
Channel Slope	0.68 %
Critical Slope	0.43 %

Cross Section for RA-1 - Rigel 100-Yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.68 %
Normal Depth	1.45 ft
Discharge	139.50 cfs



Worksheet for RA-2 - Rigel 100-Yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.60 %
Discharge	142.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	5.91
0+00.00	2.91
0+05.00	2.81
0+05.50	2.79
0+05.50	2.31
0+07.00	2.44
0+07.00	2.47
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+55.00	0.50
0+60.00	0.60
0+60.00	3.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 5.91)	(0+60.00, 3.60)	0.016

Options

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

Results

Normal Depth	1.49 ft
Roughness Coefficient	0.016
Elevation	1.49 ft
Elevation Range	0.00 to 5.91 ft
Flow Area	24.8 ft²
Wetted Perimeter	34.86 ft

Worksheet for RA-2 - Rigel 100-Yr

Results		
Hydraulic Radius	0.71	ft
Top Width	33.41	ft
Normal Depth	1.49	ft
Critical Depth	1.59	ft
Critical Slope	0.43	%
Velocity	5.73	ft/s
Velocity Head	0.51	ft
Specific Energy	2.00	ft
Froude Number	1.173	
Flow Type	Supercritical	

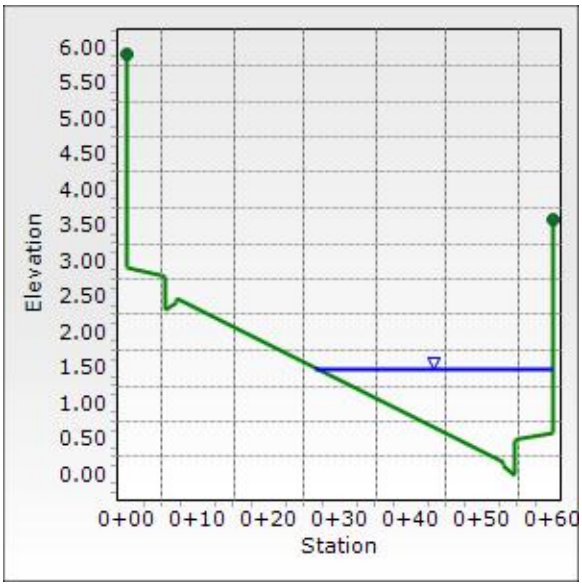
GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.49	ft
Critical Depth	1.59	ft
Channel Slope	0.60	%
Critical Slope	0.43	%

Cross Section for RA-2 - Rigel 100-Yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.60 %
Normal Depth	1.49 ft
Discharge	142.00 cfs



Worksheet for MA-2A Meade 100-Yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.30 %
Discharge	231.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.60
0+53.00	0.31
0+53.00	0.27
0+54.50	0.14
0+54.50	0.62
0+55.00	0.64
0+60.00	0.74

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 0.74)	0.016

Options

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

Results

Normal Depth	1.30 ft
Roughness Coefficient	0.016
Elevation	1.30 ft
Elevation Range	0.00 to 0.74 ft
Flow Area	51.6 ft²
Wetted Perimeter	62.32 ft
Hydraulic Radius	0.83 ft
Top Width	60.00 ft

Worksheet for MA-2A Meade 100-Yr

Results		
Normal Depth	1.30	ft
Critical Depth	1.21	ft
Critical Slope	0.43	%
Velocity	4.49	ft/s
Velocity Head	0.31	ft
Specific Energy	1.61	ft
Froude Number	0.853	
Flow Type	Subcritical	

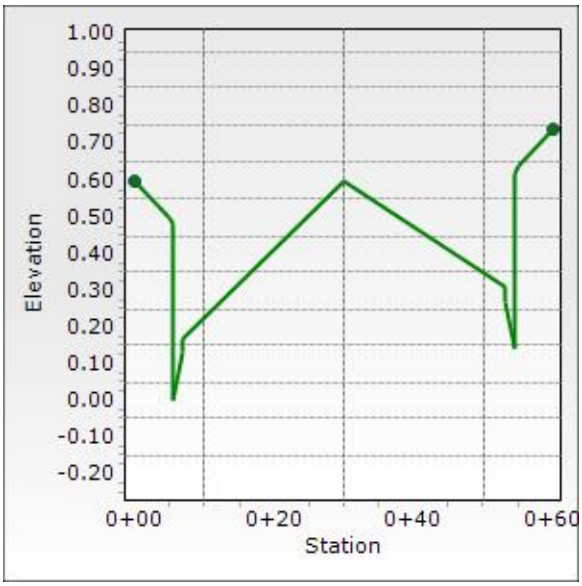
GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.30	ft
Critical Depth	1.21	ft
Channel Slope	0.30	%
Critical Slope	0.43	%

Cross Section for MA-2A Meade 100-Yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.30 %
Normal Depth	1.30 ft
Discharge	231.50 cfs



Worksheet for MA-2B Meade 100-Yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.51 %
Discharge	229.50 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+55.00	0.50
0+65.00	0.70
0+65.00	1.10

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+65.00, 1.10)	0.016

Options

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

Results

Normal Depth	1.12 ft
Roughness Coefficient	0.016
Elevation	1.12 ft
Elevation Range	0.00 to 1.10 ft
Flow Area	45.1 ft²
Wetted Perimeter	67.01 ft

Worksheet for MA-2B Meade 100-Yr

Results		
Hydraulic Radius	0.67	ft
Top Width	65.00	ft
Normal Depth	1.12	ft
Critical Depth	1.16	ft
Critical Slope	0.43	%
Velocity	5.09	ft/s
Velocity Head	0.40	ft
Specific Energy	1.52	ft
Froude Number	1.078	
Flow Type	Supercritical	

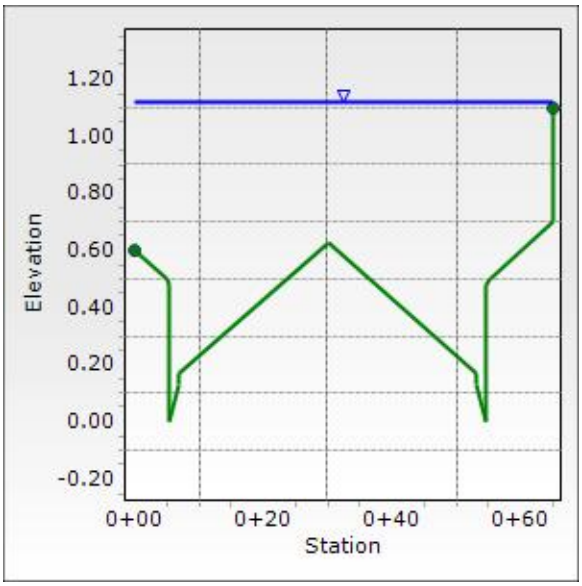
GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.12	ft
Critical Depth	1.16	ft
Channel Slope	0.51	%
Critical Slope	0.43	%

Cross Section for MA-2B Meade 100-Yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.51 %
Normal Depth	1.12 ft
Discharge	229.50 cfs



Worksheet for MA-2C Meade 100-Yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.40 %
Discharge	227.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.75
0+05.00	0.65
0+05.50	0.63
0+05.50	0.15
0+07.00	0.28
0+07.00	0.32
0+30.00	0.45
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.75)	(0+60.00, 0.60)	0.016

Options

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

Results

Normal Depth	0.92 ft
Roughness Coefficient	0.016
Elevation	0.92 ft
Elevation Range	0.00 to 0.75 ft
Flow Area	32.0 ft²
Wetted Perimeter	61.55 ft
Hydraulic Radius	0.52 ft
Top Width	60.00 ft

Worksheet for MA-2C Meade 100-Yr

Results	
Normal Depth	0.92 ft
Critical Depth	1.15 ft
Critical Slope	0.43 %
Velocity	7.10 ft/s
Velocity Head	0.78 ft
Specific Energy	1.70 ft
Froude Number	1.715
Flow Type	Supercritical

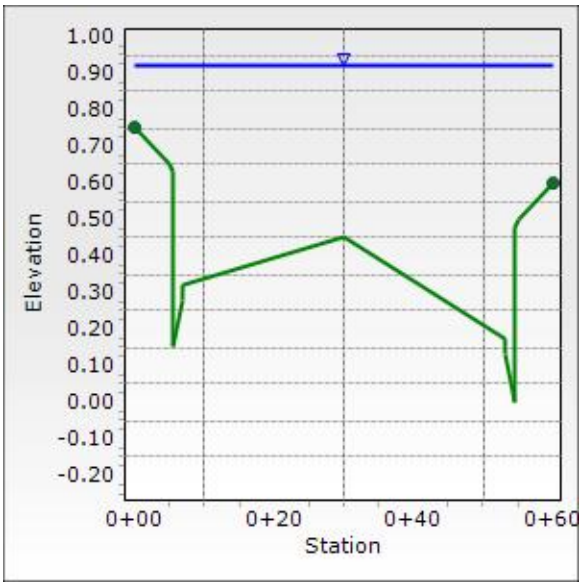
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.92 ft
Critical Depth	1.15 ft
Channel Slope	1.40 %
Critical Slope	0.43 %

Cross Section for MA-2C Meade 100-Yr

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.40 %
Normal Depth	0.92 ft
Discharge	227.00 cfs



Worksheet for ONH

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.30	%
Discharge	2.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2,108.00
0+43.03	2,107.24
1+02.44	2,108.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2,108.00)	(1+02.44, 2,108.00)	0.016

Options

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

Results

Normal Depth	0.12	ft
Roughness Coefficient	0.016	
Elevation	2,107.36	ft
Elevation Range	2,107.24 to 2,108.00	ft
Flow Area	0.9	ft²
Wetted Perimeter	15.90	ft
Hydraulic Radius	0.06	ft
Top Width	15.90	ft
Normal Depth	0.12	ft
Critical Depth	0.14	ft
Critical Slope	0.90	%
Velocity	2.13	ft/s
Velocity Head	0.07	ft
Specific Energy	0.19	ft
Froude Number	1.549	
Flow Type	Supercritical	

GVF Input Data

Worksheet for ONH

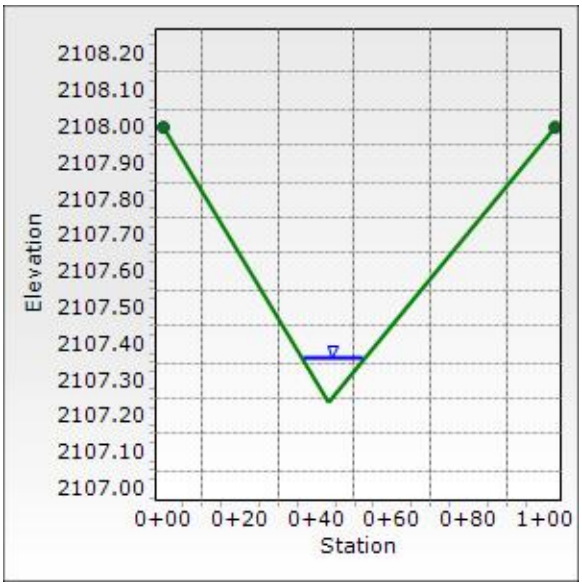
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.12 ft
Critical Depth	0.14 ft
Channel Slope	2.30 %
Critical Slope	0.90 %

Cross Section for ONH

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	2.30 %
Normal Depth	0.12 ft
Discharge	2.00 cfs



Worksheet for ONP1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.77	%
Discharge	1.50	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+02.24	2,111.50
0+03.14	2,111.45
0+35.29	2,111.18
0+64.93	2,111.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+02.24, 2,111.50)	(0+64.93, 2,111.50)	0.016

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

Results		
Normal Depth	0.11	ft
Roughness Coefficient	0.016	
Elevation	2,111.29	ft
Elevation Range	2,111.18 to 2,111.50	ft
Flow Area	1.3	ft²
Wetted Perimeter	23.21	ft
Hydraulic Radius	0.05	ft
Top Width	23.21	ft
Normal Depth	0.11	ft
Critical Depth	0.10	ft
Critical Slope	1.00	%
Velocity	1.18	ft/s
Velocity Head	0.02	ft
Specific Energy	0.13	ft
Froude Number	0.888	
Flow Type	Subcritical	

Worksheet for ONP1

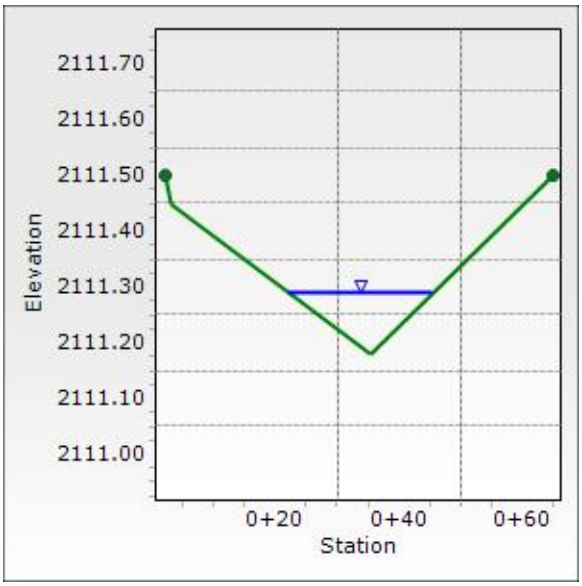
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.11 ft
Critical Depth	0.10 ft
Channel Slope	0.77 %
Critical Slope	1.00 %

Cross Section for ONP1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.77 %
Normal Depth	0.11 ft
Discharge	1.50 cfs



Worksheet for ONP2 South

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.55	%
Discharge	1.50	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.22
0+11.50	0.00
0+11.50	4.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.22)	(0+11.50, 4.00)	0.016

Options

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

Results

Normal Depth	0.16	ft
Roughness Coefficient	0.016	
Elevation	0.16	ft
Elevation Range	0.00 to 4.00	ft
Flow Area	0.7	ft²
Wetted Perimeter	8.71	ft
Hydraulic Radius	0.08	ft
Top Width	8.54	ft
Normal Depth	0.16	ft
Critical Depth	0.18	ft
Critical Slope	0.85	%
Velocity	2.15	ft/s
Velocity Head	0.07	ft
Specific Energy	0.24	ft
Froude Number	1.325	
Flow Type	Supercritical	

GVF Input Data

Worksheet for ONP2 South

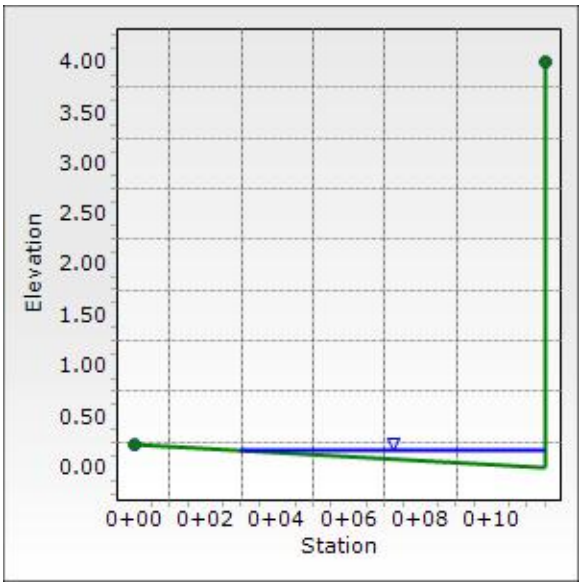
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.16 ft
Critical Depth	0.18 ft
Channel Slope	1.55 %
Critical Slope	0.85 %

Cross Section for ONP2 South

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.55 %
Normal Depth	0.16 ft
Discharge	1.50 cfs



Worksheet for ONP2 North

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.10	%
Discharge	1.50	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	4.00
0+00.00	0.00
0+22.00	0.26

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 4.00)	(0+22.00, 0.26)	0.016

Options

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

Results

Normal Depth	0.23	ft
Roughness Coefficient	0.016	
Elevation	0.23	ft
Elevation Range	0.00 to 4.00	ft
Flow Area	2.2	ft²
Wetted Perimeter	19.47	ft
Hydraulic Radius	0.11	ft
Top Width	19.24	ft
Normal Depth	0.23	ft
Critical Depth	0.15	ft
Critical Slope	0.90	%
Velocity	0.69	ft/s
Velocity Head	0.01	ft
Specific Energy	0.23	ft
Froude Number	0.359	
Flow Type	Subcritical	

GVF Input Data

Worksheet for ONP2 North

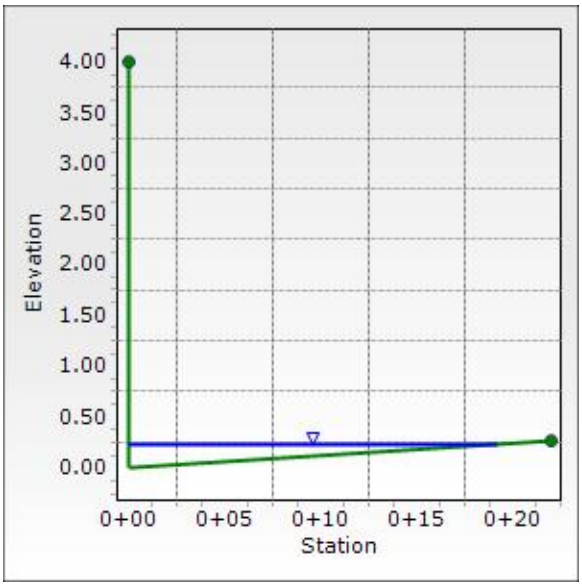
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.23 ft
Critical Depth	0.15 ft
Channel Slope	0.10 %
Critical Slope	0.90 %

Cross Section for ONP2 North

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.10 %
Normal Depth	0.23 ft
Discharge	1.50 cfs



Worksheet for ONR1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.50	%
Discharge	0.50	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+10.78	2,111.50
0+23.49	2,111.27
0+36.62	2,111.07
0+47.90	2,111.31
0+48.77	2,111.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+10.78, 2,111.50)	(0+48.77, 2,111.50)	0.016

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

Results		
Normal Depth	0.10	ft
Roughness Coefficient	0.016	
Elevation	2,111.17	ft
Elevation Range	2,111.07 to 2,111.50	ft
Flow Area	0.6	ft²
Wetted Perimeter	11.28	ft
Hydraulic Radius	0.05	ft
Top Width	11.28	ft
Normal Depth	0.10	ft
Critical Depth	0.09	ft
Critical Slope	1.06	%
Velocity	0.89	ft/s
Velocity Head	0.01	ft
Specific Energy	0.11	ft
Froude Number	0.698	
Flow Type	Subcritical	

Worksheet for ONR1

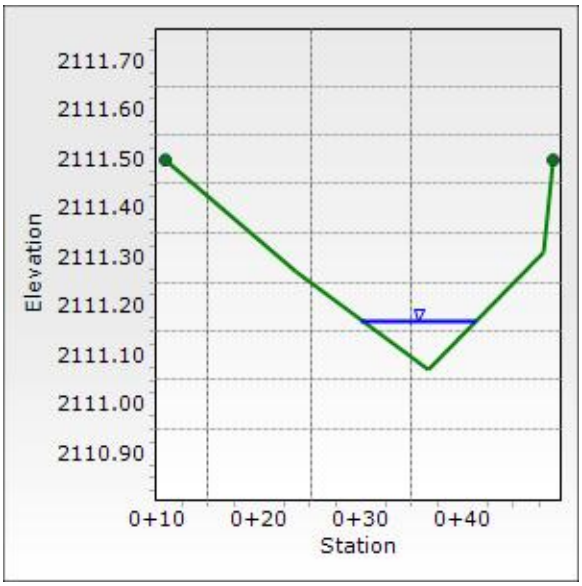
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.10 ft
Critical Depth	0.09 ft
Channel Slope	0.50 %
Critical Slope	1.06 %

XS for ONR1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.50 %
Normal Depth	0.10 ft
Discharge	0.50 cfs



Worksheet for ONR2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.68	%
Discharge	0.50	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	5.48
0+21.90	0.00
0+53.30	0.63

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 5.48)	(0+53.30, 0.63)	0.016

Options

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

Results

Normal Depth	0.10	ft
Roughness Coefficient	0.016	
Elevation	0.10	ft
Elevation Range	0.00 to 5.48	ft
Flow Area	0.3	ft²
Wetted Perimeter	5.67	ft
Hydraulic Radius	0.05	ft
Top Width	5.66	ft
Normal Depth	0.10	ft
Critical Depth	0.12	ft
Critical Slope	0.96	%
Velocity	1.69	ft/s
Velocity Head	0.04	ft
Specific Energy	0.15	ft
Froude Number	1.299	
Flow Type	Supercritical	

GVF Input Data

Worksheet for ONR2

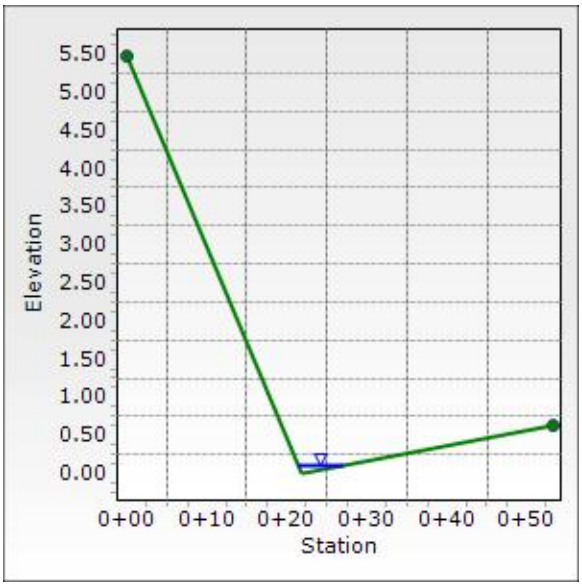
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.10 ft
Critical Depth	0.12 ft
Channel Slope	1.68 %
Critical Slope	0.96 %

XS for ONR2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.68 %
Normal Depth	0.10 ft
Discharge	0.50 cfs



Worksheet for ONH Emergency Overflow (ONH + ONP)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.30	%
Discharge	3.50	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2,108.00
0+43.03	2,107.24
1+02.44	2,108.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2,108.00)	(1+02.44, 2,108.00)	0.016

Options

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

Results

Normal Depth	0.15	ft
Roughness Coefficient	0.016	
Elevation	2,107.39	ft
Elevation Range	2,107.24 to 2,108.00	ft
Flow Area	1.4	ft²
Wetted Perimeter	19.61	ft
Hydraulic Radius	0.07	ft
Top Width	19.61	ft
Normal Depth	0.15	ft
Critical Depth	0.18	ft
Critical Slope	0.84	%
Velocity	2.45	ft/s
Velocity Head	0.09	ft
Specific Energy	0.24	ft
Froude Number	1.604	
Flow Type	Supercritical	

GVF Input Data

Worksheet for ONH Emergency Overflow (ONH + ONP)

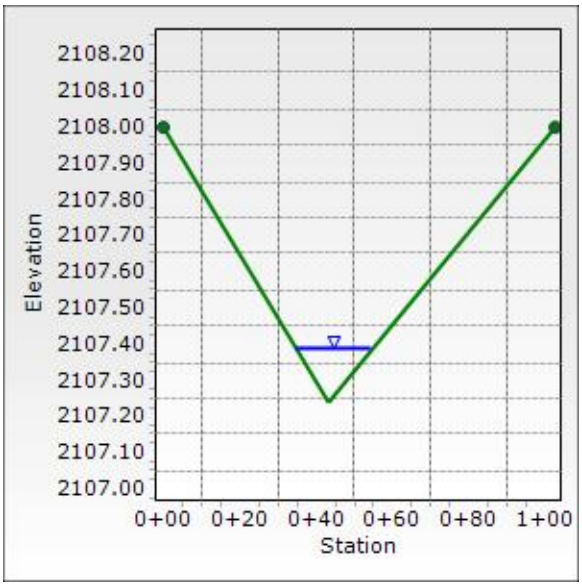
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.15 ft
Critical Depth	0.18 ft
Channel Slope	2.30 %
Critical Slope	0.84 %

Cross Section for ONH Emergency Overflow (ONH + ONP)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	2.30 %
Normal Depth	0.15 ft
Discharge	3.50 cfs



Grate Inlet Headwater Depth Calculation

4.5-in by 65-ft Trench Drain ONH #1

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	65.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	130.8
Pc=	Perimeter (w/clogging) (ft)	65.4
Hw=	Headwater depth (ft)	0.05

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	24.4
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	3.0
Hw=	Headwater depth (ft)	0.01

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.05

Grate Inlet Headwater Depth Calculation

4.5-in by 58-ft Trench Drain ONH #2

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	58.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	116.8
Pc=	Perimeter (w/clogging) (ft)	58.4
Hw=	Headwater depth (ft)	0.05

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	21.8
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	2.7
Hw=	Headwater depth (ft)	0.02

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.05

Grate Inlet Headwater Depth Calculation

4.5-in by 160-ft Trench Drain ONH #3

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	160.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	320.8
Pc=	Perimeter (w/clogging) (ft)	160.4
Hw=	Headwater depth (ft)	0.03

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	60.0
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	7.5
Hw=	Headwater depth (ft)	0.00

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.03

Grate Inlet Headwater Depth Calculation

4.5-in by 70-ft Trench Drain ONH #4

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	70.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	140.8
Pc=	Perimeter (w/clogging) (ft)	70.4
Hw=	Headwater depth (ft)	0.05

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	26.3
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	3.3
Hw=	Headwater depth (ft)	0.01

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.05

Grate Inlet Headwater Depth Calculation

4.5-in by 213-ft Trench Drain ONP #1

Known:

Q=	Flow (cfs)	1.5
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	213.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	426.8
Pc=	Perimeter (w/clogging) (ft)	213.4
Hw=	Headwater depth (ft)	0.02

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	79.9
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	10.0
Hw=	Headwater depth (ft)	0.00

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.02

Grate Inlet Headwater Depth Calculation

4.5-in by 67-ft Trench Drain ONP #2

Known:

Q=	Flow (cfs)	1.5
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	67.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	134.8
Pc=	Perimeter (w/clogging) (ft)	67.4
Hw=	Headwater depth (ft)	0.04

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	25.1
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	3.1
Hw=	Headwater depth (ft)	0.01

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.04

Grate Inlet Headwater Depth Calculation

4.5-in by 67-ft Trench Drain ONP #3

Known:

Q=	Flow (cfs)	1.5
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	67.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	134.8
Pc=	Perimeter (w/clogging) (ft)	67.4
Hw=	Headwater depth (ft)	0.04

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	25.1
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	3.1
Hw=	Headwater depth (ft)	0.01

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.04

Grate Inlet Headwater Depth Calculation

4.5-in by 72-ft Trench Drain ONR #1

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	72.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	144.8
Pc=	Perimeter (w/clogging) (ft)	72.4
Hw=	Headwater depth (ft)	0.05

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	27.0
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	3.4
Hw=	Headwater depth (ft)	0.01

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.05

Grate Inlet Headwater Depth Calculation

4.5-in by 66-ft Trench Drain ONR #2

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	66.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	132.8
Pc=	Perimeter (w/clogging) (ft)	66.4
Hw=	Headwater depth (ft)	0.05

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	24.8
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	3.1
Hw=	Headwater depth (ft)	0.01

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.05

Grate Inlet Headwater Depth Calculation

4.5-in by 35-ft Trench Drain ONV #1

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	35.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	70.8
Pc=	Perimeter (w/clogging) (ft)	35.4
Hw=	Headwater depth (ft)	0.08

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	13.1
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	1.6
Hw=	Headwater depth (ft)	0.05

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.08

Grate Inlet Headwater Depth Calculation

4.5-in by 188-ft Trench Drain ONV #2

Known:

Q=	Flow (cfs)	2.0
W=	Width of Grate (ft)	0.375
L=	Length of Grate (ft)	188.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50

Weir Conditions:

$Hw=(Q/(Cw*P))^{2/3}$

Cw=	Weir Coefficient	2.7
P=	Perimeter of grate (ft)	376.8
Pc=	Perimeter (w/clogging) (ft)	188.4
Hw=	Headwater depth (ft)	0.02

Orifice Conditions:

$Hw=(Q/(Co*Ac))^{2}/2*g$

Co=	Orifice Coefficient	0.67
Ag=	Grate Area (ft^2)	70.5
Gf=	Grate Opening Factor	0.25
Ac=	Grate Open Area (w/ clogging) (ft^2)	8.8
Hw=	Headwater depth (ft)	0.00

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth (ft) = 0.02

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
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X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Sirius Avenue
Project File : SiriusAvenue.prj
Run Date and Time: 9/9/2024 4:27:05 PM

Project in English units

PLAN DATA

Plan Title: Proposed Conditions_District2_UP2_2024
Plan File : k:\LAV_Civil\092965012 - Area 15 District 2 (Fisher Brothers)\Reports\DRAINAGE\06_UP2\Calculations\Hydraulics\HECRAS\SiriusAvenue.p07

Geometry Title: Proposed Conditions Geom_District2_UP2
Geometry File : k:\LAV_Civil\092965012 - Area 15 District 2 (Fisher Brothers)\Reports\DRAINAGE\06_UP2\Calculations\Hydraulics\HECRAS\SiriusAvenue.g03

Flow Title : Sirius_EventLots
Flow File : k:\LAV_Civil\092965012 - Area 15 District 2 (Fisher Brothers)\Reports\DRAINAGE\06_UP2\Calculations\Hydraulics\HECRAS\SiriusAvenue.f02

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 2

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Program Selects Appropriate method
Computational Flow Regime: Supercritical Flow

FLOW DATA

Flow Title: Sirius_EventLots
Flow File : k:\LAV_Civil\092965012 - Area 15 District 2 (Fisher Brothers)\Reports\DRAINAGE\06_UP2\Calculations\Hydraulics\HECRAS\SiriusAvenue.f02

Flow Data (cfs)

River	Reach	RS	100-yr
SIRIUS AVE	SIRIUS	1916	1158
SIRIUS AVE	SIRIUS	1215	1158
SIRIUS AVE	SIRIUS	1036	1158

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
SIRIUS AVE	SIRIUS	100-yr	Critical	Critical

GEOMETRY DATA

Geometry Title: Proposed Conditions Geom_District2_UP2
Geometry File : k:\LAV_Civil\092965012 - Area 15 District 2 (Fisher Brothers)\Reports\DRAINAGE\06_UP2\Calculations\Hydraulics\HECRAS\SiriusAvenue.g03

CROSS SECTION

```
RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1916

INPUT
Description:
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    2124   45.66    2124   47.74 2123.09   50.09    2122   52.26 2121.54
   58.04 2121.25    58.1 2120.75    59.6 2120.86    82.6    2121   105.6 2120.81
   107.1  2120.7   107.1  2121.2   112.1  2121.2  115.24 2121.48  115.44 2121.47
  116.39  2121.5  117.08 2121.52  124.01 2121.77  127.89  2121.9  128.11 2121.92
  128.26 2121.93  216.93    2122   219.4 2121.94  219.67 2121.94  226.29 2121.76
  229.79 2121.74  234.52 2121.87  234.72 2121.86   236.6 2121.87  236.67 2121.87
  240.82    2122  339.66 2122.04   339.8 2122.02  339.82 2122.02  343.87 2122.35
  344.04 2122.35  348.23 2122.68  350.49 2122.83  357.66  2122.9  363.61  2123.1
   364.9 2123.14  365.91 2123.19

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016   58.04    .013    59.6    .016   105.6    .013   112.1    .025
  339.82    .016

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  365.91           166.86  166.86  166.86             .1       .3

CROSS SECTION


RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1750

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  2120.4       0    2118      53    2117      53  2116.5    54.5 2116.61
    77.5  2117.2    90.5 2116.66      92 2116.55      92 2117.05      97 2117.58
      97    2120    97.5    2120    97.5 2117.58   100.5  2117.6

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      53    .013    54.5    .016    90.5    .013    97.5     .02

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            53      92           216.84  216.84  216.84             .1       .3
Right Levee     Station=      97      Elevation=    2120

CROSS SECTION


RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1533

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  2114.3       0    2112      17  2111.7      34    2112      59  2113.2
      59    2116      59  2120.5    59.5  2120.5    59.5    2116    59.5  2113.2
    65.5  2112.5    65.5    2112      67 2112.11      90 2112.67     113 2112.11
     118 2112.58     118 2113.08     124    2113     150    2114

Manning's n Values        num=       7
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016      59     .02    59.5    .016    65.5    .013      67    .016
     113    .013     124     .02

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          65.5     118           318.07  318.07  318.07             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
     124     150 2115.42       F
Left Levee      Station=    59.5      Elevation=    2116

LATERAL STRUCTURE


RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1245

INPUT
Description:
Lateral structure position     = Left overbank
Distance from Upstream XS =
Deck/Roadway Width        =      10
Weir Coefficient          =       3
Weir Flow Reference       = Water Surface
 Weir Embankment Coordinates    num =        3
     Sta    Elev     Sta    Elev     Sta    Elev
       0  2109.8      30  2110.3      60  2109.9
```

```
Weir crest shape                          = Broad Crested


CROSS SECTION


RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1215

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  2110.3      93    2110     119  2109.5     123 2109.25     127  2109.5
     150    2110     173  2109.8   174.5 2109.69   174.5 2110.11   179.5 2110.19
   184.5 2110.26   184.5 2112.68     185 2112.68     185 2110.26     203    2111

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .016     119    .013     127    .016     173    .013   179.5     .02
   184.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           119   174.5               45      45      45             .1       .3
Right Levee     Station=   184.5      Elevation= 2112.68

LATERAL STRUCTURE


RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1177

INPUT
Description:
Lateral structure position     = Left overbank
Distance from Upstream XS =
Deck/Roadway Width        =       1
Weir Coefficient          =       3
Weir Flow Reference       = Water Surface
 Weir Embankment Coordinates    num =        2
     Sta    Elev     Sta    Elev
       0 2111.09      14  2111.1

Weir crest shape                          = Broad Crested


CROSS SECTION


RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1170

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   139.4  2111.1  142.47 2110.98  147.47 2110.78  174.27  2109.7  194.86  2109.5
  200.12  2109.4  200.12  2108.9  202.12 2109.07  226.85  2109.5  250.35  2109.1
  252.35 2108.93  252.35 2109.43  263.75 2109.53  263.75 2111.95  264.89 2111.95
  264.89 2109.53  284.54    2111

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
   139.4    .016  263.75    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         139.4  252.35             134     134     134             .1       .3
Right Levee     Station=  263.75      Elevation= 2111.95

CROSS SECTION


RIVER: SIRIUS AVE
REACH: SIRIUS             RS: 1036

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   221.4 2111.22   222.4 2111.22   222.4  2108.7   227.4  2108.6   232.4  2108.5
   232.4    2108   233.9 2108.17   256.9  2108.3   281.9 2108.17   283.9    2108
   283.9  2108.5   288.9  2108.6   293.9  2108.7   293.9 2111.22   294.9 2111.22

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   221.4    .013   222.4    .016   293.9    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         222.4   283.9                0       0       0             .1       .3
```

SUMMARY OF MANNING'S N VALUES

River:SIRIUS AVE

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7
SIRIUS	1916	.016	.013	.016	.013	.025	.016	
SIRIUS	1750	.016	.013	.016	.013	.02		
SIRIUS	1533	.016	.02	.016	.013	.016	.013	.02
SIRIUS	1245	Lat Struct						
SIRIUS	1215	.016	.013	.016	.013	.02	.015	
SIRIUS	1177	Lat Struct						
SIRIUS	1170	.016	.013					
SIRIUS	1036	.013	.016	.013				

SUMMARY OF REACH LENGTHS

River: SIRIUS AVE

Reach	River Sta.	Left	Channel	Right
SIRIUS	1916	166.86	166.86	166.86
SIRIUS	1750	216.84	216.84	216.84
SIRIUS	1533	318.07	318.07	318.07
SIRIUS	1245	Lat Struct		
SIRIUS	1215	45	45	45
SIRIUS	1177	Lat Struct		
SIRIUS	1170	134	134	134
SIRIUS	1036	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: SIRIUS AVE

Reach	River Sta.	Contr.	Expan.
SIRIUS	1916	.1	.3
SIRIUS	1750	.1	.3
SIRIUS	1533	.1	.3
SIRIUS	1245	Lat Struct	
SIRIUS	1215	.1	.3
SIRIUS	1177	Lat Struct	
SIRIUS	1170	.1	.3
SIRIUS	1036	.1	.3

HEC-RAS Plan: UP2 River: SIRIUS AVE Reach: SIRIUS Profile: 100-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SIRIUS	1916	100-yr	1158.00	2120.70	2122.55	2122.55	2122.93	0.008145	4.96	233.59	297.67	0.99
SIRIUS	1750	100-yr	1158.00	2116.50	2118.23	2118.93	2120.74	0.015487	14.09	95.80	97.00	2.14
SIRIUS	1533	100-yr	1158.00	2112.00	2113.71	2114.66	2117.09	0.017377	15.05	79.46	83.06	2.29
SIRIUS	1245		Lat Struct									
SIRIUS	1215	100-yr	1095.58	2109.25	2110.68	2111.05	2111.89	0.011744	10.27	129.87	184.50	1.88
SIRIUS	1177		Lat Struct									
SIRIUS	1170	100-yr	1045.32	2108.90	2110.95	2110.95	2111.62	0.003495	6.53	159.90	120.60	1.01
SIRIUS	1036	100-yr	1045.32	2108.00	2110.21	2110.22	2111.16	0.003246	7.96	134.10	71.50	1.01

Plan: UP2 SIRIUS AVE SIRIUS RS: 1916 Profile: 100-yr

E.G. Elev (ft)	2122.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.023	
W.S. Elev (ft)	2122.55	Reach Len. (ft)	166.86	166.86	166.86
Crit W.S. (ft)	2122.55	Flow Area (sq ft)		233.59	
E.G. Slope (ft/ft)	0.008145	Area (sq ft)		233.59	
Q Total (cfs)	1158.00	Flow (cfs)		1158.00	
Top Width (ft)	297.67	Top Width (ft)		297.67	
Vel Total (ft/s)	4.96	Avg. Vel. (ft/s)		4.96	
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)		0.78	
Conv. Total (cfs)	12831.4	Conv. (cfs)		12831.4	
Length Wtd. (ft)	166.86	Wetted Per. (ft)		298.85	
Min Ch El (ft)	2120.70	Shear (lb/sq ft)		0.40	
Alpha	1.00	Stream Power (lb/ft s)		1.97	
Frctn Loss (ft)	1.97	Cum Volume (acre-ft)	0.51	1.80	0.17
C & E Loss (ft)	0.21	Cum SA (acres)	0.77	1.61	0.25

Plan: UP2 SIRIUS AVE SIRIUS RS: 1750 Profile: 100-yr

E.G. Elev (ft)	2120.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.51	Wt. n-Val.	0.016	0.016	0.013
W.S. Elev (ft)	2118.23	Reach Len. (ft)	216.84	216.84	216.84
Crit W.S. (ft)	2118.93	Flow Area (sq ft)	38.81	52.41	4.59
E.G. Slope (ft/ft)	0.015487	Area (sq ft)	38.81	52.41	4.59
Q Total (cfs)	1158.00	Flow (cfs)	363.23	738.22	56.55
Top Width (ft)	97.00	Top Width (ft)	53.00	39.00	5.00
Vel Total (ft/s)	12.09	Avg. Vel. (ft/s)	9.36	14.09	12.33
Max Chl Dpth (ft)	1.73	Hydr. Depth (ft)	0.73	1.34	0.92
Conv. Total (cfs)	9305.1	Conv. (cfs)	2918.7	5932.0	454.4
Length Wtd. (ft)	216.84	Wetted Per. (ft)	53.24	40.03	5.68
Min Ch El (ft)	2116.50	Shear (lb/sq ft)	0.70	1.27	0.78
Alpha	1.10	Stream Power (lb/ft s)	6.60	17.83	9.63
Frctn Loss (ft)	3.56	Cum Volume (acre-ft)	0.44	1.25	0.16
C & E Loss (ft)	0.09	Cum SA (acres)	0.66	0.97	0.24

Plan: UP2 SIRIUS AVE SIRIUS RS: 1533 Profile: 100-yr

E.G. Elev (ft)	2117.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.38	Wt. n-Val.	0.016	0.016	0.013
W.S. Elev (ft)	2113.71	Reach Len. (ft)	318.07	318.07	318.07
Crit W.S. (ft)	2114.66	Flow Area (sq ft)	5.18	70.23	4.04
E.G. Slope (ft/ft)	0.017377	Area (sq ft)	5.18	70.23	10.67
Q Total (cfs)	1158.00	Flow (cfs)	54.26	1056.92	46.82
Top Width (ft)	83.06	Top Width (ft)	6.00	52.50	24.56
Vel Total (ft/s)	14.57	Avg. Vel. (ft/s)	10.47	15.05	11.58
Max Chl Dpth (ft)	2.01	Hydr. Depth (ft)	0.86	1.34	0.67
Conv. Total (cfs)	8784.7	Conv. (cfs)	411.7	8017.8	355.2
Length Wtd. (ft)	318.07	Wetted Per. (ft)	6.55	53.54	6.00
Min Ch El (ft)	2112.00	Shear (lb/sq ft)	0.86	1.42	0.73
Alpha	1.02	Stream Power (lb/ft s)	8.98	21.42	8.46
Frctn Loss (ft)	4.54	Cum Volume (acre-ft)	0.33	0.95	0.12
C & E Loss (ft)	0.65	Cum SA (acres)	0.52	0.74	0.17

Plan: UP2 SIRIUS AVE SIRIUS RS: 1215 Profile: 100-yr

E.G. Elev (ft)	2111.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.	0.016	0.015	0.015
W.S. Elev (ft)	2110.68	Reach Len. (ft)	45.00	45.00	45.00
Crit W.S. (ft)	2111.05	Flow Area (sq ft)	73.66	51.26	4.94
E.G. Slope (ft/ft)	0.011744	Area (sq ft)	73.66	51.26	4.94
Q Total (cfs)	1095.58	Flow (cfs)	537.31	526.34	31.93
Top Width (ft)	184.50	Top Width (ft)	119.00	55.50	10.00
Vel Total (ft/s)	8.44	Avg. Vel. (ft/s)	7.29	10.27	6.46
Max Chl Dpth (ft)	1.43	Hydr. Depth (ft)	0.62	0.92	0.49
Conv. Total (cfs)	10109.7	Conv. (cfs)	4958.2	4856.9	294.7
Length Wtd. (ft)		Wetted Per. (ft)	119.39	55.95	10.42
Min Ch El (ft)	2109.25	Shear (lb/sq ft)	0.45	0.67	0.35
Alpha	1.10	Stream Power (lb/ft s)	3.30	6.90	2.25
Frctn Loss (ft)		Cum Volume (acre-ft)	0.04	0.50	0.06
C & E Loss (ft)		Cum SA (acres)	0.06	0.35	0.04

Plan: UP2 SIRIUS AVE SIRIUS RS: 1170 Profile: 100-yr

E.G. Elev (ft)	2111.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.		0.016	0.016
W.S. Elev (ft)	2110.95	Reach Len. (ft)	134.00	134.00	134.00
Crit W.S. (ft)	2110.95	Flow Area (sq ft)		143.11	16.79
E.G. Slope (ft/ft)	0.003495	Area (sq ft)		143.11	16.79
Q Total (cfs)	1045.32	Flow (cfs)		935.01	110.31
Top Width (ft)	120.60	Top Width (ft)		109.20	11.40
Vel Total (ft/s)	6.54	Avg. Vel. (ft/s)		6.53	6.57
Max Chl Dpth (ft)	2.05	Hydr. Depth (ft)		1.31	1.47
Conv. Total (cfs)	17682.1	Conv. (cfs)		15816.2	1865.9
Length Wtd. (ft)	134.00	Wetted Per. (ft)		110.25	12.82
Min Ch El (ft)	2108.90	Shear (lb/sq ft)		0.28	0.29
Alpha	1.00	Stream Power (lb/ft s)		1.85	1.88
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)		0.40	0.05
C & E Loss (ft)	0.03	Cum SA (acres)		0.26	0.03

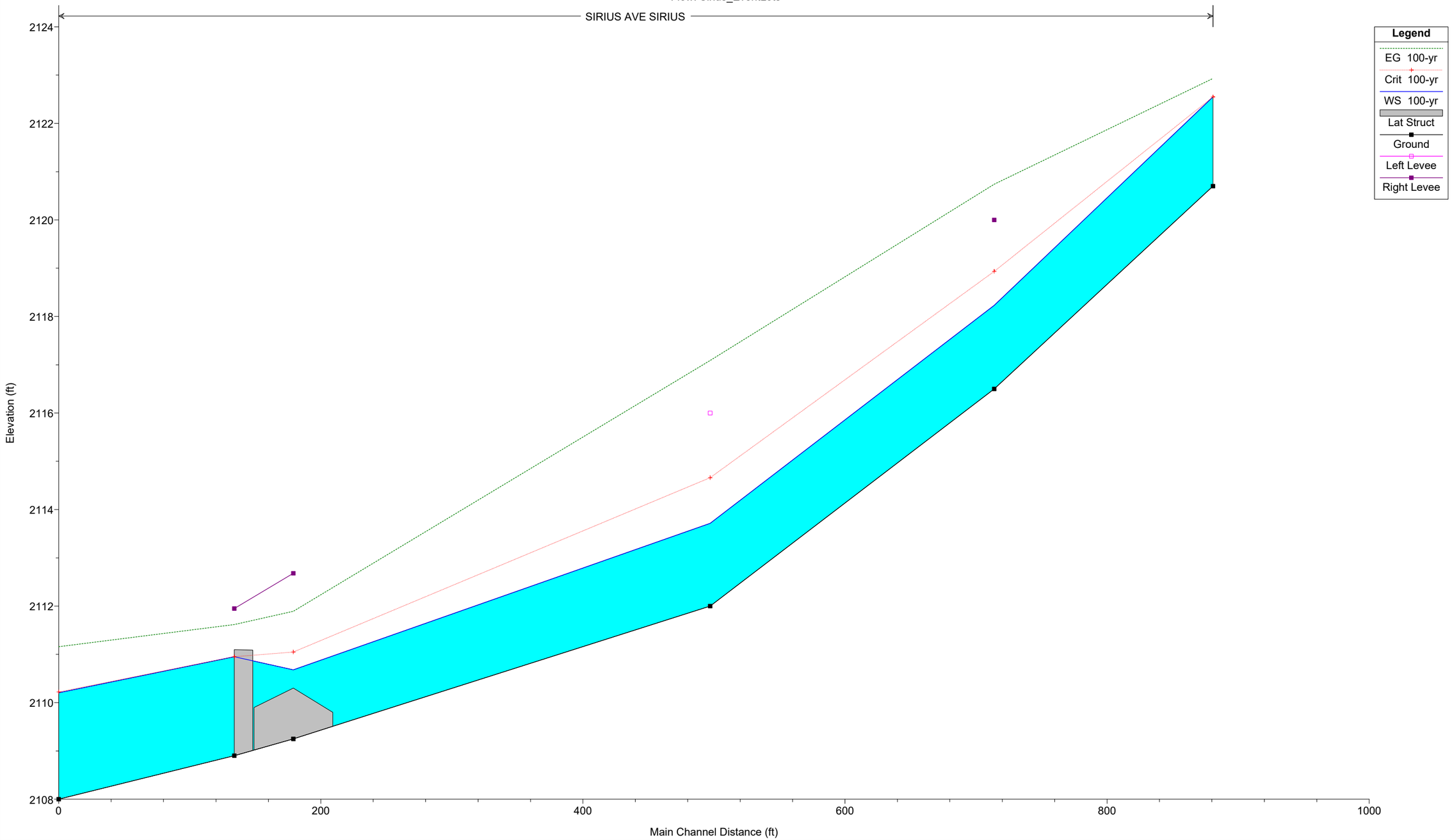
Plan: UP2 SIRIUS AVE SIRIUS RS: 1036 Profile: 100-yr

E.G. Elev (ft)	2111.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.		0.016	0.016
W.S. Elev (ft)	2110.21	Reach Len. (ft)			
Crit W.S. (ft)	2110.22	Flow Area (sq ft)		118.05	16.05
E.G. Slope (ft/ft)	0.003246	Area (sq ft)		118.05	16.05
Q Total (cfs)	1045.32	Flow (cfs)		939.27	106.05
Top Width (ft)	71.50	Top Width (ft)		61.50	10.00
Vel Total (ft/s)	7.79	Avg. Vel. (ft/s)		7.96	6.61
Max Chl Dpth (ft)	2.21	Hydr. Depth (ft)		1.92	1.61
Conv. Total (cfs)	18346.3	Conv. (cfs)		16485.0	1861.3
Length Wtd. (ft)		Wetted Per. (ft)		64.02	11.51
Min Ch El (ft)	2108.00	Shear (lb/sq ft)		0.37	0.28
Alpha	1.01	Stream Power (lb/ft s)		2.97	1.87
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Sirius Avenue

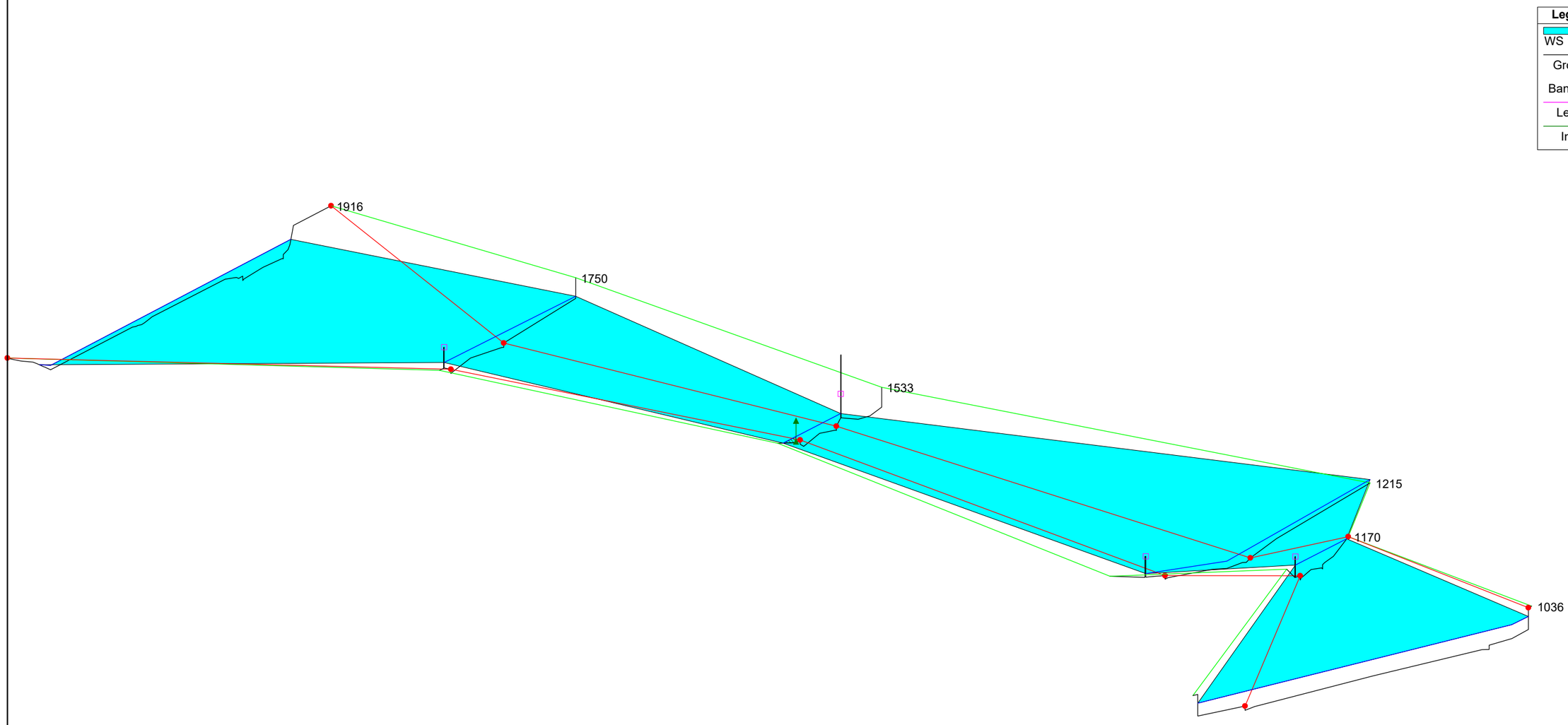
Flow: Sirius_EventLots

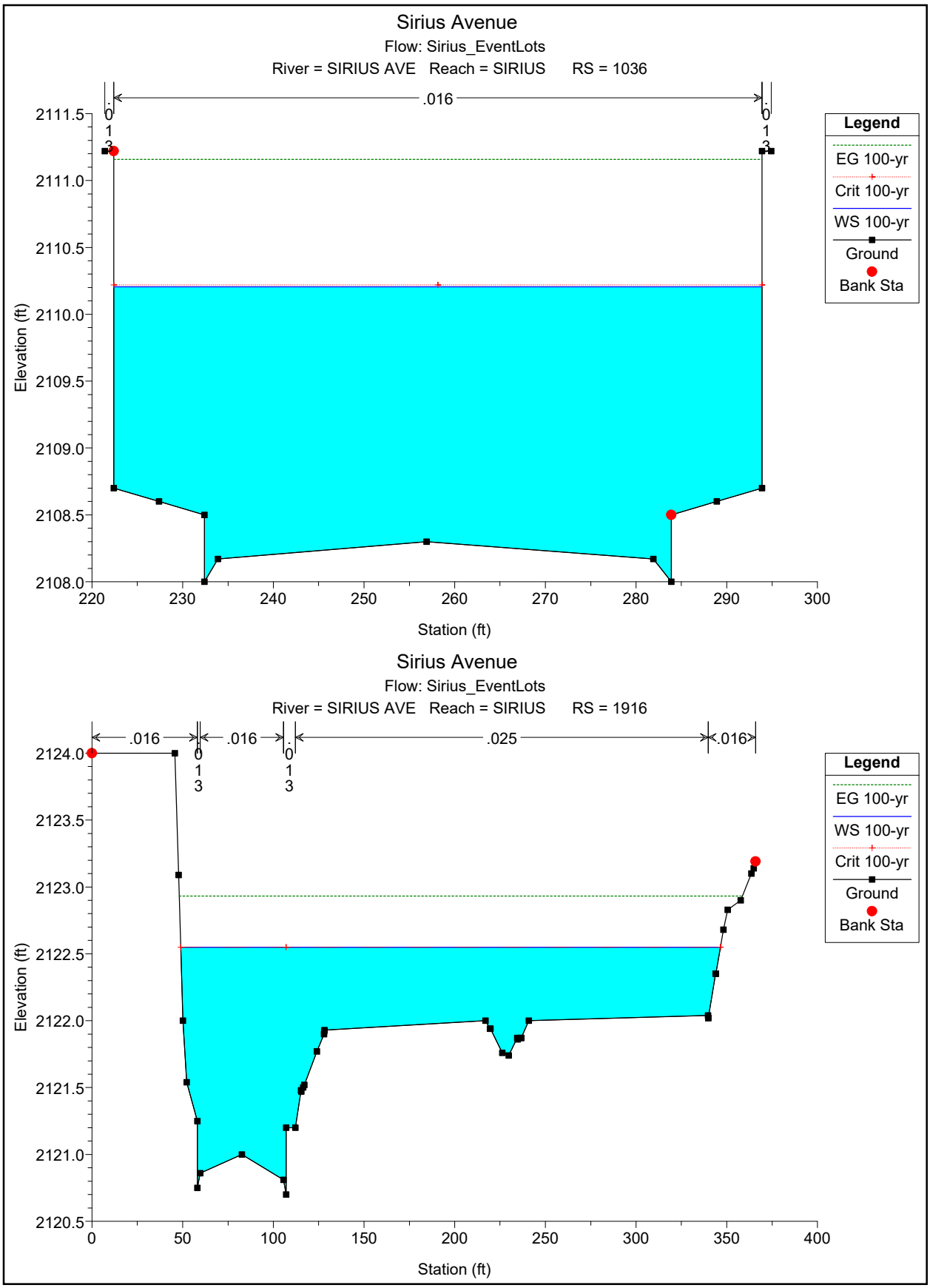
SIRIUS AVE SIRIUS

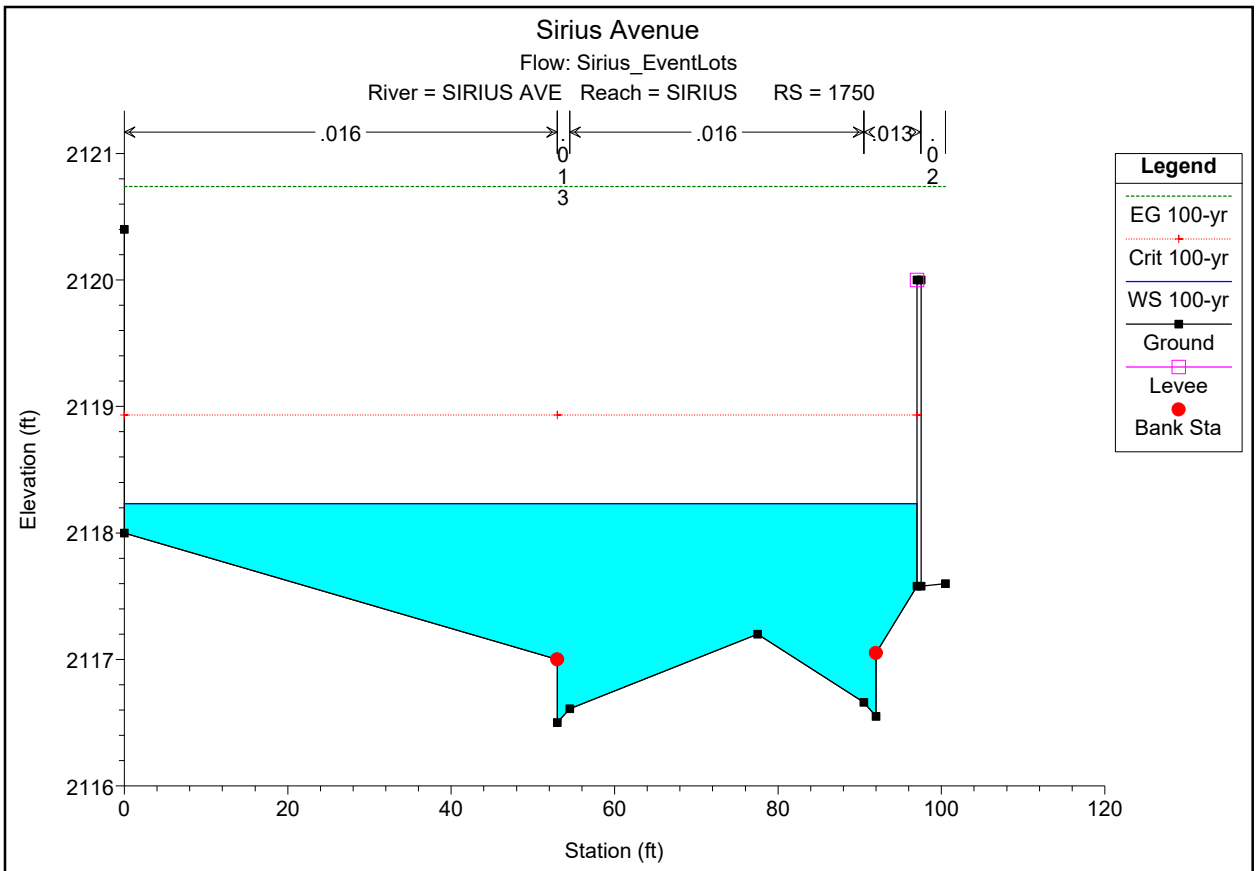


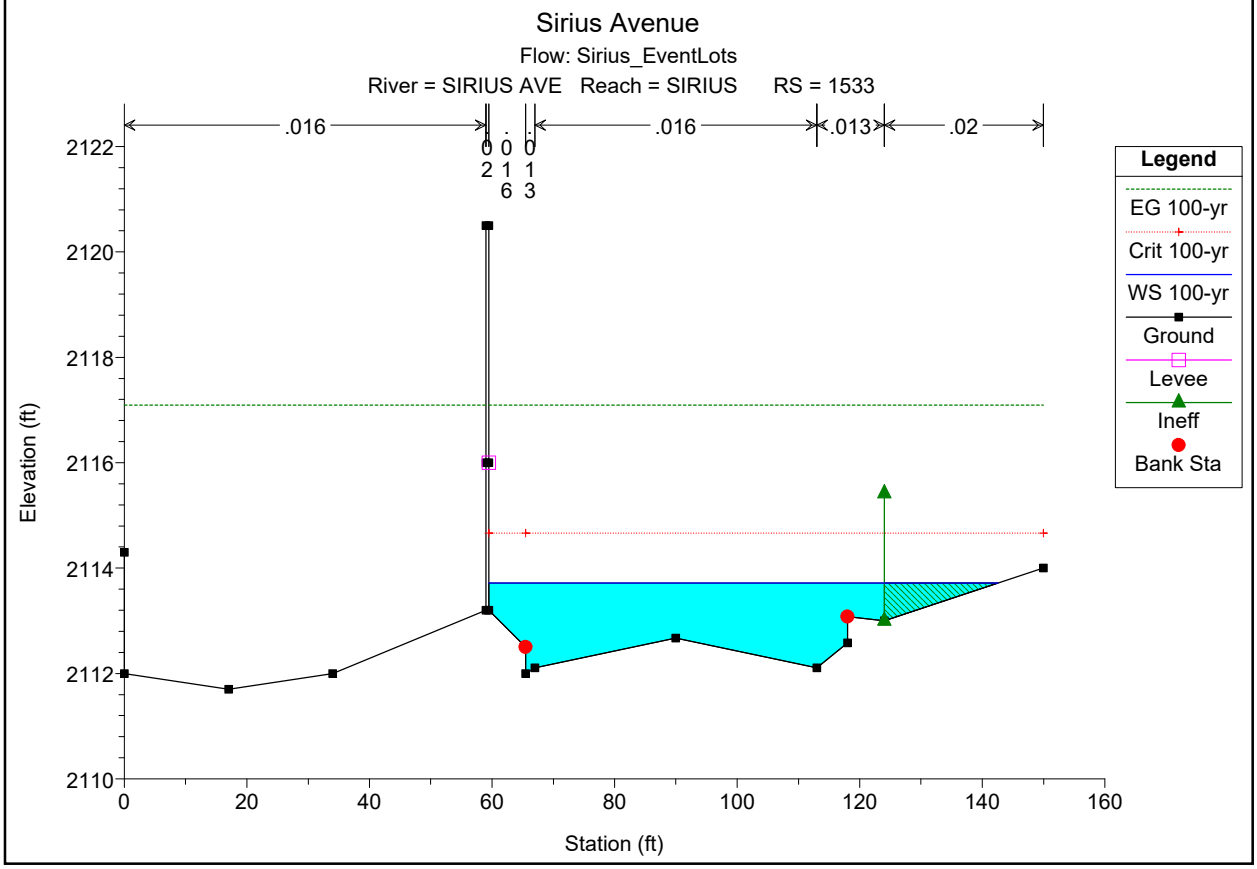
Sirius Avenue

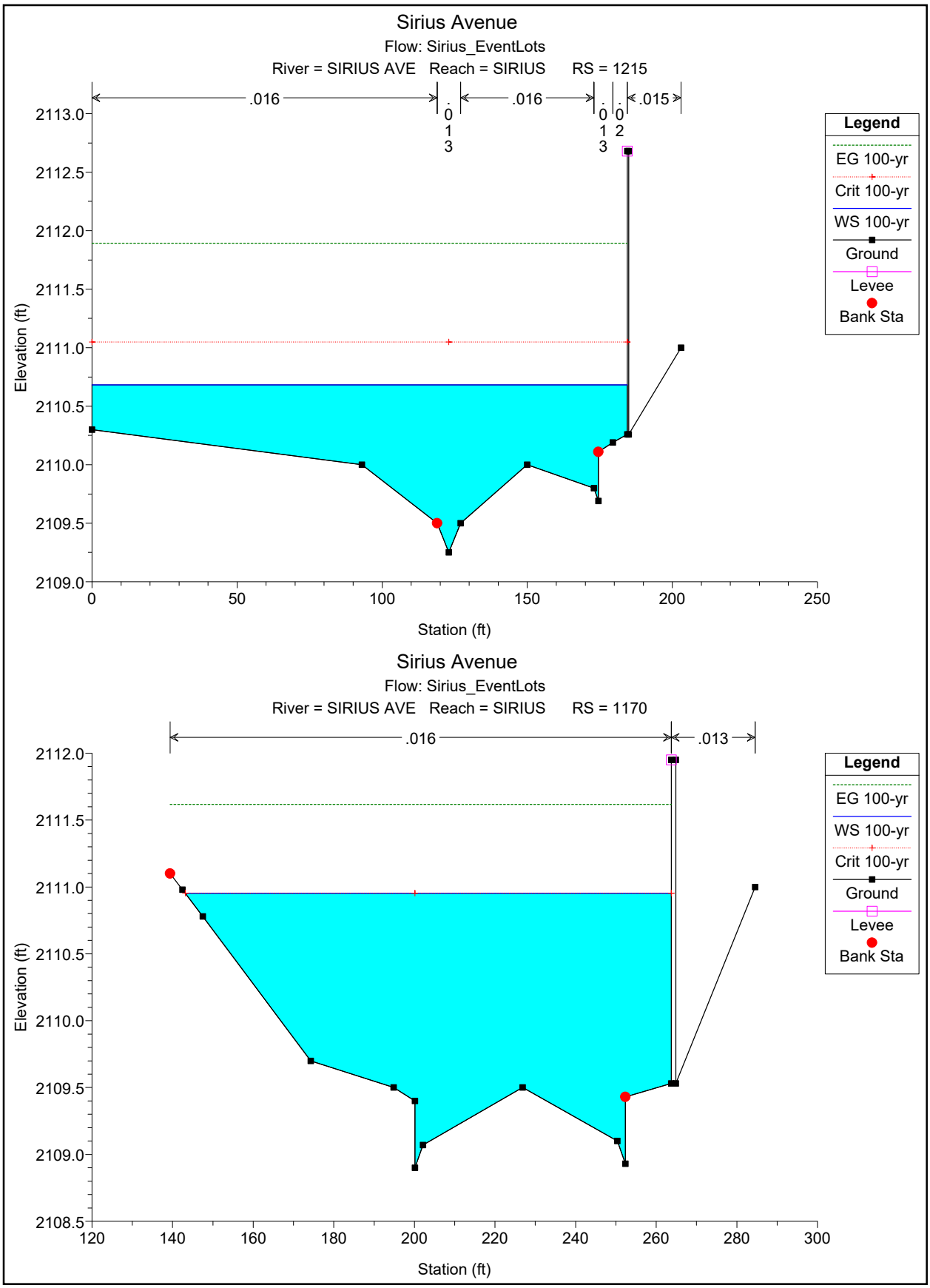
Flow: Sirius_EventLots




Sirius Avenue
Flow: Sirius_EventLots
River = SIRIUS AVE Reach = SIRIUS RS = 1036
.016
.013
.013
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Bank Sta
Elevation (ft)
2111.5
2111.0
2110.5
2110.0
2109.5
2109.0
2108.5
2108.0
220
230
240
250
260
270
280
290
300
Station (ft)
Sirius Avenue
Flow: Sirius_EventLots
River = SIRIUS AVE Reach = SIRIUS RS = 1916
.016
.016
.025
.016
.013
.013
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Bank Sta
Elevation (ft)
2124.0
2123.5
2123.0
2122.5
2122.0
2121.5
2121.0
2120.5
0
50
100
150
200
250
300
350
400
Station (ft)


Sirius Avenue
Flow: Sirius_EventLots
River = SIRIUS AVE Reach = SIRIUS RS = 1750
.016
.016
.013
.013
.02
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Sirius Avenue
Flow: Sirius_EventLots
River = SIRIUS AVE Reach = SIRIUS RS = 1533
.016
.016
.013
.02
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Sirius Avenue
Flow: Sirius_EventLots
River = SIRIUS AVE Reach = SIRIUS RS = 1215
.016
.016
.015
Legend
EG 100-yr
Crit 100-yr
WS 100-yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Sirius Avenue
Flow: Sirius_EventLots
River = SIRIUS AVE Reach = SIRIUS RS = 1170
.016
.013
Legend
EG 100-yr
WS 100-yr
Crit 100-yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

HEC-RAS Plan: UP2 River: SIRIUS AVE Reach: SIRIUS Profile: 100-yr

Reach	River Sta	Profile	Q US	Q Leaving Total	Q DS	Q Weir	Q Gates	Wr Top Wdth	Weir Max Depth	Weir Avg Depth	Min El Weir Flow	E.G. US.	W.S. US.	E.G. DS	W.S. DS
			(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
SIRIUS	1245	100-yr	1158.00	114.11	1045.32	114.11		60.00	1.17	0.72	2109.80	2112.39	2110.97	2111.71	2110.86
SIRIUS	1177	100-yr	1095.58	0.00	1045.32	0.00					2111.09	2111.70	2110.87	2111.62	2110.95

FFE Hydraulic Sections															
SECTION	TRIBUTARY BASINS	SLOPE %	Q_{100} (cfs)	FLOW DEPTH (ft)	FLOW LINE (ft)	FLOW LINE + 2D (ft)	WSE (ft)	FFE BLDG1 (ft)	FFE BLDG2 (ft)	FFE BLDG3 (ft)	FFE BLDG4 (ft)	FFE BLDG5 (ft)	FFE BLDG6 (ft)	BLDG PROTECTED?	BLDG PROTECTED?
ONH	ONH	2.30	2	0.12	2107.50	2107.74	-	2108.00	2108.00	-	-	-	-	YES	YES
ONP1	ONP	0.77	1.5	0.11	2111.25	2111.47	-	-	-	-	2111.50	-	2111.50	YES	YES
ONP2 South	ONP	1.55	1.5	0.16	2111.30	2111.62	-	-	-	-	-	-	2111.50	**	-
ONP2 North	1/2ONP	0.10	1.5	0.23	2107.50	2107.96	-	2108.00	-	-	-	-	-	YES	-
ONR1	ONR	0.50	0.5	0.10	2110.95	2111.15	-	-	-	-	2111.50	-	2111.50	**	**
ONR2	ONR	1.68	0.5	0.10	2110.80	2111.00	-	-	-	-	2111.50	2111.40	-	YES	YES
RD	**CRCPS06 + ONP + ONL + ONM + ONQ + ONR + ONS + ONT + ONV + ONW + ***RD	0.25	2548	8.56	-	-	2108.42	2108.00	-	-	-	-	-	*	-
ST2	**CRCPS06 + ONR + ONS + ONT + ONV + ONW + ***RD	0.90	2543	6.35	-	-	2108.06	-	-	-	-	-	2111.50	YES	-
*F-F(ROAD)	**CRCPS06 + ONV	0.70	2539	3.59	-	-	2110.58	-	-	-	-	2111.40	-	YES	-
RA	**PS08(OF1) + 114-cfs + ONG + ONK + ONN + ONO + ONU	0.45	136.5	0.96	2108.65	2111.11	-	-	-	-	2111.50	-	-	YES	-
RA1	**PS08(OF1) + 114-cfs + ONC + ONG + ONK + ONN + ONO + ONU + 1/2OF5 + 1/2RA	0.68	139.5	1.45	2107.60	2110.55	-	-	2108.00	-	-	-	-	*	-
MA2A	**PS08(OF1) + **PS08(OF3) + **PS08(OF5) + 114-cfs + ONA + ONB + ONC + OND + ONE + ONF + ONG + ONH + ONK + ONN + ONO + ONU + ONX + RA	0.30	231.5	1.30	2102.30	2105.10	-	2108.00	-	-	-	-	-	YES	-
MA2B	**PS08(OF1) + **PS08(OF3) + **PS08(OF5) + 114-cfs + ONA + ONB + ONC + OND + ONE + ONG + ONH + ONK + ONN + ONO + ONU + RA	0.51	229.5	1.12	2101.90	2104.52	-	2108.00	-	-	-	-	-	YES	-
MA2C	**PS08(OF1) + **PS08(OF3) + **PS08(OF5) + 114-cfs + ONA + ONB + ONC + OND + ONG + ONK + ONN + ONO + ONU + RA	1.40	227	0.92	2105.61	2108.03	-	-	2108.00	-	-	-	-	*	-

*Solid Grouted Flood Walls have been provided adjacent to building

**Trench Drains have been provided adjacent to building