

July 30, 2024



**City of Aurora –Engineering Department**  
15151 East Alameda Parkway  
Aurora, CO 80012

**Re: County Line Road - Drainage Compliance Letter**

To whom it may concern:

The intent of this letter is to demonstrate that the ultimate drainage condition for County Line Road is in compliance with the Final Drainage Report for the Overland Ranch Filing 1 property. The drainage calculations for County Line Road that were included with the Final Drainage Report for Overland Ranch Filing 1, have been included with this letter for reference.

**Storm Sewer System**

County Line Road will utilize the drainage infrastructure that will be constructed with the Overland Ranch Filing 1 development. All proposed swales, culvert crossings, and detention ponds within the Overland Ranch Filing 1 development have been designed to incorporate all of County Line Road's drainage and storm sewer outfalls. County Line Road will also convey flows from the future pond, located just south of County Line Road that will be constructed with the Elora Filing 1 improvements. Coordination with Elora Filing 1 has been conducted to ensure all pond release rates, emergency overflows, and future storm sewer on the Elora Filing 1 site have been incorporated into the overall drainage concept. These flows, along with County Line Road drainage were routed and analyzed as part of the Final Drainage Report for Overland Ranch Filing 1. Based on the new drainage concept from Elora, the flows within the culverts and swales within Overland Ranch Filing 1 have decreased from the original flows utilized in the Preliminary Drainage Report for Overland Ranch Filing 1. This decrease will allow all culverts and swales to function as intended, and convey flows from Elora safely through the Overland Ranch Subdivision. All pertinent drainage calculations have been included with this letter to convey that all drainage infrastructure has been adequately sized. These calculations include StormCAD results, drainage routing, inlet calculations, and UD-Detention workbooks for both the Overland Ranch and Elora Filing 1 developments. With these calculations, it is thus concluded that all infrastructure within these basins are adequately sized and no additional calculations are necessary to verify the existing systems will continue to function as designed in the report referenced above. The County Line Road proposed drainage maps can also be found in the appendix.

**Water Quality Pond**

The proposed County Line Road improvements shall be provided water quality and 100-year detention by the full-spectrum detention ponds that were proposed with the Overland Ranch

Filing 1 development. The ultimate County Line Road drainage was incorporated into the Filing 1 design to ensure the proposed drainage infrastructure and ponds were adequately sized. The UD-Detention workbooks for the Filing 1 ponds have been included with this letter.

## **Conclusions**

Based on the above data, the proposed County Line improvements are within conformance with the previously analyzed drainage study prepared for the Overland Ranch Filing 1 Development. No impacts to storm sewer or the detention ponds are anticipated as a result of the proposed improvements. All of the proposed drainage improvements for County Line Road comply with the Final Drainage Report for Overland Ranch Filing 1 Development and are in accordance with City of Aurora regulations.

Sincerely,

**JR Engineering, LLC**

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Kurtis Williams, P.E.  
State of Colorado No. 34270  
For and on Behalf of JR Engineering

Date

## COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: \_\_\_\_\_  
Location: Aurora

Project Name: Overland Ranch Filing 1  
Project No.: 16118.00  
Calculated By: AAM  
Checked By: \_\_\_\_\_  
Date: 7/23/24

Basin ID	Total Area (ac)	Paving, Drives, Walks, Ponds			Landscaping/Park			Open Space			Basins Total
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	Weighted % Imp.
CL1	2.66	95%	0.40	14.3%	20%	0.00	0.0%	5%	2.26	4.2%	18.5%
CL2	1.45	95%	1.10	72.1%	20%	0.35	4.8%	5%	0.00	0.0%	76.9%
CL3	0.59	95%	0.58	93.4%	20%	0.01	0.3%	5%	0.00	0.0%	93.7%
CL4	1.80	95%	0.82	43.3%	20%	0.98	10.9%	5%	0.00	0.0%	54.2%
CL5	0.58	95%	0.56	91.7%	20%	0.02	0.7%	5%	0.00	0.0%	92.4%
CL6	1.43	95%	0.76	50.5%	20%	0.67	9.4%	5%	0.00	0.0%	59.9%
CL7	0.62	95%	0.60	91.9%	20%	0.02	0.6%	5%	0.00	0.0%	92.6%
CL8	0.63	95%	0.46	69.4%	20%	0.17	5.4%	5%	0.00	0.0%	74.8%
CL9	0.27	95%	0.26	91.5%	20%	0.01	0.7%	5%	0.00	0.0%	92.2%
CL10	0.28	95%	0.19	64.5%	20%	0.04	2.9%	5%	0.05	0.9%	68.2%
CL11	0.28	95%	0.17	57.7%	20%	0.04	2.9%	5%	0.07	1.3%	61.8%
TOTAL CL	10.59										58.4%
UB3*	7.32	100%	0.20	2.7%	5%	5.81	4.0%	45%	1.31	8.1%	14.8%
UB3A*	1.05	100%	0.10	9.5%	5%	0.82	3.9%	45%	0.13	5.6%	19.0%
UB12*	0.69	100%	0.32	46.4%	5%	0.07	0.5%	45%	0.30	19.6%	66.4%
UB13*	3.03	100%	0.38	12.5%	5%	1.14	1.9%	45%	1.51	22.4%	36.8%
TOTAL B	12.09										23.6%

Per Table 5-5, City of Aurora Storm Drainage Criteria Manual:

Paving, Drives, Walks: 95% impervious  
Open Space 5% impervious  
Landscaping: 20% impervious  
Community Park: 25% impervious  
Low & Medium-Density SFH (3 - 5 du/ac) 55% impervious (Includes roads)  
Medium-Density MFH/  
High Density SFH 65% impervious (Includes roads)  
(5 - 20 du/ac)

\*Per Table 1, City of Aurora Storm Drainage and Technical Criteria Manual:

Paving, Drives, Walks: 100% impervious  
Undeveloped Areas 2%-5% impervious  
(Lawns): (Does not include roads)  
Commercial Areas: 95% impervious (Does not include roads)  
Neighborhood Areas: 85% impervious (Does not include roads)  
Single-Family Residential 45% impervious  
(0.25 Acres or Less): (Does not include roads)

# COMPOSITE RUNOFF COEFFICIENT CALCULATIONS

Subdivision: \_\_\_\_\_ Project Name: Overland Ranch Filing 1  
 Location: Aurora Project No.: 16118.00  
 Calculated By: AAM  
 Checked By: \_\_\_\_\_  
 Date: 7/23/24

C-Value - 100-Year

Basin ID	Total Area (ac)	Basins Total Weighted % Imp.	Hydrologic Soil Group			Hydrologic Soil Group			Minor Coefficients			Major Coefficients			Major Coefficients			Basins Total Weighted C <sub>2</sub>	Basins Total Weighted C <sub>5</sub>	Basins Total Weighted C <sub>100</sub>
			Area A (ac)	Area B (ac)	Area C/D (ac)	% A (ac)	% B (ac)	% C/D (ac)	C <sub>2,A</sub>	C <sub>2,B</sub>	C <sub>2,C/D</sub>	C <sub>5,A</sub>	C <sub>5,B</sub>	C <sub>5,C/D</sub>	C <sub>100,A</sub>	C <sub>100,B</sub>	C <sub>100,C/D</sub>			
CL1	2.66	18.5%	0.00	2.66	0.00	0%	100%	0%	0.09	0.12	0.13	0.10	0.14	0.19	0.25	0.51	0.56	0.12	0.14	0.51
CL2	1.45	76.9%	0.00	0.83	0.62	0%	57%	43%	0.60	0.62	0.62	0.62	0.65	0.67	0.71	0.79	0.80	0.62	0.65	0.79
CL3	0.59	93.7%	0.00	0.20	0.39	0%	34%	66%	0.77	0.78	0.77	0.79	0.80	0.80	0.84	0.87	0.87	0.77	0.80	0.87
CL4	1.80	54.2%	0.00	1.80	0.00	0%	100%	0%	0.38	0.41	0.42	0.39	0.44	0.48	0.53	0.68	0.71	0.41	0.44	0.68
CL5	0.58	92.4%	0.00	0.58	0.00	0%	100%	0%	0.76	0.77	0.76	0.78	0.79	0.79	0.83	0.86	0.86	0.77	0.79	0.86
CL6	1.43	59.9%	0.00	1.43	0.00	0%	100%	0%	0.43	0.46	0.47	0.45	0.49	0.53	0.58	0.71	0.73	0.46	0.49	0.71
CL7	0.62	92.6%	0.00	0.62	0.00	0%	100%	0%	0.76	0.77	0.76	0.78	0.79	0.79	0.83	0.86	0.86	0.77	0.79	0.86
CL8	0.63	74.8%	0.00	0.60	0.03	0%	95%	5%	0.57	0.60	0.60	0.59	0.63	0.65	0.69	0.78	0.79	0.60	0.63	0.78
CL9	0.27	92.2%	0.00	0.00	0.27	0%	0%	100%	0.76	0.76	0.76	0.78	0.79	0.79	0.83	0.86	0.86	0.76	0.79	0.86
CL10	0.28	68.2%	0.00	0.00	0.28	0%	0%	100%	0.51	0.54	0.54	0.53	0.57	0.59	0.64	0.75	0.76	0.54	0.59	0.76
CL11	0.28	61.8%	0.00	0.00	0.28	0%	0%	100%	0.45	0.48	0.48	0.47	0.51	0.54	0.59	0.72	0.74	0.48	0.54	0.74
UB3*	7.32	14.8%	0.00	7.32	0.00	0%	100%	0%	0.07	0.09	0.10	0.08	0.11	0.16	0.22	0.50	0.54	0.09	0.11	0.50
UB3A*	1.05	19.0%	0.00	1.05	0.00	0%	100%	0%	0.10	0.12	0.13	0.10	0.14	0.19	0.26	0.51	0.56	0.12	0.14	0.51
UB12*	0.69	66.4%	0.00	0.19	0.50	0%	28%	72%	0.49	0.52	0.52	0.51	0.55	0.58	0.63	0.74	0.76	0.52	0.57	0.75
UB13*	3.03	36.8%	0.00	0.60	2.43	0%	20%	80%	0.23	0.26	0.27	0.24	0.29	0.34	0.40	0.60	0.63	0.27	0.33	0.63
TOTAL	22.68	39.9%	0.00	17.88	4.80	0%	79%	21%	---	---	---									



# STANDARD FORM SF-2 TIME OF CONCENTRATION

Subdivision: \_\_\_\_\_ Project Name: Overland Ranch Filing 1  
 Location: Aurora Project No.: 16118.00  
 Calculated By: AAM  
 Checked By: \_\_\_\_\_  
 Date: 7/23/24

SUB-BASIN							INITIAL/OVERLAND			TRAVEL TIME					t <sub>c</sub> CHECK			FINAL
DATA							(T <sub>i</sub> )			(T <sub>t</sub> )					(URBANIZED BASINS)			
BASIN	D.A.	Hydrologic	Impervious	C <sub>2</sub>	C <sub>5</sub>	C <sub>100</sub>	L	S <sub>o</sub>	t <sub>i</sub>	L <sub>t</sub>	S <sub>t</sub>	K	VEL. (ft/s)	t <sub>t</sub> (min)	COMP. t <sub>c</sub> (min)	TOTAL LENGTH (ft)	Urbanized t <sub>c</sub> (min)	
CL1	2.66	B	18.5%	0.12	0.14	0.51	30.0	6.2%	5.2	1117.0	4.1%	15.00	3.0	6.1	11.3	1147.00	30.8	11.3
CL2	1.45	B	76.9%	0.62	0.65	0.79	30.0	2.0%	3.5	1058.0	3.0%	20.00	3.5	5.1	8.6	1088.00	18.1	8.6
CL3	0.59	C	93.7%	0.77	0.80	0.87	45.0	2.0%	2.9	672.0	3.6%	20.00	3.8	3.0	5.8	717.00	12.7	5.8
CL4	1.80	B	54.2%	0.41	0.44	0.68	45.0	2.0%	6.3	525.0	2.5%	20.00	3.2	2.8	9.1	570.00	20.1	9.1
CL5	0.58	B	92.4%	0.77	0.79	0.86	33.0	2.0%	2.6	442.0	2.5%	20.00	3.2	2.3	4.9	475.00	12.4	5.0
CL6	1.43	B	59.9%	0.46	0.49	0.71	39.0	2.0%	5.5	806.0	2.6%	20.00	3.2	4.2	9.6	845.00	20.6	9.6
CL7	0.62	B	92.6%	0.77	0.79	0.86	26.0	2.0%	2.3	806.0	2.6%	20.00	3.2	4.2	6.4	832.00	14.1	6.4
CL8	0.63	C	74.8%	0.60	0.63	0.78	39.0	2.0%	4.2	345.0	2.1%	20.00	2.9	2.0	6.2	384.00	15.3	6.2
CL9	0.27	C	92.2%	0.76	0.79	0.86	26.0	2.0%	2.3	285.0	1.7%	20.00	2.6	1.8	4.1	311.00	12.0	5.0
CL10	0.28	C	68.2%	0.54	0.59	0.76	54.0	6.7%	3.6	362.0	3.8%	15.00	2.9	2.1	5.7	416.00	16.1	5.7
CL11	0.28	C	61.8%	0.48	0.54	0.74	54.0	6.7%	4.0	362.0	3.7%	15.00	2.9	2.1	6.0	416.00	17.3	6.0
UB3*	7.32	C	14.8%	0.09	0.11	0.50	106.0	4.1%	11.6	665.0	2.5%	15.00	2.4	4.7	16.3	771.00	29.8	16.3
UB3A*	1.05	C	19.0%	0.12	0.14	0.51	91.0	5.8%	9.2	241.0	6.7%	15.00	3.9	1.0	10.3	332.00	24.1	10.3
UB12*	0.69	C	66.4%	0.52	0.57	0.75	135.0	2.5%	8.2	266.0	2.8%	20.00	3.3	1.3	9.5	401.00	16.2	9.5
UB13*	3.03	C	36.8%	0.27	0.33	0.63	279.0	6.6%	12.5	223.0	2.8%	20.00	3.3	1.1	13.6	502.00	21.3	13.6

NOTES:

$$t_c = t_i + t_t$$

Equation 6-2

Where:

*t<sub>c</sub>* = computed time of concentration (minutes)

*t<sub>i</sub>* = overland (initial) flow time (minutes)

*t<sub>t</sub>* = channelized flow time (minutes).

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$

Equation 6-4

Where:

*t<sub>t</sub>* = channelized flow time (travel time, min)

*L<sub>t</sub>* = waterway length (ft)

*S<sub>o</sub>* = waterway slope (ft/ft)

*V<sub>t</sub>* = travel time velocity (ft/sec) = *K*√*S<sub>o</sub>*

*K* = NRCS conveyance factor (see Table 6-2).

*t<sub>c</sub>* is lesser of Equation 6-2 and Equation 6-5

For Urbanized basins a minimum *t<sub>c</sub>* of 5.0 minutes is required.

For non-urbanized basins a minimum *t<sub>c</sub>* of 10.0 minutes is required.

$$t_i = \frac{0.395(1.1 - C_s)\sqrt{L_i}}{S_o^{0.33}}$$

Equation 6-3

Where:

*I* = rainfall intensity (inches per hour)

*P<sub>1</sub>* = 1-hour point rainfall depth from Table 5-1 or NOAA Atlas 14 online tool (inches)

*T<sub>s</sub>* = storm duration (minutes)

*D* = rainfall depth (inches)

$$I = \frac{28.5 \cdot P_1}{(10 + T_s)^{0.786}}$$

$$D = \frac{I \cdot T_s}{60}$$

Equation 5-1

Equation 5-2

$$t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

Equation 6-5

Where:

*t<sub>c</sub>* = minimum time of concentration for first design point when less than *t<sub>c</sub>* from Equation 6-1.

*L<sub>t</sub>* = length of channelized flow path (ft)

*i* = imperviousness (expressed as a decimal)

*S<sub>t</sub>* = slope of the channelized flow path (ft/ft).

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

**STANDARD FORM SF-3**  
**STORM DRAINAGE SYSTEM DESIGN**  
(RATIONAL METHOD PROCEDURE)

Subdivision: \_\_\_\_\_ Project Name: Overland Ranch Filing 1  
Location: Aurora Project No.: 16118.00  
Design Storm: 2-Year Calculated By: AAM  
Checked By: \_\_\_\_\_  
P<sub>1</sub>: 0.83 Inches Date: 7/23/24

Flow	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t <sub>c</sub> (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t <sub>c</sub> (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q <sub>street</sub> (cfs)	C*A (ac)	Slope (%)	Q <sub>pipe</sub> (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t <sub>t</sub> (min)	
	C1	CL1	2.66	0.12	11.34	0.31	2.13	0.66					0.66	0.31	2.0					25	2.8	0.1	Existing swale conveyance to existing 42" culvert.
	C2	CL2	1.45	0.62	8.59	0.90	2.37	2.13					2.13	0.90	2.0					25	2.8	0.1	Road Conveyance to Elora Site
	C3	CL3	0.59	0.77	5.81	0.46	2.69	1.24								1.24	0.46	1.0	18	46	4.0	0.2	On-grade inlet Piped to DP1.0A
	3A	UB3A*	1.05	0.12	10.28	0.13	2.21	0.29								0.29	0.13	1.0	18	3	2.4	0.0	Ex. Type D inlet Piped to DP1.0A
	1.0A								10.30	0.59	2.21	1.30	1.30	0.59	2.5					665	3.2	3.5	Sum of DP C3 & 3A Swale conveyance to DP 1.2
	C6	CL6	1.43	0.46	9.62	0.66	2.27	1.50								1.50	0.66	2.0	18	46	5.2	0.1	On-grade inlet Piped to DP 6.0
	C7	CL7	0.62	0.77	6.43	0.48	2.61	1.25								1.25	0.48	2.0	18	21	5.0	0.1	On-grade inle Piped to DP 6.0
	6.0								9.77	1.14	2.26	2.58				2.58	1.14	2.0	18	27	6.2	0.1	Sum of DP C6 & DP C7 Piped to DP 6.2
	C4	CL4	1.80	0.41	9.12	0.74	2.32	1.72								1.72	0.74	1.0	18	47	4.4	0.2	Sump inlet Piped to DP 6.1
	C5	CL5	0.58	0.77	5.00	0.44	2.81	1.24								1.24	0.44	1.0	18	21	4.0	0.1	Sump inlet Sum of carryover flow from DP C7 & Sub-Basin CL5, Piped to DP 6.1
	6.1								9.30	1.18	2.30	2.71				2.71	1.18	1.0	18	255	5.0	0.9	Sum of DP C4 & DP C5 Piped to DP 6.2
	Pond A		31.68		30.00	0.09	3.73	0.34								0.34	0.09	1.0	42	170	2.4	1.2	Elora Pond Release Piped to DP 6.2
	6.2								31.21	2.41	1.27	3.06	3.06	2.41	5.5	3.06	2.41	1.00	42	337	4.7	1.2	Sum of DP 6.0, DP 6.1 & Elora Pond A Release into Overland Filing 1 Drainage Infrastructure
	3	UB3*	7.32	0.09	16.26	0.66	1.81	1.19								1.19	0.66	2.4	54	0	4.5	0.0	54" Culvert Piped to DP 1.2
	1.2								32.40	3.66	1.24	4.54				4.54	3.66	2.4	54				Sum of DP 1.0A, DP 6.2, & DP 3 Piped to Overland Ranch Infrastructure
	C8	CL8	0.63	0.60	6.22	0.38	2.64	1.00					1.00	0.38	2.0								Road Conveyance to Elora Site
	C9	CL9	0.27	0.76	5.00	0.20	2.81	0.56					0.56	0.20	2.0								Road Conveyance to Overland Ranch Site
	C10	CL10	0.28	0.54	5.65	0.15	2.71	0.41					0.41	0.15	2.0								Roadside Swale Conveyance to Historic Outfall
	C11	CL11	0.28	0.48	6.05	0.14	2.66	0.37					0.37	0.14	2.0								Roadside Swale Conveyance to Historic Outfall
	12	UB12*	0.69	0.52	9.51	0.36	2.28	0.82								0.82	0.36	1.0	18	19	3.4	0.1	Sump Inlet Piped to DP 1.9
	13	UB13*	3.03	0.27	13.61	0.82	1.96	1.61								1.61	0.82	1.0	18	19	4.3	0.1	Sump Inlet Piped to DP 1.9
	1.9								13.68	1.18	1.96	2.31				2.31	1.18	4.0	18	843	7.7	1.8	Sum of DP 12 & DP 13 Piped to Overland Ranch Infrastructure

Notes:  
Street and Pipe C\*A values are determined by Q/i using the catchment's intensity value.

**STANDARD FORM SF-3**  
**STORM DRAINAGE SYSTEM DESIGN**  
(RATIONAL METHOD PROCEDURE)

Subdivision: \_\_\_\_\_  
Location: Aurora  
Design Storm: 100-Year  
P<sub>1</sub>: 2.38 Inches

Project Name: Overland Ranch Filing 1  
Project No.: 16118.00  
Calculated By: AAM  
Checked By: \_\_\_\_\_  
Date: 7/23/24

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t <sub>c</sub> (min)	C*A (ac)	I (in/hr)	Q (cfs)	t <sub>c</sub> (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q <sub>street</sub> (cfs)	C*A (ac)	Slope (%)	Q <sub>pipe</sub> (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t <sub>t</sub> (min)	
	C1	CL1	2.66	0.51	11.34	1.36	6.12	8.32					8.32	1.36	2.0					25	2.8	0.1	Existing swale conveyance to existing 42" culvert.
	C2	CL2	1.45	0.79	8.59	1.15	6.82	7.84					7.84	1.15	2.0					25	2.8	0.1	Road Conveyance to Elora Site
	C3	CL3	0.59	0.87	5.81	0.51	7.74	3.95								3.95	0.51	1.0	18	46	5.5	0.1	On-grade inlet Piped to DP1.0A
	3A	UB3A*	1.05	0.51	10.28	0.54	6.37	3.44								3.44	0.54	1.0	18	3	5.3	0.0	Ex. Type D inlet Piped to DP1.0A
	1.0A								10.29	1.05	6.37	6.69	6.69	1.05	2.5					665	3.2	3.5	Sum of DP C3 & 3A Swale conveyance to DP 1.2
	C6	CL6	1.43	0.71	9.62	1.01	6.54	6.61					3.4	0.52	1.6	3.20	0.49	2.0	18	281 46	2.5 6.6	1.9 0.1	On-grade inlet, carryover flow to DP C4 Piped to DP 6.0
	C7	CL7	0.62	0.86	6.43	0.53	7.52	3.99					1.4	0.18	1.6	2.60	0.35	2.0	18	281 21	2.5 6.2	1.9 0.1	On-grade inlet, carryover flow to DP C5 Piped to DP 6.0
	6.0								9.74	0.84	6.51	5.44				5.44	0.84	2.0	18	27	7.7	0.1	Sum of DP C6 & DP C7 Piped to DP 6.2
	C4	CL4	1.80	0.68	9.12	1.23	6.67	8.20	11.47	1.75	6.09	10.66				10.66	1.75	1.0	18	47	6.8	0.1	Sump inlet Sum of carryover flow from DP C6 & Sub-Basin CL4, Piped to DP 6.1
	C5	CL5	0.58	0.86	5.00	0.50	8.07	4.04	8.28	0.68	6.91	4.73				4.73	0.68	1.0	18	21	5.7	0.1	Sump inlet Sum of carryover flow from DP C7 & Sub-Basin CL5, Piped to DP 6.1
	6.1								11.59	2.43	6.06	14.76				14.76	2.43	1.0	18	255	8.4	0.5	Sum of DP C4 & DP C5 Piped to DP 6.2
	Pond A		31.68		40.00	12.53	3.13	39.22								39.22	12.53	1.0	42	170	9.8	0.3	Elora Pond Release Piped to DP 6.2
	6.2								40.29	15.80	3.12	49.30	49.30	15.80	5.5					337	4.7	1.2	Sum of DP 6.0, DP 6.1 & Elora Pond A Swale Conveyance to DP 1.2
	3	UB3*	7.32	0.50	16.26	3.62	5.20	18.82								18.82	3.62	2.4	54	0	10.6	0.0	54" Culvert Piped to DP 1.2
	1.2								41.49	20.47	3.06	62.64				62.64	20.47	2.4	54				54" Culvert Piped to Overland Ranch Infrastructure
	C8	CL8	0.63	0.78	6.22	0.49	7.59	3.72					3.72	0.49	2.0								Road Conveyance to Elora Site
	C9	CL9	0.27	0.86	5.00	0.23	8.07	1.86					1.86	0.23	2.0								Road Conveyance to Overland Ranch Site
	C10	CL10	0.28	0.76	5.65	0.21	7.81	1.64					1.64	0.21	2.0								Roadside Swale Conveyance to Historic Outfall
	C11	CL11	0.28	0.74	6.05	0.21	7.65	1.61					1.61	0.21	2.0								Roadside Swale Conveyance to Historic Outfall
	12	UB12*	0.69	0.75	9.51	0.52	6.57	3.42								3.42	0.52	1.0	18	19	5.3	0.1	Sump Inlet Piped to DP 1.9
	13	UB13*	3.03	0.63	13.61	1.90	5.65	10.74								10.74	1.90	1.0	18	19	6.8	0.0	Sump Inlet Piped to DP 1.9
	1.9								13.65	2.42	5.64	13.65				13.65	2.42	4.0	18				Sum of DP 12 & DP 13 Piped to Overland Ranch Infrastructure

Notes:  
Street and Pipe C\*A values are determined by Q/i using the catchment's intensity value.

**INLET MANAGEMENT**

Worksheet Protected

INLET NAME	<a href="#">CL6</a>	<a href="#">CL7</a>	<a href="#">CL3</a>
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

## USER-DEFINED INPUT

## User-Defined Design Flows

Minor $Q_{Known}$ (cfs)	1.5	1.3	1.2
Major $Q_{Known}$ (cfs)	6.6	4.0	4.0

Bypass (Carry-Over) Flow from Upstream [Inlets must be organized from upstream \(left\) to downstream \(right\) in order for bypass flows to be linked.](#)

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0	
Major Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0	

## Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

## Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

## Minor Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)			
One-Hour Precipitation, $P_1$ (inches)			

## Major Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)			
One-Hour Precipitation, $P_1$ (inches)			

## CALCULATED OUTPUT

Minor Total Design Peak Flow, $Q$ (cfs)	1.5	1.3	1.2
Major Total Design Peak Flow, $Q$ (cfs)	6.6	4.0	4.0
Minor Flow Bypassed Downstream, $Q_b$ (cfs)	0.1	0.0	0.0
Major Flow Bypassed Downstream, $Q_b$ (cfs)	3.4	1.4	0.0

**INLET MANAGEMENT**

Worksheet Protected

INLET NAME	<b>CL4</b>	<b>CL5</b>	<b>UB12</b>
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

## USER-DEFINED INPUT

## User-Defined Design Flows

Minor $Q_{known}$ (cfs)	1.7	1.2	0.8
Major $Q_{known}$ (cfs)	10.7	4.7	3.4

## Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0	0.0

## Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

## Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

## Minor Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)			
One-Hour Precipitation, $P_1$ (inches)			

## Major Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)			
One-Hour Precipitation, $P_1$ (inches)			

## CALCULATED OUTPUT

Minor Total Design Peak Flow, $Q$ (cfs)	1.7	1.2	0.8
Major Total Design Peak Flow, $Q$ (cfs)	10.7	4.7	3.4
Minor Flow Bypassed Downstream, $Q_b$ (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, $Q_b$ (cfs)	N/A	N/A	N/A

**INLET MANAGEMENT**

Worksheet Protected

INLET NAME	<a href="#">UB13</a>	<a href="#">UB3A</a>
Site Type (Urban or Rural)	URBAN	URBAN
Inlet Application (Street or Area)	STREET	AREA
Hydraulic Condition	In Sump	Swale
Inlet Type	CDOT Type R Curb Opening	CDOT TYPE D (Parallel)

## USER-DEFINED INPUT

## User-Defined Design Flows

Minor $Q_{known}$ (cfs)	1.6	0.3
Major $Q_{known}$ (cfs)	10.7	3.4

## Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0
Major Bypass Flow Received, $Q_b$ (cfs)	0.0	0.0

## Watershed Characteristics

Subcatchment Area (acres)		
Percent Impervious		
NRCS Soil Type		

## Watershed Profile

Overland Slope (ft/ft)		
Overland Length (ft)		
Channel Slope (ft/ft)		
Channel Length (ft)		

## Minor Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)		
One-Hour Precipitation, $P_1$ (inches)		

## Major Storm Rainfall Input

Design Storm Return Period, $T_r$ (years)		
One-Hour Precipitation, $P_1$ (inches)		

## CALCULATED OUTPUT

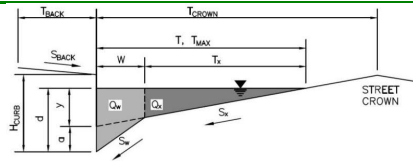
Minor Total Design Peak Flow, $Q$ (cfs)	1.6	0.3
Major Total Design Peak Flow, $Q$ (cfs)	10.7	3.4
Minor Flow Bypassed Downstream, $Q_b$ (cfs)	N/A	0.0
Major Flow Bypassed Downstream, $Q_b$ (cfs)	N/A	0.0

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Overland Ranch Filling 1

Inlet ID: CL6

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} =$	24.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.016	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.026	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX} =$	16.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

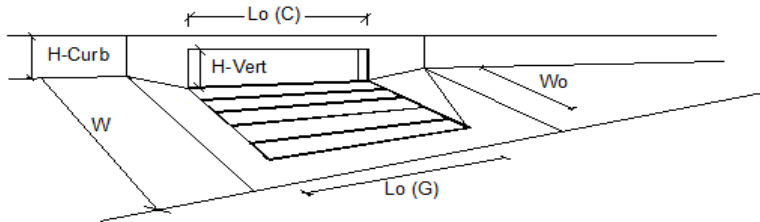
	Minor Storm	Major Storm	
$Q_{allow} =$	15.1	53.1	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.50 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 6.61 cfs on sheet 'Inlet Management'

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		$a_{LOCAL}$ =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		$N_o$ =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		$L_o$ =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		$W_o$ =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		$C_f (G)$ =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		$C_f (C)$ =	0.10	0.10	
Street Hydraulics: OK - $Q < Q_{allowable}$ Street Capacity		MINOR		MAJOR	
Total Inlet Interception Capacity		$Q$ =	1.4	3.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		$Q_o$ =	0.1	3.4	cfs
Capture Percentage = $Q_i/Q_o$		$C\%$ =	95	49	%

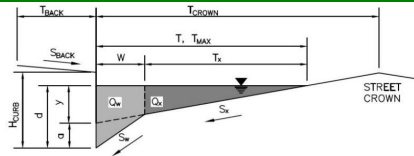


**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Overland Ranch Filing 1

Inlet ID: CL7

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK}$	=	0.0	ft
$S_{BACK}$	=	0.020	ft/ft
$n_{BACK}$	=	0.016	

$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	26.0	ft
$W$	=	2.00	ft
$S_x$	=	0.020	ft/ft
$S_w$	=	0.083	ft/ft
$S_o$	=	0.026	ft/ft
$n_{STREET}$	=	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX}$	16.0	26.0	ft
$d_{MAX}$	6.0	12.0	inches

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

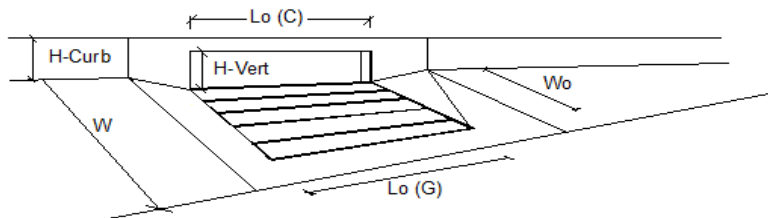
	Minor Storm	Major Storm	
$Q_{allow}$	15.1	51.5	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.25 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 3.99 cfs on sheet 'Inlet Management'

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



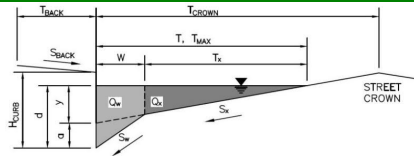
Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		$a_{LOCAL}$ =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		$L_o$ =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		$W_o$ =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		$C_l$ (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		$C_r$ (C) =	0.10	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			MINOR		MAJOR
Total Inlet Interception Capacity		$Q$ =	1.2	2.6	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		$Q_o$ =	0.0	1.4	cfs
Capture Percentage = $Q_i/Q_o$		C% =	99	64	%

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Overland Ranch Filing 1

Inlet ID: CL3

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK}$	=	0.0	ft
$S_{BACK}$	=	0.020	ft/ft
$n_{BACK}$	=	0.016	

$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	26.0	ft
$W$	=	2.00	ft
$S_x$	=	0.020	ft/ft
$S_w$	=	0.083	ft/ft
$S_o$	=	0.048	ft/ft
$n_{STREET}$	=	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm		
$T_{MAX}$	=	16.0	26.0	ft
$d_{MAX}$	=	6.0	12.0	inches

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

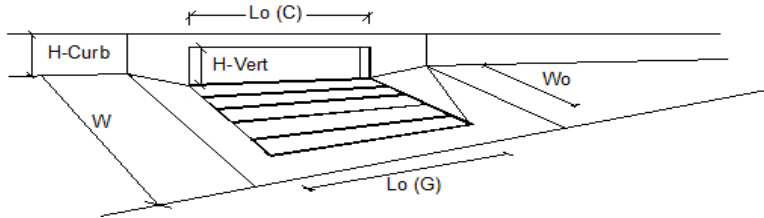
	Minor Storm	Major Storm		
$Q_{allow}$	=	15.4	69.9	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.24 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 3.95 cfs on sheet 'Inlet Management'

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



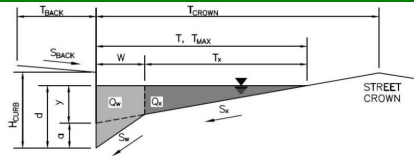
Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		$a_{LOCAL}$ =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		$L_o$ =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		$W_o$ =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		$C_l$ (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		$C_r$ (C) =	0.10	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$		MINOR		MAJOR	
Total Inlet Interception Capacity		$Q$ =	1.2	3.9	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		$Q_o$ =	0.0	0.0	cfs
Capture Percentage = $Q_i/Q_o$		C% =	100	99	%

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Overland Ranch Filing 1

Inlet ID: CL4

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} =$	24.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.016	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_X =$	0.020	ft/ft
$S_W =$	0.083	ft/ft
$S_O =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	16.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches

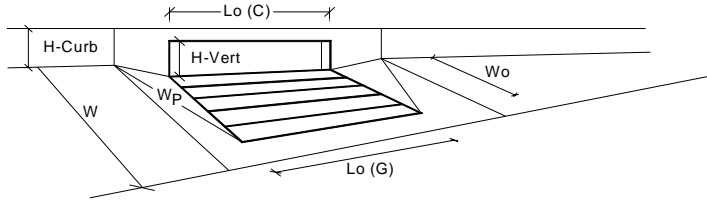
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
$Q_{allow} =$	SUMP	SUMP	cfs

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



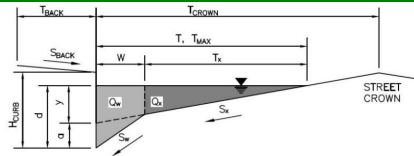
Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		$a_{local}$ =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		$N_o$ =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	3.6	6.6	inches
<u>Grate Information</u>			MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate		$L_o (G)$ =	N/A	N/A	feet
Width of a Unit Grate		$W_o$ =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		$A_{ratio}$ =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		$C_f (G)$ =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		$C_w (G)$ =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		$C_o (G)$ =	N/A	N/A	
<u>Curb Opening Information</u>			MINOR	MAJOR	
Length of a Unit Curb Opening		$L_o (C)$ =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		$H_{vert}$ =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		$H_{throat}$ =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		$W_o$ =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		$C_f (C)$ =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		$C_w (C)$ =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		$C_o (C)$ =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>			MINOR	MAJOR	
Depth for Grate Midwidth		$d_{Grate}$ =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		$d_{Curb}$ =	0.14	0.39	ft
Grated Inlet Performance Reduction Factor for Long Inlets		$RF_{Grate}$ =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		$RF_{Curb}$ =	0.75	0.97	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		$Q_a$ =	1.8	10.8	cfs
		$Q_{PEAK REQUIRED}$ =	1.7	10.7	cfs

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Overland Ranch Filing 1

Inlet ID: CL5

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} =$	0.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.016	

$H_{CURB} =$	6.00	inches
$T_{CROWN} =$	26.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	16.0	26.0	ft
$d_{MAX} =$	6.0	12.0	inches

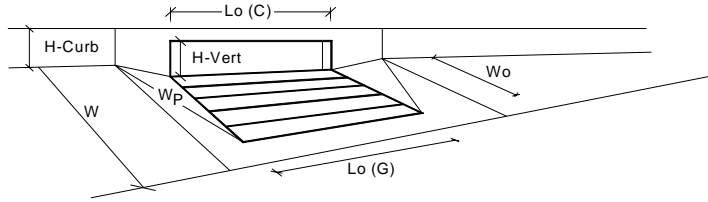
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
$Q_{allow} =$	SUMP	SUMP	cfs

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a <sub>local</sub> =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	3.5	5.7	inches
<b>Grate Information</b>			MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate		L <sub>o</sub> (G) =	N/A	N/A	feet
Width of a Unit Grate		W <sub>o</sub> =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>r</sub> (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =	N/A	N/A	
<b>Curb Opening Information</b>			MINOR	MAJOR	
Length of a Unit Curb Opening		L <sub>o</sub> (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>o</sub> =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>r</sub> (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>			MINOR	MAJOR	
Depth for Grate Midwidth		d <sub>Grate</sub> =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =	0.13	0.31	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =	0.99	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q <sub>a</sub> =	1.3	4.9	cfs
		Q <sub>PEAK REQUIRED</sub> =	1.2	4.7	cfs

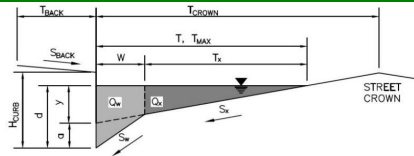


**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Overland Ranch Filing 1

Inlet ID: UB12

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} =$	15.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.016	

$H_{CURB} =$	4.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	5.6	12.0	inches

MINOR STORM Allowable Capacity is not applicable to Sump Condition

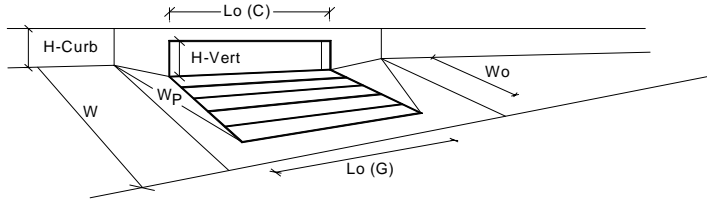
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
$Q_{allow} =$	SUMP	SUMP	cfs

Warning 02

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



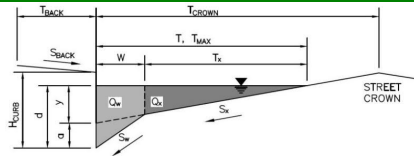
Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a <sub>local</sub> =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	3.2	4.9	inches
<u>Grate Information</u>			MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate		L <sub>o</sub> (G) =	N/A	N/A	feet
Width of a Unit Grate		W <sub>o</sub> =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>r</sub> (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =	N/A	N/A	
<u>Curb Opening Information</u>			MINOR	MAJOR	
Length of a Unit Curb Opening		L <sub>o</sub> (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>o</sub> =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>r</sub> (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>			MINOR	MAJOR	
Depth for Grate Midwidth		d <sub>Grate</sub> =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =	0.10	0.25	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =	0.96	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q <sub>a</sub> =	0.9	3.4	cfs
		Q <sub>PEAK REQUIRED</sub> =	0.8	3.4	cfs

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Overland Ranch Filing 1

Inlet ID: UB13

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} =$	15.0	ft
$S_{BACK} =$	0.020	ft/ft
$n_{BACK} =$	0.016	

$H_{CURB} =$	4.00	inches
$T_{CROWN} =$	17.0	ft
$W =$	2.00	ft
$S_x =$	0.020	ft/ft
$S_w =$	0.083	ft/ft
$S_o =$	0.000	ft/ft
$n_{STREET} =$	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	17.0	17.0	ft
$d_{MAX} =$	5.6	12.0	inches

MINOR STORM Allowable Capacity is not applicable to Sump Condition

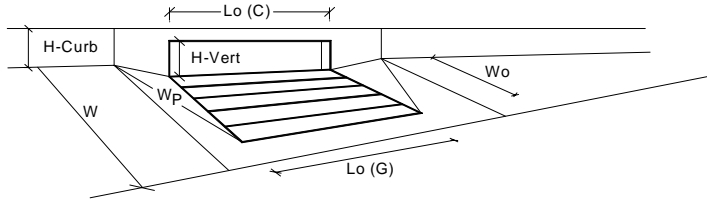
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
$Q_{allow} =$	SUMP	SUMP	cfs

Warning 02

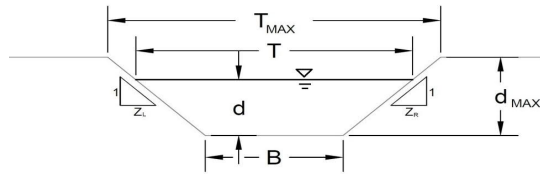
# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a <sub>local</sub> =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	3.8	8.6	inches
<u>Grate Information</u>			MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate		L <sub>o</sub> (G) =	N/A	N/A	feet
Width of a Unit Grate		W <sub>o</sub> =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>r</sub> (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =	N/A	N/A	
<u>Curb Opening Information</u>			MINOR	MAJOR	
Length of a Unit Curb Opening		L <sub>o</sub> (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>d</sub> =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>r</sub> (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>			MINOR	MAJOR	
Depth for Grate Midwidth		d <sub>Grate</sub> =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =	0.15	0.55	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		Q <sub>a</sub> =	1.7	10.7	cfs
		Q <sub>PEAK REQUIRED</sub> =	1.6	10.7	cfs

## AREA INLET IN A SWALE

Overland Ranch Filing 1  
UB3A

This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

**Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)**

NRCS Vegetal Retardance (A, B, C, D, or E)

Manning's n (Leave cell D16 blank to manually enter an n value)

Channel Invert Slope

Bottom Width

Left Side Slope

Right Side Slope

Check one of the following soil types:

Soil Type:	Max. Velocity ( $V_{MAX}$ )	Max Froude No. ( $F_{MAX}$ )
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

A, B, C, D, or E =

n =	0.030
$S_0$ =	0.0500 ft/ft
B =	0.00 ft
Z1 =	10.00 ft/ft
Z2 =	4.50 ft/ft

Choose One:

- ☐ Non-Cohesive  
☒ Cohesive  
☐ Paved

Maximum Allowable Top Width of Channel for Minor & Major Storm  
 Maximum Allowable Water Depth in Channel for Minor & Major Storm

	Minor Storm	Major Storm	
$T_{MAX}$ =	14.00	18.00	ft
$d_{MAX}$ =	1.00	1.20	ft

**Allowable Channel Capacity Based On Channel Geometry**

MINOR STORM Allowable Capacity is based on Top Width Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
$Q_{allow}$ =	45.9	81.9	cfs
$d_{allow}$ =	0.97	1.20	ft

**Water Depth in Channel Based On Design Peak Flow**

Design Peak Flow

Water Depth

$Q_o$ =	0.3	3.4	cfs
d =	0.15	0.36	ft

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

## AREA INLET IN A SWALE

Overland Ranch Filing 1  
UB3A

## Inlet Design Information (Input)

Type of Inlet

CDOT TYPE D (Parallel)

Inlet Type =

CDOT TYPE D (Parallel)

Angle of Inclined Grate (must be  $\leq 30$  degrees)

Width of Grate

Length of Grate

Open Area Ratio

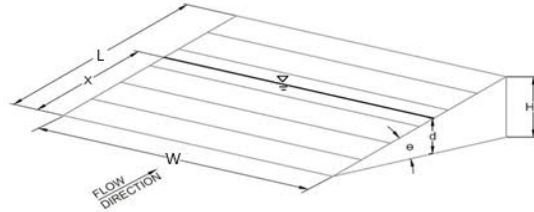
Height of Inclined Grate

Clogging Factor

Grate Discharge Coefficient

Orifice Coefficient

Weir Coefficient

 $\theta = 0.00$  degrees $W = 6.00$  ft $L = 3.00$  ft $A_{RATIO} = 0.70$  $H_B = 0.00$  ft $C_f = 0.38$  $C_d = 0.76$  $C_o = 0.50$  $C_w = 1.62$ 

Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)

Total Inlet Interception Capacity (assumes clogged condition)

Bypassed Flow

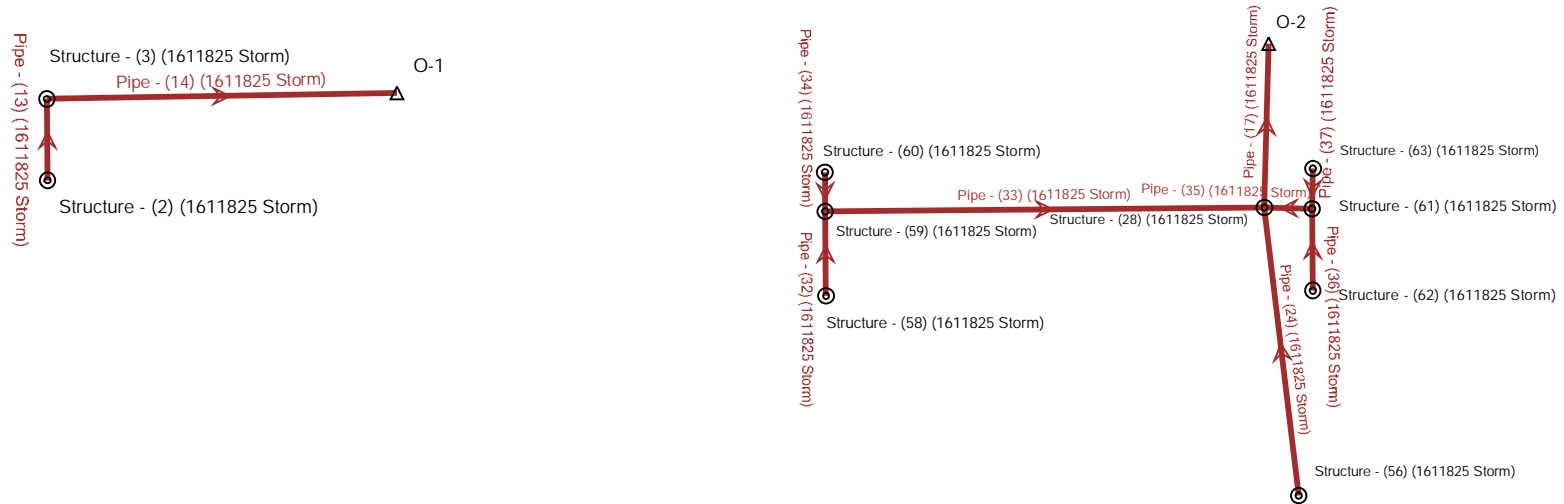
Capture Percentage =  $Q_a/Q_o$ 

MINOR

MAJOR

 $d = 0.15$  0.36 $Q_a = 1.4$  5.7 cfs $Q_b = 0.0$  0.0 cfs $C\% = 100$  100 %

## Scenario: 100-year

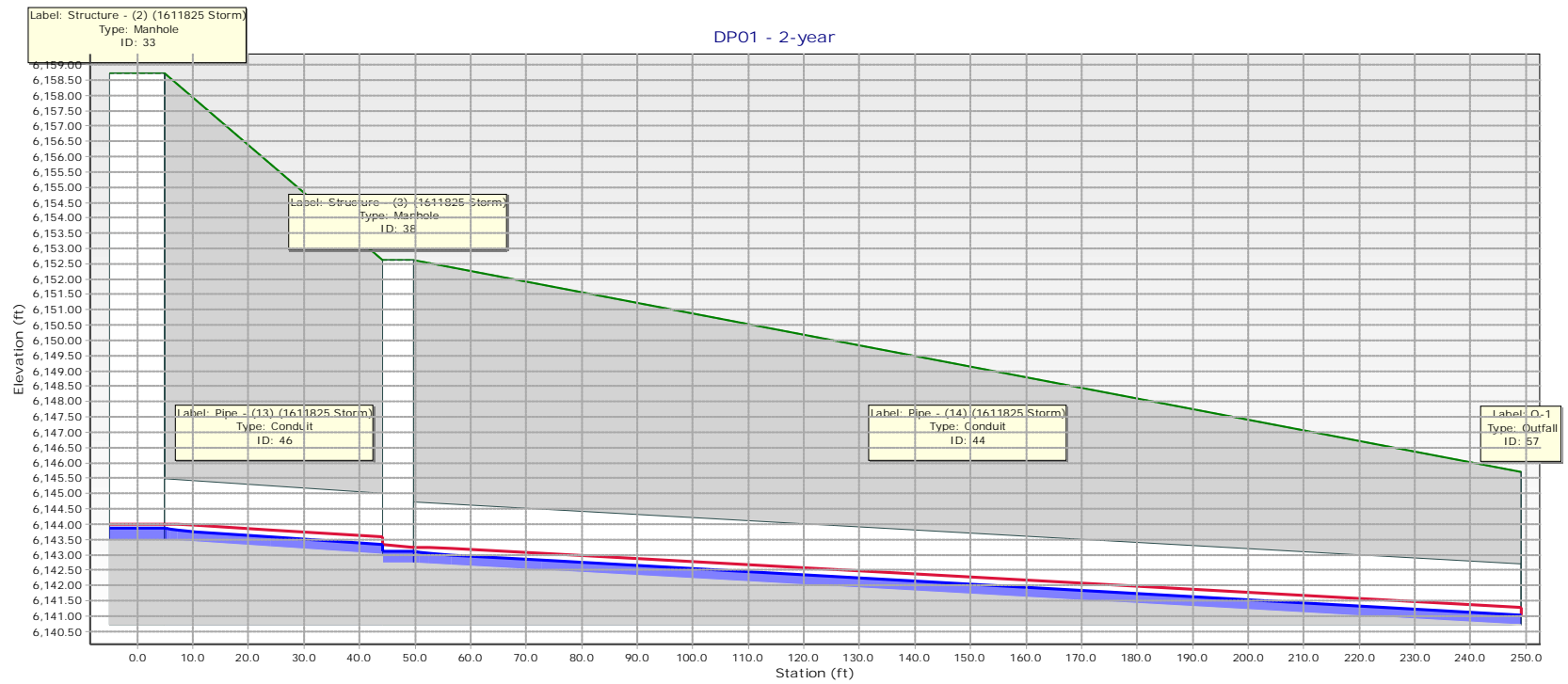


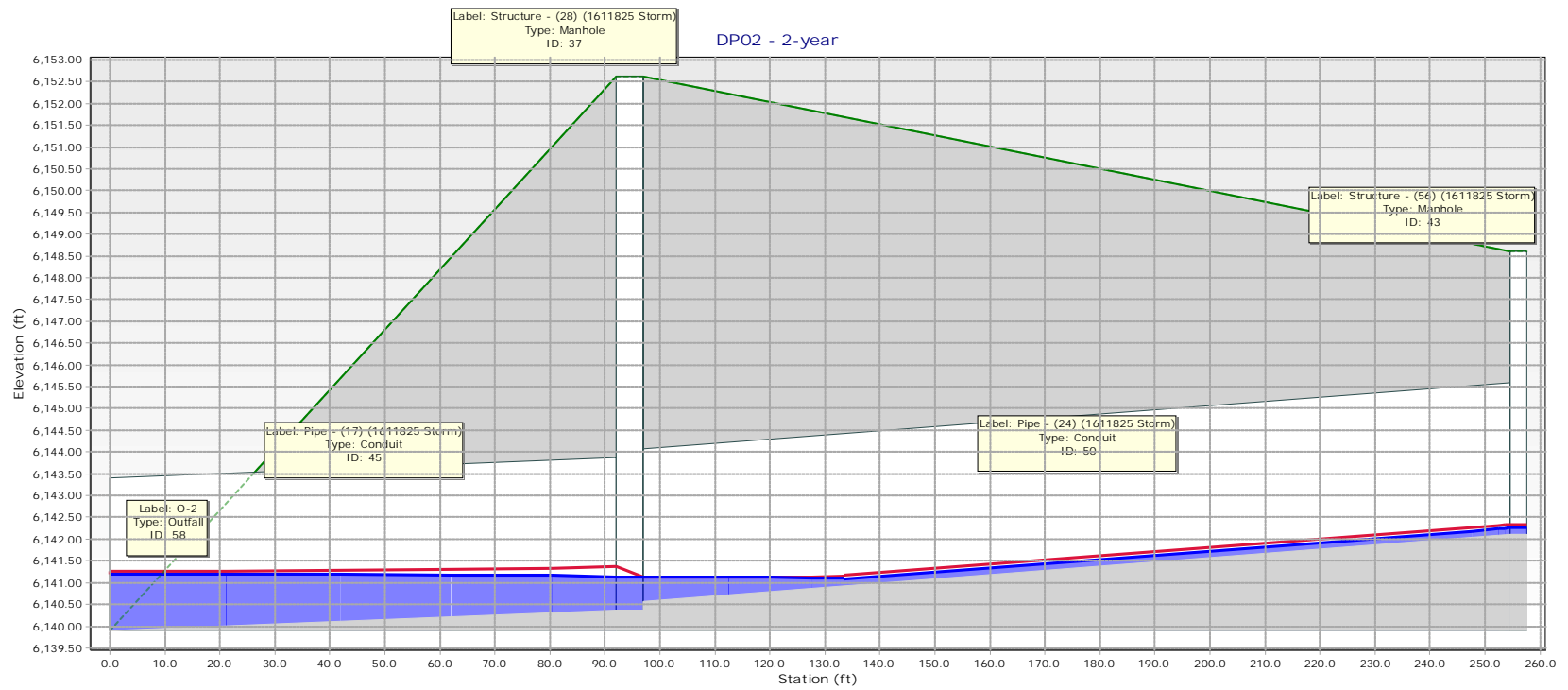
Scenario: 2-year  
Current Time Step: 0.000 h  
FlexTable: Conduit Table

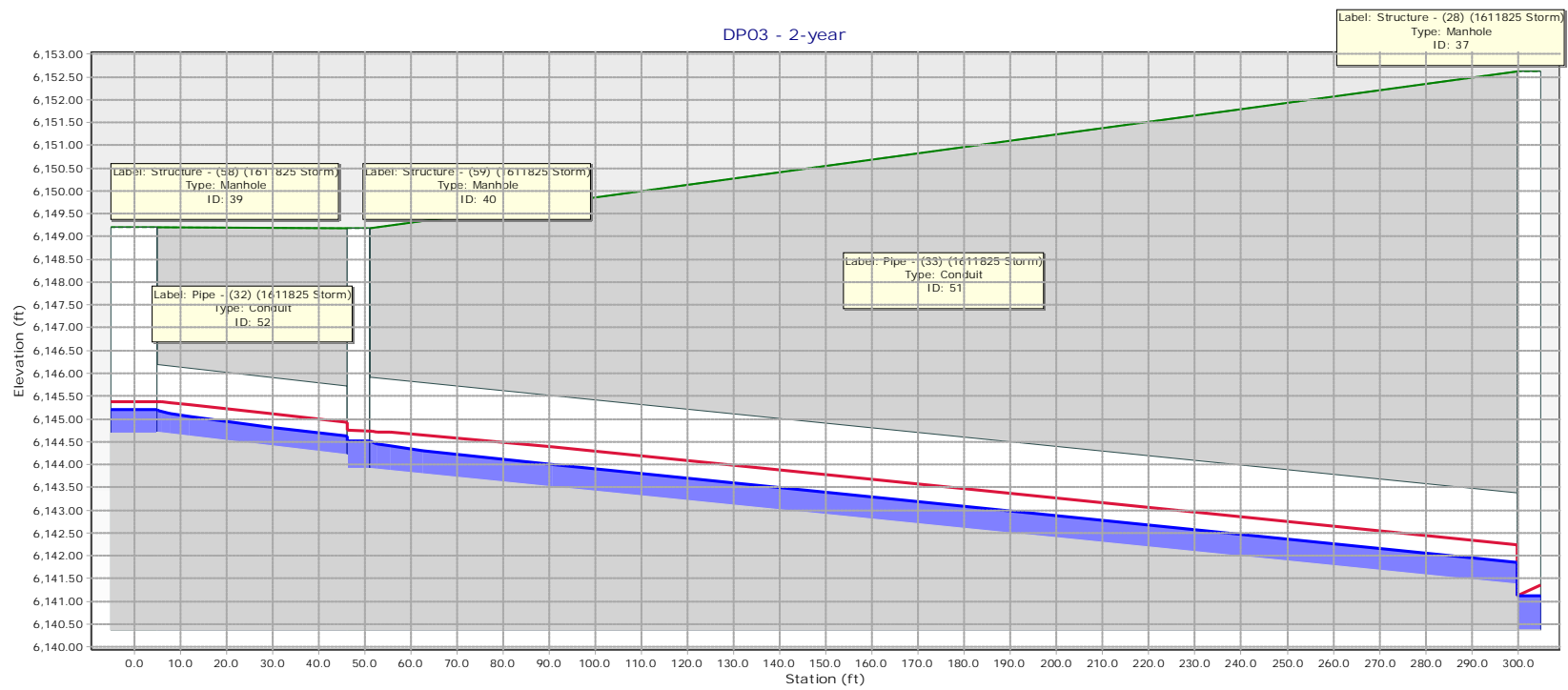
Upstream Structure	Label	Flow (cfs)	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Velocity (ft/s)	Manning's n
Structure - (2) (1611825 Storm)	Pipe - (13) (1611825 Storm)	1.24	24.0	47.0	6,143.49	6,143.02	0.010	6,158.72	6,152.61	6,143.88	6,143.34	6,144.01	6,143.57	3.86	0.013
Structure - (3) (1611825 Storm)	Pipe - (14) (1611825 Storm)	1.30	24.0	202.2	6,142.72	6,140.71	0.010	6,152.61	6,145.71	6,143.12	6,141.04	6,143.25	6,141.27	3.90	0.013
Structure - (28) (1611825 Storm)	Pipe - (17) (1611825 Storm)	6.05	42.0	94.5	6,139.90	6,140.37	-0.005	6,139.90	6,152.62	6,141.12	6,141.20	6,141.37	6,141.25	4.50	0.013
Structure - (56) (1611825 Storm)	Pipe - (24) (1611825 Storm)	0.34	42.0	161.6	6,140.57	6,142.10	-0.009	6,152.62	6,148.60	6,142.27	6,141.12	6,142.33	6,141.13	2.37	0.013
Structure - (58) (1611825 Storm)	Pipe - (32) (1611825 Storm)	1.72	18.0	48.6	6,144.70	6,144.22	0.010	6,149.20	6,149.18	6,145.20	6,144.63	6,145.38	6,144.93	4.38	0.013
Structure - (59) (1611825 Storm)	Pipe - (33) (1611825 Storm)	2.96	24.0	253.8	6,143.91	6,141.37	0.010	6,149.18	6,152.62	6,144.51	6,141.86	6,144.73	6,142.25	4.98	0.013
Structure - (60) (1611825 Storm)	Pipe - (34) (1611825 Storm)	1.24	18.0	22.7	6,144.44	6,144.21	0.010	6,149.09	6,149.18	6,144.86	6,144.56	6,145.00	6,144.81	3.99	0.013
Structure - (61) (1611825 Storm)	Pipe - (35) (1611825 Storm)	2.75	18.0	27.6	6,141.57	6,142.12	-0.020	6,152.62	6,153.36	6,142.75	6,142.02	6,142.99	6,142.61	6.41	0.013
Structure - (62) (1611825 Storm)	Pipe - (36) (1611825 Storm)	1.50	18.0	47.2	6,142.62	6,143.57	-0.020	6,153.36	6,153.35	6,144.03	6,142.94	6,144.20	6,143.40	5.40	0.013
Structure - (63) (1611825 Storm)	Pipe - (37) (1611825 Storm)	1.25	18.0	23.1	6,142.62	6,143.08	-0.020	6,153.36	6,153.03	6,143.50	6,142.92	6,143.65	6,143.31	5.10	0.013

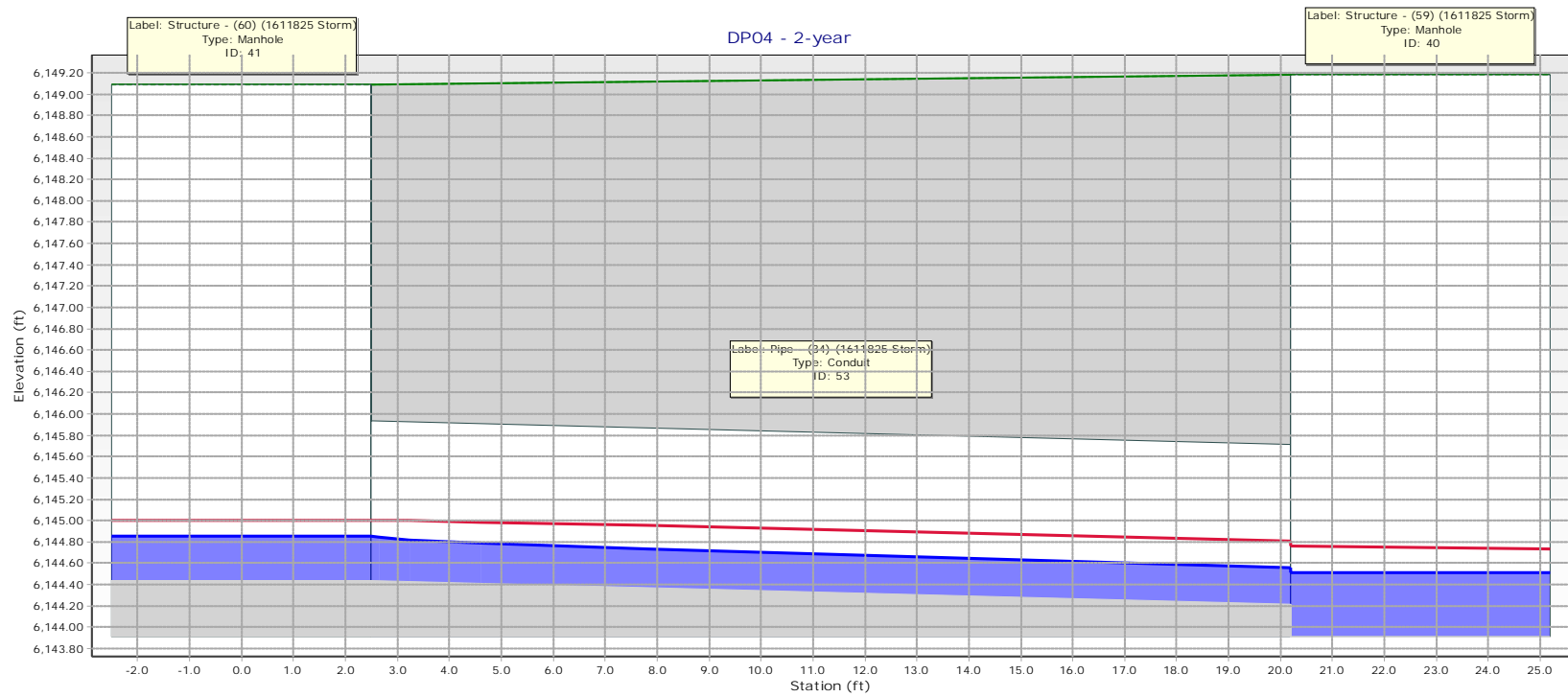
X:\1610000.all\1611825\StormCAD\1611825 StormCAD Model.stsw

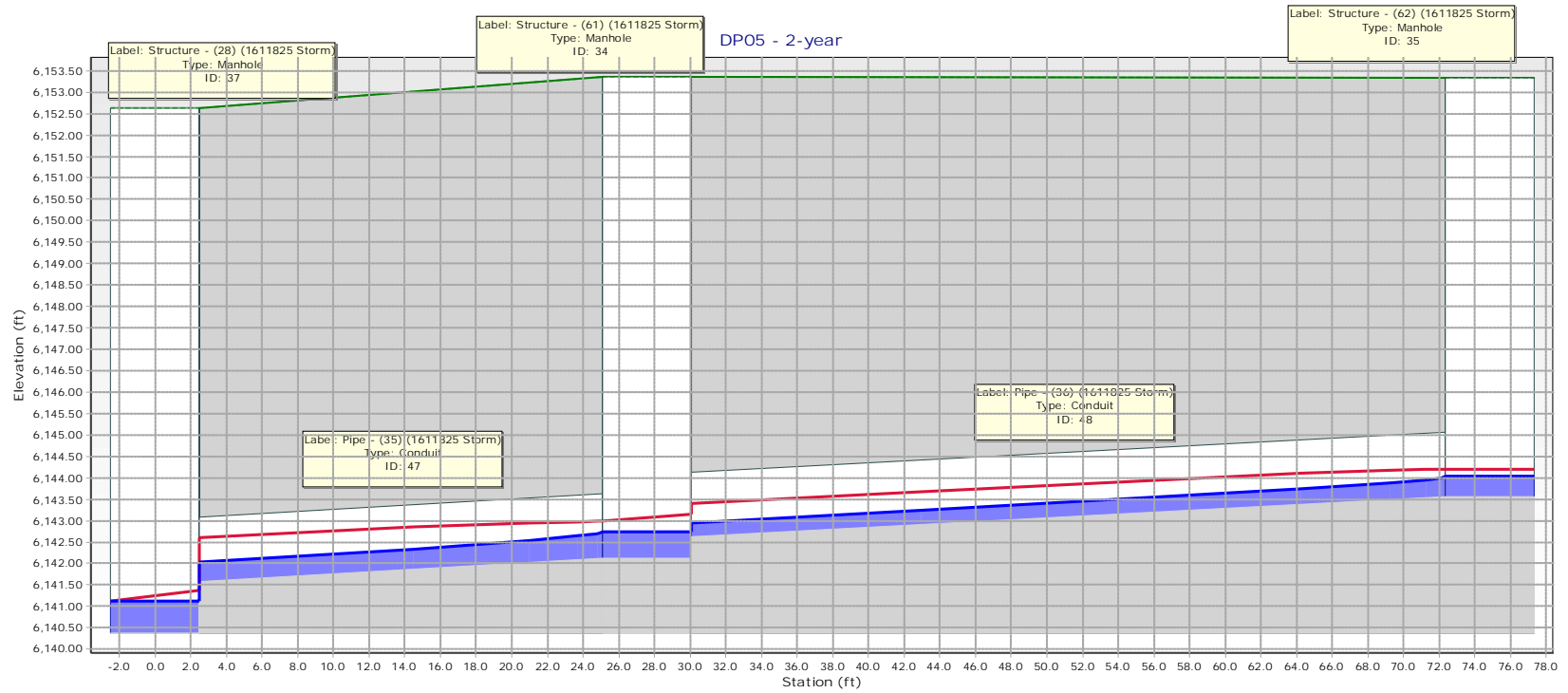


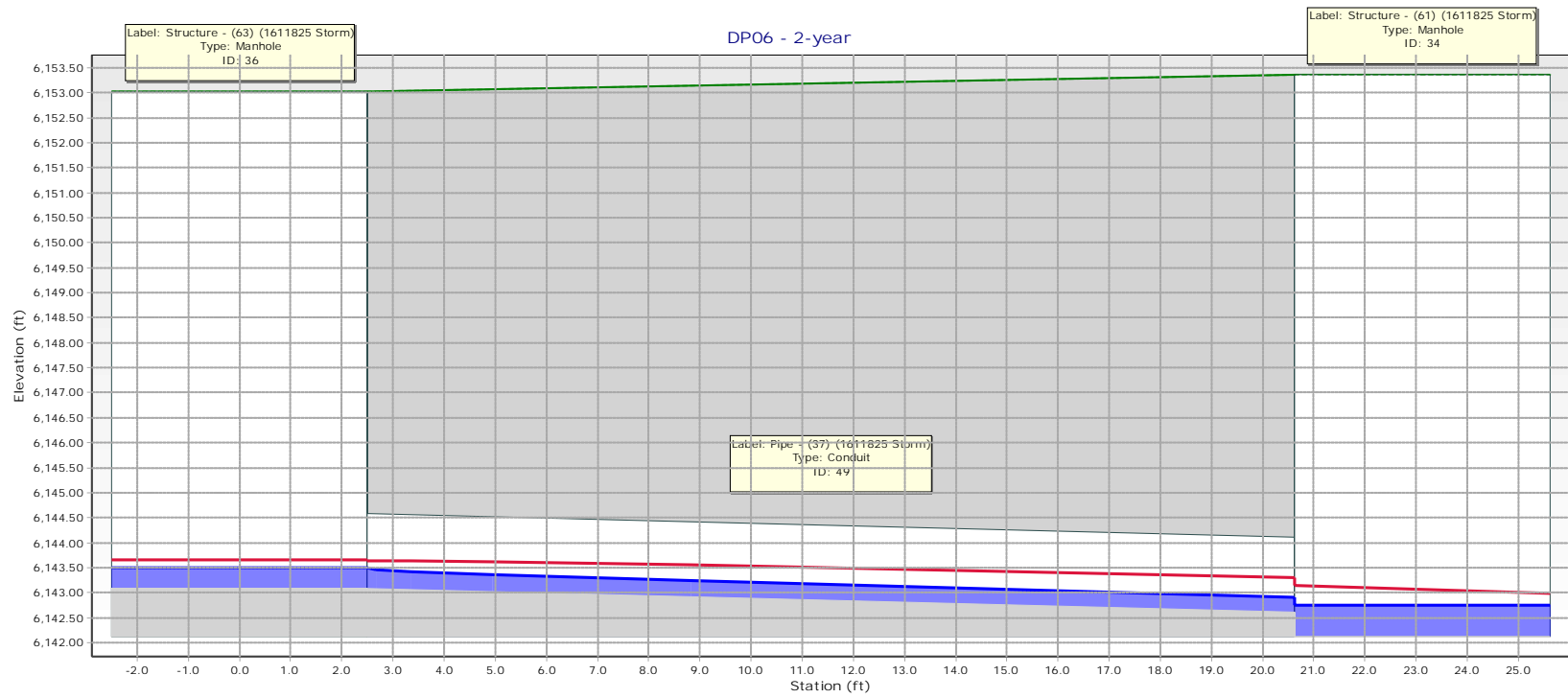








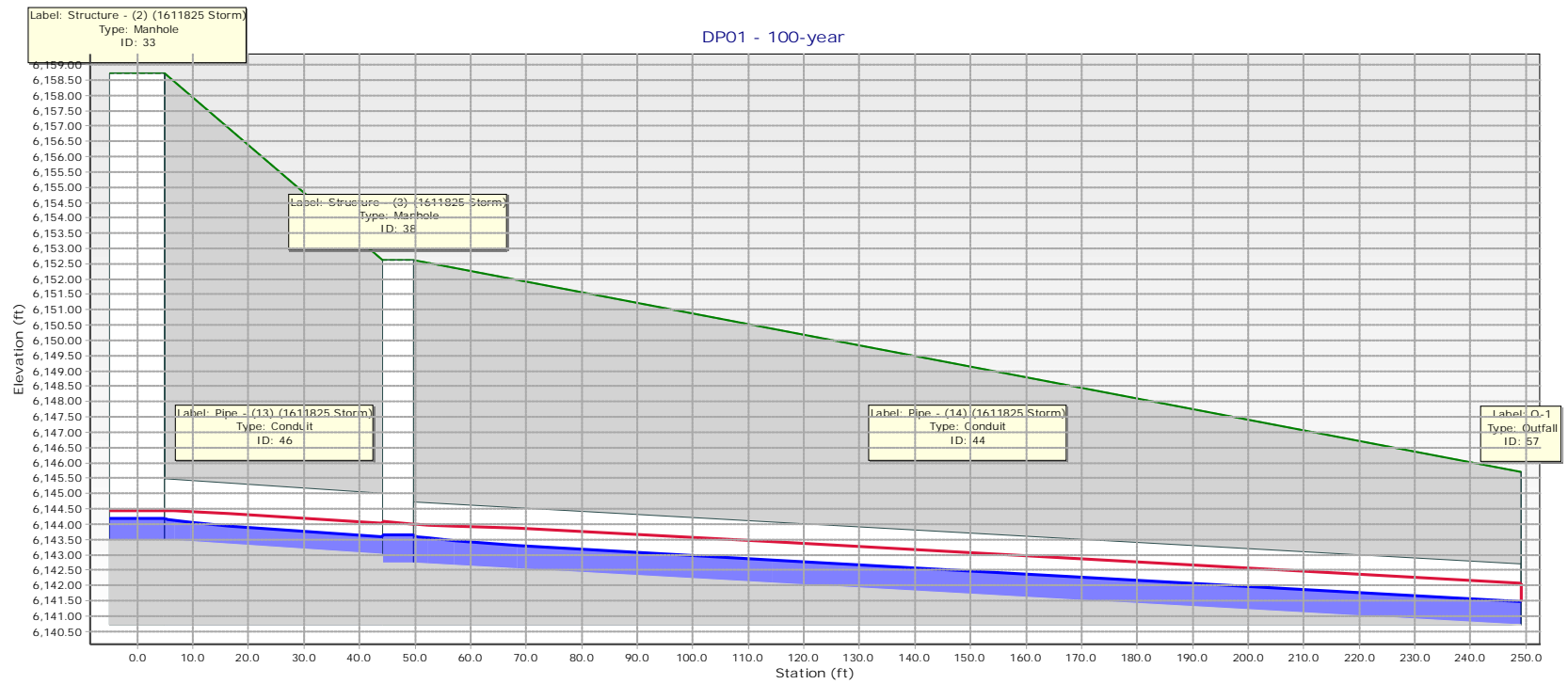




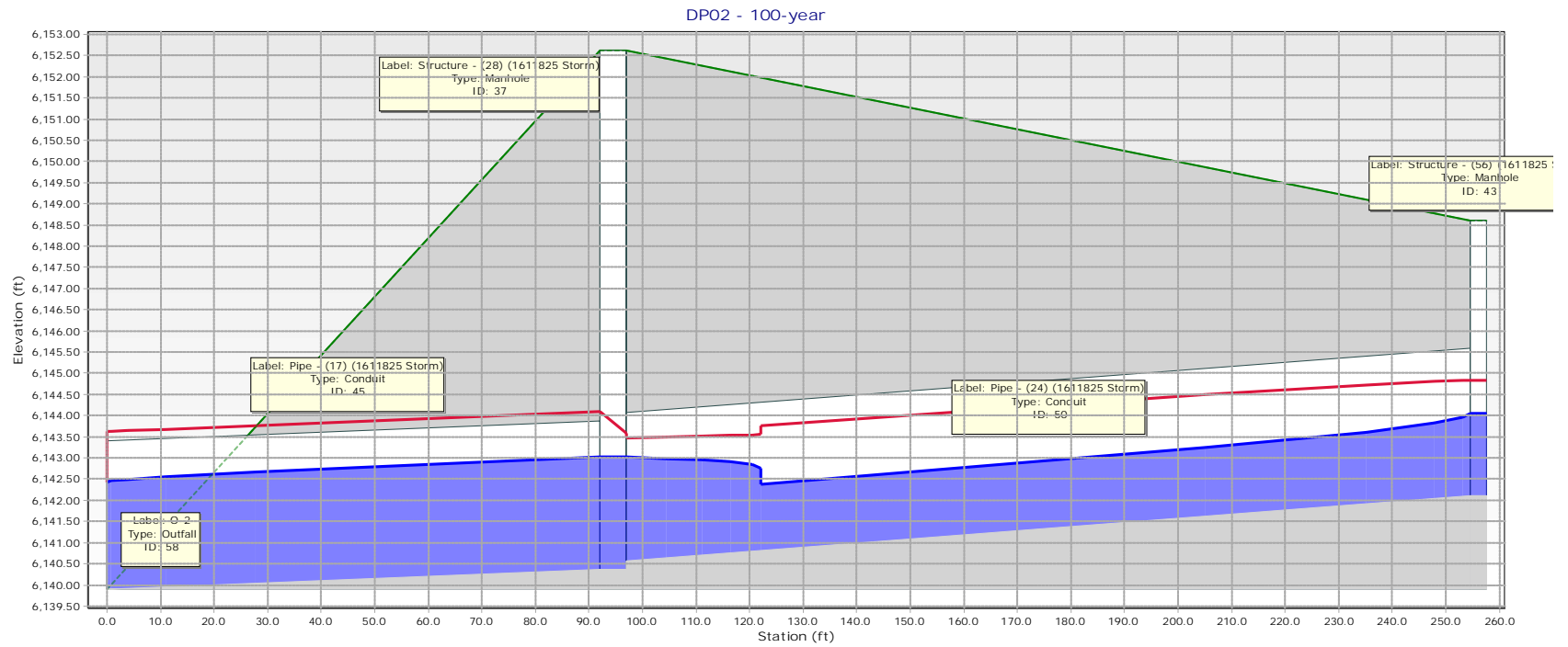
**Scenario: 100-year**  
**Current Time Step: 0.000 h**  
**FlexTable: Conduit Table**

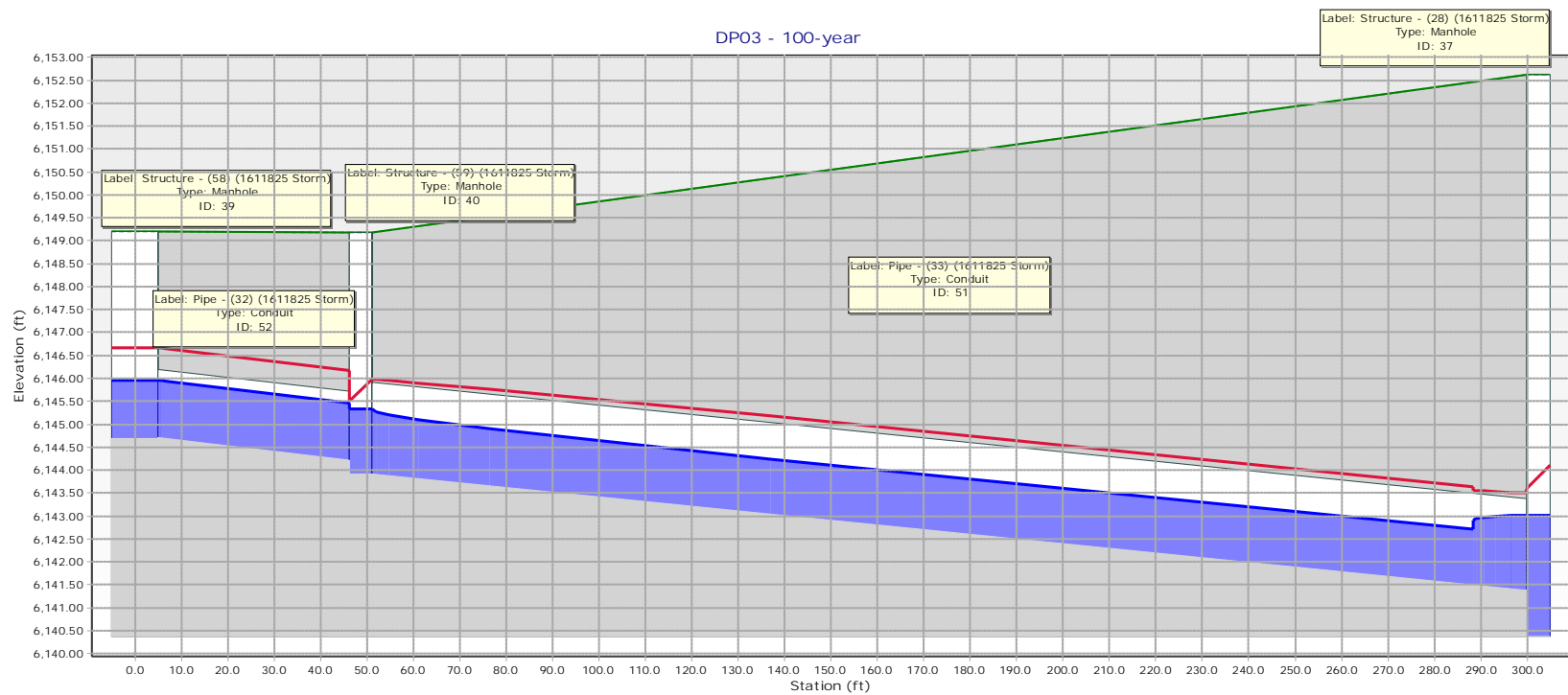
Upstream Structure	Label	Flow (cfs)	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Velocity (ft/s)	Manning's n
Structure - (2) (1611825 Storm)	Pipe - (13) (1611825 Storm)	3.95	24.0	47.0	6,143.49	6,143.02	0.010	6,158.72	6,152.61	6,144.19	6,143.59	6,144.44	6,144.04	5.41	0.013
Structure - (3) (1611825 Storm)	Pipe - (14) (1611825 Storm)	6.69	24.0	202.2	6,142.72	6,140.71	0.010	6,152.61	6,145.71	6,143.64	6,141.46	6,143.99	6,142.07	6.26	0.013
Structure - (28) (1611825 Storm)	Pipe - (17) (1611825 Storm)	65.21	42.0	94.5	6,139.90	6,140.37	-0.005	6,139.90	6,152.62	6,143.01	6,142.43	6,144.10	6,143.62	8.36	0.013
Structure - (56) (1611825 Storm)	Pipe - (24) (1611825 Storm)	39.22	42.0	161.6	6,140.57	6,142.10	-0.009	6,152.62	6,148.60	6,144.05	6,143.01	6,144.84	6,143.48	9.61	0.013
Structure - (58) (1611825 Storm)	Pipe - (32) (1611825 Storm)	10.66	18.0	48.6	6,144.70	6,144.22	0.010	6,149.20	6,149.18	6,148.96	6,148.46	6,149.53	6,149.03	6.03	0.013
Structure - (59) (1611825 Storm)	Pipe - (33) (1611825 Storm)	15.39	24.0	253.8	6,143.91	6,141.37	0.010	6,149.18	6,152.62	6,148.46	6,143.01	6,149.64	6,144.19	8.71	0.013
Structure - (60) (1611825 Storm)	Pipe - (34) (1611825 Storm)	4.73	18.0	22.7	6,144.44	6,144.21	0.010	6,149.09	6,149.18	6,148.51	6,148.46	6,148.62	6,148.57	2.68	0.013
Structure - (61) (1611825 Storm)	Pipe - (35) (1611825 Storm)	10.60	18.0	27.6	6,141.57	6,142.12	-0.020	6,152.62	6,153.36	6,143.37	6,143.01	6,144.08	6,143.59	9.11	0.013
Structure - (62) (1611825 Storm)	Pipe - (36) (1611825 Storm)	6.61	18.0	47.2	6,142.62	6,143.57	-0.020	6,153.36	6,153.35	6,144.56	6,143.34	6,145.00	6,144.31	8.18	0.013
Structure - (63) (1611825 Storm)	Pipe - (37) (1611825 Storm)	3.99	18.0	23.1	6,142.62	6,143.08	-0.020	6,153.36	6,153.03	6,143.84	6,143.18	6,144.15	6,143.86	7.11	0.013

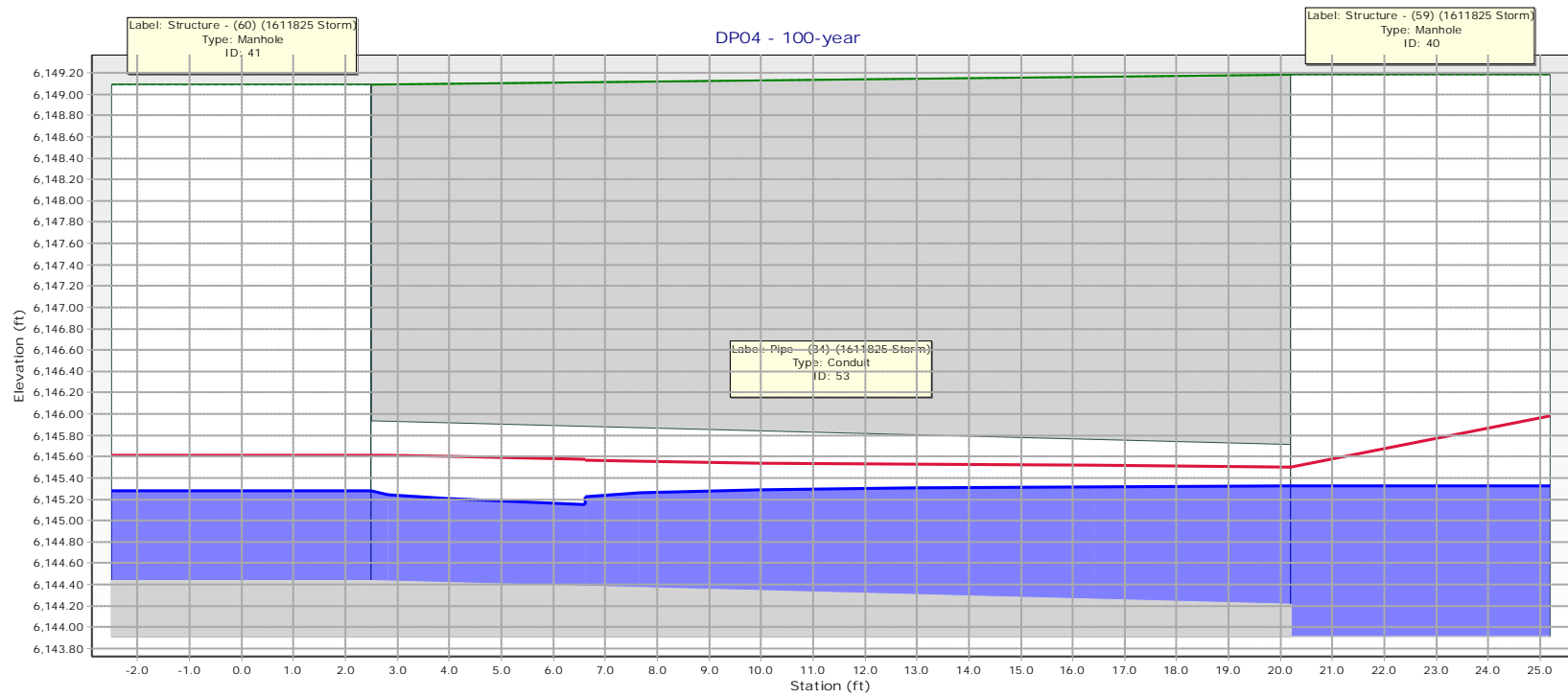
X:\1610000.all\1611825\StormCAD\1611825 StormCAD Model.stsw

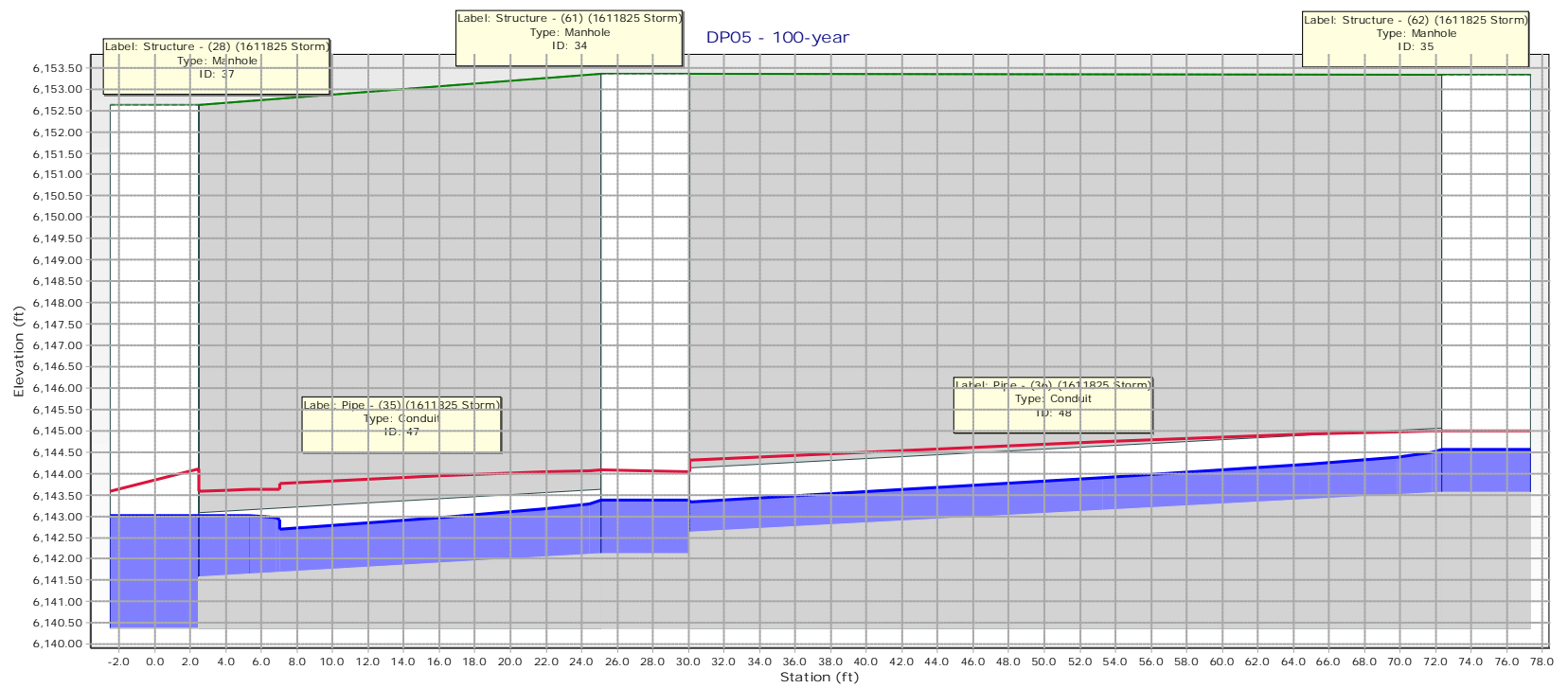


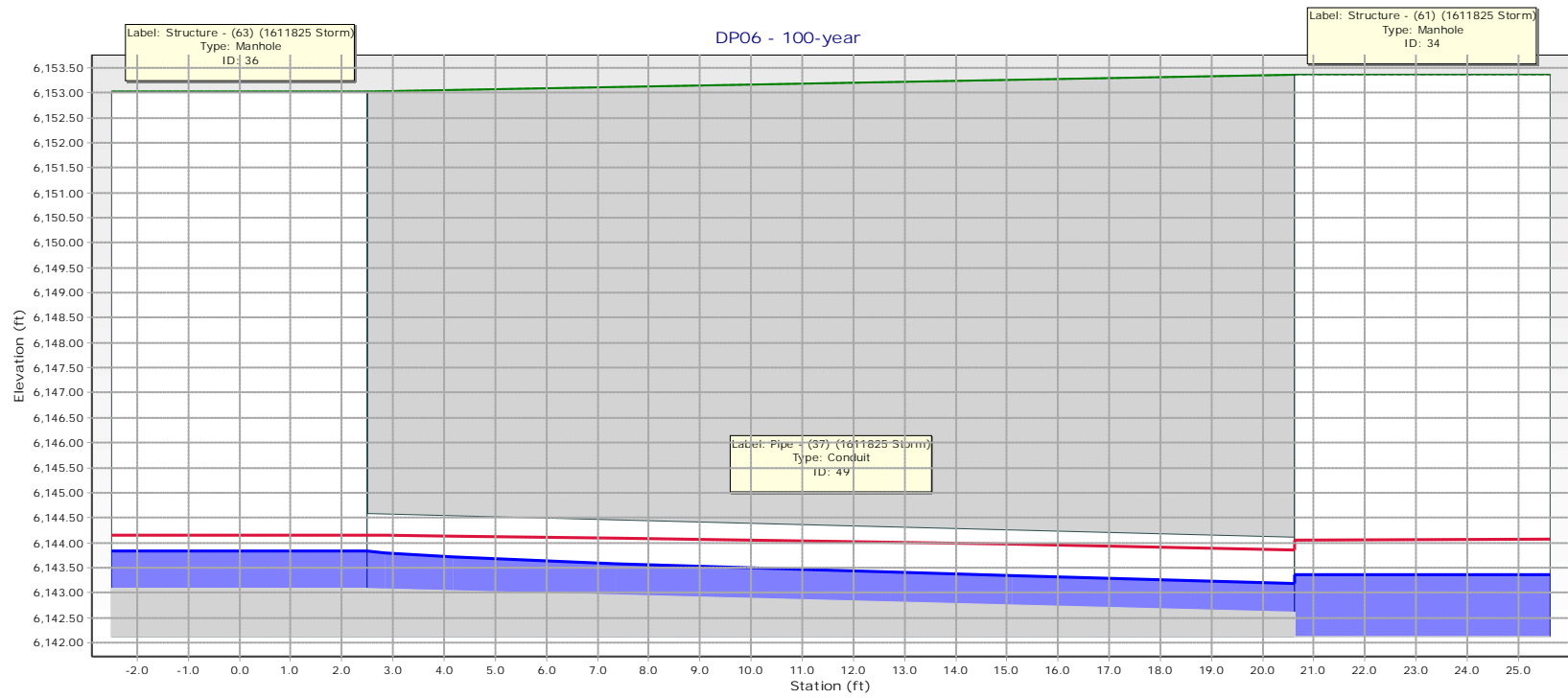












## Worksheet for DP C4 & C5 SUMP

Project Description	
Solve For	Headwater Elevation
Input Data	
Discharge	12.53 cfs
Crest Elevation	6,149.15 ft
Weir Coefficient	3.00 ft <sup>1/2</sup> /s
Crest Length	20.0 ft
Results	
Headwater Elevation	6,149.50 ft
Headwater Height Above Crest	0.35 ft
Flow Area	7.0 ft <sup>2</sup>
Velocity	1.78 ft/s
Wetted Perimeter	20.7 ft
Top Width	20.00 ft

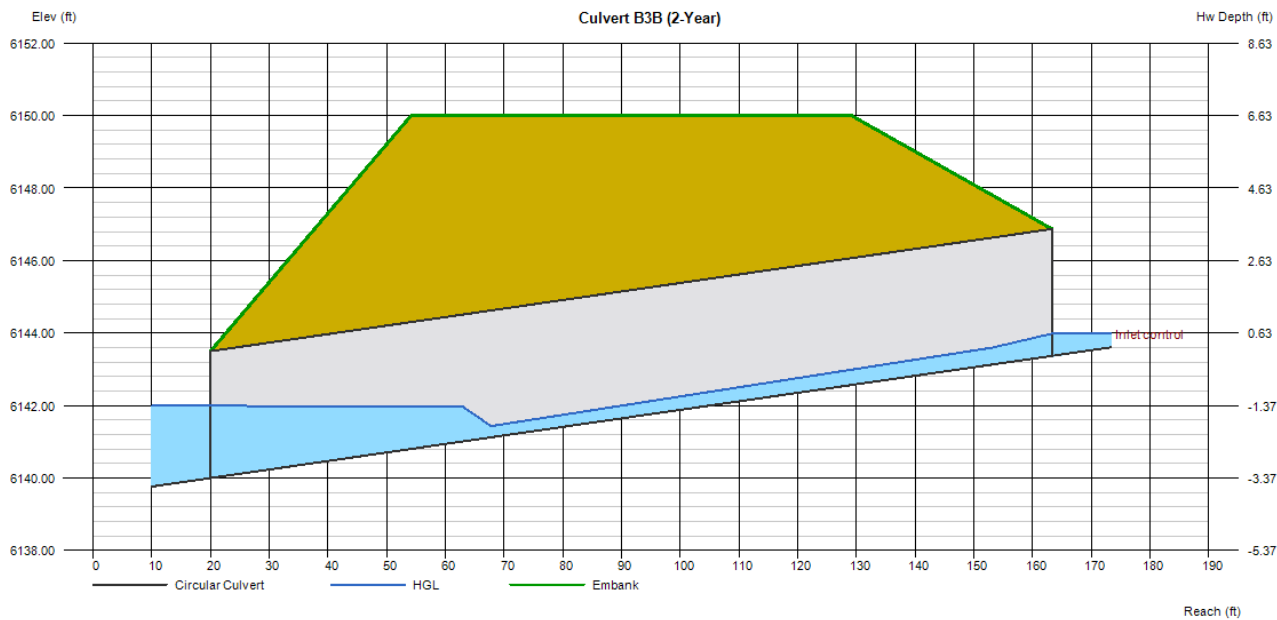
# Culvert Report

## Culvert B3B (2-Year)

Invert Elev Dn (ft)	= 6140.00
Pipe Length (ft)	= 143.31
Slope (%)	= 2.35
Invert Elev Up (ft)	= 6143.37
Rise (in)	= 42.0
Shape	= Circular
Span (in)	= 42.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

<b>Embankment</b>	
Top Elevation (ft)	= 6150.00
Top Width (ft)	= 75.00
Crest Width (ft)	= 27.00

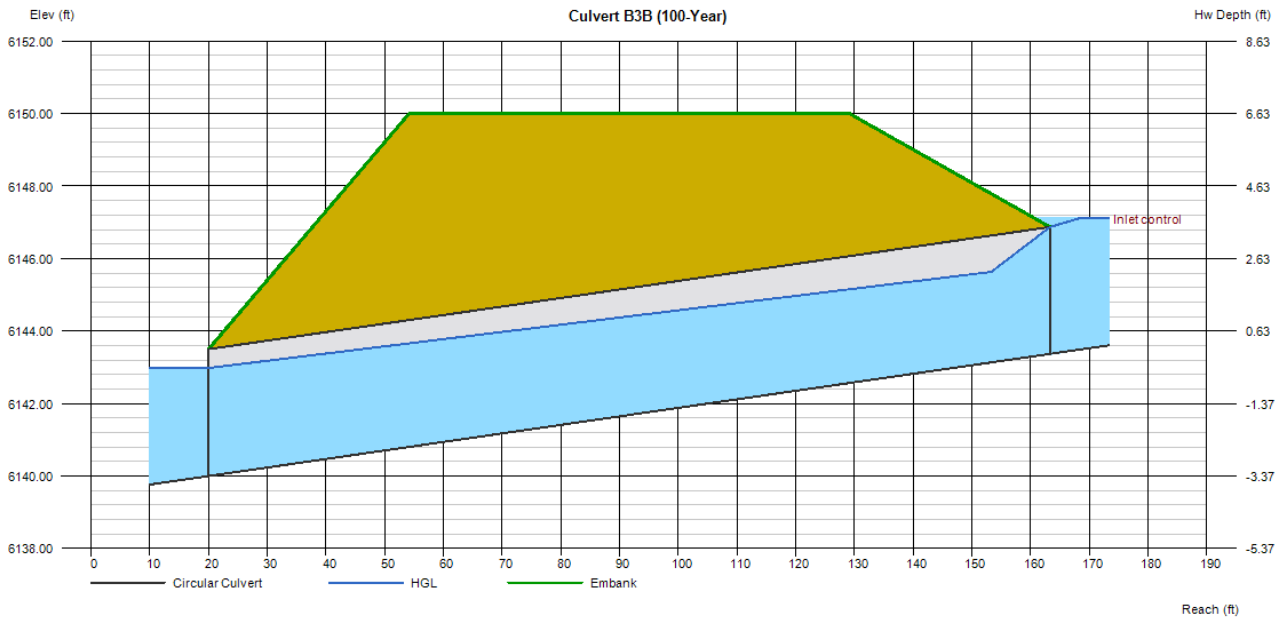
<b>Calculations</b>	
Qmin (cfs)	= 2.66
Qmax (cfs)	= 61.80
Tailwater Elev (ft)	= (dc+D)/2
<b>Highlighted</b>	
Qtotal (cfs)	= 2.66
Qpipe (cfs)	= 2.66
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 0.47
Veloc Up (ft/s)	= 3.28
HGL Dn (ft)	= 6141.99
HGL Up (ft)	= 6143.86
Hw Elev (ft)	= 6143.98
Hw/D (ft)	= 0.18
Flow Regime	= Inlet Control



# Culvert Report

## Culvert B3B (100-Year)

Invert Elev Dn (ft)	= 6140.00	<b>Calculations</b>	
Pipe Length (ft)	= 143.31	Qmin (cfs)	= 2.66
Slope (%)	= 2.35	Qmax (cfs)	= 61.80
Invert Elev Up (ft)	= 6143.37	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 42.0		
Shape	= Circular	<b>Highlighted</b>	
Span (in)	= 42.0	Qtotal (cfs)	= 61.80
No. Barrels	= 1	Qpipe (cfs)	= 61.80
n-Value	= 0.012	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 7.08
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 8.55
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 6142.98
		HGL Up (ft)	= 6145.83
		Hw Elev (ft)	= 6147.11
		Hw/D (ft)	= 1.07
		Flow Regime	= Inlet Control
<b>Embankment</b>			
Top Elevation (ft)	= 6150.00		
Top Width (ft)	= 75.00		
Crest Width (ft)	= 27.00		





# Culvert Report

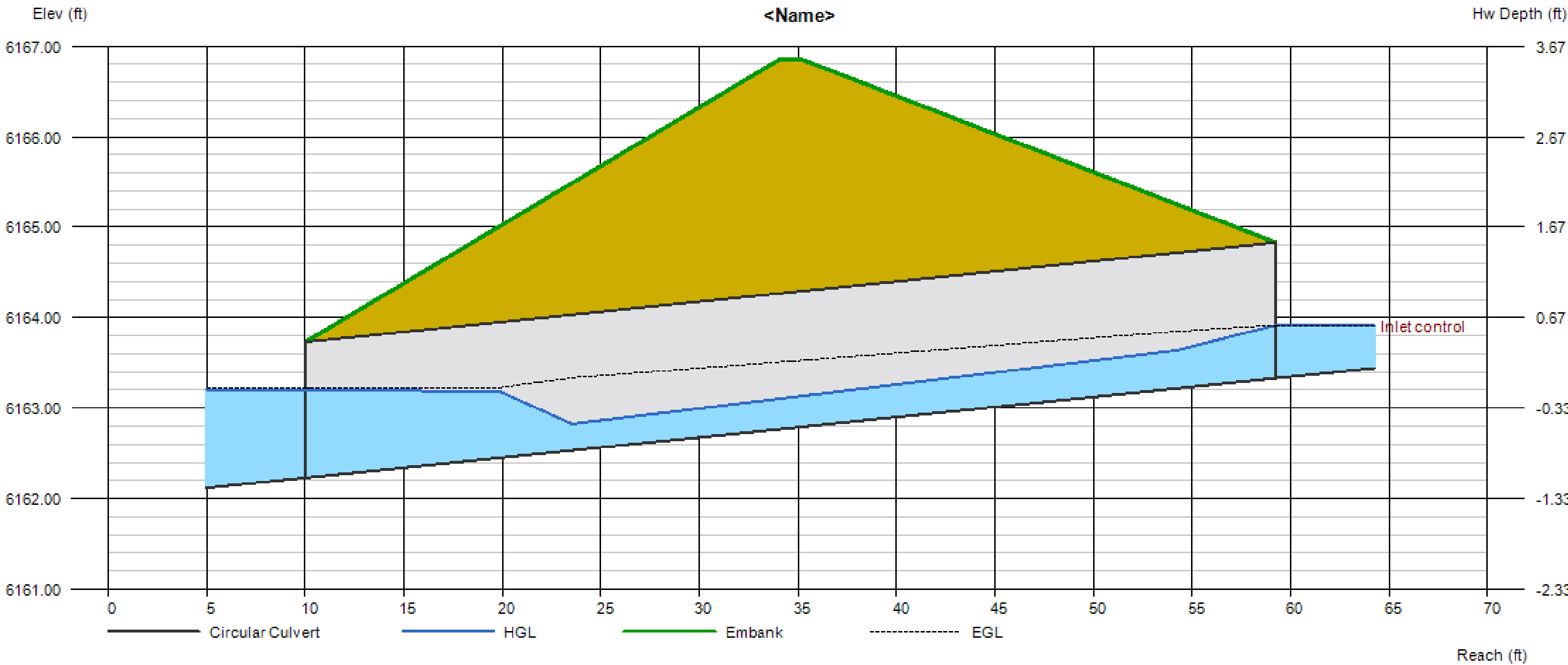
## Culvert B3C (2-year)

Invert Elev Dn (ft)	= 6162.23
Pipe Length (ft)	= 49.25
Slope (%)	= 2.23
Invert Elev Up (ft)	= 6163.33
Rise (in)	= 18.0
Shape	= Circular
Span (in)	= 18.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

<b>Embankment</b>	
Top Elevation (ft)	= 6166.86
Top Width (ft)	= 1.00
Crest Width (ft)	= 1.00

<b>Calculations</b>	
Qmin (cfs)	= 1.39
Qmax (cfs)	= 1.39
Tailwater Elev (ft)	= (dc+D)/2

<b>Highlighted</b>	
Qtotal (cfs)	= 1.39
Qpipe (cfs)	= 1.39
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 1.15
Veloc Up (ft/s)	= 3.20
HGL Dn (ft)	= 6163.20
HGL Up (ft)	= 6163.77
Hw Elev (ft)	= 6163.92
Hw/D (ft)	= 0.39
Flow Regime	= Inlet Control



# Culvert Report

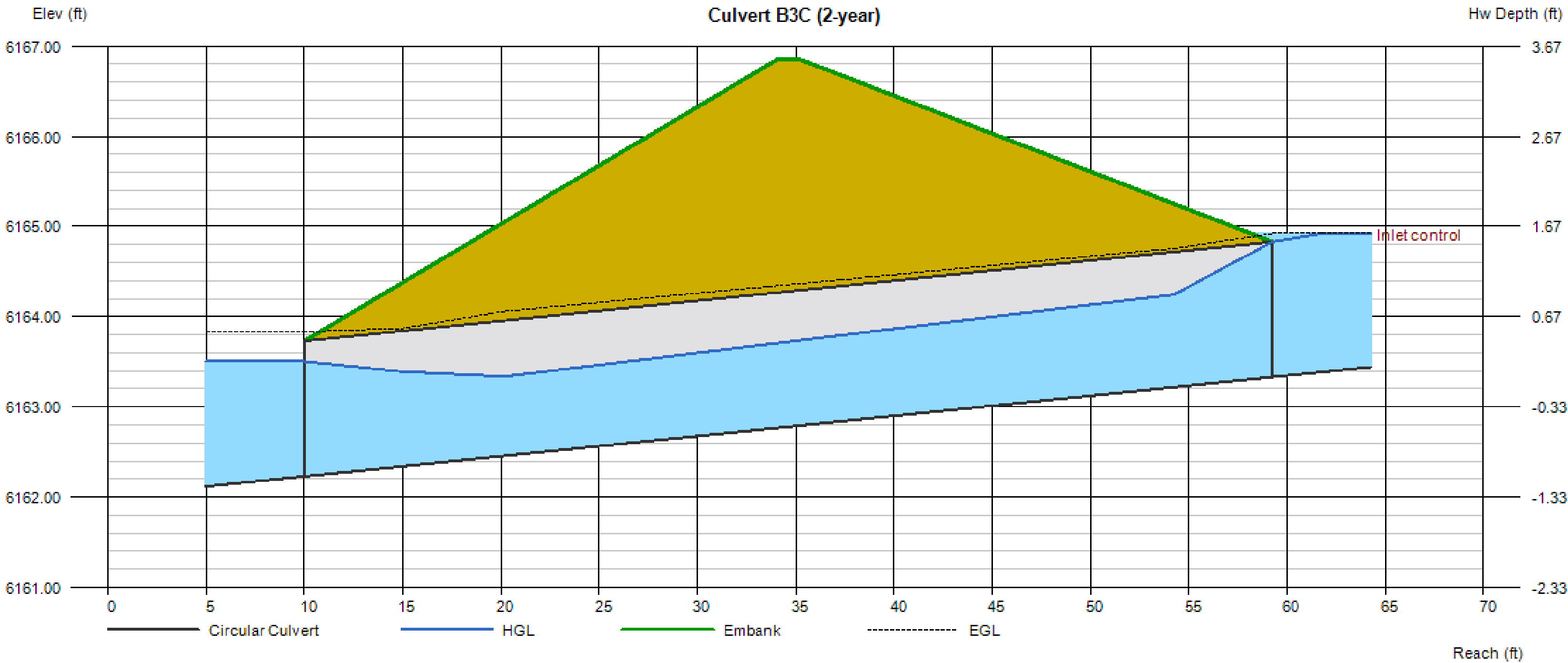
## Culvert B3C (2-year)

Invert Elev Dn (ft)	= 6162.23
Pipe Length (ft)	= 49.25
Slope (%)	= 2.23
Invert Elev Up (ft)	= 6163.33
Rise (in)	= 18.0
Shape	= Circular
Span (in)	= 18.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

<b>Embankment</b>	
Top Elevation (ft)	= 6166.86
Top Width (ft)	= 1.00
Crest Width (ft)	= 1.00

<b>Calculations</b>	
Qmin (cfs)	= 7.34
Qmax (cfs)	= 7.34
Tailwater Elev (ft)	= (dc+D)/2

<b>Highlighted</b>	
Qtotal (cfs)	= 7.34
Qpipe (cfs)	= 7.34
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 4.59
Veloc Up (ft/s)	= 5.56
HGL Dn (ft)	= 6163.50
HGL Up (ft)	= 6164.38
Hw Elev (ft)	= 6164.92
Hw/D (ft)	= 1.06
Flow Regime	= Inlet Control



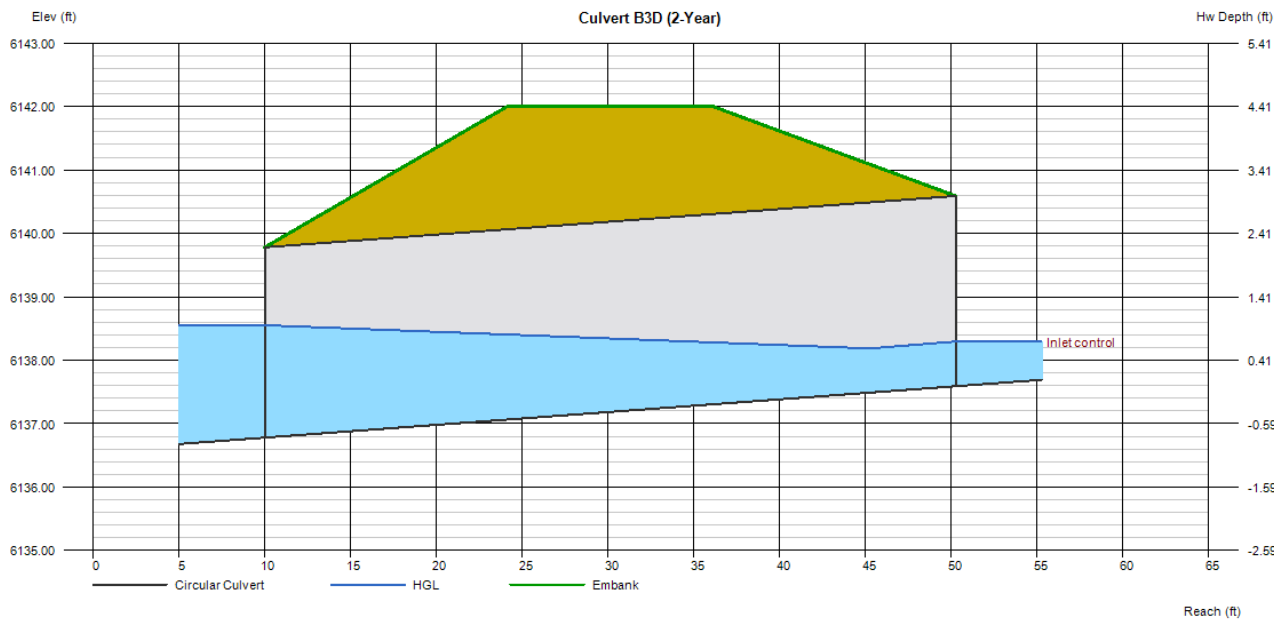
# Culvert Report

## Culvert B3D (2-Year)

Invert Elev Dn (ft)	= 6136.78
Pipe Length (ft)	= 40.25
Slope (%)	= 2.01
Invert Elev Up (ft)	= 6137.59
Rise (in)	= 36.0
Shape	= Circular
Span (in)	= 36.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

<b>Embankment</b>	
Top Elevation (ft)	= 6142.00
Top Width (ft)	= 12.00
Crest Width (ft)	= 12.00

<b>Calculations</b>	
Qmin (cfs)	= 3.06
Qmax (cfs)	= 49.30
Tailwater Elev (ft)	= (dc+D)/2
<b>Highlighted</b>	
Qtotal (cfs)	= 3.06
Qpipe (cfs)	= 3.06
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 0.70
Veloc Up (ft/s)	= 3.50
HGL Dn (ft)	= 6138.55
HGL Up (ft)	= 6138.13
Hw Elev (ft)	= 6138.30
Hw/D (ft)	= 0.24
Flow Regime	= Inlet Control



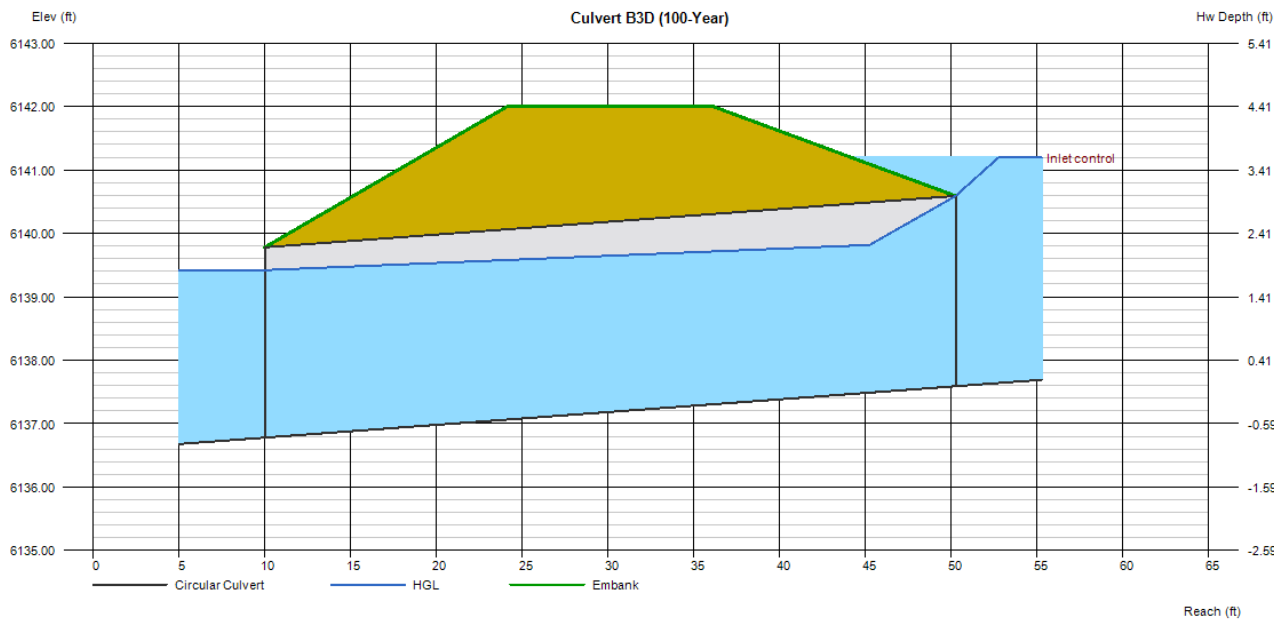
# Culvert Report

## Culvert B3D (100-Year)

Invert Elev Dn (ft)	= 6136.78
Pipe Length (ft)	= 40.25
Slope (%)	= 2.01
Invert Elev Up (ft)	= 6137.59
Rise (in)	= 36.0
Shape	= Circular
Span (in)	= 36.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

<b>Embankment</b>	
Top Elevation (ft)	= 6142.00
Top Width (ft)	= 12.00
Crest Width (ft)	= 12.00

<b>Calculations</b>	
Qmin (cfs)	= 3.06
Qmax (cfs)	= 49.30
Tailwater Elev (ft)	= (dc+D)/2
<b>Highlighted</b>	
Qtotal (cfs)	= 49.29
Qpipe (cfs)	= 49.29
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 7.48
Veloc Up (ft/s)	= 8.54
HGL Dn (ft)	= 6139.42
HGL Up (ft)	= 6139.87
Hw Elev (ft)	= 6141.20
Hw/D (ft)	= 1.20
Flow Regime	= Inlet Control

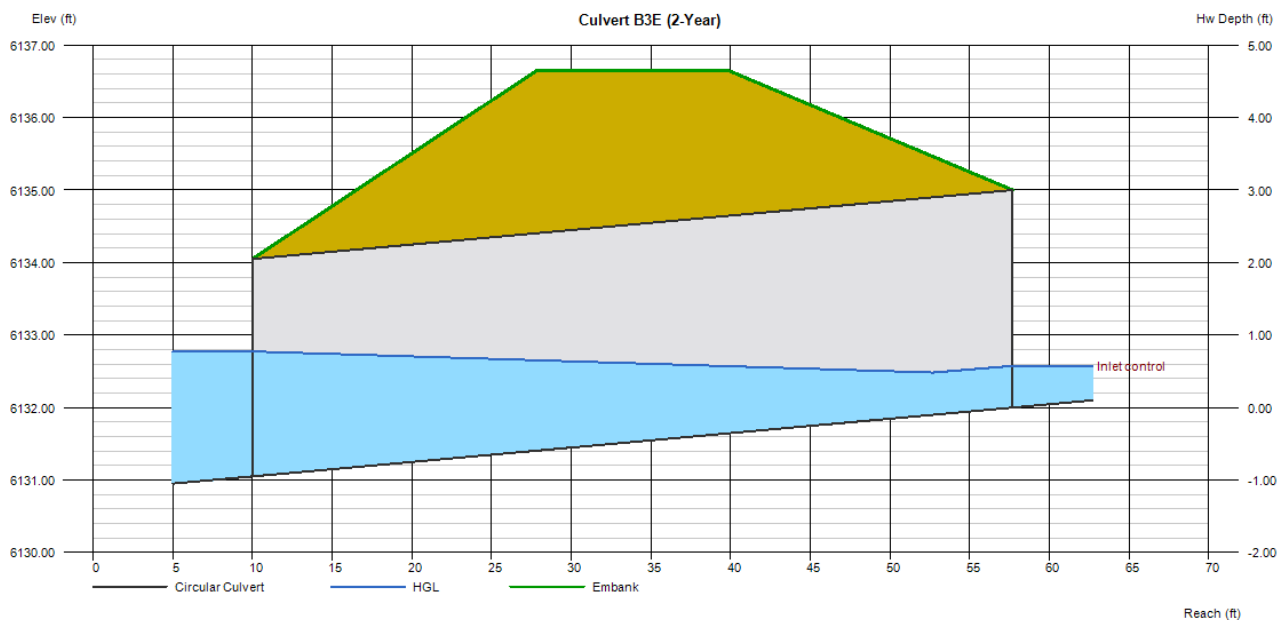


### Culvert B3E (2-Year)

<b>Highlighted</b>	
Qtotal (cfs)	= 2.09
Qpipe (cfs)	= 2.09
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 0.50
Veloc Up (ft/s)	= 3.16
HGL Dn (ft)	= 6132.77
HGL Up (ft)	= 6132.45
Hw Elev (ft)	= 6132.57
Hw/D (ft)	= 0.19
Flow Regime	= Inlet Control

## Embankment

Top Elevation (ft) = 6136.65  
Top Width (ft) = 12.00  
Crest Width (ft) = 12.00



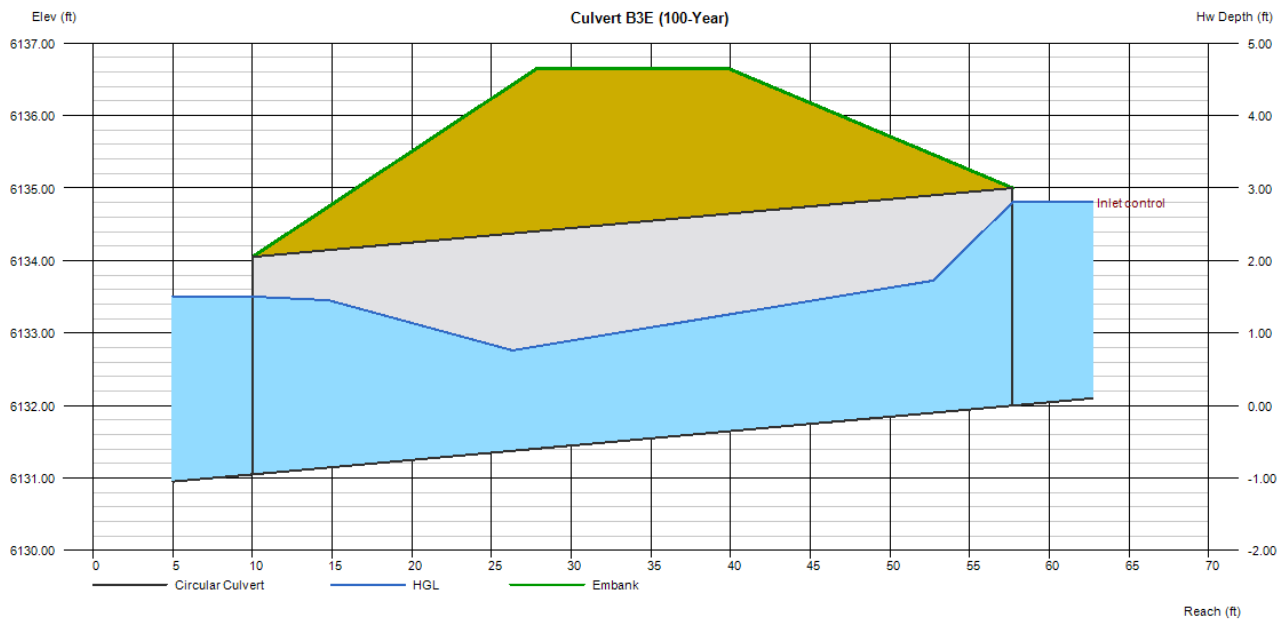
# Culvert Report

## Culvert B3E (100-Year)

Invert Elev Dn (ft)	= 6131.05
Pipe Length (ft)	= 47.70
Slope (%)	= 1.99
Invert Elev Up (ft)	= 6132.00
Rise (in)	= 36.0
Shape	= Circular
Span (in)	= 36.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

<b>Embankment</b>	
Top Elevation (ft)	= 6136.65
Top Width (ft)	= 12.00
Crest Width (ft)	= 12.00

<b>Calculations</b>	
Qmin (cfs)	= 2.09
Qmax (cfs)	= 34.46
Tailwater Elev (ft)	= (dc+D)/2
<b>Highlighted</b>	
Qtotal (cfs)	= 34.46
Qpipe (cfs)	= 34.46
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 5.57
Veloc Up (ft/s)	= 7.28
HGL Dn (ft)	= 6133.50
HGL Up (ft)	= 6133.91
Hw Elev (ft)	= 6134.81
Hw/D (ft)	= 0.94
Flow Regime	= Inlet Control



# Channel Report

## Swale B3A (2-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 3.30

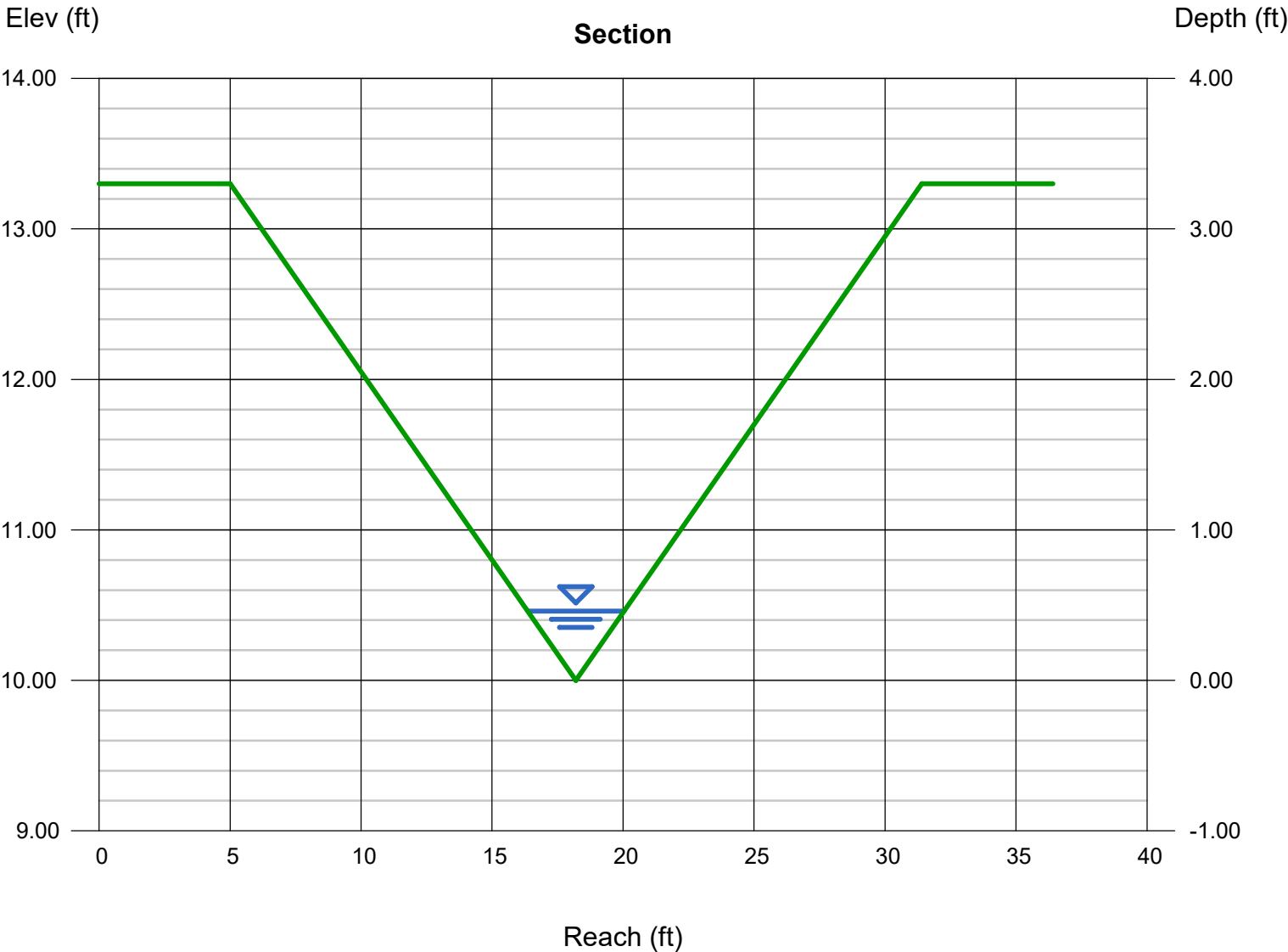
Invert Elev (ft) = 10.00  
Slope (%) = 2.43  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 2.29

### Highlighted

Depth (ft) = 0.46  
Q (cfs) = 2.290  
Area (sqft) = 0.85  
Velocity (ft/s) = 2.71  
Wetted Perim (ft) = 3.79  
Crit Depth, Yc (ft) = 0.46  
Top Width (ft) = 3.68  
EGL (ft) = 0.57



# Channel Report

## Swale B3A (100-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 3.30

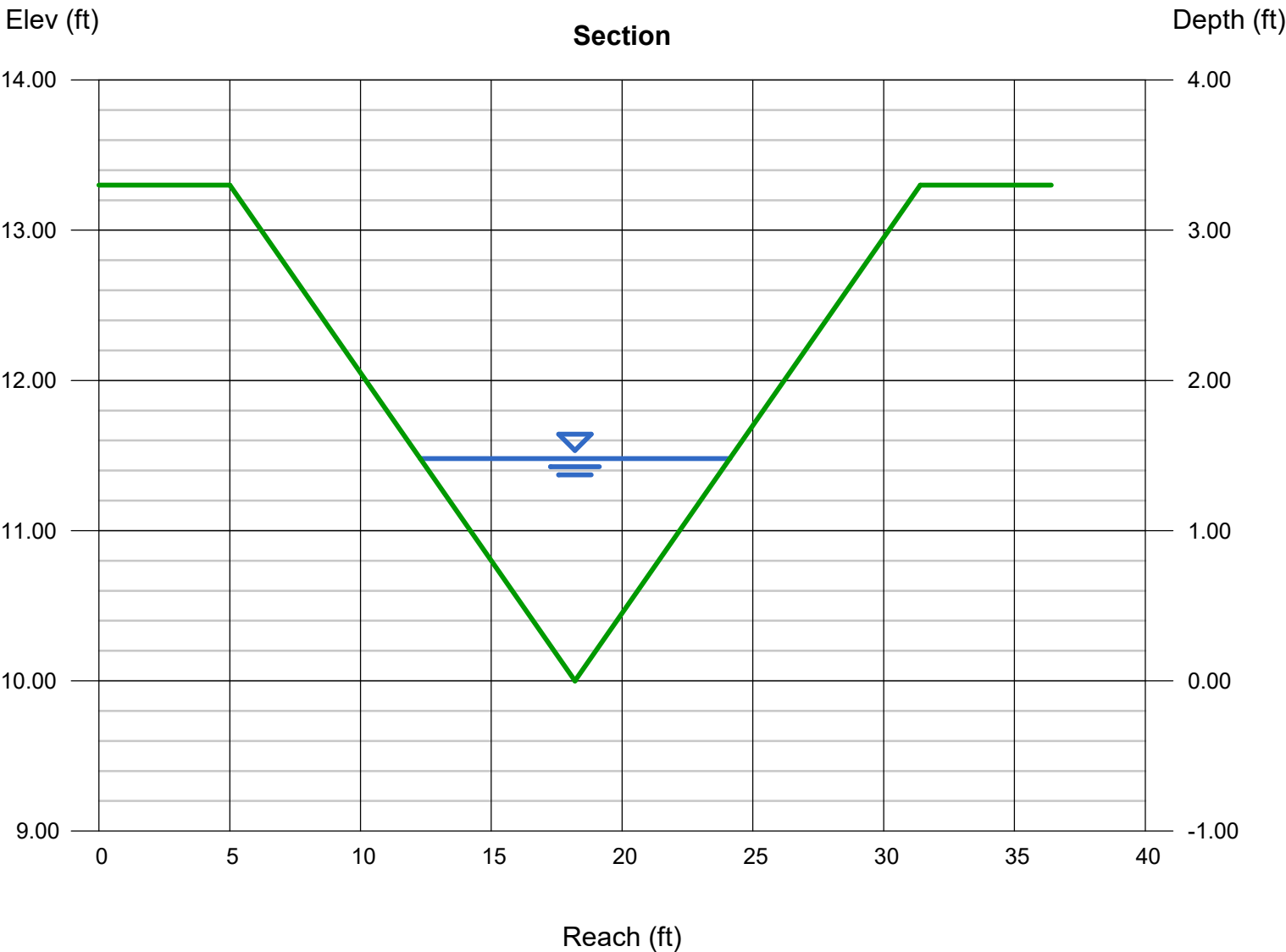
Invert Elev (ft) = 10.00  
Slope (%) = 2.43  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 53.84

### Highlighted

Depth (ft) = 1.48  
Q (cfs) = 53.84  
Area (sqft) = 8.76  
Velocity (ft/s) = 6.15  
Wetted Perim (ft) = 12.20  
Crit Depth, Yc (ft) = 1.63  
Top Width (ft) = 11.84  
EGL (ft) = 2.07





# Channel Report

## Swale B3B (2-Year)

### Triangular

Side Slopes (z:1) = 33.00, 6.00  
Total Depth (ft) = 1.30

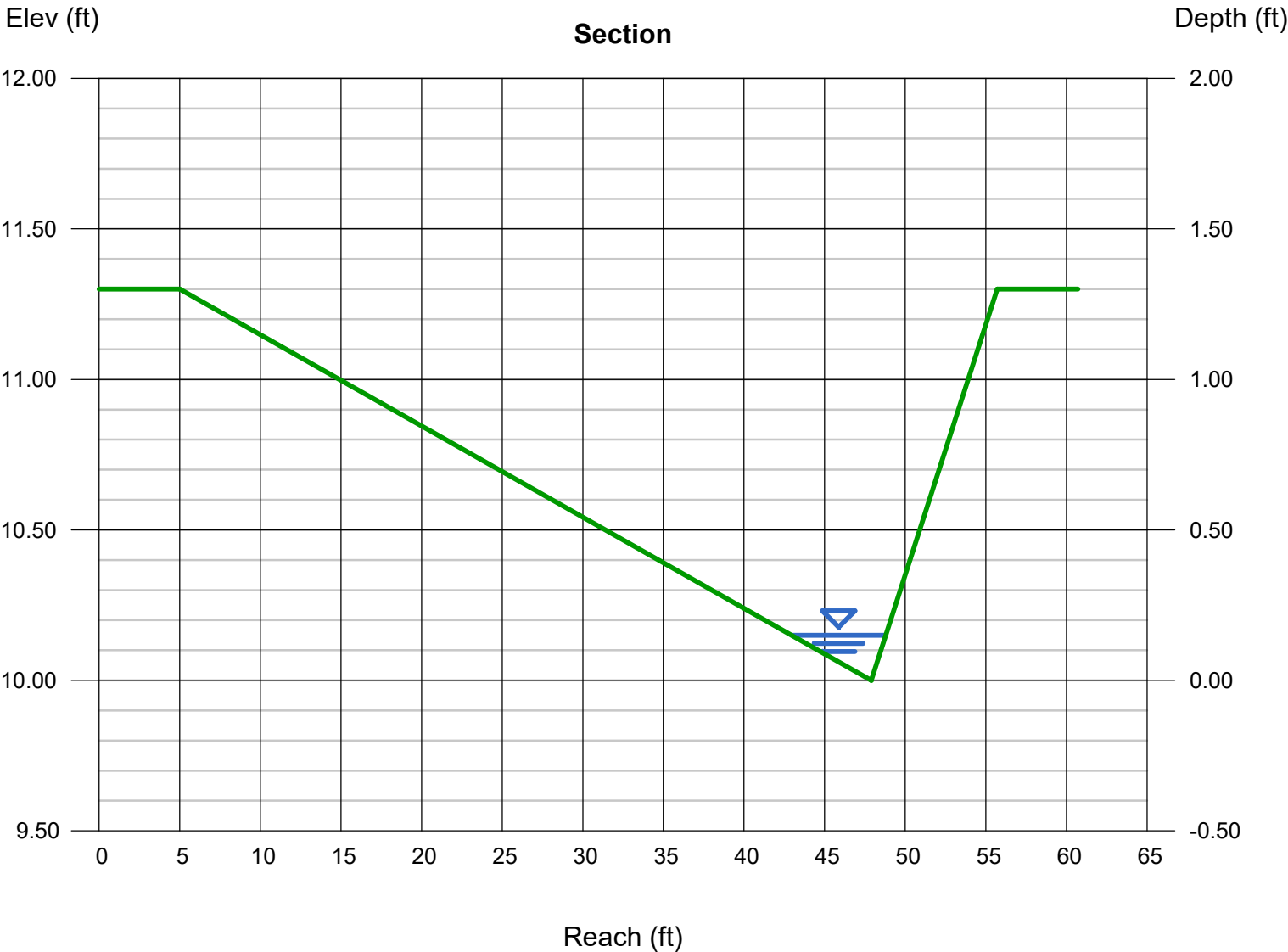
Invert Elev (ft) = 10.00  
Slope (%) = 5.80  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 0.90

### Highlighted

Depth (ft) = 0.15  
Q (cfs) = 0.900  
Area (sqft) = 0.44  
Velocity (ft/s) = 2.05  
Wetted Perim (ft) = 5.86  
Crit Depth, Yc (ft) = 0.17  
Top Width (ft) = 5.85  
EGL (ft) = 0.22



# Channel Report

## Swale B3B (100-Year)

### Triangular

Side Slopes (z:1) = 33.00, 6.00  
Total Depth (ft) = 1.30

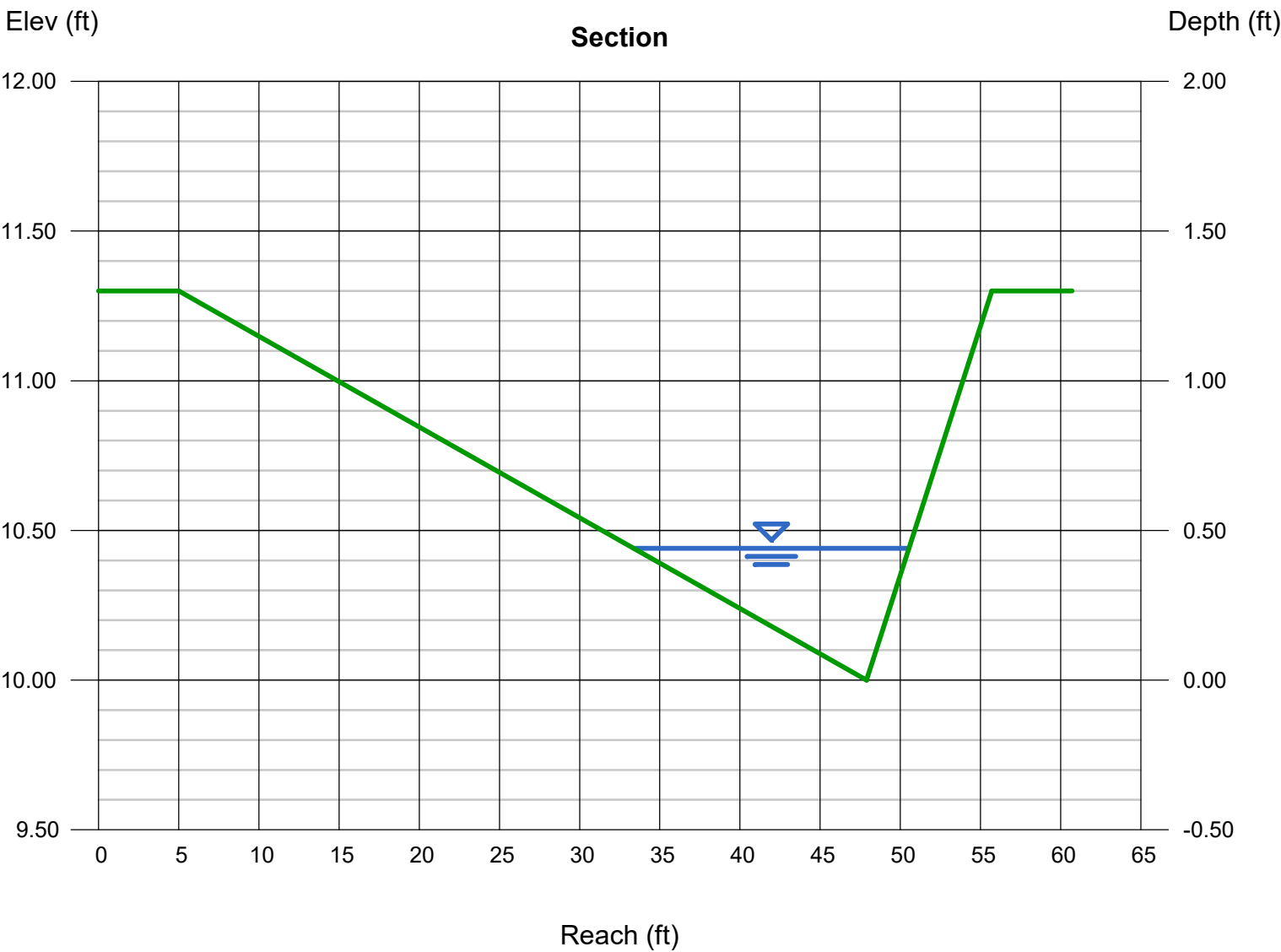
Invert Elev (ft) = 10.00  
Slope (%) = 5.80  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 16.27

### Highlighted

Depth (ft) = 0.44  
Q (cfs) = 16.27  
Area (sqft) = 3.78  
Velocity (ft/s) = 4.31  
Wetted Perim (ft) = 17.20  
Crit Depth, Yc (ft) = 0.54  
Top Width (ft) = 17.16  
EGL (ft) = 0.73



# Channel Report

## Swale B3C (2-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 2.50

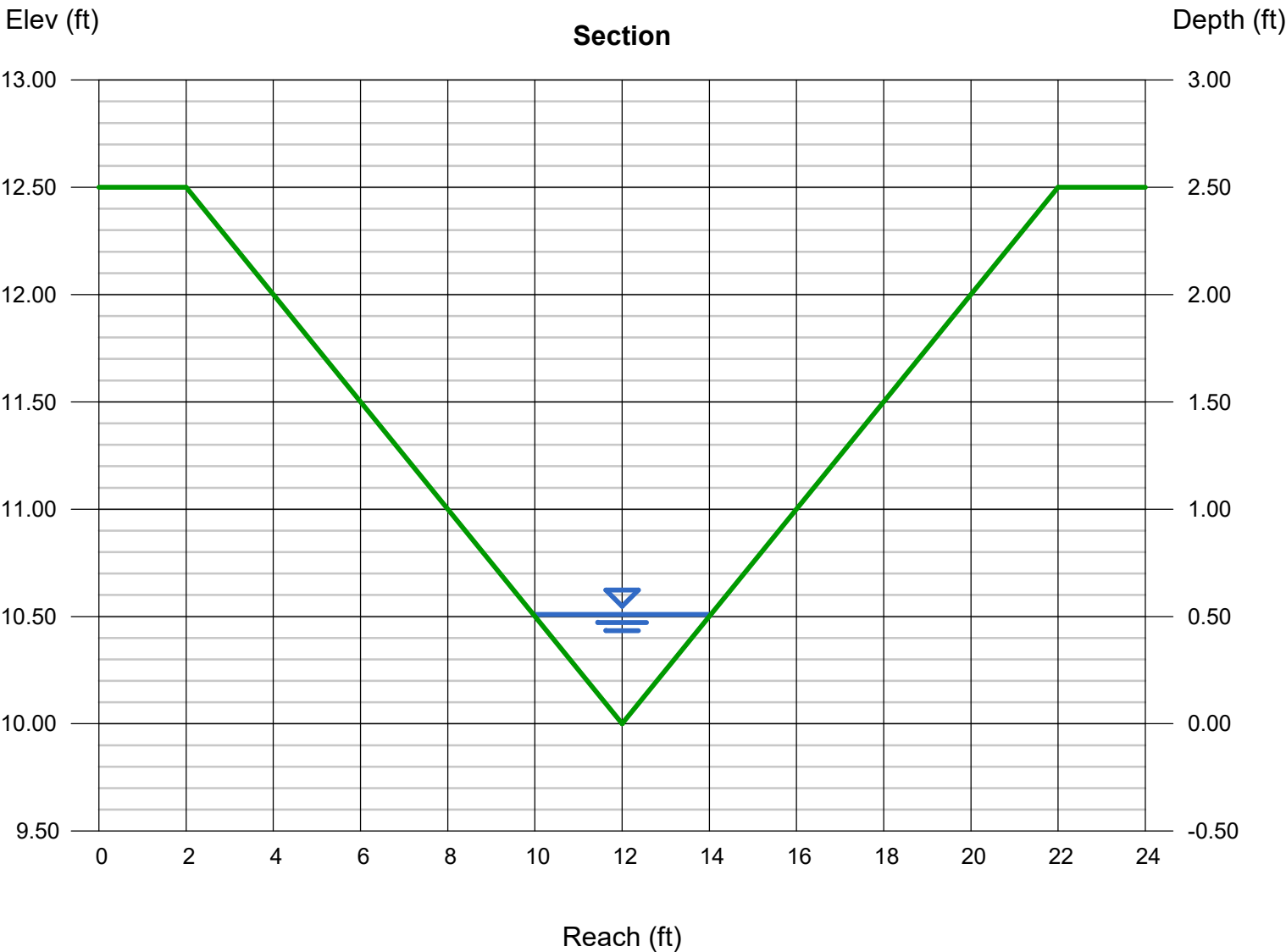
Invert Elev (ft) = 10.00  
Slope (%) = 2.09  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 2.81

### Highlighted

Depth (ft) = 0.51  
Q (cfs) = 2.810  
Area (sqft) = 1.04  
Velocity (ft/s) = 2.70  
Wetted Perim (ft) = 4.21  
Crit Depth, Yc (ft) = 0.50  
Top Width (ft) = 4.08  
EGL (ft) = 0.62



# Channel Report

## Swale B3C (100-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 5.00

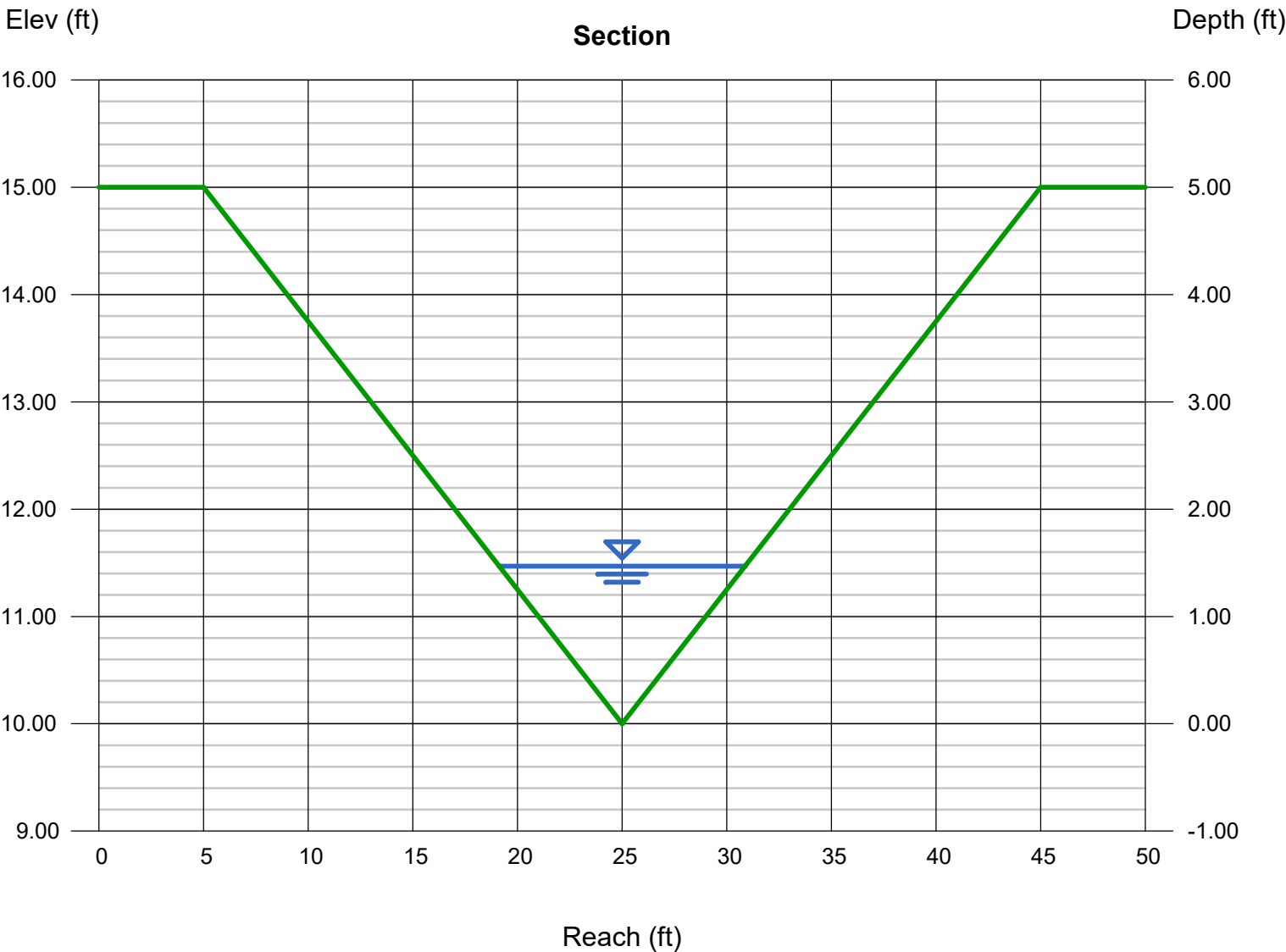
Invert Elev (ft) = 10.00  
Slope (%) = 2.00  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 47.58

### Highlighted

Depth (ft) = 1.47  
Q (cfs) = 47.58  
Area (sqft) = 8.64  
Velocity (ft/s) = 5.50  
Wetted Perim (ft) = 12.12  
Crit Depth, Yc (ft) = 1.55  
Top Width (ft) = 11.76  
EGL (ft) = 1.94



# Channel Report

## Swale CL10 (2-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 1.25

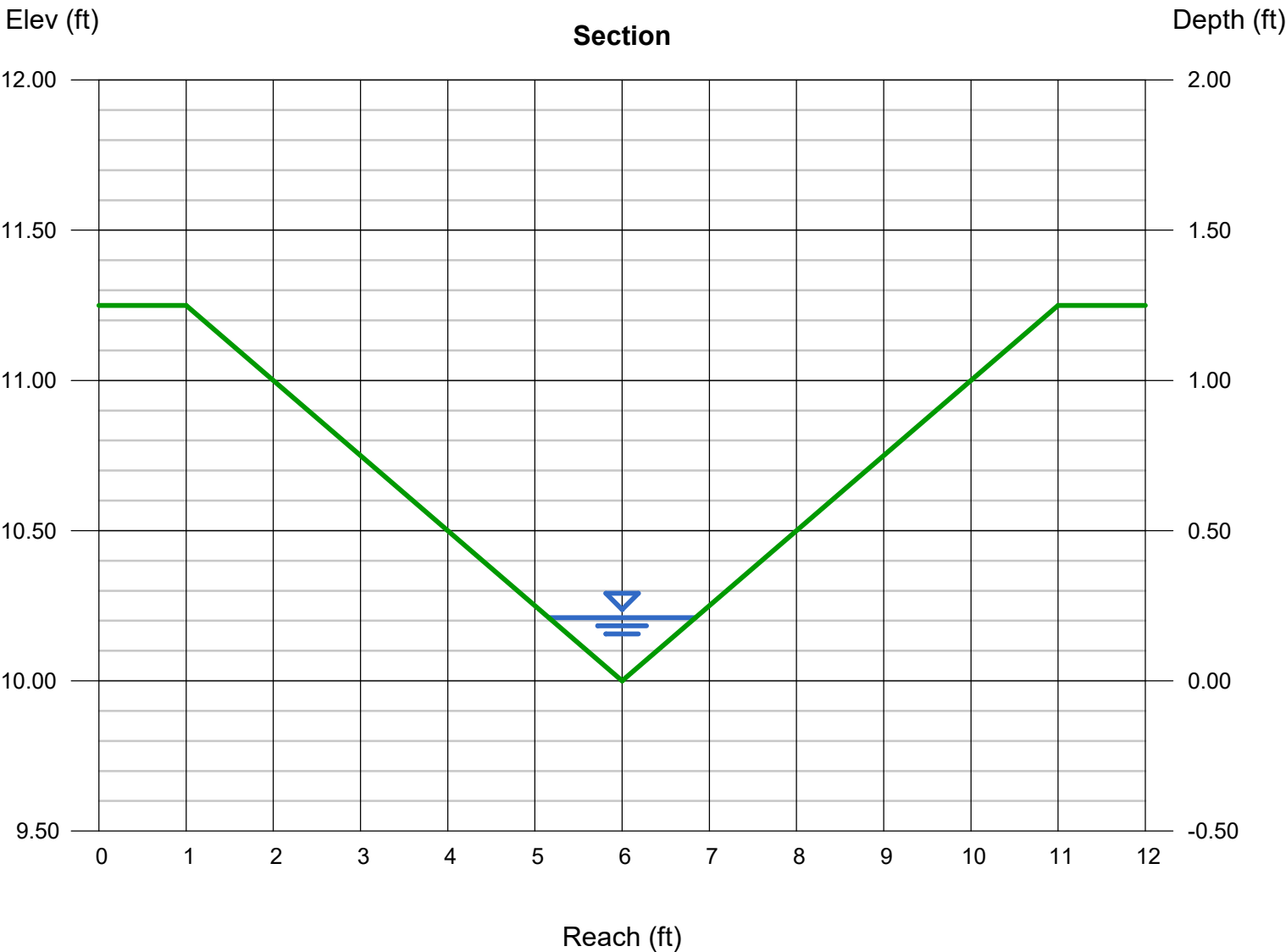
Invert Elev (ft) = 10.00  
Slope (%) = 5.00  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 0.41

### Highlighted

Depth (ft) = 0.21  
Q (cfs) = 0.410  
Area (sqft) = 0.18  
Velocity (ft/s) = 2.32  
Wetted Perim (ft) = 1.73  
Crit Depth, Yc (ft) = 0.24  
Top Width (ft) = 1.68  
EGL (ft) = 0.29



# Channel Report

## Swale CL10 (100-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 1.25

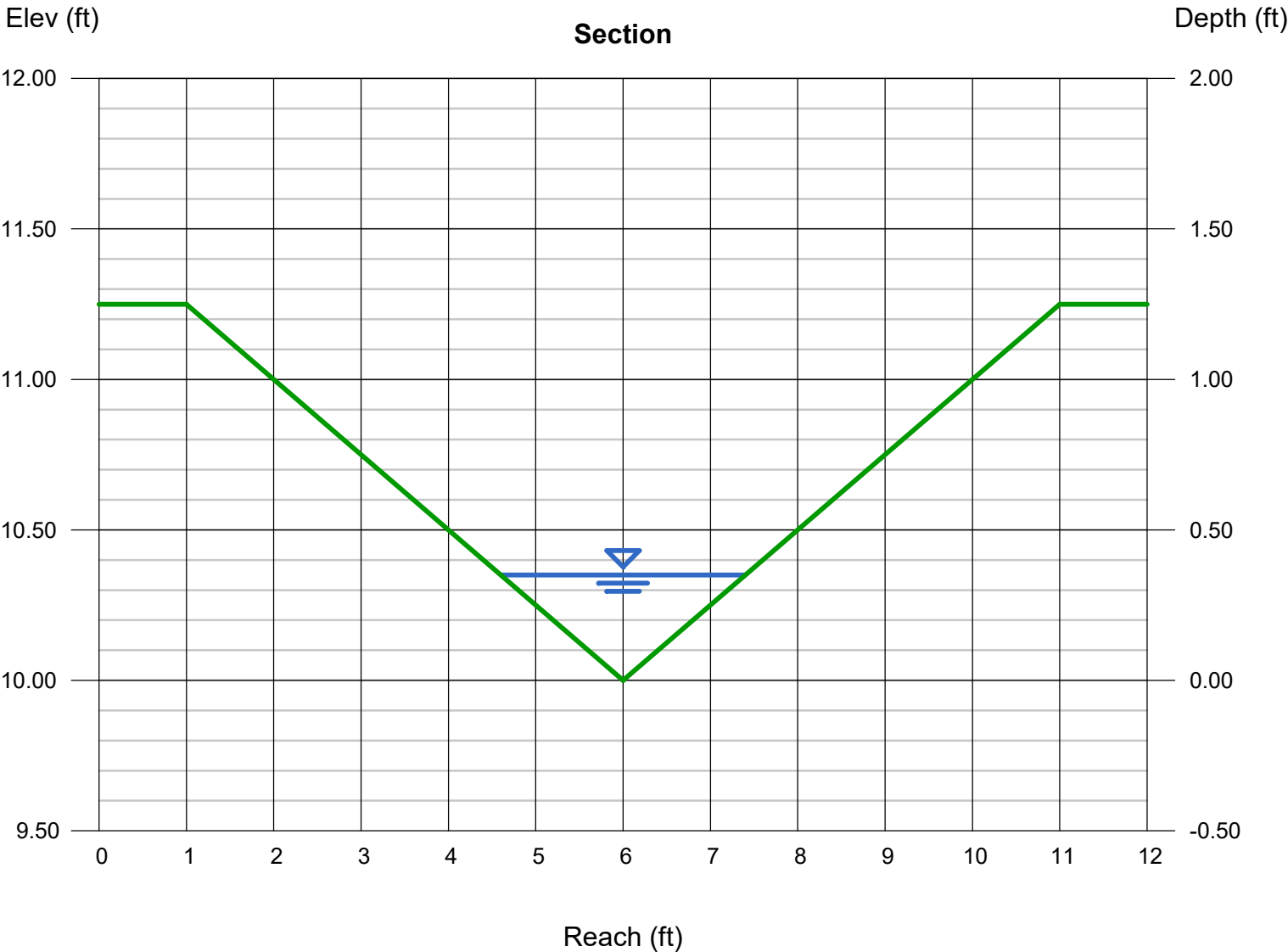
Invert Elev (ft) = 10.00  
Slope (%) = 5.00  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 1.64

### Highlighted

Depth (ft) = 0.35  
Q (cfs) = 1.640  
Area (sqft) = 0.49  
Velocity (ft/s) = 3.35  
Wetted Perim (ft) = 2.89  
Crit Depth, Yc (ft) = 0.41  
Top Width (ft) = 2.80  
EGL (ft) = 0.52



# Channel Report

## Swale CL11 (2-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 1.25

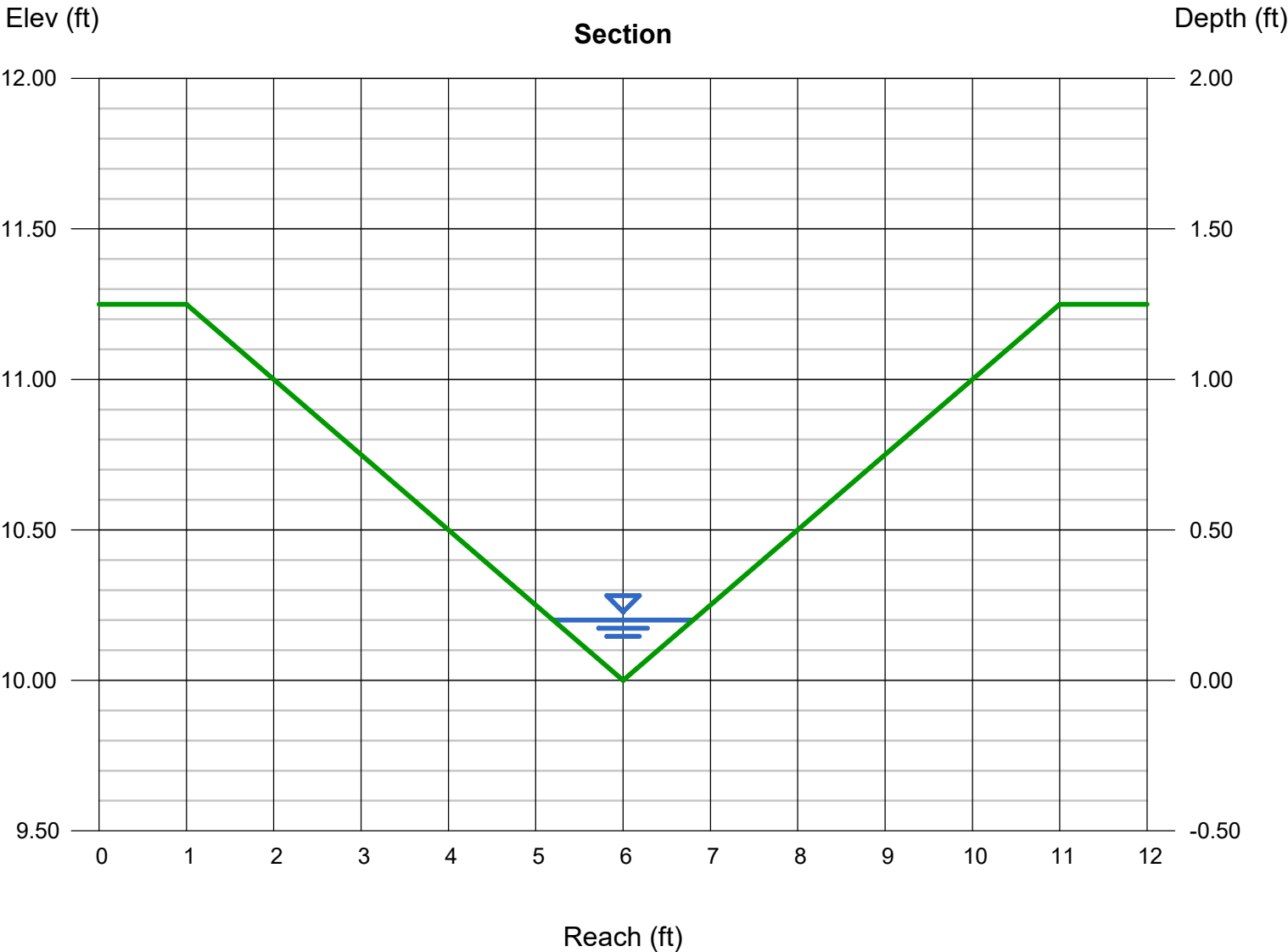
Invert Elev (ft) = 10.00  
Slope (%) = 5.00  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 0.37

### Highlighted

Depth (ft) = 0.20  
Q (cfs) = 0.370  
Area (sqft) = 0.16  
Velocity (ft/s) = 2.31  
Wetted Perim (ft) = 1.65  
Crit Depth, Yc (ft) = 0.23  
Top Width (ft) = 1.60  
EGL (ft) = 0.28



# Channel Report

## Swale CL11 (100-Year)

### Triangular

Side Slopes (z:1) = 4.00, 4.00  
Total Depth (ft) = 1.25

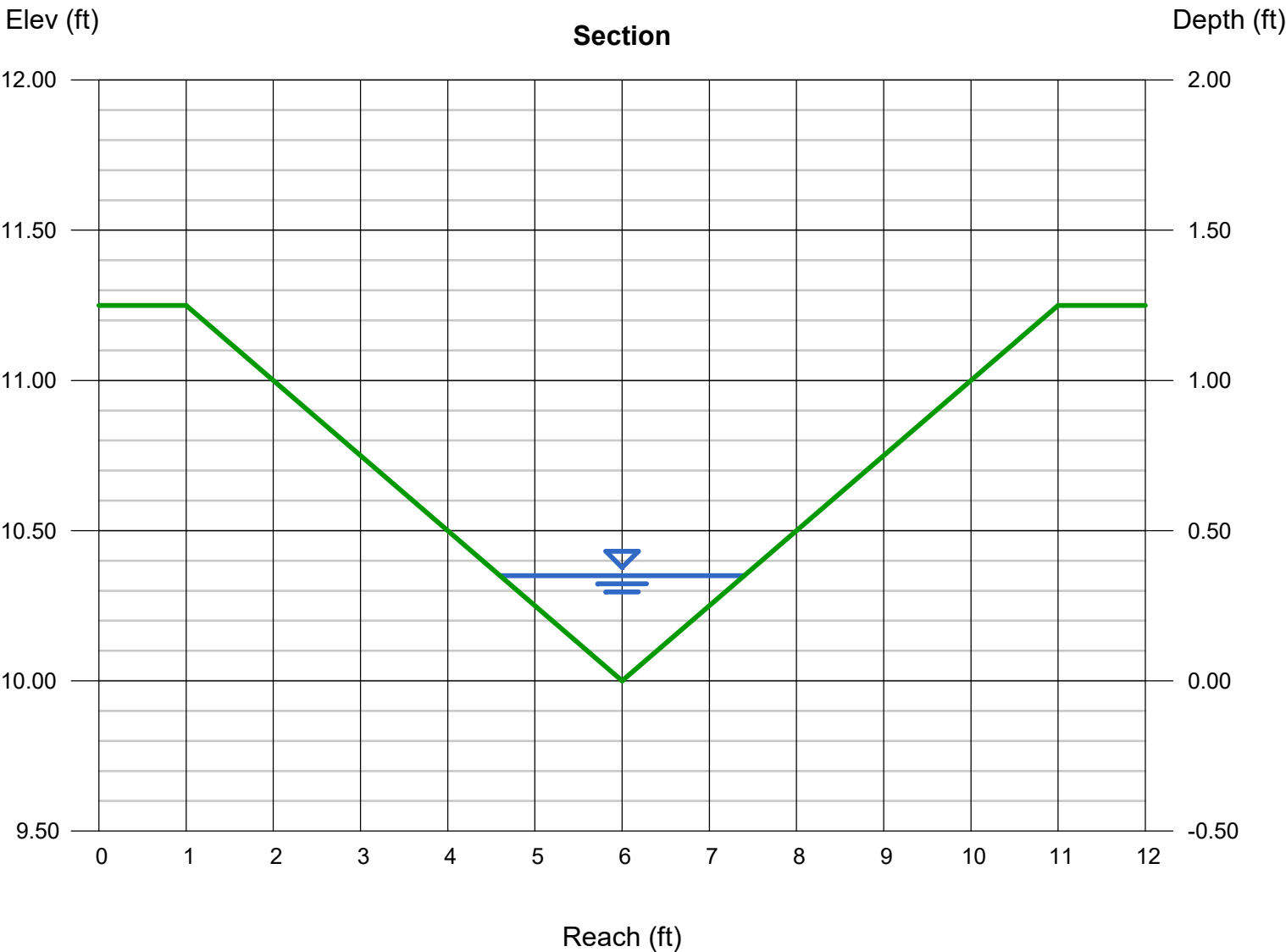
Invert Elev (ft) = 10.00  
Slope (%) = 5.00  
N-Value = 0.030

### Calculations

Compute by: Known Q  
Known Q (cfs) = 1.61

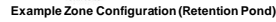
### Highlighted

Depth (ft) = 0.35  
Q (cfs) = 1.610  
Area (sqft) = 0.49  
Velocity (ft/s) = 3.29  
Wetted Perim (ft) = 2.89  
Crit Depth, Yc (ft) = 0.40  
Top Width (ft) = 2.80  
EGL (ft) = 0.52



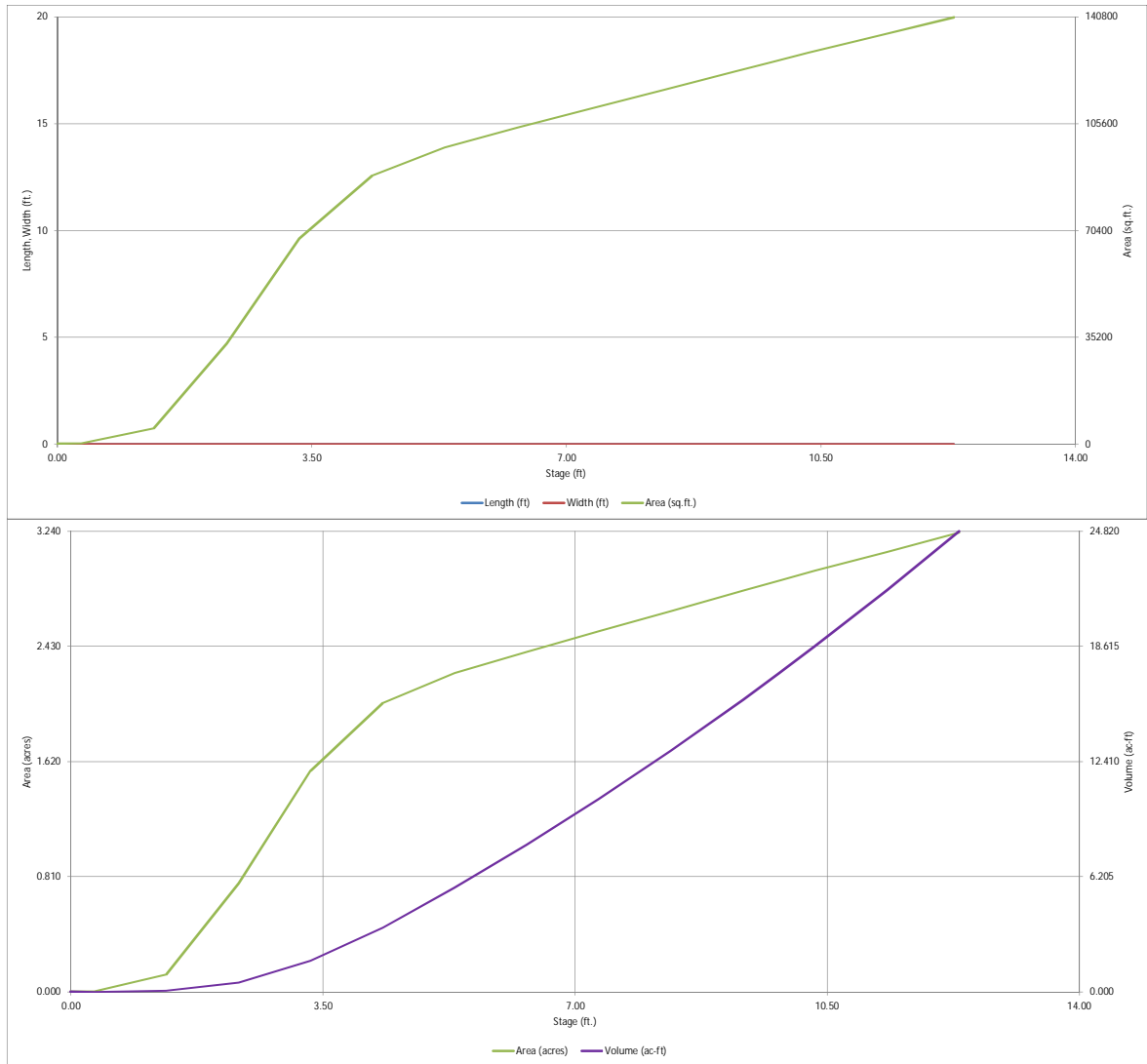


## MHFD-Detention, Version 4.05 (January 2022)

Basin ID: Pond 302[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)

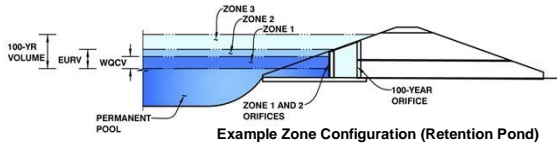


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-DETENTION, Version 4.05 (January 2022)

Project: Trails at Overland Ranch

Basin ID: Pond 302



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WOCV)	3.86	2.543	Orifice Plate
Zone 2 (EURV)	5.77	4.054	Rectangular Orifice
Zone 3 (100-year)	8.22	6.074	Weir&Pipe (Restrict)
Total (all zones)		12.671	

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV in a Filtration BMP)

Underdrain Orifice Invert Depth =  ft (distance below the filtration media surface)  
Underdrain Orifice Diameter =  inches

Calculated Parameters for Underdrain  
Underdrain Orifice Area =  ft<sup>2</sup>  
Underdrain Orifice Centroid =  feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WOCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches (use rectangular openings)

Calculated Parameters for Plate  
WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.29	2.57					
Orifice Area (sq. inches)	7.08	7.08	7.08					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Vertical Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Vertical Orifice Height =  inches  
Vertical Orifice Width =  inches

Calculated Parameters for Vertical Orifice  
Zone 2 Rectangular:  Not Selected  
Vertical Orifice Area =  ft<sup>2</sup>  
Vertical Orifice Centroid =  feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Overflow Weir Front Edge Height, H<sub>o</sub> =  ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length =  feet  
Overflow Weir Gate Slope =  H:V  
Horiz. Length of Weir Sides =  feet  
Overflow Gate Type =  inches  
Debris Clogging % =  %

Calculated Parameters for Overflow Weir  
Zone 3 Weir:  Not Selected  
Height of Gate Upper Edge, H<sub>u</sub> =  feet  
Overflow Weir Slope Length =  feet  
Gate Open Area / 100-yr Orifice Area =  ft<sup>2</sup>  
Overflow Gate Open Area w/o Debris =  ft<sup>2</sup>  
Overflow Gate Open Area w/ Debris =  ft<sup>2</sup>

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Depth to Invert of Outlet Pipe =  ft (distance below basin bottom at Stage = 0 ft)  
Outlet Pipe Diameter =  inches  
Restrictor Plate Height Above Pipe Invert =  inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate  
Zone 3 Restrictor:  Not Selected  
Outlet Orifice Area =  ft<sup>2</sup>  
Outlet Orifice Centroid =  feet  
Half-Central Angle of Restrictor Plate on Pipe =  radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =  ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length =  feet  
Spillway End Slopes =  H:V  
Freeboard above Max Water Surface =  feet

Calculated Parameters for Spillway  
Spillway Design Flow Depth =  feet  
Stage at Top of Freeboard =  feet  
Basin Area at Top of Freeboard =  acres  
Basin Volume at Top of Freeboard =  acre-ft

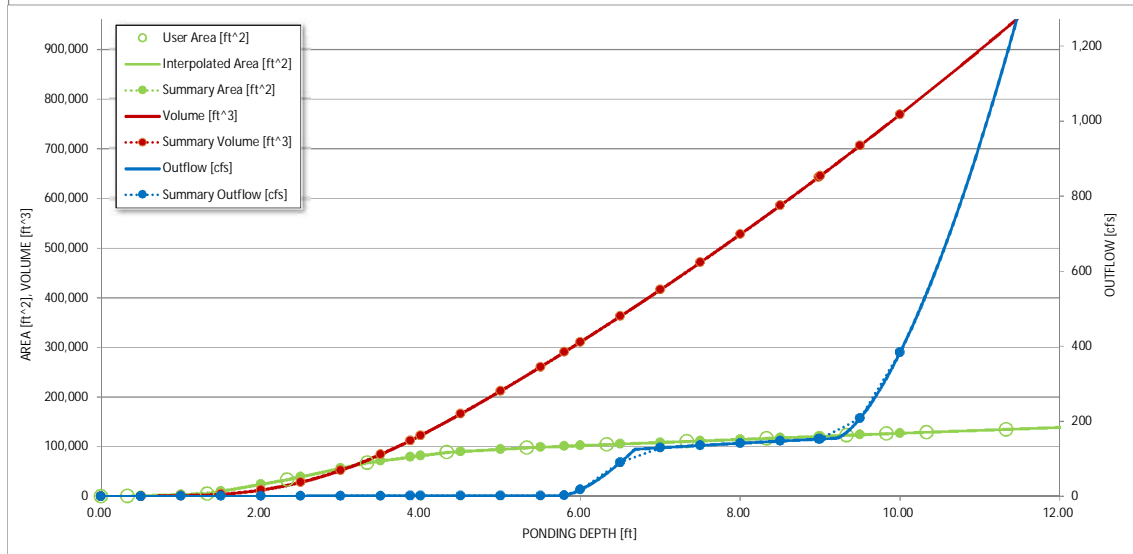
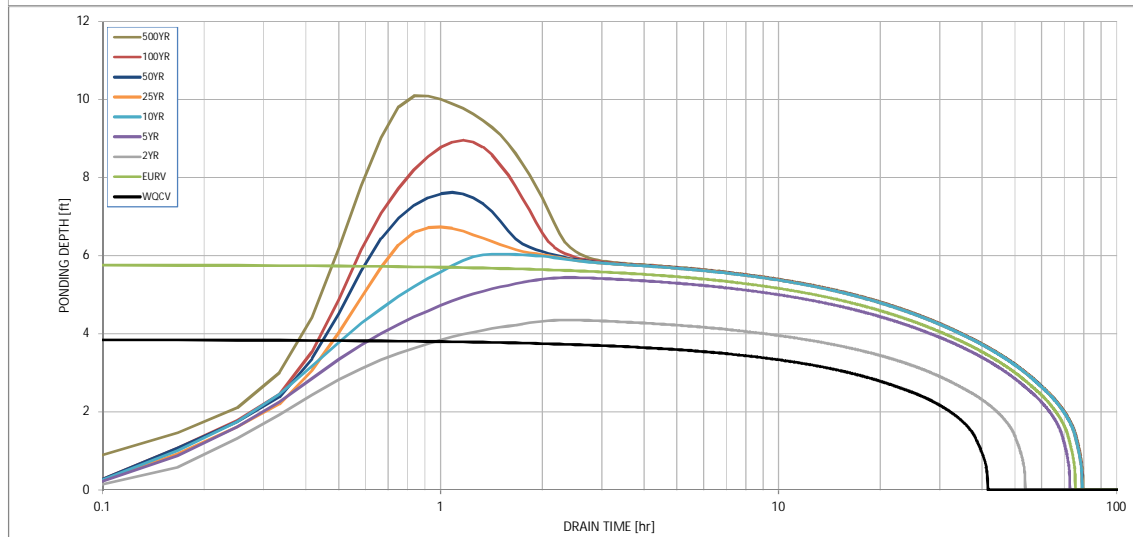
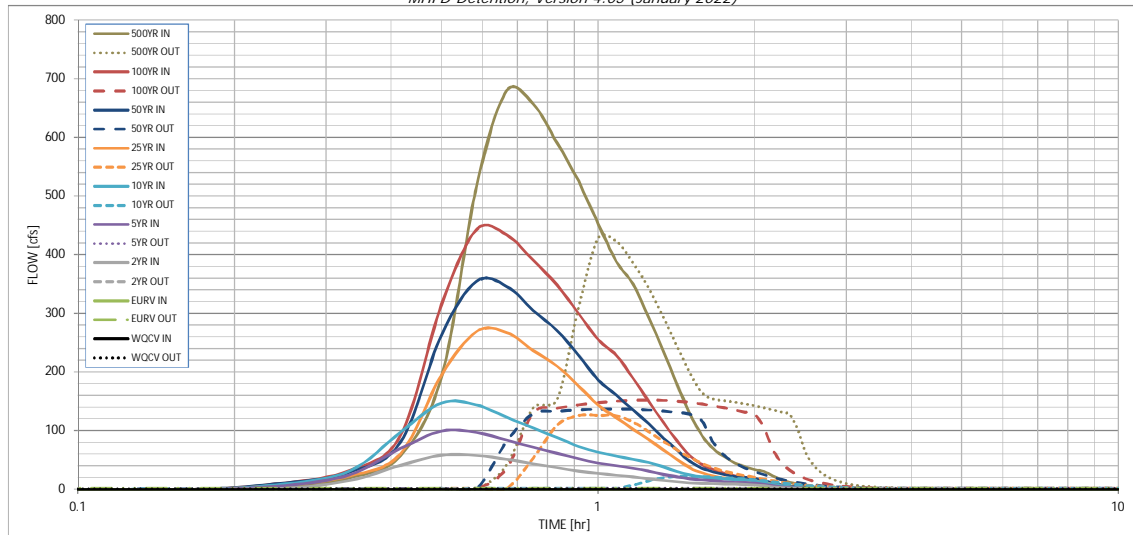
## Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	0.83	1.14	1.37	1.76	2.08	2.38	3.30
One-Hour Rainfall Depth (in) =	N/A	N/A	0.83	1.14	1.37	1.76	2.08	2.38	3.30
CUHP Runoff Volume (acre-ft) =	2.543	6.597	3.723	6.124	8.746	15.241	19.889	25.173	39.335
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.723	6.124	8.746	15.241	19.889	25.173	39.335
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	2.1	14.2	48.3	147.4	210.3	277.4	454.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.08	0.27	0.82	1.17	1.55	2.53
Peak Inflow Q (cfs) =	N/A	N/A	58.3	99.3	147.4	269.0	354.6	442.8	679.6
Peak Outflow Q (cfs) =	1.1	1.7	1.3	1.6	22.1	126.1	137.1	152.3	428.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.5	0.9	0.7	0.5	0.9
Structure Controlling Flow =	Plate	Overflow Weir 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	0.3	1.7	1.8	2.1	2.2
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	68	49	66	70	66	63	61	54
Time to Drain 99% of Inflow Volume (hours) =	40	72	52	69	75	73	72	71	68
Maximum Ponding Depth (ft) =	3.86	5.77	4.35	5.44	6.04	6.74	7.62	8.97	10.10
Area at Maximum Ponding Depth (acres) =	1.81	2.31	2.04	2.26	2.35	2.45	2.58	2.77	2.93
Maximum Volume Stored (acre-ft) =	2.556	6.598	3.499	5.844	7.227	8.908	11.121	14.701	17.950

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: \_\_\_\_\_

## Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.36
	0:15:00	0.00	0.00	1.86	6.44	9.17	7.45	10.74	10.92	19.77
	0:20:00	0.00	0.00	15.09	24.93	31.41	23.00	29.51	32.31	57.13
	0:25:00	0.00	0.00	40.78	69.60	97.37	60.65	80.13	91.44	192.14
	0:30:00	0.00	0.00	58.30	99.32	147.41	195.58	263.99	315.60	515.64
	0:35:00	0.00	0.00	57.61	96.99	144.07	269.01	354.62	442.81	679.63
	0:40:00	0.00	0.00	51.21	83.81	122.90	267.55	346.32	434.09	657.28
	0:45:00	0.00	0.00	43.68	71.59	104.54	236.84	305.25	390.79	590.91
	0:50:00	0.00	0.00	36.73	61.61	88.09	210.12	271.01	348.35	525.71
	0:55:00	0.00	0.00	31.08	51.98	73.34	176.53	228.26	299.98	452.59
	1:00:00	0.00	0.00	26.97	44.83	63.31	143.54	186.53	255.24	388.90
	1:05:00	0.00	0.00	24.18	40.02	56.80	122.49	160.98	228.43	349.63
	1:10:00	0.00	0.00	21.13	36.03	51.18	102.87	135.44	189.83	293.35
	1:15:00	0.00	0.00	18.09	31.12	45.68	84.95	111.57	150.47	236.01
	1:20:00	0.00	0.00	15.31	25.70	38.60	67.35	88.07	114.67	179.79
	1:25:00	0.00	0.00	12.84	21.02	30.30	51.55	66.96	83.21	129.89
	1:30:00	0.00	0.00	11.04	17.98	24.40	36.92	47.76	57.34	91.71
	1:35:00	0.00	0.00	10.08	16.36	21.17	27.97	36.38	42.18	68.85
	1:40:00	0.00	0.00	9.65	14.64	19.10	22.65	29.48	33.32	54.88
	1:45:00	0.00	0.00	9.42	13.14	17.62	19.33	25.04	27.11	45.03
	1:50:00	0.00	0.00	9.27	12.06	16.61	17.08	22.00	22.90	38.36
	1:55:00	0.00	0.00	8.35	11.27	15.59	15.72	20.08	19.94	33.57
	2:00:00	0.00	0.00	7.33	10.42	14.12	14.76	18.74	17.90	30.24
	2:05:00	0.00	0.00	5.78	8.21	10.97	11.58	14.62	13.65	23.07
	2:10:00	0.00	0.00	4.30	5.99	7.91	8.32	10.47	9.79	16.38
	2:15:00	0.00	0.00	3.20	4.40	5.71	6.01	7.52	7.08	11.77
	2:20:00	0.00	0.00	2.35	3.21	4.14	4.36	5.45	5.20	8.62
	2:25:00	0.00	0.00	1.71	2.27	2.96	3.09	3.84	3.70	6.11
	2:30:00	0.00	0.00	1.22	1.58	2.08	2.16	2.68	2.58	4.25
	2:35:00	0.00	0.00	0.85	1.10	1.46	1.54	1.91	1.83	3.00
	2:40:00	0.00	0.00	0.56	0.74	0.97	1.03	1.27	1.21	1.97
	2:45:00	0.00	0.00	0.33	0.46	0.57	0.62	0.76	0.72	1.15
	2:50:00	0.00	0.00	0.17	0.24	0.28	0.31	0.38	0.35	0.55
	2:55:00	0.00	0.00	0.07	0.10	0.10	0.11	0.12	0.11	0.17
	3:00:00	0.00	0.00	0.02	0.02	0.01	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Detention, Version 4.05 (January 2022)*

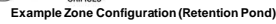
### Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

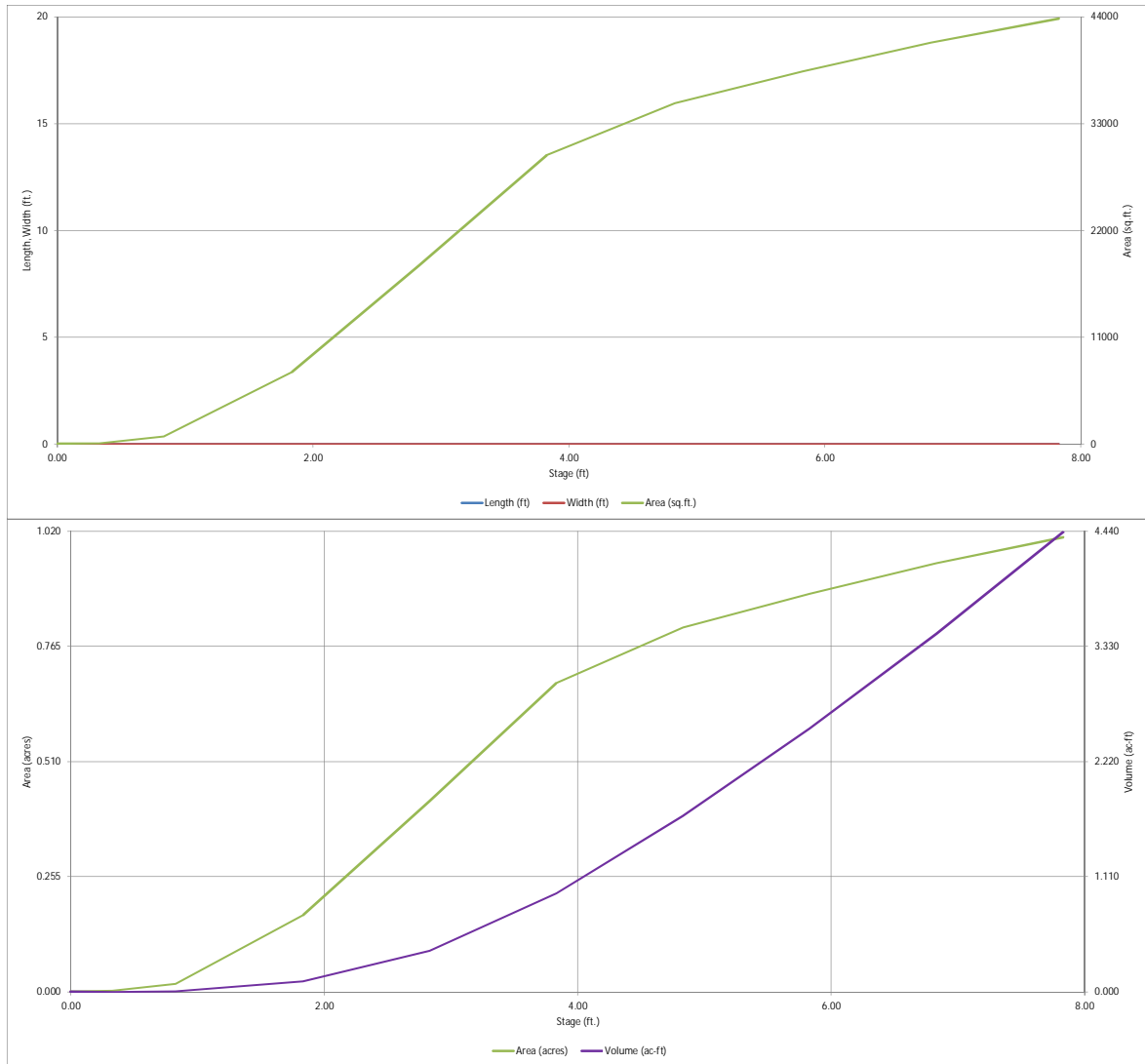
[illegible]

## MHFD-Detention, Version 4.05 (January 2022)

Basin ID: Temp Pond D[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)



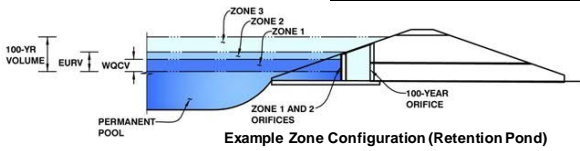


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)

Project: Trails at Overland Ranch

Basin ID: Temp Pond D



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.47	0.259	Orifice Plate
Zone 2 (EURV)	3.24	0.327	Orifice Plate
Zone 3 (100-year)	4.30	0.691	Weir&Pipe (Restrict)
Total (all zones)		1.277	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain	
Underdrain Orifice Area =	N/A ft <sup>2</sup>
Underdrain Orifice Centroid =	N/A feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.24	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	0.89	sq. inches (diameter = 1-1/16 inches)

Calculated Parameters for Plate	
WO Orifice Area per Row =	6.181E-03 ft <sup>2</sup>
Elliptical Half-Width =	N/A feet
Elliptical Slot Centroid =	N/A feet
Elliptical Slot Area =	N/A ft <sup>2</sup>

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.83	1.65					
Orifice Area (sq. inches)	0.89	0.89	0.89					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice	
Vertical Orifice Area =	N/A ft <sup>2</sup>
Vertical Orifice Centroid =	N/A feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.24	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	0%	N/A	%

Calculated Parameters for Overflow Weir	
Height of Grate Upper Edge, Hi =	4.24 ft
Overflow Weir Slope Length =	4.12 feet
Grate Open Area / 100-yr Orifice Area =	6.50
Overflow Grate Open Area w/o Debris =	11.48 ft <sup>2</sup>
Overflow Grate Open Area w/ Debris =	11.48 ft <sup>2</sup>

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.33	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	18.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	
Outlet Orifice Area =	1.77 ft <sup>2</sup>
Outlet Orifice Centroid =	0.75 feet
Half-Central Angle of Restrictor Plate on Pipe =	3.14 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	4.83	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	40.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway	
Spillway Design Flow Depth =	0.47 feet
Stage at Top of Freeboard =	6.30 feet
Basin Area at Top of Freeboard =	0.91 acres
Basin Volume at Top of Freeboard =	2.96 acre-ft

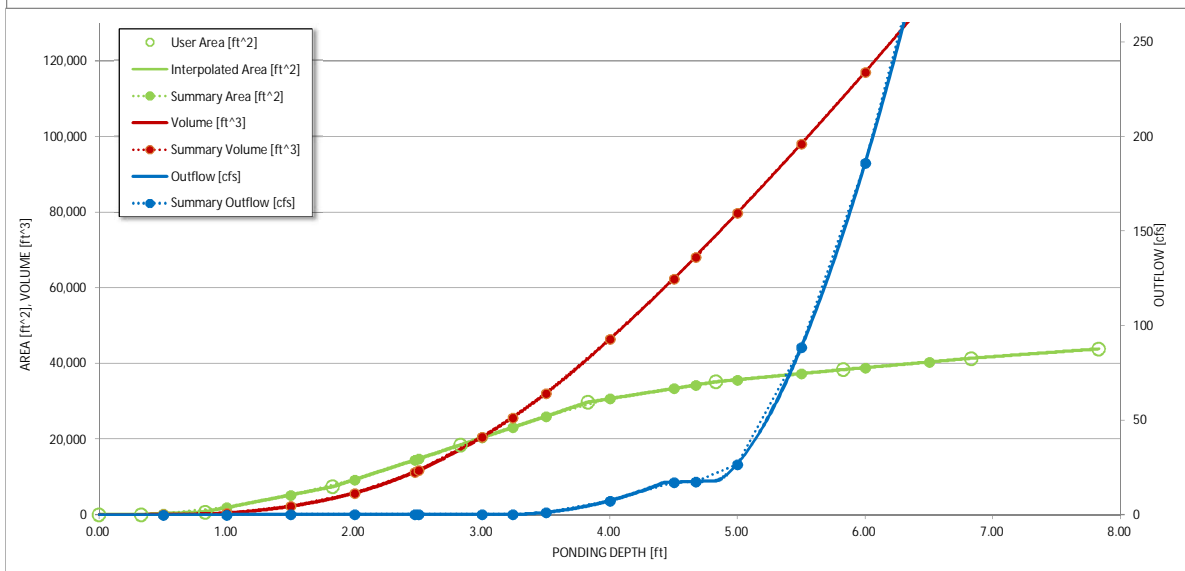
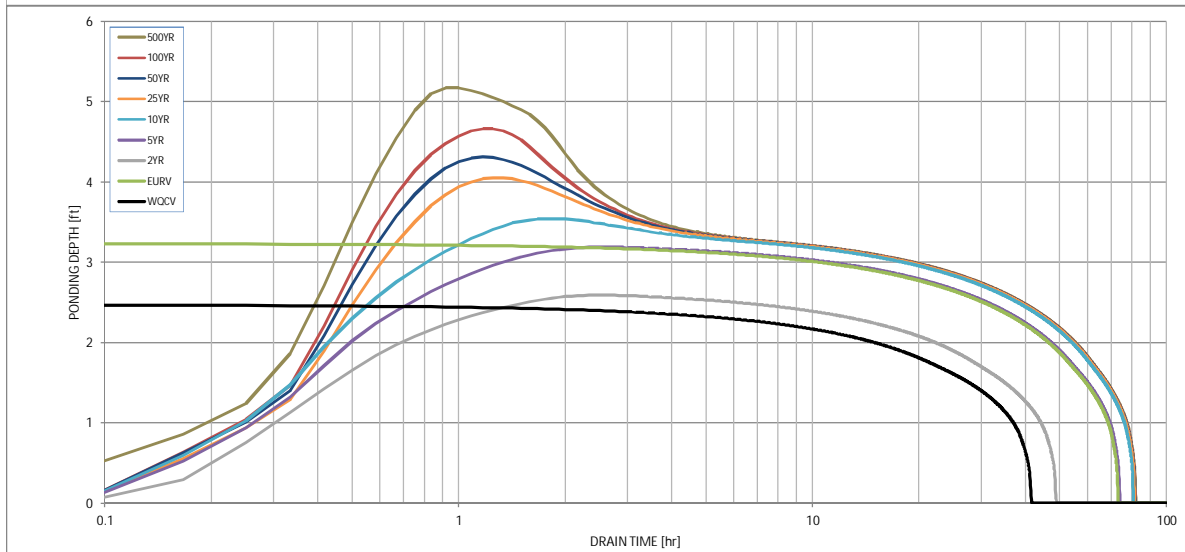
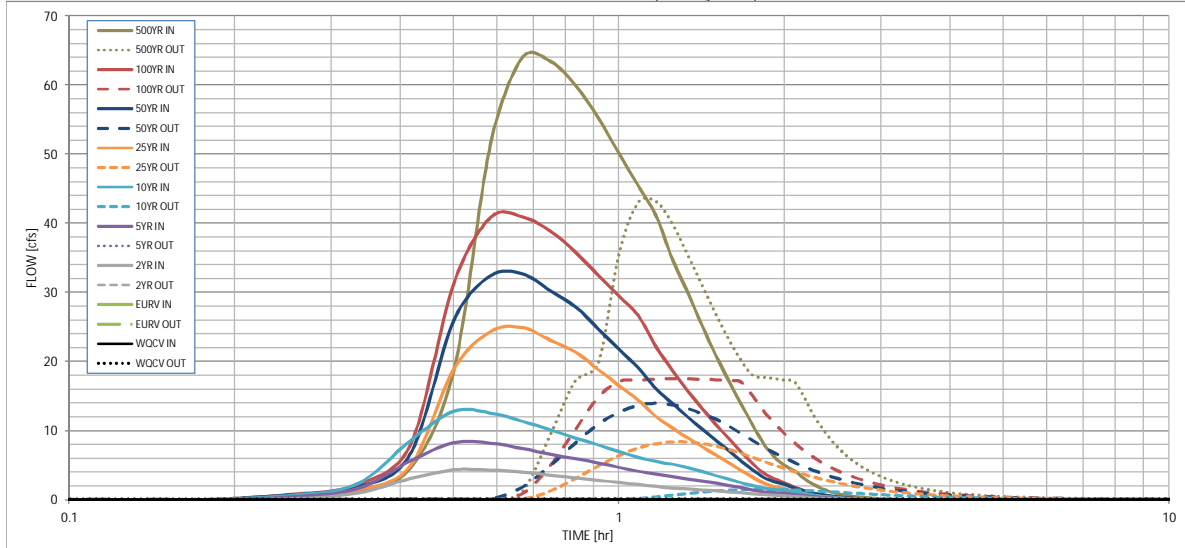
## Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period	N/A	N/A	0.83	1.14	1.37	1.76	2.08	2.38	3.30
One-Hour Rainfall Depth (in)	N/A	N/A	0.323	0.589	0.884	1.645	2.185	2.793	4.431
CUHP Runoff Volume (acre-ft)	N/A	N/A	0.323	0.589	0.884	1.645	2.185	2.793	4.431
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	0.2	2.2	6.0	17.1	23.9	31.1	50.7
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.01	0.11	0.29	0.82	1.14	1.49	2.43
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A	4.4	8.3	12.8	24.9	32.7	41.0	64.0
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.1	0.1	1.5	8.4	14.0	17.53	43.2
Peak Inflow Q (cfs)	N/A	N/A	0.1	0.1	0.3	0.5	0.6	0.6	0.9
Peak Outflow Q (cfs)	N/A	N/A	0.1	0.1	0.3	0.5	0.6	0.6	0.9
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Structure Controlling Flow	Plate	Overflow Weir 1	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	N/A	0.1	0.7	1.2	1.5	1.6
Max Velocity through Grate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours)	38	67	45	68	72	68	65	62	55
Time to Drain 99% of Inflow Volume (hours)	40	70	47	71	77	75	74	73	70
Maximum Ponding Depth (ft)	2.47	3.24	2.59	3.19	3.54	4.05	4.31	4.67	5.17
Area at Maximum Ponding Depth (acres)	0.33	0.53	0.36	0.51	0.61	0.71	0.74	0.79	0.83
Maximum Volume Stored (acre-ft)	0.259	0.590	0.297	0.559	0.761	1.101	1.283	1.558	1.972

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: \_\_\_\_\_

## Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23
	0:15:00	0.00	0.00	0.13	0.44	0.63	0.51	0.74	0.75	1.31
	0:20:00	0.00	0.00	0.99	1.60	2.28	1.46	1.86	2.24	4.53
	0:25:00	0.00	0.00	3.08	5.62	8.55	4.89	6.61	7.89	18.62
	0:30:00	0.00	0.00	4.36	8.28	12.85	18.85	25.92	31.22	51.36
	0:35:00	0.00	0.00	4.34	8.22	12.58	24.36	32.42	40.86	64.01
	0:40:00	0.00	0.00	4.07	7.44	11.40	24.95	32.71	40.96	63.47
	0:45:00	0.00	0.00	3.58	6.61	10.16	23.12	30.25	38.92	59.97
	0:50:00	0.00	0.00	3.17	5.97	8.96	21.37	27.92	35.84	55.27
	0:55:00	0.00	0.00	2.84	5.33	7.96	18.84	24.74	32.49	50.12
	1:00:00	0.00	0.00	2.53	4.73	7.03	16.52	21.79	29.49	45.44
	1:05:00	0.00	0.00	2.25	4.17	6.16	14.44	19.13	26.68	41.16
	1:10:00	0.00	0.00	1.96	3.77	5.56	12.08	16.09	22.20	34.84
	1:15:00	0.00	0.00	1.75	3.41	5.19	10.42	13.98	18.79	29.98
	1:20:00	0.00	0.00	1.59	3.05	4.70	8.96	12.00	15.79	25.15
	1:25:00	0.00	0.00	1.44	2.72	4.09	7.71	10.29	13.19	20.92
	1:30:00	0.00	0.00	1.31	2.42	3.53	6.48	8.62	10.94	17.24
	1:35:00	0.00	0.00	1.18	2.12	2.99	5.35	7.10	8.87	13.87
	1:40:00	0.00	0.00	1.04	1.77	2.50	4.29	5.67	6.96	10.79
	1:45:00	0.00	0.00	0.91	1.44	2.05	3.30	4.35	5.23	8.11
	1:50:00	0.00	0.00	0.80	1.19	1.74	2.44	3.26	3.86	6.19
	1:55:00	0.00	0.00	0.68	1.04	1.52	1.93	2.64	3.04	5.00
	2:00:00	0.00	0.00	0.60	0.93	1.34	1.63	2.26	2.51	4.21
	2:05:00	0.00	0.00	0.49	0.75	1.08	1.25	1.74	1.87	3.17
	2:10:00	0.00	0.00	0.39	0.60	0.86	0.94	1.31	1.36	2.32
	2:15:00	0.00	0.00	0.32	0.47	0.68	0.72	1.00	0.98	1.68
	2:20:00	0.00	0.00	0.25	0.37	0.53	0.54	0.75	0.70	1.21
	2:25:00	0.00	0.00	0.20	0.29	0.40	0.41	0.56	0.51	0.88
	2:30:00	0.00	0.00	0.16	0.22	0.31	0.31	0.42	0.38	0.66
	2:35:00	0.00	0.00	0.12	0.17	0.23	0.23	0.31	0.29	0.49
	2:40:00	0.00	0.00	0.10	0.13	0.17	0.17	0.24	0.22	0.38
	2:45:00	0.00	0.00	0.07	0.10	0.13	0.13	0.18	0.17	0.29
	2:50:00	0.00	0.00	0.06	0.07	0.10	0.10	0.14	0.13	0.21
	2:55:00	0.00	0.00	0.04	0.05	0.07	0.07	0.10	0.09	0.15
	3:00:00	0.00	0.00	0.03	0.03	0.05	0.05	0.06	0.06	0.09
	3:05:00	0.00	0.00	0.02	0.02	0.03	0.03	0.04	0.03	0.05
	3:10:00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	3:15:00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)

### Summary Stage-Area-Volume-Discharge Relationships

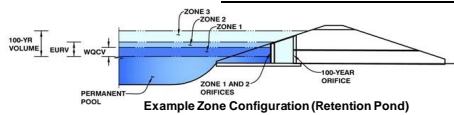
The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

[illegible]

MHFD-Detention, Version 4.06 (July 2022)

Basin ID: Pond A



### Example Zone Configuration (Retention Pond)

Selected BMP Type	=	EDB	
Watershed Area	=	31.68	acres
Watershed Length	=	1.676	ft
Watershed Length to Centroid	=	480	ft
Watershed Slope	=	0.005	ft/ft
Watershed Imperviousness	=	41.00%	percent
Percentage Hydrologic Soil Group A	=	0.0%	percent
Percentage Hydrologic Soil Group B	=	66.3%	percent
Percentage Hydrologic Soil Groups C/D	=	33.7%	percent
Target SCS Drain Time	=	40.0	hours
Location for 1-hr Rainfall Depths	=	User Input	

### Optional User Overrides

Water Quality Capture Volume (WQC)	0.482	acre-feet
Excess Urban Runoff Volume (EUCV)	1.314	acre-feet
2-yr Runoff Volume ( $P1 = 1 \text{ in.}$ )	0.996	acre-feet
5-yr Runoff Volume ( $P1 = 1.42 \text{ in.}$ )	1.864	acre-feet
10-yr Runoff Volume ( $P1 = 1.68 \text{ in.}$ )	2.488	acre-feet
25-yr Runoff Volume ( $P1 = 1.69 \text{ in.}$ )	2.687	acre-feet
50-yr Runoff Volume ( $P1 = 2.35 \text{ in.}$ )	4.407	acre-feet
100-yr Runoff Volume ( $P1 = 2.71 \text{ in.}$ )	5.500	acre-feet
500-yr Runoff Volume ( $P1 = 3.14 \text{ in.}$ )	6.686	acre-feet
Approximate 2-yr Detention Volume	0.862	acre-feet
Approximate 5-yr Detention Volume	1.407	acre-feet
Approximate 10-yr Detention Volume	1.835	acre-feet
Approximate 25-yr Detention Volume	1.791	acre-feet
Approximate 50-yr Detention Volume	2.316	acre-feet
Approximate 100-yr Detention Volume	2.747	acre-feet

	acre-feet
	acre-feet
1.00	inches
1.42	inches
1.68	inches
	inches
2.35	inches
2.71	inches
	inches

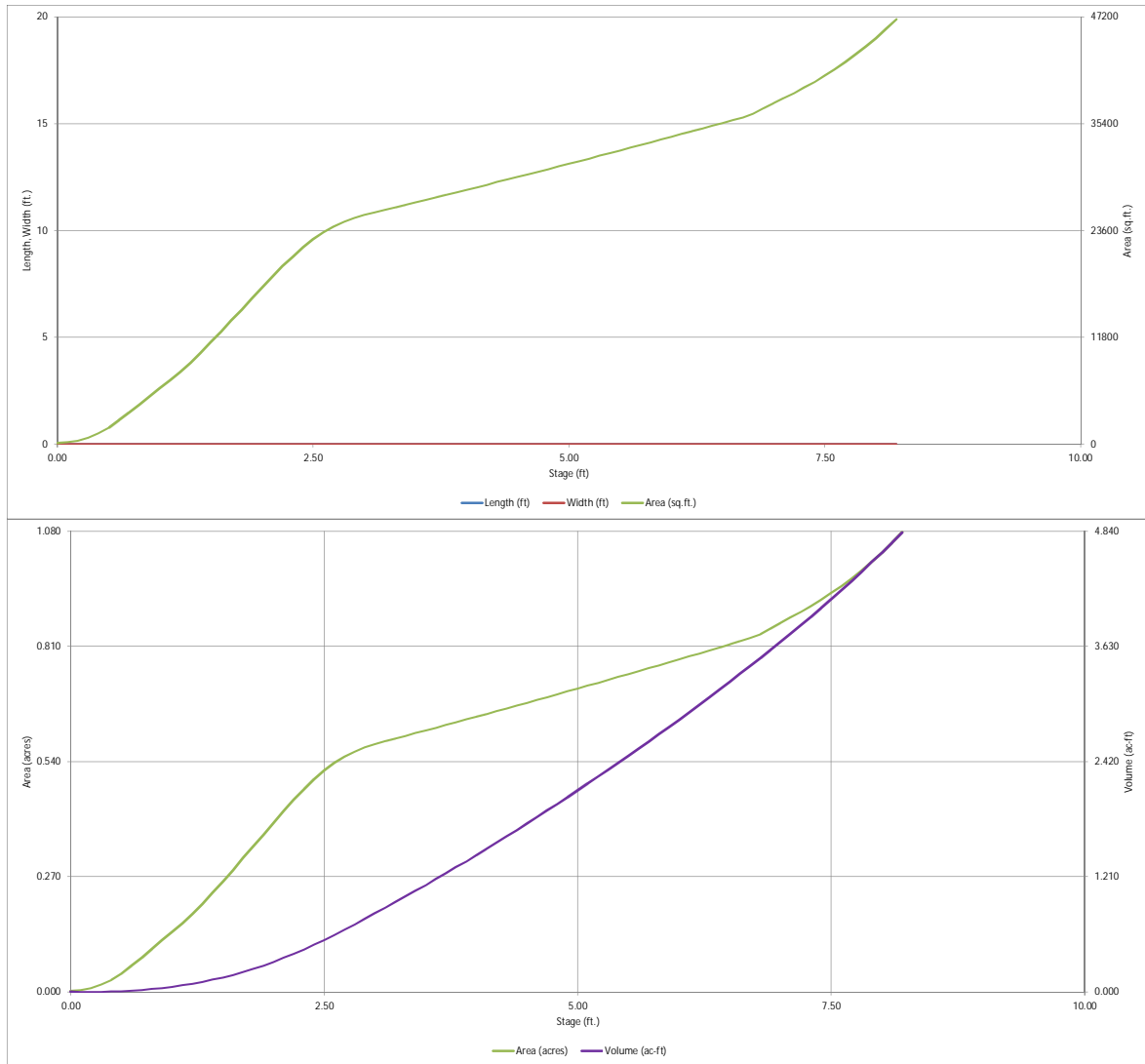
Zone 1 Volume (WOCV) =	0.482	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.832	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.434	acre-feet
Total Detention Basin Volume =	2.747	acre-feet
Initial Surcharge Volume (ISV) =	user	ft <sup>3</sup>
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth ( $H_{\text{total}}$ ) =	user	ft
Depth of Trickle Channel ( $H_{\text{TC}}$ ) =	user	ft
Slope of Trickle Channel ( $S_{\text{TC}}$ ) =	user	ft/ft
Slopes of Main Basin Channels ( $S_{\text{main}}$ ) =	user	H:V
Basin Length-to-Width Ratio ( $R_{\text{BW}}$ ) =	user	

Initial Surcharge Area ( $A_{SV}$ )	=	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{SV}$ )	=	user	ft
Surcharge Volume Width ( $W_{SV}$ )	=	user	ft
Depth of Basin Floor ( $H_{1(LOR)}$ )	=	user	ft
Length of Basin Floor ( $L_{1(LOR)}$ )	=	user	ft
Width of Basin Floor ( $W_{1(LOR)}$ )	=	user	ft
Area of Basin Floor ( $A_{1(LOR)}$ )	=	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{1(LOR)}$ )	=	user	ft <sup>3</sup>
Depth of Main Basin ( $H_{MAIN}$ )	=	user	ft
Length of Main Basin ( $L_{MAIN}$ )	=	user	ft
Width of Main Basin ( $W_{MAIN}$ )	=	user	ft
Area of Main Basin ( $A_{MAIN}$ )	=	user	ft <sup>2</sup>
Volume of Main Basin ( $V_{MAIN}$ )	=	user	ft <sup>3</sup>
Calculated Total Basin Volume ( $V_{TOTAL}$ )	=	USER	acre-feet

[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Defention, Version 4.06 (July 2022)

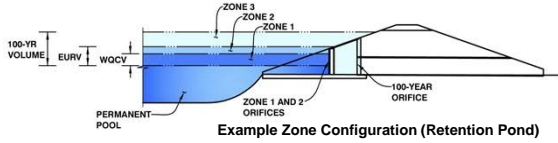


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Elora Filing No. 1

Basin ID: Pond A



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WOCV)	2.38	0.482	Orifice Plate
Zone 2 (EURV)	3.81	0.832	Orifice Plate
Zone 3 (100-year)	5.86	1.434	Weir&Pipe (Restrict)
Total (all zones)		2.747	

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV in a Filtration BMP)

Underdrain Orifice Invert Depth =  ft (distance below the filtration media surface)  
Underdrain Orifice Diameter =  inches

Calculated Parameters for Underdrain  
Underdrain Orifice Area =  ft<sup>2</sup>  
Underdrain Orifice Centroid =  feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WOCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches (diameter = 1-13/16 inches)

Calculated Parameters for Plate  
WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.15	1.27	2.54					
Orifice Area (sq. inches)	2.57	2.57	2.57					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice =   ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Vertical Orifice =   ft (relative to basin bottom at Stage = 0 ft)  
Vertical Orifice Diameter =   inches

Calculated Parameters for Vertical Orifice  
Vertical Orifice Area =   ft<sup>2</sup>  
Vertical Orifice Centroid =   feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, H <sub>o</sub>	3.81	6.25
Overflow Weir Front Edge Length	5.83	5.83
Overflow Weir Grate Slope	4.00	0.00
Horiz. Length of Weir Sides	5.58	2.92
Overflow Grate Type	Type C Grate	Type C Grate
Debris Clogging %	50%	50%

ft (relative to basin bottom at Stage = 0 ft)  
feet  
H:V  
feet  
feet  
Type C Grate  
%

Calculated Parameters for Overflow Weir  
Height of Grate Upper Edge, H<sub>u</sub> =   feet  
Overflow Weir Slope Length =   feet  
Grate Open Area / 100-yr Orifice Area =    
Overflow Grate Open Area w/o Debris =   ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris =   ft<sup>2</sup>

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe	2.50	N/A
Outlet Pipe Diameter	30.00	N/A
Restrictor Plate Height Above Pipe Invert	18.40	

ft (distance below basin bottom at Stage = 0 ft)  
inches  
inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate  
Outlet Orifice Area =   ft<sup>2</sup>  
Outlet Orifice Centroid =   feet  
Half-Central Angle of Restrictor Plate on Pipe =   radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =  ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length =  feet  
Spillway End Slopes =  H:V  
Freeboard above Max Water Surface =  feet

Calculated Parameters for Spillway  
Spillway Design Flow Depth =  feet  
Stage at Top of Freeboard =  feet  
Basin Area at Top of Freeboard =  acres  
Basin Volume at Top of Freeboard =  acre-ft

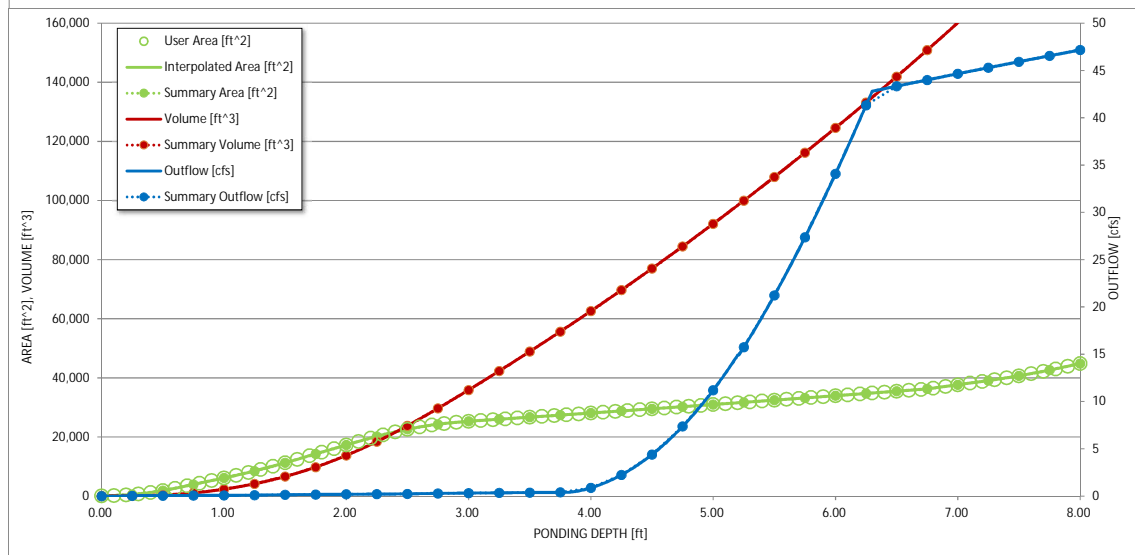
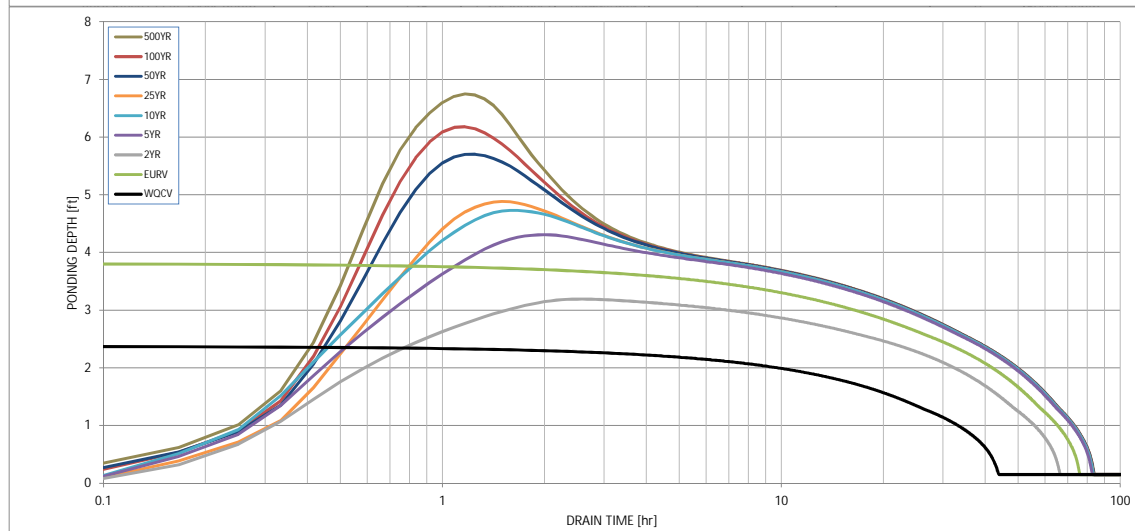
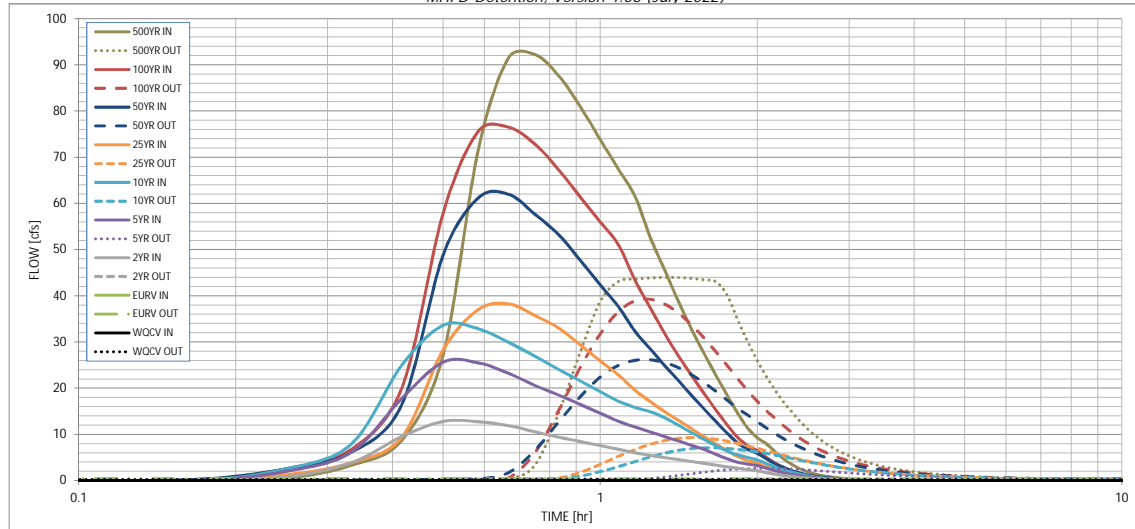
## Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WOCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period	N/A	N/A	1.00	1.42	1.68	1.69	2.35	2.71	3.14
One-Hour Rainfall Depth (in)	N/A	N/A	1.00	1.42	1.68	1.69	2.35	2.71	3.14
CUHP Runoff Volume (acre-ft)	0.482	1.314	0.996	1.864	2.488	2.687	4.407	5.500	6.686
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	0.996	1.864	2.488	2.687	4.407	5.500	6.686
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.4	8.1	13.2	17.7	33.9	44.6	55.7
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.01	0.26	0.42	0.56	1.07	1.41	1.76
Peak Inflow Q (cfs)	N/A	N/A	12.8	25.7	33.6	38.3	62.0	76.5	92.2
Peak Outflow Q (cfs)	0.2	0.4	0.3	2.7	7.1	9.3	26.1	39.2	44.0
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.3	0.5	0.5	0.8	0.9	0.8
Structure Controlling Flow	Plate	Overflow Weir 1	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	0.1	0.3	0.4	1.1	1.7	1.9
Max Velocity through Gate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-3.7
Time to Drain 97% of Inflow Volume (hours)	40	68	60	72	70	69	63	60	58
Time to Drain 99% of Inflow Volume (hours)	42	72	64	78	78	77	75	73	71
Maximum Ponding Depth (ft)	2.38	3.81	3.19	4.31	4.73	4.88	5.70	6.18	6.75
Area at Maximum Ponding Depth (acres)	0.49	0.63	0.59	0.66	0.69	0.70	0.76	0.79	0.83
Maximum Volume Stored (acre-ft)	0.485	1.315	0.935	1.633	1.925	2.030	2.629	2.994	3.456

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			



# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: \_\_\_\_\_

## Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.16	0.50
	0:15:00	0.00	0.00	0.83	2.00	2.57	1.27	2.54	2.60	3.33
	0:20:00	0.00	0.00	3.86	6.18	7.95	3.88	6.16	6.81	8.76
	0:25:00	0.00	0.00	9.58	17.84	25.04	9.44	16.53	20.13	27.33
	0:30:00	0.00	0.00	12.81	25.66	33.63	28.33	48.92	58.00	71.53
	0:35:00	0.00	0.00	12.75	25.49	32.85	36.98	61.19	75.56	91.50
	0:40:00	0.00	0.00	11.89	23.23	29.95	38.26	61.99	76.51	92.21
	0:45:00	0.00	0.00	10.54	20.58	26.90	35.69	57.63	72.81	87.57
	0:50:00	0.00	0.00	9.39	18.49	24.04	33.00	53.17	67.21	80.86
	0:55:00	0.00	0.00	8.44	16.47	21.55	29.31	47.60	61.29	73.79
	1:00:00	0.00	0.00	7.56	14.56	19.26	25.90	42.37	56.00	67.41
	1:05:00	0.00	0.00	6.79	12.83	17.18	22.88	37.65	51.05	61.44
	1:10:00	0.00	0.00	6.02	11.57	15.79	19.53	32.27	43.31	52.37
	1:15:00	0.00	0.00	5.43	10.52	14.87	17.02	28.39	37.17	45.21
	1:20:00	0.00	0.00	4.96	9.48	13.53	14.81	24.70	31.59	38.45
	1:25:00	0.00	0.00	4.53	8.52	11.89	12.93	21.47	26.74	32.52
	1:30:00	0.00	0.00	4.13	7.61	10.34	11.13	18.33	22.58	27.43
	1:35:00	0.00	0.00	3.73	6.74	8.90	9.47	15.43	18.78	22.78
	1:40:00	0.00	0.00	3.33	5.69	7.57	7.92	12.76	15.28	18.51
	1:45:00	0.00	0.00	2.97	4.72	6.40	6.48	10.29	12.08	14.61
	1:50:00	0.00	0.00	2.70	3.99	5.57	5.21	8.16	9.38	11.39
	1:55:00	0.00	0.00	2.38	3.56	5.00	4.30	6.76	7.58	9.28
	2:00:00	0.00	0.00	2.12	3.26	4.49	3.77	5.92	6.47	7.96
	2:05:00	0.00	0.00	1.73	2.66	3.66	2.99	4.68	5.01	6.18
	2:10:00	0.00	0.00	1.39	2.11	2.91	2.31	3.60	3.76	4.65
	2:15:00	0.00	0.00	1.11	1.67	2.30	1.79	2.78	2.81	3.48
	2:20:00	0.00	0.00	0.88	1.32	1.80	1.39	2.13	2.07	2.57
	2:25:00	0.00	0.00	0.70	1.03	1.39	1.07	1.63	1.53	1.90
	2:30:00	0.00	0.00	0.55	0.80	1.06	0.82	1.23	1.16	1.43
	2:35:00	0.00	0.00	0.43	0.61	0.80	0.63	0.93	0.88	1.08
	2:40:00	0.00	0.00	0.33	0.46	0.60	0.48	0.70	0.67	0.83
	2:45:00	0.00	0.00	0.25	0.35	0.46	0.37	0.54	0.52	0.64
	2:50:00	0.00	0.00	0.19	0.26	0.35	0.28	0.41	0.40	0.49
	2:55:00	0.00	0.00	0.14	0.18	0.25	0.20	0.30	0.29	0.35
	3:00:00	0.00	0.00	0.09	0.12	0.17	0.14	0.20	0.20	0.24
	3:05:00	0.00	0.00	0.05	0.08	0.10	0.09	0.13	0.12	0.15
	3:10:00	0.00	0.00	0.03	0.04	0.05	0.05	0.07	0.06	0.08
	3:15:00	0.00	0.00	0.01	0.02	0.02	0.02	0.03	0.03	0.03
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Detention, Version 4.06 (July 2022)*

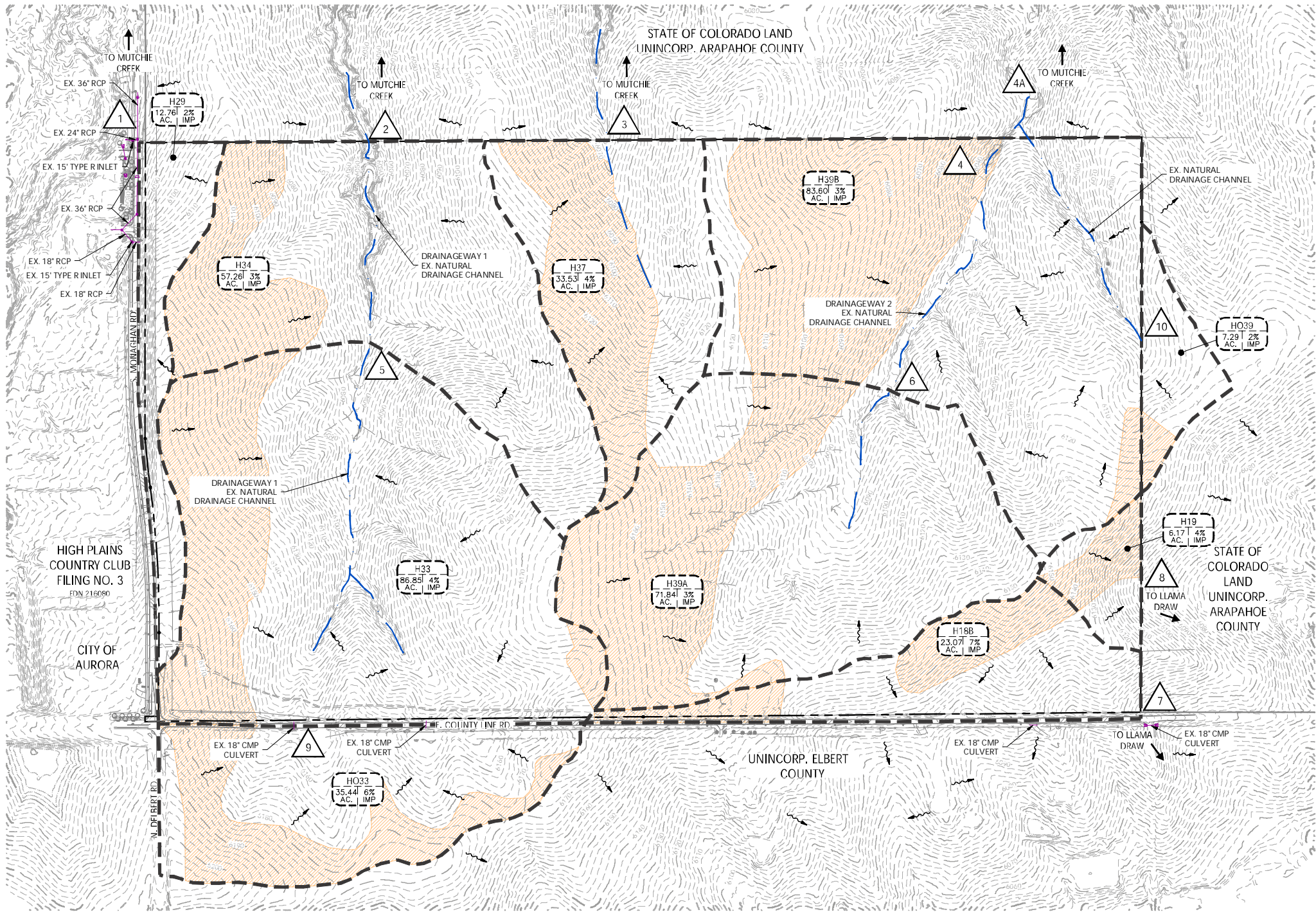
### Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

[illegible]





VICINITY MAP  
NOT TO SCALE

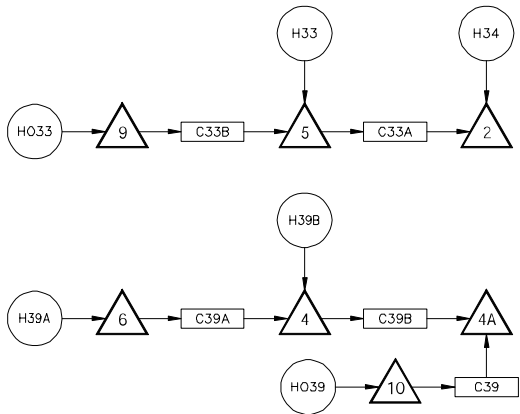
**LEGEND**

- Property Line
- Basin Boundary
- Ex. Major Contour (10')
- Ex. Minor Contour (2')
- Ex. Drainageway FL
- Ex. Storm Manhole
- Ex. Storm Sewer Line
- Flow Arrow
- Ex. Basin Designation
- Design Point
- Type C Soils
- See Master Drng. Note 8

**MASTER DRAINAGE NOTES:**

- CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
- STORM SEWER SYSTEMS, IN COMBINATION WITH THE STREETS, WILL BE SIZED FOR THE 100-YR STORM EVENT.
- STORM SEWER SHALL BE PUBLIC UNLESS LABELED AS PRIVATE.
- THE STORM SEWER SHOWN MAY NOT BE IN ITS FINAL LOCATION. ADDITIONAL STORM SEWER MAY BE REQUIRED AND WILL BE REFINED WITH THE PRELIMINARY DRAINAGE REPORT.
- DETENTION PONDS SHALL BE PRIVATE. MEP ELIGIBLE PONDENTS SHALL BE DESIGNED AT MINIMUM TO MEET MHFD STANDARDS. POND SHOWN ARE CONCEPTUAL ONLY. ACTUAL SIZE, SHAPE, AND LOCATION MAY VARY.
- CULVERTS SHALL BE PROVIDED WITH AN EMERGENCY OVERFLOW PATH THAT DOES NOT ENCROACH INTO ANY RESIDENTIAL LOTS.
- AT EACH CULVERT & DETENTION POND EMERGENCY SPILLWAY, THE ADJACENT FINISHED FLOOR ELEVATIONS WILL BE 1' ABOVE THE EMERGENCY WATER SURFACE ELEVATION OVER THE ROAD OR POND EMBANKMENT.
- SOIL TYPE IS MIXED, CONSISTING OF HYDROLOGIC TYPE B AND C SOILS. ANY AREA NOT SHOWN AS TYPE C SOIL IS TYPE B SOIL.
- DRAINAGEWAY 1 IS A MILE HIGH FLOOD DISTRICT MAINTENANCE ELIGIBLE STREAM CORRIDOR. IT WILL BE LOCATED WITHIN A SEPARATE TRACT AND OWNED BY THE CITY OF AURORA.
- DRAINAGEWAY 2 SHALL BE DESIGNED AS A PRIVATE OPEN CHANNEL PER CITY OF AURORA CRITERIA.

**EXISTING SWMM DIAGRAMS**



Existing Summary Runoff Table				
Design Point	Contributing Area	Routed Runoff (CFS)		
		Q2	Q10	Q100
1	H29	0.0	10.0	
2	H33, H34, HO33	4.9	312.5	
3	H37	1.0	52.0	
4	H39A, H39B	2.5	269.3	
4A	H39A, H39B, HO39	2.9	284.8	
5	H33, HO33	3.9	225.4	
6	H39A	2.0	121.0	
7	H18B	1.0	23.0	
8	H19	0.0	15.0	
9	HO33	2.0	81.0	
10	HO39	0.0	17.0	

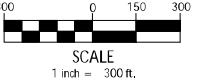
Basin Runoff Calculations - Direct Runoff										
										Project No.: 1002-98
										16-Dec-21
Basin ID	Design Point	Total Area (Ac.)	Imp (%)	Tp (min)		Runoff Coeff.			Peak Flow (cfs)	
				2-yr	100-yr	C <sub>2</sub>	C <sub>5</sub>	C <sub>100</sub>	Q <sub>2</sub>	Q <sub>100</sub>
Existing										
H18B	7	23.07	7%	44.0	54.0	0.22	0.23	0.29	1.0	23.0
H19	8	6.17	4%	31.0	36.0	0.20	0.22	0.28	0.0	15.0
H29	1	12.76	2%	45.0	63.0	0.15	0.16	0.20	0.0	10.0
H33	5	86.85	4%	38.0	43.0	0.18	0.19	0.24	3.0	149.0
H34	2	57.26	3%	39.0	45.0	0.17	0.18	0.23	1.0	88.0
H37	3	33.53	4%	39.0	44.0	0.20	0.22	0.28	1.0	52.0
H39A	6	71.84	3%	38.0	43.0	0.19	0.20	0.26	2.0	121.0
H39B	4	83.60	3%	36.0	42.0	0.19	0.20	0.26	2.0	156.0
HO33	9	35.44	6%	32.0	37.0	0.21	0.23	0.28	2.0	81.0
HO39	10	7.29	2%	31.0	36.0	0.16	0.18	0.22	0.0	17.0
										2 Year P <sub>1</sub> = 0.99
										5 Year P <sub>1</sub> = 1.39
										100 Year P <sub>1</sub> = 2.65

**PROJECT BENCHMARK:**

BM: 5565295E001  
RECOVERED 3" BRASS CAP LOCATED ON THE SOUTHEASTERLY CORNER OF CURB OPENING INLET ON THE EASTERLY SIDE OF SMOKY HILL ROAD AND BEING NEARLY ON A PROJECTED LINE WITH THE SOUTHEASTERLY BOUNDARY OF SERENITY RIDGE FILING NO. 3 AND THE NORTH-WESTERLY BOUNDARY OF SERENITY RIDGE FILING NO. 1.  
DATUM ELEV. = 6145.93' (NAVD 88)

Approved For One Year From This Date  
08/05/2022

City Engineer  
Water Department  
Date  
07/26/2022  
08/04/2022



Know what's below.  
Call before you dig.



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Westminster, CO 80234  
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www.innovativelandinc.com

Revision Type:		Revision:		Revision:	
No.	Rev. Date:	No.	Rev. Date:	No.	Rev. Date:
1		2		3	
4		5		6	
Designed By: XWL		Prepared By: XWL		Approved By: TTH	
Date: July 22, 2022		Date: July 22, 2022		Date: July 22, 2022	
Horizontal Scale: 1" = 300'		Horizontal Scale: 1" = 300'		Horizontal Scale: 1" = 300'	
Vertical Scale: N/A		Vertical Scale: N/A		Vertical Scale: N/A	
Job No.: 1002-98		Job No.: 1002-98		Job No.: 1002-98	

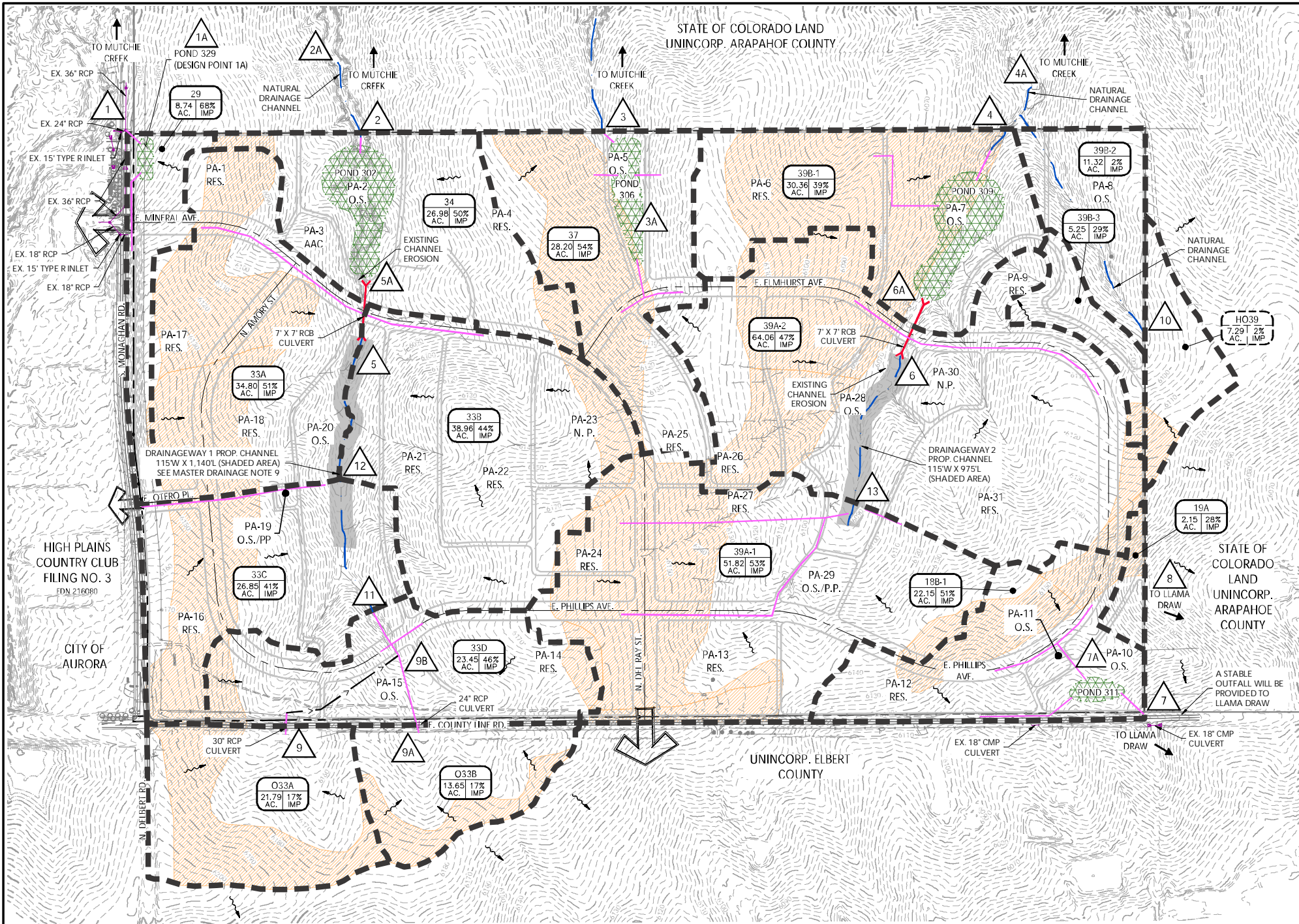
Trails at Overland Ranch

Aurora, Colorado

Master Drainage Plans

Master Drainage Plan - Existing Conditions

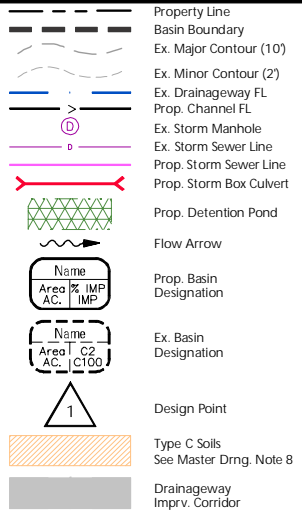




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- STORM SEWER SHALL BE PUBLIC UNLESS LABELED AS PRIVATE.
- THE STORM SEWER SHOWN MAY NOT BE IN ITS FINAL LOCATION. ADDITIONAL STORM SEWER MAY BE REQUIRED AND WILL BE REFINED WITH THE PRELIMINARY DRAINAGE REPORT.
- DETENTION PONDS SHALL BE PRIVATE. MEP ELIGIBLE PONDS SHALL BE DESIGNED AT MINIMUM TO MEET MHFD STANDARDS. PONDS SHOWN ARE CONCEPTUAL ONLY. ACTUAL SIZE, SHAPE, AND LOCATION MAY VARY.
- CULVERTS SHALL BE PROVIDED WITH AN EMERGENCY OVERFLOW PATH THAT DOES NOT ENCRUMB TO ANY RESIDENTIAL LOTS.
- AT EACH CULVERT & DETENTION POND EMERGENCY SPILLWAY, THE ADJACENT FINISHED FLOOR ELEVATIONS WILL BE 1' ABOVE THE EMERGENCY WATER SURFACE ELEVATION OVER THE ROAD OR POND EMBANKMENT.
- SOIL TYPE IS MIXED, CONSISTING OF HYDROLOGIC TYPE B AND C SOILS. ANY AREA NOT SHOWN AS TYPE C SOIL IS TYPE B SOIL.
- DRAINAGEWAY 1 IS A MILE HIGH FLOOD DISTRICT MAINTENANCE ELIGIBLE STREAM CORRIDOR. IT WILL BE LOCATED WITHIN A SEPARATE TRACT AND OWNED BY THE CITY OF AURORA.
- DRAINAGEWAY 2 SHALL BE DESIGNED AS A PRIVATE OPEN CHANNEL PER CITY OF AURORA CRITERIA.

LEGEND



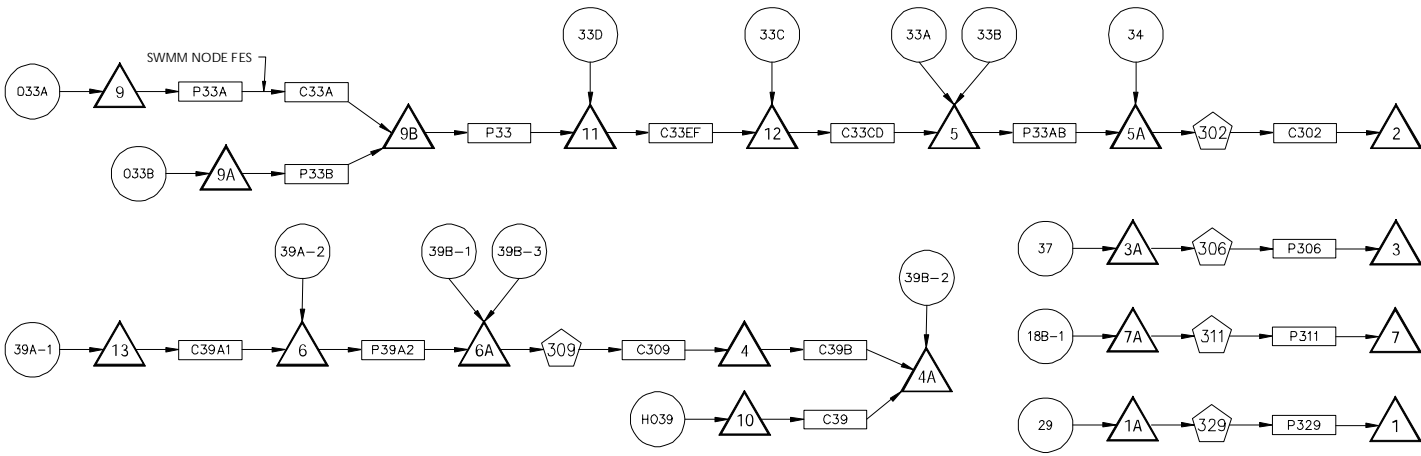
Runoff Comparison Table						
Design Point	Existing			Proposed		
	Contrib. Basin	Q <sub>2</sub>	Q <sub>100</sub>	Contrib. Basin	Pre-Detention	Detained
1	H29	0.0	10.0	29	9.0	34.0
2	H33, H34, HO33	4.9	312.5	33A, 33B, 33C, 33D, 34, O33A, O33B	89.4	522.9
3	H37	1.0	52.0	37	17.0	76.0
4	H39A, H39B	2.8	269.3	39A-1, 39A-2, 39B-1, 39B-2, 39A-1, 39A-2, 39B-1, 39B-2, 39B-3, HO39	98.0	508.7
4A	H39A, H39B, HO39	2.9	284.8	33A, 33B, 33C, 33D, O33A, O33B	0.4	151.2
5	H33, HO33	3.9	225.4	O33A, O33B	74.9	451.1
6	H39A	2.0	121.0	39A-1, 39A-2	81.8	409.3
7	H18B	1.0	23.0	18B-1	12.0	59.0
8	H19	0.0	15.0	19A	1.0	8.0
9 (9B)	HO33	2.0	81.0	O33A, O33B	6.6	82.4
10	HO39	0.0	17.0	HO39	0.0	17.0

Basin Runoff Calculations - Direct Runoff

Basin ID	Design Point	Total Area (Ac.)	Imp (%)	Time Peak (min)		Runoff Coeff.			Peak Flow (cfs)	
				2-yr	100-yr	C <sub>2</sub>	C <sub>5</sub>	C <sub>100</sub>	Q <sub>2</sub>	Q <sub>100</sub>
Proposed										
18B-1	7	22.15	51%	32.0	37.0	0.42	0.47	0.60	12.00	59.00
19A	8	2.15	28%	30.0	35.0	0.28	0.31	0.40	1.00	8.00
29	1	8.74	68%	30.0	35.0	0.54	0.58	0.71	9.00	34.00
33A	5	34.80	51%	30.0	35.0	0.41	0.45	0.58	27.00	127.00
33B	5	38.96	44%	31.0	37.0	0.36	0.41	0.59	21.00	113.00
33C	12	26.85	41%	32.0	37.0	0.36	0.40	0.51	12.00	68.00
33D	11	23.45	46%	31.0	36.0	0.39	0.43	0.54	14.00	72.00
34	5A	26.98	50%	32.0	37.0	0.42	0.46	0.60	15.00	72.00
37	3	28.20	54%	32.0	37.0	0.43	0.47	0.61	17.00	76.00
39A-1	13	51.82	53%	31.0	36.0	0.42	0.47	0.62	37.00	171.00
39A-2	6	64.06	47%	30.0	35.0	0.38	0.43	0.57	49.00	246.00
39B-1	6A	30.36	39%	31.0	36.0	0.38	0.41	0.52	15.00	92.00
39B-2	4A	11.32	2%	35.0	41.0	0.15	0.16	0.20	0.00	19.00
39B-3	6A	5.25	29%	39.0	45.0	0.28	0.31	0.41	1.00	8.00
O33A	9	21.79	17%	32.0	39.0	0.32	0.36	0.61	4.00	49.00
O33B	9A	13.65	17%	31.0	36.0	0.32	0.37	0.61	3.00	34.00

\*Note Pond 302 information includes offsite Basins O33A & O33B

PROPOSED SWMM DIAGRAMS



Outfall Runoff Comparison Table				
Design Point	Existing		Proposed (Detained)	
	Q <sub>2</sub>	Q <sub>100</sub>	Q <sub>2</sub>	Q <sub>100</sub>
1	0.0	10.0	N/A	7.4
2	4.9	312.5	N/A	127.9
3	1.0	52.0	N/A	23.4
4	2.8	269.3	N/A	128.3
7	1.0	23.0	N/A	10.5
8	0.0	15.0	1.0	8.0

Detention Pond Table

		Pond Name			
Desc.	Units	302***	306	309	311
Area	Acre	186.48	28.20	151.49	22.15
MEP Eligible**		Yes	No	Yes	No
Imperv.	%	41%	54%	47%	51%
WQCV	Acre-Ft	3.66	0.58	2.99	0.46
EURV	Acre-Ft	8.73	1.49	7.48	1.21
100-yr	Acre-Ft	19.48	2.83	15.74	2.78
100-Yr +1/2 EURV	Acre-Ft	23.65	3.58	19.48	3.39
Hist. Release Rate	CFS	312.50	52.00	264.80	23.00
Aurora Release Rate	CFS	158.51	23.97	128.77	18.83
Allow. Release Rate	CFS	158.51	23.97	128.77	10.83*

\*Pond 311 Allowable Release Rate reduced to account for Basin 19A free release rate

\*\*MEP - MHFD Maintenance Eligibility Program

\*\*\*Pond 302 contributing area & imperv. includes offsite Basins O33A & O33B

FACSIMILE

This electronic plan is a facsimile of the signed and sealed pdf set

*Xylina Warren-Laird* Date: 7/22/2022  
Xylina Warren-Laird, PE

PROJECT BENCHMARK:

BM: 556529SE001  
RECOVERED 3" BRASS CAP LOCATED ON THE SOUTHEASTERLY CORNER OF CURB OPENING INLET ON THE EASTERLY SIDE OF SMOKY HILL ROAD AND BEING NEARLY ON A PROJECTED LINE WITH THE SOUTHEASTERLY BOUNDARY OF SERENITY RIDGE FILING NO. 3 AND THE NORTHWESTERLY BOUNDARY OF SERENITY RIDGE FILING NO. 1.

DATUM ELEV. = 6145.93' (NAVD 88)



12071 Tejon Street, Suite 470  
Westminster, CO 80234  
303.421.4224  
www.innovativelandinc.com

Revision Type:		Revision:		Revision:	
No.	Rev. Date:	No.	Rev. Date:	No.	Rev. Date:
1		2		3	
4		5		6	

Design: July 22, 2022  
Prepared By: XWL  
Horr. Scale: 1" = 300'  
Vert. Scale: N/A  
Approved By: TTH

Sheet: 2 of 2  
Job No.: 1002-98

Trails at Overland Ranch

Aurora, Colorado

Master Drainage Plans

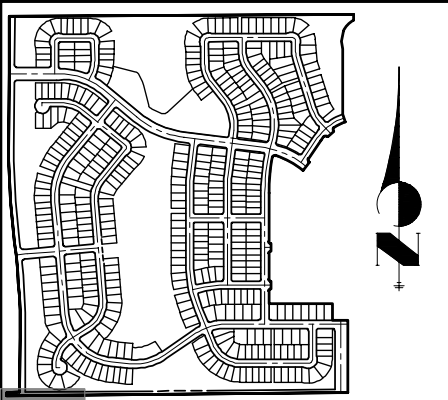
Master Drainage Plan - Proposed Conditions



Know what's below.  
Call before you dig.

Sheet: 2





## KEY MAP

SCALE: 1"=700'

### LEGEND:

- 6100 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 6100 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- DRAINAGE BASIN
- DRAINAGE SUB-BASIN
- A = BASIN DESIGNATION
- B = AREA IN ACRES
- C = 2-YR RUNOFF COEFFICIENT
- D = 100-YR RUNOFF COEFFICIENT
- DESIGN POINT
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- PROPOSED FLOODPLAIN
- 100YR PROPOSED EASEMENT
- PROPOSED TOP OF SLOPE
- PROPOSED TOE OF SLOPE
- OVERLAND RANCH FILING 1 STORM
- COUNTY LINE RD STORM
- BY OTHERS STORM

### NOTE:

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### BENCHMARK:

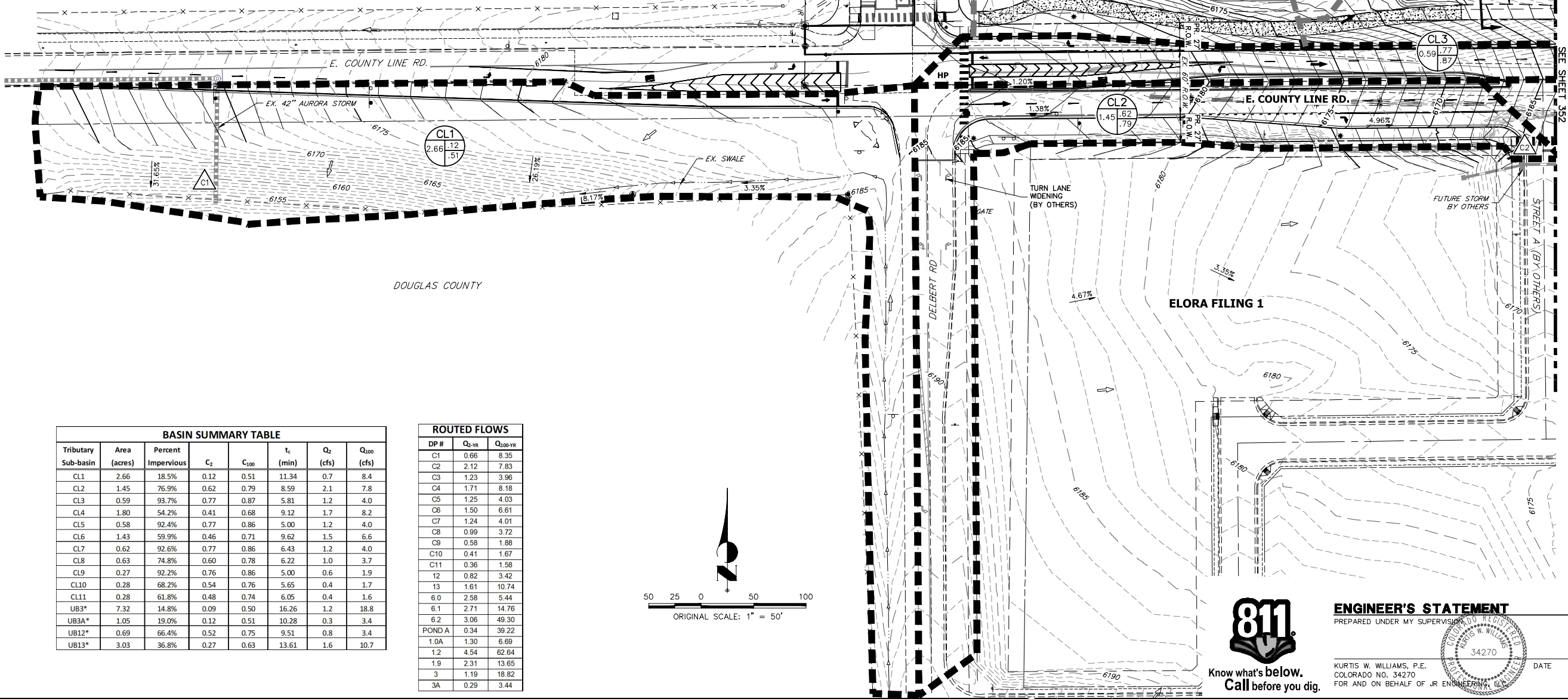
COA ID 556532NE004-3" BRASS CAP ON THE SELY CORNER OF A CURB OPENING INLET STRUCTURE BEING ON THE EASTERLY SIDE OF SMOKEY HILL ROAD AND BEING NEARLY ON A PROJECTED LINE WITH THE SELY BOUNDARY OF SERENITY RIDGE SUBD. FILING NO. 3 & THE NWLY BDY OF SERENITY RIDGE FILING NO. 1. NAVD88 ELEVATION=6095.997.

### BASIS OF BEARINGS:

THE WEST LINE OF THE SOUTHWEST 1/4 OF SECTION 34, TOWNSHIP 5 SOUTH, RANGE 65 WEST OF THE 6TH P.M. BEING MONUMENTED BY A 3.25" ALUMINUM CAP STAMPED "LS 25942" AT THE WEST 1/4 CORNER AND A3.25" ALUMINUM CAP STAMPED "LS 38098" AT THE SOUTHWEST CORNER, SAID LINE BEARING S00°23'41"W AS REFERENCED TO COLORADO STATE PLANE CENTRAL ZONE NAVD88 ELEVATION: 6145.93

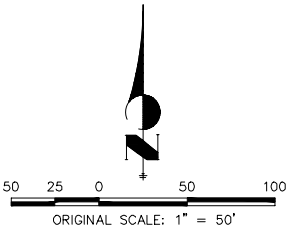
LENNAR COLORADO LLC  
LAND USE: HIGH PLAINS (BLACKSTONE)  
COUNTRY CLUB  
ZONING: R-1

HIGH PLAINS COUNTRY CLUB FILING NO. 3  
EDN 206088



BASIN SUMMARY TABLE							
Tributary Sub-basin	Area (acres)	Percent Impervious	C <sub>2</sub>	C <sub>100</sub>	t <sub>c</sub> (min)	Q <sub>2</sub> (cfs)	Q <sub>100</sub> (cfs)
CL1	2.66	18.5%	0.12	0.51	11.34	0.7	8.4
CL2	1.45	76.9%	0.62	0.79	8.59	2.1	7.8
CL3	0.59	93.7%	0.77	0.87	5.81	1.2	4.0
CL4	1.80	54.2%	0.41	0.68	9.12	1.7	8.2
CL5	0.58	92.4%	0.77	0.86	5.00	1.2	4.0
CL6	1.43	59.9%	0.46	0.71	9.62	1.5	6.6
CL7	0.62	92.6%	0.77	0.86	6.43	1.2	4.0
CL8	0.63	74.8%	0.60	0.78	6.22	1.0	3.7
CL9	0.27	92.2%	0.76	0.86	5.00	0.6	1.9
CL10	0.28	68.2%	0.54	0.76	5.65	0.4	1.7
CL11	0.28	61.8%	0.48	0.74	6.05	0.4	1.6
UB3*	7.32	14.8%	0.09	0.50	16.26	1.2	18.8
UB3A*	1.05	19.0%	0.12	0.51	10.28	0.3	3.4
UB12*	0.69	66.4%	0.52	0.75	9.51	0.8	3.4
UB13*	3.03	36.8%	0.27	0.63	13.61	1.6	10.7

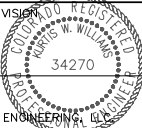
ROUTED FLOWS			
DP #	Q <sub>2-YR</sub>	Q <sub>100-YR</sub>	
C1	0.66	8.35	
C2	2.12	7.83	
C3	1.23	3.96	
C4	1.71	8.18	
C5	1.25	4.03	
C6	1.50	6.61	
C7	1.24	4.01	
C8	0.99	3.72	
C9	0.58	1.88	
C10	0.41	1.67	
C11	0.36	1.58	
12	0.82	3.42	
13	1.61	10.74	
6.0	2.58	5.44	
6.1	2.71	14.76	
6.2	3.06	49.30	
POND A	0.34	39.22	
1.0A	1.30	6.69	
1.2	4.54	62.64	
1.9	2.31	13.65	
3	1.19	18.82	
3A	0.29	3.44	



### ENGINEER'S STATEMENT

PREPARED UNDER MY SUPERVISION

KURTIS W. WILLIAMS, P.E.  
COLORADO NO. 34270  
FOR AND ON BEHALF OF JR ENGINEERING



DATE

OVERLAND RANCH FILING NO. 1

ULTIMATE COUNTY LINE RD DRAINAGE

SHEET 351

JOB NO. 16118.10

PREPARED FOR

JEN COLORADO 19 LLC  
680 5TH AVE FL 25  
NEW YORK, NY 10019  
CONTACT: JERRY RICHMOND  
303-267-6255

JR ENGINEERING  
A Westman Company



Central 303-740-0808 • Colorado Springs 719-539-2593  
Fort Collins 970-491-9888 • www.jrengineering.com

BY DATE

No. REVISION

H-SCALE 1"=50'

V-SCALE N/A

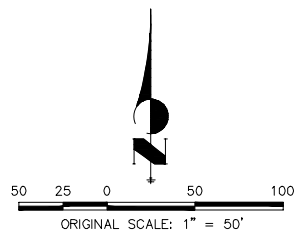
DATE 6/19/24

DESIGNED BY WKN

DRAWN BY MMC

CHECKED BY





**NOTE:**  
ALL STORM INFRASTRUCTURE IS PUBLIC, UNLESS STATED OTHERWISE, AND DESIGNED FOR THE 100Y STORM EVENT.

**BENCHMARK:**  
COA ID 556532NE04-3" BRASS CAP ON THE SELY CORNER OF A CURB OPENING INLET STRUCTURE BEING ON THE EASTERLY SIDE OF SMOKY HILL ROAD AND BEING NEARLY ON A PROJECTED LINE WITH THE SELY BOUNDARY OF SERENITY RIDGE SUBD. FILING NO. 3 & THE NWLY Bdy OF SERENITY RIDGE FILING NO. 1. NAVD88 ELEVATION=6093.997.

**BASIS OF BEARINGS:**  
THE WEST LINE OF THE SOUTHWEST 1/4 OF SECTION 34, TOWNSHIP 5 SOUTH, RANGE 65 WEST OF THE 6TH P.M. BEING MONUMENTED BY A 3.25" ALUMINUM CAP STAMPED "LS 25942" AT THE WEST 1/4 CORNER AND A3.25" ALUMINUM CAP STAMPED "LS 38098" AT THE SOUTHWEST CORNER, SAID LINE BEARING S00°23'41"W AS REFERENCED TO COLORADO STATE PLANE CENTRAL ZONE NAVD88 ELEVATION: 6145.93

- LEGEND:**
- 6100 PROPOSED MAJOR CONTOUR
  - 6100 PROPOSED MINOR CONTOUR
  - 6100 EXISTING MAJOR CONTOUR
  - 6100 EXISTING MINOR CONTOUR
  - DRAINAGE BASIN
  - DRAINAGE SUB-BASIN
  - A BASIN DESIGNATION
  - B AREA IN ACRES
  - C 2-YR RUNOFF COEFFICIENT
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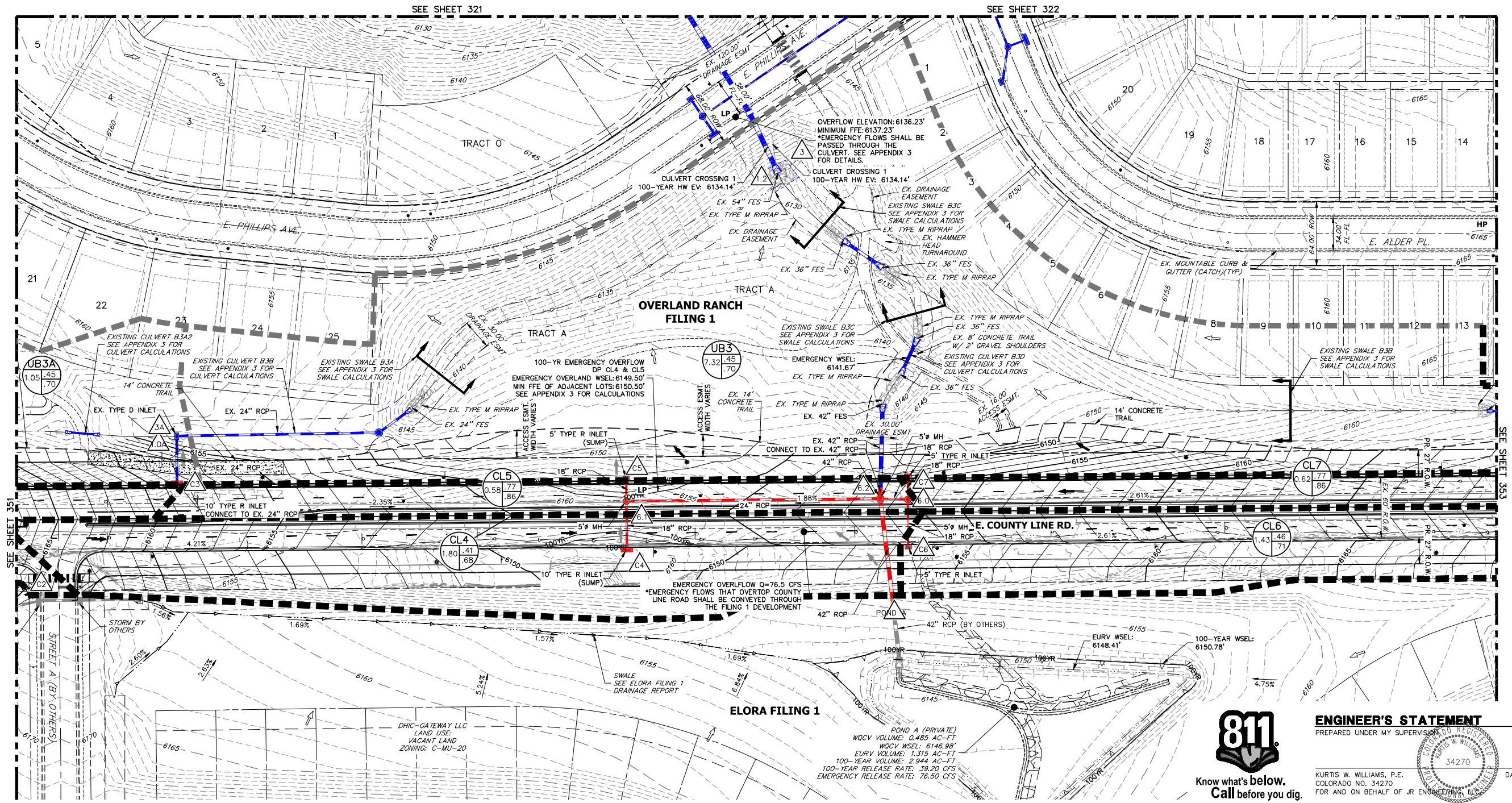


UNTIL SUCH TIME AS THE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR  
**JEN COLORADO 19 LLC**  
680 5TH AVE FL 25  
NEW YORK, NY 10019  
CONTACT: JERRY RICHMOND  
303-267-6255

**JR ENGINEERING**  
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Central 303-740-0808 • Colorado Springs 719-539-2593  
Fort Collins 970-491-9888 • [www.jrengineering.com](http://www.jrengineering.com)



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PREPARED UNDER MY SUPERVISION

**KURTIS W. WILLIAMS, P.E.**  
COLORADO NO. 34270  
FOR AND ON BEHALF OF JR ENGINEERING, INC.

DATE

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ULTIMATE COUNTY LINE RD DRAINAGE			V-SCALE N/A					
			DATE 6/19/24					
			DESIGNED BY WKN					
			DRAWN BY MMC					
			CHECKED BY					
SHEET 352								
JOB NO. 16118.10								

NOTE:

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BENCHMARK:

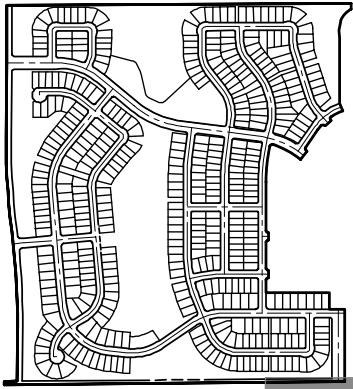
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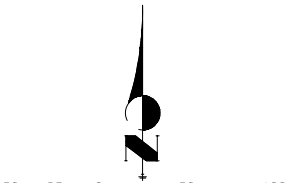
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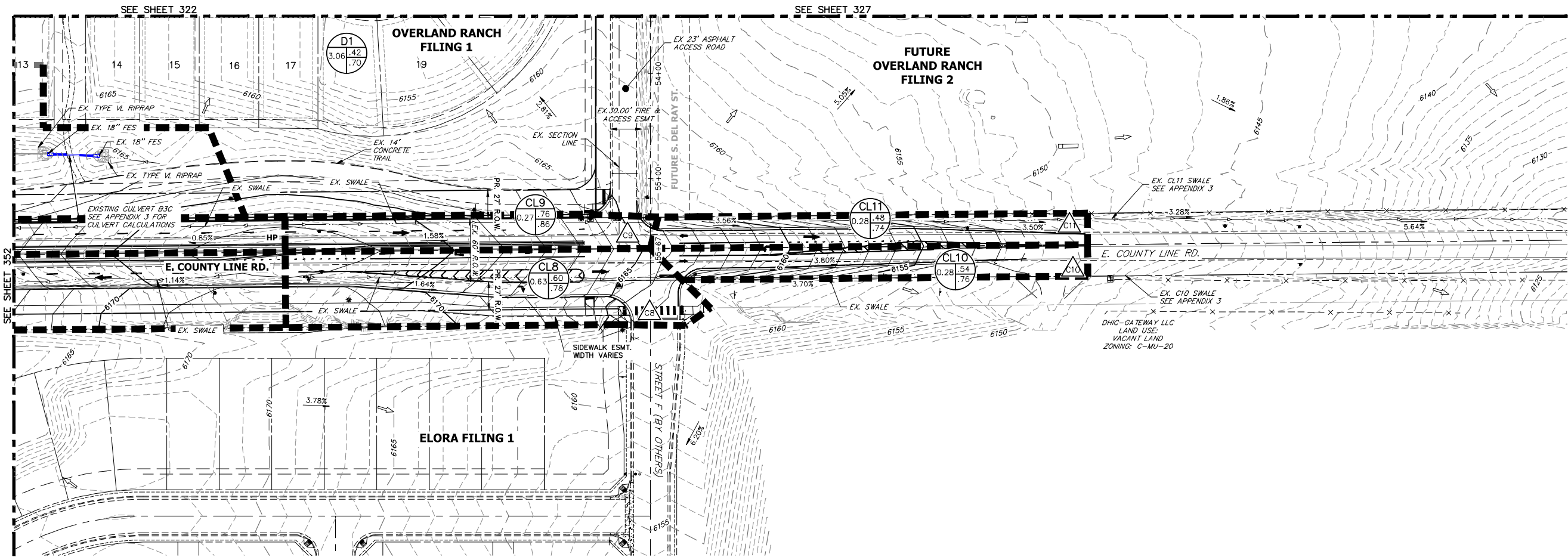


KEY MAP

SCALE: 1"=700'



ORIGINAL SCALE: 1" = 50'



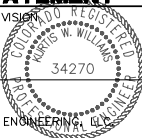
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COLORADO NO. 34270  
FOR AND ON BEHALF OF JR ENGINEERING

DATE



UNTIL SUCH TIME AS  
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AGENCIES, JR ENGINEERING  
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ONLY FOR THE PURPOSES  
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NEWYORK, NY 10019  
CONTACT: JERRY RICHMOND  
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BY	DATE	No.	REVISION

OVERLAND RANCH FILING NO. 1	DESIGNED BY WKN	CHECKED BY MMC
ULTIMATE COUNTY LINE RD DRAINAGE		
SHEET 353		
JOB NO. 16118.10		

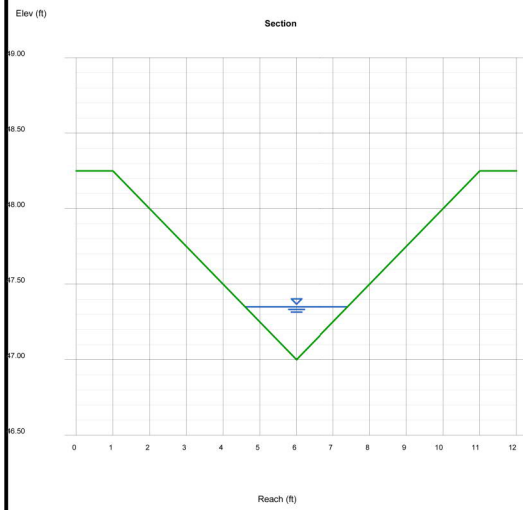


## Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Tuesday, Jul 30 2002

<b>Triangular</b>	
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 6147.00
Slope (%)	= 5.00
N-Value	= 0.030
<b>Calculations</b>	
Compute by:	Known Q
Known Q (cfs)	= 1.64

<b>Highlighted</b>	
Depth (ft)	= 0.35
Q (cfs)	= 1.640
Area (sqft)	= 0.49
Velocity (ft/s)	= 3.35
Wetted Perim (ft)	= 2.89
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 2.80
EGL (ft)	= 0.52

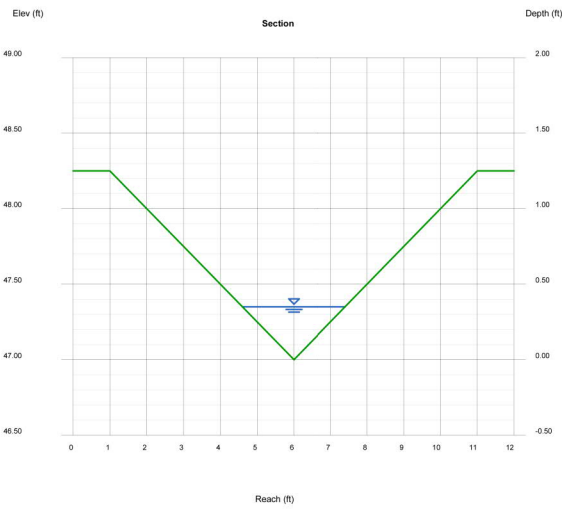


## Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Tuesday, Jul 30 2022

<b>Triangular</b>	
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 6147.00
Slope (%)	= 5.00
N-Value	= 0.030
<b>Calculations</b>	
Compute by:	Known Q
Known Q (cfs)	= 1.61

<b>Highlighted</b>	
Depth (ft)	= 0.35
Q (cfs)	= 1.610
Area (sqft)	= 0.49
Velocity (ft/s)	= 3.29
Wetted Perim (ft)	= 2.89
Crit Depth, Yc (ft)	= 0.40
Top Width (ft)	= 2.80
EGL (ft)	= 0.52



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SHEET 354		OVERLAND RANCH FILING NO. 1		H-SCALE		N/A		No.		REVISION		BY		DATE	
JOB NO. 16118.10		ULTIMATE COUNTY LINE RD DRAINAGE		V-SCALE		N/A									
				DATE		6/19/24									
				DESIGNED BY		WKN									
				DRAWN BY		MMC									
				CHECKED BY											



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PREPARED UNDER MY SUPERVISION

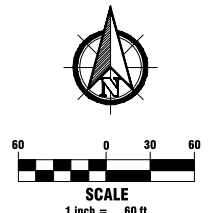
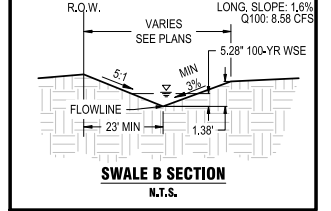
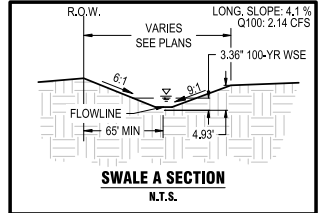
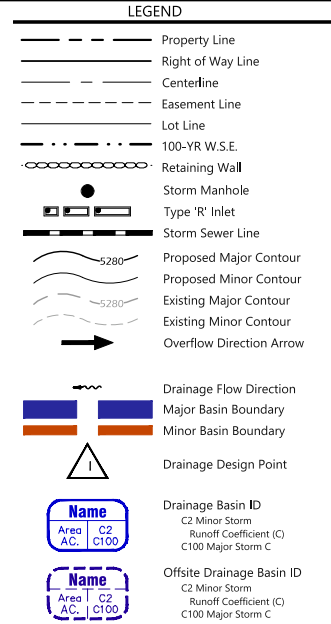
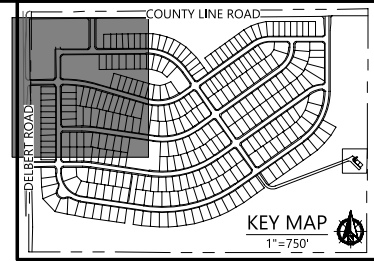
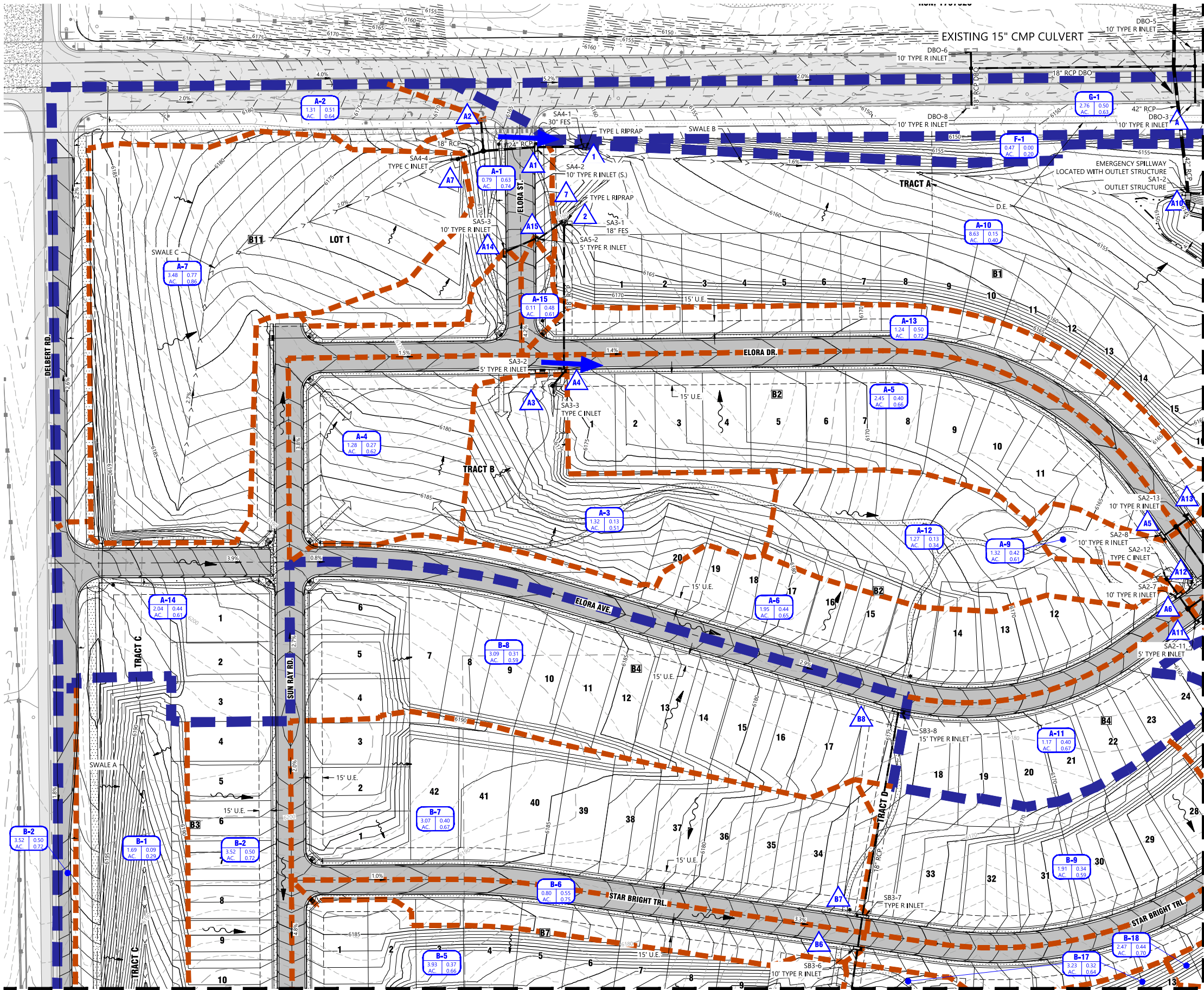
KURTIS W. WILLIAMS, P.E.  
COLORADO NO. 34270  
FOR AND ON BEHALF OF

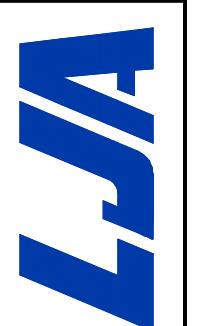
DATE \_\_\_\_\_





L:\JOB FOLDERS\1084-0001\PROD\DRAINAGE\FINAL\ELORA-PROPOSED DRAINAGE PLAN PRINTED ON: 8/1/2024 8:45 PM





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No.	Rev.	Date:	Revision Type:
1			
2			
3			
4			
5			


Proj. Name: Elora Filing No. 1

Location: Elbert County, Colorado

Plan Set: Phase III Drainage Report

Sheet Name: Proposed Drainage Plan

NOT FOR CONSTRUCTION



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No.	Rev.	Date:	Revision Type:
1			
2			
3			
4			
5			

Job No.: 1084-0001

Job Title: ARV

Scale Horiz: 1" = 60'

Scale Vert: N/A

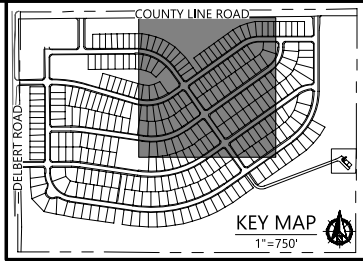
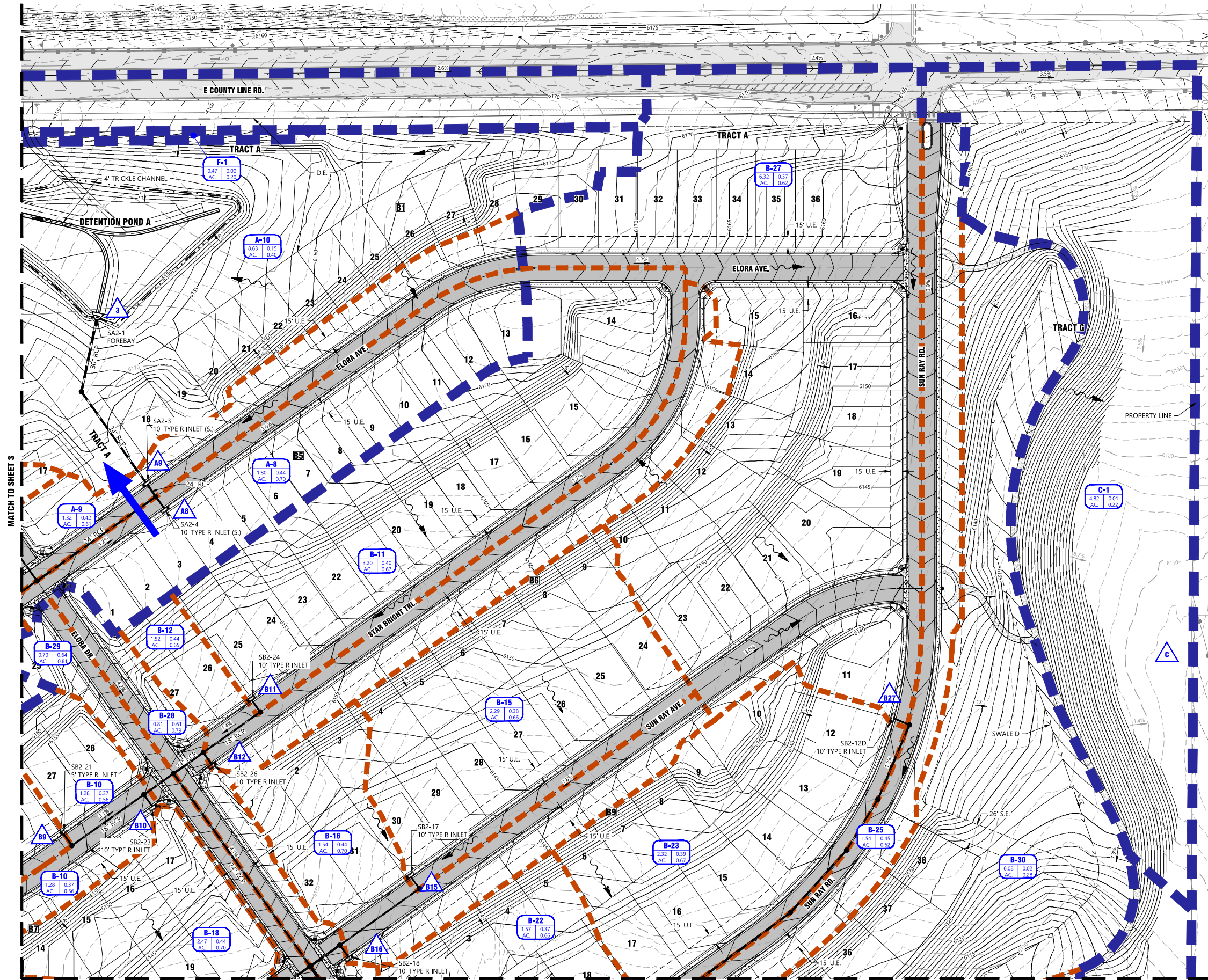
3 of 7

Sheet: 3

Date: -----



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- LEGEND**
- Property Line
  - Right of Way Line
  - Centerline
  - Easement Line
  - Lot Line
  - 100-YR W.S.E.
  - Retaining Wall
  - Storm Manhole
  - Type 'R' Inlet
  - Storm Sewer Line
  - Proposed Major Contour
  - Proposed Minor Contour
  - Existing Major Contour
  - Existing Minor Contour
  - Overflow Direction Arrow
  - Drainage Flow Direction
  - Major Basin Boundary
  - Minor Basin Boundary
  - Drainage Design Point
  - Drainage Basin ID  
C2 Minor Storm  
Runoff Coefficient (C)  
C100 Major Storm C
  - Offsite Drainage Basin ID  
C2 Minor Storm  
Runoff Coefficient (C)  
C100 Major Storm C



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Revision Type:		Revision:		Revision Date:		Revision Description:	
1							
2							
3							
4							
5							
6							

Job No. 1084-0001  
Scale Horiz: 1" = 60'  
Scale Vert: N/A

Designed: ARV  
Prepared: ARV  
Approved: ARV

Sheet: 4 of 7  
Date: 8/1/2024

Elora Filing No. 1  
Elbert County, Colorado  
Phase III Drainage Report  
Proposed Drainage Plan

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