Part II

MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT

For

SHILOH MESA AT WOODMEN HEIGHTS

And

FINAL DRAINAGE REPORT

For

SHILOH MESA COMMERCIAL FILING NO. 1

Prepared for:
City of Colorado Springs
Engineering Development Review Division Team
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July 2019

Project No. 18.469.006

APPENDIX A - Part II

HYDROLOGIC AND HYDRAULIC CALCULATIONS

Project Name:	Shiloh Mesa MDDP Amendment
Project Location:	NE Colorado Springs
Designer	JTS
Notes:	Existing Conditions

Average Channel Velocity 5 ft/s (If specific channel vel is used, this will be ignored)
Average Slope for Initial Flow 0.04 ft/ft (If Elevations are used, this will be ignored)
Note:
Q2, Q5 & Q10 are based on C10;
Q25, Q50 & Q100 are based on C100

	Area		Rational 'C' Values								Flow Lengths				Initial Flow				Channel Flow					Tc	Rainfall Intensity & Rational Flow Rate					
			Surface Type 1 (Historic Flow: Greenbelts)			Surface Type 2 (Imperv: Pavement, etc.)			Composite		Initial	True Initial	Channel	True Channel	High Point	Low Point	Average	Initial	High Point	Low Point	Average	Velocity	Channel	Total	i2	Q2	i5	Q5	i100	Q100
Basin	sf	acres	C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	ft	Length ft	ft	Length ft	Elevation	Elevation	Slope	Tc (min)	Elevation	Elevation	Slope	(ft/s)	Tc (min)	(min)	in/hr	cfs	in/hr	cfs	in/hr	cfs
L (OS2+OS4) (MDDP-F1)	111514	2.56	0.08	0.36		0.90	0.96	111514	0.90	0.96													0.0	5.0				9.6		18.1
											950	300	758	1408	6942	6914	0.029	23.0	6914	6897	0.022		4.7	27.7	1.6	4.3	2.0	5.6	4.3	53.1
EX 1	1481911	34.02	0.08	0.36	1481911	0.90	0.96	0	0.08	0.36	315	300	633	648	6936	6912	0.076	16.8	6912	6911	0.002	5.0	2.2	18.9	1.9	2.2	2.5	2.9	5.3	27.5
EX2	627707	14.41	0.08	0.36	627707	0.90	0.96	0	0.08	0.36																				
Total Area =	2221132	50.99																												

Project Name:	Shiloh Mesa MDDP Amendment
Project Location:	NE Colorado Springs
Designer	JTS
Notes:	Proposed Conditions

Average Channel Velocity: 5 ft/s (If specific channel vel is used, this will be ignored)
Average Slope for Initial Flow: 0.04 ft/ft (If Elevations are used, this will be ignored)

(If specific channel vel is used, this will be ignored)
(If Elevations are used, this will be ignored)

Basin	Description	Area sf	Area acres	Rational 'C' Values: Surface Type 1 (Commercial Areas) 95% Impermeable C5	C100	Area (SF)	Surface Type 2 (Neighborhood Areas) 85% Impermeable C5	C100	Area (SF)	Surface Type 3 (Parks & Cemeteries) 7% Impervious C5	C100	Area	Surface Type 4 (Residential 1/8th Acre) 65% Impervious C5	C100	Area	Surface Type 5 (Paved Streets) 100% Impermeable C5	C100	Area	Composite C5	Composite C100	Flow Lengths: Initial ft	True Initial Length ft	Channel ft	True Channel Length ft	Initial Flow: High Point Elevation	Low Point Elevation	Average Slope	Initial Tc (min)	Channel Flow: High Point Elevation	Low Point Elevation	Average Slope	Velocity (ft/s)	Channel Tc (min)	Tc: Total (min)	Rainfall Intensity & Rational Flow Rate: i2 in/hr	i5 in/hr	Q5 cfs	i10 in/hr	Q10 cfs	i25 in/hr	Q25 cfs	i50 in/hr	Q50 cfs	i100 in/hr	Q100 cfs	SWMM Values: Q5 cfs	Q100 cfs
A	Enclaves at Shiloh Mesa	307974	7.07	0.81	0.88	0	0.68	0.78	0	0.12	0.39	113519	0.5	0.59	0	0.9	0.96	194454.8	0.82	0.75	50	50	670	670	6932	6930	0	4	6930	6913	0		2	6	3	5	21.24	5	21	6	32	7	38	8	43.69	N/A	N/A
B	Shiloh Mesa Filing No. 5	426667	9.79	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	361667	0.9	0.96	0	0.40	0.56	50	50	1470	1470	6938.4	6937.38	0	2	6937	6924	0		3	5	3	5	24.33	5	24	6	33	7	39	9	45.11	21.58	51.90
C1	WVC	234020	5.37	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	234020	0.90	0.96	12	12	285	285	6930	6929.76	0	1	6930	6924	0		1	5	3	5	1.63	5	1	6	2	7	2	9	2.82	1.51	3.58
C2	WVC	15945	0.37	0.81	0.88	15945	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0	0.81	0.88	12																												
D1	Commercial Filing No. 1: North Half of Shiloh Mesa Drive	15298	0.35	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	15298	0.90	0.96	70	70	390	390	6926.7	6923.49	0	2	6923	6912	0		1	5	3	5	1.63	5	2	6	2	7	3	9	2.95		
D2	Commercial Filing No. 1: South Half of Shiloh Mesa Drive	17506	0.40	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	17506	0.90	0.96	69	69	394	394	6926.7	6924.26	0	2	6924	6901.88	0		1	5	3	5	1.88	5	2	6	2	7	3	9	3.37		
E1	Commercial Filing No. 1: Lot 7	35846	0.82	0.81	0.88	35846	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0	0.81	0.88	50	50	392	392	6915	6914	0	3	6914	6910	0		1	5	3	5	3.43	5	3	6	5	7	5	9	6.33		
	Future Lot 7 Detention Discharge																																			0.20								1.20		
E2	Commercial Filing No. 1: Lot 8	35755	0.82	0.81	0.88	35755	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0	0.81	0.88	13	13	162	162	6909	6908.74	0	2	6909	6903	0		1	5	3	5	3.42	5	3	6	5	7	5	9	6.32	N/A	N/A
	Future Lot 8 Detention Discharge																																	0.20										
F1A	Geraldine Point to Inlet F1	13738	0.32	0.81	0.88	1338	0.68	0.78		0.12	0.39		0.5	0.59		0.9	0.96	12400	0.90	0.96	13	13	163	163	6909	6908.74	0	1	6909	6904	0		1	5	3	5	1.46	5	1	6	2	7	2	9	2.65		
F1	Commercial Filing No. 1: Lot 9 & Geraldine Point	52672	1.21	0.81	0.88	40272	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	12400	0.84	0.90	13	13	194	194	6909	6908.74	0	1	6909	6903	0		1	5	3	5	5.23	5	5	6	7	7	8		9.52		
	Future Lot 9 & Geraldine Detention Discharge																																	0.20								1.70		
F2	Commercial Filing No. 1: Lot 10	89348	2.05	0.81	0.88	89348	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0	0.81	0.88	50	50	570	570	6910	6909	0	3	6909	6903	0		2	5	3	5	8.55	5	6	6	12	7	[illegible]	9	15.79		
	Future Lot 10 Detention Discharge																																	0.10								2.60		
G1	Commercial Filing No. 1: Includes West Portions of Lots 5 & 6 and Adjacent half of Carmela Grove	143814	3.30	0.81	0.88	115051.2	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	28762.8	0.83	0.90	50	50	431	431	6915	6914	0	3	6914	6909	0		1	5	3	5	14.10	5	14	6	[illegible]	7	22	9	25.99	15.23	34.51
G2	Commercial Filing No. 1: Includes East Remainder of Lot 6, North Portion of Lot 5, and Adjacent half of Mulberry Wood Drive	57918	1.33	0.81	0.88	38612	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	19306	0.84	0.91	50	50	717	717	6923	6922	0	3	6922	6915	0		2	5	3	5	5.71	5	6	6	8	7	9	9	10.53	5.55	13.11
G3	Commercial Filing No. 1: Remainder of Lot 5 and Adjacent half of Carmela Grove	39520	0.91	0.81	0.88	31616	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	7904	0.83	0.90	50	50	257	257	6918	6917	0	3	6917	6914	0		1	5	3	5	3.87	5	4	6	5	7	6	9	7.14	4.37	9.74
G4	Commercial Filing No. 1: West Half of Mulberry Wood Drive Between Carmela Grove and Woodman Road	5782	0.13	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	5782	0.90	0.96	18	18	159	159	6916	6915.64	0	1	6916	6914	0		1	5	3	5	0.61	5	1	6	1	7	1	9	1.11	0.67	1.43
G5	Commercial Filing No. 1: Lot 2, East portion of Lot 3 & Adjacent half of Carmela Grove	58030	1.33	0.81	0.88	48358.3333	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	9671.667	0.83	0.90	50	50	383	383	6916	6915	0	3	6915	6911	0		1	5	3	5	5.69	5	6	6	8	7	9	9	10.49	6.44	14.35
G6	Commercial Filing No. 1: Tract A, Lot 4 and remaining portion of Lot 3	70961	1.63	0.81	0.88	70961	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0	0.81	0.88	50	50	200	200	6913	6912	0	3	6912	6910	0		1	5	3	5	6.79	5	7	6	9	7	11	9	12.54	7.62	17.37
G7	Commercial Filing No. 1: West half of Carmela Grove adjacent to Sub-basin G1	23300	0.53	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	23300	0.90	0.96	12.5	13	480	480	6916	6915.75	0	1	6916	6910	0		2	5	3	5	2.48	5	2	6	3	7	4	9	4.49	2.16	5.13
H1	Commercial Filing No. 1: East Half of Mulberry Wood Drive Adjacent to WVC	21532	0.49	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	21532	0.90	0.96	13	13	857	857	6929	6928.74	0	1	6929	6919	0		3	5	3	5	2.29	5	2	6	3	7	4	9	4.15	2.04	4.80
H2	WVC	224534	5.15	0.81	0.88	224534	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0	0.81	0.88	50	50	376	376	6933	6932	0	3	6932	6922	0		1	5	3	5	21.48	5	21	6	29	7	34	9	39.68	19.72	49.12
H3	Commercial Filing No. 1: North Half of Woodman Valley View Adjacent to WVC	9378	0.22	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	9378	0.90	0.96	9	9	335	335	6925	6924.82	0	1	6925	6919	0		1	5	3	5	1.00	5	1	6	1	7	2	9	1.81	1.06	2.35
I1	Commercial Filing No. 1: South Half of Woodman Valley View Adjacent to Lot 1	8893	0.20	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	8893	0.90	0.96	9	9	308	308	6924	6923.82	0	1	6924	6919	0		1	5	3	5	0.95	5	1	6	1	7	1	9	1.71	0.97	2.15
I2	Commercial Filing No. 1: Lot 1	114397	2.63	0.81	0.88	114397	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0	0.81	0.88	50	50	338	338	6922	6921	0	3	6921	6917	0		1	5	3	5	10.95	5	11	6	15	7	17	9	20.22	12.28	27.74
I3	Commercial Filing No. 1: East Half of Mulberry Wood Drive Adjacent to Lot 1	7524	0.17	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	7524	0.90	0.96	12.5	13	228	228	6918	6917.75	0	1	6918	6915	0		1	5	3	5	0.80	5	1	6	1	7	1	9	1.45	0.84	1.84
OSD2	Flow Bypass from Inlet on Kenosha Drive	61500	1.41																															4.80								7.20	7.20	4.80
OSD6	Offsite Flows from Shiloh Mesa Filing No. 1	31282	0.72																															3.00								6.30	6.30	3.00
OS4	Non-Project Related Offsite Portion of Marksheffel Drive. Approximately adjacent to Enclaves (MDDP-F1)	49774	1.14																															4.00								7.60	N/A	N/A
OS2	Non-Project Related Offsite Portion of Marksheffel Drive. Approximately adjacent to Commercial Filing No. 1 (MDDP-F1)	61916	1.42																															5.60								10.50	N/A	N/A

DESIGN POINTS WEST OUTFALL	Contributing Basins		Cumulative Area																																		Q5 cfs	TO WEST OUTFALL							Q100 cfs	Q5 cfs	Q100 cfs
W1	A	307974.00	7.07	0.81	0.88	307974.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	553	553	6930	6928	0	2	6928	6916	0		2	5	3	5	21.24	5	29	6	40	[illegible]	[illegible]	[illegible]	[illegible]		
W2	D2	17506.00	0.40	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	17506.00	0.90	0.96	25	25	437	437	6926	6925	0	1	6925	6912	0		1	5	3	5	1.88	5	2	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
W3	D1, D2	32804.00	0.75	0.81	0.88	0	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	32804.00	0.90	0.96	25	25	471	471	6926	6925	0	1	6925	6910	0		2	5	3	5	3.49	5	3	6	5	[illegible]	[illegible]	9	[illegible]		
W4 Pond A Discharge	A, D1, D2	340778.00	7.82	0.81	0.88	307974.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	32804.00	0.82	0.89	50	50	553	553	6930	6928	0	2	6928	6916	0		2	5	3	5	0.20	5	32	6	44	7	52	9	4.80		
OS4	OS4 Non-Project Related Flows from Marksheffel added to Pond A Discharge	49774.00	1.14	0.81	0.88	49774.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	690	690	6929	6928	0	2	6928	6912	0		2	5	3	5	4.20	5	5	6	6	7	8	9	12.40		
W5	A, D1, D2, E1, OS4 Stub for Lot 7	426398.00	9.79	0.81	0.88	393594.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	32804.00	0.82	0.89	25	25	270	270	6912	6911	0	2	6911	6910	0		1	5	3	5	4.60	5	40	6	56	7	65	9	18.40	N/A	N/A
W6	A, D1, D2, E1, E2 Stub for Lot 8	462153.00	10.61	0.81	0.88	429349.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	32804.00	0.82	0.89	25	25	434.1	434.1	6912	6911	0	2	6911	6904	0		1	5	3	5	4.80	5	44	6	60	7	71	9	19.60		
W7	F1 WQ Pond (Geraldine & Lot 9)	52672.00	1.21	0.81	0.88	52672.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	216	216	6909	6908	0	2	6908	6900	0		1	5	3	5	0.20	5	5	6	7	7	8	9	1.70		
W8	A, D1, D2, E1, E2, & F1 (F1 WQ Pond Discharge)	514825.00	11.82	0.81	0.88	514825.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	513.4	513.4	6912	6911	0	2	6911	6902	0		2	5	3	5	5.00	5	48	6	66	7	78	9	21.30		
W9	F2 Stub for Lot 10	89348.00	2.05	0.81	0.88	89348.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	250	250	6910	6908	0	1	6908	6905	0		1	5	3	5	0.10	5	8	6	12	7	14	9	2.60		
W10	A, D1, D2, OS4, E1, E2, F1, & F2	604173.00	13.87	0.81	0.88	604173.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	743.2	743.2	6912	6911	0	2	6911	6904	0		2	5	3	5	5.10	5	57	6	78	7	92	9	23.90		
W11 (West Outfall)	A, D1, D2, OS4, E1, E2, F1, F2, & OS2 Outfall to Existing Storm Sewer	666089.00	15.29	0.81	0.88	666089.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	774.7	774.7	6912	6911	0	2	6911	6898	0		3	5	3	5	10.70	5	62	6	86	7	101	9	34.40		
DESIGN POINTS SOUTH OUTFALL																																						TO SOUTH OUTFALL									
S1	B, C1	660687.00	15.17	0.81	0.88	660687.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	2034.5	2034.5	6941	6940	0	3	6940	6928	0		7	10	3	4	14.94	4	50	5	69	6	81	7	35.57	22.5	51.2
S2	S1, C2	676632.00	15.53	0.81	0.88	676632.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	2282.6	2282.6	6941	6940	0	3	6940	6926	0		8	11	2	4	50.78	4	50	5	68	6	81	7	93.78	43.7	106.6
S3 Pond CH Discharge	S2, H2	901166.00	20.69	0.81	0.88	901166.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	32.5	32.5	6920	6919	0	2	6919	6918	0		0	5	3	5	1.88	5	84	6	116	7	137	9	3.30	2.1	4.5
S4	S3, H3	910544.00	20.90	0.81	0.88	910544.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	60	60	6920	6919	0	2	6919	6918	0		0	5	3	5	2.88	5	85	6	117	7	138	9	5.11	2.1	4.5
S5	S4, I1	919437.00	21.11	0.81	0.88	919437.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	93.78	93.78	6920	6919	0	2	6919	6917	0		0	5	3	5	3.82	5	86	6	119	7	140	9	6.82	2.3	6.6
S6	S5, H1, G2	998887.00	22.93	0.81	0.88	998887.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	202.1	202.1	6920	6919	0	2	6919	6916	0		1	5	3	5	11.83	5	94	6	129	7	152	9	21.50	8.8	24.1
S7	S6, I2, I3	1120808.00	25.73	0.81	0.88	1120808.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	422.3	422.3	6920	6919	0	2	6919	6915	0		1	5	3	5	23.57	5	105	6	144	7	170	9	43.16	22.1	52.5
S8	S7, G4	1126590.00	25.86	0.81	0.88	1126590.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	25	25	455.6	455.6	6920	6919	0	2	6919	6914	0		2	5	3	5	24.19	5	106	6	145	7	171	9	44.28	22.8	53.8
S9	G3 & G5	97550.00	2.24	0.81	0.88	97550.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	383.1	383.1	6916	6914	0	2	6914	6912.3	0		1	5	3	5	9.56	5	9	6	13	7	15	9	17.63	10.8	24.1
S10	S9, G1, G7	264664.00	6.08	0.81	0.88	264664.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	686.6	686.6	6916	6914	0	2	6914	6908.3	0		2	5	3	5	26.14	5	25	6	34	7	40	9	48.11	35.7	80.9
S11 Pond 14	S8, S10, G6	1462215.00	33.57	0.81	0.88	1462215.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	738.6	738.6	6916	6914	0	2	6914	6903	0		2	5	3	5	43.64	5	137	6	188	7	222	9	99.60	65.2	129.6
S11 Pond 14 Discharge	S10, G6	1462215.00	33.57	0.81	0.88	1462215.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	738.6	738.6	6916	6914	0	2	6914	6903	0		2	5	3	5	4.20	5	137	6	188	7	222	9	26.54	4.0	20.3
S12 South Outfall	S10, G6	1462215.00	33.57	0.81	0.88	1462215.00	0.68	0.78	0	0.12	0.39	0	0.5	0.59	0	0.9	0.96	0.00	0.81	0.88	50	50	200	200	6913	6912	0	3	6912	6910	0		1	5	3	5	4.20	5	137	6	188	7	222	9	26.54	4.0	20.3
	Total Area =		50.99																																												

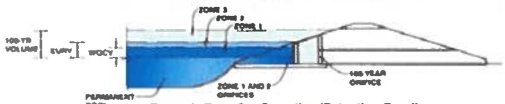
Note: Q2, Q5 & Q10 are based on C5; Q25, Q50 & Q100 are based on C100
At DP S3, the design discharge is added to contributing runoff calculations, drainage area upstream of Pond CH is not included.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-Basin A, D1, and D2 into Pond A



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	7.82	acres
Watershed Length =	1,300	ft
Watershed Slope =	0.017	ft/ft
Watershed Imperviousness =	63.14%	percent
Percentage Hydrologic Soil Group A =	39.5%	percent
Percentage Hydrologic Soil Group B =	60.5%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.161	acre-feet
Excess Urban Runoff Volume (EURV) =	0.566	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.434	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.576	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.728	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.923	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	1.087	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	1.292	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	1.736	acre-feet
Approximate 2-yr Detention Volume =	0.408	acre-feet
Approximate 5-yr Detention Volume =	0.542	acre-feet
Approximate 10-yr Detention Volume =	0.679	acre-feet
Approximate 25-yr Detention Volume =	0.764	acre-feet
Approximate 50-yr Detention Volume =	0.814	acre-feet
Approximate 100-yr Detention Volume =	0.888	acre-feet

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.14	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.161	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.405	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.322	acre-feet
Total Detention Basin Volume =	0.888	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
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^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	64	0.001		
	--	0.33	--	--	--	64	0.001	20	0.000
	--	1.00	--	--	--	3,528	0.081	1,189	0.027
	--	2.00	--	--	--	4,965	0.114	5,421	0.124
	--	3.00	--	--	--	6,306	0.145	11,106	0.255
	--	4.00	--	--	--	7,754	0.178	18,136	0.416
	--	5.00	--	--	--	9,312	0.214	26,669	0.612
	--	6.00	--	--	--	10,985	0.252	36,818	0.845
	--	7.00	--	--	--	12,764	0.293	48,692	1.118
	--	8.00	--	--	--	14,990	0.344	62,569	1.436
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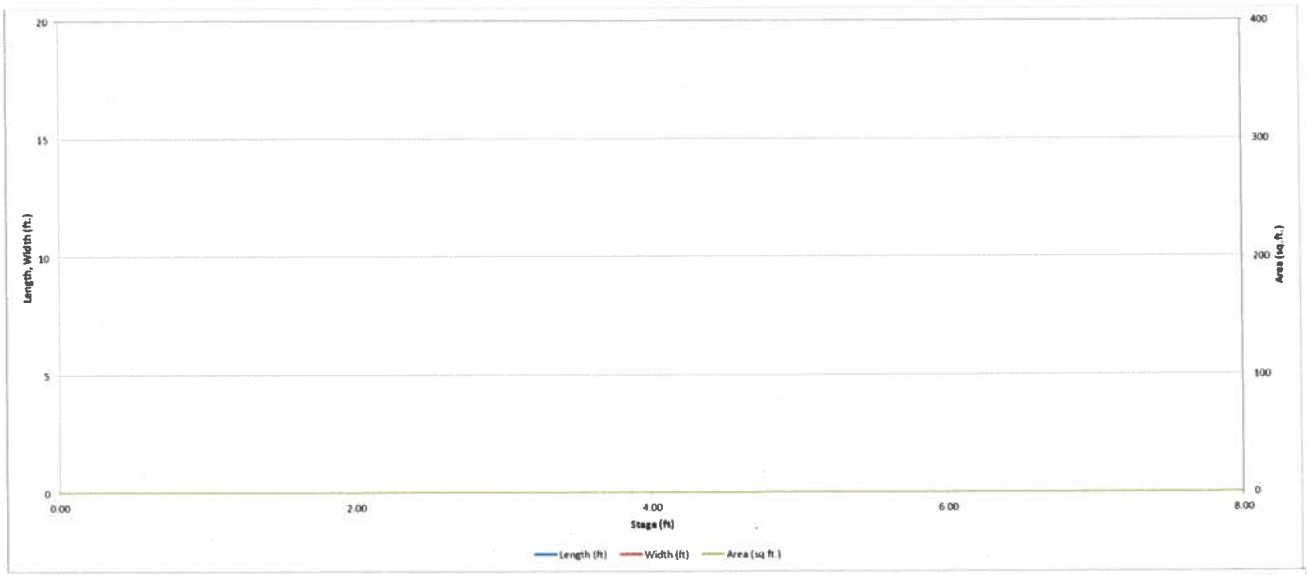
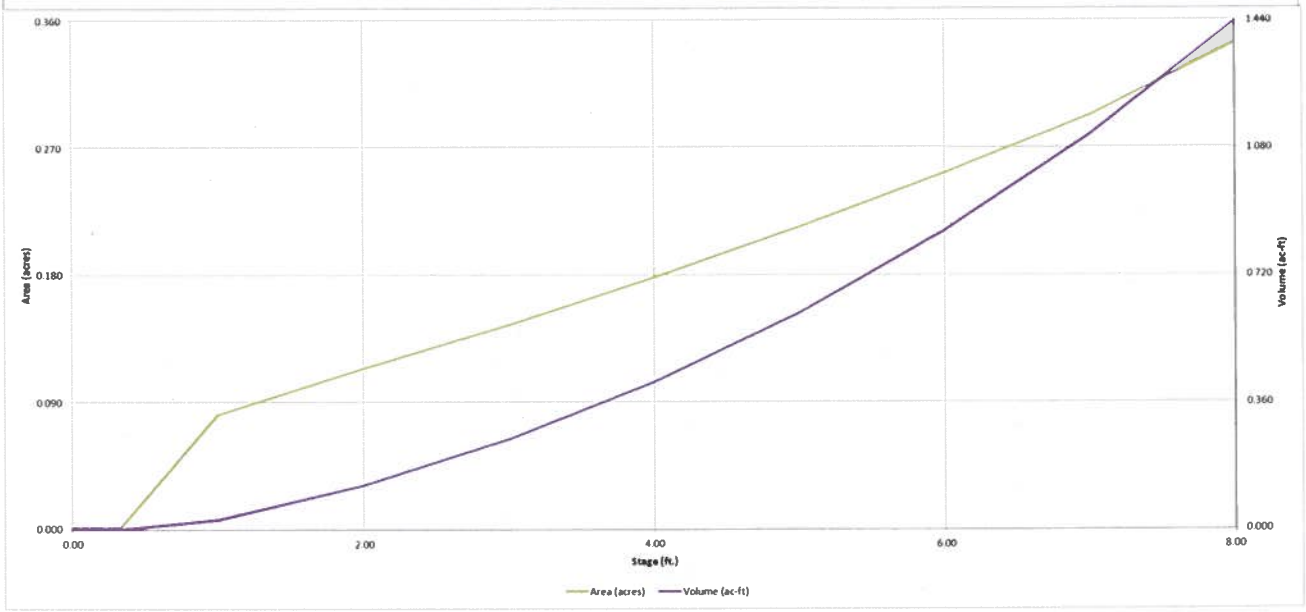
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



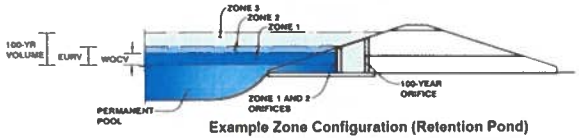


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-Basin A, D1, and D2 into Pond A



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.30	0.161	Orifice Plate
Zone 2 (EURV)	4.78	0.405	Orifice Plate
Zone 3 (100-year)	6.17	0.322	Weir&Pipe (Circular)
		0.888	Total

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^2
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)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	4.78	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	16.00	inches
Orifice Plate: Orifice Area per Row =	N/A	inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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	1.30	2.60	3.90				
Orifice Area (sq. inches)	1.00	1.00	1.00	1.05				

	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

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.75	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	4.75	N/A	feet
Over Flow Weir Slope Length =	2.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	6.78	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	2.80	N/A	ft^2
Overflow Grate Open Area w/ Debris =	1.40	N/A	ft^2

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

	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	0.30	N/A	ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	8.70	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Circular	Not Selected	
Outlet Orifice Area =	0.41	N/A	ft^2
Outlet Orifice Centroid =	0.36	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.10	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	60.00	feet
Spillway End Slopes =	20.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

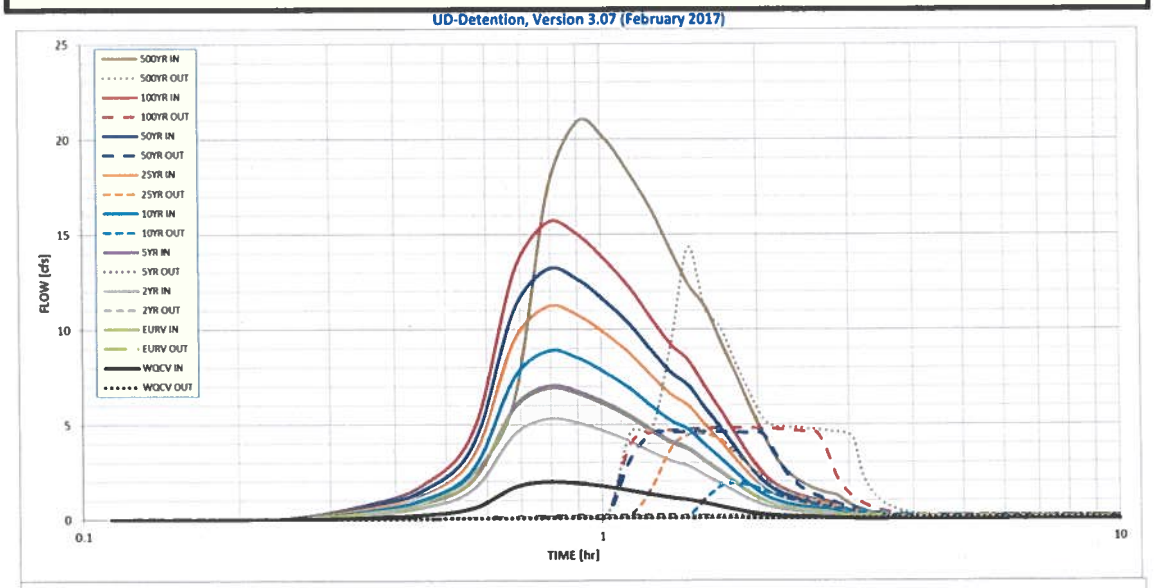
Spillway Design Flow Depth=	0.18	feet
Stage at Top of Freeboard =	7.28	feet
Basin Area at Top of Freeboard =	0.31	acres

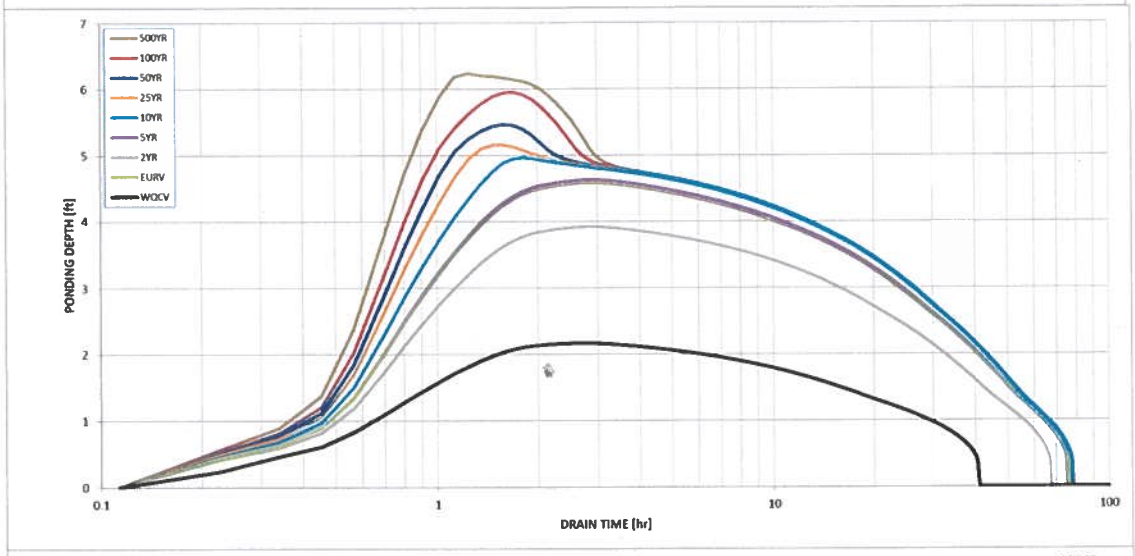
Routed Hydrograph Results

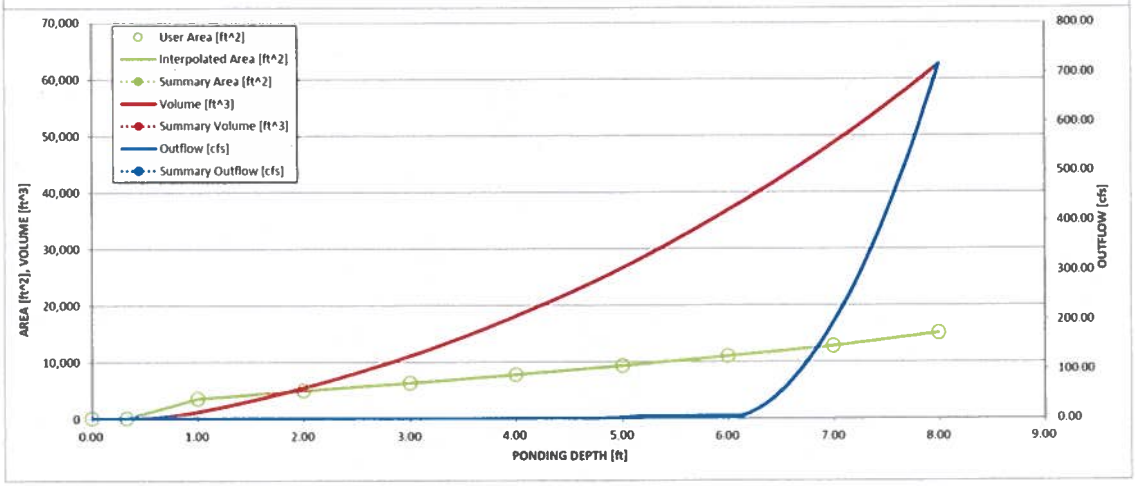
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.161	0.566	0.434	0.576	0.728	0.923	1.087	1.292	1.736
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.160	0.565	0.433	0.575	0.728	0.922	1.086	1.291	1.735
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.01	0.08	0.29	0.44	0.65	1.07
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.1	0.6	2.2	3.4	5.1	8.4
Peak Inflow Q (cfs) =	2.0	6.9	5.3	7.0	8.9	11.2	13.2	15.6	20.9
Peak Outflow Q (cfs) =	0.1	0.2	0.2	0.2	1.9	4.5	4.6	4.8	14.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	2.7	3.0	2.0	1.4	0.9	1.7
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.6	1.5	1.6	1.6	1.7
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) =	39	68	61	68	68	66	65	62	58
Time to Drain 99% of Inflow Volume (hours) =	40	72	65	73	74	73	73	72	70
Maximum Ponding Depth (ft) =	2.17	4.58	3.92	4.63	4.96	5.16	5.47	5.95	6.24
Area at Maximum Ponding Depth (acres) =	0.12	0.20	0.18	0.20	0.21	0.22	0.23	0.25	0.26
Maximum Volume Stored (acre-ft) =	0.144	0.526	0.402	0.536	0.604	0.645	0.715	0.833	0.904

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)





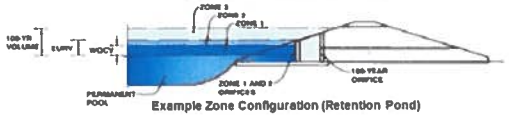


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin B1 (Lot 7 Pond)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	SF	
Watershed Area =	0.82	acres
Watershed Length =	206	ft
Watershed Slope =	0.024	ft/ft
Watershed Imperviousness =	95.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.024	acre-feet
Excess Urban Runoff Volume (EURV) =	0.088	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.075	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.098	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.118	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.138	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.154	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.175	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.222	acre-feet
Approximate 2-yr Detention Volume =	0.071	acre-feet
Approximate 5-yr Detention Volume =	0.092	acre-feet
Approximate 10-yr Detention Volume =	0.112	acre-feet
Approximate 25-yr Detention Volume =	0.120	acre-feet
Approximate 50-yr Detention Volume =	0.124	acre-feet
Approximate 100-yr Detention Volume =	0.128	acre-feet

Drain Time Too Long

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.14	inches

Stage-Storage Calculation

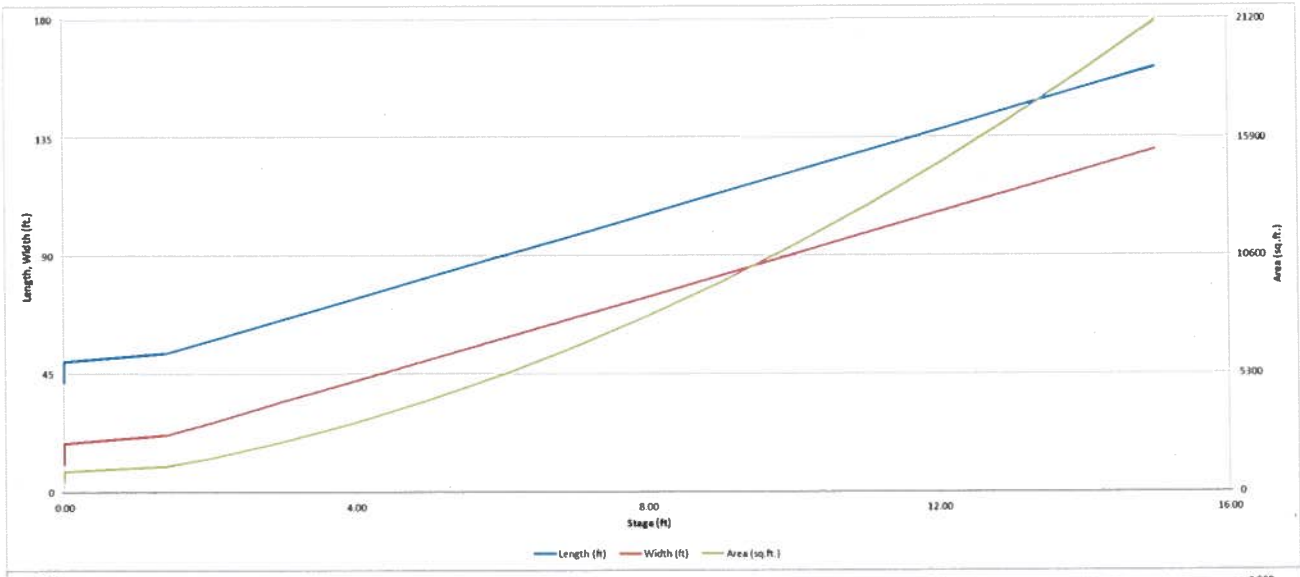
Zone 1 Volume (WQCV) =	0.024	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.063	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.041	acre-feet
Total Detention Basin Volume =	0.128	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	3.75	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	4	
Initial Surcharge Area (A_{ISV}) =	0	ft^2
Surcharge Volume Length (L_{ISV}) =	0.0	ft
Surcharge Volume Width (W_{ISV}) =	0.0	ft
Depth of Basin Floor (H_{FLOOR}) =	0.00	ft
Length of Basin Floor (L_{FLOOR}) =	41.8	ft
Width of Basin Floor (W_{FLOOR}) =	10.5	ft
Area of Basin Floor (A_{FLOOR}) =	438	ft^2
Volume of Basin Floor (V_{FLOOR}) =	0	ft^3
Depth of Main Basin (H_{MAIN}) =	3.75	ft
Length of Main Basin (L_{MAIN}) =	71.8	ft
Width of Main Basin (W_{MAIN}) =	40.5	ft
Area of Main Basin (A_{MAIN}) =	2,907	ft^2
Volume of Main Basin (V_{MAIN}) =	5,590	ft^3
Calculated Total Basin Volume (V_{total}) =	0.128	acre-feet

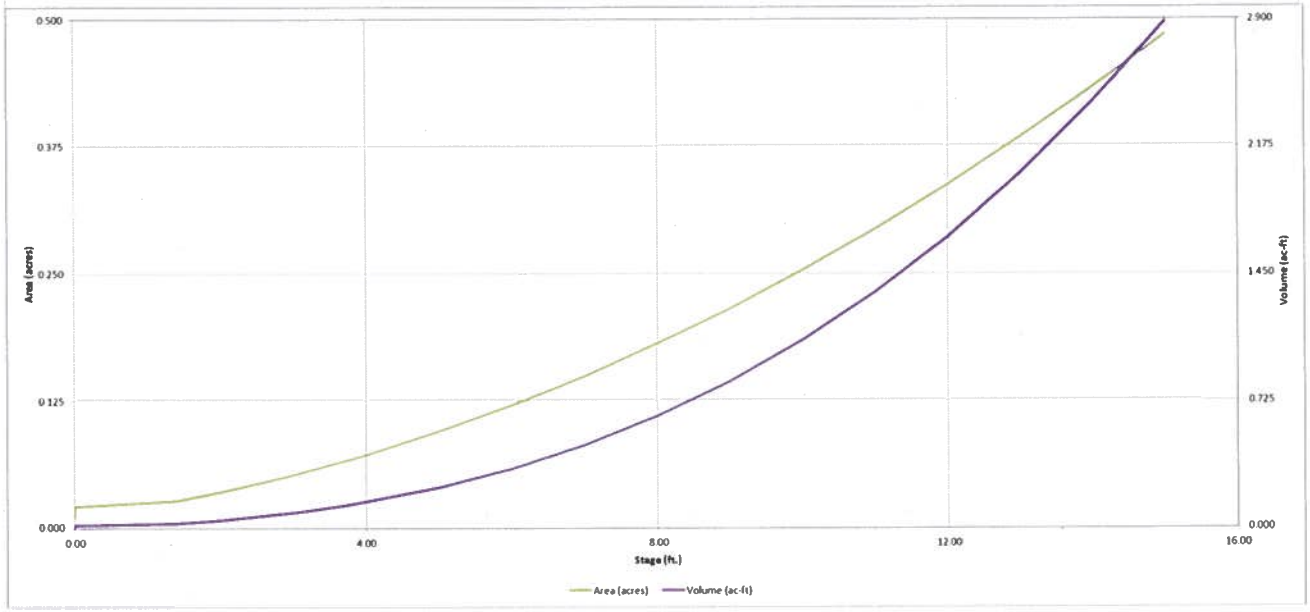
Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	0.00		41.8	10.5	438		0.010		
	1.00		49.8	18.4	915		0.021	659	0.015
Zone 1 (WQCV)	1.39		53.0	21.6	1,143		0.026	1,070	0.025
	2.00		57.8	26.4	1,524		0.035	1,868	0.043
	3.00		65.8	34.5	2,269		0.052	3,772	0.087
Zone 2 (EURV)	3.03		66.1	34.7	2,293		0.053	3,840	0.088
Zone 3 (100-year)	3.71		71.5	40.1	2,871		0.066	5,593	0.128
	4.00		73.8	42.5	3,135		0.072	6,463	0.148
	5.00		81.8	50.5	4,130		0.095	10,085	0.232
	6.00		89.8	58.5	5,252		0.121	14,765	0.339
	7.00		97.8	66.5	6,503		0.149	20,632	0.474
	8.00		105.8	74.5	7,881		0.181	27,813	0.639
	9.00		113.8	82.5	9,387		0.216	36,437	0.836
	10.00		121.8	90.5	11,022		0.253	46,631	1.070
	11.00		129.8	98.5	12,784		0.293	58,523	1.344
	12.00		137.8	106.5	14,675		0.337	72,242	1.658
	13.00		145.8	114.5	16,693		0.383	87,915	2.018
	14.00		153.8	122.5	18,839		0.432	105,671	2.426
	15.00		161.8	130.5	21,114		0.485	125,637	2.884

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



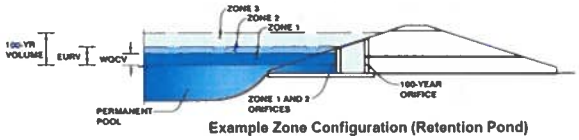


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin E1 (Lot 7 Pond)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.39	0.024	Filtration Media
Zone 2 (EURV)	3.03	0.063	Orifice Plate
Zone 3 (100-year)	3.71	0.041	Weir&Pipe (Circular)
		0.128	Total

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

Underdrain Orifice Invert Depth =	2.00	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.41	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft^2
Underdrain Orifice Centroid =	0.02	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)

Invert of Lowest Orifice =	1.39	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.03	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	6.60	inches
Orifice Plate: Orifice Area per Row =	0.35	sq. inches (diameter = 5/8 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	2.431E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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)	1.39	1.94	2.48					
Orifice Area (sq. inches)	0.35	0.35	0.35					

	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

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.03	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.03	N/A	feet
Over Flow Weir Slope Length =	2.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	27.76	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	2.80	N/A	ft^2
Overflow Grate Open Area w/ Debris =	1.40	N/A	ft^2

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

	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	2.30	N/A	ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	4.30	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Circular	Not Selected	
Outlet Orifice Area =	0.10	N/A	ft^2
Outlet Orifice Centroid =	0.18	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.60	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	1.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

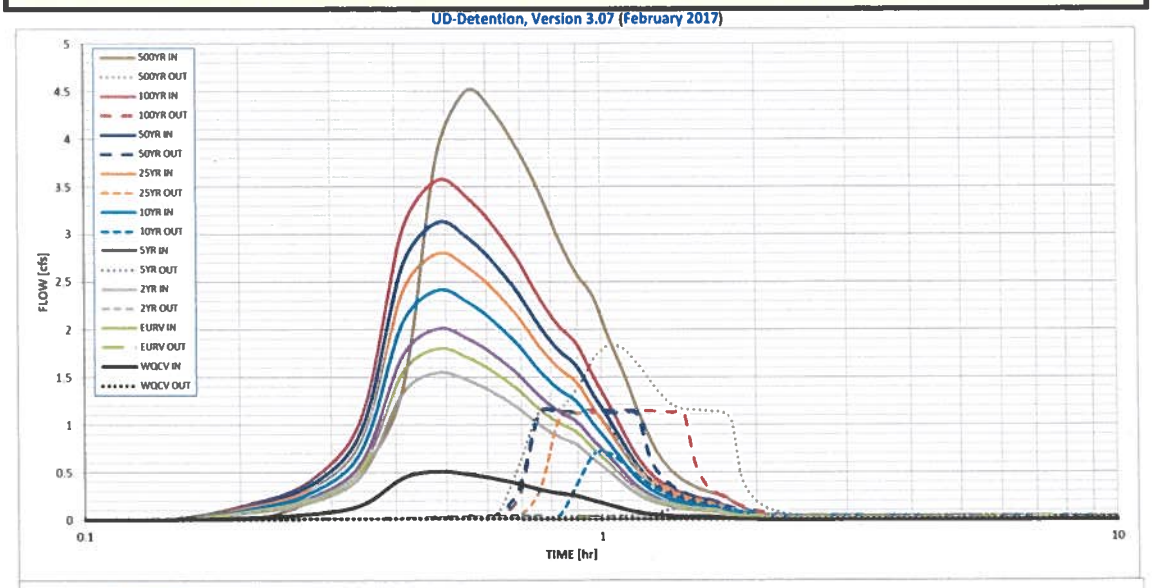
Spillway Design Flow Depth=	0.56	feet
Stage at Top of Freeboard =	5.16	feet
Basin Area at Top of Freeboard =	0.10	acres

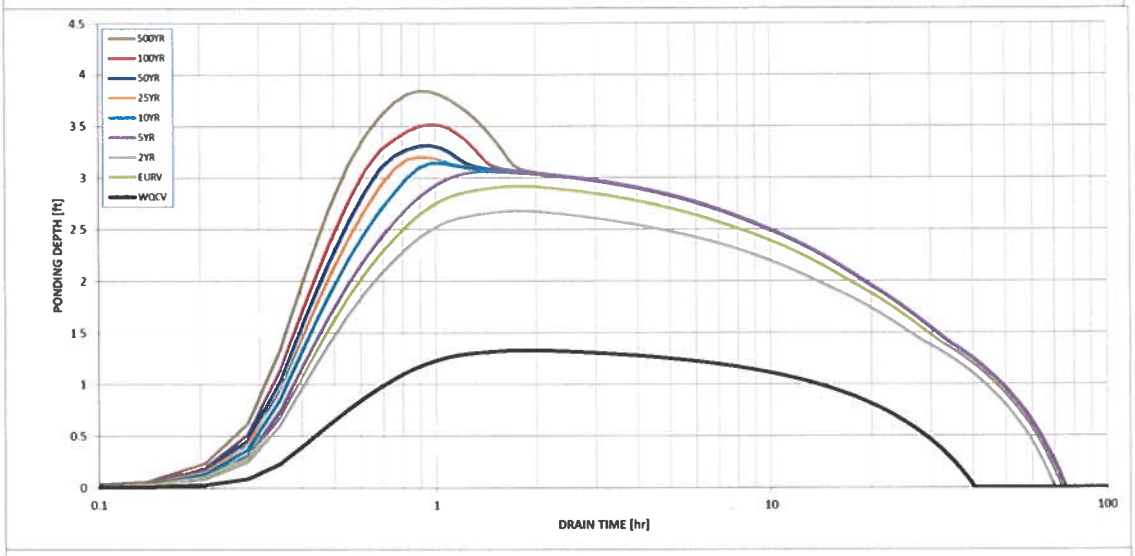
Routed Hydrograph Results

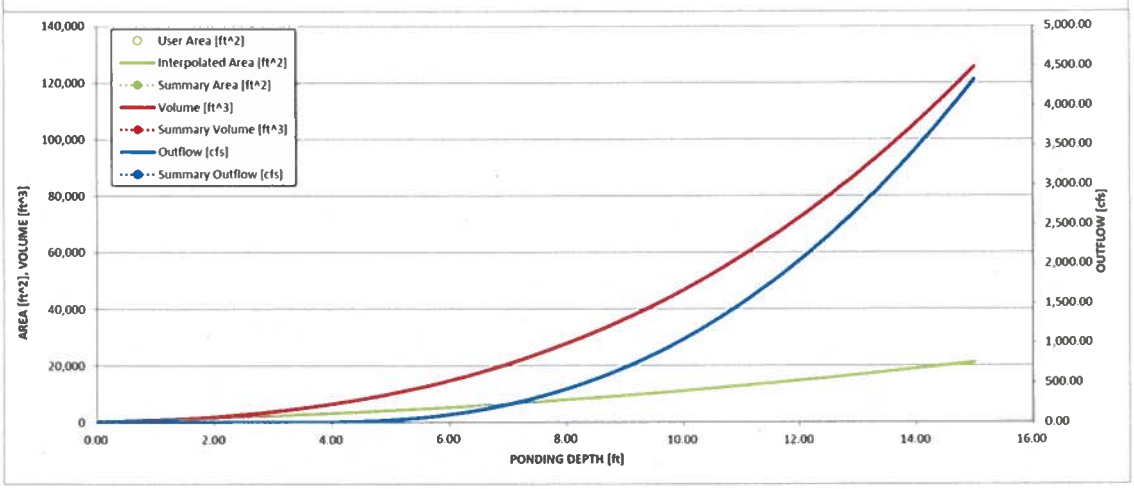
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.024	0.088	0.075	0.098	0.118	0.138	0.154	0.175	0.222
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.024	0.087	0.075	0.098	0.118	0.137	0.153	0.175	0.222
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.03	0.26	0.84	1.15	1.54	2.26
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.2	0.7	0.9	1.3	1.9
Peak Inflow Q (cfs) =	0.5	1.8	1.5	2.0	2.4	2.8	3.1	3.6	4.5
Peak Outflow Q (cfs) =	0.0	0.0	0.0	0.1	0.7	1.1	1.1	1.2	1.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	6.3	3.2	1.6	1.2	0.9	1.0
Structure Controlling Flow =	Filtration Media	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.0	0.2	0.4	0.4	0.4	0.4
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) =	39	69	66	70	69	68	67	66	63
Time to Drain 99% of Inflow Volume (hours) =	40	72	69	73	73	73	72	72	71
Maximum Ponding Depth (ft) =	1.33	2.92	2.68	3.06	3.14	3.20	3.31	3.52	3.84
Area at Maximum Ponding Depth (acres) =	0.03	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07
Maximum Volume Stored (acre-ft) =	0.023	0.082	0.070	0.090	0.094	0.097	0.104	0.116	0.137

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)





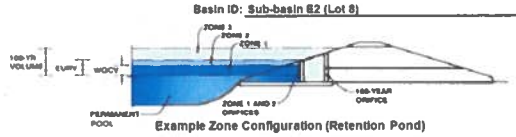


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin 62 (Lot 8)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	SF	
Watershed Area =	0.82	acres
Watershed Length =	207	ft
Watershed Slope =	0.029	ft/ft
Watershed Imperviousness =	95.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

Drain Time Too Long

Water Quality Capture Volume (WQCV) =	0.024	acre-feet
Excess Urban Runoff Volume (EURV) =	0.088	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.075	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.098	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.118	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.138	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.154	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.175	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.222	acre-feet
Approximate 2-yr Detention Volume =	0.071	acre-feet
Approximate 5-yr Detention Volume =	0.092	acre-feet
Approximate 10-yr Detention Volume =	0.112	acre-feet
Approximate 25-yr Detention Volume =	0.120	acre-feet
Approximate 50-yr Detention Volume =	0.124	acre-feet
Approximate 100-yr Detention Volume =	0.128	acre-feet

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.14	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.024	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.063	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.041	acre-feet
Total Detention Basin Volume =	0.128	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	3.75	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	4	

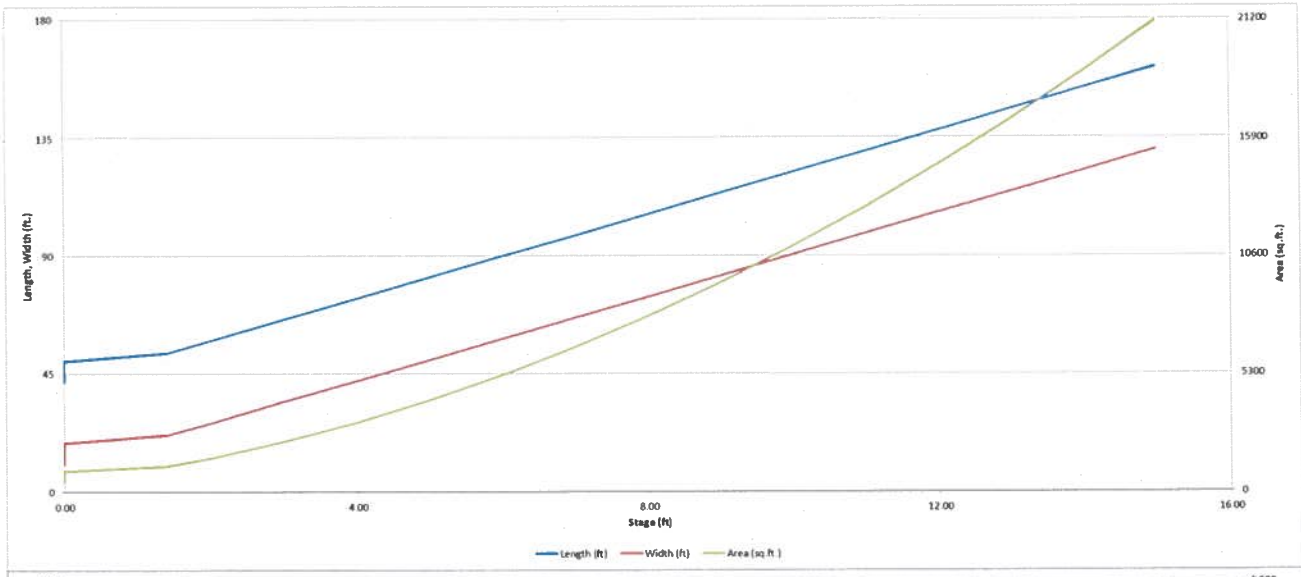
Initial Surcharge Area (A_{ISV}) =	0	ft^2
Surcharge Volume Length (L_{ISV}) =	0.0	ft
Surcharge Volume Width (W_{ISV}) =	0.0	ft
Depth of Basin Floor (H_{FLOOR}) =	0.00	ft
Length of Basin Floor (L_{FLOOR}) =	41.8	ft
Width of Basin Floor (W_{FLOOR}) =	10.5	ft
Area of Basin Floor (A_{FLOOR}) =	438	ft^2
Volume of Basin Floor (V_{FLOOR}) =	0	ft^3
Depth of Main Basin (H_{MAIN}) =	3.75	ft
Length of Main Basin (L_{MAIN}) =	71.8	ft
Width of Main Basin (W_{MAIN}) =	40.5	ft
Area of Main Basin (A_{MAIN}) =	2.907	ft^2
Volume of Main Basin (V_{MAIN}) =	5.590	ft^3
Calculated Total Basin Volume (V_{total}) =	0.128	acre-feet

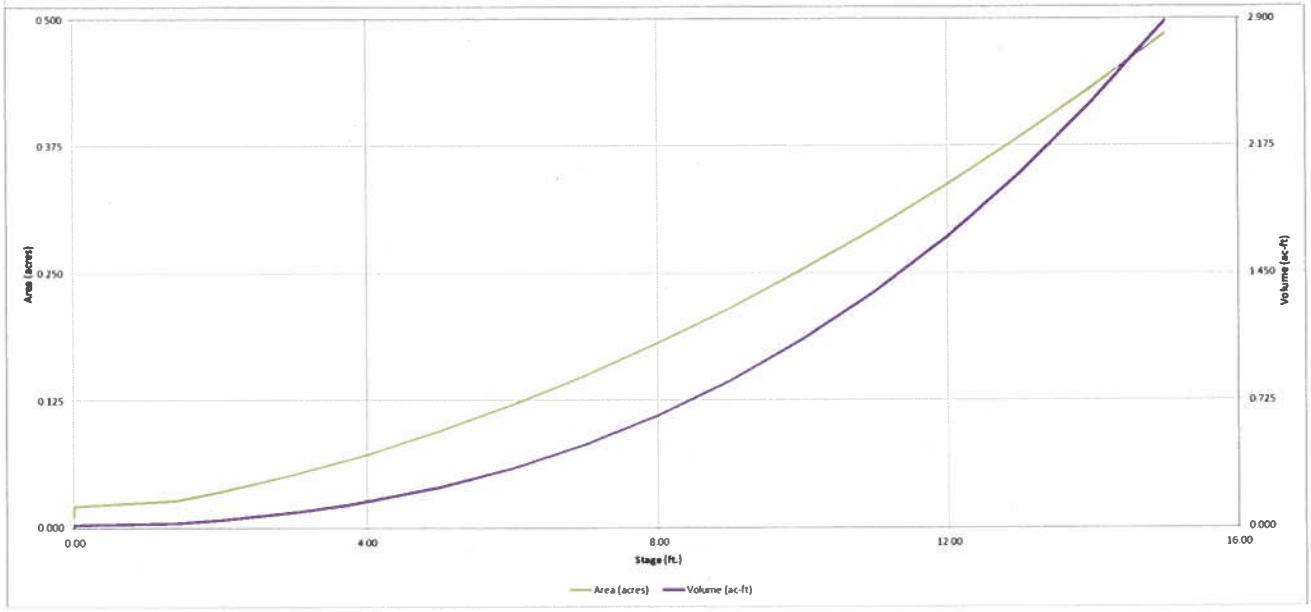
Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	0.00		41.8	10.5	438		0.010		
	1.00		49.8	18.4	915		0.021	659	0.015
Zone 1 (WQCV)	1.39		53.0	21.6	1,143		0.026	1,070	0.025
	2.00		57.8	26.4	1,524		0.035	1,868	0.043
	3.00		65.8	34.5	2,269		0.052	3,772	0.087
Zone 2 (EURV)	3.03		66.1	34.7	2,293		0.053	3,840	0.088
Zone 3 (100-year)	3.71		71.5	40.1	2,871		0.066	5,593	0.128
	4.00		73.8	42.5	3,135		0.072	6,463	0.148
	5.00		81.8	50.5	4,130		0.095	10,085	0.232
	6.00		89.8	58.5	5,252		0.121	14,765	0.339
	7.00		97.8	66.5	6,503		0.149	20,632	0.474
	8.00		105.8	74.5	7,881		0.181	27,813	0.639
	9.00		113.8	82.5	9,387		0.216	36,437	0.836
	10.00		121.8	90.5	11,022		0.253	46,631	1.070
	11.00		129.8	98.5	12,784		0.293	58,523	1.344
	12.00		137.8	106.5	14,675		0.337	72,242	1.658
	13.00		145.8	114.5	16,693		0.383	87,915	2.018
	14.00		153.8	122.5	18,839		0.432	105,671	2.426
	15.00		161.8	130.5	21,114		0.485	125,637	2.884

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



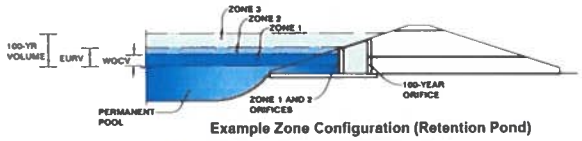


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin E2 (Lot 8)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.39	0.024	Filtration Media
Zone 2 (EURV)	3.03	0.063	Orifice Plate
Zone 3 (100-year)	3.71	0.041	Weir&Pipe (Circular)
		0.128	Total

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

Underdrain Orifice Invert Depth =	2.00	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.41	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft^2
Underdrain Orifice Centroid =	0.02	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)

Invert of Lowest Orifice =	1.39	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.03	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	6.60	inches
Orifice Plate: Orifice Area per Row =	0.35	sq. inches (diameter = 5/8 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	2.431E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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)	1.39	1.94	2.48					
Orifice Area (sq. inches)	0.35	0.35	0.35					

	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

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.03	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.03	N/A	feet
Over Flow Weir Slope Length =	2.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	27.76	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	2.80	N/A	ft^2
Overflow Grate Open Area w/ Debris =	1.40	N/A	ft^2

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

	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	2.30	N/A	ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	4.30	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Circular	Not Selected	
Outlet Orifice Area =	0.10	N/A	ft^2
Outlet Orifice Centroid =	0.18	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.60	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	1.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

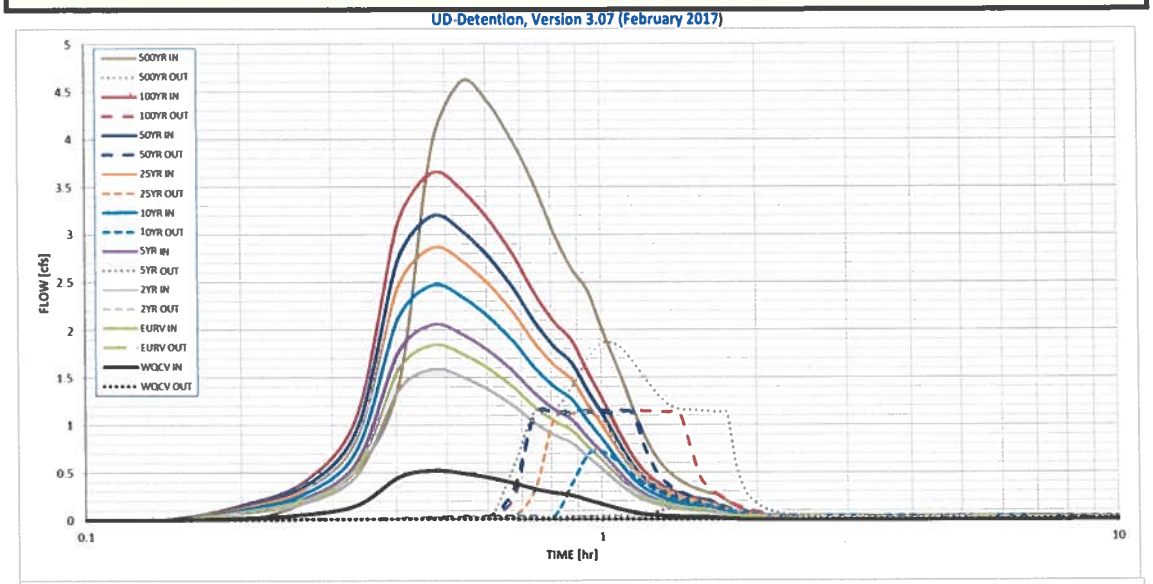
Spillway Design Flow Depth=	0.57	feet
Stage at Top of Freeboard =	5.17	feet
Basin Area at Top of Freeboard =	0.10	acres

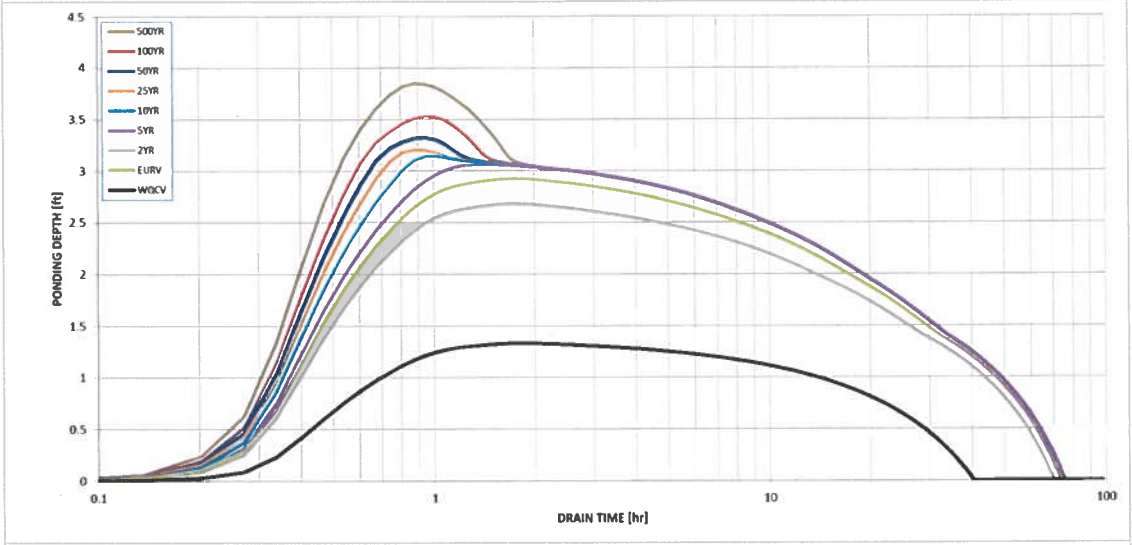
Routed Hydrograph Results

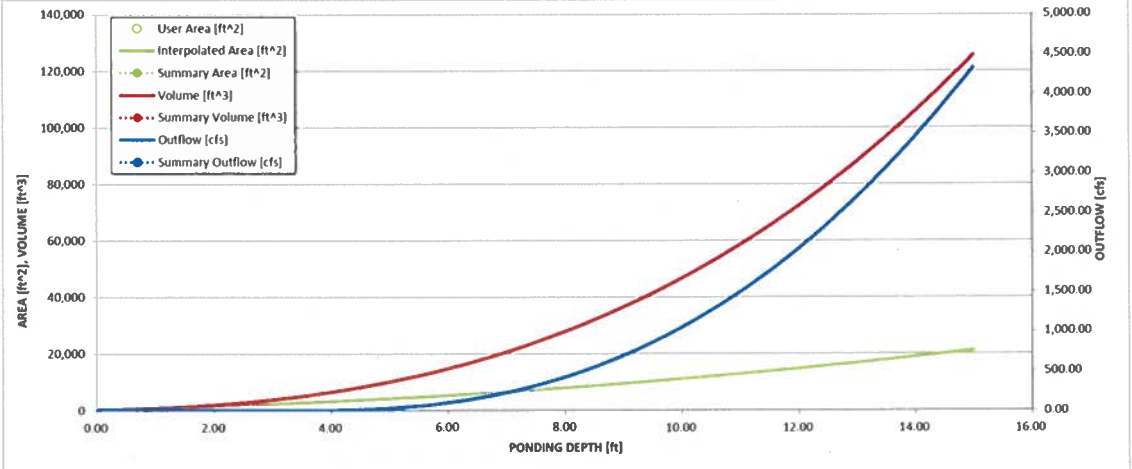
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.024	0.088	0.075	0.098	0.118	0.138	0.154	0.175	0.222
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.024	0.087	0.075	0.098	0.118	0.137	0.153	0.175	0.222
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.03	0.27	0.86	1.18	1.58	2.32
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.2	0.7	1.0	1.3	1.9
Peak Inflow Q (cfs) =	0.5	1.8	1.6	2.1	2.5	2.9	3.2	3.6	4.6
Peak Outflow Q (cfs) =	0.0	0.0	0.0	0.1	0.7	1.1	1.1	1.2	1.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	6.3	3.2	1.6	1.2	0.9	1.0
Structure Controlling Flow =	Filtration Media	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.0	0.2	0.4	0.4	0.4	0.4
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) =	39	69	66	70	69	68	67	66	63
Time to Drain 99% of Inflow Volume (hours) =	40	72	69	73	73	73	72	72	71
Maximum Ponding Depth (ft) =	1.33	2.92	2.68	3.06	3.14	3.21	3.32	3.53	3.85
Area at Maximum Ponding Depth (acres) =	0.03	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07
Maximum Volume Stored (acre-ft) =	0.023	0.082	0.071	0.090	0.094	0.097	0.104	0.117	0.138

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)





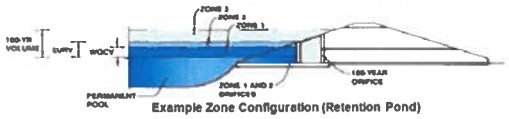


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin F1 (Geraldine and Lot 9)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	SF	
Watershed Area =	1.22	acres
Watershed Length =	266	ft
Watershed Slope =	0.026	ft/ft
Watershed Imperviousness =	95.67%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.037	acre-feet
Excess Urban Runoff Volume (EURV) =	0.132	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.113	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.147	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.177	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.206	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.231	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.262	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.332	acre-feet
Approximate 2-yr Detention Volume =	0.107	acre-feet
Approximate 5-yr Detention Volume =	0.138	acre-feet
Approximate 10-yr Detention Volume =	0.168	acre-feet
Approximate 25-yr Detention Volume =	0.180	acre-feet
Approximate 50-yr Detention Volume =	0.187	acre-feet
Approximate 100-yr Detention Volume =	0.193	acre-feet

Drain Time Too Long

Optional User Override 1-hr Precipitation	
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.14	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.037	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.095	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.061	acre-feet
Total Detention Basin Volume =	0.193	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	4.00	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	4	

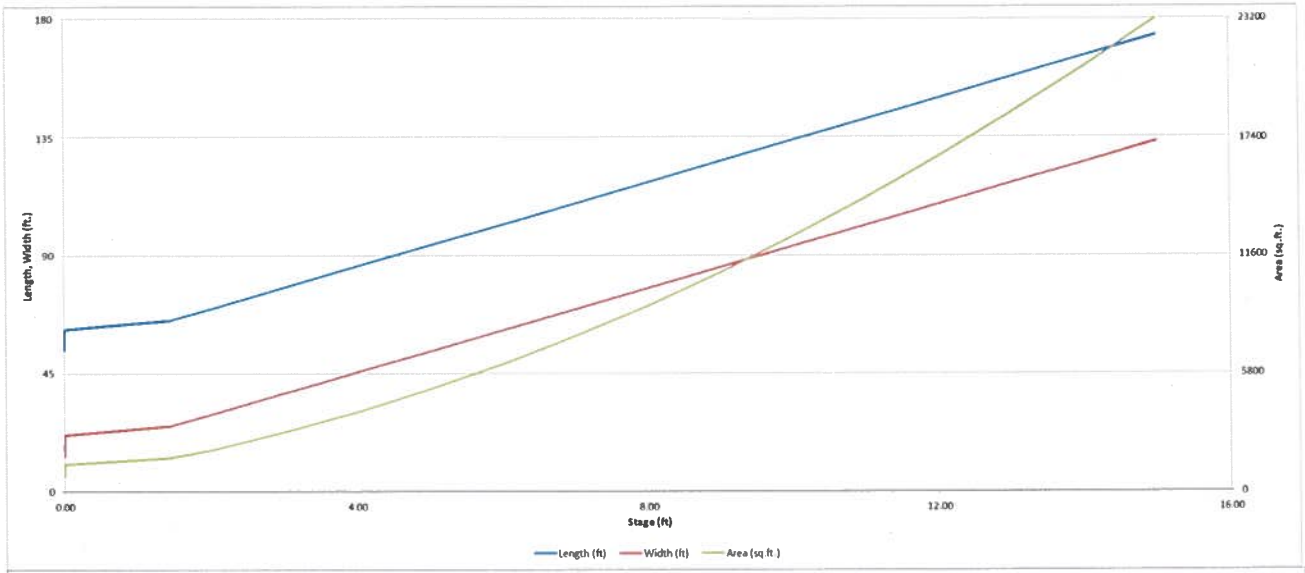
Initial Surcharge Area (A_{ISV}) =	0	ft^2
Surcharge Volume Length (L_{ISV}) =	0.0	ft
Surcharge Volume Width (W_{ISV}) =	0.0	ft
Depth of Basin Floor (H_{FLOOR}) =	0.00	ft
Length of Basin Floor (L_{FLOOR}) =	53.8	ft
Width of Basin Floor (W_{FLOOR}) =	13.4	ft
Area of Basin Floor (A_{FLOOR}) =	723	ft^2
Volume of Basin Floor (V_{FLOOR}) =	0	ft^3
Depth of Main Basin (H_{MAIN}) =	4.00	ft
Length of Main Basin (L_{MAIN}) =	85.8	ft
Width of Main Basin (W_{MAIN}) =	45.4	ft
Area of Main Basin (A_{MAIN}) =	3,899	ft^2
Volume of Main Basin (V_{MAIN}) =	8,403	ft^3
Calculated Total Basin Volume (V_{total}) =	0.193	acre-feet

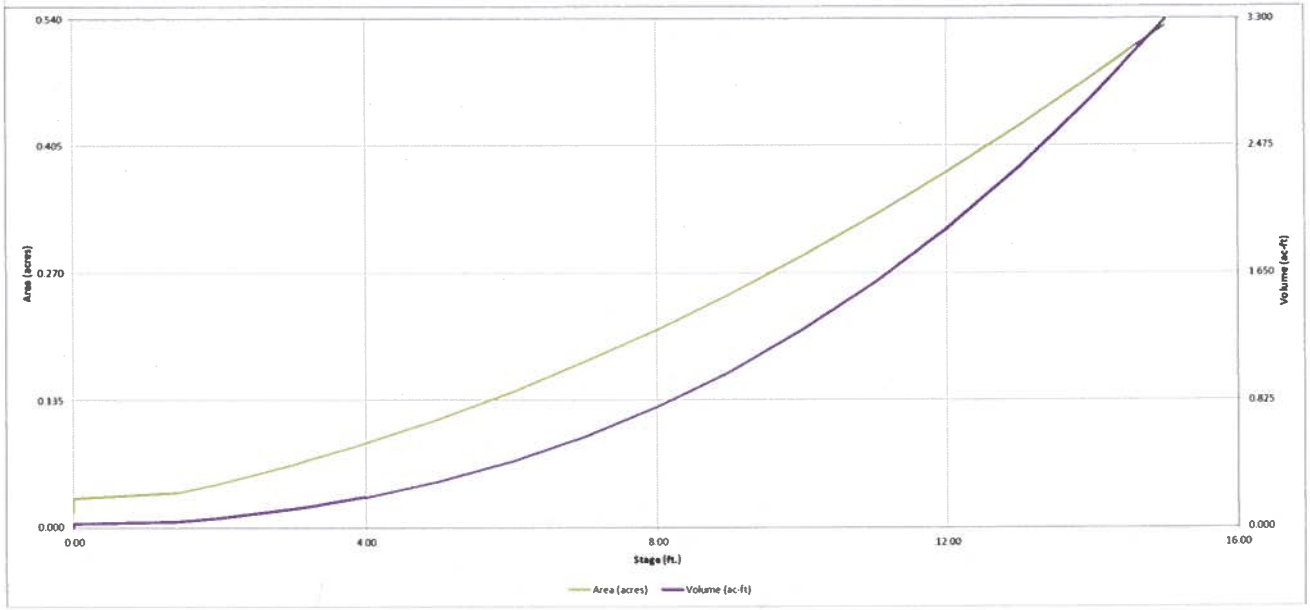
Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	0.00		53.8	13.4	723		0.017		
	1.00		61.7	21.4	1,319		0.030	1,001	0.023
Zone 1 (WQCV)	1.41		65.1	24.7	1,609		0.037	1,615	0.037
	2.00		69.7	29.4	2,047		0.047	2,673	0.061
	3.00		77.8	37.4	2,913		0.067	5,167	0.119
Zone 2 (EURV)	3.20		79.4	39.0	3,100		0.071	5,768	0.132
Zone 3 (100-year)	3.96		85.5	45.1	3,857		0.089	8,407	0.193
	4.00		85.8	45.4	3,899		0.090	8,563	0.197
	5.00		93.8	53.4	5,013		0.115	13,008	0.299
	6.00		101.8	61.4	6,255		0.144	18,631	0.428
	7.00		109.8	69.4	7,625		0.175	25,561	0.587
	8.00		117.8	77.4	9,123		0.209	33,924	0.779
	9.00		125.8	85.4	10,749		0.247	43,849	1.007
	10.00		133.8	93.4	12,503		0.287	55,464	1.273
	11.00		141.8	101.4	14,385		0.330	68,897	1.582
	12.00		149.8	109.4	16,395		0.376	84,276	1.935
	13.00		157.8	117.4	18,533		0.425	101,729	2.335
	14.00		165.8	125.4	20,798		0.477	121,384	2.787
	15.00		173.8	133.4	23,192		0.532	143,369	3.291

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



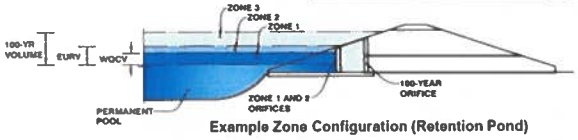


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin F1 (Geraldine and Lot 9)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.41	0.037	Filtration Media
Zone 2 (EURV)	3.20	0.095	Orifice Plate
Zone 3 (100-year)	3.96	0.061	Weir&Pipe (Circular)
		0.193	Total

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

Underdrain Orifice Invert Depth =	1.50	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.53	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft^2
Underdrain Orifice Centroid =	0.02	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)

Invert of Lowest Orifice =	1.41	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	6.11	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	8.00	inches
Orifice Plate: Orifice Area per Row =	0.72	sq. inches (diameter = 15/16 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	5.000E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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)	1.41	2.07	2.73					
Orifice Area (sq. inches)	0.72	0.72	0.72					

	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

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.20	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.20	N/A	feet
Over Flow Weir Slope Length =	2.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	20.53	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	2.80	N/A	ft^2
Overflow Grate Open Area w/ Debris =	1.40	N/A	ft^2

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

	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	2.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	5.00	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Circular	Not Selected	
Outlet Orifice Area =	0.14	N/A	ft^2
Outlet Orifice Centroid =	0.21	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.80	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	2.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

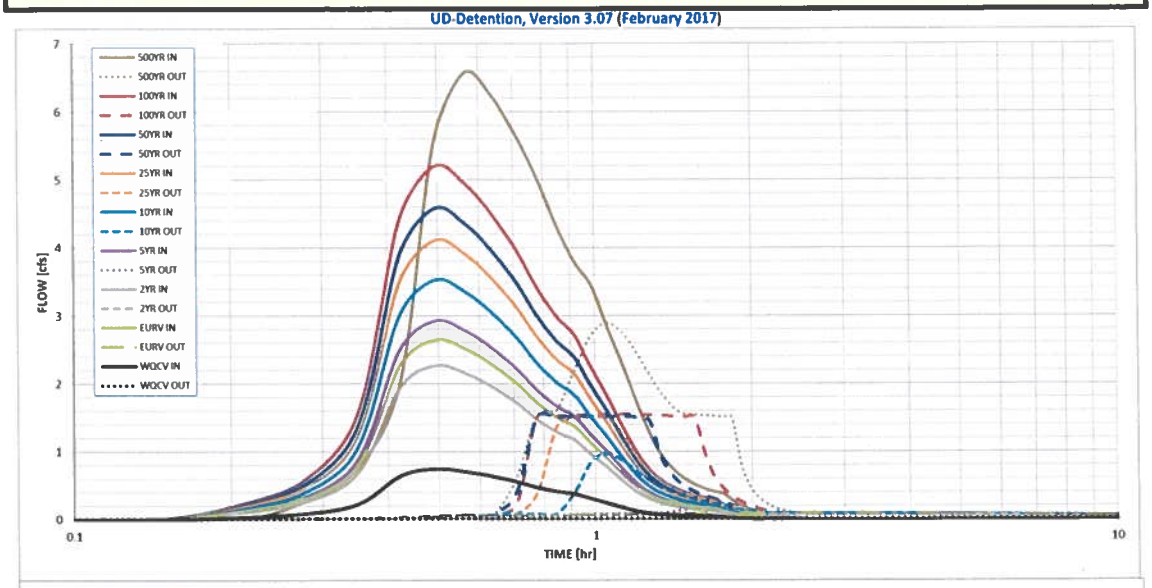
Spillway Design Flow Depth=	0.58	feet
Stage at Top of Freeboard =	5.38	feet
Basin Area at Top of Freeboard =	0.13	acres

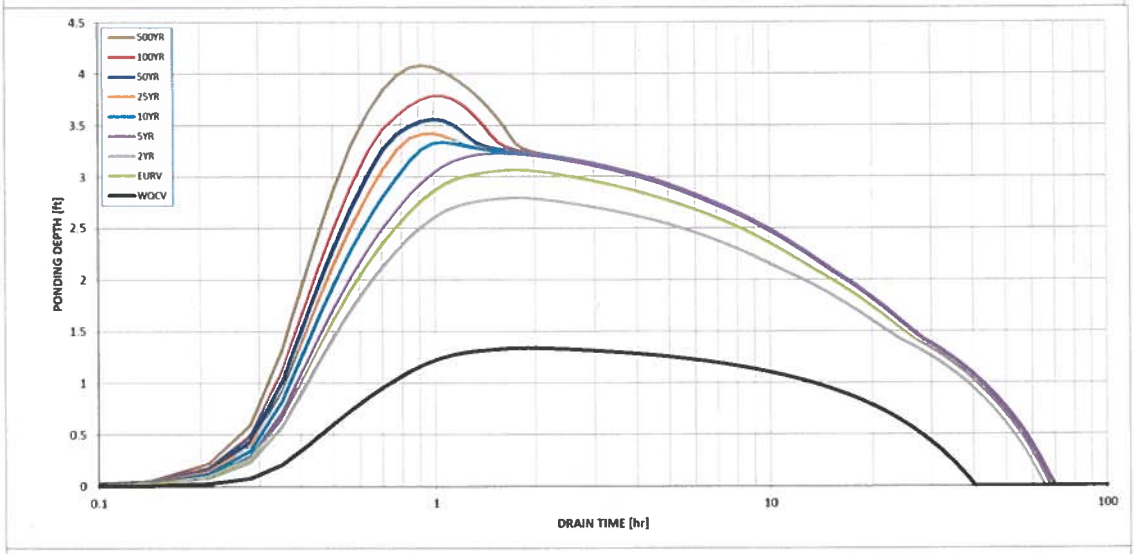
Routed Hydrograph Results

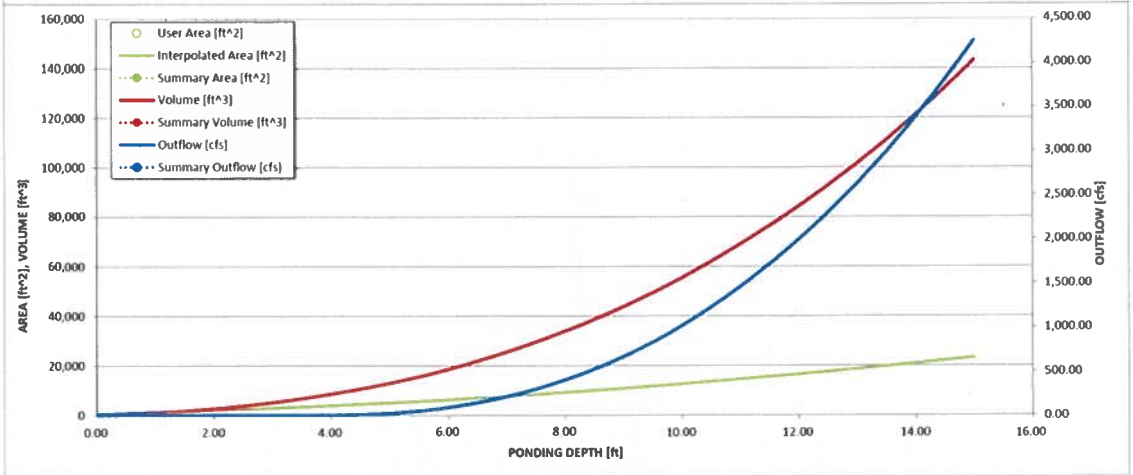
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.037	0.132	0.113	0.147	0.177	0.206	0.231	0.262	0.332
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.036	0.132	0.113	0.146	0.177	0.206	0.230	0.262	0.332
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.03	0.26	0.81	1.12	1.50	2.20
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.3	1.0	1.4	1.8	2.7
Peak Inflow Q (cfs) =	0.7	2.6	2.3	2.9	3.5	4.1	4.6	5.2	6.6
Peak Outflow Q (cfs) =	0.0	0.1	0.1	0.2	1.0	1.5	1.5	1.6	2.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	5.3	3.1	1.5	1.1	0.8	1.1
Structure Controlling Flow =	Filtration Media	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.0	0.3	0.5	0.5	0.5	0.5
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) =	39	63	61	64	63	62	61	60	58
Time to Drain 99% of Inflow Volume (hours) =	40	66	64	68	67	67	67	66	66
Maximum Ponding Depth (ft) =	1.34	3.06	2.80	3.23	3.34	3.42	3.56	3.78	4.08
Area at Maximum Ponding Depth (acres) =	0.04	0.07	0.06	0.07	0.07	0.08	0.08	0.08	0.09
Maximum Volume Stored (acre-ft) =	0.035	0.123	0.105	0.134	0.142	0.149	0.159	0.177	0.204

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)





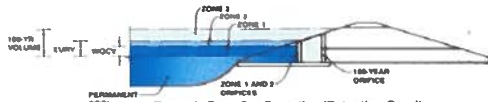


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin F1 (Geraldine Point Only)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	SF	
Watershed Area =	0.28	acres
Watershed Length =	266	ft
Watershed Slope =	0.026	ft/ft
Watershed Imperviousness =	95.67%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.009	acre-feet
Excess Urban Runoff Volume (EURV) =	0.031	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.026	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.034	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.041	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.048	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.054	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.061	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.077	acre-feet
Approximate 2-yr Detention Volume =	0.025	acre-feet
Approximate 5-yr Detention Volume =	0.032	acre-feet
Approximate 10-yr Detention Volume =	0.039	acre-feet
Approximate 25-yr Detention Volume =	0.042	acre-feet
Approximate 50-yr Detention Volume =	0.043	acre-feet
Approximate 100-yr Detention Volume =	0.045	acre-feet

Drain Time Too Long

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.14	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.009	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.022	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.014	acre-feet
Total Detention Basin Volume =	0.045	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
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^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	168	0.004		
	--	5.00	--	--	--	2,808	0.064	7,440	0.171
	--	6.00	--	--	--	3,600	0.083	10,644	0.244
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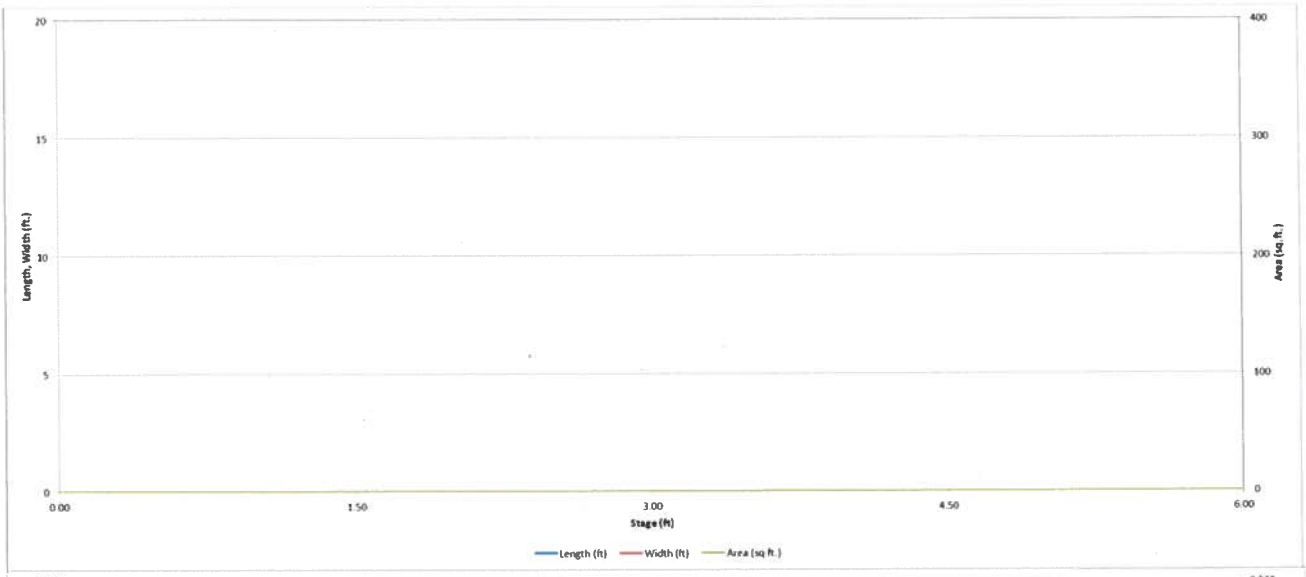
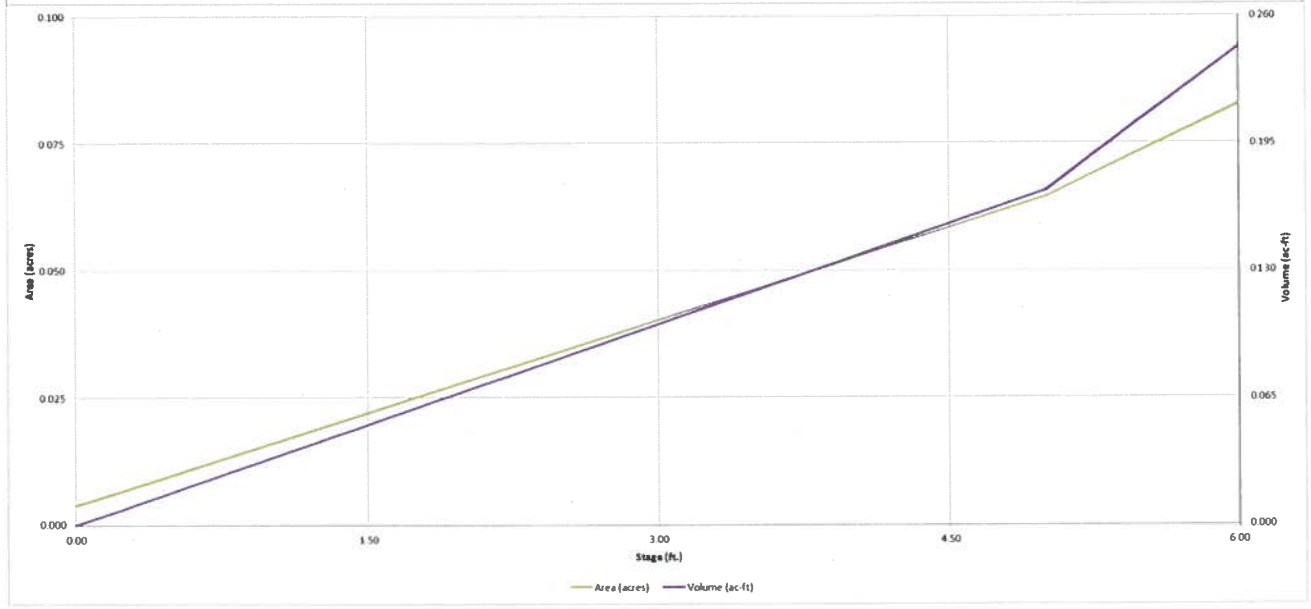
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



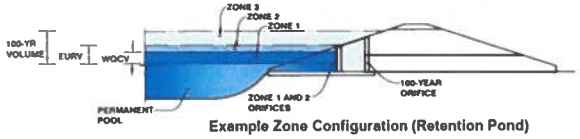


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin F1 (Geraldine Point Only)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.92	0.009	Filtration Media
Zone 2 (EURV)	1.96	0.022	Rectangular Orifice
Zone 3 (100-year)	2.42	0.014	Weir&Pipe (Circular)
		0.045	Total

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

Underdrain Orifice Invert Depth =	1.50	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.26	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft^2
Underdrain Orifice Centroid =	0.01	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)

Invert of Lowest Orifice =	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	N/A	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	N/A	inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (optional)	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	0.92	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	3.20	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	12.00		inches

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected	
Vertical Orifice Area =	0.50	N/A	ft^2
Vertical Orifice Centroid =	0.25	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.20	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.20	N/A	feet
Over Flow Weir Slope Length =	2.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	20.53	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	2.80	N/A	ft^2
Overflow Grate Open Area w/ Debris =	1.40	N/A	ft^2

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

	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	2.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	5.00	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Circular	Not Selected	
Outlet Orifice Area =	0.14	N/A	ft^2
Outlet Orifice Centroid =	0.21	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.80	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	2.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

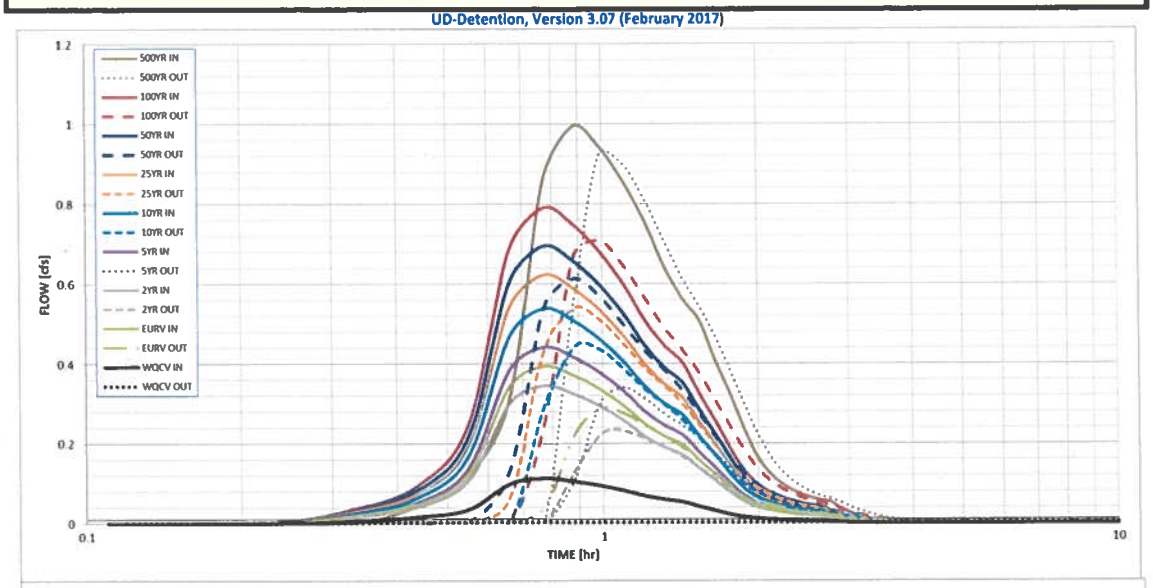
Spillway Design Flow Depth=	0.21	feet
Stage at Top of Freeboard =	5.01	feet
Basin Area at Top of Freeboard =	0.06	acres

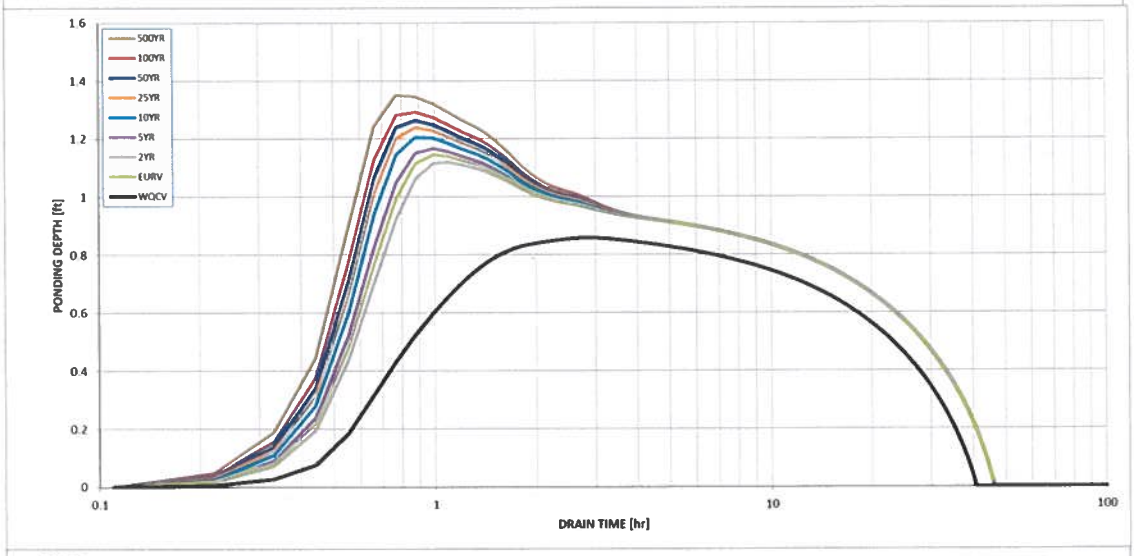
Routed Hydrograph Results

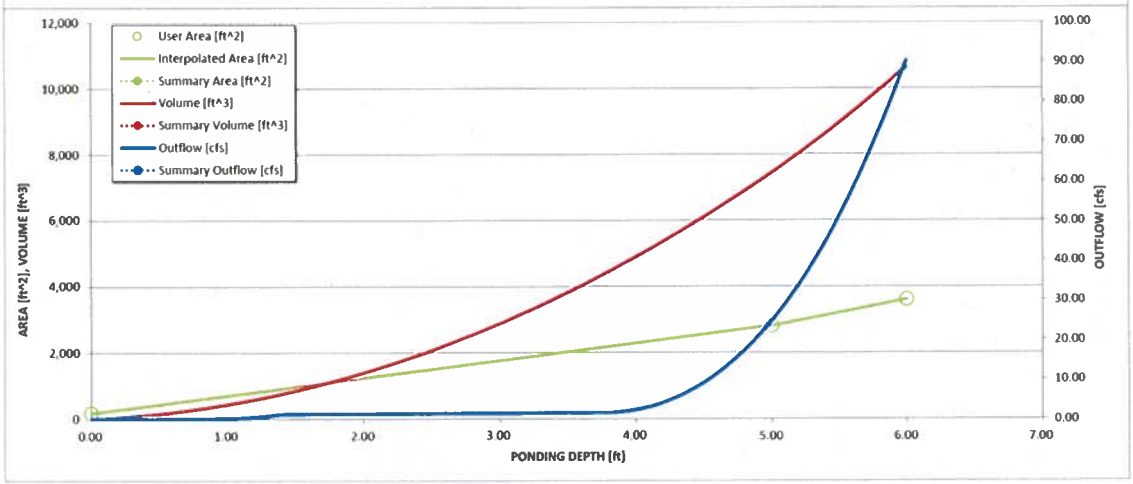
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.009	0.031	0.026	0.034	0.041	0.048	0.054	0.061	0.077
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.008	0.030	0.026	0.034	0.041	0.048	0.053	0.061	0.077
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.01	0.13	0.47	0.65	0.89	1.33
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4
Peak Inflow Q (cfs) =	0.1	0.4	0.3	0.4	0.5	0.6	0.7	0.8	1.0
Peak Outflow Q (cfs) =	0.0	0.3	0.2	0.3	0.4	0.5	0.6	0.7	0.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	82.7	11.6	4.0	3.3	2.8	2.4
Structure Controlling Flow =	Filtration Media	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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) =	39	41	42	41	40	39	38	37	34
Time to Drain 99% of Inflow Volume (hours) =	40	45	45	44	44	44	43	43	42
Maximum Ponding Depth (ft) =	0.86	1.15	1.12	1.17	1.21	1.24	1.26	1.29	1.35
Area at Maximum Ponding Depth (acres) =	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Maximum Volume Stored (acre-ft) =	0.008	0.012	0.012	0.013	0.013	0.014	0.014	0.015	0.016

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)





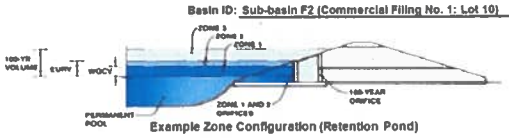


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin F2 (Commercial Filing No. 1: Lot 10)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	SF	
Watershed Area =	2.05	acres
Watershed Length =	323	ft
Watershed Slope =	0.015	ft/ft
Watershed Imperviousness =	95.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.061	acre-feet
Excess Urban Runoff Volume (EURV) =	0.219	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.188	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.244	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.294	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.344	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.384	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.438	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.555	acre-feet
Approximate 2-yr Detention Volume =	0.177	acre-feet
Approximate 5-yr Detention Volume =	0.230	acre-feet
Approximate 10-yr Detention Volume =	0.280	acre-feet
Approximate 25-yr Detention Volume =	0.300	acre-feet
Approximate 50-yr Detention Volume =	0.311	acre-feet
Approximate 100-yr Detention Volume =	0.321	acre-feet

Drain Time Too Long

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.14	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.061	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.158	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.102	acre-feet
Total Detention Basin Volume =	0.321	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	4.50	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	4	

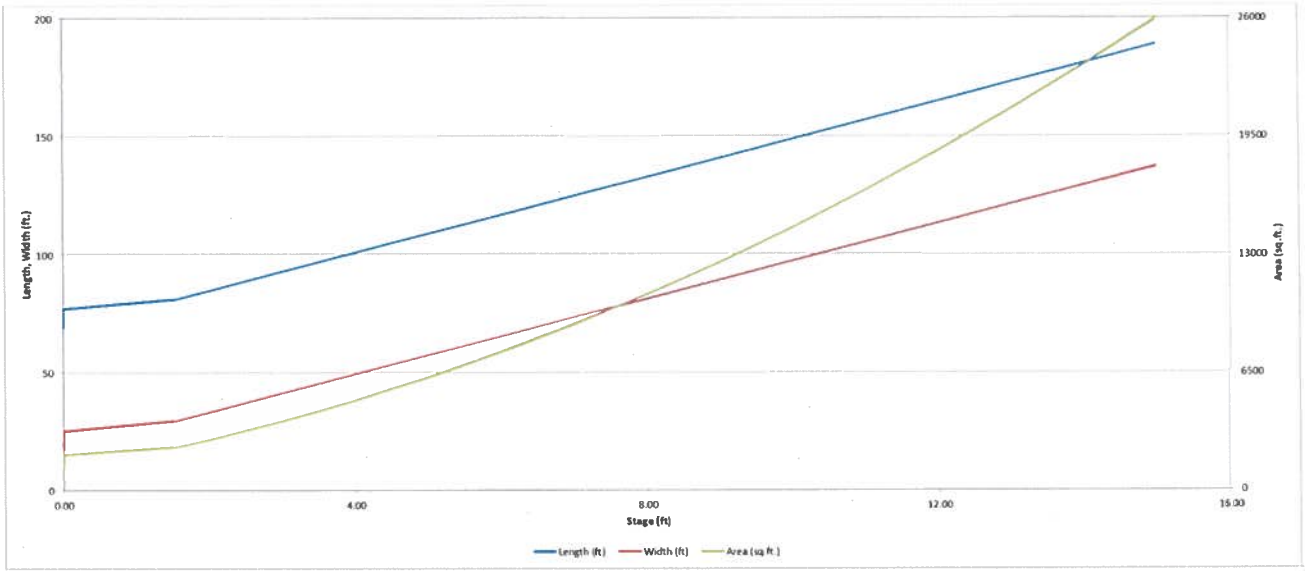
Initial Surcharge Area (A_{ISV}) =	0	ft^2
Surcharge Volume Length (L_{ISV}) =	0.0	ft
Surcharge Volume Width (W_{ISV}) =	0.0	ft
Depth of Basin Floor (H_{FLOOR}) =	0.00	ft
Length of Basin Floor (L_{FLOOR}) =	68.8	ft
Width of Basin Floor (W_{FLOOR}) =	17.2	ft
Area of Basin Floor (A_{FLOOR}) =	1,182	ft^2
Volume of Basin Floor (V_{FLOOR}) =	0	ft^3
Depth of Main Basin (H_{MAIN}) =	4.50	ft
Length of Main Basin (L_{MAIN}) =	104.8	ft
Width of Main Basin (W_{MAIN}) =	53.2	ft
Area of Main Basin (A_{MAIN}) =	5,573	ft^2
Volume of Main Basin (V_{MAIN}) =	13,984	ft^3
Calculated Total Basin Volume (V_{total}) =	0.321	acre-feet

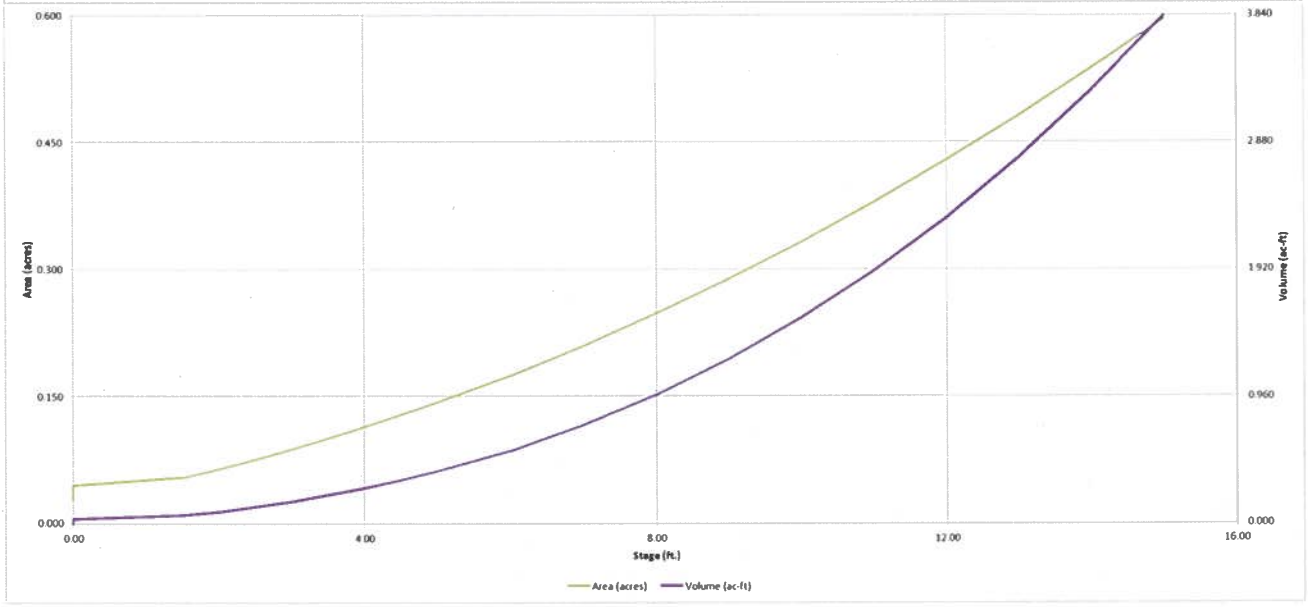
Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	0.00		68.8	17.2	1,182		0.027		
	1.00		76.7	25.1	1,926		0.044	1,528	0.035
Zone 1 (WQCV)	1.52		80.9	29.4	2,376		0.055	2,667	0.061
	2.00		84.7	33.1	2,804		0.064	3,883	0.089
	3.00		92.8	41.2	3,822		0.088	7,218	0.166
Zone 2 (EURV)	3.57		97.3	45.8	4,453		0.102	9,574	0.220
	4.00		100.8	49.2	4,957		0.114	11,597	0.266
Zone 3 (100-year)	4.46		104.5	52.9	5,523		0.127	14,006	0.322
	5.00		108.8	57.2	6,221		0.143	17,175	0.394
	6.00		116.8	65.2	7,613		0.175	24,081	0.553
	7.00		124.8	73.2	9,132		0.210	32,443	0.745
	8.00		132.8	81.2	10,780		0.247	42,389	0.973
	9.00		140.8	89.2	12,556		0.288	54,046	1.241
	10.00		148.8	97.2	14,460		0.332	67,543	1.551
	11.00		156.8	105.2	16,491		0.379	83,008	1.906
	12.00		164.8	113.2	18,651		0.428	100,568	2.309
	13.00		172.8	121.2	20,939		0.481	120,353	2.763
	14.00		180.8	129.2	23,354		0.536	142,488	3.271
	15.00		188.8	137.2	25,898		0.595	167,104	3.836

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



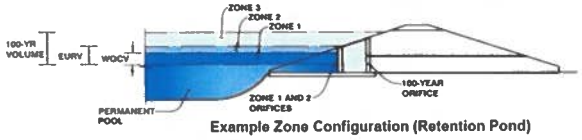


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Shiloh Mesa MDDP Amendment

Basin ID: Sub-basin F2 (Commercial Filing No. 1: Lot 10)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.52	0.061	Filtration Media
Zone 2 (EURV)	3.57	0.158	Orifice Plate
Zone 3 (100-year)	4.46	0.102	Weir&Pipe (Circular)
		0.321	Total

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

Underdrain Orifice Invert Depth =	2.00	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.65	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft^2
Underdrain Orifice Centroid =	0.03	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)

Invert of Lowest Orifice =	1.52	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.57	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	8.20	inches
Orifice Plate: Orifice Area per Row =	0.74	sq. inches (diameter = 15/16 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	5.139E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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)	1.52	2.20	2.89					
Orifice Area (sq. inches)	0.74	0.74	0.74					

	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

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.57	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.57	N/A	feet
Over Flow Weir Slope Length =	2.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	12.53	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	2.80	N/A	ft^2
Overflow Grate Open Area w/ Debris =	1.40	N/A	ft^2

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

	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	2.30	N/A	ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	6.40	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Circular	Not Selected	
Outlet Orifice Area =	0.22	N/A	ft^2
Outlet Orifice Centroid =	0.27	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.30	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	3.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

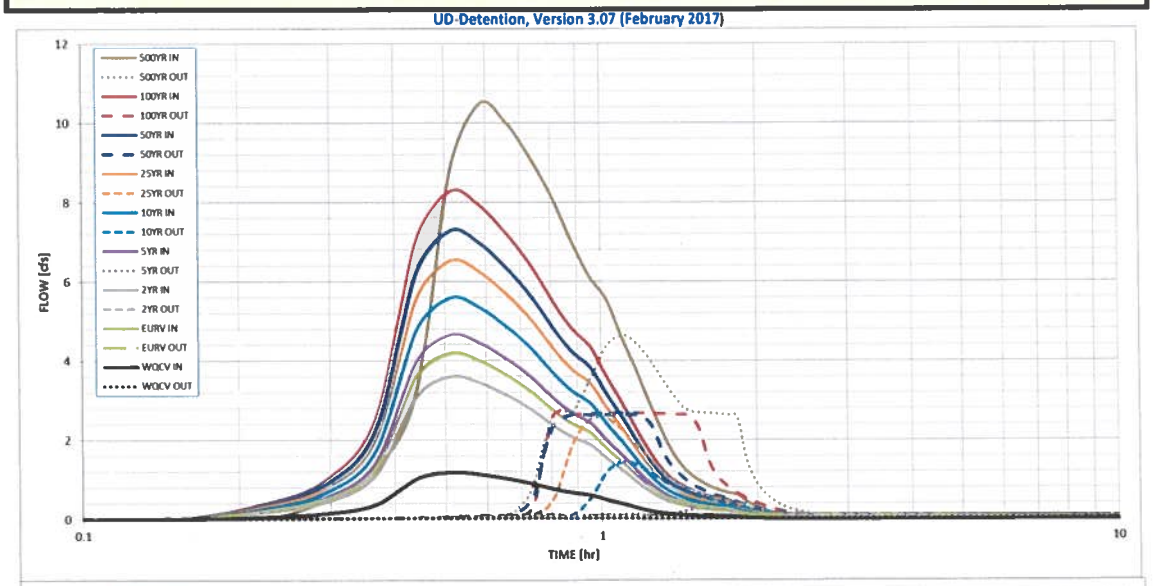
Spillway Design Flow Depth=	0.66	feet
Stage at Top of Freeboard =	5.96	feet
Basin Area at Top of Freeboard =	0.17	acres

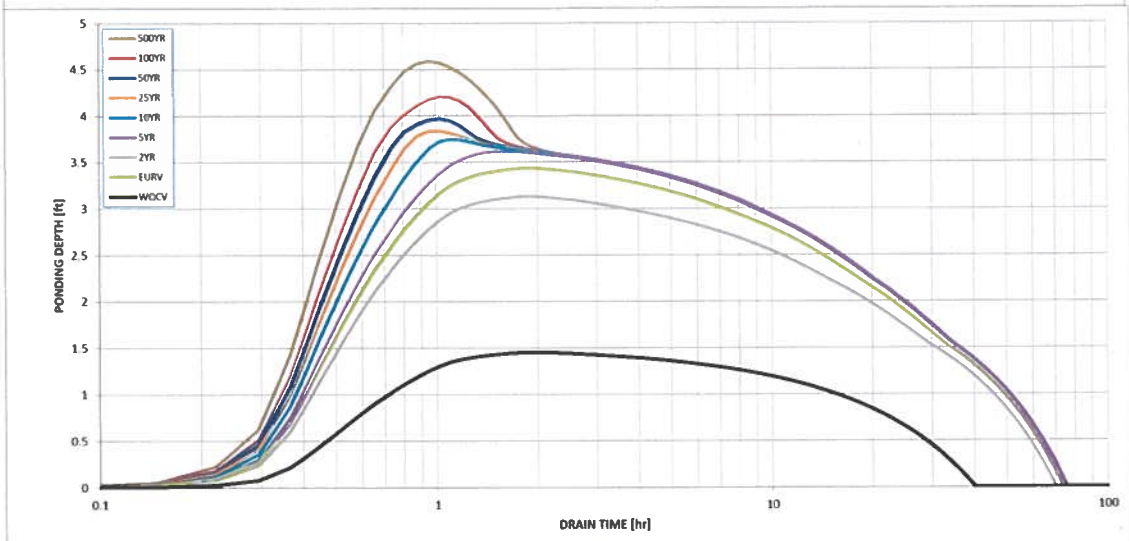
Routed Hydrograph Results

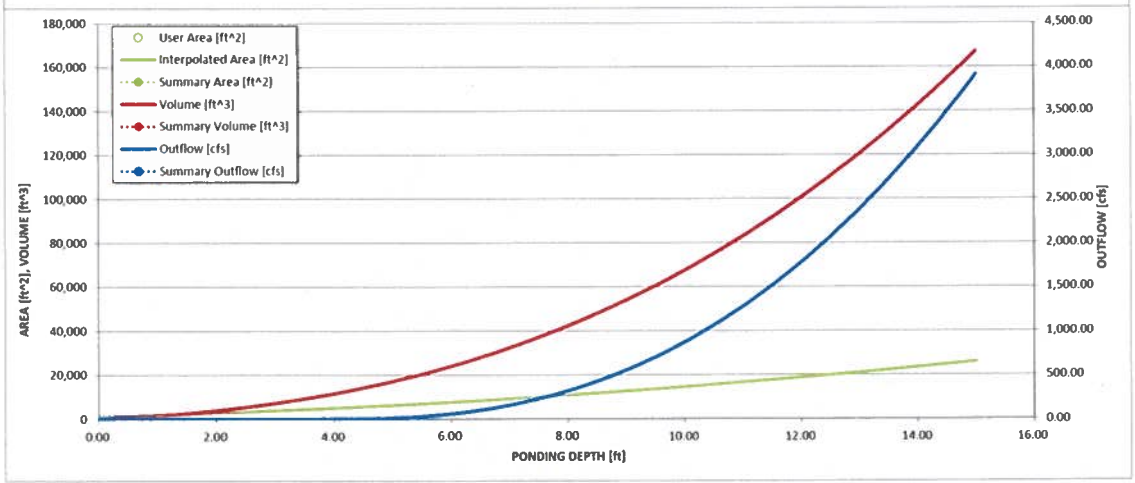
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.061	0.219	0.188	0.244	0.294	0.344	0.384	0.438	0.555
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.061	0.219	0.188	0.244	0.294	0.344	0.384	0.437	0.555
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.02	0.24	0.78	1.07	1.43	2.11
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.1	0.5	1.6	2.2	2.9	4.3
Peak Inflow Q (cfs) =	1.2	4.2	3.6	4.7	5.6	6.5	7.3	8.3	10.5
Peak Outflow Q (cfs) =	0.0	0.1	0.1	0.3	1.4	2.5	2.6	2.7	4.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	5.7	2.9	1.6	1.2	0.9	1.1
Structure Controlling Flow =	Filtration Media	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.5	0.9	0.9	0.9	0.9
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) =	39	69	66	70	69	68	67	66	64
Time to Drain 99% of Inflow Volume (hours) =	40	72	69	74	73	73	73	72	72
Maximum Ponding Depth (ft) =	1.45	3.44	3.13	3.62	3.75	3.84	3.97	4.21	4.59
Area at Maximum Ponding Depth (acres) =	0.05	0.10	0.09	0.10	0.11	0.11	0.11	0.12	0.13
Maximum Volume Stored (acre-ft) =	0.057	0.206	0.177	0.224	0.239	0.247	0.262	0.290	0.338

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







INLET NAME	Inlet I1	Inlet H3	Inlet H1
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	Colorado Springs D-10-R	Colorado Springs D-10-R	Colorado Springs D-10-R

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.0	1.1	2.0
Major Q_{Known} (cfs)	2.3	2.4	4.8

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.8

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)			
C_1			
C_2			
C_3			
User-defined C			
User-defined 5-yr C_5			
User-defined T_c			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			
C_1			
C_2			
C_3			
User-defined C			
User-defined 5-yr C_5			
User-defined T_c			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.0**	**1.1**	**2.0**
Major Total Design Peak Flow, Q (cfs)	**2.3**	**2.4**	**5.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.4	0.4	1.6

INLET NAME	Inlet G2	Inlet G3	Inlet G5
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	Colorado Springs D-10-R	Colorado Springs D-10-R	Colorado Springs D-10-R

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.6	4.4	6.4
Major Q_{Known} (cfs)	13.1	9.7	14.4

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.4	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	4.5	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)			
C_1			
C_2			
C_3			
User-defined C			
User-defined 5-yr C_5			
User-defined T_c			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			
C_1			
C_2			
C_3			
User-defined C			
User-defined 5-yr C_5			
User-defined T_c			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.6**	**4.8**	**6.4**
Major Total Design Peak Flow, Q (cfs)	**13.1**	**14.2**	**14.4**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.4	0.2	0.7
Major Flow Bypassed Downstream, Q_b (cfs)	4.5	5.2	5.3

INLET NAME	Inlet E2	Inlet OS4
Site Type (Urban or Rural)		
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	On Grade
Inlet Type	Colorado Springs D-10-R	Colorado Springs D-10-R

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	0.8	4.0
Major Q_{Known} (cfs)	1.7	7.6

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)		
C_1		
C_2		
C_3		
User-defined C		
User-defined 5-yr C_5		
User-defined T_c		

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		
C_1		
C_2		
C_3		
User-defined C		
User-defined 5-yr C_5		
User-defined T_c		

CALCULATED OUTPUT

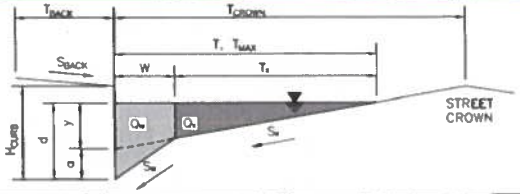
Minor Total Design Peak Flow, Q (cfs)	**0.8**	**4.0**
Major Total Design Peak Flow, Q (cfs)	**1.7**	**7.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.1	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.5	0.0

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

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

Shiloh Mesa MDDP

Inlet I1



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	8.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_x =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_w =	0.042	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.017	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

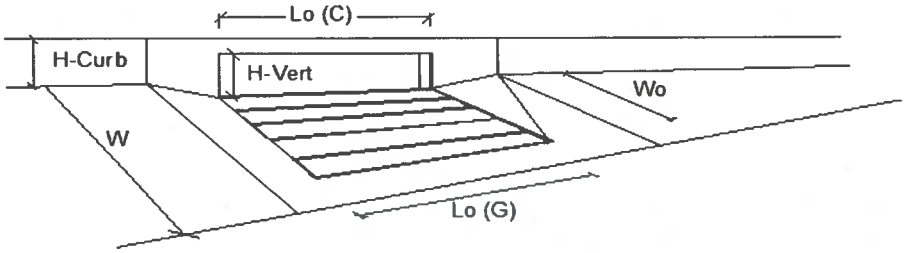
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	7.2	14.6	cfs

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'

INLET ON A CONTINUOUS GRADE

Version 4.04 Released November 2016



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	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 =	6.00	6.00	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_fG =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_fC =	0.10	0.10	

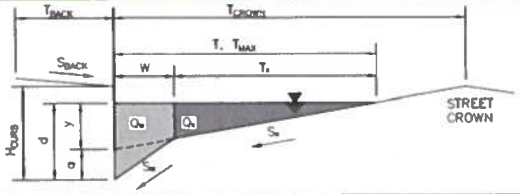
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.0**	**1.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**84**	**%**

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

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

Shiloh Mesa MDDP

Inlet H3



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	8.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.042	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.017	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

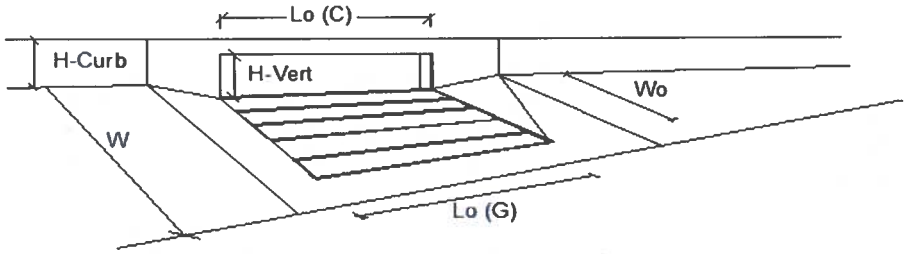
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	7.2	14.6	cfs

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'

INLET ON A CONTINUOUS GRADE

Version 4.04 Released November 2016



Design Information (Input)		MINOR	MAJOR	
Type of Inlet: Colorado Springs D-10-R	Type =	Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	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 =	6.00	6.00	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_fG =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_fC =	0.10	0.10	

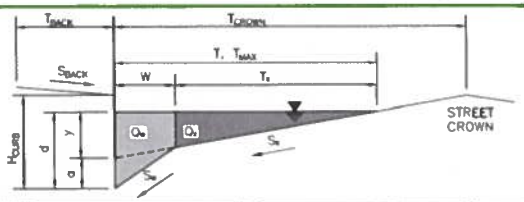
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.1**	**2.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**83**	**%**

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

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

Shiloh Mesa MDDP

Inlet H1



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	8.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_x =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_w =	0.042	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

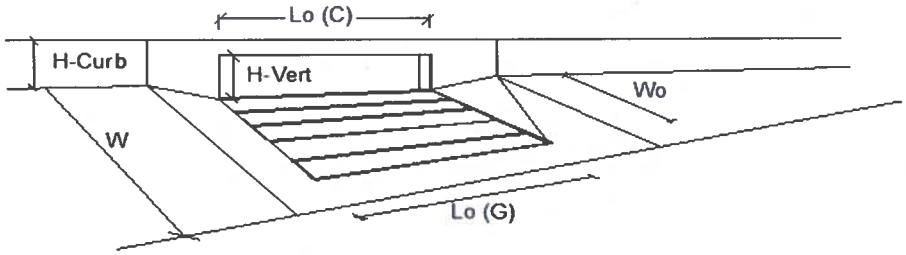
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	5.5	11.2	cfs

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'

INLET ON A CONTINUOUS GRADE

Version 4.04 Released November 2016



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	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 =	8.00	8.00	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	

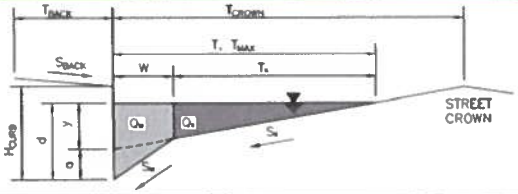
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.0**	**4.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**71**	**%**

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

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

Shiloh Mesa MDDP

Inlet G2



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	8.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.042	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

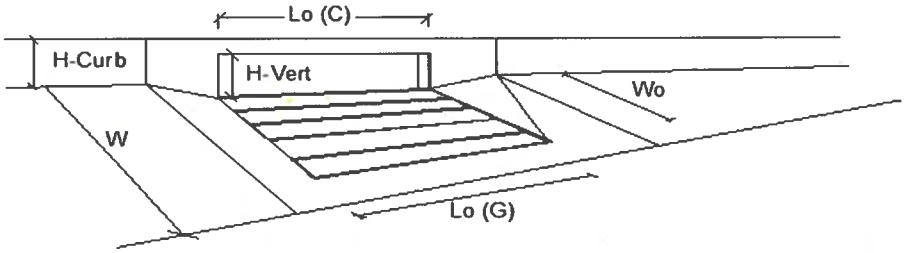
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	7.8	15.8	cfs

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'

INLET ON A CONTINUOUS GRADE

Version 4.04 Released November 2016



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	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 =	12.00	12.00	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	

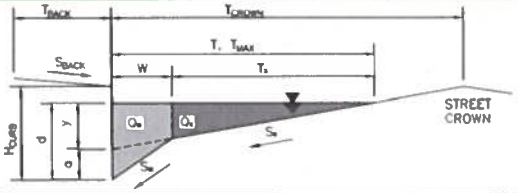
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.2**	**8.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.4**	**4.5**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**93**	**66**	**%**

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

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

Shiloh Mesa MDDP

Inlet G3



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	8.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.042	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.023	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

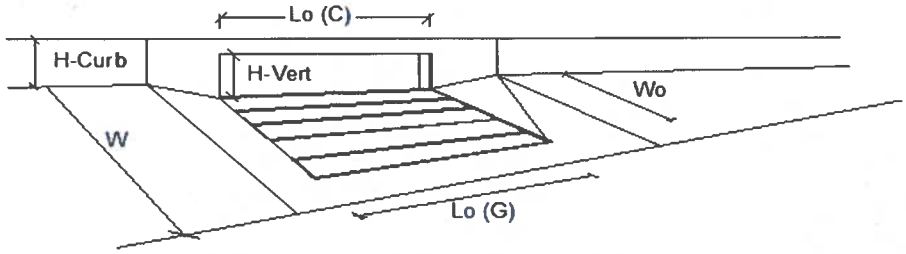
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	8.4	14.4	cfs

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'

INLET ON A CONTINUOUS GRADE

Version 4.04 Released November 2016



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	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 =	12.00	12.00	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_fG =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_fC =	0.10	0.10	

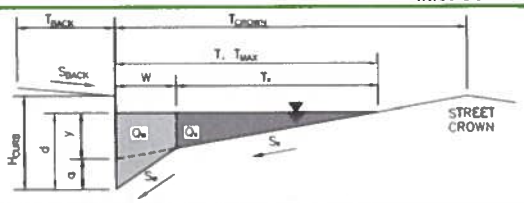
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.6**	**9.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.2**	**5.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**97**	**63**	**%**

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

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

Shiloh Mesa MDDP

Inlet G5



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	8.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.042	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

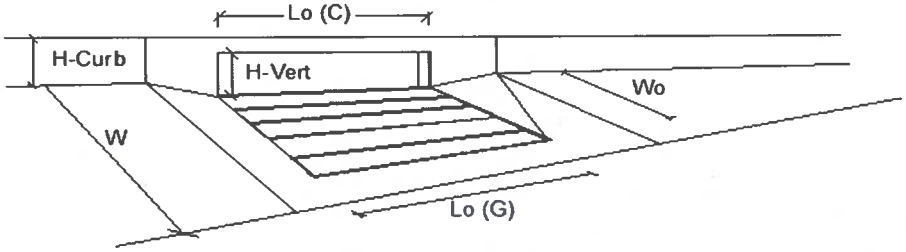
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	5.5	9.5	cfs

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.04 Released November 2016



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	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 =	12.00	12.00	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	

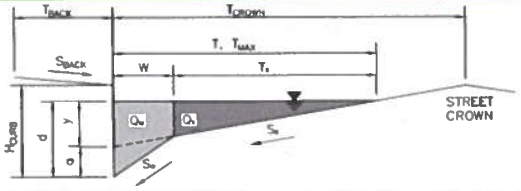
Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.7**	**9.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.7**	**5.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**89**	**63**	**%**

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

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

Shiloh Mesa MDDP

Inlet OS4



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	21.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_x =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_w =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	21.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

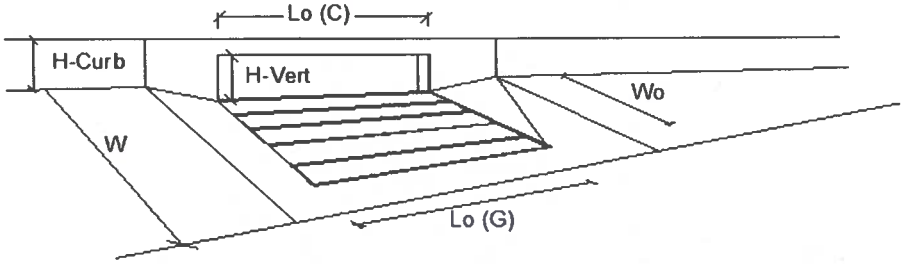
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	4.2	17.0	cfs

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'

INLET ON A CONTINUOUS GRADE

Version 4.04 Released November 2016



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	Colorado Springs D-10-R		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	8.00	8.00	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_fG =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_fC =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.0**	**7.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

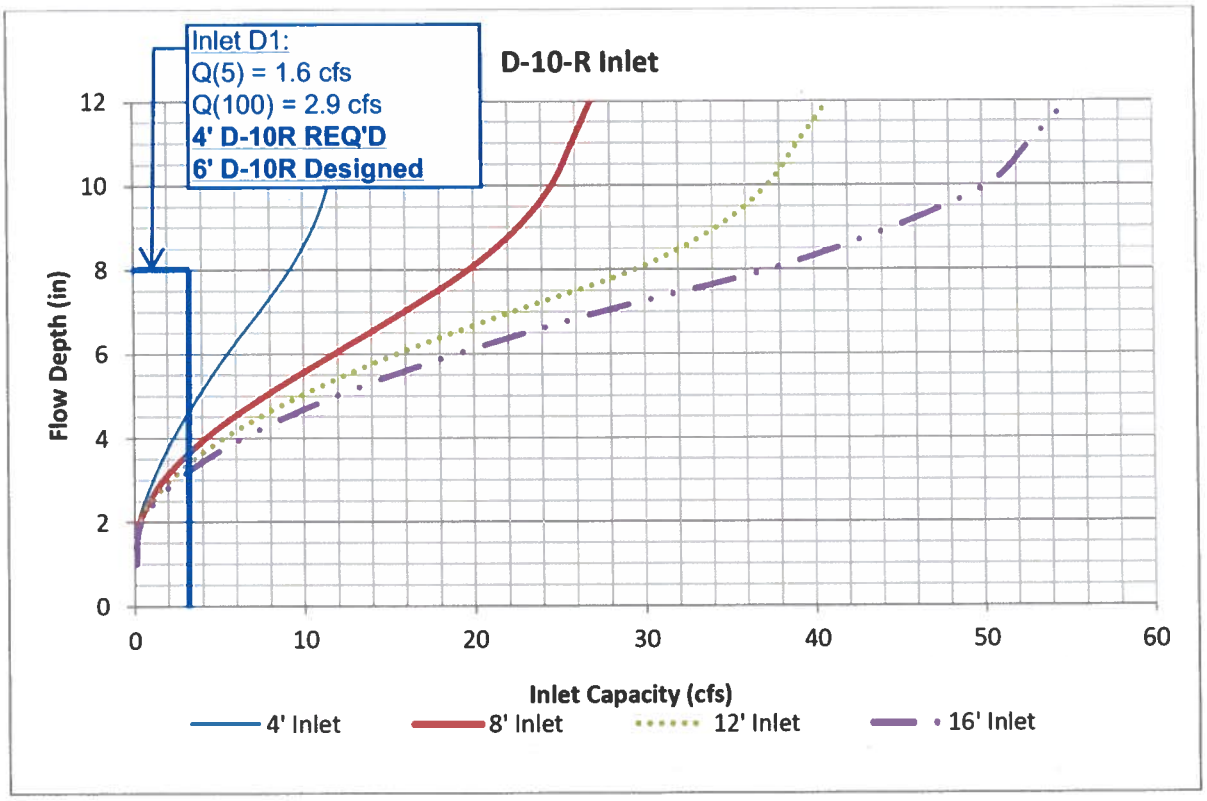


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

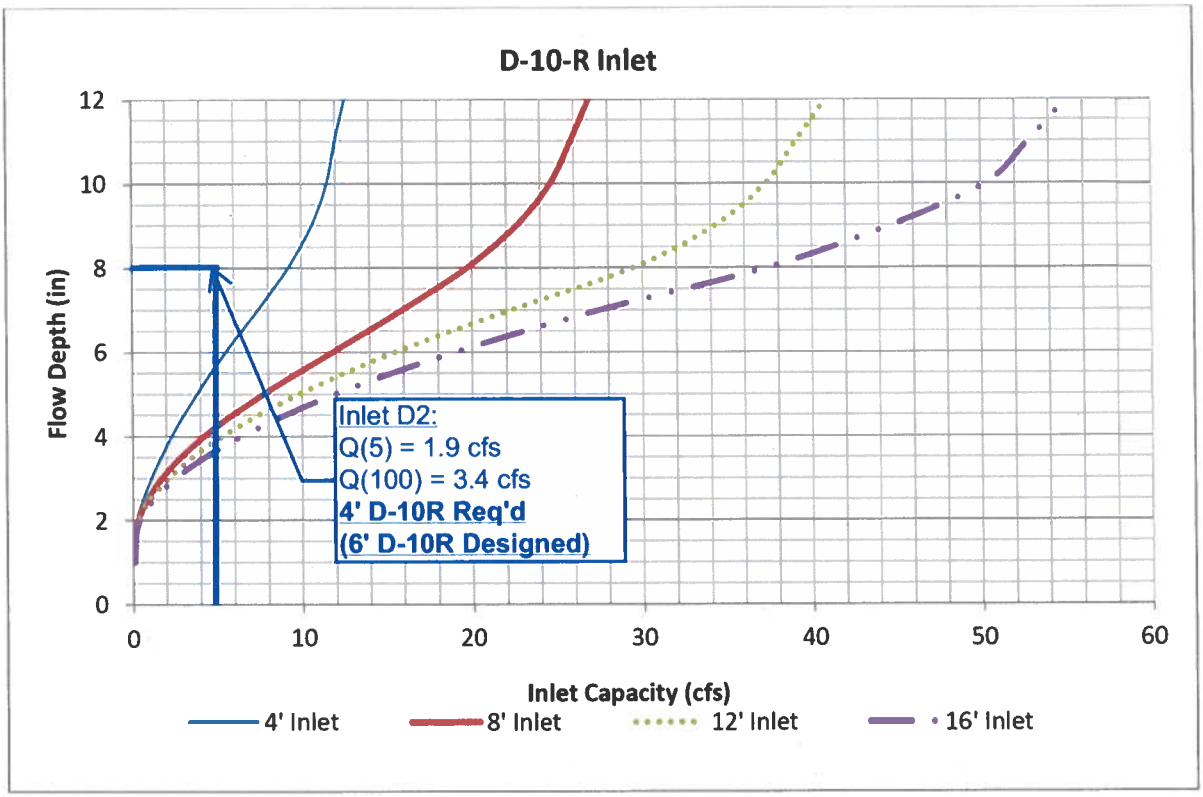


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

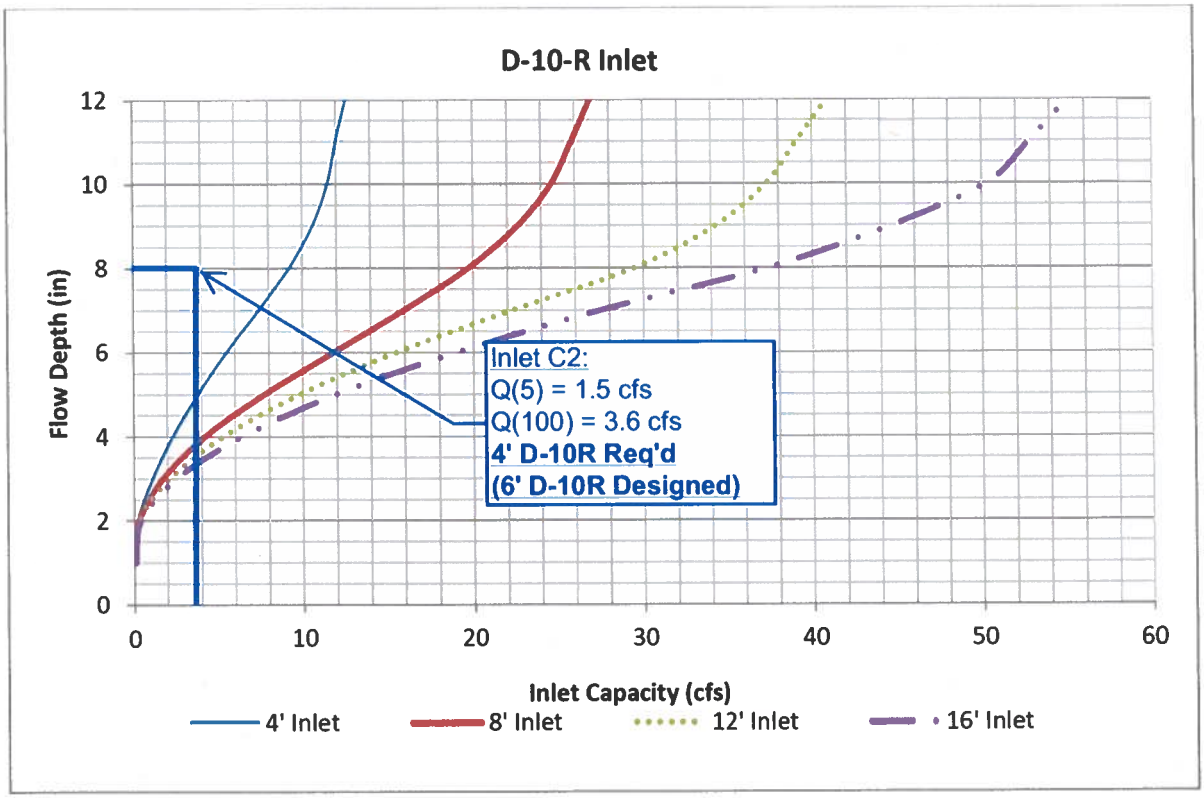


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

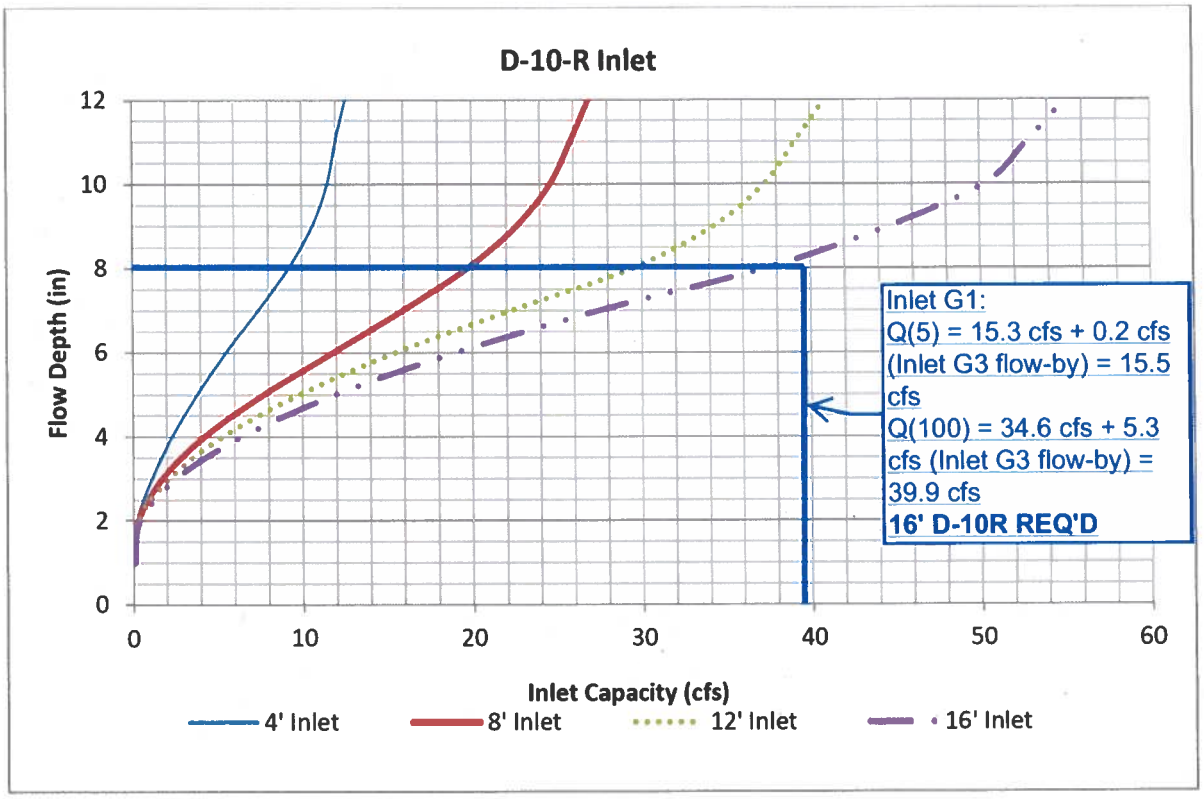


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

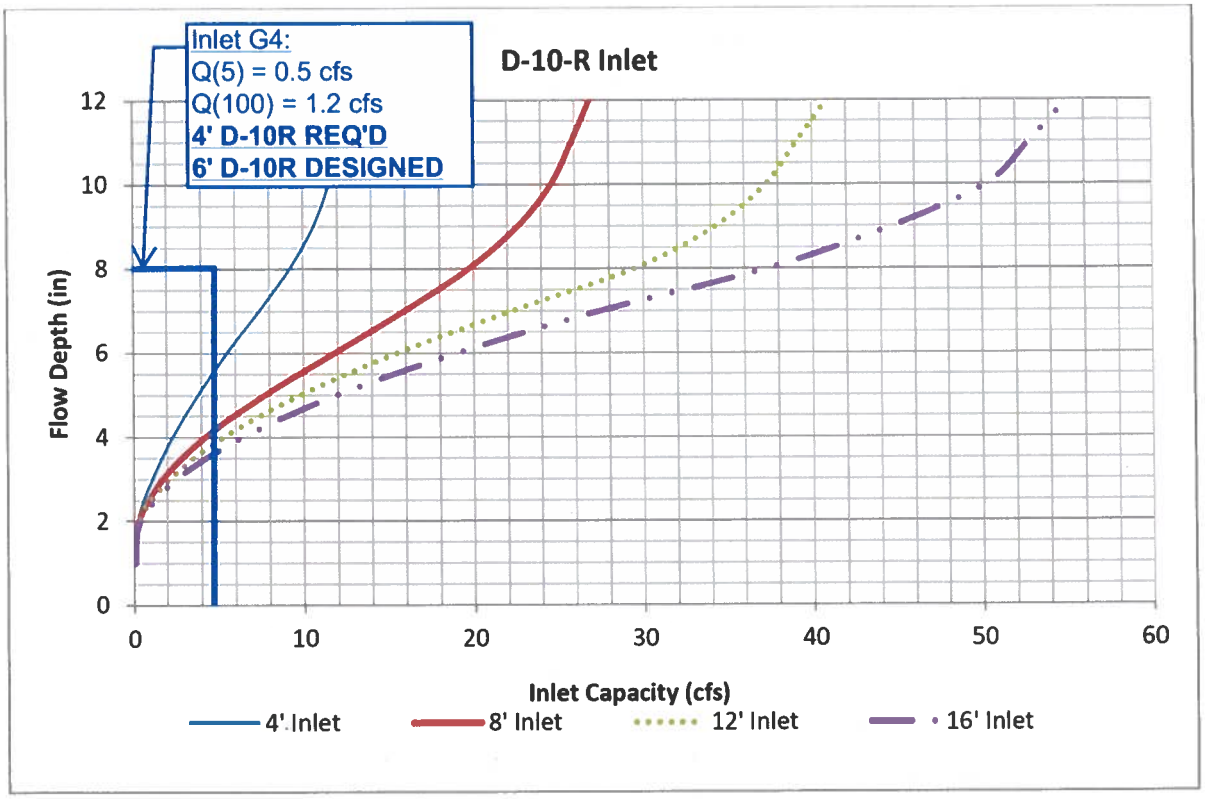


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

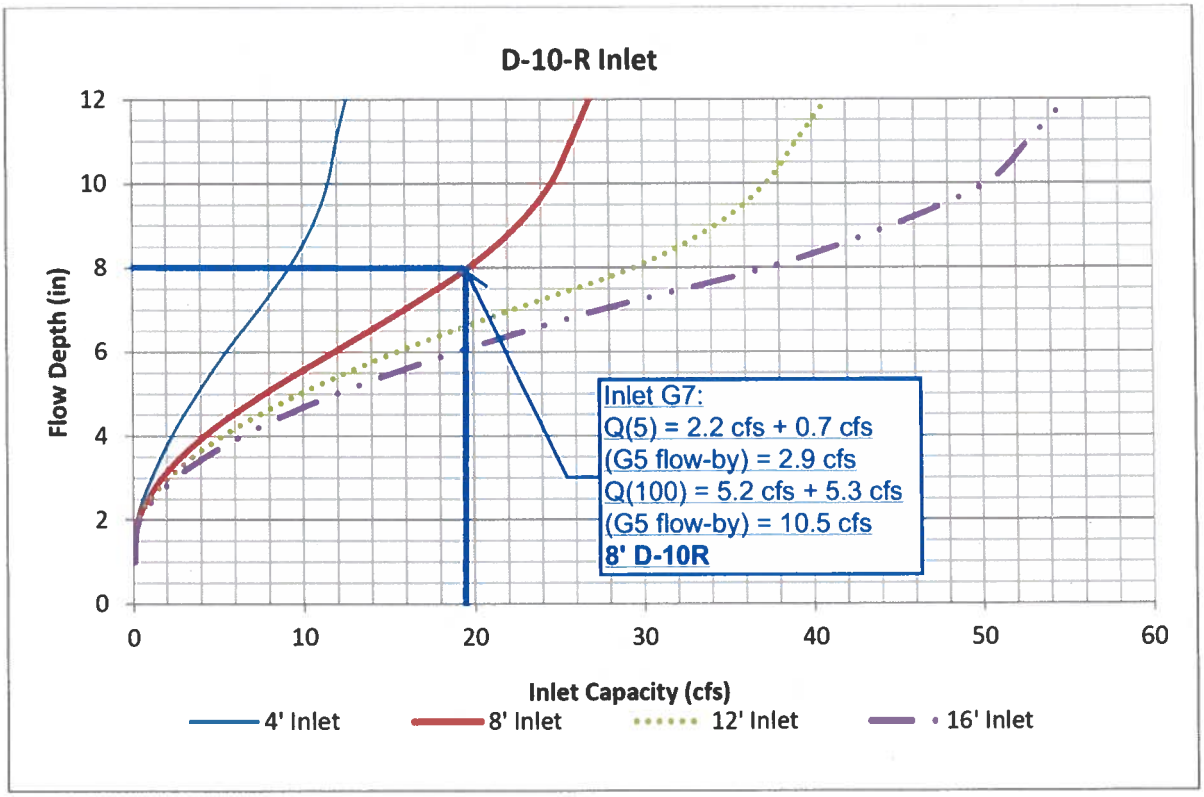


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

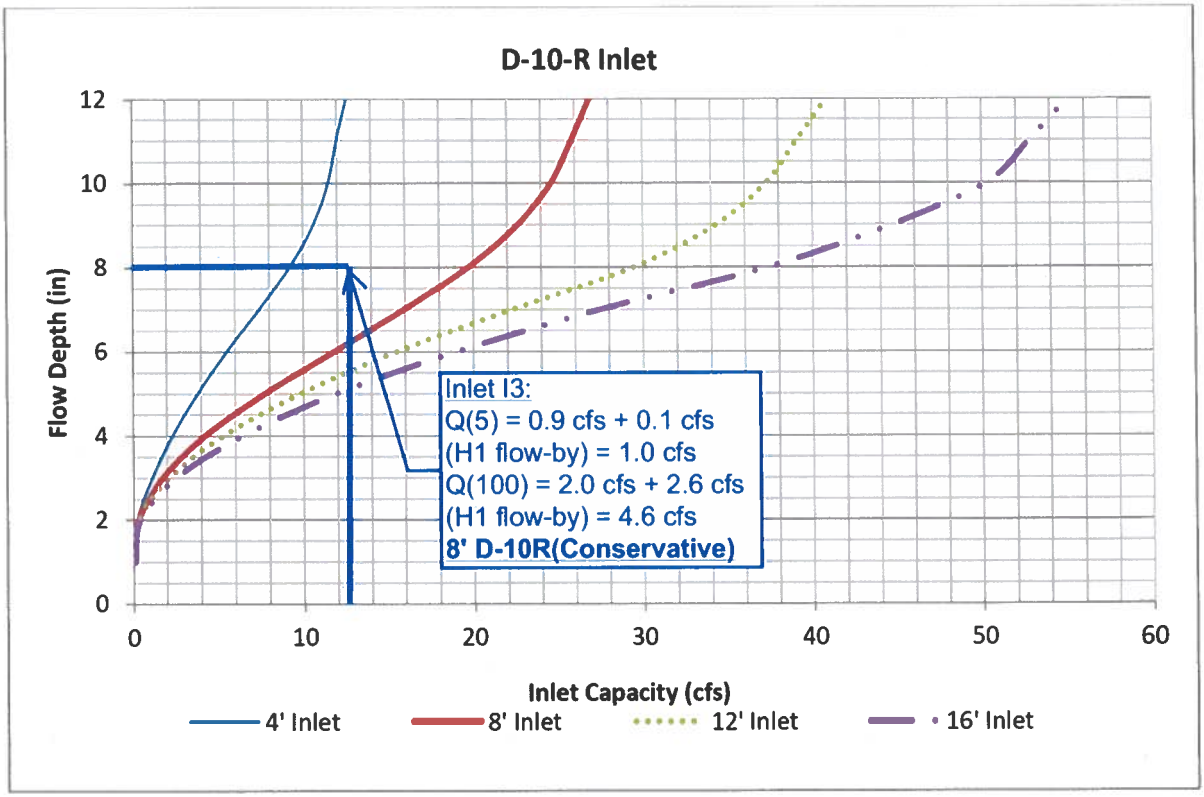


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet

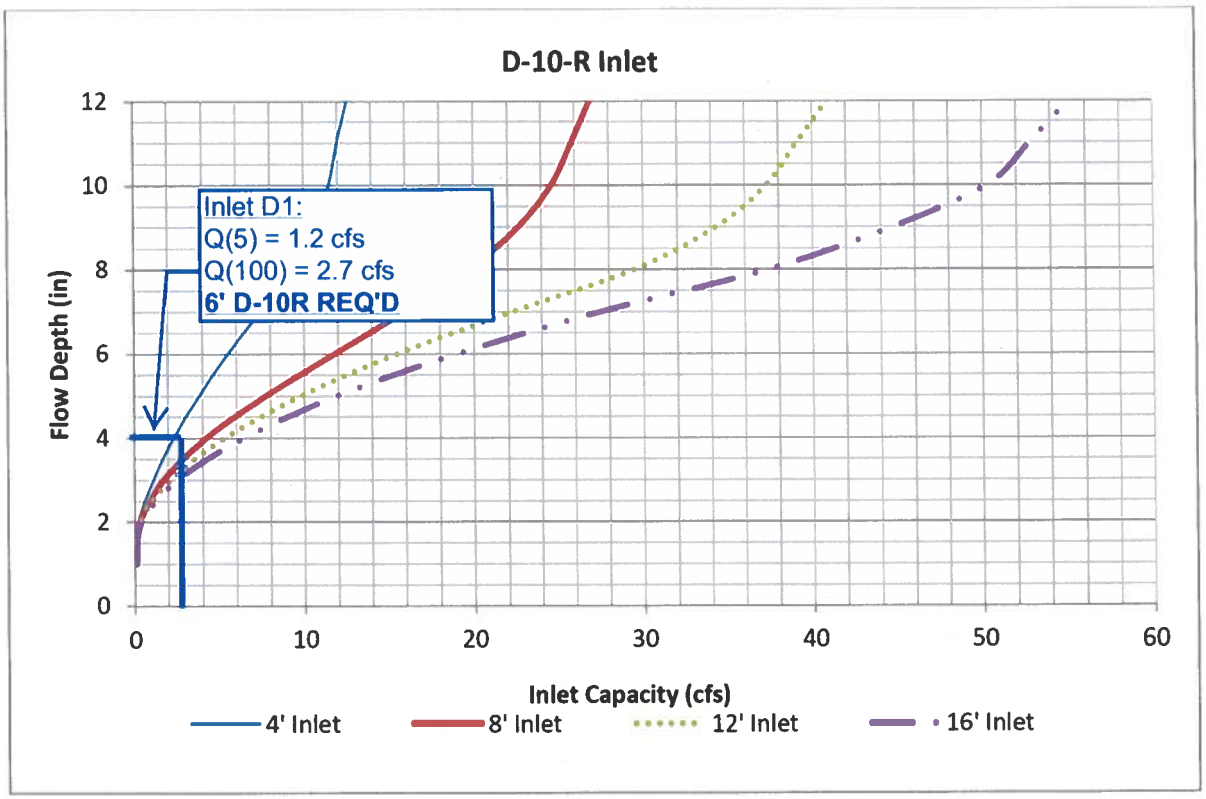
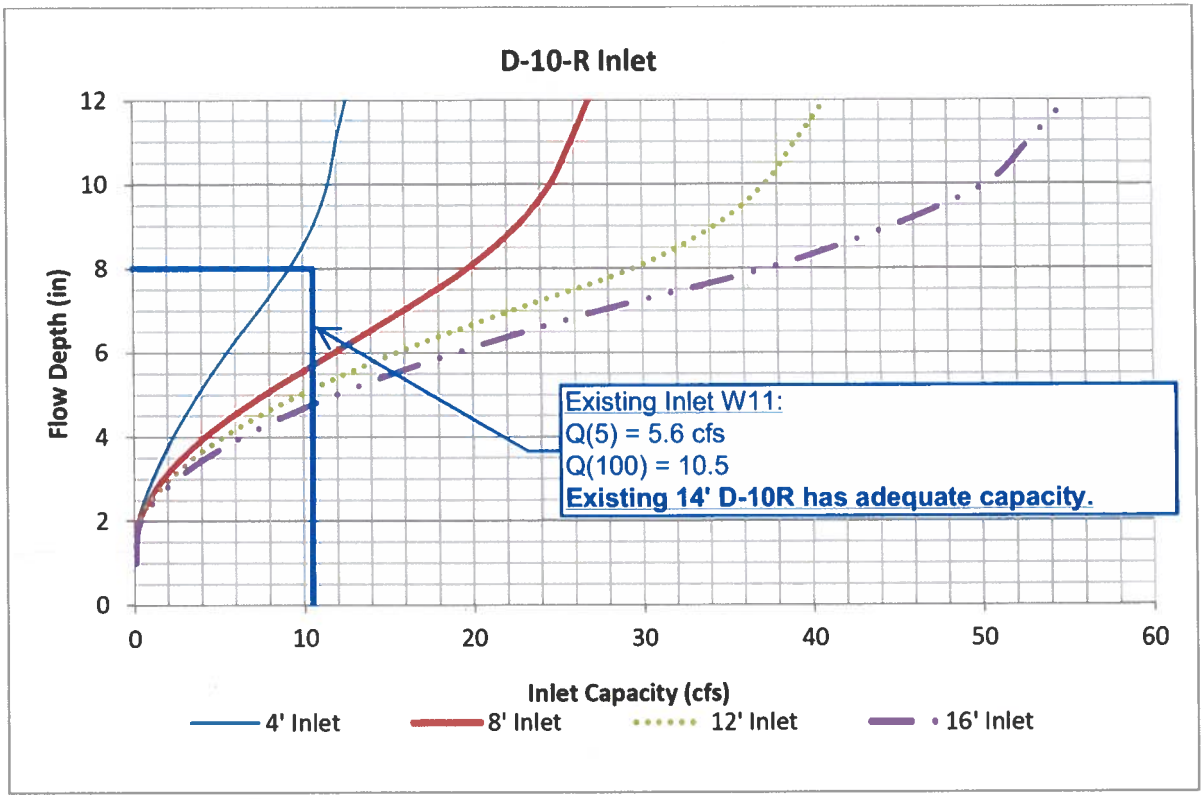


Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W2

Circular

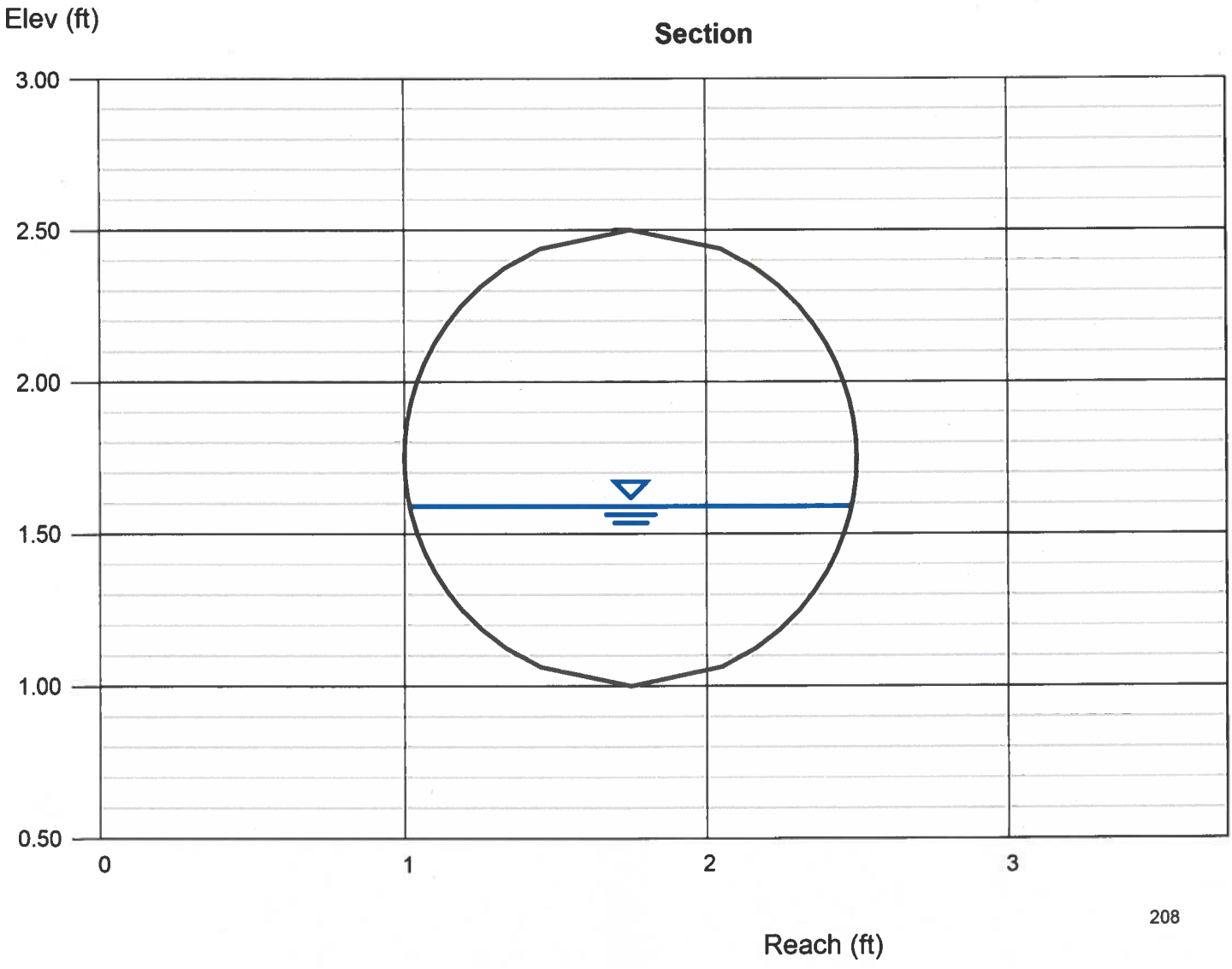
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 3.40

Highlighted

Depth (ft)	= 0.59
Q (cfs)	= 3.400
Area (sqft)	= 0.65
Velocity (ft/s)	= 5.23
Wetted Perim (ft)	= 2.04
Crit Depth, Yc (ft)	= 0.71
Top Width (ft)	= 1.47
EGL (ft)	= 1.02



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W3

Circular

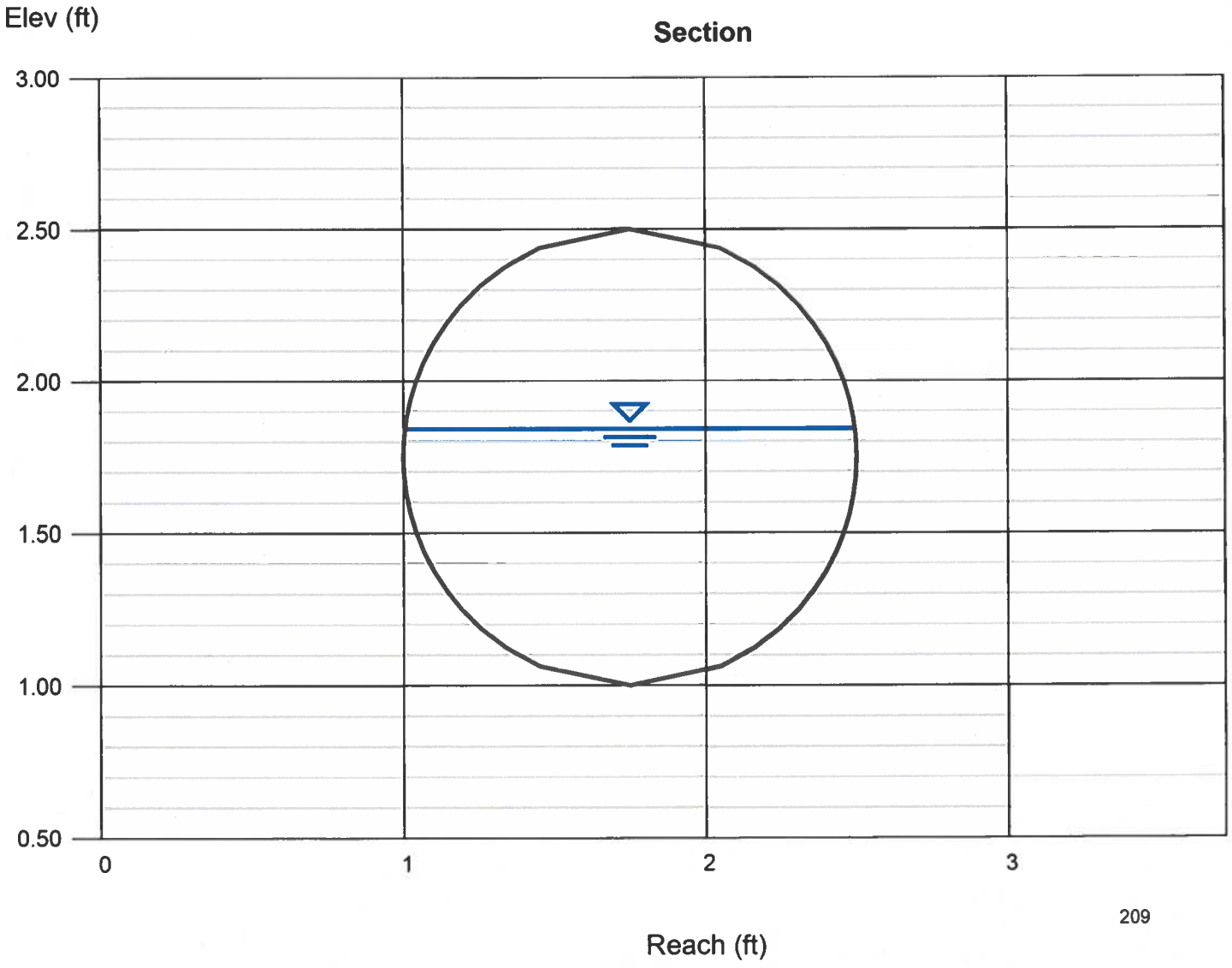
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.30

Highlighted

Depth (ft)	= 0.84
Q (cfs)	= 6.300
Area (sqft)	= 1.02
Velocity (ft/s)	= 6.16
Wetted Perim (ft)	= 2.54
Crit Depth, Yc (ft)	= 0.97
Top Width (ft)	= 1.49
EGL (ft)	= 1.43



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W4 - Pond A Discharge

Circular

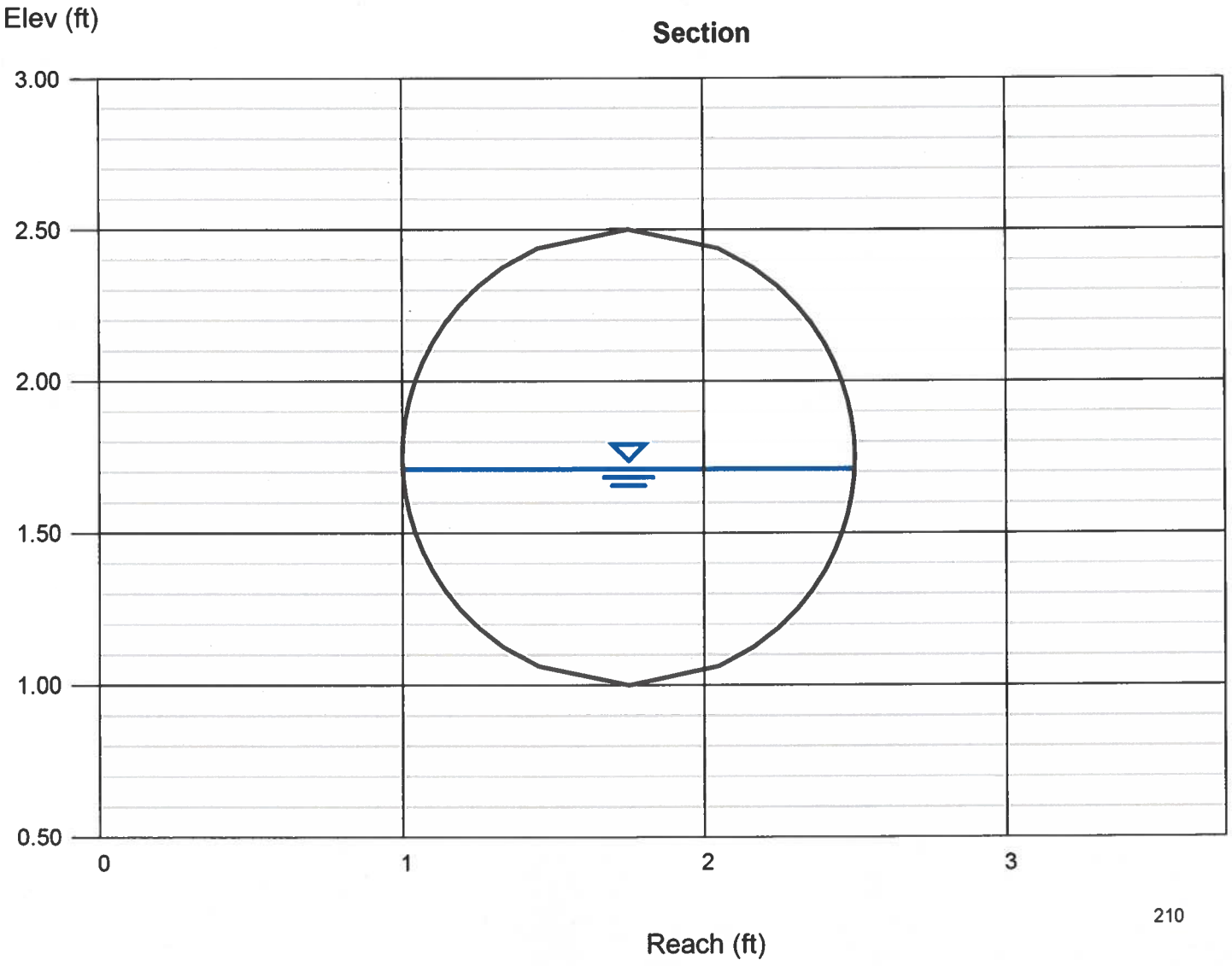
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.80

Highlighted

Depth (ft)	= 0.71
Q (cfs)	= 4.800
Area (sqft)	= 0.83
Velocity (ft/s)	= 5.81
Wetted Perim (ft)	= 2.28
Crit Depth, Yc (ft)	= 0.84
Top Width (ft)	= 1.50
EGL (ft)	= 1.23



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP OS4

Circular

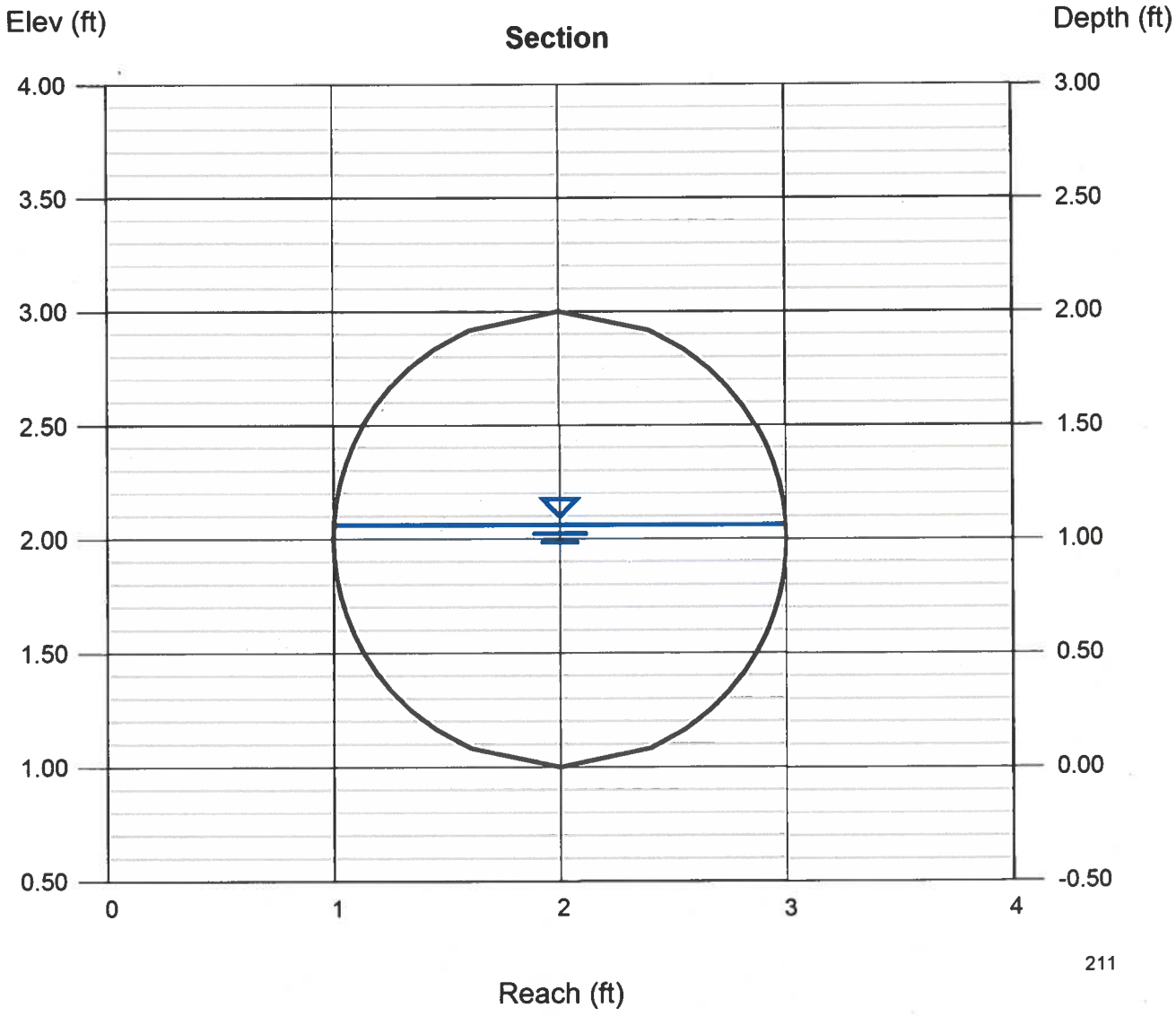
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.40

Highlighted

Depth (ft)	= 1.06
Q (cfs)	= 12.40
Area (sqft)	= 1.70
Velocity (ft/s)	= 7.30
Wetted Perim (ft)	= 3.27
Crit Depth, Yc (ft)	= 1.27
Top Width (ft)	= 2.00
EGL (ft)	= 1.89



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W5

Circular

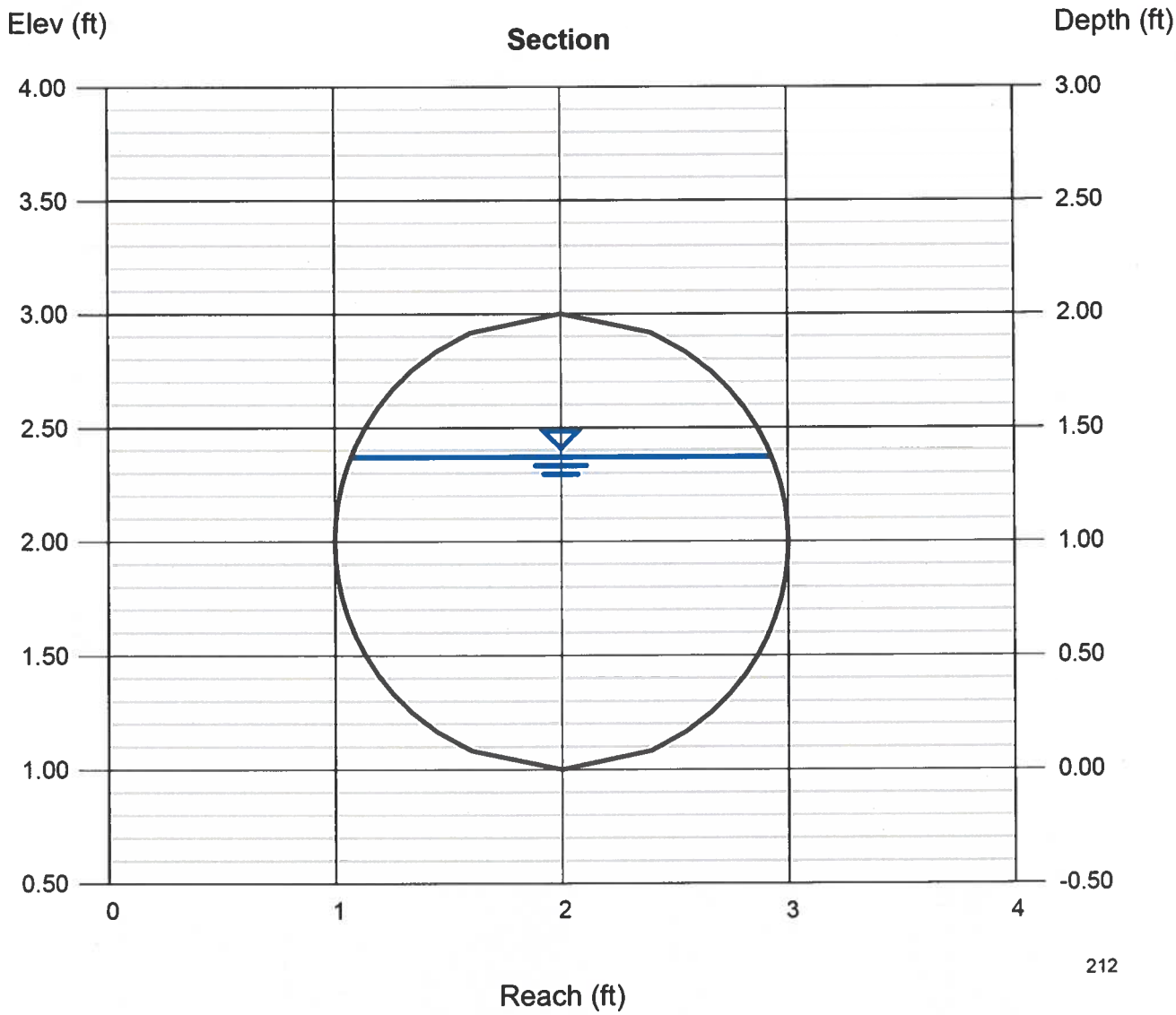
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 18.40

Highlighted

Depth (ft)	= 1.37
Q (cfs)	= 18.40
Area (sqft)	= 2.29
Velocity (ft/s)	= 8.02
Wetted Perim (ft)	= 3.90
Crit Depth, Yc (ft)	= 1.55
Top Width (ft)	= 1.86
EGL (ft)	= 2.37



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W6

Circular

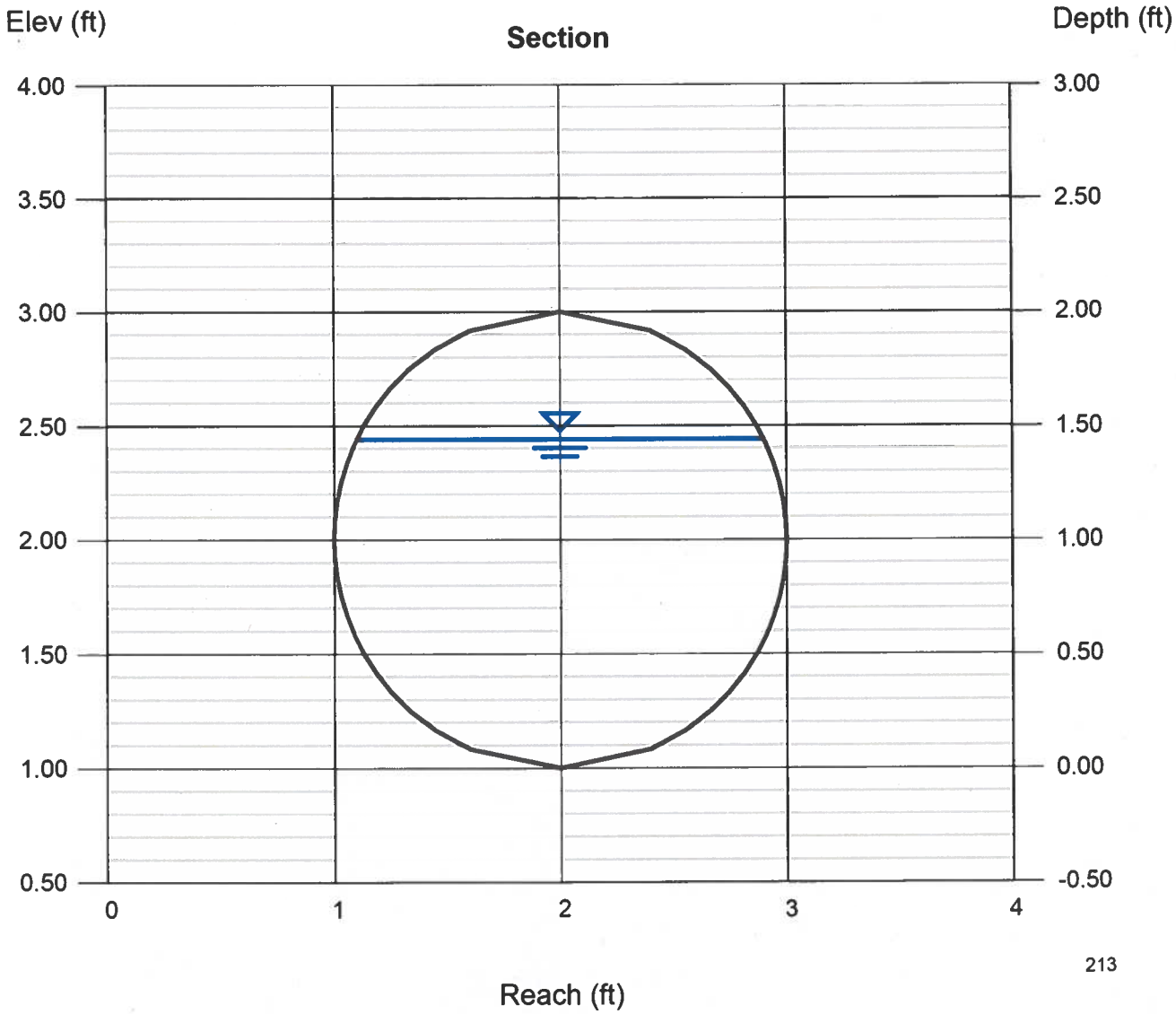
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 19.60

Highlighted

Depth (ft)	= 1.44
Q (cfs)	= 19.60
Area (sqft)	= 2.43
Velocity (ft/s)	= 8.07
Wetted Perim (ft)	= 4.06
Crit Depth, Yc (ft)	= 1.59
Top Width (ft)	= 1.79
EGL (ft)	= 2.45



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W7-Geraldine WQ Pond

Circular

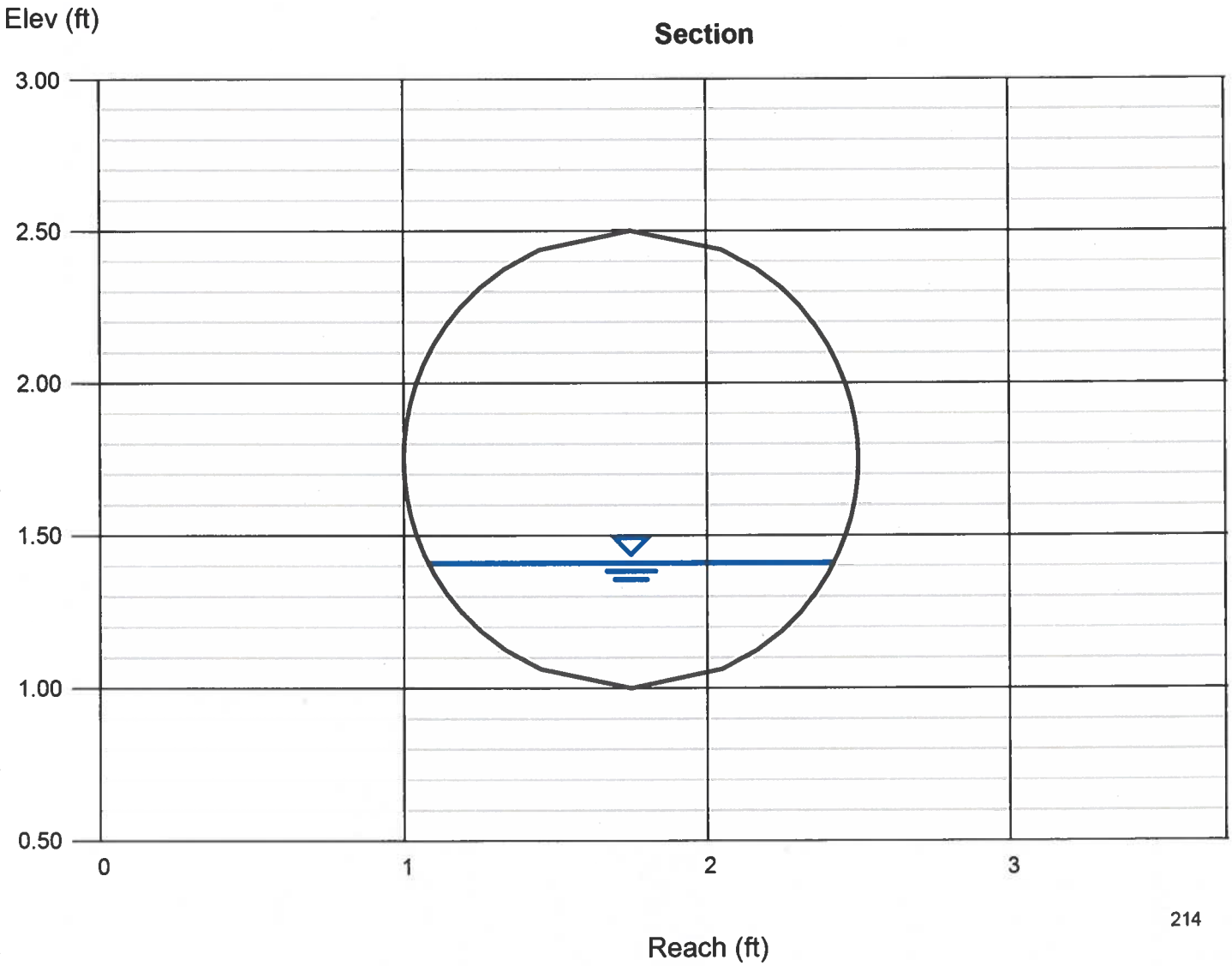
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.70

Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 1.700
Area (sqft)	= 0.40
Velocity (ft/s)	= 4.29
Wetted Perim (ft)	= 1.66
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 1.34
EGL (ft)	= 0.70



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W8

Circular

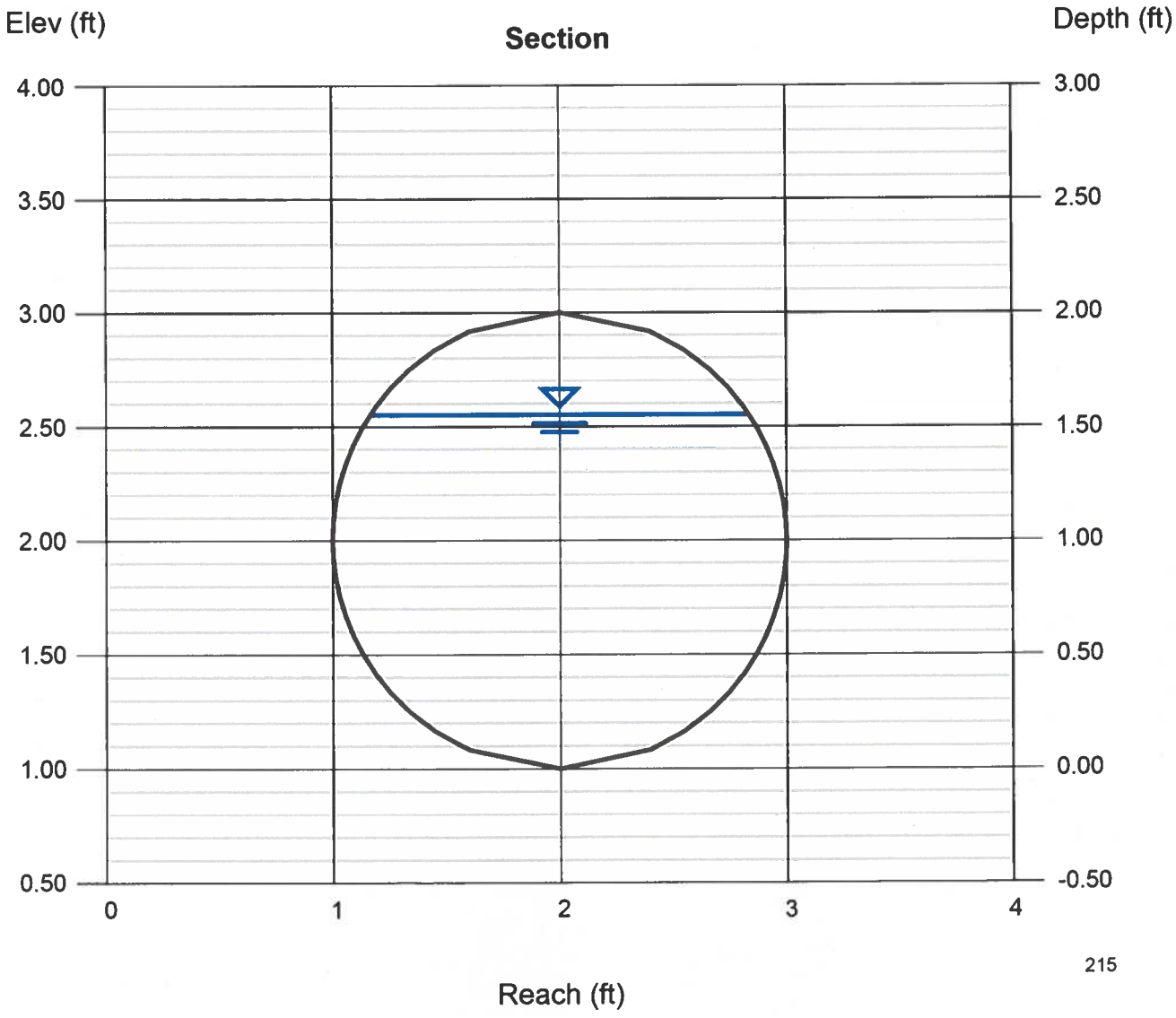
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 21.30

Highlighted

Depth (ft)	= 1.55
Q (cfs)	= 21.30
Area (sqft)	= 2.62
Velocity (ft/s)	= 8.15
Wetted Perim (ft)	= 4.31
Crit Depth, Yc (ft)	= 1.66
Top Width (ft)	= 1.67
EGL (ft)	= 2.58



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W9-Stub for Lot 10

Circular

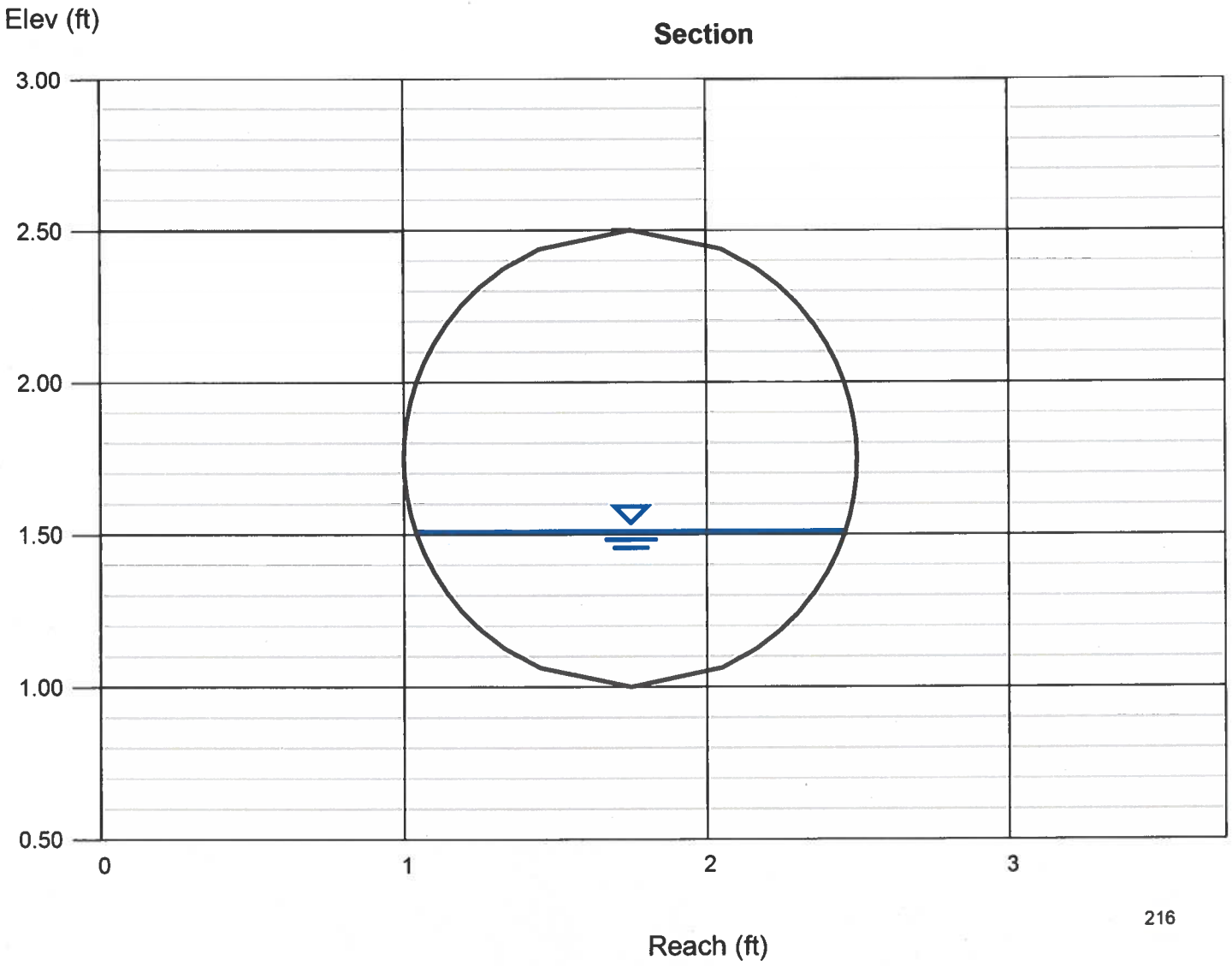
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.60

Highlighted

Depth (ft)	= 0.51
Q (cfs)	= 2.600
Area (sqft)	= 0.53
Velocity (ft/s)	= 4.86
Wetted Perim (ft)	= 1.87
Crit Depth, Yc (ft)	= 0.61
Top Width (ft)	= 1.42
EGL (ft)	= 0.88



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W10

Circular

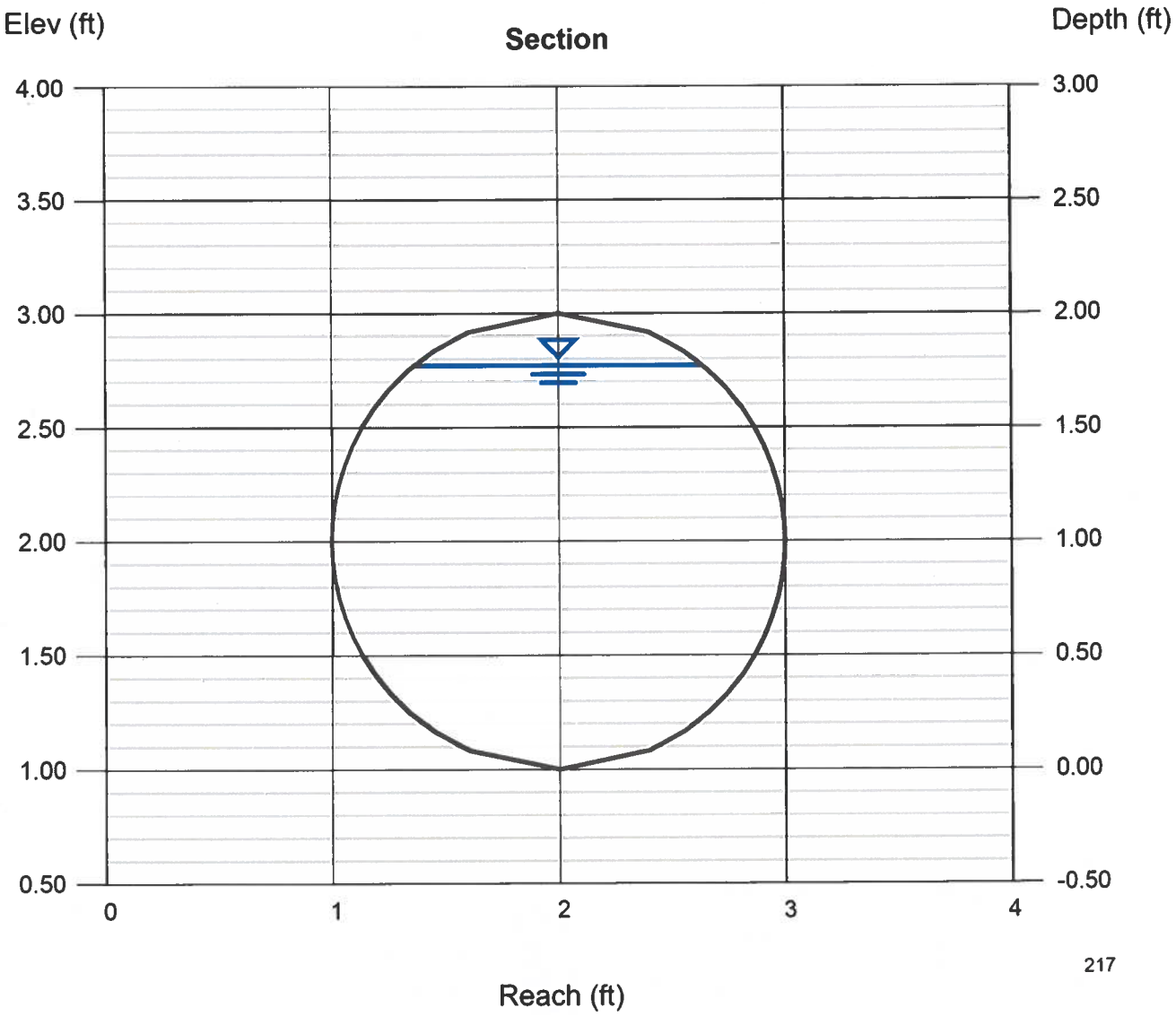
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 23.90

Highlighted

Depth (ft)	= 1.77
Q (cfs)	= 23.90
Area (sqft)	= 2.94
Velocity (ft/s)	= 8.13
Wetted Perim (ft)	= 4.90
Crit Depth, Yc (ft)	= 1.74
Top Width (ft)	= 1.28
EGL (ft)	= 2.80



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP W11-Equivalent of 60inx38in

Circular

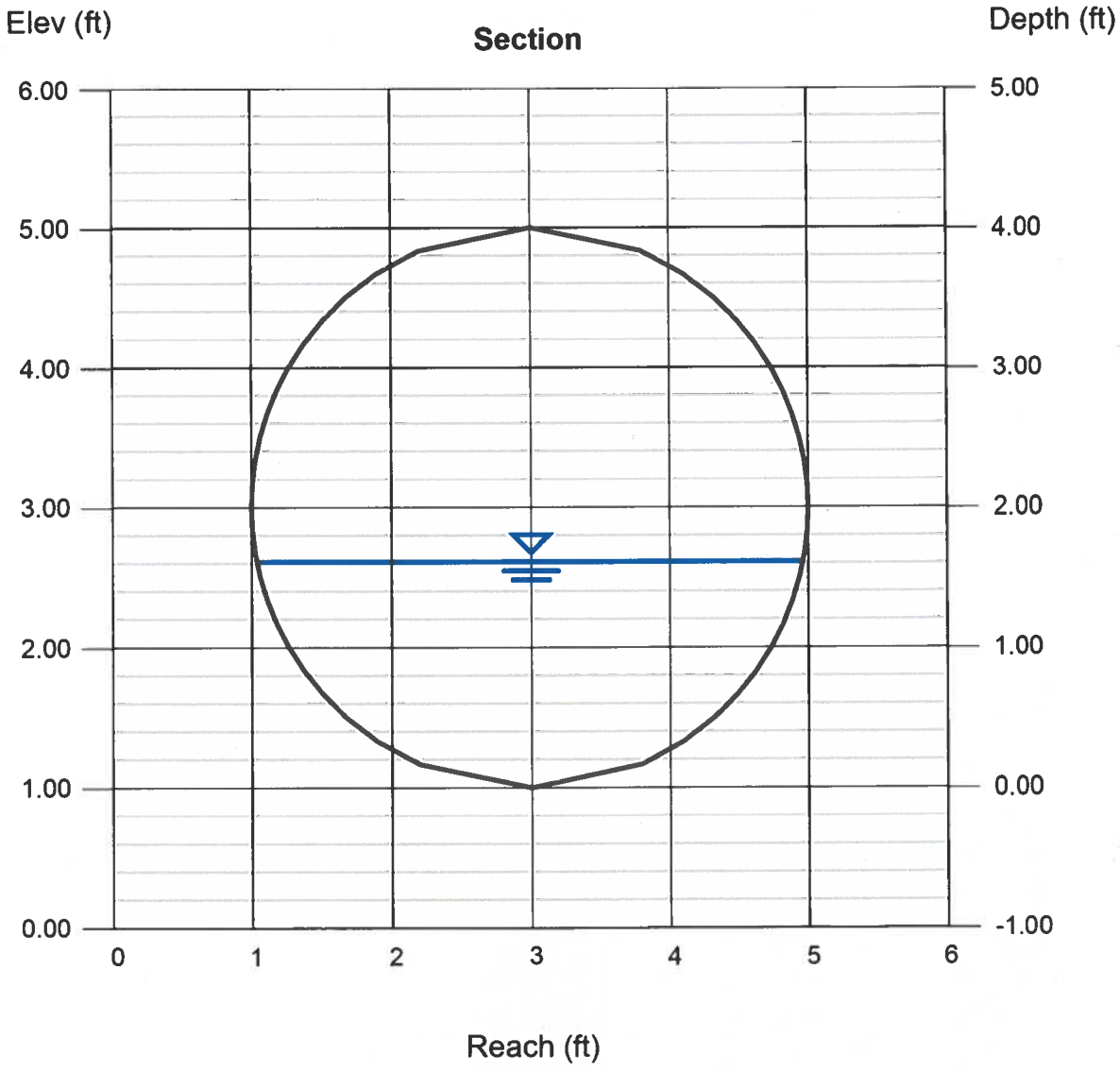
Diameter (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 34.40

Highlighted

Depth (ft)	= 1.61
Q (cfs)	= 34.40
Area (sqft)	= 4.74
Velocity (ft/s)	= 7.26
Wetted Perim (ft)	= 5.50
Crit Depth, Yc (ft)	= 1.74
Top Width (ft)	= 3.92
EGL (ft)	= 2.43



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP S1

Circular

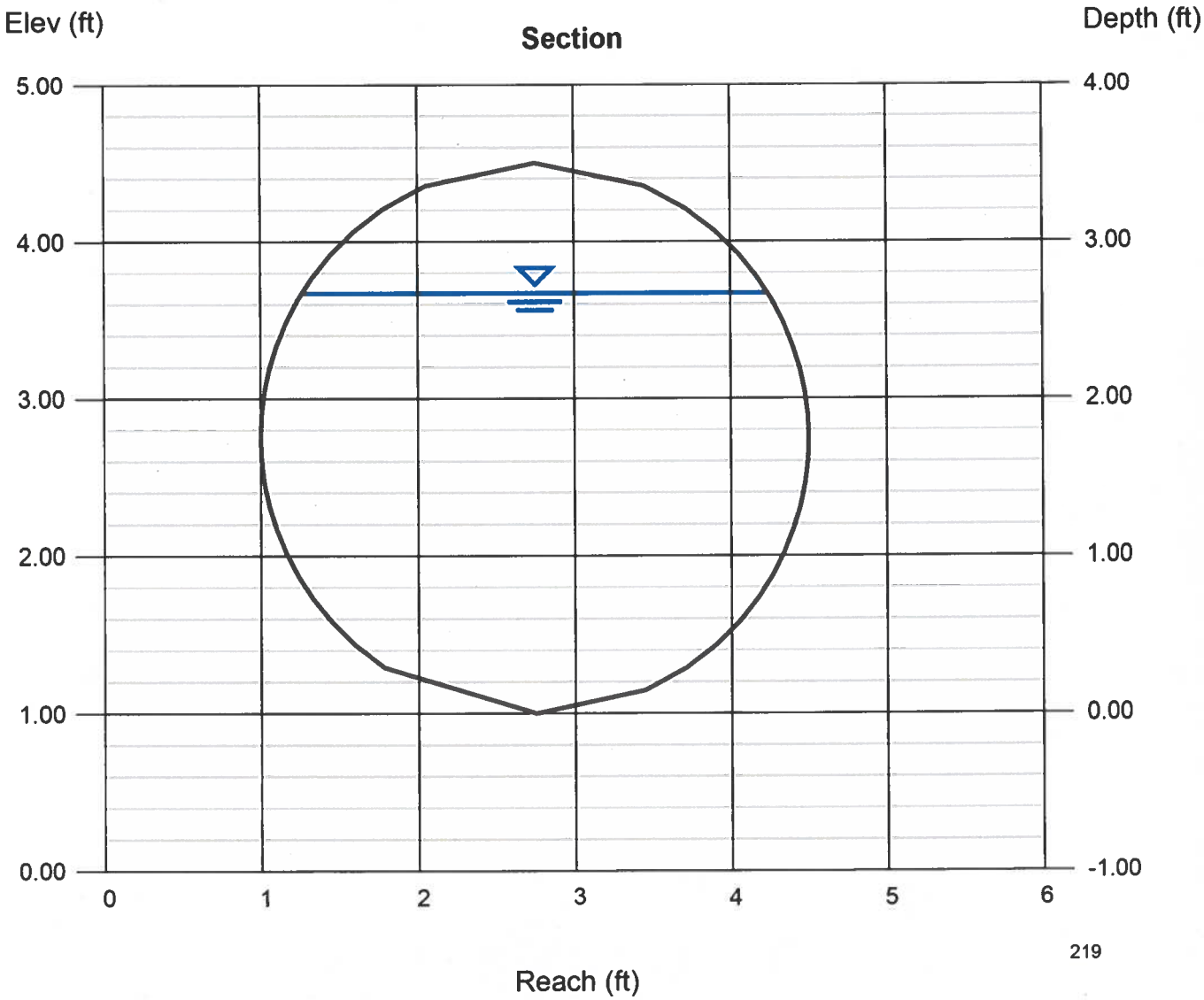
Diameter (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.30
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 51.20

Highlighted

Depth (ft)	= 2.67
Q (cfs)	= 51.20
Area (sqft)	= 7.88
Velocity (ft/s)	= 6.50
Wetted Perim (ft)	= 7.44
Crit Depth, Yc (ft)	= 2.24
Top Width (ft)	= 2.98
EGL (ft)	= 3.33



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP S2 (54in)

Circular

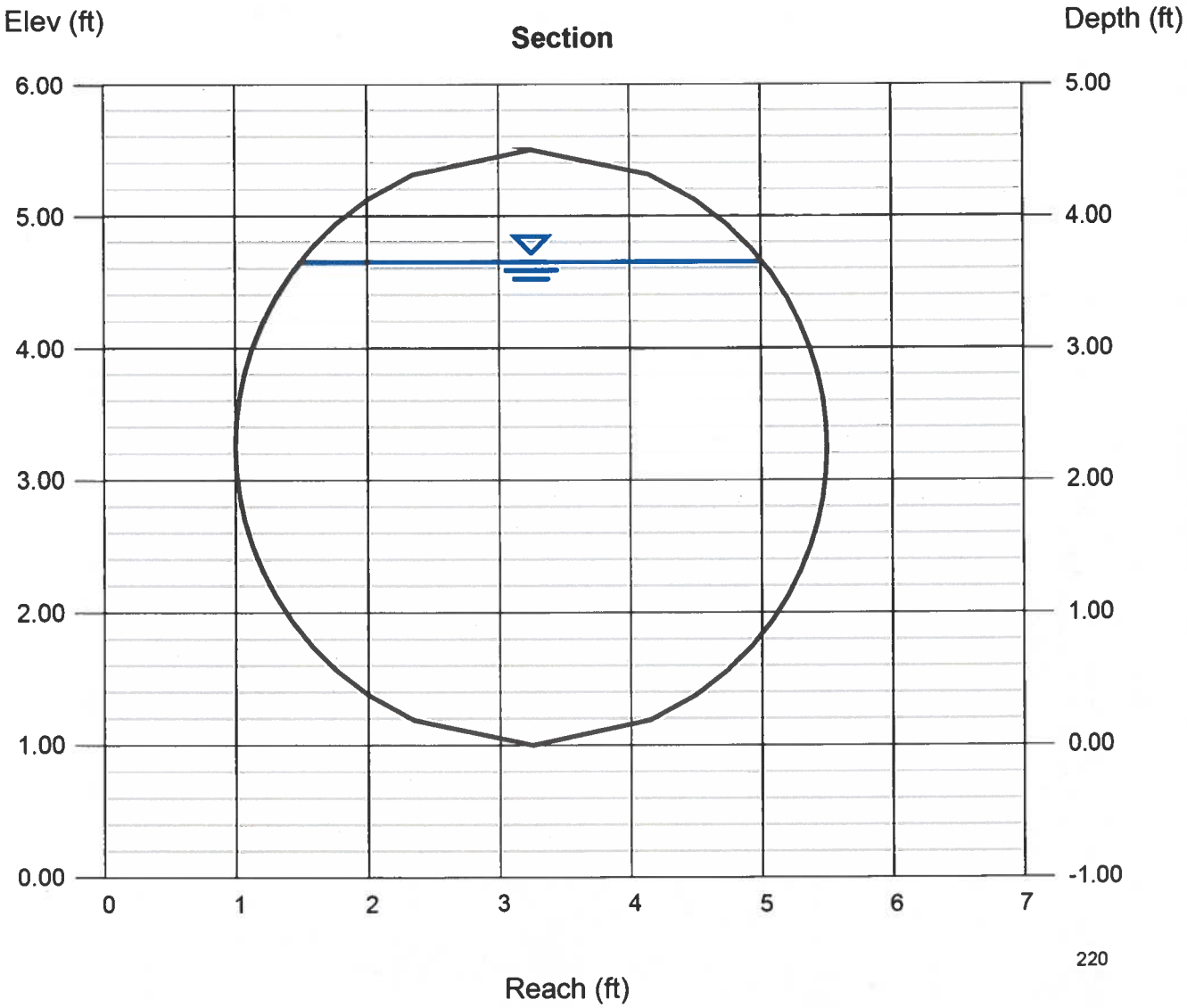
Diameter (ft)	= 4.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.30
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 106.60

Highlighted

Depth (ft)	= 3.65
Q (cfs)	= 106.60
Area (sqft)	= 13.83
Velocity (ft/s)	= 7.71
Wetted Perim (ft)	= 10.10
Crit Depth, Yc (ft)	= 3.04
Top Width (ft)	= 3.52
EGL (ft)	= 4.57



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP S2 (60in)

Circular

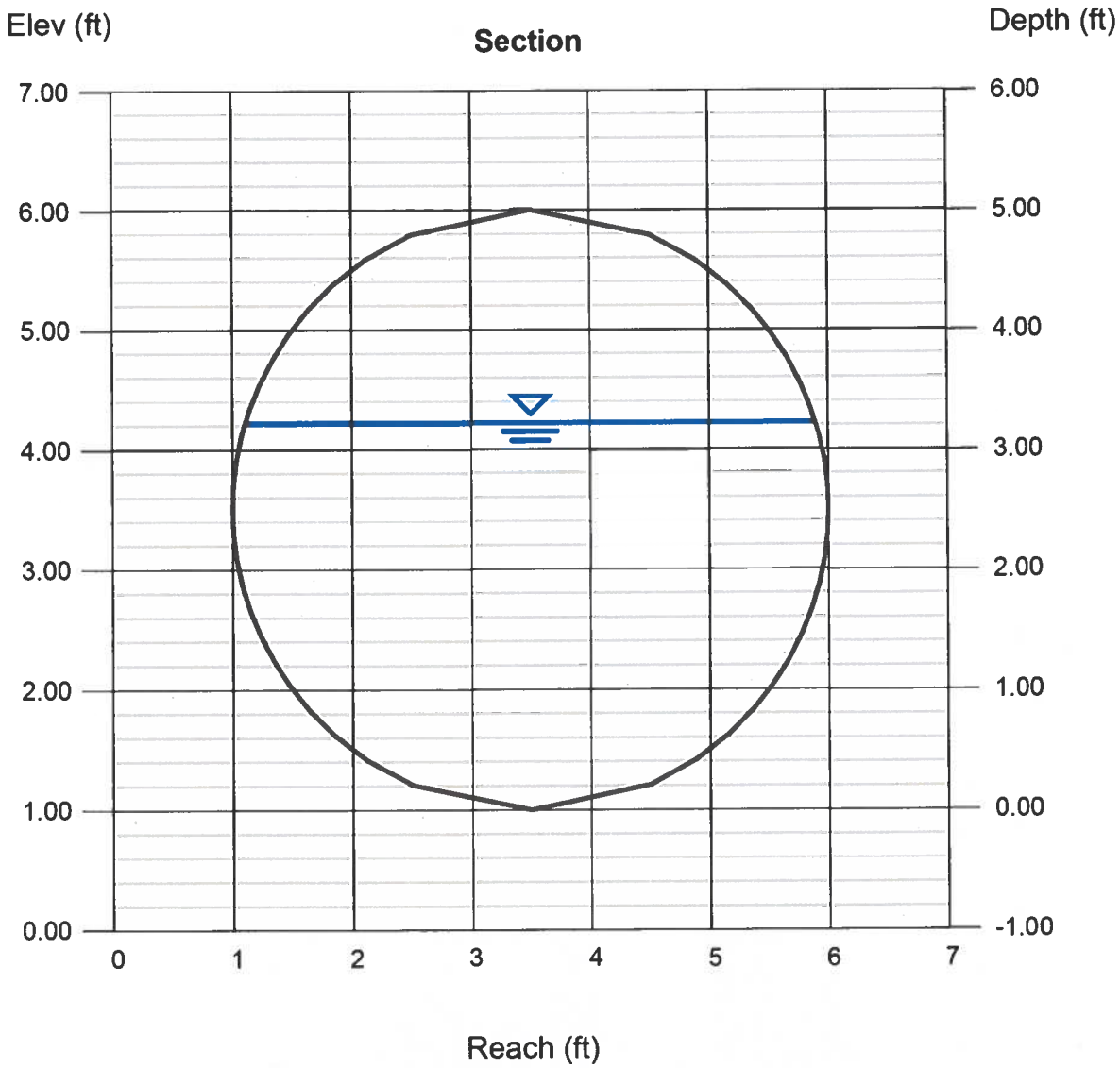
Diameter (ft)	= 5.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.30
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 106.60

Highlighted

Depth (ft)	= 3.22
Q (cfs)	= 106.60
Area (sqft)	= 13.39
Velocity (ft/s)	= 7.96
Wetted Perim (ft)	= 9.32
Crit Depth, Yc (ft)	= 2.94
Top Width (ft)	= 4.79
EGL (ft)	= 4.21



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP S3 Pond CH Discharge

Circular

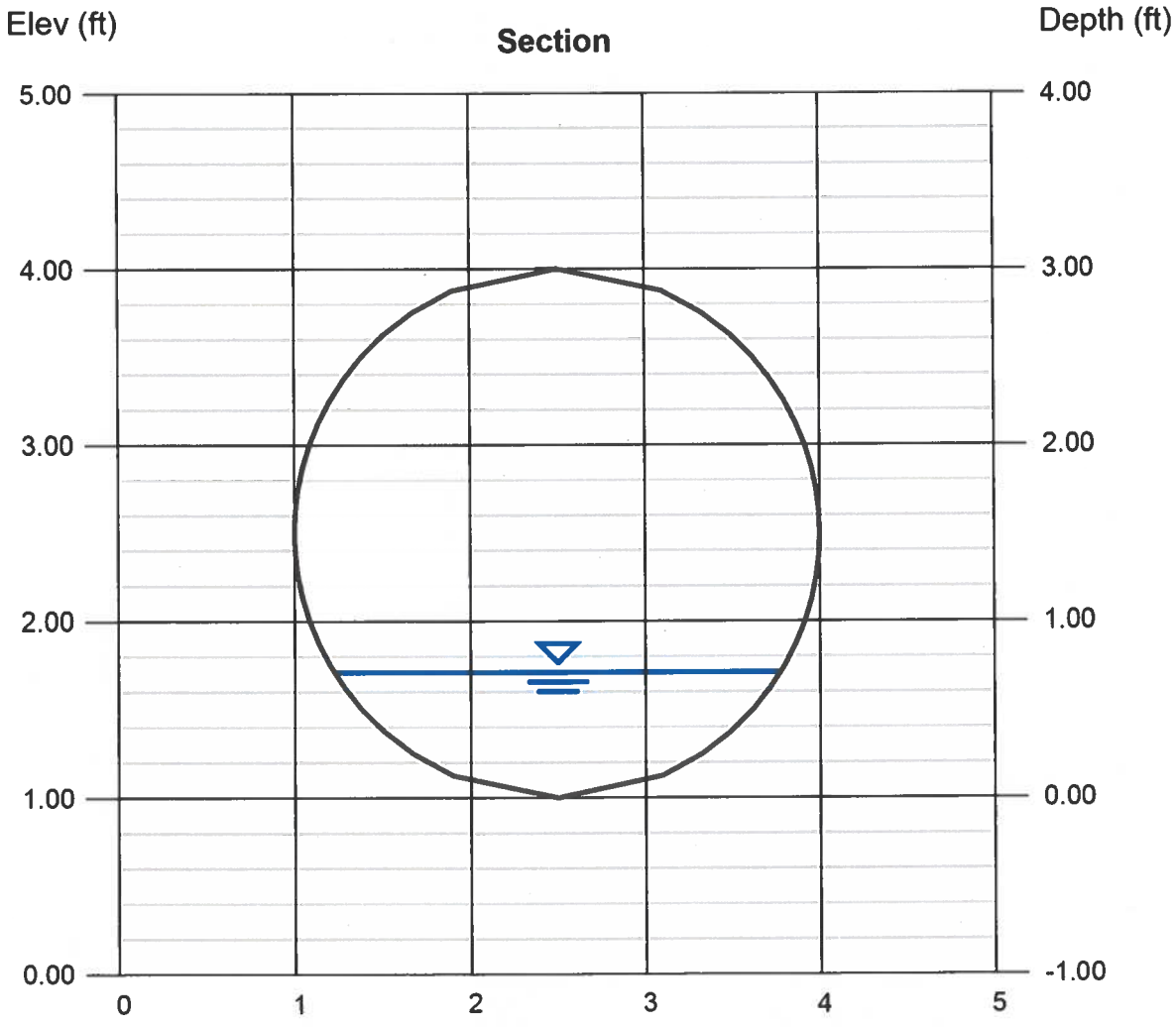
Diameter (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.30
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.50

Highlighted

Depth (ft)	= 0.71
Q (cfs)	= 4.500
Area (sqft)	= 1.29
Velocity (ft/s)	= 3.48
Wetted Perim (ft)	= 3.06
Crit Depth, Yc (ft)	= 0.66
Top Width (ft)	= 2.56
EGL (ft)	= 0.90



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP S5

Circular

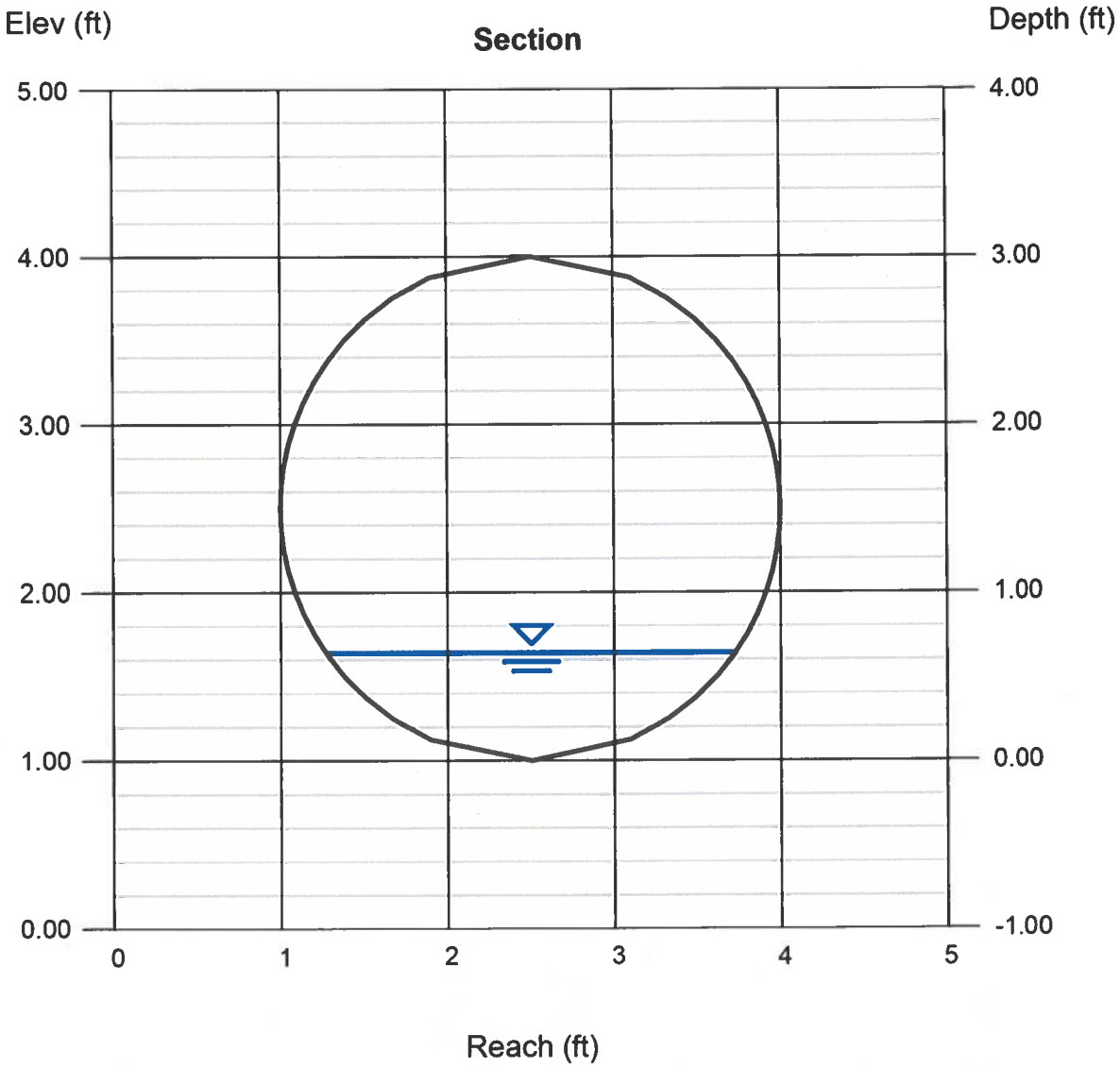
Diameter (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.60

Highlighted

Depth (ft)	= 0.64
Q (cfs)	= 6.600
Area (sqft)	= 1.12
Velocity (ft/s)	= 5.90
Wetted Perim (ft)	= 2.89
Crit Depth, Yc (ft)	= 0.81
Top Width (ft)	= 2.47
EGL (ft)	= 1.18



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP S6 (18in Crossroad lateral)

Circular

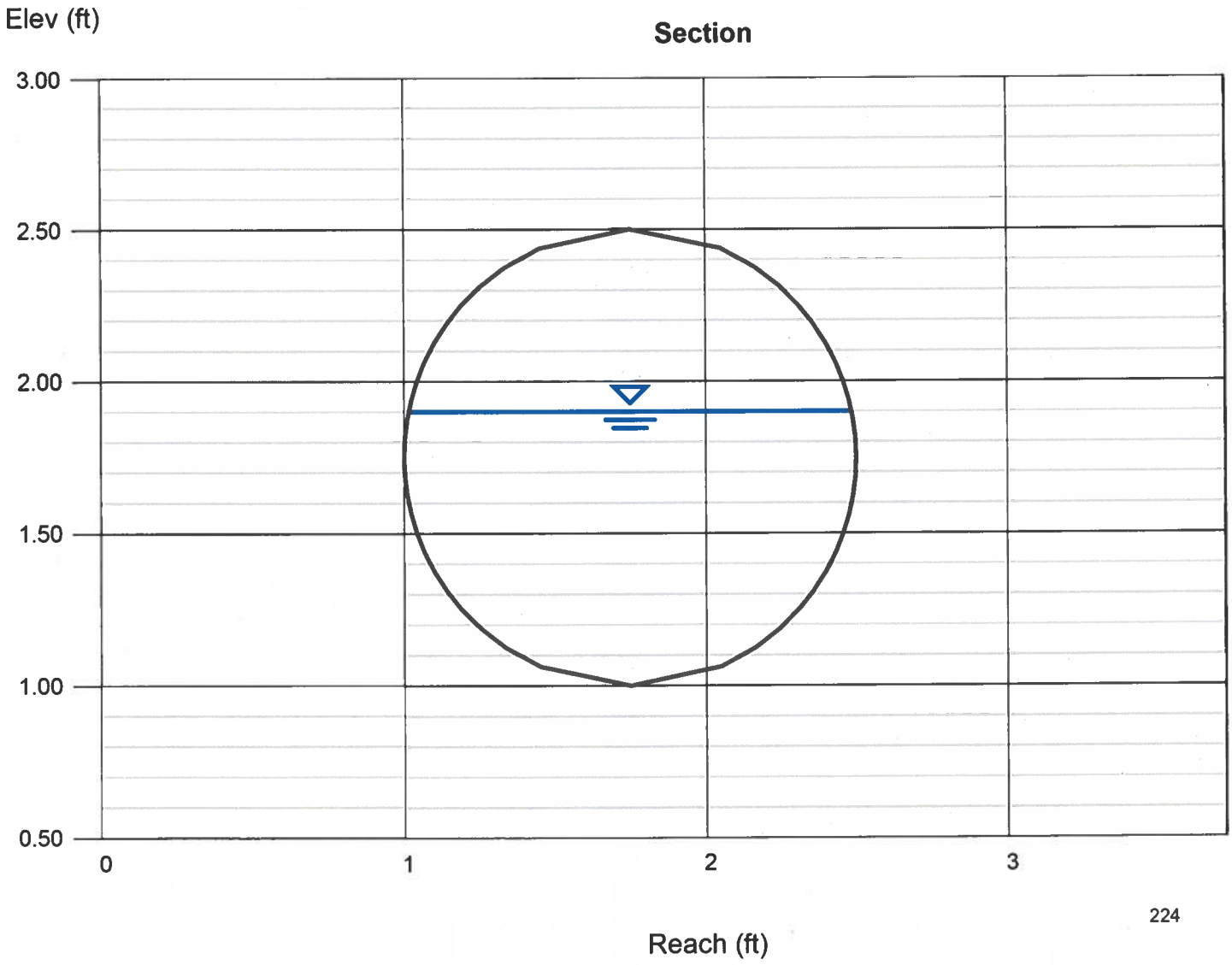
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 3.50
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 13.10

Highlighted

Depth (ft)	= 0.90
Q (cfs)	= 13.10
Area (sqft)	= 1.11
Velocity (ft/s)	= 11.80
Wetted Perim (ft)	= 2.66
Crit Depth, Yc (ft)	= 1.36
Top Width (ft)	= 1.47
EGL (ft)	= 3.06



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

DP S6 (42in)

Circular

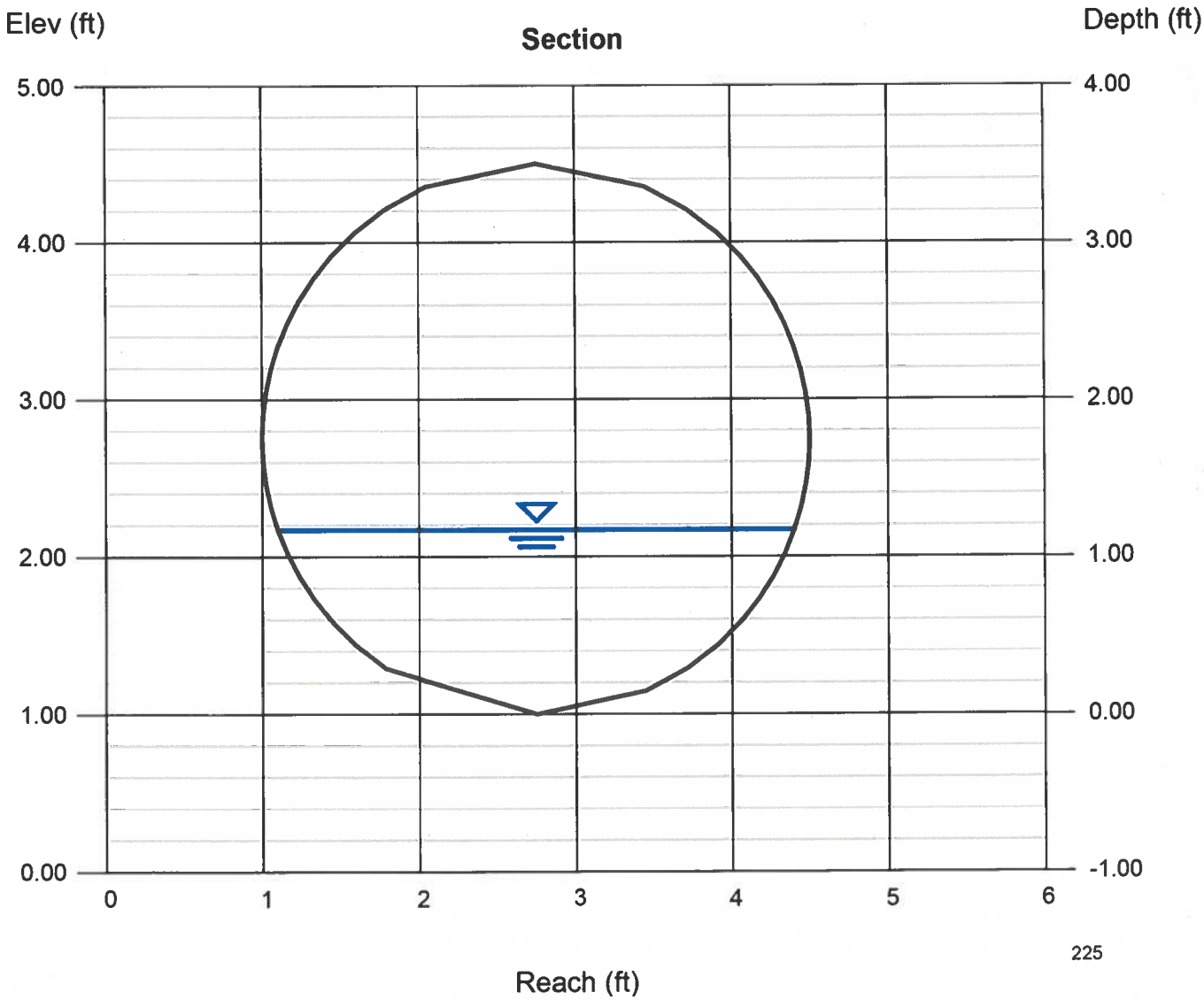
Diameter (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 24.10

Highlighted

Depth (ft)	= 1.17
Q (cfs)	= 24.10
Area (sqft)	= 2.83
Velocity (ft/s)	= 8.52
Wetted Perim (ft)	= 4.32
Crit Depth, Yc (ft)	= 1.51
Top Width (ft)	= 3.30
EGL (ft)	= 2.30



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

S7

Circular

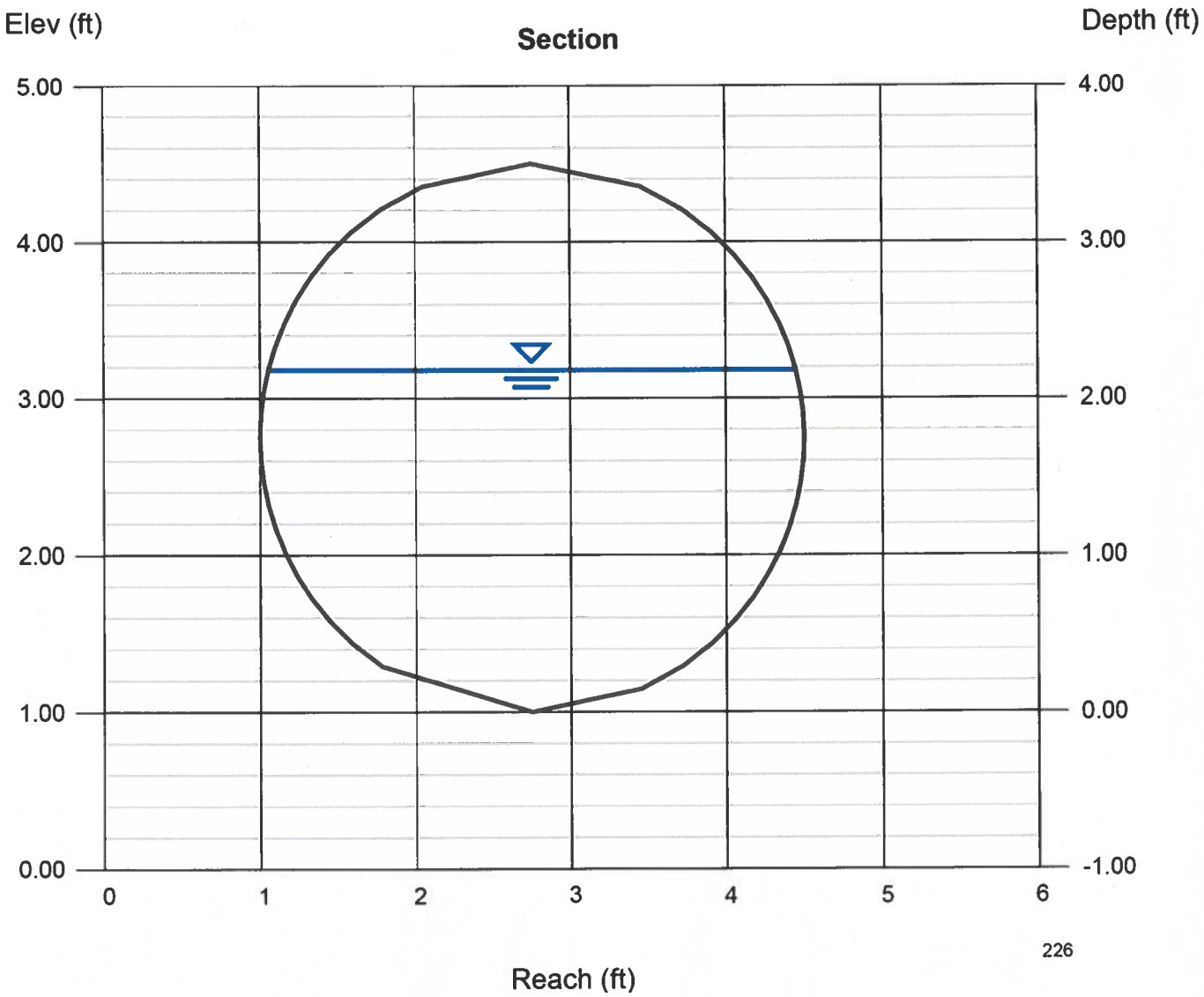
Diameter (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 52.50

Highlighted

Depth (ft)	= 2.18
Q (cfs)	= 52.50
Area (sqft)	= 6.31
Velocity (ft/s)	= 8.33
Wetted Perim (ft)	= 6.37
Crit Depth, Yc (ft)	= 2.27
Top Width (ft)	= 3.39
EGL (ft)	= 3.26



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

S8

Circular

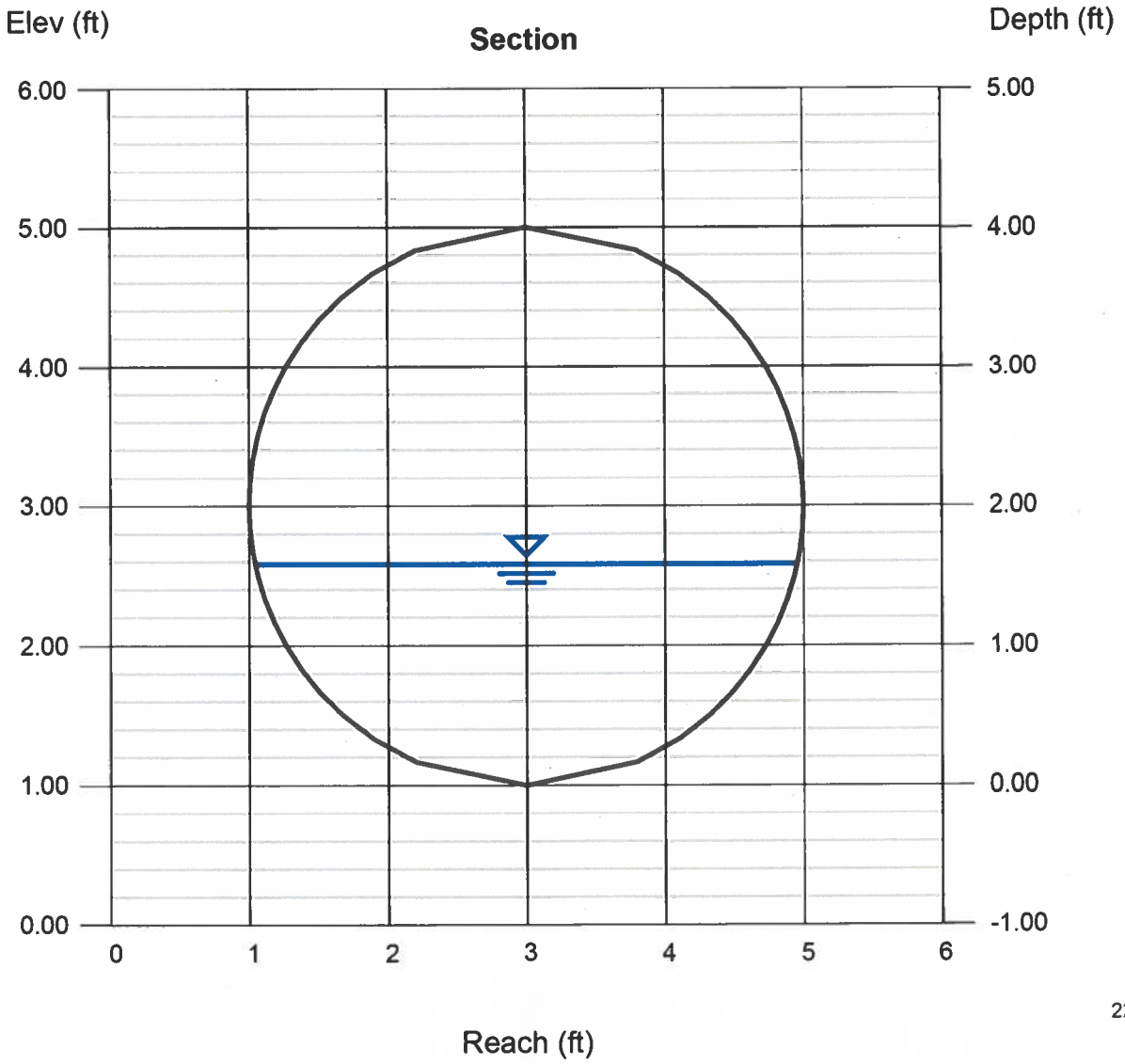
Diameter (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.30
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 53.80

Highlighted

Depth (ft)	= 1.58
Q (cfs)	= 53.80
Area (sqft)	= 4.62
Velocity (ft/s)	= 11.64
Wetted Perim (ft)	= 5.44
Crit Depth, Yc (ft)	= 2.20
Top Width (ft)	= 3.91
EGL (ft)	= 3.69



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

S9 (18in Crossroad)

Circular

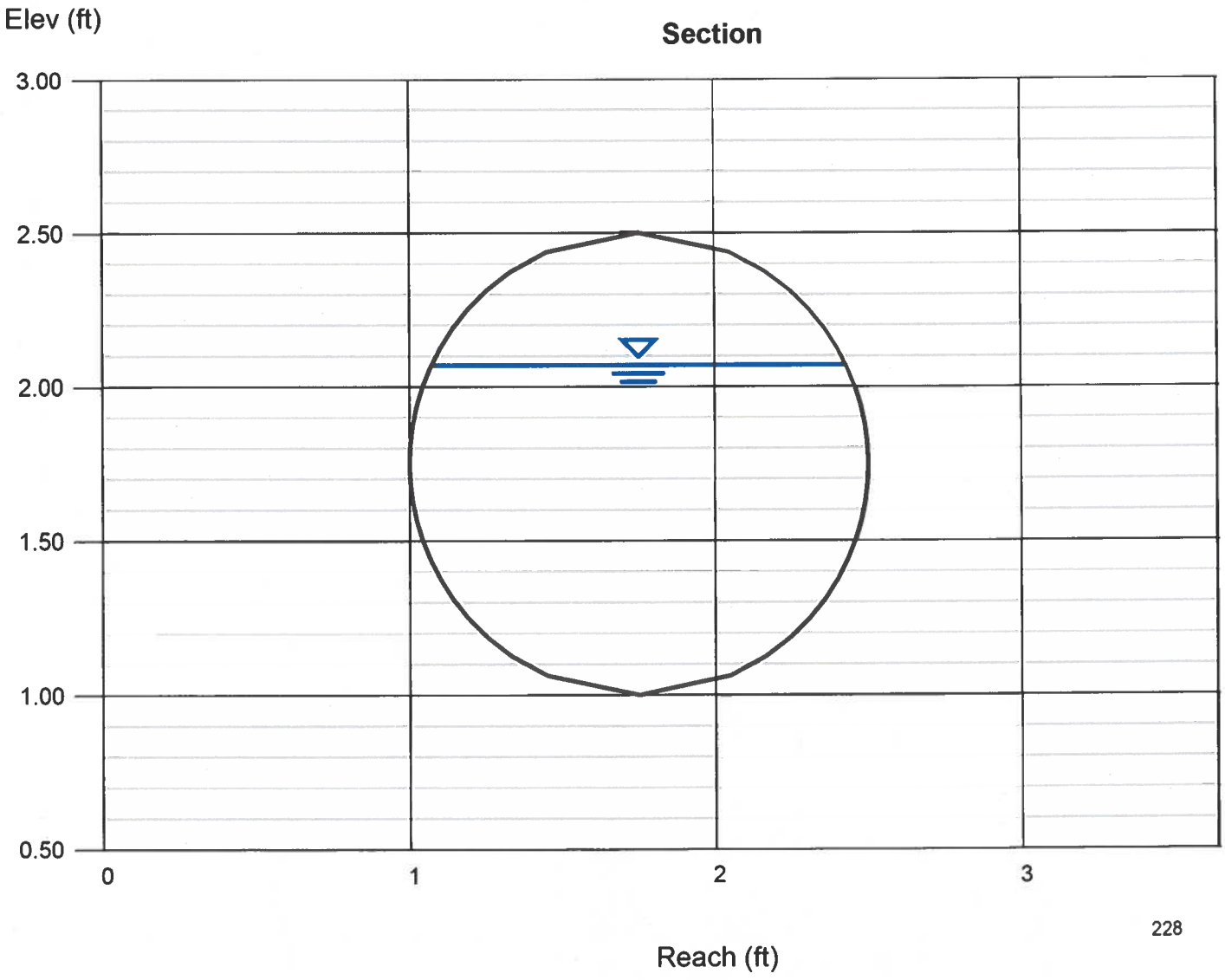
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.00

Highlighted

Depth (ft)	= 1.07
Q (cfs)	= 9.000
Area (sqft)	= 1.35
Velocity (ft/s)	= 6.66
Wetted Perim (ft)	= 3.02
Crit Depth, Yc (ft)	= 1.17
Top Width (ft)	= 1.35
EGL (ft)	= 1.76



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

S9 (30in)

Circular

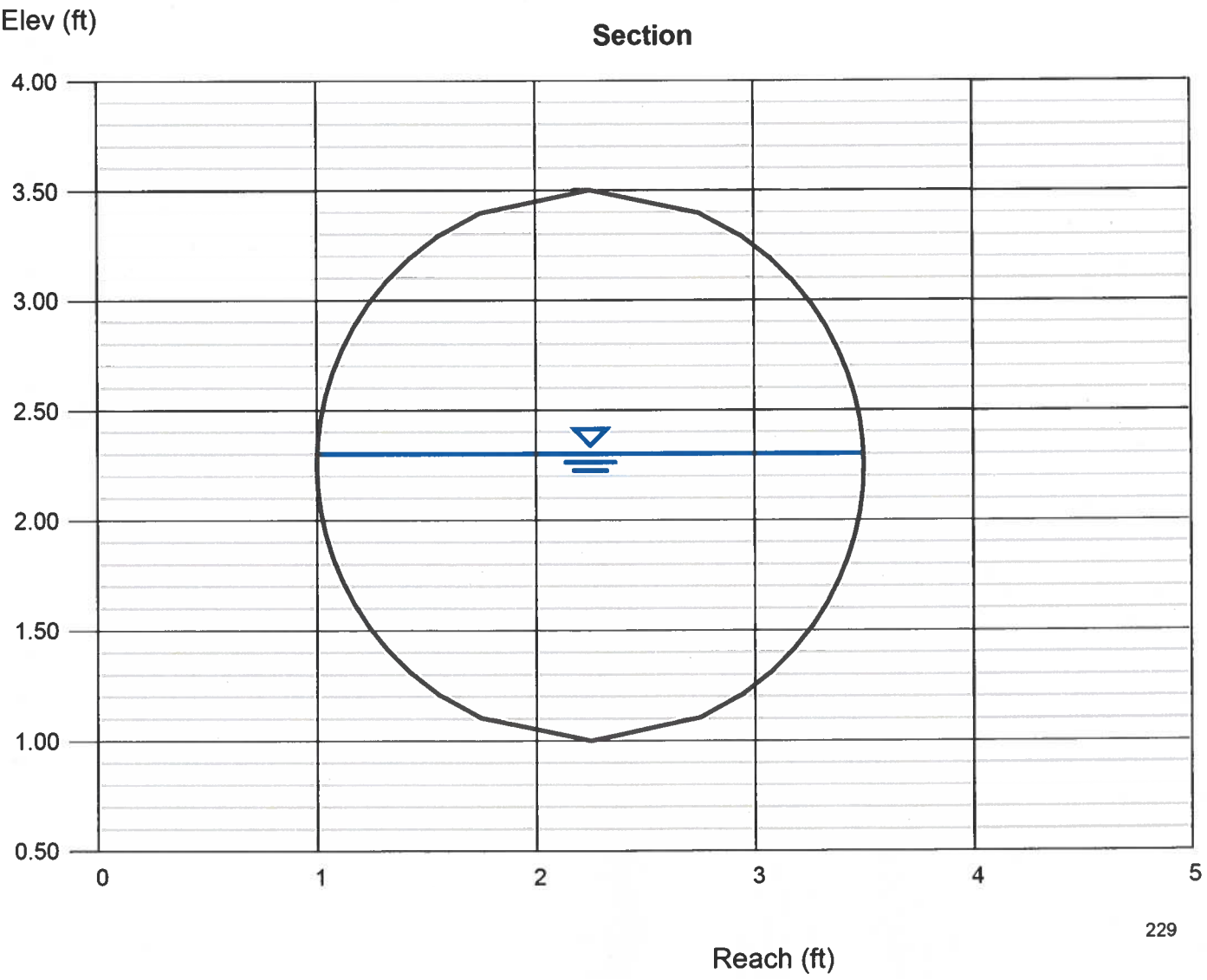
Diameter (ft)	= 2.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.20
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 24.10

Highlighted

Depth (ft)	= 1.30
Q (cfs)	= 24.10
Area (sqft)	= 2.59
Velocity (ft/s)	= 9.30
Wetted Perim (ft)	= 4.04
Crit Depth, Yc (ft)	= 1.68
Top Width (ft)	= 2.50
EGL (ft)	= 2.64



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

S10 (36in)

Circular

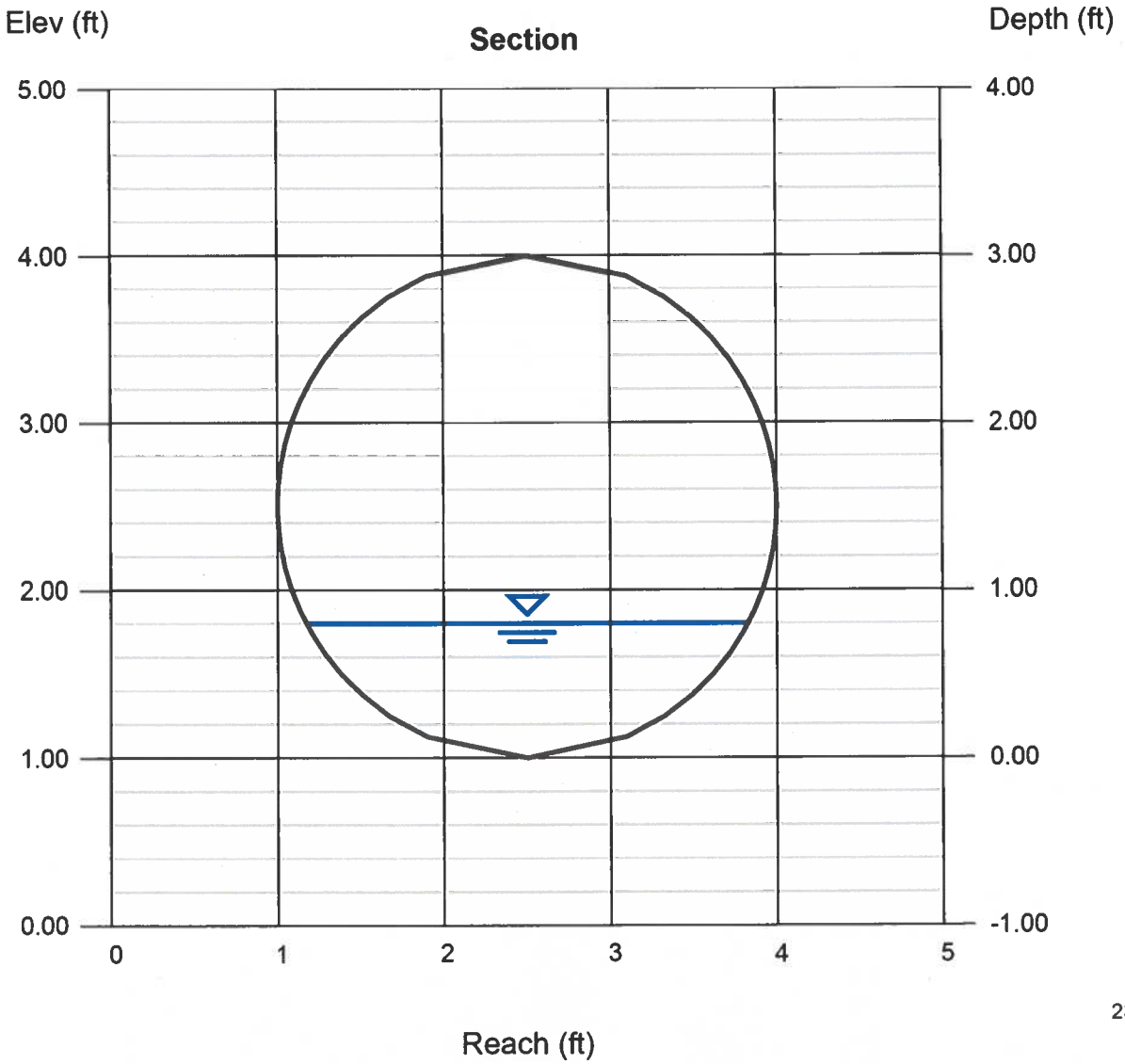
Diameter (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.50

Highlighted

Depth (ft)	= 0.80
Q (cfs)	= 10.50
Area (sqft)	= 1.53
Velocity (ft/s)	= 6.86
Wetted Perim (ft)	= 3.27
Crit Depth, Yc (ft)	= 1.02
Top Width (ft)	= 2.66
EGL (ft)	= 1.53



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

S10 (42in)

Circular

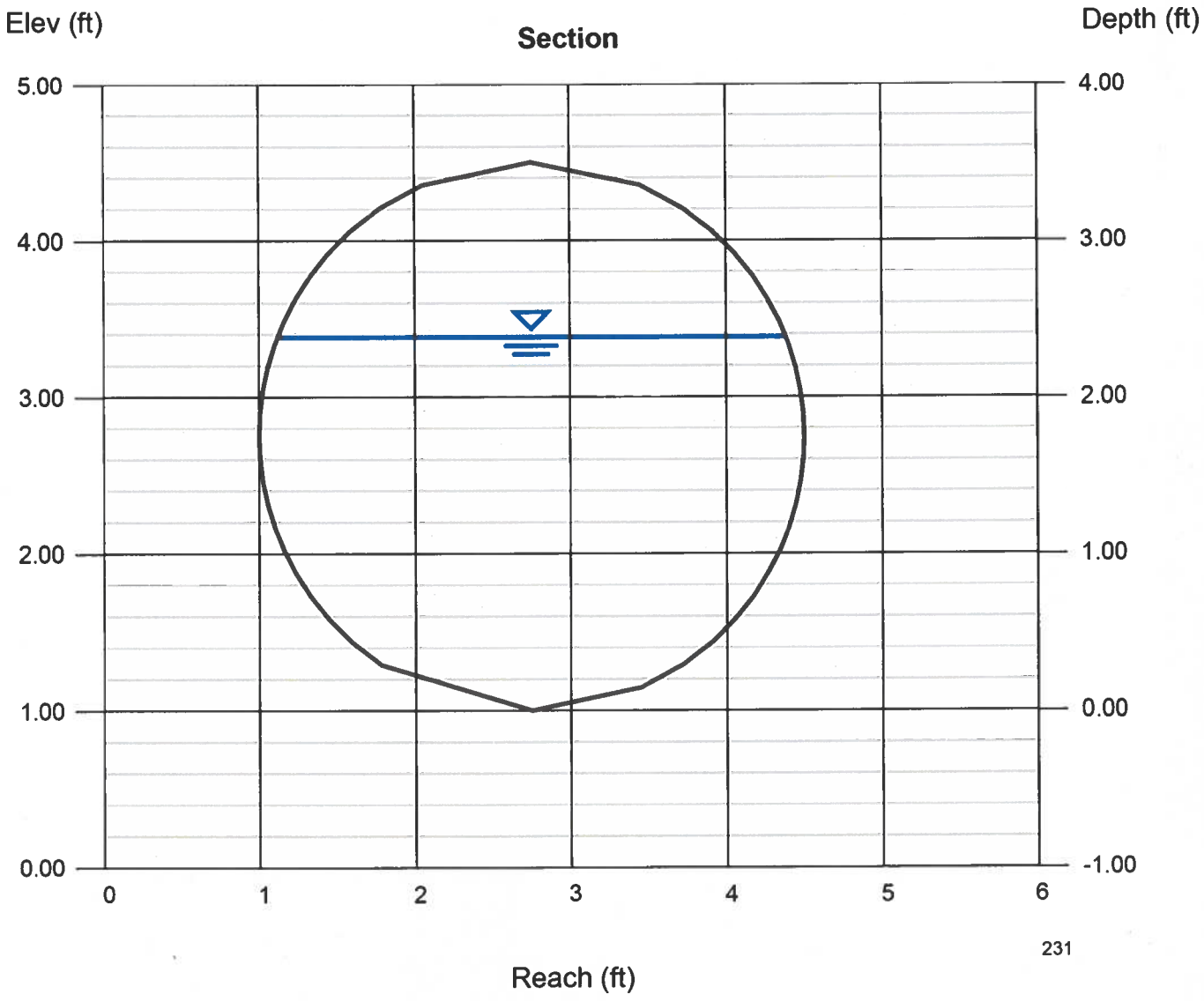
Diameter (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 80.90

Highlighted

Depth (ft)	= 2.38
Q (cfs)	= 80.90
Area (sqft)	= 6.97
Velocity (ft/s)	= 11.60
Wetted Perim (ft)	= 6.79
Crit Depth, Yc (ft)	= 2.81
Top Width (ft)	= 3.26
EGL (ft)	= 4.47



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Feb 28 2019

S11 (36in)

Circular

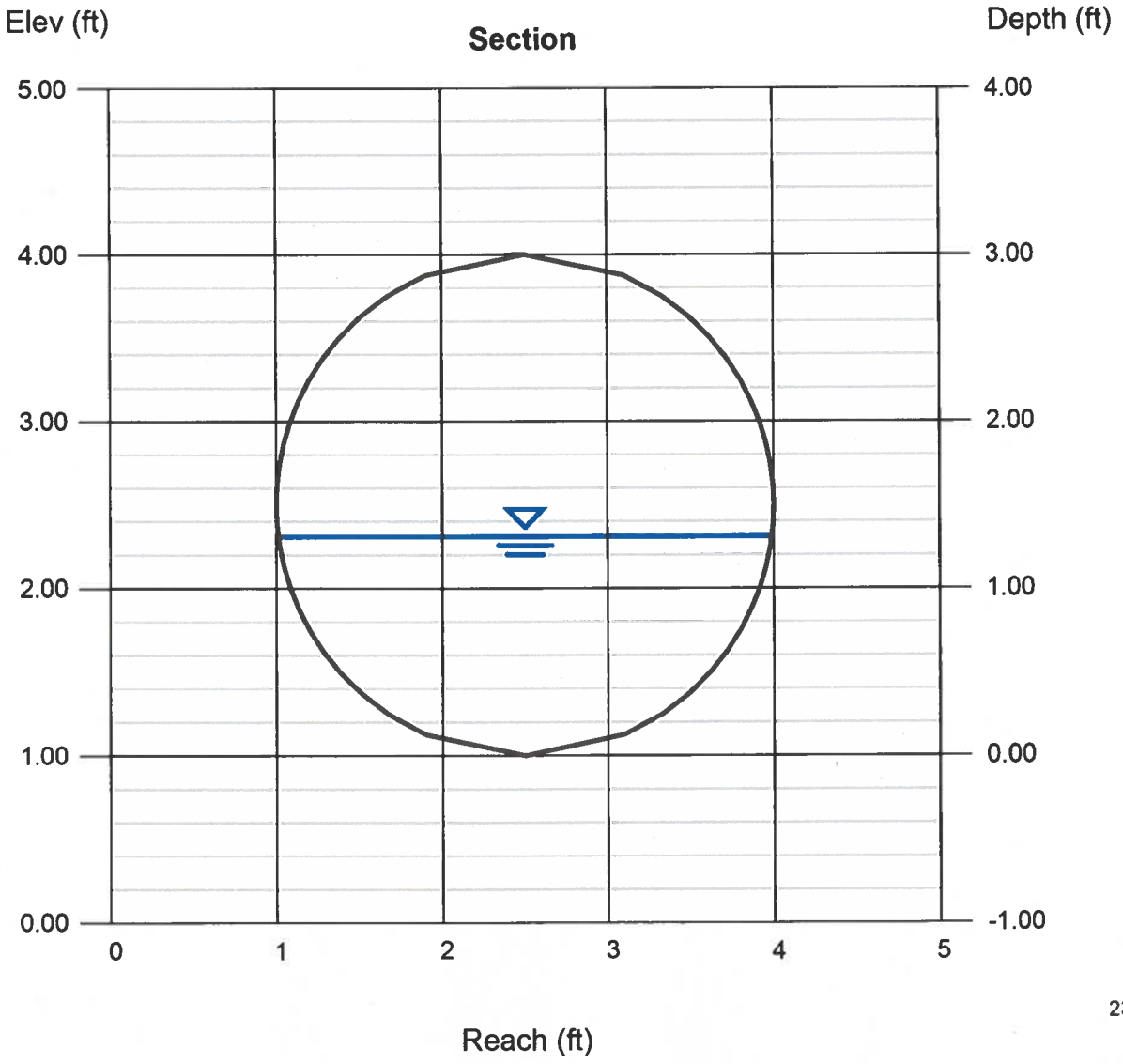
Diameter (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 20.30

Highlighted

Depth (ft)	= 1.31
Q (cfs)	= 20.30
Area (sqft)	= 2.97
Velocity (ft/s)	= 6.83
Wetted Perim (ft)	= 4.33
Crit Depth, Yc (ft)	= 1.45
Top Width (ft)	= 2.98
EGL (ft)	= 2.04



100-Year; 99%; 120 Hours

Table - Node Pond_CH Max Volume(CF)= 162421.1

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	133973.9	0	82.5
0	1:57:00	161917.5	1	99.7
0	2:57:00	153814.7	2	94.7
0	3:57:00	140611.7	3	86.6
0	4:57:00	127868	4	78.7
0	5:57:00	115841.8	5	71.3
0	6:57:00	104655.9	6	64.4
0	7:57:00	94341.31	7	58.1
0	8:57:00	84973.3	8	52.3
0	9:57:00	76583.84	9	47.2
0	10:57:00	69373.15	10	42.7
0	11:57:00	63426.28	11	39.1
0	12:57:00	58474.19	12	36.0
0	13:57:00	54312.96	13	33.4
0	14:57:00	50783.46	14	31.3
0	15:57:00	47761.81	15	29.4
0	16:57:00	45152.64	16	27.8
0	18:57:00	40891.32	18	25.2
0	19:57:00	39134.98	19	24.1
0	20:57:00	37574.15	20	23.1
0	21:57:00	36176.3	21	22.3
0	22:57:00	34913.73	22	21.5
0	23:57:00	33763.54	23	20.8
1	0:57:00	32706.29	24	20.1
1	1:57:00	31724.71	25	19.5
1	2:57:00	30802.77	26	19.0
1	3:57:00	29924.23	27	18.4
1	4:57:00	29066.82	28	17.9
1	5:57:00	28215.06	29	17.4
1	6:57:00	27368.58	30	16.9
1	7:57:00	26527.42	31	16.3
1	8:57:00	25691.63	32	15.8
1	9:57:00	24861.24	33	15.3
1	10:57:00	24036.29	34	14.8

5-Year: 97%; 72 Hours

Table - Node Pond_CH Max Volume(CF)= 73423.81

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	57263.98	0	78.0
0	1:57:00	73176.05	1	99.7
0	2:57:00	69754.41	2	95.0
0	3:57:00	64100.58	3	87.3
0	4:57:00	59152.72	4	80.6
0	5:57:00	54938.88	5	74.8
0	6:57:00	51345.74	6	69.9
0	7:57:00	48262.73	7	65.7
0	8:57:00	45598.11	8	62.1
0	9:57:00	43279	9	58.9
0	10:57:00	41245.86	10	56.2
0	11:57:00	39452.89	11	53.7
0	12:57:00	37860.71	12	51.6
0	13:57:00	36436.32	13	49.6
0	14:57:00	35151.42	14	47.9
0	15:57:00	33982.43	15	46.3
0	16:57:00	32909.61	16	44.8
0	18:57:00	30983.73	18	42.2
0	19:57:00	30098.69	19	41.0
0	20:57:00	29239.79	20	39.8
0	21:57:00	28387.54	21	38.7
0	22:57:00	27540.48	22	37.5
0	23:57:00	26698.66	23	36.4
1	0:57:00	25862.13	24	35.2
1	1:57:00	25030.96	25	34.1
1	2:57:00	24205.18	26	33.0
1	3:57:00	23384.84	27	31.8
1	4:57:00	22569.98	28	30.7
1	5:57:00	21760.64	29	29.6
1	6:57:00	20956.83	30	28.5
1	7:57:00	20158.54	31	27.5
1	8:57:00	19365.73	32	26.4
1	9:57:00	18578.38	33	25.3
1	10:57:00	17796.83	34	24.2

1	11:57:00	23216.83	35	14.3
1	12:57:00	22402.88	36	13.8
1	13:57:00	21594.49	37	13.3
1	14:57:00	20791.64	38	12.8
1	15:57:00	19994.33	39	12.3
1	16:57:00	19202.47	40	11.8
1	17:57:00	18416.19	41	11.3
1	18:57:00	17635.74	42	10.9
1	19:57:00	16861.18	43	10.4
1	20:57:00	16092.76	44	9.9
1	21:57:00	15330.76	45	9.4
1	22:57:00	14575.37	46	9.0
1	23:57:00	13826.78	47	8.5
2	0:57:00	13085.2	48	8.1
2	1:57:00	12350.86	49	7.6
2	2:57:00	11624.02	50	7.2
2	3:57:00	10904.95	51	6.7
2	4:57:00	10193.97	52	6.3
2	5:57:00	9491.4	53	5.8
2	6:57:00	8797.64	54	5.4
2	7:57:00	8113.13	55	5.0
2	8:57:00	7438.35	56	4.6
2	9:57:00	6773.91	57	4.2
2	10:57:00	6120.49	58	3.8
2	11:57:00	5478.91	59	3.4
2	12:57:00	4850.23	60	3.0
2	13:57:00	4235.78	61	2.6
2	14:57:00	3637.39	62	2.2
2	15:57:00	3057.72	63	1.9
2	16:57:00	2501.39	64	1.5
2	17:57:00	1977.08	65	1.2
2	18:57:00	1491.76	66	0.9
2	19:57:00	1051.38	67	0.6
2	20:57:00	664.59	68	0.4
2	21:57:00	345.43	69	0.2
2	22:57:00	121.19	70	0.1
2	23:57:00	33.75	71	0.0
3	0:57:00	10.98	72	0.0

1	11:57:00	17021.16	35	23.2
1	12:57:00	16251.53	36	22.1
1	13:57:00	15488.28	37	21.1
1	14:57:00	14731.58	38	20.1
1	15:57:00	13981.64	39	19.0
1	16:57:00	13238.65	40	18.0
1	17:57:00	12502.86	41	17.0
1	18:57:00	11774.5	42	16.0
1	19:57:00	11053.84	43	15.1
1	20:57:00	10341.2	44	14.1
1	21:57:00	9636.9	45	13.1
1	22:57:00	8941.32	46	12.2
1	23:57:00	8254.88	47	11.2
2	0:57:00	7578.07	48	10.3
2	1:57:00	6911.46	49	9.4
2	2:57:00	6255.71	50	8.5
2	3:57:00	5611.62	51	7.6
2	4:57:00	4980.18	52	6.8
2	5:57:00	4362.66	53	5.9
2	6:57:00	3760.76	54	5.1
2	7:57:00	3176.92	55	4.3
2	8:57:00	2615.19	56	3.6
2	9:57:00	2083.45	57	2.8
2	10:57:00	1589.58	58	2.2
2	11:57:00	1139.24	59	1.6
2	12:57:00	740.36	60	1.0
2	13:57:00	405.49	61	0.6
2	14:57:00	157.71	62	0.2
2	15:57:00	43.83	63	0.1
2	16:57:00	13.61	64	0.0
2	17:57:00	5.44	65	0.0
2	18:57:00	2.74	66	0.0
2	19:57:00	1.62	67	0.0
2	20:57:00	1.08	68	0.0
2	21:57:00	0.78	69	0.0
2	22:57:00	0.6	70	0.0
2	23:57:00	0.49	71	0.0
3	0:57:00	0.41	72	0.0

EURV 97% 72 Hours

Table - Node Pond_CH Max Volume(CF)= 53619.17

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	38791.22	0	72.3
0	1:57:00	52996.47	1	98.8
0	2:57:00	52234.05	2	97.4
0	3:57:00	49343.24	3	92.0
0	4:57:00	46632.91	4	87.0
0	5:57:00	44226.09	5	82.5
0	6:57:00	42101.27	6	78.5
0	7:57:00	40222.11	7	75.0
0	8:57:00	38553.72	8	71.9
0	9:57:00	37063.48	9	69.1
0	10:57:00	35722.61	10	66.6
0	11:57:00	34506.17	11	64.4
0	12:57:00	33393.61	12	62.3
0	13:57:00	32366.9	13	60.4
0	14:57:00	31409.53	14	58.6
0	15:57:00	30505.95	15	56.9
0	16:57:00	29639.14	16	55.3
0	18:57:00	27936.26	18	52.1
0	19:57:00	27092.45	19	50.5
0	20:57:00	26253.84	20	49.0
0	21:57:00	25420.48	21	47.4
0	22:57:00	24592.45	22	45.9
0	23:57:00	23769.79	23	44.3
1	0:57:00	22952.57	24	42.8
1	1:57:00	22140.82	25	41.3
1	2:57:00	21334.56	26	39.8
1	3:57:00	20533.82	27	38.3
1	4:57:00	19738.56	28	36.8
1	5:57:00	18948.69	29	35.3
1	6:57:00	18164.51	30	33.9
1	7:57:00	17386.15	31	32.4
1	8:57:00	16613.71	32	31.0
1	9:57:00	15847.49	33	29.6
1	10:57:00	15087.74	34	28.1

WQCV: 40 Hours Minimum

Table - Node Pond_CH Max Volume(CF)= 48151.37

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	12139.7	0	25.2
0	1:57:00	46820.71	1	97.2
0	2:57:00	47342.05	2	98.3
0	3:57:00	45141.2	3	93.7
0	4:57:00	42988.75	4	89.3
0	5:57:00	41040.54	5	85.2
0	6:57:00	39298.05	6	81.6
0	7:57:00	37738.56	7	78.4
0	8:57:00	36336.84	8	75.5
0	9:57:00	35068.18	9	72.8
0	10:57:00	33911.23	10	70.4
0	11:57:00	32847.57	11	68.2
0	12:57:00	31860.33	12	66.2
0	13:57:00	30933.9	13	64.2
0	14:57:00	30052.6	14	62.4
0	15:57:00	29195.71	15	60.6
0	16:57:00	28344.83	16	58.9
0	18:57:00	26658.11	18	55.4
0	19:57:00	25822.45	19	53.6
0	20:57:00	24992.05	20	51.9
0	21:57:00	24166.96	21	50.2
0	22:57:00	23347.25	22	48.5
0	23:57:00	22532.97	23	46.8
1	0:57:00	21724.17	24	45.1
1	1:57:00	20920.85	25	43.4
1	2:57:00	20123.02	26	41.8
1	3:57:00	19330.63	27	40.1
1	4:57:00	18543.7	28	38.5
1	5:57:00	17762.57	29	36.9
1	6:57:00	16987.29	30	35.3
1	7:57:00	16218.05	31	33.7
1	8:57:00	15455.19	32	32.1
1	9:57:00	14698.88	33	30.5
1	10:57:00	13949.32	34	29.0

1	11:57:00	14334.65	35	26.7
1	12:57:00	13588.4	36	25.3
1	13:57:00	12849.23	37	24.0
1	14:57:00	12117.38	38	22.6
1	15:57:00	11393.09	39	21.2
1	16:57:00	10676.66	40	19.9
1	17:57:00	9968.41	41	18.6
1	18:57:00	9268.69	42	17.3
1	19:57:00	8577.91	43	16.0
1	20:57:00	7896.51	44	14.7
1	21:57:00	7225.03	45	13.5
1	22:57:00	6564.08	46	12.2
1	23:57:00	5914.4	47	11.0
2	0:57:00	5276.86	48	9.8
2	1:57:00	4652.61	49	8.7
2	2:57:00	4043.09	50	7.5
2	3:57:00	3450.36	51	6.4
2	4:57:00	2877.53	52	5.4
2	5:57:00	2330.34	53	4.3
2	6:57:00	1817.95	54	3.4
2	7:57:00	1346.24	55	2.5
2	8:57:00	921.84	56	1.7
2	9:57:00	554.71	57	1.0
2	10:57:00	261.74	58	0.5
2	11:57:00	80.4	59	0.1
2	12:57:00	23.02	60	0.0
2	13:57:00	8.13	61	0.0
2	14:57:00	3.7	62	0.0
2	15:57:00	2.05	63	0.0
2	16:57:00	1.3	64	0.0
2	17:57:00	0.91	65	0.0
2	18:57:00	0.69	66	0.0
2	19:57:00	0.55	67	0.0
2	20:57:00	0.46	68	0.0
2	21:57:00	0.39	69	0.0
2	22:57:00	0.35	70	0.0
2	23:57:00	0.32	71	0.0
3	0:57:00	0.29	72	0.0

1	11:57:00	13206.72	35	27.4
1	12:57:00	12471.31	36	25.9
1	13:57:00	11743.34	37	24.4
1	14:57:00	11023.08	38	22.9
1	15:57:00	10310.85	39	21.4
1	16:57:00	9606.96	40	20.0
1	17:57:00	8911.81	41	18.5
1	18:57:00	8225.81	42	17.1
1	19:57:00	7549.47	43	15.7
1	20:57:00	6883.34	44	14.3
1	21:57:00	6228.1	45	12.9
1	22:57:00	5584.56	46	11.6
1	23:57:00	4953.71	47	10.3
2	0:57:00	4336.84	48	9.0
2	1:57:00	3735.67	49	7.8
2	2:57:00	3152.7	50	6.5
2	3:57:00	2592.05	51	5.4
2	4:57:00	2061.81	52	4.3
2	5:57:00	1569.68	53	3.3
2	6:57:00	1121.34	54	2.3
2	7:57:00	724.87	55	1.5
2	8:57:00	393.1	56	0.8
2	9:57:00	149.82	57	0.3
2	10:57:00	41.58	58	0.1
2	11:57:00	13.03	59	0.0
2	12:57:00	5.27	60	0.0
2	13:57:00	2.68	61	0.0
2	14:57:00	1.61	62	0.0
2	15:57:00	1.08	63	0.0
2	16:57:00	0.79	64	0.0
2	17:57:00	0.61	65	0.0
2	18:57:00	0.5	66	0.0
2	19:57:00	0.43	67	0.0
2	20:57:00	0.38	68	0.0
2	21:57:00	0.34	69	0.0
2	22:57:00	0.31	70	0.0

100-Year; 99%; 120 Hours

Table - Node Pond_14 — Max Volume(CF)= 110571

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	105975.7	0	95.8
0	1:57:00	99319.23	1	89.8
0	2:57:00	92359.48	2	83.5
0	3:57:00	88293.87	3	79.9
0	4:57:00	83788.48	4	75.8
0	5:57:00	78847.13	5	71.3
0	6:57:00	73544.99	6	66.5
0	7:57:00	67972.25	7	61.5
0	8:57:00	62140.84	8	56.2
0	9:57:00	56110.07	9	50.7
0	10:57:00	49868.98	10	45.1
0	11:57:00	43439.5	11	39.3
0	12:57:00	37197.02	12	33.6
0	13:57:00	31438.77	13	28.4
0	14:57:00	26356.93	14	23.8
0	15:57:00	22131.02	15	20.0
0	16:57:00	18891.68	16	17.1
0	18:57:00	15648.35	18	14.2
0	19:57:00	14998.73	19	13.6
0	20:57:00	14541.42	20	13.2
0	21:57:00	14178.68	21	12.8
0	22:57:00	13867.4	22	12.5
0	23:57:00	13584.61	23	12.3
1	0:57:00	13313.93	24	12.0
1	1:57:00	13029.57	25	11.8
1	2:57:00	12713.28	26	11.5
1	3:57:00	12382.19	27	11.2
1	4:57:00	12062	28	10.9
1	5:57:00	11772.69	29	10.6
1	6:57:00	11510.44	30	10.4
1	7:57:00	11271.19	31	10.2
1	8:57:00	11051.34	32	10.0
1	9:57:00	10848.03	33	9.8
1	10:57:00	10658.45	34	9.6
1	11:57:00	10480.53	35	9.5
1	12:57:00	10312.51	36	9.3
1	13:57:00	10152.62	37	9.2
1	14:57:00	9999.23	38	9.0

5-Year: 97%; 72 Hours

Table - Node Pond_14 — Max Volume(CF)= 55459

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	45484.04	0	82.0
0	1:57:00	55373.26	1	99.8
0	2:57:00	51557.36	2	93.0
0	3:57:00	45199.51	3	81.5
0	4:57:00	38815.55	4	70.0
0	5:57:00	32869.85	5	59.3
0	6:57:00	27560.45	6	49.7
0	7:57:00	23088.24	7	41.6
0	8:57:00	19580.57	8	35.3
0	9:57:00	17137.95	9	30.9
0	10:57:00	15845.24	10	28.6
0	11:57:00	15120.75	11	27.3
0	12:57:00	14630.04	12	26.4
0	13:57:00	14250.33	13	25.7
0	14:57:00	13929.51	14	25.1
0	15:57:00	13641.85	15	24.6
0	16:57:00	13369.99	16	24.1
0	18:57:00	12781.06	18	23.0
0	19:57:00	12451.59	19	22.5
0	20:57:00	12126.39	20	21.9
0	21:57:00	11831.08	21	21.3
0	22:57:00	11563.73	22	20.9
0	23:57:00	11320.13	23	20.4
1	0:57:00	11096.65	24	20.0
1	1:57:00	10890.15	25	19.6
1	2:57:00	10697.97	26	19.3
1	3:57:00	10517.78	27	19.0
1	4:57:00	10347.87	28	18.7
1	5:57:00	10186.43	29	18.4
1	6:57:00	10031.82	30	18.1
1	7:57:00	9882.45	31	17.8
1	8:57:00	9736.63	32	17.6
1	9:57:00	9591.96	33	17.3
1	10:57:00	9447.16	34	17.0
1	11:57:00	9302.24	35	16.8
1	12:57:00	9157.17	36	16.5
1	13:57:00	9011.9	37	16.2
1	14:57:00	8866.38	38	16.0

1	15:57:00	9850.74	39	8.9
1	16:57:00	9705.38	40	8.8
1	17:57:00	9560.67	41	8.6
1	18:57:00	9415.83	42	8.5
1	19:57:00	9270.88	43	8.4
1	20:57:00	9125.78	44	8.3
1	21:57:00	8980.46	45	8.1
1	22:57:00	8834.88	46	8.0
1	23:57:00	8688.97	47	7.9
2	0:57:00	8542.66	48	7.7
2	1:57:00	8395.87	49	7.6
2	2:57:00	8248.51	50	7.5
2	3:57:00	8100.48	51	7.3
2	4:57:00	7951.65	52	7.2
2	5:57:00	7801.9	53	7.1
2	6:57:00	7651.08	54	6.9
2	7:57:00	7498.99	55	6.8
2	8:57:00	7345.42	56	6.6
2	9:57:00	7190.1	57	6.5
2	10:57:00	7032.7	58	6.4
2	11:57:00	6872.8	59	6.2
2	12:57:00	6709.85	60	6.1
2	13:57:00	6543.09	61	5.9
2	14:57:00	6371.45	62	5.8
2	15:57:00	6193.22	63	5.6
2	16:57:00	6005.33	64	5.4
2	17:57:00	5801.38	65	5.2
2	18:57:00	5576.31	66	5.0
2	19:57:00	5327.3	67	4.8
2	20:57:00	5050.01	68	4.6
2	21:57:00	4736.89	69	4.3
2	22:57:00	4372.25	70	4.0
2	23:57:00	3928.82	71	3.6
3	0:57:00	3489.74	72	3.2
3	1:57:00	3104.93	73	2.8
3	2:57:00	2769.07	74	2.5
3	3:57:00	2458.45	75	2.2
3	4:57:00	2159.55	76	2.0
3	5:57:00	1870.24	77	1.7
3	6:57:00	1600.02	78	1.4
3	7:57:00	1358.42	79	1.2
3	8:57:00	1148.56	80	1.0

1	15:57:00	8720.53	39	15.7
1	16:57:00	8574.29	40	15.5
1	17:57:00	8427.59	41	15.2
1	18:57:00	8280.34	42	14.9
1	19:57:00	8132.44	43	14.7
1	20:57:00	7983.77	44	14.4
1	21:57:00	7834.2	45	14.1
1	22:57:00	7683.59	46	13.9
1	23:57:00	7531.75	47	13.6
2	0:57:00	7378.49	48	13.3
2	1:57:00	7223.53	49	13.0
2	2:57:00	7066.57	50	12.7
2	3:57:00	6907.2	51	12.5
2	4:57:00	6744.91	52	12.2
2	5:57:00	6578.99	53	11.9
2	6:57:00	6408.45	54	11.6
2	7:57:00	6231.76	55	11.2
2	8:57:00	6046.24	56	10.9
2	9:57:00	5846.23	57	10.5
2	10:57:00	5625.74	58	10.1
2	11:57:00	5382	59	9.7
2	12:57:00	5111.07	60	9.2
2	13:57:00	4806.3	61	8.7
2	14:57:00	4454.42	62	8.0
2	15:57:00	4025.71	63	7.3
2	16:57:00	3577.67	64	6.5
2	17:57:00	3181.11	65	5.7
2	18:57:00	2836.39	66	5.1
2	19:57:00	2522.68	67	4.5
2	20:57:00	2221.4	68	4.0
2	21:57:00	1930.16	69	3.5
2	22:57:00	1654.54	70	3.0
2	23:57:00	1406.66	71	2.5
3	0:57:00	1189.89	72	2.1

EURV 97% 72 Hours

Table - Node Pond_14 — Max Volume(CF)= 37432

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	31682.31	0	84.6
0	1:57:00	36913.02	1	98.6
0	2:57:00	32471.46	2	86.7
0	3:57:00	27144.16	3	72.5
0	4:57:00	22597.84	4	60.4
0	5:57:00	19117.33	5	51.1
0	6:57:00	16796.02	6	44.9
0	7:57:00	15616.51	7	41.7
0	8:57:00	14936.86	8	39.9
0	9:57:00	14469.36	9	38.7
0	10:57:00	14103.85	10	37.7
0	11:57:00	13792.35	11	36.8
0	12:57:00	13509.69	12	36.1
0	13:57:00	13236.05	13	35.4
0	14:57:00	12940.05	14	34.6
0	15:57:00	12616.49	15	33.7
0	16:57:00	12284.75	16	32.8
0	18:57:00	11693.48	18	31.2
0	19:57:00	11438.66	19	30.6
0	20:57:00	11205.69	20	29.9
0	21:57:00	10991.09	21	29.4
0	22:57:00	10792.15	22	28.8
0	23:57:00	10606.13	23	28.3
1	0:57:00	10431.3	24	27.9
1	1:57:00	10265.81	25	27.4
1	2:57:00	10107.95	26	27.0
1	3:57:00	9956.11	27	26.6
1	4:57:00	9808.68	28	26.2
1	5:57:00	9663.69	29	25.8
1	6:57:00	9518.87	30	25.4
1	7:57:00	9373.93	31	25.0
1	8:57:00	9228.85	32	24.7
1	9:57:00	9083.59	33	24.3
1	10:57:00	8938.1	34	23.9
1	11:57:00	8792.32	35	23.5
1	12:57:00	8646.19	36	23.1
1	13:57:00	8499.62	37	22.7
1	14:57:00	8352.55	38	22.3

WQCV: 40 Hours Minimum

Table - Node Pond_14 — Max Volume(CF)= 35880

Days	Hours	Volume (ft3)	Total Hours	% Remaining
0	0:58:00	10828.46	0	30.2
0	1:57:00	35880.02	1	100.0
0	2:57:00	30888.3	2	86.1
0	3:57:00	25349.32	3	70.7
0	4:57:00	20876.71	4	58.2
0	5:57:00	17681.46	5	49.3
0	6:57:00	15909.93	6	44.3
0	7:57:00	15009.73	7	41.8
0	8:57:00	14449.78	8	40.3
0	9:57:00	14042.41	9	39.1
0	10:57:00	13710.59	10	38.2
0	11:57:00	13415.9	11	37.4
0	12:57:00	13127.85	12	36.6
0	13:57:00	12812.58	13	35.7
0	14:57:00	12479.34	14	34.8
0	15:57:00	12151.41	15	33.9
0	16:57:00	11853.55	16	33.0
0	18:57:00	11338.39	18	31.6
0	19:57:00	11113.09	19	31.0
0	20:57:00	10905.01	20	30.4
0	21:57:00	10711.48	21	29.9
0	22:57:00	10530.05	22	29.3
0	23:57:00	10359.04	23	28.9
1	0:57:00	10196.64	24	28.4
1	1:57:00	10041.18	25	28.0
1	2:57:00	9891.08	26	27.6
1	3:57:00	9744.64	27	27.2
1	4:57:00	9599.5	28	26.8
1	5:57:00	9454.24	29	26.3
1	6:57:00	9308.87	30	25.9
1	7:57:00	9163.35	31	25.5
1	8:57:00	9017.63	32	25.1
1	9:57:00	8871.66	33	24.7
1	10:57:00	8725.36	34	24.3
1	11:57:00	8578.69	35	23.9
1	12:57:00	8431.55	36	23.5
1	13:57:00	8283.86	37	23.1
1	14:57:00	8135.52	38	22.7

1	15:57:00	8204.87	39	21.9
1	16:57:00	8056.49	40	21.5
1	17:57:00	7907.27	41	21.1
1	18:57:00	7757.08	42	20.7
1	19:57:00	7605.76	43	20.3
1	20:57:00	7453.1	44	19.9
1	21:57:00	7298.89	45	19.5
1	22:57:00	7142.83	46	19.1
1	23:57:00	6984.57	47	18.7
2	0:57:00	6823.65	48	18.2
2	1:57:00	6659.47	49	17.8
2	2:57:00	6491.18	50	17.3
2	3:57:00	6317.56	51	16.9
2	4:57:00	6136.59	52	16.4
2	5:57:00	5944.35	53	15.9
2	6:57:00	5733.83	54	15.3
2	7:57:00	5501.39	55	14.7
2	8:57:00	5243.86	56	14.0
2	9:57:00	4956.1	57	13.2
2	10:57:00	4628.76	58	12.4
2	11:57:00	4240.04	59	11.3
2	12:57:00	3785.07	60	10.1
2	13:57:00	3362.03	61	9.0
2	14:57:00	2994.3	62	8.0
2	15:57:00	2669.63	63	7.1
2	16:57:00	2362.78	64	6.3
2	17:57:00	2067.31	65	5.5
2	18:57:00	1782.13	66	4.8
2	19:57:00	1520.52	67	4.1
2	20:57:00	1288.65	68	3.4
2	21:57:00	1089.44	69	2.9
2	22:57:00	926.12	70	2.5
2	23:57:00	803.13	71	2.1
3	0:57:00	725.64	72	1.9

1	15:57:00	7986.41	39	22.3
1	16:57:00	7836.42	40	21.8
1	17:57:00	7685.38	41	21.4
1	18:57:00	7533.11	42	21.0
1	19:57:00	7379.41	43	20.6
1	20:57:00	7224.02	44	20.1
1	21:57:00	7066.61	45	19.7
1	22:57:00	6906.79	46	19.2
1	23:57:00	6744.02	47	18.8
2	0:57:00	6577.61	48	18.3
2	1:57:00	6406.53	49	17.9
2	2:57:00	6229.21	50	17.4
2	3:57:00	6042.92	51	16.8
2	4:57:00	5841.83	52	16.3
2	5:57:00	5620.13	53	15.7
2	6:57:00	5375.04	54	15.0
2	7:57:00	5102.56	55	14.2
2	8:57:00	4795.86	56	13.4
2	9:57:00	4441.21	57	12.4
2	10:57:00	4008.93	58	11.2
2	11:57:00	3562.06	59	9.9
2	12:57:00	3167.54	60	8.8
2	13:57:00	2824.44	61	7.9
2	14:57:00	2511.35	62	7.0
2	15:57:00	2210.51	63	6.2
2	16:57:00	1919.59	64	5.4
2	17:57:00	1644.91	65	4.6
2	18:57:00	1398.13	66	3.9
2	19:57:00	1182.57	67	3.3
2	20:57:00	1001.29	68	2.8
2	21:57:00	857.63	69	2.4
2	22:57:00	758.86	70	2.1

SWMM Model 2-Hour Storm Inputs										
1-Hour Depth		0.43	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CO Springs Multiplier	time	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
0	0	0	0	0	0	0	0	0	0	0
0.014	0:05	0.006	0.015	0.017	0.021	0.025	0.028	0.032	0.035	0.044
0.046	0:10	0.020	0.049	0.055	0.069	0.081	0.092	0.104	0.116	0.144
0.079	0:15	0.034	0.085	0.094	0.119	0.138	0.158	0.178	0.199	0.248
0.12	0:20	0.052	0.128	0.143	0.180	0.210	0.240	0.270	0.302	0.377
0.179	0:25	0.077	0.192	0.213	0.269	0.313	0.358	0.403	0.451	0.562
0.258	0:30	0.111	0.276	0.307	0.387	0.452	0.516	0.581	0.650	0.810
0.421	0:35	0.181	0.450	0.501	0.632	0.737	0.842	0.947	1.061	1.322
0.712	0:40	0.306	0.762	0.847	1.068	1.246	1.424	1.602	1.794	2.236
0.824	0:45	0.354	0.882	0.981	1.236	1.442	1.648	1.854	2.076	2.587
0.892	0:50	0.384	0.954	1.061	1.338	1.561	1.784	2.007	2.248	2.801
0.935	0:55	0.402	1.000	1.113	1.403	1.636	1.870	2.104	2.356	2.936
0.972	1:00	0.418	1.040	1.157	1.458	1.701	1.944	2.187	2.449	3.052
1.004	1:05	0.432	1.074	1.195	1.506	1.757	2.008	2.259	2.530	3.153
1.018	1:10	0.438	1.089	1.211	1.527	1.782	2.036	2.291	2.565	3.197
1.03	1:15	0.443	1.102	1.226	1.545	1.803	2.060	2.318	2.596	3.234
1.041	1:20	0.448	1.114	1.239	1.562	1.822	2.082	2.342	2.623	3.269
1.052	1:25	0.452	1.126	1.252	1.578	1.841	2.104	2.367	2.651	3.303
1.063	1:30	0.457	1.137	1.265	1.595	1.860	2.126	2.392	2.679	3.338
1.072	1:35	0.461	1.147	1.276	1.608	1.876	2.144	2.412	2.701	3.366
1.082	1:40	0.465	1.158	1.288	1.623	1.894	2.164	2.435	2.727	3.397
1.091	1:45	0.469	1.167	1.298	1.637	1.909	2.182	2.455	2.749	3.426
1.1	1:50	0.473	1.177	1.309	1.650	1.925	2.200	2.475	2.772	3.454
1.109	1:55	0.477	1.187	1.320	1.664	1.941	2.218	2.495	2.795	3.482
1.119	2:00	0.481	1.197	1.332	1.679	1.958	2.238	2.518	2.820	3.514

APPENDIX B

STANDARD DESIGN CHARTS AND TABLES

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis--Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

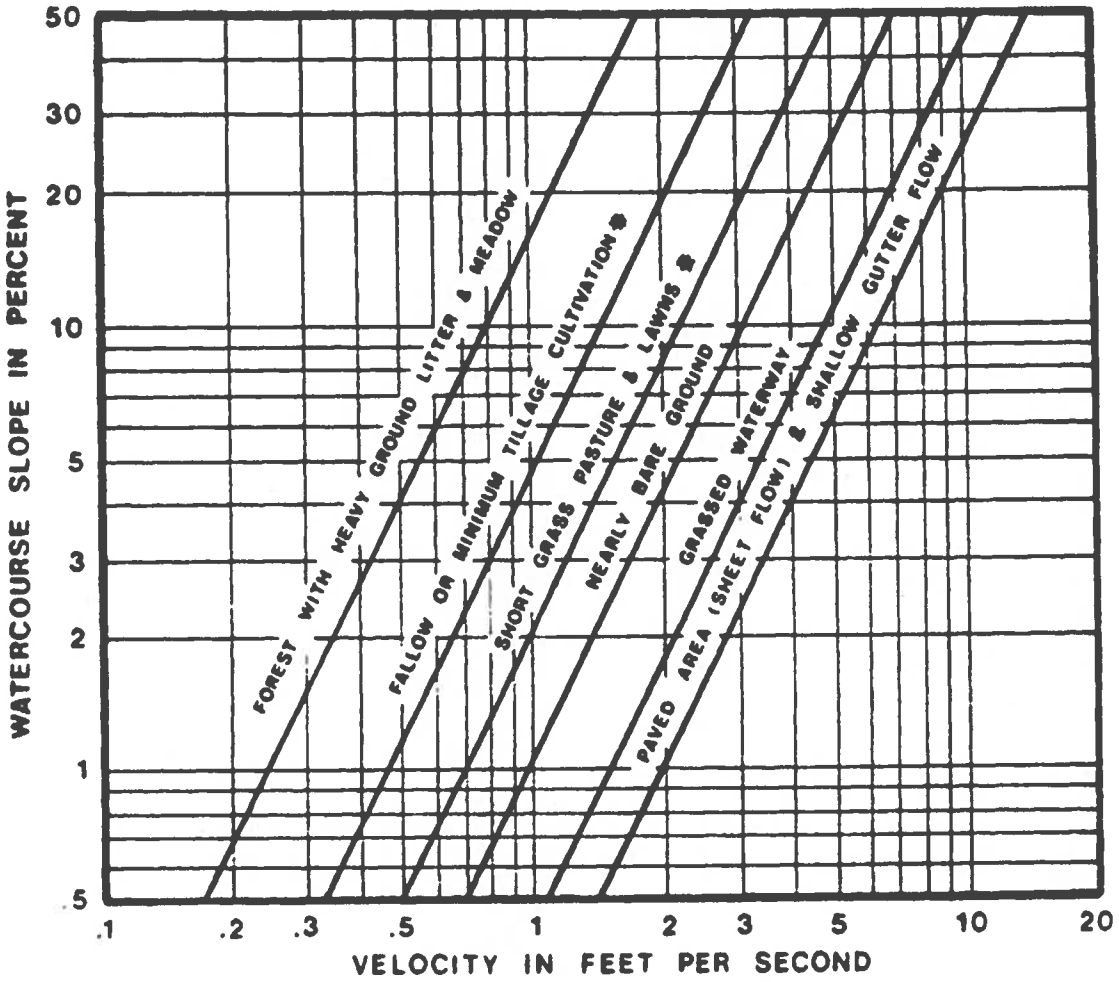
depths over the duration of the storm as a fraction of the 1-hour depth and is also shown in Figure 6-19. By applying the 1-hour depths shown in Table 6-2 to the values shown in Table 6-3, a short-duration project design storm can be developed for any return period storm from a 2-year up to 100-year frequency. By applying the appropriate 1-hour depth for other project locations, a project design storm can be created for any location.

Table 6-3. 2-Hour Design Storm Distribution, ≤ 1 mi^2

Time (minutes)	Fraction of 1-Hour Rainfall Depth	Time (minutes)	Fraction of 1-Hour Rainfall Depth
5	0.014	65	1.004
10	0.046	70	1.018
15	0.079	75	1.030
20	0.120	80	1.041
25	0.179	85	1.052
30	0.258	90	1.063
35	0.421	95	1.072
40	0.712	100	1.082
45	0.824	105	1.091
50	0.892	110	1.100
55	0.935	115	1.109
60	0.972	120	1.119

- **Frontal Storms**: The characteristics of longer-duration "frontal storms" (general) is less well understood than the shorter duration thunderstorms and should be studied further. However, some events of this nature have been observed, such as the April 1999 storm which produced flooding on Fountain Creek, showing that these types of events do occur and tend to produce hazardous flood flows. In addition, modeling of the Jimmy Camp Creek drainage basin using the 24-hour, Type II distribution shows that it produces results reasonably comparably to recorded flow data. Therefore, the NRCS 24-hour Type II distribution has replaced the Type IIa distribution as the standard, long-duration design storm. This distribution can be applied to drainage basins up to 10 square miles without a DARF correction and is shown in Table 6-4. This distribution is included as a standard storm option in the HEC-HMS program.

Figure 6-25. Estimate of Average Concentrated Shallow Flow



2019 DRAINAGE, BRIDGE AND POND FEES
CITY OF COLORADO SPRINGS

Basin Name	DBPS Year	Drainage Fee/Acre	Bridge Fee/Acre	Pond Land Fee/Acre	Pond Facility Fee/Acre	Surcharge/ Acre
19th Street	1964	$4,030				
21st Street	1977	$6,151				
Bear Creek	1980	$3,959	$373			
Big Johnson, Crews	1991	$15,316	$1,259	$241		
Black Squirrel Creek	1989	$14,302	$1,603	$789		
Camp Creek	1964	$2,270				
Cottonwood Creek[1],[2]	2000	$13,923	$1,130			$723
Douglas Creek	1981	$12,728	$285			
Dry Creek[3]	1966	$0.00				
Elkhorn Basin[4]	n/a	$0.00				
Fishers Canyon[5]	1991	$0.00				
Fountain Creek[6]	n/a	VAR				
Jimmy Camp Creek	2015	$7,975			$2,599	
Kettle Creek[7] Old Ranch Trib.	2001	$0.00				
Little Johnson	1988	$13,367		$1,227		
Mesa	1986	$10,699				
Middle Tributary	1987	$6,995		$1,121		
Miscellaneous[8]	n/a	$11,905				
Monument Branch[12]	1987	$0.00				
North Rockrimmon	1973	$6,152				
Park Vista (MDDP)	2004	$17,135				
Peterson Field	1984	$12,925	$595			
Pine Creek[9]	1988	$0.00				
Pope's Bluff	1976	$4,096	$701			
Pulpit Rock	1968	$6,784				
Sand Creek[10]	1996	$12,645	$761	$1,070	$3,676	$1,333
Shooks Run[11]	1994	$0.00				
Smith Creek[12]	2002	$0.00				
South Rockrimmon	1976	$4,810				
Southwest Area	1984	$13,467				
Spring Creek	1968	$10,609				
Templeton Gap	1977	$6,997	$77			
Windmill Gulch	1992	$14,594	$271	$3,055		

All Drainage, Bridge and Detention Pond Facilities Fees adjusted by 6.7% over 2018 by City Council Resolution No. 159-18 on December 11, 2018 to be effective on January 1, 2019. Land Fees are based on the Park Land Dedication Fee which is currently $76,602/acre (0% change for inflation in 2018).

[1] The 2018 Cottonwood Creek drainage fee consists of a capital improvement fee of $10,853 per acre and land fee of $3,069 per acre for a total of $13,923 per acre. These fees are adjusted annually using different procedures but are combined for collection purposes. **The surcharge fee of $723/ac is due in cash; credits for prior facility construction cannot be used to offset this fee,** which is deposited into a separate City fund known as the "Cottonwood Creek Surcharge" fund.

[2] The Wolf Ranch portion of the Cottonwood Creek Drainage Basin was approved as a "no fee" basin **as to Drainage Fees only** by City Council on August 28, 2018 by Resolution No. 96-18

[3] Dry Creek is a closed basin per City Council Resolution No.118-08 on June 24, 2008

[4] Elkhorn Basin is a closed basin per the Annexation Agreements for the area.

[5] Fishers Canyon is a closed basin per City Council Resolution No. 74-08 on April 22, 2008.

[6] Pursuant to the recommendation of the Subdivision Storm Drainage Board adopted at its meeting of September 15, 1977, there are exempted and excluded from the provisions of this part construction of the main Fountain Creek Channel from the confluence of Fountain Creek with Monument Creek northwest to the City limits. Land developments taking place adjacent to Fountain Creek shall remain responsible for dedicating rights of way necessary for the channelization of Fountain Creek, and the developers shall continue to pay to the City as a condition of subdivision plat approval the applicable drainage fees. Drainage fees are required in accordance with the appropriate basin study.

[7] Kettle Creek Old Ranch Tributary is a closed basin per City Council Resolution 139-02 on August 27, 2002.

[8] Miscellaneous fee is assessed on unstudied areas and the Roswell and Westside Basins.

[9] Pine Creek is a closed basin per City Council Resolution No.236-88 on December 13, 1988.

[10] Sand Creek Detention Pond #2 Surcharge (Ridgeview and Indigo Ranch) = $1,333/ac. for 2019. Sand Creek Pond fees include two components, one for facility construction costs ($3,676) and one for land dedication costs ($1,070), the total Pond fee within Sand Creek is $4,746/ac.

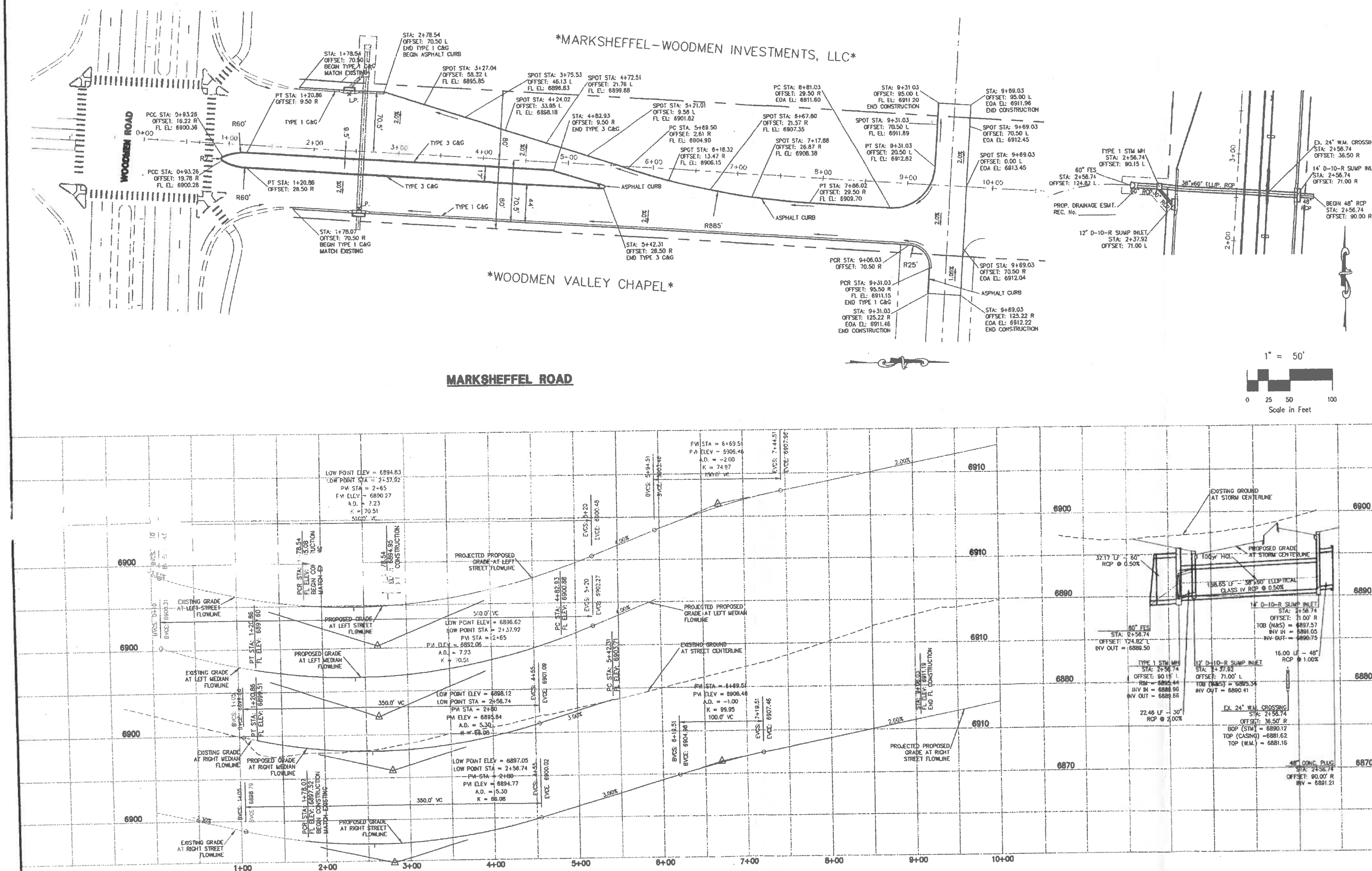
[11] Shooks Run is a closed basin pursuant to the recommendation of the Drainage Board, adopted at its meeting on October 15, 1963.

[12] Smith Creek is a closed basin per City Council Resolution 140-02 on August 27, 2002

[12] Monument Branch Basin is a closed basin per City Council Res. 177-10 on October 12, 2010

APPENDIX C

REPORT REFERENCES



WOODMEN HEIGHTS – ROADWAY INFRASTRUCTURE

PLAN & PROFILE

PROJECT NO. 08-001	FILE: M:\dwg\CDs\08001-Road P&P - Marksheffel 2008-intel.dwg		
DESIGNED BY: VAS	SCALE	DATE: 11/3/08	C2
DRAWN BY: DFS	HORIZ: 1"=50'	SHEET 2 OF 5	
CHECKED BY: VAS	VERT: 1"=5'		

CIVIL CONSULTANTS, INC.

15 NORTH NEVADA AVENUE
COLORADO SPRINGS, COLORADO 80903
T 719.955.5485
F 719.444.8427

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

REVISIONS: NO. | DATE: | BY: | DESCRIPTION: | APPR'D BY: | DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

STATEMENT:
THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN; THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY. RESUBMITTAL REQUIRED IF CONSTRUCTION HAS NOT COMMENCED WITHIN 180 DAYS AFTER REVIEW DATE.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES
FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1-800-922-1987

WASTEWATER DESIGN APPROVAL:
SIGNED: ____________
DATE: ______ PROJECT NO. ______
RMS NO. ______
IN CASE OF ERRORS OR OMISSIONS WITH THE SEWER DESIGN AS SHOWN ON THIS DOCUMENT THE STANDARDS AS DEFINED IN THE "RULES AND REGULATIONS FOR THE INSTALLATIONS OF SEWER MAINS" SHALL RULE. APPROVAL EXPIRES 180 DAYS FROM DESIGN APPROVAL.

UTILITY GRADE APPROVAL:
SIGNED: ____________ DATE: ______
FOR THE CITY ENGINEER
CENTERLINE LINE AND GRADE IS REVIEWED FOR CONFORMANCE TO THE CITY STANDARDS TO ALLOW FOR THE DESIGN AND CONSTRUCTION OF UTILITY MAINS. DRAINAGE FACILITIES DESIGN HAS BEEN CHECKED BY THE DESIGN ENGINEER TO AVOID CONFLICTS WITH UTILITY MAINS. THIS IS NOT A CURB & GUTTER REVIEW AND THE DEVELOPER WILL BE RESPONSIBLE FOR ANY COSTS DUE TO DESIGN CHANGES PRIOR TO CURB & GUTTER REVIEW. THE REVIEW EXPIRES IN 180 DAYS.

UNDERDRAIN REVIEW:
SIGNED: ____________ DATE: ______
FOR THE CITY ENGINEER
REVIEW BY WASTEWATER DIVISION IS FOR SYSTEM SEPARATION AND DISCHARGE TO OPEN OR STORM SEWER. THE WASTEWATER DIVISION IS NOT RESPONSIBLE FOR SUBDRAIN SYSTEM MAINTENANCE.
NOTE: UNDERDRAIN SYSTEM WILL NOT BE MAINTAINED BY THE PUBLIC WORKS DEPARTMENT.

REVIEW:
TRAFFIC ENGINEERING: [signature] DATE: 3/9/2009
STREET DESIGN:
CURB & GUTTER: [signature] DATE: 2/12/09
FINAL REVIEW: [signature] DATE: 3/20/09
DRAINAGE DESIGN: Filed in accord w/ 7.7.906 Code / City of C/S
DRAINAGE REVIEW: [signature] DATE: 11/4/08

DESIGN DATA:
SIDEWALKS: WIDTH 6'
LOCATION: Attached ☐ Detached ■
CURB TYPE 1 ■ CURB TYPE 3 ■
CURB TYPE 5 ☐
ROW WIDTH 160' FL-FL VARIES
STREET TYPE PRIN. ART. HVEEM
13" FULL DEPTH ASPHALT
ASPHALT THICKNESS:
AC Surface 13" Full
AC Base ______
AGG. BASE THICKNESS:
Class 6 ______
Class 5 ______
Class 2 ______

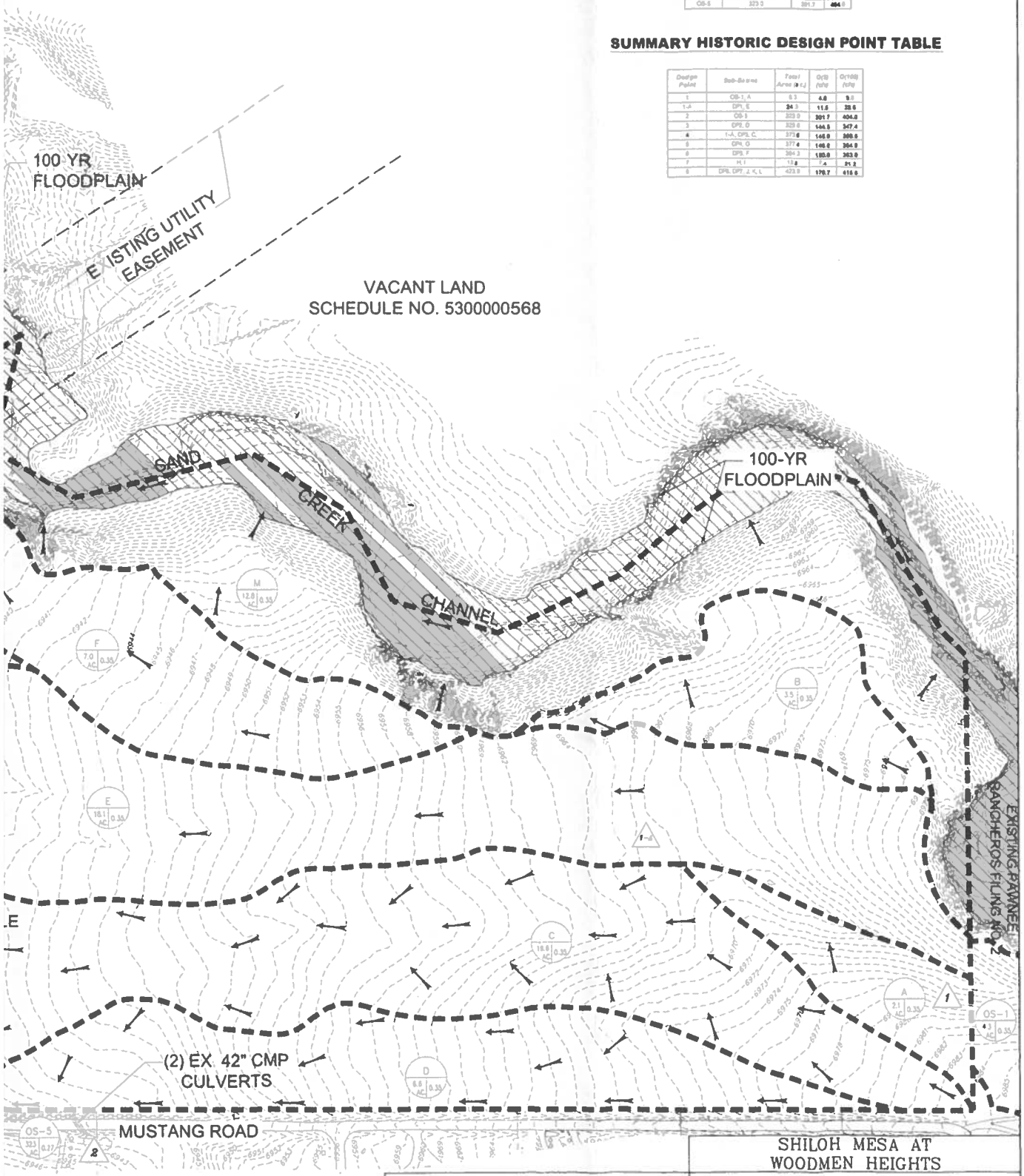
STATEMENT:
ANY CHANGES OR ALTERATIONS AFFECTING THE GRADE, ALIGNMENT, ELEVATION AND/OR DEPTH OF COVER OF SEWERS AND APPURTENANCES SHOWN ON THIS DRAWING SHALL BE THE RESPONSIBILITY OF THE DEVELOPER. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR OPERATIONAL DAMAGES AND DEFECTS IN THE INSTALLATION AND MATERIAL OF MAINS AND SERVICES FROM THE DATE OF APPROVAL UNTIL FINAL ACCEPTANCE IS ISSUED.
BY: [signature] DATE: 11-4-08

SUMMARY HISTORIC BASIN RUNOFF TABLE

Sub-Basin Designation	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
A	2.1	2.3	6.6
B	3.5	2.4	6.1
C	19.6	7.1	17.7
D	6.6	3.6	6.1
E	16.1	8.0	22.8
F	7.0	4.0	8.5
G	3.8	3.2	5.4
H	7.7	4.2	10.4
K	6.5	3.8	9.4
L	3.2	6.1	13.6
OS-1	4.3	3.7	6.5
OS-5	323.0	201.7	404.0

SUMMARY HISTORIC DESIGN POINT TABLE

Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
1	OS-1, A	6.4	4.8	9.0
1-A	DP1, E	24.3	11.0	33.6
2	OS-5	323.0	201.7	404.0
3	DP2, D	329.6	144.5	347.4
4	1-A, DP3, C	373.6	146.9	368.6
5	DP4, G	377.4	146.2	364.0
6	DP5, F	384.3	185.8	363.0
7	H,I	12.9	7.4	21.2
8	DP6, DP7, J, K, L	423.8	170.7	416.6



Matrix Design Group, Inc.
Integrated Design Solutions
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208

SHILOH MESA AT WOODMEN HEIGHTS

MASTER DEVELOPEMNT DRAINAGE PLAN

DRAINAGE PLAN
EXISTING CONDITIONS

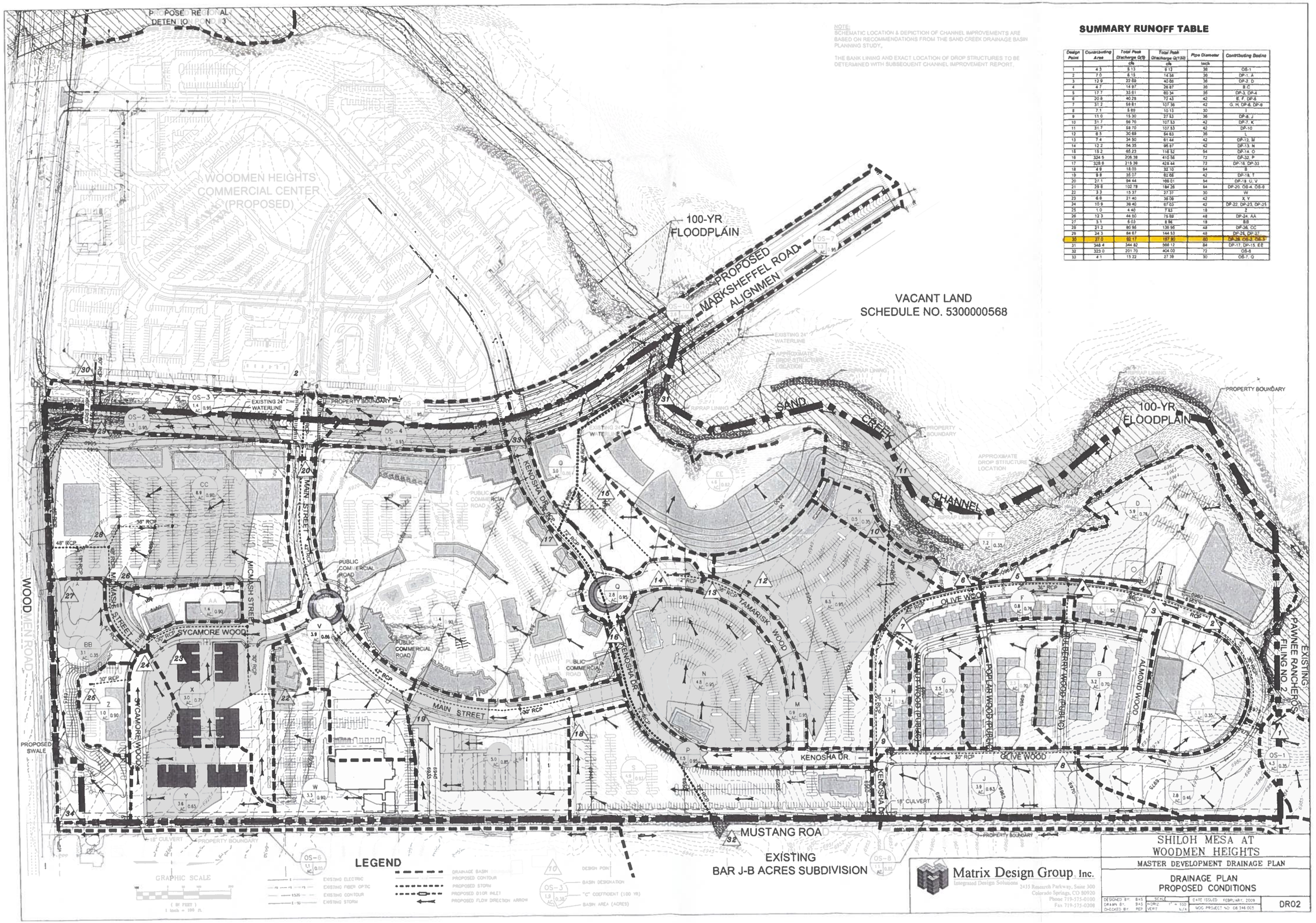
DESIGNED BY	BAS	SCALE: HORIZ. 1" = 100' VERT. N/A	DATE ISSUED: FEBRUARY, 2006
DRAWN BY	BAS		MDG PROJECT NO. 05.346.002
CHECKED BY	MDS		DR01

NOTE:
SCHEMATIC LOCATION & DEPICTION OF CHANNEL IMPROVEMENTS ARE BASED ON RECOMMENDATIONS FROM THE SAND CREEK DRAINAGE BASIN PLANNING STUDY.

THE BANK LINING AND EXACT LOCATION OF DROP STRUCTURES TO BE DETERMINED WITH SUBSEQUENT CHANNEL IMPROVEMENT REPORT.

SUMMARY RUNOFF TABLE

Design Point	Contributing Area	Total Peak Discharge Q(5)	Total Peak Discharge Q(100)	Pipe Diameter	Contributing Basins
		cfs	cfs	inch	
1	4.3	5.13	9.12	36	OS-1
2	7.0	8.15	14.56	36	DP-1, A
3	12.9	22.69	40.65	36	DP-2, D
4	4.7	14.97	26.87	36	B,C
5	17.7	33.81	60.34	36	DP-3, DP-4
6	20.6	40.76	72.43	42	E, F, DP-5
7	31.2	59.81	107.56	42	G, H, DP-6, DP-8
8	7.1	5.69	10.13	30	I
9	11.0	15.30	27.53	36	DP-8, J
10	31.7	59.70	107.53	42	DP-7, K
11	31.7	59.70	107.53	42	DP-10
12	8.3	30.68	54.63	36	L
13	7.4	34.90	61.44	42	DP-12, M
14	12.2	54.35	95.97	42	DP-13, N
15	15.2	65.23	114.52	54	DP-14, O
16	324.5	206.38	410.56	72	DP-32, P
17	328.6	215.39	428.64	72	DP-16, DP-33
18	4.9	18.03	32.10	54	S
19	9.8	35.07	62.68	42	DP-18, T
20	27.1	94.44	169.01	54	DP-19, U, V
21	29.8	102.78	184.26	54	DP-20, OS-4, OS-5
22	3.3	15.37	27.37	30	W
23	6.6	21.40	38.09	42	X, Y
24	10.9	39.40	67.03	42	DP-22, DP-23, DP-25
25	1.0	4.40	7.63	18	Z
26	12.3	44.50	75.69	48	DP-24, AA
27	3.1	8.03	8.96	18	BB
28	21.2	80.56	136.95	48	DP-26, CC
29	24.3	84.67	144.53	48	DP-28, DP-27
30	27.0	92.17	187.80	60	DP-29, OS-2, OS-3
31	348.4	344.82	566.12	84	DP-17, DP-15, EE
32	323.0	201.70	404.00	72	OS-9
33	4.1	15.22	27.39	30	OS-7, Q



Matrix Design Group Inc.
Integrated Design Solutions
2435 Research Parkway, Suite 300
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Phone 719-575-0100
Fax 719-575-0208

SHILOH MESA AT WOODMEN HEIGHTS
MASTER DEVELOPMENT DRAINAGE PLAN
DRAINAGE PLAN
PROPOSED CONDITIONS

DESIGNED BY:	BAS	SCALE	DATE ISSUED: FEBRUARY, 2009
DRAWN BY:	BAS	HORIZ. 1" = 100'	
CHECKED BY:	REP	VERT. N/A	MDG PROJECT NO: 08.346.005

DR02

III. EXISTING FACILITIES

A. Previous Analysis of Existing Facilities

The SCDBPS outlines the drainage improvements required by the City, prior to development in this area. The SCDBPS proposed numerous regional detention ponds throughout the development area of Woodmen Heights Metropolitan District. Other studies of the Shiloh Mesa development area include ***The Master Development Drainage Plan for Woodmen Heights*** (Classic MDDP), by Classic Consulting Engineers and Surveyors, dated June 2004, and more recently ***The Master Development Drainage Plan Update for Woodmen Heights and Final Drainage Report for Forest Meadows Filing No. 1 and No. 4*** (ESI MDDP), by Engineering and Surveying Inc (ESI), dated February of 2006. The Classic MDDP proposed eliminating Detention Facilities No. 4 and 5, as outlined in the SCDBPS, and enlarging Facilities No. 3 and 6 to compensate for the loss of detention area.

Detention Facility No. 3 (Pond #3), is located inline with the main reach of the Sand Creek Channel just west of the proposed Marksheffel Road alignment and north of Woodmen Road. This detention pond was sized to accommodate the developed stormwater runoff from the eastern portion of the Woodmen Heights Metropolitan District. According to the Classic MDDP, Pond #3 is a 224 acre-foot facility with a total developed inflow of Q_{100}=2883 cubic feet per second (cfs) and a release rate of **Q_{100}=2242 cfs**. It was anticipated that this facility would be combined with a neighborhood park area. In addition to Pond #3, the Woodmen Heights Metropolitan District is responsible to complete the construction of Regional Pond #2, located adjacent to Security Service Field, approximately 3 miles downstream. Construction is underway to complete the interim condition of Pond #2.

The ESI MDDP was approved by the City in February of 2006, and functions as an amendment/update to the Classic MDDP. The ESI MDDP evaluated the previous analysis performed in the Classic MDDP and resized Pond #3 to a 209 acre-foot facility. The reason for the decrease in size of Pond #3 can be attributed to the rerouting of runoff from 18.7 acres, known as Parcel 11 in the Classic MDDP, to Detention Facility No. 6. Minor changes were also made with respect to drainage analysis, such as an increased inflow of Q_{100}=3207 cfs to Pond #3 and a release rate of **Q_{100}=2240 cfs**. Both the Classic MDDP and the ESI MDDP, assumed that Pond #3 would accept developed flows from the Shiloh Mesa development and would treat the runoff for water quality.

B. Offsite Analysis of Existing Facilities

The Classic MDDP and the ESI MDDP utilized the SCS method for computing the hydrologic analysis. The impervious area of each basin was analyzed to compare the results from the ESI MDDP to those calculated using the Rational Method in this report (which will yield more conservative results). It was assumed that the time of concentration would remain the same for each analysis, and therefore the impervious area is the controlling factor for evaluating the peak runoff rates. For the proposed site, the ESI MDDP employed a curve number of 92. According to **Table 5-5** of the Drainage Criteria Manual, *Runoff Curve Numbers for Hydrologic Soil*, a commercial area with a curve number of 92 corresponded to an 85 percent impervious area. Conversely, **Table 5-1** of the Drainage Criteria Manual, *Recommended Average Runoff*

SHILOH MESA
POST DEVELOPMENT DRAINAGE PLAN
DECEMBER 2015

NORTH
1" = 100'

LEGEND

- DESIGN POINT
- FLOW DIRECTION
- EMERGENCY OVERFLOW
- BASIN DESIGNATION (A, 8.0 ACRES, C100, C5)
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- BASIN BOUNDARY
- EMERGENCY OVERFLOW PATH
- SAND FILTRATION BASIN
- PIPE RUN IDENTIFIER
- SELECTIVE LINING
- GRADE CONTROL

DRAINAGE NOTES

1. PROPOSED TYPE D-10-R DROP INLET, SUMP & AT-GRADE COND'N
2. PROPOSED STORM SEWER PIPE
3. PROPOSED FABRICATED END SECTION
5. PROPOSED STORM DRAIN HEADWALL
6. PROPOSED WATER QUALITY FEATURE – SAND FILTRATION BASIN
7. PROPOSED POND OUTLET, DESIGNED TO BYPASS Q100
8. PROPOSED RIPRAP APRON
9. PROPOSED TRAPEZOIDAL DIVERSION CHANNEL

BASIN SUMMARY TABLE

BASIN ID	BASIN AREA (Acres)	FLOW Q5 (CFS)	FLOW Q100 EST (CFS)
OS1*	4.3	3.8	9.0
OS5*	323	72.0	340.0
A1	3.78	7.1	15.1
A2	6.20	9.4	20.1
A3	2.30	4.7	9.9
A4	1.20	1.8	5.3
B1	1.20	3.2	8.7
B2	4.10	7.6	16.3
C1	1.70	3.3	7.1
C2	4.64	10.8	22.4
[illegible]	[illegible]	8.4	18.0
[illegible]	6.1b	11.1	23.8
[illegible]	[illegible]	3.5	7.4
D5	0.40	1.	3.5
D6	1.65	3.0	6.3
F1	2.38	4.8	9.9
F2	2.16	4.0	8.6
G1	1.75	3.3	7.1
G2	2.58	5.3	11.2
OS7**	1.8	6.7	12.5
OS10**	1.9	7.0	13.2

*Q5 & Q100 REFERENCED FROM "MASTER DEVELOPMENT DRAINAGE PLAN FOR SHILOH MESA AT WOODMEN HEIGHTS", PREPARED BY MATRIX

**Q5 & Q100 REVISED AREAS AND FLOWS FOR "MASTER DEVELOPMENT DRAINAGE PLAN FOR SHILOH MESA AT WOODMEN HEIGHTS", PREPARED BY MATRIX

PIPE TABLE

PIPE #	DIA.(IN.) & MTL	FLOW Q5 (CFS)	FLOW Q100 (CFS)
1	*2- 42" RCP	72.0	340.0
2	72" RCP	72.0	340.0
3	24" RCP	7.1	15.1
4	18" RCP	3.2	6.7
5	24" RCP	7.6	16.3
6	24" RCP	10.3	21.9
7	18" RCP	3.3	7.1
8	30" RCP	10.8	22.4
9	30" RCP	14.1	29.5
10	36" RCP	23.9	50.2
11	18" RCP	4.7	9.9
12	24" RCP	8.3	20.8
13	30" RCP	12.9	27.5
14	42" RCP	32.3	68.4
15	18" RCP	3.3	7.1
16	18" RCP	5.3	11.2
17	24" RCP	8.2	17.6
18	18" RCP	4.0	8.6
19	18" RCP	4.6	9.9
20	24" RCP	8.5	18.1
21	30" RCP	16.5	35.3
22	24" RCP	8.4	18.0
23	18" RCP	1.8	3.5
24	42" RCP	31.9	70.6
25	18" RCP	3.5	7.4
26	42" RCP	35.0	77.2
27	24" RCP	6.4	16.6
28	36" RCP	22.4	50.7

* PROPOSED DUEL - 42" RCP TO BE USED IN CONJUNCTION WITH EXISTING DUAL - 42" CMP TO BE INSTALLED WITH UPSTREAM DEVELOPMENT (CULVERTS TO PROVIDE EQUIVALENT FLOW AREA OF 2 - 60" RCP CULVERTS)

DESIGN POINT SUMMARY TABLE

DESIGN PT.	PEAK Q5 (CFS)	PEAK Q100 (CFS)	COMMENTS
	NORTH WQ POND TRIBUTARY		
A1	7.1	15.1	6-FT SUMP D-10-R
			RELEASE INTO N. WQ POND
	CENTRAL WQ POND TRIBUTARY		
A2	9.4	20.1	8-FT SUMP D-10-R
A3	4.7	9.9	4-FT SUMP D-10-R
B1	3.2	6.7	4-FT SUMP D-10-R
B2	7.6	16.3	6-FT SUMP D-10-R
C1	3.3	7.1	4-FT SUMP D-10-R
C2	10.8	22.4	10-FT SUMP D-10-R
A4	33.4	72.0	RELEASE INTO C. WQ POND
	SOUTHERN WQ POND TRIBUTARY		
D1	8.4	18.0	8-FT SUMP D-10-R
D2	11.1	23.8	12-FT AT-GRADED-10-R
D3	3.5	7.4	4-FT SUMP D-10-R
F1	4.6	9.9	4-FT SUMP D-10-R
F2	4.0	8.6	4-FT SUMP D-10-R
G1	3.3	7.1	4-FT SUMP D-10-R
G2	5.3	11.2	4-FT SUMP D-10-R
D5	1.8	3.5	4-FT SUMP D-10-R
D4	35.0	77.2	RELEASE INTO S. WQ POND
	OS7 OFFSITE TRIBUTARY		
OS7,OS10	11.4	21.5	TBD
D2	4.7	7.2	FLOW-BY
D6	3.0	8.3	SHEET FLOW

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v 719.955.5485
f 719.448.8007
CIVIL CONSULTANTS, INC.

SHILOH-MESA
POST DEVELOPMENT DRAINAGE PLAN

PROJECT NO. 08-026	FILE: O:\08026\Documents\Reports\Drainage\DP		
DESIGNED BY: VAS	SCALE	DATE: 6/08/2015	
DRAWN BY: ET	HORIZ: 1"=100'	SHEET 2 OF 3	DP-1
CHECKED BY: VAS	VERT: N/A		

SHILOH MESA
POST DEVELOPMENT DRAINAGE PLAN-MARKSHEFFEL ROAD
DECEMBER 2015

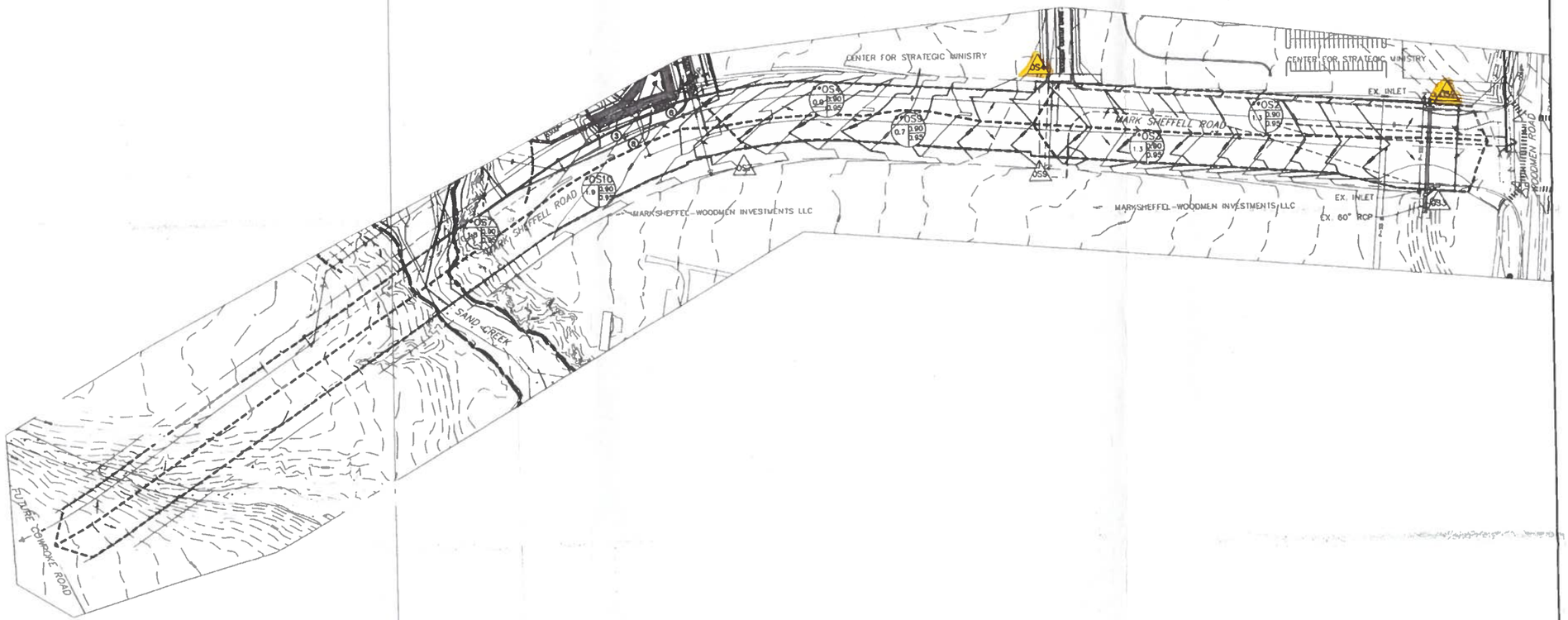
LEGEND

DESIGN POINT
FLOW DIRECTION
EMERGENCY OVERFLOW
BASIN DESIGNATION (A, 5.0 ACRES, 25 C100, Co)
PROPOSED MINOR CONTOUR
PROPOSED MAJOR CONTOUR
EXISTING MINOR CONTOUR
EXISTING MAJOR CONTOUR
BASIN BOUNDARY
EMERGENCY OVERFLOW PATH
SAND FILTRATION BASIN
PIPE RUN IDENTIFIER
SELECTIVE LINING
GRADE CONTROL

DRAINAGE NOTES

1. PROPOSED TYPE D-10-R DROP INLET, SUMP & AT-GRADE COND'N
2. PROPOSED STORM SEWER PIPE
3. PROPOSED FABRICATED END SECTION
4. REMOVE & REPLACE EX. CMP PIPES W/ PROPOSED RCBC CROSSING
5. PROPOSED STORM DRAIN HEADWALL
6. PROPOSED WATER QUALITY FEATURE - SAND FILTRATION BASIN
7. PROPOSED POND OUTLET, DESIGNED TO BYPASS Q100
8. PROPOSED RIPRAP APRON
9. PROPOSED TRAPEZOIDAL DIVERSION CHANNEL

NORTH
1" = 100'



BASIN SUMMARY TABLE

BASIN ID	BASIN AREA (Acres)	FLOW Q5 (CFS)	FLOW Q100 EST. (CFS)
OS7**	1.8	6.7	12.5
OS10**	1.9	7.0	13.2
OS4**	0.9	4.0	7.6
OS9**	0.7	3.2	6.0
OS2**	1.3	5.6	10.5
OS3**	1.3	5.7	10.7

**Q5 & Q100 REVISED AREAS AND FLOWS FOR "MASTER DEVELOPMENT DRAINAGE PLAN FOR SHILOH MESA AT MARKSHEFFEL HEIGHTS" PREPARED & MATRIX APPROVED NOVEMBER 2009

DESIGN

DESIGN PT.	PEAK Q5 (CFS)	PEAK Q100 (CFS)	
OFFSITE TRIBUTARY			
OS7	13.7	25.7	TBD
OS4	4.0	7.6	PER MDDP MATRIX
OS9	3.2	6.0	PER MDDP MATRIX
OS2	5.6	10.5	PER MDDP MATRIX
OS3	5.7	10.7	PER MDDP MATRIX

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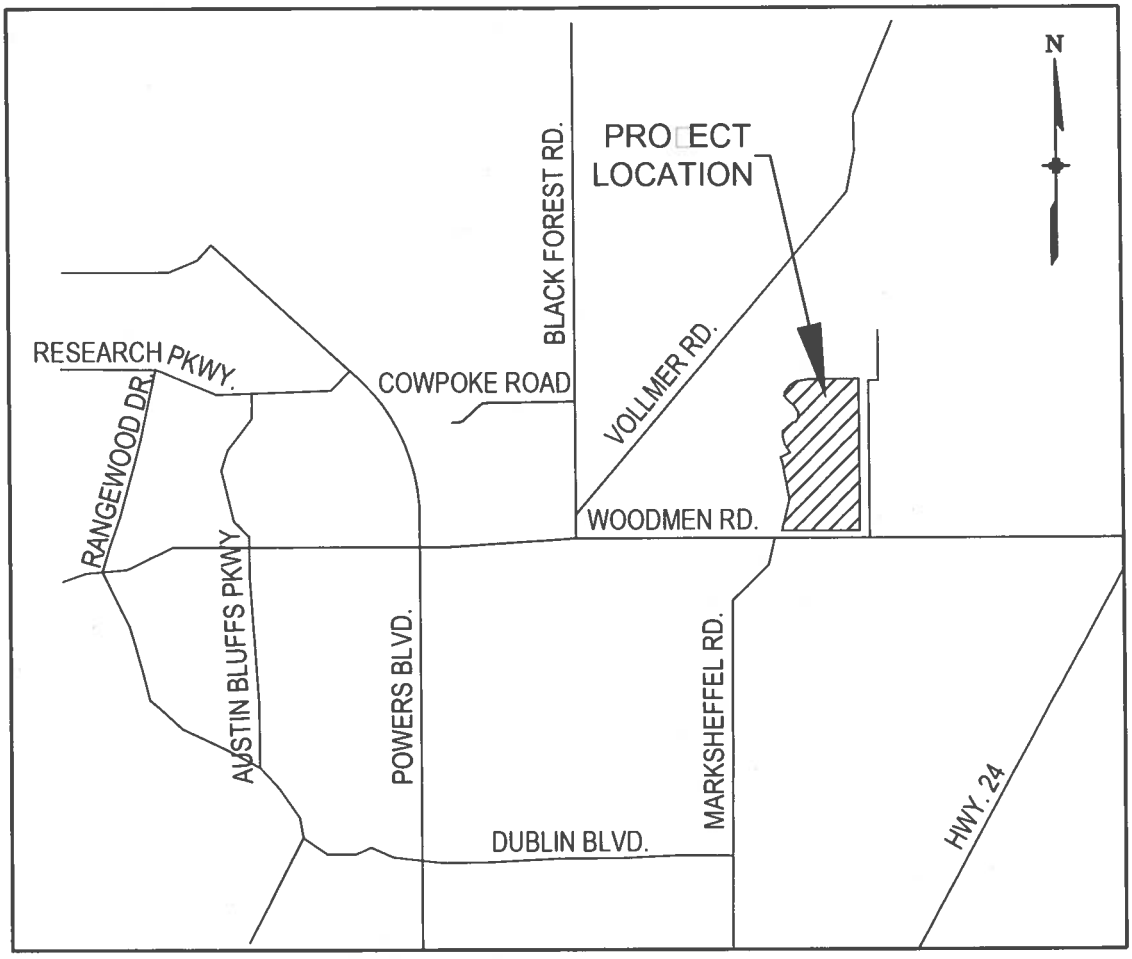
CIVIL CONSULTANTS, INC.

SHILOH-MESA
POST DEVELOPMENT DRAINAGE PLAN-MARKSHEFFEL

PROJECT NO. 08-028	FILE: O:\08028\DWG\DEV PLAN\Drainage\DP2		
DESIGNED BY: VAS	SCALE	DATE: 6/08/2015	
DRAWN BY: ET	HORIZ: 1"=100'	SHEET 3 OF 3	DP2
CHECKED BY: VAS	VERT: N/A		

APPENDIX D

MAPS



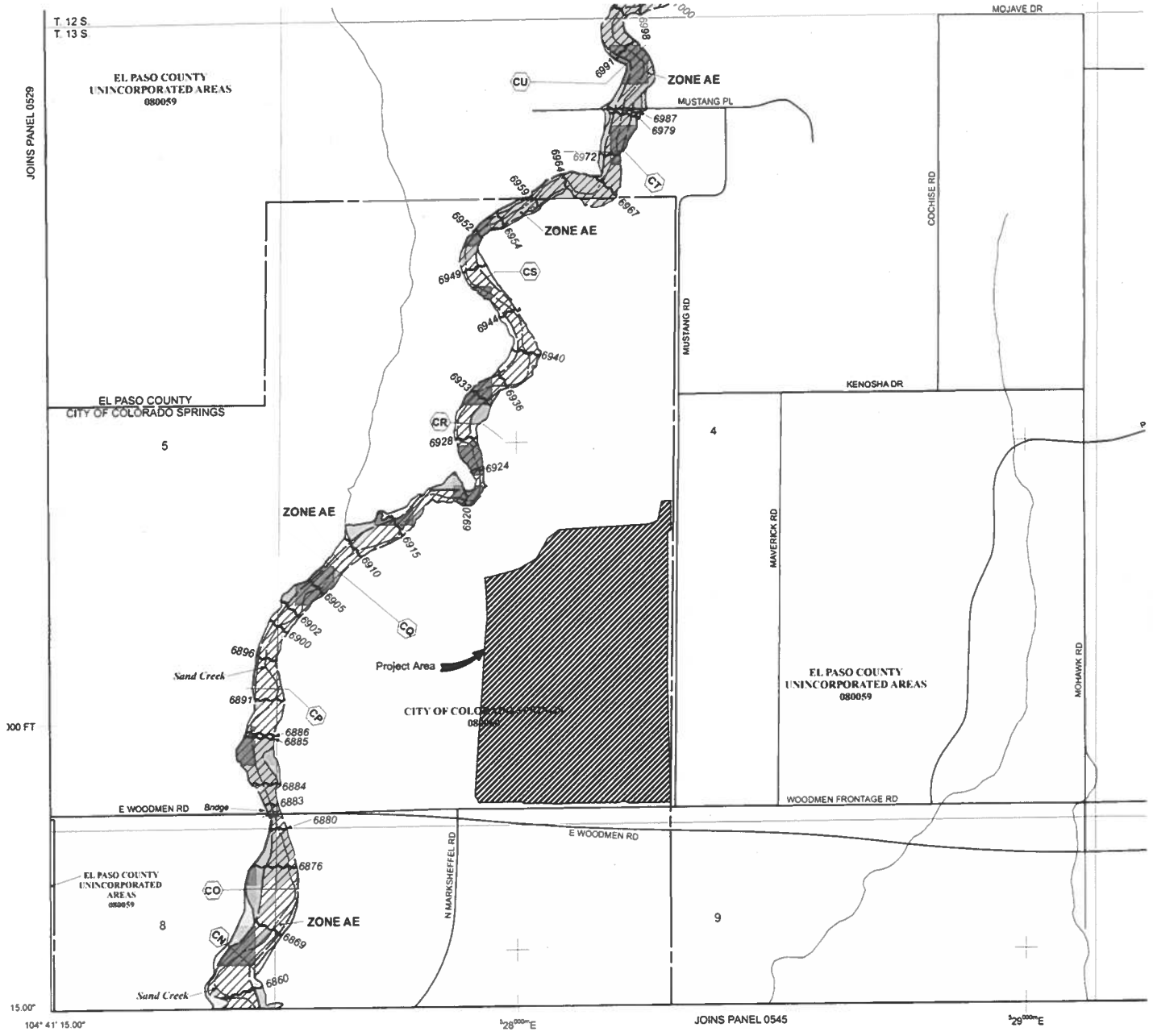
NORTH
N.T.S.

PREPARED BY:

Matrix DESIGN GROUP
AN EMPLOYEE-OWNED COMPANY

SHILOH MESA FILING NO. 5 & SHILOH MESA COMMERCIAL FILING NO. 1

DESIGNED BY:	NMS	SCALE		DATE ISSUED:	03.02.17	DRAWING No.	
DRAWN BY:	NMS	HORIZ.	N/A	SHEET	1 OF 1	1	
CHECKED BY:	GGS	VERT.	N.A				



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST, AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0533G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 533 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS CITY OF	080060	0533	G
EL PASO COUNTY	080059	0533	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0533G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

Hydrologic Soil Group—El Paso County Area, Colorado
(Shiloh Mesa Filing No. 5 & Shiloh Mesa Commercial Filing No. 1)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 14, Sep 23, 2016

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

Date(s) aerial images were photographed: Apr 15, 2011—Sep 22, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — El Paso County Area, Colorado (CO625)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	10.3	16.3%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	33.7	53.1%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	19.4	30.6%
Totals for Area of Interest			**63.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

811
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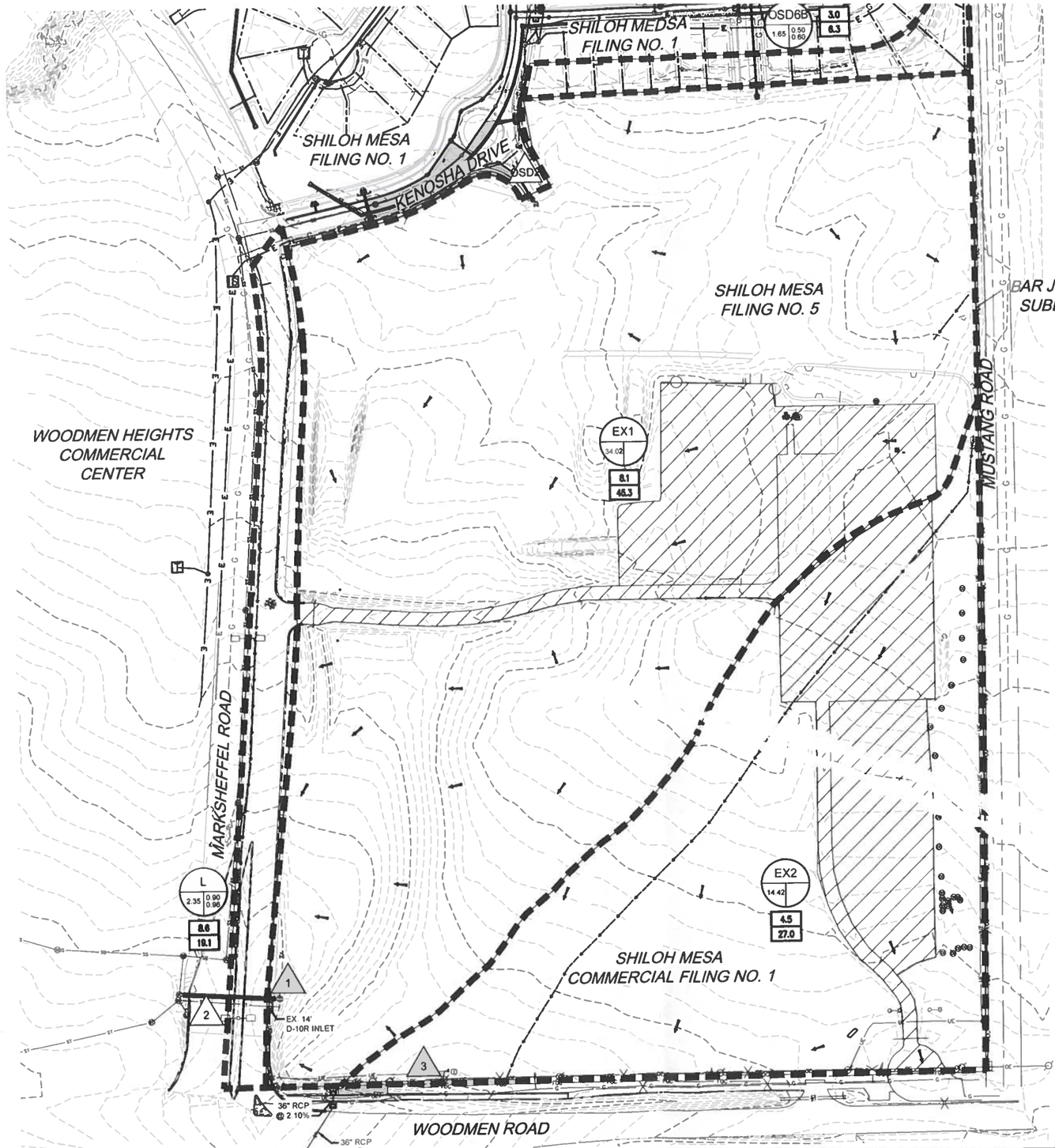
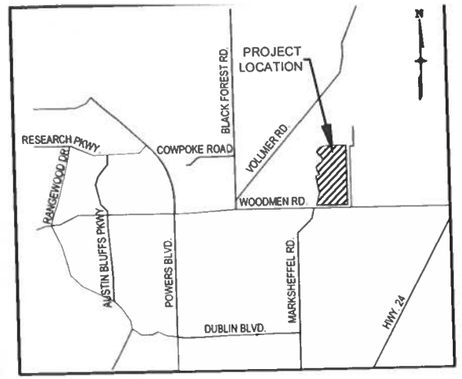




VICINITY MAP

NORTH
N.T.S.

LEGEND

- SUB-BASIN BOUNDARY
- 4900 EXISTING CONTOUR
- FLOW DIRECTION
- FLOWLINE
- LOT LINE
- DESIGN POINT
- SUB BASIN DESIGNATION
- SUB BASIN 100 YEAR RUNOFF COEFFICIENT
- SUB BASIN AREA (AC.)
- 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 100-YEAR STORM EVENT PEAK FLOW (CFS)

REFERENCE DRAWINGS

X-Ex Feat
X-MSBASE-RES
X-Util
DR02
DR01
X-888-PR-ROAD_ROUNDABOUT
X-Base-FS
X-900-PR-UTIL_COMM
X-900-EX-UTIL
x 900 xr-base

No.	DATE	DESCRIPTION	BY
		REVISIONS	

COMPUTER FILE MANAGEMENT

FILE NAME: S:\18.346.015 - Woodmen Valley Chapel\200 Drainage\201 Drainage Reports\MDDP Amendment\Dwg\DR01.dwg
CTB FILE: —
PLOT DATE: October 24, 2018 5:24:55 PM

SHEET KEY

PREPARED BY:
Matrix DESIGN GROUP

SEAL

PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

SHILOH MESA AT WOODMEN HEIGHTS

FILING NO. 5 & COMMERCIAL FILING NO. 1
MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT

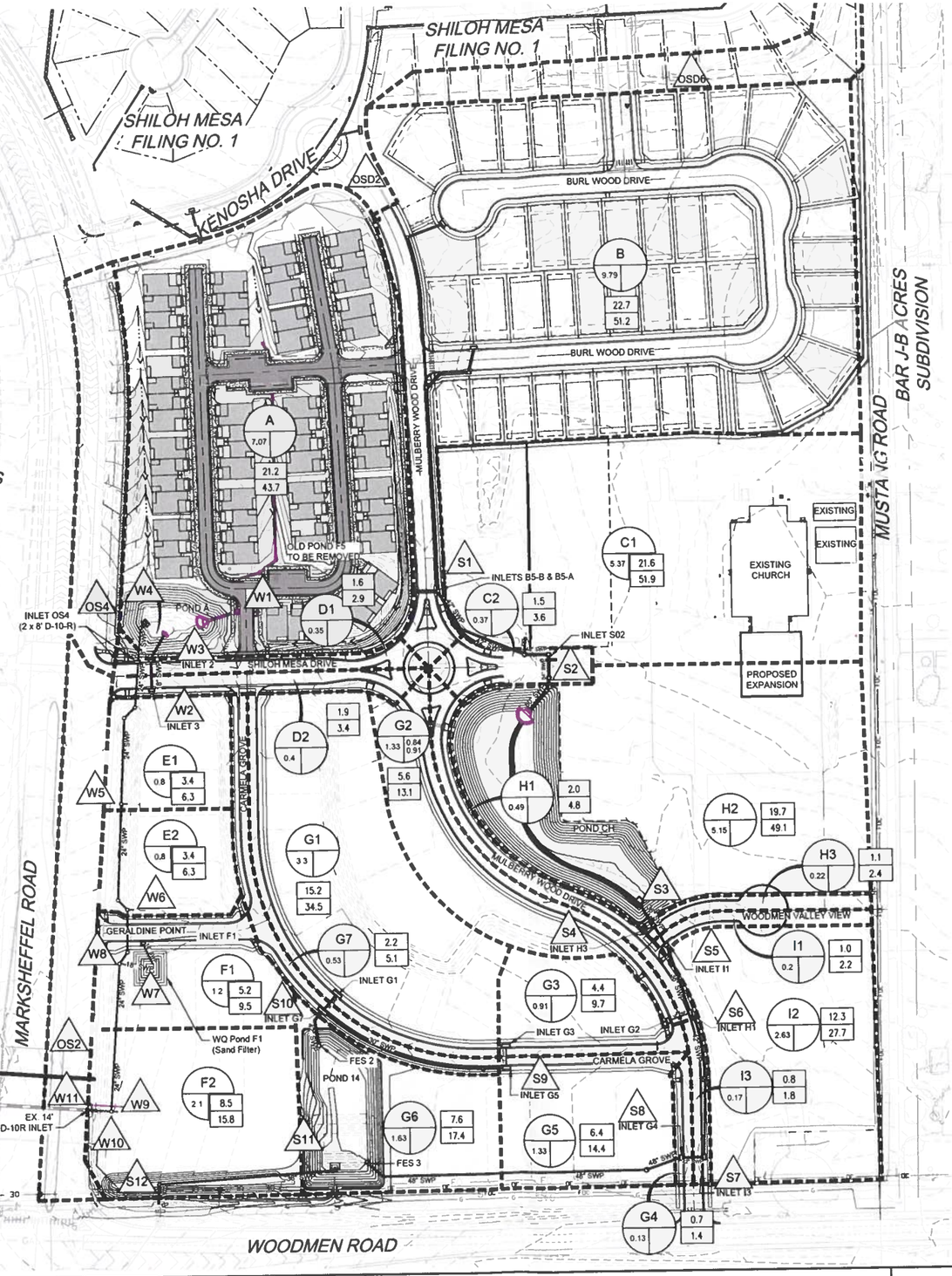
EXISTING CONDITIONS DRAINAGE MAP

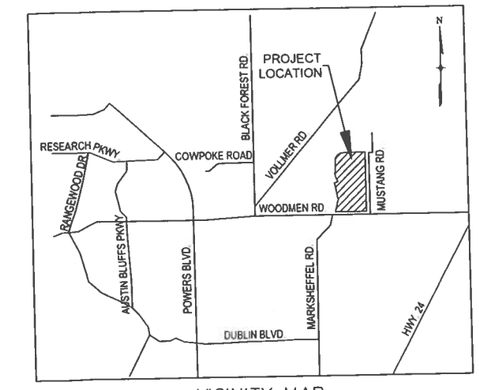
DESIGNED BY:	NMS	SCALE:		DATE ISSUED:	October 2018	DRAWING No.
DRAWN BY:	NMS	HORIZ.	1" = 100'			DR04

811 Know what's below. Call before you dig.

Table 3.3 Pond Summary Table

Pond ID	Contributing Basins	EX 5-YR (CFS)	PR 5-YR (CFS)	EX 100-YR (CFS)	PR 100-YR (CFS)
Pond A UD-Detention	A, D1, D2	0 1	0 2	5 1	4 8
Pond E1 UD-Detention	E1	0	0 1	1 3	1 2
Pond E2 UD-Detention	E2	0	0 1	1 3	1 2
Pond F1 UD-Detention	F1	0	0 2	1 8	1 6
Pond F2 UD-Detention	F2	0 1	0 3	2 9	2 7
WEST OUTFALL		16 5	10 70	71 2	34 40
Pond CH SWMM	B, C1, C2 & H2		2 1		4 5
Pond 14 SWMM	B, C1, C2, H1, H2, H3, I1, I2, I3 G1, G2, G3, G4, G5, G6, & G7		4 0		20 3
SOUTH OUTFALL		4 2	4 0	27 1	20 3





VICINITY MAP

NORTH N.T.S.

LEGEND

- SUB-BASIN BOUNDARY
- EXISTING CONTOUR
- FLOW DIRECTION
- FLOWLINE
- LOT LINE
- DESIGN POINT
- SUB BASIN DESIGNATION
- SUB BASIN 100 YEAR RUNOFF COEFFICIENT
- SUB BASIN AREA (AC.)
- 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 100-YEAR STORM EVENT PEAK FLOW (CFS)

Basin Summary Table
Shiloh Mesa MDDP Amendment

Area ID	Area (Acres)	Q5 (cfs)	Q100 (cfs)
OS4	1 14	4 0	7 6
OS2	1 42	5 6	10 5
A	7 07	21 2	43 7
B	9 79	22 7	51 2
C1	5 37	21 6	51 9
C2	0 37	1 5	3 6
D1	0 35	1 6	2 9
D2	0 40	1 9	3 4
E1	0 82	3 4	6 3
E2	0 82	3 4	6 3
F1	1 21	5 2	9 5
F2	2 05	8 5	15 8
G1	3 30	15 2	34 5
G2	1 33	5 6	13 1
G3	0 91	4 4	9 7
G4	0 13	0 7	1 4
G5	1 33	6 4	14 4
G6	1 63	7 6	17 4
G7	0 53	2 2	5 1
H1	0 49	2 0	4 8
H2	5 15	19 7	49 1
H3	0 22	4 4	9 7
I1	0 20	1 0	2 2
I2	2 63	12 3	27 7
I3	0 17	0 8	1 8

Design Point Summary Table

Design Point	Upstream Area (Acres)	Upstream Q5 (cfs)	Upstream Q100 (cfs)	Subbasins Included
WEST OUTFALL				
W1	7.07	21.2	43.7	A
W2	0.40	1.9	3.4	D2
W3	0.75	3.5	6.3	D1
W4 Pond A Discharge	7.82	0.2	4.8	A, D1, D2
OS4	1.14	4.2	12.4	OS4 Non-Project Related Flows from Marksheffel added to Pond A Discharge
W5	9.79	4.6	18.4	A, D1, D2, E1, OS4 Stub for Lot 7
W6	10.61	4.8	19.6	A, D1, D2, E1, E2 Stub for Lot 8
W7	1.21	0.2	1.7	F1 WQ Pond (Geraldine & Lot 9)
W8	11.82	5.0	21.3	A, D1, D2, E1, E2, & F1 (F1 WQ Pond Discharge)
W9	2.05	0.1	2.6	F2 Stub for Lot 10
W10	13.87	5.1	23.9	A, D1, D2, OS4, E1, E2, F1, & F2
W11 (West Outfall)	15.29	10.7	34 4	A, D1, D2, OS4, E1, E2, F1, F2, & OS2 Outfall to Existing Storm Sewer
SOUTH OUTFALL				
S1	15 17	22 5	51 2	B
S2	15 53	43 7	106 6	B, C1 & C2
S3 Pond CH Discharge	20 69	2 1	4 5	B, C1, C2 & H2
S4	20.90	2 1	4 5	B, C1, C2, H2 & H3
S5	21.11	2 3	8 6	B, C1, C2, H2, H3 & I1
S6	22.93	9 8	24 1	B, C1, C2, H2, H3, I1, H1 & G2
S7	25.73	22 1	52 5	B, C1, C2, H2, H3, I1, H1, G2, I2, & I3
S8	25 86	22 6	53 8	B, C1, C2, H2, H3, I1, H1, G2, I2, I3 & G4
S9	2 24	10 8	24 1	G3 & G5
S10	6 08	35 7	80 9	G3, G5, G1, & G7
S11 Pond 14 Discharge	33.57	4.0	20.3	B, C1, C2, H1, H2, H3, I1, I2, I3 G1, G2, G3, G4, G5, G6, & G7
S12 South Outfall	33.57	4.0	20.3	B, C1, C2, H1, H2, H3, I1, I2, I3 G1, G2, G3, G4, G5, G6, & G7

REFERENCE DRAWINGS
X-Ex Feat
X-Ex Util
X-MSBASE-RES
X-Util
DR02
DR01
x-685-pr-road_roundabout
x-base-05
x-900-pr-road_comm
X-800-PR-UTIL_COMM
X-PR-BASE
X-EX-BASE_UTIL
X-PR-UTIL-WVC
X-EX-BASE
x-600-pr-map_comm

No.	DATE	DESCRIPTION	BY
		REVISIONS	

COMPUTER FILE MANAGEMENT
FILE NAME: S:\18,346.015 - Woodmen Valley Chapel\200 Dra nage\201 Drainage Reports\MDDP Amendment\Dwg\DR02 MDDPAmendment (01-29-2019).dwg
CTB FILE: ---
PLOT DATE: March 1, 2019 12:49:58 PM

SHEET KEY

PREPARED BY Matrix DESIGN GROUP

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FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

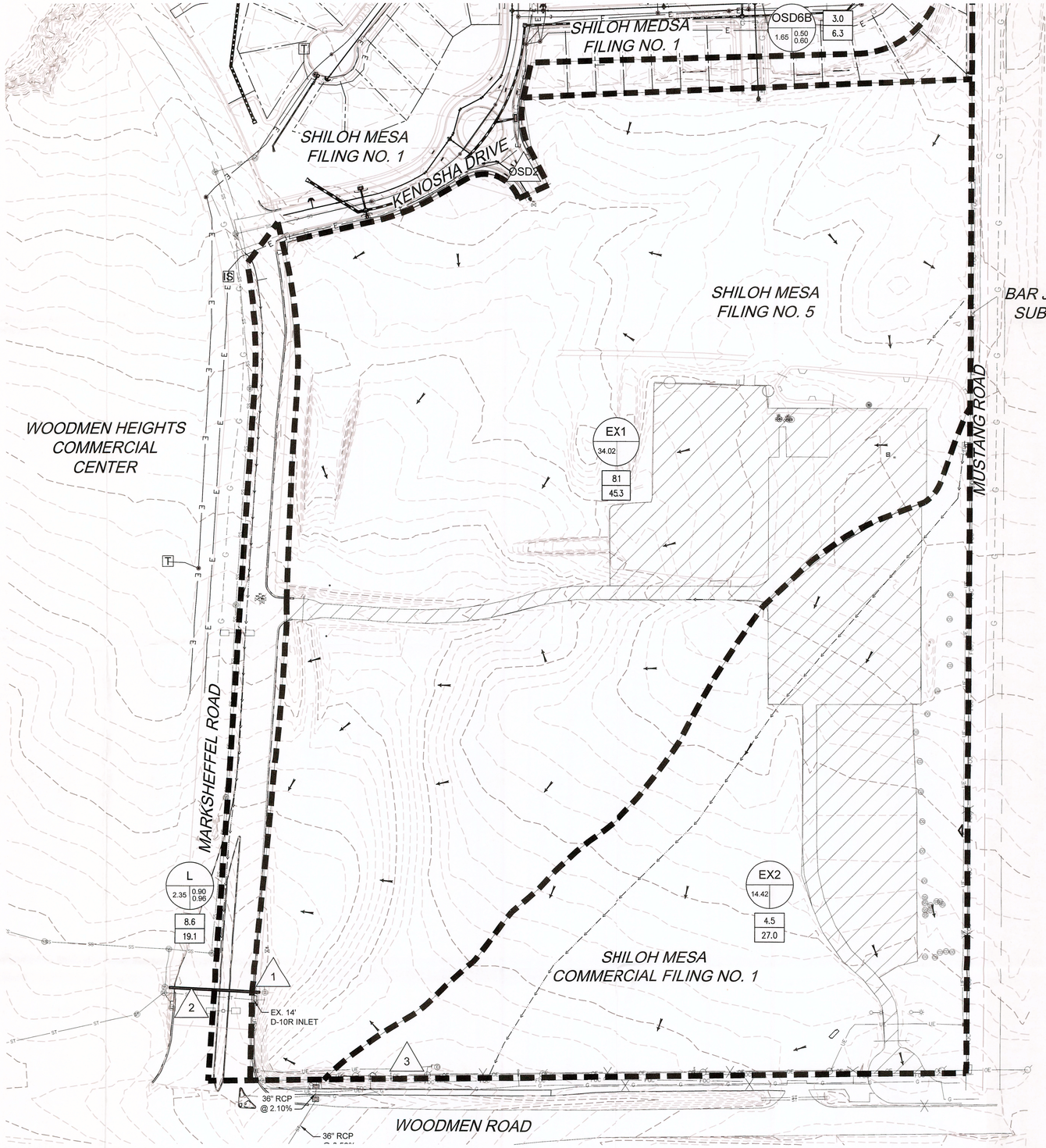
SHILOH MESA AT WOODMEN HEIGHTS

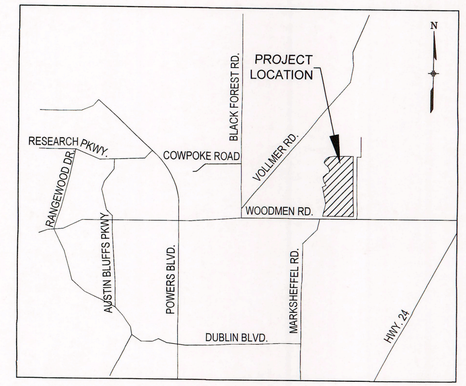
FILING NO. 5 & COMMERCIAL FILING NO. 1
MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT

DEVELOPED CONDITIONS DRAINAGE MAP

DESIGNED BY: JTS
DRAWN BY: JTS
SCALE: HORIZ. 1" = 100'
DATE ISSUED: February 2019
DRAWING No

Know what's below. Call before you dig.





VICINITY MAP

NORTH
N.T.S.

LEGEND

- SUB-BASIN BOUNDARY
- 4900 — EXISTING CONTOUR
- FLOW DIRECTION
- FLOWLINE
- LOT LINE
- X — DESIGN POINT
- X / X.XX / X.XX — SUB BASIN DESIGNATION; SUB BASIN 100 YEAR RUNOFF COEFFICIENT; SUB BASIN AREA (AC.)
- 0.0 — 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 0.0 — 100-YEAR STORM EVENT PEAK FLOW (CFS)

REFERENCE DRAWINGS

X-Ex Feat
X-MSBASE-RES
X-Util
DR02
DR01
X-SBS-PR-ROAD_ROUNDABOUT
X-Base-F5
X-900-PR-UTIL_COMM
X-900-EX-UTIL
x-900-ex-base

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

FILE NAME: S:\18.346.015 - Woodmen Valley Chapel\200 Drainage\201 Drainage Reports\MDDP Amendment\Dwg\DR01.dwg
CTB FILE: ----
PLOT DATE: October 24, 2018 5:23:36 PM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE.

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FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 16.900.001

SHILOH MESA AT WOODMEN HEIGHTS

FILING NO. 5 & COMMERCIAL FILING NO. 1
MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT

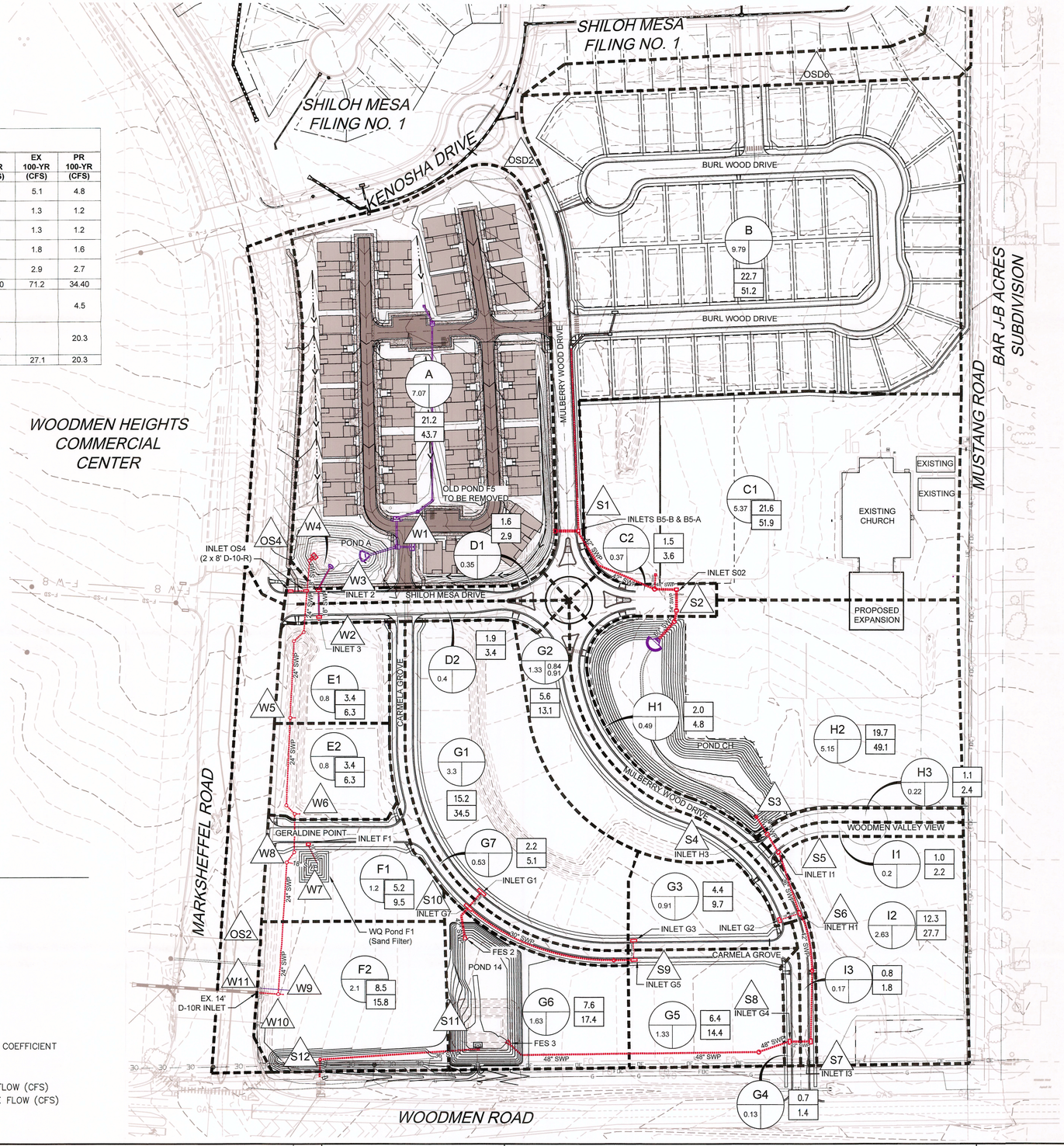
EXISTING CONDITIONS DRAINAGE MAP

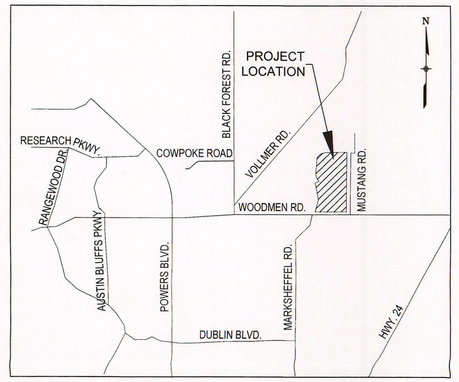
DESIGNED BY:	NMS	SCALE	DATE ISSUED:	October 2018	DRAWING No.
DRAWN BY:	NMS	HORIZ. 1" = 100'	SHEET	01 OF 02	DR01
CHECKED BY:	GGS	VERT. N/A			

Know what's below. Call before you dig.

Table 3.3
Pond Summary Table

Pond ID	Contributing Basins	EX 5-YR (CFS)	PR 5-YR (CFS)	EX 100-YR (CFS)	PR 100-YR (CFS)
Pond A UD-Detention	A, D1, D2	0.1	0.2	5.1	4.8
Pond E1 UD-Detention	E1	0	0.1	1.3	1.2
Pond E2 UD-Detention	E2	0	0.1	1.3	1.2
Pond F1 UD-Detention	F1	0	0.2	1.8	1.6
Pond F2 UD-Detention	F2	0.1	0.3	2.9	2.7
WEST OUTFALL		16.5	10.70	71.2	34.40
Pond CH SWMM	B, C1, C2 & H2		2.1		4.5
Pond 14 SWMM	B, C1, C2, H1, H2, H3, I1, I2, I3 G1, G2, G3, G4, G5, G6, & G7		4.0		20.3
SOUTH OUTFALL		4.2	4.0	27.1	20.3





VICINITY MAP

NORTH
N.T.S.

LEGEND

- SUB-BASIN BOUNDARY
- 4900 — EXISTING CONTOUR
- FLOW DIRECTION
- FLOWLINE
- LOT LINE
- X — DESIGN POINT
- X / X.XX / X.XX — SUB BASIN DESIGNATION; SUB BASIN 100 YEAR RUNOFF COEFFICIENT; SUB BASIN AREA (AC.)
- 0.0 — 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 0.0 — 100-YEAR STORM EVENT PEAK FLOW (CFS)

Basin Summary Table
Shiloh Mesa MDDP Amendment

Area ID	Area (Acres)	Q5 (cfs)	Q100 (cfs)
OS4	1.14	4.0	7.6
OS2	1.42	5.6	10.5
A	7.07	21.2	43.7
B	9.79	22.7	51.2
C1	5.37	21.6	51.9
C2	0.37	1.5	3.6
D1	0.35	1.6	2.9
D2	0.40	1.9	3.4
E1	0.82	3.4	6.3
E2	0.82	3.4	6.3
F1	1.21	5.2	9.5
F2	2.05	8.5	15.8
G1	3.30	15.2	34.5
G2	1.33	5.6	13.1
G3	0.91	4.4	9.7
G4	0.13	0.7	1.4
G5	1.33	6.4	14.4
G6	1.63	7.6	17.4
G7	0.53	2.2	5.1
H1	0.49	2.0	4.8
H2	5.15	19.7	49.1
H3	0.22	4.4	9.7
I1	0.20	1.0	2.2
I2	2.63	12.3	27.7
I3	0.17	0.8	1.8

Design Point Summary Table

Design Point	Upstream Area (Acres)	Upstream Q5 (cfs)	Upstream Q100 (cfs)	Subbasins Included
WEST OUTFALL				
W1	7.07	21.2	43.7	A
W2	0.40	1.9	3.4	D2
W3	0.75	3.5	6.3	D1
W4 Pond A Discharge	7.82	0.2	4.8	A, D1, D2
OS4	1.14	4.2	12.4	OS4 Non-Project Related Flows from Marksheffel added to Pond A Discharge
W5	9.79	4.6	18.4	A, D1, D2, E1, OS4 Stub for Lot 7
W6	10.61	4.8	19.6	A, D1, D2, E1, E2 Stub for Lot 8
W7	1.21	0.2	1.7	F1 WQ Pond (Geraldine & Lot 9)
W8	11.82	5.0	21.3	A, D1, D2, E1, E2, & F1 (F1 WQ Pond Discharge)
W9	2.05	0.1	2.6	F2 Stub for Lot 10
W10	13.87	5.1	23.9	A, D1, D2, OS4, E1, E2, F1, & F2
W11 (West Outfall)	15.29	10.7	34.4	A, D1, D2, OS4, E1, E2, F1, F2, & OS2 Outfall to Existing Storm Sewer
SOUTH OUTFALL				
S1	15.17	22.5	51.2	B
S2	15.53	43.7	106.6	B, C1 & C2
S3 Pond CH Discharge	20.69	2.1	4.5	B, C1, C2 & H2
S4	20.90	2.1	4.5	B, C1, C2, H2 & H3
S5	21.11	2.3	6.6	B, C1, C2, H2, H3 & I1
S6	22.93	9.8	24.1	B, C1, C2, H2, H3, I1, H1 & G2
S7	25.73	22.1	52.5	B, C1, C2, H2, H3, I1, H1, G2, I2, & I3
S8	25.86	22.6	53.8	B, C1, C2, H2, H3, I1, H1, G2, I2, I3 & G4
S9	2.24	10.8	24.1	G3 & G5
S10	6.08	35.7	80.9	G3, G5, G1, & G7
S11 Pond 14 Discharge	33.57	4.0	20.3	B, C1, C2, H1, H2, H3, I1, I2, I3 G1, G2, G3, G4, G5, G6, & G7
S12 South Outfall	33.57	4.0	20.3	B, C1, C2, H1, H2, H3, I1, I2, I3 G1, G2, G3, G4, G5, G6, & G7

REFERENCE DRAWINGS
X-Ex Feat
X-Ex Util
X-MSBASE-RES
X-Util
DR02
DR01
x-686-px-road_roundabout
x-base-f5
x-900-px-road_comm
X-900-PR-UTIL_COMM
X-PR-BASE
X-EX-BASE_UTIL
X-PR-UTIL-WVC
X-EX-BASE
x-900-px-map_comm
PR-UTIL
X-900-PR-UTIL

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT
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CTB FILE: ----
PLOT DATE: March 1, 2019 12:52:13 PM
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PROJECT No. 18.469.006

SHILOH MESA AT WOODMEN HEIGHTS

FILING NO. 5 & COMMERCIAL FILING NO. 1
MASTER DEVELOPMENT DRAINAGE PLAN AMENDMENT

DEVELOPED CONDITIONS DRAINAGE MAP

		SCALE		DATE ISSUED:	February 2019	DRAWING No.
DESIGNED BY:	JTS	HORIZ.	1" = 100'	SHEET	02 OF 02	DR02
DRAWN BY:	JTS	VERT.	N/A			
CHECKED BY:	NMS					