



INNOVATIVE DESIGN. CLASSIC RESULTS.

**FINAL DRAINAGE REPORT  
FOR  
RETREAT AT TIMBERRIDGE  
FILING NO. 3**

Prepared for:  
**TIMBERRIDGE DEVELOPMENT GROUP, LLC**  
2138 FLYING HORSE CLUB DRIVE  
COLORADO SPRINGS CO 80921  
(719) 592-9333

Prepared by:  
**CLASSIC CONSULTING**  
619 N. CASCADE AVE SUITE 200  
COLORADO SPRINGS CO 80903  
(719) 785-0790

Job No. 1185.30

PCD Project No. SF-22-041



**ARROYA LANE CROSSING (BridgeCor Steel Box 31'-11" Span x 11'-8" Rise)  
(Sterling Ranch MDDP 100-yr flows analyzed with no scour countermeasures)**

**Provide 500-year flow  
calculations also**

**Contraction Scour**

	Left	Channel	Right
<b>Input Data</b>			
Average Depth (ft):	5.85	6.95	4.87
Approach Velocity (ft/s):	2.09	4.07	1.84
Br Average Depth (ft):	7.25	6.48	9.20
BR Opening Flow (cfs):	381.56	904.57	181.87
BR Top WD (ft):	9.90	10.75	4.57
Grain Size D50 (mm):	2	2	2
Approach Flow (cfs):	693.97	340.68	433.35
Approach Top WD (ft):	56.77	12.03	48.33
K1 Coefficient:	0.590	0.590	0.590
<b>Results</b>			
Scour Depth Ys (ft):	3.99	15.49	2.35
Critical Velocity (ft/s):			
Equation:	Clear	Clear	Clear

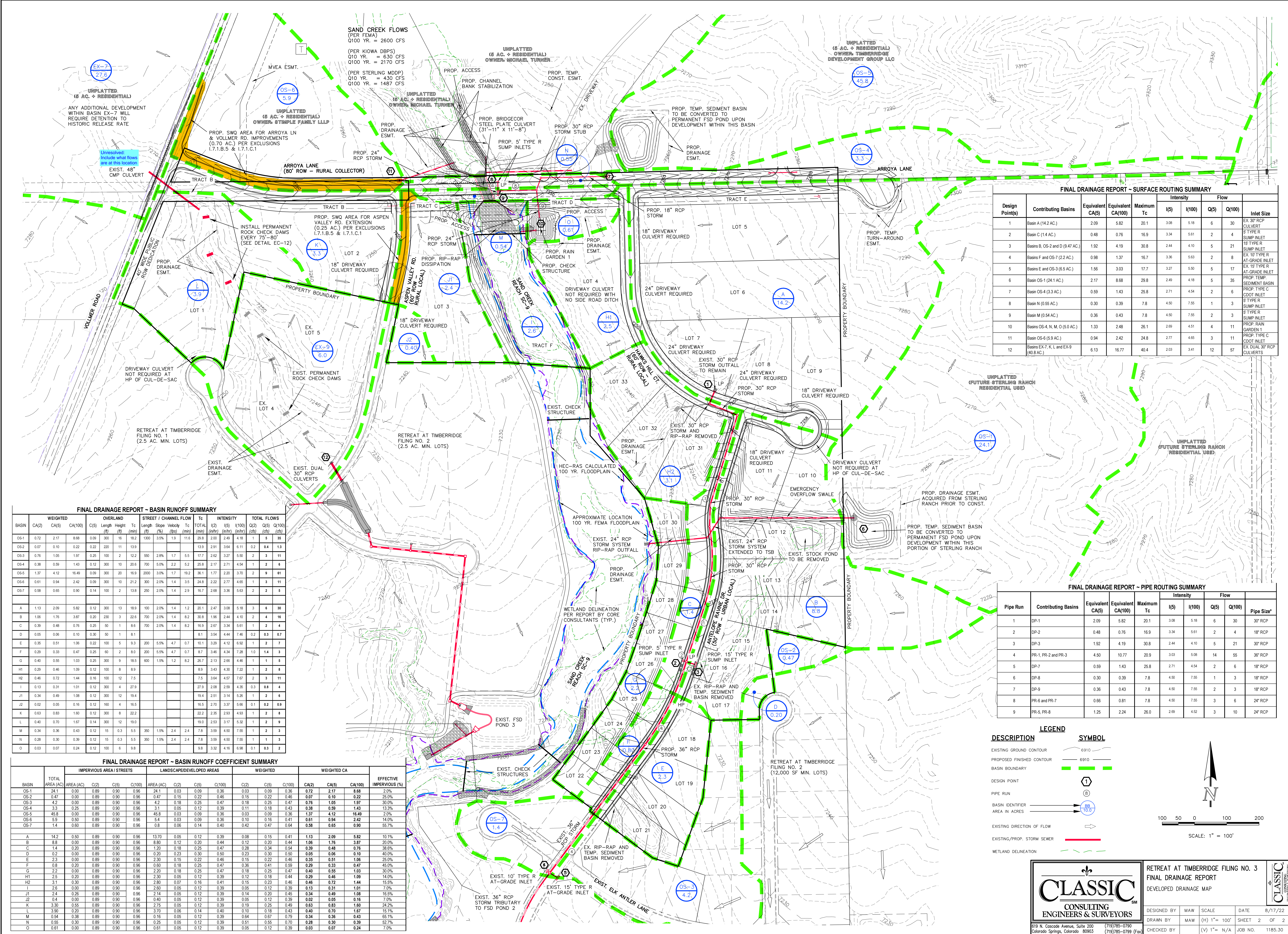
**Abutment Scour**

	Left	Right
<b>Input Data</b>		
Station at Toe (ft):	289.85	320.77
Toe Sta at appr (ft):	260.81	293.01
Abutment Length (ft):	80	60
Depth at Toe (ft):	8.11	8.35
K1 Shape Coef:	0.82 - Vert. with wing walls	
Degree of Skew (degrees):	160	90.00
K2 Skew Coef:	1.08	1.00
Projected Length L' (ft):	50	58
Avg Depth Obstructed Ya (ft):	2.21	
Flow Obstructed Qe (cfs):		
Area Obstructed Ae (sq ft):	256.88	182.50
<b>Results</b>		
Scour Depth Ys (ft):	2.21	
Qe/Ae = Ve:	0.00	0.00
Froude #:	0.00	0.00
Equation:	Froehlich	Froehlich

**Combined Scour Depths**

Left abutment scour + contraction scour (ft): 6.20





### FINAL DRAINAGE REPORT - SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity				Flow	Inlet Size
					I(5)	I(100)	Q(5)	Q(100)		
1	Basin A (14.2 AC)	2.09	5.82	20.1	3.08	5.18	6	30	EX 30" RCP CULVERT	
2	Basin C (1.4 AC)	0.48	0.76	16.9	3.34	5.61	2	4	6" TYPE R SUMP INLET	
3	Basins B, OS-2 and D (9.47 AC)	1.92	4.19	30.8	2.44	4.10	5	21	15" TYPE R SUMP INLET	
4	Basins F and OS-7 (2.2 AC)	0.98	1.37	16.7	3.36	5.63	2	8	EX 10" TYPE R AT-GRADE INLET	
5	Basins E and OS-3 (6.5 AC)	1.56	3.03	17.7	3.27	5.50	5	17	EX 15" TYPE R AT-GRADE INLET	
6	Basin OS-1 (24.1 AC)	2.17	8.68	29.8	2.49	4.18	5	35	PROP. TEMP. SEDIMENT BASIN	
7	Basin OS-4 (3.3 AC)	0.59	1.43	25.8	2.71	4.54	2	6	PROP. TYPE C CDOOT INLET	
8	Basin N (0.55 AC)	0.30	0.39	7.8	4.50	7.55	1	3	5" TYPE R SUMP INLET	
9	Basin M (0.54 AC)	0.36	0.43	7.8	4.50	7.55	2	3	5" TYPE R SUMP INLET	
10	Basins OS-4, N, M, O (5.0 AC)	1.33	2.48	26.1	2.89	4.51	4	11	PROP. RAIN GARDEN 1	
11	Basin OS-6 (5.9 AC)	0.94	2.42	24.8	2.77	4.65	3	11	PROP. TYPE C CDOOT INLET	
12	Basins EX-7, K, L and EX-9 (40.8 AC)	6.13	16.77	40.4	2.03	3.41	12	57	EX. DUAL 30" RCP CULVERTS	

### FINAL DRAINAGE REPORT - BASIN RUNOFF SUMMARY

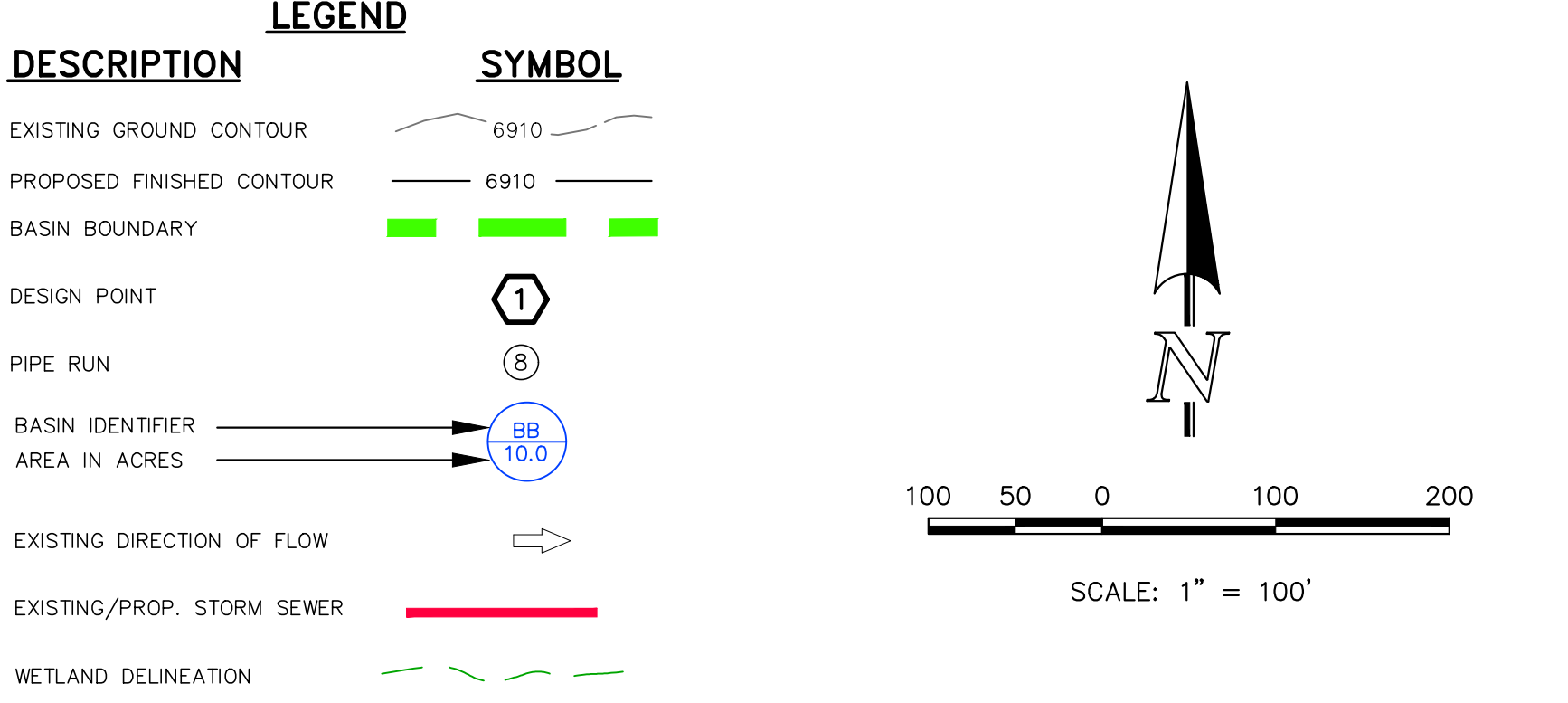
BASIN	WEIGHTED			OVERLAND			STREET / CHANNEL FLOW			Tc (min)	INTENSITY	TOTAL FLOWS						
	CA(2)	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Length (ft)	Slope (%)	Velocity (ft/s)			Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)				
OS-1	0.72	2.17	8.68	0.09	300	16	18.2	1300	3.9%	1.9	11.6	298	2.00	2.49	4.18	1	5	33
OS-2	0.07	0.10	0.22	0.22	220	11	13.9	13.9	2.91	3.64	6.11	0.2	0.4	1.3				
OS-3	0.76	1.05	1.97	0.25	100	2	12.3	550	2.8%	1.7	5.5	17.7	2.62	3.27	5.50	2	3	11
OS-4	0.38	0.59	1.43	0.12	300	10	20.6	700	5.0%	2.2	5.2	25.8	2.17	2.71	4.54	1	2	6
OS-5	1.37	4.12	16.49	0.09	300	20	16.9	2000	3.0%	1.7	19.2	36.1	1.77	2.20	3.70	2	9	61
OS-6	0.61	0.94	2.42	0.09	300	10	21.2	3000	3.0%	1.4	3.5	24.8	2.22	2.77	4.65	1	3	11
OS-7	0.58	0.65	0.60	0.14	100	2	13.8	250	2.0%	1.4	2.9	16.7	2.88	3.36	5.63	2	2	5
A	1.13	2.09	5.82	0.12	300	13	18.9	100	2.0%	1.4	1.2	20.1	2.47	3.08	5.18	3	6	30
B	1.06	1.76	3.87	0.20	230	3	22.6	700	3.0%	1.4	8.2	30.8	1.96	2.44	4.10	2	4	16
C	0.30	0.48	0.76	0.25	50	1	8.6	700	3.0%	1.4	8.2	16.9	2.67	3.34	5.61	1	2	4
D	0.05	0.06	0.10	0.30	50	1	8.1	8.1	3.54	4.44	7.46	0.2	0.3	0.7				
E	0.35	0.51	1.06	0.22	100	5	9.3	200	5.9%	4.7	0.7	10.1	3.29	4.12	6.92	1	2	7
F	0.29	0.33	0.47	0.25	60	2	8.0	200	5.9%	4.7	0.7	8.7	3.46	4.34	7.28	1.0	1.4	3
G	0.40	0.55	1.03	0.25	300	9	18.5	600	1.9%	1.2	8.2	26.7	2.13	2.66	4.46	1	1	5
H	0.29	0.48	1.09	0.12	100	8	8.9	8.9	3.43	4.30	7.22	1	2	8				
H2	0.46	0.72	1.44	0.16	100	12	7.5	7.5	3.64	4.57	7.67	2	3	11				
I	0.13	0.31	1.01	0.12	300	4	27.9	27.9	2.08	2.59	4.36	0.3	0.8	4				
J	0.34	0.48	1.08	0.12	300	12	19.4	19.4	2.51	3.14	5.28	1	2	6				
J2	0.02	0.05	0.16	0.12	160	4	16.5	16.5	2.70	3.37	5.66	0.1	0.2	0.9				
K	0.63	0.83	1.60	0.12	300	8	23.2	23.2	2.36	2.93	4.93	1	2	8				
L	0.40	0.70	1.67	0.14	300	12	19.0	19.0	2.53	3.17	5.32	1	2	9				
M	0.34	0.36	0.43	0.12	15	0.3	5.5	360	1.9%	2.4	2.4	7.8	3.59	4.50	7.55	1	2	3
N	0.28	0.30	0.39	0.12	15	0.3	5.5	360	1.9%	2.4	2.4	7.8	3.59	4.50	7.55	1	1	3
O	0.03	0.07	0.24	0.12	100	6	9.8	9.8	3.32	4.16	6.96	0.1	0.3	2				

### FINAL DRAINAGE REPORT - BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	IMPERVIOUS AREA / STREETS			LANDSCAPE/DEVELOPED AREAS			WEIGHTED			WEIGHTED CA			EFFECTIVE IMPERVIOUS (%)		
	TOTAL AREA (AC)	AREA (AC)	C(2)	C(5)	C(100)	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)		CA(2)	CA(5)
OS-1	24.1	0.00	0.89	0.90	0.96	24.1	0.03	0.09	0.36	0.03	0.09	0.36	0.72	2.17	8.68
OS-2	0.47	0.00	0.89	0.90	0.96	0.47	0.15	0.22	0.46	0.15	0.22	0.46	0.07	0.10	0.22
OS-3	4.2	0.00	0.89	0.90	0.96	4.2	0.18	0.25	0.47	0.18	0.25	0.47	0.76	1.05	1.97
OS-4	3.3	0.25	0.89	0.90	0.96	3.11	0.15	0.12	0.39	0.11	0.18	0.43	0.59	0.59	1.43
OS-5	45.8	0.00	0.89	0.90	0.96	45.8	0.03	0.09	0.36	0.03	0.09	0.36	1.37	4.12	16.49
OS-6	5.9	0.50	0.89	0.90	0.96	5.4	0.03	0.09	0.36	0.10	0.16	0.41	0.61	0.94	2.42
OS-7	1.4	0.60	0.89	0.90	0.96	0.8	0.06	0.14	0.40	0.42	0.47	0.64	0.58	0.65	0.60
A	14.2	0.50	0.89	0.90	0.96	13.70	0.05	0.12	0.39	0.08	0.15	0.41	1.13	2.09	5.82
B	8.8	0.00	0.89	0.90	0.96	8.80	0.12	0.20	0.44	0.12	0.20	0.44	1.06	1.76	3.87
C	1.4	0.20	0.89	0.90	0.96	1.20	0.18	0.25	0.47	0.28	0.34	0.54	0.39	0.48	0.76
D	0.2	0.00	0.89	0.90	0.96	0.20	0.23	0.30	0.50	0.23	0.30	0.50	0.05	0.06	0.10
E	2.3	0.00	0.89	0.90	0.96	2.30	0.15	0.22	0.46	0.15	0.22	0.46	0.35	0.51	1.06
F	0.8	0.20	0.89	0.90	0.96	0.60	0.18	0.25	0.47	0.36	0.41	0.59	0.29	0.33	0.47
G	2.2	0.00	0.89	0.90	0.96	2.20	0.18	0.25	0.47	0.18	0.25	0.47	0.40	0.55	1.03
H	2.5	0.20	0.89	0.90	0.96	2.30	0.05	0.12	0.39	0.12	0.18	0.44	0.29	0.46	1.09
H2	3.1	0.30	0.89	0.90	0.96	2.80	0.07	0.15	0.41	0.15	0.23	0.46	0.46	0.72	1.44
I	2.6	0.00	0.89	0.90	0.96	2.60	0.05	0.12	0.39	0.05	0.12	0.39	0.31	0.31	1.01
J	2.4	0.26	0.89	0.90	0.96	2.14	0.05	0.12	0.39	0.14	0.20	0.45	0.34	0.49	1.08
J2	0.4	0.00	0.89	0.90	0.96	0.40	0.05	0.12	0.39	0.05	0.12	0.39	0.02	0.05	0.16
K	3.30	0.50	0.89	0.90	0.96	2.75	0.05	0.12	0.39	0.19	0.25	0.49	0.63	0.83	1.56
L	3.90	0.20	0.89	0.90	0.96	3.70	0.05	0.14	0.40	0.10	0.18	0.43	0.40	0.70	1.67
M	0.54	0.38	0.89	0.90	0.96	0.16	0.05	0.12	0.39	0.64	0.67	0.79	0.34	0.36	0.43
N	0.55	0.30	0.89	0.90	0.96	0.25	0.05	0.12	0.39	0.51	0.55	0.70	0.28	0.30	0.39
O	0.61	0.00	0.89	0.90	0.96	0.61	0.05	0.12	0.39	0.05	0.12	0.39	0.03	0.07	0.24

### FINAL DRAINAGE REPORT - PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity				Flow	Pipe Size
					I(5)	I(100)	Q(5)	Q(100)		
1	DP-1	2.09	5.82	20.1	3.08	5.18	6	30	30" RCP	
2	DP-2	0.48	0.76	16.9	3.34	5.61	2	4	18" RCP	
3	DP-3	1.92	4.19	30.8	2.44	4.10	5	21	30" RCP	
4	PR-1, PR-2 and PR-3	4.50	10.77	20.9	3.00	5.08	14	55	36" RCP	
5	DP-7	0.59	1.43	25.8	2.71	4.54	2	6	18" RCP	
6	DP-8	0.30	0.39	7.8	4.50	7.55	1	3	18" RCP	
7	DP-9	0.36	0.43	7.8	4.50	7.55	2	3	18" RCP	
8	PR-6 and PR-7	0.66	0.81	7.8	4.50	7.55	3	6	24" RCP	
9	PR-5, PR-8	1.25	2.24	26.0	2.69	4.52	3	10	24" RCP	



619 N. Cascade Avenue, Suite 200  
Colorado Springs, Colorado 80903

RETREAT AT TIMBERIDGE FILING NO. 3  
FINAL DRAINAGE REPORT  
DEVELOPED DRAINAGE MAP

DESIGNED BY: MAW SCALE: DATE: 8/17/22  
DRAWN BY: MAW (H) 1" = 100' SHEET 2 OF 2  
CHECKED BY: (V) 1" = N/A JOB NO.: 1185.30