Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jun 21 2018

Culvert Crossing at DP 10

Invert Elev Dn (ft)	=	7244.00
Pipe Length (ft)	=	100.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	7245.00
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

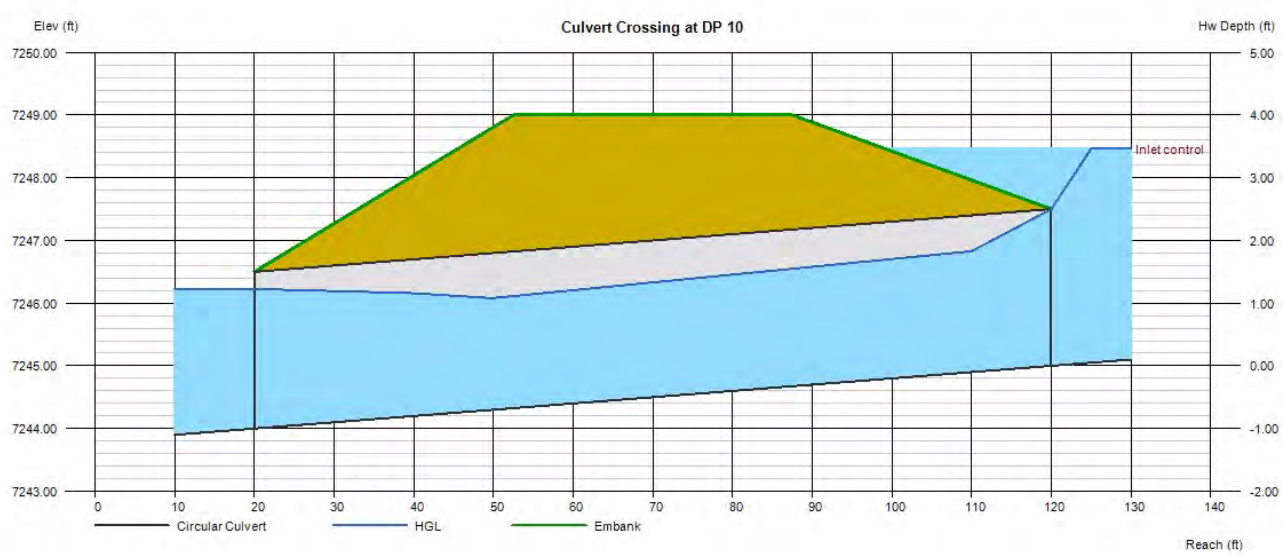
Top Elevation (ft)	=	7249.00
Top Width (ft)	=	35.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	0.00
Qmax (cfs)	=	33.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	33.00
Qpipe (cfs)	=	33.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.15
Veloc Up (ft/s)	=	8.02
HGL Dn (ft)	=	7246.23
HGL Up (ft)	=	7246.95
Hw Elev (ft)	=	7248.46
Hw/D (ft)	=	1.38
Flow Regime	=	Inlet Control



Provide culvert reports for culverts along the east side (see comment letter).

C_N VALUES - EXISTING CONDITIONS

BASIN (label)	BASIN AREA (Ac)	SOIL TYPE B CN	SOIL TYPE B AREA (Ac.)	WEIGHTED C-
EX-1	156.9	61	156.9	61
EX-2	9.2	61	9.2	61
EX-3	24.9	61	24.9	61
EX-4	35.2	63	35.2	63
EX-6	6.7	61	6.7	61
SC-1	12.5	63	12.5	63
SC-2	350.0	63	350.0	63
OS-1	49.1	61	49.1	61
OS-2	2.1	61	2.1	61
OS-3	5.7	65	5.7	65
OS-4	16.1	63	16.1	63
OS-5	27.6	63	27.6	63

TIME OF CONCENTRATION - EXISTING CONDITIONS

BASIN	Cn	C(5)	OVERLAND Length (ft)	OVERLAND Height (ft)	OVERLAND Tc (min)	STREET / CHANNEL FLOW Length (ft)	Slope (%)	Velocity (ft/s)	Tc (min)	Tc TOTAL (min)	Tc LAG (min)	Tc LAG (hr)
EX-1	61.0	0.08	300	8	23.1	1600	1.8%	1.3	20.5	43.6	26.2	0.44
EX-2	61.0	0.08	300	10	21.4					21.4	12.9	0.21
EX-3	61.0	0.08	300	8	23.1	1500	4.0%	1.5	16.7	39.7	23.8	0.40
EX-4	63.0	0.08	300	24	16.1	1900	6.0%	1.8	17.6	33.7	20.2	0.34
EX-6	61.0	0.08	300	14	19.2	800	1.0%	1.0	13.3	32.5	19.5	0.33
SC-1	63.0	0.08	200	6	18.1	500	2.0%	1.2	6.9	25.1	15.0	0.25
SC-2	63.0	0.08	300	12	20.2	3500	1.8%	1.3	44.9	65.1	39.0	0.65
OS-1	61.0	0.08	300	22	16.5	1300	4.0%	1.5	14.4	31.0	18.6	0.31
OS-2	61.0	0.08	300	12	20.2	550	5.0%	1.7	5.4	25.6	15.3	0.26
OS-3	65.0	0.08	300	10	21.4	250	3.0%	3.5	1.2	22.6	13.6	0.23
OS-4	63.0	0.08	300	22	16.5	1100	4.0%	1.4	13.1	29.6	17.8	0.30
OS-5	63.0	0.08	300	10	21.4	1300	3.0%	1.2	18.1	39.5	23.7	0.39

BASIN SUMMARY - EXISTING CONDITIONS

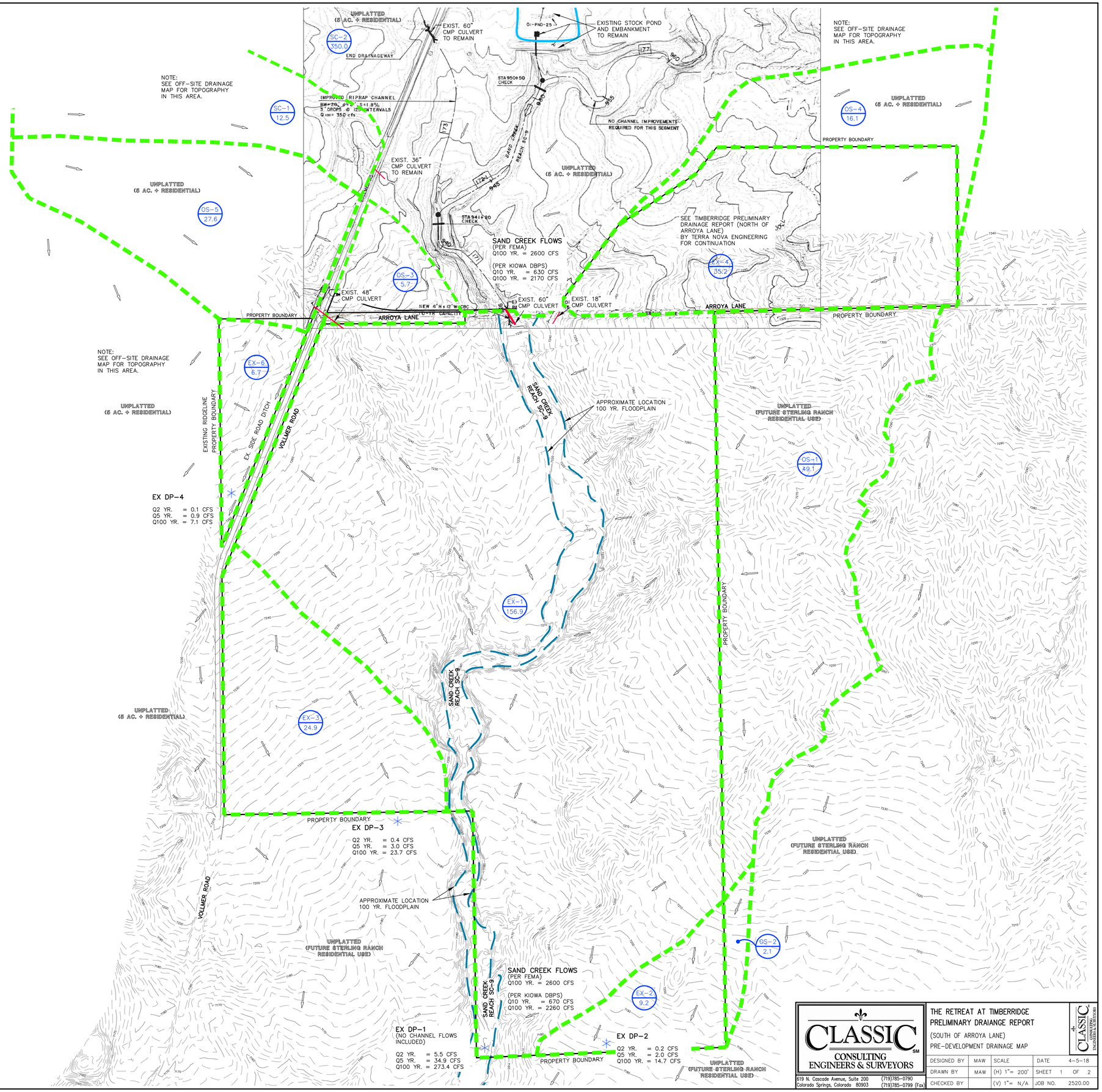
BASIN (label)	TOTAL BASIN AREA (acres)	WEIGHTED CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
EX-1	156.9	61	0.44	2.6	17.7	140.3
EX-2	9.2	61	0.21	0.2	1.7	12.2
EX-3	24.9	61	0.40	0.4	3.0	23.7
EX-4	35.2	63	0.34	1.3	6.9	41.8
EX-6	6.7	61	0.33	0.1	0.9	7.1
SC-1	12.5	63	0.25	0.5	3.0	17.3
SC-2	350.0	63	0.65	9.9	44.2	275.3
OS-1	49.1	61	0.31	0.9	7.0	53.9
OS-2	2.1	61	0.26	0.04	0.3	2.5
OS-3	5.7	65	0.23	0.6	2.1	9.9
OS-4	16.1	63	0.30	0.6	3.4	20.7
OS-5	27.6	63	0.39	1.0	5.2	32.1

DESIGN POINTS SURFACE ROUTING SUMMARY - EXISTING CONDITIONS

Design Point (label)	Contributing Basins	Q 2 Yr. Q (cfs)	Q 5 Yr. Q (cfs)	Q 100 Yr. Q (cfs)
EX DP-1	BASINS OS-1, OS-2, OS-4, OS-5, EX-1, EX-2, EX-5, EX-6	5.6	36.0	281.7
EX DP-2	BASINS OS-2, EX-2	0.2	2.0	14.7
EX DP-3	BASIN EX-3	0.4	3.0	23.7
EX DP-4	BASIN EX-6	0.1	1.0	7.1
Ex. 36" CMP at Vollmer	SC-1	0.5	3.0	17.3
Ex. 60" CMP at Vollmer	SC-2	9.88	44.2	275.3

Delete?

Provide column with design point contributing area



LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
BASIN BOUNDARY	
DESIGN POINT	
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
STORM SEWER	

N

200 100 0 200 400

SCALE: 1" = 200'

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THE RETREAT AT TIMBERRIDGE
PRELIMINARY DRAIANGE REPORT
(SOUTH OF ARROYA LANE)
PRE-DEVELOPMENT DRAINAGE MAP

DESIGNED BY	MAW	SCALE	DATE	4-5-18
DRAWN BY	MAW	(H) 1"= 200'	SHEET 1	OF 2
CHECKED BY		(V) 1"= N/A	JOB NO.	2520.00

PRELIMINARY DRAINAGE REPORT – BASIN RUNOFF SUMMARY

BASIN	WEIGHTED CA(2)	WEIGHTED CA(5)	WEIGHTED CA(100)	OVERLAND Q(5)	OVERLAND Length (ft)	OVERLAND Height (ft)	OVERLAND Tc (min)	STREET / CHANNEL FLOW Length (ft)	STREET / CHANNEL FLOW Slope (%)	STREET / CHANNEL FLOW Velocity (fps)	STREET / CHANNEL FLOW Tc (min)	Tc TOTAL (min)	INTENSITY I(2) (in/hr)	INTENSITY I(5) (in/hr)	INTENSITY I(100) (in/hr)	TOTAL FLOWS Q(2) (cfs)	TOTAL FLOWS Q(5) (cfs)	TOTAL FLOWS Q(100) (cfs)
A1	0.77	1.79	5.12	0.14	120	2.4	15.1	740	2.8%	1.6	7.8	22.9	2.31	2.88	4.94	1.8	5	25
A2	0.41	0.97	2.76	0.14	300	12	19.0	400	4.0%	2.0	3.3	22.3	2.34	2.92	4.91	1.0	3	14
A3	0.35	0.83	2.36	0.14	300	8	21.7	400	3.0%	1.7	3.8	25.6	2.18	2.72	4.57	0.8	2	11
A4	0.25	0.42	0.92	0.20	180	8	13.3	180	4.0%	2.0	1.5	14.8	2.63	3.54	5.94	0.7	1	5
A5	0.33	0.77	2.20	0.14	280	10	19.1					19.1	2.53	3.16	5.31	0.9	2	12
B1	1.13	2.63	7.52	0.14	300	10.5	19.9	1280	3.2%	1.8	11.9	31.8	1.92	2.39	4.02	2.2	6	30
B2	0.48	1.12	3.20	0.14	300	10.5	19.9					19.9	2.48	3.10	5.20	1.2	3	17
B3	1.28	1.69	3.06	0.14	300	10.5	19.9	370	1.5%	1.2	5.0	24.9	2.21	2.76	4.63	2.8	5	14
B4	0.78	1.82	5.20	0.14	300	10.5	19.9					19.9	2.48	3.10	5.20	1.9	6	27
C1	1.13	2.13	5.25	0.17	300	12	18.4	600	2.0%	2.8	3.5	21.9	2.36	2.95	4.95	2.7	6	26
C2	0.52	0.86	1.89	0.20	300	14	16.9					16.9	2.67	3.34	5.61	1.4	3	11
C3	0.77	1.46	3.61	0.17	300	17	16.4					16.4	2.71	3.39	5.68	2.1	5	21
D1	1.02	1.28	2.72	0.21	200	4	18.0	600	2.0%	2.8	3.5	21.6	2.38	2.98	5.00	2.4	4	14
D2	2.54	3.53	6.63	0.25	150	3	15.0	900	3.0%	3.5	4.3	19.3	2.51	3.14	5.28	6.4	11	35
D3	0.68	0.85	1.81	0.21	150	3	15.6	375	2.0%	2.8	2.2	17.8	2.61	3.26	5.48	1.8	3	10
D4	1.36	1.84	3.30	0.27	150	3	14.6	600	3.0%	3.7	2.7	17.3	2.64	3.31	5.56	3.6	6	18
D5	2.30	3.20	6.02	0.25	150	3	15.0	1050	2.8%	3.2	5.5	20.5	2.44	3.05	5.13	5.6	10	31
D6	2.75	3.83	7.19	0.25	150	3	15.0	1200	2.0%	2.8	7.1	22.0	2.36	2.94	4.94	6.5	11	36
D7	0.19	0.43	1.11	0.16	150	3	16.5					16.5	2.70	3.37	5.67	0.5	1	6
D8	0.29	0.40	0.75	0.25	70	2.8	8.1					8.1	3.54	4.44	7.46	1.0	2	6
D9	0.38	0.53	0.99	0.25	70	2.8	8.1					8.1	3.54	4.44	7.46	1.3	2	7
D10	0.31	0.43	0.80	0.25	80	3.2	8.7					8.7	3.46	4.34	7.29	1.1	2	6
E	1.16	1.17	1.25	0.25	30	7.5	2.9	400	5.0%	2.2	3.0	5.9	3.93	4.92	8.27	4.5	6	10
F1	0.54	1.63	6.52	0.09	60	3	8.3	2400	2.0%	1.4	28.3	36.6	1.75	2.19	3.68	1.0	4	24
F2	0.14	0.41	1.65	0.09	60	6	6.6	1200	2.0%	1.4	14.1	20.7	2.43	3.03	5.09	0.3	1	8
H	0.40	0.94	2.68	0.14	300	11	19.6	900	2.0%	1.4	10.6	30.2	1.98	2.47	4.15	0.8	2	11
OS-1A	0.14	0.43	1.73	0.09	300	15	18.6	400	5.0%	4.5	1.5	20.1	2.47	3.08	5.18	0.4	1	9
OS-1B	0.70	2.11	8.42	0.09	300	15	18.6	1200	5.0%	4.5	4.5	23.0	2.30	2.88	4.83	1.6	6	41
OS-2A	0.06	0.18	0.72	0.09	300	12	20.0					20.0	2.47	3.09	5.19	0.1	0.6	4
OS-2B	0.07	0.21	0.83	0.09	300	12	20.0					20.0	2.47	3.09	5.19	0.2	0.6	4
OS-2C	0.45	1.34	5.36	0.09	300	12	20.0	1000	3.0%	3.5	4.8	24.8	2.21	2.77	4.64	1.0	4	25
OS-2D	0.03	0.08	0.31	0.09	250	12	17.2					17.2	2.65	3.32	5.57	0.07	0.3	2
OS-2E	0.09	0.28	1.12	0.09	300	12	20.0					20.0	2.47	3.09	5.19	0.2	0.9	6
OS-3	0.42	0.74	2.21	0.08	300	10	21.4	250	3.0%	3.5	1.2	22.6	2.32	2.90	4.87	1	2	11
OS-5	0.55	2.21	9.66	0.08	300	12	20.2	1500	3.0%	3.5	7.2	27.4	2.10	2.62	4.39	1	6	42

PRELIMINARY DRAINAGE REPORT – BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS AREA (AC)	C(2)	C(50)	C(100)	LANDSCAPE / DEVELOPED AREAS AREA (AC)	C(2)	C(5)	C(100)	WEIGHTED C(2)	WEIGHTED C(5)	WEIGHTED C(100)	WEIGHTED CA CA(2)	CA(5)	CA(100)
A1	12.8	0.00	0.89	0.95	0.96	12.80	0.06	0.14	0.40	0.06	0.14	0.40	**0.77**	**1.79**	**5.12**
A2	6.9	0.00	0.89	0.95	0.96	6.90	0.06	0.14	0.40	0.06	0.14	0.40	**0.41**	**0.97**	**2.76**
A3	5.9	0.00	0.89	0.95	0.96	5.90	0.06	0.14	0.40	0.06	0.14	0.40	**0.35**	**0.83**	**2.36**
A4	2.1	0.00	0.89	0.95	0.96	2.10	0.12	0.20	0.44	0.12	0.20	0.44	**0.25**	**0.42**	**0.92**
A5	5.5	0.00	0.89	0.95	0.96	5.50	0.06	0.14	0.40	0.06	0.14	0.40	**0.33**	**0.77**	**2.20**
B1	18.8	0.00	0.89	0.95	0.96	18.80	0.06	0.14	0.40	0.06	0.14	0.40	**1.13**	**2.63**	**7.52**
B2	8.0	0.00	0.89	0.95	0.96	8.00	0.06	0.14	0.40	0.06	0.14	0.40	**0.48**	**1.12**	**3.20**
B3	6.10	1.10	0.89	0.95	0.96	5.00	0.06	0.14	0.40	0.21	0.28	0.50	**1.28**	**1.69**	**3.06**
B4	13.0	0.00	0.89	0.95	0.96	13.00	0.06	0.14	0.40	0.06	0.14	0.40	**0.78**	**1.82**	**5.20**
C1	12.5	0.00	0.89	0.95	0.96	12.50	0.09	0.17	0.42	0.09	0.17	0.42	**1.13**	**2.13**	**5.25**
C2	4.3	0.00	0.89	0.95	0.96	4.30	0.12	0.20	0.44	0.12	0.20	0.44	**0.52**	**0.86**	**1.89**
C3	8.6	0.00	0.89	0.95	0.96	8.60	0.09	0.17	0.42	0.09	0.17	0.42	**0.77**	**1.46**	**3.61**
D1	6.0	0.00	0.89	0.95	0.96	6.00	0.17	0.21	0.45	0.17	0.21	0.45	**1.02**	**1.28**	**2.72**
D2	14.1	0.00	0.89	0.95	0.96	14.10	0.18	0.25	0.47	0.18	0.25	0.47	**2.54**	**3.53**	**6.63**
D3	4.0	0.00	0.89	0.95	0.96	4.00	0.17	0.21	0.45	0.17	0.21	0.45	**0.68**	**0.85**	**1.81**
D4	6.8	0.00	0.89	0.95	0.96	6.80	0.20	0.27	0.49	0.20	0.27	0.49	**1.36**	**1.84**	**3.30**
D5	12.8	0.00	0.89	0.95	0.96	12.80	0.18	0.25	0.47	0.18	0.25	0.47	**2.30**	**3.20**	**6.02**
D6	15.3	0.00	0.89	0.95	0.96	15.30	0.18	0.25	0.47	0.18	0.25	0.47	**2.75**	**3.83**	**7.19**
D7	2.7	0.00	0.89	0.95	0.96	2.70	0.07	0.16	0.41	0.07	0.16	0.41	**0.19**	**0.43**	**1.11**
D8	1.6	0.00	0.89	0.95	0.96	1.60	0.18	0.25	0.47	0.18	0.25	0.47	**0.29**	**0.40**	**0.75**
D9	2.1	0.00	0.89	0.95	0.96	2.10	0.18	0.25	0.47	0.18	0.25	0.47	**0.38**	**0.53**	**0.99**
D10	1.7	0.00	0.89	0.95	0.96	1.70	0.18	0.25	0.47	0.18	0.25	0.47	**0.31**	**0.43**	**0.80**
E	1.3	1.30	0.89	0.95	0.96	0.00	0.18	0.25	0.47	0.89	0.90	0.96	**1.16**	**1.17**	**1.25**
F1	18.1	0.00	0.89	0.95	0.96	18.10	0.03	0.09	0.36	0.03	0.09	0.36	**0.54**	**1.63**	**6.52**
F2	4.6	0.00	0.89	0.95	0.96	4.60	0.03	0.09	0.36	0.03	0.09	0.36	**0.14**	**0.41**	**1.65**
H	6.7	0.00	0.89	0.95	0.96	6.70	0.06	0.14	0.40	0.06	0.14	0.40	**0.40**	**0.94**	**2.68**
OS-1A	4.8	0.00	0.89	0.95	0.96	4.80	0.03	0.09	0.36	0.03	0.09	0.36	**0.14**	**0.43**	**1.73**
OS-1B	23.4	0.00	0.89	0.95	0.96	23.40	0.03	0.09	0.36	0.03	0.09	0.36	**0.70**	**2.11**	**8.42**
OS-2A	2.0	0.00	0.89	0.95	0.96	2.00	0.03	0.09	0.36	0.03	0.09	0.36	**0.06**	**0.18**	**0.72**
OS-2B	2.3	0.00	0.89	0.95	0.96	2.30	0.03	0.09	0.36	0.03	0.09	0.36	**0.07**	**0.21**	**0.83**
OS-2C	14.9	0.00	0.89	0.95	0.96	14.90	0.03	0.09	0.36	0.03	0.09	0.36	**0.45**	**1.34**	**5.36**
OS-2D	0.85	0.00	0.89	0.95	0.96	0.85	0.03	0.09	0.36	0.03	0.09	0.36	**0.03**	**0.08**	**0.31**
OS-2E	3.1	0.00	0.89	0.95	0.96	3.10	0.03	0.09	0.36	0.03	0.09	0.36	**0.09**	**0.28**	**1.12**
OS-3	5.7	0.35	0.89	0.95	0.96	5.35	0.02	0.08	0.35	0.07	0.13	0.39	**0.42**	**0.74**	**2.21**
OS-5	27.6	0.00	0.89	0.95	0.96	27.60	0.02	0.08	0.35	0.02	0.08	0.35	**0.55**	**2.21**	**9.66**

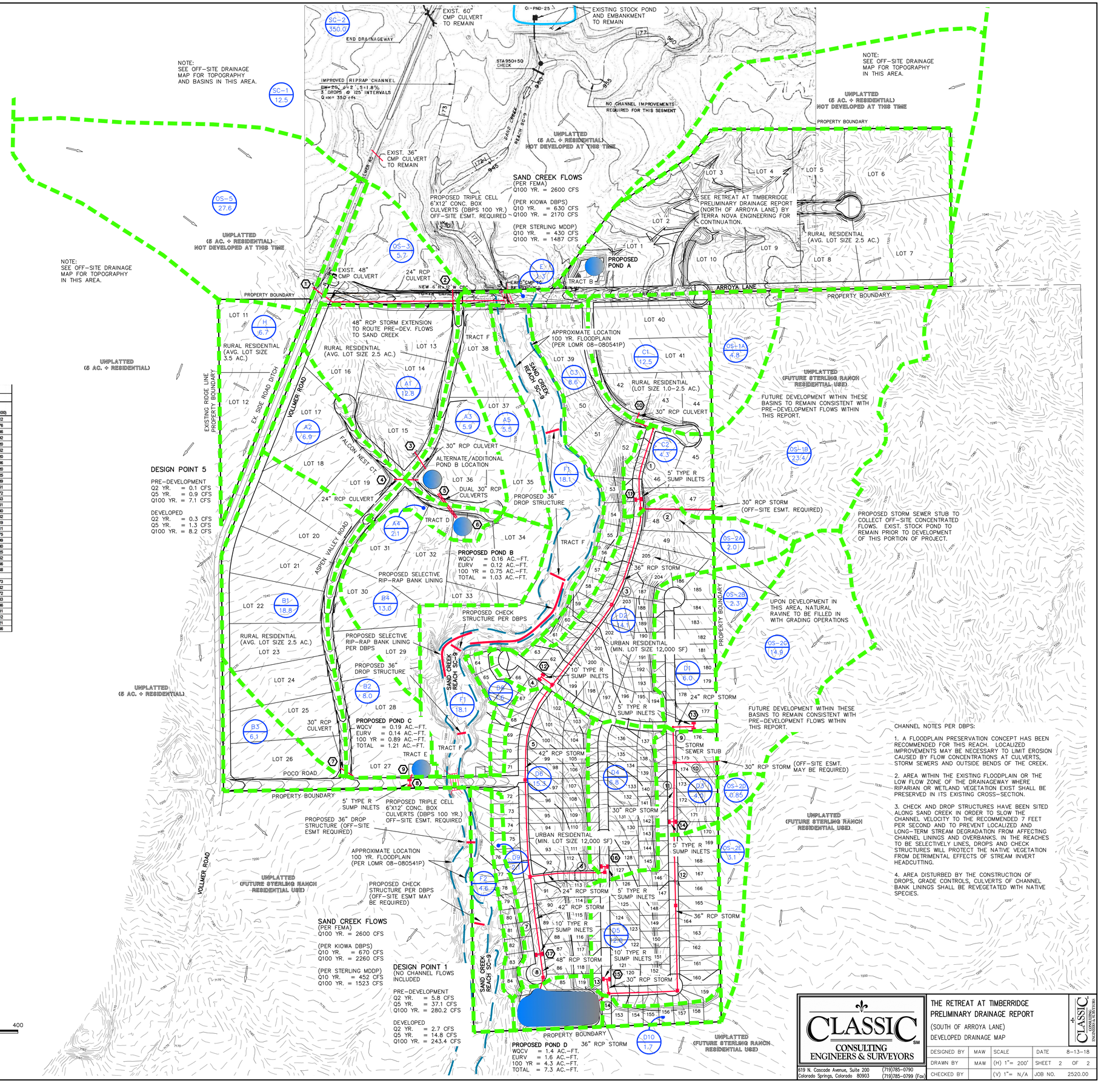
PRELIMINARY DRAINAGE REPORT – SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Culvert / Inlet Size
1	OS-5 (27.6 ac.)	2.21	9.66	27.4	2.62	4.39	6	42	EX. 48" CMP
2	OS-3 (5.7 ac.)	0.74	2.21	22.6	2.90	4.87	2	11	24" RCP
3	DP-2, A-1 (18.5 ac.)	2.54	7.33	23.6	2.84	4.76	7	35	30" RCP
4	A2 (6.9 ac.)	0.97	2.76	22.3	2.92	4.91	3	14	24" RCP
5	DP-3, DP-4, A3 (31.3 ac.)	4.33	12.45	25.6	2.72	4.57	12	57	DUAL 30" RCP CULVERTS
6	**OS-3, A1, A2, A3 and A4 (POND B INFLOW - 33.4 ac.)**	4.75	13.37	25.6	2.66	4.47	**13**	**60**	
7	B1 (18.8 ac.)	2.63	7.52	31.8	2.39	4.02	6	30	30" RCP
8	B3 (6.1 ac.)	1.69	3.06	24.9	2.76	4.63	5	14	5' Type R sump inlets
9	**B1, B2 and B3 (POND C INFLOW - 32.9ac.)**	5.44	13.78	34.8	2.26	3.79	**12**	**52**	
10	C1, OS-1A (17.3 ac.)	2.56	6.98	23.4	2.85	4.79	7	33	30" RCP
11	C2 (4.3 ac.)	0.86	1.89	16.9	3.34	5.61	3	11	5' Type R sump inlets
12	D2, OS-2A (16.1 ac.)	3.71	7.35	20.0	3.09	5.19	11	38	10' Type R sump inlets
13	D1, OS-2B (8.3 ac.)	1.49	3.55	21.6	2.98	5.00	4	18	5' Type R sump inlets
14	D3, OS-2D (4.85 ac.)	0.93	2.12	17.8	3.26	5.48	3	12	5' Type R sump inlets
15	D5, OS-2E (15.9 ac.)	3.48	7.13	20.5	3.05	5.13	11	37	10' Type R sump inlets
16	D4 6.8 ac.)	1.84	3.30	17.3	3.31	5.56	6	18	5' Type R sump inlets
17	D6 (15.3 ac.)	3.83	7.19	22.0	2.94	4.94	11	36	10' Type R sump inlets
18	**DP-10 Thru DP-17 and OS-1B, OS-2C, D7 (POND D INFLOW - 129.9 ac.)**	22.55	54.40	27.8	2.60	4.36	**59**	**237**	

provide contributing acreage column

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
BASIN BOUNDARY	
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
DESIGN POINT	1
EXISTING DIRECTION OF FLOW	
PROPOSED DIRECTION OF FLOW	
PROPOSED DRAINAGE IMPROVEMENTS	
PROPOSED DETENTION/SWQ POND	



CHANNEL NOTES PER DBPS:

1. A FLOODPLAIN PRESERVATION CONCEPT HAS BEEN RECOMMENDED FOR THIS REACH. LOCALIZED IMPROVEMENTS MAY BE NECESSARY TO LIMIT EROSION CAUSED BY FLOW CONCENTRATIONS AT CULVERTS, STORM SEWERS AND OUTSIDE BENDS OF THE CREEK.

2. AREA WITHIN THE EXISTING FLOODPLAIN OR THE LOW FLOW ZONE OF THE DRAINAGEWAY WHERE RIPARIAN OR WETLAND VEGETATION EXIST SHALL BE PRESERVED IN ITS EXISTING CROSS-SECTION.

3. CHECK AND DROP STRUCTURES HAVE BEEN SITED ALONG SAND CREEK IN ORDER TO SLOW THE CHANNEL VELOCITY TO THE RECOMMENDED 7 FEET PER SECOND AND TO PREVENT LOCALIZED AND LONG-TERM STREAM DEGRADATION FROM AFFECTING CHANNEL LININGS AND OVERBANKS. IN THE REACHES TO BE SELECTIVELY LINES, DROPS AND CHECK STRUCTURES WILL PROTECT THE NATIVE VEGETATION FROM DETRIMENTAL EFFECTS OF STREAM INVERT HEADCUTTING.

4. AREA DISTURBED BY THE CONSTRUCTION OF DROPS, GRADE CONTROLS, CULVERTS OF CHANNEL BANK LININGS SHALL BE REVEGETATED WITH NATIVE SPECIES.

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THE RETREAT AT TIMBERRIDGE
PRELIMINARY DRAINAGE REPORT
(SOUTH OF ARROYA LANE)
DEVELOPED DRAINAGE MAP

DESIGNED BY	MAW	SCALE	DATE	8-13-18
DRAWN BY	MAW	(H) 1"= 200'	SHEET 2 OF 2	
CHECKED BY		(V) 1"= N/A	JOB NO.	2520.00