Appendix A

CTC PREFERRED DESIGN APPROACH

Excerpt from *California Tahoe Conservancy Soil Erosion Control Grants Program – Program Announcement and Guidelines*, July 2002

D. Preferred Design Approach

This section presents an overall strategy to consider when designing projects. It is intended to apply not only to grant application preparation, but also to the more detailed design work that occurs after a grant is awarded.

The preferred design approach is a refinement of previous erosion control program guidelines, and reflects the current assessment of state-of-the-art technology and experience in implementing erosion control project at Lake Tahoe. The preferred design approach emphasizes project elements that prevent the mobilization of fine sediment and nutrients by erosion (source control), and that reduce the volume of runoff reaching natural surface waters (hydrologic design considerations). Source control measures and hydrologic design considerations, primarily infiltration, are the most cost-effective and efficient means to improve water quality. Water quality treatment measures to remove pollutants from runoff are to be considered after application of the other two groups of design considerations (source control and hydrologic design).

In cases where applicants find it difficult to apply a specific portion of the preferred design approach to a project or element of a project, the applicant should consult with Conservancy staff on specific barriers to implementation of the preferred design approach before submitting site improvement applications. If project designs are not based on this approach, grantees will be required to explain the specific barriers to the application of the preferred design approach and provide documentation to support how the proposed alternative approach meets program objectives (e.g., maximizes water quality benefit).

The Conservancy recognizes that this approach must be applied within the context of professional engineering practices to avoid impacts on public health and safety and damage to public and private property. It also recognizes that there are legal and regulatory limitations to the application of these principles, such as applicable drainage law.

Specific elements of the preferred design approach are:

Source Control

1. Place higher priority on source controls than on treatment. Source controls are measures that prevent erosion. Treatment facilities remove pollutants from runoff.
2. Emphasize reduction in bare, erodible surfaces (e.g., steep cut slopes, dirt roads) and impervious area.
3. Emphasize stabilization of gullies, unstable channels, and other sources that contribute especially high sediment loads.
4. Maximize self-sustaining source control methods, such as revegetation with native plants, pine needle mulching, and adding soil amendments such as mycorrhizal inoculum to soils when appropriate.

Hydrologic Design

5. Maintain or create distributed flow patterns (e.g., flows which discharge from the right-of-way frequently, or from shoulders by unconcentrated "sheet flow") and avoid concentration of flows where feasible.
6. Maximize infiltration of runoff from impervious surfaces. In some cases this can be accomplished by techniques described in number 5 above or also by the construction of leach fields, dry wells, or detention basins, for example.
7. Keep runoff from non-urban areas separate from urban runoff until urban runoff is treated. Treatment efficiency is much greater when flow volumes are smaller.
8. Keep treated urban runoff separate from untreated urban runoff to avoid resuspension of sediments and decreased treatment efficiency in downstream facilities.
9. Apply geomorphologic principles to natural channel design and mimic natural processes when stabilizing, restoring, or recreating natural drainage channels. For example, channels with floodplains tend to be more stable than those without. Channels with steps and pools are a frequent natural stream form and have better habitat values than those with continuous slopes. Avoid adding to or decreasing natural stream flows or changing watershed boundaries.

Treatment

10. Emphasize removal of fine sediments and phosphorous. For the purposes of the program guidelines, fine sediment is considered to be those particles that pass the number 200 sieve (less than 75 microns). Examples of improvements that are likely to achieve this objective are properly-sized, flat or gently-sloping, well-vegetated, detention areas (meadow-like areas).
11. Use natural treatment systems, such as meadows, where feasible. Because of the critical importance of wetland plants in removing pollutants from runoff, projects located in Stream Environment Zones (SEZ) should generally preserve the existing vegetation and function of the SEZs to the maximum extent practicable.

These guidelines continue to place a priority on SEZ restoration work. Such restoration work is cost-effective and beneficial for removing nutrients and fine sediment from runoff. The Environmental Improvement Program (EIP) calls for 40 acres of SEZ restoration over the 10-year EIP period in each of the primary grantee jurisdictions. In addition, the 208 Plan calls for the restoration of 1,100 acres of disturbed SEZs in the Basin. As in past years' programs, preference will be given to qualified projects that provide for infiltration of runoff and absorption of nutrients by plants and soil. This concept will continue to be promoted in the plan review process.

Appendix B

HYDROLOGY AND HYDRAULICS

RATIONAL METHOD RESULTS
(Existing Conditions)

CSA 5, JN 95157
Rational Method
XWS A

NOTES

2.850	= P_2 (2 yr, 24 hr rainfall depth based on 35 inches mean annual precip)
6.0	Initial Time of Concentration for all areas
0.90	Time of Concentration based on County of El Dorado Drainage Manual (Chapter 2)
0.10	Time of Concentration determined using Longest Travel Path in Watershed
	c value a composite of pervious and impervious areas
	**100 Year Storm Assumes 25% increase in C

DATA RUN

(yellow)	= Computed Automatically
(green)	=Determined from Appendix 4.2 of County of El Dorado Drainage Manual
(pink)	=Determined from Previous Worksheets
WS A 0%	=Bulking'

y=bx^m

	b	m
10 yrs	7.4567	-0.505
25 yrs	8.7807	-0.507
100 yrs	10.571	-0.506

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS A1 1-2	40.11	2.50%	10 Year	35.82	0.12	1.22	5.9												
			25 Year	35.82	0.12	1.43	6.9												
			100 Year	35.82	0.15	1.73	10.4												
																			0.00
			JUNCTION	35.82															
WS A2 3-2	3.78	17.48%	10 Year	37.21	0.24	1.20	1.1												
			25 Year	37.21	0.24	1.40	1.3												
			100 Year	37.21	0.30	1.70	1.9												
																			0.00
			JUNCTION	37.21															
WS A1-A2	43.89	3.79%	10 Year	37.21	0.13	1.20	6.9												
			25 Year	37.21	0.13	1.40	8.0												
			100 Year	37.21	0.16	1.70	12.1												
							18" CMP	PIPE 376	60	6394.5	6394.0	0.83%	0.024	1.50	0.7157	0.8000	1.8	4.5	0.22
			JUNCTION	37.44															
WS A3 4-5	0.66	31.61%	10 Year	8.44	0.35	2.54	0.6												
			25 Year	8.44	0.35	2.98	0.7	OMP INLET	Rim	6403.99									
			100 Year	8.44	0.44	3.59	1.1												
							24" CMP	PIPE 459	62	6401.49	6400.50	1.60%	0.024	2.00	0.0209	0.0704	0.2814	2.5	0.42
			JUNCTION	8.86															
WS A1-A3	44.55	4.20%	10 Year	37.44	0.13	1.20	7.1												
			25 Year	37.44	0.13	1.40	8.3												
			100 Year	37.44	0.17	1.69	12.6												
																			0.00
			JUNCTION	37.44															
WS A4 6-7	63.62	2.86%	10 Year	63.96	0.12	0.91	7.1												
			25 Year	63.96	0.12	1.07	8.3												
			100 Year	63.96	0.15	1.29	12.6												
																			0.00
			JUNCTION	63.96															
WS A1-A4	108.18	3.41%	10 Year	63.96	0.13	0.91	12.6												
			25 Year	63.96	0.13	1.07	14.7												
			100 Year	63.96	0.16	1.29	22.2												
							36" CMP	PIPE 451	26	6331.00	6329.60	5.38%	0.024	3.00	0.0811	0.1821	1.6389	9.0	0.05
			JUNCTION	64.01															

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Rational Method
XWS A

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
	0.05	80.03%	**10 Year**	**6.66**	**0.74**	**2.86**	**0.1**												
WS A5 8-9			**25 Year**	**6.66**	**0.74**	**3.36**	**0.1**	**OMP INLET**	Rim	6381.46									
			100 Year	**6.66**	**0.93**	**4.05**	**0.2**												
							18" CMP	**PIPE 438**	44	6379.56	6379.33	0.52%	0.024	1.50	0.0128	**0.0502**	0.11295	1.0	0.73
			JUNCTION	**7.38**															
	1.57	21.45%	**10 Year**	**9.41**	**0.27**	**2.40**	**1.0**												
WS A6 10-11			**25 Year**	**9.41**	**0.27**	**2.82**	**1.2**	**OMP INLET**	Rim	6382.84									
			100 Year	**9.41**	**0.34**	**3.40**	**1.8**												
							18" CMP	**PIPE 439**	18	6380.84	6380.64	1.11%	0.024	1.50	0.0927	**0.1982**	0.44595	2.7	0.11
			JUNCTION	**9.52**															
	1.61	23.11%	**10 Year**	**9.52**	**0.28**	**2.39**	**1.1**												
			25 Year	**9.52**	**0.28**	**2.80**	**1.3**	**SDMH**	238	Perf									
WS A5-A6			**100 Year**	**9.52**	**0.36**	**3.38**	**1.9**												
							18" CMP	**PIPE 2796**	294	6379.25	6352.88	8.97%	0.024	1.50	0.0350	**0.1000**	0.225	5.7	0.86
			JUNCTION	**10.37**															
	3.62	19.10%	**10 Year**	**34.81**	**0.25**	**1.24**	**1.1**												
WS A7 12-13			**25 Year**	**34.81**	**0.25**	**1.45**	**1.3**	**OMP INLET**	Rim	6357.19									
			100 Year	**34.81**	**0.32**	**1.75**	**2.0**												
							18" CMP	**PIPE 441**	29	6355.00	6354.46	1.86%	0.024	1.50	0.0793	**0.1800**	0.405	2.8	0.17
			JUNCTION	**34.98**															
	5.24	20.34%	**10 Year**	**34.98**	**0.26**	**1.24**	**1.7**												
			25 Year	**34.98**	**0.26**	**1.45**	**2.0**		239	Perf									
WS A5-A7			**100 Year**	**34.98**	**0.33**	**1.75**	**3.0**												
							18" CMP	**PIPE 2799**	269	6352.76	6347.10	2.10%	0.024	1.50	0.1118	**0.2308**	0.5191875	3.8	1.17
			JUNCTION	**36.15**															
	4.77	21.67%	**10 Year**	**49.24**	**0.27**	**1.04**	**1.4**												
WS A8 14-15			**25 Year**	**49.24**	**0.27**	**1.22**	**1.6**	**OMP INLET**	Rim	6349.63									
			100 Year	**49.24**	**0.34**	**1.47**	**2.4**												
																			0.00
			JUNCTION	**49.24**															
	10.01	20.97%	**10 Year**	**49.24**	**0.27**	**1.04**	**2.8**												
			25 Year	**49.24**	**0.27**	**1.22**	**3.3**		244	Perf									
WS A5-A8			**100 Year**	**49.24**	**0.33**	**1.47**	**4.9**												
							18" CMP	**PIPE 2800**	303	6347.04	6345.25	0.59%	0.024	1.50	0.3457	**0.5308**	1.1943	2.7	1.85
			JUNCTION	**51.09**															
	5.49	23.70%	**10 Year**	**14.91**	**0.29**	**1.90**	**3.0**												
WS A9 16-17			**25 Year**	**14.91**	**0.29**	**2.23**	**3.5**	**OMP INLET**	Rim	6347.25									
			100 Year	**14.91**	**0.36**	**2.69**	**5.4**												
																			0.00
			JUNCTION	**14.91**															
	15.50	21.94%	**10 Year**	**51.09**	**0.28**	**1.02**	**4.4**												
			25 Year	**51.09**	**0.28**	**1.20**	**5.1**		241	Perf									
WS A5-A9			**100 Year**	**51.09**	**0.34**	**1.44**	**7.7**												
							18" CMP	**PIPE 2801**	300	6345.19	6343.60	0.53%	0.024	1.50	0.5706	**0.8000**	1.8	2.8	1.76
			JUNCTION	**52.86**															

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XWS A

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
	3.84	24.10%	**10 Year**	**72.84**	**0.29**	**0.86**	**1.0**												
			25 Year	**72.84**	**0.29**	**1.00**	**1.1**	**OMP INLET**	Rim	6346.19									
WS A10 18-19			**100 Year**	**72.84**	**0.37**	**1.21**	**1.7**												
																			0.00
			JUNCTION	**72.84**															
	19.34	22.37%	**10 Year**	**72.84**	**0.28**	**0.86**	**4.6**												
			25 Year	**72.84**	**0.28**	**1.00**	**5.4**		241	Perf									
WS A5-A10			**100 Year**	**72.84**	**0.35**	**1.21**	**8.1**												
							18" CMP	**PIPE 2802**	300	6343.54	6339.15	1.46%	0.024	1.50	0.3625	**0.5594**	1.25865	4.3	1.17
			JUNCTION	**74.01**															
	4.70	21.17%	**10 Year**	**66.22**	**0.27**	**0.90**	**1.1**												
			25 Year	**66.22**	**0.27**	**1.05**	**1.3**	**OMP INLET**	Rim	6341.62									
WS A11 20-21			**100 Year**	**66.22**	**0.34**	**1.27**	**2.0**												
																			0.00
			JUNCTION	**66.22**															
	24.04	22.13%	**10 Year**	**74.01**	**0.28**	**0.85**	**5.7**												
			25 Year	**74.01**	**0.28**	**0.99**	**6.6**		242	Perf									
WS A5-A11			**100 Year**	**74.01**	**0.35**	**1.20**	**10.0**												
							18" CMP	**PIPE 2803**	301	6339.09	6335.36	1.24%	0.024	1.50	0.4824	**0.7220**	1.6245	4.1	1.24
			JUNCTION	**75.24**															
	4.62	23.57%	**10 Year**	**72.31**	**0.29**	**0.86**	**1.1**												
			25 Year	**72.31**	**0.29**	**1.00**	**1.3**	**OMP INLET**	Rim	6338.67									
WS A12 22-23			**100 Year**	**72.31**	**0.36**	**1.21**	**2.0**												
																			0.00
			JUNCTION	**72.31**															
	28.66	22.37%	**10 Year**	**75.24**	**0.28**	**0.84**	**6.7**												
			25 Year	**75.24**	**0.28**	**0.98**	**7.9**		232	Perf									
WS A5-A12			**100 Year**	**75.24**	**0.35**	**1.19**	**11.9**												
							24" CMP	**PIPE 2804**	291	6334.80	6331.76	1.04%	0.024	2.00	0.2904	**0.4675**	1.8698	4.2	1.15
			JUNCTION	**76.40**															
	4.64	24.77%	**10 Year**	**75.99**	**0.30**	**0.84**	**1.2**												
			25 Year	**75.99**	**0.30**	**0.98**	**1.4**	**OMP INLET**	Rim	6334.48									
WS A13 24-25			**100 Year**	**75.99**	**0.37**	**1.18**	**2.0**												
																			0.00
			JUNCTION	**75.99**															
	33.30	22.70%	**10 Year**	**76.40**	**0.28**	**0.83**	**7.8**												
			25 Year	**76.40**	**0.28**	**0.97**	**9.1**		252	Perf									
WS A5-A13			**100 Year**	**76.40**	**0.35**	**1.18**	**13.8**												
							24" CMP	**PIPE 2805**	301	6331.70	6328.90	0.93%	0.024	2.00	0.3582	**0.5499**	2.1996	4.2	1.21
			JUNCTION	**77.60**															
	4.79	20.80%	**10 Year**	**62.57**	**0.27**	**0.92**	**1.2**												
			25 Year	**62.57**	**0.27**	**1.08**	**1.4**	**OMP INLET**	Rim	6332.04									
WS A14 26-27			**100 Year**	**62.57**	**0.33**	**1.30**	**2.1**												
																			0.00
			JUNCTION	**62.57**															

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Rational Method
XWS A

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS A5-A14	38.09	22.46%	10 Year	77.60	0.28	0.83	8.8												
			25 Year	77.60	0.28	0.97	10.3												
			100 Year	77.60	0.35	1.17	15.6												
							24" CMP	PIPE 449	66	6328.84	6328.67	0.26%	0.024	2.00	0.7671	0.8000	3.2	3.2	0.34
			JUNCTION	77.95															
WS A15 28-29	2.86	20.62%	10 Year	74.32	0.26	0.85	0.6												
			25 Year	74.32	0.26	0.99	0.7	OMP INLET	Rim	6332.04									
			100 Year	74.32	0.33	1.19	1.1												
																			0.00
			JUNCTION	74.32															
WS A5-A15	40.95	22.33%	10 Year	77.95	0.28	0.83	9.4												
			25 Year	77.95	0.28	0.96	11.0		173	Perf									
			100 Year	77.95	0.35	1.17	16.6												
							24" CMP	PIPE 450	173	6328.61	6328.11	0.29%	0.024	2.00	0.7740	0.8000	3.2	3.4	0.84
			JUNCTION	78.78															
WS A16 30-31	0.02	0.00%	10 Year	8.80	0.10	2.49	0.0												
			25 Year	8.80	0.10	2.92	0.0	DI	TG	6333.16									
			100 Year	8.80	0.13	3.52	0.0												
																			0.00
			JUNCTION	8.80															
WS A5-A16	40.97	22.32%	10 Year	78.78	0.28	0.82	9.4												
			25 Year	78.78	0.28	0.96	11.0												
			100 Year	78.78	0.35	1.16	16.6												
																			0.00
			JUNCTION	78.78															
WS A1-A16	149.15	8.61%	10 Year	78.78	0.17	0.82	20.7												
			25 Year	78.78	0.17	0.96	24.2												
			100 Year	78.78	0.21	1.16	36.5												
							36" CMP	PIPE 452	299	6327.11	6324.16	0.99%	0.024	3.00	0.3119	0.4920	4.428	4.7	1.07
			JUNCTION	79.85															
WS A17 32-33	0.31	24.08%	10 Year	20.82	0.29	1.61	0.1												
			25 Year	20.82	0.29	1.88	0.2	DI	TG	6329.67									
			100 Year	20.82	0.37	2.27	0.3												
																			0.00
			JUNCTION	20.82															
WS A1-A17	149.45	8.64%	10 Year	79.85	0.17	0.82	20.6												
			25 Year	79.85	0.17	0.95	24.1												
			100 Year	79.85	0.21	1.15	36.4												
							36" CMP	PIPE 453	242	6324.10	6321.70	0.99%	0.024	3.00	0.3101	0.4920	4.428	4.7	0.87
			JUNCTION	80.72															
WS A18 34-35	0.22	25.56%	10 Year	27.62	0.30	1.40	0.1												
			25 Year	27.62	0.30	1.63	0.1	DI	TG	6326.17									
			100 Year	27.62	0.38	1.97	0.2												
																			0.00
			JUNCTION	27.62															

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Rational Method
XWS A

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS A1-A18	149.68	8.66%	10 Year	80.72	0.17	0.81	20.6												
			25 Year	80.72	0.17	0.95	24.0												
			100 Year	80.72	0.21	1.15	36.3												
							36" CMP	PIPE 454	62	6321.09	6320.00	1.76%	0.024	3.00	0.2322	0.3927	3.5343	5.8	0.18
			JUNCTION	80.89				TO BASIN 14											
WS A19 36-37	3.35	23.37%	10 Year	11.96	0.29	2.13	2.0												
			25 Year	11.96	0.29	2.50	2.4	OMP INLET	Rim	6332.48									
			100 Year	11.96	0.36	3.01	3.6		239	Perf									
							18" CMP	PIPE 2791	304	6329.75	6328.59	0.38%	0.024	1.50	0.3159	0.4969	1.118025	2.1	2.36
			JUNCTION	14.33															
WS A20 38-39	3.76	22.72%	10 Year	12.10	0.28	2.12	2.2												
			25 Year	12.10	0.28	2.48	2.6	OMP INLET	Rim	6331.05									
			100 Year	12.10	0.35	2.99	4.0												
																			0.00
			JUNCTION	12.10															
WS A19-A20	7.11	23.03%	10 Year	14.33	0.28	1.94	3.9												
			25 Year	14.33	0.28	2.28	4.6		242	Perf									
			100 Year	14.33	0.36	2.75	6.9												
							18" CMP	PIPE 2792	302	6328.53	6327.39	0.38%	0.024	1.50	0.6097	0.8000	1.8	2.2	2.31
			JUNCTION	16.63															
WS A21 40-41	3.69	22.11%	10 Year	12.50	0.28	2.08	2.1												
			25 Year	12.50	0.28	2.44	2.5	OMP INLET	Rim	6329.84									
			100 Year	12.50	0.35	2.94	3.8												
																			0.00
			JUNCTION	12.50															
WS A19-A21	10.80	22.71%	10 Year	16.63	0.28	1.80	5.5												
			25 Year	16.63	0.28	2.11	6.4		235	Perf									
			100 Year	16.63	0.35	2.55	9.7												
							18" CMP	PIPE 2793	295	6327.33	6325.48	0.63%	0.024	1.50	0.6603	0.8000	1.8	3.0	1.61
			JUNCTION	18.24															
WS A22 42-43	3.63	23.98%	10 Year	12.26	0.29	2.10	2.2												
			25 Year	12.26	0.29	2.46	2.6	OMP INLET	Rim	6327.56									
			100 Year	12.26	0.36	2.97	3.9												
																			0.00
			JUNCTION	12.26															
WS A19-A22	14.43	23.03%	10 Year	18.24	0.28	1.72	7.1												
			25 Year	18.24	0.28	2.01	8.3		240	Perf									
			100 Year	18.24	0.36	2.43	12.5												
							24" CMP	PIPE 2794	295	6325.00	6322.79	0.75%	0.024	2.00	0.3607	0.5547	2.2188	3.2	1.55
			JUNCTION	19.79															
WS A23 44-45	3.65	21.41%	10 Year	12.61	0.27	2.07	2.1												
			25 Year	12.61	0.27	2.43	2.4	OMP INLET	Rim	6325.45									
			100 Year	12.61	0.34	2.93	3.6												
																			0.00
			JUNCTION	12.61															

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SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	$Qn/(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS A19-A23	18.08	22.70%	**10 Year**	**19.79**	**0.28**	**1.65**	**8.4**												
			25 Year	**19.79**	**0.28**	**1.93**	**9.8**		250	Perf									
			100 Year	**19.79**	**0.35**	**2.33**	**14.9**												
							24" CMP	**PIPE 2795**	300	6322.73	6321.96	0.26%	0.024	2.00	0.7343	**0.8000**	3.2	3.1	1.63
			JUNCTION	**21.42**															
WS A24 46-47	3.78	20.20%	**10 Year**	**15.37**	**0.26**	**1.88**	**1.9**												
			25 Year	**15.37**	**0.26**	**2.20**	**2.2**	**OMP INLET**	Rim	6325.12									
			100 Year	**15.37**	**0.33**	**2.65**	**3.3**												
																			0.00
			JUNCTION	**15.37**															
WS A19-A24	21.86	22.27%	**10 Year**	**21.42**	**0.28**	**1.59**	**9.6**												
			25 Year	**21.42**	**0.28**	**1.86**	**11.3**												
			100 Year	**21.42**	**0.35**	**2.24**	**17.0**												
							24" CMP	**PIPE 1619**	70	6321.90	6321.72	0.26%	0.024	2.00	0.8416	**0.8000**	3.2	3.0	0.39
			JUNCTION	**21.80**															
WS A25 48-49	2.45	25.92%	**10 Year**	**11.52**	**0.31**	**2.17**	**1.6**												
			25 Year	**11.52**	**0.31**	**2.54**	**1.9**	**OMP INLET**	Rim	6325.41									
			100 Year	**11.52**	**0.38**	**3.07**	**2.9**												
																			0.00
			JUNCTION	**11.52**															
WS A19-A25	24.30	22.64%	**10 Year**	**21.80**	**0.28**	**1.57**	**10.7**												
			25 Year	**21.80**	**0.28**	**1.84**	**12.6**		148	Perf									
			100 Year	**21.80**	**0.35**	**2.22**	**19.0**												
							24" CMP	**PIPE 1620**	148	6321.66	6321.30	0.24%	0.024	2.00	0.9636	**0.8000**	3.2	3.4	0.73
			JUNCTION	**22.54**															
WS A26 50-51	0.12	28.85%	**10 Year**	**10.59**	**0.33**	**2.26**	**0.1**												
			25 Year	**10.59**	**0.33**	**2.65**	**0.1**	**OMP INLET**	Rim	6326.65									
			100 Year	**10.59**	**0.41**	**3.20**	**0.2**												
																			0.00
			JUNCTION	**10.59**															
WS A19-A26	24.43	22.67%	**10 Year**	**22.54**	**0.28**	**1.55**	**10.6**												
			25 Year	**22.54**	**0.28**	**1.81**	**12.4**												
			100 Year	**22.54**	**0.35**	**2.19**	**18.8**												
							24" CMP	**PIPE 1621**	244.5	6321.20	6319.00	0.90%	0.024	2.00	0.4956	**0.7504**	3.0016	3.5	1.15
			JUNCTION	**23.69**				**TO BASIN 15**											
WS A1-A26	174.10	10.63%	**10 Year**	**80.89**	**0.19**	**0.81**	**26.1**												
			25 Year	**80.89**	**0.19**	**0.95**	**30.5**												
			100 Year	**80.89**	**0.23**	**1.14**	**46.1**												
								RLC											0.00
			JUNCTION	**80.89**															

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SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS A27 52-53	0.73	0.00%	10 Year	11.83	0.10	2.14	0.2												
			25 Year	11.83	0.10	2.51	0.2												
			100 Year	11.83	0.13	3.03	0.3												
								RLC											0.00
			JUNCTION	11.83															
WS A1-A27	174.83	10.59%	10 Year	92.73	0.18	0.76	24.4												
			25 Year	92.73	0.18	0.88	28.5												
			100 Year	92.73	0.23	1.07	43.1												
								RLC											0.00
			JUNCTION	92.73															
WS A28 54-55	3.61	23.50%	10 Year	13.94	0.29	1.97	2.0												
			25 Year	13.94	0.29	2.31	2.4	OMP INLET	Rim	6319.30									
			100 Year	13.94	0.36	2.79	3.6												
							18" CMP	PIPE 1624	305	6317.30	6313.90	1.11%	0.024	1.50	0.1851	0.3328	0.7488	3.2	1.59
			JUNCTION	15.53															
WS A29 56-57	0.77	42.27%	10 Year	13.43	0.44	2.01	0.7												
			25 Year	13.43	0.44	2.35	0.8	OMP INLET	Rim	6316.24									
			100 Year	13.43	0.55	2.84	1.2												
							12" CMP	PIPE 1625	32	6314.74	6314.40	1.06%	0.024	1.00	0.1859	0.3328	0.3328	2.4	0.22
			JUNCTION	13.65															
WS A28-A29	4.39	26.81%	10 Year	15.53	0.31	1.87	2.6												
			25 Year	15.53	0.31	2.19	3.0												
			100 Year	15.53	0.39	2.64	4.6												
																			0.00
			JUNCTION	15.53															
WS A30 58-59	3.76	20.31%	10 Year	13.64	0.26	1.99	2.0												
			25 Year	13.64	0.26	2.33	2.3	OMP INLET	Rim	6316.24									
			100 Year	13.64	0.33	2.82	3.5												
																			0.00
			JUNCTION	13.64															
WS A28-A30	8.14	23.81%	10 Year	15.53	0.29	1.87	4.4												
			25 Year	15.53	0.29	2.19	5.2												
			100 Year	15.53	0.36	2.64	7.8												
							18" CMP	PIPE 1626	203	6313.84	6312.80	0.51%	0.024	1.50	0.5880	0.8000	1.8	2.9	1.18
			JUNCTION	16.70															
WS A31 60-61	2.42	19.30%	10 Year	12.88	0.25	2.05	1.3												
			25 Year	12.88	0.25	2.40	1.5	OMP INLET	Rim	6314.80									
			100 Year	12.88	0.32	2.90	2.2												
																			0.00
			JUNCTION	12.88															

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SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
	10.56	22.78%	10 Year	16.70	0.28	1.80	5.4												
			25 Year	16.70	0.28	2.11	6.3												
WS A28-A31			100 Year	16.70	0.35	2.54	9.5												
							18" CMP	PIPE 1627	25	6312.74	6312.50	0.96%	0.024	1.50	0.5216	0.8000	1.8	3.5	0.12
			JUNCTION	16.82															
	0.09	29.49%	10 Year	31.14	0.34	1.31	0.0												
			25 Year	31.14	0.34	1.54	0.0	OMP INLET	Rim	6314.80									
WS A32 62-63			100 Year	31.14	0.42	1.86	0.1												
																			0.00
			JUNCTION	31.14															
	10.65	22.84%	10 Year	31.14	0.28	1.31	4.0												
			25 Year	31.14	0.28	1.54	4.6												
WS A28-A32			100 Year	31.14	0.35	1.86	7.0												
							24" CMP	PIPE 1628	67	6312.00	6311.00	1.49%	0.024	2.00	0.1430	0.2739	1.0956	4.2	0.26
			JUNCTION	31.40				TO BASIN 16											
	185.48	11.29%	10 Year	92.73	0.19	0.76	26.7												
			25 Year	92.73	0.19	0.88	31.2												
WS A1-A32			100 Year	92.73	0.24	1.07	47.1												
								CONFLUENCE BEYOND BASIN IN RLC											0.00
			JUNCTION	92.73															

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NOTES

2.850	= P_2 (2 yr, 24 hr rainfall depth based on 35 inches mean annual precip)
6.0	Initial Time of Concentration for all areas
0.90	Time of Concentration based on County of El Dorado Drainage Manual (Chapter 2)
0.10	Time of Concentration determined using Longest Travel Path in Watershed

c value a composite of pervious and impervious areas

**100 Year Storm Assumes 25% increase in C

y=bx^m

	b	m
10 yrs	7.4567	-0.505
25 yrs	8.7807	-0.507
100 yrs	10.571	-0.506

DATA RUN

(yellow)	= Computed Automatically
(green)	=Determined from Appendix 4.2 of County of El Dorado Drainage Manual
(pink)	=Determined from Previous Worksheets

WS B	0%	=Bulking'

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B1 1-2	3.24	16.27%	10 Year	19.31	0.23	1.67	1.2												
			25 Year	19.31	0.23	1.96	1.5												
			100 Year	19.31	0.29	2.36	2.2												
							18" CMP	PIPE 373	40	6481.8	6481.4	1.00%	0.024	1.50	0.1189	0.2403	0.5405625	2.7	0.25
			JUNCTION	19.56															
WS B2 2-3	2.92	22.35%	10 Year	1.56	0.28	5.96	4.9												
			25 Year	1.56	0.28	7.01	5.7												
			100 Year	1.56	0.35	8.45	8.6												
																			0.00
			JUNCTION	1.56															
WS B1-B2	6.17	19.15%	10 Year	21.12	0.25	1.60	2.5												
			25 Year	21.12	0.25	1.87	2.9												
			100 Year	21.12	0.32	2.26	4.4												
							18" CMP	PIPE 375	74	6431.3	6430.6	1.00%	0.024	1.50	0.2377	0.4027	0.906075	3.2	0.38
			JUNCTION	21.50															
WS B3 3-4	3.17	28.34%	10 Year	0.88	0.33	7.94	8.2												
			25 Year	0.88	0.33	9.36	9.7												
			100 Year	0.88	0.41	11.26	14.6												
																			0.00
			JUNCTION	0.88															
WS B1-B3	9.33	22.27%	10 Year	22.38	0.28	1.55	4.0												
			25 Year	22.38	0.28	1.82	4.7												
			100 Year	22.38	0.35	2.19	7.1												
							18" CMP	PIPE 377	56	6403.3	6401.4	3.29%	0.024	1.50	0.2117	0.3727	0.838575	5.6	0.17
			JUNCTION	22.55															
WS B4 5-6	2.69	14.92%	10 Year	9.04	0.22	2.45	1.4												
			25 Year	9.04	0.22	2.88	1.7												
			100 Year	9.04	0.27	3.47	2.6												
							18" CMP	PIPE NR	40	6426.5	6426.1	1.00%	0.024	1.50	0.1382	0.2691	0.6053625	2.8	0.24
			JUNCTION	9.28															
WS B1-B4	12.03	20.63%	10 Year	22.55	0.27	1.55	4.9												
			25 Year	22.55	0.27	1.81	5.8												
			100 Year	22.55	0.33	2.18	8.7												
																			0.00
			JUNCTION	22.55															

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SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B5 4-7	3.58	27.22%	10 Year	1.71	0.32	5.69	6.5												
			25 Year	1.71	0.32	6.70	7.6												
			100 Year	1.71	0.40	8.07	11.5												
																			0.00
			JUNCTION	1.71															
WS B1-B5	15.60	22.14%	10 Year	24.26	0.28	1.49	6.4												
			25 Year	24.26	0.28	1.74	7.5												
			100 Year	24.26	0.35	2.11	11.4												
																			0.00
			JUNCTION	24.26															
WS B6 8-9	10.68	8.81%	10 Year	27.54	0.17	1.40	2.5												
			25 Year	27.54	0.17	1.63	3.0												
			100 Year	27.54	0.21	1.97	4.5												
							18" CMP	PIPE 374	40	6463.5	6460.6	7.25%	0.024	1.50	0.0900	0.1982	0.44595	5.7	0.12
			JUNCTION	27.66															
WS B7 9-10	2.67	22.37%	10 Year	1.32	0.28	6.47	4.8												
			25 Year	1.32	0.28	7.62	5.7												
			100 Year	1.32	0.35	9.18	8.5												
																			0.00
			JUNCTION	1.32															
WS B6-B7	13.34	11.52%	10 Year	28.98	0.19	1.36	3.5												
			25 Year	28.98	0.19	1.59	4.1												
			100 Year	28.98	0.24	1.92	6.2												
							18" CMP	PIPE NR	40	6428.5	6427.9	1.50%	0.024	1.50	0.2714	0.4426	0.99585	4.1	0.16
			JUNCTION	29.15															
WS B8 10-7	5.41	24.22%	10 Year	1.47	0.29	6.13	9.7												
			25 Year	1.47	0.29	7.21	11.5												
			100 Year	1.47	0.37	8.69	17.3												
																			0.00
			JUNCTION	1.47															
WS B6-B8	18.75	15.18%	10 Year	30.62	0.22	1.32	5.5												
			25 Year	30.62	0.22	1.55	6.4												
			100 Year	30.62	0.28	1.87	9.7												
																			0.00
			JUNCTION	30.62															
WS B1-B8	34.36	18.34%	10 Year	30.62	0.25	1.32	11.2												
			25 Year	30.62	0.25	1.55	13.1												
			100 Year	30.62	0.31	1.87	19.8												
							18" CMP	PIPE 1718	41	6373.7	6369.3	10.73%	0.024	1.50	0.3263	0.5115	1.150875	9.8	0.07
			JUNCTION	30.69															
WS B9 7-11	3.90	26.82%	10 Year	0.29	0.31	13.86	17.0												
			25 Year	0.29	0.31	16.36	20.1												
			100 Year	0.29	0.39	19.68	30.1												
																			0.00
			JUNCTION	0.29															

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SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B1-B9	38.25	19.21%	10 Year	30.98	0.25	1.32	12.8												
			25 Year	30.98	0.25	1.54	14.9												
			100 Year	30.98	0.32	1.86	22.6												
							21"x15" ACMP	PIPE 1717	43	6357.9	6355.1	6.51%	0.024	1.50	0.4767	0.7115	1.600875	9.3	0.08
			JUNCTION	31.06															
WS B10 11-12	1.66	39.21%	10 Year	0.97	0.41	7.59	5.2												
			25 Year	0.97	0.41	8.94	6.2												
			100 Year	0.97	0.52	10.76	9.3												
																			0.00
			JUNCTION	0.97															
WS B1-B10	39.92	20.04%	10 Year	32.02	0.26	1.30	13.5												
			25 Year	32.02	0.26	1.51	15.7												
			100 Year	32.02	0.33	1.83	23.8												
							28"x20" ACMP	PIPE 455	33	6336.10	6334.40	5.15%	0.024	2.00	0.2621	0.4327	1.7308	9.1	0.06
			JUNCTION	32.09															
WS B11 13-14	5.60	15.87%	10 Year	38.42	0.23	1.18	1.5												
			25 Year	38.42	0.23	1.38	1.8	OMP INLET	Rim	6336.40									
			100 Year	38.42	0.28	1.67	2.6												
							12" CMP	PIPE 456	32	6334.90	6334.70	0.62%	0.024	1.00	0.5324	0.8000	0.8	2.2	0.24
			JUNCTION	38.66															
WS B12 15-14	0.76	73.33%	10 Year	9.98	0.69	2.33	1.2												
			25 Year	9.98	0.69	2.74	1.4	OMP INLET		6336.40									
			100 Year	9.98	0.86	3.30	2.1												
																			0.00
			JUNCTION	9.98															
WS B11-B12	6.35	22.71%	10 Year	38.66	0.28	1.18	2.1												
			25 Year	38.66	0.28	1.38	2.5												
			100 Year	38.66	0.35	1.66	3.7												
							21"x15" ACMP	PIPE 457	63	6334.64	6334.40	0.38%	0.024	1.50	0.3248	0.5067	1.1399625	2.2	0.49
			JUNCTION	39.15															
WS B1-12	46.27	20.41%	10 Year	39.15	0.26	1.17	14.3												
			25 Year	39.15	0.26	1.37	16.7												
			100 Year	39.15	0.33	1.65	25.2												
																			0.00
			JUNCTION	39.15															
WS B13 14-16	3.71	14.89%	10 Year	2.90	0.22	4.36	3.5												
			25 Year	2.90	0.22	5.12	4.2												
			100 Year	2.90	0.27	6.17	6.3												
																			0.00
			JUNCTION	2.90															
WS B1-13	49.98	20.00%	10 Year	42.05	0.26	1.13	14.7												
			25 Year	42.05	0.26	1.32	17.1												
			100 Year	42.05	0.32	1.59	25.9												
							28"x20" ACMP	PIPE 1630	37	6332.32	6331.30	2.76%	0.024	2.00	0.3902	0.5918	2.3672	6.2	0.10
			JUNCTION	42.15															

CSA 5, JN 95157
Rational Method
XWS B

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B14 17-18	0.34	59.90%	10 Year	9.92	0.58	2.34	0.5												
			25 Year	9.92	0.58	2.74	0.5	OMP INLET	Rim	6334.38									
			100 Year	9.92	0.72	3.31	0.8												
							18" CMP	PIPE 1629	44	6332.00	6331.47	1.20%	0.024	1.50	0.0397	0.1079	0.2426625	1.9	0.39
			JUNCTION	10.31															
WS B15 19-18	0.03	70.86%	10 Year	6.78	0.67	2.84	0.1												
			25 Year	6.78	0.67	3.33	0.1	OMP INLET	Rim	6333.47									
			100 Year	6.78	0.83	4.01	0.1												
																			0.00
			JUNCTION	6.78															
WS B14-B15	0.37	60.92%	10 Year	10.31	0.59	2.30	0.5												
			25 Year	10.31	0.59	2.69	0.6												
			100 Year	10.31	0.73	3.25	0.9												
																			0.00
			JUNCTION	10.31															
WS B1-B15	50.35	20.30%	10 Year	42.15	0.26	1.13	14.9												
			25 Year	42.15	0.26	1.32	17.4												
			100 Year	42.15	0.33	1.59	26.3												
							28"x20" ACMP	PIPE 1631	238	6331.24	6329.94	0.55%	0.024	2.00	0.8903	0.8000	3.2	5.4	0.73
			JUNCTION	42.87															
WS B16 20-21	3.32	13.56%	10 Year	70.26	0.21	0.87	0.6												
			25 Year	70.26	0.21	1.02	0.7												
			100 Year	70.26	0.26	1.23	1.1												
							12" CMP	PIPE 1632	31	6329.99	6329.68	1.00%	0.024	1.00	0.1690	0.3130	0.313	1.9	0.27
			JUNCTION	70.52															
WS B1-B16	53.68	19.88%	10 Year	70.52	0.26	0.87	12.1												
			25 Year	70.52	0.26	1.01	14.1												
			100 Year	70.52	0.32	1.23	21.3												
																			0.00
			JUNCTION	70.52															
WS B17 21-22	2.52	19.62%	10 Year	2.31	0.26	4.89	3.2												
			25 Year	2.31	0.26	5.75	3.7												
			100 Year	2.31	0.32	6.93	5.6												
																			0.00
			JUNCTION	2.31															
WS B1-B17	56.19	19.87%	10 Year	72.83	0.26	0.86	12.4												
			25 Year	72.83	0.26	1.00	14.5												
			100 Year	72.83	0.32	1.21	22.0												
							28"x20" ACMP	PIPE 1636	60	6326.00	6325.50	0.83%	0.024	2.00	0.6016	0.8000	3.2	3.9	0.26
			JUNCTION	73.09															
WS B18 23-24	2.18	26.06%	10 Year	36.88	0.31	1.21	0.8												
			25 Year	36.88	0.31	1.41	0.9	OMP INLET	Rim	6349.84									
			100 Year	36.88	0.39	1.70	1.4												
							18" CMP	PIPE 489	293	6347.84	6329.50	6.26%	0.024	1.50	0.0309	0.0923	0.207675	4.6	1.07
			JUNCTION	37.95															

CSA 5, JN 95157
Rational Method
XWS B

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	$Qn/(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B19 25-26	3.14	24.27%	10 Year	22.82	0.29	1.54	1.4												
			25 Year	22.82	0.29	1.80	1.7	OMP INLET	Rim	6331.55									
			100 Year	22.82	0.37	2.17	2.5												
																			0.00
			JUNCTION	22.82															
WS B18-B19	5.32	25.00%	10 Year	37.95	0.30	1.19	1.9												
			25 Year	37.95	0.30	1.39	2.2												
			100 Year	37.95	0.38	1.68	3.4												
							18" CMP	PIPE 490	295	6329.44	6325.26	1.42%	0.024	1.50	0.1517	0.2885	0.649125	3.4	1.44
			JUNCTION	39.38															
WS B20 27-28	3.74	25.57%	10 Year	38.29	0.30	1.18	1.3												
			25 Year	38.29	0.30	1.38	1.6	OMP INLET	Rim	6327.26									
			100 Year	38.29	0.38	1.67	2.4												
																			0.00
			JUNCTION	38.29															
WS B18-B20	9.06	25.24%	10 Year	39.38	0.30	1.17	3.2												
			25 Year	39.38	0.30	1.36	3.7												
			100 Year	39.38	0.38	1.65	5.6												
																			0.00
			JUNCTION	39.38															
WS B21 29-28	1.18	22.19%	10 Year	26.44	0.28	1.43	0.5												
			25 Year	26.44	0.28	1.67	0.5	OMP INLET	Rim	6327.24									
			100 Year	26.44	0.35	2.02	0.8												
							12" CMP	PIPE 229	32	6325.74	6325.55	0.59%	0.024	1.00	0.1697	0.3130	0.313	1.5	0.36
			JUNCTION	26.80															
WS B18-B21	10.24	24.89%	10 Year	39.38	0.30	1.17	3.6												
			25 Year	39.38	0.30	1.36	4.2												
			100 Year	39.38	0.37	1.65	6.3												
							18" CMP	PIPE 300	62	6325.20	6324.69	0.82%	0.024	1.50	0.3747	0.5687	1.279575	3.3	0.32
			JUNCTION	39.70															
WS B1-B21	66.43	20.64%	10 Year	73.09	0.27	0.85	15.0												
			25 Year	73.09	0.27	1.00	17.6												
			100 Year	73.09	0.33	1.21	26.5												
																			0.00
			JUNCTION	73.09															
WS B22 28-30	0.92	13.17%	10 Year	1.74	0.21	5.64	1.1												
			25 Year	1.74	0.21	6.63	1.3												
			100 Year	1.74	0.26	7.99	1.9												
																			0.00
			JUNCTION	1.74															
WS B1-B22	67.35	20.54%	10 Year	74.83	0.26	0.84	15.0												
			25 Year	74.83	0.26	0.98	17.5												
			100 Year	74.83	0.33	1.19	26.5												
							28"x20" ACMP	PIPE 1637	40	6320.56	6319.47	2.73%	0.024	2.00	0.4014	0.6054	2.4216	7.2	0.09
			JUNCTION	74.92															

CSA 5, JN 95157
Rational Method
XWS B

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B23 31-30	0.35	54.99%	10 Year	11.36	0.54	2.19	0.4												
			25 Year	11.36	0.54	2.56	0.5	OMP INLET	Rim	6321.64									
			100 Year	11.36	0.67	3.09	0.7												
																			0.00
			JUNCTION	11.36															
WS B1-B23	67.70	20.72%	10 Year	74.92	0.27	0.84	15.2												
			25 Year	74.92	0.27	0.98	17.7												
			100 Year	74.92	0.33	1.19	26.8												
							28"x20" ACMP	PIPE 1638	89	6319.41	6318.95	0.52%	0.024	2.00	0.9309	0.8000	3.2	4.7	0.31
			JUNCTION	75.23															
WS B24 30-32	4.81	14.93%	10 Year	4.04	0.22	3.68	3.9												
			25 Year	4.04	0.22	4.33	4.6												
			100 Year	4.04	0.27	5.21	6.9												
																			0.00
			JUNCTION	4.04															
WS B1-B24	72.50	20.33%	10 Year	79.27	0.26	0.82	15.6												
			25 Year	79.27	0.26	0.96	18.2												
			100 Year	79.27	0.33	1.16	27.5												
							28"x20" ACMP	PIPE 1645	150	6316.08	6313.46	1.75%	0.024	2.00	0.5210	0.8000	3.2	4.9	0.51
			JUNCTION	79.79															
WS B25 33-34	7.92	23.05%	10 Year	17.69	0.28	1.75	3.9												
			25 Year	17.69	0.28	2.05	4.6												
			100 Year	17.69	0.36	2.47	7.0												
							12" CMP	PIPE 1639	34	6318.86	6318.55	0.91%	0.024	1.00	1.1580	0.8000	0.8	5.8	0.10
			JUNCTION	17.79															
WS B26 34-35	1.29	18.41%	10 Year	2.78	0.25	4.45	1.4												
			25 Year	2.78	0.25	5.23	1.7	OMP INLET	Rim	6315.50									
			100 Year	2.78	0.31	6.30	2.5												
																			0.00
			JUNCTION	2.78															
WS B25-B26	9.20	22.40%	10 Year	20.57	0.28	1.62	4.2												
			25 Year	20.57	0.28	1.90	4.9												
			100 Year	20.57	0.35	2.29	7.4												
																			0.00
			JUNCTION	20.57															
WS B1-B26	81.71	20.57%	10 Year	79.79	0.26	0.82	17.7												
			25 Year	79.79	0.26	0.95	20.6												
			100 Year	79.79	0.33	1.15	31.1												
							28"x20" ACMP	PIPE 1646	60	6313.40	6313.20	0.33%	0.024	2.00	1.3490	0.8000	3.2	6.4	0.16
			JUNCTION	79.94															

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Rational Method
XWS B

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B27 36-37	3.03	14.87%	10 Year	14.71	0.22	1.92	1.3												
			25 Year	14.71	0.22	2.25	1.5	OMP INLET	Rim	6315.11									
			100 Year	14.71	0.27	2.71	2.2												
																			0.00
			JUNCTION	14.71															
WS B1-B27	84.74	20.36%	10 Year	79.94	0.26	0.82	18.2												
			25 Year	79.94	0.26	0.95	21.2												
			100 Year	79.94	0.33	1.15	32.1												
							28"x20" ACMP	PIPE 1647	36	6313.14	6313.04	0.28%	0.024	2.00	1.5216	0.8000	3.2	6.6	0.09
			JUNCTION	80.03															
WS B28 37-38	8.59	18.93%	10 Year	3.80	0.25	3.80	8.2												
			25 Year	3.80	0.25	4.46	9.6												
			100 Year	3.80	0.31	5.38	14.5												
																			0.00
			JUNCTION	3.80															
WS B1-B28	93.33	20.23%	10 Year	83.84	0.26	0.80	19.5												
			25 Year	83.84	0.26	0.93	22.7	RISER		6313.00	6312.00=RIM EL								
			100 Year	83.84	0.33	1.12	34.3	(BASIN 13)											
							24" CMP	PIPE 1656	53	6309.00	6308.50	0.94%	0.024	2.00	0.8842	0.8000	3.2	7.1	0.12
			JUNCTION	83.96															
WS B29 38-39	1.90	31.79%	10 Year	1.74	0.35	5.63	3.8												
			25 Year	1.74	0.35	6.62	4.5												
			100 Year	1.74	0.44	7.98	6.7												
																			0.00
			JUNCTION	1.74															
WS B1-B29	95.23	20.46%	10 Year	85.70	0.26	0.79	19.8												
			25 Year	85.70	0.26	0.92	23.1												
			100 Year	85.70	0.33	1.11	34.9												
																			0.00
			JUNCTION	85.70															
WS B30 40-41	0.14	30.83%	10 Year	7.33	0.35	2.73	0.1												
			25 Year	7.33	0.35	3.20	0.2	OMP INLET	Rim	6317.77									
			100 Year	7.33	0.43	3.86	0.2												
							18" CMP	PIPE 1650	234	6315.76	6311.24	1.93%	0.024	1.50	0.0091	0.0380	0.0853875	1.8	2.14
			JUNCTION	9.48															
WS B31 42-43	0.74	45.70%	10 Year	21.51	0.47	1.58	0.5												
			25 Year	21.51	0.47	1.85	0.6	OMP INLET	Rim	6313.48									
			100 Year	21.51	0.58	2.24	1.0												
							12" CMP	PIPE 1651	35	6311.98	6311.74	0.69%	0.024	1.00	0.1839	0.3328	0.3328	1.9	0.31
			JUNCTION	21.81															

CSA 5, JN 95157
Rational Method
XWS B

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS B30-B31	0.88	43.32%	10 Year	21.81	0.45	1.57	0.6												
			25 Year	21.81	0.45	1.84	0.7												
			100 Year	21.81	0.56	2.22	1.1												
																			0.00
			JUNCTION	21.81															
WS B32 44-43	0.11	47.75%	10 Year	7.61	0.48	2.68	0.1												
			25 Year	7.61	0.48	3.14	0.2	OMP INLET	Rim	6313.48									
			100 Year	7.61	0.60	3.79	0.2												
																			0.00
			JUNCTION	7.61															
WS B30-B32	0.98	43.80%	10 Year	21.81	0.45	1.57	0.7												
			25 Year	21.81	0.45	1.84	0.8												
			100 Year	21.81	0.56	2.22	1.2												
							18" CMP	PIPE 1652	152	6311.18	6308.46	1.79%	0.024	1.50	0.0495	0.1281	0.288225	2.8	0.90
			JUNCTION	22.71															
WS B33 45-46	0.57	27.59%	10 Year	25.07	0.32	1.47	0.3												
			25 Year	25.07	0.32	1.71	0.3	OMP INLET	Rim	6310.50									
			100 Year	25.07	0.40	2.07	0.5												
																			0.00
			JUNCTION	25.07															
WS B30-B33	1.55	37.86%	10 Year	25.07	0.40	1.47	0.9												
			25 Year	25.07	0.40	1.71	1.1												
			100 Year	25.07	0.50	2.07	1.6												
							18" CMP	PIPE 1653	156	6308.40	6306.35	1.31%	0.024	1.50	0.0759	0.1756	0.3949875	2.7	0.96
			JUNCTION	26.03															
WS B34 47-48	1.76	22.06%	10 Year	42.11	0.28	1.13	0.5												
			25 Year	42.11	0.28	1.32	0.6	OMP INLET	Rim	6308.69									
			100 Year	42.11	0.35	1.59	1.0												
																			0.00
			JUNCTION	42.11															
WS B35 49-50	0.24	30.69%	10 Year	19.06	0.35	1.68	0.1												
			25 Year	19.06	0.35	1.97	0.2	OMP INLET	Rim	6312.46									
			100 Year	19.06	0.43	2.38	0.2												
							18" CMP	PIPE 1654	375	6310.46	6306.69	1.01%	0.024	1.50	0.0133	0.0502	0.11295	1.5	4.30
			JUNCTION	23.37															
WS B34-B35	2.00	23.10%	10 Year	42.11	0.28	1.13	0.6												
			25 Year	42.11	0.28	1.32	0.8												
			100 Year	42.11	0.36	1.59	1.1												
							18" CMP	PIPE 1655	50	6306.63	6306.35	0.56%	0.024	1.50	0.0817	0.1845	0.415125	1.8	0.46
			JUNCTION	42.57															

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Rational Method
XWS B

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	$Qn/(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
	3.55	29.54%	10 Year	42.57	0.34	1.12	1.3												
			25 Year	42.57	0.34	1.31	1.6												
WS B30-B35			100 Year	42.57	0.42	1.58	2.4												
																			0.00
			JUNCTION	42.57															
	98.78	20.79%	10 Year	85.70	0.27	0.79	20.7												
			25 Year	85.70	0.27	0.92	24.2												
WS B1-B35			100 Year	85.70	0.33	1.11	36.6												
								CONFLUENCE NEAR BOUNDARY											0.00
			JUNCTION	85.70															

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Rational Method
XWS C

NOTES	2.850	= P_2 (2 yr, 24 hr rainfall depth based on 35 inches mean annual precip)
	6.0	Initial Time of Concentration for all areas
	0.90	Time of Concentration based on County of El Dorado Drainage Manual (Chapter 2)
	0.10	Time of Concentration determined using Longest Travel Path in Watershed
	c value a composite of pervious and impervious areas	
		**100 Year Storm Assumes 25% increase in C
DATA RUN		= Computed Automatically
		=Determined from Appendix 4.2 of County of El Dorado Drainage Manual
		=Determined from Previous Worksheets
WS C	0%	=Bulking'

y=bx^m

	b	m
10 yrs	7.4567	-0.505
25 yrs	8.7807	-0.507
100 yrs	10.571	-0.506

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS C1 1-2	6.89	20.05%	10 Year	16.49	0.26	1.81	3.2												
			25 Year	16.49	0.26	2.12	3.8												
			100 Year	16.49	0.33	2.56	5.7												
							18" CMP	PIPE 471	298	6308.90	6305.42	1.17%	0.024	1.50	0.2863	0.4625	1.040625	3.7	1.36
			JUNCTION	17.85															
WS C2 2-3	4.53	17.35%	10 Year	48.71	0.24	1.05	1.1												
			25 Year	48.71	0.24	1.22	1.3												
			100 Year	48.71	0.30	1.48	2.0												
																			0.00
			JUNCTION	48.71															
WS C1-C2	11.41	18.98%	10 Year	48.71	0.25	1.05	3.0												
			25 Year	48.71	0.25	1.22	3.5												
			100 Year	48.71	0.31	1.48	5.3												
							18" CMP	PIPE 471	298	6308.90	6305.42	1.17%	0.024	1.50	0.2651	0.4327	0.973575	3.6	1.37
			JUNCTION	50.09															

CSA 5, JN 95157
Rational Method
XWS D

NOTES

2.850	= P_2 (2 yr, 24 hr rainfall depth based on 35 inches mean annual precip)
6.0	Initial Time of Concentration for all areas
0.90	Time of Concentration based on County of El Dorado Drainage Manual (Chapter 2)
0.10	Time of Concentration determined using Longest Travel Path in Watershed

c value a composite of pervious and impervious areas

**100 Year Storm Assumes 25% increase in C

y=bx^m

	b	m
10 yrs	7.4567	-0.505
25 yrs	8.7807	-0.507
100 yrs	10.571	-0.506

DATA RUN

	= Computed Automatically
	=Determined from Appendix 4.2 of County of El Dorado Drainage Manual
	=Determined from Previous Worksheets
WS D 0%	=Bulking'

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ $(D^{8/3}S^{.5})$	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS D1 1-2	20.21	4.00%	10 Year	37.67	0.13	1.19	3.2												
			25 Year	37.67	0.13	1.39	3.7												
			100 Year	37.67	0.16	1.69	5.6												
							18" CMP	PIPE 2934	36	6472.9	6470.0	8.06%	0.024	1.50	0.1067	0.2214	0.4980375	7.5	0.08
			JUNCTION	37.75															
WS D2 2-3	2.79	21.78%	10 Year	7.22	0.27	2.75	2.1												
			25 Year	7.22	0.27	3.22	2.5												
			100 Year	7.22	0.34	3.89	3.7												
																			0.00
			JUNCTION	7.22															
WS D1-D2	23.00	6.15%	10 Year	44.97	0.15	1.09	3.7												
			25 Year	44.97	0.15	1.27	4.4												
			100 Year	44.97	0.19	1.54	6.6												
							18" CMP	PIPE 2935	30	6414.8	6414.6	0.70%	0.024	1.50	0.4257	0.6362	1.43145	3.1	0.16
			JUNCTION	45.13															
WS D3 4-5	1.38	27.17%	10 Year	8.40	0.32	2.55	1.1												
			25 Year	8.40	0.32	2.99	1.3												
			100 Year	8.40	0.40	3.60	2.0												
																			0.00
			JUNCTION	8.40															
WS D1-D3	24.38	7.35%	10 Year	45.13	0.16	1.09	4.2												
			25 Year	45.13	0.16	1.27	4.9												
			100 Year	45.13	0.20	1.54	7.4												
							18" CMP	PIPE 2936	60	6414.8	6410.8	6.72%	0.024	1.50	0.1547	0.2934	0.66015	7.5	0.13
			JUNCTION	45.27															
WS D4 5-6	4.74	21.77%	10 Year	9.02	0.27	2.46	3.2												
			25 Year	9.02	0.27	2.88	3.7												
			100 Year	9.02	0.34	3.47	5.6												
																			0.00
			JUNCTION	9.02															
WS A1-A4	29.12	9.69%	10 Year	45.27	0.18	1.09	5.6												
			25 Year	45.27	0.18	1.27	6.6												
			100 Year	45.27	0.22	1.54	9.9												
							18" CMP	PIPE 381	40	6373.1	6372.1	2.45%	0.024	1.50	0.3417	0.5308	1.1943	5.5	0.12
			JUNCTION	45.39															

CSA 5, JN 95157
Rational Method
XWS D

SUBWS & NODES	Area (acres)	% Imperviousness		Tc (min)	Composite C	Rainfall Intensity (in/hr)	Peak Runoff (cfs)	Conveyance	Flow Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	n	Pipe Diameter (ft)	Qn/ ($D^{8/3}S^{.5}$)	A/D^2	Area (ft^2)	Velocity (ft/s)	Travel Time (min)
WS D5 7-8	2.69	21.77%	10 Year	16.23	0.27	1.83	1.3												
			25 Year	16.23	0.27	2.14	1.6												
			100 Year	16.23	0.34	2.58	2.4												
																			0.00
			JUNCTION	16.23															

UNIT HYDROGRAPH METHOD RESULTS
(Existing Conditions)

Global Summary Results for Run "100Yr-24Hr"

Project: CSA5 EWS 2015 Simulation Run: 100Yr-24Hr

Start of Run: 01Jul2000, 12:00
End of Run: 03Jul2000, 00:00
Compute Time: 02Dec2015, 14:32:27

Basin Model: EWS 2015
Meteorologic Model: 100yr-24hr
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage A... (MI2)	Peak Disch... (CFS)	Time of Peak	Volume (AC-FT)
EWS A	0.2898125	26.66	02Jul2000, 01:04	17.7885
EWS B	0.1543438	32.96	02Jul2000, 00:58	16.8055
EWS C	0.0178281	4.47	02Jul2000, 00:34	1.7852
EWS D	0.0496966	15.92	02Jul2000, 00:31	5.2305
EWS to BSN 13	0.1458281	30.40	02Jul2000, 00:57	15.4827
EWS to BSN 14	0.2338750	16.48	02Jul2000, 00:53	11.2749
EWS to BSN 15	0.0381719	17.54	02Jul2000, 00:16	4.5125
EWS to BSN 16	0.0166406	6.75	02Jul2000, 00:21	1.9808

Global Summary Results for Run "25Yr-1Hr"

Project: CSA5 EWS 2015   Simulation Run: 25Yr-1Hr

Start of Run: 01Jul2000, 12:00   Basin Model: EWS 2015
End of Run: 01Jul2000, 18:00   Meteorologic Model: 25yr-1hr
Compute Time: 02Dec2015, 14:32:37   Control Specifications: 1 Hour

Show Elements: All Elements   Volume Units: IN AC-FT   Sorting: Hydrologic

Hydrologic Element	Drainage A... (MI2)	Peak Disch... (CFS)	Time of Peak	Volume (AC-FT)
EWS A	0.28981	16.95	01Jul2000, 13:28	1.9194
EWS B	0.15434	17.70	01Jul2000, 13:24	1.8823
EWS C	0.0178281	2.72	01Jul2000, 13:02	0.1989
EWS D	0.0496966	4.72	01Jul2000, 12:59	0.3255
EWS to BSN 13	0.14583	16.54	01Jul2000, 13:23	1.7306
EWS to BSN 14	0.23388	11.69	01Jul2000, 13:21	1.1881
EWS to BSN 15	0.0381719	10.41	01Jul2000, 12:45	0.5076
EWS to BSN 16	0.0166406	3.97	01Jul2000, 12:50	0.2230

Global Summary Results for Run "10Yr-6Hr"

Project: CSA5 EWS 2015 Simulation Run: 10Yr-6Hr

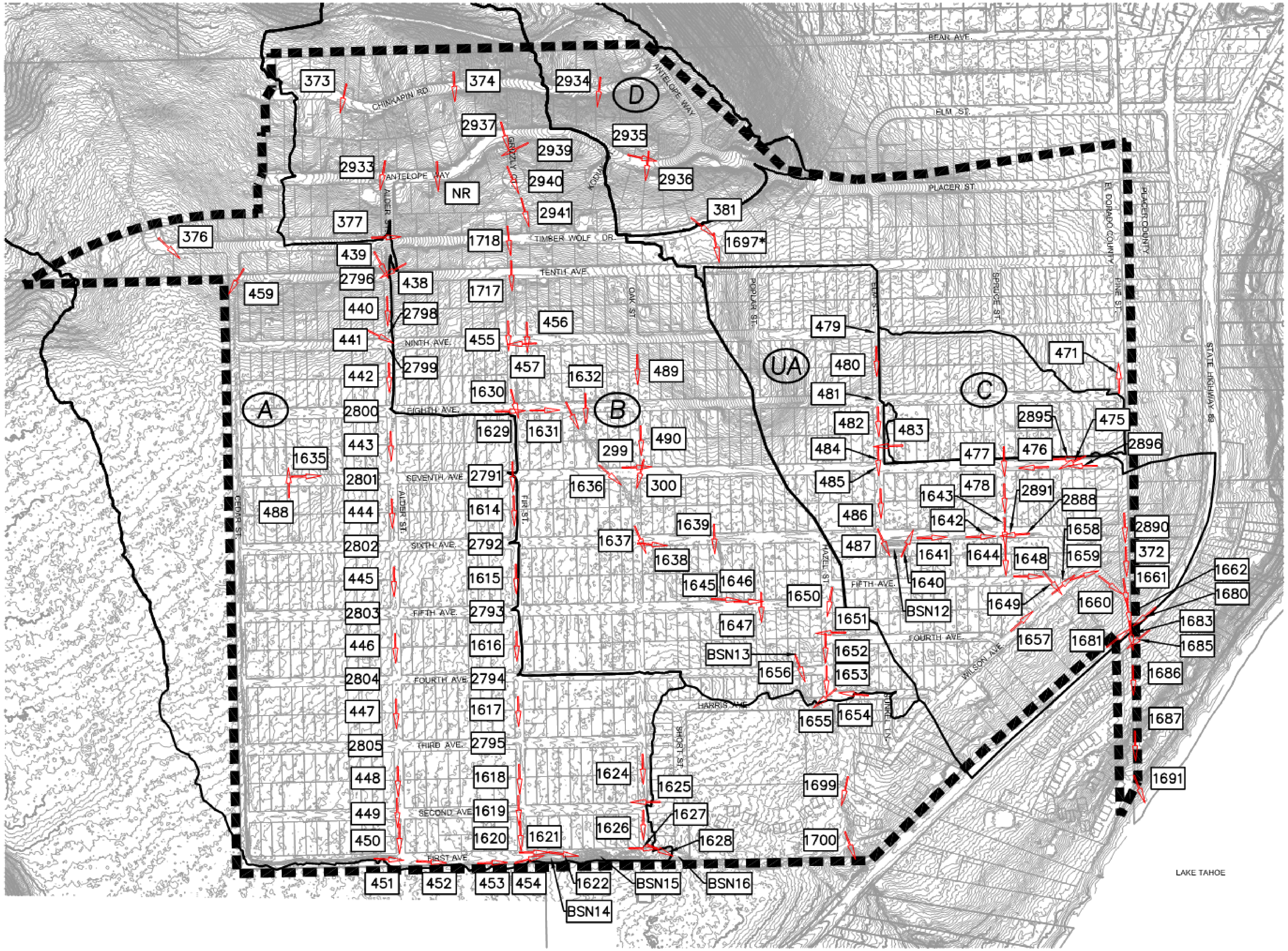
Start of Run: 01Jul2000, 12:00
End of Run: 02Jul2000, 00:00
Compute Time: 02Dec2015, 14:32:32

Basin Model: EWS 2015
Meteorologic Model: 10yr-6hr
Control Specifications: 6 Hour

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage A... (MI2)	Peak Disch... (CFS)	Time of Peak	Volume (AC-FT)
EWS A	0.2898125	16.78	01Jul2000, 15:58	3.9388
EWS B	0.1543438	17.14	01Jul2000, 15:54	3.8627
EWS C	0.0178281	2.39	01Jul2000, 15:32	0.4082
EWS D	0.0496966	4.12	01Jul2000, 15:29	0.6945
EWS to BSN 13	0.1458281	15.93	01Jul2000, 15:53	3.5513
EWS to BSN 14	0.2338750	11.15	01Jul2000, 15:51	2.4381
EWS to BSN 15	0.0381719	8.78	01Jul2000, 15:15	1.0417
EWS to BSN 16	0.0166406	3.38	01Jul2000, 15:20	0.4575

HYDRAULIC RESULTS
(Existing Conditions)



LEGEND

D	WATERSHED ID
	WATERSHED BOUNDARY
2941	EXISTING PIPE ID
BSN16	EXISTING BASIN ID
	EXISTING PIPE FLOW DIRECTION
	CONTOUR WITH ELEVATION
	PROJECT AREA
	COUNTY ROW, CALTRANS ROW, OR PROPERTY LINES
CMP	CORRUGATED METAL PIPE
HDPE	HIGH DENSITY POLYETHELYNE
P	PERFORATED
DI	DRAINAGE INLET
CMP I OR CMP R	CORRUGATED METAL PIPE INLET OR RISER
SDMH	STORM DRAIN MANHOLE
CHNL	CHANNEL
NR	NO REFERENCE
UA	UPPER AREA
*	CONTINUATION OF STORM DRAIN SYSTEM NORTH ALONG TENTH AVENUE NOT SHOWN

0 250' 500'
SCALE

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

CSA 5
EROSION CONTROL PROJECT

PIPE LOCATION MAP

DATE: 12/2015 | PROJECT NO.: 95157 | BY: ALD

EXHIBIT
1

WATERSHED	PIPE ID	SIZE / MAT'L	INLET FEATURE	OUTLET FEATURE
UPPER AREA WATERSHED	2895	18" HDPE	CMP I	CMP I
	475	12" CMP	CMP I	CMP I
	2896	18" HDPE	CMP I	CMP I
	476	18" CMP	CMP I	CMP I
	477	12" CMP	CMP I	CMP I
	478	18" CMP	CMP I	CMP I
	1643	18" CMP	CMP I	CMP I
	479	18" CMP	CMP I	PIPE 480
	480	18" P CMP	PIPE 479	CMP I
	481	18" CMP	CMP I	PIPE 482
	482	18" P CMP	PIPE 481	CMP I
	483	12" CMP	CMP I	CMP I
	484	18" P CMP	CMP I	PIPE 485
	485	18" CMP	PIPE 484	CMP I
	486	18" P CMP	CMP I	CMP I
	487	24" CMP	CMP I	BASIN 12
	1640	24" CMP	CMP R	CMP I
	1641	24" CMP	CMP I	CMP I
	1642	24" CMP	CMP I	CMP I
	2888	18" P HDPE	CMP I	CMP I
	2891	18" P HDPE	CMP I	CMP I
	1644	24" CMP	CMP I	CMP I
	1648	24" CMP	CMP I	CMP I
	1649	24" CMP	CMP I	CMP I
	1657	18" CMP	CMP I	CMP I
	1658	30" CMP	CMP I	CMP I
	1659	30" CMP	CMP I	CMP I
	1660	30" CMP	CMP I	SDMH
	2890	18" P HDPE	DI	CMP I
	372	18" CMP	CMP I	CMP I
	1661	30" CMP	CMP I	SDMH
	1662	35"x24" CMP	SDMH	SDMH
	1680	28"x20" CMP	DI	SDMH
	1681	18" CMP	DI	SDMH
	1683	42"x29" CMP	SDMH	SDMH
	1685	24" CMP	DI	SDMH
	1686	36" CMP	SDMH	SDMH
	1687	36" CMP	SDMH	SDMH
	1691	36" CMP	SDMH	LAKE TAHOE
WATERSHED A	376	18" CMP	CHNL	CHNL
	459	24" CMP	CHNL	CHNL
	438	18" CMP	CMP I	SDMH
	439	18" CMP	CMP I	SDMH
	2796	18" CMP	SDMH	PIPE 440
	440	18" P CMP	PIPE 2796	PIPE 2798
	2798	18" CMP	PIPE 440	SDMH
	441	18" CMP	CMP I	SDMH
	2799	18" CMP	SDMH	PIPE 442
	442	18" P CMP	PIPE 2799	CMP I
	2800	18" CMP	CMP I	PIPE 443
	443	18" P CMP	PIPE 2800	CMP I
	488	18" CMP	CMP I	CMP I
	1635	18" CMP	CMP I	CHNL
	2801	18" CMP	CMP I	PIPE 444
	444	18" P CMP	PIPE 2801	CMP I
	2802	18" CMP	CMP I	PIPE 445
	445	18" P CMP	PIPE 2802	CMP I
	2803	18" CMP	CMP I	PIPE 446
	446	18" P CMP	PIPE 2803	CMP I
	2804	24" CMP	CMP I	PIPE 447
	447	18" P CMP	PIPE 2804	CMP I
	2805	28"x20" CMP	CMP I	PIPE 448
	448	18" P CMP	PIPE 2805	CMP I
	449	24" CMP	CMP I	CMP I
	450	24" P CMP	CMP I	DI
	451	36" CMP	CHNL	DI
	452	36" CMP	DI	DI

WATERSHED	PIPE ID	SIZE / MAT'L	INLET FEATURE	OUTLET FEATURE
WATERSHED A (CON'T)	453	36" CMP	DI	DI
	454	36" CMP	DI	BASIN 14
	2791	18" CMP	CMP I	PIPE 1614
	1614	18" P CMP	PIPE 2791	CMP I
	2792	18" CMP	CMP I	PIPE 1615
	1615	18" P CMP	PIPE 2792	CMP I
	2793	18" CMP	CMP I	PIPE 1616
	1616	18" P CMP	PIPE 2793	CMP I
	2794	24" CMP	CMP I	PIPE 1617
	1617	24" P CMP	PIPE 2794	CMP I
	2795	24" CMP	CMP I	PIPE 1618
	1618	24" P CMP	PIPE 2795	CMP I
	1619	24" CMP	CMP I	CMP I
	1620	24" P CMP	CMP I	CMP I
	1621	24" CMP	CMP I	SDMH
	1622	24" CMP	SDMH	BASIN 15
	1624	18" CMP	CMP I	CMP I
	1625	12" CMP	CMP I	CMP I
	1626	18" CMP	CMP I	CMP I
	1627	18" CMP	CMP I	CMP I
	1628	24" CMP	CMP I	BASIN 16
WATERSHED B	373	18" CMP	CHNL	CHNL
	2933	18" CMP	CHNL	CHNL
	377	18" CMP	CHNL	CHNL
	374	18" CMP	CHNL	CHNL
	NR	18" CMP	CHNL	CHNL
	378	18" CMP	CHNL	CHNL
	2937	18" CMP	CHNL	CHNL
	2939	18" HPDE	CHNL	CHNL
	2940	18" HDPE	CMP I	CMP I
	2941	18" HPDE	CMP I	CHNL
	1718	18" CMP	CHNL	CHNL
	1717	21"x15" CMP	CHNL	CHNL
	455	28"x20" CMP	CHNL	CHNL
	456	12" CMP	CMP I	CMP I
	457	21"x15" CMP	CMP I	CHNL
	1630	28"x20" CMP	CHNL	CMP I
	1629	18" CMP	CMP I	CMP I
	1631	28"x20" CMP	CMP I	CHNL
	1632	12" CMP	CHNL	CHNL
	489	18" CMP	CMP I	CMP I
	490	18" CMP	CMP I	CMP I
	299	12" CMP	CMP I	CMP I
	300	18" CMP	CMP I	CHNL
	1636	28"x20" CMP	CHNL	CHNL
	1637	28"x20" CMP	CHNL	CMP I
	1638	28"x20" CMP	CMP I	CHNL
	1645	28"x20" CMP	CHNL	CMP I
	1639	12" CMP	CHNL	CHNL
	1646	28"x20" CMP	CMP I	CMP I
	1647	28"x20" CMP	CMP I	CHNL/BASIN 13
	1656	24" CMP	CMP R	CHNL
	1650	18" CMP	CMP I	CMP I
	1651	12" CMP	CMP I	CMP I
	1652	18" CMP	CMP I	CMP I
	1653	18" CMP	CMP I	PIPE 1655
	1654	18" CMP	CMP I	CMP I
	1655	18" CMP	CMP I	CHNL
	1699	24" CMP	CHNL	CHNL
	1700	36" CMP	CHNL	CHNL
WS C	471	18" CMP	CMP I	CMP I
WS D	2934	18" CMP	CHNL	CHNL
	2935	12" CMP	DI	CHNL
	2936	18" CMP	CHNL	UNKNOWN
	381	18" CMP	CHNL	CMP I
	1697	18" CMP	CMP I	CMP I

EL DORADO COUNTY CALIFORNIA

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

CSA 5
EROSION CONTROL PROJECT

PIPE TABLES

EXHIBIT 2

DATE: 12/2015 | PROJECT NO.: 95157 | BY: ALD

CSA 5 JN 95157
WS A, Rational Method
PipeCalcs

Pipe ID	Material	Dia	n	Slope*100	s	A	R	Q	Qpeak (25yr1Hr)	% of Capacity
PIPE 376	18" CMP	1.50	0.024	0.83%	0.0083	1.76715	0.375	5.2	8.0	154%
PIPE 459	24" CMP	2.00	0.024	1.60%	0.0160	3.14159	0.5	15.5	0.7	4%
PIPE 451	36" CMP	3.00	0.024	5.38%	0.0538	7.06858	0.75	84.1	14.7	17%
PIPE 438	18" CMP	1.50	0.024	0.52%	0.0052	1.76715	0.375	4.1	0.1	3%
PIPE 439	18" CMP	1.50	0.024	1.11%	0.0111	1.76715	0.375	6.0	1.2	20%
PIPE 2796	18" CMP	1.50	0.024	8.97%	0.0897	1.76715	0.375	17.1	1.3	8%
PIPE 441	18" CMP	1.50	0.024	1.86%	0.0186	1.76715	0.375	7.8	1.3	17%
PIPE 2799	18" CMP	1.50	0.024	2.10%	0.0210	1.76715	0.375	8.3	2.0	24%
PIPE 2800	18" CMP	1.50	0.024	0.59%	0.0059	1.76715	0.375	4.4	3.3	74%
PIPE 2801	18" CMP	1.50	0.024	0.53%	0.0053	1.76715	0.375	4.2	5.1	123%
PIPE 2802	18" CMP	1.50	0.024	1.46%	0.0146	1.76715	0.375	6.9	5.4	78%
PIPE 2803	18" CMP	1.50	0.024	1.24%	0.0124	1.76715	0.375	6.4	6.6	104%
PIPE 2804	24" CMP	2.00	0.024	1.04%	0.0104	3.14159	0.5	12.6	7.9	63%
PIPE 2805	24" CMP	2.00	0.024	0.93%	0.0093	3.14159	0.5	11.9	9.1	77%
PIPE 449	24" CMP	2.00	0.024	0.26%	0.0026	3.14159	0.5	6.2	10.3	165%
PIPE 450	24" CMP	2.00	0.024	0.29%	0.0029	3.14159	0.5	6.6	11.0	167%
PIPE 452	36" CMP	3.00	0.024	0.99%	0.0099	7.06858	0.75	36.0	24.2	67%
PIPE 453	36" CMP	3.00	0.024	0.99%	0.0099	7.06858	0.75	36.1	24.1	67%
PIPE 454	36" CMP	3.00	0.024	1.76%	0.0176	7.06858	0.75	48.0	24.0	50%
PIPE 2791	18" CMP	1.50	0.024	0.38%	0.0038	1.76715	0.375	3.5	2.4	68%
PIPE 2792	18" CMP	1.50	0.024	0.38%	0.0038	1.76715	0.375	3.5	4.6	131%
PIPE 2793	18" CMP	1.50	0.024	0.63%	0.0063	1.76715	0.375	4.5	6.4	142%
PIPE 2794	24" CMP	2.00	0.024	0.75%	0.0075	3.14159	0.5	10.6	8.3	78%
PIPE 2795	24" CMP	2.00	0.024	0.26%	0.0026	3.14159	0.5	6.2	9.8	158%
PIPE 1619	24" CMP	2.00	0.024	0.26%	0.0026	3.14159	0.5	6.2	11.3	181%
PIPE 1620	24" CMP	2.00	0.024	0.24%	0.0024	3.14159	0.5	6.1	12.6	207%
PIPE 1621	24" CMP	2.00	0.024	0.90%	0.0090	3.14159	0.5	11.7	12.4	107%
PIPE 1624	18" CMP	1.50	0.024	1.11%	0.0111	1.76715	0.375	6.0	2.4	40%
PIPE 1625	12" CMP	1.00	0.024	1.06%	0.0106	0.7854	0.25	2.0	0.8	40%
PIPE 1626	18" CMP	1.50	0.024	0.51%	0.0051	1.76715	0.375	4.1	5.2	127%
PIPE 1627	18" CMP	1.50	0.024	0.96%	0.0096	1.76715	0.375	5.6	6.3	112%
PIPE 1628	24" CMP	2.00	0.024	1.49%	0.0149	3.14159	0.5	15.0	4.6	31%

CSA 5 JN 95157
WS B, Rational Method
PipeCalcs

Pipe ID	Material	Dia	n	Slope*100	s	A	R	Q	Qpeak (25yr1Hr)	% of Capacity
PIPE 373	18" CMP	1.50	0.024	1.00%	0.0100	1.76715	0.375	5.7	1.46	26%
PIPE 375	18" CMP	1.50	0.024	1.00%	0.0100	1.76715	0.375	5.7	2.92	51%
PIPE 377	18" CMP	1.50	0.024	3.29%	0.0329	1.76715	0.375	10.3	4.72	46%
PIPE NR	18" CMP	1.50	0.024	1.00%	0.0100	1.76715	0.375	5.7	1.70	30%
PIPE 374	18" CMP	1.50	0.024	7.25%	0.0725	1.76715	0.375	15.4	2.98	19%
PIPE 2937	18" CMP	1.50	0.024	1.33%	0.0133	1.76715	0.375	6.6	4.08	62%
PIPE 1718	18" CMP	1.50	0.024	10.73%	0.1073	1.76715	0.375	18.7	13.13	70%
PIPE 1717	21"x15" ACMP	1.50	0.024	6.51%	0.0651	1.76715	0.375	14.6	14.94	103%
PIPE 455	28"x20" ACMP	2.00	0.024	5.15%	0.0515	3.14159	0.5	27.9	15.73	56%
PIPE 456	12" CMP	1.00	0.024	0.62%	0.0062	0.7854	0.25	1.5	1.75	115%
PIPE 457	21"x15" ACMP	1.50	0.024	0.38%	0.0038	1.76715	0.375	3.5	2.46	70%
PIPE 1630	28"x20" ACMP	2.00	0.024	2.76%	0.0276	3.14159	0.5	20.4	17.14	84%
PIPE 1629	18" CMP	1.50	0.024	1.20%	0.0120	1.76715	0.375	6.3	0.54	9%
PIPE 1631	28"x20" ACMP	2.00	0.024	0.55%	0.0055	3.14159	0.5	9.1	17.41	192%
PIPE 1632	12" CMP	1.00	0.024	1.00%	0.0100	0.7854	0.25	1.9	0.70	36%
PIPE 1636	28"x20" ACMP	2.00	0.024	0.83%	0.0083	3.14159	0.5	11.2	14.53	130%
PIPE 489	18" CMP	1.50	0.024	6.26%	0.0626	1.76715	0.375	14.3	0.95	7%
PIPE 490	18" CMP	1.50	0.024	1.42%	0.0142	1.76715	0.375	6.8	2.22	33%
PIPE 229	12" CMP	1.00	0.024	0.59%	0.0059	0.7854	0.25	1.5	0.54	37%
PIPE 300	18" CMP	1.50	0.024	0.82%	0.0082	1.76715	0.375	5.2	4.17	81%
PIPE 1637	28"x20" ACMP	2.00	0.024	2.73%	0.0273	3.14159	0.5	20.3	17.53	86%
PIPE 1638	28"x20" ACMP	2.00	0.024	0.52%	0.0052	3.14159	0.5	8.8	17.71	200%
PIPE 1645	28"x20" ACMP	2.00	0.024	1.75%	0.0175	3.14159	0.5	16.2	18.22	112%
PIPE 1639	12" CMP	1.00	0.024	0.91%	0.0091	0.7854	0.25	1.8	4.61	249%
PIPE 1646	28"x20" ACMP	2.00	0.024	0.33%	0.0033	3.14159	0.5	7.1	20.61	290%
PIPE 1647	28"x20" ACMP	2.00	0.024	0.28%	0.0028	3.14159	0.5	6.5	21.22	328%
PIPE 1656	24" CMP	2.00	0.024	0.94%	0.0094	3.14159	0.5	11.9	22.72	190%
PIPE 1650	18" CMP	1.50	0.024	1.93%	0.0193	1.76715	0.375	7.9	0.16	2%
PIPE 1651	12" CMP	1.00	0.024	0.69%	0.0069	0.7854	0.25	1.6	0.63	40%
PIPE 1652	18" CMP	1.50	0.024	1.79%	0.0179	1.76715	0.375	7.6	0.81	11%
PIPE 1653	18" CMP	1.50	0.024	1.31%	0.0131	1.76715	0.375	6.5	1.07	16%
PIPE 1654	18" CMP	1.50	0.024	1.01%	0.0101	1.76715	0.375	5.7	0.16	3%
PIPE 1655	18" CMP	1.50	0.024	0.56%	0.0056	1.76715	0.375	4.3	0.75	18%

CSA 5 JN 95157
WS C Rational Method
PipeCalcs

Pipe ID	Material	Dia	n	Slope*100	s	A	R	**Q**	Qpeak (25yr1Hr)	% of Capacity
PIPE 471	18" CMP	1.50	0.024	1.17%	0.0117	1.76715	0.375	6.2	3.80	62%
PIPE 471	18" CMP	1.50	0.024	1.17%	0.0117	1.76715	0.375	6.2	3.52	57%

CSA 5 JN 95157
WS D, Rational Method
PipeCalcs

Pipe ID	Material	Dia	n	Slope*100	s	A	R	Q	Qpeak (25yr1Hr)	% of Capacity
PIPE 2934	18" CMP	1.50	0.024	8.06%	0.0806	1.76715	0.375	16.2	3.7	23%
PIPE 2935	18" CMP	1.50	0.024	0.70%	0.0070	1.76715	0.375	4.8	4.4	92%
PIPE 2936	18" CMP	1.50	0.024	6.72%	0.0672	1.76715	0.375	14.8	4.9	33%
PIPE 381	18" CMP	1.50	0.024	2.45%	0.0245	1.76715	0.375	8.9	6.6	74%

PLRM
(Existing Conditions)

****

POLLUTTANT LOAD REDUCTION MODEL (PLRM) - VERSION 2.0 (Build 2.0.006)

****

****

Global Information

****

Project Name:.................... CSA5XWSv2
Scenario Name:................... Scenario1
Number of years in simulation :.. 6
Met Grid # simulated:............ 274
Working Directory:............... \\CDAData5\TD-SLT-Engineering\PROJECTS\95959 PLR\PLRP Analyses\V2ModelRuns\Projects\Project4\Scenario1\
Date First Created:.............. 12/2/2015 3:10:04 PM
Date Computed:................... 12/2/2015 3:35:19 PM

****

Catchments

****

A	Volume(ac-ft/yr)	TSS(lbs/yr)	FSP(lbs/yr)	TP(lbs/yr)	SRP(lbs/yr)	TN(lbs/yr)	DIN(lbs/yr)
Roads	17.5	15848.5	10295.0	33.0	3.2	130.5	18.2
Single Family Residential	8.1	1177.0	418.5	9.8	3.0	36.7	3.0
Multi Family Residential	0.1	39.6	23.0	0.2	0.0	0.8	0.1
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A Total	25.7	17065	10736	43	6	168	21

B	Volume(ac-ft/yr)	TSS(lbs/yr)	FSP(lbs/yr)	TP(lbs/yr)	SRP(lbs/yr)	TN(lbs/yr)	DIN(lbs/yr)
Roads	16.3	11003.4	6300.1	24.8	2.5	116.7	15.6
Single Family Residential	8.1	1183.6	421.1	9.8	3.1	36.9	3.0
Multi Family Residential	0.3	96.0	55.5	0.4	0.1	1.9	0.3
CICU	0.0	35.6	22.4	0.1	0.0	0.3	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B Total	24.7	12319	6799	35	6	156	19

C	Volume(ac-ft/yr)	TSS(lbs/yr)	FSP(lbs/yr)	TP(lbs/yr)	SRP(lbs/yr)	TN(lbs/yr)	DIN(lbs/yr)
Roads	1.0	686.0	418.3	1.5	0.2	6.7	0.9
Single Family Residential	0.8	115.1	41.0	1.0	0.3	3.6	0.3
Multi Family Residential	0.1	43.4	25.2	0.2	0.0	0.8	0.1
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C Total	1.9	845	484	3	0	11	1

D	Volume(ac-ft/yr)	TSS(lbs/yr)	FSP(lbs/yr)	TP(lbs/yr)	SRP(lbs/yr)	TN(lbs/yr)	DIN(lbs/yr)
Roads	2.5	2928.5	1741.4	5.8	0.6	22.0	3.0
Single Family Residential	1.1	162.4	58.1	1.3	0.4	5.0	0.4
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D Total	3.6	3091	1800	7	1	27	3

UA	Volume(ac-ft/yr)	TSS(lbs/yr)	FSP(lbs/yr)	TP(lbs/yr)	SRP(lbs/yr)	TN(lbs/yr)	DIN(lbs/yr)
Roads	10.4	10235.2	6462.9	21.0	2.0	82.0	11.3
Single Family Residential	3.6	513.3	183.5	4.3	1.3	16.0	1.3
Multi Family Residential	0.3	91.7	53.2	0.4	0.1	1.7	0.3
CICU	1.5	1204.6	758.8	2.9	1.5	10.0	1.2
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UA Total	15.7	12045	7458	28	5	110	14

****
Storm Water Treatment
****

****
Scenario Summary
****

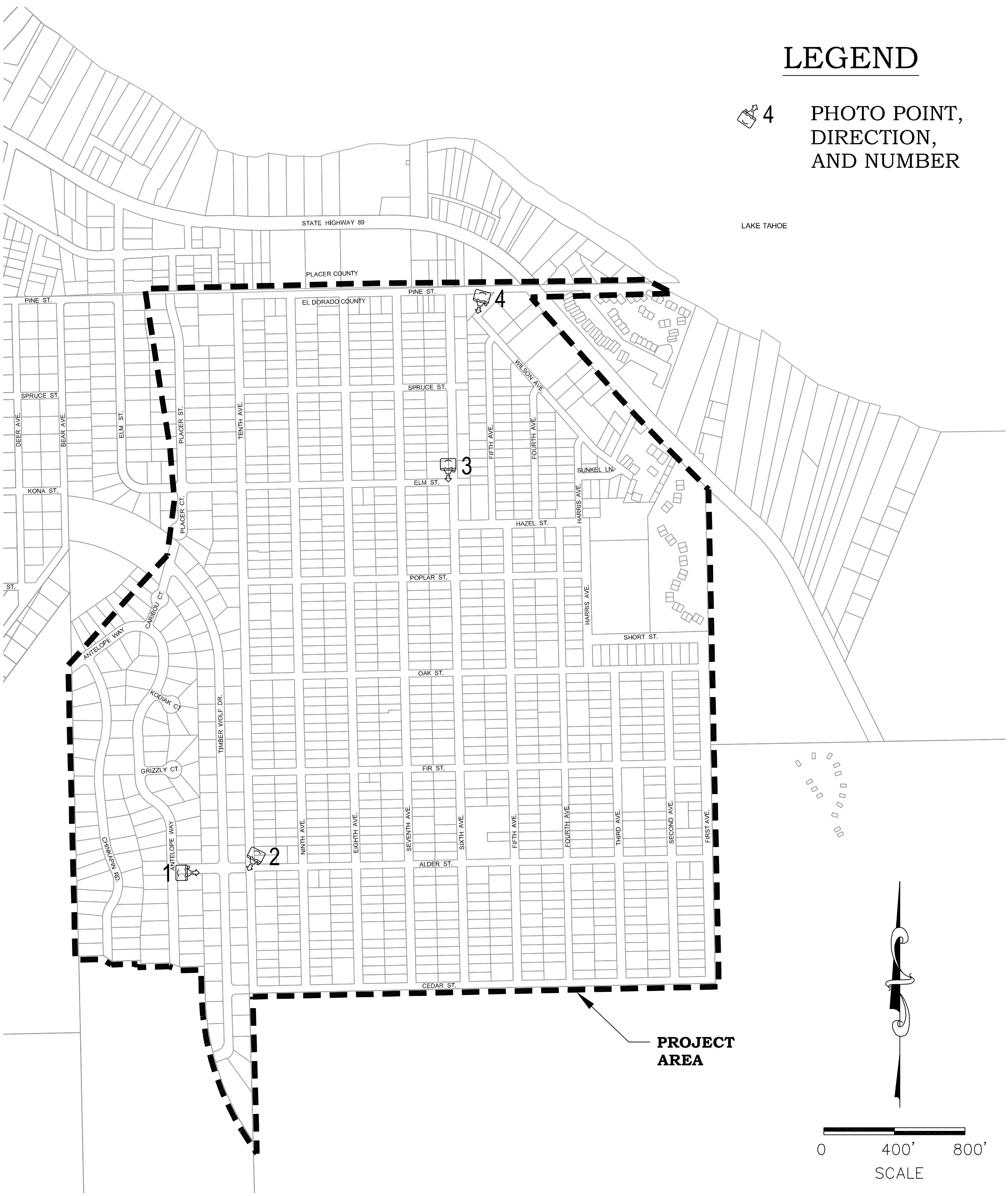
Average Annual Hydrology	acre-feet/yr	inches/yr
Total Precipitation	1049.9	33.4
Evaporation Loss	258.1	8.2
System Surface Discharge..	71.6	2.3
Percolation to Groundwater	721.6	22.9
Continuity Error..........	0%	
Percent Surface Runoff....	7%	

Average Annual Surface Loading

Name	Volume(ac-ft/yr)	TSS(lbs/yr)	FSP(lbs/yr)	TP(lbs/yr)	SRP(lbs/yr)	TN(lbs/yr)	DIN(lbs/yr)
Outfall1	50.4	29390.4	17540.1	78.1	12.0	323.7	40.3
Outfall2	15.7	12045.5	7458.8	28.5	4.9	109.8	14.0
Outfall3	5.5	3934.9	2283.7	9.8	1.5	38.2	4.7
Scenario Total	71.6	45370.8	27282.6	116.4	18.4	471.7	59.0

Appendix C

PROBLEM AREA PHOTOGRAPHS



COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

CSA 5
EROSION CONTROL PROJECT

PROBLEM AREA PHOTO POINTS

EXHIBIT

1

DATE:	PROJECT NO.:	BY:
10/2015	95157	ALD

CSA 5 ECP
Photographs of Typical Problems

Photo Point #1

Alder Street
October 2015
On Alder Street looking east. Upslope runoff creating unstable, erosive shoulder conditions.

Photo Point #2

Tenth Avenue and Alder Street
October 2015
On Tenth Avenue and Alder Street looking southwest. Eroding cut slope. CMP inlet does not have sediment trapping capabilities which is typical of those in the subdivision.

Photo Point #3

Sixth Avenue and Elm Street
October 2015
On Sixth Avenue and Elm Street looking south. Upslope runoff creating unstable, erosive shoulder condition.

Photo Point #4

Wilson Avenue
June 2015
On Wilson Avenue looking southwest. Parking on the dirt shoulder has created ponding and tracking of mud and dirt onto the roadway.

Appendix D

BMP TOOLBOX

Description:

Revegetation is the establishment of vegetation, both native and adapted, to control erosion with and without structural solutions. Vegetation is a natural soil stabilization technique and can be established in combination with other source controls such as mulches.

Issues and Concerns:

Maintenance:

- May require periodic re-treatment with seed, amendments, and/or mulch.

Advantages:

- Inexpensive
- Aesthetic
- Low maintenance
- Natural
- Self-sustaining

Disadvantages:

- May not be viable for all sites.
- May require some engineering solutions (toe protection, retaining walls) to reduce slope.
- Most effective on slopes with ratios of 3:1 and less.
- Does not resist snow removal activities.

Goals		Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding slopes in order to reduce the coarse, fine and very fine sediment in runoff.

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

ROM Construction Cost: $3/ft^2

Cost to Provide Source Control: $0.10/ft^2

Cost to Reduce Runoff Volume: NA

Cost to Reduce Runoff Peak: NA

Cost to Reduce Sediment: NA

Field Photo:

Description:

An AC Pavement section installed over a dirt road or driveway is a source control BMP intended stabilize and therefore to eliminate a source of sediment for transport. Runoff from the paved surface must be conveyed to a conveyance and/or infiltration system.

Issues and Concerns:

Maintenance:

- Periodically inspect the condition of asphalt and seal coat the surface every 2 to 4 years.
- Fill cracks and holes in the asphalt to prevent water from undermining the integrity of the asphalt base.

Advantages:

- Pavement improves the aesthetic appearance of the road or property.
- Pavement stabilizes sediment from the dirt surface and reduces the mobilization of sediment by either runoff or tracking of vehicles.

Disadvantages:

- Does not reduce the volume of runoff or the peak flow.

Goals		Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding channels/ditches in order to reduce the coarse, fine and very fine sediment in runoff.

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 15 years

ROM Construction Cost: \$16/ft^2

Cost to Provide Source Control: \$1.07/ft^2

Cost to Reduce Runoff Volume: NA

Cost to Reduce Runoff Peak: NA

Cost to Reduce Sediment: NA

Detail:

Key Design Considerations:

1. Runoff from the paved surface must be conveyed to a conveyance and/or infiltration system.
2. The grade and super-elevation of the paved road or driveway must be considered to assure that runoff does not create erosion.
3. At a minimum, the AC pavement section should consist of an asphalt surface course of at least 2 1/2 inches over 4 inches of aggregate base for a driveway and an asphalt surface course of at least 2 1/2 inches over 8 inches of aggregate base for a roadway.

Description:

AC Dike is constructed of asphalt concrete and used to collect and convey surface runoff from paved streets, parking lots, or other impervious surfaces.

Field Photo:

Photo Not Available

Issues and Concerns:

Maintenance:

- Periodic inspection of structure's integrity
- Annual sweeping to prevent debris from blocking the natural flow path
- Dike backing replacement

Advantages:

- Open channel, stable conveyance
- Reduces road shoulder degradation and roadside erosion
- Relative ease of sediment removal through frequent sweeping and/or vactoring
- Urbanizes neighborhood appearance
- Promotes vegetation behind dike

Disadvantages:

- Relative high cost
- Concentrates runoff
- Urbanizes neighborhood appearance
- Reduces infiltration
- Easily damaged from snow removal operations

Key Design Considerations:

1. Designer should take into account runoff volume, flow velocities, and areas/parcels to discharge collected water.
2. The existing roadway longitudinal and lateral slope conditions, soil type, soil conditions, snow storage allowance, barriers for unpaved areas, minimum setback, impact to downstream areas should all be considered in the design of the dike.

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding channels/ditches in order to reduce the coarse, fine and very fine sediment in runoff.

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

ROM Construction Cost: $43/ft^2

Cost to Provide Source Control: $2.87/ft^2

Cost to Reduce Runoff Volume: NA

Cost to Reduce Runoff Peak: NA

Cost to Reduce Sediment: NA

Description:

A seed and blanket channel is identical to a grass-lined swale in that once the vegetation is established and the biodegradable blanket is gone, the channel is a shallow, vegetation-lined depression in the earth's surface to convey runoff and stabilize the soil. The seed and blanket channel also allows for the infiltration of runoff as flow is being conveyed.

Field Photo:

Issues and Concerns:

Maintenance:

- Periodic inspection for side slope stability, debris and sediment accumulation.
- Periodic mowing.

Advantages:

- Minimize erosion, stabilize soils, and reduce sediment entering runoff.
- Allows for infiltration of runoff and precipitation.

Disadvantages:

- Not suitable for dry locations.
- Not suitable for high velocities.

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding channels/ditches in order to reduce the coarse, fine and very fine sediment in runoff.
2.	Reduce the storm water runoff volume from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Infiltrate a portion of the 25-year 1-hour storm water volume.
3.	Reduce the peak flow from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Reduce the peak discharge of the 25-year 1-hour storm by infiltrating a portion of the runoff volume.

Key Design Considerations:

1. Designer should take into account runoff volume and flow velocities.
2. Designer should utilize the Manning's Equation to design channel dimensions.
3. Consider site conditions when establishing freeboard for design flow rates.

CADD Detail:
(over)

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

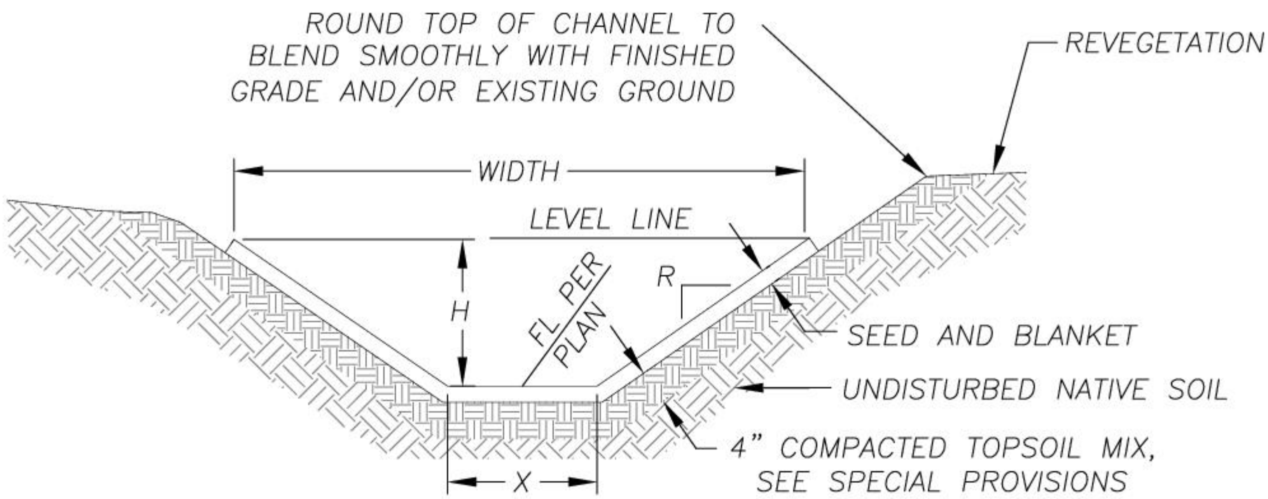
ROM Construction Cost: $51/LF

Cost to Provide Source Control: $0.57/ft²

Cost to Reduce Runoff Volume: $0.01/ft³

Cost to Reduce Runoff Peak: $46.63/cfs

Cost to Reduce Sediment: $1.38/lb


ROUND TOP OF CHANNEL TO BLEND SMOOTHLY WITH FINISHED GRADE AND/OR EXISTING GROUND
REVEGETATION
WIDTH
LEVEL LINE
H
FL PER PLAN
R
SEED AND BLANKET
UNDISTURBED NATIVE SOIL
4" COMPACTED TOPSOIL MIX, SEE SPECIAL PROVISIONS
X

Description:

A rock dissipator is a rock-lined apron at the inlet and outlet of a pipe or at a location where dissipation of runoff velocity is necessary. The rock dissipator also allows for the infiltration of runoff.

Issues and Concerns:

Maintenance:

- Periodic inspection for stability, debris, and sediment accumulation

Advantages:

- Slows velocities, minimizing erosion, stabilize soils and reduce sediment entering runoff.
- Allows for infiltration of runoff and precipitation.

Disadvantages:

- Not suitable as a primary sediment trapping device since collection of trapped debris may be difficult.

Field Photo:

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding channels/ditches in order to reduce the coarse, fine and very fine sediment in runoff.
2.	Reduce the storm water runoff volume from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Infiltrate a portion of the 25-year, 1-hour storm water volume.
3.	Reduce the peak flow from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Reduce the peak discharge of the 25-year, 1-hour storm by infiltrating a portion of the runoff volume.

Key Design Considerations:

1. Designer should take into account runoff volume and flow velocities.
2. Rock dissipators should not to be used over clayey soils without a filter fabric beneath rock.
3. Consider site conditions when establishing side slopes.
4. Use angular rock rather than round rock.

CADD Detail:

N/A

Cost Analysis (Based on 2011-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

ROM Construction Cost: $22/SF

Cost to Provide Source Control: $0.73/ft^2

Cost to Reduce Runoff Volume: $0.02/ft^3

Cost to Reduce Runoff Peak: $60.34/cfs

Cost to Reduce Sediment: $1.79/lb

Description:

A rock-lined channel is a shallow, rock-lined depression in the earth's surface to convey runoff, stabilize the soil and slow water velocities. The rock-lined channel also allows for the infiltration of runoff as flow is conveyed by the channel.

Issues and Concerns:

Maintenance:

- Periodic inspection for side slope stability, debris and sediment accumulation

Advantages:

- Slows velocities, minimizing erosion, stabilize soils and reduce sediment entering runoff.
- Allows for infiltration of runoff and precipitation.

Disadvantages:

- Not suitable as a primary sediment trapping device since collection of trapped debris may be difficult.

Field Photo:

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding channels/ditches in order to reduce the coarse, fine and very fine sediment in runoff.
2.	Reduce the storm water runoff volume from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Infiltrate a portion of the 25-year, 1-hour storm water volume.
3.	Reduce the peak flow from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Reduce the peak discharge of the 25-year, 1-hour storm by infiltrating a portion of the runoff volume.

Key Design Considerations:

1. Designer should take into account runoff volume and flow velocities.
2. Rock-lined channels should not to be used over clayey soils without a filter fabric beneath rock.
3. Designer should utilize the Manning's Equation to design channel dimensions.
4. Consider site conditions when establishing freeboard for design flow rates.
5. Use angular rock rather than rounded or subrounded rock.

CADD Detail:
(over)

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

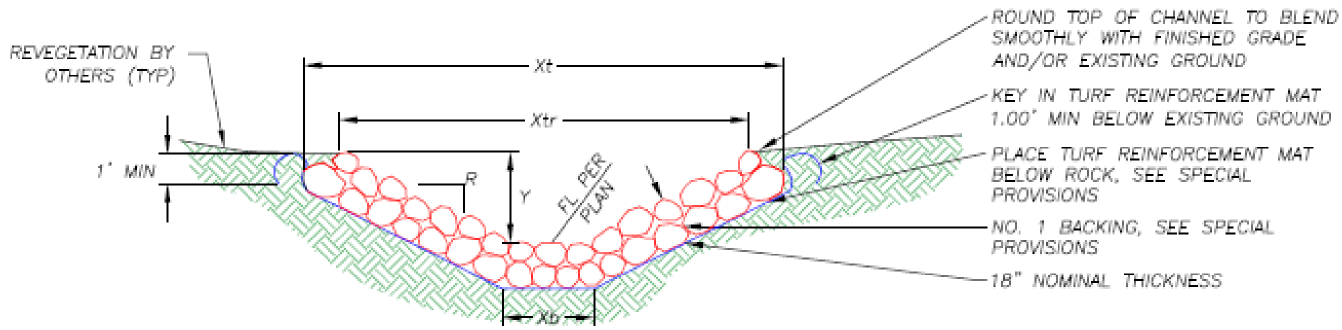
ROM Construction Cost: $83/LF

Cost to Provide Source Control: $0.92/ft^2

Cost to Reduce Runoff Volume: $0.02/ft^3

Cost to Reduce Runoff Peak: $75.89/cfs

Cost to Reduce Sediment: $2.25/lb



STREET AND STATION	WIDTH, Xt (EXCAVATION)	WIDTH, Xtr (ROCK)	WIDTH, Xb (EXCAVATION)	DEPTH, Y	SLOPE RATIO, R
EXAMPLE 20+68.30 TO 21+52.72	8.65'	6.65'	2.25'	1.5'	3:1

NOTES:

1. "Y" DEPICTS MIN REQ'D DEPTH OF CHANNEL. FINISHED TOP WIDTH AND SIDE SLOPE HEIGHT MAY VARY DEPENDING ON EXISTING TERRAIN.

2. SEE SPECIAL PROVISIONS FOR SUBGRADE COMPACTION REQUIREMENTS.

Description:

A grass-lined swale is a shallow, vegetation-lined depression in the earth's surface to convey runoff and stabilize the soil. The grass-lined swale also allows for the infiltration of runoff as flow is being conveyed.

Issues and Concerns:

Maintenance:

- Periodic inspection for side slope stability, debris and sediment accumulation.
- Periodic mowing.

Advantages:

- Minimize erosion, stabilize soils, and reduce sediment entering runoff.
- Allows for infiltration of runoff and precipitation.

Disadvantages:

- Not suitable for dry locations.
- Not suitable for high velocities.

Field Photo:

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding channels/ditches in order to reduce the coarse, fine and very fine sediment in runoff.
2.	Reduce the storm water runoff volume from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Infiltrate a portion of the 25-year, 1-hour storm water volume.
3.	Reduce the peak flow from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Reduce the peak discharge of the 25-year, 1-hour storm by infiltrating a portion of the runoff volume.

Key Design Considerations:

1. Designer should take into account runoff volume and flow velocities.
2. Designer should utilize the Manning's Equation to design channel dimensions.
3. Consider site conditions when establishing freeboard for design flow rates.

CADD Detail:
(over)

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

ROM Construction Cost: $42/LF

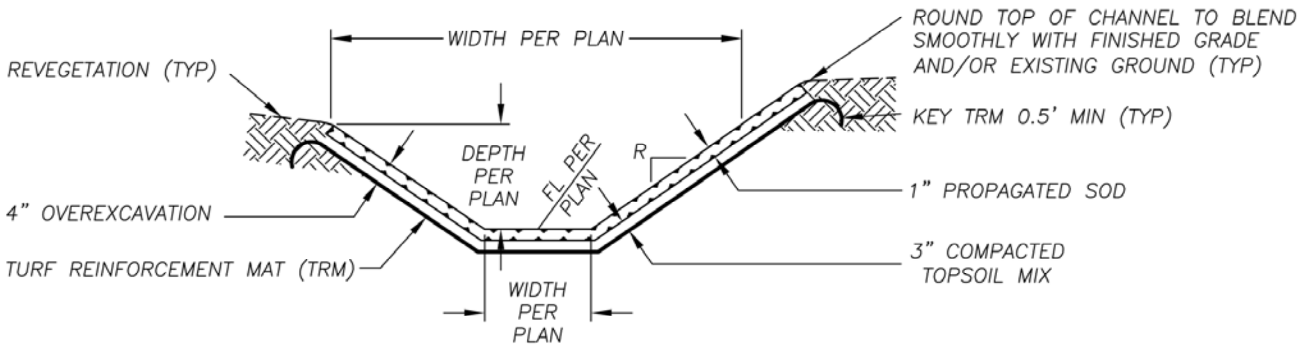
Cost to Provide Source Control: $0.47/ft^2

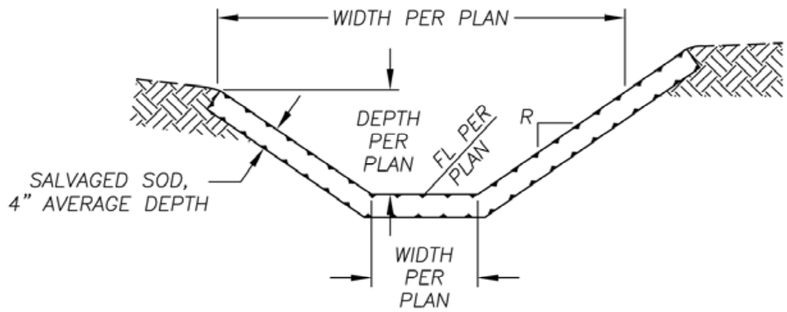
Cost to Reduce Runoff Volume: $0.01/ft^3

Cost to Reduce Runoff Peak: $38.40/cfs

Cost to Reduce Sediment: $1.14/lb

Propagated Sod and Salvaged Sod





Description:

CSP Inlets are depressions in the ground that temporarily detain runoff allowing sediment and other debris to settle out of suspension from runoff. Infiltration is achieved through an open area in the foundation.

Field Photo:

Issues and Concerns:

Maintenance:

- Annual inspection of structure's integrity and condition of channel.
- Annual vactoring necessary to remove sediment accumulation.

Advantages:

- CSP inlets require less area compared to other treatment BMP's.
- Requires little or no hydraulic head to operate.
- Ease of construction.

Disadvantages:

- Minimal volume, peak or pollutant load reduction.
- Vector control issues may persist if water remains inside.
- Re-suspended sediment under heavy flows if not installed for first flush treatment.
- Primarily treats coarse sediment when not operated in a first flush configuration.
- Potential traps for small animals.
- Can be considered unattractive.

Key Design Considerations:

1. Designer should take into account runoff volume and consider trapping capabilities, i.e. install in series, add baffles, or install for first flush treatment.
2. Soil type, soil conditions, groundwater depth, existing utilities, and excavation limitations need to be investigated prior to designing the CSP inlet.
3. Designer should consider the various alternatives for cover types, e.g., hinged lid, grate, trash rack, and window opening to allow for efficient and safe removal of sediment from the CSP inlet.

CADD Detail:

(over)

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Provide regional treatment of coarse, fine and very fine sediment in runoff.
2.	Reduce the storm water runoff volume from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Capture and store a portion of the 25-year, 1-hour storm water volume.
3.	Reduce the peak flow from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Reduce the peak discharge of the 25-year, 1-hour storm by detaining and infiltrating a portion of the runoff volume.

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

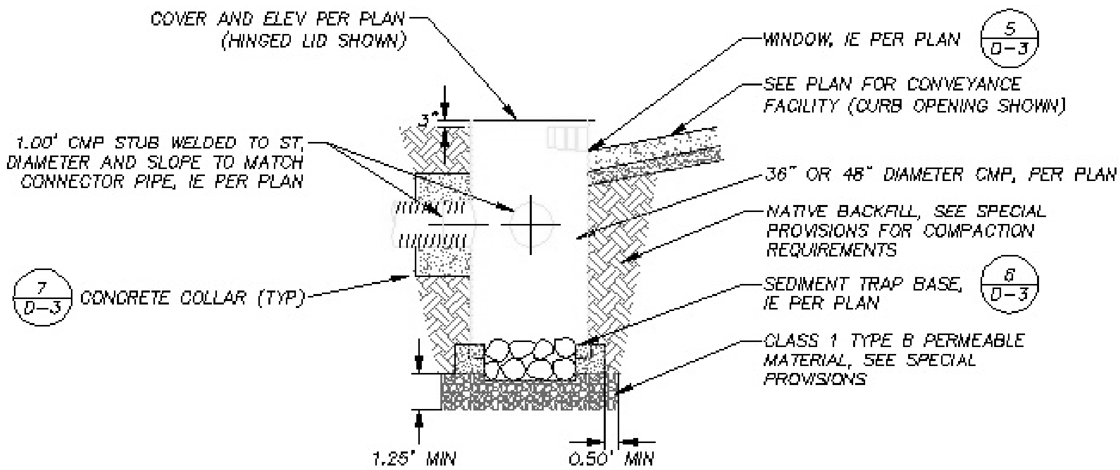
ROM Construction Cost: $4,500/EA

Cost to Provide Source Control: NA

Cost to Reduce Runoff Volume: $0.14/ft^3

Cost to Reduce Runoff Peak: $1,747/cfs

Cost to Reduce Sediment: $15.24/lb



NOTE: SEE SPECIAL PROVISIONS FOR SUBGRADE COMPACTION REQUIREMENTS.

Description:

Underground infiltration treatment consists of either buried perforated pipe, trench filled with drain rock, buried storm water chambers or underground infiltration vaults which allow for the infiltration of storm water runoff. Underground infiltration captures and detains the first flush of each storm and once the system has reached capacity additional flow is bypassed.

Issues and Concerns:

Maintenance:

- Annual inspection for proper drainage.
- Periodic cleanouts to remove sediment and maximize capacity.

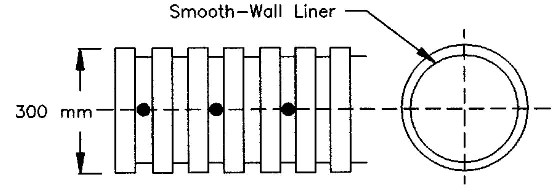
Advantages:

- Allows for treatment within County ROW when area for other treatment BMP's is unavailable.
- Increases infiltration and provides runoff volume reduction.
- Lowers peak flows and storage volume in the watershed.
- Reduces the amount of coarse sediment in the watershed as well as fine and very fine sediment when operated for first flush treatment.

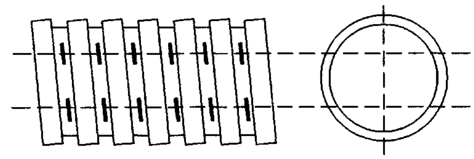
Disadvantages:

- Increased cost of maintenance.

Perforated Pipe Schematic:



(a) Smooth–wall Perforated Pipe


(b) Corrugated Perforated Pipe

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Provide regional treatment of coarse, fine and very fine sediment in runoff.
2.	Reduce the storm water runoff volume from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Capture and store a portion of the 25-year, 1-hour storm water volume.
3.	Reduce the peak flow from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Reduce the peak discharge of the 25-year, 1-hour storm by detaining and infiltrating a portion of the runoff volume.

Key Design Considerations:

1. Infiltration system will need to withstand traffic loads if installed in County ROW.
2. Cleanouts and inspection risers should be placed for the convenience of cleaning and inspecting the system.
3. The infiltration system should be designed to capture and treat the first flush from a storm event and bypass the remaining flow once the system has reached capacity.

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

ROM Construction Cost: $145/LF

Cost to Provide Source Control: NA

Cost to Reduce Runoff Volume: $0.04/ft^3

Cost to Reduce Runoff Peak: $265.14/cfs

Cost to Reduce Sediment: $4.45/lb

Description:

Drainage inlets are underground concrete vaults with surface grates that intercept runoff from gutters or other paved surfaces. Infiltrating drainage inlets temporarily detain runoff, allow sediment and other debris to settle out of suspension, and allow for infiltration of storm water.

Issues and Concerns:

Maintenance:

- Annual inspection of structure's integrity and condition.
- Annual vactoring necessary to remove sediment and debris accumulation.

Advantages:

- Drainage inlets require less area compared to other treatment BMP's.
- Integral with intercepting runoff from curb and gutter or asphalt dike and conveying to underground pipe systems.
- Can be used with a transverse drain.
- Requires little or no hydraulic head to operate.
- Ease of construction.

Disadvantages:

- Minimal volume, peak, or pollutant load reduction.
- Re-suspended sediment under heavy flows if not installed for first flush treatment.
- Primarily treats coarse sediment when not operated in a first flush configuration.

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Provide regional treatment of coarse, fine and very fine sediment in runoff.
2.	Reduce the storm water runoff volume from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Capture and store a portion of the 25-year, 1-hour storm water volume.
3.	Reduce the peak flow from the 25-year, 1-hour event by 33% or to the Maximum Extent Practicable.	Reduce the peak discharge of the 25-year, 1-hour storm by detaining and infiltrating a portion of the runoff volume.

Field Photo:

Key Design Considerations:

1. Designer should take into account runoff volume and trapping capabilities, i.e. install in series or install for first flush treatment.
2. Soil type, soil conditions, groundwater depth, and existing utilities need to be investigated prior to designing the drainage inlet.
3. Designer should consider types and volume of debris, such as pine needles, when determining locations for drainage inlets.

CADD Detail:

(over)

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

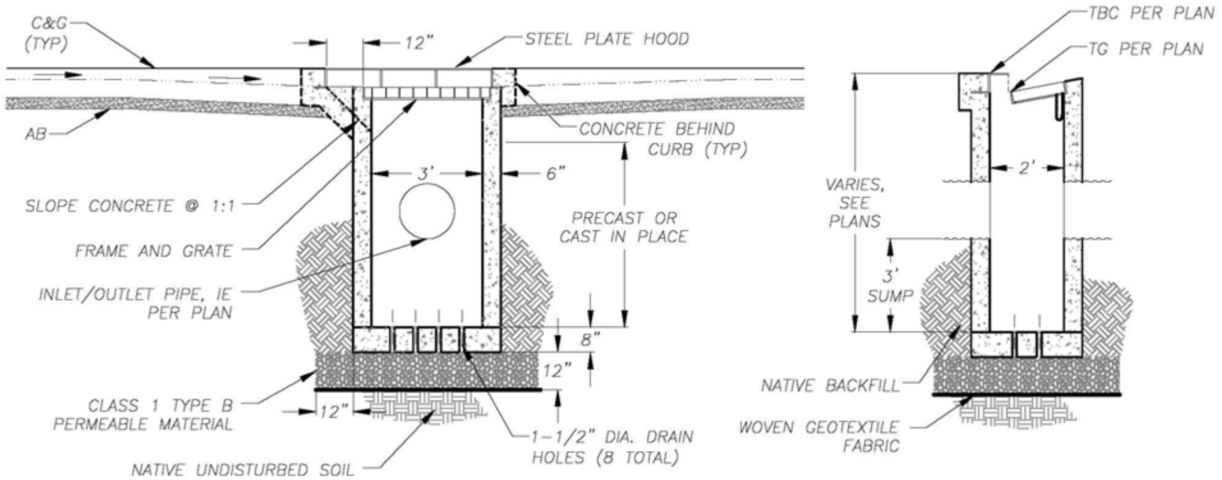
ROM Construction Cost: $4,500/EA

Cost to Provide Source Control: NA

Cost to Reduce Runoff Volume: $0.22/ft^3

Cost to Reduce Runoff Peak: $4,114/cfs

Cost to Reduce Sediment: $23.77/lb


C&G (TYP)
12"
STEEL PLATE HOOD
AB
CONCRETE BEHIND CURB (TYP)
3'
6"
SLOPE CONCRETE @ 1:1
FRAME AND GRATE
PRECAST OR CAST IN PLACE
INLET/OUTLET PIPE, IE PER PLAN
8"
12"
CLASS 1 TYPE B PERMEABLE MATERIAL
12"
1-1/2" DIA. DRAIN HOLES (8 TOTAL)
NATIVE UNDISTURBED SOIL
TBC PER PLAN
TG PER PLAN
VARIES, SEE PLANS
2'
3' SUMP
NATIVE BACKFILL
WOVEN GEOTEXTILE FABRIC

Description:

Rock slope protection is the installation of rock over an eroding slope or bare soil in order to stabilize and protect the site from further erosion. Rock slope protection can be placed directly onto the bare soil or a soil separation filter fabric can be placed beneath the rock.

Field Photo:

Issues and Concerns:

Maintenance:

- Periodic inspection for side slope stability, debris and sediment accumulation.

Advantages:

- Stabilizes soil, minimizes erosion and sediment mobilization.
- Allows for infiltration of precipitation and runoff.

Disadvantages:

- More expensive than revegetation.
- In some situations rock slope protection is visually unappealing.

	Goals	Objectives
1.	Reduce the amount of coarse, fine and very fine sediment from runoff by 33% or to the Maximum Extent Practicable.	Stabilize eroding slopes in order to reduce the coarse, fine and very fine sediment in runoff.

Cost Analysis (Based on 2010-2015 proposed bid costs and 35 inches/year mean annual rainfall):

Estimated Design Life: 30 years

ROM Construction Cost: $17/ft^2

Cost to Provide Source Control: $0.57/ft^2

Cost to Reduce Runoff Volume: NA

Cost to Reduce Runoff Peak: NA

Cost to Reduce Sediment: NA

Key Design Considerations:

1. Slope stability should be a consideration in the evaluation of placement of rock slope protection.
2. Rock slope protection should not to be used over silt or clay unless suitable soil separation fabric is installed.
3. Use angular rock to improve interlocking characteristics to improve stability.

Appendix E

ALTERNATIVE ROM CONSTRUCTION COST ESTIMATES

CSA 5 ECP
PRELIMINARY CONSTRUCTION COST ESTIMATE
ALTERNATE 1

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (in Figures)	ITEM TOTAL (in Figures)
1	Mobilization	1	LS	$ 40,000	$ 40,000.00
2	Traffic Control	1	LS	$ 20,000	$ 20,000.00
3	Sweeping	20	DAY	$ 500	$ 10,000.00
4	Trench and Excavation Safety	1	LS	$ 7,000	$ 7,000.00
5	Install & Maintain Temporary BMPs	1	LS	$ 15,000	$ 15,000.00
6	Remove CMP Inlet	7	EA	$ 1,100	$ 7,700.00
7	Remove CMP		LF	$ 50.00	$ -
8	CSP Inlet/Riser or Drainage Inlet	17	EA	$ 4,500	$ 76,500.00
9	18" HDPE Pipe	220	LF	$ 110	$ 24,200.00
10	18" HDPE Perforated Pipe		LF	$ 145	$ -
11	24" HDPE Pipe		LF	$ 125	$ -
12	24" HDPE Perforated Pipe		LF	$ 155	$ -
13	Infiltration System (Gallery)	2	EA	$ 20,000	$ 40,000.00
14	SDMH	2	EA	$ 5,600	$ 11,200.00
15	AC Dike	850	LF	$ 42	$ 35,700.00
16	AC Pavement (incl D/Ws)	200	SF	$ 16	$ 3,200.00
17	Basin Access with Gate	1	EA	$ 6,000	$ 6,000.00
18	Armored Channel	1,400	LF	$ 88	$ 123,200.00
19	Rock Slope Protection	1,500	SF	$ 17	$ 25,500.00
20	Rock Bowl/Rock Dissipator	500	SF	$ 13	$ 6,500.00
21	Restore Road Ditch (GLS)	100	LF	$ 42	$ 4,200.00
22	Clear and Restore Channel		LF	$ 50	$ -
23	Revegetation (Basins)	5	EA	$ 3,000	$ 15,000.00
24	Revegetation (General)	5,000	SF	$ 3	$ 15,000.00
25	CCCs	1	LS	$ 6,000	$ 6,000.00
26	Project Sign	1	EA	$ 2,000	$ 2,000.00
		TOTAL		**$**	**493,900.00**
		20% CONTINGENCY		**$**	**98,780.00**
		GRAND TOTAL		**$**	**592,680.00**

CSA 5 ECP
PRELIMINARY CONSTRUCTION COST ESTIMATE
ALTERNATE 2

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (in Figures)	ITEM TOTAL (in Figures)
1	Mobilization	1	LS	$ 50,000	$ 50,000.00
2	Traffic Control	1	LS	$ 20,000	$ 20,000.00
3	Sweeping	35	DAY	$ 500	$ 17,500.00
4	Trench and Excavation Safety	1	LS	$ 7,000	$ 7,000.00
5	Install & Maintain Temporary BMPs	1	LS	$ 25,000	$ 25,000.00
6	Remove CMP Inlet	26	EA	$ 1,100	$ 28,600.00
7	Remove CMP	5,200	LF	$ 50.00	$ 260,000.00
8	CSP Inlet/Riser or Drainage Inlet	27	EA	$ 4,500	$ 121,500.00
9	18" HDPE Pipe	815	LF	$ 110	$ 89,650.00
10	18" HDPE Perforated Pipe	2,930	LF	$ 145	$ 424,850.00
11	24" HDPE Pipe	350	LF	$ 125	$ 43,750.00
12	24" HDPE Perforated Pipe	1,195	LF	$ 155	$ 185,225.00
13	Infiltration System (Gallery)	1	EA	$ 20,000	$ 20,000.00
14	Storm Drain Manhole	1	EA	$ 5,600	$ 5,600.00
15	AC Dike	700	LF	$ 42	$ 29,400.00
16	AC Pavement (incl D/Ws)	1,200	SF	$ 16	$ 19,200.00
17	Basin Access with Gate	1	EA	$ 6,000	$ 6,000.00
18	Armored Channel		LF	$ 88	-
19	Rock Slope Protection	800	SF	$ 17	$ 13,600.00
20	Rock Bowl/Rock Dissipator		SF	$ 13	-
21	Restore Road Ditch (GLS)	70	LF	$ 42	$ 2,940.00
22	Clear and Restore Channel	2,330	LF	$ 50	$ 116,500.00
23	Revegetation (Basins)	5	EA	$ 3,000	$ 15,000.00
24	Revegetation (General)	10,000	SF	$ 3	$ 30,000.00
25	CCCs	1	LS	$ 6,000	$ 6,000.00
26	Project Sign	1	EA	$ 2,000	$ 2,000.00
	TOTAL			**$**	**1,539,315.00**
	20% CONTINGENCY			**$**	**307,865.00**
	GRAND TOTAL			**$**	**1,847,180.00**

CSA 5 ECP
PRELIMINARY CONSTRUCTION COST ESTIMATE
ALTERNATE 3

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (in Figures)	ITEM TOTAL (in Figures)
1	Mobilization	1	LS	$ 35,000	$ 35,000.00
2	Traffic Control	1	LS	$ 20,000	$ 20,000.00
3	Sweeping	15	DAY	$ 500	$ 7,500.00
4	Trench and Excavation Safety	1	LS	$ 7,000	$ 7,000.00
5	Install & Maintain Temporary BMPs	1	LS	$ 10,000	$ 10,000.00
6	Remove CMP Inlet		EA	$ 1,100	$ -
7	Remove CMP		LF	$ 50.00	$ -
8	CSP Inlet/Riser or Drainage Inlet	1	EA	$ 4,500	$ 4,500.00
9	18" HDPE Pipe	100	LF	$ 110	$ 11,000.00
10	18" HDPE Perforated Pipe		LF	$ 145	$ -
11	24" HDPE Pipe		LF	$ 125	$ -
12	24" HDPE Perforated Pipe		LF	$ 155	$ -
13	Infiltration System (Gallery)	2	EA	$ 20,000	$ 40,000.00
14	Storm Drain Manhole	2	EA	$ 5,600	$ 11,200.00
15	AC Dike	700	LF	$ 42	$ 29,400.00
16	AC Pavement (incl D/Ws)		SF	$ 16	$ -
17	Basin Access with Gate		EA	$ 6,000	$ -
18	Armored Channel		LF	$ 88	-
19	Rock Slope Protection	800	SF	$ 17	$ 13,600.00
20	Rock Bowl/Rock Dissipator		SF	$ 13	-
21	Restore Road Ditch (GLS)	100	LF	$ 42	$ 4,200.00
22	Clear and Restore Channel		LF	$ 50	$ -
23	Revegetation (Basins)		EA	$ 3,000	$ -
24	Revegetation (General)	2,500	SF	$ 3	$ 7,500.00
25	CCCs	1	LS	$ 4,200	$ 4,200.00
26	Project Sign	1	EA	$ 2,000	$ 2,000.00
		TOTAL		**$**	**207,100.00**
		20% CONTINGENCY		**$**	**41,420.00**
		GRAND TOTAL		**$**	**248,520.00**

Appendix F

CORRESPONDENCE

CSA5 Erosion Control Project - Public Comments During Development of Feasibility Report

#	Date	Communication	Comment
1	11/13/2015	Email / Site Visit	Requested field meeting to discuss existing erosion problems in the Westlake Village Area of Tahoma. During site visit noted existing erosion occuring on both sides of Antelope Way from end of Antelope to below Placer Street (west side of Antelope is larger issue). Also noted eroding slopes on the north side of Placer Street, between Antelope and due east of Timberwolf where the old cul-de-sac exists.
2	11/13/2015	Email	Requested exhibit from field meeting which showed publicly owned parcels and estimated SEZ boundary within the Tahoma area. Offered to pass on my contact information to the members of the home owners association.
3	11/16/2015	Email	Concern of flooding caused by runoff from Antelope Way. Flows are causing erosion on the backside of their property at 7183 Antelope Way. In addition material is being deposited on the edge of the old cul-de-sac on Placer Street, near the start of their driveway.
4	11/16/2015	Email	Commented that existing erosion of the drain at the corner of Elm and 6th street was more due to cleaning of the vactor at this location than to stormwater runoff. Suggested rocklining the remaining exposed area as opposed to a major overhaul of the drain inlet.
5	11/17/2015	Email / Maintenance Log	Appreciative of work completed year before. Concern over the effectiveness and longevity of the County chip seal work that was completed this summer.
6	11/18/2015	Email / Site Visit	Noted that flows from the east side of 10th flow across the driveway at 7091 10th Avenue and on to Elm Street. Also requested copy of exhibit which shows publicly owned parcels and estimated SEZ boundary with the Tahoma area.
7	8/5/2014	Maintenance Log	Runoff from the road currently drains across their property at 7008 8th Avenue.
8	8/11/2014	Maintenance Log	Resident has had flooding issues in his garage for 10 years due to the way the County "did" the roads.
9	11/5/2015	Letter / Maintenance Log / Phone Call	Noted that flows from Poplar, between 7th Avenue and 7th Avenue, cross 7th Avenue and impact their property at 7133 7th Avenue. Noted that flows are causing flooding under their home and erosion of their backyard.
10	11/6/2015	Letter	Requested to be kept informed of the Project, along with what the Project includes and how it affects their property at 347 Alder Street.
11	11/12/2015	Letter	Thought the Report was well done and was in support of the recommendations.
12	11/2/2015	Phone Call	Called requesting information on Project.
13	11/3/2015	Phone Call	Called requesting information on Project. Had no comments on problem areas at time of call.
14	11/3/2015	Phone Call	Called requesting information on Project. Specifically, is it funded?; Will it cause traffic delays?; and How do I learn more about BMP's?
15	11/4/2015	Phone Call	Called requesting information on Project. Was not aware of any stormwater issues, but his property manager lives close by and may contact me with specific issues.
16	11/5/2015	Phone Call	Called regarding client that owns two parcels in the Project area. Specific questions were in regard to if the project would improve IPES scores. After checking with TRPA, IPES scores in the project area are currently at 1, unless within a previously identified Stream Environment Zone (SEZ).
17	11/12/2015	Phone Call /Email	Called regarding the Project. Is in the process of building new home and had questions regarding the BMP requirement for homeowners in the Project area.