APPENDIX D

ORE PAD CHANNEL

D

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CALCULATION COVER SHEET

Date: 5/16/08 **Page** 1 **of** 2

Project No.: 89241 **Project Title:** Pinon Ridge Mill Design

Calculation No.: 89241.6-7

Calculation Title: One Pad Channel Design

Design Verification Required: ☐ Yes ☒ No

Calculation Type: ☐ Scoping ☐ Preliminary ☒ Final ☐ Voided
☐ Superseded by Calculation No.: _____

ORIGINAL AND REVISED CALCULATIONS/ANALYSIS APPROVAL

	Rev. 1 Printed Name/Signature/Date	Rev. ____ Printed Name/Signature/Date	Rev. ____ Printed Name/Signature/Date
Originator:	T. Kluthe 5/16/08		
Checked By:	C Larson 12/12/08		
Approved By:	C Larson 12/12/08		
Other:			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. No.	Responsible Project Manager Initials
DEN 08R179	SITE DRAINAGE ANALYSIS & DESIGN REPORT - PINON RIDGE MILL		CL

RECORD OF REVISION

Rev.	Reason for Revision

ATTACHMENTS

Attachment No.	Title	Total Pages
1	One Pad Channel Design	4

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PROJECT Pinon Ridge PROJECT NO. 89241
SUBJECT One Pad Channel Design BY T. Klutke DATE 5/16
REVIEWED BY CB DATE 5/20/08

Objective: Size conveyance channel from One Pad to East Stormwater pond for 1,000-yr storm event.

Assumptions:
1) One Pad is effectively impervious, producing 100% runoff.
2) Use 1000-yr rainfall depth of 4.43 in from NOAA Atlas 14.
3) Critical depth at channel inlet
4) Channel liner will protect against scour and erosion.
5) 24-hr storm with SCS Type II dimensionless rainfall distribution.

Basin Parameters

Area = 6.25 ac

Rainfall Depth = 4.43 in.

Slope > 1%

Channel bottom width = 3 ft
Channel Side Slopes = 3H:1V
Channel Depth = 1.5 ft

See attachments for Peak Flow determination, Channel Sizing, and Rainfall Depth Determination.

3

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Colorado 38.245 N 109.06 W 6414 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Dec 6 2007

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | D

NOAA ATLAS VOL. III

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.13	0.20	0.25	0.34	0.41	0.50	0.56	0.70	0.89	1.11	1.28	1.51	1.78	2.00	2.62	3.23	3.93	4.68
2	0.17	0.26	0.32	0.43	0.53	0.63	0.70	0.87	1.10	1.38	1.59	1.88	2.23	2.50	3.27	4.01	4.88	5.80
5	0.23	0.35	0.43	0.58	0.72	0.84	0.91	1.09	1.36	1.73	1.98	2.35	2.78	3.11	4.02	4.90	5.95	7.00
10	0.28	0.43	0.53	0.71	0.88	1.03	1.09	1.29	1.57	2.02	2.30	2.74	3.23	3.62	4.62	5.60	6.79	7.92
25	0.36	0.55	0.68	0.91	1.13	1.32	1.37	1.58	1.88	2.42	2.75	3.29	3.87	4.32	5.40	6.53	7.87	9.09
50	0.43	0.65	0.81	1.08	1.34	1.58	1.63	1.82	2.12	2.75	3.11	3.73	4.36	4.87	6.00	7.23	8.68	9.95
100	0.50	0.77	0.95	1.28	1.58	1.88	1.93	2.10	2.39	3.10	3.50	4.20	4.88	5.46	6.62	7.94	9.49	10.80
200	0.59	0.90	1.12	1.50	1.86	2.23	2.28	2.46	2.69	3.48	3.90	4.69	5.43	6.07	7.23	8.64	10.29	11.62
500	0.73	1.11	1.37	1.85	2.29	2.78	2.83	3.02	3.23	4.00	4.46	5.39	6.18	6.92	8.04	9.56	11.32	12.66
1000	0.85	1.29	1.60	2.15	2.67	3.29	3.33	3.53	3.73	4.43	4.92	5.95	6.79	7.61	8.65	10.26	12.09	13.43

2.00

3.00

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

*** Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.15	0.23	0.29	0.39	0.48	0.57	0.63	0.78	0.97	1.23	1.41	1.67	1.97	2.21	2.89	3.53	4.31	5.12
2	0.20	0.30	0.37	0.50	0.62	0.72	0.79	0.97	1.21	1.53	1.76	2.09	2.46	2.77	3.60	4.38	5.36	6.36
5	0.27	0.40	0.50	0.68	0.83	0.96	1.02	1.21	1.49	1.91	2.18	2.61	3.07	3.44	4.44	5.36	6.53	7.68
10	0.33	0.50	0.62	0.83	1.03	1.17	1.23	1.43	1.73	2.23	2.54	3.04	3.58	4.01	5.10	6.13	7.45	8.69
25	0.42	0.65	0.80	1.08	1.33	1.50	1.55	1.75	2.07	2.68	3.05	3.66	4.28	4.80	5.99	7.17	8.67	10.01
50	0.51	0.77	0.96	1.29	1.60	1.81	1.84	2.03	2.35	3.06	3.46	4.17	4.85	5.44	6.69	7.97	9.60	11.00
100	0.61	0.93	1.16	1.56	1.93	2.17	2.19	2.36	2.65	3.47	3.92	4.73	5.47	6.12	7.40	8.80	10.54	11.99
200	0.74	1.12	1.39	1.87	2.32	2.60	2.62	2.78	3.01	3.92	4.41	5.33	6.14	6.87	8.14	9.64	11.48	12.97
500	0.94	1.43	1.77	2.38	2.95	3.31	3.34	3.47	3.66	4.59	5.15	6.23	7.12	7.97	9.16	10.80	12.78	14.27
1000	1.13	1.72	2.13	2.87	3.56	3.98	4.02	4.10	4.26	5.16	5.77	6.99	7.93	8.88	9.95	11.69	13.79	15.26

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

*** Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day

Pinon Ridge Uranium Mill Hydrologic Analysis

Rainfall Distribution

SCS Rainfall Distribution: Type II

Frequency (yr): 1000

Total 24-hour Rainfall Depth (in): 4.43

*Assume entire ore pad is impervious

Structure Area (ac) = 6.25

Structure Area (ft^2) = 272250

Hour, t	t/24	P_t/P_{24}	SCS Cumul P	Hour	HEC-1 Cumul P	P_t/P_{24} Type I	Type IA	Type II	Type III	Time Hour	Time (sec)	Inc. Depth (ft)	Structure QI (cfs)
0.00	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000	0	3600	0.00	0.0
2.00	0.083	0.022	0.097	1	0.049	0.035	0.050	0.022	0.020	1	3600	0.00	0.3
4.00	0.167	0.048	0.213	2	0.097	0.076	0.116	0.048	0.043	2	3600	0.00	0.3
6.00	0.250	0.080	0.354	3	0.155	0.125	0.206	0.080	0.072	3	3600	0.00	0.4
7.00	0.292	0.098	0.434	4	0.213	0.156	0.268	0.098	0.089	4	3600	0.00	0.4
8.00	0.333	0.120	0.532	5	0.284	0.194	0.425	0.120	0.115	5	3600	0.01	0.4
8.50	0.354	0.133	0.589	6	0.354	0.219	0.480	0.133	0.130	6	3600	0.01	0.4
9.00	0.375	0.147	0.651	7	0.434	0.254	0.520	0.147	0.148	7	3600	0.01	0.5
9.50	0.396	0.163	0.722	8	0.532	0.303	0.550	0.163	0.167	8	3600	0.01	0.6
9.75	0.406	0.172	0.762	9	0.651	0.362	0.564	0.172	0.178	9	3600	0.01	0.8
10.00	0.417	0.181	0.802	10	0.802	0.515	0.577	0.181	0.189	10	3600	0.01	0.9
10.50	0.438	0.204	0.904	11	1.041	0.583	0.601	0.204	0.216	11	3600	0.02	1.5
11.00	0.458	0.235	1.041	12	2.937	0.624	0.624	0.235	0.250	12	3600	0.16	11.9
11.50	0.479	0.283	1.254	13	3.420	0.654	0.645	0.283	0.298	13	3600	0.04	3.0
11.75	0.490	0.357	1.582	14	3.633	0.669	0.655	0.357	0.339	14	3600	0.02	1.3
12.00	0.500	0.663	2.937	15	3.766	0.682	0.664	0.663	0.500	15	3600	0.01	0.8
12.50	0.521	0.735	3.256	16	3.898	0.706	0.683	0.735	0.702	16	3600	0.01	0.8
13.00	0.542	0.772	3.420	17	3.978	0.727	0.701	0.772	0.751	17	3600	0.01	0.5
13.50	0.563	0.799	3.540	18	4.058	0.748	0.719	0.799	0.785	18	3600	0.01	0.5
14.00	0.583	0.820	3.633	19	4.138	0.767	0.736	0.820	0.811	19	3600	0.01	0.5
16.00	0.667	0.880	3.898	20	4.217	0.830	0.800	0.880	0.886	20	3600	0.01	0.5
20.00	0.833	0.952	4.217	21	4.271	0.926	0.906	0.952	0.957	21	3600	0.00	0.3
24.00	1.000	1.000	4.430	22	4.324	1.000	1.000	1.000	1.000	22	3600	0.00	0.3
				23	4.377					23	3600	0.00	0.3
				24	4.430					24	3600	0.00	0.3
											Peak Flow (cfs) =		11.9

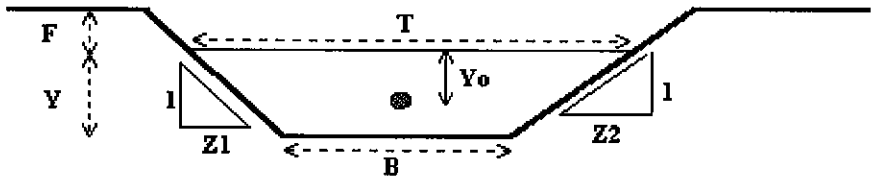
CR 7/1/03

CDL 12/1/08

Critical Flow Analysis - Trapezoidal Channel

4/

Project: **Pinon Ridge Uranium Mill**
Channel ID: **Ore Pad Channel to East Stormwater Pond**



Design Information (Input)			
Bottom Width	B =	3.0	ft
Left Side Slope	Z1 =	3.0	ft/ft
Right Side Slope	Z2 =	3.0	ft/ft
Design Discharge	Q =	**12.0**	cfs

Critical Flow Condition (Calculated)			
Critical Flow Depth	**Y =**	**0.6**	ft
Critical Flow Area	A =	3.1	sq ft
Critical Top Width	T =	6.8	ft
Critical Hydraulic Depth	D =	0.5	ft
Critical Flow Velocity	V =	3.9	fps
Froude Number	**Fr =**	**1.0**	
Critical Wetted Perimeter	P =		ft
Critical Hydraulic Radius	R =		ft
Critical (min) Specific Energy	Esc =		ft
Centroid on the Critical Flow Area	Yoc =		ft
Critical (min) Specific Force	Fsc =		kip