Tamme Bishop, P.E.
Consulting Engineer

June 30, 2025

Rob Zuber
Division of Reclamation, Mining & Safety
1313 Sherman St., Room 215
Denver, CO 80203

Re: Bowie No. 2 Mine
Permit C-1996-083,
Minor Revision #211

Dear Mr. Zuber:

On behalf of Bowie Resources LLC, enclosed is an application for a minor revision to change the design of Ditch F-7. As currently designed, Ditch F-7 requires riprap. However, the ditch grade used in the permitted SEDCAD design is much greater than on the ground conditions; its current grade includes the Ditch F-7a segment which should not be included in the Ditch F-7 design.

Since input parameters for Ditch F-7 change the peak flow and runoff, Ditch F-7a has been revised. In addition, associated pages for Pond F Protection of the Hydrologic Balance areas for the 10, 25 and 100-year runoff events have been updated.

Please see revised pages App. B-1, 2, 13-19, 21, 24-28, 35 and 36

Please let me know if you have any questions.

Sincerely,

Tamme Bishop

Tamme Bishop, P.E.
tammekb@gmail.com

COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY
1313 Sherman Street, Room 215, Denver, Colorado 80203, (303) 866-3567

APPLICATION FORM FOR A REVISION TO A COAL MINING AND RECLAMATION PERMIT

This form must be completed and submitted with all requests for minor revisions, as defined in Rule 1.04(73), technical revisions, as defined in Rule 1.04(136), and permit revisions, as defined in Rule 1.04(90). All revisions are to address the requirements of Rule 2.08.4. Three (3) copies of the revision, including maps, must be submitted in order for it to be complete.

All revisions are to be formatted so they can be inserted into the permit to replace the revised sections, maps, tables and/or figures, with a revised table of contents, if necessary. The revision submittal date should be printed in the lower right corner of each revision page. A cover letter to the revision should explain the nature of the revision and reference the specific permit sections being revised.

For federal mines, a copy of the revision application must be submitted to all agencies on the federal mailing list (except OSM) at the same time the application is submitted to the Division, and proof of distribution must be submitted to the Division along with the application. Copies of revision pages modified during the review process must be distributed in the same manner, along with proof of distribution. Proof of distribution must be submitted prior to implementation of the revision.

Permit No.: C - 1996 - 083 Date: 06 / 30 / 2025

Permittee: Bowie Resources, LLC

Bowie No. 2 Mine

Street: P.O. Box 1488

City: Paonia

State: CO Zip Code: 81428 -

Brief Description of Revision: Revise the design for Ditch F-7 and associated pages.

Public Notice Attached: Yes __ No ✔ *(Required for PRs and TRs)*

Bond Increase: Yes __ No ✔ **Federal** ✔ **Non-Federal** __ **Mine**

Proposed Change in:

Permit Area -

Disturbed	(+/-) __ __ 0 . 0 Acres	
Permit	(+/-) __ __ 0 . 0 Acres	
Affected	(+/-) __ __ 0 . 0 Acres	

Surface Ownership -

Private Land	(+/-) __ __ 0 . 0 Acres
Federal Land	(+/-) __ __ 0 . 0 Acres
State Land	(+/-) __ __ 0 . 0 Acres

Mineral Ownership -

Mineral Private	(+/-) __ __ 0 . 0 Acres	**Mineral State** (+/-) __ __ 0 . 0 Acres
Mineral Federal	(+/-) __ __ 0 . 0 Acres	

Appendix B
PROTECTION OF THE HYDROLOGIC BALANCE
BOWIE N0.2 MINE
COAL MINE WASTE DISPOSAL AREA NO.2

Notes for Calculations:

1. Pages 3-10 present a spread sheet calculation of the required capacity of Sediment Pond F based on the 10-year, 24-hour event, and sizing of the emergency and embankment spillways. Pages 11-13 are SedCad pages which verify the water storage capacity required for Pond F. Pages 14-15 are the Structure Networking for the Pond F drainage area, and pages 16-19 are the Subwatershed Hydrology Details.
2. Page 21 shows the peak flow used to size the emergency and embankment spillways using the 25-year, 24-hour event in the SEDCAD4 program.
3. Design points are shown on Figure 2.
4. Ditches were sized using SEDCAD4. Ditches were sized using the 100 year, 24-hour event and begin on page 22.
5. During June of 2017, the hydrology of the top of gob pile #4 was revised, the PHC and affected ditches and culverts were revised accordingly.
6. During June 2025, the grade of Ditch F-7 was revised, affected PHC pages were revised accordingly.

ENGINEER'S CERTIFICATION

The calculations and information presented on the following pages with dates of 01/15, 06/17, and 06/25, were prepared by me during the months of January 2015, June 2017, and June 2025, the information presented is true and correct to the best of my knowledge and belief.

COLORADO LICENSED TAMMERIN KAE STOVER-BISHOP 43402 PROFESSIONAL ENGINEER

Tammerin K. Stover-Bishop P.E.
Registered Professional Engineer
State of Colorado No. 43402

06/30/2025
Date

Appendix B

Summary Coal Mine Waste Disposal Area Ditches and Culverts

		Ditch Grade		Minimum Grade		Maximum Grade		RipRap	Peak
		Min	Max	Depth	Velocity	Depth	Velocity	D_{50} Inch*	Flow
				Feet	Ft/Sec	Feet	Ft/Sec		cfs
	F1	4.2%	4.2%	0.40	4.2	0.40	4.2		6.18
	F2	1.3%	1.3%	0.47	2.6	0.47	2.6		5.17
	F3	4.4%	4.4%	0.45	4.6	0.45	4.6		8.62
	F4	30.0%	30.0%	1.60	11.5	1.60	11.5	24	44.01
	F5	2.0%	2.0%	0.38	2.8	0.38	2.8		3.50
	F6	1.1%	1.1%	0.40	2.1	0.40	2.1		3.93
	F7	1.4%	1.4%		Trapezoidal Channel				18.38
	F7a	33.0%	33.0%	0.50	11.7	0.50	11.7	24	18.38
	F8	4.6%	4.6%	0.50	4.9	0.50	4.9		10.01
	F9	30.0%	30.0%	0.10	6.2	0.10	6.2	12	1.40
	F10	2.2%	2.2%	0.54	3.7	0.54	3.7		9.63
	F11	3.4%	3.4%	0.33	3.3	0.33	3.3		3.19
	F12	3.6%	3.6%	0.39	3.8	0.39	3.8		5.03
	F13	2.0%	2.0%	0.80	4.1	0.80	4.1		3.93
	F14 (2%)	2.0%	2.0%		Trapezoidal Channel				11.22
	F14 (30%)	26.0%	26.0%		Trapezoidal Channel			18	11.22
	F15	1.8%	1.8%	0.48	2.7	0.48	2.74		0.96
	F16	10.0%	10.0%	1.30	8.0	1.30	7.98	18	3.05
	F17	1.0%	1.0%	0.68	2.6	0.68	2.6		2.14
	F18	3.4%	3.4%	0.56	2.3	0.56	2.3		1.08
	F19	2.9%	2.9%	0.39	2.6	0.39	2.6		0.60
	F20	7.0%	7.0%	0.28	4.2	0.28	4.2		3.48
	East Div.	5.0%	30.0%		Trapezoidal Channel			0-24"	26.00
	W. Div #2	4.0%	4.0%	0.40	2.6	0.40	2.6		3.52
	W. Div #1	3.5%	3.5%	0.81	4.3	0.81	4.3		10.64
Permanent Culvert:									
F2	30"								15.14
F4	*Deleted From Design with TR-87, will remain in place until Pond D expansion is complete.*								
Temporary Culvert:									
T-F1	30" Half Culvert								21.75
T-F2	12"								0.47
T-F3	24"								21.41
T-F4	30" Half Culvert								4.74
T-F5	30" Half Culvert								5.82
* Minimum D_{50}									
Flow depth in feet does not include freeboard.									

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#36	1.440	1.440	1.25	0.10
#8	2.560	2.560	1.91	0.16
#4	3.320	3.320	3.02	0.26
#18	0.470	7.790	6.33	0.54
#43	0.670	0.670	0.65	0.05
#13	0.220	0.890	0.83	0.06
#20	2.140	3.030	1.47	0.10
#17	1.140	4.170	1.81	0.13
#25	0.000	11.960	8.15	0.67
#10	2.710	14.670	9.84	0.83
#35	0.000	14.670	9.84	0.83
#22	1.570	1.570	0.47	0.03
#44	1.390	1.390	0.29	0.02
#19	1.100	2.490	0.62	0.04
#28	9.500	9.500	1.72	0.14
#45	2.150	2.150	2.09	0.17
#5	3.180	5.330	5.19	0.41
#11	0.860	6.190	6.02	0.48
#3	3.970	3.970	3.61	0.31
#23	303.130	322.790	14.27	1.43
#15	2.200	2.200	1.81	0.14
#16	3.110	3.110	3.03	0.24
#14	3.040	6.150	5.68	0.48
#9	2.710	2.710	2.23	0.17
#7	1.110	334.960	24.61	2.26
#2	0.000	353.690	35.53	3.17

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#36	1	1.220	0.079	0.000	0.000	90.000	TR55	1.19	0.094
	2	0.220	0.002	0.000	0.000	74.000	TR55	0.07	0.002
	Σ	**1.440**						**1.25**	**0.095**
#8	1	2.560	0.134	0.000	0.000	87.000	TR55	1.91	0.163
	Σ	**2.560**						**1.91**	**0.163**
#4	1	3.320	0.142	0.000	0.000	90.000	TR55	3.02	0.260
	Σ	**3.320**						**3.02**	**0.260**
#18	1	0.470	0.016	0.000	0.000	87.000	TR55	0.39	0.025
	Σ	**7.790**						**6.33**	**0.543**
#43	1	0.670	0.043	0.000	0.000	90.000	TR55	0.65	0.051
	Σ	**0.670**						**0.65**	**0.051**
#13	1	0.220	0.013	0.000	0.000	87.000	TR55	0.18	0.009
	Σ	**0.890**						**0.83**	**0.060**
#20	1	1.770	0.099	0.000	0.000	74.000	TR55	0.53	0.038
	2	0.370	0.005	0.000	0.000	74.000	TR55	0.11	0.004
	Σ	**3.030**						**1.47**	**0.102**
#17	1	1.140	0.011	0.000	0.000	74.000	TR55	0.34	0.024
	Σ	**4.170**						**1.81**	**0.126**
#25	Σ	**11.960**						**8.15**	**0.669**
#10	1	2.710	0.211	0.000	0.000	87.000	TR55	1.92	0.164
	Σ	**14.670**						**9.84**	**0.834**
#35	Σ	**14.670**						**9.84**	**0.834**
#22	1	1.570	0.007	0.000	0.000	74.000	TR55	0.47	0.034
	Σ	**1.570**						**0.47**	**0.034**
#44	1	1.040	0.020	0.000	0.000	57.000	TR55	0.00	0.000
	2	0.350	0.100	0.000	0.000	87.000	TR55	0.29	0.018
	Σ	**1.390**						**0.29**	**0.018**
#19	1	1.100	0.051	0.000	0.000	74.000	TR55	0.33	0.021
	Σ	**2.490**						**0.62**	**0.039**
#28	1	7.730	0.103	0.000	0.000	57.000	TR55	0.01	0.003
	2	1.770	0.008	0.000	0.000	90.000	TR55	1.72	0.136

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	Σ	**9.500**						**1.72**	**0.139**
#45	1	2.150	0.050	0.000	0.000	90.000	TR55	2.09	0.165
	Σ	**2.150**						**2.09**	**0.165**
#5	1	3.180	0.071	0.000	0.000	90.000	TR55	3.09	0.245
	Σ	**5.330**						**5.19**	**0.410**
#11	1	0.860	0.044	0.000	0.000	90.000	TR55	0.84	0.066
	Σ	**6.190**						**6.02**	**0.476**
#3	1	3.970	0.161	0.000	0.000	90.000	TR55	3.61	0.311
	Σ	**3.970**						**3.61**	**0.311**
#23	1	124.960	0.145	0.000	0.000	57.000	TR55	0.20	0.114
	2	171.650	0.609	0.000	0.000	57.000	TR55	0.26	0.154
	3	1.820	0.026	0.000	0.000	61.000	TR55	0.00	0.000
	4	1.700	0.010	0.000	0.000	74.000	TR55	0.51	0.037
	5	0.450	0.145	0.000	0.000	74.000	TR55	0.10	0.005
	6	2.550	0.019	0.000	0.000	90.000	TR55	2.48	0.196
	Σ	**322.790**						**14.27**	**1.432**
#15	1	2.200	0.073	0.000	0.000	87.000	TR55	1.81	0.138
	Σ	**2.200**						**1.81**	**0.138**
#16	1	3.110	0.090	0.000	0.000	90.000	TR55	3.03	0.239
	Σ	**3.110**						**3.03**	**0.239**
#14	1	3.040	0.147	0.000	0.000	90.000	TR55	2.77	0.238
	Σ	**6.150**						**5.68**	**0.477**
#9	1	2.710	0.060	0.000	0.000	87.000	TR55	2.23	0.170
	Σ	**2.710**						**2.23**	**0.170**
#7	1	1.110	0.019	0.000	0.000	81.000	TR55	0.62	0.044
	Σ	**334.960**						**24.61**	**2.261**
#2	Σ	**353.690**						**35.53**	**3.167**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	5. Nearly bare and untilled, and alluvial valley fans	4.21	50.00	1,189.00	2.050	0.161
#3	**1**	**Time of Concentration:**					**0.161**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	5. Nearly bare and untilled, and alluvial valley fans	1.56	10.00	639.00	1.250	0.142
#4	**1**	**Time of Concentration:**					**0.142**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	4.42	24.00	543.00	2.100	0.071
#5	**1**	**Time of Concentration:**					**0.071**
#7	1	5. Nearly bare and untilled, and alluvial valley fans	44.64	208.00	466.00	6.680	0.019
#7	**1**	**Time of Concentration:**					**0.019**
#8	1	5. Nearly bare and untilled, and alluvial valley fans	1.83	12.00	655.02	1.350	0.134
#8	**1**	**Time of Concentration:**					**0.134**
#9	1	5. Nearly bare and untilled, and alluvial valley fans	9.30	62.00	667.00	3.040	0.060
#9	**1**	**Time of Concentration:**					**0.060**
#10	1	5. Nearly bare and untilled, and alluvial valley fans	1.36	12.00	885.02	1.160	0.211
#10	**1**	**Time of Concentration:**					**0.211**
#11	1	5. Nearly bare and untilled, and alluvial valley fans	4.27	14.00	328.00	2.060	0.044
#11	**1**	**Time of Concentration:**					**0.044**
#13	1	5. Nearly bare and untilled, and alluvial valley fans	30.15	82.00	272.00	5.490	0.013
#13	**1**	**Time of Concentration:**					**0.013**
#14	1	5. Nearly bare and untilled, and alluvial valley fans	2.26	18.00	798.00	1.500	0.147
#14	**1**	**Time of Concentration:**					**0.147**
#15	1	5. Nearly bare and untilled, and alluvial valley fans	2.43	10.00	411.00	1.550	0.073
#15	**1**	**Time of Concentration:**					**0.073**
#16	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	22.00	613.00	1.890	0.090
#16	**1**	**Time of Concentration:**					**0.090**
#17	1	5. Nearly bare and untilled, and alluvial valley fans	40.30	106.00	263.00	6.340	0.011
#17	**1**	**Time of Concentration:**					**0.011**
#18	1	5. Nearly bare and untilled, and alluvial valley fans	28.75	92.00	320.00	5.360	0.016
#18	**1**	**Time of Concentration:**					**0.016**
#19	1	5. Nearly bare and untilled, and alluvial valley fans	20.38	170.00	834.00	4.510	0.051
#19	**1**	**Time of Concentration:**					**0.051**
#20	1	5. Nearly bare and untilled, and alluvial valley fans	8.47	88.00	1,039.00	2.910	0.099
#20	**1**	**Time of Concentration:**					**0.099**
#20	2	5. Nearly bare and untilled, and alluvial valley fans	54.55	84.00	154.00	7.380	0.005
#20	**2**	**Time of Concentration:**					**0.005**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#22	1	5. Nearly bare and untilled, and alluvial valley fans	37.04	60.00	162.00	6.080	0.007
#22	**1**	**Time of Concentration:**					**0.007**
#23	1	1. Forest with heavy ground litter	120.08	1,740.00	1,449.00	2.770	0.145
#23	**1**	**Time of Concentration:**					**0.145**
#23	2	1. Forest with heavy ground litter	43.41	1,580.00	3,640.00	1.660	0.609
#23	**2**	**Time of Concentration:**					**0.609**
#23	3	1. Forest with heavy ground litter	56.67	102.00	180.00	1.900	0.026
#23	**3**	**Time of Concentration:**					**0.026**
#23	4	5. Nearly bare and untilled, and alluvial valley fans	70.34	230.00	327.00	8.380	0.010
#23	**4**	**Time of Concentration:**					**0.010**
#23	5	1. Forest with heavy ground litter	120.08	1,740.00	1,449.00	2.770	0.145
#23	**5**	**Time of Concentration:**					**0.145**
#23	6	5. Nearly bare and untilled, and alluvial valley fans	16.31	46.00	282.00	4.030	0.019
#23	**6**	**Time of Concentration:**					**0.019**
#28	1	1. Forest with heavy ground litter	76.83	630.00	820.00	2.210	0.103
#28	**1**	**Time of Concentration:**					**0.103**
#28	2	5. Nearly bare and untilled, and alluvial valley fans	10.64	10.00	94.00	3.260	0.008
#28	**2**	**Time of Concentration:**					**0.008**
#36	1	5. Nearly bare and untilled, and alluvial valley fans	1.45	5.00	344.00	1.200	0.079
#36	**1**	**Time of Concentration:**					**0.079**
#36	2	5. Nearly bare and untilled, and alluvial valley fans	26.09	12.00	46.00	5.100	0.002
#36	**2**	**Time of Concentration:**					**0.002**
#43	1	5. Nearly bare and untilled, and alluvial valley fans	2.96	8.00	270.00	1.720	0.043
#43	**1**	**Time of Concentration:**					**0.043**
#44	1	5. Nearly bare and untilled, and alluvial valley fans	12.88	34.00	264.00	3.580	0.020
#44	**1**	**Time of Concentration:**					**0.020**
#45	1	5. Nearly bare and untilled, and alluvial valley fans	7.87	40.00	508.00	2.800	0.050
#45	**1**	**Time of Concentration:**					**0.050**

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#36	1.440	1.440	1.58	0.12
#8	2.560	2.560	2.49	0.21
#4	3.320	3.320	3.82	0.33
#18	0.470	7.790	8.13	0.70
#43	0.670	0.670	0.81	0.07
#13	0.220	0.890	1.04	0.08
#20	2.140	3.030	2.04	0.14
#17	1.140	4.170	2.56	0.18
#25	0.000	11.960	10.70	0.88
#10	2.710	14.670	12.95	1.10
#35	0.000	14.670	12.95	1.10
#22	1.570	1.570	0.73	0.05
#44	1.390	1.390	0.37	0.02
#19	1.100	2.490	0.88	0.06
#28	9.500	9.500	2.15	0.20
#45	2.150	2.150	2.61	0.21
#5	3.180	5.330	6.47	0.52
#11	0.860	6.190	7.51	0.61
#3	3.970	3.970	4.57	0.40
#23	303.130	322.790	18.14	2.60
#15	2.200	2.200	2.32	0.18
#16	3.110	3.110	3.77	0.31
#14	3.040	6.150	7.15	0.61
#9	2.710	2.710	2.86	0.22
#7	1.110	334.960	31.32	3.67
#2	0.000	353.690	45.87	4.88

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#36	1.440	1.440	2.14	0.17
#8	2.560	2.560	3.50	0.30
#4	3.320	3.320	5.17	0.46
#18	0.470	7.790	11.22	0.98
#43	0.670	0.670	1.08	0.09
#13	0.220	0.890	1.40	0.11
#20	2.140	3.030	3.05	0.23
#17	1.140	4.170	3.93	0.29
#25	0.000	11.960	15.14	1.27
#10	2.710	14.670	18.38	1.58
#35	0.000	14.670	18.38	1.58
#22	1.570	1.570	1.21	0.09
#44	1.390	1.390	0.60	0.04
#19	1.100	2.490	1.44	0.11
#28	9.500	9.500	3.52	0.33
#45	2.150	2.150	3.48	0.29
#5	3.180	5.330	8.62	0.72
#11	0.860	6.190	10.01	0.83
#3	3.970	3.970	6.18	0.54
#23	303.130	322.790	26.00	5.62
#15	2.200	2.200	3.19	0.26
#16	3.110	3.110	5.03	0.42
#14	3.040	6.150	9.63	0.84
#9	2.710	2.710	3.93	0.31
#7	1.110	334.960	44.01	7.12
#2	0.000	353.690	65.04	8.89

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#36	1	1.220	0.079	0.000	0.000	90.000	TR55	1.97	0.164
	2	0.220	0.002	0.000	0.000	74.000	TR55	0.17	0.008
	Σ	**1.440**						**2.14**	**0.172**
#8	1	2.560	0.134	0.000	0.000	87.000	TR55	3.50	0.302
	Σ	**2.560**						**3.50**	**0.302**
#4	1	3.320	0.142	0.000	0.000	90.000	TR55	5.17	0.455
	Σ	**3.320**						**5.17**	**0.455**
#18	1	0.470	0.016	0.000	0.000	87.000	TR55	0.68	0.054
	Σ	**7.790**						**11.22**	**0.983**
#43	1	0.670	0.043	0.000	0.000	90.000	TR55	1.08	0.090
	Σ	**0.670**						**1.08**	**0.090**
#13	1	0.220	0.013	0.000	0.000	87.000	TR55	0.32	0.021
	Σ	**0.890**						**1.40**	**0.111**
#20	1	1.770	0.099	0.000	0.000	74.000	TR55	1.36	0.098
	2	0.370	0.005	0.000	0.000	74.000	TR55	0.28	0.017
	Σ	**3.030**						**3.05**	**0.225**
#17	1	1.140	0.011	0.000	0.000	74.000	TR55	0.88	0.063
	Σ	**4.170**						**3.93**	**0.288**
#25	Σ	**11.960**						**15.14**	**1.271**
#10	1	2.710	0.211	0.000	0.000	87.000	TR55	3.52	0.305
	Σ	**14.670**						**18.38**	**1.576**
#35	Σ	**14.670**						**18.38**	**1.576**
#22	1	1.570	0.007	0.000	0.000	74.000	TR55	1.21	0.087
	Σ	**1.570**						**1.21**	**0.087**
#44	1	1.040	0.020	0.000	0.000	57.000	TR55	0.09	0.008
	2	0.350	0.100	0.000	0.000	87.000	TR55	0.51	0.037
	Σ	**1.390**						**0.60**	**0.045**
#19	1	1.100	0.051	0.000	0.000	74.000	TR55	0.85	0.061
	Σ	**2.490**						**1.44**	**0.105**
#28	1	7.730	0.103	0.000	0.000	57.000	TR55	0.65	0.089
	2	1.770	0.008	0.000	0.000	90.000	TR55	2.86	0.238

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	Σ	**9.500**						**3.52**	**0.327**
#45	1	2.150	0.050	0.000	0.000	90.000	TR55	3.48	0.290
	Σ	**2.150**						**3.48**	**0.290**
#5	1	3.180	0.071	0.000	0.000	90.000	TR55	5.14	0.429
	Σ	**5.330**						**8.62**	**0.719**
#11	1	0.860	0.044	0.000	0.000	90.000	TR55	1.39	0.115
	Σ	**6.190**						**10.01**	**0.834**
#3	1	3.970	0.161	0.000	0.000	90.000	TR55	6.18	0.544
	Σ	**3.970**						**6.18**	**0.544**
#23	1	124.960	0.145	0.000	0.000	57.000	TR55	5.08	1.458
	2	171.650	0.609	0.000	0.000	57.000	TR55	5.03	1.960
	3	1.820	0.026	0.000	0.000	61.000	TR55	0.41	0.034
	4	1.700	0.010	0.000	0.000	74.000	TR55	1.31	0.094
	5	0.450	0.145	0.000	0.000	74.000	TR55	0.30	0.022
	6	2.550	0.019	0.000	0.000	90.000	TR55	4.12	0.344
	Σ	**322.790**						**26.00**	**5.617**
#15	1	2.200	0.073	0.000	0.000	87.000	TR55	3.19	0.255
	Σ	**2.200**						**3.19**	**0.255**
#16	1	3.110	0.090	0.000	0.000	90.000	TR55	5.03	0.419
	Σ	**3.110**						**5.03**	**0.419**
#14	1	3.040	0.147	0.000	0.000	90.000	TR55	4.73	0.417
	Σ	**6.150**						**9.63**	**0.836**
#9	1	2.710	0.060	0.000	0.000	87.000	TR55	3.93	0.315
	Σ	**2.710**						**3.93**	**0.315**
#7	1	1.110	0.019	0.000	0.000	81.000	TR55	1.25	0.094
	Σ	**334.960**						**44.01**	**7.117**
#2	Σ	**353.690**						**65.04**	**8.885**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	5. Nearly bare and untilled, and alluvial valley fans	4.21	50.00	1,189.00	2.050	0.161
#3	**1**	**Time of Concentration:**					**0.161**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	5. Nearly bare and untilled, and alluvial valley fans	1.56	10.00	639.00	1.250	0.142
#4	**1**	**Time of Concentration:**					**0.142**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	4.42	24.00	543.00	2.100	0.071
#5	**1**	**Time of Concentration:**					**0.071**
#7	1	5. Nearly bare and untilled, and alluvial valley fans	44.64	208.00	466.00	6.680	0.019
#7	**1**	**Time of Concentration:**					**0.019**
#8	1	5. Nearly bare and untilled, and alluvial valley fans	1.83	12.00	655.02	1.350	0.134
#8	**1**	**Time of Concentration:**					**0.134**
#9	1	5. Nearly bare and untilled, and alluvial valley fans	9.30	62.00	667.00	3.040	0.060
#9	**1**	**Time of Concentration:**					**0.060**
#10	1	5. Nearly bare and untilled, and alluvial valley fans	1.36	12.00	885.02	1.160	0.211
#10	**1**	**Time of Concentration:**					**0.211**
#11	1	5. Nearly bare and untilled, and alluvial valley fans	4.27	14.00	328.00	2.060	0.044
#11	**1**	**Time of Concentration:**					**0.044**
#13	1	5. Nearly bare and untilled, and alluvial valley fans	30.15	82.00	272.00	5.490	0.013
#13	**1**	**Time of Concentration:**					**0.013**
#14	1	5. Nearly bare and untilled, and alluvial valley fans	2.26	18.00	798.00	1.500	0.147
#14	**1**	**Time of Concentration:**					**0.147**
#15	1	5. Nearly bare and untilled, and alluvial valley fans	2.43	10.00	411.00	1.550	0.073
#15	**1**	**Time of Concentration:**					**0.073**
#16	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	22.00	613.00	1.890	0.090
#16	**1**	**Time of Concentration:**					**0.090**
#17	1	5. Nearly bare and untilled, and alluvial valley fans	40.30	106.00	263.00	6.340	0.011
#17	**1**	**Time of Concentration:**					**0.011**
#18	1	5. Nearly bare and untilled, and alluvial valley fans	28.75	92.00	320.00	5.360	0.016
#18	**1**	**Time of Concentration:**					**0.016**
#19	1	5. Nearly bare and untilled, and alluvial valley fans	20.38	170.00	834.00	4.510	0.051
#19	**1**	**Time of Concentration:**					**0.051**
#20	1	5. Nearly bare and untilled, and alluvial valley fans	8.47	88.00	1,039.00	2.910	0.099
#20	**1**	**Time of Concentration:**					**0.099**
#20	2	5. Nearly bare and untilled, and alluvial valley fans	54.55	84.00	154.00	7.380	0.005
#20	**2**	**Time of Concentration:**					**0.005**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#22	1	5. Nearly bare and untilled, and alluvial valley fans	37.04	60.00	162.00	6.080	0.007
#22	**1**	**Time of Concentration:**					**0.007**
#23	1	1. Forest with heavy ground litter	120.08	1,740.00	1,449.00	2.770	0.145
#23	**1**	**Time of Concentration:**					**0.145**
#23	2	1. Forest with heavy ground litter	43.41	1,580.00	3,640.00	1.660	0.609
#23	**2**	**Time of Concentration:**					**0.609**
#23	3	1. Forest with heavy ground litter	56.67	102.00	180.00	1.900	0.026
#23	**3**	**Time of Concentration:**					**0.026**
#23	4	5. Nearly bare and untilled, and alluvial valley fans	70.34	230.00	327.00	8.380	0.010
#23	**4**	**Time of Concentration:**					**0.010**
#23	5	1. Forest with heavy ground litter	120.08	1,740.00	1,449.00	2.770	0.145
#23	**5**	**Time of Concentration:**					**0.145**
#23	6	5. Nearly bare and untilled, and alluvial valley fans	16.31	46.00	282.00	4.030	0.019
#23	**6**	**Time of Concentration:**					**0.019**
#28	1	1. Forest with heavy ground litter	76.83	630.00	820.00	2.210	0.103
#28	**1**	**Time of Concentration:**					**0.103**
#28	2	5. Nearly bare and untilled, and alluvial valley fans	10.64	10.00	94.00	3.260	0.008
#28	**2**	**Time of Concentration:**					**0.008**
#36	1	5. Nearly bare and untilled, and alluvial valley fans	1.45	5.00	344.00	1.200	0.079
#36	**1**	**Time of Concentration:**					**0.079**
#36	2	5. Nearly bare and untilled, and alluvial valley fans	26.09	12.00	46.00	5.100	0.002
#36	**2**	**Time of Concentration:**					**0.002**
#43	1	5. Nearly bare and untilled, and alluvial valley fans	2.96	8.00	270.00	1.720	0.043
#43	**1**	**Time of Concentration:**					**0.043**
#44	1	5. Nearly bare and untilled, and alluvial valley fans	12.88	34.00	264.00	3.580	0.020
#44	**1**	**Time of Concentration:**					**0.020**
#45	1	5. Nearly bare and untilled, and alluvial valley fans	7.87	40.00	508.00	2.800	0.050
#45	**1**	**Time of Concentration:**					**0.050**

Structure Detail:

Structure #10 (Riprap Channel)

F7

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
3.00	2.0:1	2.0:1	1.4	0.30		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.38 cfs	
Depth:	0.92 ft	1.22 ft
Top Width:	6.66 ft	7.86 ft
Velocity:	4.15 fps	
X-Section Area:	4.43 sq ft	
Hydraulic Radius:	0.624 ft	
Froude Number:	0.90	
Manning's n:	0.0310	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure Detail:

Structure #35 (Riprap Channel)

F7a

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
3.00	2.0:1	2.0:1	33.0	0.30		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.38 cfs	
Depth:	0.15 ft	0.45 ft
Top Width:	3.61 ft	4.81 ft
Velocity*:		
X-Section Area:	0.51 sq ft	
Hydraulic Radius:	0.138 ft	
Froude Number*:		
Manning's n*:		
Dmin:	8.00 in	
D50:	24.00 in	
Dmax:	30.00 in	

Velocity and Manning's n calculations may not apply for this method.