Illustration 62
Hydrology and Sedimentation Analysis of RP-2345

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April 14, 2022

DESERADO MINE
BLUE MOUNTAIN ENERGY

3607 County Road 65
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Introduction

Blue Mountain Energy plans to combine the refuse disposals areas RP-234 and RP-5 into a single area to be known as RP-2345. The original permitted refuse disposal areas are nearing their original permitted configuration and there is continuing need for refuse disposal area.

In 2019, an unexpected change in coal processing waste moisture content occurred. Coal waste slurry from the bottom of the clarifier used to be discharged into the old, sealed D Seam mine. That disposal avenue unexpectedly ended, and the high moisture material had to be routed to the refuse piles. The high moisture material must be spread out and dried before it can be properly compacted.

Fortunately, the refuse disposal area RP-A was approved at the end of 2019. Though it was originally planned to serve the primary disposal needs as RP-234 and RP-5 were completed, the high moisture material requires a significant surface area to dry out. This is especially true during the winter as the material must be stored in low spaced out rows until spring when it can be spread and dried. The surface area of all the current disposal areas is required to make it through the winter. Combining and continuing use of the old disposal areas will facilitate the refuse drying process with minimal new disturbance.

The valley between the original piles will be filled and the pile design height will be increased up to the maximum as outlined in Illustration 42B. Terraces will be increased to 20 feet in width.

Hydrology

The reconfigured disposal area was modeled in SEDCAD 4. The structures are numerated, and the sub watershed areas are delineated on the accompanying Map 165. Rainfall data is included in Appendix A. Curve numbers previously calculated for refuse areas were used. SEDCAD results are included in Appendices B, C and D.

The existing sediment ponds along with most of the existing ditches will be utilized. The ditches in the valley will mostly be buried, but remaining portions will be slightly reconfigured to accommodate the toe of the refuse slope. The main change to the existing structures will be the ditches to the south. Rather than flowing down the valley between the two piles, there will be one continuous mild slope erodible channel flowing east-northeast along the south perimeter of the combined piles.

The overall area is unchanged, but the additional mild sloped terraces attenuate the flow rate significantly. More area flows to the RP-5 sediment pond, but the pond water elevation does not reach the emergency spillway during the 100-year storm. The other sediment ponds receive less water than before. No changes to the ponds or their outlet structures are required. The stage-storage and outlet hydraulics curves can be found on maps 79, 80 and 80A.

All the existing structures that will continue to be utilized still have adequate capacity. The new structures are the terrace channels and the ditch around the south perimeter. These new channels are mildly sloping erodible channels not requiring rip rap. The acute junctions where a terrace meets the next downstream channel will be wide and nearly flat acting as stilling basins. Rip rap has also been

included in these sections as an added measure to protect against localized erosion. Most of the terraces feed into an existing rip rap channel except for structure 5 which feeds into structure 8, another erodible channel. Structures 2 and 3 are the ditch along side the pile access haul road. They will need to be lined with rip rap as specified in the 100-year calculations, but it could be years before the pile gets high enough to require the access road.

Sedimentology

Sedimentology was modeled for the 10 Year storm. The sediment ponds reduce the settleable solids concentration to well below the 0.5 ml/l. A summary of the sediment pond performance is included in Table 1.

Table 1. Sediment Pond Performance

	Peak Settleable Concentration (ml/l)	
Sediment Pond	In	Out
RP-5	195.85	0.09
RP-4	188.80	0.00
RP-2-3	177.23	0.03

References

OSMRE. *Guidelines for the Use of the Revised Universal Soil Loss Equation on Mined Lands, Construction Sites, and Reclaimed Lands.* Version 1.06. August 1998.

USDA NRCS Conservation Engineering Division. *Technical Release 55 (TR-55).* June 1986.

USDA NRCS. *Web Soil Survey.* https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

NOAA National Weather Service. *Precipitation Frequency Data Server.* https://hdsc.nws.noaa.gov/hdsc/pfds/

Fletcher, B. P. and Grace, J. S., Jr. *Practical Guidance for Estimating and Controlling Erosion at Culvert Outlets.* 1972. Corps of Engineers Research, Report H-72-5, Waterways Experiment Station, Vicksburg, Mississippi.

Appendix A – Rainfall Data

Precipitation Frequency Data Server

NOAA Atlas 14, Volume 8, Version 2
Location name: Rangely, Colorado, USA*
Latitude: 40.1919°, Longitude: -108.7203°
Elevation: 6725.82 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.142 (0.111-0.183)	0.167 (0.131-0.215)	0.216 (0.168-0.279)	0.265 (0.205-0.344)	0.345 (0.264-0.452)	0.416 (0.308-0.586)	0.495 (0.353-0.718)	0.584 (0.399-0.873)	0.715 (0.469-1.10)	0.824 (0.521-1.27)
10-min	0.209 (0.163-0.268)	0.245 (0.191-0.315)	0.317 (0.247-0.409)	0.388 (0.301-0.504)	0.506 (0.386-0.706)	0.609 (0.451-0.858)	0.725 (0.517-1.05)	0.855 (0.584-1.28)	1.05 (0.688-1.61)	1.21 (0.764-1.87)
15-min	0.254 (0.199-0.327)	0.298 (0.233-0.384)	0.386 (0.301-0.499)	0.474 (0.367-0.615)	0.616 (0.471-0.861)	0.742 (0.550-1.05)	0.884 (0.631-1.28)	1.04 (0.713-1.56)	1.28 (0.837-1.97)	1.47 (0.931-2.28)
30-min	0.331 (0.259-0.425)	0.388 (0.304-0.500)	0.502 (0.391-0.648)	0.614 (0.476-0.797)	0.796 (0.608-1.11)	0.958 (0.709-1.36)	1.14 (0.812-1.65)	1.34 (0.915-2.00)	1.64 (1.07-2.52)	1.88 (1.19-2.91)
60-min	0.405 (0.317-0.520)	0.474 (0.370-0.609)	0.606 (0.472-0.783)	0.735 (0.569-0.954)	0.939 (0.716-1.31)	1.12 (0.826-1.57)	1.32 (0.938-1.90)	1.54 (1.05-2.29)	1.86 (1.22-2.86)	2.12 (1.34-3.28)
2-hr	0.478 (0.378-0.607)	0.559 (0.442-0.710)	0.711 (0.560-0.906)	0.855 (0.670-1.10)	1.08 (0.831-1.48)	1.28 (0.954-1.77)	1.50 (1.08-2.13)	1.73 (1.19-2.54)	2.08 (1.38-3.15)	2.38 (1.51-3.60)
3-hr	0.532 (0.423-0.670)	0.616 (0.489-0.777)	0.771 (0.611-0.976)	0.918 (0.723-1.17)	1.15 (0.884-1.55)	1.34 (1.01-1.84)	1.56 (1.13-2.19)	1.79 (1.24-2.60)	2.13 (1.42-3.20)	2.41 (1.55-3.64)
6-hr	0.644 (0.518-0.801)	0.743 (0.597-0.926)	0.919 (0.736-1.15)	1.08 (0.856-1.35)	1.32 (1.02-1.74)	1.51 (1.14-2.03)	1.72 (1.26-2.38)	1.96 (1.38-2.78)	2.27 (1.62-3.34)	2.53 (1.65-3.76)
12-hr	0.795 (0.647-0.977)	0.917 (0.745-1.13)	1.13 (0.912-1.39)	1.31 (1.05-1.62)	1.57 (1.23-2.04)	1.79 (1.36-2.36)	2.01 (1.48-2.73)	2.25 (1.59-3.15)	2.58 (1.75-3.72)	2.84 (1.87-4.16)
24-hr	0.959 (0.789-1.16)	1.11 (0.908-1.34)	1.35 (1.11-1.65)	1.57 (1.27-1.92)	1.87 (1.48-2.39)	2.12 (1.63-2.74)	2.37 (1.78-3.16)	2.64 (1.88-3.63)	3.00 (2.05-4.26)	3.29 (2.19-4.74)
2-day	1.11 (0.926-1.33)	1.28 (1.07-1.54)	1.57 (1.30-1.89)	1.82 (1.50-2.20)	2.17 (1.74-2.74)	2.46 (1.92-3.15)	2.76 (2.08-3.63)	3.08 (2.21-4.17)	3.51 (2.43-4.90)	3.85 (2.59-5.46)
3-day	1.21 (1.01-1.43)	1.40 (1.17-1.68)	1.72 (1.43-2.05)	2.00 (1.66-2.39)	2.40 (1.93-3.00)	2.72 (2.13-3.45)	3.06 (2.31-3.99)	3.41 (2.47-4.58)	3.90 (2.71-5.40)	4.29 (2.90-6.02)
4-day	1.28 (1.08-1.52)	1.49 (1.25-1.76)	1.84 (1.54-2.18)	2.14 (1.78-2.55)	2.57 (2.08-3.19)	2.92 (2.30-3.68)	3.28 (2.50-4.25)	3.67 (2.67-4.89)	4.20 (2.93-5.77)	4.61 (3.13-6.43)
7-day	1.48 (1.26-1.74)	1.71 (1.46-2.01)	2.10 (1.78-2.47)	2.44 (2.06-2.88)	2.93 (2.39-3.60)	3.32 (2.64-4.14)	3.73 (2.86-4.77)	4.16 (3.05-5.47)	4.74 (3.34-6.43)	5.20 (3.57-7.16)
10-day	1.66 (1.42-1.93)	1.91 (1.63-2.22)	2.33 (1.98-2.71)	2.69 (2.27-3.15)	3.29 (2.62-3.89)	3.61 (2.89-4.46)	4.04 (3.11-5.12)	4.48 (3.31-5.85)	5.09 (3.61-6.84)	5.56 (3.84-7.59)
20-day	2.17 (1.88-2.48)	2.46 (2.13-2.82)	2.95 (2.54-3.39)	3.36 (2.88-3.88)	3.93 (3.25-4.69)	4.37 (3.53-5.30)	4.82 (3.76-6.00)	5.28 (3.94-6.76)	5.90 (4.23-7.78)	6.37 (4.44-8.55)
30-day	2.58 (2.25-2.93)	2.92 (2.55-3.33)	3.48 (3.03-3.97)	3.94 (3.40-4.51)	4.57 (3.80-5.39)	5.04 (4.10-6.04)	5.52 (4.32-6.79)	6.00 (4.50-7.59)	6.62 (4.77-8.63)	7.09 (4.97-9.41)
45-day	3.10 (2.72-3.49)	3.51 (3.08-3.96)	4.18 (3.65-4.73)	4.72 (4.10-5.36)	5.43 (4.54-6.33)	5.97 (4.87-7.07)	6.49 (5.11-7.89)	7.00 (5.28-8.75)	7.65 (5.54-9.85)	8.13 (5.74-10.7)
60-day	3.53 (3.11-3.96)	4.02 (3.54-4.51)	4.79 (4.21-5.39)	5.41 (4.72-6.11)	6.22 (5.21-7.19)	6.81 (5.59-8.01)	7.39 (5.84-8.90)	7.94 (6.01-9.85)	8.63 (6.28-11.0)	9.13 (6.48-11.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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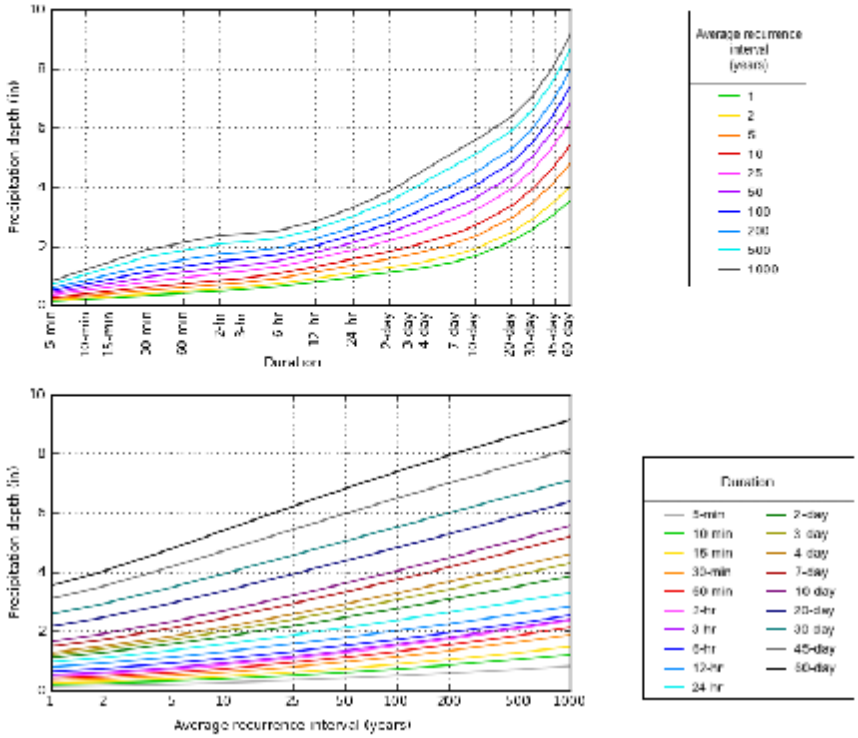
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 40.1919°, Longitude: -108.7203°



NOAA Atlas 14, Volume 8, Version 2 Created (GMT): Tue Jul 9 19:04:33 2019

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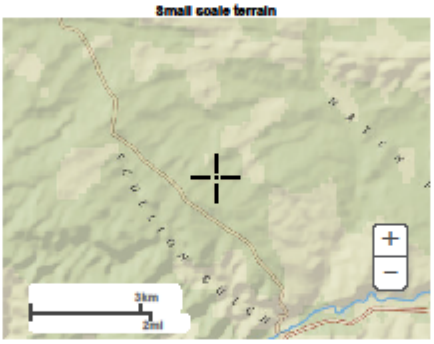
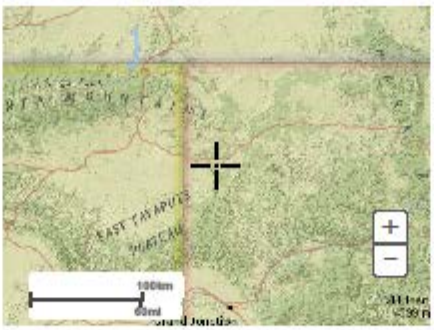
Maps & aerials

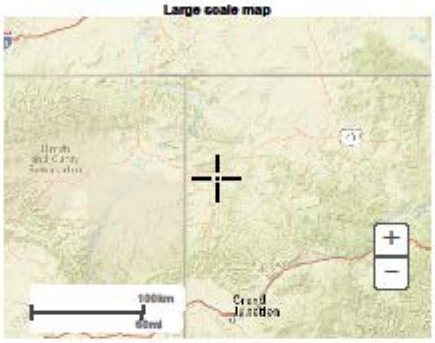
Small scale terrain



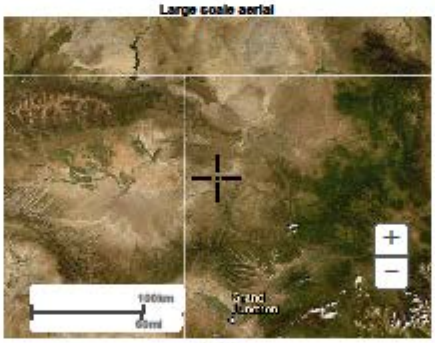
Large scale terrain



Large scale map



Large scale aerial



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Disclaimer

Appendix B – 10 Year SEDCAD Results including Sedimentology

Combination Pile 2345

Jason Tuttle

General Information

Storm Information:

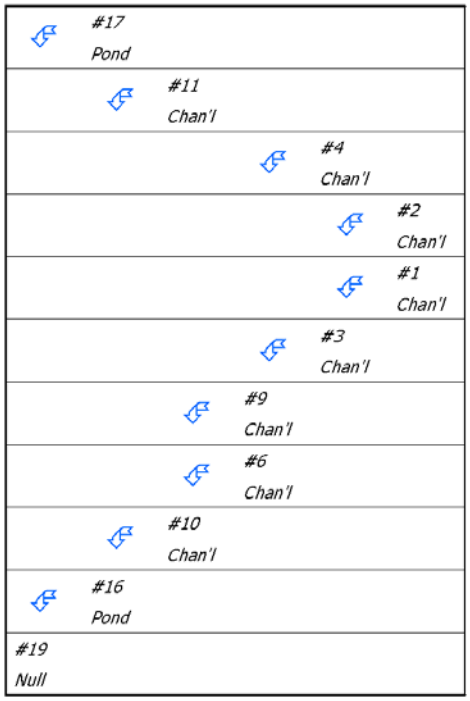
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.570 inches

Particle Size Distribution:

Size (mm)	Standard
1.0000	100.000%
0.5600	95.000%
0.3500	90.000%
0.1500	80.000%
0.0500	60.000%
0.0250	40.000%
0.0095	20.000%
0.0001	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#3	0.236	0.332	Highest Terrace CCW
Channel	#2	==>	#3	0.028	0.400	Haul road top
Channel	#3	==>	#9	0.065	0.393	Haul road bottom
Channel	#4	==>	#9	0.357	0.320	Middle terrace CCW
Channel	#5	==>	#8	0.259	0.335	Middle terrace CW
Channel	#6	==>	#10	0.361	0.302	Low terrace CCW
Channel	#7	==>	#15	0.086	0.313	Low terrace CW
Channel	#8	==>	#15	0.255	0.337	South perimeter channel
Channel	#9	==>	#10	0.051	0.400	West perimeter channel upper
Channel	#10	==>	#16	0.078	0.362	West perimeter channel lower
Channel	#11	==>	#16	0.028	0.390	North base west 1
Channel	#12	==>	#17	0.029	0.399	North base east 1
Channel	#13	==>	#17	0.012	0.404	North base west 2
Channel	#14	==>	#18	0.023	0.382	North base east 2
Channel	#15	==>	#18	0.053	0.397	East perimeter channel
Pond	#16	==>	#19	0.000	0.000	Upper pond
Pond	#17	==>	#19	0.000	0.000	Middle pond
Pond	#18	==>	#19	0.000	0.000	Lower pond
Null	#19	==>	End	0.000	0.000	outfall outfall



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.27	36.37	2,874.00	3.37	0.236
#1	**Muskingum K:**					**0.236**
#2	8. Large gullies, diversions, and low flowing streams	5.15	36.23	703.00	6.81	0.028
#2	**Muskingum K:**					**0.028**
#3	8. Large gullies, diversions, and low flowing streams	4.33	63.63	1,470.92	6.23	0.065
#3	**Muskingum K:**					**0.065**
#4	8. Large gullies, diversions, and low flowing streams	1.02	39.57	3,888.92	3.02	0.357
#4	**Muskingum K:**					**0.357**
#5	8. Large gullies, diversions, and low flowing streams	1.32	42.57	3,217.93	3.45	0.259
#5	**Muskingum K:**					**0.259**
#6	8. Large gullies, diversions, and low flowing streams	0.75	25.21	3,368.06	2.59	0.361

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	**Muskingum K:**					**0.361**
#7	8. Large gullies, diversions, and low flowing streams	0.90	8.00	888.28	2.84	0.086
#7	**Muskingum K:**					**0.086**
#8	8. Large gullies, diversions, and low flowing streams	1.38	45.00	3,249.69	3.53	0.255
#8	**Muskingum K:**					**0.255**
#9	8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.90	6.82	0.051
#9	**Muskingum K:**					**0.051**
#10	8. Large gullies, diversions, and low flowing streams	2.24	28.36	1,267.43	4.48	0.078
#10	**Muskingum K:**					**0.078**
#11	8. Large gullies, diversions, and low flowing streams	4.09	25.00	611.23	6.06	0.028
#11	**Muskingum K:**					**0.028**
#12	8. Large gullies, diversions, and low flowing streams	4.97	35.36	711.95	6.68	0.029
#12	**Muskingum K:**					**0.029**
#13	8. Large gullies, diversions, and low flowing streams	5.70	18.84	330.48	7.16	0.012
#13	**Muskingum K:**					**0.012**
#14	8. Large gullies, diversions, and low flowing streams	3.37	16.04	475.47	5.51	0.023
#14	**Muskingum K:**					**0.023**
#15	8. Large gullies, diversions, and low flowing streams	4.84	61.45	1,270.62	6.59	0.053
#15	**Muskingum K:**					**0.053**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#5		13.620	13.620	8.18	0.77	245.0	375,033	227.80	126.92
#8		14.630	28.250	13.76	1.60	321.0	301,831	183.02	82.49
#7		4.310	4.310	3.20	0.25	76.1	374,054	233.20	126.28
#15		5.320	37.880	14.67	2.15	448.9	290,312	177.81	86.93
#14		2.600	2.600	1.93	0.15	33.9	287,319	179.12	96.05
#18	In	6.520	47.000	16.01	2.67	603.6	287,500	177.23	94.23
	Out			10.48	2.67	12.6	4,492	0.03	0.03
#13		1.230	1.230	0.91	0.07	11.5	213,008	132.80	70.83
#12		2.280	2.280	1.69	0.13	15.1	155,061	96.67	51.05
#17	In	4.400	7.910	5.88	0.45	104.5	302,838	188.80	97.30
	Out			1.28	0.45	0.0	84	0.00	0.00
#11		2.130	2.130	1.58	0.12	27.1	281,302	175.37	93.99
#4		19.270	19.270	11.05	1.08	352.1	378,927	228.35	128.24
#2		3.850	3.850	2.86	0.22	27.2	164,441	102.52	54.15
#1		9.770	9.770	6.21	0.55	70.7	166,304	101.97	54.83
#3		5.100	18.720	9.13	1.06	183.4	242,329	150.78	73.77
#9		7.360	45.350	17.83	2.56	603.1	296,788	181.45	97.12
#6		20.320	20.320	12.17	1.16	382.9	385,149	233.85	130.75
#10		3.320	68.990	29.62	3.91	1,030.3	323,143	197.27	107.57
#16	In	4.390	75.510	29.61	4.28	1,119.9	321,227	195.85	106.77
	Out			14.16	4.28	59.6	12,308	0.09	0.09
#19		14.630	145.050	26.96	8.23	152.7	64,828	20.55	4.29

Particle Size Distribution(s) at Each Structure

Structure #5 (Middle terrace CW):

Size (mm)	In/Out
1.0000	100.000%
0.5600	100.000%
0.3500	100.000%
0.1500	90.139%
0.0500	67.605%
0.0250	45.070%
0.0095	22.535%
0.0001	0.000%

Structure #8 (South perimeter channel):

Size (mm)	In/Out
1.0000	100.000%
0.5600	100.000%
0.3500	99.566%
0.1500	90.654%
0.0500	67.991%
0.0250	45.327%
0.0095	22.664%
0.0001	0.000%

Structure #7 (Low terrace CW):

Size (mm)	In/Out
1.0000	100.000%
0.5600	95.000%
0.3500	90.000%
0.1500	80.000%
0.0500	60.000%
0.0250	40.000%
0.0095	20.000%
0.0001	0.000%

Structure #15 (East perimeter channel):

Size (mm)	In/Out
1.0000	100.000%
0.5600	98.577%
0.3500	96.873%
0.1500	87.648%
0.0500	65.736%
0.0250	43.824%
0.0095	21.912%
0.0001	0.000%

Structure #14 (North base east 2):

Size (mm)	In/Out
1.0000	100.000%
0.5600	95.000%
0.3500	90.000%
0.1500	80.000%
0.0500	60.000%
0.0250	40.000%
0.0095	20.000%
0.0001	0.000%

Structure #18 (Lower pond):

Size (mm)	In	Out
1.0000	100.000%	100.000%
0.5600	97.667%	100.000%
0.3500	95.118%	100.000%
0.1500	85.693%	100.000%
0.0500	64.270%	100.000%
0.0250	42.846%	100.000%
0.0095	21.423%	100.000%
0.0001	0.000%	0.000%

Structure #13 (North base west 2):

Size (mm)	In/Out
1.0000	100.000%
0.5600	95.000%
0.3500	90.000%
0.1500	80.000%

Size (mm)	In/Out
0.0500	60.000%
0.0250	40.000%
0.0095	20.000%
0.0001	0.000%

Structure #12 (North base east 1):

Size (mm)	In/Out
1.0000	100.000%
0.5600	95.000%
0.3500	90.000%
0.1500	80.000%
0.0500	60.000%
0.0250	40.000%
0.0095	20.000%
0.0001	0.000%

Structure #17 (Middle pond):

Size (mm)	In	Out
1.0000	100.000%	100.000%
0.5600	95.001%	100.000%
0.3500	90.001%	100.000%
0.1500	80.001%	100.000%
0.0500	60.001%	100.000%
0.0250	40.000%	100.000%
0.0095	20.000%	100.000%
0.0001	0.000%	0.000%

Structure #11 (North base west 1):

Size (mm)	In/Out
1.0000	100.000%
0.5600	95.000%
0.3500	90.000%
0.1500	80.000%
0.0500	60.000%
0.0250	40.000%
0.0095	20.000%
0.0001	0.000%

Structure #4 (Middle terrace CCW):

Size (mm)	In/Out
1.0000	100.000%
0.5600	100.000%
0.3500	100.000%
0.1500	92.491%
0.0500	69.369%
0.0250	46.246%
0.0095	23.123%
0.0001	0.000%

Structure #2 (Haul road top):

Size (mm)	In/Out
1.0000	100.000%
0.5600	95.000%
0.3500	90.000%
0.1500	80.000%
0.0500	60.000%
0.0250	40.000%
0.0095	20.000%
0.0001	0.000%

Structure #1 (Highest Terrace CCW):

Size (mm)	In/Out
1.0000	100.000%
0.5600	100.000%
0.3500	98.242%
0.1500	87.326%
0.0500	65.495%
0.0250	43.663%
0.0095	21.832%
0.0001	0.000%

Structure #3 (Haul road bottom):

Size (mm)	In/Out
1.0000	100.000%
0.5600	96.927%
0.3500	93.191%
0.1500	82.837%

Size (mm)	In/Out
0.0500	62.127%
0.0250	41.418%
0.0095	20.709%
0.0001	0.000%

Structure #9 (West perimeter channel upper):

Size (mm)	In/Out
1.0000	100.000%
0.5600	98.507%
0.3500	96.809%
0.1500	88.186%
0.0500	66.140%
0.0250	44.093%
0.0095	22.047%
0.0001	0.000%

Structure #6 (Low terrace CCW):

Size (mm)	In/Out
1.0000	100.000%
0.5600	100.000%
0.3500	100.000%
0.1500	90.269%
0.0500	67.702%
0.0250	45.135%
0.0095	22.567%
0.0001	0.000%

Structure #10 (West perimeter channel lower):

Size (mm)	In/Out
1.0000	100.000%
0.5600	98.915%
0.3500	97.705%
0.1500	88.632%
0.0500	66.474%
0.0250	44.316%
0.0095	22.158%
0.0001	0.000%

Structure #16 (Upper pond):

Size (mm)	In	Out
1.0000	100.000%	100.000%
0.5600	99.545%	100.000%
0.3500	98.306%	100.000%
0.1500	89.023%	100.000%
0.0500	66.767%	100.000%
0.0250	44.511%	100.000%
0.0095	22.256%	100.000%
0.0001	0.000%	0.000%

Structure #19:

Size (mm)	In/Out
1.0000	100.000%
0.5600	100.000%
0.3500	99.088%
0.1500	93.340%
0.0500	81.844%
0.0250	70.348%
0.0095	58.852%
0.0001	0.000%

Structure Detail:

Structure #5 (Erodible Channel)

Middle terrace CW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
10.0:1	3.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	8.18 cfs	
Depth:	0.71 ft	1.21 ft
Top Width:	9.27 ft	15.77 ft
Velocity:	2.48 fps	
X-Section Area:	3.30 sq ft	
Hydraulic Radius:	0.352 ft	
Froude Number:	0.73	

Structure #8 (Erodible Channel)

South perimeter channel

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.00	3.0:1	3.0:1	1.4	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	13.76 cfs	
Depth:	0.82 ft	1.32 ft
Top Width:	6.95 ft	9.95 ft
Velocity:	3.73 fps	
X-Section Area:	3.69 sq ft	
Hydraulic Radius:	0.511 ft	

	w/o Freeboard	w/ Freeboard
Froude Number:	0.90	

Structure #7 (Erodible Channel)

Low terrace CW

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
0.00	10.0:1	3.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.20 cfs	
Depth:	0.50 ft	1.00 ft
Top Width:	6.52 ft	13.02 ft
Velocity:	1.96 fps	
X-Section Area:	1.63 sq ft	
Hydraulic Radius:	0.248 ft	
Froude Number:	0.69	

Structure #15 (Riprap Channel)

East perimeter channel

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)
1.00	2.5:1	2.5:1	4.8	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	14.67 cfs	
Depth:	0.88 ft	1.38 ft
Top Width:	5.39 ft	7.89 ft

	w/o Freeboard	w/ Freeboard
Velocity:	5.22 fps	
X-Section Area:	2.81 sq ft	
Hydraulic Radius:	0.490 ft	
Froude Number:	1.28	
Manning's n:	0.0390	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #14 (Riprap Channel)

North base east 2

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)
1.00	2.5:1	2.5:1	3.4	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.93 cfs	
Depth:	0.36 ft	0.86 ft
Top Width:	2.78 ft	5.28 ft
Velocity:	2.86 fps	
X-Section Area:	0.67 sq ft	
Hydraulic Radius:	0.231 ft	
Froude Number:	1.02	
Manning's n:	0.0360	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #18 (Pond)

Lower pond

Pond Inputs:

Initial Pool Elev:	5,492.99 ft

Initial Pool:	7.41 ac-ft
*Sediment Storage:	1.61 ac-ft
Dead Space:	0.00 %

**Sediment capacity based on Average Annual R of 16.6 for 3 year(s)*

Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
48.00	9.00	30.00	80.00	2.50	0.0240	5,492.99

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,496.00

Pond Results:

Peak Elevation:	5,493.40 ft
H'graph Detention Time:	1.10 hrs
Pond Model:	CSTRS
Dewater Time:	1.08 days
Trap Efficiency:	97.90 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,487.96	1.201	0.000	0.000		Top of Sed. Storage
5,488.00	1.220	0.046	0.000		
5,488.25	1.244	0.354	0.000		
5,488.50	1.269	0.668	0.000		
5,488.75	1.293	0.988	0.000		
5,489.00	1.318	1.315	0.000		
5,489.25	1.343	1.648	0.000		
5,489.50	1.369	1.986	0.000		
5,489.75	1.394	2.332	0.000		
5,490.00	1.420	2.684	0.000		
5,490.25	1.445	3.042	0.000		
5,490.50	1.471	3.406	0.000		
5,490.75	1.497	3.777	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,491.00	1.523	4.155	0.000		
5,491.25	1.550	4.539	0.000		
5,491.50	1.576	4.930	0.000		
5,491.75	1.603	5.327	0.000		
5,492.00	1.630	5.731	0.000		
5,492.25	1.664	6.143	0.000		
5,492.50	1.699	6.563	0.000		
5,492.75	1.734	6.993	0.000		
5,492.99	1.769	7.413	0.000		Spillway #1
5,493.00	1.770	7.431	0.038	11.20	
5,493.25	1.798	7.877	5.158	13.75	
5,493.40	1.814	8.144	10.477	1.00	Peak Stage
5,493.50	1.826	8.330	14.178		
5,493.75	1.854	8.790	25.798		
5,494.00	1.882	9.257	39.528		
5,494.25	1.911	9.731	55.082		
5,494.50	1.940	10.212	62.214		
5,494.75	1.969	10.701	62.833		
5,495.00	1.998	11.196	63.446		
5,495.25	2.028	11.700	64.052		
5,495.50	2.057	12.210	64.653		
5,495.75	2.087	12.728	65.249		
5,496.00	2.117	13.254	65.839		Spillway #2
5,496.25	2.148	13.787	70.282		
5,496.50	2.178	14.328	77.918		
5,496.75	2.209	14.876	87.629		
5,497.00	2.240	15.432	99.018		

Detailed Discharge Table

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,487.96	0.000	0.000	0.000
5,488.00	0.000	0.000	0.000
5,488.25	0.000	0.000	0.000
5,488.50	0.000	0.000	0.000
5,488.75	0.000	0.000	0.000
5,489.00	0.000	0.000	0.000
5,489.25	0.000	0.000	0.000

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,489.50	0.000	0.000	0.000
5,489.75	0.000	0.000	0.000
5,490.00	0.000	0.000	0.000
5,490.25	0.000	0.000	0.000
5,490.50	0.000	0.000	0.000
5,490.75	0.000	0.000	0.000
5,491.00	0.000	0.000	0.000
5,491.25	0.000	0.000	0.000
5,491.50	0.000	0.000	0.000
5,491.75	0.000	0.000	0.000
5,492.00	0.000	0.000	0.000
5,492.25	0.000	0.000	0.000
5,492.50	0.000	0.000	0.000
5,492.75	0.000	0.000	0.000
5,492.99	0.000	0.000	0.000
5,493.00	0.038	0.000	0.038
5,493.25	5.158	0.000	5.158
5,493.50	14.178	0.000	14.178
5,493.75	25.798	0.000	25.798
5,494.00	39.528	0.000	39.528
5,494.25	55.082	0.000	55.082
5,494.50	62.214	0.000	62.214
5,494.75	62.833	0.000	62.833
5,495.00	63.446	0.000	63.446
5,495.25	64.052	0.000	64.052
5,495.50	64.653	0.000	64.653
5,495.75	65.249	0.000	65.249
5,496.00	65.839	0.000	65.839
5,496.25	66.424	3.859	70.282
5,496.50	67.003	10.914	77.918
5,496.75	67.578	20.051	87.629
5,497.00	68.148	30.870	99.018

Structure #13 (Riprap Channel)

North base west 2

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)
1.00	2.5:1	2.5:1	5.7	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.91 cfs	
Depth:	0.23 ft	0.73 ft
Top Width:	2.14 ft	4.64 ft
Velocity:	2.56 fps	
X-Section Area:	0.36 sq ft	
Hydraulic Radius:	0.160 ft	
Froude Number:	1.10	
Manning's n:	0.0410	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #12 (Riprap Channel)

North base east 1

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.69 cfs	
Depth:	0.31 ft	0.81 ft
Top Width:	2.53 ft	5.03 ft
Velocity:	3.12 fps	
X-Section Area:	0.54 sq ft	
Hydraulic Radius:	0.204 ft	
Froude Number:	1.19	

	w/o Freeboard	w/ Freeboard
Manning's n:	0.0370	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #17 (Pond)

Middle pond

Pond Inputs:

Initial Pool Elev:	5,507.00 ft
Initial Pool:	12.52 ac-ft
*Sediment Storage:	0.28 ac-ft
Dead Space:	0.00 %

**Sediment capacity based on Average Annual R of 16.6 for 3 year(s)*

Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
36.00	8.00	30.00	66.00	2.00	0.0240	5,507.00

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
12.00	5,508.30

Pond Results:

Peak Elevation:	5,507.09 ft
H'graph Detention Time:	1.64 hrs
Pond Model:	CSTRS
Dewater Time:	0.71 days
Trap Efficiency:	99.96 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,498.39	0.737	0.000	0.000		Top of Sed. Storage
5,498.50	0.755	0.079	0.000		
5,498.75	0.799	0.273	0.000		
5,499.00	0.845	0.478	0.000		
5,499.25	0.892	0.695	0.000		
5,499.50	0.940	0.924	0.000		
5,499.75	0.989	1.165	0.000		
5,500.00	1.040	1.419	0.000		
5,500.25	1.091	1.685	0.000		
5,500.50	1.145	1.965	0.000		
5,500.75	1.199	2.258	0.000		
5,501.00	1.255	2.564	0.000		
5,501.25	1.312	2.885	0.000		
5,501.50	1.370	3.220	0.000		
5,501.75	1.429	3.570	0.000		
5,502.00	1.490	3.935	0.000		
5,502.25	1.510	4.310	0.000		
5,502.50	1.530	4.690	0.000		
5,502.75	1.550	5.075	0.000		
5,503.00	1.570	5.465	0.000		
5,503.25	1.595	5.860	0.000		
5,503.50	1.620	6.262	0.000		
5,503.75	1.645	6.670	0.000		
5,504.00	1.670	7.084	0.000		
5,504.25	1.692	7.505	0.000		
5,504.50	1.715	7.931	0.000		
5,504.75	1.737	8.362	0.000		
5,505.00	1.760	8.799	0.000		
5,505.25	1.784	9.242	0.000		
5,505.50	1.809	9.691	0.000		
5,505.75	1.834	10.147	0.000		
5,506.00	1.859	10.608	0.000		
5,506.25	1.884	11.076	0.000		
5,506.50	1.909	11.550	0.000		
5,506.75	1.934	12.031	0.000		
5,507.00	1.960	12.517	0.000		Spillway #1
5,507.09	1.970	12.691	1.282	17.10	Peak Stage
5,507.25	1.987	13.011	3.652		
5,507.50	2.014	13.511	10.330		
5,507.75	2.041	14.018	18.977		
5,508.00	2.069	14.531	29.217		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,508.25	2.096	15.052	38.052		
5,508.30	2.102	15.157	38.803		Spillway #2
5,508.50	2.124	15.580	45.002		
5,508.75	2.152	16.114	56.214		
5,509.00	2.180	16.656	69.837		

Detailed Discharge Table

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,498.39	0.000	0.000	0.000
5,498.50	0.000	0.000	0.000
5,498.75	0.000	0.000	0.000
5,499.00	0.000	0.000	0.000
5,499.25	0.000	0.000	0.000
5,499.50	0.000	0.000	0.000
5,499.75	0.000	0.000	0.000
5,500.00	0.000	0.000	0.000
5,500.25	0.000	0.000	0.000
5,500.50	0.000	0.000	0.000
5,500.75	0.000	0.000	0.000
5,501.00	0.000	0.000	0.000
5,501.25	0.000	0.000	0.000
5,501.50	0.000	0.000	0.000
5,501.75	0.000	0.000	0.000
5,502.00	0.000	0.000	0.000
5,502.25	0.000	0.000	0.000
5,502.50	0.000	0.000	0.000
5,502.75	0.000	0.000	0.000
5,503.00	0.000	0.000	0.000
5,503.25	0.000	0.000	0.000
5,503.50	0.000	0.000	0.000
5,503.75	0.000	0.000	0.000
5,504.00	0.000	0.000	0.000
5,504.25	0.000	0.000	0.000
5,504.50	0.000	0.000	0.000
5,504.75	0.000	0.000	0.000
5,505.00	0.000	0.000	0.000
5,505.25	0.000	0.000	0.000

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,505.50	0.000	0.000	0.000
5,505.75	0.000	0.000	0.000
5,506.00	0.000	0.000	0.000
5,506.25	0.000	0.000	0.000
5,506.50	0.000	0.000	0.000
5,506.75	0.000	0.000	0.000
5,507.00	0.000	0.000	0.000
5,507.25	3.652	0.000	3.652
5,507.50	10.330	0.000	10.330
5,507.75	18.977	0.000	18.977
5,508.00	29.217	0.000	29.217
5,508.25	38.052	0.000	38.052
5,508.30	38.803	0.000	38.803
5,508.50	41.684	3.318	45.002
5,508.75	45.024	11.190	56.214
5,509.00	48.133	21.704	69.837

Structure #11 (Riprap Channel)

North base west 1

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)
1.00	2.5:1	2.5:1	4.1	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.58 cfs	
Depth:	0.31 ft	0.81 ft
Top Width:	2.56 ft	5.06 ft
Velocity:	2.85 fps	
X-Section Area:	0.55 sq ft	
Hydraulic Radius:	0.207 ft	
Froude Number:	1.08	
Manning's n:	0.0370	
Dmin:	1.00 in	

	w/o Freeboard	w/ Freeboard
D50:	1.50 in	
Dmax:	3.00 in	

Structure #4 (Erodible Channel)

Middle terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	11.05 cfs	
Depth:	0.80 ft	1.30 ft
Top Width:	10.37 ft	16.87 ft
Velocity:	2.67 fps	
X-Section Area:	4.14 sq ft	
Hydraulic Radius:	0.394 ft	
Froude Number:	0.75	

Structure #2 (Riprap Channel)

Haul road top

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.86 cfs	
Depth:	0.31 ft	0.81 ft

	w/o Freeboard	w/ Freeboard
Top Width:	2.53 ft	5.03 ft
Velocity*:		
X-Section Area:	0.54 sq ft	
Hydraulic Radius:	0.204 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

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

Structure #1 (Erodible Channel)

Highest Terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.3	0.0300	1.00			4.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	6.21 cfs	
Depth:	0.62 ft	1.62 ft
Top Width:	8.00 ft	21.00 ft
Velocity:	2.52 fps	
X-Section Area:	2.46 sq ft	
Hydraulic Radius:	0.304 ft	
Froude Number:	0.80	

Structure #3 (Riprap Channel)

Haul road bottom

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	9.13 cfs	
Depth:	0.72 ft	1.22 ft
Top Width:	4.61 ft	7.11 ft
Velocity:	4.51 fps	
X-Section Area:	2.02 sq ft	
Hydraulic Radius:	0.414 ft	
Froude Number:	1.20	
Manning's n:	0.0410	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #9 (Riprap Channel)

West perimeter channel upper

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)
1.00	2.5:1	2.5:1	5.2	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	17.83 cfs	
Depth:	0.93 ft	1.43 ft
Top Width:	5.66 ft	8.16 ft
Velocity:	5.74 fps	
X-Section Area:	3.11 sq ft	
Hydraulic Radius:	0.516 ft	
Froude Number:	1.37	

	w/o Freeboard	w/ Freeboard
Manning's n:	0.0380	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #6 (Erodible Channel)

Low terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	12.17 cfs	
Depth:	0.83 ft	1.33 ft
Top Width:	10.75 ft	17.25 ft
Velocity:	2.74 fps	
X-Section Area:	4.45 sq ft	
Hydraulic Radius:	0.409 ft	
Froude Number:	0.75	

Structure #10 (Riprap Channel)

West perimeter channel lower

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)
1.00	2.5:1	2.5:1	2.2	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	29.62 cfs	
Depth:	1.36 ft	1.86 ft
Top Width:	7.79 ft	10.29 ft
Velocity:	4.97 fps	
X-Section Area:	5.97 sq ft	
Hydraulic Radius:	0.718 ft	
Froude Number:	1.00	
Manning's n:	0.0360	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #16 (Pond)

Upper pond

Pond Inputs:

Initial Pool Elev:	5,515.80 ft
Initial Pool:	7.34 ac-ft
*Sediment Storage:	2.99 ac-ft
Dead Space:	20.00 %

**Sediment capacity based on Average Annual R of 16.6 for 3 year(s)*

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,515.80

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
15.00	5,517.20

Pond Results:

Peak Elevation:	5,516.39 ft
H'graph Detention Time:	1.74 hrs
Pond Model:	CSTRS
Dewater Time:	0.98 days
Trap Efficiency:	94.68 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,512.69	2.127	0.000	0.000		Top of Sed. Storage
5,512.75	2.146	0.137	0.000		
5,513.00	2.220	0.682	0.000		
5,513.25	2.257	1.242	0.000		
5,513.50	2.294	1.811	0.000		
5,513.75	2.332	2.389	0.000		
5,514.00	2.370	2.977	0.000		
5,514.25	2.385	3.571	0.000		
5,514.50	2.400	4.169	0.000		
5,514.75	2.415	4.771	0.000		
5,515.00	2.430	5.377	0.000		
5,515.25	2.449	5.987	0.000		
5,515.50	2.467	6.601	0.000		
5,515.75	2.486	7.220	0.000		
5,515.80	2.490	7.344	0.000		Spillway #1
5,516.00	2.500	7.844	2.765	19.45	
5,516.25	2.517	8.471	9.325	3.25	
5,516.39	2.527	8.819	14.158	0.90	Peak Stage
5,516.50	2.535	9.103	18.087		
5,516.75	2.552	9.738	28.593		
5,517.00	2.570	10.379	40.590		
5,517.20	2.585	10.895	51.158		Spillway #2
5,517.25	2.588	11.023	54.426		
5,517.50	2.606	11.673	76.037		
5,517.75	2.625	12.327	102.950		
5,518.00	2.643	12.985	133.867		
5,518.25	2.662	13.648	168.203		
5,518.50	2.680	14.316	205.590		

Detailed Discharge Table

Elevation (ft)	Broad-crested Weir (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,512.69	0.000	0.000	0.000
5,512.75	0.000	0.000	0.000
5,513.00	0.000	0.000	0.000
5,513.25	0.000	0.000	0.000
5,513.50	0.000	0.000	0.000

Elevation (ft)	Broad-crested Weir (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,513.75	0.000	0.000	0.000
5,514.00	0.000	0.000	0.000
5,514.25	0.000	0.000	0.000
5,514.50	0.000	0.000	0.000
5,514.75	0.000	0.000	0.000
5,515.00	0.000	0.000	0.000
5,515.25	0.000	0.000	0.000
5,515.50	0.000	0.000	0.000
5,515.75	0.000	0.000	0.000
5,515.80	0.000	0.000	0.000
5,516.00	2.765	0.000	2.765
5,516.25	9.325	0.000	9.325
5,516.50	18.087	0.000	18.087
5,516.75	28.593	0.000	28.593
5,517.00	40.590	0.000	40.590
5,517.20	51.158	0.000	51.158
5,517.25	53.911	0.515	54.426
5,517.50	68.436	7.601	76.037
5,517.75	84.072	18.877	102.950
5,518.00	100.746	33.121	133.867
5,518.25	118.396	49.807	168.203
5,518.50	136.971	68.619	205.590

Structure #19 (Null)

outfall

outfall

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)
#5	1	13.620	0.318	0.000	0.000	89.000	TR55	8.18	0.766
	Σ	**13.620**						**8.18**	**0.766**
#8	1	9.150	0.261	0.000	0.000	89.000	TR55	5.81	0.523
	2	5.480	0.264	0.000	0.000	89.000	TR55	3.47	0.313
	Σ	**28.250**						**13.76**	**1.602**
#7	1	4.310	0.103	0.000	0.000	89.000	TR55	3.20	0.245
	Σ	**4.310**						**3.20**	**0.245**
#15	1	3.630	0.067	0.000	0.000	89.000	TR55	2.70	0.206
	2	1.690	0.061	0.000	0.000	89.000	TR55	1.26	0.096
	Σ	**37.880**						**14.67**	**2.149**
#14	1	2.600	0.038	0.000	0.000	89.000	TR55	1.93	0.148
	Σ	**2.600**						**1.93**	**0.148**
#18	1	6.520	0.021	0.000	0.000	89.000	TR55	4.85	0.371
	Σ	**47.000**						**16.01**	**2.668**
#13	1	1.230	0.111	0.000	0.000	89.000	TR55	0.91	0.070
	Σ	**1.230**						**0.91**	**0.070**
#12	1	2.280	0.033	0.000	0.000	89.000	TR55	1.69	0.130
	Σ	**2.280**						**1.69**	**0.130**
#17	1	4.400	0.021	0.000	0.000	89.000	TR55	3.27	0.250
	Σ	**7.910**						**5.88**	**0.449**
#11	1	2.130	0.032	0.000	0.000	89.000	TR55	1.58	0.121
	Σ	**2.130**						**1.58**	**0.121**
#4	1	19.270	0.381	0.000	0.000	89.000	TR55	11.05	1.079
	Σ	**19.270**						**11.05**	**1.079**
#2	1	3.850	0.075	0.000	0.000	89.000	TR55	2.86	0.219
	Σ	**3.850**						**2.86**	**0.219**
#1	1	9.770	0.250	0.000	0.000	89.000	TR55	6.21	0.553
	Σ	**9.770**						**6.21**	**0.553**
#3	1	5.100	0.081	0.000	0.000	89.000	TR55	3.79	0.290
	Σ	**18.720**						**9.13**	**1.062**
#9	1	4.370	0.053	0.000	0.000	89.000	TR55	3.25	0.249

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	2	2.990	0.059	0.000	0.000	89.000	TR55	2.22	0.170
	Σ	**45.350**						**17.83**	**2.560**
#6	1	20.320	0.332	0.000	0.000	89.000	TR55	12.17	1.157
	Σ	**20.320**						**12.17**	**1.157**
#10	1	3.320	0.092	0.000	0.000	89.000	TR55	2.47	0.189
	Σ	**68.990**						**29.62**	**3.905**
#16	1	4.390	0.021	0.000	0.000	89.000	TR55	3.26	0.250
	Σ	**75.510**						**29.61**	**4.276**
#19	1	9.150	0.261	0.000	0.000	89.000	TR55	5.81	0.523
	2	5.480	0.264	0.000	0.000	89.000	TR55	3.47	0.313
	Σ	**145.050**						**26.96**	**8.230**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#5	1	0.320	225.00	33.00	0.3000	1.0000	1	245.0	375,033	227.80	126.92
	Σ							**245.0**	**375,033**	**227.80**	**126.92**
#8	1	0.320	60.00	33.00	0.3000	1.0000	1	73.3	180,755	110.82	59.77
	2	0.320	30.00	10.00	0.3000	1.0000	1	7.1	31,254	19.15	10.16
	Σ							**321.0**	**301,831**	**183.02**	**82.49**
#7	1	0.320	225.00	33.00	0.3000	1.0000	1	76.1	374,054	233.20	126.28
	Σ							**76.1**	**374,054**	**233.20**	**126.28**
#15	1	0.320	150.00	33.00	0.3000	1.0000	1	49.2	297,645	185.56	99.58
	2	0.320	50.00	10.00	0.3000	1.0000	1	2.7	39,114	24.38	12.73
	Σ							**448.9**	**290,312**	**177.81**	**86.93**
#14	1	0.320	150.00	33.00	0.3000	1.0000	1	33.9	287,319	179.12	96.05
	Σ							**33.9**	**287,319**	**179.12**	**96.05**
#18	1	0.320	225.00	33.00	0.3000	1.0000	1	120.9	390,115	243.21	131.92
	Σ							**603.6**	**287,500**	**177.23**	**94.23**
#13	1	0.320	100.00	33.00	0.3000	1.0000	1	11.5	213,008	132.80	70.83
	Σ							**11.5**	**213,008**	**132.80**	**70.83**
#12	1	0.320	50.00	33.00	0.3000	1.0000	1	15.1	155,061	96.67	51.05

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
	Σ							**15.1**	**155,061**	**96.67**	**51.05**
#17	1	0.320	225.00	33.00	0.3000	1.0000	1	77.9	374,844	233.69	126.56
	Σ							**104.5**	**302,838**	**188.80**	**97.30**
#11	1	0.320	150.00	33.00	0.3000	1.0000	1	27.1	281,302	175.37	93.99
	Σ							**27.1**	**281,302**	**175.37**	**93.99**
#4	1	0.320	225.00	33.00	0.3000	1.0000	1	352.1	378,927	228.35	128.24
	Σ							**352.1**	**378,927**	**228.35**	**128.24**
#2	1	0.320	50.00	33.00	0.3000	1.0000	1	27.2	164,441	102.52	54.15
	Σ							**27.2**	**164,441**	**102.52**	**54.15**
#1	1	0.320	50.00	33.00	0.3000	1.0000	1	70.7	166,304	101.97	54.83
	Σ							**70.7**	**166,304**	**101.97**	**54.83**
#3	1	0.320	200.00	33.00	0.3000	1.0000	1	85.6	358,279	223.36	120.70
	Σ							**183.4**	**242,329**	**150.78**	**73.77**
#9	1	0.320	150.00	33.00	0.3000	1.0000	1	60.6	303,521	189.22	101.59
	2	0.320	100.00	10.00	0.3000	1.0000	1	7.2	58,745	36.62	19.13
	Σ							**603.1**	**296,788**	**181.45**	**97.12**
#6	1	0.320	225.00	33.00	0.3000	1.0000	1	382.9	385,149	233.85	130.75
	Σ							**382.9**	**385,149**	**233.85**	**130.75**
#10	1	0.320	150.00	33.00	0.3000	1.0000	1	44.5	294,855	183.82	98.63
	Σ							**1,030.3**	**323,143**	**197.27**	**107.57**
#16	1	0.320	225.00	33.00	0.3000	1.0000	1	77.7	374,757	233.64	126.53
	Σ							**1,119.9**	**321,227**	**195.85**	**106.77**
#19	1	0.320	60.00	33.00	0.3000	1.0000	1	73.3	180,755	110.82	59.77
	2	0.320	30.00	10.00	0.3000	1.0000	1	7.1	31,254	19.15	10.16
	Σ							**152.7**	**64,828**	**20.55**	**4.29**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	33.00	50.00	151.51	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	1.27	36.37	2,874.00	3.370	0.236
#1	**1**	**Time of Concentration:**					**0.250**
#2	1	2. Minimum tillage cultivation	0.50	0.25	50.00	0.350	0.039

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		2. Minimum tillage cultivation	33.00	25.00	75.75	2.870	0.007
		8. Large gullies, diversions, and low flowing streams	5.00	35.14	702.89	6.700	0.029
#2	**1**	**Time of Concentration:**					**0.075**
#3	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	5.00	73.54	1,470.92	6.700	0.060
#3	**1**	**Time of Concentration:**					**0.081**
#4	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	38.88	3,888.92	3.000	0.360
#4	**1**	**Time of Concentration:**					**0.381**
#5	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	32.17	3,217.93	3.000	0.297
#5	**1**	**Time of Concentration:**					**0.318**
#6	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	33.67	3,367.92	3.000	0.311
#6	**1**	**Time of Concentration:**					**0.332**
#7	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	8.88	888.28	3.000	0.082
#7	**1**	**Time of Concentration:**					**0.103**
#8	1	2. Minimum tillage cultivation	33.00	20.00	60.60	2.870	0.005
		8. Large gullies, diversions, and low flowing streams	1.38	44.84	3,249.69	3.520	0.256
#8	**1**	**Time of Concentration:**					**0.261**
#8	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	1.38	44.84	3,249.69	3.520	0.256
#8	**2**	**Time of Concentration:**					**0.264**
#9	1	2. Minimum tillage cultivation	33.00	10.00	30.30	2.870	0.002
		8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.88	6.820	0.051
#9	**1**	**Time of Concentration:**					**0.053**
#9	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.90	6.820	0.051
#9	**2**	**Time of Concentration:**					**0.059**
#10	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	2.24	28.39	1,267.43	4.480	0.078
#10	**1**	**Time of Concentration:**					**0.092**
#11	1	2. Minimum tillage cultivation	33.00	16.50	50.00	2.870	0.004

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	4.09	24.99	611.23	6.060	0.028
#11	**1**	**Time of Concentration:**					**0.032**
#12	1	2. Minimum tillage cultivation	33.00	16.50	50.00	2.870	0.004
		8. Large gullies, diversions, and low flowing streams	4.97	35.38	711.95	6.680	0.029
#12	**1**	**Time of Concentration:**					**0.033**
#13	1	2. Minimum tillage cultivation	0.33	0.33	100.00	0.280	0.099
		8. Large gullies, diversions, and low flowing streams	5.70	18.83	330.48	7.160	0.012
#13	**1**	**Time of Concentration:**					**0.111**
#14	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	3.37	16.02	475.47	5.500	0.024
#14	**1**	**Time of Concentration:**					**0.038**
#15	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	4.84	61.49	1,270.62	6.600	0.053
#15	**1**	**Time of Concentration:**					**0.067**
#15	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	4.84	61.49	1,270.62	6.600	0.053
#15	**2**	**Time of Concentration:**					**0.061**
#16	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
#16	**1**	**Time of Concentration:**					**0.021**
#17	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
#17	**1**	**Time of Concentration:**					**0.021**
#18	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
#18	**1**	**Time of Concentration:**					**0.021**

Appendix C – 25 Year SEDCAD Results

Combination Pile 2345

Jason Tuttle

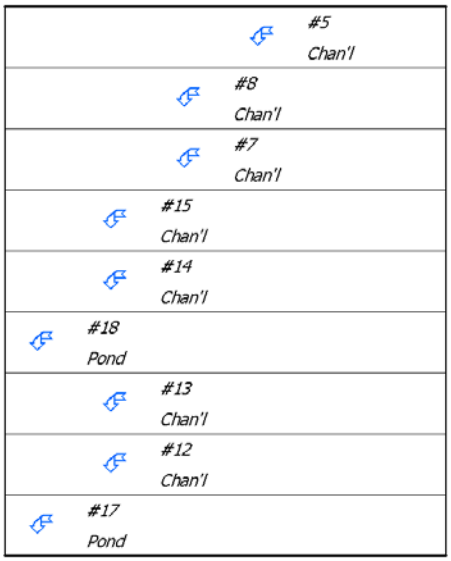
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	1.870 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#3	0.236	0.332	Highest Terrace CCW
Channel	#2	==>	#3	0.028	0.400	Haul road top
Channel	#3	==>	#9	0.065	0.393	Haul road bottom
Channel	#4	==>	#9	0.357	0.320	Middle terrace CCW
Channel	#5	==>	#8	0.259	0.335	Middle terrace CW
Channel	#6	==>	#10	0.361	0.302	Low terrace CCW
Channel	#7	==>	#15	0.086	0.313	Low terrace CW
Channel	#8	==>	#15	0.255	0.337	South perimeter channel
Channel	#9	==>	#10	0.051	0.400	West perimeter channel upper
Channel	#10	==>	#16	0.078	0.362	West perimeter channel lower
Channel	#11	==>	#16	0.028	0.390	North base west 1
Channel	#12	==>	#17	0.029	0.399	North base east 1
Channel	#13	==>	#17	0.012	0.404	North base west 2
Channel	#14	==>	#18	0.023	0.382	North base east 2
Channel	#15	==>	#18	0.053	0.397	East perimeter channel
Pond	#16	==>	#19	0.000	0.000	Upper pond
Pond	#17	==>	#19	0.000	0.000	Middle pond
Pond	#18	==>	#19	0.000	0.000	Lower pond
Null	#19	==>	End	0.000	0.000	outfall outfall



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.27	36.37	2,874.00	3.37	0.236
#1	**Muskingum K:**					**0.236**
#2	8. Large gullies, diversions, and low flowing streams	5.15	36.23	703.00	6.81	0.028
#2	**Muskingum K:**					**0.028**
#3	8. Large gullies, diversions, and low flowing streams	4.33	63.63	1,470.92	6.23	0.065
#3	**Muskingum K:**					**0.065**
#4	8. Large gullies, diversions, and low flowing streams	1.02	39.57	3,888.92	3.02	0.357
#4	**Muskingum K:**					**0.357**
#5	8. Large gullies, diversions, and low flowing streams	1.32	42.57	3,217.93	3.45	0.259
#5	**Muskingum K:**					**0.259**
#6	8. Large gullies, diversions, and low flowing streams	0.75	25.21	3,368.06	2.59	0.361
#6	**Muskingum K:**					**0.361**
#7	8. Large gullies, diversions, and low flowing streams	0.90	8.00	888.28	2.84	0.086
#7	**Muskingum K:**					**0.086**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#8	8. Large gullies, diversions, and low flowing streams	1.38	45.00	3,249.69	3.53	0.255
#8	**Muskingum K:**					**0.255**
#9	8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.90	6.82	0.051
#9	**Muskingum K:**					**0.051**
#10	8. Large gullies, diversions, and low flowing streams	2.24	28.36	1,267.43	4.48	0.078
#10	**Muskingum K:**					**0.078**
#11	8. Large gullies, diversions, and low flowing streams	4.09	25.00	611.23	6.06	0.028
#11	**Muskingum K:**					**0.028**
#12	8. Large gullies, diversions, and low flowing streams	4.97	35.36	711.95	6.68	0.029
#12	**Muskingum K:**					**0.029**
#13	8. Large gullies, diversions, and low flowing streams	5.70	18.84	330.48	7.16	0.012
#13	**Muskingum K:**					**0.012**
#14	8. Large gullies, diversions, and low flowing streams	3.37	16.04	475.47	5.51	0.023
#14	**Muskingum K:**					**0.023**
#15	8. Large gullies, diversions, and low flowing streams	4.84	61.45	1,270.62	6.59	0.053
#15	**Muskingum K:**					**0.053**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#5		13.620	13.620	11.09	1.03
#8		14.630	28.250	18.83	2.16
#7		4.310	4.310	4.21	0.33
#15		5.320	37.880	20.00	2.90
#14		2.600	2.600	2.54	0.20
#18	In	6.520	47.000	21.69	3.59
	Out			14.93	3.59
#13		1.230	1.230	1.20	0.09
#12		2.280	2.280	2.23	0.17
#17	In	4.400	7.910	7.73	0.61
	Out			1.79	0.61
#11		2.130	2.130	2.08	0.16
#4		19.270	19.270	15.08	1.45
#2		3.850	3.850	3.76	0.30
#1		9.770	9.770	8.34	0.74
#3		5.100	18.720	12.39	1.43
#9		7.360	45.350	24.15	3.45
#6		20.320	20.320	16.54	1.56
#10		3.320	68.990	40.12	5.26
#16	In	4.390	75.510	40.22	5.76
	Out			21.09	5.76
#19		0.000	130.420	37.37	9.96

Structure Detail:

Structure #5 (Erodible Channel)

Middle terrace CW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
10.0:1	3.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	11.09 cfs	
Depth:	0.80 ft	1.30 ft
Top Width:	10.38 ft	16.88 ft
Velocity:	2.67 fps	
X-Section Area:	4.15 sq ft	
Hydraulic Radius:	0.395 ft	
Froude Number:	0.75	

Structure #8 (Erodible Channel)

South perimeter channel

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.00	3.0:1	3.0:1	1.4	0.0300	0.50			5.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.83 cfs	
Depth:	0.96 ft	1.46 ft
Top Width:	7.73 ft	10.73 ft
Velocity:	4.05 fps	
X-Section Area:	4.65 sq ft	
Hydraulic Radius:	0.578 ft	

	w/o Freeboard	w/ Freeboard
Froude Number:	0.92	

Structure #7 (Erodible Channel)

Low terrace CW

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
0.00	10.0:1	3.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	4.21 cfs	
Depth:	0.56 ft	1.06 ft
Top Width:	7.22 ft	13.72 ft
Velocity:	2.10 fps	
X-Section Area:	2.01 sq ft	
Hydraulic Radius:	0.275 ft	
Froude Number:	0.70	

Structure #15 (Riprap Channel)

East perimeter channel

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)
1.00	2.5:1	2.5:1	4.8	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	20.00 cfs	
Depth:	1.00 ft	1.50 ft
Top Width:	5.98 ft	8.48 ft
Velocity:	5.76 fps	
X-Section Area:	3.47 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	0.546 ft	
Froude Number:	1.33	
Manning's n:	0.0380	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #14 (Riprap Channel)

North base east 2

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)
1.00	2.5:1	2.5:1	3.4	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.54 cfs	
Depth:	0.40 ft	0.90 ft
Top Width:	3.01 ft	5.51 ft
Velocity:	3.14 fps	
X-Section Area:	0.81 sq ft	
Hydraulic Radius:	0.255 ft	
Froude Number:	1.07	
Manning's n:	0.0350	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #18 (Pond)

Lower pond

Pond Inputs:

Initial Pool Elev:	5,492.99 ft
Initial Pool:	9.02 ac-ft

Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
48.00	9.00	30.00	80.00	2.50	0.0240	5,492.99

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,496.00

Pond Results:

Peak Elevation:	5,493.52 ft
Dewater Time:	1.10 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,486.00	0.570	0.000	0.000	
5,486.25	0.617	0.148	0.000	
5,486.50	0.666	0.309	0.000	
5,486.75	0.717	0.482	0.000	
5,487.00	0.770	0.667	0.000	
5,487.25	0.873	0.873	0.000	
5,487.50	0.982	1.104	0.000	
5,487.75	1.098	1.364	0.000	
5,488.00	1.220	1.654	0.000	
5,488.25	1.244	1.962	0.000	
5,488.50	1.269	2.276	0.000	
5,488.75	1.293	2.596	0.000	
5,489.00	1.318	2.923	0.000	
5,489.25	1.343	3.255	0.000	
5,489.50	1.369	3.594	0.000	
5,489.75	1.394	3.940	0.000	
5,490.00	1.420	4.291	0.000	
5,490.25	1.445	4.650	0.000	
5,490.50	1.471	5.014	0.000	
5,490.75	1.497	5.385	0.000	
5,491.00	1.523	5.763	0.000	
5,491.25	1.550	6.147	0.000	
5,491.50	1.576	6.537	0.000	
5,491.75	1.603	6.935	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,492.00	1.630	7.339	0.000		
5,492.25	1.664	7.751	0.000		
5,492.50	1.699	8.171	0.000		
5,492.75	1.734	8.600	0.000		
5,492.99	1.769	9.021	0.000		Spillway #1
5,493.00	1.770	9.038	0.038	11.25	
5,493.25	1.798	9.484	5.158	13.60	
5,493.50	1.826	9.937	14.178	1.30	
5,493.52	1.828	9.967	14.935	0.15	Peak Stage
5,493.75	1.854	10.397	25.798		
5,494.00	1.882	10.864	39.528		
5,494.25	1.911	11.339	55.082		
5,494.50	1.940	11.820	62.214		
5,494.75	1.969	12.308	62.833		
5,495.00	1.998	12.804	63.446		
5,495.25	2.028	13.307	64.052		
5,495.50	2.057	13.818	64.653		
5,495.75	2.087	14.336	65.249		
5,496.00	2.117	14.862	65.839		Spillway #2
5,496.25	2.148	15.395	70.282		
5,496.50	2.178	15.936	77.918		
5,496.75	2.209	16.484	87.629		
5,497.00	2.240	17.040	99.018		

Detailed Discharge Table

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,486.00	0.000	0.000	0.000
5,486.25	0.000	0.000	0.000
5,486.50	0.000	0.000	0.000
5,486.75	0.000	0.000	0.000
5,487.00	0.000	0.000	0.000
5,487.25	0.000	0.000	0.000
5,487.50	0.000	0.000	0.000
5,487.75	0.000	0.000	0.000
5,488.00	0.000	0.000	0.000
5,488.25	0.000	0.000	0.000
5,488.50	0.000	0.000	0.000
5,488.75	0.000	0.000	0.000

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,489.00	0.000	0.000	0.000
5,489.25	0.000	0.000	0.000
5,489.50	0.000	0.000	0.000
5,489.75	0.000	0.000	0.000
5,490.00	0.000	0.000	0.000
5,490.25	0.000	0.000	0.000
5,490.50	0.000	0.000	0.000
5,490.75	0.000	0.000	0.000
5,491.00	0.000	0.000	0.000
5,491.25	0.000	0.000	0.000
5,491.50	0.000	0.000	0.000
5,491.75	0.000	0.000	0.000
5,492.00	0.000	0.000	0.000
5,492.25	0.000	0.000	0.000
5,492.50	0.000	0.000	0.000
5,492.75	0.000	0.000	0.000
5,492.99	0.000	0.000	0.000
5,493.00	0.038	0.000	0.038
5,493.25	5.158	0.000	5.158
5,493.50	14.178	0.000	14.178
5,493.75	25.798	0.000	25.798
5,494.00	39.528	0.000	39.528
5,494.25	55.082	0.000	55.082
5,494.50	62.214	0.000	62.214
5,494.75	62.833	0.000	62.833
5,495.00	63.446	0.000	63.446
5,495.25	64.052	0.000	64.052
5,495.50	64.653	0.000	64.653
5,495.75	65.249	0.000	65.249
5,496.00	65.839	0.000	65.839
5,496.25	66.424	3.859	70.282
5,496.50	67.003	10.914	77.918
5,496.75	67.578	20.051	87.629
5,497.00	68.148	30.870	99.018

Structure #13 (Riprap Channel)

North base west 2

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)
1.00	2.5:1	2.5:1	5.7	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.20 cfs	
Depth:	0.26 ft	0.76 ft
Top Width:	2.28 ft	4.78 ft
Velocity:	2.87 fps	
X-Section Area:	0.42 sq ft	
Hydraulic Radius:	0.176 ft	
Froude Number:	1.18	
Manning's n:	0.0390	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #12 (Riprap Channel)

North base east 1

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.23 cfs	
Depth:	0.35 ft	0.85 ft
Top Width:	2.74 ft	5.24 ft
Velocity:	3.42 fps	
X-Section Area:	0.65 sq ft	
Hydraulic Radius:	0.226 ft	
Froude Number:	1.24	
Manning's n:	0.0360	
Dmin:	1.00 in	

	w/o Freeboard	w/ Freeboard
D50:	1.50 in	
Dmax:	3.00 in	

Structure #17 (Pond)

Middle pond

Pond Inputs:

Initial Pool Elev:	5,507.00 ft
Initial Pool:	12.79 ac-ft

Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
36.00	8.00	30.00	66.00	2.00	0.0240	5,507.00

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
12.00	5,508.30

Pond Results:

Peak Elevation:	5,507.12 ft
Dewater Time:	0.73 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,498.00	0.670	0.000	0.000	
5,498.25	0.712	0.173	0.000	
5,498.50	0.755	0.356	0.000	
5,498.75	0.799	0.550	0.000	
5,499.00	0.845	0.756	0.000	
5,499.25	0.892	0.973	0.000	
5,499.50	0.940	1.202	0.000	
5,499.75	0.989	1.443	0.000	
5,500.00	1.040	1.696	0.000	
5,500.25	1.091	1.962	0.000	
5,500.50	1.145	2.242	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,500.75	1.199	2.535	0.000		
5,501.00	1.255	2.842	0.000		
5,501.25	1.312	3.162	0.000		
5,501.50	1.370	3.497	0.000		
5,501.75	1.429	3.847	0.000		
5,502.00	1.490	4.212	0.000		
5,502.25	1.510	4.587	0.000		
5,502.50	1.530	4.967	0.000		
5,502.75	1.550	5.352	0.000		
5,503.00	1.570	5.742	0.000		
5,503.25	1.595	6.138	0.000		
5,503.50	1.620	6.539	0.000		
5,503.75	1.645	6.947	0.000		
5,504.00	1.670	7.362	0.000		
5,504.25	1.692	7.782	0.000		
5,504.50	1.715	8.208	0.000		
5,504.75	1.737	8.639	0.000		
5,505.00	1.760	9.077	0.000		
5,505.25	1.784	9.520	0.000		
5,505.50	1.809	9.969	0.000		
5,505.75	1.834	10.424	0.000		
5,506.00	1.859	10.886	0.000		
5,506.25	1.884	11.353	0.000		
5,506.50	1.909	11.828	0.000		
5,506.75	1.934	12.308	0.000		
5,507.00	1.960	12.795	0.000		Spillway #1
5,507.12	1.973	13.036	1.788	17.50	Peak Stage
5,507.25	1.987	13.288	3.652		
5,507.50	2.014	13.788	10.330		
5,507.75	2.041	14.295	18.977		
5,508.00	2.069	14.809	29.217		
5,508.25	2.096	15.329	38.052		
5,508.30	2.102	15.434	38.803		Spillway #2
5,508.50	2.124	15.857	45.002		
5,508.75	2.152	16.391	56.214		
5,509.00	2.180	16.933	69.837		

Detailed Discharge Table

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,498.00	0.000	0.000	0.000
5,498.25	0.000	0.000	0.000
5,498.50	0.000	0.000	0.000
5,498.75	0.000	0.000	0.000
5,499.00	0.000	0.000	0.000
5,499.25	0.000	0.000	0.000
5,499.50	0.000	0.000	0.000
5,499.75	0.000	0.000	0.000
5,500.00	0.000	0.000	0.000
5,500.25	0.000	0.000	0.000
5,500.50	0.000	0.000	0.000
5,500.75	0.000	0.000	0.000
5,501.00	0.000	0.000	0.000
5,501.25	0.000	0.000	0.000
5,501.50	0.000	0.000	0.000
5,501.75	0.000	0.000	0.000
5,502.00	0.000	0.000	0.000
5,502.25	0.000	0.000	0.000
5,502.50	0.000	0.000	0.000
5,502.75	0.000	0.000	0.000
5,503.00	0.000	0.000	0.000
5,503.25	0.000	0.000	0.000
5,503.50	0.000	0.000	0.000
5,503.75	0.000	0.000	0.000
5,504.00	0.000	0.000	0.000
5,504.25	0.000	0.000	0.000
5,504.50	0.000	0.000	0.000
5,504.75	0.000	0.000	0.000
5,505.00	0.000	0.000	0.000
5,505.25	0.000	0.000	0.000
5,505.50	0.000	0.000	0.000
5,505.75	0.000	0.000	0.000
5,506.00	0.000	0.000	0.000
5,506.25	0.000	0.000	0.000
5,506.50	0.000	0.000	0.000
5,506.75	0.000	0.000	0.000
5,507.00	0.000	0.000	0.000
5,507.25	3.652	0.000	3.652
5,507.50	10.330	0.000	10.330
5,507.75	18.977	0.000	18.977
5,508.00	29.217	0.000	29.217

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,508.25	38.052	0.000	38.052
5,508.30	38.803	0.000	38.803
5,508.50	41.684	3.318	45.002
5,508.75	45.024	11.190	56.214
5,509.00	48.133	21.704	69.837

Structure #11 (Riprap Channel)

North base west 1

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)
1.00	2.5:1	2.5:1	4.1	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.08 cfs	
Depth:	0.35 ft	0.85 ft
Top Width:	2.76 ft	5.26 ft
Velocity:	3.13 fps	
X-Section Area:	0.66 sq ft	
Hydraulic Radius:	0.229 ft	
Froude Number:	1.13	
Manning's n:	0.0360	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #4 (Erodible Channel)

Middle terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	15.08 cfs	
Depth:	0.90 ft	1.40 ft
Top Width:	11.65 ft	18.15 ft
Velocity:	2.89 fps	
X-Section Area:	5.22 sq ft	
Hydraulic Radius:	0.443 ft	
Froude Number:	0.76	

Structure #2 (Riprap Channel)

Haul road top

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.76 cfs	
Depth:	0.32 ft	0.82 ft
Top Width:	2.61 ft	5.11 ft
Velocity*:		
X-Section Area:	0.58 sq ft	
Hydraulic Radius:	0.212 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

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

Structure #1 (Erodible Channel)

Highest Terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.3	0.0300	1.00			4.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	8.34 cfs	
Depth:	0.69 ft	1.69 ft
Top Width:	8.94 ft	21.94 ft
Velocity:	2.71 fps	
X-Section Area:	3.07 sq ft	
Hydraulic Radius:	0.340 ft	
Froude Number:	0.82	

Structure #3 (Riprap Channel)

Haul road bottom

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	12.39 cfs	
Depth:	0.81 ft	1.31 ft
Top Width:	5.04 ft	7.54 ft
Velocity:	5.06 fps	
X-Section Area:	2.44 sq ft	
Hydraulic Radius:	0.456 ft	
Froude Number:	1.28	
Manning's n:	0.0390	
Dmin:	2.00 in	
D50:	3.00 in	

	w/o Freeboard	w/ Freeboard
Dmax:	4.50 in	

Structure #9 (Riprap Channel)

West perimeter channel upper

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)
1.00	2.5:1	2.5:1	5.2	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	24.15 cfs	
Depth:	1.06 ft	1.56 ft
Top Width:	6.32 ft	8.82 ft
Velocity:	6.20 fps	
X-Section Area:	3.90 sq ft	
Hydraulic Radius:	0.579 ft	
Froude Number:	1.39	
Manning's n:	0.0380	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #6 (Erodible Channel)

Low terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	16.54 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.93 ft	1.43 ft
Top Width:	12.07 ft	18.57 ft
Velocity:	2.95 fps	
X-Section Area:	5.60 sq ft	
Hydraulic Radius:	0.459 ft	
Froude Number:	0.76	

Structure #10 (Riprap Channel)

West perimeter channel lower

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)
1.00	2.5:1	2.5:1	2.2	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	40.12 cfs	
Depth:	1.54 ft	2.04 ft
Top Width:	8.71 ft	11.21 ft
Velocity:	5.36 fps	
X-Section Area:	7.49 sq ft	
Hydraulic Radius:	0.805 ft	
Froude Number:	1.02	
Manning's n:	0.0360	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #16 (Pond)

Upper pond

Pond Inputs:

Initial Pool Elev:	5,515.80 ft
Initial Pool:	10.33 ac-ft

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,515.80

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
15.00	5,517.20

Pond Results:

Peak Elevation:	5,516.57 ft
Dewater Time:	1.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,511.00	1.280	0.000	0.000		
5,511.25	1.430	0.339	0.000		
5,511.50	1.588	0.716	0.000		
5,511.75	1.755	1.133	0.000		
5,512.00	1.930	1.594	0.000		
5,512.25	2.001	2.085	0.000		
5,512.50	2.072	2.594	0.000		
5,512.75	2.146	3.122	0.000		
5,513.00	2.220	3.667	0.000		
5,513.25	2.257	4.227	0.000		
5,513.50	2.294	4.796	0.000		
5,513.75	2.332	5.374	0.000		
5,514.00	2.370	5.962	0.000		
5,514.25	2.385	6.556	0.000		
5,514.50	2.400	7.154	0.000		
5,514.75	2.415	7.756	0.000		
5,515.00	2.430	8.362	0.000		
5,515.25	2.449	8.972	0.000		
5,515.50	2.467	9.586	0.000		
5,515.75	2.486	10.205	0.000		
5,515.80	2.490	10.329	0.000		Spillway #1
5,516.00	2.500	10.829	2.765	18.85	
5,516.25	2.517	11.456	9.325	3.85	
5,516.50	2.535	12.087	18.087	1.05	
5,516.57	2.540	12.269	21.092	0.35	Peak Stage

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,516.75	2.552	12.723	28.593		
5,517.00	2.570	13.364	40.590		
5,517.20	2.585	13.880	51.158		Spillway #2
5,517.25	2.588	14.008	54.426		
5,517.50	2.606	14.658	76.037		
5,517.75	2.625	15.312	102.950		
5,518.00	2.643	15.970	133.867		
5,518.25	2.662	16.633	168.203		
5,518.50	2.680	17.301	205.590		

Detailed Discharge Table

Elevation (ft)	Broad-crested Weir (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,511.00	0.000	0.000	0.000
5,511.25	0.000	0.000	0.000
5,511.50	0.000	0.000	0.000
5,511.75	0.000	0.000	0.000
5,512.00	0.000	0.000	0.000
5,512.25	0.000	0.000	0.000
5,512.50	0.000	0.000	0.000
5,512.75	0.000	0.000	0.000
5,513.00	0.000	0.000	0.000
5,513.25	0.000	0.000	0.000
5,513.50	0.000	0.000	0.000
5,513.75	0.000	0.000	0.000
5,514.00	0.000	0.000	0.000
5,514.25	0.000	0.000	0.000
5,514.50	0.000	0.000	0.000
5,514.75	0.000	0.000	0.000
5,515.00	0.000	0.000	0.000
5,515.25	0.000	0.000	0.000
5,515.50	0.000	0.000	0.000
5,515.75	0.000	0.000	0.000
5,515.80	0.000	0.000	0.000
5,516.00	2.765	0.000	2.765
5,516.25	9.325	0.000	9.325
5,516.50	18.087	0.000	18.087
5,516.75	28.593	0.000	28.593
5,517.00	40.590	0.000	40.590

Elevation (ft)	Broad-crested Weir (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,517.20	51.158	0.000	51.158
5,517.25	53.911	0.515	54.426
5,517.50	68.436	7.601	76.037
5,517.75	84.072	18.877	102.950
5,518.00	100.746	33.121	133.867
5,518.25	118.396	49.807	168.203
5,518.50	136.971	68.619	205.590

Structure #19 (Null)

outfall

outfall

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)
#5	1	13.620	0.318	0.000	0.000	89.000	TR55	11.09	1.031
	Σ	**13.620**						**11.09**	**1.031**
#8	1	9.150	0.261	0.000	0.000	89.000	TR55	7.82	0.705
	2	5.480	0.264	0.000	0.000	89.000	TR55	4.67	0.422
	Σ	**28.250**						**18.83**	**2.158**
#7	1	4.310	0.103	0.000	0.000	89.000	TR55	4.21	0.330
	Σ	**4.310**						**4.21**	**0.330**
#15	1	3.630	0.067	0.000	0.000	89.000	TR55	3.55	0.278
	2	1.690	0.061	0.000	0.000	89.000	TR55	1.65	0.129
	Σ	**37.880**						**20.00**	**2.896**
#14	1	2.600	0.038	0.000	0.000	89.000	TR55	2.54	0.199
	Σ	**2.600**						**2.54**	**0.199**
#18	1	6.520	0.021	0.000	0.000	89.000	TR55	6.37	0.500
	Σ	**47.000**						**21.69**	**3.595**
#13	1	1.230	0.111	0.000	0.000	89.000	TR55	1.20	0.094
	Σ	**1.230**						**1.20**	**0.094**
#12	1	2.280	0.033	0.000	0.000	89.000	TR55	2.23	0.175
	Σ	**2.280**						**2.23**	**0.175**
#17	1	4.400	0.021	0.000	0.000	89.000	TR55	4.30	0.337
	Σ	**7.910**						**7.73**	**0.606**
#11	1	2.130	0.032	0.000	0.000	89.000	TR55	2.08	0.163
	Σ	**2.130**						**2.08**	**0.163**
#4	1	19.270	0.381	0.000	0.000	89.000	TR55	15.08	1.454
	Σ	**19.270**						**15.08**	**1.454**
#2	1	3.850	0.075	0.000	0.000	89.000	TR55	3.76	0.295
	Σ	**3.850**						**3.76**	**0.295**
#1	1	9.770	0.250	0.000	0.000	89.000	TR55	8.34	0.745
	Σ	**9.770**						**8.34**	**0.745**
#3	1	5.100	0.081	0.000	0.000	89.000	TR55	4.98	0.391
	Σ	**18.720**						**12.39**	**1.431**
#9	1	4.370	0.053	0.000	0.000	89.000	TR55	4.27	0.335
	2	2.990	0.059	0.000	0.000	89.000	TR55	2.92	0.229

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	**45.350**						**24.15**	**3.448**
#6	1	20.320	0.332	0.000	0.000	89.000	TR55	16.54	1.559
	Σ	**20.320**						**16.54**	**1.559**
#10	1	3.320	0.092	0.000	0.000	89.000	TR55	3.24	0.254
	Σ	**68.990**						**40.12**	**5.261**
#16	1	4.390	0.021	0.000	0.000	89.000	TR55	4.29	0.336
	Σ	**75.510**						**40.22**	**5.761**
#19	Σ	**130.420**						**37.37**	**9.961**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	33.00	50.00	151.51	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	1.27	36.37	2,874.00	3.370	0.236
#1	**1**	**Time of Concentration:**					**0.250**
#2	1	2. Minimum tillage cultivation	0.50	0.25	50.00	0.350	0.039
		2. Minimum tillage cultivation	33.00	25.00	75.75	2.870	0.007
		8. Large gullies, diversions, and low flowing streams	5.00	35.14	702.89	6.700	0.029
#2	**1**	**Time of Concentration:**					**0.075**
#3	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	5.00	73.54	1,470.92	6.700	0.060
#3	**1**	**Time of Concentration:**					**0.081**
#4	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	38.88	3,888.92	3.000	0.360
#4	**1**	**Time of Concentration:**					**0.381**
#5	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	32.17	3,217.93	3.000	0.297
#5	**1**	**Time of Concentration:**					**0.318**
#6	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	33.67	3,367.92	3.000	0.311
#6	**1**	**Time of Concentration:**					**0.332**
#7	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	8.88	888.28	3.000	0.082
#7	**1**	**Time of Concentration:**					**0.103**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#8	1	2. Minimum tillage cultivation	33.00	20.00	60.60	2.870	0.005
		8. Large gullies, diversions, and low flowing streams	1.38	44.84	3,249.69	3.520	0.256
#8	**1**	**Time of Concentration:**					**0.261**
#8	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	1.38	44.84	3,249.69	3.520	0.256
#8	**2**	**Time of Concentration:**					**0.264**
#9	1	2. Minimum tillage cultivation	33.00	10.00	30.30	2.870	0.002
		8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.88	6.820	0.051
#9	**1**	**Time of Concentration:**					**0.053**
#9	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.90	6.820	0.051
#9	**2**	**Time of Concentration:**					**0.059**
#10	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	2.24	28.39	1,267.43	4.480	0.078
#10	**1**	**Time of Concentration:**					**0.092**
#11	1	2. Minimum tillage cultivation	33.00	16.50	50.00	2.870	0.004
		8. Large gullies, diversions, and low flowing streams	4.09	24.99	611.23	6.060	0.028
#11	**1**	**Time of Concentration:**					**0.032**
#12	1	2. Minimum tillage cultivation	33.00	16.50	50.00	2.870	0.004
		8. Large gullies, diversions, and low flowing streams	4.97	35.38	711.95	6.680	0.029
#12	**1**	**Time of Concentration:**					**0.033**
#13	1	2. Minimum tillage cultivation	0.33	0.33	100.00	0.280	0.099
		8. Large gullies, diversions, and low flowing streams	5.70	18.83	330.48	7.160	0.012
#13	**1**	**Time of Concentration:**					**0.111**
#14	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	3.37	16.02	475.47	5.500	0.024
#14	**1**	**Time of Concentration:**					**0.038**
#15	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	4.84	61.49	1,270.62	6.600	0.053
#15	**1**	**Time of Concentration:**					**0.067**
#15	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	4.84	61.49	1,270.62	6.600	0.053
#15	**2**	**Time of Concentration:**					**0.061**
#16	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
#16	**1**	**Time of Concentration:**					**0.021**
#17	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#17	**1**	**Time of Concentration:**					**0.021**
#18	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
#18	**1**	**Time of Concentration:**					**0.021**

Appendix D – 100 Year SEDCAD Results

Combination Pile 2345

Jason Tuttle

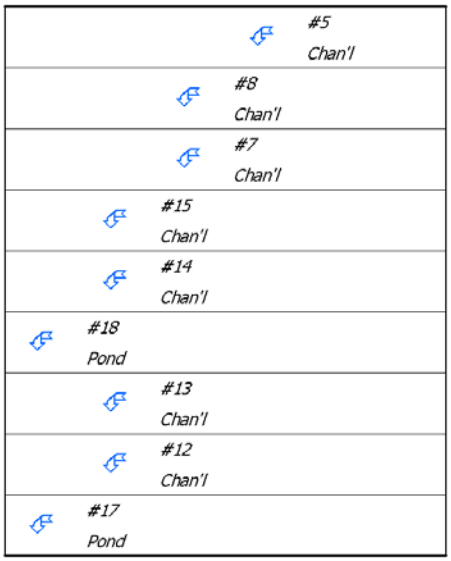
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	2.370 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#3	0.236	0.332	Highest Terrace CCW
Channel	#2	==>	#3	0.028	0.400	Haul road top
Channel	#3	==>	#9	0.065	0.393	Haul road bottom
Channel	#4	==>	#9	0.357	0.320	Middle terrace CCW
Channel	#5	==>	#8	0.259	0.335	Middle terrace CW
Channel	#6	==>	#10	0.361	0.302	Low terrace CCW
Channel	#7	==>	#15	0.086	0.313	Low terrace CW
Channel	#8	==>	#15	0.255	0.337	South perimeter channel
Channel	#9	==>	#10	0.051	0.400	West perimeter channel upper
Channel	#10	==>	#16	0.078	0.362	West perimeter channel lower
Channel	#11	==>	#16	0.028	0.390	North base west 1
Channel	#12	==>	#17	0.029	0.399	North base east 1
Channel	#13	==>	#17	0.012	0.404	North base west 2
Channel	#14	==>	#18	0.023	0.382	North base east 2
Channel	#15	==>	#18	0.053	0.397	East perimeter channel
Pond	#16	==>	#19	0.000	0.000	Upper pond
Pond	#17	==>	#19	0.000	0.000	Middle pond
Pond	#18	==>	#19	0.000	0.000	Lower pond
Null	#19	==>	End	0.000	0.000	outfall outfall



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.27	36.37	2,874.00	3.37	0.236
#1	**Muskingum K:**					**0.236**
#2	8. Large gullies, diversions, and low flowing streams	5.15	36.23	703.00	6.81	0.028
#2	**Muskingum K:**					**0.028**
#3	8. Large gullies, diversions, and low flowing streams	4.33	63.63	1,470.92	6.23	0.065
#3	**Muskingum K:**					**0.065**
#4	8. Large gullies, diversions, and low flowing streams	1.02	39.57	3,888.92	3.02	0.357
#4	**Muskingum K:**					**0.357**
#5	8. Large gullies, diversions, and low flowing streams	1.32	42.57	3,217.93	3.45	0.259
#5	**Muskingum K:**					**0.259**
#6	8. Large gullies, diversions, and low flowing streams	0.75	25.21	3,368.06	2.59	0.361
#6	**Muskingum K:**					**0.361**
#7	8. Large gullies, diversions, and low flowing streams	0.90	8.00	888.28	2.84	0.086
#7	**Muskingum K:**					**0.086**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#8	8. Large gullies, diversions, and low flowing streams	1.38	45.00	3,249.69	3.53	0.255
#8	**Muskingum K:**					**0.255**
#9	8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.90	6.82	0.051
#9	**Muskingum K:**					**0.051**
#10	8. Large gullies, diversions, and low flowing streams	2.24	28.36	1,267.43	4.48	0.078
#10	**Muskingum K:**					**0.078**
#11	8. Large gullies, diversions, and low flowing streams	4.09	25.00	611.23	6.06	0.028
#11	**Muskingum K:**					**0.028**
#12	8. Large gullies, diversions, and low flowing streams	4.97	35.36	711.95	6.68	0.029
#12	**Muskingum K:**					**0.029**
#13	8. Large gullies, diversions, and low flowing streams	5.70	18.84	330.48	7.16	0.012
#13	**Muskingum K:**					**0.012**
#14	8. Large gullies, diversions, and low flowing streams	3.37	16.04	475.47	5.51	0.023
#14	**Muskingum K:**					**0.023**
#15	8. Large gullies, diversions, and low flowing streams	4.84	61.45	1,270.62	6.59	0.053
#15	**Muskingum K:**					**0.053**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#5		13.620	13.620	16.20	1.50
#8		14.630	28.250	27.73	3.14
#7		4.310	4.310	5.93	0.48
#15		5.320	37.880	29.33	4.22
#14		2.600	2.600	3.58	0.29
#18	In	6.520	47.000	31.68	5.24
	Out			23.46	5.24
#13		1.230	1.230	1.69	0.14
#12		2.280	2.280	3.14	0.25
#17	In	4.400	7.910	10.89	0.88
	Out			2.69	0.88
#11		2.130	2.130	2.93	0.24
#4		19.270	19.270	22.12	2.12
#2		3.850	3.850	5.30	0.43
#1		9.770	9.770	12.04	1.08
#3		5.100	18.720	18.06	2.08
#9		7.360	45.350	35.18	5.02
#6		20.320	20.320	24.21	2.27
#10		3.320	68.990	58.39	7.66
#16	In	4.390	75.510	58.71	8.39
	Out			34.24	8.39
#19		0.000	130.420	59.61	14.51

Structure Detail:

Structure #5 (Erodible Channel)

Middle terrace CW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
10.0:1	3.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	16.20 cfs	
Depth:	0.92 ft	1.42 ft
Top Width:	11.97 ft	18.47 ft
Velocity:	2.94 fps	
X-Section Area:	5.51 sq ft	
Hydraulic Radius:	0.455 ft	
Froude Number:	0.76	

Structure #8 (Erodible Channel)

South perimeter channel

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.00	3.0:1	3.0:1	1.4	0.0300	0.50			5.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	27.73 cfs	
Depth:	1.14 ft	1.64 ft
Top Width:	8.85 ft	11.85 ft
Velocity:	4.48 fps	
X-Section Area:	6.20 sq ft	
Hydraulic Radius:	0.672 ft	

	w/o Freeboard	w/ Freeboard
Froude Number:	0.94	

Structure #7 (Erodible Channel)

Low terrace CW

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
0.00	10.0:1	3.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	5.93 cfs	
Depth:	0.63 ft	1.13 ft
Top Width:	8.21 ft	14.71 ft
Velocity:	2.29 fps	
X-Section Area:	2.59 sq ft	
Hydraulic Radius:	0.312 ft	
Froude Number:	0.72	

Structure #15 (Riprap Channel)

East perimeter channel

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)
1.00	2.5:1	2.5:1	4.8	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	29.33 cfs	
Depth:	1.16 ft	1.66 ft
Top Width:	6.80 ft	9.30 ft
Velocity:	6.47 fps	
X-Section Area:	4.53 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	0.625 ft	
Froude Number:	1.40	
Manning's n:	0.0370	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #14 (Riprap Channel)

North base east 2

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)
1.00	2.5:1	2.5:1	3.4	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.58 cfs	
Depth:	0.47 ft	0.97 ft
Top Width:	3.34 ft	5.84 ft
Velocity:	3.51 fps	
X-Section Area:	1.02 sq ft	
Hydraulic Radius:	0.289 ft	
Froude Number:	1.12	
Manning's n:	0.0340	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #18 (Pond)

Lower pond

Pond Inputs:

Initial Pool Elev:	5,492.99 ft
Initial Pool:	9.02 ac-ft

Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
48.00	9.00	30.00	80.00	2.50	0.0240	5,492.99

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,496.00

Pond Results:

Peak Elevation:	5,493.70 ft
Dewater Time:	1.11 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,486.00	0.570	0.000	0.000	
5,486.25	0.617	0.148	0.000	
5,486.50	0.666	0.309	0.000	
5,486.75	0.717	0.482	0.000	
5,487.00	0.770	0.667	0.000	
5,487.25	0.873	0.873	0.000	
5,487.50	0.982	1.104	0.000	
5,487.75	1.098	1.364	0.000	
5,488.00	1.220	1.654	0.000	
5,488.25	1.244	1.962	0.000	
5,488.50	1.269	2.276	0.000	
5,488.75	1.293	2.596	0.000	
5,489.00	1.318	2.923	0.000	
5,489.25	1.343	3.255	0.000	
5,489.50	1.369	3.594	0.000	
5,489.75	1.394	3.940	0.000	
5,490.00	1.420	4.291	0.000	
5,490.25	1.445	4.650	0.000	
5,490.50	1.471	5.014	0.000	
5,490.75	1.497	5.385	0.000	
5,491.00	1.523	5.763	0.000	
5,491.25	1.550	6.147	0.000	
5,491.50	1.576	6.537	0.000	
5,491.75	1.603	6.935	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,492.00	1.630	7.339	0.000		
5,492.25	1.664	7.751	0.000		
5,492.50	1.699	8.171	0.000		
5,492.75	1.734	8.600	0.000		
5,492.99	1.769	9.021	0.000		Spillway #1
5,493.00	1.770	9.038	0.038	11.25	
5,493.25	1.798	9.484	5.158	13.40	
5,493.50	1.826	9.937	14.178	1.35	
5,493.70	1.848	10.305	23.458	0.65	Peak Stage
5,493.75	1.854	10.397	25.798		
5,494.00	1.882	10.864	39.528		
5,494.25	1.911	11.339	55.082		
5,494.50	1.940	11.820	62.214		
5,494.75	1.969	12.308	62.833		
5,495.00	1.998	12.804	63.446		
5,495.25	2.028	13.307	64.052		
5,495.50	2.057	13.818	64.653		
5,495.75	2.087	14.336	65.249		
5,496.00	2.117	14.862	65.839		Spillway #2
5,496.25	2.148	15.395	70.282		
5,496.50	2.178	15.936	77.918		
5,496.75	2.209	16.484	87.629		
5,497.00	2.240	17.040	99.018		

Detailed Discharge Table

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,486.00	0.000	0.000	0.000
5,486.25	0.000	0.000	0.000
5,486.50	0.000	0.000	0.000
5,486.75	0.000	0.000	0.000
5,487.00	0.000	0.000	0.000
5,487.25	0.000	0.000	0.000
5,487.50	0.000	0.000	0.000
5,487.75	0.000	0.000	0.000
5,488.00	0.000	0.000	0.000
5,488.25	0.000	0.000	0.000
5,488.50	0.000	0.000	0.000
5,488.75	0.000	0.000	0.000

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,489.00	0.000	0.000	0.000
5,489.25	0.000	0.000	0.000
5,489.50	0.000	0.000	0.000
5,489.75	0.000	0.000	0.000
5,490.00	0.000	0.000	0.000
5,490.25	0.000	0.000	0.000
5,490.50	0.000	0.000	0.000
5,490.75	0.000	0.000	0.000
5,491.00	0.000	0.000	0.000
5,491.25	0.000	0.000	0.000
5,491.50	0.000	0.000	0.000
5,491.75	0.000	0.000	0.000
5,492.00	0.000	0.000	0.000
5,492.25	0.000	0.000	0.000
5,492.50	0.000	0.000	0.000
5,492.75	0.000	0.000	0.000
5,492.99	0.000	0.000	0.000
5,493.00	0.038	0.000	0.038
5,493.25	5.158	0.000	5.158
5,493.50	14.178	0.000	14.178
5,493.75	25.798	0.000	25.798
5,494.00	39.528	0.000	39.528
5,494.25	55.082	0.000	55.082
5,494.50	62.214	0.000	62.214
5,494.75	62.833	0.000	62.833
5,495.00	63.446	0.000	63.446
5,495.25	64.052	0.000	64.052
5,495.50	64.653	0.000	64.653
5,495.75	65.249	0.000	65.249
5,496.00	65.839	0.000	65.839
5,496.25	66.424	3.859	70.282
5,496.50	67.003	10.914	77.918
5,496.75	67.578	20.051	87.629
5,497.00	68.148	30.870	99.018

Structure #13 (Riprap Channel)

North base west 2

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)
1.00	2.5:1	2.5:1	5.7	0.50		

Riprap Channel Results:

PADER Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.69 cfs	
Depth:	0.00 ft	
Top Width:	0.00 ft	
Velocity:	0.00 fps	
X-Section Area:	0.00 sq ft	
Hydraulic Radius:	0.000 ft	
Froude Number:	0.00	
Manning's n:	0.0000	
Dmin:	0.00 in	
D50:	0.00 in	
Dmax:	0.00 in	

Structure #12 (Riprap Channel)

North base east 1

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

PADER Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.14 cfs	
Depth:	0.00 ft	
Top Width:	0.00 ft	
Velocity:	0.00 fps	
X-Section Area:	0.00 sq ft	
Hydraulic Radius:	0.000 ft	
Froude Number:	0.00	
Manning's n:	0.0000	
Dmin:	0.00 in	

	w/o Freeboard	w/ Freeboard
D50:	0.00 in	
Dmax:	0.00 in	

Structure #17 (Pond)

Middle pond

Pond Inputs:

Initial Pool Elev:	5,507.00 ft
Initial Pool:	12.79 ac-ft

Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
36.00	8.00	30.00	66.00	2.00	0.0240	5,507.00

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
12.00	5,508.30

Pond Results:

Peak Elevation:	5,507.18 ft
Dewater Time:	0.75 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,498.00	0.670	0.000	0.000	
5,498.25	0.712	0.173	0.000	
5,498.50	0.755	0.356	0.000	
5,498.75	0.799	0.550	0.000	
5,499.00	0.845	0.756	0.000	
5,499.25	0.892	0.973	0.000	
5,499.50	0.940	1.202	0.000	
5,499.75	0.989	1.443	0.000	
5,500.00	1.040	1.696	0.000	
5,500.25	1.091	1.962	0.000	
5,500.50	1.145	2.242	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,500.75	1.199	2.535	0.000		
5,501.00	1.255	2.842	0.000		
5,501.25	1.312	3.162	0.000		
5,501.50	1.370	3.497	0.000		
5,501.75	1.429	3.847	0.000		
5,502.00	1.490	4.212	0.000		
5,502.25	1.510	4.587	0.000		
5,502.50	1.530	4.967	0.000		
5,502.75	1.550	5.352	0.000		
5,503.00	1.570	5.742	0.000		
5,503.25	1.595	6.138	0.000		
5,503.50	1.620	6.539	0.000		
5,503.75	1.645	6.947	0.000		
5,504.00	1.670	7.362	0.000		
5,504.25	1.692	7.782	0.000		
5,504.50	1.715	8.208	0.000		
5,504.75	1.737	8.639	0.000		
5,505.00	1.760	9.077	0.000		
5,505.25	1.784	9.520	0.000		
5,505.50	1.809	9.969	0.000		
5,505.75	1.834	10.424	0.000		
5,506.00	1.859	10.886	0.000		
5,506.25	1.884	11.353	0.000		
5,506.50	1.909	11.828	0.000		
5,506.75	1.934	12.308	0.000		
5,507.00	1.960	12.795	0.000		Spillway #1
5,507.18	1.980	13.158	2.688	17.95	Peak Stage
5,507.25	1.987	13.288	3.652		
5,507.50	2.014	13.788	10.330		
5,507.75	2.041	14.295	18.977		
5,508.00	2.069	14.809	29.217		
5,508.25	2.096	15.329	38.052		
5,508.30	2.102	15.434	38.803		Spillway #2
5,508.50	2.124	15.857	45.002		
5,508.75	2.152	16.391	56.214		
5,509.00	2.180	16.933	69.837		

Detailed Discharge Table

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,498.00	0.000	0.000	0.000
5,498.25	0.000	0.000	0.000
5,498.50	0.000	0.000	0.000
5,498.75	0.000	0.000	0.000
5,499.00	0.000	0.000	0.000
5,499.25	0.000	0.000	0.000
5,499.50	0.000	0.000	0.000
5,499.75	0.000	0.000	0.000
5,500.00	0.000	0.000	0.000
5,500.25	0.000	0.000	0.000
5,500.50	0.000	0.000	0.000
5,500.75	0.000	0.000	0.000
5,501.00	0.000	0.000	0.000
5,501.25	0.000	0.000	0.000
5,501.50	0.000	0.000	0.000
5,501.75	0.000	0.000	0.000
5,502.00	0.000	0.000	0.000
5,502.25	0.000	0.000	0.000
5,502.50	0.000	0.000	0.000
5,502.75	0.000	0.000	0.000
5,503.00	0.000	0.000	0.000
5,503.25	0.000	0.000	0.000
5,503.50	0.000	0.000	0.000
5,503.75	0.000	0.000	0.000
5,504.00	0.000	0.000	0.000
5,504.25	0.000	0.000	0.000
5,504.50	0.000	0.000	0.000
5,504.75	0.000	0.000	0.000
5,505.00	0.000	0.000	0.000
5,505.25	0.000	0.000	0.000
5,505.50	0.000	0.000	0.000
5,505.75	0.000	0.000	0.000
5,506.00	0.000	0.000	0.000
5,506.25	0.000	0.000	0.000
5,506.50	0.000	0.000	0.000
5,506.75	0.000	0.000	0.000
5,507.00	0.000	0.000	0.000
5,507.25	3.652	0.000	3.652
5,507.50	10.330	0.000	10.330
5,507.75	18.977	0.000	18.977
5,508.00	29.217	0.000	29.217

Elevation (ft)	Drop Inlet (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,508.25	38.052	0.000	38.052
5,508.30	38.803	0.000	38.803
5,508.50	41.684	3.318	45.002
5,508.75	45.024	11.190	56.214
5,509.00	48.133	21.704	69.837

Structure #11 (Riprap Channel)

North base west 1

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)
1.00	2.5:1	2.5:1	4.1	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.93 cfs	
Depth:	0.41 ft	0.91 ft
Top Width:	3.06 ft	5.56 ft
Velocity:	3.51 fps	
X-Section Area:	0.84 sq ft	
Hydraulic Radius:	0.260 ft	
Froude Number:	1.18	
Manning's n:	0.0350	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

Structure #4 (Erodible Channel)

Middle terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	22.12 cfs	
Depth:	1.03 ft	1.53 ft
Top Width:	13.45 ft	19.95 ft
Velocity:	3.18 fps	
X-Section Area:	6.96 sq ft	
Hydraulic Radius:	0.511 ft	
Froude Number:	0.78	

Structure #2 (Riprap Channel)

Haul road top

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	5.30 cfs	
Depth:	0.35 ft	0.85 ft
Top Width:	2.74 ft	5.24 ft
Velocity*:		
X-Section Area:	0.65 sq ft	
Hydraulic Radius:	0.226 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

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

Structure #1 (Erodible Channel)

Highest Terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.3	0.0300	1.00			4.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	12.04 cfs	
Depth:	0.79 ft	1.79 ft
Top Width:	10.26 ft	23.26 ft
Velocity:	2.98 fps	
X-Section Area:	4.05 sq ft	
Hydraulic Radius:	0.390 ft	
Froude Number:	0.83	

Structure #3 (Riprap Channel)

Haul road bottom

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)
1.00	2.5:1	2.5:1	5.0	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.06 cfs	
Depth:	0.95 ft	1.45 ft
Top Width:	5.73 ft	8.23 ft
Velocity:	5.68 fps	
X-Section Area:	3.18 sq ft	
Hydraulic Radius:	0.522 ft	
Froude Number:	1.34	
Manning's n:	0.0380	
Dmin:	2.00 in	
D50:	3.00 in	

	w/o Freeboard	w/ Freeboard
Dmax:	4.50 in	

Structure #9 (Riprap Channel)

West perimeter channel upper

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)
1.00	2.5:1	2.5:1	5.2	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	35.18 cfs	
Depth:	1.28 ft	1.78 ft
Top Width:	7.39 ft	9.89 ft
Velocity:	6.56 fps	
X-Section Area:	5.36 sq ft	
Hydraulic Radius:	0.680 ft	
Froude Number:	1.36	
Manning's n:	0.0400	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #6 (Erodible Channel)

Low terrace CCW

Triangular Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	10.0:1	1.0	0.0300	0.50			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	24.21 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	1.07 ft	1.57 ft
Top Width:	13.92 ft	20.42 ft
Velocity:	3.25 fps	
X-Section Area:	7.45 sq ft	
Hydraulic Radius:	0.529 ft	
Froude Number:	0.78	

Structure #10 (Riprap Channel)

West perimeter channel lower

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)
1.00	2.5:1	2.5:1	2.2	0.50		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	58.39 cfs	
Depth:	1.78 ft	2.28 ft
Top Width:	9.90 ft	12.40 ft
Velocity:	6.01 fps	
X-Section Area:	9.71 sq ft	
Hydraulic Radius:	0.917 ft	
Froude Number:	1.07	
Manning's n:	0.0350	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #16 (Pond)

Upper pond

Pond Inputs:

Initial Pool Elev:	5,515.80 ft
Initial Pool:	10.33 ac-ft

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,515.80

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
15.00	5,517.20

Pond Results:

Peak Elevation:	5,516.87 ft
Dewater Time:	1.03 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,511.00	1.280	0.000	0.000		
5,511.25	1.430	0.339	0.000		
5,511.50	1.588	0.716	0.000		
5,511.75	1.755	1.133	0.000		
5,512.00	1.930	1.594	0.000		
5,512.25	2.001	2.085	0.000		
5,512.50	2.072	2.594	0.000		
5,512.75	2.146	3.122	0.000		
5,513.00	2.220	3.667	0.000		
5,513.25	2.257	4.227	0.000		
5,513.50	2.294	4.796	0.000		
5,513.75	2.332	5.374	0.000		
5,514.00	2.370	5.962	0.000		
5,514.25	2.385	6.556	0.000		
5,514.50	2.400	7.154	0.000		
5,514.75	2.415	7.756	0.000		
5,515.00	2.430	8.362	0.000		
5,515.25	2.449	8.972	0.000		
5,515.50	2.467	9.586	0.000		
5,515.75	2.486	10.205	0.000		
5,515.80	2.490	10.329	0.000		Spillway #1
5,516.00	2.500	10.829	2.765	17.90	
5,516.25	2.517	11.456	9.325	4.80	
5,516.50	2.535	12.087	18.087	1.10	
5,516.75	2.552	12.723	28.593	0.65	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,516.87	2.561	13.025	34.241	0.30	Peak Stage
5,517.00	2.570	13.364	40.590		
5,517.20	2.585	13.880	51.158		Spillway #2
5,517.25	2.588	14.008	54.426		
5,517.50	2.606	14.658	76.037		
5,517.75	2.625	15.312	102.950		
5,518.00	2.643	15.970	133.867		
5,518.25	2.662	16.633	168.203		
5,518.50	2.680	17.301	205.590		

Detailed Discharge Table

Elevation (ft)	Broad-crested Weir (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,511.00	0.000	0.000	0.000
5,511.25	0.000	0.000	0.000
5,511.50	0.000	0.000	0.000
5,511.75	0.000	0.000	0.000
5,512.00	0.000	0.000	0.000
5,512.25	0.000	0.000	0.000
5,512.50	0.000	0.000	0.000
5,512.75	0.000	0.000	0.000
5,513.00	0.000	0.000	0.000
5,513.25	0.000	0.000	0.000
5,513.50	0.000	0.000	0.000
5,513.75	0.000	0.000	0.000
5,514.00	0.000	0.000	0.000
5,514.25	0.000	0.000	0.000
5,514.50	0.000	0.000	0.000
5,514.75	0.000	0.000	0.000
5,515.00	0.000	0.000	0.000
5,515.25	0.000	0.000	0.000
5,515.50	0.000	0.000	0.000
5,515.75	0.000	0.000	0.000
5,515.80	0.000	0.000	0.000
5,516.00	2.765	0.000	2.765
5,516.25	9.325	0.000	9.325
5,516.50	18.087	0.000	18.087
5,516.75	28.593	0.000	28.593
5,517.00	40.590	0.000	40.590

Elevation (ft)	Broad-crested Weir (cfs)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,517.20	51.158	0.000	51.158
5,517.25	53.911	0.515	54.426
5,517.50	68.436	7.601	76.037
5,517.75	84.072	18.877	102.950
5,518.00	100.746	33.121	133.867
5,518.25	118.396	49.807	168.203
5,518.50	136.971	68.619	205.590

Structure #19 (Null)

outfall

outfall

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)
#5	1	13.620	0.318	0.000	0.000	89.000	TR55	16.20	1.502
	Σ	**13.620**						**16.20**	**1.502**
#8	1	9.150	0.261	0.000	0.000	89.000	TR55	11.30	1.027
	2	5.480	0.264	0.000	0.000	89.000	TR55	6.75	0.614
	Σ	**28.250**						**27.73**	**3.143**
#7	1	4.310	0.103	0.000	0.000	89.000	TR55	5.93	0.481
	Σ	**4.310**						**5.93**	**0.481**
#15	1	3.630	0.067	0.000	0.000	89.000	TR55	5.00	0.405
	2	1.690	0.061	0.000	0.000	89.000	TR55	2.33	0.188
	Σ	**37.880**						**29.33**	**4.218**
#14	1	2.600	0.038	0.000	0.000	89.000	TR55	3.58	0.290
	Σ	**2.600**						**3.58**	**0.290**
#18	1	6.520	0.021	0.000	0.000	89.000	TR55	8.98	0.728
	Σ	**47.000**						**31.68**	**5.236**
#13	1	1.230	0.111	0.000	0.000	89.000	TR55	1.69	0.137
	Σ	**1.230**						**1.69**	**0.137**
#12	1	2.280	0.033	0.000	0.000	89.000	TR55	3.14	0.254
	Σ	**2.280**						**3.14**	**0.254**
#17	1	4.400	0.021	0.000	0.000	89.000	TR55	6.06	0.491
	Σ	**7.910**						**10.89**	**0.883**
#11	1	2.130	0.032	0.000	0.000	89.000	TR55	2.93	0.238
	Σ	**2.130**						**2.93**	**0.238**
#4	1	19.270	0.381	0.000	0.000	89.000	TR55	22.12	2.117
	Σ	**19.270**						**22.12**	**2.117**
#2	1	3.850	0.075	0.000	0.000	89.000	TR55	5.30	0.430
	Σ	**3.850**						**5.30**	**0.430**
#1	1	9.770	0.250	0.000	0.000	89.000	TR55	12.04	1.085
	Σ	**9.770**						**12.04**	**1.085**
#3	1	5.100	0.081	0.000	0.000	89.000	TR55	7.02	0.569
	Σ	**18.720**						**18.06**	**2.084**
#9	1	4.370	0.053	0.000	0.000	89.000	TR55	6.02	0.488
	2	2.990	0.059	0.000	0.000	89.000	TR55	4.12	0.334

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	**45.350**						**35.18**	**5.023**
#6	1	20.320	0.332	0.000	0.000	89.000	TR55	24.21	2.270
	Σ	**20.320**						**24.21**	**2.270**
#10	1	3.320	0.092	0.000	0.000	89.000	TR55	4.57	0.371
	Σ	**68.990**						**58.39**	**7.663**
#16	1	4.390	0.021	0.000	0.000	89.000	TR55	6.04	0.490
	Σ	**75.510**						**58.71**	**8.391**
#19	Σ	**130.420**						**59.61**	**14.510**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	33.00	50.00	151.51	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	1.27	36.37	2,874.00	3.370	0.236
#1	**1**	**Time of Concentration:**					**0.250**
#2	1	2. Minimum tillage cultivation	0.50	0.25	50.00	0.350	0.039
		2. Minimum tillage cultivation	33.00	25.00	75.75	2.870	0.007
		8. Large gullies, diversions, and low flowing streams	5.00	35.14	702.89	6.700	0.029
#2	**1**	**Time of Concentration:**					**0.075**
#3	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	5.00	73.54	1,470.92	6.700	0.060
#3	**1**	**Time of Concentration:**					**0.081**
#4	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	38.88	3,888.92	3.000	0.360
#4	**1**	**Time of Concentration:**					**0.381**
#5	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	32.17	3,217.93	3.000	0.297
#5	**1**	**Time of Concentration:**					**0.318**
#6	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	33.67	3,367.92	3.000	0.311
#6	**1**	**Time of Concentration:**					**0.332**
#7	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
		8. Large gullies, diversions, and low flowing streams	1.00	8.88	888.28	3.000	0.082
#7	**1**	**Time of Concentration:**					**0.103**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#8	1	2. Minimum tillage cultivation	33.00	20.00	60.60	2.870	0.005
		8. Large gullies, diversions, and low flowing streams	1.38	44.84	3,249.69	3.520	0.256
#8	**1**	**Time of Concentration:**					**0.261**
#8	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	1.38	44.84	3,249.69	3.520	0.256
#8	**2**	**Time of Concentration:**					**0.264**
#9	1	2. Minimum tillage cultivation	33.00	10.00	30.30	2.870	0.002
		8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.88	6.820	0.051
#9	**1**	**Time of Concentration:**					**0.053**
#9	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	5.18	65.21	1,258.90	6.820	0.051
#9	**2**	**Time of Concentration:**					**0.059**
#10	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	2.24	28.39	1,267.43	4.480	0.078
#10	**1**	**Time of Concentration:**					**0.092**
#11	1	2. Minimum tillage cultivation	33.00	16.50	50.00	2.870	0.004
		8. Large gullies, diversions, and low flowing streams	4.09	24.99	611.23	6.060	0.028
#11	**1**	**Time of Concentration:**					**0.032**
#12	1	2. Minimum tillage cultivation	33.00	16.50	50.00	2.870	0.004
		8. Large gullies, diversions, and low flowing streams	4.97	35.38	711.95	6.680	0.029
#12	**1**	**Time of Concentration:**					**0.033**
#13	1	2. Minimum tillage cultivation	0.33	0.33	100.00	0.280	0.099
		8. Large gullies, diversions, and low flowing streams	5.70	18.83	330.48	7.160	0.012
#13	**1**	**Time of Concentration:**					**0.111**
#14	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	3.37	16.02	475.47	5.500	0.024
#14	**1**	**Time of Concentration:**					**0.038**
#15	1	2. Minimum tillage cultivation	33.00	49.50	150.00	2.870	0.014
		8. Large gullies, diversions, and low flowing streams	4.84	61.49	1,270.62	6.600	0.053
#15	**1**	**Time of Concentration:**					**0.067**
#15	2	2. Minimum tillage cultivation	10.00	5.00	50.00	1.580	0.008
		8. Large gullies, diversions, and low flowing streams	4.84	61.49	1,270.62	6.600	0.053
#15	**2**	**Time of Concentration:**					**0.061**
#16	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
#16	**1**	**Time of Concentration:**					**0.021**
#17	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#17	**1**	**Time of Concentration:**					**0.021**
#18	1	2. Minimum tillage cultivation	33.00	75.00	227.27	2.870	0.021
#18	**1**	**Time of Concentration:**					**0.021**