HYDROLOGY STUDY FOR
WARRIOR 282 LLC

WARRIOR MINE NO. 1
P-3953
JEFFERSON COUNTY, ALABAMA

BY
PERC ENGINEERING CO., INC.
P.O. BOX 1712
JASPER, ALABAMA 35502

DETAILED DESIGN PLANS
DIVERSIONS C-C' AND D-D'
ATTACHMENT III-B-3

DECEMBER 21, 2011

SPECIFICATIONS FOR DIVERSION CHANNELS AND DIVERSION BERMS

1. Temporary diversions shall be constructed to pass safely the peak runoff from a 2-year, 6-hour precipitation event.

2. To protect fills and property and to avoid danger to public health and safety, permanent diversions shall be constructed to pass safely the peak runoff from a 10-year, 6-hour precipitation event. Permanent diversions shall be constructed with gently sloping banks that are stabilized by vegetation.

3. Diversions shall be designed, constructed, and maintained in a manner which prevents additional contributions of suspended solids to stream flow and to runoff outside the permit area, to the extent possible, using the best technology currently available. Appropriate sediment control measures for these diversions may include, but not be limited to, maintenance of appropriate gradients, channel lining, re-vegetation, roughness structures, and detention basins.

4. No diversion shall be located so as to increase the potential for land slides and no diversion shall be constructed on existing land slides.

5. When no longer needed, each temporary diversion shall be removed and the affected land re-graded, top-soiled, and re-vegetated in accordance with Rules 880-X-10C-.10, 880-X-10C-.11, 880-X-10C-.52 - 880-X-10C-.58, 880-X-10C-.60, and 880-X-10C-.62.

6. Channel linings, when slopes are between 1-3 percent shall consist of both perennial and annual grasses and when slopes are greater than 3 percent, shall consist of riprap or be cut into non-erodible material.

7. Freeboard shall provide protection for transition of flows and for critical areas such as swales and curves along the entire channel length.

8. Energy dissipaters shall be installed, when necessary, at discharge points where natural streams and exit velocity of the diversion ditch flow is greater than that of the receiving stream.

9. Excess excavated material not necessary for diversion channel geometry or re-grading of the channel shall be disposed of in accordance with Rule 880-X-10C-.36.

10. Topsoil removed from the diversion excavations shall be handled in accordance with Rule 880-X-10C-.07 through 880-X-10C-.11.

11. Diversions shall not be constructed or operated to divert water into underground mines.

12. The embankment or berm foundation area shall be cleared of all organic matter, all surfaces sloped to no steeper than lv:lh and the entire foundation surface scarified.

13. The entire embankment or berm shall be compacted to 95% density, based on standard proctor as outlined in ASTM.

14. The material placed in the berm shall be free of sod, roots, stones over 6 inches in diameter, and other objectionable materials. The fill material shall be placed and spread over the entire fill area, starting at the lowest point of the foundation, in layers not to exceed 12 inches in thickness. Construction of the fill shall be undertaken only at such times as the moisture content of the fill material will permit satisfactory compaction in accordance with paragraph 13.

15. The berm and all disturbed areas shall be seeded with both perennial and annual grasses in order to insure that erosion is minimized. Hay bales or riprap may be placed at the toe of the berm immediately upon completion of construction.

16. All berms shall be examined quarterly for structural weakness, instability, erosion, or other hazardous conditions and maintenance performed as necessary

NOTES

1) The channel lining for Diversion C-C' will consist of Class III Riprap from station 0+00 to 1+00, a grass mixture from stations 1+00 to 21+21, Class II Riprap from station 21+21 to 21+83 and Class I Riprap from station 21+83 to 28+40.

2) The channel lining for Diversion D-D' will consist of Bermuda grass from station 0+00 to 5+69 and a grass mixture from station 5+69 to 20+21.

3) Design flow depths of Diversion C-C' were set from the results of running a 25 year-6 hour storm event by SedCad 4.0.

4) A SedCad 4.0 run for a 25 year-6 hour storm event is included in these design plans for the existing impoundment of Hal Cook Enterprises, Warrior Pit, ASMC Permit P-3103, located within the NW/SE and NE/SE of Section 14 to check the maximum water elevation for overtopping of Diversion C-C'. From the SedCad 4.0 run the maximum water elevation of the impoundment will be elevation 423.14. To ensure no overtopping of Diversion C-C', a berm will be constructed to elevation 424.0 from station 21+87 to station 28+40. See the attached planview drawing for the location of the existing impoundment and cross-section drawings.

5) Diversion D-D' will be constructed prior to disturbance (with the exception of the construction of Primary Road 1P) within the watershed of Diversion D-D' as shown on the Watershed Map within these design plans.

6) If leases for the property located within Increment No. 3 as shown on the Permit Map within the ASMC files are granted prior to the construction of Diversion D-D', approximately 840 feet (station 0+00 to station 8+40) will not be constructed and Basin 004P will be constructed prior to disturbance within the watershed of Basin 004P for sediment control. However, the remaining portion of Diversion D-D' (station 8+40 to station 20+21) will be constructed as to the approved detailed design plans.

RIP-RAP CLASSIFICATION SPECIFICATIONS

CLASS 1 RIP-RAP

No more than 10% of the stone will have a diameter greater than twelve (12) inches; no more than 50% of the stone will have a diameter less than ten (10) inches; and no more than 10% of the stone will have a diameter of less than six (6) inches. The thickness of the rip-rap liner will be no less than twelve (12) inches.

CLASS 2 RIP-RAP

No more than 10% of the stone will have a diameter greater than sixteen (16) inches; no more than 50% of the stone will have a diameter less than twelve (12) inches; and no more than 10% of the stone will have a diameter of less than six (6) inches. The thickness of the rip-rap liner will be no less than sixteen (16) inches.

CLASS 3 RIP-RAP

No more than 10% of the stone will have a diameter greater than twenty two (22) inches; no more than 50% of the stone will have a diameter less than sixteen (16) inches; and no more than 10% of the stone will have a diameter of less than eight (8) inches. The thickness of the rip-rap liner will be no less than twenty two (22) inches.

CLASS 4 RIP-RAP

No more than 10% of the stone will have a diameter greater than twenty seven (27) inches; no more than 50% of the stone will have a diameter less than twenty two (22) inches; and no more than 10% of the stone will have a diameter of less than ten (10) inches. The thickness of the rip-rap liner will be no less than twenty seven (27) inches.

CLASS 5 RIP-RAP

No more than 10% of the stone will have a diameter greater than thirty four (34) inches; no more than 50% of the stone will have a diameter less than twenty seven (27) inches; and no more than 10% of the stone will have a diameter of less than sixteen (16) inches. The thickness of the rip-rap liner will be no less than thirty four (34) inches.

Applicant: Warrior 282 LLC
Mine Name: Warrior Mine No. 1
Permit Number: P-3953

Silt Fencing Design and Construction Specifications

1. Fence height - 3' including 6" trench flap.

2. Silt fencing will be secured into place by prefabricated wood or metal posts spaced as necessary.

3. The silt fence will have an equivalent opening size of 30-50 mesh by U.S. Standard Sieve.

4. The maximum particle size passing the silt fence will be .59 millimeter.

5. The flow rate of the silt fence will be 20 gallon per minute per square foot.

6. The silt fence will have a burst strength of 210 pound per square inch.

7. The grab tensile elongation of the silt fence will be 15%.

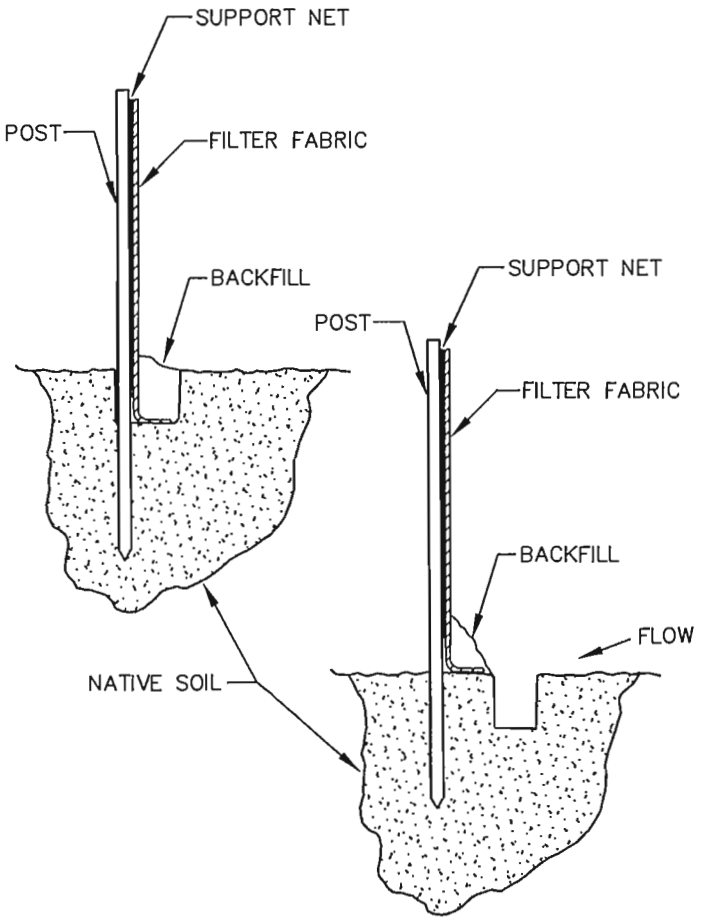
8. The grab tensile strength of the silt fence will be 100 pounds.

9. The silt fence will be installed by initially excavating a trench approximately 6" wide by 6" deep along the contour for the entire length of the silt fence. Upon completion of the trench, the silt fence will be stretched along the trench with the prefabricated wood or metal posts being driven into the ground approximately 1.5' deep against the upper wall of the trench. The 6" trench flap will then be placed into the trench and covered with compacted fill material.

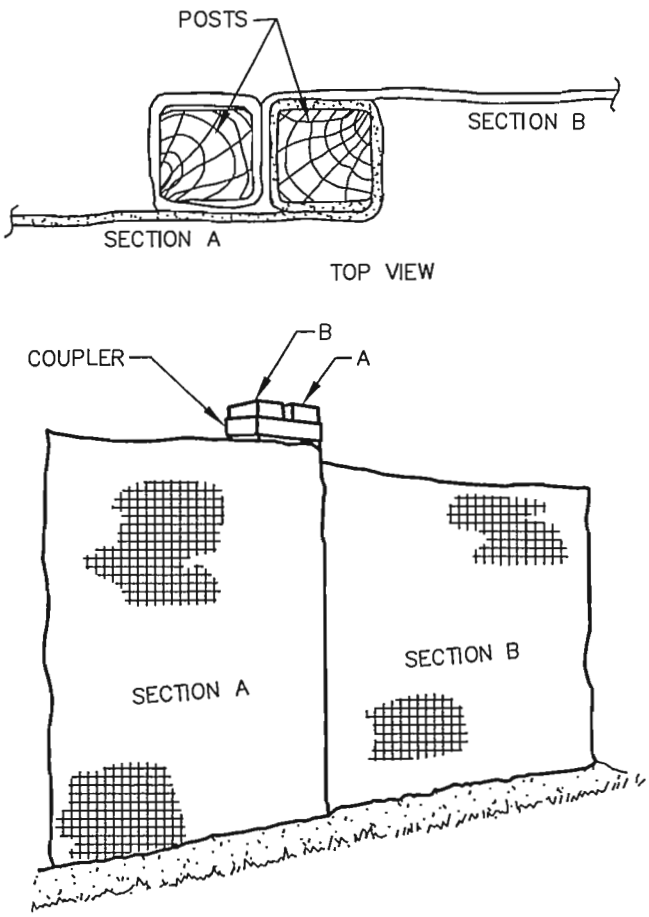
10. Inspections of the silt fence will be made bimonthly and repair or replacement will be made promptly as required.

11. Accumulated sediment will be removed from the silt fencing when necessary to ensure the proper function of the silt fencing. Accumulated sediment will be disposed of within Coarse Refuse Area No. 1.

12. Prior to the removal of the silt fence, any silt or sediment retained by the silt fence will be seeded with a mixture of both annual and perennial grasses, fertilized, and mulched to establish a permanent and diverse vegetative cover.



TOE–IN METHOD



JOINING SECTIONS OF SILT FENCE

CONSTRUCTION SPECIFICATIONS

1.) SILT FENCING SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY FITTING THE ADJACENT FENCE SECTION.
2.) EACH SECTION OF FENCING SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 6".
3.) FENCING SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE–BARS AT A SPACING NOT TO EXCEED 6'.
4.) INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.

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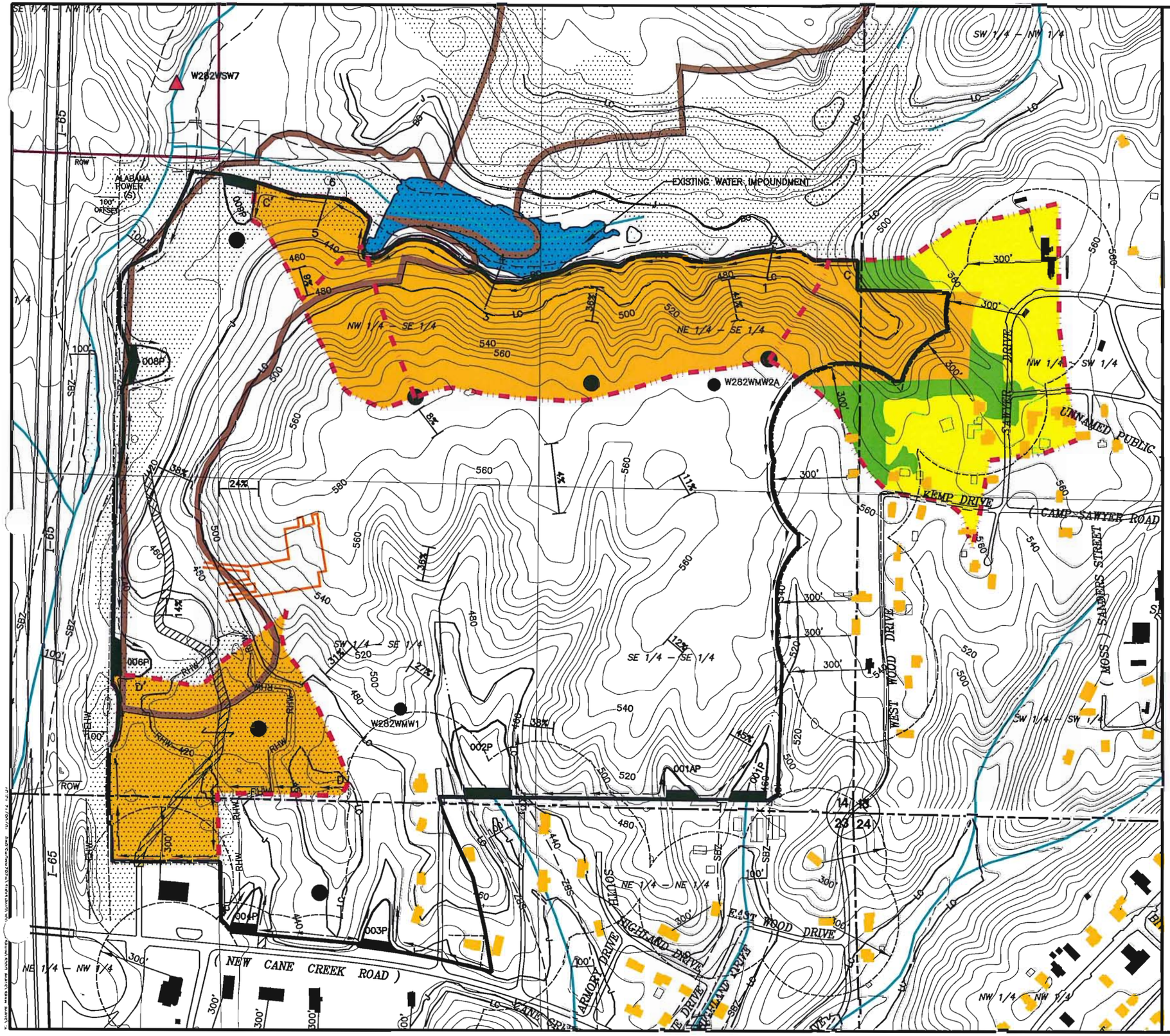
SILTFENCE TYPICAL

DRAWN BY: K.D.P. DWG. NAME: SILTFENC	DATE: 6–24–91
APPROVED BY: R.E.P.	SCALE: NONE

K:\SS\SILTFENC 02/03/



MAP LEGEND

- Permit Boundary
- 400 Surface Contour
- 001 Sediment Basin
- 10% Land Slope Measurement
- EHW Existing Highwall
- RHW Reclaimed Highwall
- A A' Reclamation Cross Section
- Diversion Ditch, Berm, or Low Wall
- County Road (Paved unless otherwise designated)
- Road (Private unless otherwise shown)
- Area Previously Surface Mined
- Unoccupied Dwelling (Barn, Shed, Etc.)
- Occupied Dwelling
- Commercial Building
- Haul Road
- Ancillary Road
- Private Impoundment
- LC Lick Creek Seam Outcrop
- J Jefferson Seam Outcrop
- BC Black Creek Seam Outcrop
- W282WMW2A Monitoring Well
- W282WSW7 Suface Water Monitoring Site
- Intermittent Stream
- Perennial Stream
- Drainage Course
- SBZ Stream Buffer Zone
- Coal Stockpile/Equipment Storage Area
- Hal Cook Enterprises, Inc — Warrior Pit (ASMC Permit No. P-3103)
- Pilot Coal Inc. — Warrior Mine No. 1 (Underground Mine) (ASMC Permit No. P-3464)
- Watershed Boundary

CURVE NUMBER INFORMATION

- Unmanaged Timberland, Curve Number 70
- Open Spaces, Grassland or Pasture, Curve Number 75
- Graded & Bare, Curve Number 81
- Impounded Water, Curve Number 100

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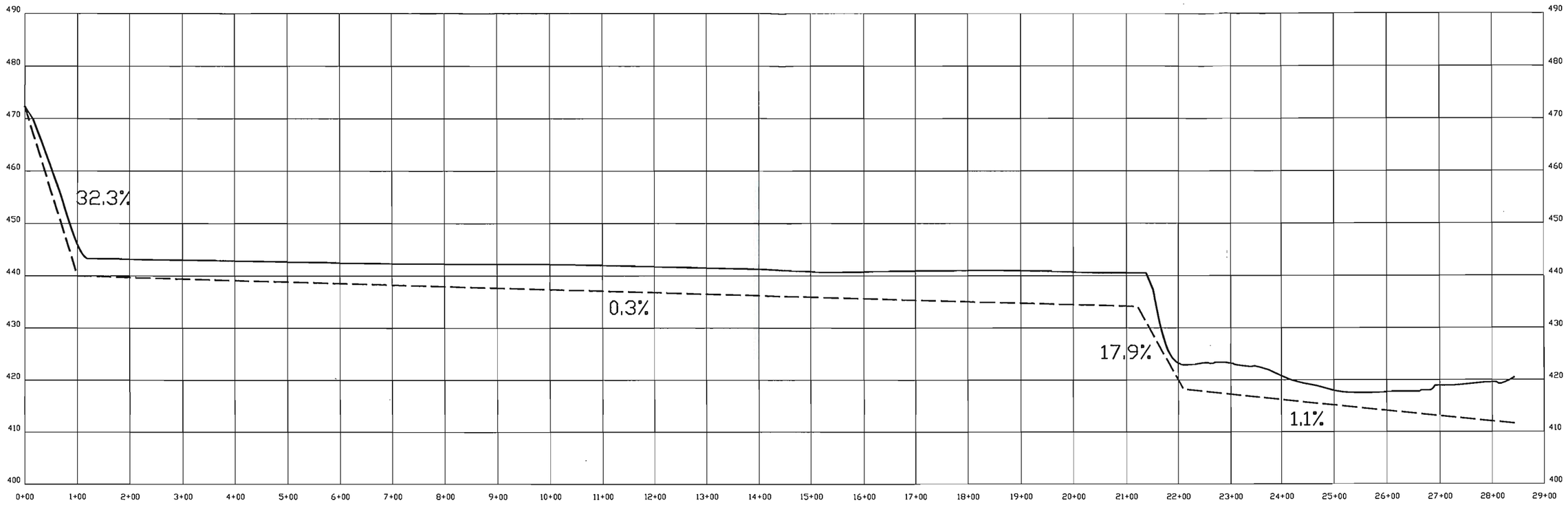
Attachment III-B-3
Watershed Map
Warrior 282 LLC
Warrior Mine No. 1
P-3953

DRAWN BY: S.D.M. DWG. NAME: W282WMDWS	DATE: 1/26/2011
APPROVED BY: L.G.S.	SCALE: 1"=400'



DIVERSION C–C'

——— EXISTING GRADE

– – – – PROPOSED GRADE

NOTES: 1) CHANNEL LINING TO CONSIST OF CLASS III RIPRAP FROM 0+00 TO 1+00.

2) CHANNEL LINING TO CONSIST OF GRASS MIXTURE FROM 1+00 TO 21+21.

3) CHANNEL LINING TO CONSIST OF CLASS II RIPRAP FROM 21+21 TO 21+83.

4) CHANNEL LINING TO CONSIST OF CLASS I RIPRAP FROM 21+83 TO 28+40.

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WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION PROFILE

DRAWN BY: S.D.M. DWG. NAME: W282WMCC'P	DATE: 1/28/2011
APPROVED BY: L.G.S.	SCALE: H: 1"=200' V: 1"=20'

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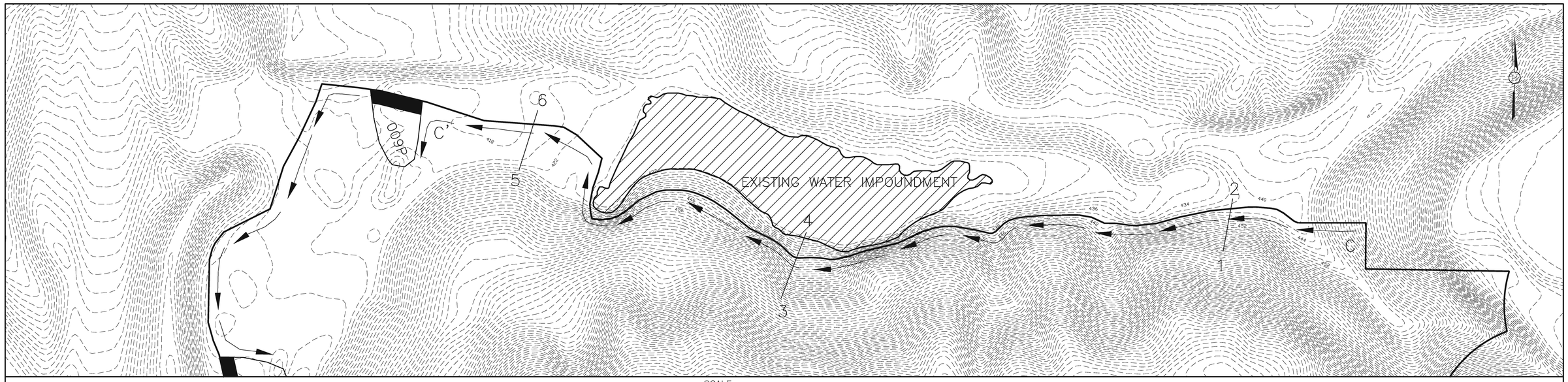
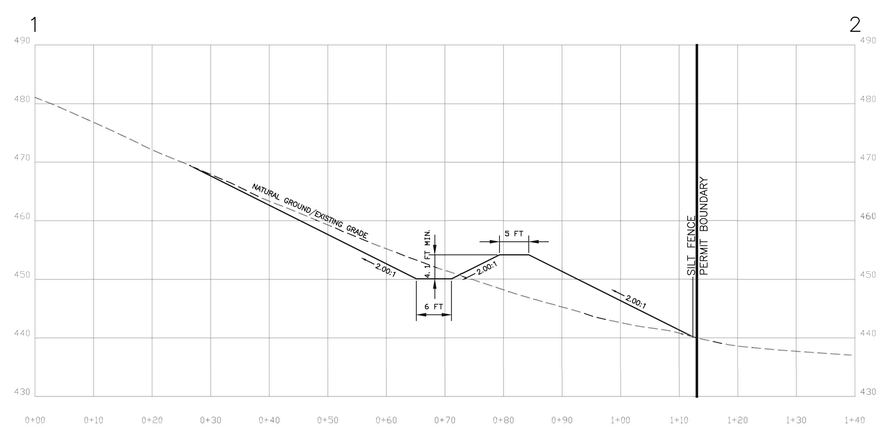
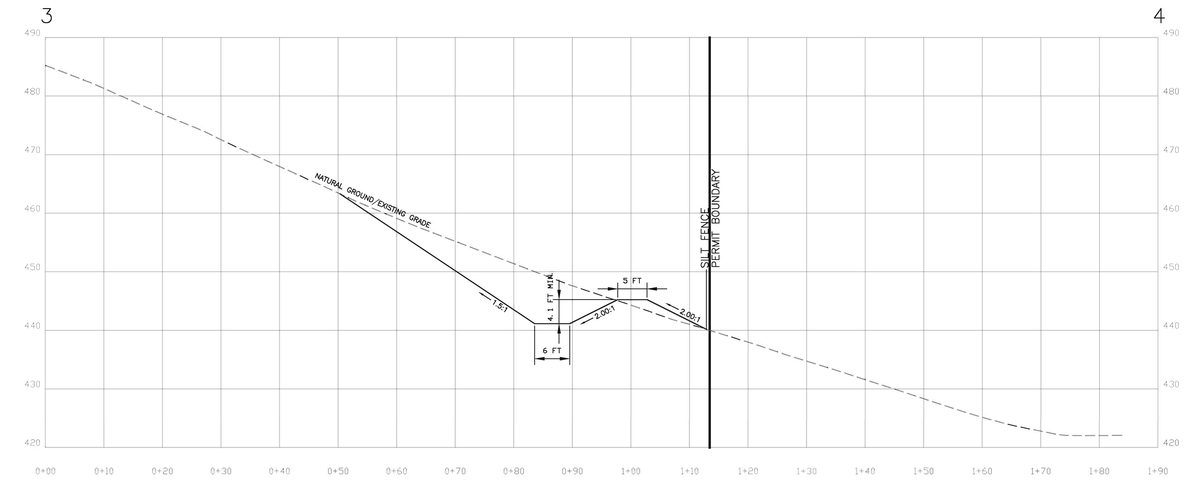


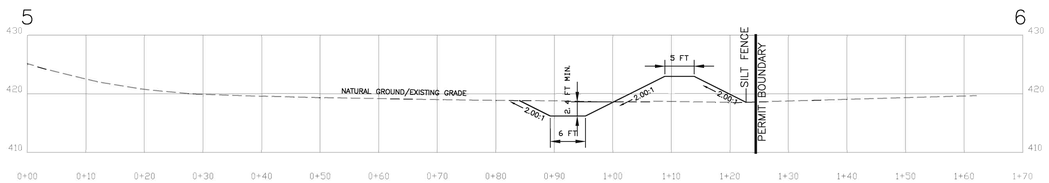
SCALE
1" = 100'

LEGEND

- DIVERSION
- 430 EXISTING CONTOURS
- PERMIT BOUNDARY







HORIZONTAL/VERTICAL
SCALE: 1"=10'

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ATTACHMENT III-B-3
WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION C-C' PLANVIEW

DRAWN BY:	S.D.M.	DATE:	10/4/2012
DWG. NAME:	W282WMCC'PV		
APPROVED BY:	L.G.S.	SCALE:	AS NOTED

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Hal Cook Enterprises, Inc.

Warrior Pit

P-3103

Existing Impoundment

4.8 Inch, 25 Year-6 Hour

SCS 6 Hour

JWT

PERC Engineering Co., Inc.
PO BOX 1712
Jasper, AL 35503

Phone: 205-384-5553
Email: John.Taylor@percengineering.com

General Information

Storm Information:

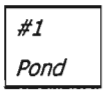
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1680
1.00	0.3840
1.50	0.6480
2.00	1.1040
2.50	2.8800
3.00	3.3600
3.50	3.7440
4.00	4.0080
4.50	4.2480
5.00	4.4400
5.50	4.6320
6.00	4.8000

Peak 30-minute Intensity: 3.552 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	P-3103 Existing Impoundment



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	160.350	160.350	207.20	24.03
	Out			196.35	0.00

Structure Detail:

Structure #1 (Pond)

P-3103 Existing Impoundment

Pond Inputs:

Initial Pool Elev:	422.00 ft
Initial Pool:	19.23 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
422.00	12.00	2.00:1	2.00:1	2.50

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
422.50	15.00	2.00:1	2.00:1	225.00

Pond Results:

Peak Elevation:	423.14 ft
Dewater Time:	1.22 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)
409.00	0.880	0.000	0.000	
409.50	0.920	0.450	0.000	
410.00	0.960	0.920	0.000	
410.50	1.001	1.410	0.000	
411.00	1.043	1.921	0.000	
411.50	1.086	2.453	0.000	
412.00	1.130	3.007	0.000	
412.50	1.175	3.583	0.000	
413.00	1.220	4.182	0.000	
413.50	1.266	4.803	0.000	
414.00	1.313	5.448	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
414.50	1.361	6.117	0.000		
415.00	1.410	6.810	0.000		
415.50	1.460	7.527	0.000		
416.00	1.510	8.269	0.000		
416.50	1.561	9.037	0.000		
417.00	1.613	9.831	0.000		
417.50	1.666	10.651	0.000		
418.00	1.720	11.497	0.000		
418.50	1.771	12.370	0.000		
419.00	1.824	13.269	0.000		
419.50	1.877	14.194	0.000		
420.00	1.930	15.145	0.000		
420.50	1.985	16.124	0.000		
421.00	2.040	17.130	0.000		
421.50	2.096	18.164	0.000		
422.00	2.153	19.226	0.000		Spillway #1
422.50	2.210	20.317	0.540	24.42*	Spillway #2
423.00	2.265	21.436	52.408	3.30	
423.14	2.281	21.755	196.346	1.55	Peak Stage
423.50	2.321	22.582	569.671		
424.00	2.378	23.757	1,140.120		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
409.00	0.000	0.000	0.000
409.50	0.000	0.000	0.000
410.00	0.000	0.000	0.000
410.50	0.000	0.000	0.000
411.00	0.000	0.000	0.000
411.50	0.000	0.000	0.000
412.00	0.000	0.000	0.000
412.50	0.000	0.000	0.000
413.00	0.000	0.000	0.000
413.50	0.000	0.000	0.000
414.00	0.000	0.000	0.000
414.50	0.000	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
415.00	0.000	0.000	0.000
415.50	0.000	0.000	0.000
416.00	0.000	0.000	0.000
416.50	0.000	0.000	0.000
417.00	0.000	0.000	0.000
417.50	0.000	0.000	0.000
418.00	0.000	0.000	0.000
418.50	0.000	0.000	0.000
419.00	0.000	0.000	0.000
419.50	0.000	0.000	0.000
420.00	0.000	0.000	0.000
420.50	0.000	0.000	0.000
421.00	0.000	0.000	0.000
421.50	0.000	0.000	0.000
422.00	0.000	0.000	0.000
422.50	0.540	0.000	0.540
423.00	9.272	43.136	52.408
423.50	22.295	547.376	569.671
424.00	41.267	1,098.852	1,140.120

Subwatershed Hydrology Detail:

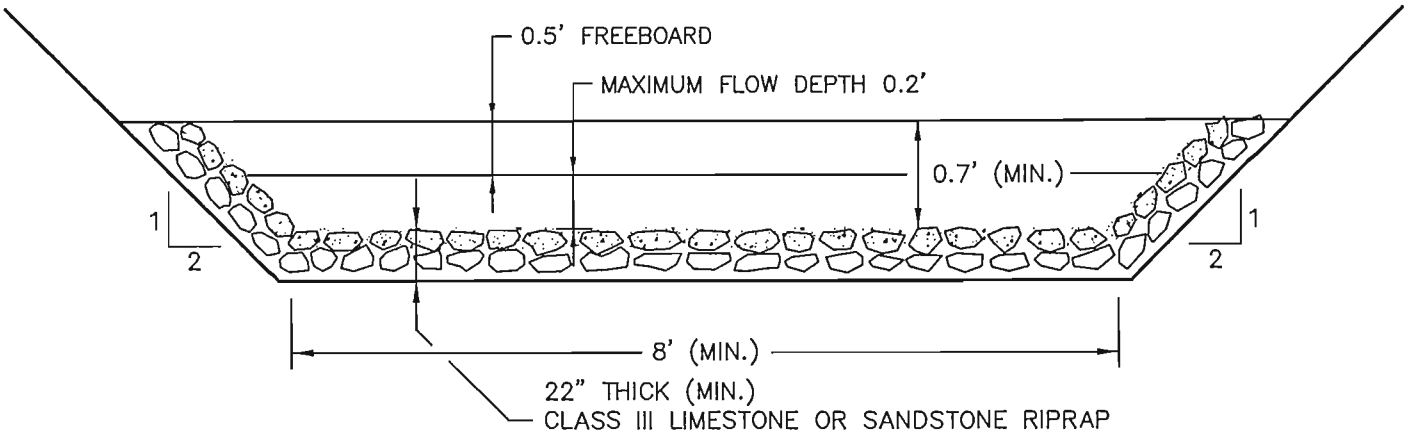
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	39.500	0.124	0.204	0.359	75.000	M	88.69	7.487
	2	86.600	0.170	0.089	0.363	70.000	M	103.26	11.069
	3	32.100	0.087	0.000	0.000	68.000	F	55.72	4.619
	4	2.150	0.001	0.000	0.000	100.000	F	7.70	0.857
	$\sum$	**160.350**						**207.20**	**24.033**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	2.00	4.00	200.00	1.130	0.049
		8. Large gullies, diversions, and low flowing streams	3.41	51.00	1,497.00	5.530	0.075
#1	**1**	**Time of Concentration:**					**0.124**
#1	2	1. Forest with heavy ground litter	5.00	10.00	200.00	0.560	0.099
		8. Large gullies, diversions, and low flowing streams	7.05	145.00	2,057.00	7.960	0.071
#1	**2**	**Time of Concentration:**					**0.170**
#1	3	3. Short grass pasture	25.00	50.00	200.00	4.000	0.013
		8. Large gullies, diversions, and low flowing streams	3.73	58.00	1,555.00	5.790	0.074
#1	**3**	**Time of Concentration:**					**0.087**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	7. Paved area and small upland gullies	4.64	148.00	3,187.00	4.330	0.204
#1	**1**	**Muskingum K:**					**0.204**
#1	2	8. Large gullies, diversions, and low flowing streams	2.27	33.00	1,451.00	4.520	0.089
#1	**2**	**Muskingum K:**					**0.089**



CHANNEL LINING TO CONSIST CLASS III RIP-RAP.
CUT SECTION

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(205) 384-5553 Office (205) 384-9481 Fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION C-C'
0+00 TO 1+00

DRAWN BY: S.D.M. DWG. NAME: W282WMCC'	DATE: 1/28/2011
APPROVED BY: L.G.S.	SCALE: NONE

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Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Channel C-C' 0+00 to 1+00

4.2 Inches, 10 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

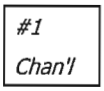
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1470
1.00	0.3360
1.50	0.5670
2.00	0.9660
2.50	2.5200
3.00	2.9400
3.50	3.2760
4.00	3.5070
4.50	3.7170
5.00	3.8850
5.50	4.0530
6.00	4.2000

Peak 30-minute Intensity: 3.108 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	23.400	23.400	40.04	0.00

Structure Detail:

Structure #1 (Riprap Channel)

Diversion C-C'

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)
8.00	2.0:1	2.0:1	32.3	0.50		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	40.04 cfs	
Depth:	0.16 ft	0.66 ft
Top Width:	8.63 ft	10.63 ft
Velocity*:		
X-Section Area:	1.30 sq ft	
Hydraulic Radius:	0.149 ft	
Froude Number*:		
Manning's n*:		
Dmin:	5.00 in	
D50:	15.00 in	
Dmax:	18.75 in	

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

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)
#1	1	6.800	0.028	0.000	0.000	81.000	F	15.02	1.291
	2	4.200	0.232	0.017	0.432	70.000	M	3.44	0.412
	3	12.400	0.120	0.019	0.430	75.000	M	22.31	1.867
	Σ	**23.400**						**40.04**	**0.000**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	5.43	25.00	460.00	6.990	0.018
#1	**1**	**Time of Concentration:**					**0.028**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	12.88	85.00	660.00	10.760	0.017
#1	**2**	**Muskingum K:**					**0.017**
#1	3	8. Large gullies, diversions, and low flowing streams	11.97	85.00	710.00	10.380	0.019
#1	**3**	**Muskingum K:**					**0.019**

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Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Channel C-C' 0+00 to 1+00

4.8 Inches, 25 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

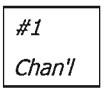
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1680
1.00	0.3840
1.50	0.6480
2.00	1.1040
2.50	2.8800
3.00	3.3600
3.50	3.7440
4.00	4.0080
4.50	4.2480
5.00	4.4400
5.50	4.6320
6.00	4.8000

Peak 30-minute Intensity: 3.552 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	23.400	23.400	49.78	4.47

Structure Detail:

Structure #1 (Riprap Channel)

Diversion C-C'

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)
8.00	2.0:1	2.0:1	32.3	0.50		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	49.78 cfs	
Depth:	0.19 ft	0.69 ft
Top Width:	8.78 ft	10.78 ft
Velocity*:		
X-Section Area:	1.63 sq ft	
Hydraulic Radius:	0.184 ft	
Froude Number*:		
Manning's n*:		
Dmin:	6.00 in	
D50:	18.00 in	
Dmax:	22.50 in	

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

Subwatershed Hydrology Detail:

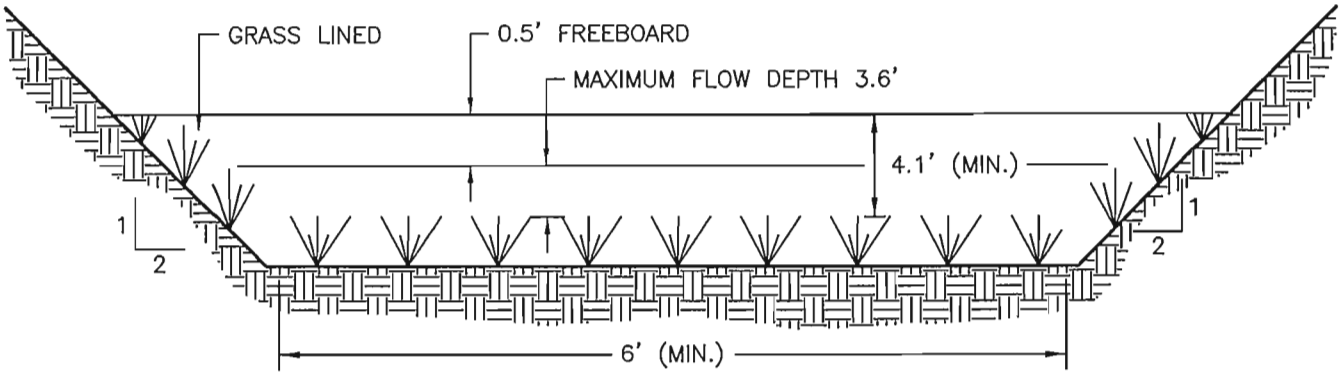
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.800	0.028	0.000	0.000	81.000	F	18.20	1.584
	2	4.200	0.232	0.017	0.432	70.000	M	4.55	0.531
	3	12.400	0.120	0.019	0.430	75.000	M	27.84	2.350
	Σ	**23.400**						**49.78**	**4.466**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	5.43	25.00	460.00	6.990	0.018
#1	**1**	**Time of Concentration:**					**0.028**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	12.88	85.00	660.00	10.760	0.017
#1	**2**	**Muskingum K:**					**0.017**
#1	3	8. Large gullies, diversions, and low flowing streams	11.97	85.00	710.00	10.380	0.019
#1	**3**	**Muskingum K:**					**0.019**



GRASS LINING TO CONSIST OF GRASS MIXTURE.

CUT SECTION

PERC
ENGINEERING CO., INC.
1806 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5553 Office (205) 384-9491 Fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION C-C'
1+00 TO 21+21

DRAWN BY: S.D.M. DWG. NAME: W282WMCC'	DATE: 1/28/2011
APPROVED BY: L.G.S.	SCALE: NONE

J:\Cook\Diversions\W282WMCC' dwg 10/04/12 13:31

W:\Steve Mies\Steve Doc

Warrior 282 LLC
Warrior Mine No. 1
P-3953

Attachment III-B-3

Diversion Channel C-C' 1+00 to 21+21

4.2 Inches, 10 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

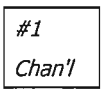
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1470
1.00	0.3360
1.50	0.5670
2.00	0.9660
2.50	2.5200
3.00	2.9400
3.50	3.2760
4.00	3.5070
4.50	3.7170
5.00	3.8850
5.50	4.0530
6.00	4.2000

Peak 30-minute Intensity: 3.108 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	43.000	43.000	71.18	6.47

Structure Detail:

Structure #1 (Vegetated Channel)

Diversion C-C'

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
6.00	2.0:1	2.0:1	0.3	D, B	0.50			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	71.18 cfs		71.18 cfs	
Depth:	2.32 ft	2.82 ft	3.38 ft	3.88 ft
Top Width:	15.28 ft	17.28 ft	19.54 ft	21.54 ft
Velocity:	2.88 fps		1.65 fps	
X-Section Area:	24.70 sq ft		43.21 sq ft	
Hydraulic Radius:	1.508 ft		2.044 ft	
Froude Number:	0.40		0.20	
Roughness Coefficient:	0.0372		0.0798	

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)
#1	1	6.800	0.190	0.000	0.000	81.000	F	12.69	1.238
	2	4.200	0.232	0.128	0.387	70.000	M	3.44	0.412
	3	32.000	0.120	0.132	0.386	75.000	M	57.58	4.818
	Σ	**43.000**						**71.18**	**6.469**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	1.61	40.00	2,480.00	3.810	0.180
#1	**1**	**Time of Concentration:**					**0.190**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	3.73	100.00	2,680.00	5.790	0.128
#1	**2**	**Muskingum K:**					**0.128**
#1	3	8. Large gullies, diversions, and low flowing streams	3.66	100.00	2,730.00	5.740	0.132
#1	**3**	**Muskingum K:**					**0.132**

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Warrior 282 LLC
Warrior Mine No. 1
P-3953

Attachment III-B-3

Diversion Channel C-C' 1+00 to 21+21

4.8 Inches, 25 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

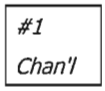
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1680
1.00	0.3840
1.50	0.6480
2.00	1.1040
2.50	2.8800
3.00	3.3600
3.50	3.7440
4.00	4.0080
4.50	4.2480
5.00	4.4400
5.50	4.6320
6.00	4.8000

Peak 30-minute Intensity: 3.552 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	43.000	43.000	89.20	8.12

Structure Detail:

Structure #1 (Vegetated Channel)

Diversion C-C'

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
6.00	2.0:1	2.0:1	0.3	D, B	0.50			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	89.20 cfs		89.20 cfs	
Depth:	2.53 ft	3.03 ft	3.60 ft	4.10 ft
Top Width:	16.14 ft	18.14 ft	20.42 ft	22.42 ft
Velocity:	3.18 fps		1.87 fps	
X-Section Area:	28.05 sq ft		47.60 sq ft	
Hydraulic Radius:	1.618 ft		2.152 ft	
Froude Number:	0.43		0.22	
Roughness Coefficient:	0.0354		0.0726	

Subwatershed Hydrology Detail:

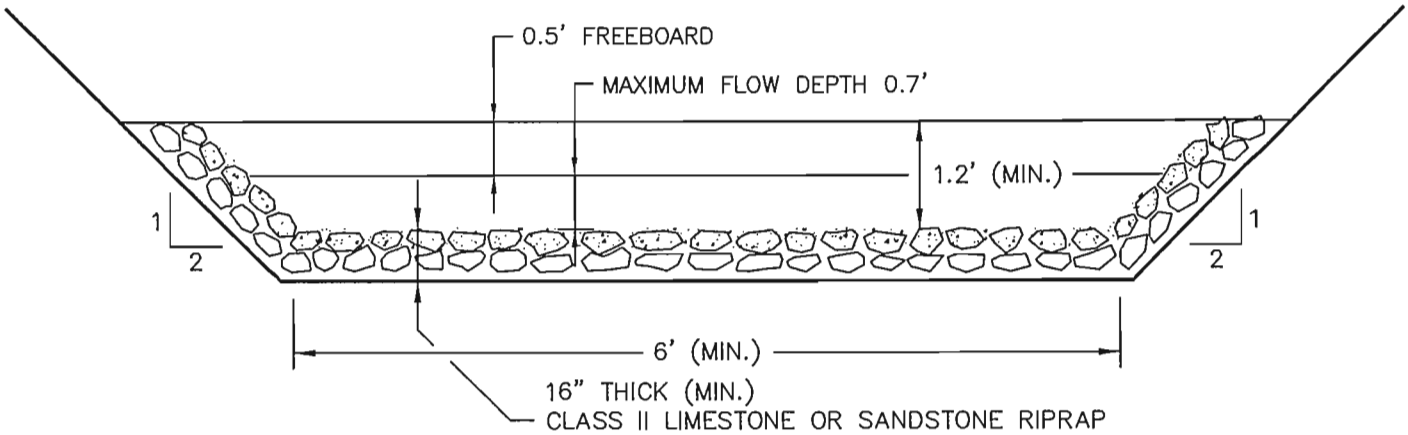
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.800	0.190	0.000	0.000	81.000	F	15.61	1.519
	2	4.200	0.232	0.128	0.387	70.000	M	4.55	0.531
	3	32.000	0.120	0.132	0.386	75.000	M	71.85	6.066
	Σ	**43.000**						**89.20**	**8.116**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	1.61	40.00	2,480.00	3.810	0.180
#1	**1**	**Time of Concentration:**					**0.190**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	3.73	100.00	2,680.00	5.790	0.128
#1	**2**	**Muskingum K:**					**0.128**
#1	3	8. Large gullies, diversions, and low flowing streams	3.66	100.00	2,730.00	5.740	0.132
#1	**3**	**Muskingum K:**					**0.132**



CHANNEL LINING TO CONSIST CLASS II RIP-RAP.

CUT SECTION

PERC
ENGINEERING CO., INC.
1606 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5553 Office (205) 384-9491 Fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION C-C'
21+21 TO 21+83

DRAWN BY: S.D.M. DWG. NAME: W282WMCC'	DATE: 1/28/2011
APPROVED BY: L.G.S.	SCALE: NONE

W:\Steve Miles\Steve Docs\Cook\Diversions\W282WMCC'.dwg 10/04/12 13:31

Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Channel C-C' 21+21 to 21+83

4.2 Inches, 10 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

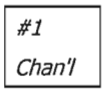
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1470
1.00	0.3360
1.50	0.5670
2.00	0.9660
2.50	2.5200
3.00	2.9400
3.50	3.2760
4.00	3.5070
4.50	3.7170
5.00	3.8850
5.50	4.0530
6.00	4.2000

Peak 30-minute Intensity: 3.108 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	46.700	46.700	78.04	7.04

Structure Detail:

Structure #1 (Riprap Channel)

Diversion C-C'

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)
6.00	2.0:1	2.0:1	17.9	0.50		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	78.04 cfs	
Depth:	0.58 ft	1.08 ft
Top Width:	8.32 ft	10.32 ft
Velocity*:		
X-Section Area:	4.14 sq ft	
Hydraulic Radius:	0.482 ft	
Froude Number*:		
Manning's n*:		
Dmin:	6.00 in	
D50:	18.00 in	
Dmax:	22.50 in	

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

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)
#1	1	6.800	0.177	0.000	0.000	81.000	F	12.87	1.249
	2	4.200	0.232	0.126	0.390	70.000	M	3.44	0.412
	3	35.700	0.120	0.043	0.457	75.000	M	64.24	5.376
	Σ	**46.700**						**78.04**	**7.036**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	1.97	50.00	2,540.00	4.200	0.167
#1	**1**	**Time of Concentration:**					**0.177**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	4.01	110.00	2,740.06	6.010	0.126
#1	**2**	**Muskingum K:**					**0.126**
#1	3	9. Small streams flowing bankfull	3.94	110.00	2,790.00	17.870	0.043
#1	**3**	**Muskingum K:**					**0.043**

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Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Channel C-C' 21+21 to 21+83

4.8 Inches, 25 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

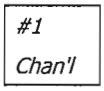
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1680
1.00	0.3840
1.50	0.6480
2.00	1.1040
2.50	2.8800
3.00	3.3600
3.50	3.7440
4.00	4.0080
4.50	4.2480
5.00	4.4400
5.50	4.6320
6.00	4.8000

Peak 30-minute Intensity: 3.552 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	46.700	46.700	97.66	8.83

Structure Detail:

Structure #1 (Riprap Channel)

Diversion C-C'

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)
6.00	2.0:1	2.0:1	17.9	0.50		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	97.66 cfs	
Depth:	0.65 ft	1.15 ft
Top Width:	8.60 ft	10.60 ft
Velocity*:		
X-Section Area:	4.74 sq ft	
Hydraulic Radius:	0.533 ft	
Froude Number*:		
Manning's n*:		
Dmin:	7.00 in	
D50:	21.00 in	
Dmax:	26.25 in	

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

Subwatershed Hydrology Detail:

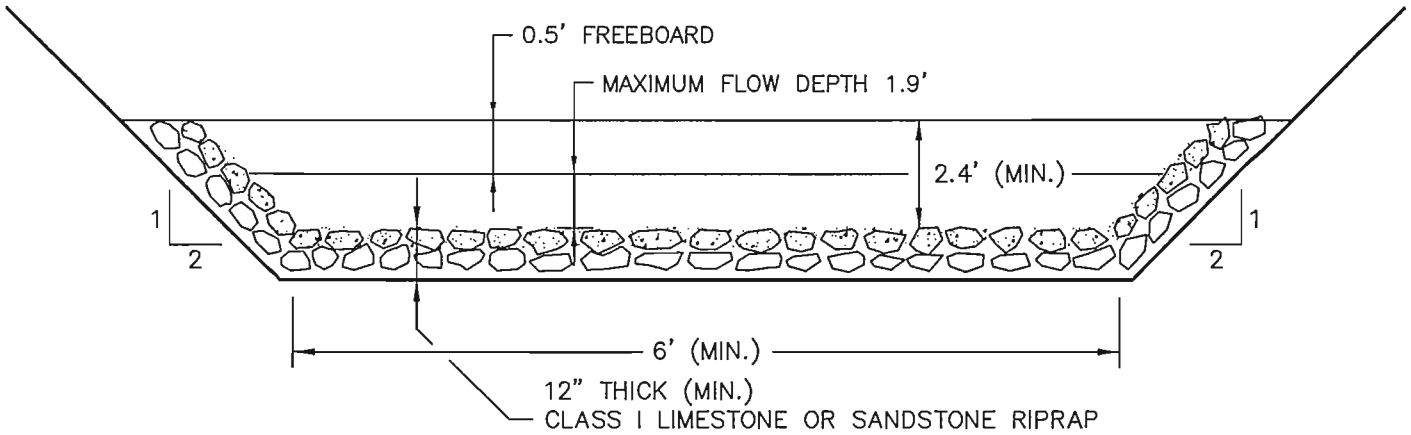
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.800	0.177	0.000	0.000	81.000	F	15.83	1.531
	2	4.200	0.232	0.126	0.390	70.000	M	4.55	0.531
	3	35.700	0.120	0.043	0.457	75.000	M	80.16	6.767
	Σ	**46.700**						**97.66**	**8.830**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	1.97	50.00	2,540.00	4.200	0.167
#1	**1**	**Time of Concentration:**					**0.177**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	4.01	110.00	2,740.06	6.010	0.126
#1	**2**	**Muskingum K:**					**0.126**
#1	3	9. Small streams flowing bankfull	3.94	110.00	2,790.00	17.870	0.043
#1	**3**	**Muskingum K:**					**0.043**



CHANNEL LINING TO CONSIST CLASS II RIP-RAP.
CUT SECTION

PERC ENGINEERING CO., INC.
1606 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5553 Office (205) 384-9491 Fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION C-C'
21+83 TO 28+40

DRAWN BY:	S.D.M.	DATE:	1/28/2011
DWG. NAME:	W282WMCC'		
APPROVED BY:	L.G.S.	SCALE:	NONE

V:\Steve Miles\Steve Da... R Cook\Diversions\W282WMCC'.dwg 10/04/12 13:31

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Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Channel C-C' 21+83 to 28+40

4.2 Inches, 10 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

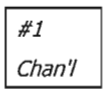
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1470
1.00	0.3360
1.50	0.5670
2.00	0.9660
2.50	2.5200
3.00	2.9400
3.50	3.2760
4.00	3.5070
4.50	3.7170
5.00	3.8850
5.50	4.0530
6.00	4.2000

Peak 30-minute Intensity: 3.108 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	49.700	49.700	78.76	7.47

Structure Detail:

Structure #1 (Riprap Channel)

Diversion C-C'

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)
6.00	2.0:1	2.0:1	1.1	0.50		

Riprap Channel Results:

PADER Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	78.76 cfs	
Depth:	1.69 ft	2.19 ft
Top Width:	12.77 ft	14.77 ft
Velocity:	4.96 fps	
X-Section Area:	15.88 sq ft	
Hydraulic Radius:	1.171 ft	
Froude Number:	0.78	
Manning's n:	0.0350	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

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)
#1	1	6.800	0.226	0.000	0.000	81.000	F	12.26	1.228
	2	4.200	0.232	0.167	0.384	70.000	M	3.44	0.412
	3	38.700	0.120	0.171	0.383	75.000	M	69.64	5.827
	Σ	**49.700**						**78.76**	**7.468**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	1.88	60.00	3,200.00	4.100	0.216
#1	**1**	**Time of Concentration:**					**0.226**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	3.53	120.00	3,400.00	5.630	0.167
#1	**2**	**Muskingum K:**					**0.167**
#1	3	8. Large gullies, diversions, and low flowing streams	3.48	120.00	3,450.06	5.590	0.171
#1	**3**	**Muskingum K:**					**0.171**

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Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Channel C-C' 21+83 to 28+40

4.8 Inches, 25 Year-6 Hour

SCS 6 Hour

SDM

PERC Engineering Co., Inc.
1606 Highway 78 West
Jasper, AL 35501

Phone: (205) 384-5553
Email: smiles@percengineering.com

General Information

Storm Information:

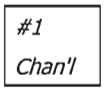
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1680
1.00	0.3840
1.50	0.6480
2.00	1.1040
2.50	2.8800
3.00	3.3600
3.50	3.7440
4.00	4.0080
4.50	4.2480
5.00	4.4400
5.50	4.6320
6.00	4.8000

Peak 30-minute Intensity: 3.552 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion C-C'



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	49.700	49.700	99.29	9.37

Structure Detail:

Structure #1 (Riprap Channel)

Diversion C-C'

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)
6.00	2.0:1	2.0:1	1.1	0.50		

Riprap Channel Results:

PADER Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	99.29 cfs	
Depth:	1.91 ft	2.41 ft
Top Width:	13.64 ft	15.64 ft
Velocity:	5.29 fps	
X-Section Area:	18.76 sq ft	
Hydraulic Radius:	1.290 ft	
Froude Number:	0.80	
Manning's n:	0.0350	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Subwatershed Hydrology Detail:

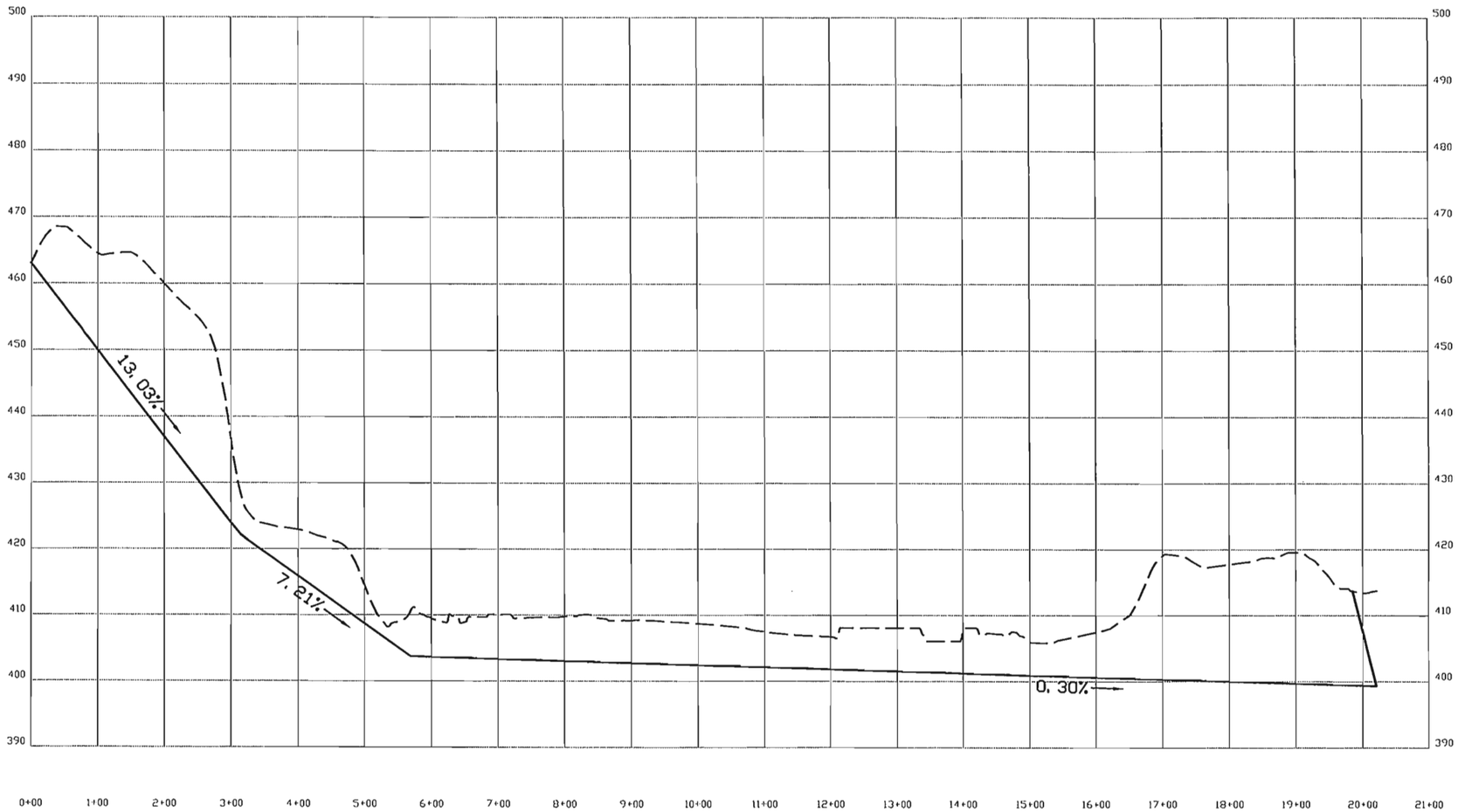
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.800	0.226	0.000	0.000	81.000	F	15.10	1.507
	2	4.200	0.232	0.167	0.384	70.000	M	4.55	0.531
	3	38.700	0.120	0.171	0.383	75.000	M	86.89	7.336
	Σ	**49.700**						**99.29**	**9.374**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	30.00	60.00	199.99	5.470	0.010
		8. Large gullies, diversions, and low flowing streams	1.88	60.00	3,200.00	4.100	0.216
#1	**1**	**Time of Concentration:**					**0.226**
#1	2	1. Forest with heavy ground litter	1.00	2.00	200.00	0.250	0.222
		8. Large gullies, diversions, and low flowing streams	1.43	2.00	140.00	3.580	0.010
#1	**2**	**Time of Concentration:**					**0.232**
#1	3	3. Short grass pasture	1.00	2.00	200.00	0.800	0.069
		8. Large gullies, diversions, and low flowing streams	0.67	3.00	450.00	2.440	0.051
#1	**3**	**Time of Concentration:**					**0.120**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2	8. Large gullies, diversions, and low flowing streams	3.53	120.00	3,400.00	5.630	0.167
#1	**2**	**Muskingum K:**					**0.167**
#1	3	8. Large gullies, diversions, and low flowing streams	3.48	120.00	3,450.06	5.590	0.171
#1	**3**	**Muskingum K:**					**0.171**



DIVERSION D–D'

——— EXISTING GRADE

– – – – PROPOSED GRADE

NOTES: 1) CHANNEL LINING TO CONSIST OF BERMUDA GRASS FROM 0+00 TO 5+69.

2) CHANNEL LINING TO CONSIST OF GRASS MIXTURE FROM 5+69 TO 20+21.

PERC ENGINEERING CO., INC.
1406 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5153 Office (205) 295-3114 fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION PROFILE

DRAWN BY: J.W.T. DWG. NAME: W282WMDD'P	DATE: 12/5/2011
APPROVED BY: L.G.S.	SCALE: H: 1"=200' V: 1"=20'

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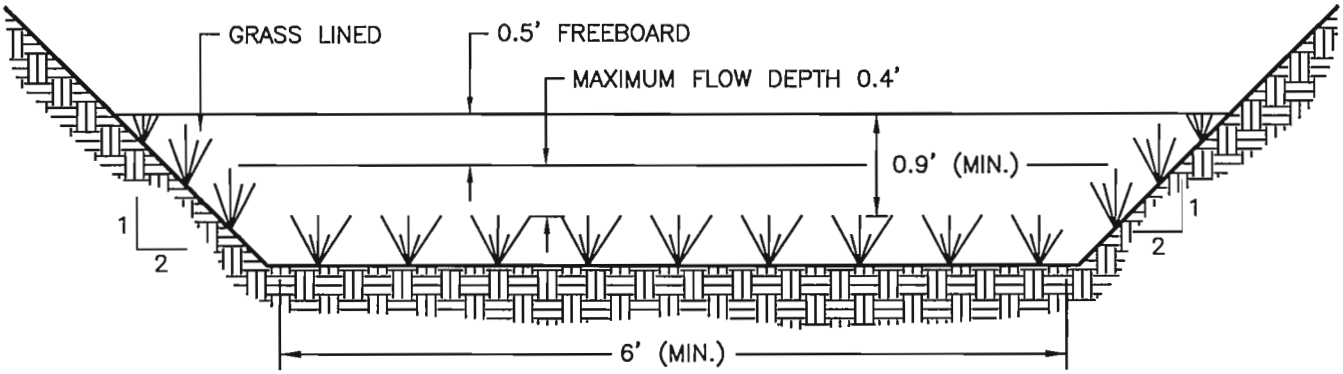

GRASS LINING TO CONSIST OF BERMUDA GRASS.

CUT SECTION

PERC
ENGINEERING CO., INC.
1806 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5053 Office (205) 384-9481 Fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION D-D'
0+00 TO 3+14

DRAWN BY: J.W.T. DWG. NAME: W282WMDD'	DATE: 12/01/2011
APPROVED BY: L.G.S.	SCALE: NONE

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Warrior 282 LLC
Warrior Mine No. 1
P-3953

Attachment III-B-3

Diversion Ditch D-D' 0+00 to 3+14

4.2 Inches, 10 Year-6 Hour

SCS 6 Hour

JWT

PERC Engineering Co., Inc.
PO BOX 1712
Jasper, AL 35503

Phone: 205-384-5553
Email: John.Taylor@percengineering.com

General Information

Storm Information:

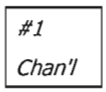
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1470
1.00	0.3360
1.50	0.5670
2.00	0.9660
2.50	2.5200
3.00	2.9400
3.50	3.2760
4.00	3.5070
4.50	3.7170
5.00	3.8850
5.50	4.0530
6.00	4.2000

Peak 30-minute Intensity: 3.108 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	D-D' 0+00



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	1.600	1.600	3.53	0.30

Structure Detail:

Structure #1 (Vegetated Channel)

D-D' 0+00

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
6.00	2.0:1	2.0:1	13.0	D, B	0.50			6.0

Vegetated Channel Results:

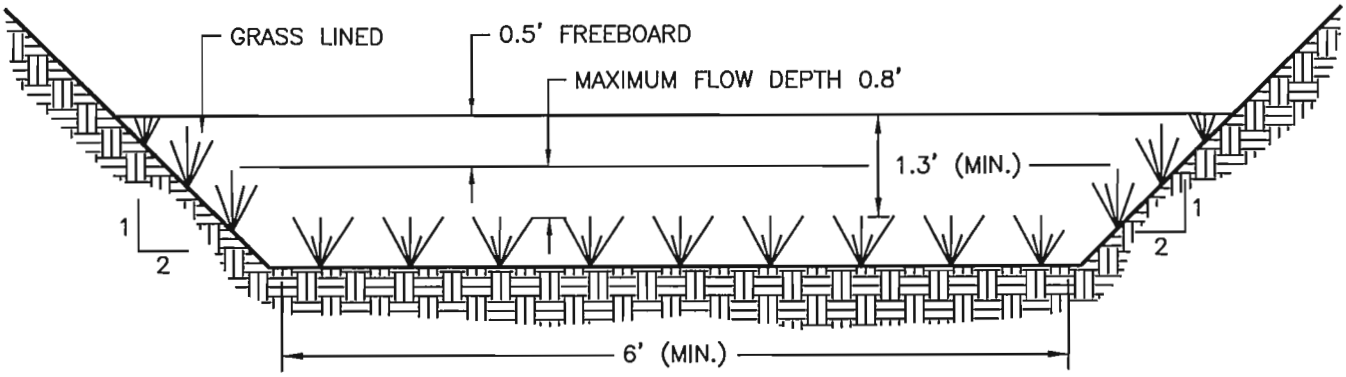
	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	3.53 cfs		3.53 cfs	
Depth:	0.22 ft	0.72 ft	0.43 ft	0.93 ft
Top Width:	6.86 ft	8.86 ft	7.72 ft	9.72 ft
Velocity:	2.54 fps		1.20 fps	
X-Section Area:	1.39 sq ft		2.94 sq ft	
Hydraulic Radius:	0.199 ft		0.372 ft	
Froude Number:	1.00		0.34	
Roughness Coefficient:	0.0717		0.2311	

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)
#1	1	1.600	0.046	0.000	0.000	81.000	F	3.53	0.304
	Σ	**1.600**						**3.53**	**0.304**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	7.00	14.00	200.00	2.640	0.021
		8. Large gullies, diversions, and low flowing streams	5.51	36.00	653.00	7.040	0.025
#1	**1**	**Time of Concentration:**					**0.046**



GRASS LINING TO CONSIST OF BERMUDA GRASS.

CUT SECTION

PERC
ENGINEERING CO., INC.
1606 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-3553 Office (205) 384-9481 Fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION D-D'
3+14 TO 5+69

DRAWN BY: J.W.T. DWG. NAME: W282WMDD'	DATE: 12/01/2011
APPROVED BY: L.G.S.	SCALE: NONE

V:\Steve Miles\Steve Doc
R Cook\Diversions\W282WMDD'.dwg 12/01/11 10:10

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Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Ditch D-D' 3+14 to 5+69

4.2 Inches, 10 Year-6 Hour

SCS 6 Hour

JWT

PERC Engineering Co., Inc.
PO BOX 1712
Jasper, AL 35503

Phone: 205-384-5553
Email: John.Taylor@percengineering.com

General Information

Storm Information:

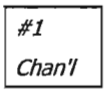
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1470
1.00	0.3360
1.50	0.5670
2.00	0.9660
2.50	2.5200
3.00	2.9400
3.50	3.2760
4.00	3.5070
4.50	3.7170
5.00	3.8850
5.50	4.0530
6.00	4.2000

Peak 30-minute Intensity: 3.108 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	D-D' 3+14



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	6.500	6.500	14.36	1.23

Structure Detail:

Structure #1 (Vegetated Channel)

D-D' 3+14

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
6.00	2.0:1	2.0:1	7.2	D, B	0.50			7.0

Vegetated Channel Results:

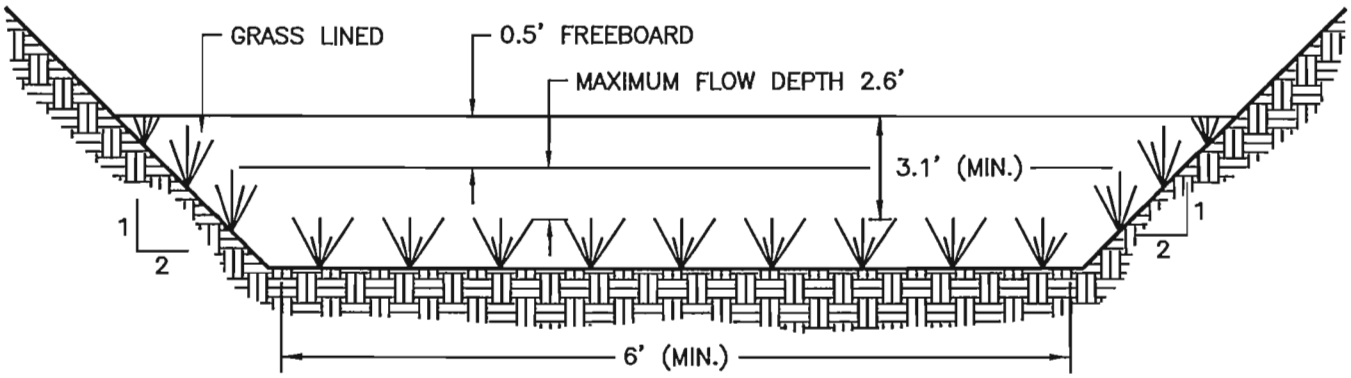
	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	14.36 cfs		14.36 cfs	
Depth:	0.47 ft	0.97 ft	0.79 ft	1.29 ft
Top Width:	7.87 ft	9.87 ft	9.15 ft	11.15 ft
Velocity:	4.43 fps		2.41 fps	
X-Section Area:	3.24 sq ft		5.97 sq ft	
Hydraulic Radius:	0.400 ft		0.627 ft	
Froude Number:	1.22		0.52	
Roughness Coefficient:	0.0489		0.1218	

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)
#1	1	6.500	0.033	0.000	0.000	81.000	F	14.36	1.234
	$\sum$	**6.500**						**14.36**	**1.234**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	17.50	35.00	200.00	4.180	0.013
		8. Large gullies, diversions, and low flowing streams	10.77	80.00	743.00	9.840	0.020
#1	**1**	**Time of Concentration:**					**0.033**



GRASS LINING TO CONSIST OF GRASS MIXTURE.

CUT SECTION

PERC
ENGINEERING CO., INC.
1806 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-3333 Office (205) 384-4491 Fax

WARRIOR 282 LLC
WARRIOR MINE NO. 1
P-3953
DIVERSION D-D'
5+69 TO 26+59

DRAWN BY: J.W.T. DWG. NAME: W282WMDD'	DATE: 12/01/2011
APPROVED BY: L.G.S.	SCALE: NONE

W:\Steve Mine\Steve Docs\R Cook\Diversions\W282WMDD'.dwg 12/01/11 10:10

Copyright 1998 -2007 Pamela L Schwab

Warrior 282 LLC

Warrior Mine No. 1

P-3953

Attachment III-B-3

Diversion Ditch D-D' 5+69 to 20+21

4.2 Inches, 10 Year-6 Hour

SCS 6 Hour

JWT

PERC Engineering Co., Inc.
PO BOX 1712
Jasper, AL 35503

Phone: 205-384-5553
Email: John.Taylor@percengineering.com

General Information

Storm Information:

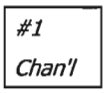
Storm Type:	Rainfall Event

Accumulated Time (hrs)	Accumulated Depth (in)
0.00	0.0000
0.50	0.1470
1.00	0.3360
1.50	0.5670
2.00	0.9660
2.50	2.5200
3.00	2.9400
3.50	3.2760
4.00	3.5070
4.50	3.7170
5.00	3.8850
5.50	4.0530
6.00	4.2000

Peak 30-minute Intensity: 3.108 in/hr

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	D-D' 5+69



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	13.400	13.400	29.60	2.54

Structure Detail:

Structure #1 (Vegetated Channel)

D-D' 5+69

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
6.00	2.0:1	2.0:1	0.3	D, B	0.50			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	29.60 cfs		29.60 cfs	
Depth:	1.64 ft	2.14 ft	2.64 ft	3.14 ft
Top Width:	12.55 ft	14.55 ft	16.56 ft	18.56 ft
Velocity:	1.95 fps		0.99 fps	
X-Section Area:	15.19 sq ft		29.80 sq ft	
Hydraulic Radius:	1.140 ft		1.673 ft	
Froude Number:	0.31		0.13	
Roughness Coefficient:	0.0457		0.1157	

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)
#1	1	13.400	0.112	0.000	0.000	81.000	F	29.60	2.544
	$\sum$	**13.400**						**29.60**	**2.544**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	17.50	35.00	200.00	4.180	0.013
		8. Large gullies, diversions, and low flowing streams	4.12	90.00	2,184.00	6.080	0.099
#1	**1**	**Time of Concentration:**					**0.112**