HYDROLOGY STUDY FOR
ALABAMA CARBON, LLC

GLADE PREPARATION PLANT
P-3829 REVISION R-8
JACKSON COUNTY, ALABAMA

BY

PERC ENGINEERING CO., INC.

P.O. BOX 1712

JASPER, ALABAMA 35502

DETAILED DESIGN PLANS
DIVERSION DITCH A-A'
DIVERSION DITCH B-B'
ATTACHMENT III-B-3

JULY 12, 2012

PERC
ENGINEERING CO., INC.

Telephone: (205) 384-5553
Facsimile: (205) 295-3114 - Main Building
(205) 295-3115 - Water Lab
Web Address: www.percengineering.com

July 12, 2012

Mr. Michael Harrison, P.E.
Alabama Surface Mining Commission
Post Office Box 2390
Jasper, Alabama 35502-2390

RE: Alabama Carbon, LLC.
Glade Preparation Plan
P-3829 Revision R-8

Dear Michael:

I hereby certify the attached detailed design plans for Diversion Ditches A-A' & B-B' for the above referenced location are in accordance with the Regulations of the Alabama Surface Mining Commission as adopted by Act 81-435 of December 18, 1981 and amended to date, and are true and correct to the best of my knowledge and belief.

If you have any questions or required additional information, please feel free to call.

Sincerely,
PERC Engineering Co., Inc.

Leslie G. Stephens, P.E., P.L.S.
Alabama Registration No. 14117-E

ALABAMA PROFESSIONAL ENGINEER AND LAND SURVEYOR REGISTERED No. 14117 LESLIE G. STEPHENS

P.O. Box 1712 • Jasper, Alabama 35502 • 1606 Highway 78 West • Jasper, Alabama 35501

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.

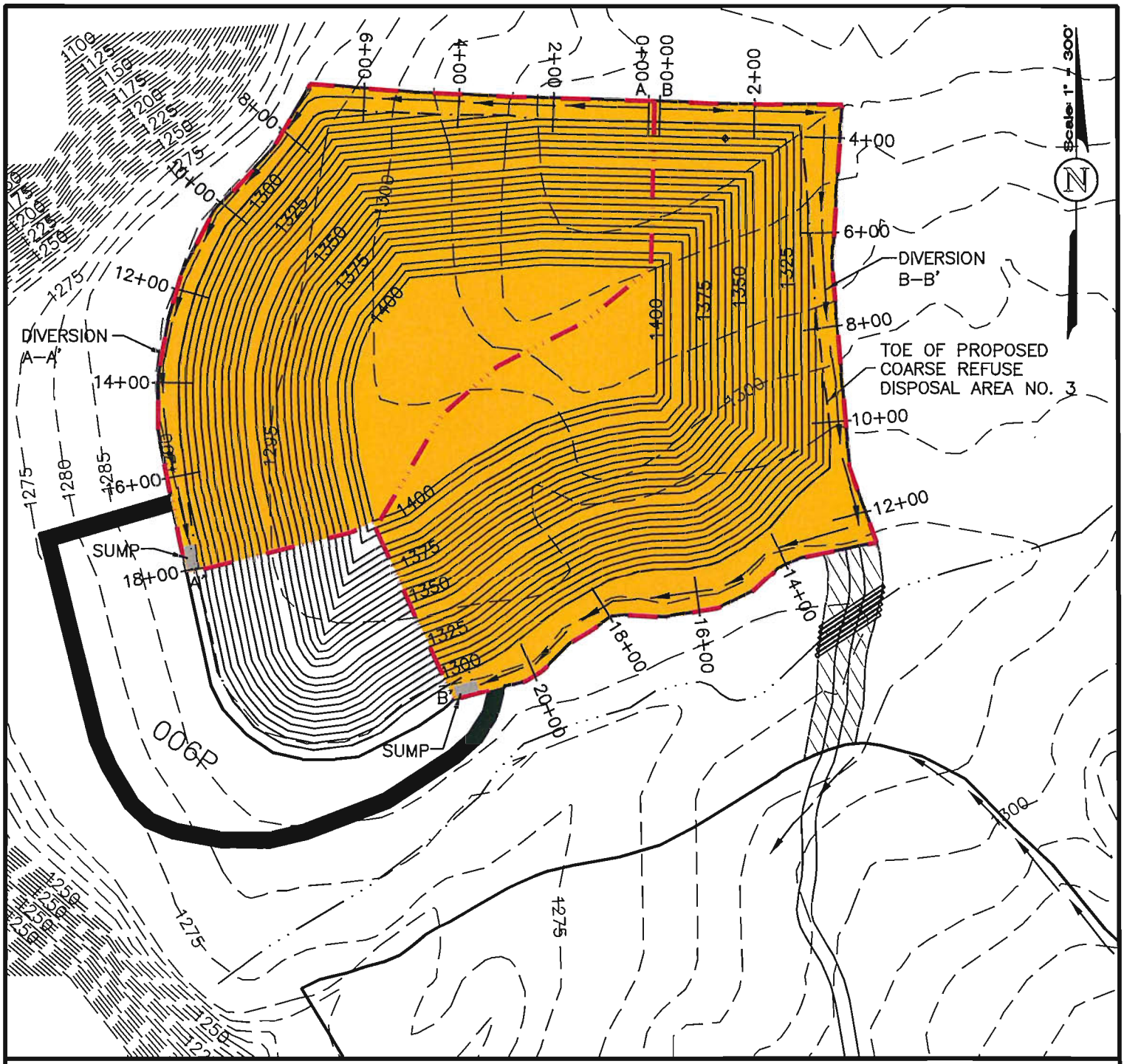
16. All berms shall be examined quarterly for structural weakness, instability, erosion, or other hazardous conditions and maintenance performed as necessary.

NOTES

1) Diversion Berm/Ditch A-A' will be a 6-foot wide Class II sandstone or limestone rip-rap lined diversion with left bank side slopes at 2H:1V and right bank side slopes at 3H:1V, looking upstream.

2) Diversion Berm/Ditch B-B' will be a 4-foot wide Class II sandstone or limestone rip-rap lined ditch with right bank side slopes at 2H:1V and left bank side slopes at 3H:1V, looking upstream.

3) A 6' deep x 20' wide x 30' long sedimentation control sump with 2H:1V side slopes will be located at the discharge ends of Diversion Ditch A-A' & B-B' prior to discharging into Basin 006P to decrease the amount of sediment in the basin. These sump volumes were not included in the Basin 006P design. They will provide easy maintenance for sedimentation trapping and removal for basin maintenance.



LEGEND

- Permit Boundary
- Major Inflow
- Normal Pool Level Elev. 1286.7
- 1275 Natural Ground Contours
- 1275 Proposed Finished Grade (Refuse Mound)
- Watershed Boundary

LANDUSE & CURVE NUMBER INFORMATION

Graded and Bare, Curve Number, 81

Note: Base Map taken from the Ider and Flat Rock,ALA U.S.G.S. 7.5 Minute Quadrangle Maps.

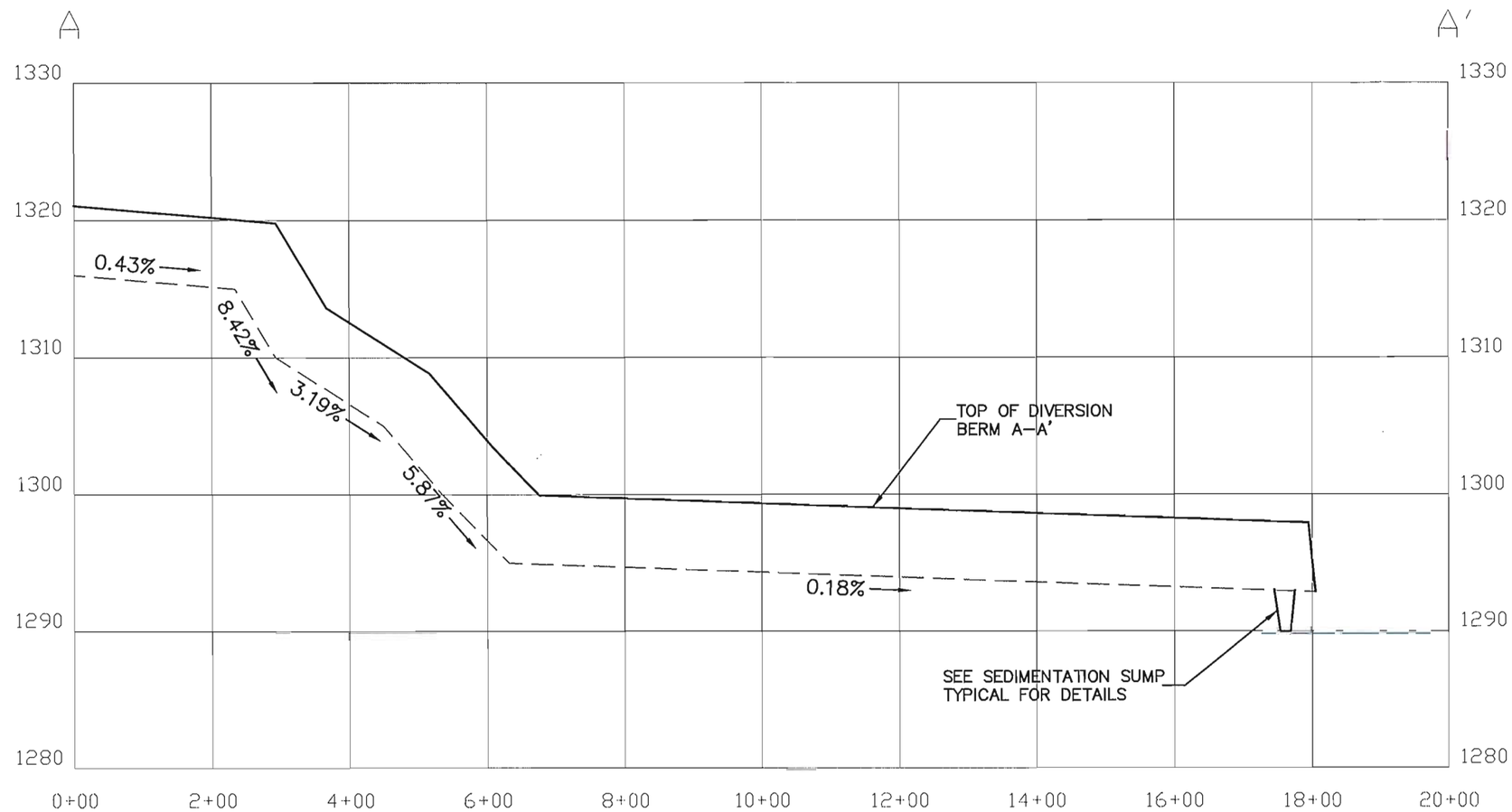
PERC ENGINEERING CO., INC.
1806 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5551 Office (205) 295-3114 Fax

Alabama Carbon, LLC
Glade Preparation Plant
P–3829 Revision R–8
Diversion Ditch/Berm Watershed Map
Attachment III–B–2(a)

DRAWN BY: J.W.T.	DATE: 07/12/2012
DWG. NAME: DDWSM	
APPROVED BY: L.G.S.	SCALE: 1"=300'

V:\Eng103\Mines\Alabama Carbon LLC\Glade Prep Plant\R-8\Ditches\DDWSM.dwg 07/12/12 09:13

V:\Eng105\Mines\Alabama Carbon LLC\Glade Prep Plant\R-8\Ditches\DDPROFILES.dwg 06/20/12 09:37



HORIZONTAL SCALE: 1"=200'
VERTICAL SCALE: 1"=10'

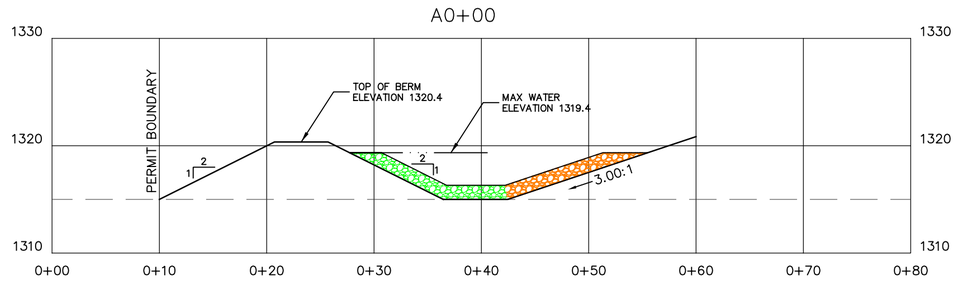
LEGEND

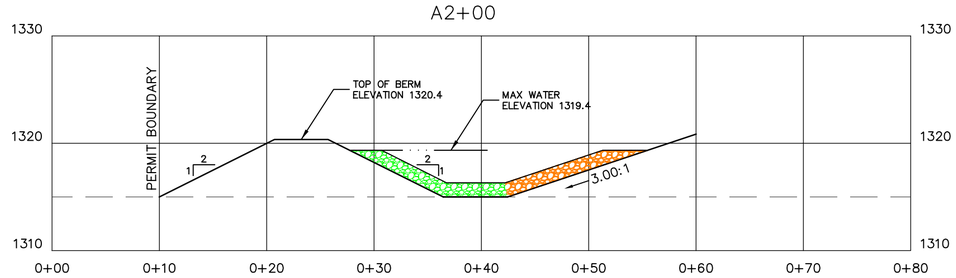
- - - - - - *Exsisting Grade*
——— *Proposed Finished Grade*

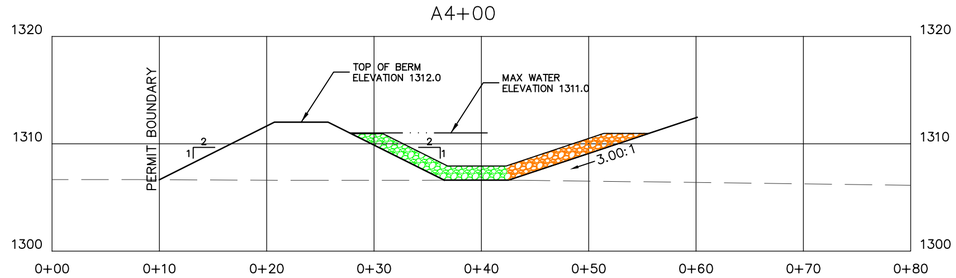
PERC ENGINEERING CO., INC.
1605 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-3552 Office (205) 295-2114 Fax

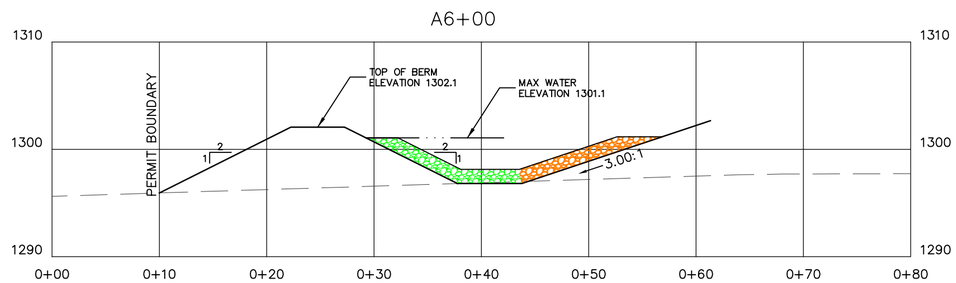
ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P-3829 REVISION R-8
DIVERSION DITCH A-A' PROFILE

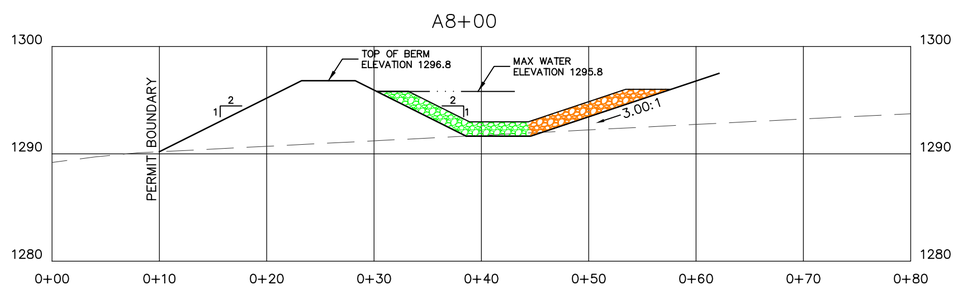
DRAWN BY: J.W.T. DWG. NAME: DDPROFILES	DATE: 06/20/2012
APPROVED BY: L.G.S.	SCALE: AS NOTED

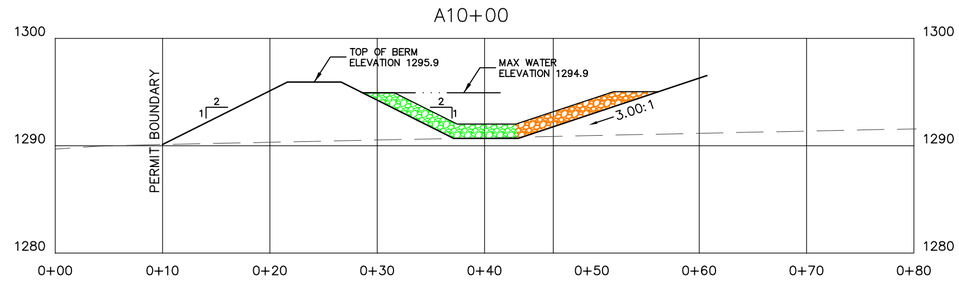


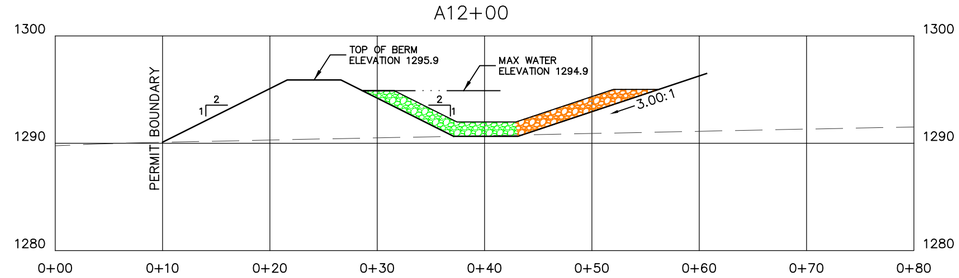


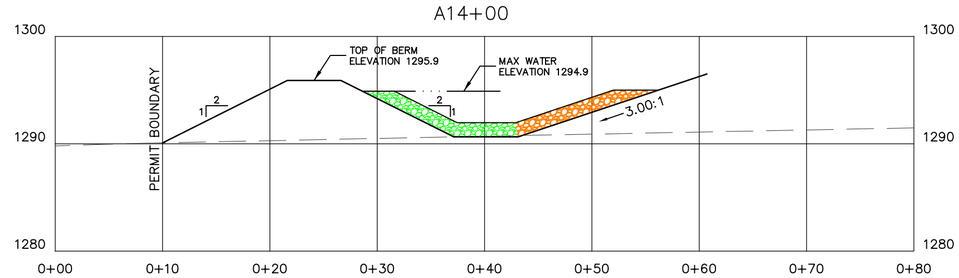


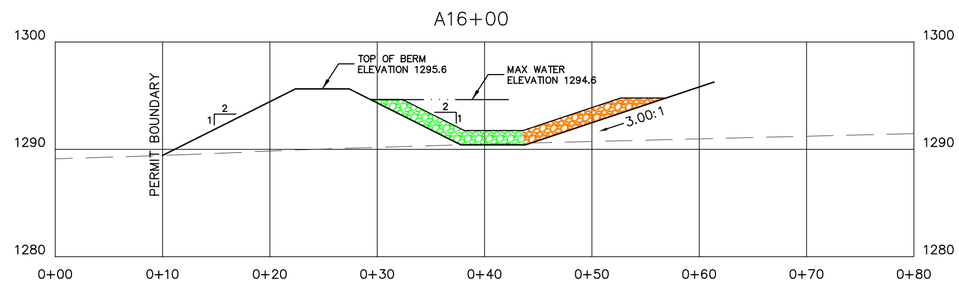


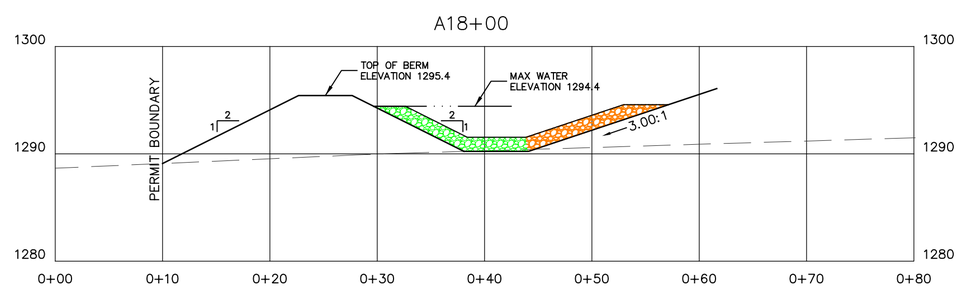












LEGEND

- *Natural Ground Profile*
- *Proposed Finished Grade*
- *Prior to Refuse or Geotube Activites*
- *Post Refuse Construction Prior to Abandonment*

NOTE:

1) CHANNEL LINING FOR DIVERSION BERM A–A' SHALL CONSIST OF 16" THICK (MIN) CLASS II LIMESTONE OR SANDSTONE RIP–RAP.

2) THE TOE OF THE COARSE REFUSE MOUND WILL BE A MINIMUM DISTANCE OF 4' FROM THE INSIDE TOE ADJACENT TO DIVERSION BERM A–A'.

PERC ENGINEERING CO., INC.
1004 Highway 78 West, Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5553 Office (205) 384-3114 Fax

Attachment III-B-3
Alabama Carbon, LLC
Glade Preparation Plant
P-3829 Revision R-8
Diversion Ditch A-A' Cross-Sections

DRAWN BY: J.W.T. DWG. NAME: DDCS	DATE: 06/20/2012
APPROVED BY: L.G.S.	SCALE: 1" = 10'

X:\Projects\Mines\Alabama Carbon, LLC\Glade Prep. Plant\R-8\Diversion\DDCS.dwg 06/21/12 11:07

Copyright 1998 -2007 Pamela L Schwab

Alabama Carbon, LLC
Glade Preparation Plant
P-3829 Revision R-8
Diversion Ditch/Berm A-A'
Station 0+00 to 18+04

5.4 Inch, 100 Year- 6 Hour

NRCS Type II

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:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	5.400 inches

Structure Networking:

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

#1
Chan'l

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	16.100	16.100	68.77	4.33

Structure Detail:

Structure #1 (Riprap Channel)

Diversion A-A'

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)
4.00	2.0:1	3.0:1	0.2	1.00		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	68.77 cfs	
Depth:	2.76 ft	3.76 ft
Top Width:	17.78 ft	22.78 ft
Velocity:	2.29 fps	
X-Section Area:	30.03 sq ft	
Hydraulic Radius:	1.593 ft	
Froude Number:	0.31	
Manning's n:	0.0377	
Dmin:	2.00 in	
D50:	9.00 in	
Dmax:	12.00 in	

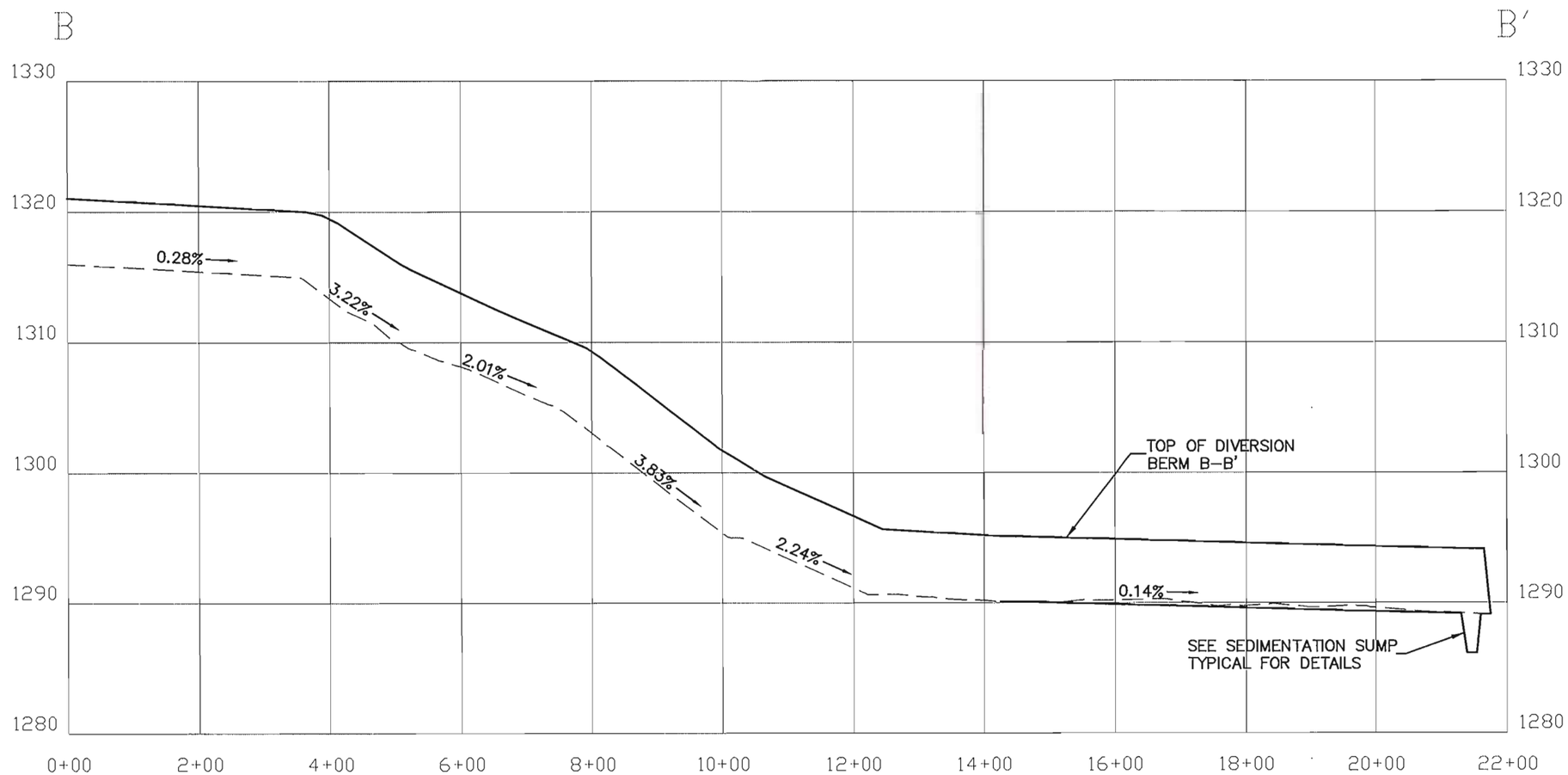
Subwatershed Hydrology Detail:

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	16.100	0.170	0.000	0.000	81.000	F	68.77	4.327
	Σ	**16.100**						**68.77**	**4.327**

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	0.50	1.00	200.00	0.700	0.079
		8. Large gullies, diversions, and low flowing streams	4.98	110.00	2,210.00	6.690	0.091
#1	**1**	**Time of Concentration:**					**0.170**

V:\Eng105\Mines\Alabama Carbon LLC\Glade Prep Plant\R-8\Ditches\DDPROFILES.dwg 06/20/12 09:37



HORIZONTAL SCALE: 1"=200'
VERTICAL SCALE: 1"=10'

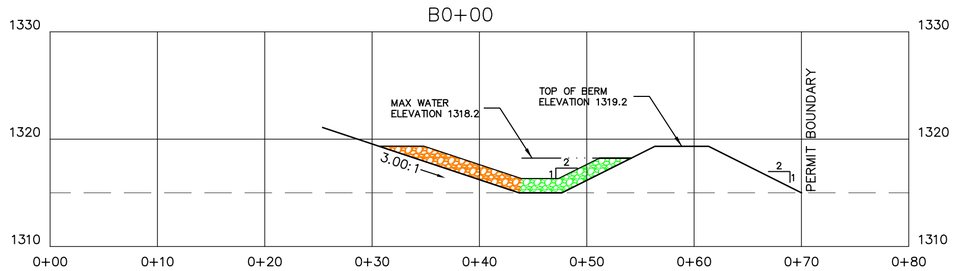
LEGEND

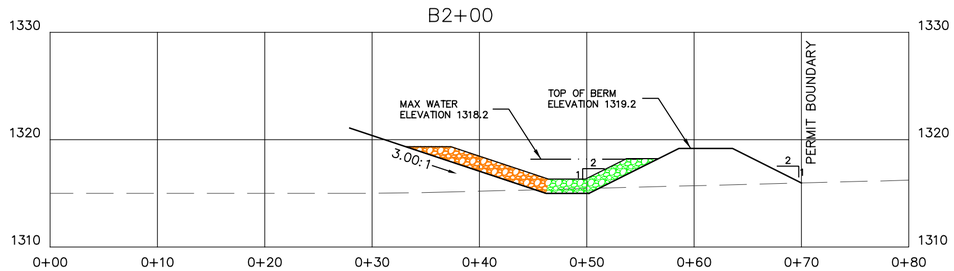
- - - - - - *Exsisting Grade*
——— *Proposed Finished Grade*

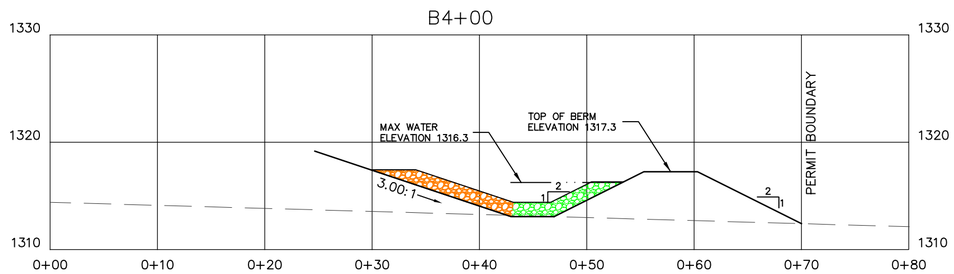
PERC ENGINEERING CO., INC.
1608 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-3553 Office (205) 293-3114 Fax

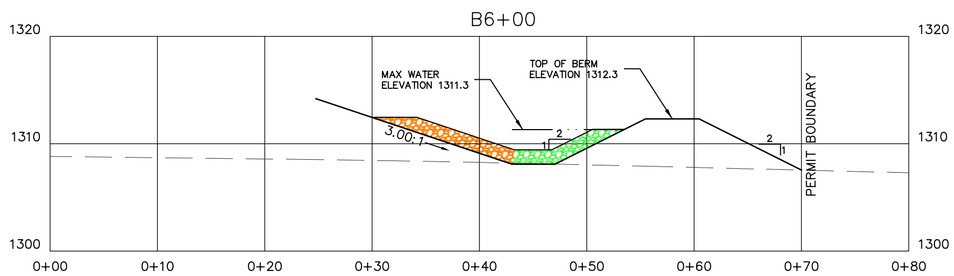
ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P-3829 REVISION R-8
DIVERSION DITCH B-B' PROFILE

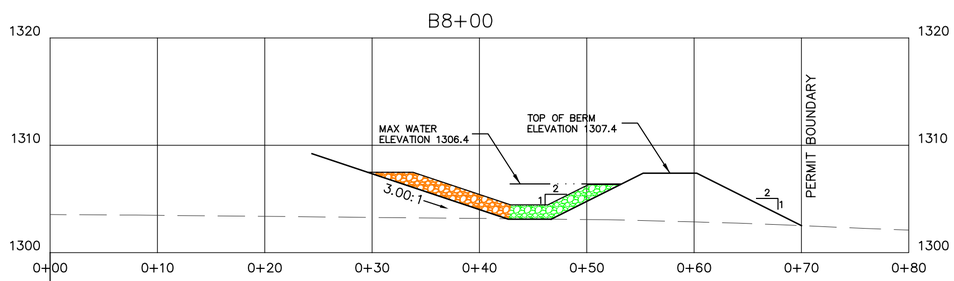
DRAWN BY: J.W.T. DWG. NAME: DDPROFILES	DATE: 06/20/2012
APPROVED BY: L.G.S.	SCALE: AS NOTED

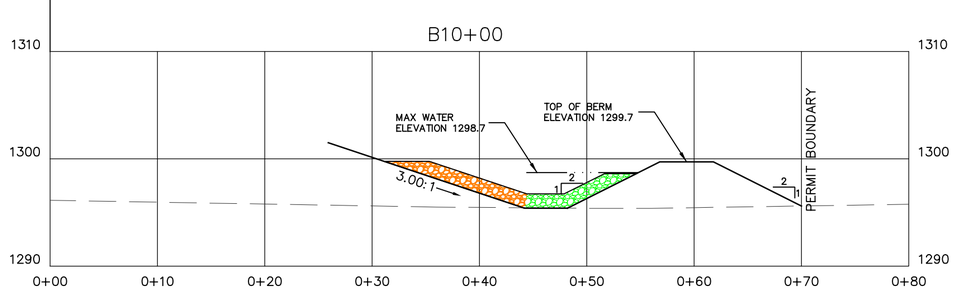


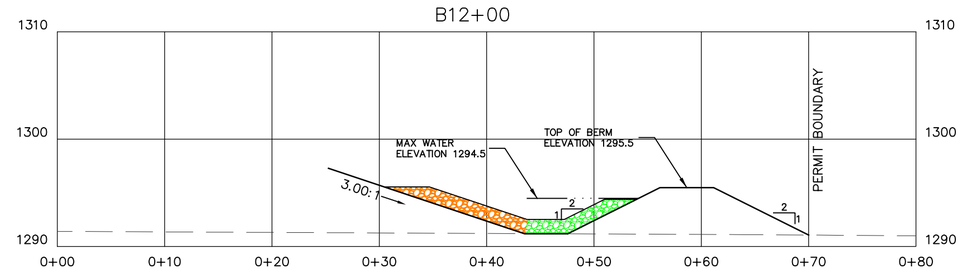


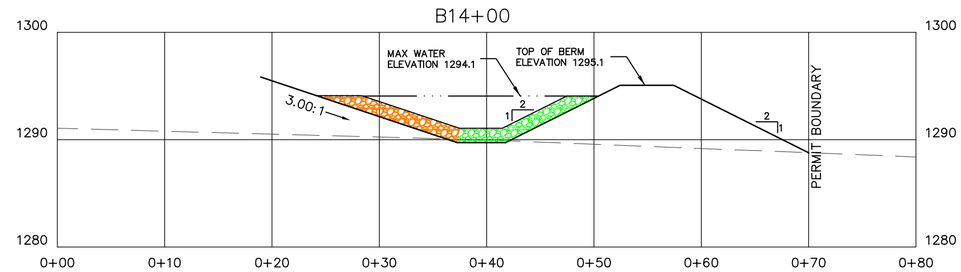


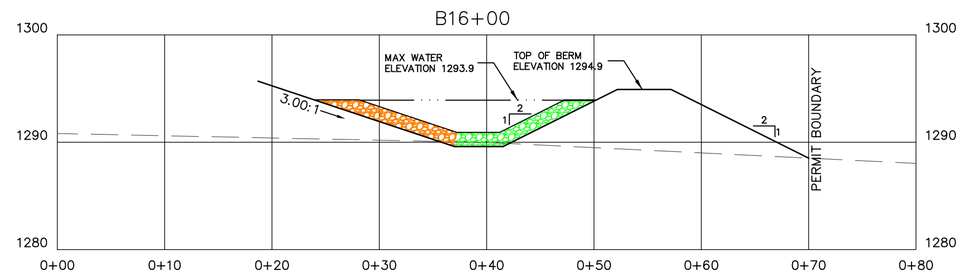


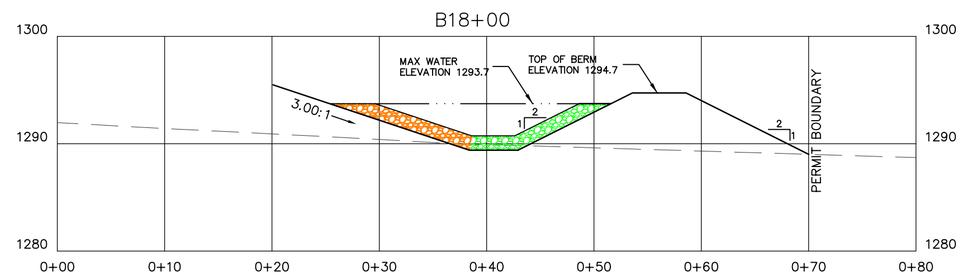


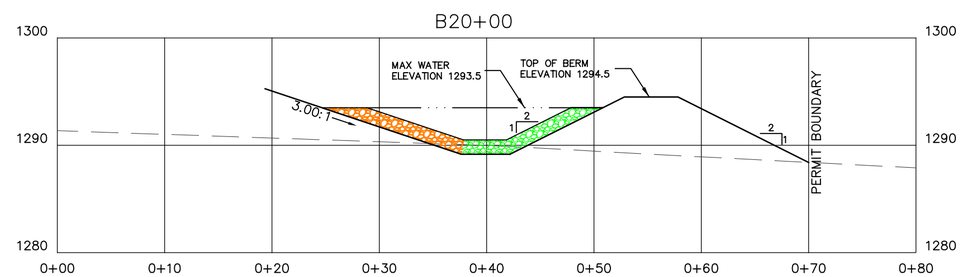












LEGEND

- *Natural Ground Profile*
- *Proposed Finished Grade*
- *Prior to Refuse or Geotube Activites*
- *Post Refuse Construction Prior to Abandonment*

NOTE:

1) CHANNEL LINING FOR DIVERSION BERM B–B' SHALL CONSIST OF 16" THICK (MIN) CLASS II LIMESTONE OR SANDSTONE RIP–RAP.

2) THE TOE OF THE COARSE REFUSE MOUND WILL BE A MINIMUM DISTANCE OF 4' FROM THE INSIDE TOE ADJACENT TO DIVERSION BERM B–B'.

PERC ENGINEERING CO., INC.
1021 Main St. S. West, Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5553 Office (205) 384-3114 Fax

Attachment III-B-3
Alabama Carbon, LLC
Glade Preparation Plant
P-3829 Revision R-8
Diversion Ditch B-B' Cross-Sections

DRAWN BY: J.W.T.	DATE: 06/20/2012
DWG. NAME: DDCS	
APPROVED BY: L.G.S.	SCALE: 1" = 10'

V:\Eng205\Mines\Alabama Carbon LLC\Glade Prep Plant\R-8\Diversion\DDCS.dwg 06/20/12 11:07

Copyright 1998 -2007 Pamela L Schwab

Alabama Carbon, LLC
Glade Preparation Plant
P-3829 Revision R-8
Diversion Ditch/Berm B-B'
Station 0+00 to 21+72

5.4 Inch, 100 Year- 6 Hour

NRCS Type II

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:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	5.400 inches

Structure Networking:

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

#1
Chan'l

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	17.100	17.100	73.21	4.59

Structure Detail:

Structure #1 (Riprap Channel)

Diversion A-A'

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)
4.00	2.0:1	3.0:1	0.1	1.00		

Riprap Channel Results:

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	73.21 cfs	
Depth:	3.00 ft	4.00 ft
Top Width:	19.01 ft	24.01 ft
Velocity:	2.12 fps	
X-Section Area:	34.54 sq ft	
Hydraulic Radius:	1.713 ft	
Froude Number:	0.28	
Manning's n:	0.0377	
Dmin:	2.00 in	
D50:	9.00 in	
Dmax:	12.00 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	17.100	0.151	0.000	0.000	81.000	F	73.21	4.587
	Σ	**17.100**						**73.21**	**4.587**

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	28.50	57.00	200.00	5.330	0.010
		8. Large gullies, diversions, and low flowing streams	2.30	53.00	2,309.00	4.540	0.141
#1	**1**	**Time of Concentration:**					**0.151**