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
BASIN 006P
ATTACHMENT III-B-2(a)

JULY 12, 2012

PERC
ENGINEERING CO., INC.

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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 Plant
P-3829 Revision R-8

Dear Michael:

I hereby certify the attached detailed design plans for Basin 006P 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 REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR No. 14117 LESLIE G. STEPHENS

P.O. Box 1172 • Jasper, Alabama 35502 • 1606 Highway 78 West • Jasper, Alabama 35501

Pond Construction Criteria

The embankment for sediment basins (temporary and permanent) shall be designed and built using the following as minimum criteria:

1. The top of the dam shall be no less than 12 feet wide.

2. See design sheet for maximum and minimum embankment slopes.

3. The foundation and abutments for the impounding structure shall be designed to be stable under all conditions of construction and operation of the impoundments, with a minimum static safety factor of 1.3 for the normal pool with steady seepage saturation conditions.

4. The dam shall be constructed with a cutoff trench based upon prudent engineering practices for the site. The cutoff shall be located on the dam centerline and be of sufficient depth to extend into a relatively impervious material from which the core of the dam shall also be constructed.

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

6. The entire embankment and cutoff trench shall be compacted to 95 percent density, based on standard proctor as outlined in ASTM.

7. The material placed in the embankment 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 that the moisture content of the fill material will permit satisfactory compaction in accordance with paragraph 5.

8. The pool area of the basin will be cleared of timber and large undergrowth.

9. The primary decant system when consisting of a pipe shall be installed according to Class C pipe installation for embankment bedding.

10. The primary decant system shall be equipped with a device, or constructed, such as to insure that subsurface withdrawal is accomplished to prevent discharge of floating solids. If a channel is used as the primary decant a skimmer shall be installed to prevent floating solids from discharging.

11. A splash pad or riprap may be required under the discharge of the primary decant system where necessary to insure that the discharge does not erode the embankment.

12. The combination primary and secondary decant system shall be designed to safely carry the expected peak flow from a 25 year - 6 hour storm. The entire emergency overflow spillway channel will be a stabilized channel and will be stabilized upon completion of construction as specified within the detailed design plans using prudent engineering measures. These measures may consist of lining the spillway with concrete or a durable rock riprap, or the spillway being constructed in consolidated non-erodible material and planted with a mixture or both annual and perennial grasses, or a combination of any or all of the above.

13. Sediment basins using a single spillway system shall be an open channel of non-erodible construction consisting of concrete, durable rock riprap or its being constructed in consolidated non-erodible material as specified in the detailed design plans.

14. The settled embankment for temporary impoundments shall be a minimum of 1.0 foot above the maximum water elevation for the runoff from a 25 year - 6 hour, or a 10 year - 24 hour precipitation event (whichever has the greatest runoff). The settled embankment for permanent impoundments shall be a minimum of 1.0 foot above the maximum water elevation for the runoff from a 25 year - 6 hour, or a 10 year - 24 hour precipitation event (whichever has the greatest runoff).

15. If basins are built in series, then the combined decant system for each shall be designed to accommodate the entire contributing drainage area.

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

17. The constructed height of the dam shall be increased a minimum of 5 percent over the design height to allow for settlement over the life of the embankment.

18. Final graded slopes of the entire permanent water impoundment area shall not exceed 2.5H-1.0V to provide for adequate safety and access for proposed water users.

19. Prior to Phase II bond release, additional data concerning water quality, water quantity, depth, size, configuration, post mining land use, etc., for each proposed permanent water impoundment, shall be submitted to the Regulatory Authority for permanent water impoundment approval.

20. All sediment basins will be inspected for stability, erosion, etc. two (2) times a month until removal of the structure or release of the reclamation bond.

21. The embankment and spillway will be maintained by repairing any damage such

as erosion, slope failure or spillway damage until removal of the structure or release of the performance bond.

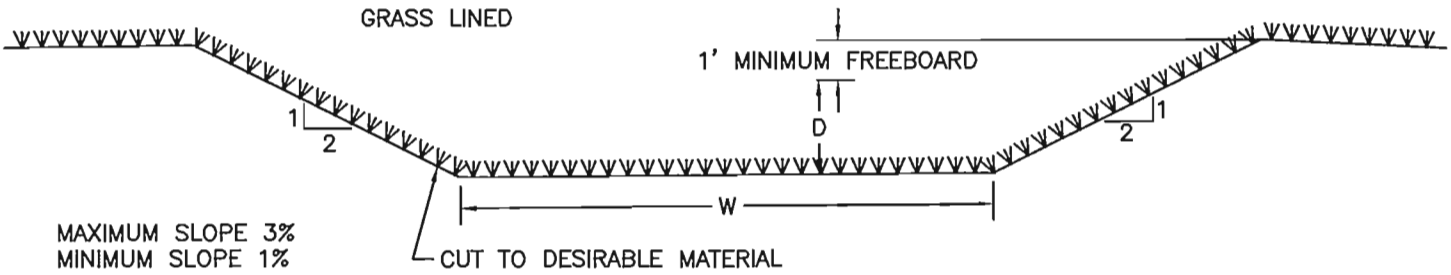
22. All ponds shall be examined quarterly for structural weakness, instability, erosion, or other hazardous conditions and maintenance performed as necessary. Formal inspections shall be made on an annual basis, including any reports or modifications, in accordance with 880-X-10C-.20[l(j)] of the Alabama Surface Mining Commission Regulations.

23. Sediment will be removed from each pond when the accumulated sediment reaches the sediment storage volume as shown on the detailed design sheet.

24. Upon completion of mining, successful reclamation and effluent standards being met, each sediment basin not remaining as a permanent water impoundment will be dewatered in an environmentally safe manner (such as siphoning, pumping, etc.) and reclaimed to approximate original contours by the following procedure: A permanent diversion channel (designed for a 10 year - 24 hour precipitation event) shall be cut along the outer edge of the basin to re-route drainage around the basin and back through the stabilized spillway to allow reclamation of the sediment basin. The diversion channel shall be designed and grassed as per enclosed information. (See permanent diversion for basin disposal).Upon completion of the diversion channel the back slope of the dam shall be graded to a minimum 3H to 1V slope. The dewatered sediment basin area shall be seeded with some combination of the following: Fescue, bermuda, rye grass, canary grass and willows. After seeding the area shall be mulched. Any additional sediment or embankment material not used to meet original contour, if non-toxic, shall be spread in thin layers within the permit area and vegetated as stated in the approved reclamation plan. All toxic material encountered in the basin disposal shall be buried and covered with 4 feet of non-toxic material and vegetated as stated in the approved reclamation plan.

25. A qualified registered professional engineer or other qualified professional specialist, under the direction of the professional engineer shall conduct regular inspections during construction and upon completion shall inspect each basin for certification purposes.

26. Point source discharge embankments shall be constructed and abutments keyed into desirable material if at all possible. In the event that undesirable material is encountered, addition design and construction criteria shall be submitted prior to certification.



$Q = \frac{1.49}{N} A R^{2/3} S^{1/2}$
N(LOOSE STONE OR GRASS LINED) = 0.035
A = AREA
R = AREA/WETTED PERIMETER
S = SLOPE

* GRASS LINING: FESCUE, BERMUDA, RYE GRASS

DIVERSION CHANNEL DEPTH (D) FOR WIDTH (W) 8.0 FT.	
PEAK FLOW Q (CFS)	DEPTH D (FT)
1–15	0.5
15–50	1.0
50–100	1.5
100–180	2.0
180–270	2.5

DIVERSION CHANNEL DEPTH (D) FOR WIDTH (W) 10.0 FT.	
PEAK FLOW Q (CFS)	DEPTH D (FT)
0–15	0.5
15–60	1.0
60–120	1.5
120–210	2.0
210–320	2.5

DIVERSION CHANNEL DEPTH (D) FOR WIDTH (W) 12.0 FT.	
PEAK FLOW Q (CFS)	DEPTH D (FT)
0–20	0.5
20–70	1.0
70–150	1.5
150–250	2.0
250–383	2.5

DIVERSION CHANNEL DEPTH (D) FOR WIDTH (W) 15.0 FT.	
PEAK FLOW Q (CFS)	DEPTH D (FT)
0–20	0.5
20–90	1.0
90–180	1.5
180–300	2.0
300–450	2.5

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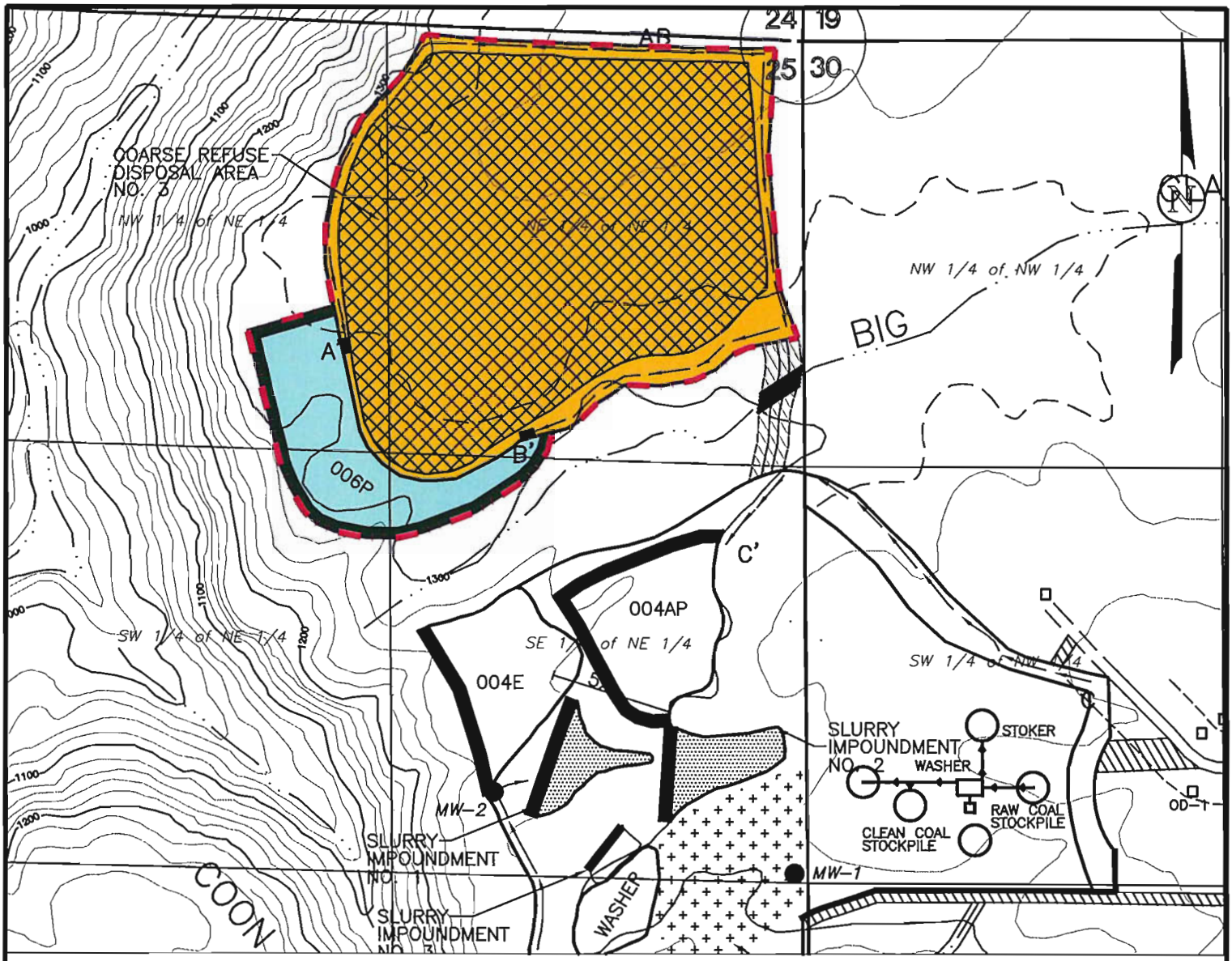
TYPICAL PERMANENT DIVERSION FOR BASIN DISPOSAL

DRAWN BY: J.W.T. DWG. NAME: TYPICALS	DATE: 04–16–2009
APPROVED BY: L.G.S.	SCALE: NONE

NOTES

1) The primary spillway of Basin 006P will consist of a 15 foot wide open channel lined with 4 inches of concrete reinforced with 6X6–W2.9XW2.9 concrete reinforcement wire. The channel lining will extend back to the existing drainage course. A 20' X 20' X 4" concrete splash pad reinforced with 6X6-W2.9XW2.9 welded wire fabric will be located at the exit point of the tail section of the channel.



LEGEND

- Permit Boundary
- 400 — Surface Contour
- 001 — Sediment Basin
- Drainage Course
- % — Land Slope Measurements
- A — A' — Reclamation Cross Section
- Diversion Ditch
- Occupied Dwelling
- Unoccupied Dwelling (Barn, Shed, etc.)
- Private Impoundment
- County Road (Paved unless otherwise designated)
- Road (Private unless otherwise shown)
- Haul Road
- MW-1 — Groundwater Monitoring Site
- Coarse Refuse Disposal Site
- Slurry Impoundments
- Embankment For Sediment Basin
- Coarse Refuse Disposal Site
- Drainage Divide

LANDUSE & CURVE NUMBER INFORMATION

- Graded and Bare, Curve Number, 81
- Sediment Basin, Curve Number 100

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

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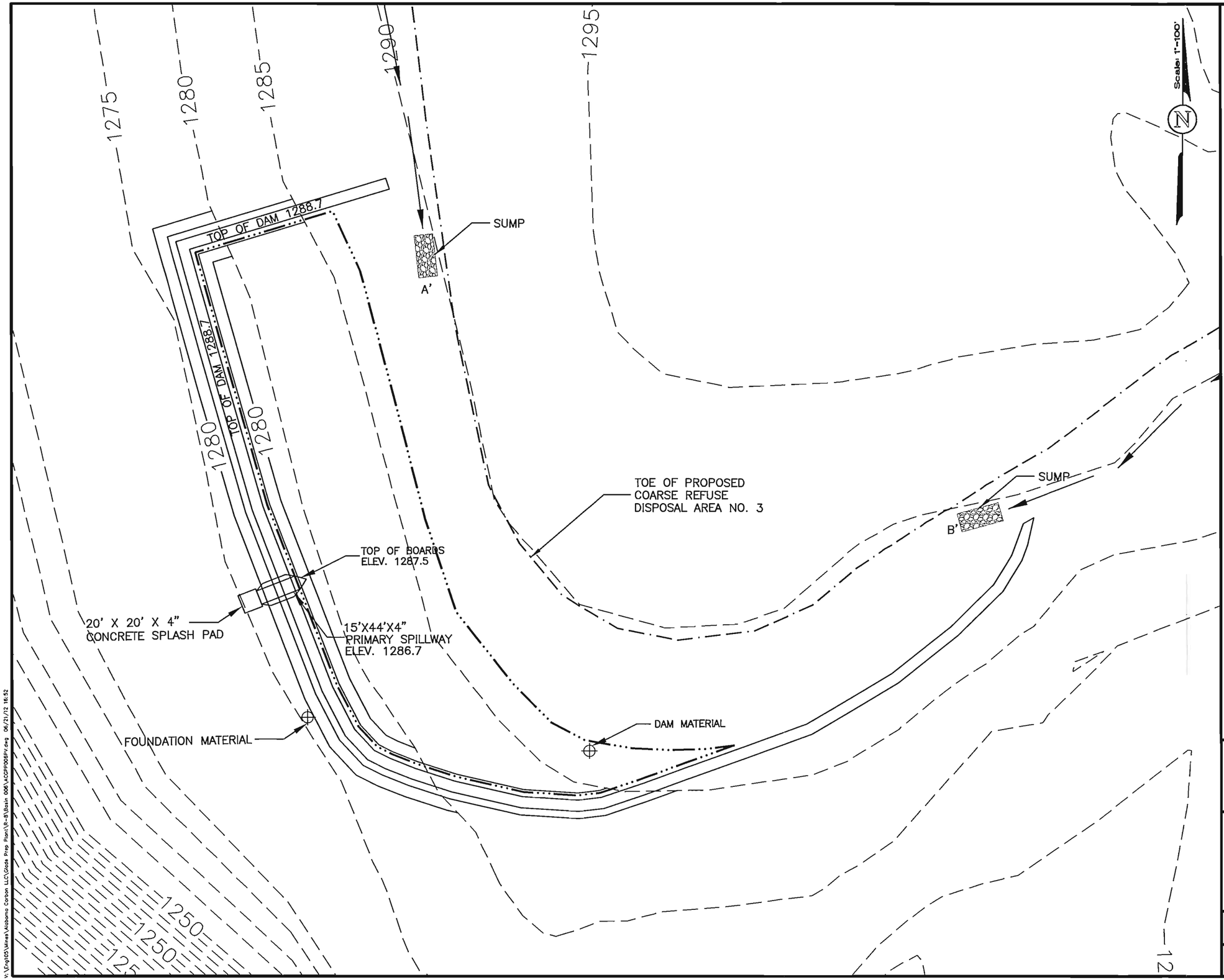
ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P-3829 REVISION R-8
BASIN 006P
ATTACHMENT III-B-2(a)

DRAWN BY: J.W.T. DWG. NAME: ACGPP006WS	DATE: 06/21/2012
APPROVED BY: L.G.S.	SCALE: 1"=500'



LEGEND

- MAJOR INFLOW
- NORMAL POOL LEVEL ELEV. 1286.7
- 1275 EXISTING CONTOURS
- 1290 PROPOSED FINISHED GRADE
- PROPOSED TOE OF COARSE REFUSE DISPOSAL AREA NO. 3

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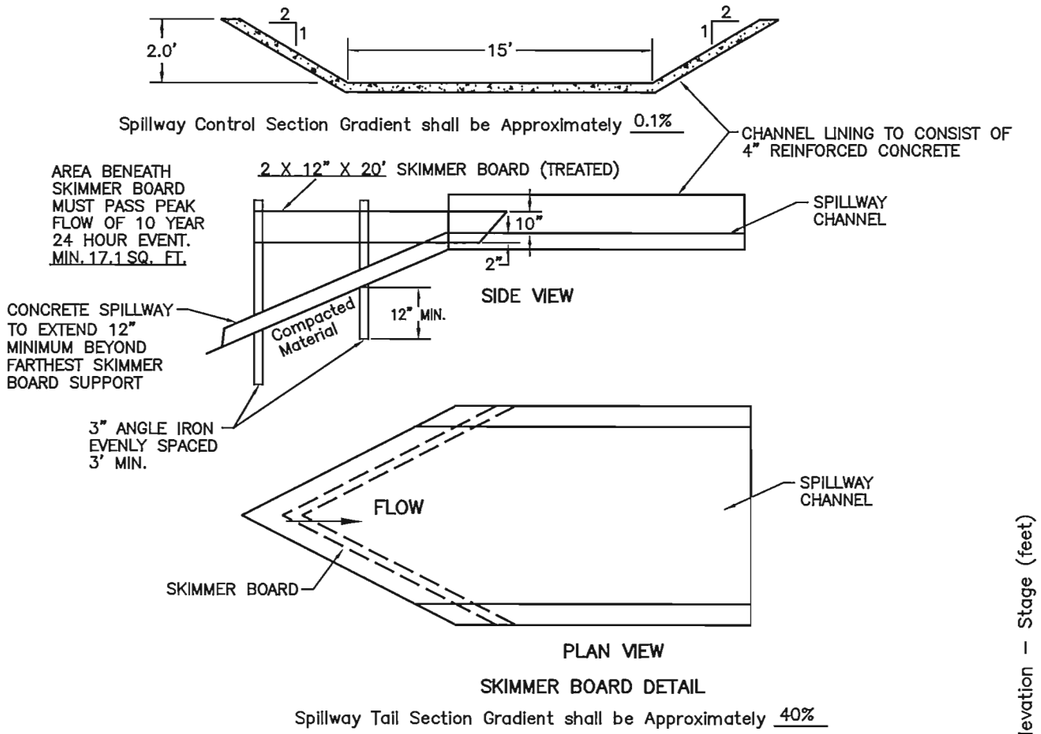
ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P-3829 REVISION R-8
BASIN 006P PLANVIEW

DRAWN BY: J.W.T.	DATE: 06/21/2012
DWG. NAME: ACGPP006PV	
APPROVED BY: L.G.S.	SCALE: 1" = 100'

Skimmer Board Elev. 1287.5
Spillway Elev. 1286.7
Q Out 33.53 C.F.S.
V Out 1.96 FT/S



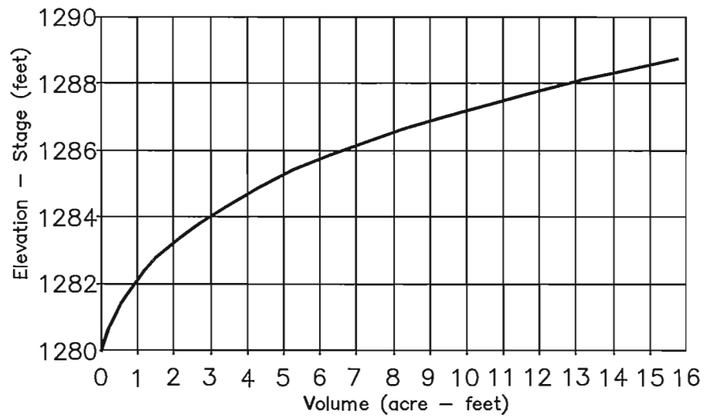
SKIMMER BOARD DETAIL

Spillway Tail Section Gradient shall be Approximately 40%

Notes:

1. The sediment shall be removed from the basin when the accumulated sediment reaches the sediment storage volume.
2. Outer slopes of embankment shall be grassed.
3. Fill material shall be placed in 12" lifts and compacted to 95% of standard proctor.
4. The surface beneath the embankment shall be stripped of undesirable material.
5. Upon completion of mining, reclamation and maintenance of water quality standards the pond will be de-watered and reclaimed.
6. See the attached pond construction criteria.
7. See the attached drawings and specifications for diversions.
8. Elevations are based on assumed datum.
9. Channel lining within the control section of the spillway channel will extend to the maximum water elevation.

Stage vs. Storage Curve

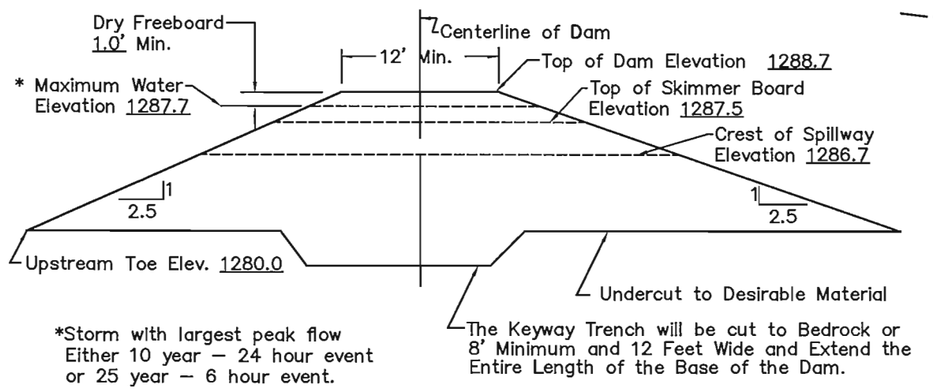


Storage Computation

Elevation (feet)	Area (acres)	Avg. Area (acres)	Interval (feet)	Storage (ac.-ft.)	Acc. Storage (ac.-ft.)
1280	0.256				0.000
1285	1.785	1.021	5	4.528	4.528
1288.7	4.267	3.026	2.7	11.263	15.791

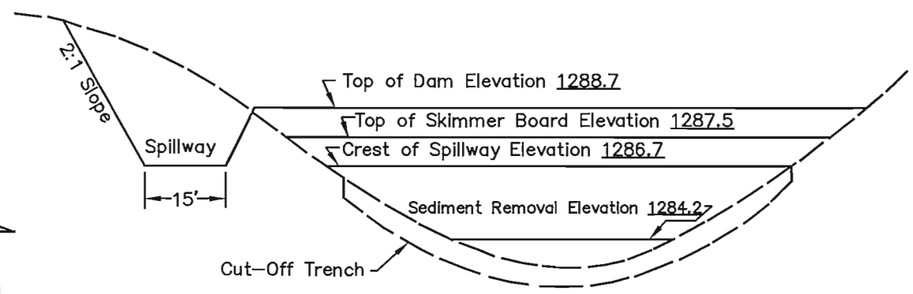
Key Basin Parameters

Drainage Area	41.6 Acres
Disturbed Area	40.6 Acres
Sediment Storage	3.3 Ac. Ft.
Detention Storage	5.2 Ac. Ft.
Permanent Pool Capacity	8.5 Ac. Ft.
Total Basin Capacity	11.9 Ac. Ft.
Peak Inflow	87.2 C.F.S.
Peak Outflow	33.5 C.F.S.



*Storm with largest peak flow Either 10 year - 24 hour event or 25 year - 6 hour event.

Typical Cross Section Along Spillway



Typical Profile Looking Downstream

Leslie G. Stephens, P.E., P.L.S.
AL Registration. #14117-E
07/12/2012
Date

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ALABAMA CARBON, LLC.
GLADE PREPARATION PLANT
P-3829 REVISION R-8
BASIN 006P
DESIGN DETAILS

DRAWN BY: J.W.T. DWG. NAME: ACGPP006DT	DATE: 06/22/2012
APPROVED BY: L.G.S.	SCALE: NONE

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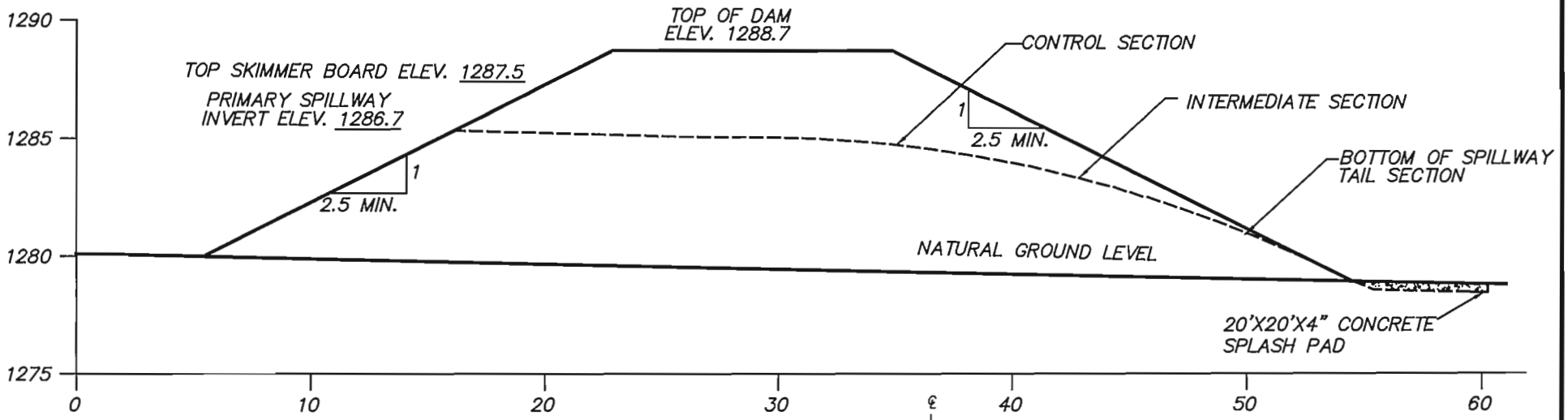
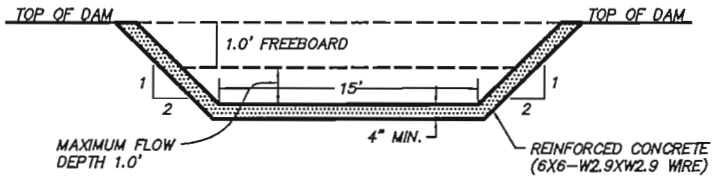
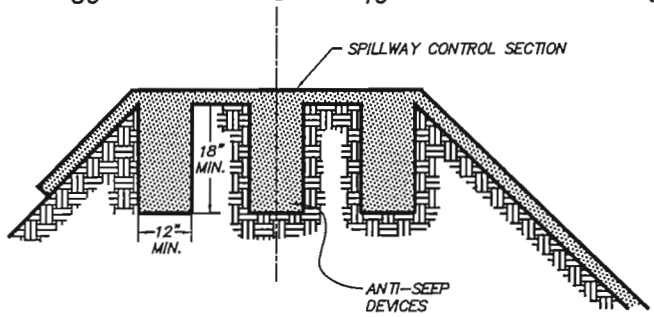
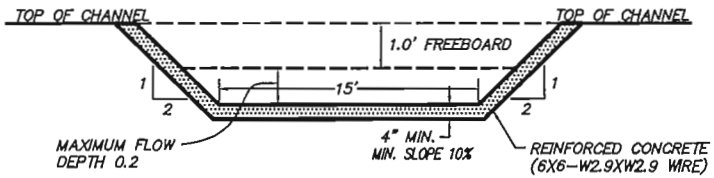




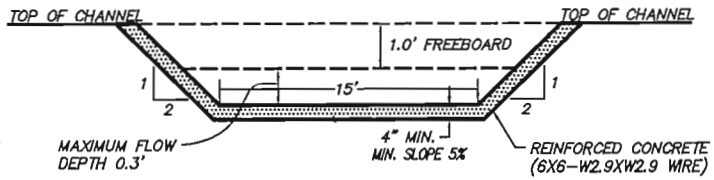
SPILLWAY CONTROL SECTION TYPICAL
N.T.S.



ANTI-SEEP DEVICE TYPICAL
N.T.S.



SPILLWAY TAIL SECTION TYPICAL
N.T.S.



SPILLWAY INTERMEDIATE SECTION TYPICAL
N.T.S.

PERC ENGINEERING CO., INC.

ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P-3829 REVISION R-8
BASIN 006P
DAM DETAILS

DRAWN BY: J.W.T. DWG. NAME: ACGPP006DD	DATE: 06/22/2012
APPROVED BY: L.G.S.	SCALE: AS NOTED

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P-3829 Revision R-8 Basin 006P Spillway Control Section

Material: Concrete, Rubble

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
15.00	2.0:1	2.0:1	0.1	0.0220	1.00		

	w/o Freeboard	w/ Freeboard
Design Discharge:	33.53 cfs	
Depth:	1.00 ft	2.00 ft
Top Width:	19.02 ft	23.02 ft
Velocity:	1.96 fps	
X-Section Area:	17.09 sq ft	
Hydraulic Radius:	0.877 ft	
Froude Number:	0.36	

P-3829 Revision R-8 Basin 006P Spillway Intermediate Section

Material: Concrete, Rubble

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
15.00	2.0:1	2.0:1	5.0	0.0220	1.00		

	w/o Freeboard	w/ Freeboard
Design Discharge:	33.53 cfs	
Depth:	0.32 ft	1.32 ft
Top Width:	16.26 ft	20.26 ft
Velocity:	6.80 fps	
X-Section Area:	4.93 sq ft	
Hydraulic Radius:	0.301 ft	
Froude Number:	2.17	

P-3829 Revision R-8 Basin 006P Spillway Tail Ditch Section

Material: Concrete, Rubble

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
15.00	2.0:1	2.0:1	40.0	0.0220	1.00		

	w/o Freeboard	w/ Freeboard
Design Discharge:	33.53 cfs	
Depth:	0.17 ft	1.17 ft
Top Width:	15.68 ft	19.68 ft
Velocity:	12.89 fps	
X-Section Area:	2.60 sq ft	
Hydraulic Radius:	0.165 ft	
Froude Number:	5.58	

ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P-3829 REVISION R-8
BASIN 006P

5.4 INCHES, 10 YEAR - 24 HOUR,
DRN 58

JWT

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

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

General Information

Storm Information:

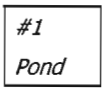
Storm Type:	DRN58
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.400 inches

Particle Size Distribution:

Size (mm)	Topsoil	Spoil
3.0000	98.000%	80.000%
2.0000	95.000%	76.000%
1.0000	86.000%	68.000%
0.5000	72.000%	60.000%
0.3000	56.000%	53.000%
0.2000	43.000%	46.000%
0.1000	30.000%	35.000%
0.0500	24.000%	26.000%
0.0300	19.000%	18.000%
0.0200	13.000%	14.000%
0.0100	10.000%	9.000%
0.0050	7.000%	6.000%
0.0030	6.000%	4.000%
0.0010	5.000%	2.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Basin 006



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)
#1	In	41.600	41.600	44.50	11.34	5,915.7	545,347	389.97	231.81
	Out			27.63	11.34	268.7	24,657	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
3.0000	82.578%	100.000%
2.0000	78.449%	100.000%
1.0000	70.191%	100.000%
0.5000	61.933%	100.000%
0.3000	54.708%	100.000%
0.2000	47.482%	100.000%
0.1000	36.128%	100.000%
0.0500	26.838%	100.000%
0.0300	18.580%	100.000%
0.0200	14.451%	100.000%
0.0100	9.290%	100.000%
0.0050	6.193%	100.000%
0.0030	4.129%	90.895%
0.0010	2.064%	45.448%

Structure Detail:

Structure #1 (Pond)

Basin 006

Pond Inputs:

Initial Pool Elev:	1,286.70 ft
Initial Pool:	5.15 ac-ft
*Sediment Storage:	3.30 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
1,286.70	12.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	1,287.50 ft
H'graph Detention Time:	1.06 hrs
Pond Model:	CSTRS
Dewater Time:	0.76 days
Trap Efficiency:	95.46 %

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)	
1,284.23	1.463	0.000	0.000		Top of Sed. Storage
1,284.50	1.571	0.405	0.000		
1,285.00	1.785	1.243	0.000		
1,285.50	2.073	2.207	0.000		
1,286.00	2.382	3.320	0.000		
1,286.50	2.712	4.592	0.000		
1,286.70	2.851	5.148	0.000		Spillway #1
1,286.80	2.920	5.437	3.433	6.65	
1,287.00	3.063	6.035	10.291	8.75	
1,287.50	3.434	7.658	27.439	2.80	
1,287.50	3.446	7.667	27.626	0.05	Peak Stage
1,288.00	3.826	9.472	65.287		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
1,288.50	4.117	11.458	116.268	
1,288.75	4.267	12.506	139.844	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,284.23	0.000	0.000
1,284.50	0.000	0.000
1,285.00	0.000	0.000
1,285.50	0.000	0.000
1,286.00	0.000	0.000
1,286.50	0.000	0.000
1,286.70	0.000	0.000
1,286.80	3.433	3.433
1,287.00	10.291	10.291
1,287.50	27.439	27.439
1,288.00	65.287	65.287
1,288.50	116.268	116.268
1,288.75	139.844	139.844

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	40.600	0.153	0.000	0.000	81.000	F	43.43	10.892
	2	1.000	0.001	0.000	0.000	100.000	F	1.42	0.450
	Σ	**41.600**						**44.50**	**11.341**

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)
#1	1	0.240	200.00	33.30	0.9000	1.0000	2	5,915.7	550,677	393.78	239.53
	2	0.001	200.00	0.01	0.0010	1.0000	1	0.0	0	0.00	0.00
	Σ							**5,915.7**	**545,347**	**389.97**	**231.81**

ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P-3829 REVISION R-8
BASIN 006P

4.5 INCHES, 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	0.1580
1.00	0.3600
1.50	0.6080
2.00	1.0350
2.50	2.7000
3.00	3.1500
3.50	3.5100
4.00	3.7580
4.50	3.9830
5.00	4.1630
5.50	4.3430
6.00	4.5000

Peak 30-minute Intensity: 3.33 in/hr

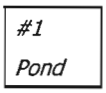
Particle Size Distribution:

Size (mm)	Topsoil	Spoil
3.0000	98.000%	80.000%
2.0000	95.000%	76.000%
1.0000	86.000%	68.000%
0.5000	72.000%	60.000%
0.3000	56.000%	53.000%
0.2000	43.000%	46.000%
0.1000	30.000%	35.000%
0.0500	24.000%	26.000%
0.0300	19.000%	18.000%
0.0200	13.000%	14.000%
0.0100	10.000%	9.000%
0.0050	7.000%	6.000%
0.0030	6.000%	4.000%

Size (mm)	Topsoil	Spoil
0.0010	5.000%	2.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Basin 006



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)
#1	In	41.600	41.600	87.19	8.68	7,465.7	742,247	527.86	349.77
	Out			33.53	8.68	379.6	36,206	0.01	0.01

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
3.0000	86.478%	100.000%
2.0000	82.154%	100.000%
1.0000	73.507%	100.000%
0.5000	64.859%	100.000%
0.3000	57.292%	100.000%
0.2000	49.725%	100.000%
0.1000	37.834%	100.000%
0.0500	28.105%	100.000%
0.0300	19.458%	100.000%
0.0200	15.134%	100.000%
0.0100	9.729%	100.000%
0.0050	6.486%	100.000%
0.0030	4.324%	85.045%
0.0010	2.162%	42.522%

Structure Detail:

Structure #1 (Pond)

Basin 006

Pond Inputs:

Initial Pool Elev:	1,286.70 ft
Initial Pool:	5.15 ac-ft
*Sediment Storage:	3.30 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
1,286.70	12.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	1,287.58 ft
H'graph Detention Time:	1.07 hrs
Pond Model:	CSTRS
Dewater Time:	0.48 days
Trap Efficiency:	94.92 %

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)	
1,284.23	1.463	0.000	0.000		Top of Sed. Storage
1,284.50	1.571	0.405	0.000		
1,285.00	1.785	1.243	0.000		
1,285.50	2.073	2.207	0.000		
1,286.00	2.382	3.320	0.000		
1,286.50	2.712	4.592	0.000		
1,286.70	2.851	5.148	0.000		Spillway #1
1,286.80	2.920	5.437	3.433	6.65	
1,287.00	3.063	6.035	10.291	1.15	
1,287.50	3.434	7.658	27.439	2.95	
1,287.58	3.506	7.950	33.528	0.75	Peak Stage
1,288.00	3.826	9.472	65.287		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
1,288.50	4.117	11.458	116.268	
1,288.75	4.267	12.506	139.844	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,284.23	0.000	0.000
1,284.50	0.000	0.000
1,285.00	0.000	0.000
1,285.50	0.000	0.000
1,286.00	0.000	0.000
1,286.50	0.000	0.000
1,286.70	0.000	0.000
1,286.80	3.433	3.433
1,287.00	10.291	10.291
1,287.50	27.439	27.439
1,288.00	65.287	65.287
1,288.50	116.268	116.268
1,288.75	139.844	139.844

Subwatershed Hydrology Detail:

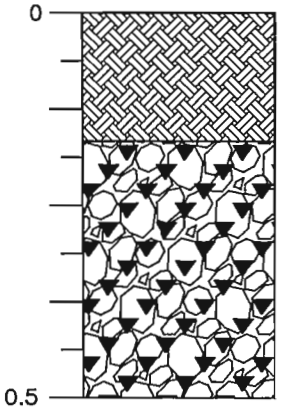
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	40.600	0.153	0.000	0.000	81.000	F	86.29	8.306
	2	1.000	0.001	0.000	0.000	100.000	F	3.36	0.374
	Σ	**41.600**						**87.19**	**8.680**

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)
#1	1	0.240	200.00	33.30	0.9000	1.0000	2	7,465.7	747,717	531.75	362.84
	2	0.001	200.00	0.01	0.0010	1.0000	1	0.0	0	0.00	0.00
	Σ							**7,465.7**	**742,247**	**527.86**	**349.77**

Alabama Carbon, LLC
Glade Preparation Plant
P-3829 Revision R-8
Basin 006P
Soil Classification

INTERVAL:	DESCRIPTION:
0 – 0.2'	Surface Material
0.2' – 0.5'	Sandy Silt
	Stiff Base



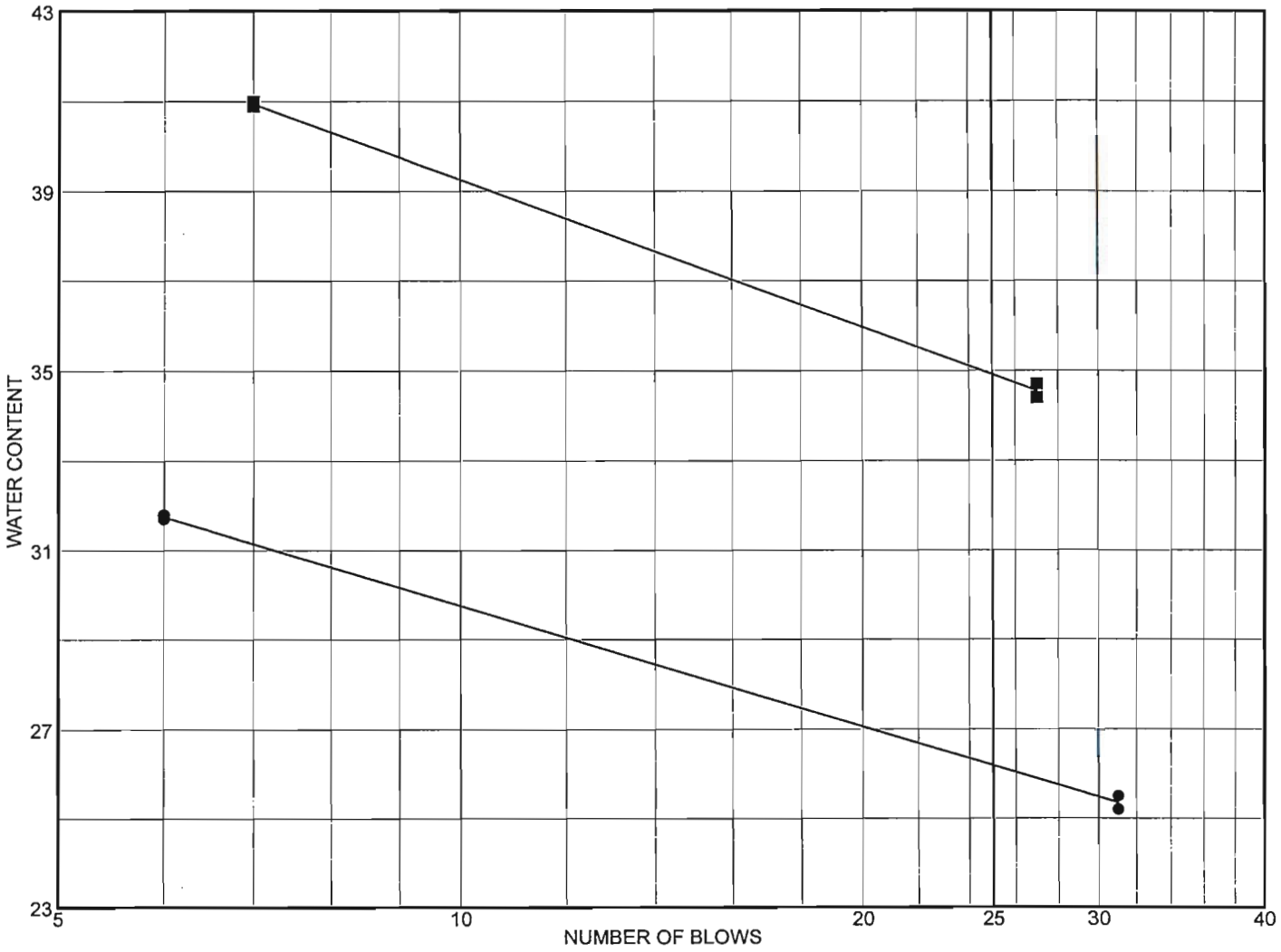
DRILL HOLE: B–1
SAMPLED BY: STEVE RIDDLESPERGER
SAMPLED DATE: 3–7–08

PERC
ENGINEERING CO., INC.
1506 Highway 78 West Jasper, Alabama 35501
P.O. Box 1712 Jasper, Alabama 35502
(205) 384-5553 Office (205) 384-9481 Fax

ALABAMA CARBON, LLC
GLADE PREPARATION PLANT
P–3829 REVISION R–8
BASIN 006P
FOUNDATION INVESTIGATION

DRAWN BY: J.W.T. DWG. NAME: ACGPP006–F1	DATE: 06/22/2012
APPROVED BY: L.G.S.	SCALE: 1" = 1'

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy silt	26	24	2	93.55	65.28	ML
■	Silty sand	35	29	6	62.75	33.01	SM

Project No. **Client:** GTM Energy Partners LLC

Project: Basin 006

Basin 006

● **Location:** Glade Prep Plant

■ **Location:** Glade Prep Plant

Remarks:

● Dam Material

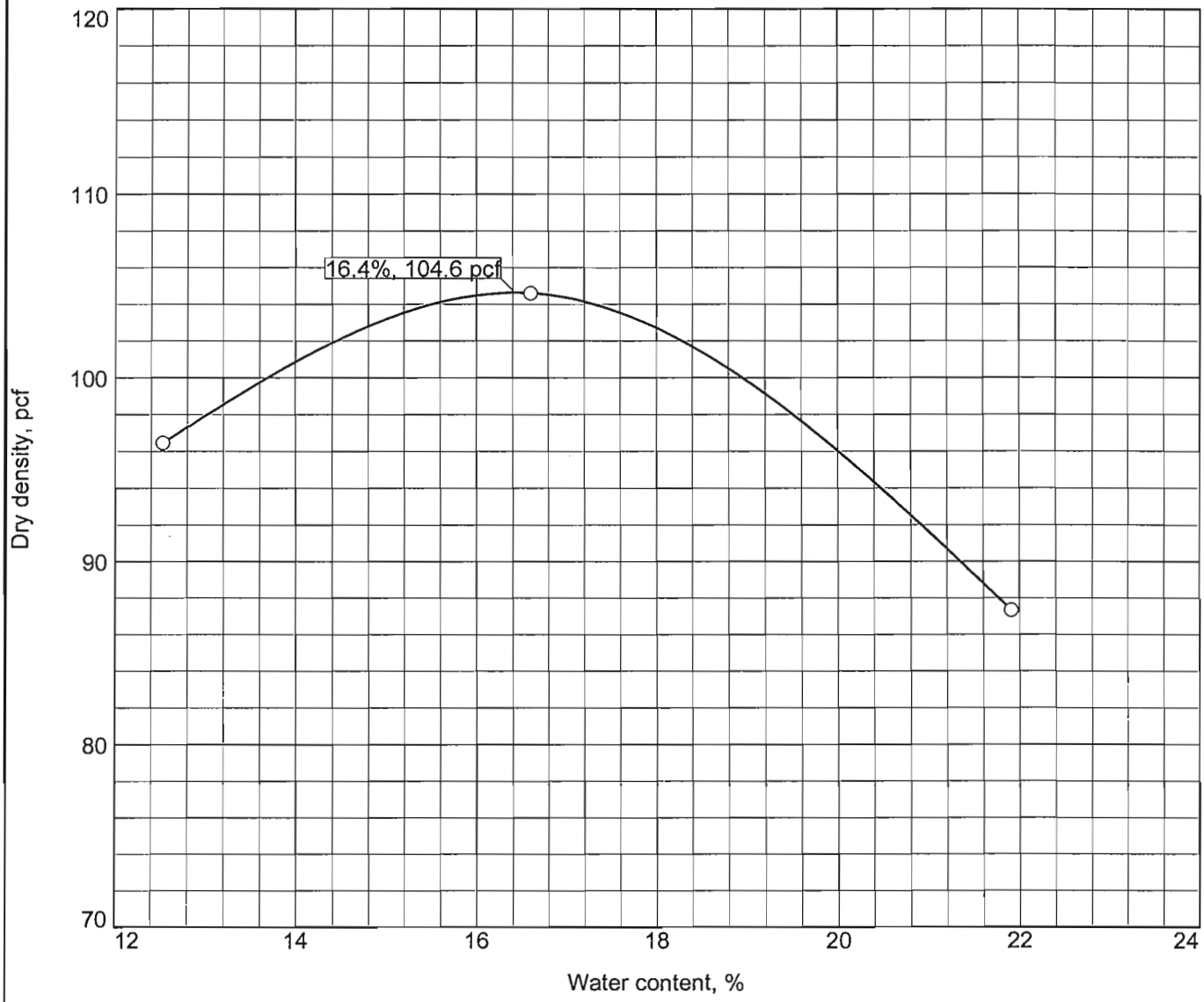
■ Foundation Material

PERC ENGINEERING CO., INC.

Jasper, Alabama

Date 6-24-2009

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	ML				26	2		65.28

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 104.6 pcf Optimum moisture = 16.4 %	Sandy silt

Project No. **Client:** GTM Energy Partners LLC

Project: Basin 006

○ **Location:** Glade Prep Plant

PERC ENGINEERING CO., INC.

Jasper, Alabama

Remarks:
Dam Material

Date 6-24-2009

Alabama Carbon, LLC
Glade Preparation Plant
P-3829 Revision R-8
Basin 006P
Stability Analysis

STABILITY ANALYSIS DATA

(Continued)

DESIGN DATA

1) Design Density = 95% of the standard proctor maximum density.
2) Embankment top width: 12.0'.
3) Freeboard minimum = 10% of structure (from top of embankment to normal pool level).
4) Safety factors for embankments with 2.5H:1V slopes, front and back.
5) Basin 006P design height = 8.7 ft.
6) DMIN = 0.00
7) All design heights are measured from the top of the embankment to the toe of the upstream slope.

SAFETY FACTORS

BASIN NUMBER	STATIC SAFETY FACTOR
006P	2.0

FOUNDATIONS AND ABUTMENTS

The foundation and abutments area will be inspected for visible structural deficiencies after clearing and grubbing, and if found they will be treated using sound engineering practices.

Alabama Carbon, LLC
Glade Preparation Plant
P-3829 Revision R-8

STABILITY ANALYSIS DATA

METHODOLOGY

The static and dynamic loading stability analyses were performed using the Simplified Bishop Method. The computer program used was the REAME Slope Stability Program as developed by Dr. Yang H. Haung, P.E. of the University of Kentucky.

SOIL CLASSIFICATION UNITS

The soil type (soil classification) to be used in the construction of the embankment structure of Basin 006P (ML) and the soil type (soil classification) of the material between the proposed embankment and stiff base of Basin 006P(SM) was sampled and analyzed by PERC Engineering Co., Inc. The soil properties used in the stability analysis (ML & SM) type soil, was taken from the U.S. Department of the Interior Bureau of Reclamation Design of Small Dams.*

SOIL PROPERTIES

	UNIFIED CLASS	COHESION (PSF)	ANGLE OF INT. FRC.	DESIGN DENSITY (PCF)
Dam Material Basin 006P	ML	100.8	29.7	129.5
Foundation Basin 006P	SM	273.6	33.0	132.1

*United States Department of Interior Bureau of Reclamation Design of Small Dams Second Edition 1973, Revised Reprint 1974 page 137 and United States Department of Interior Bureau of Reclamation Design of Small Dams Third Edition 1987 page 96 and 97.

REAME (Rotational Equilibrium Analysis of Multilayered Embankments)
Implemented on the 16-bit Microcomputers C. F. Hains, Jr. and D. M. Hains
2301 22nd Ave.
Northport, AL 35476
(205)-339-6536

Alabama Carbon, LLC Glade Preparation Plant P-3829 Revision R-8 Basin 006P Static

Number of cases to be analyzed 1

Case Number 1

Number of boundary lines= 4
Number of points on boundary lines are: 2 2 3 7

On boundary line no. 1 Point no. and coordinates are:
1 66.001 21.700 2 500.000 .000

On boundary line no. 2 Point no. and coordinates are:
1 200.000 15.500 2 263.428 12.329

On boundary line no. 3 Point no. and coordinates are:
1 66.001 22.200 2 200.000 15.500 3 216.750 22.200

On boundary line no. 4 Point no. and coordinates are:
1 66.001 22.200 2 216.750 22.200 3 221.750 24.200 4 233.750 24.200 5 258.246 14.402
6 263.428 12.329 7 500.000 .500

Line no. and slope of each segment are:
1 -.050
2 -.050
3 -.050 .400
4 .000 .400 .000 -.400 -.400 -.050

No. of radius control zones= 1 Plot or no plot= 1 No. of seepage cases= 1

Total no. of lines at bottom of radius control zones is: 1

For rad. cont. zone no. 1 Radius decrement= .000 No. of Circles= 5 Id no. for first circle=, 1
Line no.= 1 Begin pt. no.= 1 End pt. no.= 2

Soil no.	Cohesion	F. angle	Unit wt.
1	273.600	33.000	132.100
2	100.800	29.700	129.500
3	.000	.000	62.400

```
     Seismic coefficient=      .000     Min. depth of tallest slice=      .000
Unit weight of water=    62.400

     The factors of safety are determined by the SIMPLIFIED BISHOP method

     NSPG= 1  NSRCH= 0  No. of slices= 10  No. of add. radii= 2

     No. of points on water table for each case=   6

     Under seepage condition 1point no. and            coordinates of water
table are:
    1    66.001    22.200    2   216.750    22.200    3   234.985    19.337    4
258.246    14.402    5   263.428    12.329
    6   500.000      .500

 point1=(   235.000,    45.000) point2=(   235.000,    25.000) point3=(
264.000,    25.000) NJ=    2 NI=    2
     Automatic search will follow after grid with XINC=    10.000 and YINC=
10.000

 At point (   235.000,    45.000) under seepage    1,the radius and the
corresponding factor of safety are:
         31.710     5.989         29.536     5.361         27.361     5.742
25.187     6.649         23.012     9.446
         30.986     5.230         30.261     5.286         28.811     5.449
28.086     5.589
     Lowest factor of safety=     5.230 and occurs at radius  =     30.986


 At point (   235.000,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
         21.723     5.436         19.553     4.850         17.383     5.254
15.212     6.096         13.042     7.938
         20.999     4.771         20.276     4.791         18.829     4.942
18.106     5.077
     Lowest factor of safety=     4.771 and occurs at radius  =     20.999


 At point (   235.000,    25.000) under seepage    1,the radius and the
corresponding factor of safety are:
         11.735     6.291          9.630     5.975          7.524     6.423
5.418     6.820          3.313     6.918
         11.033     5.712         10.332     5.841          8.928     6.110
8.226     6.266
     Lowest factor of safety=     5.712 and occurs at radius  =     11.033


 At point (   249.500,    45.000) under seepage    1,the radius and the
corresponding factor of safety are:
         32.434     2.549         30.980     2.292         29.525     2.517
28.071     2.886         26.616     3.713
         31.950     2.188         31.465     2.237         30.495     2.352
30.010     2.428
     Lowest factor of safety=     2.188 and occurs at radius  =     31.950
```

```
 At point (   249.500,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
         22.447     2.474         21.133     2.198         19.819     2.450
18.505     2.949         17.191     4.061
         22.009     2.255         21.571     2.146         20.695     2.263
20.257     2.347
     Lowest factor of safety=     2.146 and occurs at radius  =     21.571


 At point (   249.500,    25.000) under seepage    1,the radius and the
corresponding factor of safety are:
         12.459     2.929         11.286     2.589         10.112     2.875
8.939     3.421          7.765     4.657
         12.068     2.723         11.677     2.522         10.895     2.672
10.504     2.767
     Lowest factor of safety=     2.522 and occurs at radius  =     11.677


 At point (   264.000,    45.000) under seepage    1,the radius and the
corresponding factor of safety are:
         33.159     3.603         32.636     2.693         32.114     3.260
31.591     4.368         31.069     7.517
         32.984     3.544         32.810     3.376         32.462     2.846
32.288     3.032
     Lowest factor of safety=     2.693 and occurs at radius  =     32.636


 At point (   264.000,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
         23.171     4.737         22.789     4.442         22.407     3.878
22.025     5.303         21.644     9.540
         22.662     3.354         22.535     3.591         22.280     4.233
22.153     4.690
     Lowest factor of safety=     3.354 and occurs at radius  =     22.662


 ****WARNING AT NEXT CENTER**** When radius is    12.701
 center of circle lies below ground line or circle does not intercept ground
line properly, or the circle cuts the slope
 very slightly, so a large factor of safety is assigned.

 At point (   264.000,    25.000) under seepage    1,the radius and the
corresponding factor of safety are:
         13.184     7.656         12.942     8.124         12.701**********
     Lowest factor of safety=     7.656 and occurs at radius  =     13.184



 For piezometric line No.    1

 At point (   249.500,    35.000) ,RADIUS    21.571
     the minimum factor of safety is      2.146
```

```
 At point (   249.500,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
         22.447     2.474         21.133     2.198         19.819     2.450
18.505     2.949         17.191     4.061
         22.009     2.255         21.571     2.146         20.695     2.263
20.257     2.347
     Lowest factor of safety=     2.146 and occurs at radius  =     21.571


 At point (   259.500,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
         22.946     2.950         22.275     2.424         21.604     2.874
20.933     3.771         20.262     6.256
         22.723     2.874         22.499     2.629         22.051     2.547
21.828     2.697
     Lowest factor of safety=     2.424 and occurs at radius  =     22.275


 At point (   239.500,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
         21.948     3.646         19.991     3.292         18.034     3.527
16.077     3.819         14.120     4.327
         21.295     3.211         20.643     3.241         19.338     3.357
18.686     3.440
     Lowest factor of safety=     3.211 and occurs at radius  =     21.295


 At point (   249.500,    45.000) under seepage    1,the radius and the
corresponding factor of safety are:
         32.434     2.549         30.980     2.292         29.525     2.517
28.071     2.886         26.616     3.713
         31.950     2.188         31.465     2.237         30.495     2.352
30.010     2.428
     Lowest factor of safety=     2.188 and occurs at radius  =     31.950


 At point (   249.500,    25.000) under seepage    1,the radius and the
corresponding factor of safety are:
         12.459     2.929         11.286     2.589         10.112     2.875
8.939     3.421          7.765     4.657
         12.068     2.723         11.677     2.522         10.895     2.672
10.504     2.767
     Lowest factor of safety=     2.522 and occurs at radius  =     11.677


 At point (   252.000,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
         22.572     2.430         21.418     2.166         20.265     2.481
19.112     3.058         17.959     4.368
         22.187     2.271         21.803     2.098         21.034     2.250
20.650     2.355
     Lowest factor of safety=     2.098 and occurs at radius  =     21.803


 At point (   254.500,    35.000) under seepage    1,the radius and the
corresponding factor of safety are:
```

```
         22.697     2.505          21.704     2.195          20.711     2.545
19.719     3.212          18.726     4.785
         22.366     2.374          22.035     2.118          21.373     2.289
21.042     2.406
     Lowest factor of safety=     2.118 and occurs at radius  =     22.035


 At point (   252.000,    37.500) under seepage    1,the radius and the
corresponding factor of safety are:
         25.069     2.395          23.880     2.135          22.692     2.432
21.503     2.996          20.315     4.263
         24.673     2.228          24.276     2.072          23.484     2.212
23.088     2.311
     Lowest factor of safety=     2.072 and occurs at radius  =     24.276


 At point (   252.000,    40.000) under seepage    1,the radius and the
corresponding factor of safety are:
         27.566     2.396          26.342     2.125          25.118     2.400
23.895     2.942          22.671     4.168
         27.158     2.211          26.750     2.070          25.934     2.197
25.526     2.289
     Lowest factor of safety=     2.070 and occurs at radius  =     26.750


 At point (   252.000,    42.500) under seepage    1,the radius and the
corresponding factor of safety are:
         30.062     2.412          28.804     2.142          27.545     2.395
26.286     2.886          25.028     4.080
         29.643     2.214          29.223     2.083          28.384     2.208
27.965     2.293
     Lowest factor of safety=     2.083 and occurs at radius  =     29.223


 At point (   254.500,    40.000) under seepage    1,the radius and the
corresponding factor of safety are:
         27.690     2.402          26.628     2.120          25.565     2.459
24.502     3.091          23.439     4.539
         27.336     2.256          26.982     2.047          26.273     2.213
25.919     2.325
     Lowest factor of safety=     2.047 and occurs at radius  =     26.982


 At point (   257.000,    40.000) under seepage    1,the radius and the
corresponding factor of safety are:
         27.815     2.510          26.913     2.196          26.011     2.564
25.109     3.297          24.207     5.048
         27.515     2.407          27.214     2.109          26.612     2.299
26.312     2.417
     Lowest factor of safety=     2.109 and occurs at radius  =     27.214


 At point (   254.500,    42.500) under seepage    1,the radius and the
corresponding factor of safety are:
         30.187     2.384          29.089     2.102          27.991     2.420
26.893     3.038          25.795     4.430
```

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        29.821     2.229         29.455     2.035         28.723     2.187
28.357     2.291
     Lowest factor of safety=     2.035 and occurs at radius  =     29.455


 At point (   254.500,    45.000) under seepage    1,the radius and the
corresponding factor of safety are:
        32.684     2.386         31.551     2.101         30.418     2.397
29.285     2.989         28.152     4.330
        32.306     2.224         31.929     2.040         31.173     2.180
30.796     2.279
     Lowest factor of safety=     2.040 and occurs at radius  =     31.929


 At point (   257.000,    42.500) under seepage    1,the radius and the
corresponding factor of safety are:
        30.312     2.453         29.375     2.165         28.438     2.526
27.500     3.234         26.563     4.906
        30.000     2.345         29.687     2.078         29.062     2.263
28.750     2.379
     Lowest factor of safety=     2.078 and occurs at radius  =     29.687


 At point (   252.000,    42.500) under seepage    1,the radius and the
corresponding factor of safety are:
        30.062     2.412         28.804     2.142         27.545     2.395
26.286     2.886         25.028     4.080
        29.643     2.214         29.223     2.083         28.384     2.208
27.965     2.293
     Lowest factor of safety=     2.083 and occurs at radius  =     29.223



 For piezometric line No.    1

 At point (   254.500,    42.500) ,RADIUS    29.455
     the minimum factor of safety is      2.035


1

Cross section in distorted scale. Numerals indicate boundary line no. If there
area more than 10 bound. lines, alphabets will then be used. P indicates
Piezometric line. If a portion of Piezometric line coincides with the ground or
another boundary line, only the ground or boundary line will be shown. X
indicates intersection of two boundary lines. * indicates failure surface.
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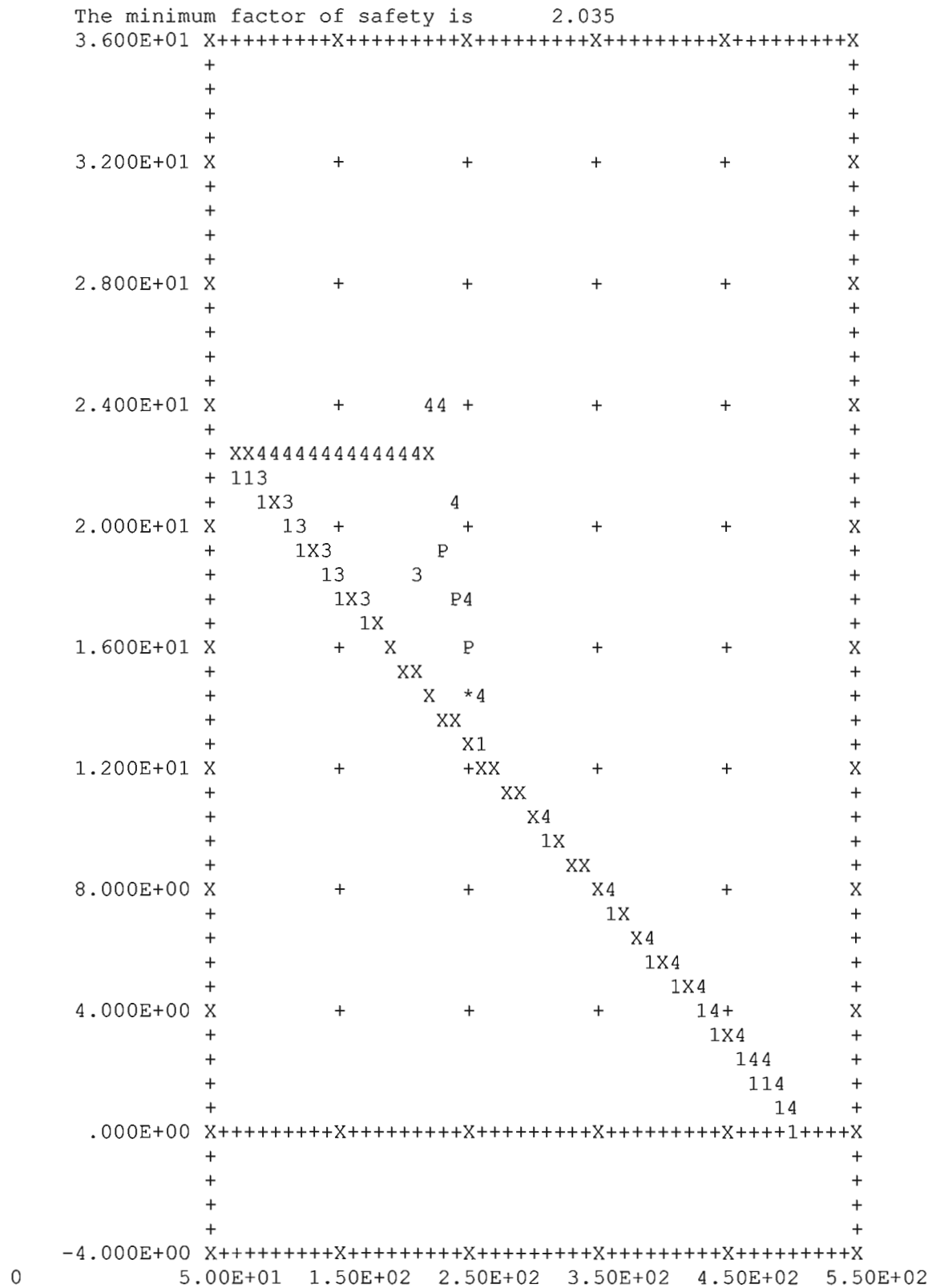
The minimum factor of safety is 2.035
3.600E+01
3.200E+01
2.800E+01
2.400E+01
2.000E+01
1.600E+01
1.200E+01
8.000E+00
4.000E+00
.000E+00
-4.000E+00
0
5.00E+01
1.50E+02
2.50E+02
3.50E+02
4.50E+02
5.50E+02