mcgehee engineering corp

April 30, 2010

Mr. Gary J. Heaton, PE
Alabama Surface Mining Commission
P. O. Box 2390
Jasper, AL 35502-2390

RE: **Quality Coal Co, Inc.**
Dutton Hill Mine, P-3920, R-1

Dear Mr. Heaton:

I, Sanford M. Hendon, a qualified registered professional engineer, hereby certify that the information, cross-sections, data, maps, etc., contained in the design of Primary Road No. 3 is true and accurate to the best of my knowledge and belief. I also certify that this design is in accordance with current, prudent mining engineering practices, and meets or exceeds the applicable parts of 880-X-8F-.17, 880-X-10C-.67, and 880-X-10C-.68 pertaining to the construction, use, and/or maintenance of primary roads.

If you have any questions or need additional information, please do not hesitate to contact our office.

Sincerely,

McGehee Engineering Corp.

ALABAMA REGISTERED No. 18208 PROFESSIONAL ENGINEER SANFORD M. HENDON

Sanford M. Hendon, P.E.
Alabama Reg. No. 118208

Post Office Box 3431 • 450 19th Street West • Jasper, Alabama 35502-3431 • 205-221-0686 • Fax 205-221-7721 • staff@mcgehee.org

QUALITY COAL CO., INC.

DUTTON HILL MINE, P-3920

DETAILED DESIGN FOR PRIMARY ROAD NO. 3

ATTACHMENT III-B-5 (a)

Prepared by:

McGehee Engineering Corp.
P. O. Box 3431
Jasper, Alabama 35502-3431
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INTRODUCTION

Primary Road No. 3 is approximately six thousand three hundred and fifty-eight (6,358) feet in length. Primary Road No. 3 will extend from the northwest end on Increment 1 and will cross Increment 2, 5 & 4 and will cross Rock Branch and tie into Pleasant Grove Road. The western end of the proposed road is an existing haul road from previous mining. Three culverts are proposed.

See attached **Primary Road Map** for the location of all primary roads.

See attached Plan/Profile for alignment and grades.

TRAFFIC CONTROL SIGNS

1. At the entrance of any primary road that accesses a public road, a speed limit sign, SPEED LIMIT 15 MPH, shall be installed.
2. At the exit of any primary road that tees into another road, a stop sign shall be installed to stop traffic before exiting that primary road.

DRAINAGE CONTROL STRUCTURES

DRAINAGE DITCHES

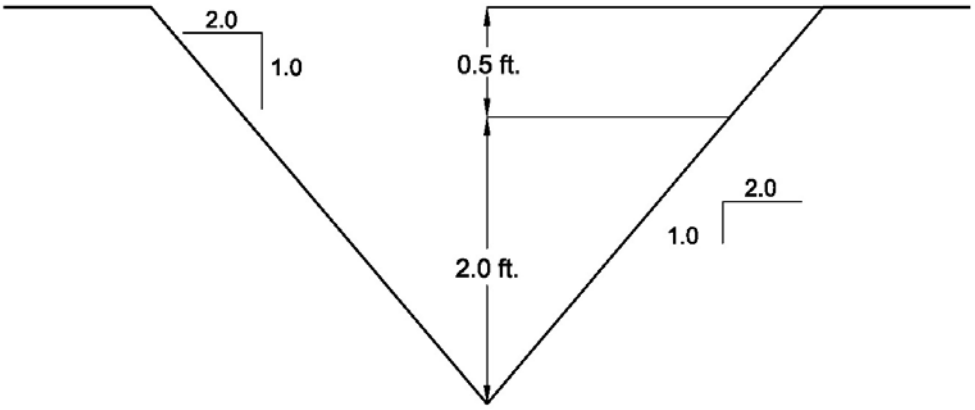
Due to the primary road drainage ditches having small drainage areas and an anticipated peak runoff of less than 3.0 C.F.S., one of the three (3) enclosed SEDCAD+ CHANNEL DESIGN TYPICAL ROAD DITCH will be more than adequate to safely pass the anticipated peak runoff from a 10-year, 6-hour precipitation event.

Drainage ditches will be located as dictated by field conditions. There are two options proposed for channel linings of the roadside ditches within these plans. See the three (3) SEDCAD+ CHANNEL DESIGN - TYPICAL ROAD DITCH cross-sections. The following Channels (configuration and lining) may be used in areas where the grades are within the range specified below:

CHANNEL DESCRIPTION	CHANNEL GRADE
Triangular - Grass lined	0.5% - 10.0%
Triangular - Rip-rap lined	10.0% - 15.0%

When rip-rap channel lining is necessary, the rip-rap shall be Class II rip-rap unless detail design calls for larger sizes. All rip-rap will be limestone or sandstone material. When a riprap liner is necessary, the entire section of each ditch to be lined with riprap will be underlain with Mirafi 500X or equivalent filter blanket. The location of all drainage ditches with respect to the primary road will be as shown on the enclosed Typical Drainage Ditch X-Section. All drainage ditches will be constructed as shown in the plans. Pertinent details on the main ditches and downdrains are shown on the following table.

TYPICAL ROAD DITCH 0.5% - 10.0%
VEGETATED CHANNEL CROSS-SECTION



CHANNEL TO BE VEGETATED WITH GRASS
MIXTURE, PREDOMINANTLY BERMUDA & FESCUE.

Discharge: 3.0 cfs
Limiting Velocity: 5.0 fps

	0.5 % Slope		10.0% Slope	
	STABILITY	CAPACITY	STABILITY	CAPACITY
Depth:	1.22 ft.	2.03 ft.	0.65 ft.	1.01 ft.
Depth w/ Freeboard:	1.72 ft.	2.53 ft.	1.15ft.	1.51 ft.
Top Width:	4.89 ft.	8.11 ft.	2.59 ft	4.03 ft.
Top Width w/Freeboard:	6.89 ft.	10.11 ft.	4.59 ft.	6.03 ft.
Velocity:	1.00 fps	0.36 fps	3.57 fps	1.48 fps
X-Section Area:	2.99 sq. ft.	8.23 sq. ft.	0.84 sq. ft.	2.03 sq. ft.
Hydraulic Radius:	0.546	0.907	0.29	0.451
Froude Number:	0.23	0.06	1.11	0.37
Roughness Coefficient:	0.0700	0.2706	0.0577	0.1873

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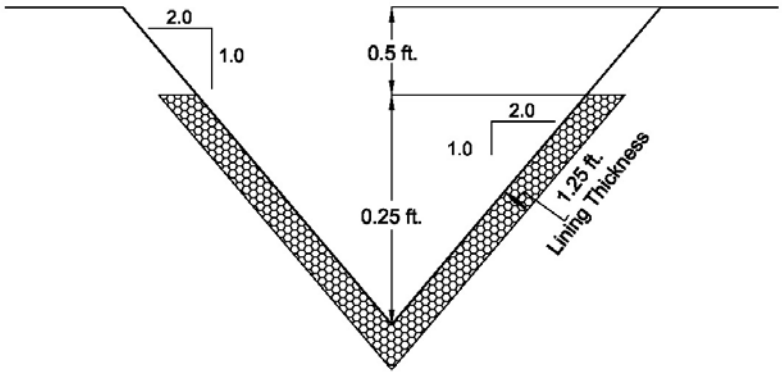
TYPICAL ROAD DITCH 10.0% - 15.0%
RIP-RAP CHANNEL CROSS-SECTION



CHANNEL TO BE LINED WITH CLASS 2 RIP-RAP
SANDSTONE OR LIMESTONE

SIMONS/OSM METHOD - Steep SLope Design
Design Discharge: 3.0 cfs

	10.0 %	15.0 %
Depth:	0.21 ft.	0.16 ft.
Depth w/ Freeboard:	0.71 ft.	0.66 ft.
Top Width:	0.82 ft.	0.64 ft.
Top Width w/Freeboard:	2.82 ft.	10.11 ft.
VELOCITY:	**	**
X-SECTION AREA:	0.08 sq. ft.	0.05 sq. ft.
HYDRAULIC RADIUS:	0.092	0.072
FROUDE NUMBER:	**	**
MANNING'S N:	**	**
Dmin:	4.00 in.	4.00 in.
D50:	12.00 in.	12.00 in.
Dmax:	15.00 in.	15.00 in.

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

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CULVERTS

Primary Road No. 3 proposes three culverts. These culverts are sufficient as is to carry the peak flow from a 10 year - 6 hour precipitation event.

PRIMARY ROAD NO. 3 - DRAINAGE CULVERT REQUIREMENTS

I.D. NO.	PIPE THICKNESS (Gauge)	PIPE DIA. (IN)	PIPE LENGTH (FT)	SLOPE %	MIN. EMBANKMENT (FT)	MAX. WATER (FT)	MIN. FREEBOARD (FT)
0+20	18	15	40	2.0	2.5	1.5	1.0
7+50	16	96	60	2.0	11.0	10.0	1.0
38+50	18	42	100	3.0	6.0	5.0	1.0

See the attached SedCad4 Runs for the drainage areas and peak flows for the culverts.

Culvert C-1 Station 0+20
Culvert C-2 Station 7+50
Culvert C-3 Station 38+50

See attached watershed maps for drainage areas.

Watershed Map Culvert C-1 & C-3

Watershed Map culvert C-2 (Rock Branch Crossing)

See **Drainage Culvert Cross-Section Sheet**.

POST MINING LAND USE

All primary roads will remain permanently for landowner access.

STABILITY ANALYSIS PROCEDURE

Primary Road No. 3 has a maximum fill of 18.7 feet near station 38+50 and a fill at station 7+50 of 11.0 feet. The fill over the culverts on Primary Road No. 3 will be constructed with on site soil material (SC soil type) and or spoil material. To be conservative spoil material was used in the stability analysis. The attached stability analysis shows the fill to meet the requirements of the regulations.

The computer program used to analyze the slope stability was the REAME Slope Stability Program as developed by Dr. Yang H. Huang, P.E. of the University of Kentucky.

SOIL PROPERTIES Primary Road No 3 Fill @ 7+50

USAGE	TYPE	COHESION (psf)	INTERNAL ANGLE OF FRICTION	EFFECTIVE DENSITY (pcf)
FOUNDATION	SC	100.00	27.92	133.52
ROAD FILL	Spoil	100.00	31.50	138.33

SOIL PROPERTIES Primary Road No 3 Fill @ 38+50

USAGE	TYPE	COHESION (psf)	INTERNAL ANGLE OF FRICTION	EFFECTIVE DENSITY (pcf)
FOUNDATION	SC	100.00	27.92	133.52
ROAD FILL	Spoil	100.00	31.50	138.33

ANALYSIS RESULTS

ROAD FILL	STATIC SAFETY FACTOR
PR – 3 Fill @ 7+50	2.172
PR – 3 Fill @ 38+50	1.840

STABILITY ANALYSIS - COMPUTER OUTPUT
PRIMARY ROAD NO. 3 @ 7+50 - STATIC

REAME
(Rotational Equilibrium Analysis of Multilayered Embankments)
Quality Coal Co., Inc. – Dutton Hill Mine P-3920
PRIMARY ROAD NO. 3 - MAX FILL @ 7+50

Number of boundary lines= 3
Number of points on boundary lines are: 2 2 6

On boundary line no. 1 Point no. and coordinates are:
1 200.000 351.000 2 800.000 339.000

On boundary line no. 2 Point no. and coordinates are:
1 500.000 347.000 2 564.600 345.700

On boundary line no. 3 Point no. and coordinates are:
1 200.000 353.000 2 500.000 347.000 3 522.000 358.000 4 540.000 358.000 5 564.600 345.700
6 800.000 341.000

Line no. and slope of each segment are:
1 -.020
2 -.020
3 -.020 .500 .000 -.500 -.020

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	100.000	27.920	133.520
2	100.000	31.500	138.330

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= 0 NSRCH= 1 No. of slices= 10 No. of add. radii= 4

No. of centers to be analyzed= 1

POINT=(500.000, 380.000) XINC= 10.000 YINC= 10.000

At point (500.000, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

34.993	2.415	33.898	2.310	32.802	2.182	31.707	2.459	30.611	3.534
33.679	2.294	33.459	2.278	33.240	2.258	33.021	2.215	32.583	2.215
32.364	2.257	32.145	2.309	31.926	2.374				

Lowest factor of safety= 2.182 and occurs at radius = 32.802

At point (510.000, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

35.193	2.636	33.163	2.746	31.133	2.719	29.104	2.784	27.074	3.241
32.757	2.737	32.351	2.730	31.945	2.724	31.539	2.720	30.727	2.721
30.321	2.728	29.915	2.739	29.510	2.757				

Lowest factor of safety= 2.636 and occurs at radius = 35.193

At point (490.000, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

34.793	16.273	34.393	7.253	33.993	75.238	33.593	98.313	33.193	167.852
34.713	18.253	34.633	20.942	34.553	24.800	34.473	6.275	34.313	8.721
34.233	11.140	34.153	15.914	34.073	29.654				

Lowest factor of safety= 6.275 and occurs at radius = 34.473

At point (500.000, 390.000) under seepage 1,the radius and the corresponding factor of safety are:

44.991	2.551	43.685	2.409	42.379	2.291	41.073	2.476	39.766	3.182
43.424	2.381	43.162	2.345	42.901	2.259	42.640	2.273	42.118	2.313
41.856	2.341	41.595	2.376	41.334	2.420				

Lowest factor of safety= 2.259 and occurs at radius = 42.901

At point (500.000, 370.000) under seepage 1,the radius and the corresponding factor of safety are:

24.995	2.508	24.110	2.501	23.226	2.541	22.341	2.775	21.456	4.093
24.818	2.504	24.641	2.501	24.464	2.500	24.287	2.499	23.933	2.505
23.757	2.511	23.580	2.522	23.403	2.533				

Lowest factor of safety= 2.499 and occurs at radius = 24.287

At point (502.500, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

35.043	2.343	33.714	2.226	32.385	2.207	31.056	2.367	29.727	3.118
33.448	2.207	33.182	2.182	32.917	2.183	32.651	2.193	32.119	2.224
31.853	2.247	31.588	2.277	31.322	2.316				

Lowest factor of safety= 2.182 and occurs at radius = 33.182

At point (497.500, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

34.943	2.654	34.081	2.624	33.219	2.656	32.358	2.750	31.496	4.119
34.771	2.644	34.598	2.635	34.426	2.629	34.254	2.626	33.909	2.624
33.737	2.629	33.564	2.638	33.392	2.644				

Lowest factor of safety= 2.624 and occurs at radius = 33.909

At point (500.000, 382.500) under seepage 1,the radius and the corresponding factor of safety are:

37.493	2.441	36.344	2.325	35.196	2.194	34.048	2.425	32.900	3.428
36.115	2.306	35.885	2.285	35.656	2.256	35.426	2.172	34.967	2.221
34.737	2.255	34.508	2.298	34.278	2.354				

Lowest factor of safety= 2.172 and occurs at radius = 35.426

At point (500.000, 385.000) under seepage 1,the radius and the corresponding factor of safety are:

39.992	2.473	38.791	2.348	37.590	2.218	36.390	2.423	35.189	3.273
38.551	2.326	38.311	2.302	38.071	2.260	37.831	2.198	37.350	2.243
37.110	2.274	36.870	2.313	36.630	2.361				

Lowest factor of safety= 2.198 and occurs at radius = 37.831

At point (502.500, 382.500) under seepage 1,the radius and the corresponding factor of safety are:

37.542	2.390	36.161	2.265	34.779	2.244	33.397	2.394	32.016	3.056
35.884	2.246	35.608	2.213	35.332	2.224	35.055	2.232	34.503	2.260
34.226	2.282	33.950	2.311	33.674	2.347				

Lowest factor of safety= 2.213 and occurs at radius = 35.608

****WARNING AT NEXT CENTER**** When radius is 35.431
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 (497.500, 382.500) under seepage 1,the radius and the corresponding factor of safety are:

37.443	2.621	36.528	2.564	35.614	2.533	34.699	2.660	33.785	3.953
36.345	2.557	36.162	2.555	35.979	2.549	35.796	2.545	35.431**********	
35.248	2.365	35.065	2.441	34.882	2.537				

Lowest factor of safety= 2.365 and occurs at radius = 35.248

At point (500.000, 382.500) ,RADIUS 35.426
the minimum factor of safety is 2.172

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.
The minimum factor of safety is 2.172

```
3.580E+02 X+++++++++X+++++++++X+++++++33X+++++++++X+++++++++X
          +                               +
          +                               +
          +                               +
          +                               +
3.560E+02 X        +        +        +       +        X
          +                               +
          +                               +
          +                               +
          +                               +
3.540E+02 X        +        +        +       +        X
          +                               +
          +                               +
          +      33                        +
          +       3             3          +
3.520E+02 X       +3       +        +       +        X
          +         3                      +
          +          3                     +
          +      11   33                     +
          +       1    3                    +
3.500E+02 X       +1    3  +        +       +        X
          +         1    3                  +
          +         11   3                  +
          +           1   33                +
          +           1    3                +
3.480E+02 X       +     1  +  3     +       +        X
          +             11   3              +
          +              1   3 *            +
          +              1   X2             +
          +              1    2             +
3.460E+02 X       +       +  11   2+       +        X
          +                1   X3           +
          +                1    3           +
          +                1    3           +
          +                1    3           +
3.440E+02 X       +       +       11   33  +        X
          +                    1    3       +
          +                    1    3       +
          +                    1    3       +
          +                    11   33      +
3.420E+02 X       +       +       +    1  + 3      X
          +                       1    3    +
          +                       1    3    +
          +                       11   3    +
          +                        1       +
3.400E+02 X       +       +       +       + 1      X
          +                        1     +
          +                        1     +
          +                        1     +
          +                               +
3.380E+02 X+++++++++X+++++++++X+++++++++X+++++++++X+++++++++X
0         8.00E+01  2.40E+02  4.00E+02  5.60E+02  7.20E+02  8.80E+02
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STABILITY ANALYSIS - COMPUTER OUTPUT
PRIMARY ROAD NO. 3 @ 38+50 - STATIC

REAME
(Rotational Equilibrium Analysis of Multilayered Embankments)
Quality Coal Co., Inc. – Dutton Hill Mine P-3920
PRIMARY ROAD NO. 3 - FILL @ 38+50

Number of boundary lines= 3
Number of points on boundary lines are: 2 2 6

On boundary line no. 1 Point no. and coordinates are:
1 200.000 351.000 2 800.000 339.000

On boundary line no. 2 Point no. and coordinates are:
1 498.800 347.000 2 596.700 345.100

On boundary line no. 3 Point no. and coordinates are:
1 200.000 353.000 2 498.800 347.000 3 536.200 365.700 4 555.400 365.700 5 596.700 345.100
6 800.000 341.000

Line no. and slope of each segment are:
1 -.020
2 -.019
3 -.020 .500 .000 -.499 -.020

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	100.000	27.920	133.520
2	100.000	31.500	138.330

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= 0 NSRCH= 1 No. of slices= 10 No. of add. radii= 4

No. of centers to be analyzed= 1

POINT=(500.000, 380.000) XINC= 10.000 YINC= 10.000

At point (500.000, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

34.993	2.110	33.790	2.080	32.588	2.096	31.385	2.386	30.182	3.344
34.752	2.101	34.512	2.094	34.271	2.087	34.031	2.084	33.550	2.076
33.309	2.074	33.069	2.057	32.828	2.063				

Lowest factor of safety= 2.057 and occurs at radius = 33.069

At point (510.000, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

35.193	1.920	33.056	1.973	30.919	1.959	28.782	2.055	26.644	2.528
32.628	1.966	32.201	1.961	31.774	1.957	31.346	1.956	30.491	1.965
30.064	1.977	29.636	1.995	29.209	2.021				

Lowest factor of safety= 1.920 and occurs at radius = 35.193

At point (520.000, 380.000) under seepage 1,the radius and the corresponding factor of safety are:

35.393	2.477	32.321	2.499	29.250	2.350	26.178	2.226	23.107	2.307

28.636 2.321 28.021 2.294 27.407 2.269 26.793 2.246 25.564 2.215
24.950 2.211 24.335 2.220 23.721 2.247
Lowest factor of safety= 2.211 and occurs at radius = 24.950

At point (510.000, 390.000) under seepage 1,the radius and the corresponding factor of safety are:
45.191 2.000 42.843 2.026 40.495 1.978 38.147 1.996 35.799 2.385
42.374 2.013 41.904 2.002 41.434 1.993 40.965 1.984 40.026 1.973
39.556 1.972 39.086 1.974 38.617 1.982
Lowest factor of safety= 1.972 and occurs at radius = 39.556

At point (510.000, 370.000) under seepage 1,the radius and the corresponding factor of safety are:
25.195 2.005 23.269 2.095 21.342 2.127 19.416 2.226 17.489 2.732
Lowest factor of safety= 2.005 and occurs at radius = 25.195

At point (512.500, 380.000) under seepage 1,the radius and the corresponding factor of safety are:
35.243 2.011 32.872 2.059 30.501 1.994 28.131 2.031 25.760 2.435
32.398 2.043 31.924 2.028 31.450 2.015 30.976 2.003 30.027 1.991
29.553 1.992 29.079 1.997 28.605 2.009
Lowest factor of safety= 1.991 and occurs at radius = 30.027

At point (507.500, 380.000) under seepage 1,the radius and the corresponding factor of safety are:
35.143 1.877 33.239 1.905 31.336 1.958 29.432 2.094 27.529 2.649
Lowest factor of safety= 1.877 and occurs at radius = 35.143

At point (505.000, 380.000) under seepage 1,the radius and the corresponding factor of safety are:
35.093 1.889 33.423 1.879 31.753 1.979 30.083 2.155 28.413 2.811
34.759 1.879 34.425 1.871 34.091 1.867 33.757 1.867 33.089 1.927
32.755 1.936 32.421 1.947 32.087 1.961
Lowest factor of safety= 1.867 and occurs at radius = 34.091

At point (502.500, 380.000) under seepage 1,the radius and the corresponding factor of safety are:
35.043 1.964 33.607 1.933 32.170 2.022 30.734 2.247 29.298 3.031
34.756 1.954 34.468 1.945 34.181 1.938 33.894 1.936 33.319 1.931
33.032 1.960 32.745 1.977 32.458 1.997
Lowest factor of safety= 1.931 and occurs at radius = 33.319

At point (505.000, 382.500) under seepage 1,the radius and the corresponding factor of safety are:
37.592 1.880 35.870 1.859 34.147 1.950 32.425 2.122 30.702 2.758
37.248 1.868 36.903 1.859 36.559 1.852 36.214 1.848 35.525 1.900
35.181 1.908 34.836 1.919 34.492 1.933
Lowest factor of safety= 1.848 and occurs at radius = 36.214

At point (505.000, 385.000) under seepage 1,the radius and the corresponding factor of safety are:
40.092 1.878 38.317 1.849 36.541 1.924 34.766 2.091 32.991 2.709
39.737 1.864 39.382 1.854 39.027 1.845 38.672 1.840 37.962 1.882
37.607 1.887 37.252 1.895 36.896 1.908
Lowest factor of safety= 1.840 and occurs at radius = 38.672

At point (505.000, 387.500) under seepage 1,the radius and the corresponding factor of safety are:
42.591 1.885 40.764 1.848 38.936 1.903 37.108 2.063 35.280 2.663
42.226 1.868 41.860 1.857 41.495 1.846 41.129 1.840 40.398 1.874
40.032 1.877 39.667 1.882 39.301 1.891

Lowest factor of safety= 1.840 and occurs at radius = 41.129

At point (505.000, 390.000) under seepage 1,the radius and the corresponding factor of safety are:

45.091	1.903	43.210	1.858	41.330	1.893	39.449	2.037	37.568	2.621
44.715	1.885	44.339	1.871	43.963	1.858	43.586	1.849	42.834	1.874
42.458	1.875	42.082	1.878	41.706	1.884				

Lowest factor of safety= 1.849 and occurs at radius = 43.586

At point (507.500, 387.500) under seepage 1,the radius and the corresponding factor of safety are:

42.641	1.915	40.580	1.925	38.518	1.910	36.457	2.008	34.395	2.526
40.168	1.918	39.755	1.912	39.343	1.908	38.931	1.907	38.106	1.917
37.694	1.928	37.281	1.945	36.869	1.971				

Lowest factor of safety= 1.907 and occurs at radius = 38.931

At point (502.500, 387.500) under seepage 1,the radius and the corresponding factor of safety are:

42.541	1.914	40.947	1.861	39.353	1.937	37.758	2.140	36.164	2.846
42.223	1.898	41.904	1.885	41.585	1.875	41.266	1.868	40.628	1.858
40.309	1.882	39.990	1.897	39.672	1.915				

Lowest factor of safety= 1.858 and occurs at radius = 40.628

At point (505.000, 387.500) ,RADIUS 41.129
the minimum factor of safety is 1.840

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.
The minimum factor of safety is 1.840

```
3.720E+02 X+++++++++X+++++++++X+++++++++X+++++++++X+++++++++X
          +                               +
          +                               +
          +                               +
          +                               +
3.680E+02 X       +       +       +       +       X
          +                               +
          +                               +
          +                    33           +
          +                               +
3.640E+02 X       +       +       +       +       X
          +                               +
          +                               +
          +                               +
          +                               +
3.600E+02 X       +       +       +       +       X
          +                    3           +
          +                               +
          +                               +
          +                               +
3.560E+02 X       +       +       +       +       X
          +                     3         +
          +                               +
          +                               +
          +     333             3             +
3.520E+02 X       +333    +       +       +       X
          +     111   33                      +
          +       11   333                    +
          +         111   33      *             +
          +           11   333                  +
3.480E+02 X       +     111   33   +       +       X
          +               11   X2               +
          +                111 *22              +
          +                  11  22            +
          +                    111 X33           +
3.440E+02 X       +       +       +11  333  +       X
          +                      111  33       +
          +                        11  333     +
          +                         111  33    +
          +                           11  3   +
3.400E+02 X       +       +       +       +  11    X
          +                             1   +
          +                               +
          +                               +
          +                               +
3.360E+02 X       +       +       +       +       X
          +                               +
          +                               +
          +                               +
          +                               +
3.320E+02 X+++++++++X+++++++++X+++++++++X+++++++++X+++++++++X
0         8.00E+01  2.40E+02  4.00E+02  5.60E+02  7.20E+02  8.80E+02
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DESIGN, CONSTRUCTION, MAINTENANCE, AND RECLAMATION SPECIFICATIONS FOR PRIMARY ROADS

1. LOCATION

A) Primary roads will be located on ridges or high areas or on the most stable available slopes so as to control and prevent erosion, siltation, flooding, and adverse impacts to fish and wildlife, or their habitat and related environmental values, to the extent possible.

B) No part of any primary road will be located in the channel of an intermittent or perennial stream without written approval from the Regulatory Authority, in accordance with 880-X-10C-.12 through 880-X-10C-.14 and 880-X-10C-.28.

C) If at all possible, all primary roads will be located upstream of sediment basins to prevent, control and minimize additional contributions of suspended solids to stream flow or runoff outside the permit area, the violation of applicable State or Federal water quality standards, seriously altering the normal flow of water in stream-beds or drainage channels, and damage to all public or private property.

D) In instances where it is not possible to locate primary roads in the above manner, sediment control will be achieved by the use of silt fences, rock check dams, hay bale berms, etc.

2. DESIGN REQUIREMENTS

A) Primary roads will be designed by or under the direct supervision of a qualified registered Professional Engineer experienced in the design and construction of roads, in accordance with the ASMC rules and regulations, and current, prudent engineering practices. No Primary Road grade will be steeper than seventeen (17) percent.

B) All primary roadway embankments will be designed and constructed to be stable under normal construction and operating conditions, with a minimum static safety factor of 1.3.

C) All primary roads will be designed, constructed, reconstructed and maintained to have adequate drainage control structures to safely pass the peak runoff anticipated from a 10 year, 6 hour precipitation event.

3. CONSTRUCTION REQUIREMENTS

A) The foundation area of the roadbed will be cleared and grubbed of all organic material and the topsoil will be removed. The disturbed area will be kept to the minimum necessary to accommodate the roadbed and/or associated drainage ditch construction.

B) The road construction material will be suitable subgrade material, free of sod, roots, stumps, etc., and will not contain rocks which exceed twelve (12) inches in diameter. The road construction material will be placed in layers (12 inch maximum thickness) and compacted to ninety five (95%) percent of the standard proctor density, as set forth in ASTM.

C) The minimum top width of primary roads will under no circumstance be less than eighteen (18) feet and will be of maximum width necessary to facilitate the largest equipment using the road.

D) All slopes (cut and fill) will be no steeper than 2 horizontal to 1 vertical, unless specified otherwise in the detailed design.

E) Roadbeds will be cut into consolidated, non-erodible material or will be surfaced with durable, non-toxic, non-acid forming material. In most instances, durable sandstone overburden material from the mine site will be used for surfacing material. In instances where durable sandstone overburden material from the site is not available or suitable, then durable, non-toxic, non-acid forming material, such as chert, crushed limestone, redrock, and/or crushed sandstone will be hauled in from off site, placed and compacted on the roadbed surface a minimum depth of four (4) inches.

F) Primary roads will be constructed with grades as shown on the Detailed Primary Road Design Plans. No Primary Road grade will be steeper than seventeen (17) percent.

4. DRAINAGE AND SEDIMENT CONTROL REQUIREMENTS

A) Primary roads will be constructed, reconstructed, and maintained to have adequate drainage control, using structures such as, but not limited to bridges, culverts, drainage pipes, ditches, cross drains, and ditch relief drains designed to safely pass the peak runoff anticipated from a 10 year, 6 hour precipitation event. All drainage control structures will be designed and constructed in such a manner whereas, to allow a free and operating conditions to prevent, control, and minimize erosion at the inlets and outlets.

B) Culverts and drainage pipes will be designed and installed to provide adequate support for the load of the largest equipment using the road. For design purposes, "H-20" (live load + impact) was used. All culverts or drainage pipes with diameters of forty-eight (48) inches or less will be covered with a minimum of one (1) foot and the maximum cover will not exceed fifty-seven (57) feet of desirable compacted material. All culverts or drainage pipes with diameters greater than forty- eight (48) inches will be covered with a minimum of two (2) feet and the maximum cover will not exceed forty-one (41) feet of

desirable compacted material. See Detailed Primary Road Design Plans for actual depth of material proposed above each culvert or drainage pipe.

C) Culverts and drainage pipes will be designed and installed to allow adequate freeboard to prevent overtopping of the embankment.

D) Drainage ditches, cross drains, and ditch relief drains will be constructed and maintained to prevent uncontrolled surface drainage over the road surface and roadway embankment.

E) Drainage ditches will be constructed with no sustained grades greater than five (5%) percent, unless unavoidable. If ditches must be constructed with grades in excess of five (5%) percent, drainage ditches will be lined as shown on the Primary Road Detailed Design Plans.

F) Sediment control will be achieved by the use of silt fences, rock check dams, hay bale berms, etc. in strategic locations, to prevent excessive siltation to the receiving streams.

G) Upon completion of construction of all roads, the side slopes of the roadway cut and fill sections, including all borrow areas formed in the construction, areas used for disposal of excess material, ditches, etc. will be seeded with a mixture of perennial and annual grasses, fertilized and mulched to prevent erosion and ensure restabilization. Grass mixtures will include, but not be limited to, fescue, bermuda, rye grass, browntop millet, clover and sericea.

5. INSPECTION AND MAINTENANCE REQUIREMENTS

A) Routine inspections and maintenance (such as regrading, resurfacing, maintenance of sediment control structures, spot replanting, and dust control) will be conducted regularly during the life of each road to assure that each road continually meets design and performance standards.

B) Dust control will be achieved by the periodic application of water, chemical binders and/or other dust suppressants.

C) Any road damaged by a catastrophic event, such as a flood, or earthquake, will be repaired as soon as it is practicable after the damage has occurred.

6. CERTIFICATION REQUIREMENTS

A) Primary roads will be designed by or under the direct supervision of a qualified registered Professional Engineer experienced in the design and construction of roads, in accordance with the ASMC rules and regulations, and current, prudent engineering practices. Each design will be certified by a registered Professional Engineer as being designed in

accordance with the Regulations of the Alabama Surface Mining Commission, Chapter 880-X-10.

B) Upon the completion of the construction of each section of the primary road, as set forth in the detailed design plans, the construction will be certified by a registered Professional Engineer, to the Alabama Surface Mining Commission, as being constructed in accordance with the approved detailed design plans.

C) In the event that a primary road is mined through in the mining process and must be reconstructed, the newly constructed primary road will be reconstructed to the minimum design criteria within the detailed design plans and the construction will be certified by a registered Professional Engineer, to the Alabama Surface Mining Commission, as being constructed in accordance with the approved detailed design plans.

7. REMOVAL AND RECLAMATION REQUIREMENTS

A) All primary roads which are not mined through and remain after the completion of mining may be left as permanent roads for landowner access, if there is no opposition by said landowner.

B) All primary roads which are not mined through and remain after the completion of mining which are not to be retained as permanent for landowner access will be removed and reclaimed in accordance with the approved grading and reclamation plans as soon as practicable after it is no longer needed for mining and reclamation purposes. This removal and reclamation will include:

1. Closing the road to traffic;

2. Removing all bridges, culverts, drainage pipes, and other drainage control structures, unless otherwise approved as part of the post mining land use;

3. Removing and/or otherwise disposing of road surfacing materials, that are not compatible with the post mining land use and revegetation requirements, onsite or removed and stored for re-use;

4. Reshaping and regrading cut and fill slopes as necessary to be compatible with the post mining land use and to compliment the natural drainage pattern of the surrounding terrain;

5. Protecting the natural drainage patterns by installing dikes or cross drains as necessary to control surface runoff and erosion;

6. Scarifying or ripping the roadbed, replacing topsoil or substitute material, and revegetating the entire disturbed area in accordance with the approved reclamation plan.

8. TYPICAL ROADBED CONFIGURATION

A) See attached **typical primary road drawing**, cross-sections, etc., for an illustration of the typical roadbed configurations.

See attached **Road Profiles**.