25.3 Provide complete calculations on spoil generation and disposal for the proposed permit area. Include a stability analysis to demonstrate that backfilled benches will meet a minimum static safety factor of 1.3. Submit this information as "Attachment 25.3.A".
See Attachment 25.3.A

25.4 Describe the measures to be used to seal or manage mine openings, exploration holes, auger holes, bore holes, wells and other openings within the proposed permit area. Provide design specifications for ensuring stability of each each permanent entry seal and down slope barrier. Include all maps, drawings, etc., required to adequately support the description of the proposed measures. Submit this information as "Attachment 25.4.A".
See Attachment 25.4.A.

26. Disposal of Excess Spoil

26.1 Are any excess spoil disposal structures proposed for use in the permit area? [XX] YES [ ] NO. If "YES", provide the following information for each proposed structure:

Facility I.D.	Type of Fill	Storage Volume	Type of Underdrain	Natural Ground Slope	Latitude	Longitude
#1	***Side Hill***	***222,368yd^3***	***N/A***	***0-27°***	***36-35-45***	***83-46-00***

26.2 Did construction of any of the above structures start prior to January 18, 1983? [ ] YES [XX] NO. If "YES", provide the information required by 405 KAR 8:030, or 8:040 Sections 25 for existing structures. Submit this information as "Attachment 26.2.A".

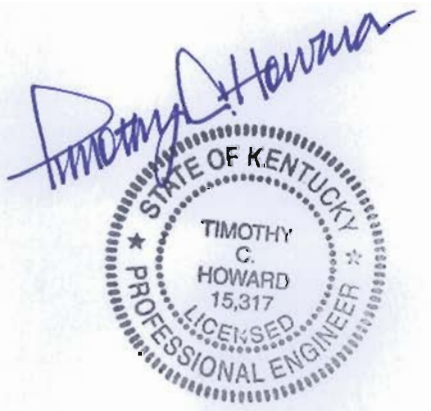
26.3 For each proposed excess spoil disposal structure provide a detailed plan (including, but not limited to, all engineering design calculations, cross-sections, maps and designs). Each plan shall meet the requirements of 405 KAR 8:030, Section 27; 405 KAR 8:040, Section 28; 405 KAR 16:130; and 405 KAR 18:130.
See Attachment 26.3.A

ATTACHMENT 25.3.A

SPOIL STORAGE AREA#1
SPOIL STORAGE CALCULATIONS

Station	Distance	Area Sq. Ft.	Avg. Area	Volume Cu. Yds.
0+00		6,090		
	232'		9,856.00	84,688.85
2+32		13,622		
	288'		12,907.50	137,680.00
5+20		12,193		
			Total	222,368.85

TOTAL STORAGE IN CUBIC YARDS 222,368.85



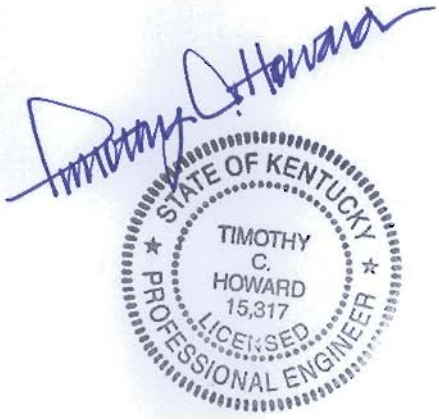
ATTACHMENT 25.3.A

SPOIL GENERATION CALCULATIONS

Station	Distance	Area Sq. Ft.	Avg. Area	Volume Cu. Yds.
3+00		11,289		
	100'		13,946.00	51,651.85
4+00		16,603		
	100'		18,655.00	69,092.59
5+00		20,707		
	100'		17,638.50	65,327.78
6+00		14,570		
			Total	186,072.22

TOTAL 186,072.22 cu.yds.
SWELL 20%
1.20 X 186,072.22 = 223,286.66 CU. YDS.

Total Spoil Yardage to Store 223,286.66 cubic yards



ATTACHMENT 25.3.A

BACKFILL MATERIAL CALCULATIONS

Station	Distance	Area Sq. Ft.	Avg. Area	Volume Cu. Yds.
3+00		11,381		
	100'		14,796.50	54,801.85
4+00		18,212		
	100'		20,876.00	77,318.52
5+00		23,522		
	100'		19,736.00	73,096.30
6+00		15,950		
			Total	205,216.67

TOTAL Backfill Material Required
205,216.67 CU YDS

Bell County Coal Corporation
#807-5223

ATTACHMENT 25.3.A

ALTERNATE TOPSOIL CALCULATIONS
REQUIRED MATERIAL FOR RECLAMATION

Facility Area	Acres	Area Sq. Ft.	Alt. Topsoil Thickness	Volume Cu. Yds.
Mine Face-Up	4.00	174,240.00	0.5	3,226.67
Ponds	2.00	87,120.00	0.5	1,613.33
Coal Stockpile	2.50			
-Permanent Roads	-0.35			
Coal Stockpile	2.15	93,654.00	0.5	1,734.33
Mine Management	6.00	261,360.00	0.5	0.00*
Total Material				6,574.33

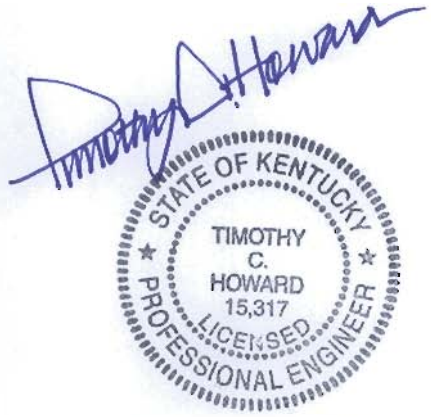
*= No alternate topsoil removed from this facility during this operation. Clean up and seeding and mulch only on this facility.

Bell County Coal Corporation
#807-5223, Comprehensive Application

ATTACHMENT 25.3.A

Total Cut Material Coal included	=	191,899.99 cu. yds.
Total Box Cut Mined	=	5,827.77 cu. yds.
Total Spoil Material Coal excluded	=	186,072.22 cu. yds.
Total Swell Material @ 20% swell	=	37,214.44 cu. yds.
Total Spoil Material + Swell of 20%	=	223,286.66 cu. yds.
Total Backfill Material Required	=	205.216.67 cu. yds.
Excess Spoil Material After Backfill	=	18,069.99 cu. yds.
Spoil Storage Area #1 Capacity	=	222,368.85 cu. yds.
Spoil Balance Difference	=	917.81 cu. yds

Spoil Balance Difference 0.00% of the total material generated during mining & reclamation operations.



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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2008 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                Howard Engineering and Geology, Inc.

INPUT FILE NAME  -C:\REAME2008\5223bfs2.DAT

TITLE -807-5223 Worst Case Backfill Stability Analysis Section 4+00

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR FAILURE SURFACES (NNS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )

ANALYSIS BY DETERMINISTIC METHOD   ( PROB = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 10
 1  X COORD.= 145.16        Y COORD.= 1278
 2  X COORD.= 165.16        Y COORD.= 1268
 3  X COORD.= 190.16        Y COORD.= 1268
 4  X COORD.= 191.83        Y COORD.= 1234
 5  X COORD.= 364.78        Y COORD.= 1234
 6  X COORD.= 366.3         Y COORD.= 1265
 7  X COORD.= 391.3         Y COORD.= 1265
 8  X COORD.= 393.8         Y COORD.= 1315
 9  X COORD.= 418.8         Y COORD.= 1315
 10 X COORD.= 421.3         Y COORD.= 1365

NO. OF POINTS ON BOUNDARY LINE 2 = 2
 1  X COORD.= 145.16        Y COORD.= 1278
 2  X COORD.= 421.3         Y COORD.= 1365

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1      -0.500       0.000      -20.359       0.000      20.395       0.000
        20.000       0.000       20.000
 2       0.315

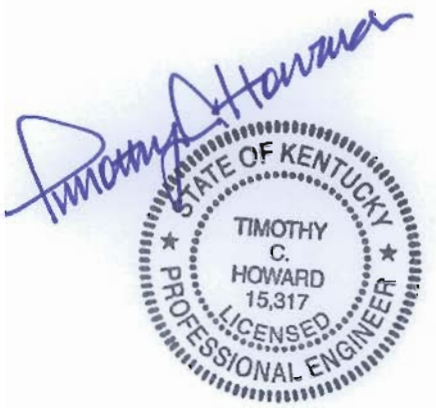
MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1                1               10

ENGLISH UNITS ARE USED WITH DISTANCE IN FEET AND FORCE IN POUND.

SOIL  ENVELOPE COHESION    FRIC. ANGLE     UNIT WEIGHTT
 No.    (TSSE)    (C)        (PHID)          (G)
  1       1   200.000         30.000        125.000

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
```

ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. = 100 Y COORD. = 1610
POINT 2 X COORD. = 100 Y COORD. = 1360
POINT 3 X COORD. = 300 Y COORD. = 1360

X INCREMENT (XINC) = 24 Y INCREMENT (YINC) = 24
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
100	1610	5	1	335.057	3.418	0
100	1560	5	1	285.593	4.371	0
100	1510	5	1	236.354	7.044	0
100	1460	4	1	187.519	23.831	0
100	1410	1	1	139.511	1000.000	0
100	1360	1	1	93.613	1000.000	0
150	1610	5	1	332.035	2.303	0
150	1560	5	1	282.042	2.383	0
150	1510	5	1	232.051	2.493	0
150	1460	5	1	182.064	2.654	0
150	1410	5	1	132.089	2.912	0
150	1360	5	1	82.143	3.391	0
200	1610	5	1	330.150	2.163	0
200	1560	5	1	287.283	2.183	0
200	1510	5	1	238.393	2.232	0
200	1460	5	1	190.083	2.304	0
200	1410	11	2	135.756	2.420	0
200	1360	11	8	81.747	2.655	0
250	1610	5	1	298.946	2.402	0
250	1560	5	1	259.555	2.254	0
250	1510	5	1	224.430	2.251	0
250	1460	11	9	171.672	2.334	0
250	1410	11	4	118.275	2.474	0
250	1360	11	10	65.619	2.796	0
300	1610	5	1	273.384	4.214	0
300	1560	5	1	229.649	2.910	0
300	1510	5	1	189.047	2.443	0
300	1460	5	1	154.074	2.370	0
300	1410	11	8	101.874	2.543	0
300	1360	8	5	46.152	3.033	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

100	1660	5	1	384.660	2.954	0
150	1660	5	1	382.031	2.243	0

200	1660	5	1	368.780	2.219	0
250	1660	5	1	341.129	2.747	0
300	1660	5	1	318.965	8.675	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	100.000	150.000	200.000	250.000	300.000
1660.000	2.954	2.243	2.219	2.747	8.675
1610.000	3.418	2.303	2.163	2.402	4.214
1560.000	4.371	2.383	2.183	2.254	2.910
1510.000	7.044	2.493	2.232	2.251	2.443
1460.000	23.831	2.654	2.304	2.334	2.370
1410.000	1000.000	2.912	2.420	2.474	2.543
1360.000	1000.000	3.391	2.655	2.796	3.033

ONLY ONE MINIMUM F.S. OF 2.163 EXISTS AT (200.000,1610.000)

AT POINT (200 1610) RADIUS 330.150
THE MINIMUM FACTOR OF SAFETY IS 2.163

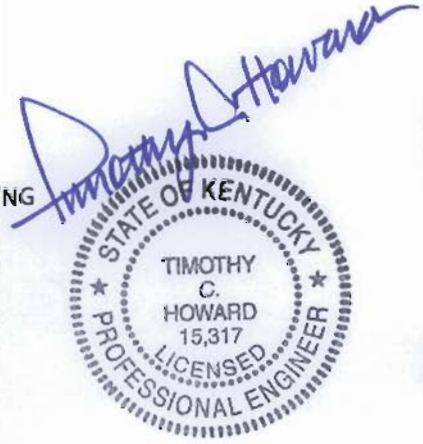
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
200	1610	5	1	330.150	2.163	0
224	1610	5	1	314.567	2.230	0
176	1610	5	1	333.429	2.182	0
200	1634	5	1	348.331	2.181	0
200	1586	5	1	312.753	2.163	0
200	1562	5	1	289.246	2.181	0
224	1586	5	1	296.257	2.200	0
176	1586	5	1	309.540	2.200	0
206	1586	5	1	308.537	2.168	0
194	1586	5	1	311.848	2.167	0
200	1592	5	1	317.022	2.161	0
200	1598	5	1	321.345	2.161	0
200	1604	5	1	325.722	2.162	0
206	1598	5	1	317.243	2.169	0
194	1598	5	1	323.706	2.158	0
188	1598	5	1	322.855	2.165	0
194	1604	5	1	329.638	2.154	0
194	1610	5	1	334.201	2.154	0
194	1616	5	1	338.624	2.156	0
200	1610	5	1	330.150	2.163	0
188	1610	5	1	334.753	2.157	0

AT POINT (194 1610) RADIUS 334.201

THE MINIMUM FACTOR OF SAFETY IS 2.154



SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	27.311	5.906	0.000	-.096	.202E+05	.192E+05	.551E+07	-.648E+06
2	1	27.311	16.027	0.000	-.014	.547E+05	.520E+05	.119E+08	-.265E+06
3	1	27.311	23.910	0.000	.067	.816E+05	.775E+05	.168E+08	.183E+07
4	1	27.311	29.543	0.000	.149	.101E+06	.958E+05	.201E+08	.502E+07
5	1	27.311	32.863	0.000	.231	.112E+06	.107E+06	.219E+08	.865E+07

6	1	27.311	33.755	0.000	.312	.115E+06	.109E+06	.220E+08	.120E+08
7	1	27.311	32.036	0.000	.394	.109E+06	.104E+06	.204E+08	.144E+08
8	1	27.311	27.431	0.000	.476	.936E+05	.890E+05	.172E+08	.149E+08
9	1	27.311	19.528	0.000	.558	.667E+05	.633E+05	.123E+08	.124E+08
10	1	27.311	7.693	0.000	.639	.263E+05	.249E+05	.608E+07	.561E+07
							SUM	.154E+09	.740E+08

AT CENTER (194.000 , 1610.000) WITH RADIUS 334.201 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 2.084
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 2.154

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

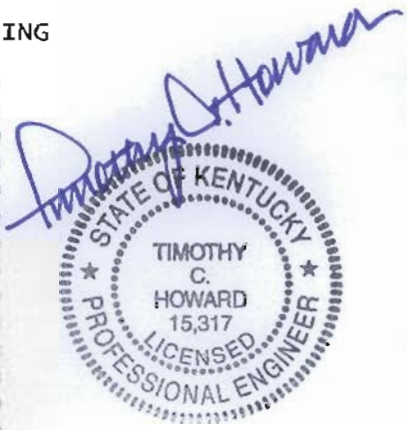
FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
100	1610	5	1	335.057	2.551	0
100	1560	5	1	285.593	3.274	0
100	1510	5	1	236.354	5.303	0
100	1460	4	1	187.519	18.046	0
100	1410	1	1	139.511	1000.000	0
100	1360	1	1	93.613	1000.000	0
150	1610	5	1	332.035	1.706	0
150	1560	5	1	282.042	1.766	0
150	1510	5	1	232.051	1.849	0
150	1460	5	1	182.064	1.972	0
150	1410	5	1	132.089	2.168	0
150	1360	5	1	82.143	2.531	0
200	1610	5	1	330.150	1.601	0
200	1560	5	1	287.283	1.616	0
200	1510	5	1	238.393	1.654	0
200	1460	5	1	190.083	1.710	0
200	1410	11	2	135.756	1.798	0
200	1360	11	8	81.747	1.977	0
250	1610	5	1	298.946	1.780	0
250	1560	5	1	259.555	1.669	0
250	1510	5	1	224.430	1.669	0
250	1460	11	9	171.672	1.732	0
250	1410	11	4	118.275	1.839	0
250	1360	11	10	65.619	2.086	0
300	1610	5	1	273.384	3.155	0
300	1560	5	1	229.649	2.166	0
300	1510	5	1	189.047	1.812	0
300	1460	5	1	154.074	1.759	0
300	1410	11	8	101.874	1.892	0
300	1360	8	5	46.152	2.266	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

100	1660	5	1	384.660	2.198	0
150	1660	5	1	382.031	1.660	0
200	1660	5	1	368.780	1.642	0
250	1660	5	1	341.129	2.042	0
300	1660	5	1	318.965	6.541	0



LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	100.000	150.000	200.000	250.000	300.000
1660.000	2.198	1.660	1.642	2.042	6.541
1610.000	2.551	1.706	1.601	1.780	3.155
1560.000	3.274	1.766	1.616	1.669	2.166
1510.000	5.303	1.849	1.654	1.669	1.812
1460.000	18.046	1.972	1.710	1.732	1.759
1410.000	1000.000	2.168	1.798	1.839	1.892
1360.000	1000.000	2.531	1.977	2.086	2.266

ONLY ONE MINIMUM F.S. OF 1.601 EXISTS AT (200.000,1610.000)

AT POINT (200 1610) RADIUS 330.150
THE MINIMUM FACTOR OF SAFETY IS 1.601

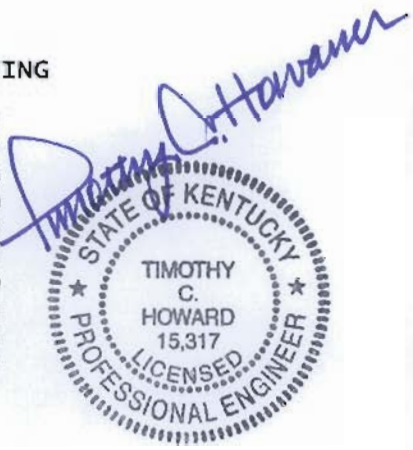
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
200	1610	5	1	330.150	1.601	0
224	1610	5	1	314.567	1.650	0
176	1610	5	1	333.429	1.614	0
200	1634	5	1	348.331	1.613	0
200	1586	5	1	312.753	1.601	0
206	1610	5	1	326.158	1.609	0
194	1610	5	1	334.201	1.594	0
188	1610	5	1	334.753	1.596	0
194	1616	5	1	338.624	1.595	0
194	1604	5	1	329.638	1.594	0

AT POINT (194 1610) RADIUS 334.201

THE MINIMUM FACTOR OF SAFETY IS 1.594

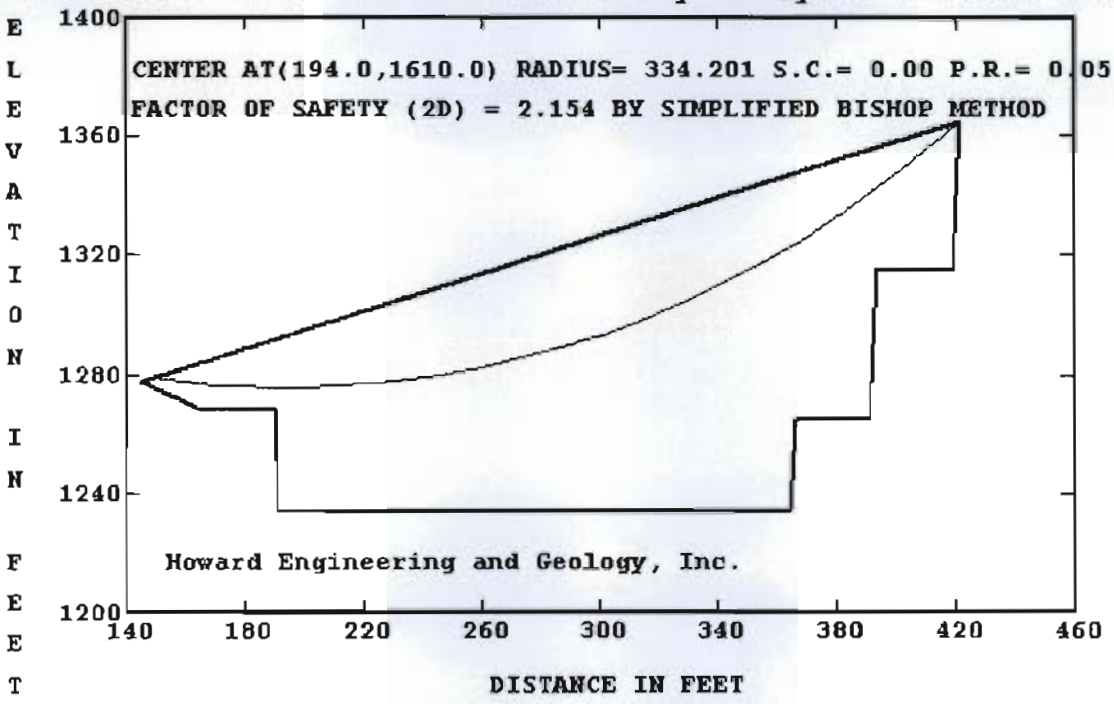


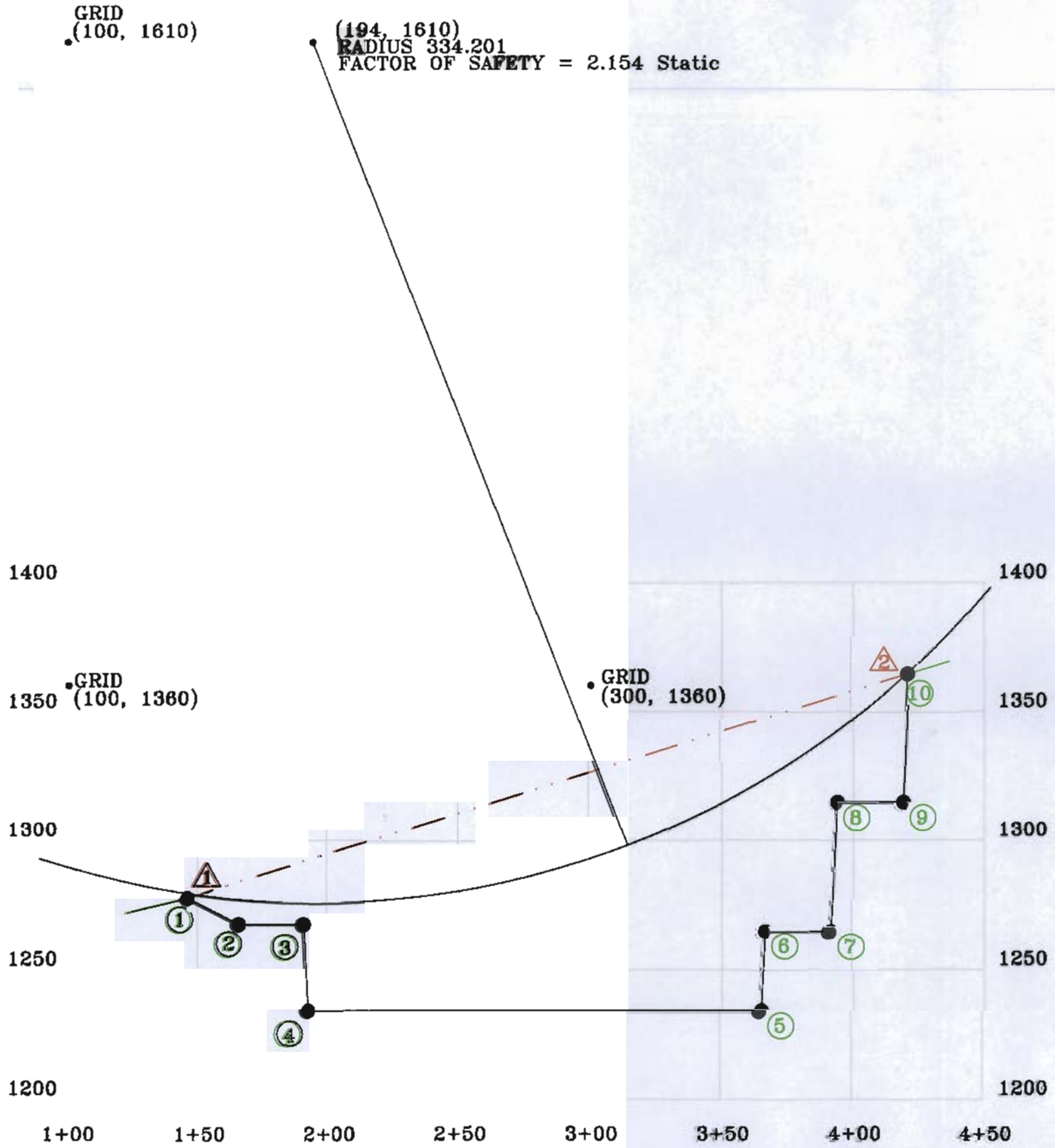
SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	27.311	5.906	0.000	-.096	.202E+05	.192E+05	.555E+07	.164E+05
2	1	27.311	16.027	0.000	-.014	.547E+05	.520E+05	.119E+08	.152E+07
3	1	27.311	23.910	0.000	.067	.816E+05	.775E+05	.167E+08	.446E+07
4	1	27.311	29.543	0.000	.149	.101E+06	.958E+05	.198E+08	.820E+07
5	1	27.311	32.863	0.000	.231	.112E+06	.107E+06	.214E+08	.121E+08
6	1	27.311	33.755	0.000	.312	.115E+06	.109E+06	.213E+08	.155E+08
7	1	27.311	32.036	0.000	.394	.109E+06	.104E+06	.196E+08	.176E+08
8	1	27.311	27.431	0.000	.476	.936E+05	.890E+05	.163E+08	.175E+08
9	1	27.311	19.528	0.000	.558	.667E+05	.633E+05	.116E+08	.142E+08
10	1	27.311	7.693	0.000	.639	.263E+05	.249E+05	.575E+07	.628E+07
							SUM	.150E+09	.974E+08

AT CENTER (194.000 , 1610.000) WITH RADIUS 334.201 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.539
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.594

807-5223 Worst Case Backfill Stability Analysis Section 4+00





4+00

Boundary Line ①

1. (145.16, 1278)
2. (165.16, 1268)
3. (190.16, 1268)
4. (191.83, 1234)
5. (364.78, 1234)
6. (366.30, 1265)
7. (391.30, 1265)
8. (393.80, 1315)
9. (418.80, 1315)
10. (421.30, 1365)

Boundary Line ②

1. (145.16, 1278)
2. (421.30, 1365)

I, Timothy C. Howard, P.E. No. 15,317

Date: 8/13/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit No. 807-5223
Worst Case Backfill Stability
Section 4+00
Attachment 25.2.A

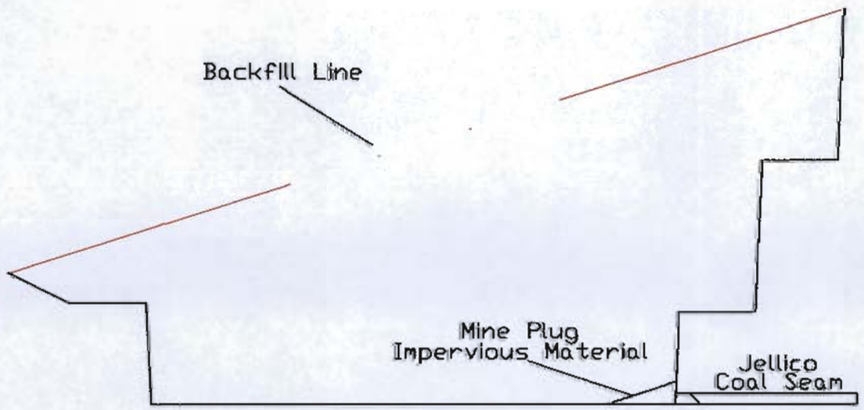
Scale: 1" = 50'

Page No. 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.

ATTACHMENT 25.4.A.

The deep mine openings will be plugged by backfilling with the most impervious spoil material available. The mine plugs will then be covered with the backfill material to fill in the hole that was created for the mine face-up area. The hole will be fill in completely and the natural ground configuration will be restored to the approximate configuration. As the coal seam is approximately 30 feet below drainage there will not be any possibility of a mine blow-out at this face-up area. Core drill holes will be grouted with cement to prevent possible inflows into ground water systems.



I, Timothy C. Howard, P.E. No. 15,317

Date: 6/2/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit No. 807-5223
Attachment 25.4, Mine Seal

Scale: 1" = 50'

Page No. 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.

ATTACHMENT 26.3.A.

The spoil material removed from the cut taken to form the mine face-up area will be stored in the spoil storage area. The spoil storage area is a flat area located next to the mine face-up area. The material will be stacked in the spoil storage area to an approximate height of 100'. A Fresh water diversion ditch has been designed to divert water from rainfall around the spoil storage area. The diversion ditch shall be constructed as indicated in the designs and will be placed at the locations shown on the MRP map. After mining, the necessary material will be removed to backfill the deep mine site as per the specifics contained in the backfilling & grading section of this application. The spoil material stored will be seeded with a verity of grasses to prevent erosion of the material. Cross-section of the proposed spoil storage area have been provided in this attachment. As this is a side hill fill with all water with the exception of water from direct rainfall diverted. The fill has been designed with-out a rock core drain. The proposed storage area is a temporary facility as stated on the certification of design.

CERTIFICATION OF DESIGN

I, Timothy C. Howard , 15,317 , 4/29/08 ,
(Signature) (Engineer's Seal) (Registration No.) (Date Certified)

hereby certify, in accordance with 405 KAR 7:040, Section 10, that the design of each of the following facilities, whose design is included in this application, Application # 807-5223 :

a) is in accordance with accepted engineering practices and recognized professional standards;
b) complies with the design requirements of KRS Chapter 350 and KAR Title 405; and
c) provided that the facility is properly constructed, operated and maintained, is adequate for the facility to meet the applicable performance standards of KRS Chapter 350 and KAR Title 405 insofar as such performance can reasonably be predicted by accepted engineering practices.

FACILITY TYPE: Temporary Excess Spoil Disposal Fill (Side Hill Fill #1)
(One facility type only)

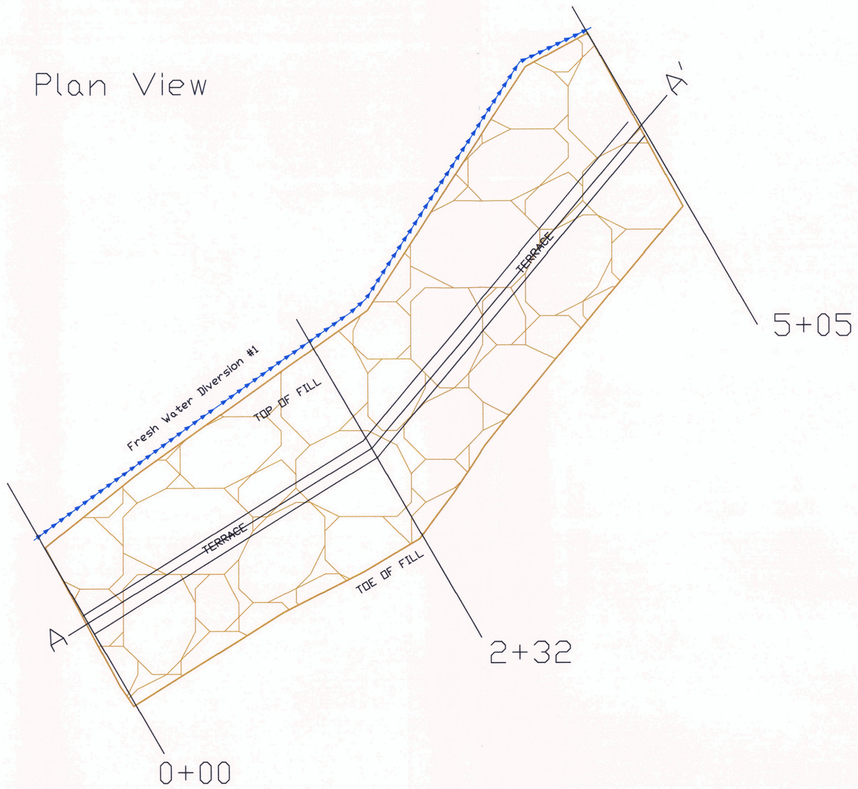
FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN	FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN
SS #1		04/28/08			

TYPES OF FACILITIES:

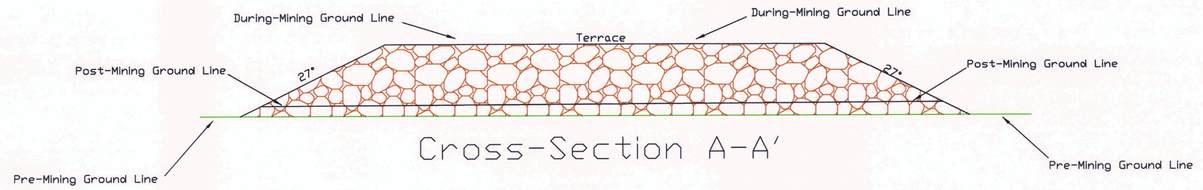
-- sedimentation pond
-- excess spoil disposal fill
-- temporary water impoundment
-- permanent water impoundment
-- coal processing waste impoundment
-- coal processing waste dam
-- coal processing waste bank
-- road
-- postmining land use plan
-- permanent ditches

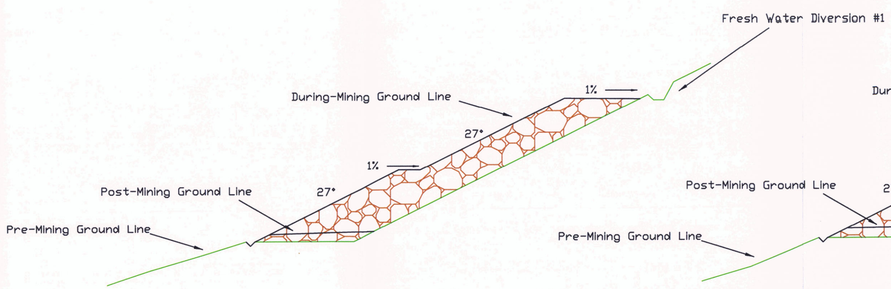
* Show hazard class, if applicable.

Plan View

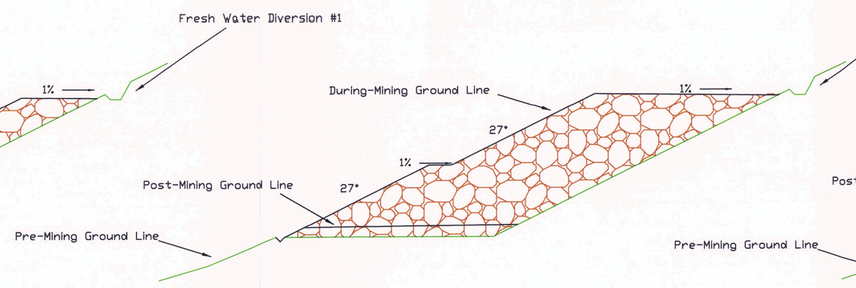


Cross-Section A-A'

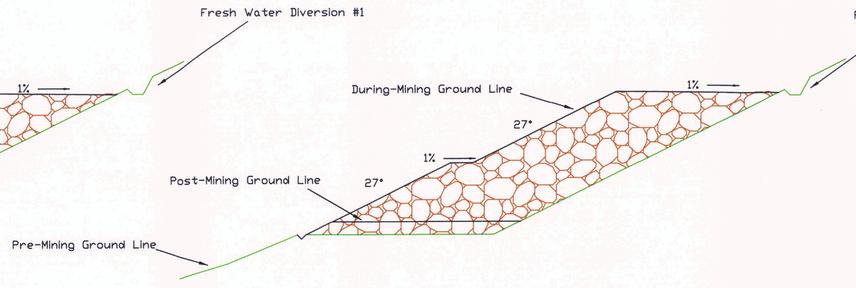




Section 0+00



Section 2+32



Section 5+05

I, Timothy C. Howard, P.E. No. 15,317

Date: 10/7/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY * TIMOTHY C. HOWARD 15317 LICENSED PROFESSIONAL ENGINEER *

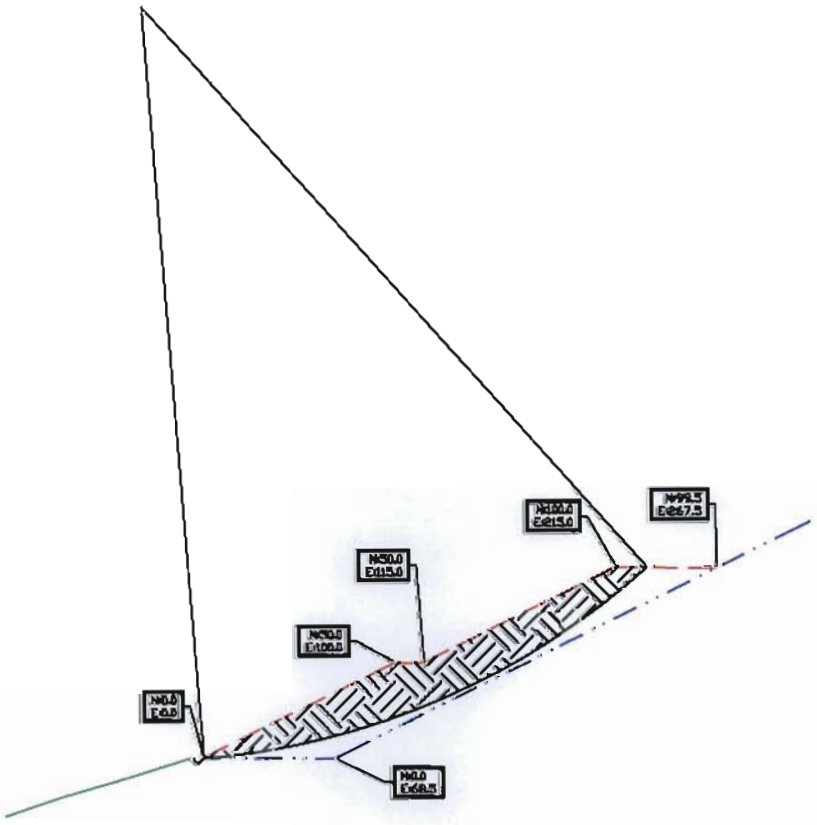
Bell County Coal Corporation

Permit No. 807-5223
Spoil Storage Area #1 Cross-Sections

Scale: 1" = 50' | **Page No.** 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.

Section 1
AT CENTER (-31.500 , 390.000) WITH RADIUS 391.270 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.520
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.544



STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

I, Timothy C. Howard, P.E. No. 15,317

Date: 4/24/08

hereby certify in accordance with 405 KAR 7:040, Section 10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

Bell County Coal Corporation

Permit No. 807-5223
Section 1
Backfilling & Grading Plan
Reame Drawing

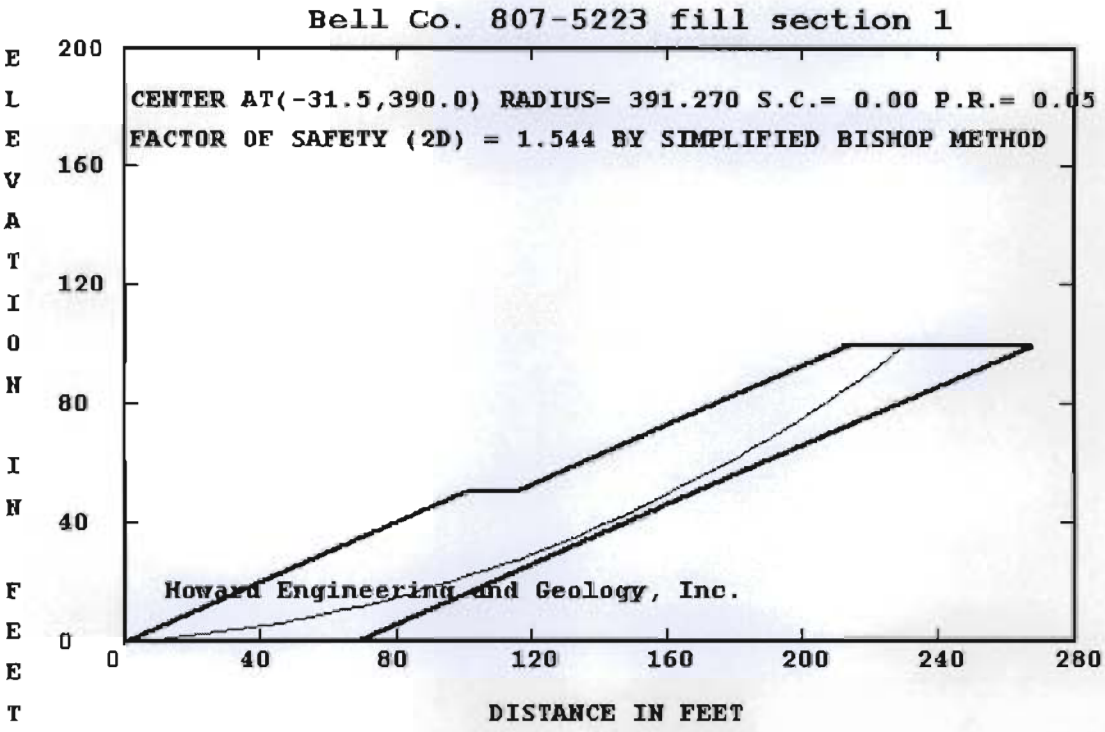
N
W E
S

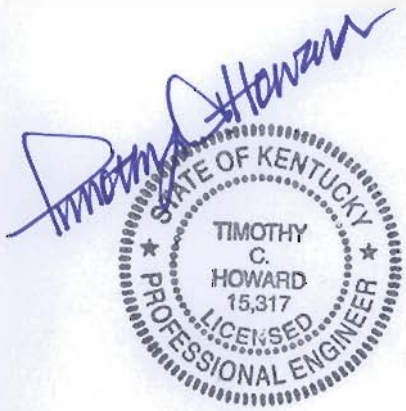
Prepared By:
HOWARD
Engineering and Geology, Inc.
P.O. Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831
(606) 573-8921 - howardeng@aol.com

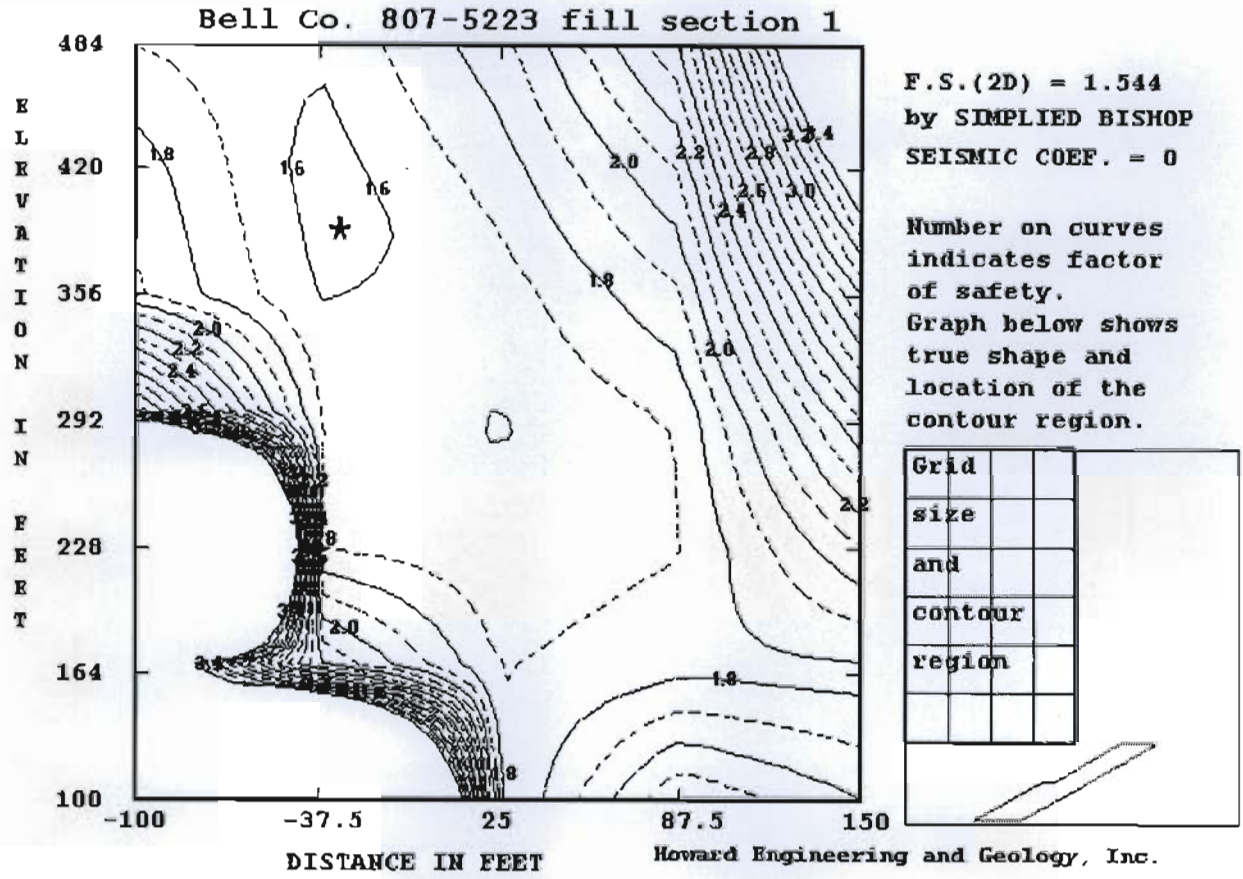
Scale: 1" = 100'

Attachment 25.3.A

DWG Full Path: W:\CLIENTS\BELLCO\Permits\807-5223\Completeness\Maps\Reame.dwg


Bell Co. 807-5223 fill section 1
CENTER AT(-31.5,390.0) RADIUS= 391.270 S.C.= 0.00 P.R.= 0.05
FACTOR OF SAFETY (2D) = 1.544 BY SIMPLIFIED BISHOP METHOD
Howard Engineering and Geology, Inc.
ELEVATION IN FEET
200
160
120
80
40
0
0
40
80
120
160
200
240
280
DISTANCE IN FEET


STATE OF KENTUCKY
TIMOTHY
C.
HOWARD
15,317
LICENSED
PROFESSIONAL ENGINEER



STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

```
REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2008 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                Howard Engineering and Geology, Inc.

INPUT FILE NAME  -C:\REAME2008\5223fill1.DAT

TITLE -807-5223 fill section 1

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR FAILURE SURFACES (NNS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )

ANALYSIS BY DETERMINISTIC METHOD   ( PROB = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 3
 1  X COORD.= 0              Y COORD.= 0
 2  X COORD.= 68.5           Y COORD.= 0
 3  X COORD.= 267.5          Y COORD.= 99.5

NO. OF POINTS ON BOUNDARY LINE 2 = 5
 1  X COORD.= 0              Y COORD.= 0
 2  X COORD.= 100            Y COORD.= 50
 3  X COORD.= 115            Y COORD.= 50
 4  X COORD.= 215            Y COORD.= 100
 5  X COORD.= 267.5          Y COORD.= 99.5

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.000       0.500
 2       0.500       0.000       0.500      -0.010

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

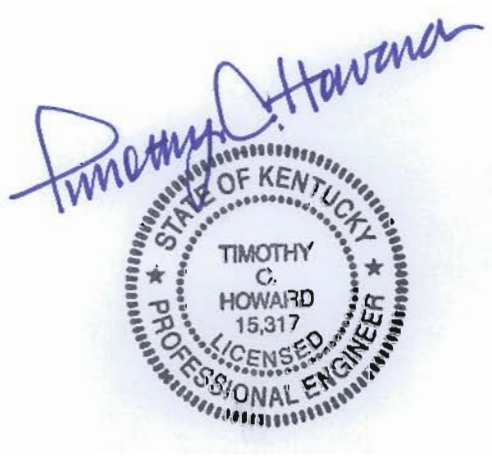
RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1                1               3

ENGLISH UNITS ARE USED WITH DISTANCE IN FEET AND FORCE IN POUND.

SOIL  ENVELOPE COHESION    FRIC. ANGLE     UNIT WEIGHTT
 No.    (TSSE)    (C)         (PHID)          (G)
  1       1   200.000         30.000         125.000

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05
```



NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-100 Y COORD. = 420
POINT 2 X COORD. =-100 Y COORD. = 100
POINT 3 X COORD. = 150 Y COORD. = 100

X INCREMENT (XINC) = 24 Y INCREMENT (YINC) = 24
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

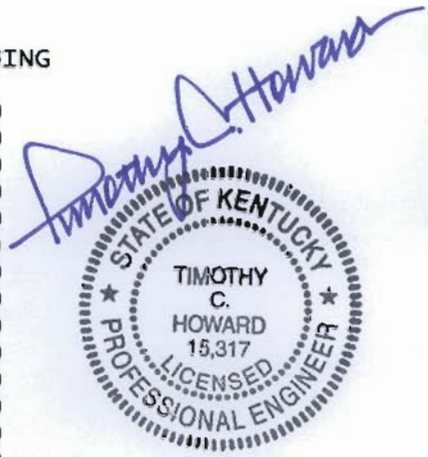
IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-100	420	5	1	431.741	1.852	0
-100	356	5	1	369.778	1.915	0
-100	292	5	1	308.649	3.044	0
-100	228	4	1	248.966	18.047	0
-100	164	1	1	192.083	1000.000	0
-100	100	1	1	141.421	1000.000	0
-37.5	420	5	1	421.671	1.549	0
-37.5	356	5	1	357.970	1.593	0
-37.5	292	5	1	294.398	1.705	0
-37.5	228	5	1	231.063	1.694	0
-37.5	164	5	1	168.233	2.256	0
-37.5	100	5	1	106.800	10.228	0
25	420	11	1	395.113	1.749	0
25	356	5	1	337.870	1.649	0
25	292	5	1	280.627	1.590	0
25	228	5	1	223.383	1.619	0
25	164	5	1	164.000	1.697	0
25	100	11	2	95.652	1.674	0
87.5	420	5	1	367.162	2.107	0
87.5	356	11	8	306.330	1.885	0
87.5	292	11	3	243.105	1.708	0
87.5	228	11	8	191.844	1.692	0
87.5	164	5	1	138.189	1.784	0
87.5	100	5	1	80.946	2.196	0
150	420	5	1	341.360	3.625	0
150	356	5	1	282.132	2.999	0
150	292	5	1	224.725	2.490	0
150	228	11	8	163.893	2.097	0
150	164	11	8	101.864	1.764	0
150	100	11	8	44.621	2.003	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-100	484	5	1	494.223	1.698	0
-37.5	484	5	1	480.307	1.615	0
25	484	11	3	442.788	1.862	0
87.5	484	5	1	424.547	2.391	0
150	484	5	1	402.053	4.333	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW



COORDINATE	-100.000	-37.500	25.000	87.500	150.000
484.000	1.698	1.615	1.862	2.391	4.333
420.000	1.852	1.549	1.749	2.107	3.625
356.000	1.915	1.593	1.649	1.885	2.999
292.000	3.044	1.705	1.590	1.708	2.490
228.000	18.047	1.694	1.619	1.692	2.097
164.000	1000.000	2.256	1.697	1.784	1.764
100.000	1000.000	10.228	1.674	2.196	2.003

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 4 CENTERS

FACTOR OF SAFETY = 1.549 AT (-37.500,420.000)
FACTOR OF SAFETY = 1.590 AT (25.000,292.000)
FACTOR OF SAFETY = 1.764 AT (150.000,164.000)
FACTOR OF SAFETY = 1.674 AT (25.000,100.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S.

AT POINT (-37.5 420) RADIUS 421.671
THE MINIMUM FACTOR OF SAFETY IS 1.549

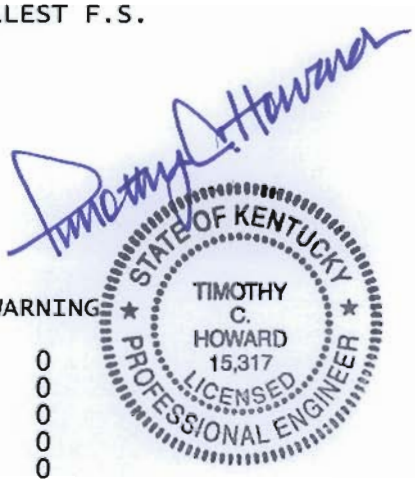
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-37.5	420	5	1	421.671	1.549	0
-13.5	420	5	1	412.331	1.608	0
-61.5	420	5	1	424.479	1.595	0
-37.5	444	5	1	444.530	1.568	0
-37.5	396	5	1	397.772	1.547	0
-37.5	372	5	1	373.885	1.565	0
-13.5	396	5	1	390.865	1.580	0
-61.5	396	5	1	400.747	1.646	0
-31.5	396	5	1	397.251	1.545	0
-25.5	396	5	1	396.231	1.551	0
-31.5	402	5	1	403.232	1.546	0
-31.5	390	5	1	391.270	1.544	0
-31.5	384	5	1	385.290	1.544	0
-25.5	390	5	1	390.833	1.546	0
-37.5	390	5	1	391.799	1.549	0

AT POINT (-31.5 390) RADIUS 391.270

THE MINIMUM FACTOR OF SAFETY IS 1.544



SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	23.100	4.669	0.000	.110	.135E+05	.128E+05	.469E+07	.580E+06
2	1	23.100	12.962	0.000	.169	.374E+05	.356E+05	.975E+07	.248E+07
3	1	23.100	19.830	0.000	.228	.573E+05	.544E+05	.138E+08	.511E+07
4	1	23.100	25.218	0.000	.287	.728E+05	.692E+05	.169E+08	.818E+07
5	1	7.602	27.944	0.000	.326	.266E+05	.252E+05	.602E+07	.339E+07
6	1	15.000	25.748	0.000	.355	.483E+05	.459E+05	.109E+08	.671E+07
7	1	0.498	22.832	0.000	.375	.142E+04	.135E+04	.325E+06	.208E+06
8	1	23.100	23.732	0.000	.405	.685E+05	.651E+05	.154E+08	.109E+08
9	1	23.100	24.123	0.000	.464	.697E+05	.662E+05	.153E+08	.127E+08

10	1	23.100	22.547	0.000	.523	.651E+05	.618E+05	.140E+08	.133E+08
11	1	23.100	18.759	0.000	.582	.542E+05	.515E+05	.117E+08	.123E+08
12	1	7.104	14.930	0.000	.621	.133E+05	.126E+05	.294E+07	.322E+07
13	1	15.995	7.116	0.000	.650	.142E+05	.135E+05	.397E+07	.362E+07
							SUM	.126E+09	.827E+08

AT CENTER (-31.500 , 390.000) WITH RADIUS 391.270 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.520
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.544

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

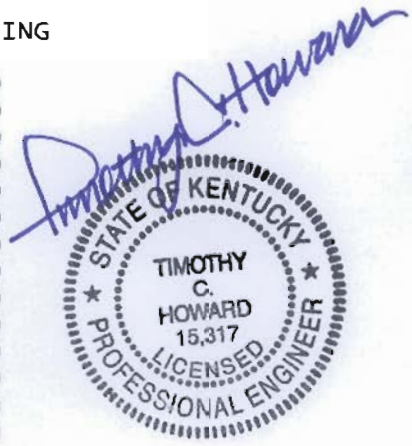
IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-100	420	5	1	431.741	1.464	0
-100	356	5	1	369.778	1.540	0
-100	292	5	1	308.649	2.489	0
-100	228	4	1	248.966	14.991	0
-100	164	1	1	192.083	1000.000	0
-100	100	1	1	141.421	1000.000	0
-37.5	420	5	1	421.671	1.215	0
-37.5	356	5	1	357.970	1.256	0
-37.5	292	5	1	294.398	1.343	0
-37.5	228	5	1	231.063	1.356	0
-37.5	164	5	1	168.233	1.832	0
-37.5	100	5	1	106.800	8.475	0
25	420	5	1	395.113	1.347	0
25	356	5	1	337.870	1.284	0
25	292	5	1	280.627	1.250	0
25	228	5	1	223.383	1.277	0
25	164	5	1	164.000	1.338	0
25	100	11	8	96.739	1.346	0
87.5	420	5	1	367.162	1.575	0
87.5	356	11	8	306.330	1.445	0
87.5	292	11	3	243.105	1.347	0
87.5	228	5	1	195.432	1.334	0
87.5	164	5	1	138.189	1.407	0
87.5	100	5	1	80.946	1.718	0
150	420	5	1	341.360	2.422	0
150	356	5	1	282.132	2.090	0
150	292	5	1	224.725	1.806	0
150	228	5	1	167.482	1.588	0
150	164	11	7	103.060	1.404	0
150	100	11	8	44.621	1.629	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-100	484	5	1	494.223	1.340	0
-37.5	484	5	1	480.307	1.256	0
25	484	11	1	452.357	1.428	0
87.5	484	5	1	424.547	1.749	0
150	484	5	1	402.053	2.773	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW



COORDINATE	-100.000	-37.500	25.000	87.500	150.000
484.000	1.340	1.256	1.428	1.749	2.773
420.000	1.464	1.215	1.347	1.575	2.422
356.000	1.540	1.256	1.284	1.445	2.090
292.000	2.489	1.343	1.250	1.347	1.806
228.000	14.991	1.356	1.277	1.334	1.588
164.000	1000.000	1.832	1.338	1.407	1.404
100.000	1000.000	8.475	1.346	1.718	1.629

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.215 AT (-37.500,420.000)
FACTOR OF SAFETY = 1.250 AT (25.000,292.000)
FACTOR OF SAFETY = 1.404 AT (150.000,164.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S.

AT POINT (-37.5 420) RADIUS 421.671
THE MINIMUM FACTOR OF SAFETY IS 1.215

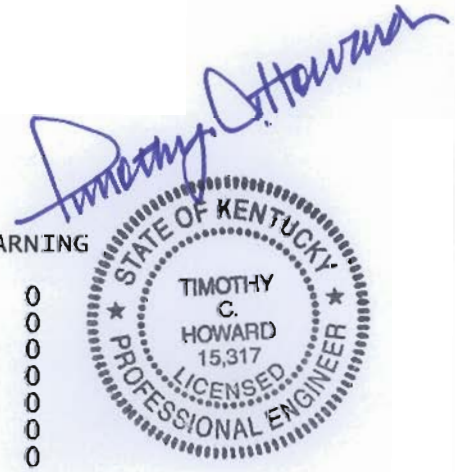
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-37.5	420	5	1	421.671	1.215	0
-13.5	420	5	1	412.331	1.253	0
-61.5	420	5	1	424.479	1.258	0
-37.5	444	5	1	444.530	1.226	0
-37.5	396	5	1	397.772	1.217	0
-31.5	420	5	1	420.381	1.221	0
-43.5	420	5	1	422.247	1.217	0
-37.5	426	5	1	427.647	1.216	0
-37.5	414	5	1	415.695	1.215	0
-37.5	408	5	1	409.720	1.215	0
-31.5	414	5	1	415.014	1.217	0
-43.5	414	5	1	416.279	1.218	0

AT POINT (-37.5 414) RADIUS 415.695

THE MINIMUM FACTOR OF SAFETY IS 1.215

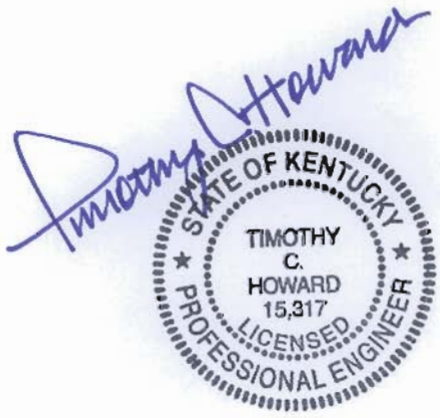


SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

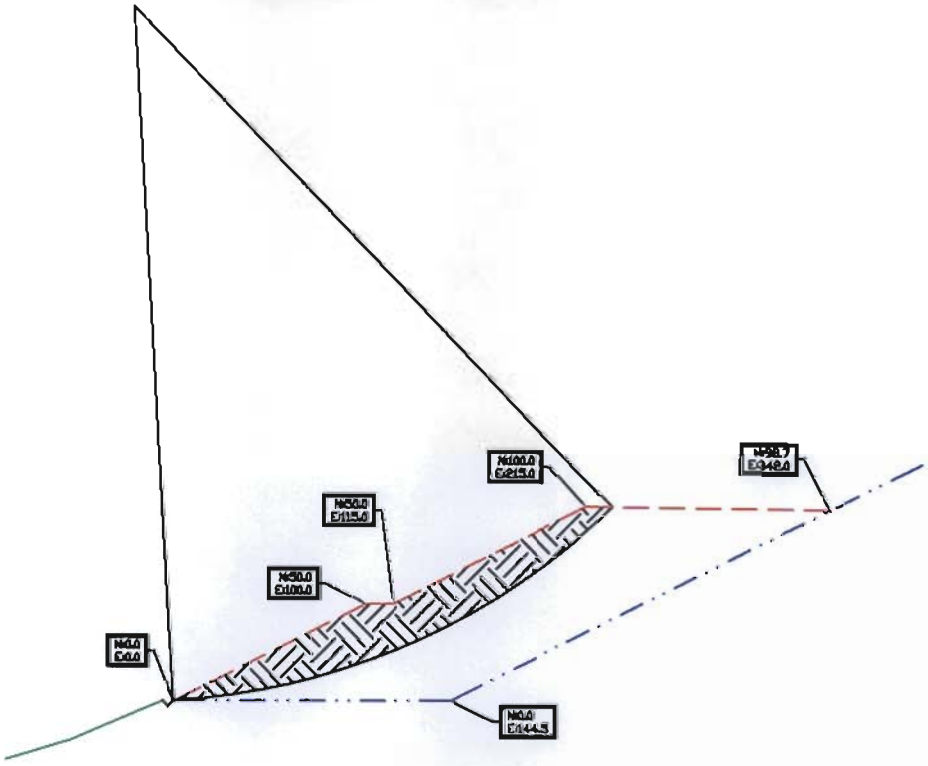
SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	23.469	4.636	0.000	.118	.136E+05	.129E+05	.501E+07	.123E+07
2	1	23.469	12.890	0.000	.175	.378E+05	.359E+05	.103E+08	.427E+07
3	1	23.469	19.753	0.000	.231	.579E+05	.551E+05	.145E+08	.786E+07
4	1	23.469	25.177	0.000	.288	.739E+05	.702E+05	.177E+08	.117E+08
5	1	6.123	27.825	0.000	.323	.213E+05	.202E+05	.497E+07	.367E+07
6	1	15.000	25.586	0.000	.349	.480E+05	.456E+05	.112E+08	.876E+07
7	1	2.346	22.834	0.000	.370	.670E+04	.636E+04	.157E+07	.128E+07
8	1	23.469	23.899	0.000	.401	.701E+05	.666E+05	.161E+08	.143E+08
9	1	23.469	24.482	0.000	.457	.718E+05	.682E+05	.160E+08	.162E+08
10	1	23.469	23.177	0.000	.514	.680E+05	.646E+05	.147E+08	.169E+08
11	1	23.469	19.768	0.000	.570	.580E+05	.551E+05	.124E+08	.157E+08
12	1	3.777	16.712	0.000	.603	.789E+04	.750E+04	.171E+07	.223E+07
13	1	19.692	8.361	0.000	.631	.206E+05	.196E+05	.544E+07	.605E+07

SUM .132E+09 .110E+09

AT CENTER (-37.500 , 414.000) WITH RADIUS 415.695 AND SEIS. COEFF. 0.10
FACTOR OF SAFETY BY NORMAL METHOD IS 1.196
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.215



Section 2
AT CENTER (-20.000 , 358.000) WITH RADIUS 358.558 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.513
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.542



STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

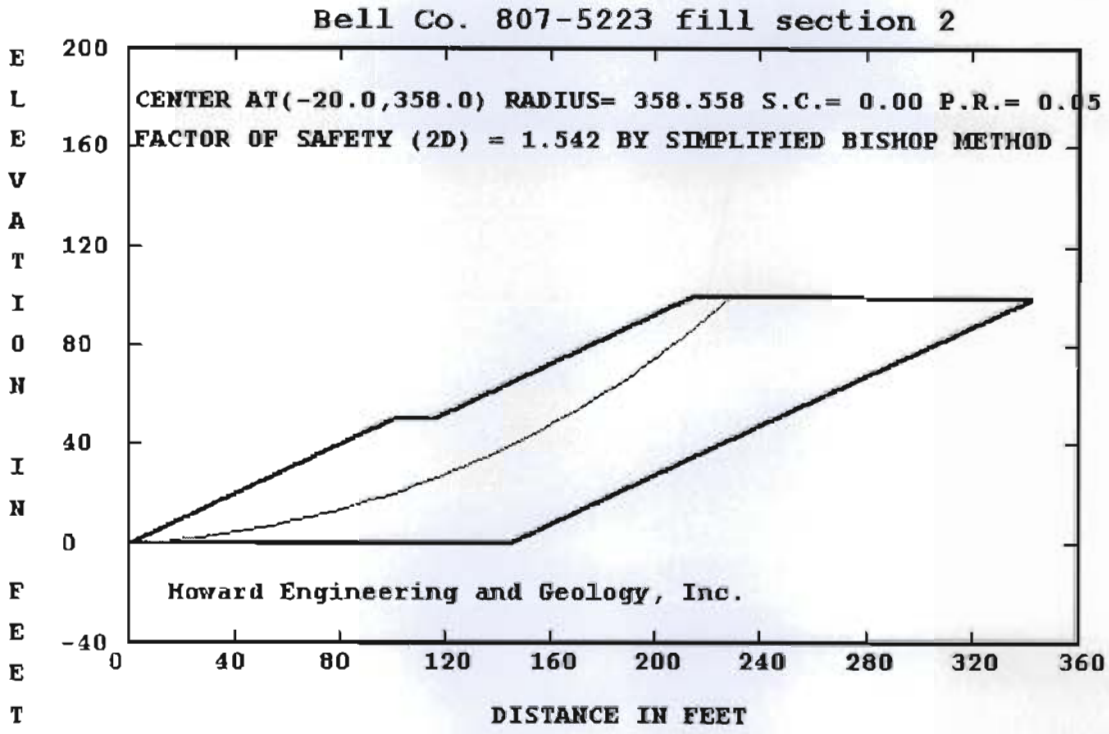
I, _____, P.E. No. 15,317

Date: 4/29/08

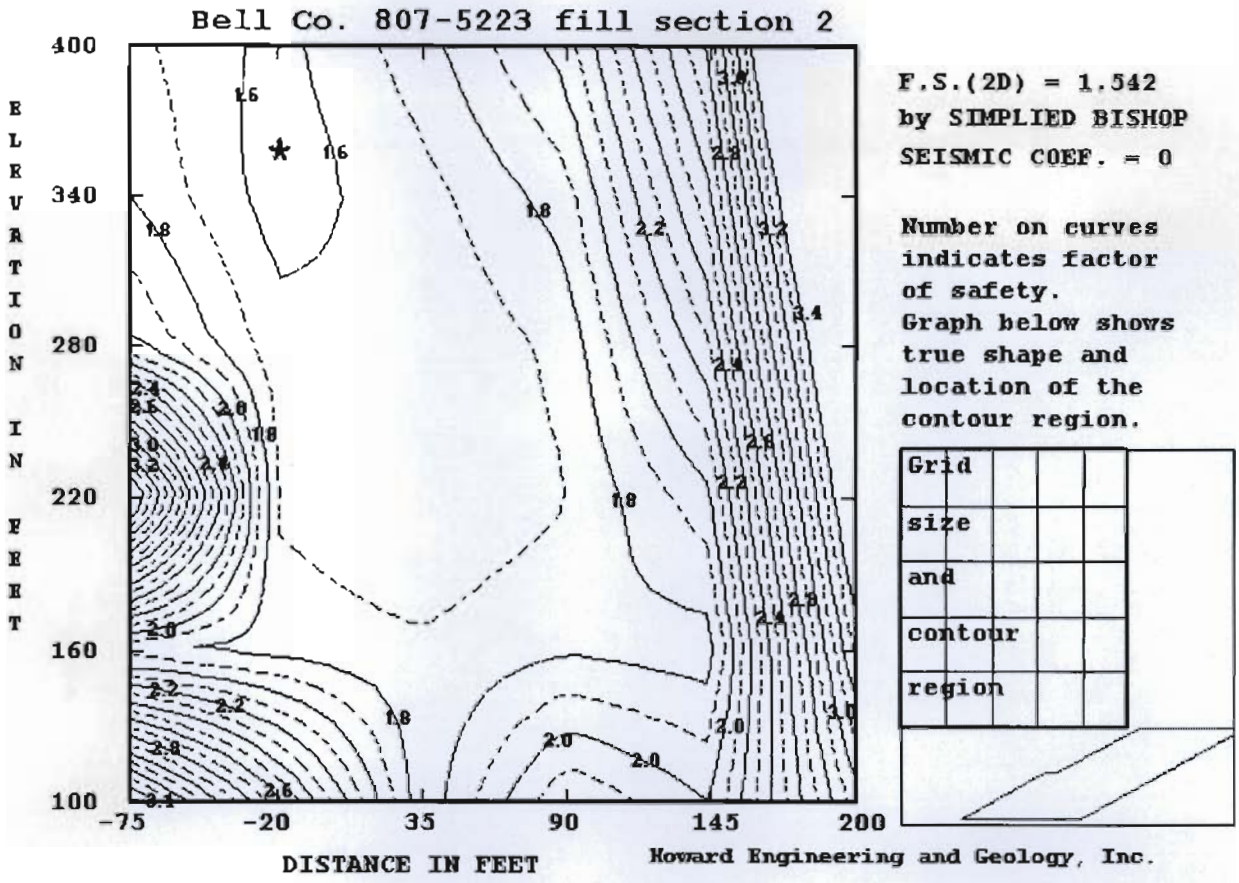
hereby certify in accordance with 405 KAR 7:040, Section 10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

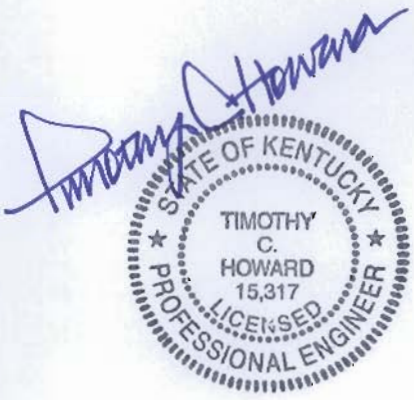
DWG FullPath: W:\CLIENTS\BELLCO\Permits\807-5223\Completeness\Backfill\Reame.dwg

Bell County Coal Corporation	
Permit No. 807-5223 Section 2 Backfilling & Grading Plan Reame Drawing	
N W E S	Prepared By: HOWARD Engineering and Geology, Inc. PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831 (606) 573-4924 - http://www.howardeng-geo.com/
	Scale: 1" = 100'
	Attachment 25.3.A



STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED PROFESSIONAL ENGINEER


Bell Co. 807-5223 fill section 2
ELEVATION IN FEET
400
340
280
220
160
100
-75
-20
35
90
145
200
DISTANCE IN FEET
F.S.(2D) = 1.542
by SIMPLIED BISHOP
SEISMIC COEF. = 0
Number on curves indicates factor of safety.
Graph below shows true shape and location of the contour region.
Grid size and contour region
Howard Engineering and Geology, Inc.


STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED
PROFESSIONAL ENGINEER

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2008 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                Howard Engineering and Geology, Inc.

INPUT FILE NAME  -C:\REAME2008\5223fill2.DAT

TITLE -807-5223 fill section 2

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR FAILURE SURFACES (NNS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )

ANALYSIS BY DETERMINISTIC METHOD    ( PROB = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 3
 1  X COORD.= 0              Y COORD.= 0
 2  X COORD.= 144.5          Y COORD.= 0
 3  X COORD.= 342            Y COORD.= 98.7

NO. OF POINTS ON BOUNDARY LINE 2 = 5
 1  X COORD.= 0              Y COORD.= 0
 2  X COORD.= 100            Y COORD.= 50
 3  X COORD.= 115            Y COORD.= 50
 4  X COORD.= 215            Y COORD.= 100
 5  X COORD.= 342            Y COORD.= 98.7

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.000       0.500
 2       0.500       0.000       0.500      -0.010

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

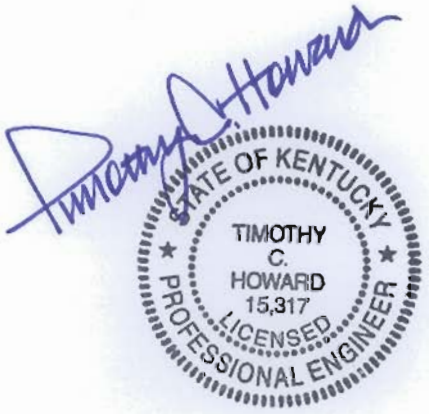
RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1                1               3

ENGLISH UNITS ARE USED WITH DISTANCE IN FEET AND FORCE IN POUND.

SOIL  ENVELOPE COHESION     FRIC. ANGLE      UNIT WEIGHTT
 No.    (TSSE)     (C)          (PHID)           (G)
  1       1   200.000          30.000          125.000

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05
```



NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-20 Y COORD. = 400
POINT 2 X COORD. =-20 Y COORD. = 100
POINT 3 X COORD. = 200 Y COORD. = 100

X INCREMENT (XINC) = 24 Y INCREMENT (YINC) = 24
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	400	5	1	400.500	1.564	0
-20	340	5	1	340.588	1.549	0
-20	280	5	1	280.713	1.640	0
-20	220	5	1	220.907	1.686	0
-20	160	5	1	161.245	1.753	0
-20	100	5	1	101.980	2.648	0
35	400	11	7	374.413	1.758	0
35	340	11	9	319.822	1.662	0
35	280	11	9	269.752	1.600	0
35	220	5	1	220.000	1.608	0
35	160	5	1	160.000	1.716	0
35	100	11	3	89.516	1.728	0
90	400	11	8	350.727	2.047	0
90	340	11	9	290.842	1.852	0
90	280	8	5	228.485	1.730	0
90	220	11	9	183.101	1.694	0
90	160	11	3	139.827	1.785	0
90	100	11	10	85.297	2.198	0
145	400	11	8	350.155	2.831	0
145	340	11	6	290.434	2.582	0
145	280	11	7	221.687	2.295	0
145	220	11	10	156.016	1.970	0
145	160	8	5	96.556	1.744	0
145	100	8	5	42.890	1.997	0
200	400	5	1	333.085	4.884	0
200	340	5	1	279.326	4.352	0
200	280	5	1	225.655	3.949	0
200	220	5	1	171.984	3.661	0
200	160	11	8	87.256	3.336	0
200	100	8	5	18.295	2.955	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-75	400	5	1	406.971	1.728	0
-75	340	5	1	348.174	1.798	0
-75	280	5	1	289.871	2.008	0
-75	220	5	1	232.433	3.632	0
-75	160	1	1	176.706	1000.000	0
-75	100	1	1	125.000	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-75.000	-20.000	35.000	90.000	145.000	200.000
400.000	1.728	1.564	1.758	2.047	2.831	4.884
340.000	1.798	1.549	1.662	1.852	2.582	4.352
280.000	2.008	1.640	1.600	1.730	2.295	3.949
220.000	3.632	1.686	1.608	1.694	1.970	3.661
160.000	1000.000	1.753	1.716	1.785	1.744	3.336
100.000	1000.000	2.648	1.728	2.198	1.997	2.955

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.549 AT (-20.000,340.000)
FACTOR OF SAFETY = 1.600 AT (35.000,280.000)
FACTOR OF SAFETY = 1.744 AT (145.000,160.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S.

AT POINT (-20 340) RADIUS 340.588
THE MINIMUM FACTOR OF SAFETY IS 1.549

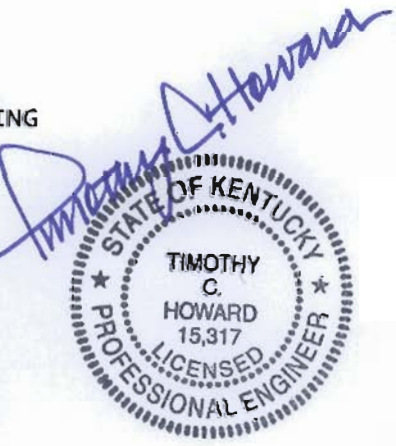
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	340	5	1	340.588	1.549	0
4	340	5	1	340.000	1.571	0
-44	340	5	1	342.835	1.657	0
-20	364	5	1	364.549	1.542	0
-20	388	5	1	388.515	1.553	0
4	364	11	2	356.870	1.592	0
-44	364	5	1	366.650	1.611	0
-14	364	5	1	364.269	1.547	0
-26	364	5	1	364.927	1.545	0
-20	370	5	1	370.540	1.544	0
-20	358	5	1	358.558	1.542	0
-20	352	5	1	352.568	1.543	0
-14	358	5	1	358.274	1.545	0
-26	358	5	1	358.943	1.548	0

AT POINT (-20 358) RADIUS 358.558

THE MINIMUM FACTOR OF SAFETY IS 1.542



SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	22.885	4.898	0.000	.088	.140E+05	.133E+05	.439E+07	.441E+06
2	1	22.885	13.582	0.000	.152	.389E+05	.369E+05	.921E+07	.211E+07
3	1	22.885	20.752	0.000	.215	.594E+05	.564E+05	.131E+08	.458E+07
4	1	22.885	26.352	0.000	.279	.754E+05	.716E+05	.159E+08	.755E+07
5	1	8.460	29.239	0.000	.323	.309E+05	.294E+05	.640E+07	.358E+07
6	1	14.426	27.233	0.000	.355	.491E+05	.467E+05	.101E+08	.625E+07
7	1	0.575	24.290	0.000	.376	.174E+04	.166E+04	.362E+06	.235E+06
8	1	22.311	24.996	0.000	.408	.697E+05	.662E+05	.143E+08	.102E+08
9	1	22.885	25.241	0.000	.471	.722E+05	.686E+05	.144E+08	.122E+08
10	1	22.885	23.368	0.000	.534	.668E+05	.635E+05	.131E+08	.128E+08
11	1	22.885	19.066	0.000	.598	.545E+05	.518E+05	.106E+08	.117E+08

12	1	9.034	14.408	0.000	.643	.163E+05	.155E+05	.330E+07	.375E+07
13	1	13.851	6.572	0.000	.675	.114E+05	.108E+05	.300E+07	.275E+07
							SUM	.118E+09	.781E+08

AT CENTER (-20.000 , 358.000) WITH RADIUS 358.558 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.513
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.542

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

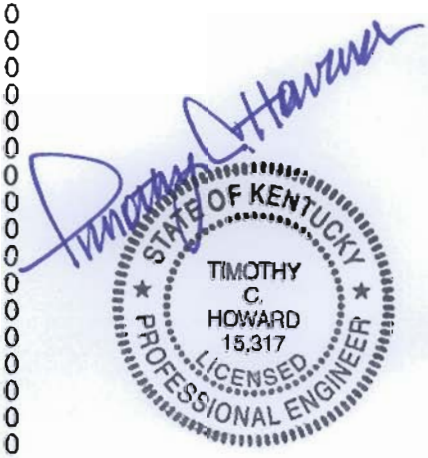
IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	400	5	1	400.500	1.223	0
-20	340	5	1	340.588	1.221	0
-20	280	5	1	280.713	1.291	0
-20	220	5	1	220.907	1.334	0
-20	160	5	1	161.245	1.414	0
-20	100	5	1	101.980	2.159	0
35	400	11	9	376.972	1.351	0
35	340	11	3	322.064	1.293	0
35	280	11	9	269.752	1.256	0
35	220	5	1	220.000	1.271	0
35	160	5	1	160.000	1.354	0
35	100	11	3	89.516	1.386	0
90	400	11	8	350.727	1.533	0
90	340	11	9	290.842	1.424	0
90	280	8	5	228.485	1.373	0
90	220	11	4	185.940	1.335	0
90	160	11	9	137.305	1.411	0
90	100	11	8	82.847	1.727	0
145	400	11	8	350.155	1.940	0
145	340	11	6	290.434	1.823	0
145	280	11	9	224.542	1.685	0
145	220	11	9	158.913	1.513	0
145	160	11	10	102.349	1.369	0
145	100	8	5	42.890	1.622	0
200	400	5	1	333.085	2.785	0
200	340	5	1	279.326	2.603	0
200	280	5	1	225.655	2.472	0
200	220	5	1	171.984	2.401	0
200	160	11	8	87.256	2.310	0
200	100	8	5	18.295	2.417	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-75	400	5	1	406.971	1.362	0
-75	340	5	1	348.174	1.426	0
-75	280	5	1	289.871	1.625	0
-75	220	5	1	232.433	2.978	0
-75	160	1	1	176.706	1000.000	0
-75	100	1	1	125.000	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW



COORDINATE	-75.000	-20.000	35.000	90.000	145.000	200.000
400.000	1.362	1.223	1.351	1.533	1.940	2.785
340.000	1.426	1.221	1.293	1.424	1.823	2.603
280.000	1.625	1.291	1.256	1.373	1.685	2.472
220.000	2.978	1.334	1.271	1.335	1.513	2.401
160.000	1000.000	1.414	1.354	1.411	1.369	2.310
100.000	1000.000	2.159	1.386	1.727	1.622	2.417

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.221 AT (-20.000,340.000)
FACTOR OF SAFETY = 1.256 AT (35.000,280.000)
FACTOR OF SAFETY = 1.369 AT (145.000,160.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S.

AT POINT (-20 340) RADIUS 340.588
THE MINIMUM FACTOR OF SAFETY IS 1.221

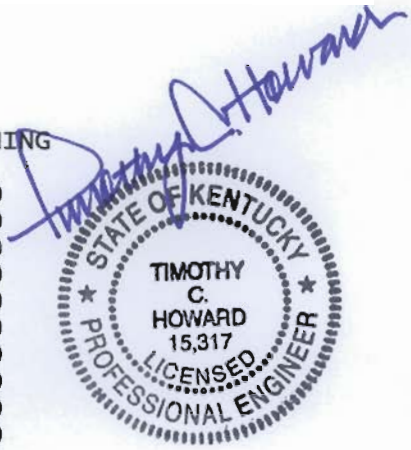
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	340	5	1	340.588	1.221	0
4	340	5	1	340.000	1.230	0
-44	340	5	1	342.835	1.305	0
-20	364	5	1	364.549	1.213	0
-20	388	5	1	388.515	1.217	0
4	364	11	8	358.652	1.243	0
-44	364	5	1	366.650	1.270	0
-14	364	5	1	364.269	1.214	0
-26	364	5	1	364.927	1.216	0
-20	370	5	1	370.540	1.213	0
-20	358	5	1	358.558	1.213	0

AT POINT (-20 364) RADIUS 364.549

THE MINIMUM FACTOR OF SAFETY IS 1.213

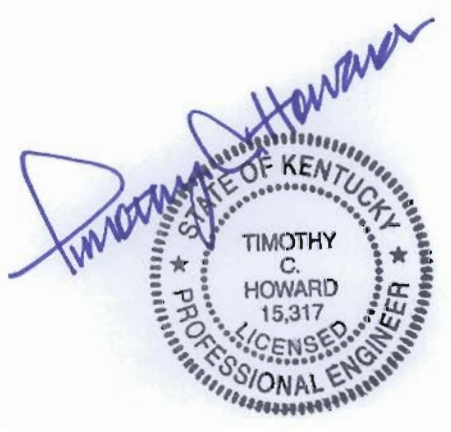


SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

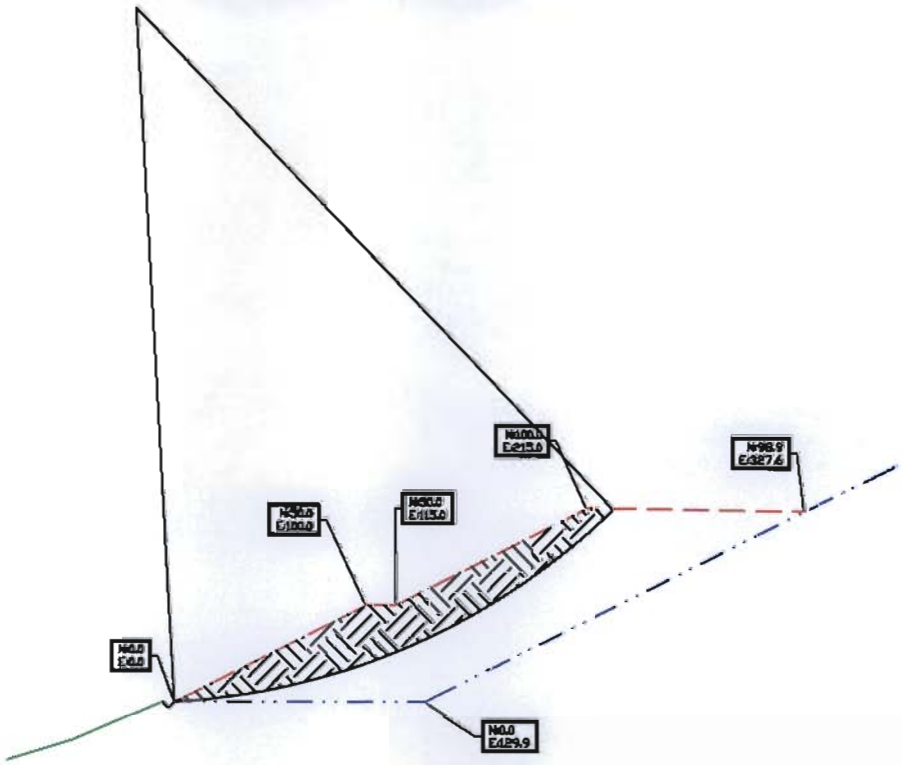
SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	23.122	4.961	0.000	.087	.143E+05	.136E+05	.452E+07	.970E+06
2	1	23.122	13.766	0.000	.150	.398E+05	.378E+05	.944E+07	.358E+07
3	1	23.122	21.052	0.000	.213	.608E+05	.578E+05	.133E+08	.684E+07
4	1	23.122	26.763	0.000	.277	.774E+05	.735E+05	.162E+08	.104E+08
5	1	7.511	29.641	0.000	.319	.278E+05	.264E+05	.567E+07	.416E+07
6	1	15.000	27.526	0.000	.350	.516E+05	.490E+05	.105E+08	.827E+07
7	1	0.611	24.662	0.000	.371	.188E+04	.179E+04	.383E+06	.316E+06
8	1	23.122	25.607	0.000	.404	.740E+05	.703E+05	.148E+08	.133E+08
9	1	23.122	25.976	0.000	.467	.751E+05	.713E+05	.144E+08	.151E+08
10	1	23.122	24.216	0.000	.531	.700E+05	.665E+05	.131E+08	.156E+08
11	1	23.122	20.039	0.000	.594	.579E+05	.550E+05	.107E+08	.142E+08
12	1	6.901	15.843	0.000	.635	.137E+05	.130E+05	.258E+07	.354E+07
13	1	16.222	7.566	0.000	.667	.153E+05	.146E+05	.366E+07	.414E+07
							SUM	.119E+09	.100E+09

AT CENTER (-20.000 , 364.000) WITH RADIUS 364.549 AND SEIS. COEFF. 0.10

FACTOR OF SAFETY BY NORMAL METHOD IS 1.187
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.213



Section 3
AT CENTER (-20.000 , 358.000) WITH RADIUS 358.558 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.513
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.542



STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

I, Timothy C. Howard, P.E. No. 15,317

Date: 4/24/08

hereby certify in accordance with 405 KAR 7:040, Section 10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

ZWG FullPath: W:\CLIENTS\BELL.COI\Permits\807-5223\Comprehensive\Maps\Reame.dwg

Bell County Coal Corporation

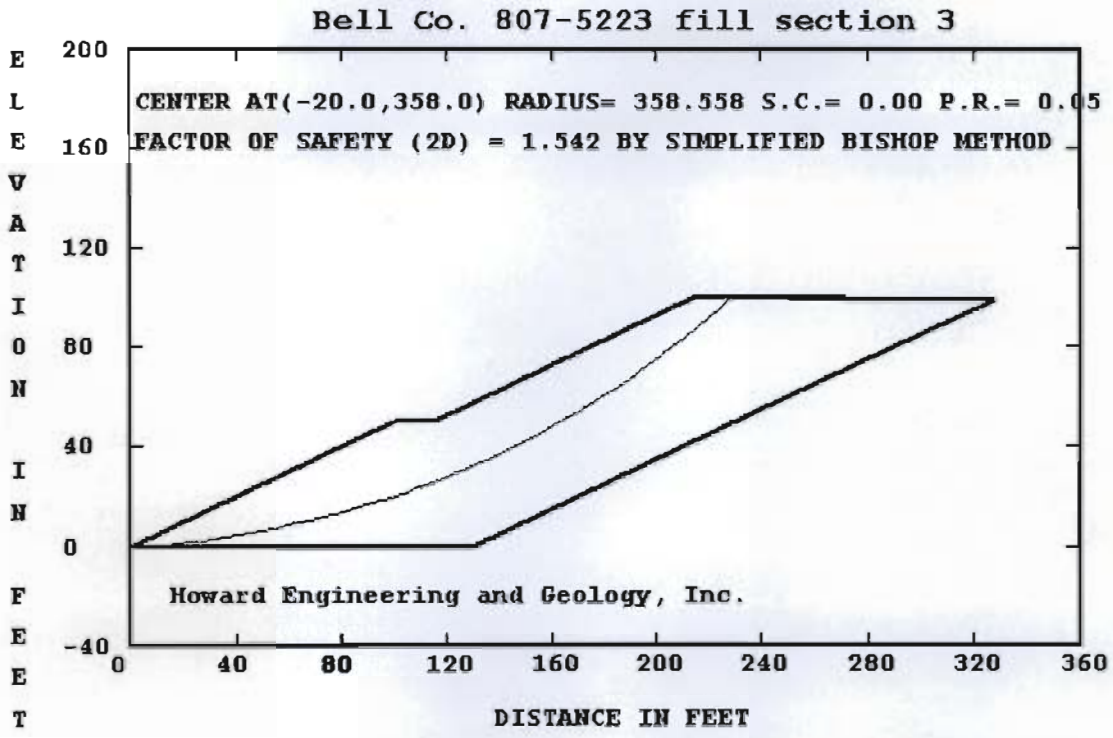
Permit No. 807-5223
Section 3
Backfilling & Grading Plan
Reame Drawing

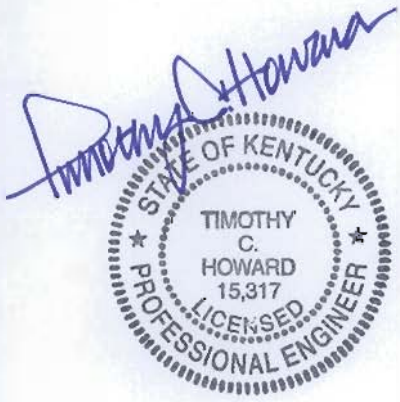
N
W
E
S

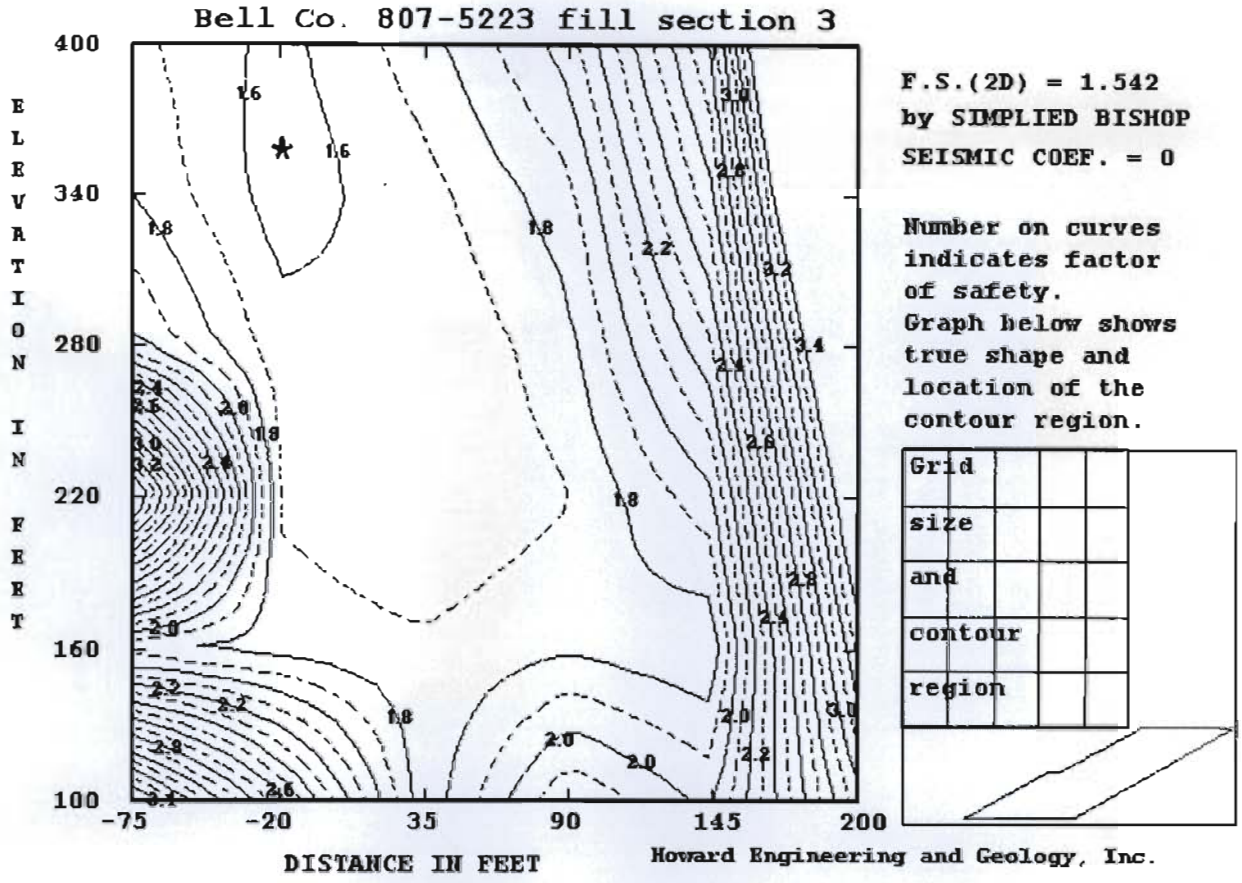
Prepared By:
HOWARD
Engineering and Geology, Inc.
PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831
(606) 573-8824 - http://www.howardeng-geo.com/

Scale: 1" = 100'

Attachment 25.3.A


Bell Co. 807-5223 fill section 3
CENTER AT(-20.0,358.0) RADIUS= 358.558 S.C.= 0.00 P.R.= 0.05
FACTOR OF SAFETY (2D) = 1.542 BY SIMPLIFIED BISHOP METHOD
Howard Engineering and Geology, Inc.
ELEVATION IN FEET
200
160
120
80
40
0
-40
0
40
80
120
160
200
240
280
320
360
DISTANCE IN FEET


STATE OF KENTUCKY
TIMOTHY
C.
HOWARD
15,317
LICENSED
PROFESSIONAL ENGINEER



STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

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REAME (ROTATIONAL EQUILIBRIUM ANALYSIS OF MULTILAYERED EARTHWORKS)
THIS 2008 VERSION IS LICENSED BY CIVIL ENGINEERING SOFTWARE CENTER TO

                Howard Engineering and Geology, Inc.

INPUT FILE NAME  -C:\REAME2008\5223fill3.DAT

TITLE -807-5223 fill section 3

NO. OF STATIC AND SEISMIC CASES (NCASE) = 2

NO. OF NONCIRCULAR FAILURE SURFACES (NNS) = 0

TWO-DIMENSIONAL ANALYSIS ( THREED = 0 )

ANALYSIS BY DETERMINISTIC METHOD   ( PROB = 0 )


CASE NO.  1   SEISMIC COEFFICIENT (SEIC) =0.000

NO. OF BOUNDARY LINES (NBL) = 2

NO. OF POINTS ON BOUNDARY LINE 1 = 3
 1  X COORD.= 0              Y COORD.= 0
 2  X COORD.= 129.9          Y COORD.= 0
 3  X COORD.= 327.6          Y COORD.= 98.6

NO. OF POINTS ON BOUNDARY LINE 2 = 5
 1  X COORD.= 0              Y COORD.= 0
 2  X COORD.= 100            Y COORD.= 50
 3  X COORD.= 115            Y COORD.= 50
 4  X COORD.= 215            Y COORD.= 100
 5  X COORD.= 327.6          Y COORD.= 98.9

LINE NO. AND SLOPE OF EACH SEGMENT ARE:
 1       0.000       0.499
 2       0.500       0.000       0.500      -0.010

MIN. DEPTH OF TALLEST SLICE (DMIN) = 0
NO. OF RADIUS CONTROL ZONES (NRCZ) = 1

RADIUS DECREMENT (RDEC) FOR ZONE 1 = 0
NO. OF CIRCLES (NCIR) FOR ZONE 1 = 5
NO. OF BOTTOM LINES (NOL) FOR ZONE 1 = 1
LINE NO. (LINO)  BEG. NO. (NBP)  END NO. (NEP)
      1                1               3

ENGLISH UNITS ARE USED WITH DISTANCE IN FEET AND FORCE IN POUND.

SOIL  ENVELOPE COHESION    FRIC. ANGLE     UNIT WEIGHTT
 No.    (TSSE)    (C)         (PHID)          (G)
  1       1   200.000         30.000         125.000

USE PORE PRESSURE RATIO
USE GRID
NO. OF SLICES (NSLI) = 10
NO. OF ADD. CIRCLES (NAC) = 3
ANALYSIS BY SIMPLIFIED BISHOP METHOD (MTHD=2)
NUMBER OF FORCES (NFO)= 0
SOFT SOIL NUMBER (SSN)= 0

PORE PRESSURE RATIO (RU) = 0.05
```

NO. OF SOILS WITH DIFFERENT PORE PRESSURE RATIO (NSDP) = 0
INPUT COORD. OF GRID POINTS 1,2,AND 3

POINT 1 X COORD. =-20 Y COORD. = 400
POINT 2 X COORD. =-20 Y COORD. = 100
POINT 3 X COORD. = 200 Y COORD. = 100

X INCREMENT (XINC) = 24 Y INCREMENT (YINC) = 24
NO. OF DIVISIONS BETWEEN POINTS 1 AND 2 (ND12) = 5
NO. OF DIVISIONS BETWEEN POINTS 2 AND 3 (ND23) = 4
ONLY A SUMMARY TABLE IS PRINTED (NPRT = 0)
SLICES WILL BE SUBDIVIDED

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

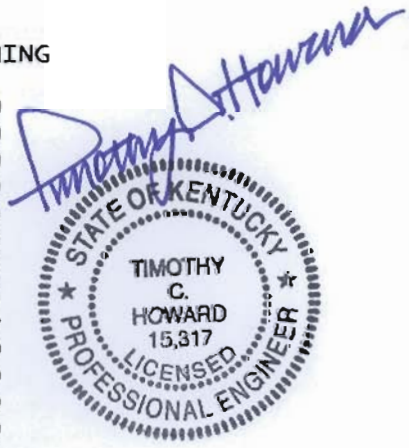
FACTORS OF SAFETY BASED ON GRID

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	400	5	1	400.500	1.564	0
-20	340	5	1	340.588	1.549	0
-20	280	5	1	280.713	1.640	0
-20	220	5	1	220.907	1.686	0
-20	160	5	1	161.245	1.753	0
-20	100	5	1	101.980	2.648	0
35	400	11	7	374.413	1.758	0
35	340	11	9	319.822	1.661	0
35	280	11	9	269.752	1.600	0
35	220	5	1	220.000	1.608	0
35	160	5	1	160.000	1.716	0
35	100	11	3	89.516	1.728	0
90	400	11	7	350.380	2.048	0
90	340	11	9	288.590	1.863	0
90	280	8	5	227.194	1.763	0
90	220	11	4	183.812	1.693	0
90	160	11	3	139.827	1.785	0
90	100	11	10	85.297	2.198	0
145	400	5	1	351.213	2.827	0
145	340	11	8	290.392	2.581	0
145	280	11	9	221.014	2.294	0
145	220	11	9	156.661	1.969	0
145	160	11	10	100.412	1.710	0
145	100	11	10	46.738	1.970	0
200	400	5	1	327.021	5.213	1
200	340	5	1	272.784	4.545	1
200	280	5	1	219.280	4.033	0
200	220	5	1	165.587	3.670	0
200	160	11	10	86.871	3.334	0
200	100	8	5	17.007	2.950	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-75	400	5	1	406.971	1.728	0
-75	340	5	1	348.174	1.798	0
-75	280	5	1	289.871	2.008	0
-75	220	5	1	232.433	3.632	0
-75	160	1	1	176.706	1000.000	0
-75	100	1	1	125.000	1000.000	0



LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW

COORDINATE	-75.000	-20.000	35.000	90.000	145.000	200.000
400.000	1.728	1.564	1.758	2.048	2.827	5.213
340.000	1.798	1.549	1.661	1.863	2.581	4.545
280.000	2.008	1.640	1.600	1.763	2.294	4.033
220.000	3.632	1.686	1.608	1.693	1.969	3.670
160.000	1000.000	1.753	1.716	1.785	1.710	3.334
100.000	1000.000	2.648	1.728	2.198	1.970	2.950

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.549 AT (-20.000,340.000)
FACTOR OF SAFETY = 1.600 AT (35.000,280.000)
FACTOR OF SAFETY = 1.710 AT (145.000,160.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S.

AT POINT (-20 340) RADIUS 340.588
THE MINIMUM FACTOR OF SAFETY IS 1.549

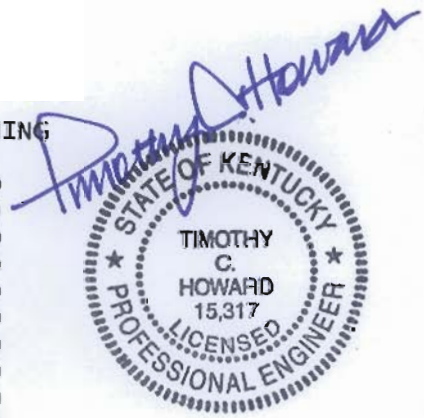
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	340	5	1	340.588	1.549	0
4	340	5	1	340.000	1.571	0
-44	340	5	1	342.835	1.657	0
-20	364	5	1	364.549	1.542	0
-20	388	5	1	388.515	1.553	0
4	364	11	2	356.870	1.592	0
-44	364	5	1	366.650	1.611	0
-14	364	5	1	364.269	1.547	0
-26	364	5	1	364.927	1.545	0
-20	370	5	1	370.540	1.544	0
-20	358	5	1	358.558	1.542	0
-20	352	5	1	352.568	1.543	0
-14	358	5	1	358.274	1.545	0
-26	358	5	1	358.943	1.548	0

AT POINT (-20 358) RADIUS 358.558

THE MINIMUM FACTOR OF SAFETY IS 1.542



SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	22.886	4.898	0.000	.088	.140E+05	.133E+05	.439E+07	.441E+06
2	1	22.886	13.583	0.000	.152	.389E+05	.369E+05	.921E+07	.211E+07
3	1	22.886	20.753	0.000	.215	.594E+05	.564E+05	.131E+08	.458E+07
4	1	22.886	26.352	0.000	.279	.754E+05	.716E+05	.159E+08	.755E+07
5	1	8.457	29.239	0.000	.323	.309E+05	.294E+05	.639E+07	.358E+07
6	1	14.429	27.232	0.000	.355	.491E+05	.467E+05	.101E+08	.625E+07
7	1	0.571	24.289	0.000	.376	.173E+04	.165E+04	.360E+06	.234E+06
8	1	22.315	24.996	0.000	.408	.697E+05	.662E+05	.143E+08	.102E+08
9	1	22.886	25.241	0.000	.471	.722E+05	.686E+05	.144E+08	.122E+08
10	1	22.886	23.368	0.000	.534	.668E+05	.635E+05	.131E+08	.128E+08
11	1	22.886	19.065	0.000	.598	.545E+05	.518E+05	.106E+08	.117E+08

12	1	9.028	14.407	0.000	.643	.163E+05	.154E+05	.329E+07	.375E+07
13	1	13.858	6.573	0.000	.675	.114E+05	.108E+05	.300E+07	.275E+07
							SUM	.118E+09	.781E+08

AT CENTER (-20.000 , 358.000) WITH RADIUS 358.558 AND SEIS. COEFF. 0.00
FACTOR OF SAFETY BY NORMAL METHOD IS 1.513
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.542

CASE NO. 2 SEISMIC COEFFICIENT (SEIC) =0.100

AUTOMATIC SEARCH WILL FOLLOW AFTER GRID

FACTORS OF SAFETY BASED ON GRID

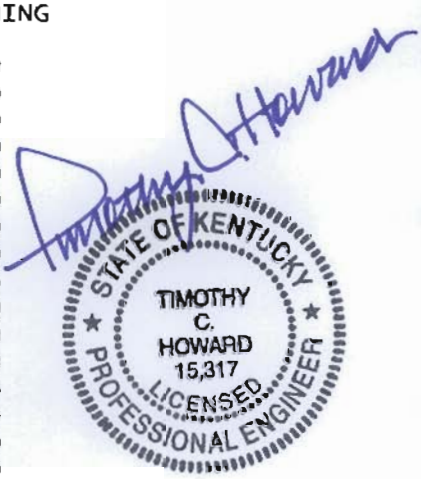
IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	400	5	1	400.500	1.223	0
-20	340	5	1	340.588	1.221	0
-20	280	5	1	280.713	1.291	0
-20	220	5	1	220.907	1.334	0
-20	160	5	1	161.245	1.414	0
-20	100	5	1	101.980	2.159	0
35	400	11	9	376.972	1.351	0
35	340	11	3	322.064	1.293	0
35	280	11	9	269.752	1.256	0
35	220	5	1	220.000	1.271	0
35	160	5	1	160.000	1.354	0
35	100	11	3	89.516	1.386	0
90	400	11	7	350.380	1.535	0
90	340	11	9	288.590	1.437	0
90	280	11	11	229.767	1.352	0
90	220	11	4	183.812	1.335	0
90	160	11	9	137.305	1.411	0
90	100	11	8	82.847	1.727	0
145	400	5	1	351.213	1.937	0
145	340	11	8	290.392	1.822	0
145	280	11	3	223.549	1.684	0
145	220	11	4	159.235	1.513	0
145	160	11	10	100.412	1.370	0
145	100	11	10	46.738	1.601	0
200	400	5	1	327.021	2.917	1
200	340	5	1	272.784	2.684	1
200	280	5	1	219.280	2.506	0
200	220	5	1	165.587	2.399	0
200	160	11	10	86.871	2.309	0
200	100	8	5	17.007	2.415	0

GRID IS EXPANDED AS FOLLOWS SO MINIMUM FACTOR OF SAFETY FALLS WITHIN THE GRID

-75	400	5	1	406.971	1.362	0
-75	340	5	1	348.174	1.426	0
-75	280	5	1	289.871	1.625	0
-75	220	5	1	232.433	2.978	0
-75	160	1	1	176.706	1000.000	0
-75	100	1	1	125.000	1000.000	0

LOWEST FACTOR OF SAFETY AT EACH GRID POINT IS TABULATED BELOW



COORDINATE	-75.000	-20.000	35.000	90.000	145.000	200.000
400.000	1.362	1.223	1.351	1.535	1.937	2.917
340.000	1.426	1.221	1.293	1.437	1.822	2.684
280.000	1.625	1.291	1.256	1.352	1.684	2.506
220.000	2.978	1.334	1.271	1.335	1.513	2.399
160.000	1000.000	1.414	1.354	1.411	1.370	2.309
100.000	1000.000	2.159	1.386	1.727	1.601	2.415

MINIMUM FACTORS OF SAFETY OCCUR AT THE FOLLOWING 3 CENTERS

FACTOR OF SAFETY = 1.221 AT (-20.000,340.000)
FACTOR OF SAFETY = 1.256 AT (35.000,280.000)
FACTOR OF SAFETY = 1.370 AT (145.000,160.000)

AUTOMATIC SEARCH WILL BE MADE ONLY ON THE CENTER WITH THE SMALLEST F.S.

AT POINT (-20 340) RADIUS 340.588
THE MINIMUM FACTOR OF SAFETY IS 1.221

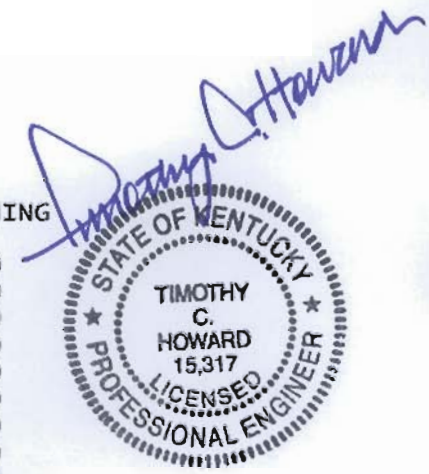
FACTORS OF SAFETY BASED ON SEARCH

IN THE FOLLOWING TABLE WARNING INDICATES HOW MANY TIMES THE
MAXIMUM RADIUS IS LIMITED BY THE END POINTS OF GROUND LINES

CENTER X COORDINATE	CENTER Y COORDINATE	NO. OF CIRCLE TOTAL	CRITIC.	RADIUS	LOWEST F.S.	WARNING
-20	340	5	1	340.588	1.221	0
4	340	5	1	340.000	1.230	0
-44	340	5	1	342.835	1.305	0
-20	364	5	1	364.549	1.213	0
-20	388	5	1	388.515	1.217	0
4	364	11	8	358.652	1.243	0
-44	364	5	1	366.650	1.270	0
-14	364	5	1	364.269	1.214	0
-26	364	5	1	364.927	1.216	0
-20	370	5	1	370.540	1.213	0
-20	358	5	1	358.558	1.213	0

AT POINT (-20 364) RADIUS 364.549

THE MINIMUM FACTOR OF SAFETY IS 1.213

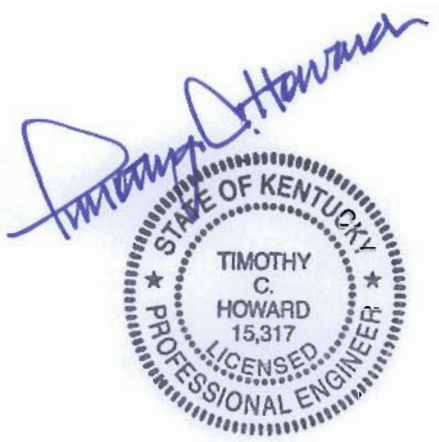


SUMMARY OF SLICE INFORMATION FOR MOST CRITICAL FAILURE SURFACE

SL. NO.	SOIL NO.	SLICE WIDTH	SLICE HEIGHT	WATER HEIGHT	BOTTOM SINE	TOTAL WEIGHT	EFFEC. WEIGHT	RESIS. MOMENT	DRIVING MOMENT
1	1	23.123	4.961	0.000	.087	.143E+05	.136E+05	.452E+07	.970E+06
2	1	23.123	13.766	0.000	.150	.398E+05	.378E+05	.945E+07	.358E+07
3	1	23.123	21.053	0.000	.213	.608E+05	.578E+05	.133E+08	.684E+07
4	1	23.123	26.764	0.000	.277	.774E+05	.735E+05	.162E+08	.104E+08
5	1	7.508	29.641	0.000	.319	.278E+05	.264E+05	.566E+07	.415E+07
6	1	15.000	27.526	0.000	.350	.516E+05	.490E+05	.105E+08	.827E+07
7	1	0.615	24.662	0.000	.371	.190E+04	.180E+04	.385E+06	.318E+06
8	1	23.123	25.607	0.000	.404	.740E+05	.703E+05	.148E+08	.133E+08
9	1	23.123	25.976	0.000	.467	.751E+05	.713E+05	.144E+08	.151E+08
10	1	23.123	24.216	0.000	.531	.700E+05	.665E+05	.131E+08	.156E+08
11	1	23.123	20.037	0.000	.594	.579E+05	.550E+05	.107E+08	.142E+08
12	1	6.893	15.842	0.000	.635	.137E+05	.130E+05	.258E+07	.353E+07
13	1	16.230	7.566	0.000	.667	.153E+05	.146E+05	.366E+07	.414E+07
							SUM	.119E+09	.100E+09

AT CENTER (-20.000 , 364.000) WITH RADIUS 364.549 AND SEIS. COEFF. 0.10

FACTOR OF SAFETY BY NORMAL METHOD IS 1.187
FACTOR OF SAFETY BY SIMPLIFIED BISHOP METHOD IS 1.213



27. Coal Mine Waste

27.1 Will any coal processing waste or underground development waste be generated or disposed of within the proposed permit area? [ ] YES [XX] NO. If "YES", provide the following information for each disposal area:

Facility I.D.	Type	Storage Volume Cu. Yds.	Latitude	Longitude	Anticipated Construction Date

27.2 Did construction of any of the above structures begin prior to January 18, 1983? [ ] YES [XX] NO. If "YES", provide the information required by 405 KAR 8:030, or 8:040, Section 25 for existing structures. Submit this information as "Attachment 27.2.A".

27.3 Will any coal mine waste be disposed of in abandoned underground mines? [ ] YES [XX] NO. If "YES", provide as "Attachment 27.3.A", the information to satisfy the requirements of 405 KAR 8:040, Sections 27 and 28.

27.4 Will coal mine waste materials, from activities located outside the proposed permit area, be disposed of within the proposed permit area? [ ] YES [XX] NO. If "YES", provide as "Attachment 27.4.A", a detailed discussion (based on relevant hydrologic, geotechnical, physical, and chemical analyses) to make a showing in accordance with 405 KAR 16:140 or 18:140, Section 1, that the disposal of such waste will not:

(a) Adversely affect water quality, water flow, or vegetation;
(b) Create public health hazards; and
(c) Cause instability in the disposal area(s).

27.5 Provide a detailed plan (including all engineering design calculations, cross-sections, maps and drawings) for each proposed structure. Each plan shall meet the applicable requirements of 405 KAR 8:030, Section 34, or 405 KAR 8:040, Section 34, as appropriate. The plan(s) shall be provided as "Attachment 27.5.A, 27.5.B., etc."

N/A

28. Disposal of Waste Other Than Coal, Soil or Rock

28.1 Provide as "Attachment 28.1.A", a description of the measures to be used for the temporary storage and final disposal of waste such as: grease, lubricants, paints, flammable liquids, garbage, abandoned machinery, timber, brush, and other combustibles generated during mining activities. Show all storage and/or disposal sites on the MRP Map.
See Attachment 28.1.A

29. Toxic Materials Handling Plan

29.1 Based on the results of the premining geologic sampling program, identify all acidic or toxic strata which will be encountered during the proposed mining operation:
N/A, none identified

Site No.	Thickness	Lithology	Elevation	Potential Acidity	Neutralization Potential

29.2 Describe how acidic and/or toxic strata will be handled to avoid contamination of surface and ground water resources within, and adjacent to the proposed permit area, and to minimize adverse effects on plant growth and land uses. Submit the description, if applicable, as "Attachment 29.2.A".
See Attachment 29.2.A

30. Surface and Ground Water Monitoring

30.1 Provide a detailed description of the in-stream surface water quality and quantity monitoring program to be used during the mining and reclamation operations. The description shall specifically address all of the following:

(a) the location of each sampling point and the rationale for selection
(b) the frequency of sample collection
(c) the method(s) to be used for sample collection
(d) the parameters to be tested
(e) the procedures to be used for reporting the analytical results of the testing program to DSMRE

Submit the description as "Attachment 30.1.A", and show the location of all monitoring points on the MRP Map.
See attachment 30.1.A.

ATTACHMENT 28.1.A

All waste such as grease, lubricants, paints, flammable liquids and garbage will be removed from the mining site and placed in the nearest available state approved sanitary landfill or taken to a recycling center. A permanent non-coal waste site has not been shown on the MRP map as a permanent site is not proposed. The storage site will move around the permit area and will be temporary. Any abandoned machinery will be sold or used as scrap. Abandoned machinery will be removed from the site upon completion of the mining activity.

Trees and brush which are removed from the proposed mining areas during clearing grubbing operations and trees and brush which are removed from mining area after mining has began may be burned during seasons and times allowed. No substance which causes air pollution will be used to ignite organic debris. All burning will be conducted according to local, state and regulatory standards. All methods of brush and tree disposal may be used when seasons permit. Excessive materials will be placed in piles in cleared areas and burned. A ditch will be constructed around the pile prior to burning to prevent possible contamination of surface water running through the pile or the ashes after burning.

ATTACHMENT 29.2.A

TOXIC MATERIALS HANDLING PLAN

Although no potential acidic units have been identified, this plan will be implemented in the event acidic units are encountered. Precautions will be taken to ensure that the strata are totally segregated during the excavation process. This material will not be mixed with other overburden material. The potentially acid strata will be placed in the backfill so that it is surrounded on all sides, top and bottom with a minimum of four (4) feet of non-toxic and non-acidic material. The acidic material shall be buried or otherwise treated within thirty (30) days of exposure. Although the acid-base account would ensure neutralization of the strata, these precautions should prevent any adverse impacts to the revegetation process or to the groundwater supply.

ATTACHMENT 30.1.A

During-Mining Surface Water Monitoring Plan

The during-mining surface water monitoring program will consist of monitoring one (1) existing monitoring station. The location of the site is detailed on the MRP/ERI map included in this application. The coordinates of the site is as follows:

BF1 - Latitude 36° 35' 43" N(4,053,333)
Longitude 83° 45' 52" W(252,699)

The sites was chosen for the following reasons:

1) The site is located downstream of a portion or all of the proposed disturbances.
2) There is a sustained flow at the site.
3) Samples collected at the site will accurately reflect the condition of the watershed affected by the proposed disturbances.

Samples taken at the site will be analyzed for the following parameters using the methods listed:

PARAMETER	METHOD
Flow Rate	Flow Estimation Meter
pH	SM #423*
Acidity	SM #402*
Alkalinity	SM #403*
Total Iron	SM #303A*
Total Manganese	SM #303A*
Sulfate	SM #426C*
Total Suspended Solids	SM #209C*
Specific Conductance	SM #205*

*"Standard Methods for the examination of water and Wastewater." 16th Edition, 1985.

Results of all analyses will be reported to the Department no later than the end of the month at the end of each quarter. Reporting will be done on Department approved water quality data entry forms. During Mining Sample Frequency: One (1) per three (3) months until final bond release.

30.2 Submit as "Attachment 30.2.A", a description of the applicant's proposed KPDES point source discharge monitoring program. Discharges from sediment ponds, underground mines and other similar discharge points within the proposed permit area shall be monitored. The description shall, at a minimum, address (a) the frequency of sample collection; (b) the parameters to be tested; and (c) the procedures to be used for reporting the analytical results of the laboratory tests. Show the location of all sampling points on the MRP Map.

See attachment 30.2.A.

30.3 Provide, as "Attachment 30.3.A", a detailed description of the ground water quality and quantity monitoring program to be used during the mining and reclamation operations. The description shall specifically address all the following:

See attachment 30.3.A.

(a) the location of each sampling point and the rationale for selection
(b) the frequency of sample collection
(c) the method(s) to be used for sample collection
(d) the parameters to be tested
(e) the procedures to be used for reporting the results of the testing program to DSMRE

Show the location of all sampling points on the MRP Map.

30.4 Provide a detailed description of each monitoring point proposed for use in the ground water monitoring program. The description shall address:

(a) the aquifer(s) to be monitored
(b) the construction specifications of each monitoring point
(c) the adequacy of each monitoring point, taking into account design, construction, and location to fulfill its intended use.

Submit the description as "Attachment 30.4.A".

See attachment 30.4.A.

30.5 Provide the following information for the surface and ground water monitoring locations. If additional pages are necessary, submit as "Item 30.5 continued".

I.D. Number	Pond Number if Applicable	Type Surface/Ground	Latitude	Longitude
STA1	***N/A***	***Ground***	***36-36-52***	***83-49-55***
GW1	***N/A***	***Ground***	***36-35-35***	***83-51-54***
GW14	***N/A***	***Ground***	***36-35-30***	***83-46-50***
Well 501	***N/A***	***Ground***	***36-34-48***	***83-47-54***
BF1	***N/A***	***Surface***	***36-35-43***	***83-45-52***
1	***1***	***KPDES***	***36-35-43***	***83-45-58***
2	***2***	***KPDES***	***36-35-46***	***83-45-57***
GW-2	***N/A***	***Ground***	***36-36-46***	***83-46-59***

ATTACHMENT 30.2.A

It is proposed to monitor the discharges from pond #1 and pond #2 as described in this application. This monitoring will meet the requirements of the KPDES Point Source Discharge Monitoring Program. The ponds to be monitored is designated as Sediment pond #1 and pond #2. The location of is detailed on the Mining and Reclamation Plan Map in Attachment "B" of this application. The coordinates of the site are provided in Item 30.5.

Grab samples will be taken at the discharge point of the pond on the 1st and 3rd Wednesday of each month. Additionally, a water sample will be taken during the first significant rainfall event during the month. This sample may be substituted for one of the scheduled samples.

Samples collected at each site will be analyzed for the following parameters using the methods listed:

PARAMETER	METHOD
Discharge (in gal/min)	Flow Estimation Meter
ph	SM 423*
Acidity	SM 402*
Alkalinity	SM 403*
Total Iron	SM 303A*
Total Manganese	SM 303A*
Total Suspended Solids	SM 209C*

*"Standard Methods for the Examination of Water and Wastewater." 16th Edition, 1985.

Results of all analyses will be reported to the Department by month at the end of each quarter. Reporting will be done on Department-approved Discharge Monitoring Report forms.

The monitoring program described above will be followed from the time active mining begins until a Phase I Bond Release is obtained.

Only one (1) sample per month will be taken for the first six (6) months after the Phase I Bond Release. These samples will be analyzed for the following parameters using the methods listed:

PARAMETER	METHOD
Discharge (in gal/min)	Flow Estimation Meter
Ph	SM 423*
Acidity	SM 402*
Alkalinity	SM 403*
Settable Solids	SM 209E*

*"Standard Methods for the Examination of Water and Wastewater." 16th Edition, 1985.

If no water quality problems are observed during the six (6) months following the Phase I Bond Release, sample frequency will be decreased to one (1) sample per three (3)

ATTACHMENT 30.2.A

months analyzed for the post-Phase I Bond Release parameters listed above. However, if any water quality problems are observed following the Phase I Bond Release, sample frequency and analysis parameters will remain the same as those required for discharge monitoring during active mining.

ATTACHMENT 30.3.A

During-Mining Groundwater Monitoring Plan

The during-mining ground water monitoring program will consist of monitoring five (5) existing monitoring stations. These sites are identified as STA1, GW-1, GW-14, GW-2 and GW-501. The location of these sites are detailed on the M.R.P./E.R.I. Map included in this application. The coordinates of these sites are as follows:

STA1	Lat. 36° 36' 52" N (4,055,697) Long. 83° 49' 55" W (246,810)
GW1	Lat. 36° 35' 35" N (4,053,347) Long. 83° 51' 54" W (243,793)
GW14	Lat. 36° 35' 30" N (4,052,973) Long. 83° 46' 50" W (221,245)
GW2	Lat. 36° 36' 46" N (4,055,323) Long. 83° 46' 59" W (251,090)
GW501	Lat. 36° 34' 48" N (4,051,725) Long. 83° 47' 54" W (249,617)

These sites were chosen for the following reasons:

1) These sites will monitor the groundwater from the aquifers which have been identified in this area.
2) There is history of water quality and quantity at the sites.

Samples taken at these sites will be analyzed for the following parameters using the methods listed:

Parameter	Method
Water level	Water level indicator
pH (standard units)	423*
acidity (mg/l)	402*
alkalinity (mg/l)	403*
dissolved iron (mg/l)	303*
dissolved manganese (mg/l)	303*
total sulfate (mg/l)	426c*
specific conductance (micromhos/cm)or	205*
total dissolved solids (mg/l)	209B*

ATTACHMENT 30.3.A

temperature (^{O}F)
*"Standard Methods for the examination of Water and Wastewater." 16th Edition, 1985.

Results of all analyses will be reported to the Department no later than the end of the month at the end of each quarter. Reporting will be done on Department approved water quality data entry forms. During Mining Sample Frequency: One (1) per three (3) months until final bond release.

ATTACHMENT 30.4.A

Ground Water Monitoring Point Descriptions

STA1

a) Mason Coal Seam Void

b) 8" casing

c) This site is currently being sampled as part of the during mining ground-water and reclamation monitoring program for existing permits.

GW-1

a) Sandstone Member of the Mingo Formation

b) 8" casing – pvc, 55' deep

c) This site is currently being sampled as part of the during mining ground-water and reclamation monitoring program for an existing permit in the watershed.

GW-14

a) Mingo Formation

b) Spring

c) This site is currently being sampled as part of the during mining ground-water and reclamation monitoring program for an existing permit in the watershed.

GW-501

a) Sandstone member of the Mingo Formation

b) 6" casing – 60' deep

c) This site is currently being sampled as part of the during mining ground-water and reclamation monitoring program for an existing permit in the watershed.

GW-2

a) Unknown depth not able to measure, aquifer unknown.

b) Well sealed casing size unknown.

c) This site is currently being sampled as part of the during mining water monitoring program for various permits

We believe that these sites will provide adequate information on the ground water in this area for the following reasons:

ATTACHMENT 30.4.A

1) These sites will monitor from the aquifers which have identified in this area.
2) These sites are downstream of the proposed surface disturbances.
3) These sites are existing points which are currently being monitored as the during mining and reclamation groundwater monitoring stations for existing permits.

30.6 List the name and address of the laboratory which will perform required testing of water samples.

Name *Cumberland Valley Engineering, Inc. / Technical Water Laboratories, INC.*
Address *PO Box 1710, Harlan, KY 40831 / PO Box 309, Bledsoe, KY 40810*

31. Sediment Ponds and Impoundments

31.1 Complete the following table for each proposed sediment pond and impoundment. The numbers preceding the rows refer to the list of titles below the chart.

1	1	2				
2	A	A				
3	6.00	4.00				
4	6.00	4.00				
5	0.895	0.602				
6	0.895	0.602				
7	1.081	0.706				
8	Dug-Out	Dug-Out				
9	1.815	0.760				
10	Dug-Out	Dug-out				
11	36-35-43	36-35-46				
12	83-45-58	83-45-57				

1.) Facility I.D. No.
2.) Hazard Classification (A, B, or C)
3.) Total Drainage Area (Acres)
4.) Disturbed Drainage Area (Acres)
5.) Sediment Storage Capacity (Acre-Feet)
6.) Storage Capacity at Principal Spillway (Acre-Feet)
7.) Storage Capacity at Emergency Spillway (Acre-Feet)
8.) Structure Height at Emergency Spillway Measured from Upstream Toe (Feet)
9.) Storage Capacity at Top of Dam (Acre-Feet)
10.) Structure Height at Top of Dam Measured from Downstream Toe (Feet)
11.) Latitude
12.) Longitude

31.2 Were any of the structures listed in chart 30.1, constructed prior to January 18, 1983? [ ] YES [XX] NO. If "YES", identify each structure and submit as "Attachment 31.2.A, 31.2.B", etc., the descriptions and compliance plan(s) required by 405 KAR 8:030, Section 25, or 405 KAR 8:040, Section 25, as appropriate.

31.3 For each proposed impoundment submit the applicable design plans and descriptions, including compliance demonstration documents, as required by 405 KAR 8:030 or 8:040, Section 34. Design plans and descriptions shall be submitted as "Attachment 31.3.A, 31.3.B," etc. Compliance demonstration documents shall be appropriately labeled and submitted in a separate document cover entitled "Sediment Ponds - Compliance Demonstration Documents". Put the applicant's name and the application number on the face of the document cover. If other state or federal agencies receive a copy of the permit application, a copy of the compliance demonstration documents shall also be provided to such agencies unless specifically waived.

See Attachment 31.3.A

NOTE: If any proposed sediment ponds are to be retained as permanent impoundments, the applicant shall ensure that such structures have been designed to meet the requirements of 405 KAR 16:100 or 405 KAR 18:100 as appropriate.

31.4 Will water be chemically treated at any of the proposed or existing sediment structures? [ ] YES [XX] NO. If "YES", provide the following information.

I.D. Number	TREATMENT CHEMICALS	Described the method of treatment application and special structures or facilities to be used

If additional pages are necessary, submit as "Item 31.4 continued". If special structures are to be utilized, submit as "Attachment 31.4.A, 31.4.B" etc., supporting engineering designs and calculations

Sediment Control

The mining activity proposed in this application will consist of underground mining of the Jellico coal seam.

In order to provide sediment control for the mining activity described in this application, it will be necessary to construct two (2) dug-out sediment ponds. These dug-out ponds are designated as Sediment Ponds #1and #2 and the location of each is detailed on the Mining and Reclamation Plan Map in this application.

The dug-out ponds will be constructed by excavating material from the existing bench area. Each emergency spillway will be rip-rapped from the inlet through the embankment all the way to natural ground to dissipate energy and prevent erosion. This rip-rap will be recovered in similar manner as discussed above.

The ponds will be constructed under the supervision of a registered professional engineer during all phases of construction. The ponds will be inspected after each significant rainfall event to determine if the pond needs to be cleaned out. The sediment in the ponds will be removed when the sediment level exceeds the design sediment volume used in the design of the sediment pond. This will ensure that the ponds will always produce an effluent which will meet the performance standards. Also, the sediment pond will be inspected by a registered professional engineer annually to certify that the ponds are maintained in such a manner that it always meets the performance standards.

There are no existing underground workings located beneath any of the sediment ponds, nor are any underground workings proposed under the ponds. Therefore, there

is no potential for the effects of subsidence on these ponds.

These ponds have been designed using the West Virginia method. We have provided the following information on this design in this attachment:

1) Watershed Map - This map details the drainage area served by the pond and its breakdown into subwatersheds.

2) Stage-Storage Curve

3) "SEDCAD" Computer Printout for the 25yr-24hr storm event during Mining and Reclamation

4) Cumulative Impact Assessment - Pre-Mining computer run

5) Certified Design Drawing

6) Engineer's Certification of Design

In addition, we are proposing to utilize alternate sediment control for the mine management areas and for any portion of the surface mining areas which field conditions and/or the operator deems necessary to control runoff from the site. The surface runoff will be controlled by berms around the perimeter of the site and the alternate sediment control will be either straw bale check dams or silt fences. The use of the proposed alternate sediment control measures are in addition to the sediment ponds included in this application. Any silt fence or straw bale dams will be inspected on a monthly basis to insure they are performing as expected. Silt fence or straw bale dams shall be cleaned, repaired or replaced at the discretion of the operator or at the request of the DNR field inspector.

Pond 1 has been designed approximately 30' feet from the highway. The speed limit in the area of the proposed mine is 35 mph. Based on the distance from the highway and the limited speed in the area the engineer is confident that the distance

from the highway will be adequate for safety. Should the public become a nuisance at the pond a fence may be installed to prevent access by the public.

CERTIFICATION OF DESIGN

I, Timothy C. Howard , 15,317 , 4/29/08 ,
(Signature) (Engineer's Seal) (Registration No.) (Date Certified)

hereby certify, in accordance with 405 KAR 7:040, Section 10, that the design of each of the following facilities, whose design is included in this application, Application # 807-5223 ;

a) is in accordance with accepted engineering practices and recognized professional standards;
b) complies with the design requirements of KRS Chapter 350 and KAR Title 405; and
c) provided that the facility is properly constructed, operated and maintained, is adequate for the facility to meet the applicable performance standards of KRS Chapter 350 and KAR Title 405 insofar as such performance can reasonably be predicted by accepted engineering practices.

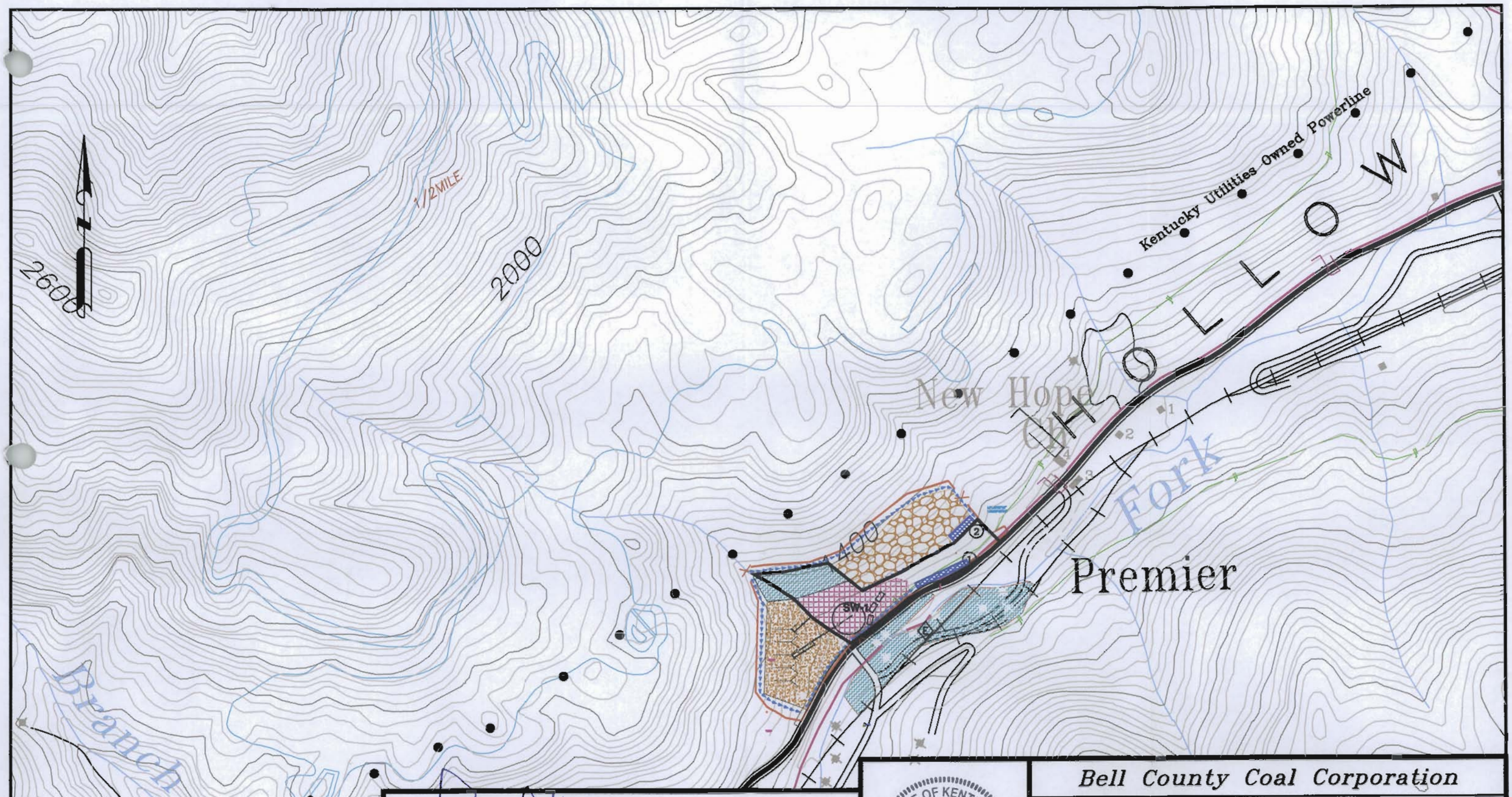
FACILITY TYPE: Sedimentation Pond (Temporary Water Impoundment)
(One facility type only)

FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN	FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN
1	A	04/28/08	2	A	04/28/08

TYPES OF FACILITIES:

-- sedimentation pond
-- excess spoil disposal fill
-- temporary water impoundment
-- permanent water impoundment
-- coal processing waste impoundment
-- coal processing waste dam
-- coal processing waste bank
-- road
-- postmining land use plan
-- permanent ditches

* Show hazard class, if applicable.



I, Timothy C. Howard, P.E. No. 15,317

Date: 4/29/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

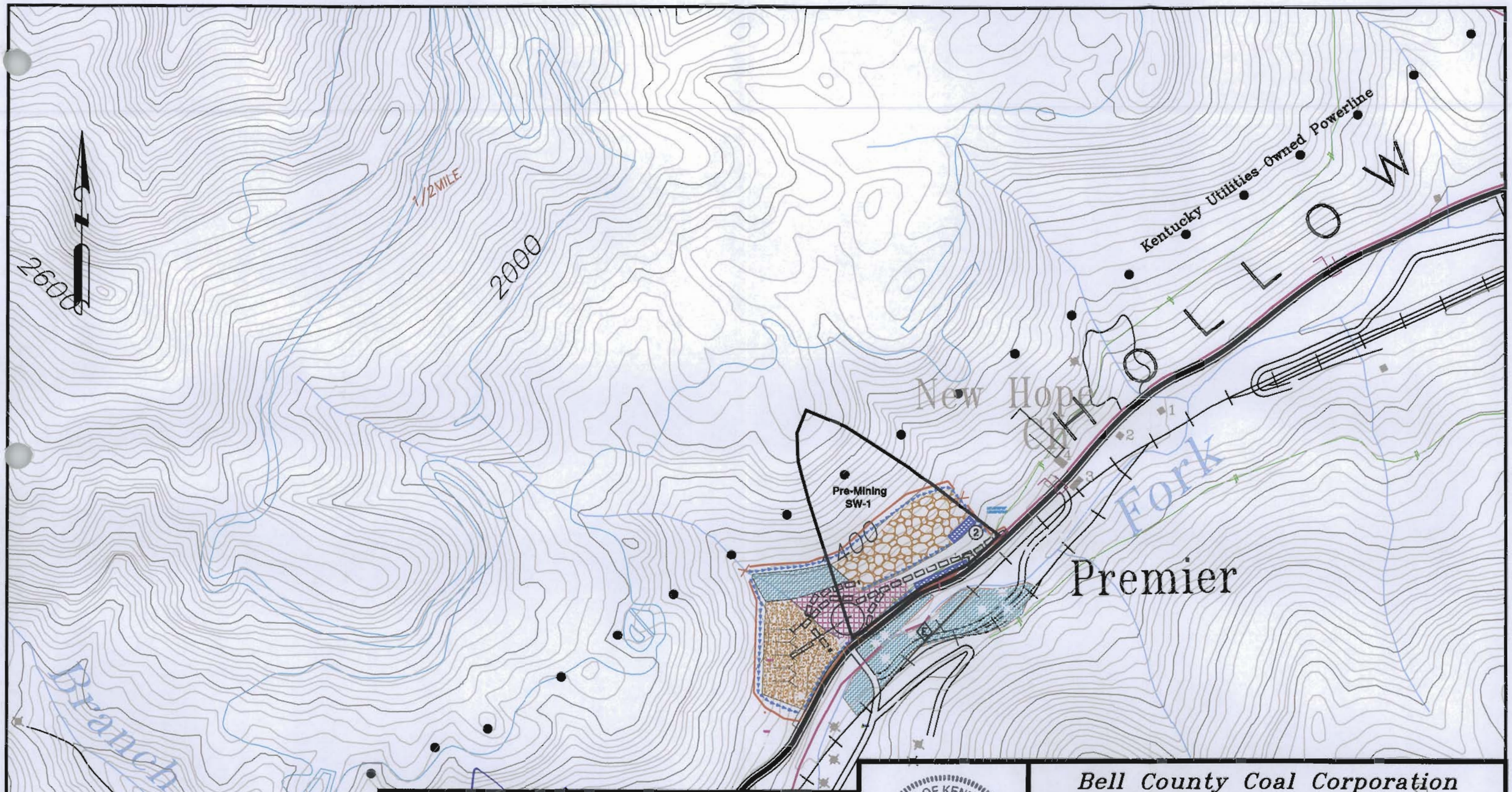
Bell County Coal Corporation

Permit No. 807-5223
Sub-Watershed Map
Proposed Pond #1

Scale: 1" = 500'

Page No. 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.



I, Timothy C. Howard, P.E. No. 15,317

Date: 4/29/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit No. 807-5223
Sub-Watershed Map
Proposed Pond #1

Scale: 1" = 500'

Page No. 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.

ATTACHMENT 31.3.A

SEDIMENT VOLUME CALCULATION

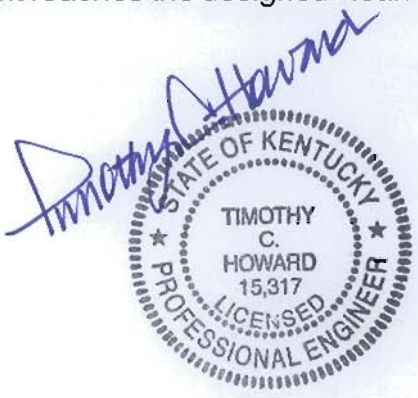
Pond Number 1

Sediment volume calculations for this pond are based on the maximum disturbance that will occur within the watershed served by the pond. The acreages used for sediment volume calculations are the same areas which are used in the "SEDCAD" computer runs. A sediment yield of 0.125 ac-ft/acre of disturbance was used and a 60% clean-out is proposed.

SUBWATERSHED #	ACREAGE	DISTURBED
1	6.00	Yes

Total Disturbed area = 6.00 ac.
6.00 ac. (0.125 ac-ft/acre) = 0.75 ac-ft total sediment yield
0.75 ac-ft (0.60) = 0.45 ac-ft sediment clean-out

The "West Virginia" method is used for this sediment pond design. The clean-out level is proposed at 60% such that when the level of sediment reaches the designed clean-out level, the pond will be cleaned.



WEST VIRGINIA DESIGN

EXCAVATED SEDIMENT POND, DUGOUT TYPE

Structure Proportioning Computation Sheet

Pond Number Pond #1

SEDIMENT STORAGE REQUIREMENT

Drainage Area = 6.00 Ac.

Area Disturbed= 6.00 Ac.

Required Sediment Volume = 0.125 Ac. Ft. X Acres Disturbed Area Controlled By Pond No. 1 = 0.75 Ac. Ft.

Actual Designed Sediment Storage Volume = 0.715 Ac. Ft.

Sediment Pool Stage 1246.50' + Headwater Depth, 3.62' + Freeboard Height (Min. 0.5') 4.88' = Top of Pond Stage 2255'

SEDIMENT POND DIMENSIONS

Bottom Length 179.5 Ft. Bottom Width 22.5 Ft.

Water Depth 9.50' Ft. Side Slopes 0.25 : 1

Volume 1.815 Ac. Ft.

EMERGENCY SPILLWAY - EXCAVATED

Side Slopes 2 : 1 Bottom Width 20 Ft.

Slope 1 % Spillway Length 12 Ft.

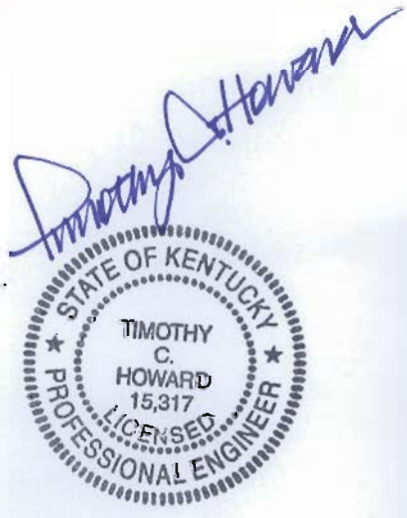
PRINCIPAL SPILLWAY

12" Diameter 50' Length

3% Slope

DISCHARGE SUMMATION

The peak discharge of a 25-year, 24-hour Storm Event for the Principal/Emergency Spillway 19.17 cfs

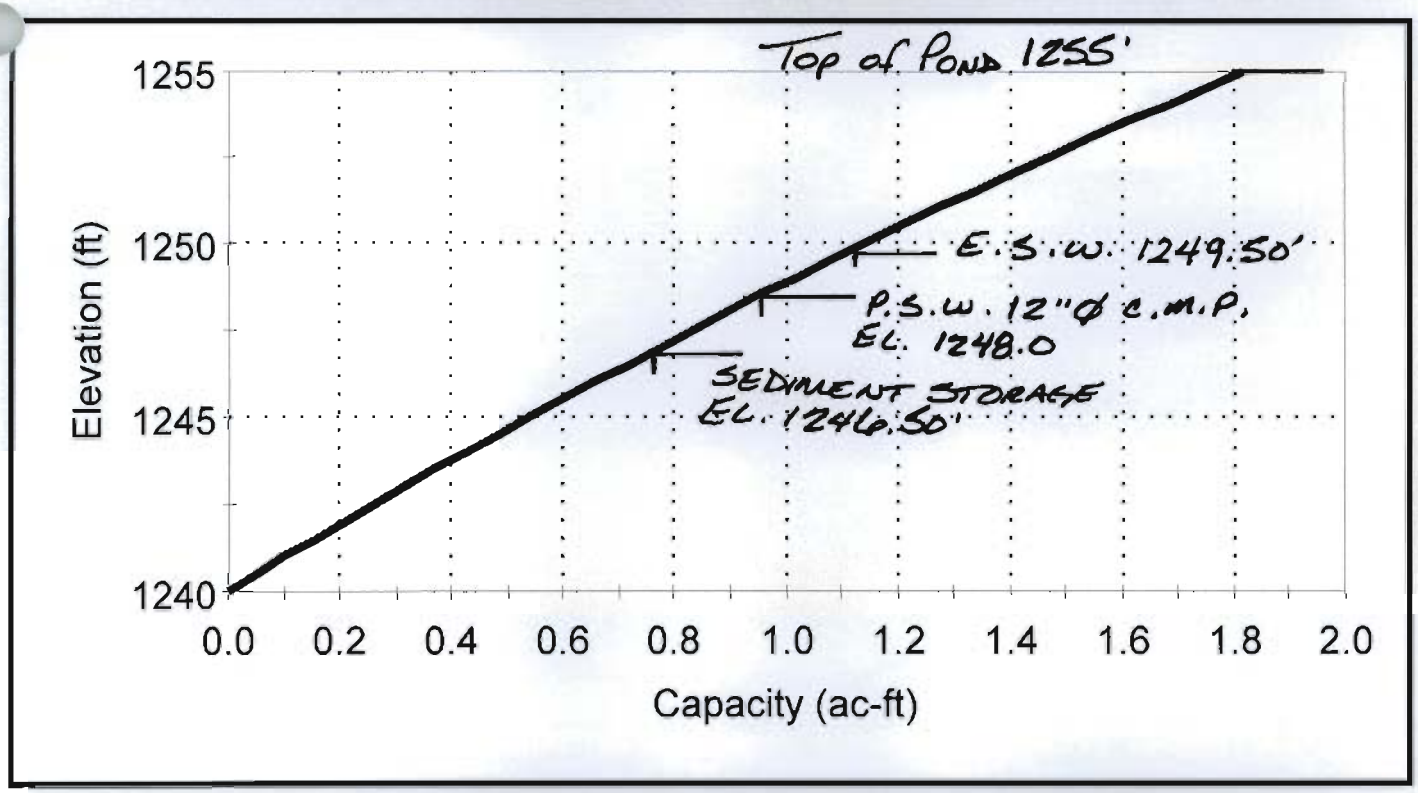


Stage Storage Chart Proposed Pond #1

Elevation-Area-Capacity Table

Elevation (ft)	Area (ac)	Capacity (ac-ft)
1,240.00	0.102	0.000
1,240.50	0.103	0.051
1,241.00	0.104	0.103
1,241.50	0.106	0.156
1,242.00	0.107	0.209
1,242.50	0.108	0.263
1,243.00	0.109	0.317
1,243.50	0.111	0.372
1,244.00	0.112	0.427
1,244.50	0.113	0.484
1,245.00	0.114	0.540
1,245.50	0.116	0.598
1,246.00	0.117	0.656
1,246.50	0.118	0.715
1,247.00	0.119	0.774
1,247.50	0.121	0.834
1,248.00	0.122	0.895
1,248.50	0.123	0.956
1,249.00	0.125	1.018
1,249.50	0.126	1.081
1,250.00	0.127	1.144
1,250.50	0.129	1.208
1,251.00	0.130	1.273
1,251.50	0.131	1.338
1,252.00	0.133	1.404
1,252.50	0.134	1.471
1,253.00	0.135	1.538
1,253.50	0.137	1.606
1,254.00	0.138	1.675
1,254.50	0.140	1.744
1,255.00	0.141	1.815

Stage Storage Curve Proposed Pond #1

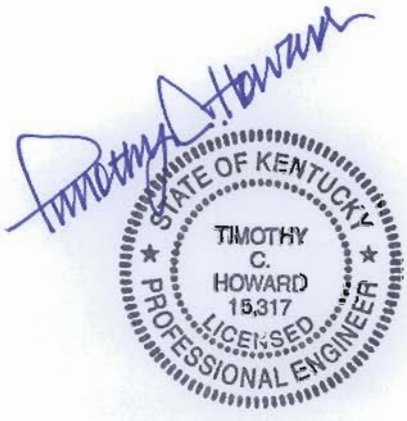


Bell County Coal Corporation

Permit No. 807-5223

Proposed Pond #1

25yr. - 24hr.



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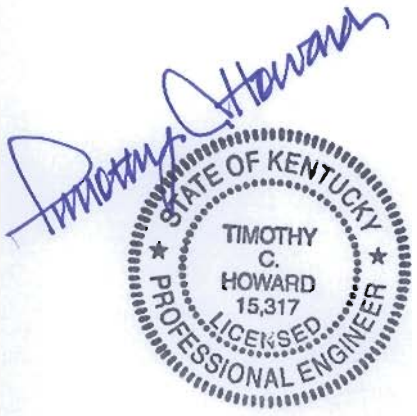
General Information

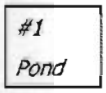
Storm Information:

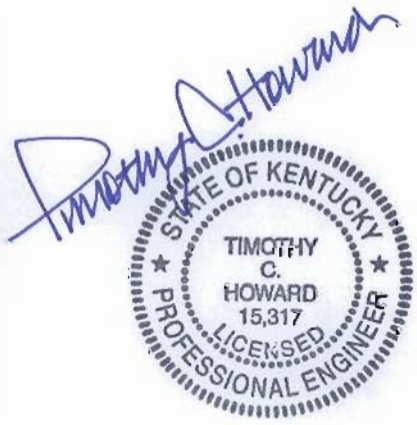
Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	5.200 inches



Structure Networking:

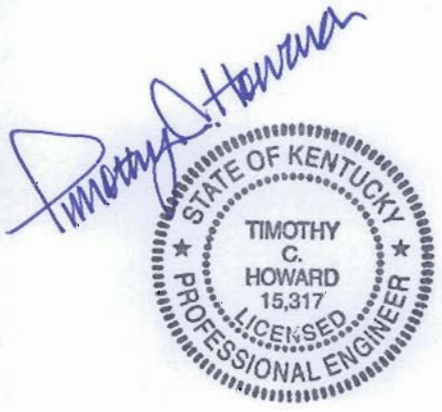
Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Pond #1





Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	6.000	6.000	19.34	1.76
	Out			19.17	1.76



Structure Detail:

Structure #1 (Pond)

Pond #1

Pond Inputs:

Initial Pool Elev:	1,248.00 ft
Initial Pool:	0.89 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	50.00	3.00	0.0240	1,248.00	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
1,249.50	12.00	2.00:1	2.00:1	20.00

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15317
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Pond Results:

Peak Elevation:	1,250.12 ft
Dewater Time:	0.68 days

Dewatering time is calculated from peak stage to lowest spillway

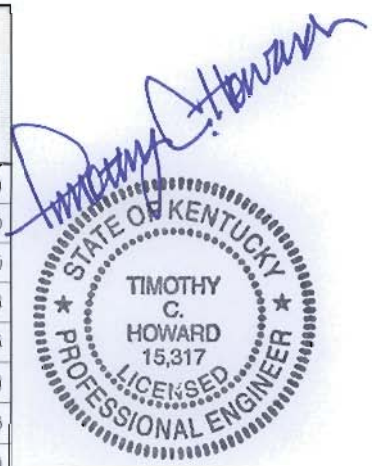
Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
1,240.00	0.102	0.000	0.000	
1,240.50	0.103	0.051	0.000	
1,241.00	0.104	0.103	0.000	
1,241.50	0.106	0.156	0.000	
1,242.00	0.107	0.209	0.000	
1,242.50	0.108	0.263	0.000	
1,243.00	0.109	0.317	0.000	
1,243.50	0.111	0.372	0.000	
1,244.00	0.112	0.427	0.000	
1,244.50	0.113	0.484	0.000	

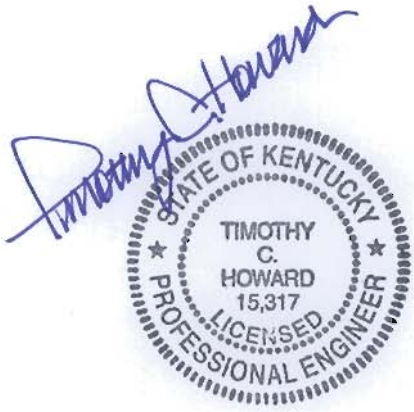
Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
1,245.00	0.114	0.540	0.000		
1,245.50	0.116	0.598	0.000		
1,246.00	0.117	0.656	0.000		
1,246.50	0.118	0.715	0.000		
1,247.00	0.119	0.774	0.000		
1,247.50	0.121	0.834	0.000		
1,248.00	0.122	0.895	0.000		Spillway #1
1,248.50	0.123	0.956	0.751	12.10	
1,249.00	0.125	1.018	2.094	2.60	
1,249.50	0.126	1.081	3.309	0.85	Spillway #2
1,250.00	0.127	1.144	7.827	0.55	
1,250.12	0.128	1.159	19.167	0.20	Peak Stage
1,250.50	0.129	1.208	57.030		
1,251.00	0.130	1.273	113.958		
1,251.50	0.131	1.338	184.317		
1,252.00	0.133	1.404	268.625		
1,252.50	0.134	1.471	366.674		
1,253.00	0.135	1.538	478.436		
1,253.50	0.137	1.606	603.954		
1,254.00	0.138	1.675	743.409		
1,254.50	0.140	1.744	896.997		
1,255.00	0.141	1.815	1,064.937		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,240.00	0.000	0.000	0.000
1,240.50	0.000	0.000	0.000
1,241.00	0.000	0.000	0.000
1,241.50	0.000	0.000	0.000
1,242.00	0.000	0.000	0.000
1,242.50	0.000	0.000	0.000
1,243.00	0.000	0.000	0.000
1,243.50	0.000	0.000	0.000
1,244.00	0.000	0.000	0.000
1,244.50	0.000	0.000	0.000
1,245.00	0.000	0.000	0.000
1,245.50	0.000	0.000	0.000



Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,246.00	0.000	0.000	0.000
1,246.50	0.000	0.000	0.000
1,247.00	0.000	0.000	0.000
1,247.50	0.000	0.000	0.000
1,248.00	0.000	0.000	0.000
1,248.50	(3)>0.751	0.000	0.751
1,249.00	(3)>2.094	0.000	2.094
1,249.50	(5)>3.309	0.000	3.309
1,250.00	(6)>3.806	4.021	7.827
1,250.50	(6)>4.156	52.874	57.030
1,251.00	(6)>4.471	109.487	113.958
1,251.50	(6)>4.759	179.558	184.317
1,252.00	(6)>5.028	263.597	268.625
1,252.50	(6)>5.297	361.377	366.674
1,253.00	(6)>5.567	472.870	478.436
1,253.50	(6)>5.797	598.157	603.954
1,254.00	(6)>6.022	737.387	743.409
1,254.50	(6)>6.247	890.750	896.997
1,255.00	(6)>6.472	1,058.465	1,064.937

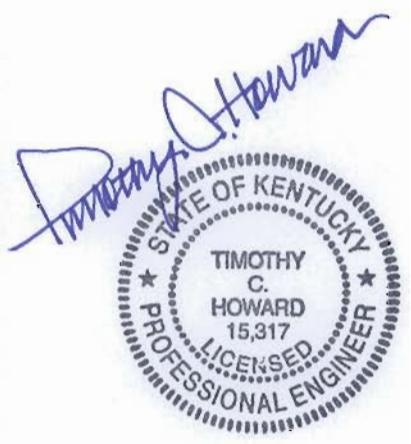


Subwatershed Hydrology Detail:

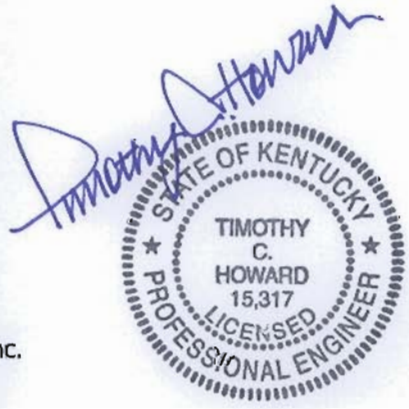
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.000	0.165	0.000	0.000	86.000	F	19.34	1.760
	Σ	**6.000**						**19.34**	**1.760**

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	1.00	5.00	500.00	1.000	0.138
		8. Large gullies, diversions, and low flowing streams	1.00	3.00	300.00	3.000	0.027
#1	**1**	**Time of Concentration:**					**0.165**



Bell County Coal Corporation
Permit No. 807-5223
Proposed Pond #1
25yr. - 24hr.
Pre-Mining Discharge



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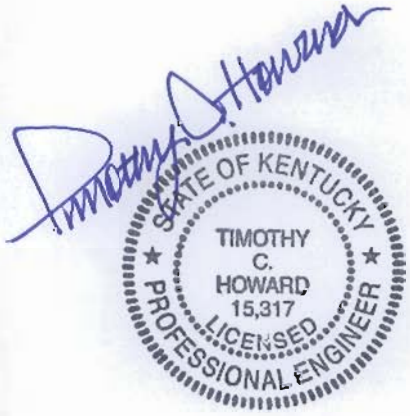
General Information

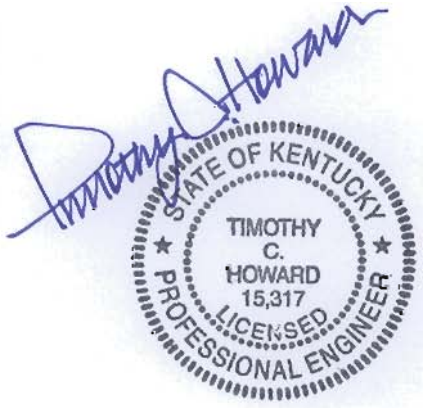
Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	5.200 inches



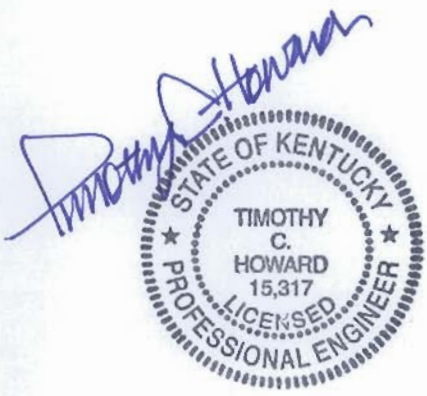
Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Pre-Mine Discarge Pond #1



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	15.200	15.200	39.72	3.09



Structure Detail:

Structure #1 (Null)

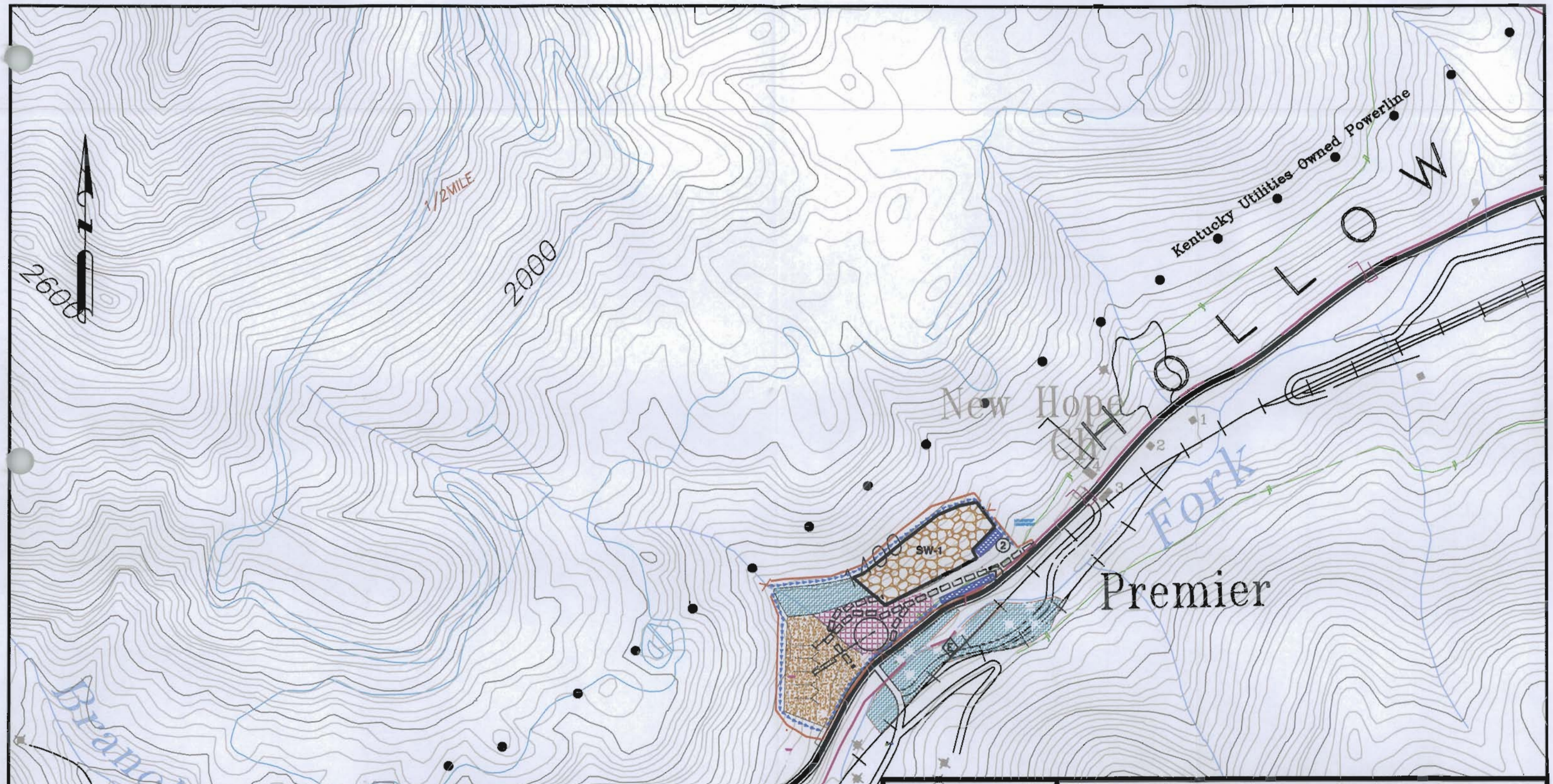
Pre-Mine Discarge Pond #1

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	15.200	0.085	0.000	0.000	73.000	S	39.72	3.085
	$\sum$	**15.200**						**39.72**	**3.085**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	1. Forest with heavy ground litter	50.00	250.00	500.00	1.780	0.078
		8. Large gullies, diversions, and low flowing streams	38.00	190.00	500.00	18.490	0.007
#1	**1**	**Time of Concentration:**					**0.085**



I, Timothy C. Howard, P.E. No. 15,317

Date: 4/29/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED
PROFESSIONAL ENGINEER

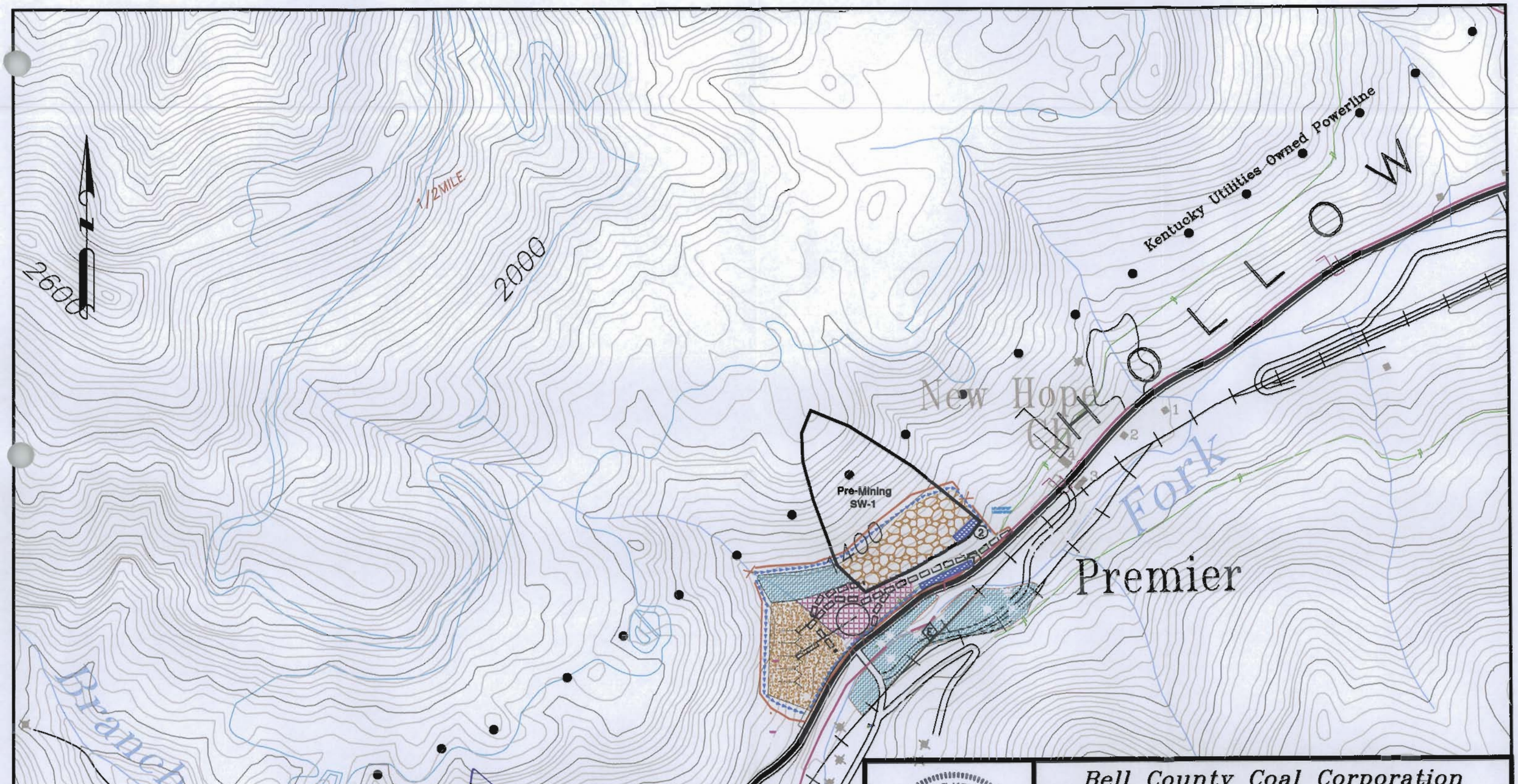
Bell County Coal Corporation

Permit No. 807-5223
Sub-Watershed Map
Proposed Pond #2

Scale: 1" = 500'

Page No. 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.



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STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit No. 807-5223
Pre-Mining Sub-Watershed Map
Proposed Pond #2

Scale: 1" = 500'

Page No. 1 of 1

prepared by:
Howard Engineering & Geology, Inc.

ATTACHMENT 31.3.A

SEDIMENT VOLUME CALCULATION

Pond Number 2

Sediment volume calculations for this pond are based on the maximum disturbance that will occur within the watershed served by the pond. The acreages used for sediment volume calculations are the same areas which are used in the "SEDCAD" computer runs. A sediment yield of 0.125 ac-ft/acre of disturbance was used and a 60% clean-out is proposed.

SUBWATERSHED #	ACREAGE	DISTURBED
2	4.00	Yes

Total Disturbed area = 4.00 ac.
4.00 ac. (0.125 ac-ft/acre) = 0.50 ac-ft total sediment yield
0.50 ac-ft (0.60) = 0.30 ac-ft sediment clean-out

The "West Virginia" method is used for this sediment pond design. The clean-out level is proposed at 60% such that when the level of sediment reaches the designed clean-out level, the pond will be cleaned.

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WEST VIRGINIA DESIGN

EXCAVATED SEDIMENT POND, DUGOUT TYPE

Structure Proportioning Computation Sheet

Pond Number Pond #2

SEDIMENT STORAGE REQUIREMENT

Drainage Area = 4.00 Ac.

Area Disturbed= 4.00 Ac.

Required Sediment Volume = 0.125 Ac. Ft. X Acres Disturbed Area Controlled By Pond No. 2 = 0.50 Ac. Ft.

Actual Designed Sediment Storage Volume = 10.50 Ac. Ft.

Sediment Pool Stage 1308.25' + Headwater Depth, 3.27' + Freeboard Height (Min. 0.5') 0.48' = Top of Pond Stage 1312'

SEDIMENT POND DIMENSIONS

Bottom Length 95 Ft. Bottom Width 25 Ft.

Water Depth 11.25' Ft. Side Slopes 0.25 : 1

Volume 0.760 Ac. Ft.

EMERGENCY SPILLWAY - EXCAVATED

Side Slopes 2 : 1 Bottom Width 20 Ft.

Slope 1 % Spillway Length 12 Ft.

PRINCIPAL SPILLWAY

12" Diameter 50' Length

3% Slope

DISCHARGE SUMMATION

The peak discharge of a 25-year, 24-hour Storm Event for the Principal/Emergency Spillway 13.90 cfs

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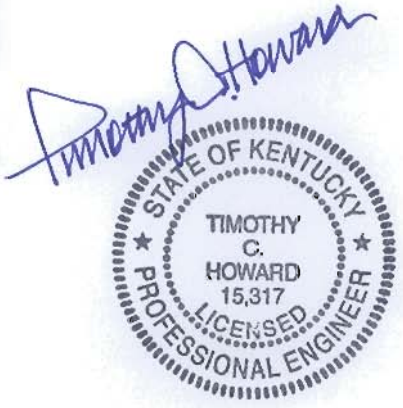
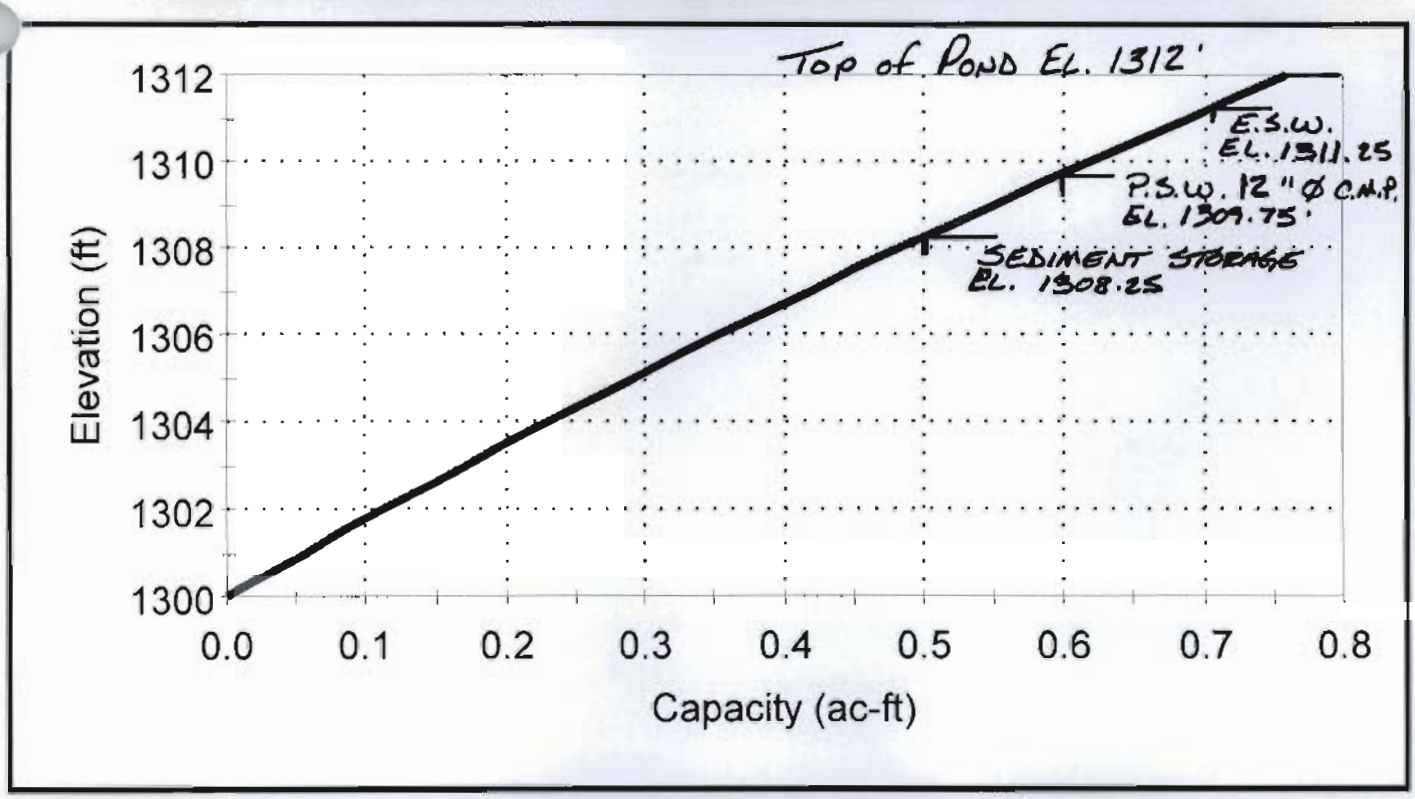
Stage Storage Chart Proposed Pond #2

Elevation-Area-Capacity Table

Elevation (ft)	Area (ac)	Capacity (ac-ft)
1,300.00	0.055	0.000
1,300.50	0.056	0.028
1,301.00	0.056	0.056
1,301.50	0.057	0.084
1,302.00	0.058	0.113
1,302.50	0.058	0.142
1,303.00	0.059	0.171
1,303.50	0.060	0.201
1,304.00	0.060	0.231
1,304.50	0.061	0.261
1,305.00	0.062	0.292
1,305.50	0.063	0.323
1,306.00	0.063	0.354
1,306.50	0.064	0.386
1,307.00	0.065	0.418
1,307.50	0.065	0.451
1,308.00	0.066	0.484
1,308.50	0.067	0.517
1,309.00	0.068	0.550
1,309.50	0.068	0.584
1,310.00	0.069	0.619
1,310.50	0.070	0.653
1,311.00	0.070	0.688
1,311.50	0.071	0.724
1,312.00	0.072	0.760



Stage Storage Curve Proposed Pond #2



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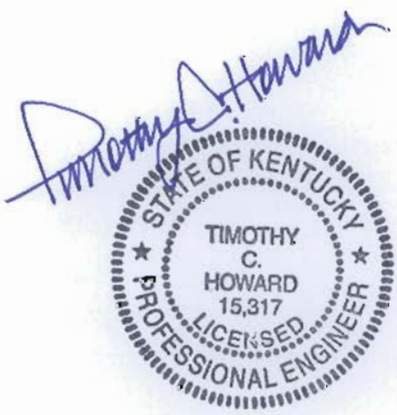
Bell County Coal Corporation
Permit No. 807-5223
Proposed Pond #2
25yr. - 24hr.



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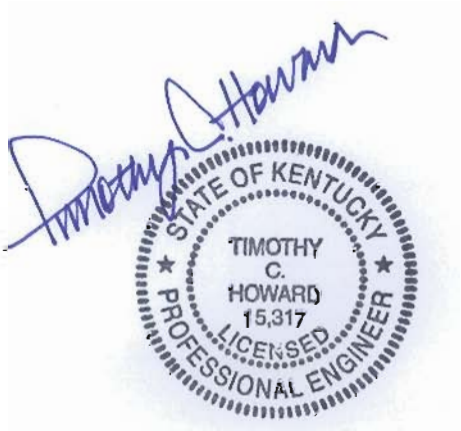
Harlan, Kentucky 40831

Phone: 606-573-6924, ext 118
Email: tmesser@howardeng-geo.com

General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	5.200 inches



Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Pond #2

#1
Pond

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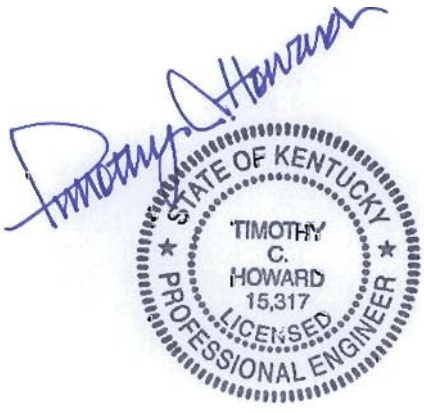
Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	4.000	4.000	13.98	1.22
	Out			13.90	1.22



Structure Detail:

Structure #1 (Pond)

Pond #2

Pond Inputs:

Initial Pool Elev:	1,309.75 ft
Initial Pool:	0.60 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	50.00	3.00	0.0240	1,309.75	0.90	0.00

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
1,311.25	12.00	2.00:1	2.00:1	20.00

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Pond Results:

Peak Elevation:	1,311.52 ft
Dewater Time:	0.61 days

Dewatering time is calculated from peak stage to lowest spillway

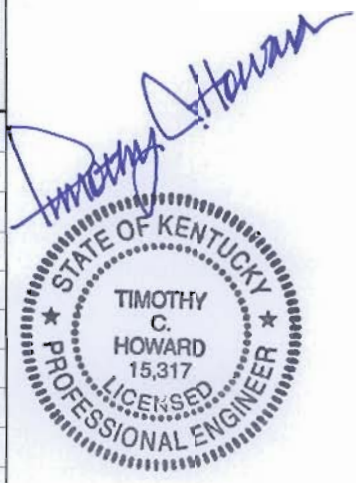
Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
1,300.00	0.055	0.000	0.000	
1,300.50	0.056	0.028	0.000	
1,301.00	0.056	0.056	0.000	
1,301.50	0.057	0.084	0.000	
1,302.00	0.058	0.113	0.000	
1,302.50	0.058	0.142	0.000	
1,303.00	0.059	0.171	0.000	
1,303.50	0.060	0.201	0.000	
1,304.00	0.060	0.231	0.000	
1,304.50	0.061	0.261	0.000	

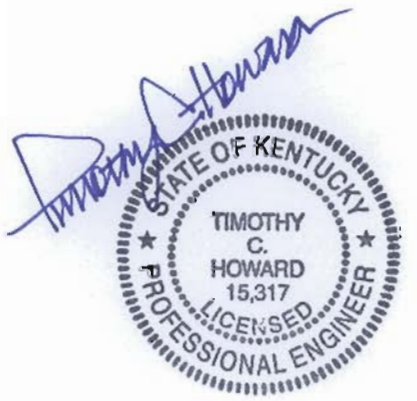
Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
1,305.00	0.062	0.292	0.000		
1,305.50	0.063	0.323	0.000		
1,306.00	0.063	0.354	0.000		
1,306.50	0.064	0.386	0.000		
1,307.00	0.065	0.418	0.000		
1,307.50	0.065	0.451	0.000		
1,308.00	0.066	0.484	0.000		
1,308.50	0.067	0.517	0.000		
1,309.00	0.068	0.550	0.000		
1,309.50	0.068	0.584	0.000		
1,309.75	0.069	0.602	0.000		Spillway #1
1,310.00	0.069	0.619	0.295	7.40	
1,310.50	0.070	0.653	1.368	6.05	
1,311.00	0.070	0.688	2.844	0.70	
1,311.25	0.071	0.706	3.309	0.45	Spillway #2
1,311.50	0.071	0.724	13.028		
1,311.52	0.071	0.726	13.897	0.05	Peak Stage
1,312.00	0.072	0.760	32.183		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,300.00	0.000	0.000	0.000
1,300.50	0.000	0.000	0.000
1,301.00	0.000	0.000	0.000
1,301.50	0.000	0.000	0.000
1,302.00	0.000	0.000	0.000
1,302.50	0.000	0.000	0.000
1,303.00	0.000	0.000	0.000
1,303.50	0.000	0.000	0.000
1,304.00	0.000	0.000	0.000
1,304.50	0.000	0.000	0.000
1,305.00	0.000	0.000	0.000
1,305.50	0.000	0.000	0.000
1,306.00	0.000	0.000	0.000
1,306.50	0.000	0.000	0.000
1,307.00	0.000	0.000	0.000
1,307.50	0.000	0.000	0.000



Elevation (ft)	Straight Pipe (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
1,308.00	0.000	0.000	0.000
1,308.50	0.000	0.000	0.000
1,309.00	0.000	0.000	0.000
1,309.50	0.000	0.000	0.000
1,309.75	0.000	0.000	0.000
1,310.00	(3)>0.295	0.000	0.295
1,310.50	(3)>1.368	0.000	1.368
1,311.00	(4)>2.844	0.000	2.844
1,311.25	(5)>3.309	0.000	3.309
1,311.50	(6)>3.628	9.400	13.028
1,312.00	(6)>3.985	28.199	32.183

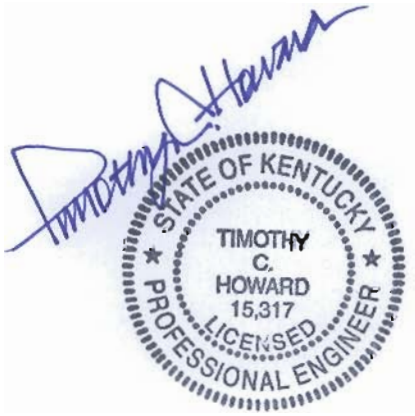


Subwatershed Hydrology Detail:

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	4.000	0.060	0.000	0.000	86.000	F	13.98	1.217
	Σ	**4.000**						**13.98**	**1.217**

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	1.00	0.50	50.00	1.000	0.013
		8. Large gullies, diversions, and low flowing streams	1.00	2.50	250.00	3.000	0.023
		8. Large gullies, diversions, and low flowing streams	50.00	50.00	100.00	21.210	0.001
		8. Large gullies, diversions, and low flowing streams	1.00	2.50	250.00	3.000	0.023
#1	**1**	**Time of Concentration:**					**0.060**



Bell County Coal Corporation

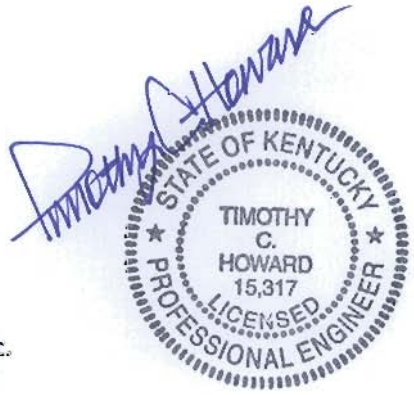
Permit No. 807-5223

Proposed Pond #2

25yr. - 24hr.

Fresh Water Diversion

By Pass Pond #2



Timothy W. Messer

Howard Engineering & Geology, Inc.
P.O. Box 271
2550 West Hwy 72, Suite 1
Harlan, Kentucky 40831

Phone: 606-573-6924, ext 118
Email: tmesser@howardeng-geo.com

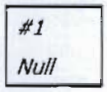
General Information

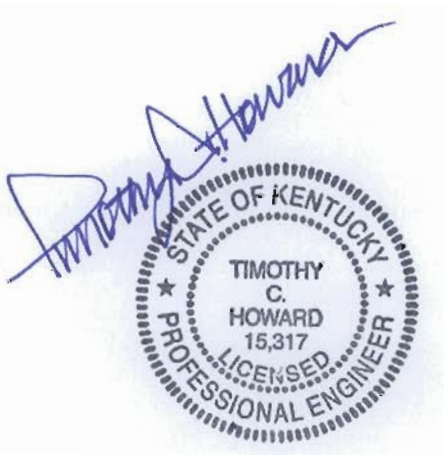
Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	5.200 Inches

Structure Networking:

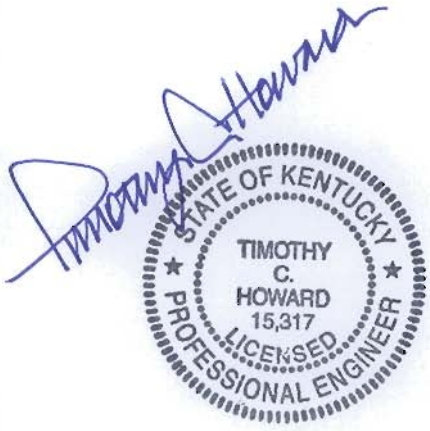
Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Fresh Water By Pass Pond #2





Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	7.500	7.500	19.60	1.52



Structure Detail:

Structure #1 (Null)

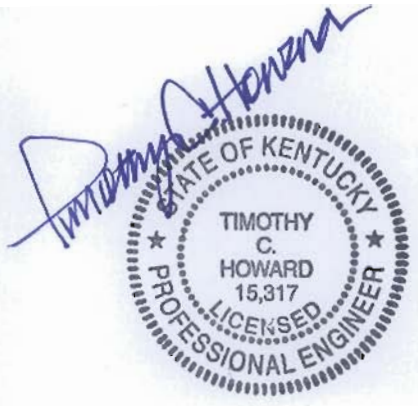
Fresh Water By Pass Pond #2

Subwatershed Hydrology Detail:

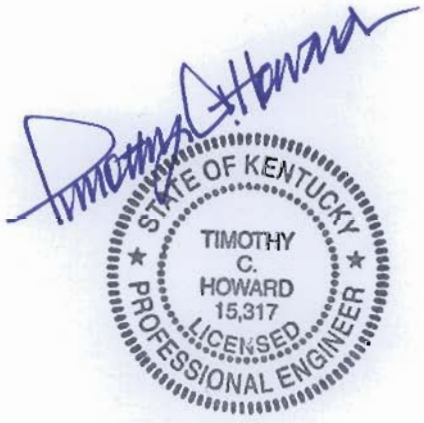
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	7.500	0.080	0.000	0.000	73.000	S	19.60	1.522
	Σ	**7.500**						**19.60**	**1.522**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	1. Forest with heavy ground litter	50.00	250.00	500.00	1.780	0.078
		8. Large gullies, diversions, and low flowing streams	45.98	80.00	174.00	20.340	0.002
#1	**1**	**Time of Concentration:**					**0.080**



Bell County Coal Corporation
Permit No. 807-5223
Proposed Pond #2
25yr. - 24hr.
Pre-Mining Discharge



Timothy W. Messer

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2550 West Hwy 72, Suite 1
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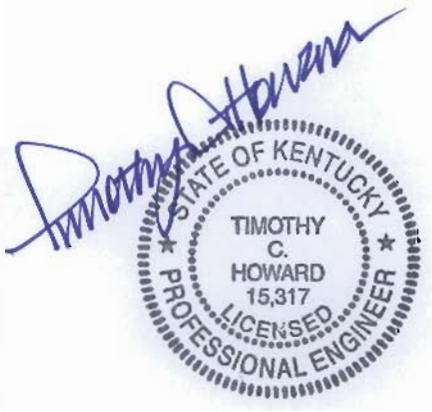
Phone: 606-573-6924, ext 118
Email: tmesser@howardeng-geo.com

General Information

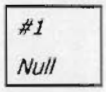
Storm Information:

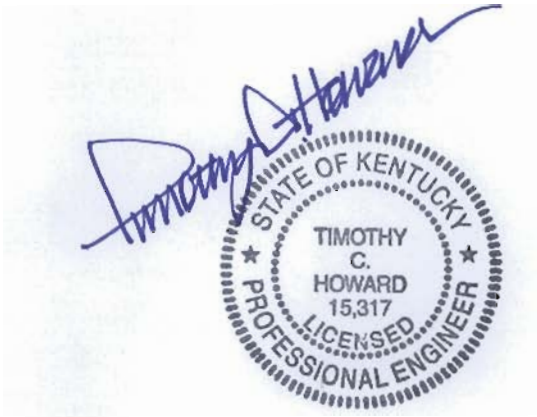
Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	5.200 inches



Structure Networking:

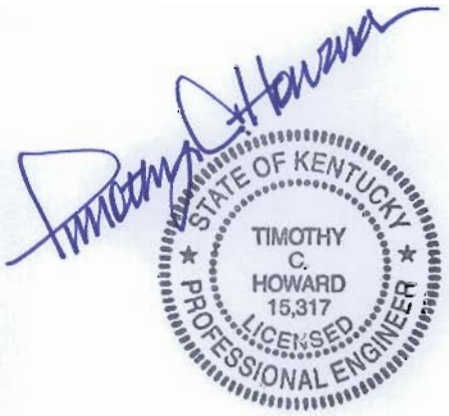
Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	Pre-Mine Discarge Pond #2





Structure Summary:

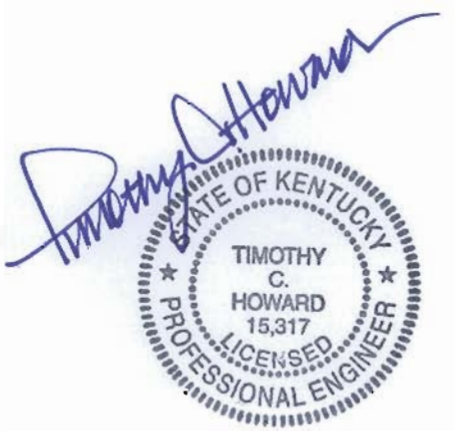
	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	11.500	11.500	30.05	2.33



Structure Detail:

Structure #1 (Null)

Pre-Mine Discarge Pond #2



Subwatershed Hydrology Detail:

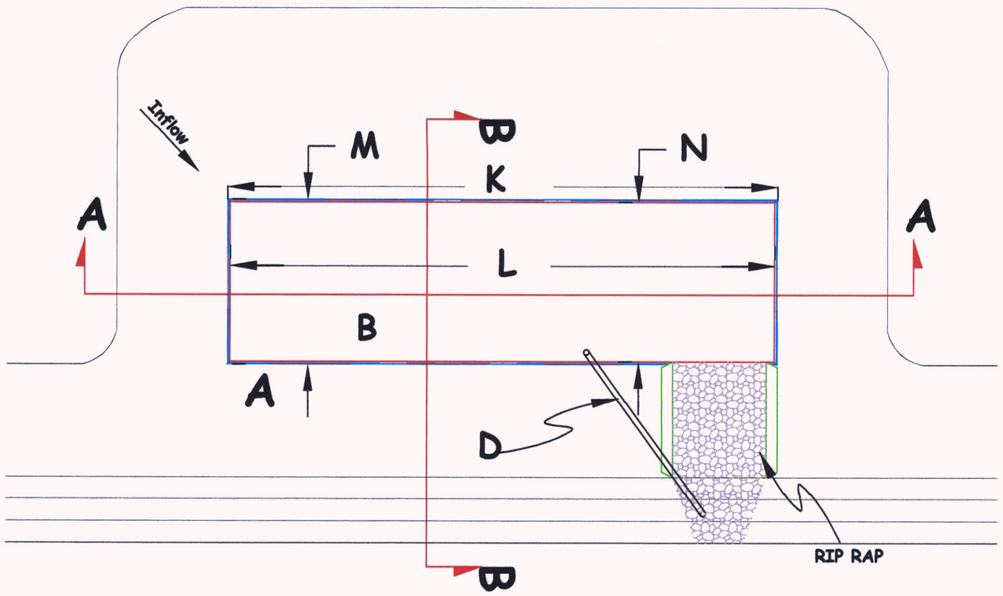
Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	11.500	0.085	0.000	0.000	73.000	S	30.05	2.334
	Σ	**11.500**						**30.05**	**2.334**

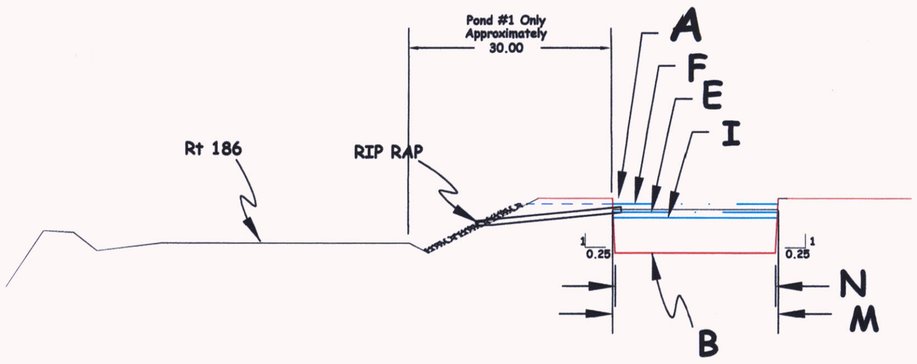
Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	1. Forest with heavy ground litter	50.00	250.00	500.00	1.780	0.078
		8. Large gullies, diversions, and low flowing streams	38.00	190.00	500.00	18.490	0.007
#1	**1**	**Time of Concentration:**					**0.085**

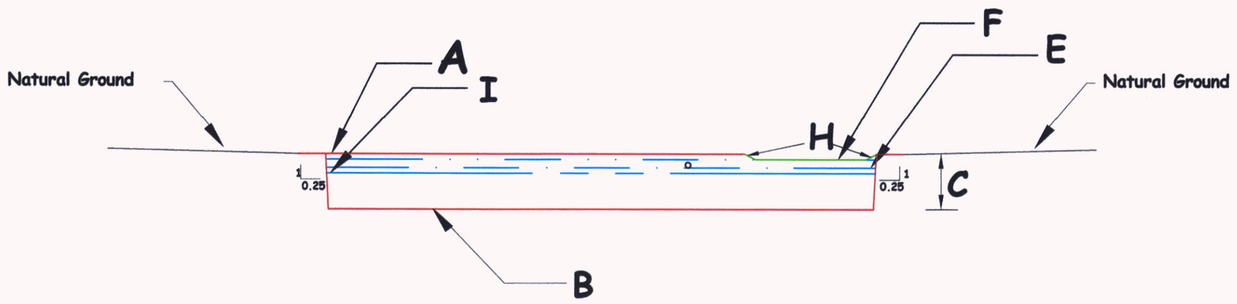
Pond #	A) Top of Pond Elev.	B) Bottom of Pond Elev.	C) Depth of Pond	D) P.S.W. Size	E) P.S.W. Elev.	F) E.S.W. Bottom Elev.	G) E.S.W. Bottom Width	H) E.S.W. Side Slopes	I) Sediment Storage El.	J) North Arrow Direction	K) Top Length	L) Bottom Length	M) Top Width	N) Bottom Width
#1	1255'	1240'	15'	12"	1248'	1249.5'	20'	2:1	1246.5'		205'	197.50'	30'	22.50'
#2	1312'	1300'	12'	12"	1309.75'	1311.25'	20'	2:1	1308.25'		101'	95'	31'	25'

PLAN VIEW





PROFILE B - B'



PROFILE A - A'

I, Timothy C. Howard, P.E. No. 15,317

Date: 8/13/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit No. 807-5223
Pond Template for Ponds #1 & #2
Attachment 31.3.A

Scale: 1" = 20'

Page No. 1 of 1

Prepared by
Howard Engineering & Geology, Inc

31.5 Provide a plan for the periodic maintenance of all sediment structures and discuss the proposed sediment clean-out schedule. Provide information as "Attachment 31.5.A".

See Attachment 31.5.A

31.6 Provide a removal plan for all temporary impoundments. Submit as "Attachment 31.6.A".

See Attachment 31.6.A

32. Diversions

32.1 Is authorization to conduct mining and reclamation or to construct mining related facilities within 100 feet of an intermittent or perennial stream being requested? [XX] YES [ ] NO. If "YES", provide the following information for all of the following.

(a) A map showing the location(s) where such authorization is requested, and the proposed disturbance(s)/facility(ies) with an indication of the specific distance to the stream(s). Submit as "Attachment 32.1.A".

(b) Cross-sections and a longitudinal profile of the stream's premining and postmining configuration. Submit as "Attachment 32.1.B".

(c) A description, including maps, plans, drawings, etc., of the specific measures to be taken to protect the stream(s) during the mining and reclamation operation. Submit as "Attachment 32.1.C".

See Attachment 32.1.ABC

32.2 Will the disturbances referenced in item 32.1 result in the temporary or permanent diversion of an intermittent or perennial stream?
[ ] YES [ ] NO. If "YES", provide as "Attachment 32.2.A", the design calculations and other pertinent information to demonstrate compliance with 405 KAR 16:080, Section 2, or 405 KAR 18:080, Section 2, as appropriate.

See Attachment 32.3.A

32.3 Complete the following chart for all diversions:

Diversion Number	Length of Diversion	Design Storm	Type of Channel	Design Velocity	Av. Slope	Erosion Control Methods
FWDD#1	*1550'*	*100 yr.*	*Trap.*	*4-20ft/s*	*.5-50%*	*Rock Lined*
FWDD#2	*888'*	*100 yr.*	*Trap.*	*1-9ft/s*	*.5-50%*	*Rock Lined*
Ditch A	*139'*	*25yr.*	*Tri.*	*2.99ft/s*	*1%*	*Rock Lined*
Ditch A1	*53'*	*25yr.*	*Tri.*	*2.99ft/s*	*1%*	*Rock Lined*
Ditch B	*276'*	*25yr.*	*Tri.*	*2.99ft/s*	*1%*	*Rock Lined*
Ditch C	*484'*	*25yr.*	*Tri.*	*2.99ft/s*	*1%*	*Rock Lined*

ATTACHMENT 31.5.A

Sediment Pond Maintenance Plan

The sediment ponds that will be constructed or used with this application will be inspected after each significant rainfall event to insure the integrity and stability of the pond and to insure that the spillways are clear and functioning properly. Also, the ponds will be inspected by a Registered Professional Engineer annually, at a minimum, to certify that the ponds are being maintained in such a manner that the effluent from the ponds will continue to meet the performance standards of the "Permanent Program".

The sediment ponds will be maintained such that the sediment level in the ponds will always be at an elevation less than the design sediment elevation detailed in Attachment 31.3. By maintaining the sediment at a level less than the design level, the pond designs provided will always produce an effluent which will meet the performance standards of the "Permanent Program".

When the sediment level reaches the level described, it will be removed from the ponds with a hydraulic excavator, crane or other suitable equipment. The sediment will be placed in a truck and will be hauled to and placed in the backfill areas. If the sediment should prove to be toxic by chemical analysis, it will be disposed of in a pit excavated on the mine bench. This disposal pit would be lined with four (4') feet of the best available impermeable material clay on all sides and the bottom. After the sediment is placed in the pit, the pit will be covered with an additional four (4') feet of clay material.

If the sediment should prove to be non-toxic, the material will be mixed with spoil material and used for backfill and grading operations.

Attachment 31.6.A

Prior to removal of any dugout or embankment sediment structure on this operation, all water will be removed from the structure by pump or siphon. The pump or siphon will be placed in such a manner as to prevent excessive erosion to the surrounding areas. The water will be removed from the pond in a controlled manner. Removal of water by any means will be done in such a manner as to prevent excessive erosion to the surrounding areas. At the discharge end of the pipe used to drain the ponds, straw bales or silt fence will be placed to trap any sediment which may be inadvertently drained from the structure. These straw bales or silt fence will also reduce erosion produced by the discharge of the pipe by dissipating the energy from the discharge. Once all water has been drained from the sediment structure any sediment trapped by the straw bales or silt fence will be placed back in the sediment pond.

After all water has been removed from the structure, the remaining sediment will be allowed to dry. A sample of the sediment material will be taken and analyzed to determine if the sediment material is toxic or non-toxic. If the material proves to be toxic it will be buried in a clay lined hole with a minimum of four (4') feet of cover. If the material proves to be non-toxic, the material will be spread and mixed with the backfill material. The rip-rap used for erosion control around the structures will be excavated and temporarily stored within the permit area for later use in the reclamation of the sediment structure sites. Effluent limitation shall be maintained to all state and federal water quality standards during all stages of pond removal.

All dugout structures located on-bench will be filled in and a small depression of (1) to (2) feet in depth will be left to comply with reclamation plan. The sediment structure sites will be revegetated with a variety of grasses and legumes immediately after the structures have been removed and reclaimed in accordance with 405 KAR 16/18:200 and

Attachment 31.6.A
TRM#21.

The equipment to be used but not limited to for pond removal is as follows:

1) Excavator

2) Bulldozer

3) Haul truck

4) Grader

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR NATURAL RESOURCES

Steven L. Beshear
Governor

Division of Mine Permits
2 Hudson Hollow
Frankfort, Kentucky 40601
Phone (502) 564-2320
Fax (502) 564-6764
www.minepermits.ky.gov

Leonard K. Peters
Secretary

Carl E. Campbell
Commissioner

August 15, 2008

TIM MESSER
HOWARD ENGINEERING & GEOLOGY
P.O. BOX 271
HARLAN KY 40831

RE: Bell County Coal Corp.
Application # 807-5223 NW

Dear MR. Messer:

Recently you submitted to this office a stream restoration plan for the above referenced permit application. This plan has been reviewed by biological staff in the Division of Mine Permits' Critical Resource Review Section, and has determined that the **plan is acceptable.**

If you have any questions, please contact Thomas Barbour, Critical Resources Review Section, at (502) 564-2320.

Sincerely,

Thomas Barbour, Acting Supervisor
Critical Resources Review Section/
Small Operator Assistance Program
Division of Mine Permits

Enclosure

c: Thomas Barbour (e)
Mike Hardin, KDFWR
Lee Andrews, USFWS
Permit File Linda Fischer (e)

ATTACHMENT 32.1.ABC

DISTURBANCE WITHIN 100' OF A STREAM

A

The proposed mine site (face-up) location will remove a portion of an unnamed tributary of Bennetts Fork. A portion of the stream will be removed and the water flow will be diverted by fresh water diversion ditch #2. The stream will be restored to pre mining conditions and configuration after the mining has been completed.

B

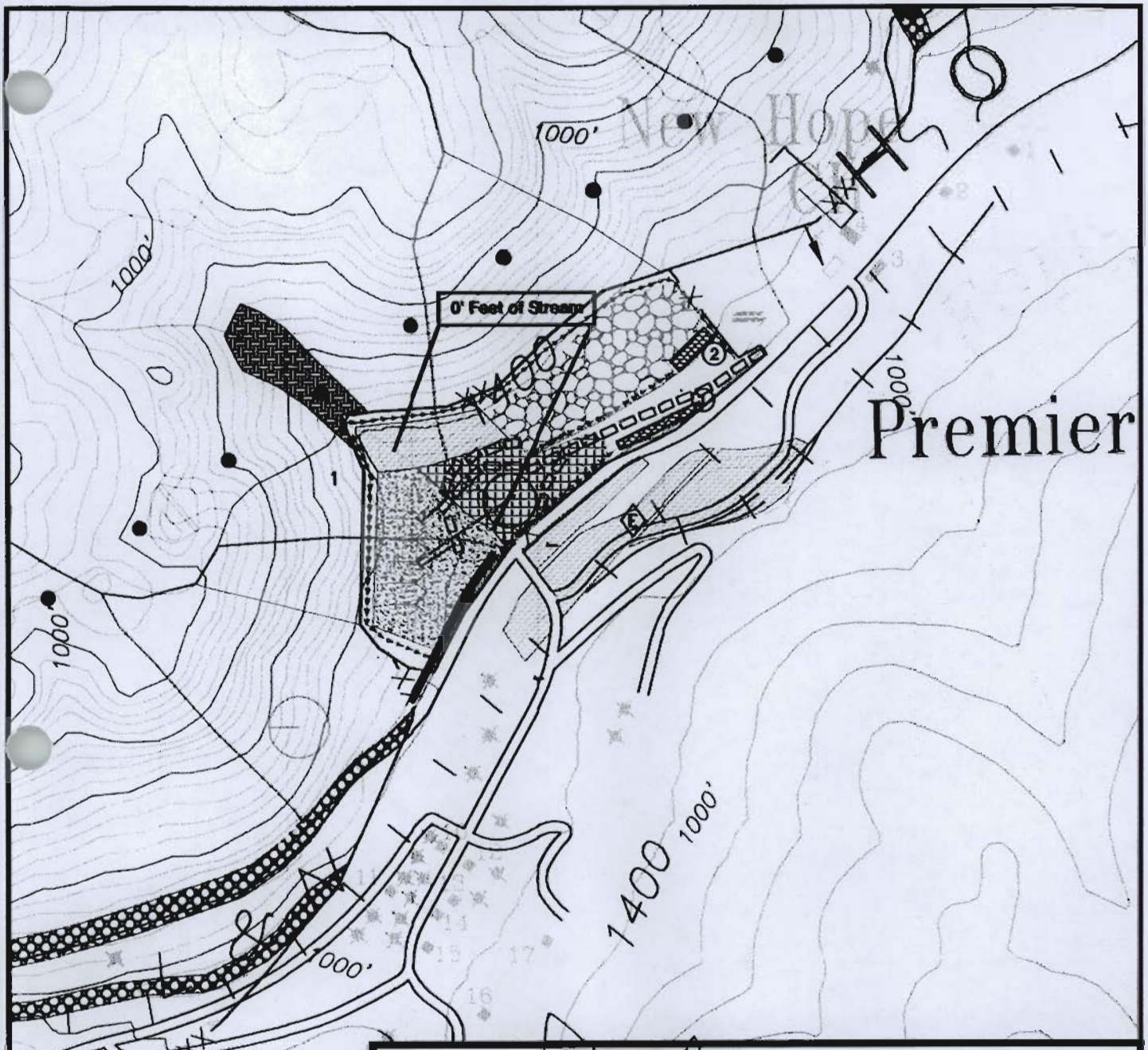
No change is proposed in the alignment of neither the stream nor the stream channel. The pre-mining and post-mining alignment of the stream will be the same.

C

Measures to be taken to avoid or minimize adverse impacts to the unnamed tributary of Hignite Creek :

1. Minimizing the amount of new disturbance.
2. Maintaining the proposed permit area in a semi-vegetated state.
3. Controlling access to the site.
4. Controlling surface runoff through ditches and culverts.

These measures should provide for a during and post mining condition that would be an improvement over the surface condition of the area as the current condition.



I, Timothy C. Howard, P.E. No. 15,317

Date: 6/2/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317
LICENSED PROFESSIONAL ENGINEER

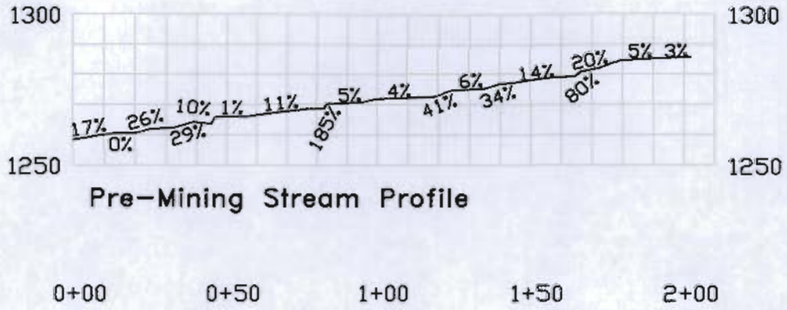
Bell County Coal Corporation

Permit No. 807-5223
Location Map Att. 11.4

Scale: 1" = 500

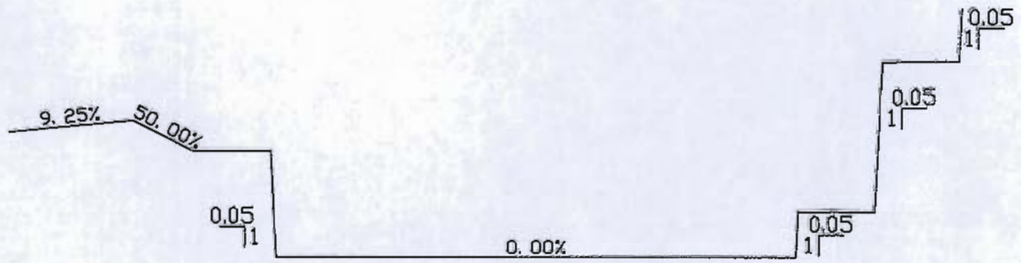
Page No. 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.

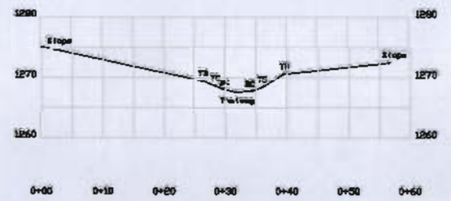


Pre-Mining Stream Profile

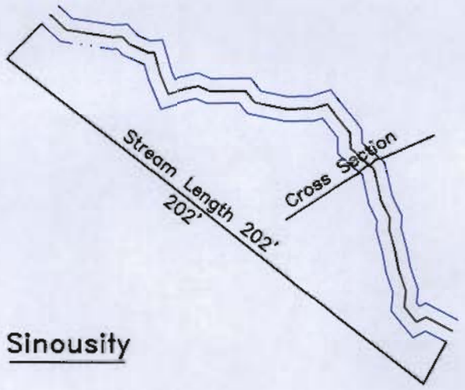
Profile



During-Mining Stream Profile



Typical Section



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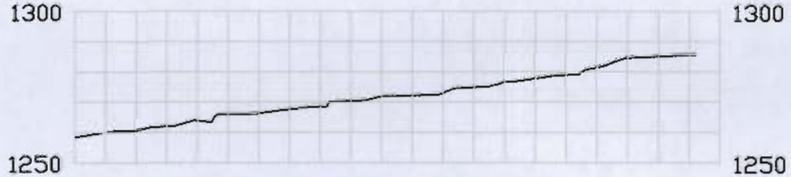


Post-Mining Stream Profile

Profile

I, Timothy C. Howard, P.E. No. 15,317

Date: 4/29/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED
PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit No. 807-5223
Attachment 32.1.b
Longitudinal Profile & Cross-Section

Scale: As-Shown | Page No. 1 of 1

Prepared by:
Howard Engineering & Geology, Inc.

ATTACHMENT 32.3.A

As a part of this application Bell County Coal Corporation is proposing to temporarily divert a intermittent stream channel as a part of the proposed mining activities.

The temporary diversion will divert the runoff from the un-named intermittent tributary away from the proposed mine face-up area. The diversion of the intermittent stream shall comply with 405 KAR 18:080, Section 2 in that the company shall comply with all local, state and federal statutes and regulations. The stream shall be restored and enhanced where possible, riparian vegetation shall be established on the banks of the stream. The longitudinal profile and cross-section, including pools and riffles and drops will be restored pertaining to the channels former aquatic habitat and characteristics. The applicant shall comply with 405 KAR 18:180 in that no more of the intermittent stream shall be disturbed than is absolutely necessary for the creation of the mine site. The applicant shall construct this site to maximize resource recovery as to reduce the possibility of this site having any re-mining potential after mining operations have been completed at this site. The constructed diversions will cut into solid or lined with riprap.

Stream Channel Restoration Plan

Existing Conditions: Some of the areas proposed for stream channel restoration, unnamed tributary of Bennetts Fork have all be previously disturbed by mining, logging and road construction. As a result of these previous disturbances, the channels exhibit both native and non-native channel characteristics. Current riparian vegetation consists of non-native or non-riparian herbaceous species such as yellow dock, multi-flora rose, and blackberry. Woody species include both native and non-native or non-riparian and include sycamore, beech, oak, elm, poplar, and birch. Existing substrate consists of unsorted, angular sandstone, siltstone cobbles and boulders with shale and clay making up the gravel and fine sediments. Riffle sections are characterized as predominantly cobble and gravel sized particles of sandstone and minor amounts of siltstone. Pool sections are characterized as predominantly gravel sized particles and smaller with a thin coating of clay deposits. Photographs of existing vegetation and substrate have been included for reference. An existing channel cross section has been included for the reach proposed for post-mining stream restoration. The channel slope with riffle-pool and or riffle-run ratios have also been included.

Mitigation: The first phase of stream channel restoration will be implemented by re-constructing a natural, normal flow channel (bed width) and full bank width designed as shown on the post-mining cross sections and in accordance with the pre-mining dimensions by the use of an excavator. These channels will be constructed along the entire reach of the unnamed tributary of Bennetts Fork after the mine site and management areas have been backfilled. The natural channel will be constructed in an irregular shape and similar to the pre-mining reach to encourage the development of natural stream sinuosity with step-pool or riffle-pool complexes using a mixed substrate material at least 6 inches in depth. Substrate material will be gathered from the overburden material generated during the mining process and harvested during the backfilling operations. The pre-mining substrate will be used as a guide in selection of substrate material for the restored channels. Cobble sized material and larger will be predominantly sandstone. Gravel sized material and smaller will be layered siltstone or durable shale. All substrate material will be non-toxic, non-acidic, and durable. Natural channel design techniques shall be utilized, using the existing morphology to design the restored channel. Details of the mitigation plan are included in the next section and associated drawings. This method of channel restoration will allow the operation to restore stream impacts as an integral part of satisfying the DNR regulations. The result of this methodology will be a minimization of the temporal stream impacts.

The second phase of stream channel restoration will occur after the natural channel has been constructed. Riparian revegetation will be planted as prescribed in Table 1 in the proposed riparian zone of 50 linear feet from the normal water height of the reconstructed channel. The revegetation plan has been designed to provide both short-term erosion control through immediate herbaceous groundcover along with long-term restoration of stream function and bank stability. Proposed riparian species were chosen based on their value to stream function, availability, non-invasiveness, tolerance to minespoil type soil conditions, availability and native occurrences and are from Appendix 4 of "Guidelines for Stream & Wetland Protection in Kentucky" by the Kentucky Division of Water. Shellbark hickory was chosen as a hardwood exfoliating bark tree species for its value as potential roost habitat for the Indiana Bat (*Myotis Sodalis*), as required by DNR.

Detailed Restoration Plan

The stream channel restoration plan in detail will involve stream reconstruction methods designed for steep gradient streams in this region.

Greater than 10%: Step-pool structures will be constructed at 40-60 feet intervals with an excavator to resemble the pre-mining gradient. Step-pool structures will be constructed utilizing natural, durable sandstone boulders in a cross-vane configuration or by construction of log weirs. Log weirs will be staked to prevent movement. Stream banks will be stabilized with durable sandstone boulders, and root wad revetments alternating bank sides. The bank full widths will be in accordance with the pre-impact widths.

After the channels have been constructed, a riparian zone of 50 feet from the centerline of the stream channel will be established utilizing the following:

Table 1

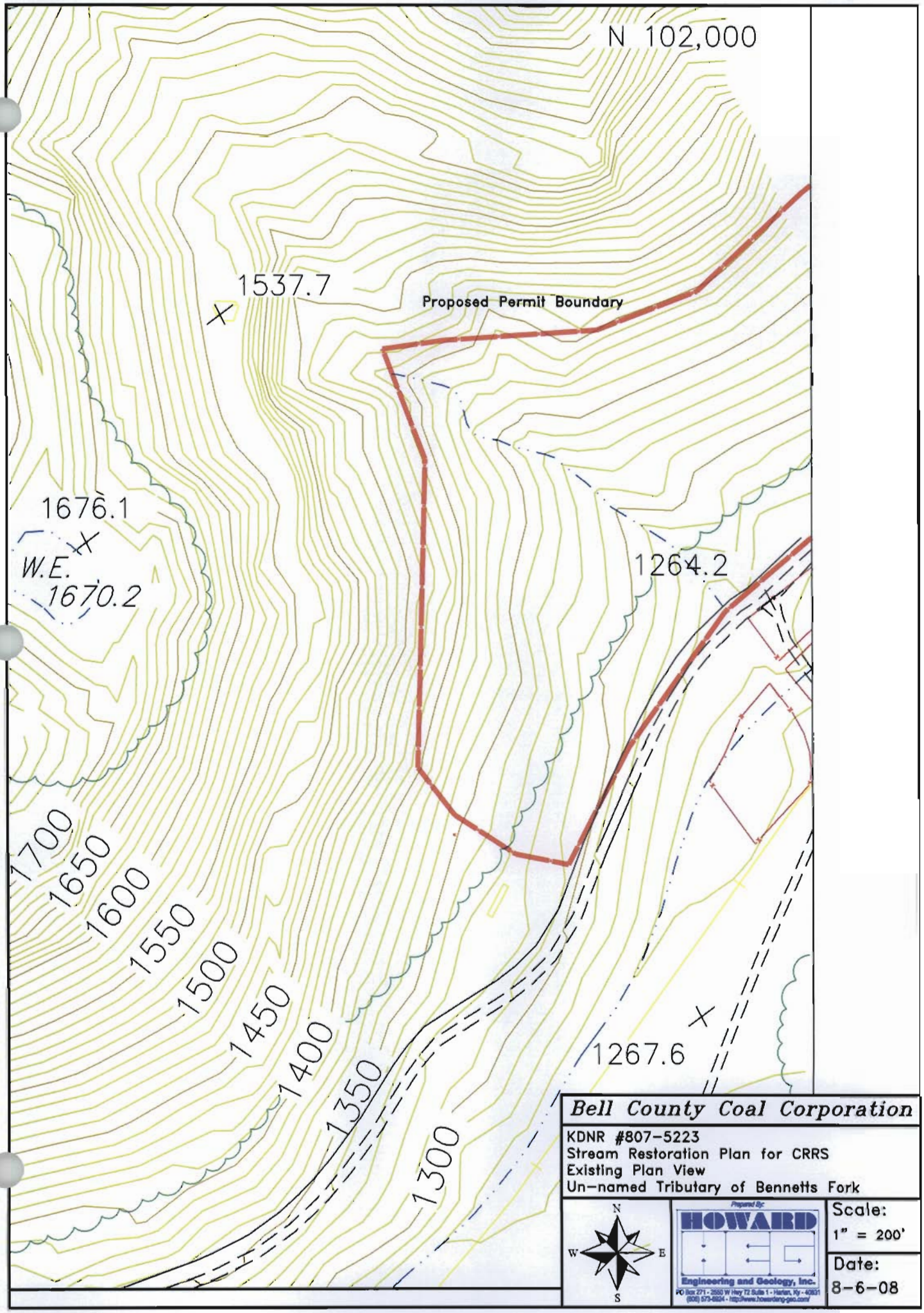
Riparian Zone Revegetation

Common Name	Scientific Name	Seeding Rate
HERBACEOUS GROUNDCOVER		
Sedge	*Carex granularis*	10 lbs./ac.
Annual Rye	*Secale cereale*	25 lbs./ac.
Deertongue grass	*Panicum clandestinum*	2 lbs/ac.
TREES		
Red maple	*Acer rubrum*	20/ac.
Green ash	*Fraxinus pennsylvanica*	30/ac.
Shellbark hickory	*Carya laciniosa*	30/ac.
Yellow poplar	*Liriodendron tulipifera*	100/ac.
SHRUBS		
Alder	*Alnus serrulata*	40/ac.
Silky Dogwood	*Cornus amomum*	30/ac.
Spicebush	*Lindera benzoin*	50/ac.

Note: Additional species may be added for nitrogen fixing capability.

Herbaceous groundcover will be planted by hydroseeder method with soil amendments included. Fiber mulch will be included in the process at a rate of 1500 lbs. /ac. Tree and shrub seedlings will be planted during the early spring or late fall planting periods using the dibble bar or mattock method. The trees and shrubs will be planted in a random/irregular, mixed distribution pattern starting at the average depth and extending 50 feet each side of the channel. Seed mixtures planted will be 98% pure and free of any noxious or invasive plant species.

If any exotic or undesirable species should occur within the riparian zone control techniques described by the Nature Conservancy that follow NPS IPM guidelines will be utilized. The methods utilized will be by mechanical means and will include: Power tools (chain saws, weed whips, winches); and or hand tools (shovels, pulaskis, loppers, Weed Wrenches™, grip hoists, machetes, chokers); and manual removal of herbaceous and shallowly-rooted plants is relatively inexpensive and can be used for plowing or pulling out large individual plants.



Bell County Coal Corporation

KDNR #807-5223
Stream Restoration Plan for CRRS
Existing Plan View
Un-named Tributary of Bennetts Fork

N
W E
S

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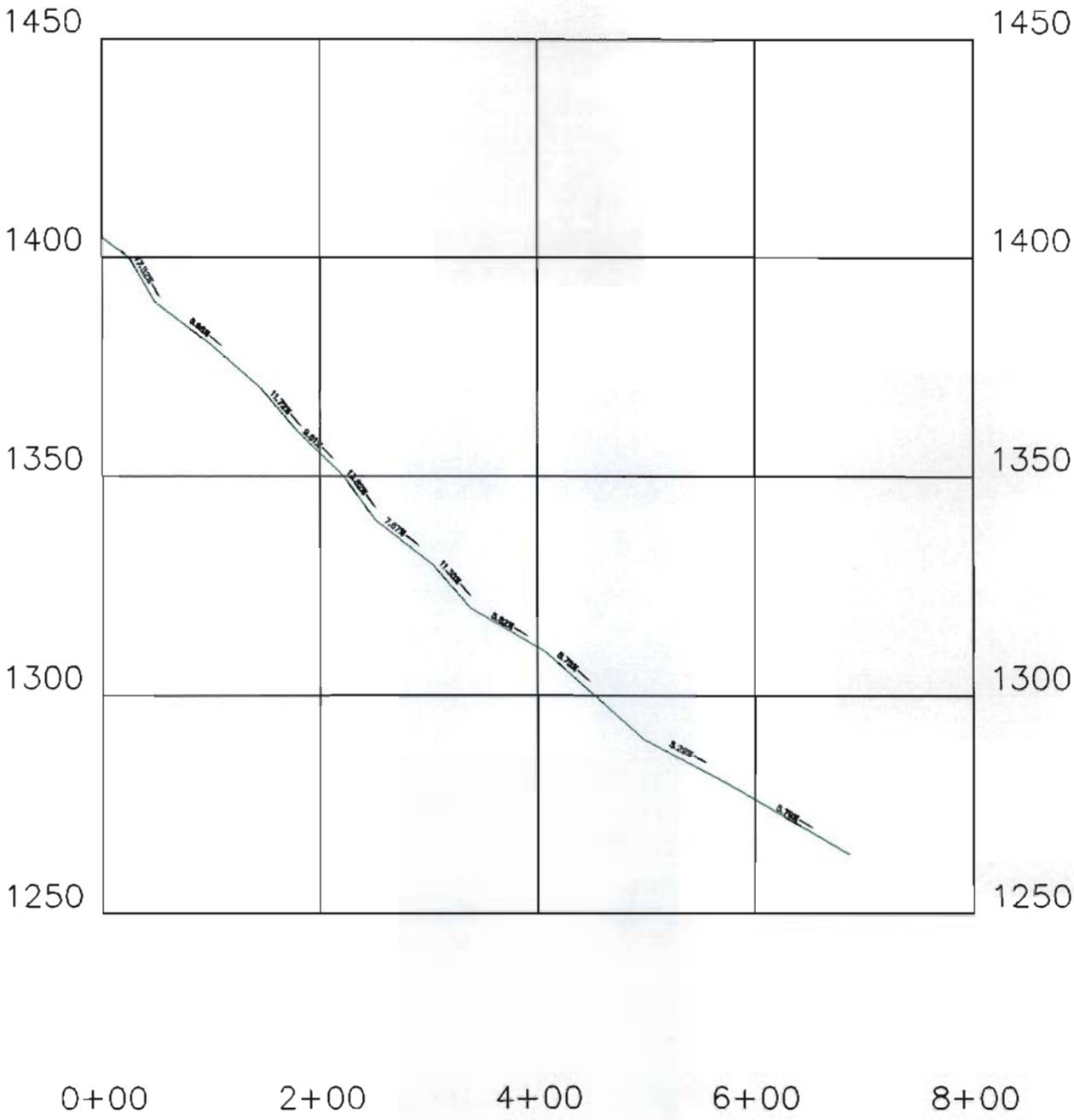
Scale:
1" = 200'

Date:
8-6-08

DIMENSIONS

Riffle/Pool Ratio = 2:1
Riffle Length = 1' – 3'
Pool Length = 2' – 4'



Bell County Coal Corporation

KDNR #807-5223
Stream Restoration Plan for CRRS
Existing Details in Bennett's Fork
Profile View

N
W
E
S

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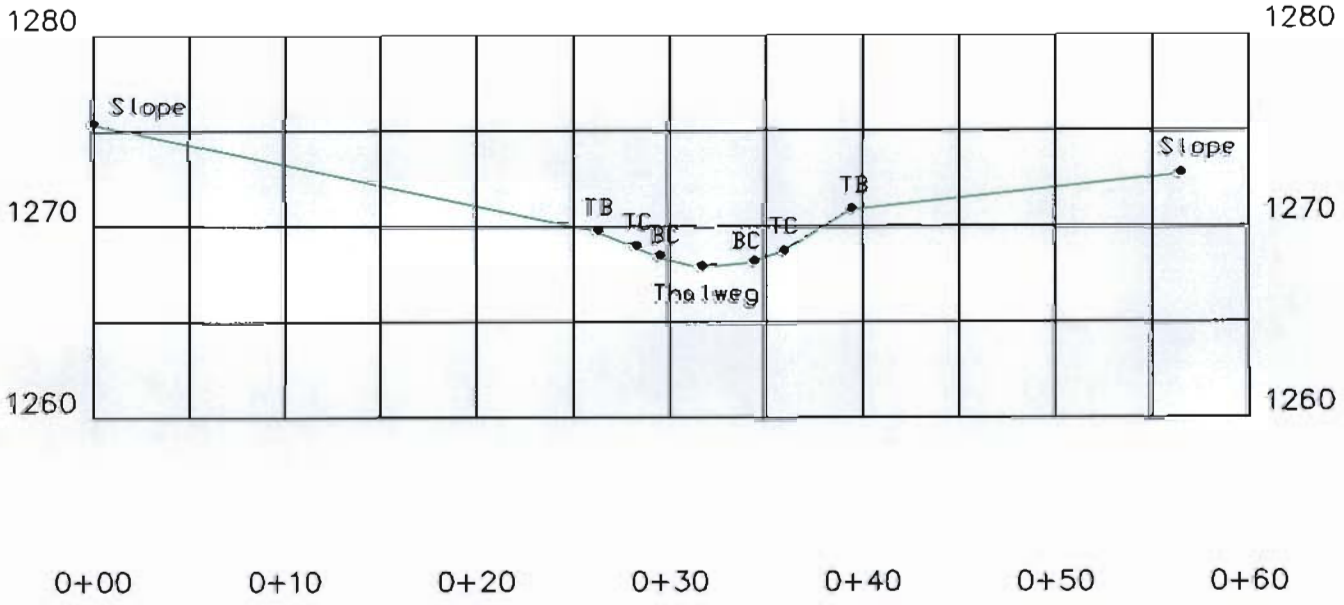
Scale: As-Shown

Date: 8-6-08

DIMENSIONS

Bankfull Width = 3' – 6'
Flood Prone Width = 6' – 9'
Riffle Depth = 2" – 4"
Pool Depth = 1.5' – 2.5'



Typical Section

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KDNR #807-5223
Stream Restoration Plan for CRRS
Existing Details in Bennett's Fork
Typical Cross Section

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Date: 8-6-08

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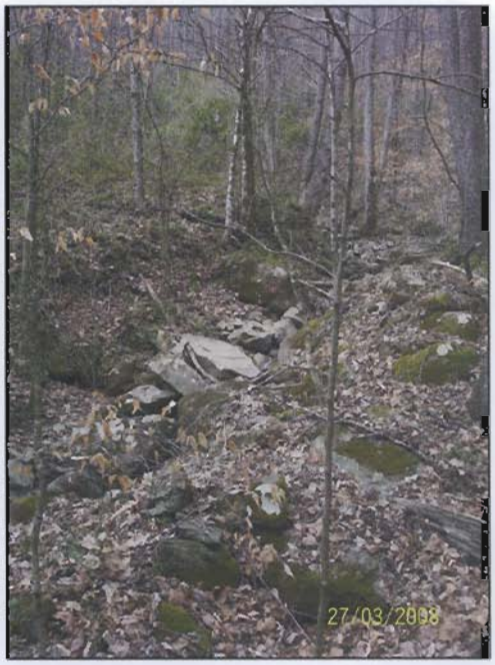
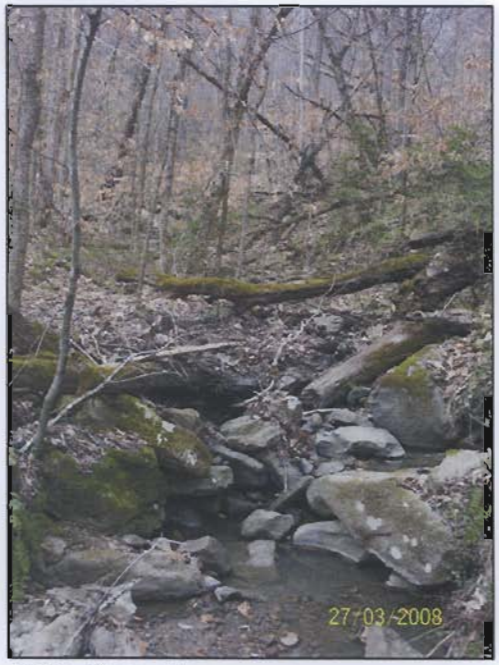
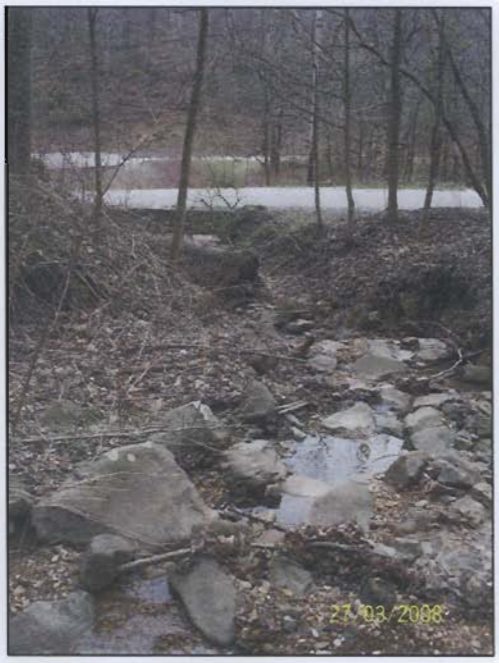


UTBF, Upper Limit



UTBF, Close-Up

UTBF, Upstream



UTBF, Downstream

UTBF, Upstream

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KDNR # 807-5223
Stream Restoration Plan for CRRS
UTBF Photos

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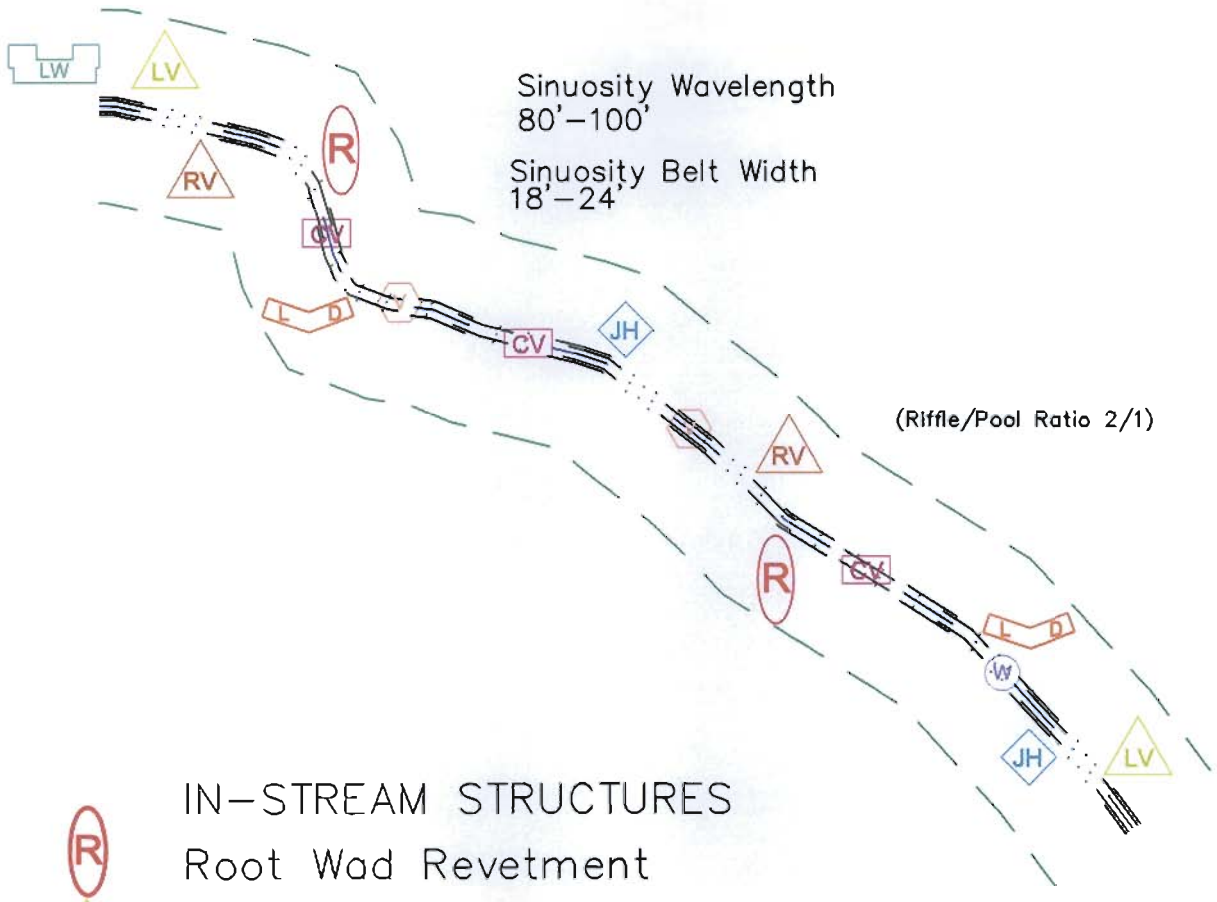

IN–STREAM STRUCTURES

- R — Root Wad Revetment
- LV — Log Vane
- RV — Rock Vane
- JH — J–Hook Vane
- CV — Cross Vane
- L D — Log Deflector
- LW — Log Weir
- V — Vortex Rock Weir
- W — W Rock Weir

- Riparian Zone 50' ea.
- Flood Prone Width
- Stream Thalweg
- Bankfull Width

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KDNR #807–5223
Stream Restoration Plan for CRRS
Mitigation Plan Details in Bennett's Fork
Plan View

N W E S

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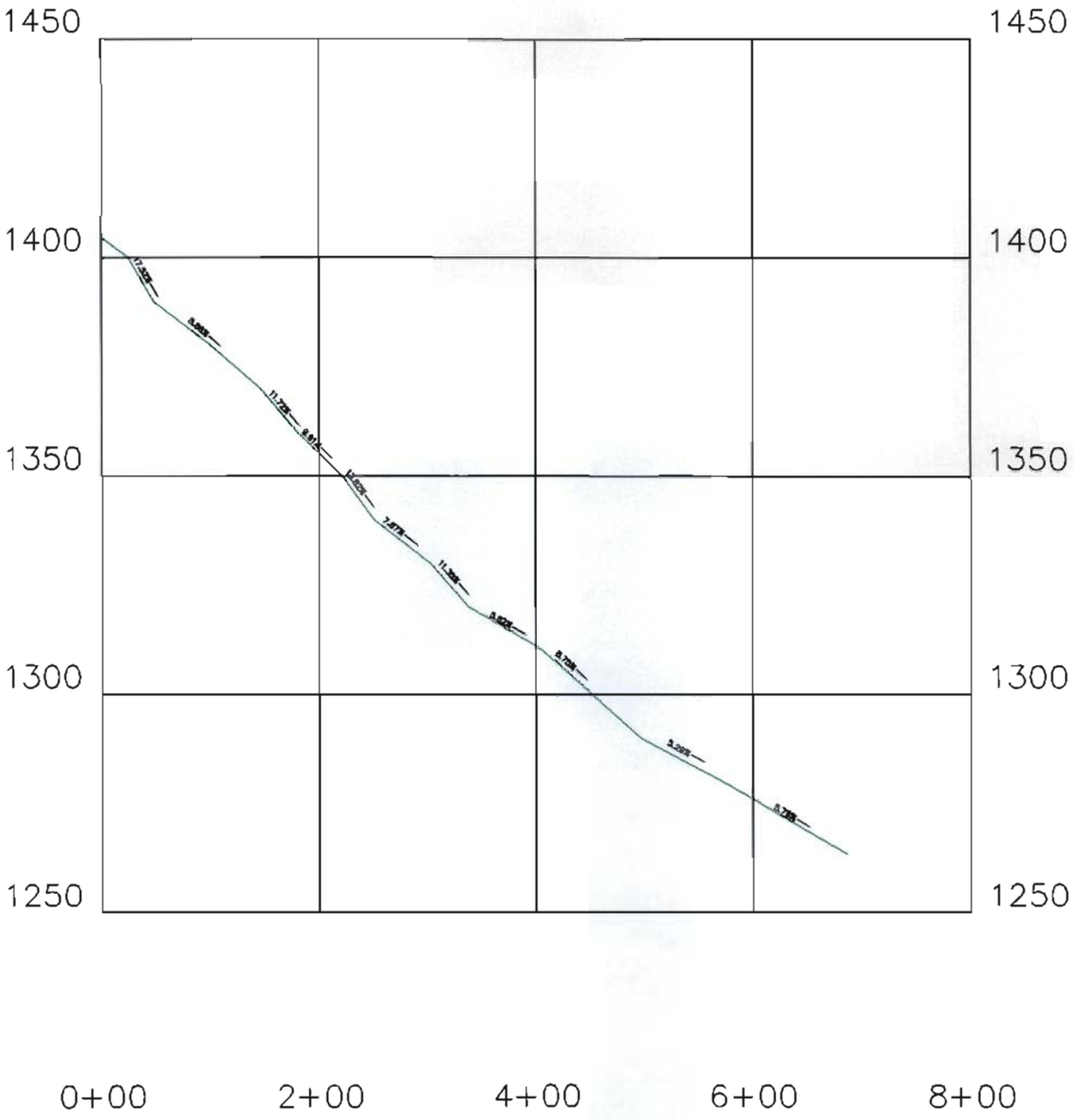
Scale: 1" = 100'

Date: 8–6–08

DIMENSIONS

Riffle/Pool Ratio = 2:1
Riffle Length = 1' – 3'
Pool Length = 2' – 4'



Bell County Coal Corporation

KDNR #807–5223
Stream Restoration Plan for CRRS
Mitigation Details in Bennett's Fork
Profile View

N
W
E
S

Prepared By:
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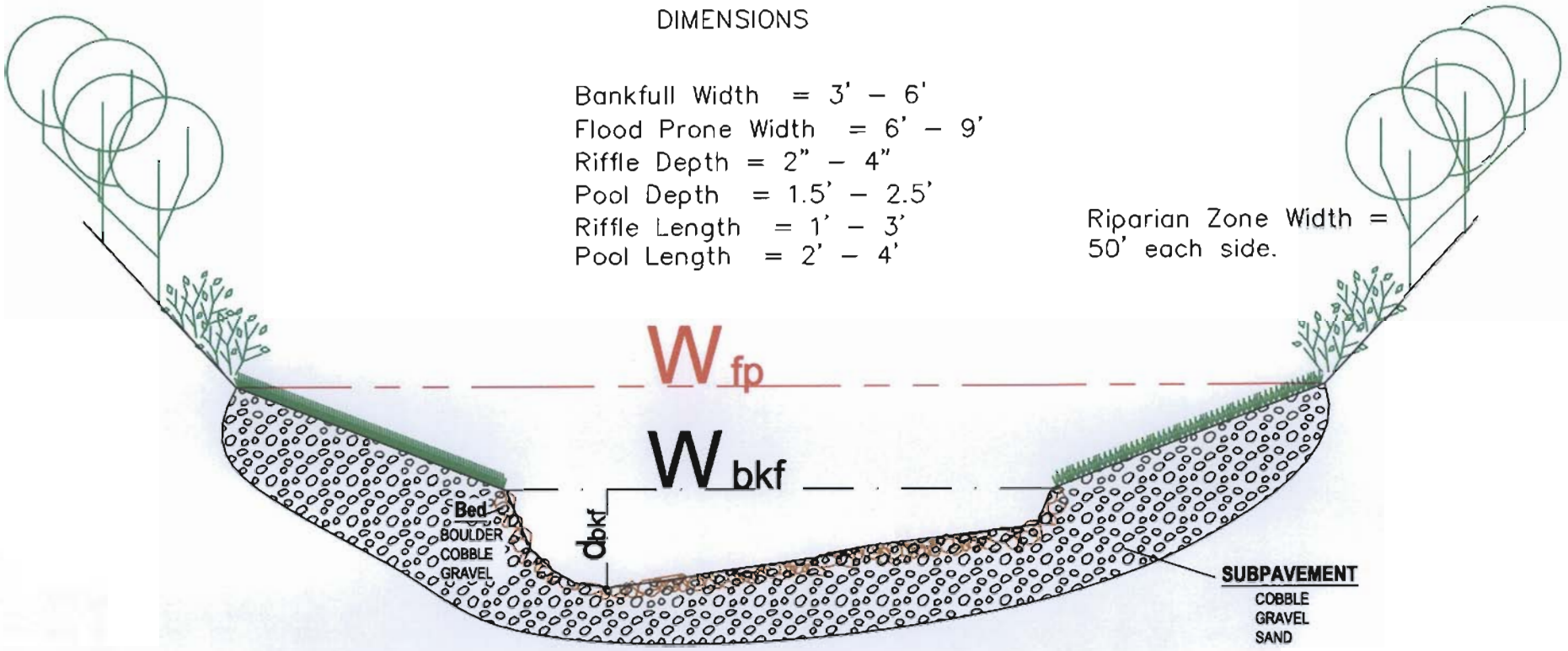
Scale: As–Shown

Date: 8–6–08

DIMENSIONS

Bankfull Width = 3' – 6'
Flood Prone Width = 6' – 9'
Riffle Depth = 2" – 4"
Pool Depth = 1.5' – 2.5'
Riffle Length = 1' – 3'
Pool Length = 2' – 4'

Riparian Zone Width = 50' each side.



GENERAL CHANNEL BED AND SUBPAVEMENT MATERIALS

General PARTICLE Size-Classes

Boulder - Large: 20 inches +
- Small: 10 to 20 inches
Cobble - 2.5 to 10 inches
Gravel - .08 to 2.5 inches
Sand - .062 to 2.0 millimeters
Silt/Clay - < .062 millimeters

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KDNR #807-5223
Stream Restoration Plan for CRRS
Mitigation Plan Details in Bennett's Fork
Typical Cross Section

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Date: 8-6-08

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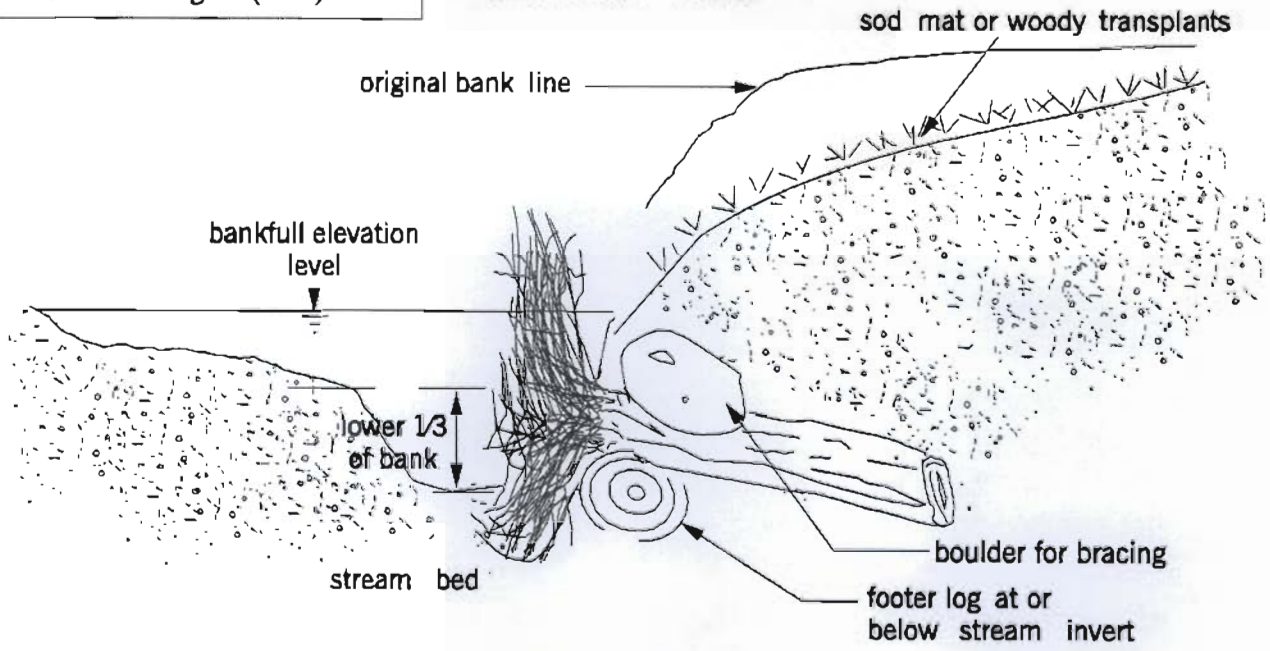
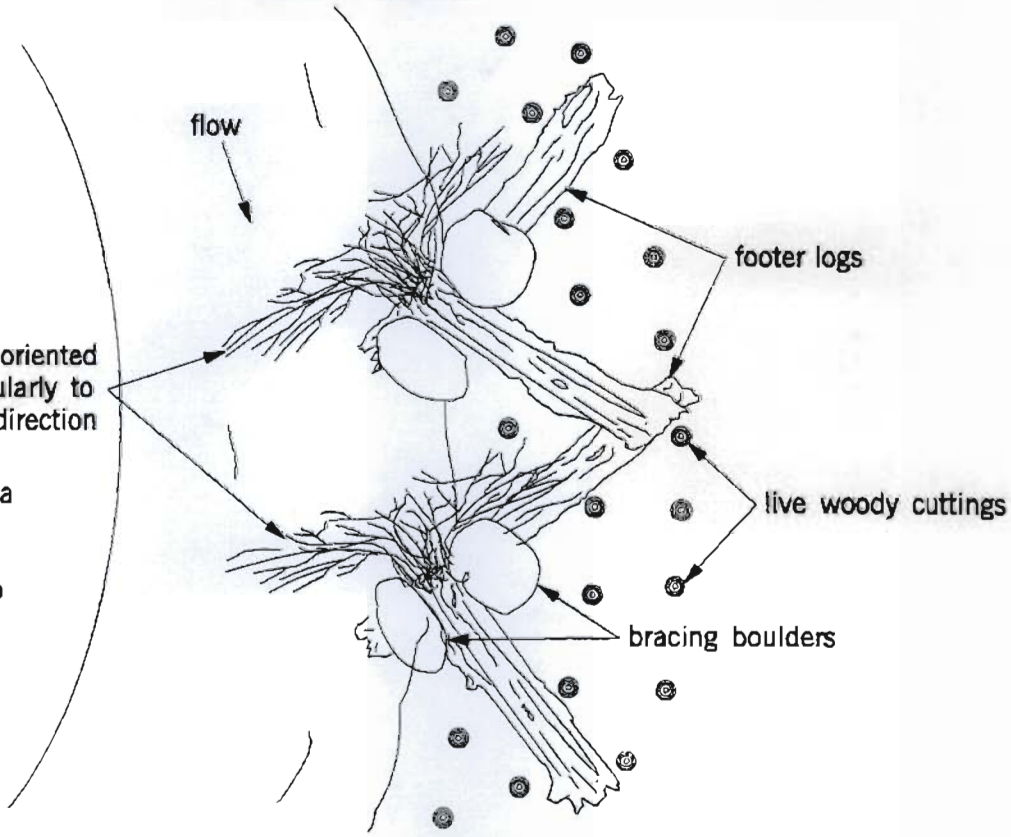
Section & Plan Views Adapted From Rosgen (1999)

SECTION VIEW



PLAN VIEW



Construction Note: a brace log can be used for additional stability and should be pinned to adjacent rootwads

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KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Root Wad Revetment

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Scale: None

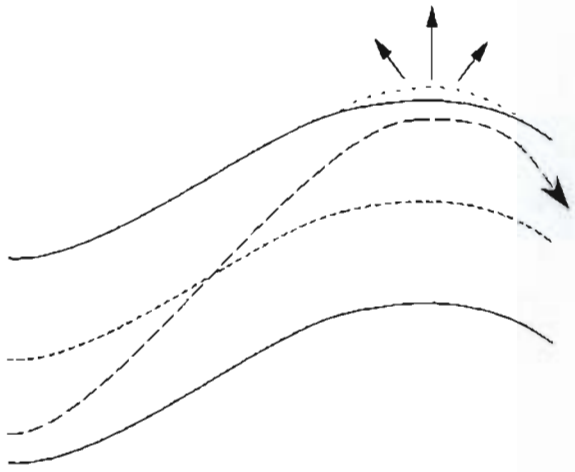
Exhibit: 6a

DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-8 06.DWG

Adapted From Chang (1988)

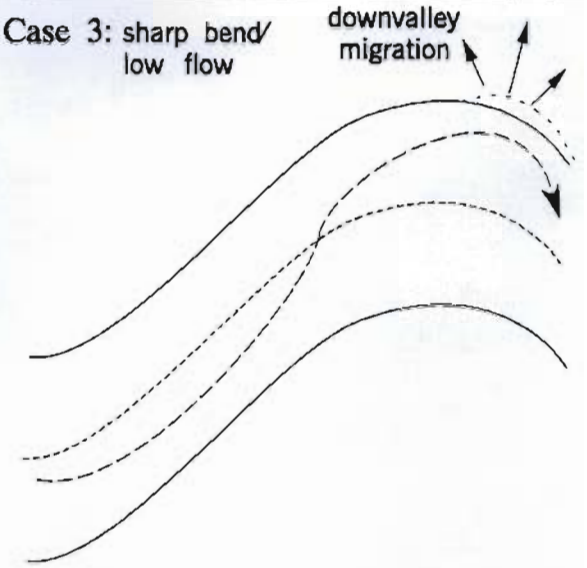
thalweg | channel centerline | erosional area

Case 1: mild bend/ low flow



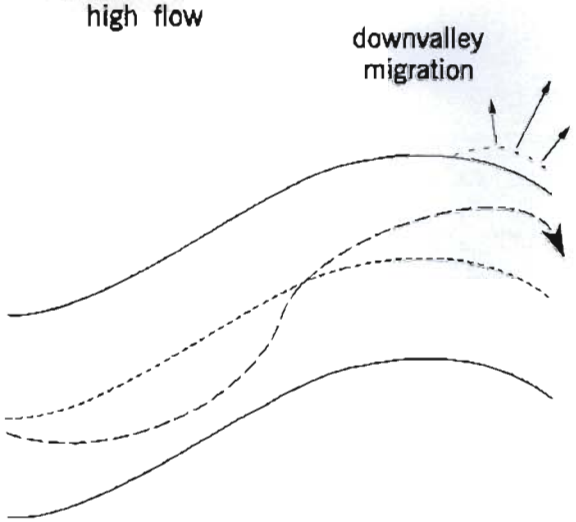
place rootwads on concave bank centering around apex of curve

Case 3: sharp bend/ low flow



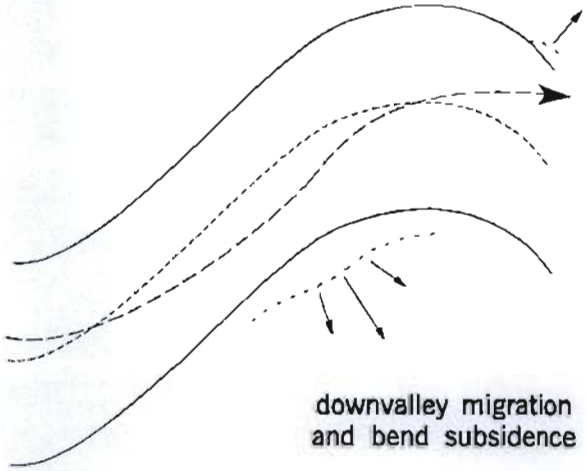
place rootwads on concave bank at apex of curve and continue into crossover reach of bend exit

Case 2: mild bend/ high flow



place rootwads on concave bank at apex of curve and continue into crossover reach of bend exit

Case 4: sharp bend/ high flow



place rootwads on concave bank at apex of curve and continue into crossover reach of bend exit; place rootwads on convex bank in the crossover reach of bend entrance

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KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Root Wad Revetment Placement

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Scale: None

Exhibit: 6b

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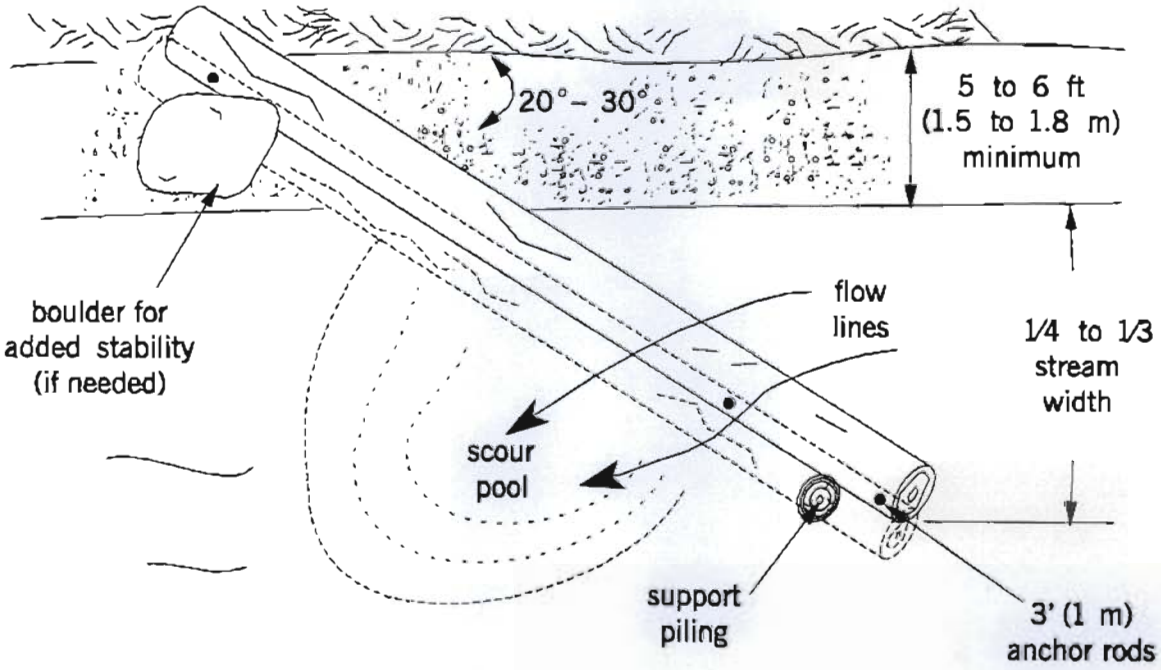
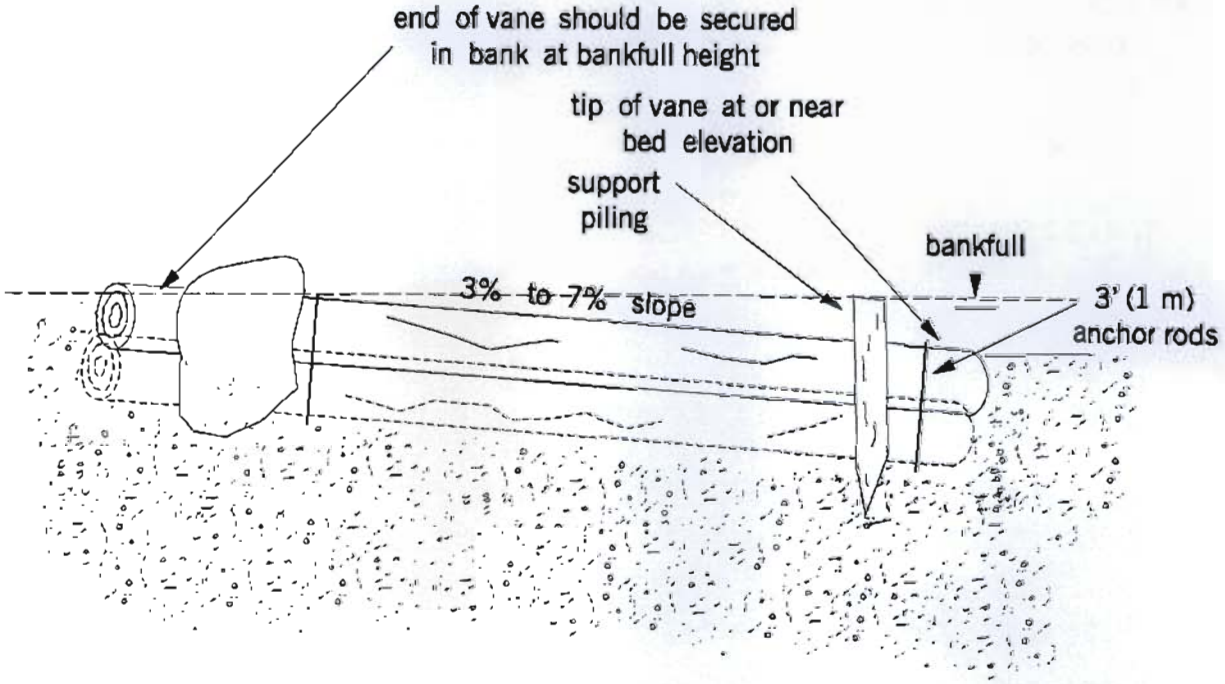
PLAN VIEW: LOG VANE



SECTION VIEW: LOG VANE

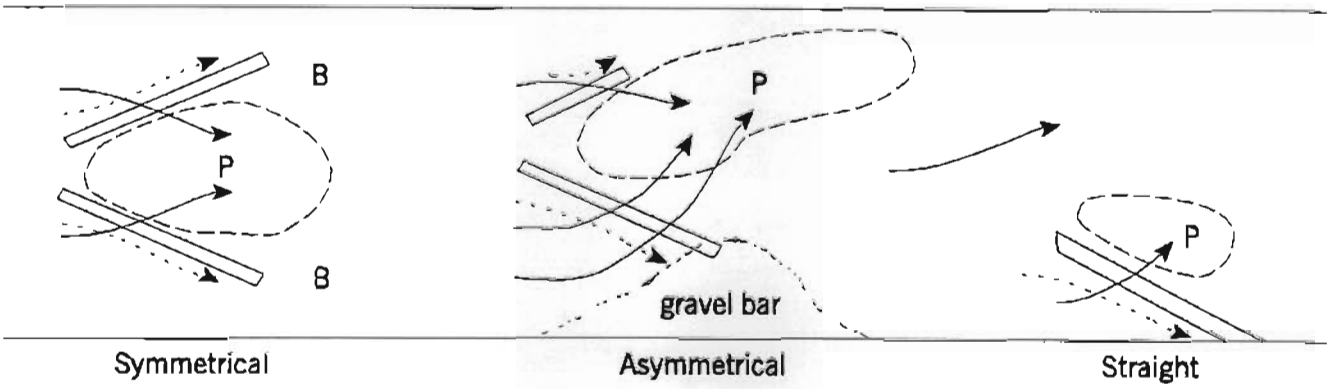


Bell County Coal Corporation	
KDNR # 807-5223 Stream Restoration Plan for CRRS Typical Log Vane	
Prepared By: HOWARD Engineering and Geology, Inc. PO Box 271 - 2650 W Hwy 72 Suite 1 - Harlan, Ky - 40831 (606) 573-6924 - http://www.howardeng-geo.com/	Scale: None Exhibit: 6c

DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEC-8 06.DWG

PLAN VIEW:
ALTERNATIVE VANE CONFIGURATIONS

Source: Hey (1995)



LEGEND:

P, pool; B, bar; E, bank erosion; ——➢ main surface flow; - - - - ➢ near bed flow; – – – – ➢ over topping flow

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Stream Restoration Plan for CRRS
Typical Log Vane

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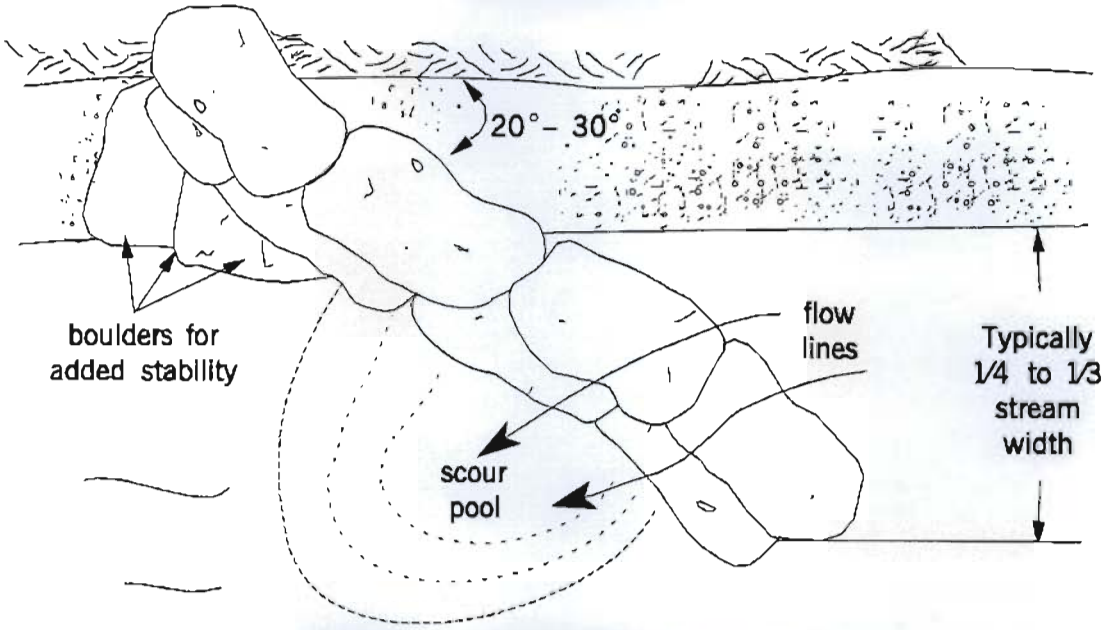
Scale: None

Exhibit: 6d

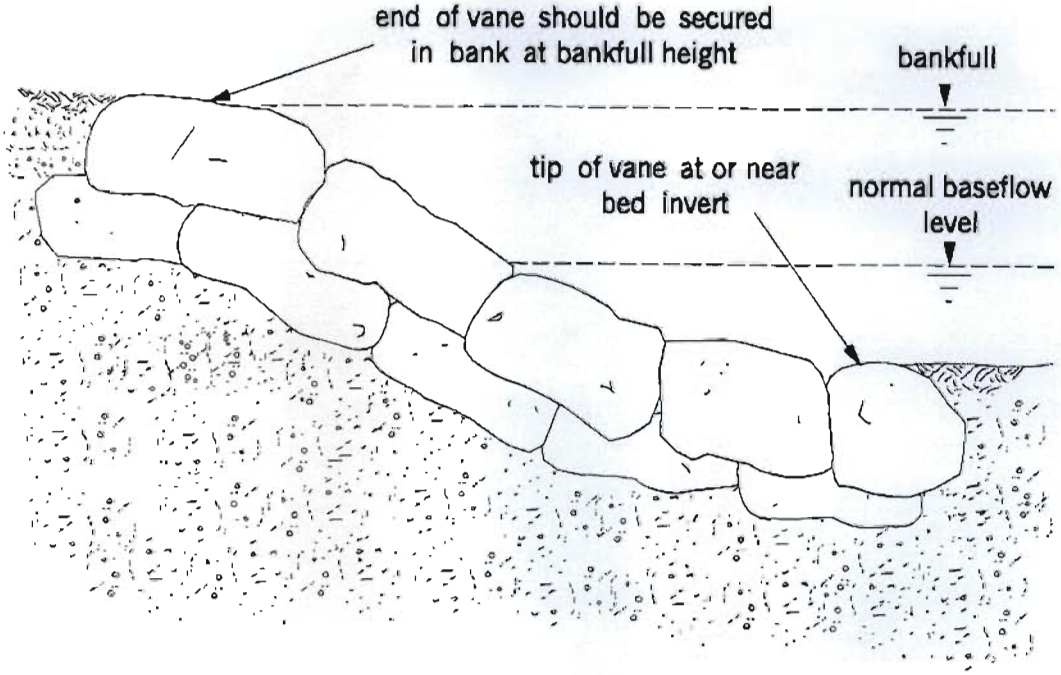
DWG FILEPATH: W:\HEG\DRAWINGS\Blank Templates\HEG-B 08.DWG

Section & Plan Views Adapted From Rosgen (1999)

PLAN VIEW: ROCK VANE



SECTION VIEW: ROCK VANE



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Rock Vane

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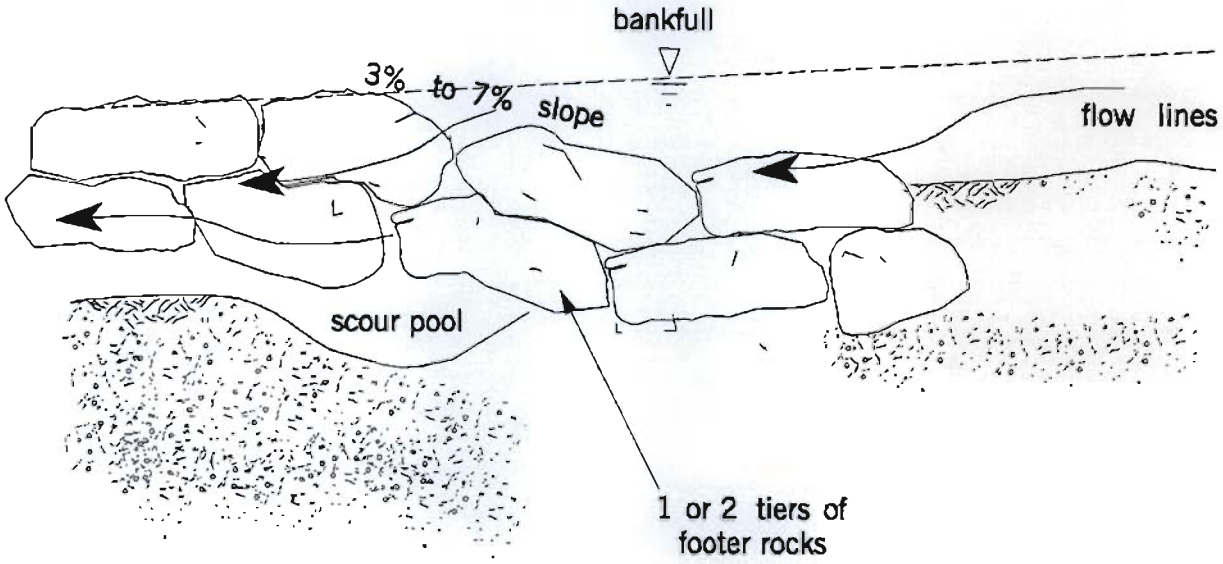
Scale: None

Exhibit: 6e

DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-B 06.DWG

Section & Plan Views Adapted From Rosgen (1999)

PROFILE VIEW: STRAIGHT VANE



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KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Rock Vane Profile

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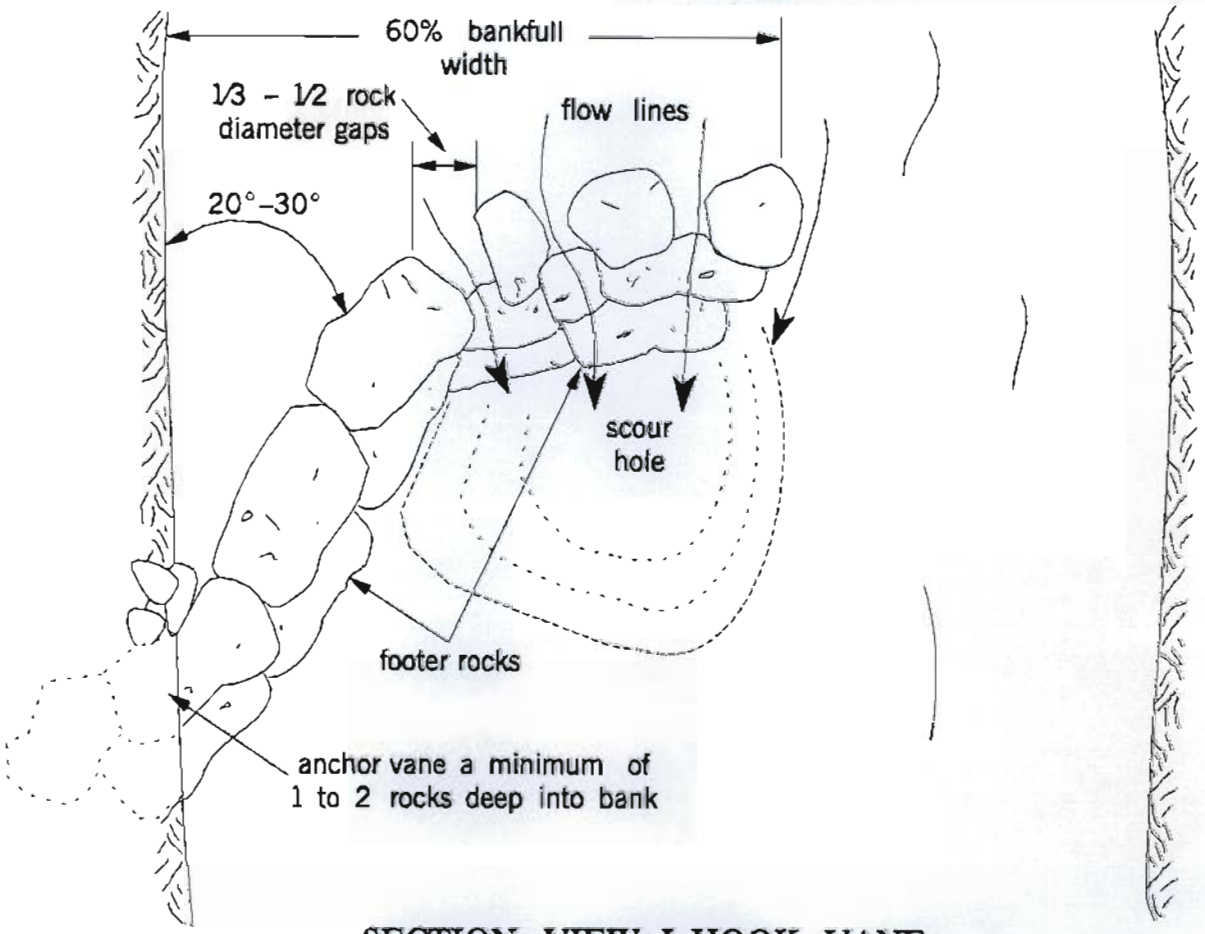
Scale: None

Exhibit: 6f

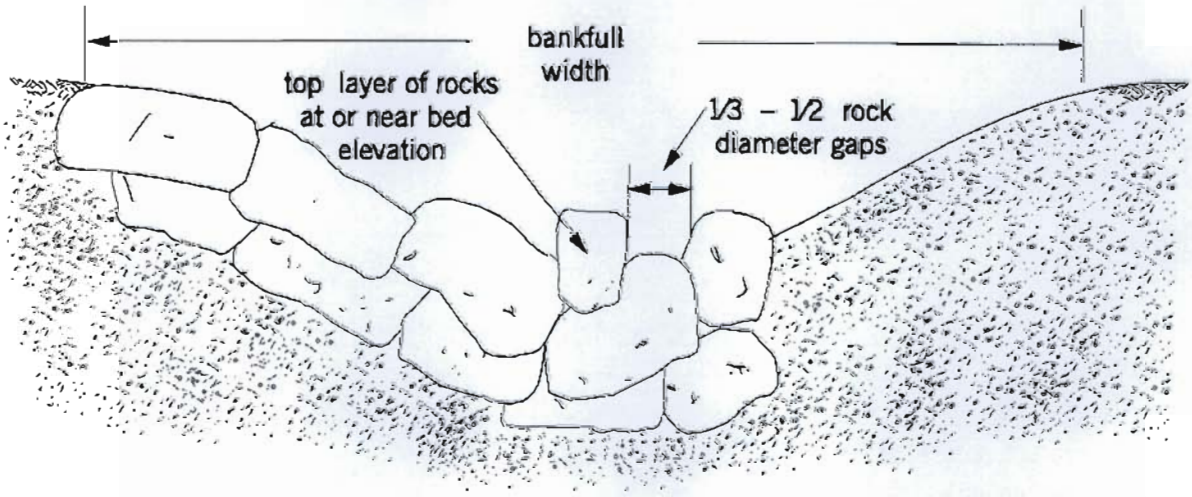
DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-8 06.DWG

Section & Plan Views Adapted From Rosgen (1999)

PLAN VIEW: J-HOOK VANE



SECTION VIEW: J-HOOK VANE



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical J-Hook Vane Plan/Section

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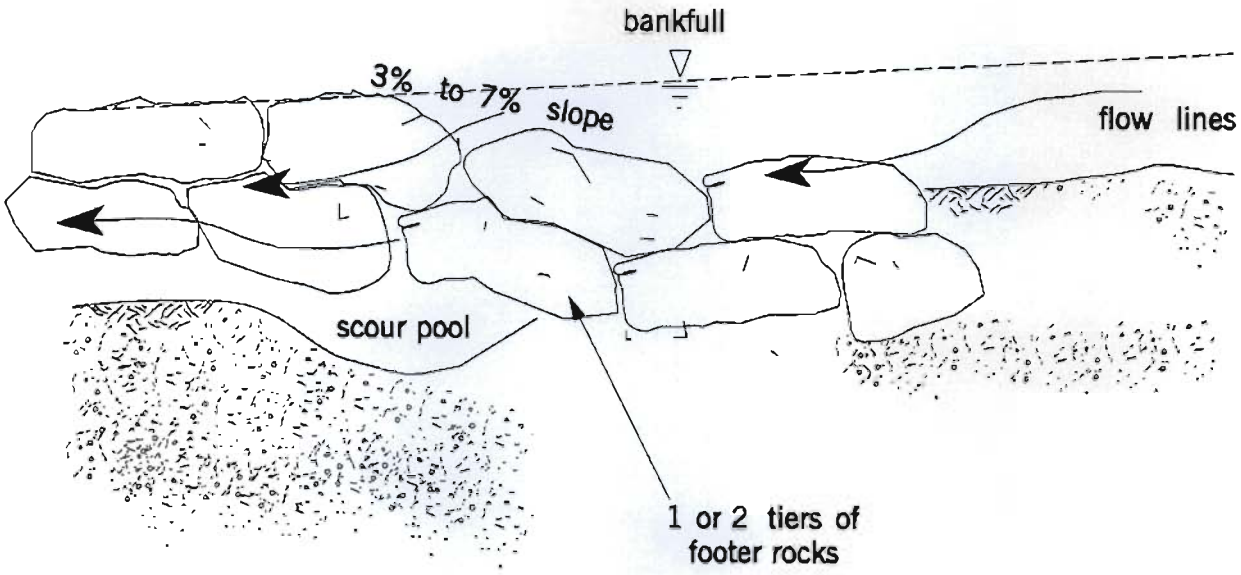
Scale: None

Exhibit: 6g

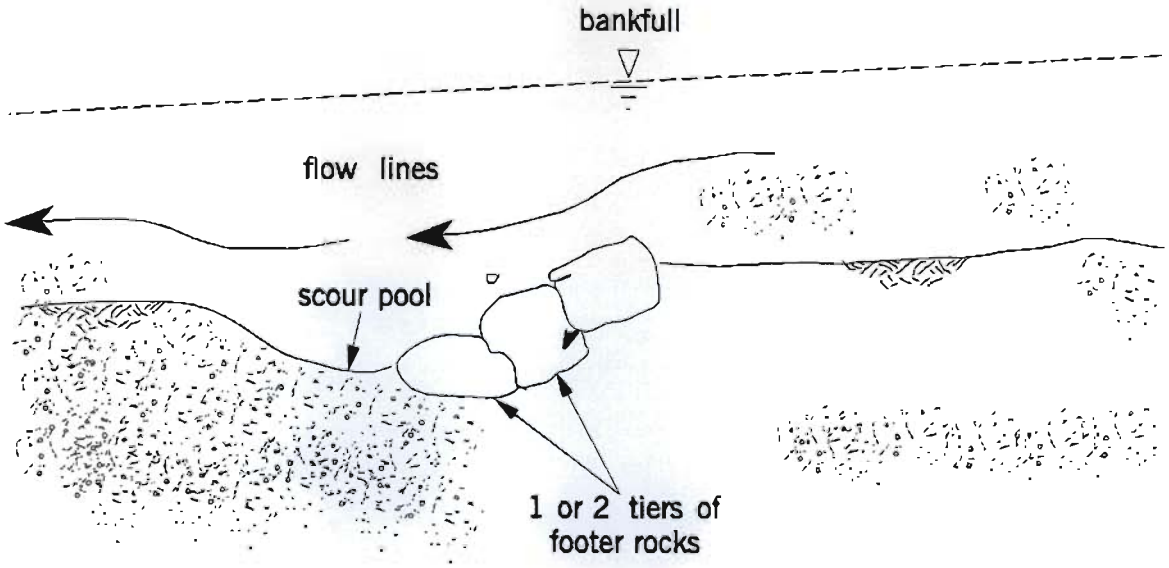
DWG Path: W:\(HEC)\DRAWINGS\Blank Templates\(HEC-BI 06).DWG

Section & Plan Views Adapted From Rosgen (1999)

PROFILE VIEW OF VANE ARM



PROFILE VIEW OF J-HOOK



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical J-Hook Vane Profile

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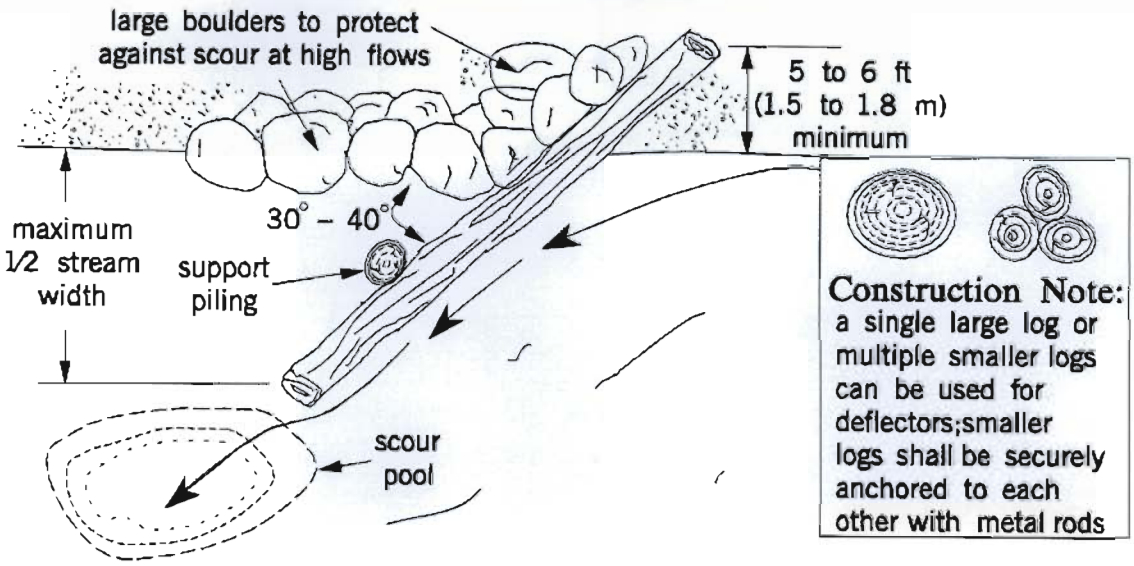
Scale: None

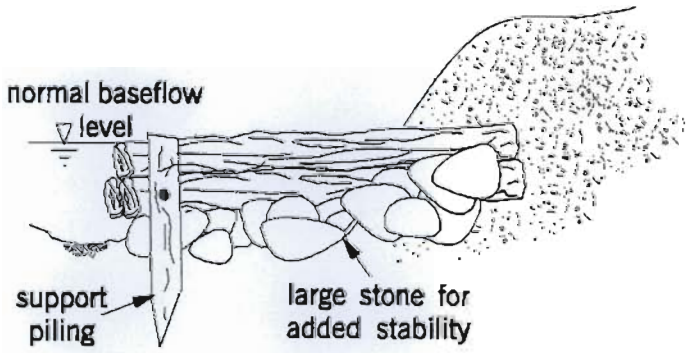
Exhibit: 6h

DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-B 08.DWG

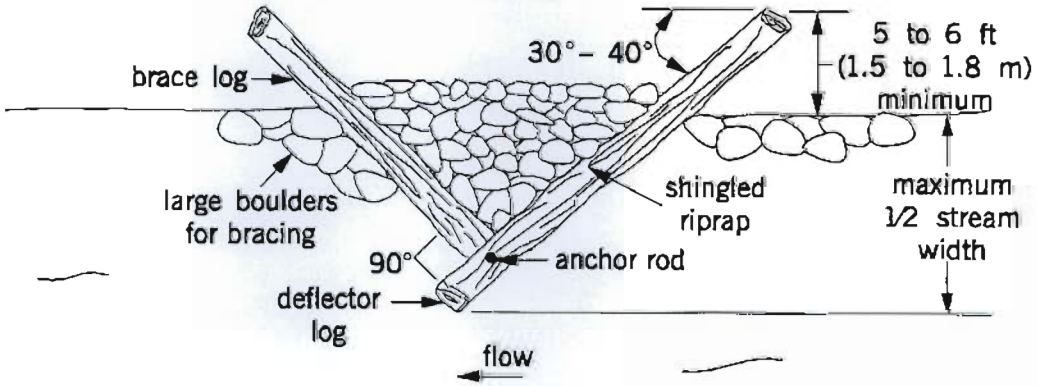
PLAN VIEW: LOG DEFLECTOR



SECTION VIEW: LOG DEFLECTOR



PLAN VIEW: LOG FRAME DEFLECTOR



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Log Deflector

Prepared By: HOWARD Engineering and Geology, Inc.
PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831
(606) 573-6924 - http://www.howardeng-geo.com

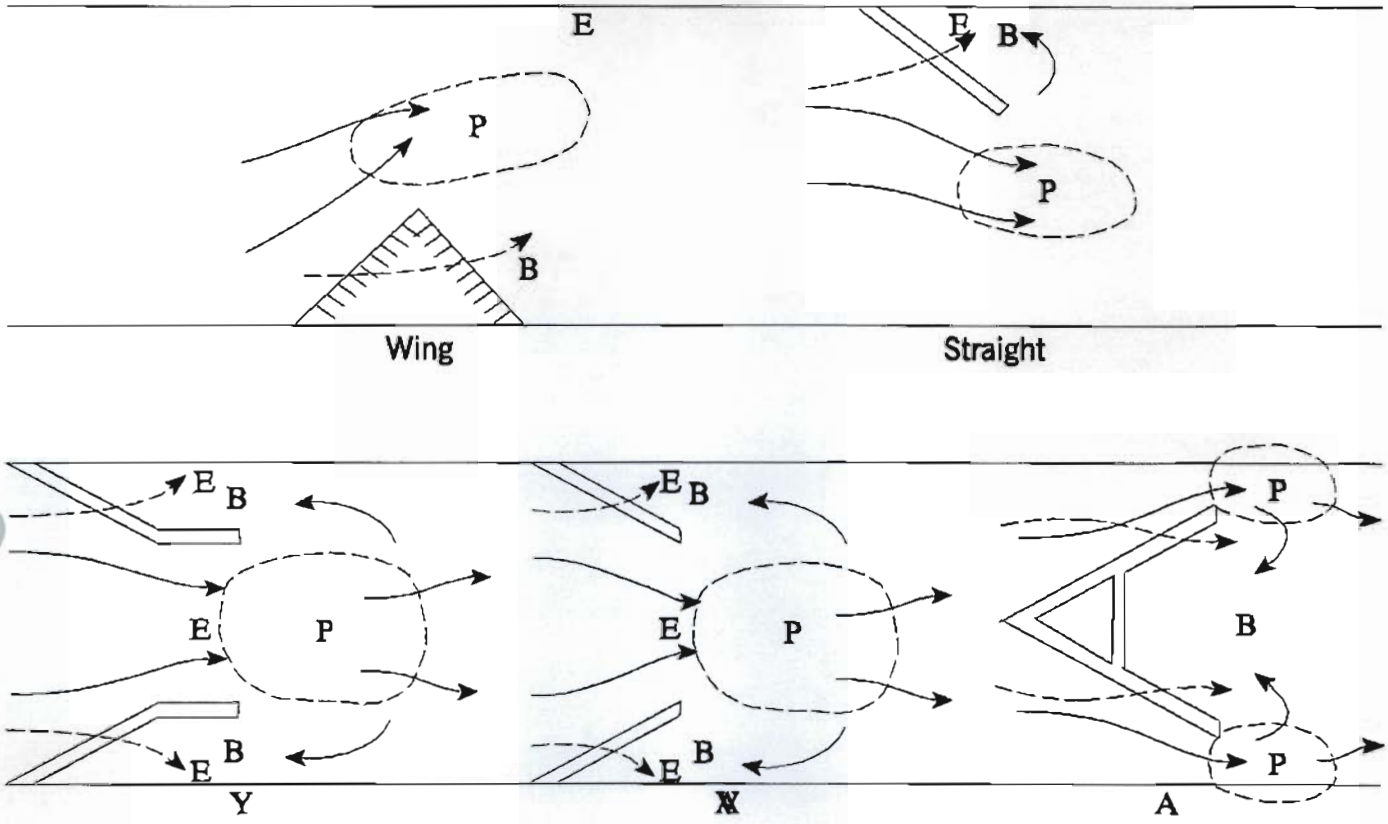
Scale: None

Exhibit: 61

DWG FullPath: #:\HEG\DRAWINGS\Blank Templates\HEG-B 06.DWG

PLAN VIEW:
ALTERNATIVE DEFLECTOR CONFIGURATIONS

Source: Hey (1995)



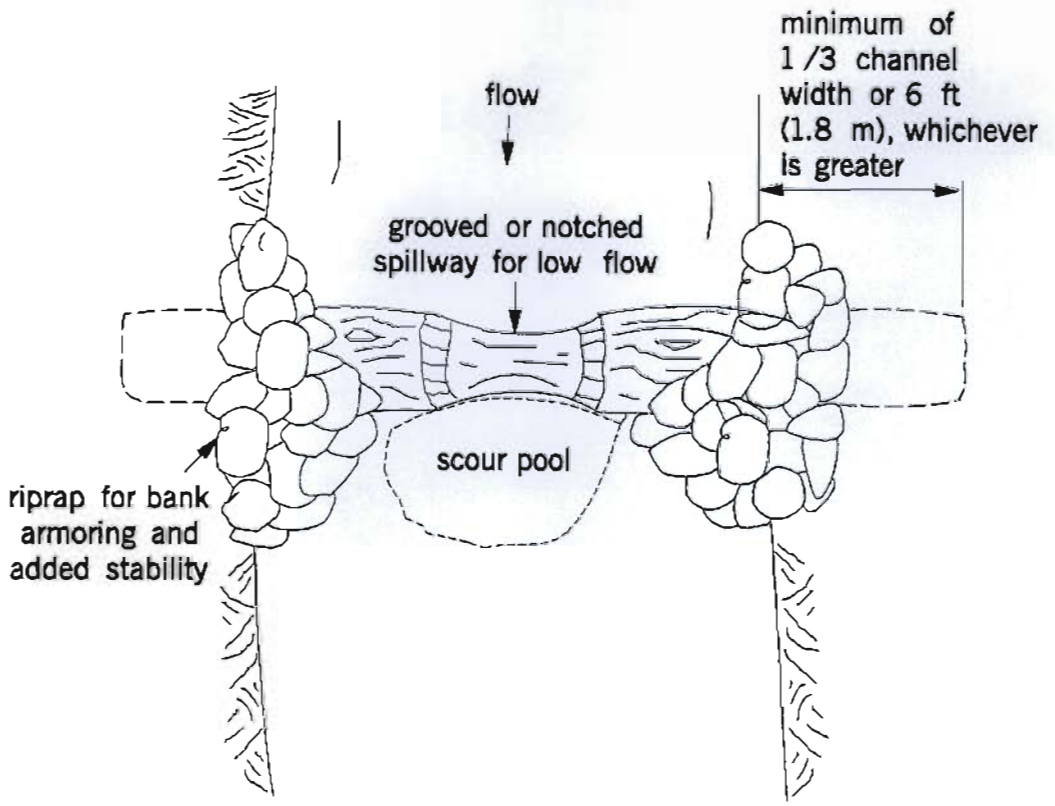
LEGEND:

P, pool; B, bar; E, bank erosion; ——▷ main/surface flow; - - - - ▷ near bed flow; – – – – ▷ over topping flow

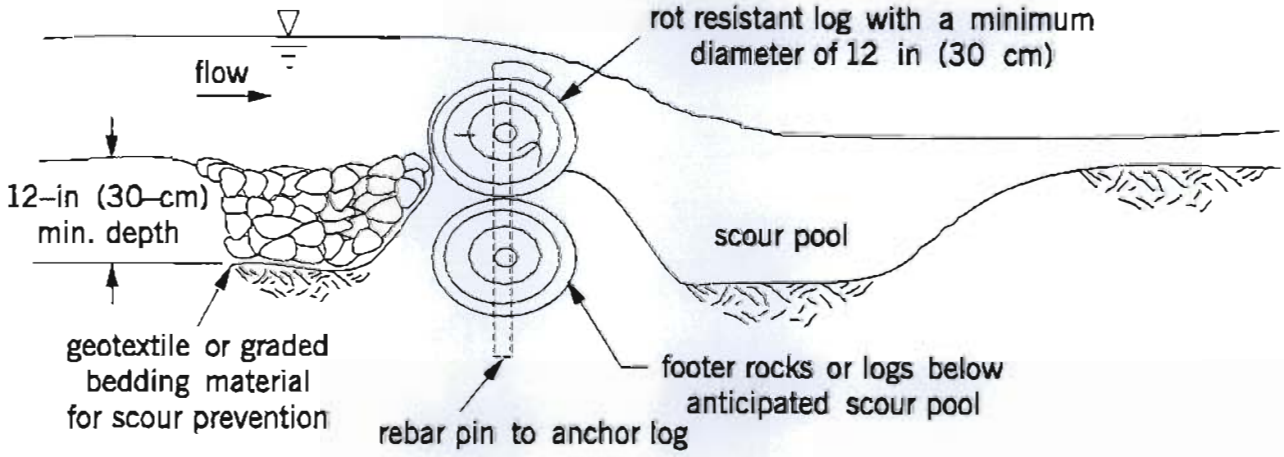
Bell County Coal Corporation	
KDNR # 807-5223 Stream Restoration Plan for CRRS Stream Deflector Configurations	
Prepared By: HOWARD HEG Engineering and Geology, Inc. PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831 (606) 573-6924 - http://www.howardeng-geo.com/	Scale: None
	Exhibit: 6j

DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-E 08.DWG

PLAN VIEW:
SINGLE LOG WEIR



SECTION VIEW:
SINGLE LOG WEIR



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Log Weir

Prepared By:
HOWARD
Engineering and Geology, Inc.
PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831
(606) 573-6924 - http://www.howardeng-geo.com/

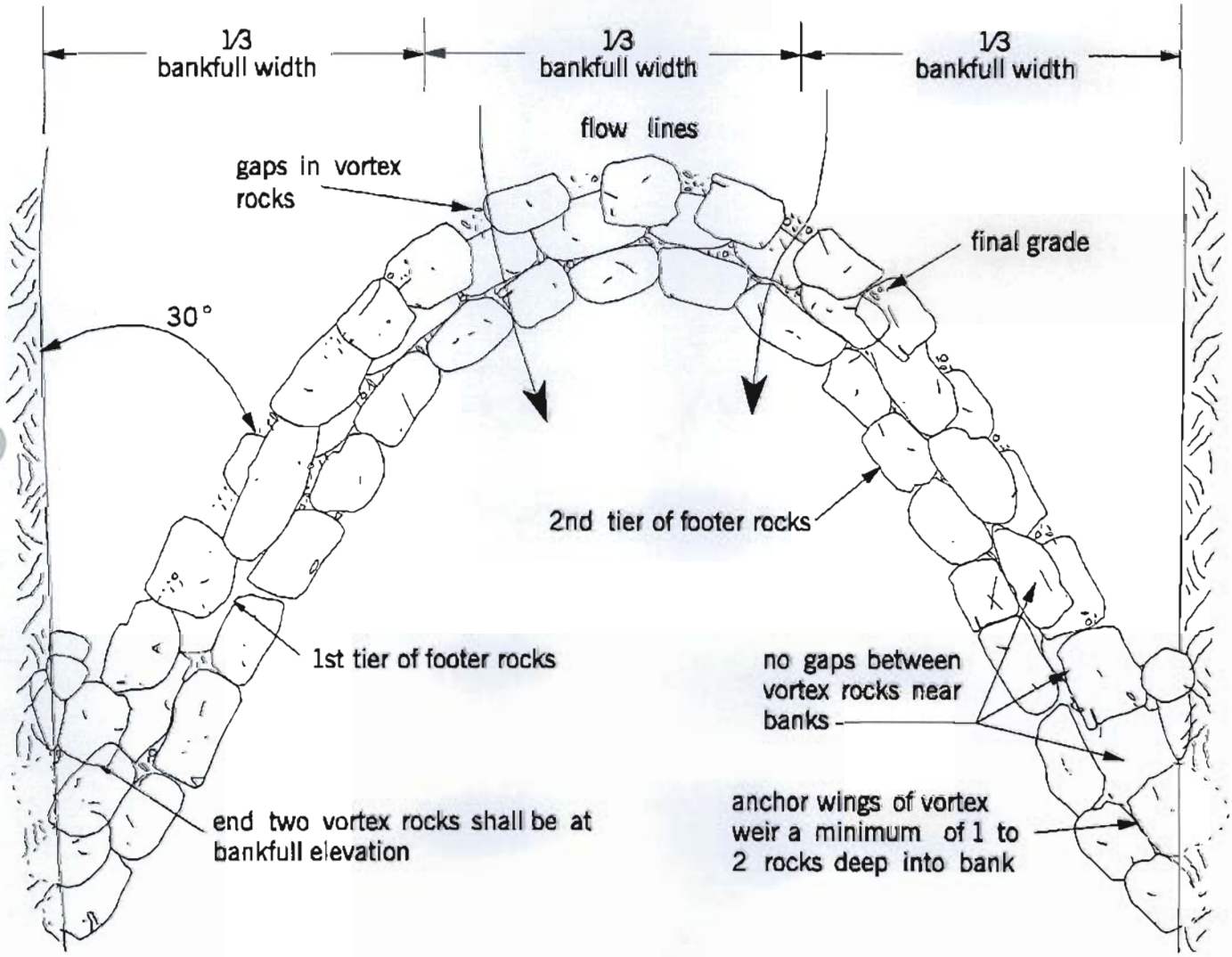
Scale: None

Exhibit: 6k

DWG FullPath: W:\HEGI\DRAWINGS\Blank Templates\HEGI-B1 SB.DWG

Section & Plan Views Adapted From Rosgen (1999)

PLAN VIEW: VORTEX ROCK WEIR



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Vortex Rock Weir Plan View

Prepared By:
HOWARD Engineering and Geology, Inc.
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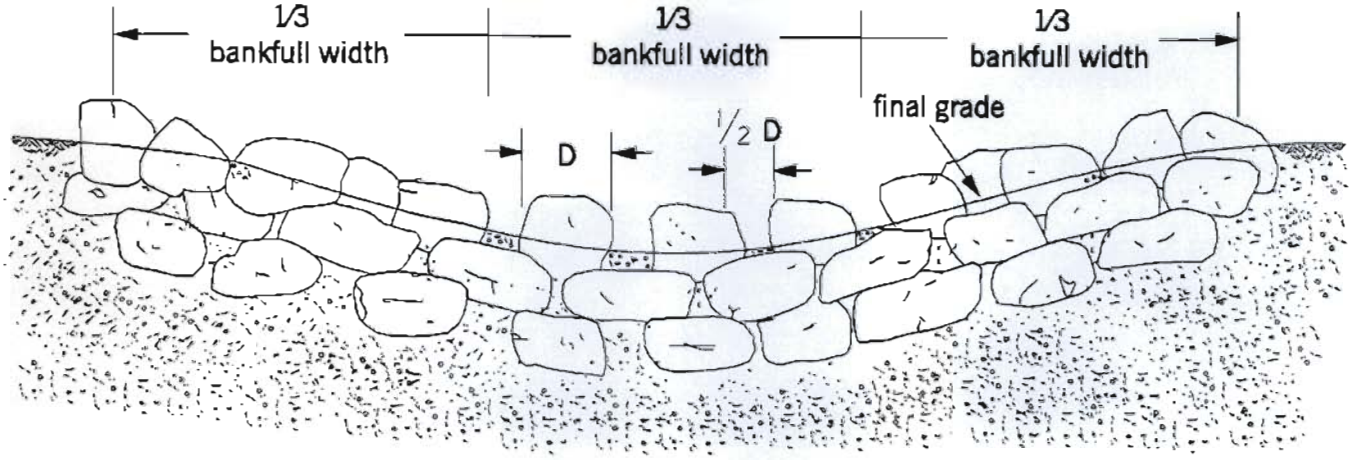
Scale: None

Exhibit: 6I

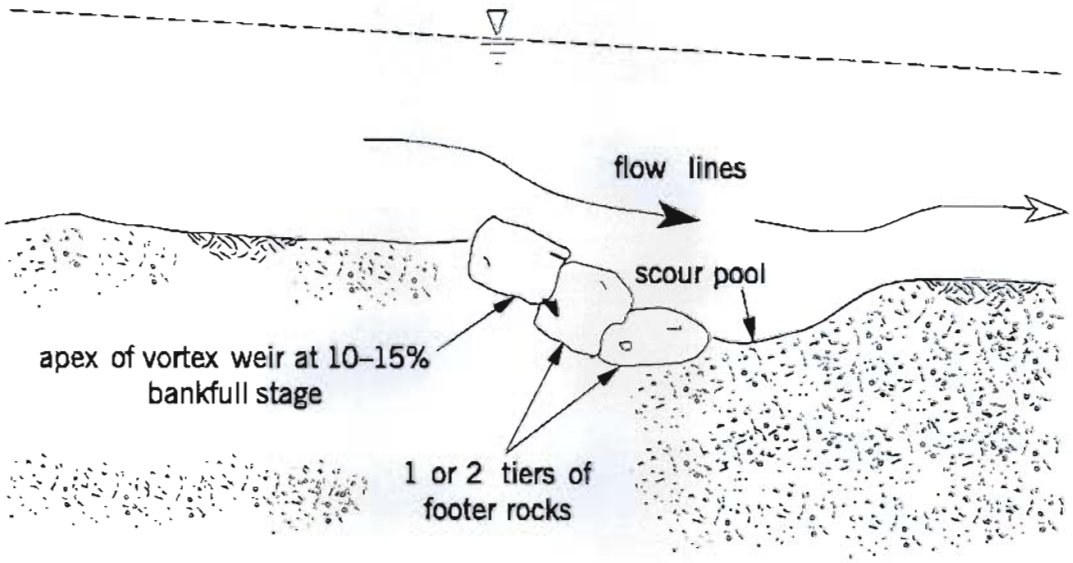
DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-EI CS.DWG

Section & Plan Views Adapted From Rosgen (1999)

SECTION VIEW: VORTEX ROCK WEIR



PROFILE VIEW: VORTEX ROCK WEIR



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Vortex Rock Weir Section/Profile

Prepared By:
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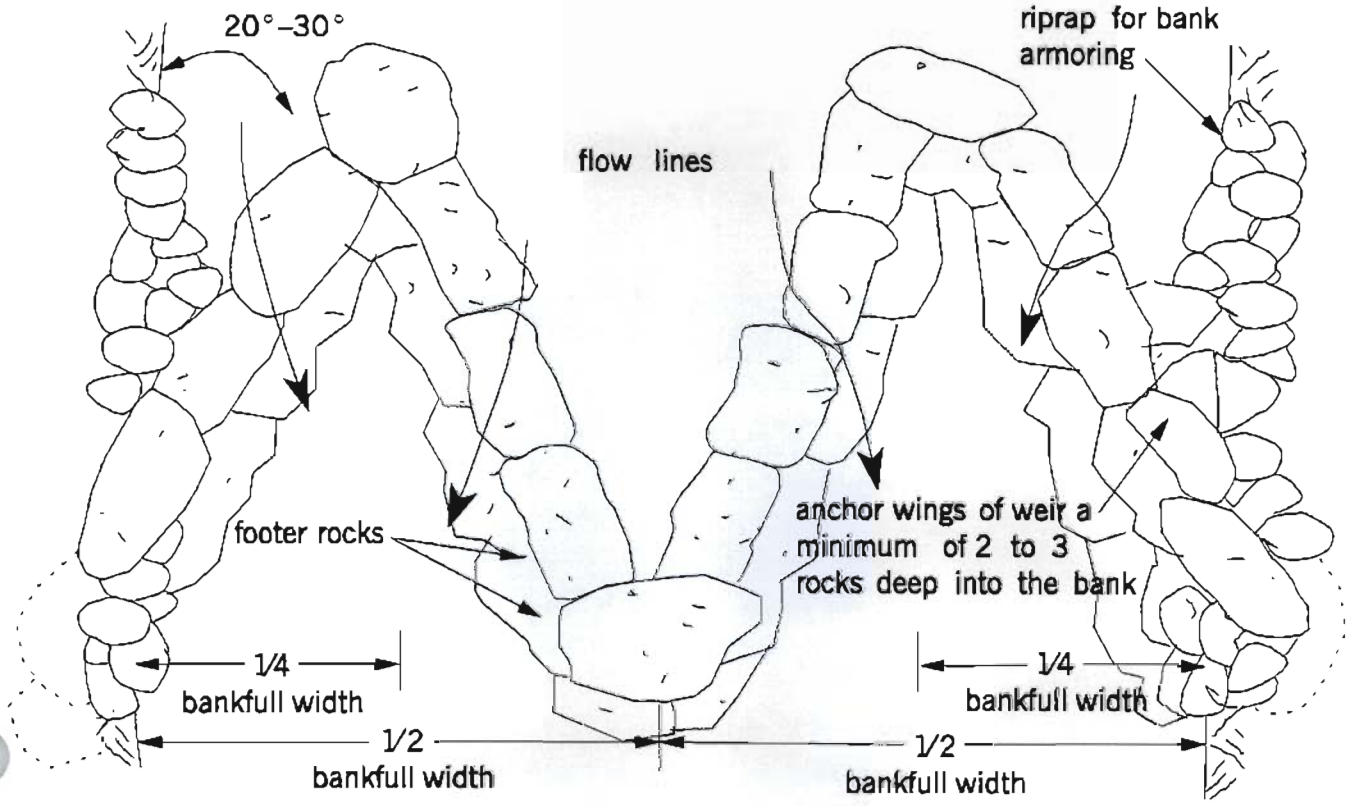
Scale: None

Exhibit: 6m

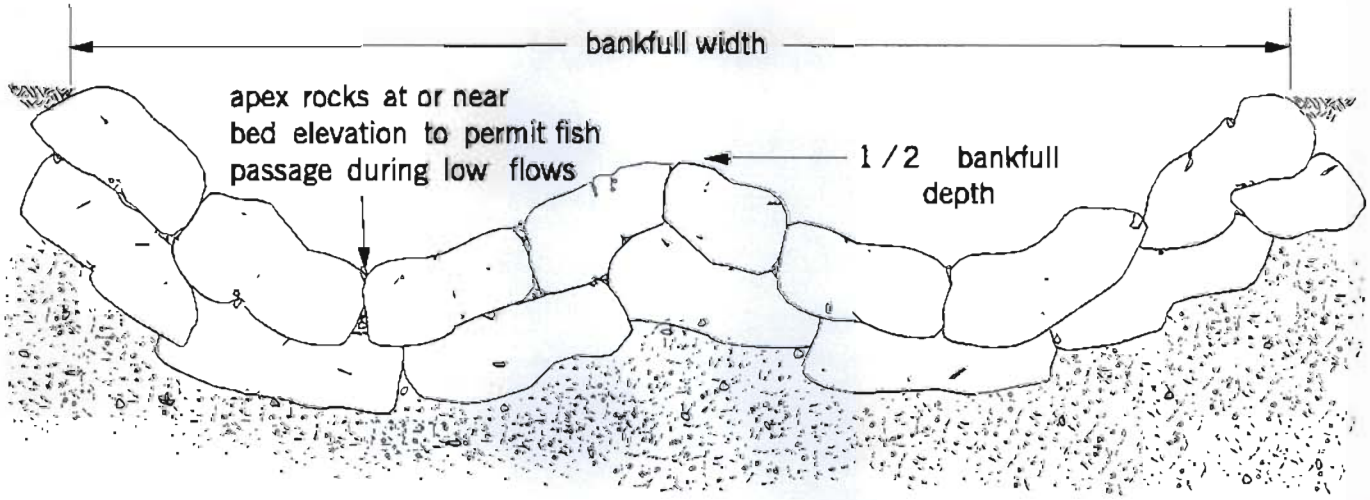
DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-8 06.DWG

Section & Plan Views Adapted From Rosgen (1993)

PLAN VIEW: W-ROCK WEIR



SECTION VIEW: W-ROCK WEIR



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical "W" Rock Weir Plan/Section

Prepared By:
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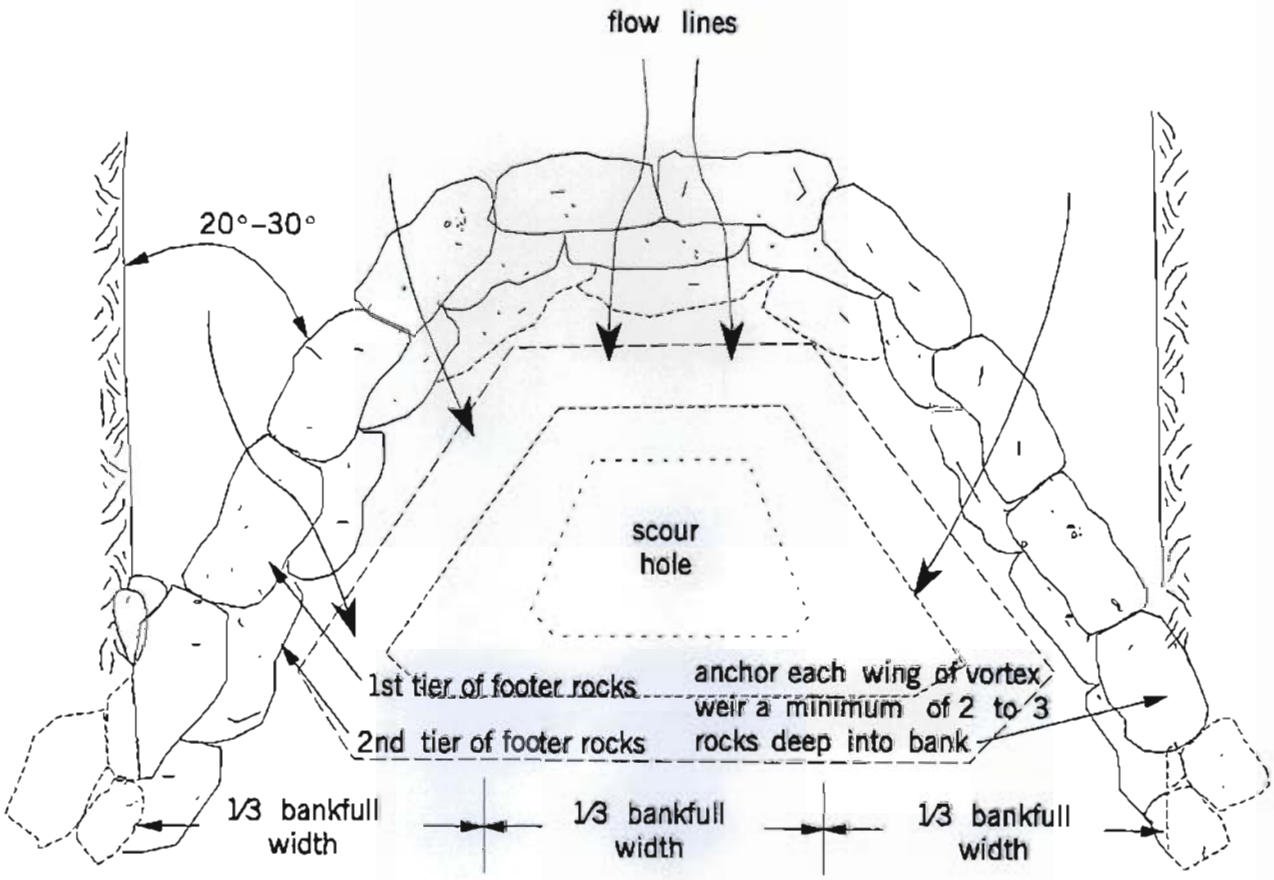
Scale: None

Exhibit: 6n

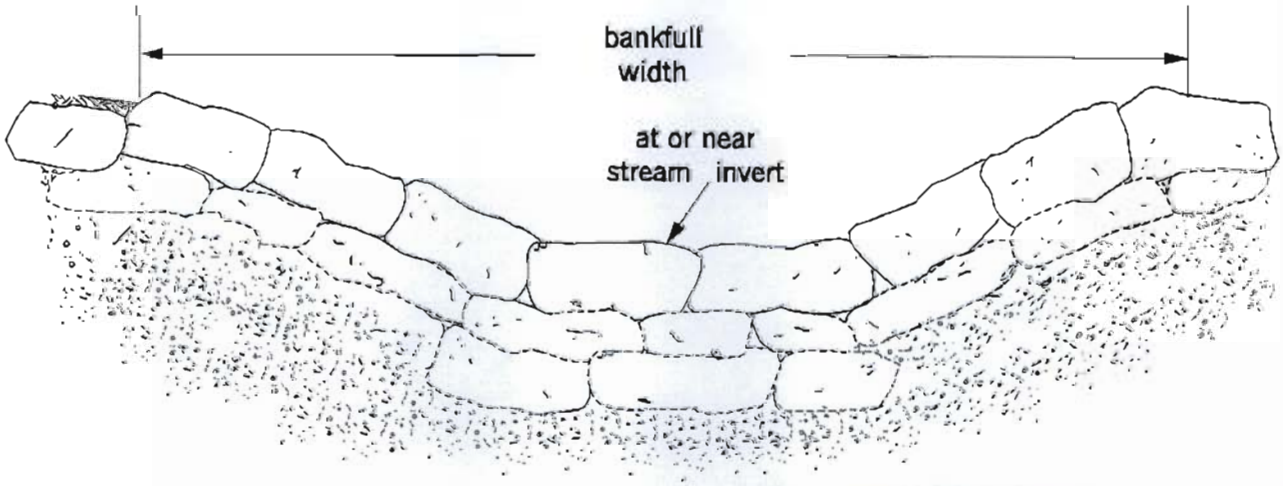
DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-EI 18.DWG

Source: Rosgen, 1999

PLAN VIEW: CROSS VANE



SECTION VIEW: CROSS VANE



Bell County Coal Corporation

KDNR # 807–5223
Stream Restoration Plan for CRRS
Typical Cross Vane Plan/Section

Prepared By:
HOWARD
Engineering and Geology, Inc.
PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831
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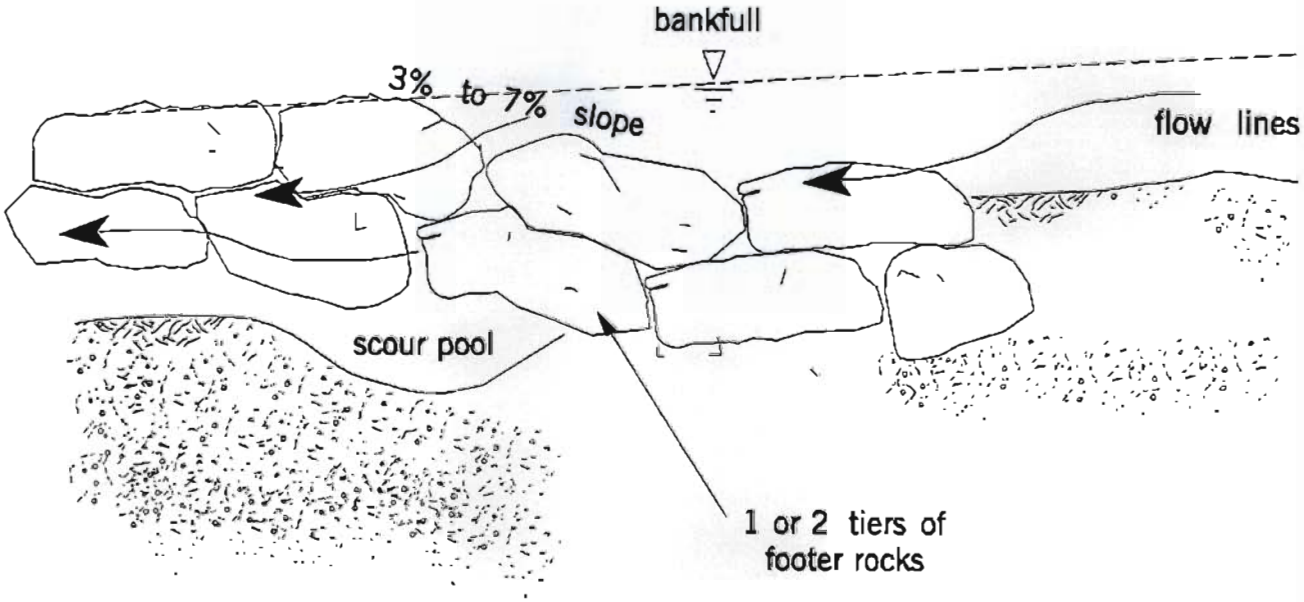
Scale: None

Exhibit: 6o

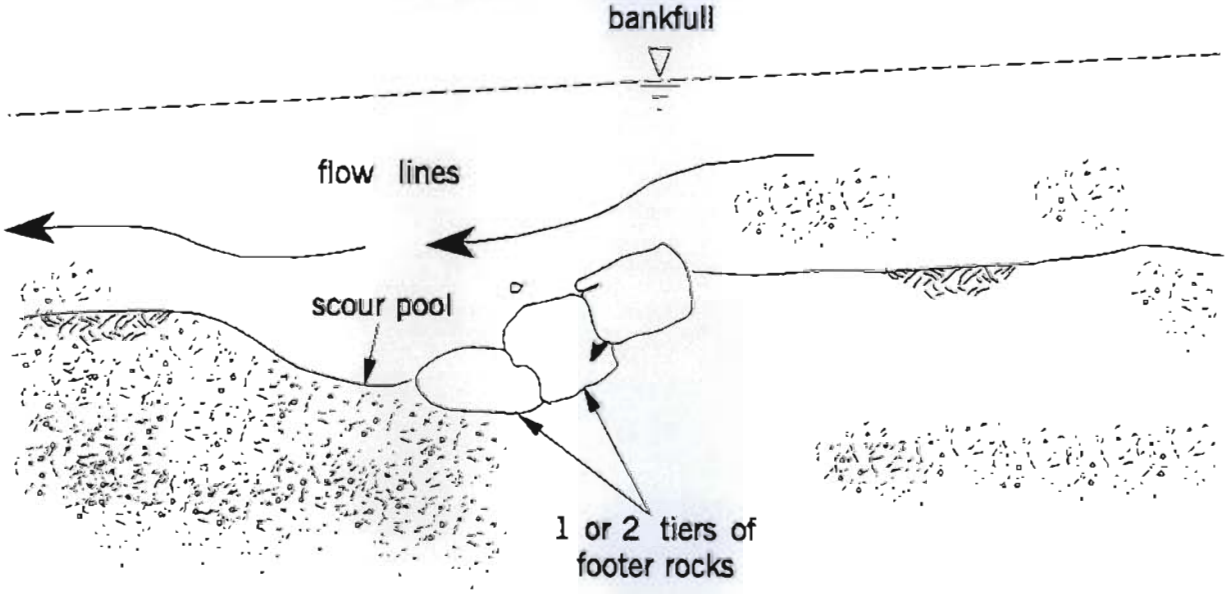
DWG: FullPath: H:\HEG\DRAWINGS\Blank Templates\HEC-8 (8).DWG

Source: Rosgen, 1999

PROFILE: CROSS VANE ARM



PROFILE VIEW OF CENTER OF CROSS VANE



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Cross Vane Profile

Prepared By:
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Engineering and Geology, Inc.
PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831
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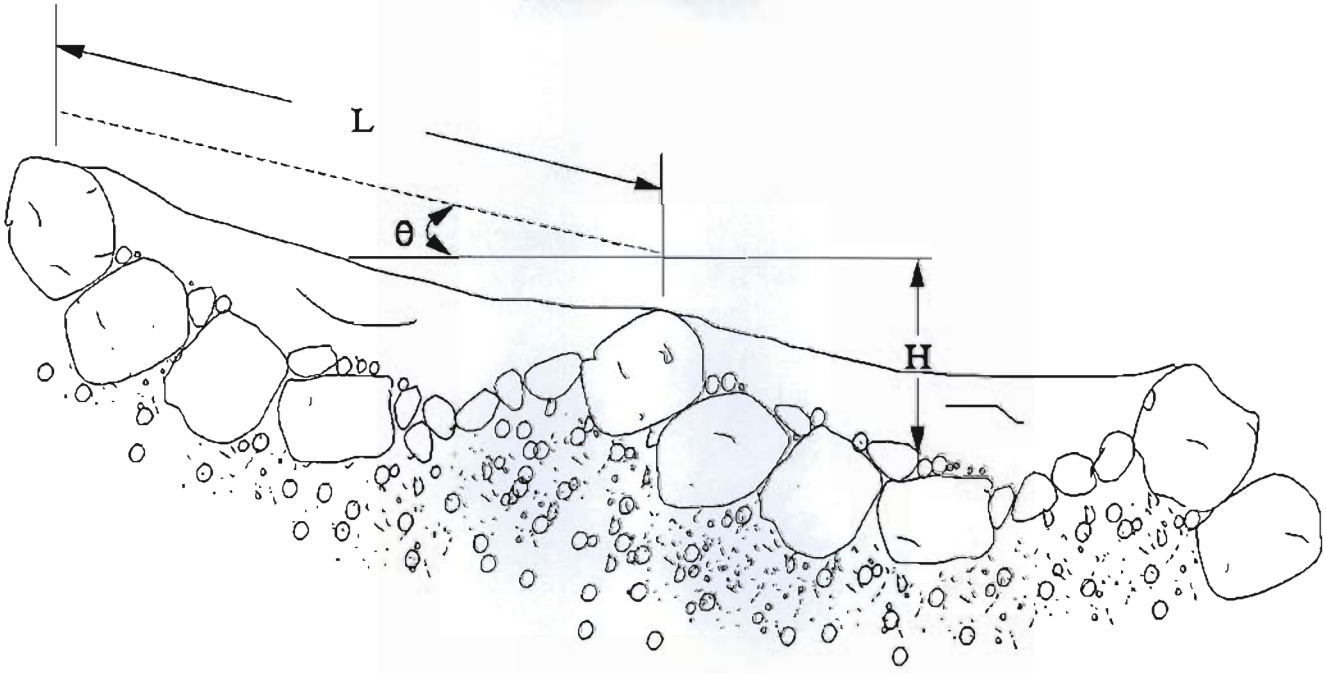
Scale: None

Exhibit: 6p

DWG FullPath: #:\HEG\DRAWINGS\Blank Templates\HEG-8 06.DWG

Adapted From Abrahams et al. (1995)

DEFINITION SKETCH: STEP POOL



Note: L is measured parallel to the bed slope (tan θ)
H is measured perpendicular to the horizontal

Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Step Pool Definition

Prepared By:
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Engineering and Geology, Inc.
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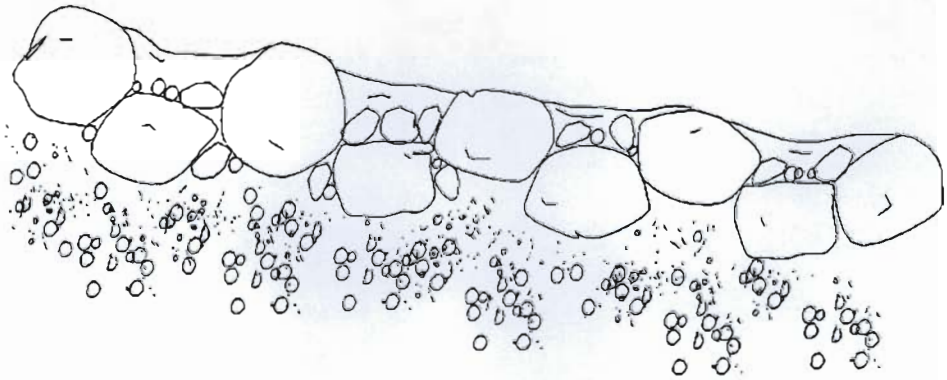
Scale: None

Exhibit: 6q

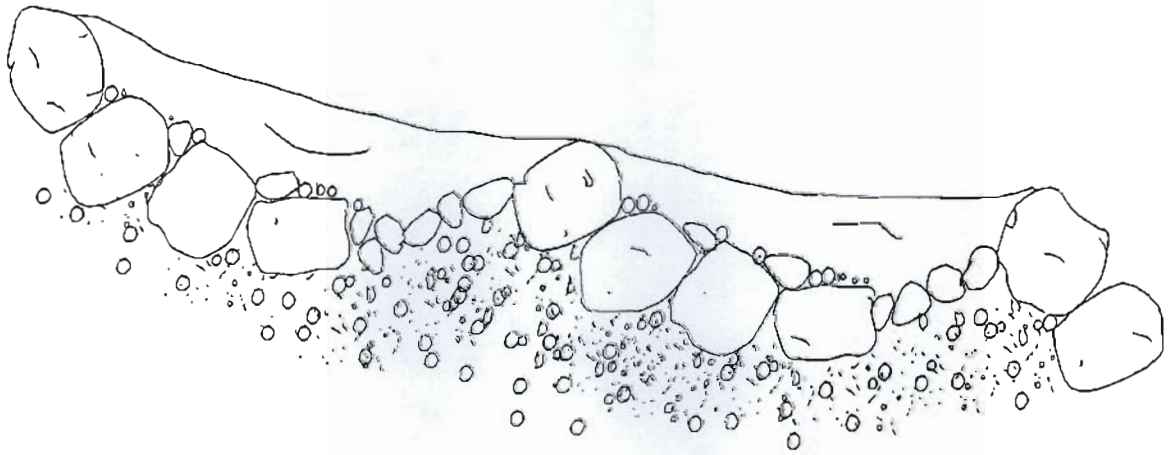
DWG Full Path: W:\REC\DRAWINGS\Blank Templates\HEG-B 06.DWG

Adapted From Montgomery and Buffington (1997)

PROFILE VIEW: CASCADE & STEP POOL MORPHOLOGIES



Approximate channel slope:	Typical pool spacing:	Average step height (Abrahams et al., 1995)
>0.065	<1 channel width	$1 \leq \{(H/L)_{AVE}/S\} \leq 2$



Approximate channel slope:	Typical pool spacing:	Average step height (Abrahams et al., 1995)
0.030–0.065	1–4 channel widths	$1 \leq \{(H/L)_{AVE}/S\} \leq 2$

Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Step Pool Profiles

Prepared By:
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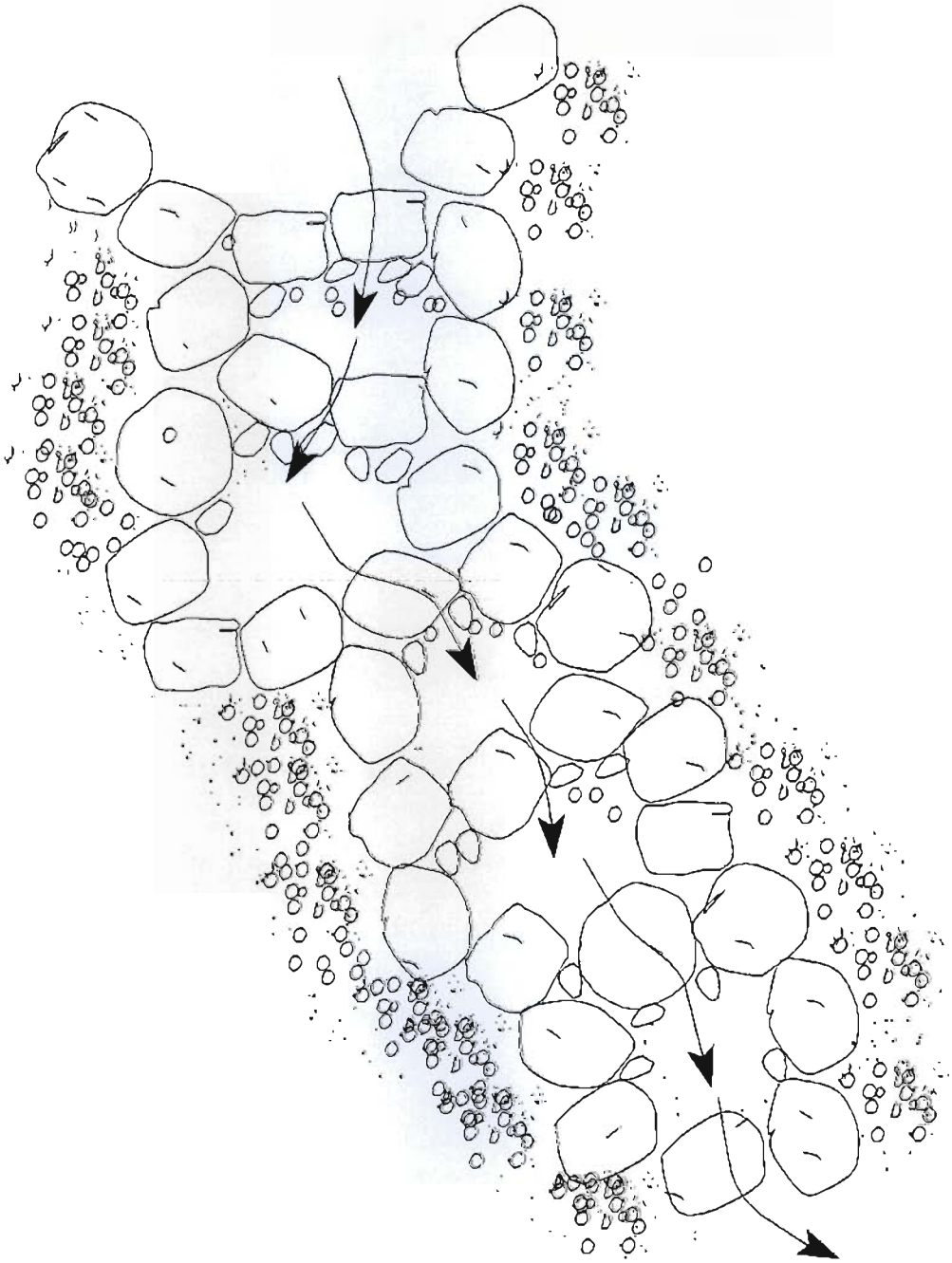
Scale: None

Exhibit: 6r

DWG Full Path: W:\HEG\DRAWINGS\Blank Templates\HEG-8 06.DWG

Section & Plan Views Adapted From Rosgen (1996)

PLAN VIEW: STEP POOL



Bell County Coal Corporation

KDNR # 807-5223
Stream Restoration Plan for CRRS
Typical Step Pool Plan View

Prepared By:
HOWARD
Engineering and Geology, Inc.
PO Box 271 - 2550 W Hwy 72 Suite 1 - Harlan, Ky - 40831
(606) 573-6924 - http://www.howardeng-geo.com/

Scale: None

Exhibit: 6s

DWG FullPath: W:\HEG\DRAWINGS\Blank Templates\HEG-B 06.DWG

Fresh Water Diversion Ditch #1
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

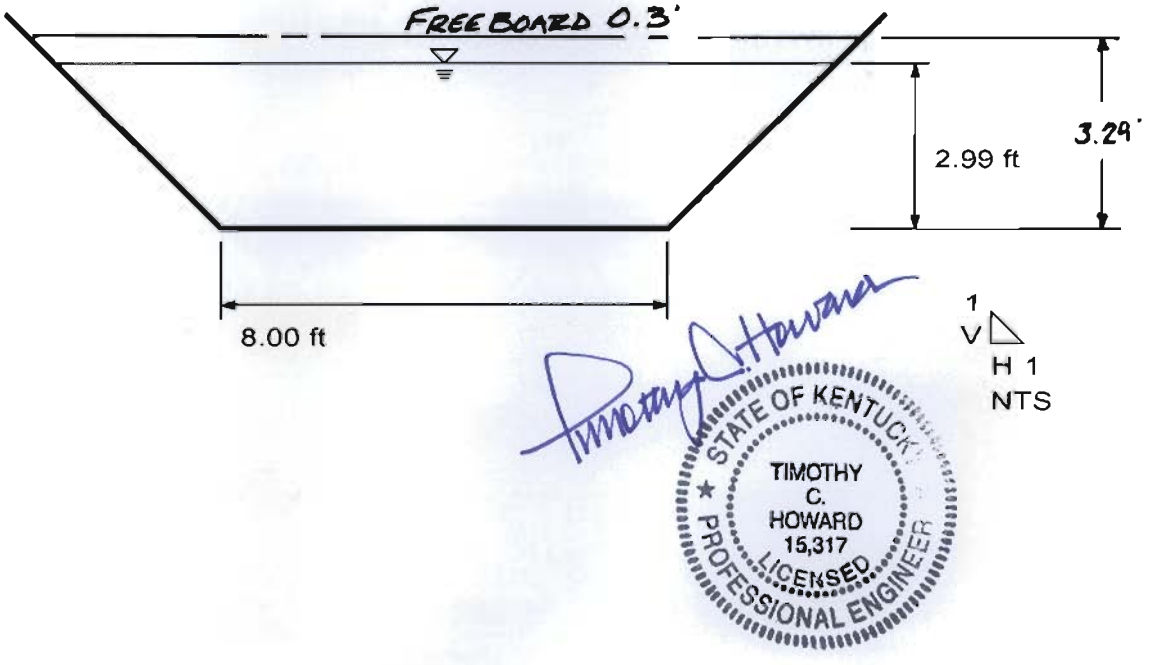
Input Data		
Mannings Coefficient	0.040	
Channel Slope	0.5000	%
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	136.80	cfs

Results		
Depth	2.99	ft
Flow Area	32.85	ft^2
Wetted Perimeter	16.45	ft
Top Width	13.98	ft
Critical Depth	1.92	ft
Critical Slope	0.023544	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	3.26	ft
Froude Number	0.48	
Flow is subcritical.		

Fresh Water Diversion Ditch #1
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.040	
Channel Slope	0.5000	%
Depth	2.99	ft
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	136.80	cfs

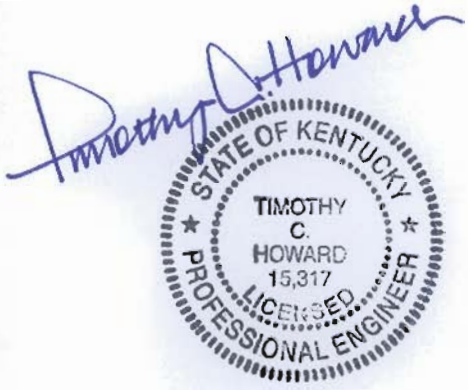


Fresh Water Diversion Ditch #1
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Channel Slope	50.0000	%
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	136.80	cfs

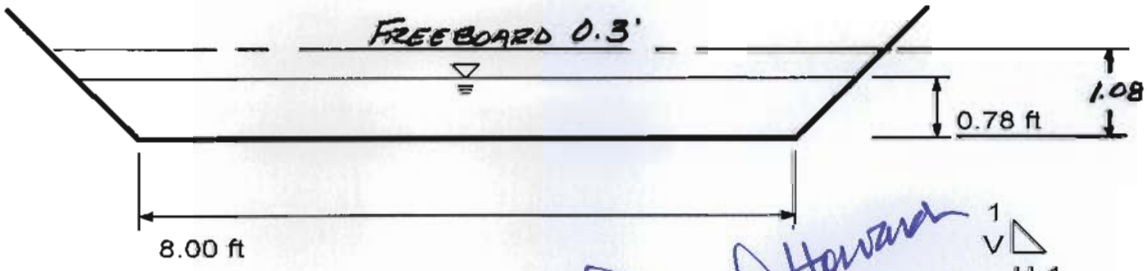
Results		
Depth	0.78	ft
Flow Area	6.81	ft²
Wetted Perimeter	10.20	ft
Top Width	9.55	ft
Critical Depth	1.92	ft
Critical Slope	0.023544	ft/ft
Velocity	20.08	ft/s
Velocity Head	6.26	ft
Specific Energy	7.04	ft
Froude Number	4.19	
Flow is supercritical.		



Fresh Water Diversion Ditch #1
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.040	
Channel Slope	50.0000	%
Depth	0.78	ft
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	136.80	cfs



STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED
PROFESSIONAL ENGINEER

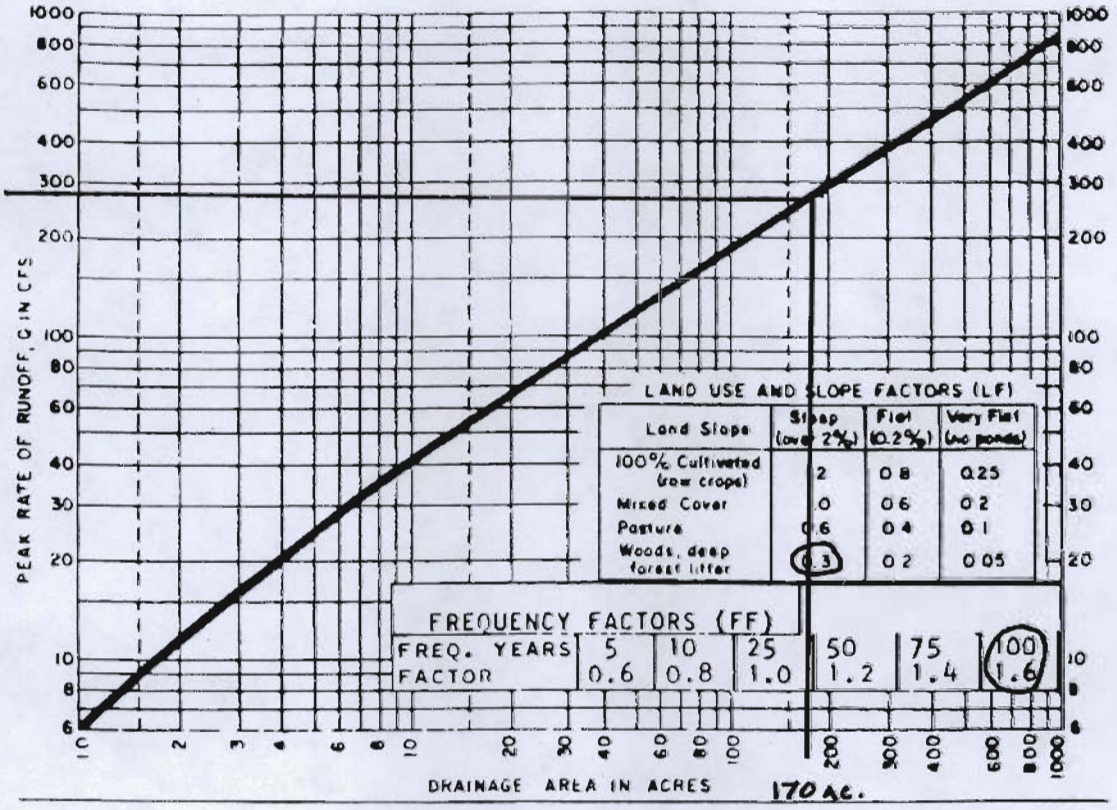
Company Name: Bell County Coal Corp.

Project: #807-5223

Freshwater Diversion #1

Date: 4-28-08 Scale: None Dwn By: tmm

285



RAINFALL FACTOR (RF)

FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

1.0 x 0.3 x 1.6 x 285

136.80 CFS

Timothy C. Howard

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED
PROFESSIONAL ENGINEER

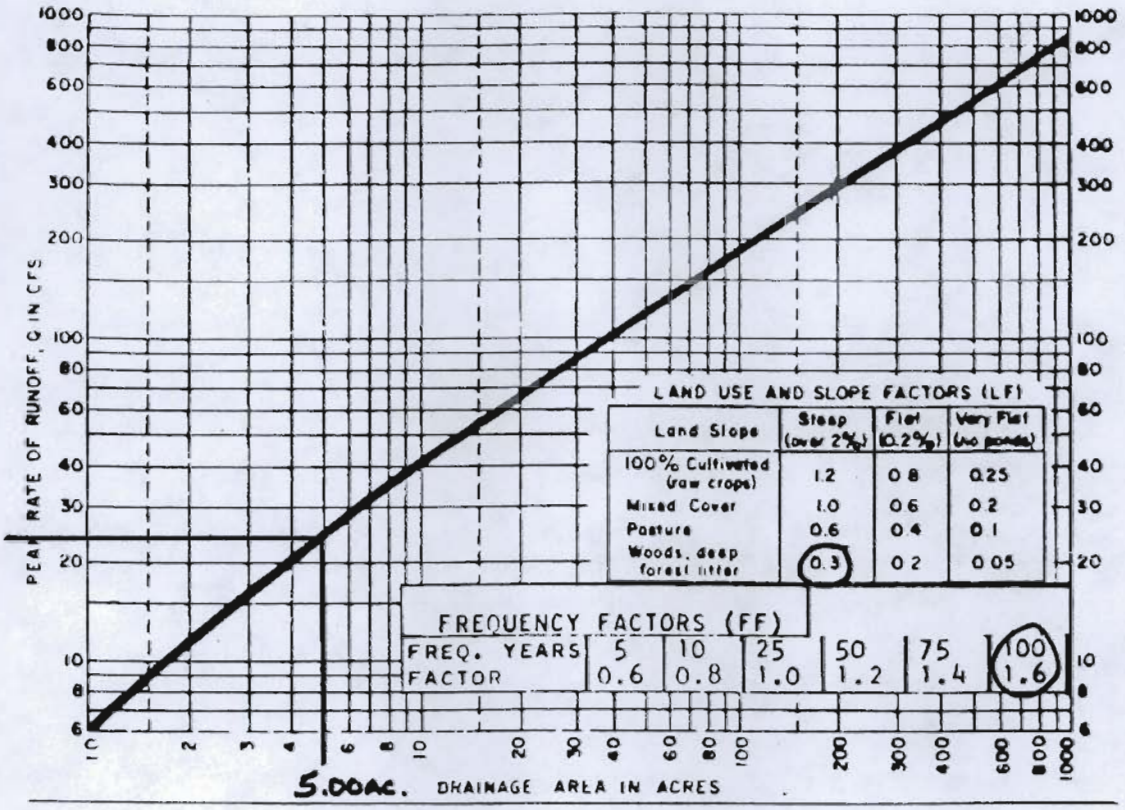
PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Company Name: BELL COUNTY COAL CORP.

Project: #807-5223

FRESHWATER DIVERSION #2

Date: 4-28-08 Scale: NONE Dwn By: TWM



24

LAND USE AND SLOPE FACTORS (LF)

Land Slope	Steep (over 2%)	Flat (0.2%)	Very Flat (no ponds)
100% Cultivated (row crops)	1.2	0.8	0.25
Mixed Cover	1.0	0.6	0.2
Pasture	0.6	0.4	0.1
Woods, deep forest litter	(0.3)	0.2	0.05

FREQUENCY FACTORS (FF)

FREQ. YEARS	5	10	25	50	75	(100)
FACTOR	0.6	0.8	1.0	1.2	1.4	(1.6)

RAINFALL FACTOR (RF)

FORMULA:

$$Q_{design} = RF \times LF \times FF \times Q$$

$1.0 \times 0.3 \times 1.6 \times 24$

11.52 CFS

Timothy C. Howard

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15317 LICENSED PROFESSIONAL ENGINEER

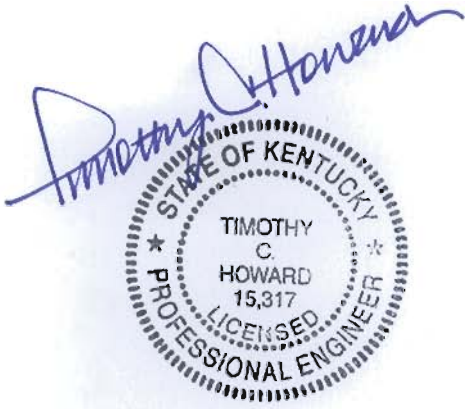
PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Fresh Water Diversion Ditch #2
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Channel Slope	0.5000	%
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	11.52	cfs

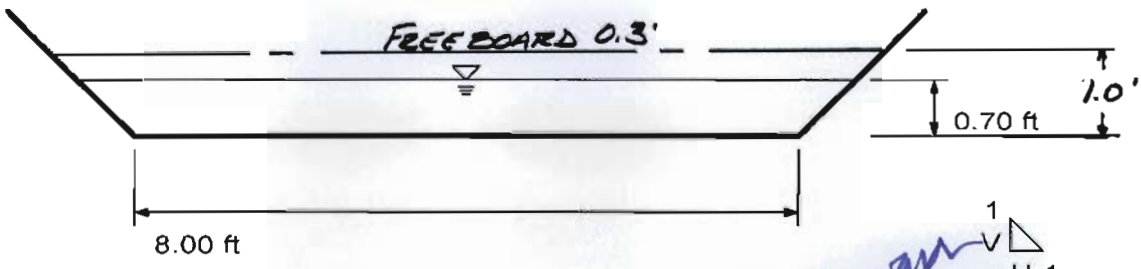
Results		
Depth	0.70	ft
Flow Area	6.09	ft²
Wetted Perimeter	9.98	ft
Top Width	9.40	ft
Critical Depth	0.39	ft
Critical Slope	0.033894	ft/ft
Velocity	1.89	ft/s
Velocity Head	0.06	ft
Specific Energy	0.76	ft
Froude Number	0.41	
Flow is subcritical.		

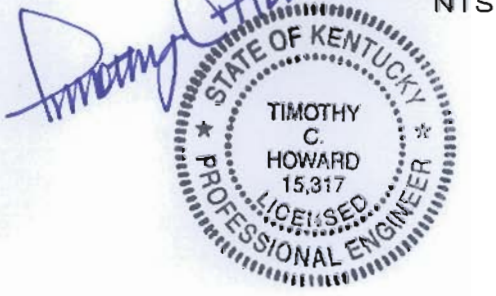


Fresh Water Diversion Ditch #2
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.040	
Channel Slope	0.5000	%
Depth	0.70	ft
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	11.52	cfs



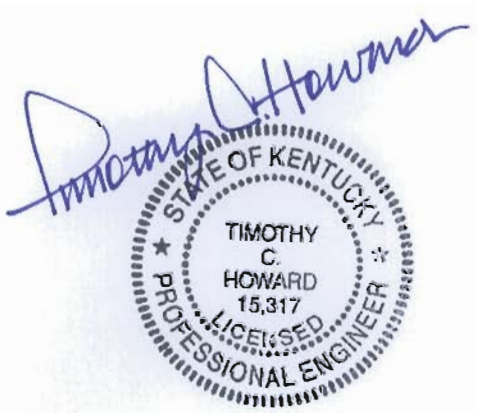


Fresh Water Diversion Ditch #2
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Channel Slope	50.0000	%
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	11.52	cfs

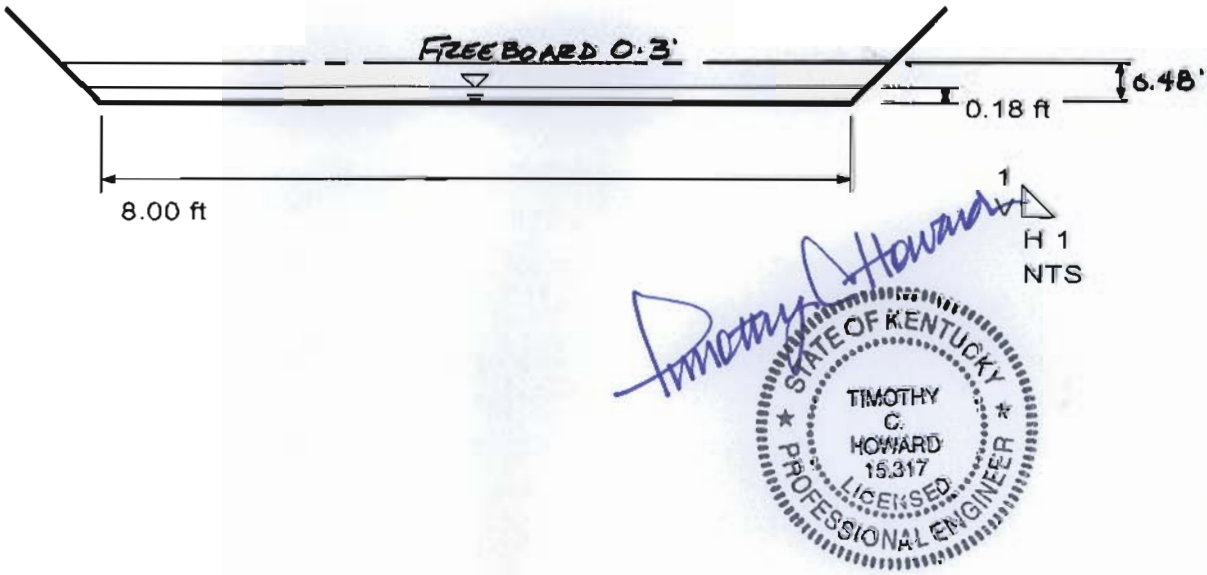
Results		
Depth	0.18	ft
Flow Area	1.44	ft²
Wetted Perimeter	8.50	ft
Top Width	8.35	ft
Critical Depth	0.39	ft
Critical Slope	0.033893	ft/ft
Velocity	8.03	ft/s
Velocity Head	1.00	ft
Specific Energy	1.18	ft
Froude Number	3.41	
Flow is supercritical.		



Fresh Water Diversion Ditch #2
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Fresh Water Diversion Ditch-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.040	
Channel Slope	50.0000	%
Depth	0.18	ft
Left Side Slope	1.000000	H : V
Right Side Slope	1.000000	H : V
Bottom Width	8.00	ft
Discharge	11.52	cfs



STATE OF KENTUCKY
TIMOTHY C. HOWARD 15317 LICENSED PROFESSIONAL ENGINEER

32.3 Are any of the proposed diversions to be retained as permanent facilities? [ ] YES [XX] NO. If "YES", list the identification numbers of those diversions._____ Additionally, provide as "Attachment 32.3.A", detailed designs, cross-sections, calculations, and drawings for each proposed diversion ditch to demonstrate compliance with 405 KAR 16:080 or 18:080, Section 1, as appropriate.
N/A

33. Transportation Facilities Plan

33.1 Describe the transportation plan for the proposed permit area. The plan shall include a discussion of road maintenance, appropriate maps, cross sections, and specifications for each road width, gradient, surface, cut, fill embankment, culvert, bridge, drainage ditch, and drainage structure. Submit the description as "Attachment 33.1.A".
See Attachment 33.1.A

33.2 Are roads for which construction began prior to January 18, 1983 proposed for use within the permit area? [ ] YES [XX] NO. If "YES", clearly identify the extent of such roads on the MRP Map and submit the information required to demonstrate compliance with 405 KAR 8:030, Section 25, or 405 KAR 8:040, Section 25 as appropriate. Submit the information as "Attachment 33.2.A".

33.3 Will conveyors and/or rail systems be located within the proposed permit area? [XX] YES [ ] NO. If "YES", submit a description as "Attachment 33.3.A" and show on the MRP Map.
SEE Attachment 33.3.A

33.4 Does the applicant propose to use alternate specifications for any road or portions of road within the permit area? [XX] YES [ ] NO. If "YES", describe the specification to be modified and provide required justification. Submit as "Attachment 33.4.A".
See Attachment 33.4.A

33.5 Describe the measures to be used to ensure that interests of the public are protected if a waiver to conduct surface disturbances within 100' from the right-of-way of any public road or to relocate a public road is being requested. Submit this description as "Attachment 33.5.A".
SEE Attachment 33.5.A

34. Air Pollution Control Plan

34.1 For proposed permit area, describe the fugitive dust control plan to be employed during site preparation, mining, and reclamation. When required, provide an air quality monitoring program and locate monitoring station(s) on the MRP Map. Submit this information as "Attachment 34.1.A".
See Attachment 34.1.A

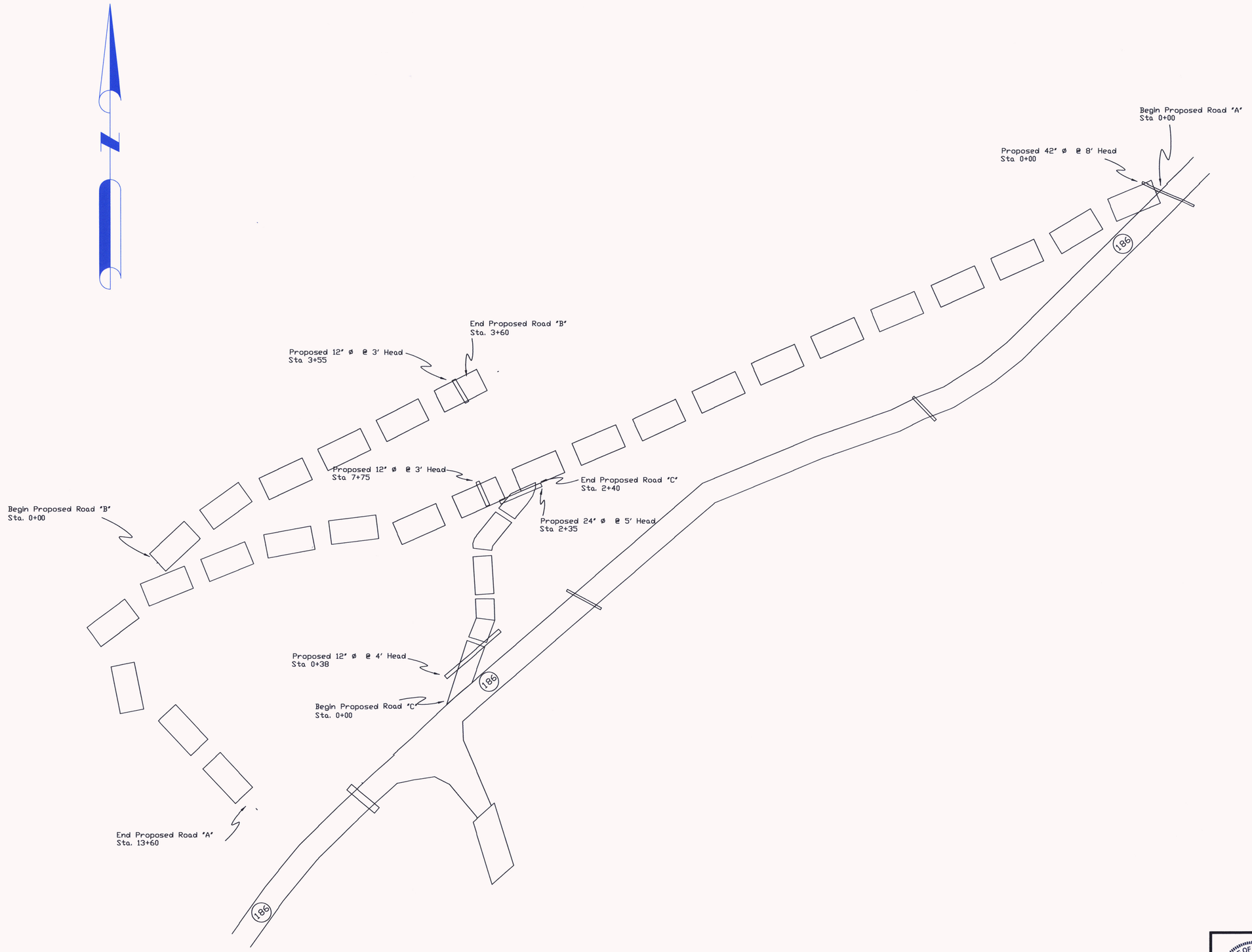
ATTACHMENT 33.1.A

TRANSPORTATION PLAN

It is proposed to construct three (3) roads to be used by the mining proposed in this application. The roads are designated as Road "A", Road "B" and "C". Roads "A" and "C" are located within the permit area and will be used to transport coal and provide access to and from the permit area. Road "B" will provide access to and from the spoil storage area for the placement of the spoil material. Roads "A", "B" and "C" are proposed and will be constructed at the locations shown on the MRP/ERI map.

The roads will be constructed as per Department standards and to adapt to conditions encountered in the field.

The haul roads will be maintained by grading, surfacing with durable material, revegetating side slopes, cut and fill slopes, watering for dust control, and minor reconstruction if necessary. The roads are proposed to be permanent structures, used for the support and achievement of the post-mining landuse. Typical cross-sections and profile drawings are included on the following pages.



I, Timothy C. Howard, P.E. No. 15,317

Date: 8/13/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit No. 807-5223
Road Plan View Drawing

Scale: 1" = 50' | **Page No. 1 of 1**

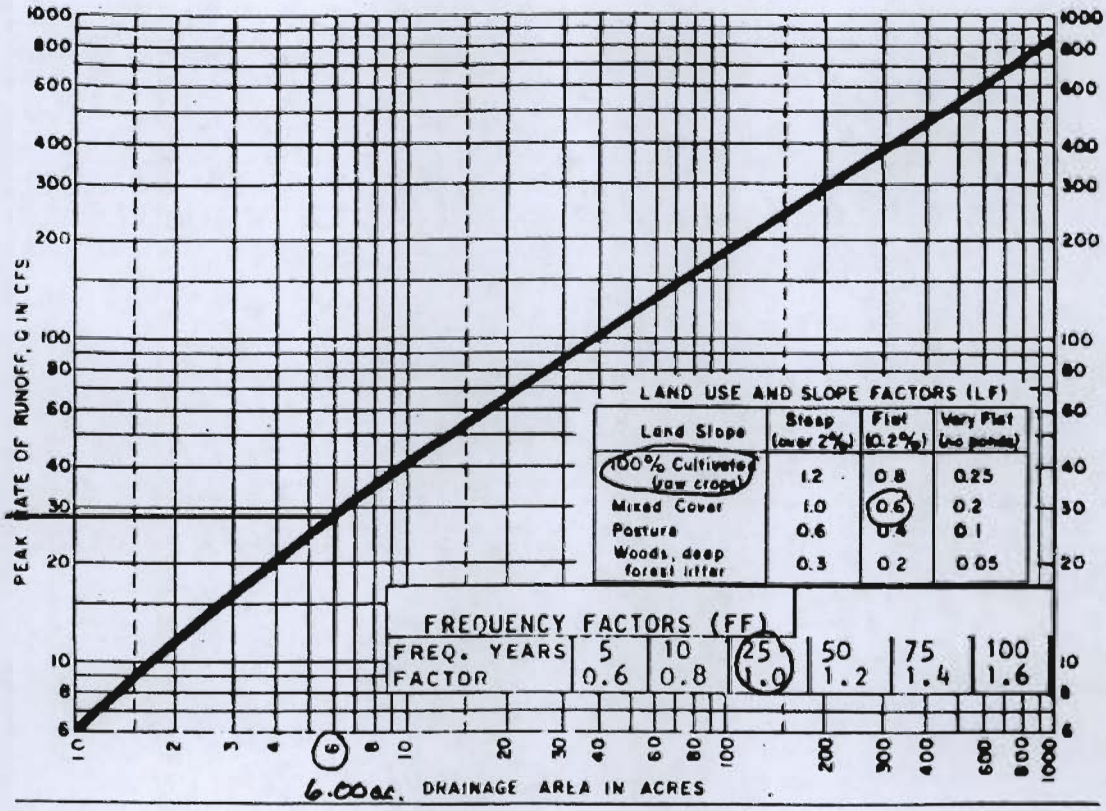
Prepared by:
Howard Engineering & Geology, Inc.

Company Name: Bell County Coal Corp

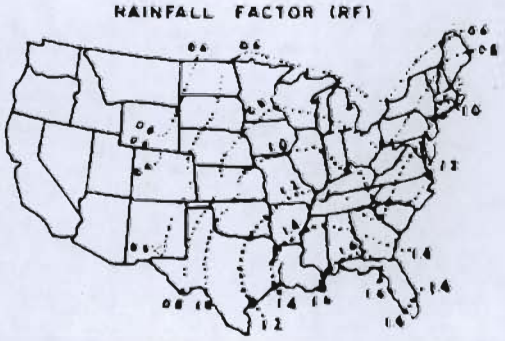
Project: #807-5223, Roads A, B & C

Road Ditches A, A1, B & C

Date: 8-12-08 Scale: None Dwn By: twm



RAINFALL FACTOR (RF)



FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

1.6 x 1.0 x 0.6 x 28 = 16.80

16.80 cfs

Timothy C. Howard

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

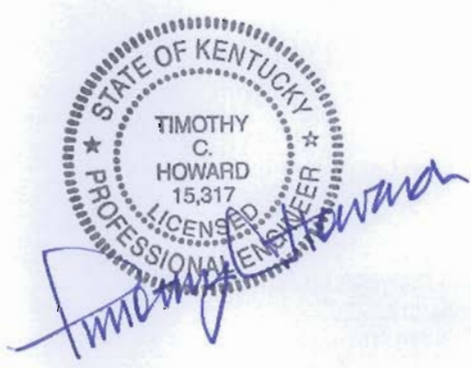
PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Road Ditches A, A1, B and C
Worksheet for Triangular Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Road Ditches A, A1, B and C
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Channel Slope	1.0000	%
Left Side Slope	0.250000	H : V
Right Side Slope	3.000000	H : V
Discharge	16.80	cfs

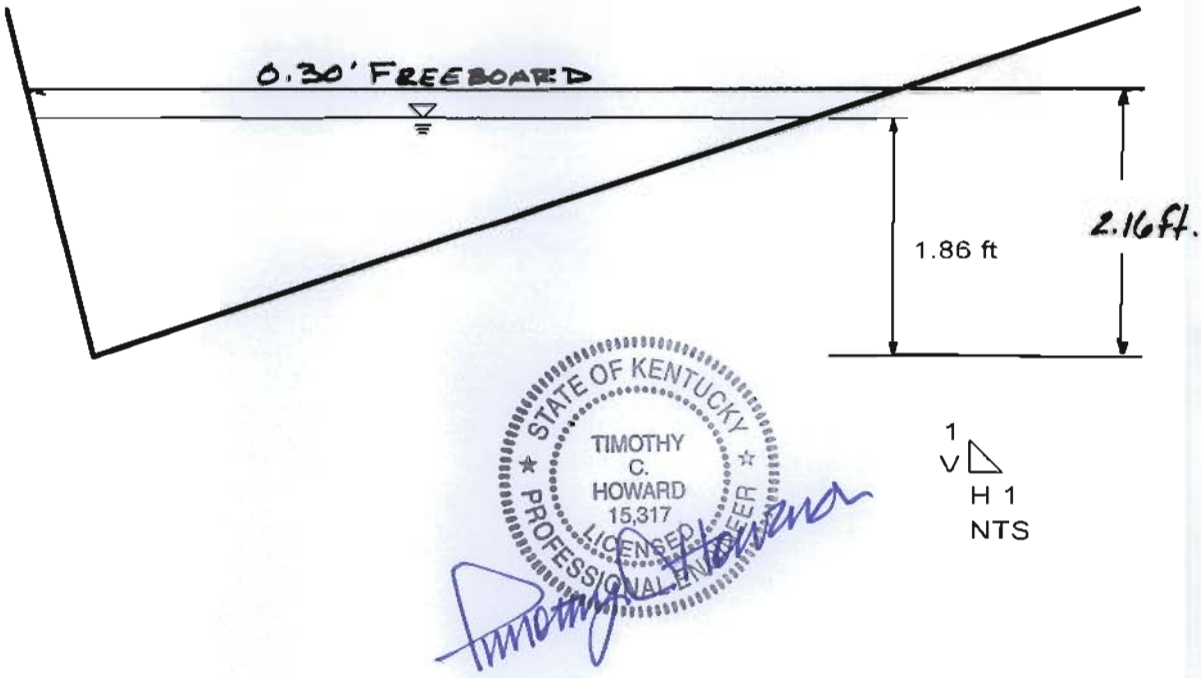
Results		
Depth	1.86	ft
Flow Area	5.62	ft²
Wetted Perimeter	7.80	ft
Top Width	6.05	ft
Critical Depth	1.46	ft
Critical Slope	0.036365	ft/ft
Velocity	2.99	ft/s
Velocity Head	0.14	ft
Specific Energy	2.00	ft
Froude Number	0.55	
Flow is subcritical.		



Road Ditches A, A1 B and C
Cross Section for Triangular Channel

Project Description	
Project File	c:\program files\flow master - haestead\fmw\project1.fm2
Worksheet	Road Ditches A, A1, B and C
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.040	
Channel Slope	1.0000	%
Depth	1.86	ft
Left Side Slope	0.250000	H : V
Right Side Slope	3.000000	H : V
Discharge	16.80	cfs



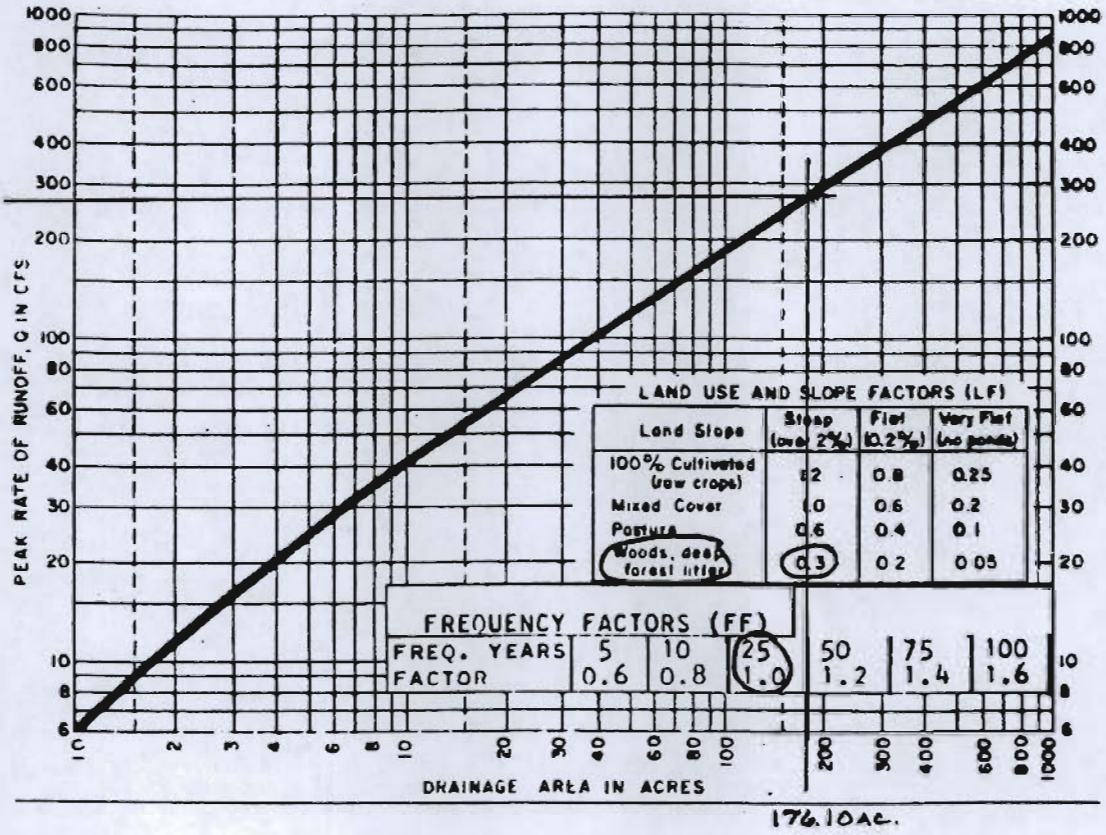
Company Name: BELL County Coal Corp.

Project: #807-5223, ROAD "A"

CULVERT @ STA. 0+00

Date: 8-12-08 Scale: NONE Dwn By: tum

280



LAND USE AND SLOPE FACTORS (LF)

Land Slope	Steep (over 2%)	Flat (0.2%)	Very Flat (no ponds)
100% Cultivated (row crops)	1.2	0.8	0.25
Mixed Cover	1.0	0.6	0.2
Pasture	0.6	0.4	0.1
Woods, deep forest litter	0.3	0.2	0.05

FREQUENCY FACTORS (FF)

FREQ. YEARS	5	10	25	50	75	100
FACTOR	0.6	0.8	1.0	1.2	1.4	1.6

176.10 ac.

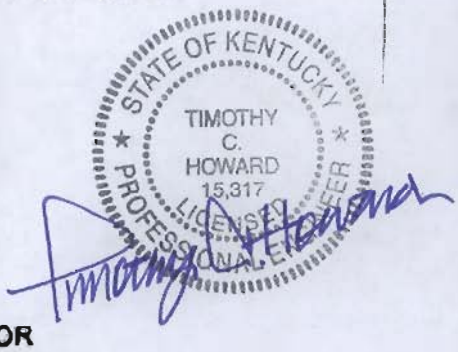
RAINFALL FACTOR (RF)

FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

1.0 X 0.3 X 1.0 X 280 = 84

84 CFS



PEAK RUNOFF METHOD FOR

WATERSHEDS UNDER 1,000 ACRES

Road "A" Cuvert @ Sta. 0+00

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	3.00	0.0240	8.00	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 42 inch pipe(s) required

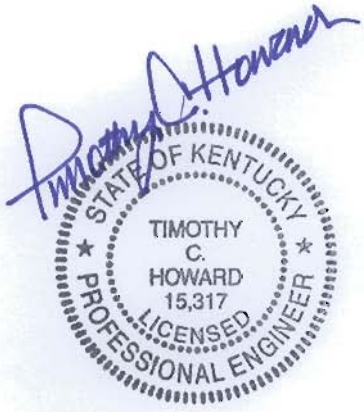
Detailed Performance Curves

Design Discharge = 84.00 cfs

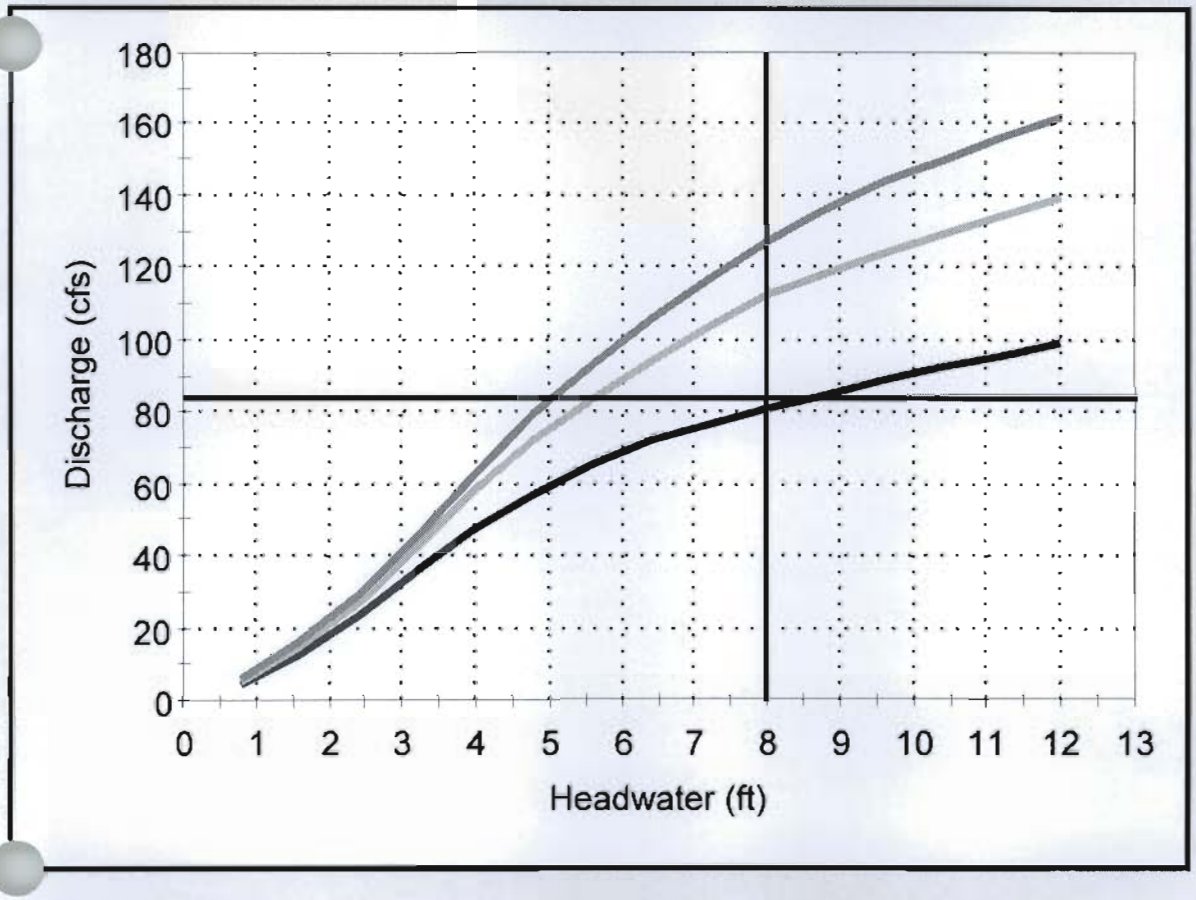
Maximum Headwater = 8.00 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (36 in)	**Discharge (cfs) (42 in)**	Discharge (cfs) (45 in)
0.80	4.50	**5.25**	5.62
1.60	12.71	**14.83**	15.89
2.40	23.36	**27.25**	29.20
3.20	35.96	**41.95**	44.95
4.00	47.70	**58.63**	62.82
4.80	57.14	**72.28**	79.63
5.60	65.22	**84.01**	93.56
6.40	71.97	**94.26**	105.68
7.20	76.52	**103.54**	116.55
8.00	80.74	**112.05**	126.49
8.80	84.75	**118.21**	135.70
9.60	88.59	**123.82**	143.38
10.40	92.26	**129.19**	149.74
11.20	95.76	**134.35**	155.85
12.00	99.17	**139.31**	161.73



Culvert Performance Curves - Structure # 0



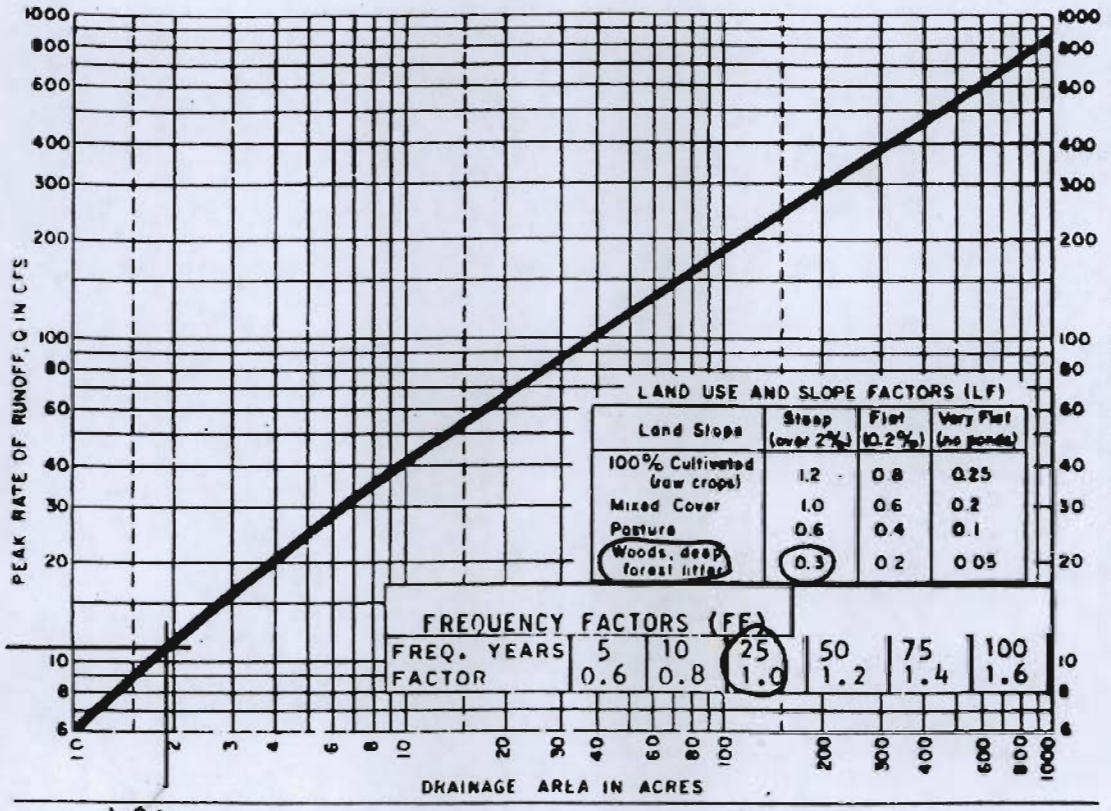
STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Company Name: BELL County Coal Corp.

Project: #807-5223, ROAD "A"

CULVERT @ STA. 7+75

Date: 8-12-08 Scale: NONE Dwn By: twm



LAND USE AND SLOPE FACTORS (LF)

Land Slope	Steep (over 2%)	Flat (0.2%)	Very Flat (no ponds)
100% Cultivated (row crops)	1.2	0.8	0.25
Mixed Cover	1.0	0.6	0.2
Pasture	0.6	0.4	0.1
Woods, deep forest litter	(0.3)	0.2	0.05

FREQUENCY FACTORS (FF)

FREQ. YEARS	5	10	(25)	50	75	100
FACTOR	0.6	0.8	(1.0)	1.2	1.4	1.6

11

1.90 ac.

RAINFALL FACTOR (RF)

FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

$1.0 \times 0.3 \times 1.0 \times 11 = 3.30$

3.30 CFS

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED PROFESSIONAL ENGINEER

PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Road "A" Cuvert @ Sta. 7+75

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	3.00	0.0240	3.00	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 12 inch pipe(s) required

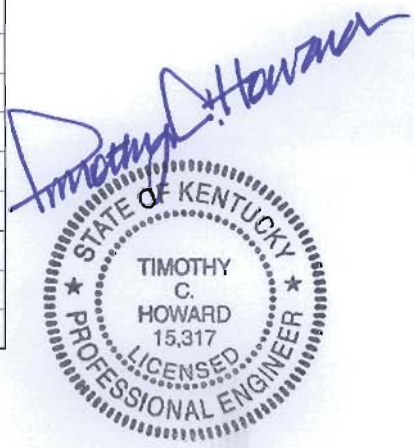
Detailed Performance Curves

Design Discharge = 3.30 cfs

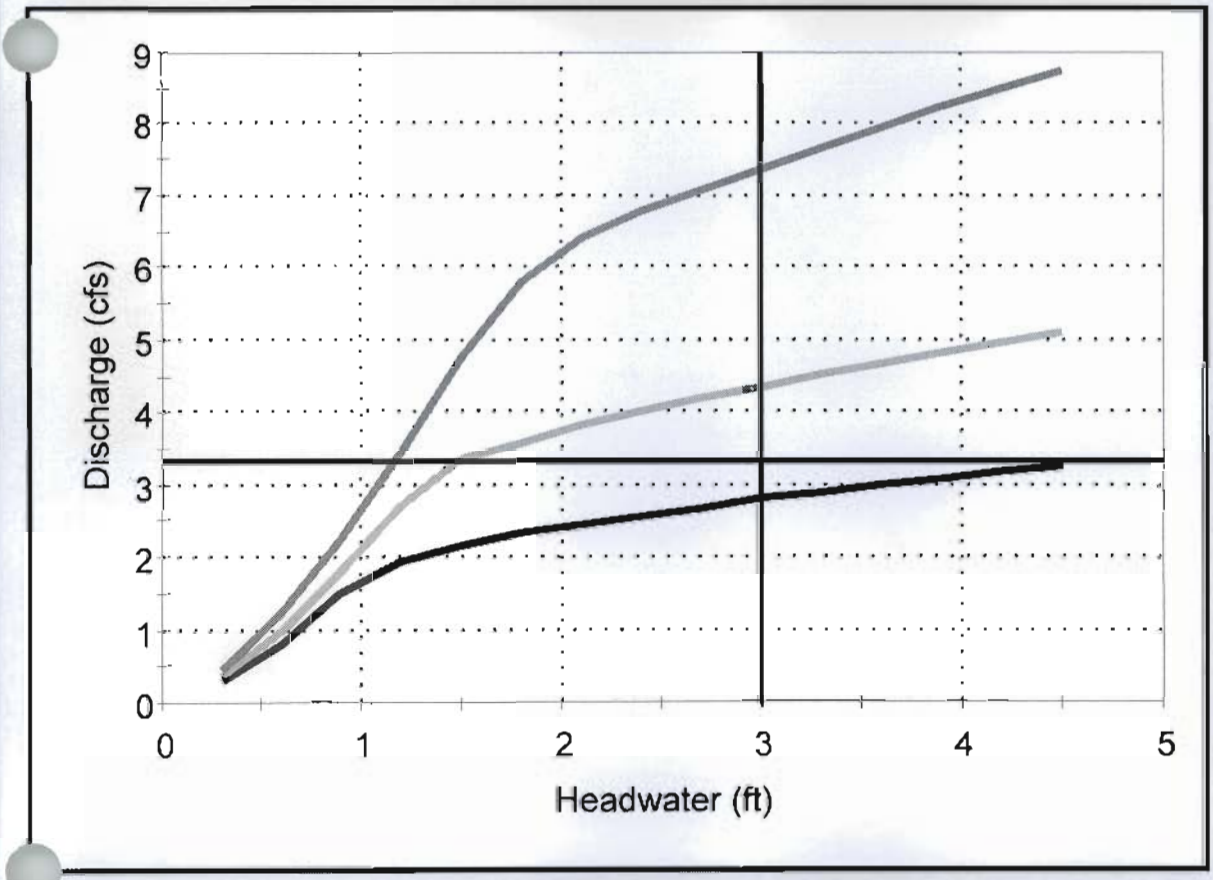
Maximum Headwater = 3.00 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (10 in)	**Discharge (cfs) (12 in)**	Discharge (cfs) (15 in)
0.30	0.29	**0.35**	0.45
0.60	0.81	**0.98**	1.22
0.90	1.48	**1.79**	2.24
1.20	1.92	**2.70**	3.44
1.50	2.16	**3.35**	4.73
1.80	2.34	**3.59**	5.79
2.10	2.45	**3.82**	6.43
2.40	2.57	**4.00**	6.76
2.70	2.68	**4.17**	7.07
3.00	2.79	**4.35**	7.38
3.30	2.89	**4.50**	7.67
3.60	2.98	**4.66**	7.95
3.90	3.07	**4.82**	8.22
4.20	3.17	**4.96**	8.48
4.50	3.26	**5.10**	8.73

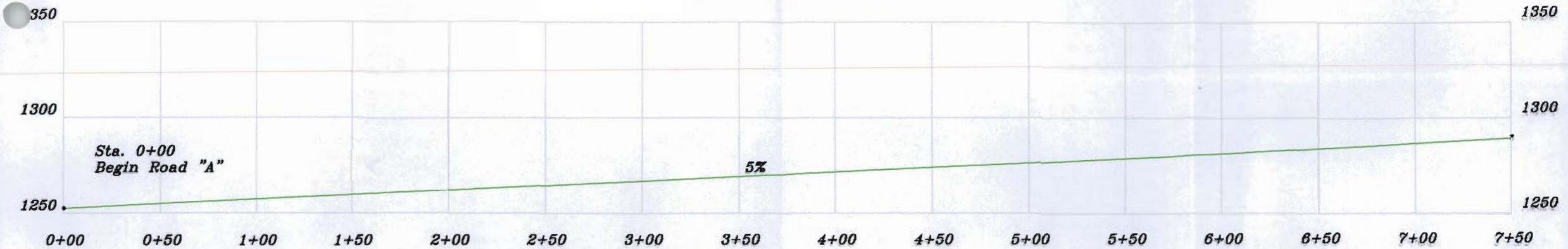


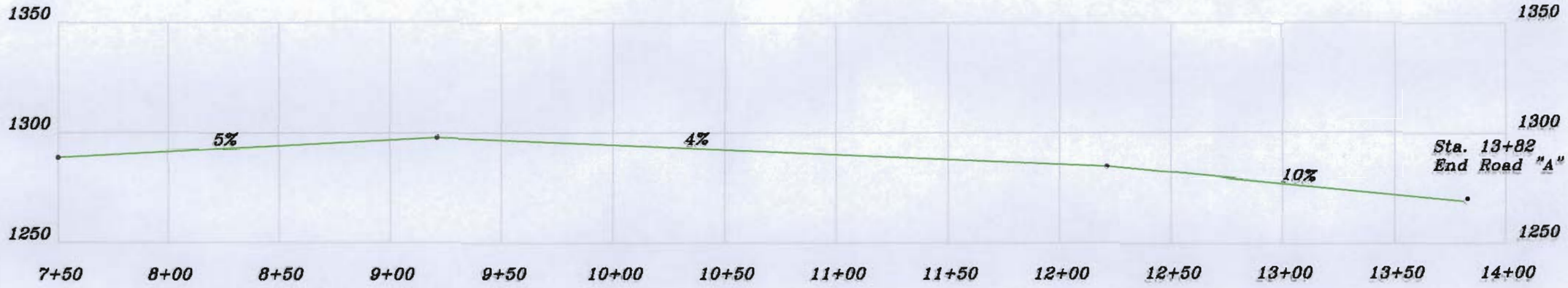
Culvert Performance Curves - Structure # 0



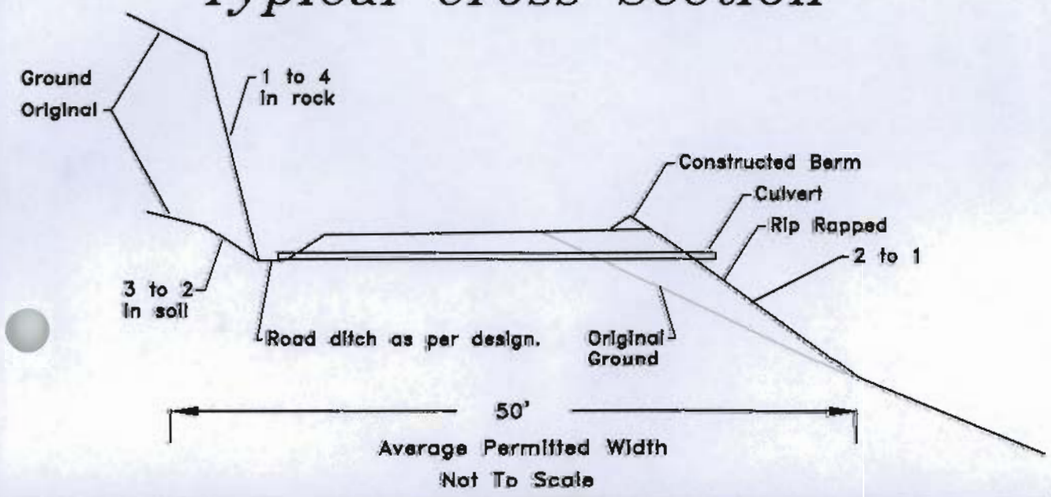
STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Road "A"





Typical Cross Section



I, Timothy C. Howard, P.E. No. 15,317

Date: 10/7/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit #807-5223
Road "A"
Profile And Typical Cross Section
Attachment 33.1.A

Scale: 1" = 50'

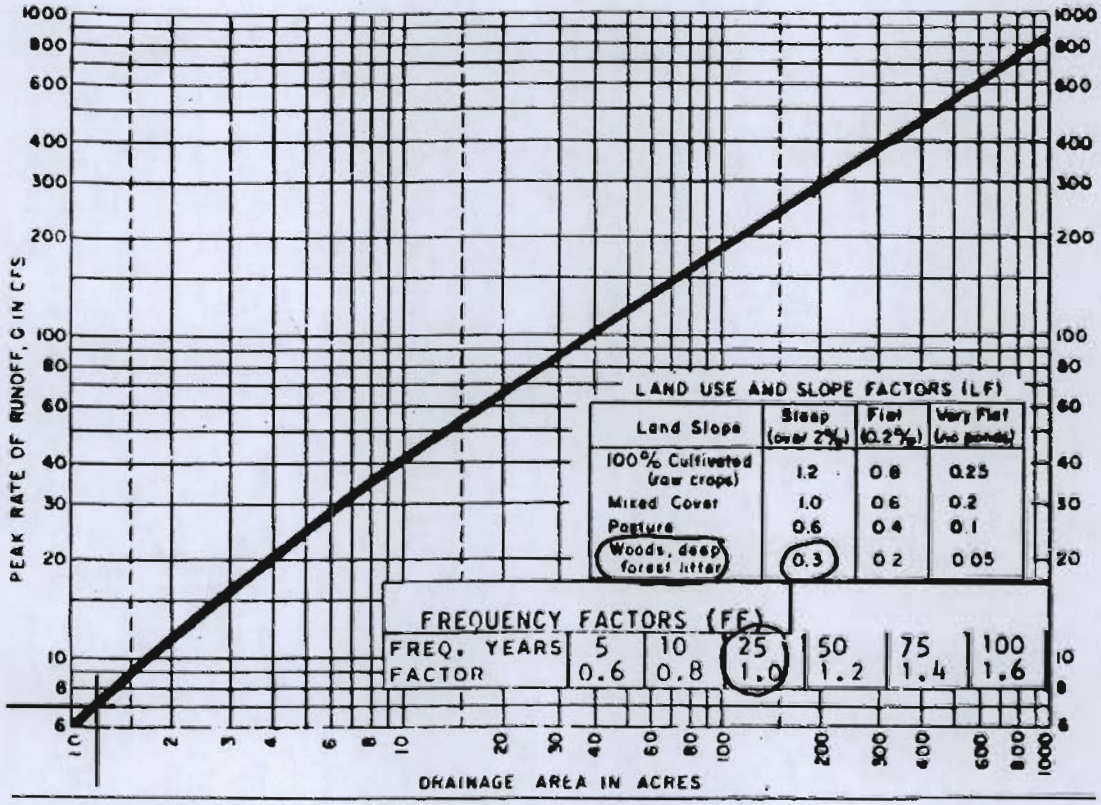
Page No.

Prepared by:
Howard Engineering & Geology, Inc.

Company Name: Bell County Coal Corp.

Project: #807-5223, Road "B"
Culvert @ Sta. 3+55

Date: 12-8-08 Scale: NONE Dwn By: twm



LAND USE AND SLOPE FACTORS (LF)

Land Slope	Steep (over 2%)	Flat (0.2%)	Very Flat (no ponds)
100% Cultivated (row crops)	1.2	0.8	0.25
Mixed Cover	1.0	0.6	0.2
Pasture	0.6	0.4	0.1
Woods, deep forest litter	0.3	0.2	0.05

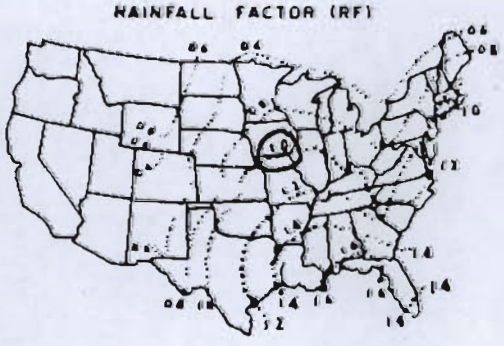
FREQUENCY FACTORS (FF)

FREQ. YEARS	5	10	25	50	75	100
FACTOR	0.6	0.8	1.0	1.2	1.4	1.6

7.0

1.20 AC.

RAINFALL FACTOR (RF)



FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

$1.0 \times 0.3 \times 1.0 \times 7.0 = 2.10$

2.10 CFS

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317
LICENSED PROFESSIONAL ENGINEER

PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Road "B" Culvert @ Sta. 3+55

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	3.00	0.0240	3.00	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 10 inch pipe(s) required

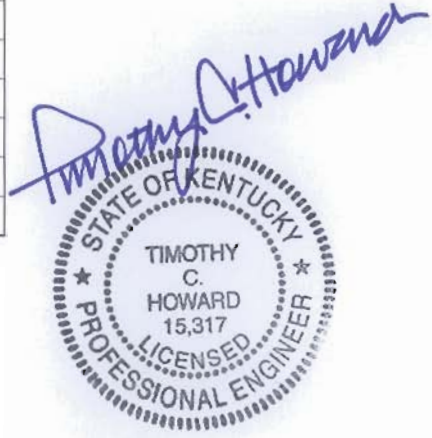
Detailed Performance Curves

Design Discharge = 2.10 cfs

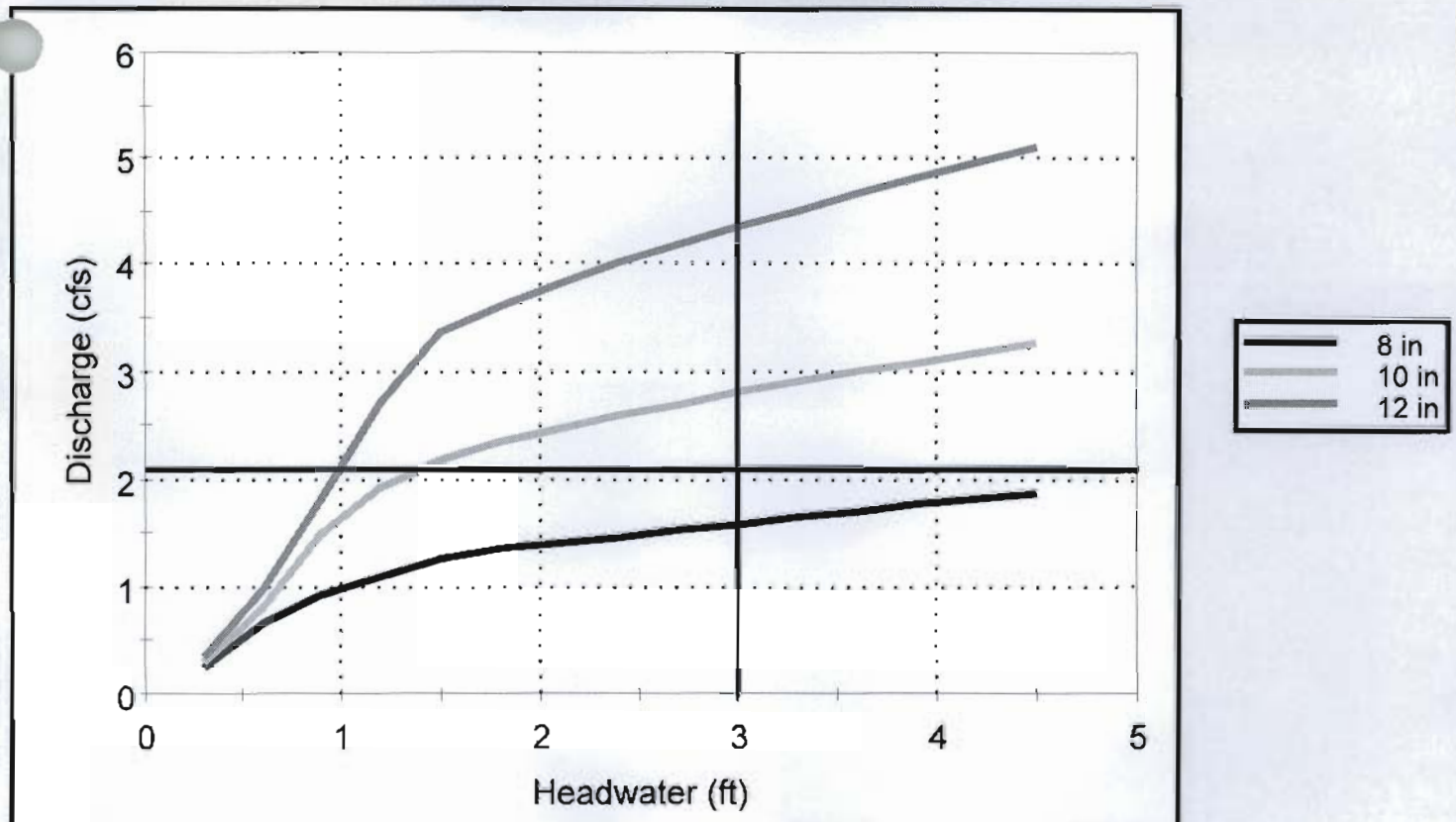
Maximum Headwater = 3.00 ft

(BOLD indicates design pipe size)

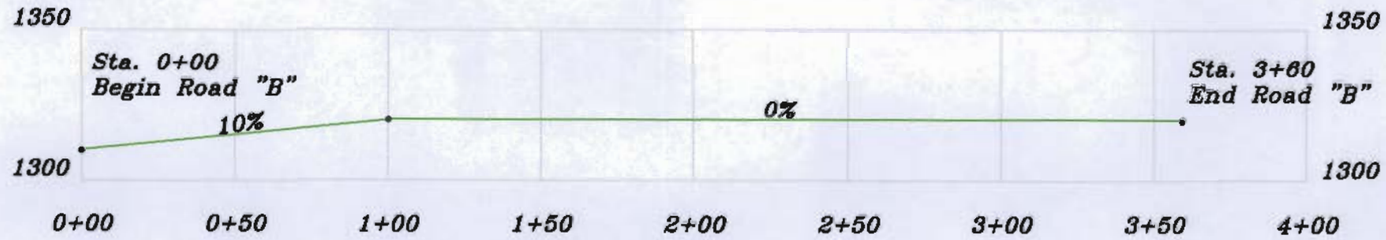
Headwater (ft)	Discharge (cfs) (8 in)	**Discharge (cfs) (10 in)**	Discharge (cfs) (12 in)
0.30	0.23	**0.29**	0.35
0.60	0.66	**0.81**	0.98
0.90	0.92	**1.48**	1.79
1.20	1.10	**1.92**	2.70
1.50	1.27	**2.16**	3.35
1.80	1.35	**2.34**	3.59
2.10	1.41	**2.45**	3.82
2.40	1.47	**2.57**	4.00
2.70	1.53	**2.68**	4.17
3.00	1.59	**2.79**	4.35
3.30	1.64	**2.89**	4.50
3.60	1.70	**2.98**	4.66
3.90	1.76	**3.07**	4.82
4.20	1.82	**3.17**	4.96
4.50	1.86	**3.26**	5.10



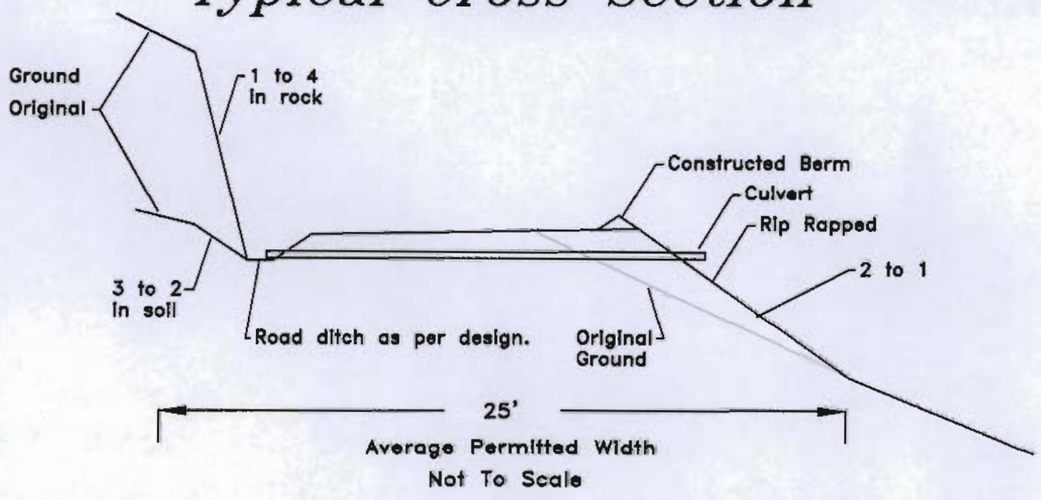
Culvert Performance Curves - Structure # 0



Road "B"



Typical Cross Section



I, Timothy C. Howard, P.E. No. 15,317

Date: 10/7/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit #807-5223
Road "B"
Profile And Typical Cross Section
Attachment 33.1.A

Scale: 1" = 50'

Page No.

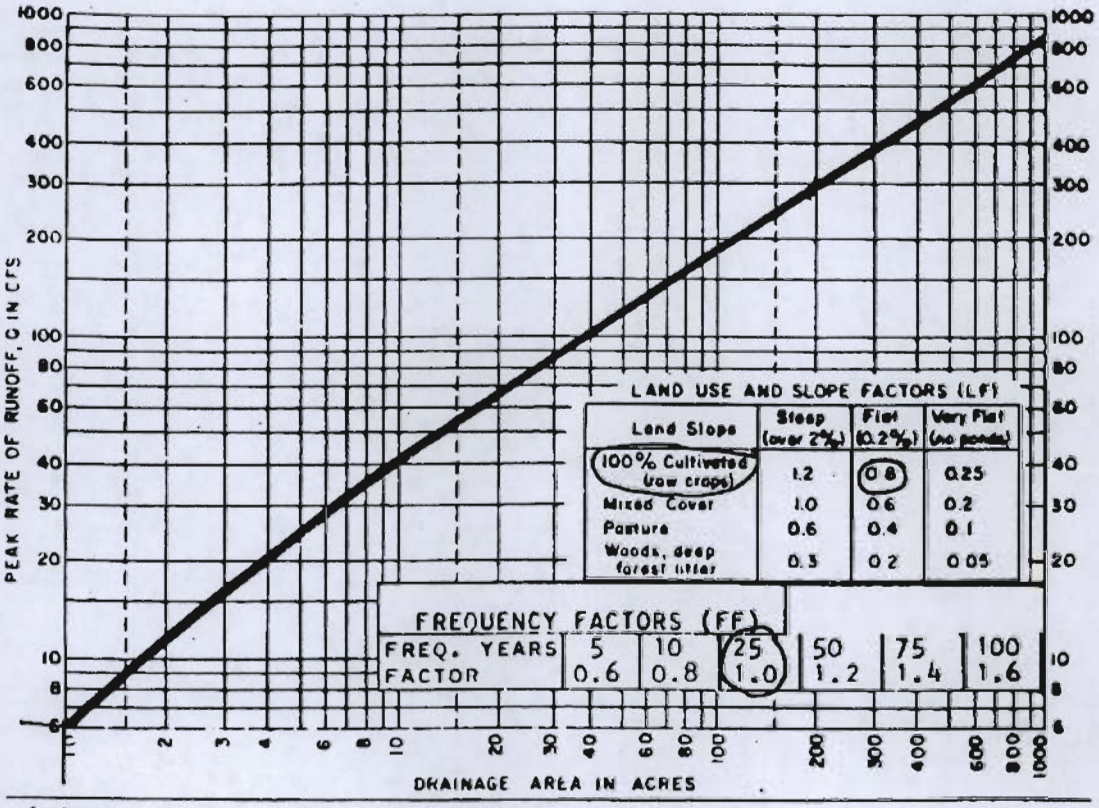
Prepared by:
Howard Engineering & Geology, Inc.

Company Name: Bell County Coal Corp

Project: #807-5223, Road "C"

Culvert @ Sta. 0+38

Date: 8-12-08 Scale: None Dwn By: twm



LAND USE AND SLOPE FACTORS (LF)

Land Slope	Steep (over 2%)	Flat (0.2%)	Very Flat (no ponds)
100% Cultivated (row crops)	1.2	0.8	0.25
Mixed Cover	1.0	0.6	0.2
Pasture	0.6	0.4	0.1
Woods, deep forest litter	0.3	0.2	0.05

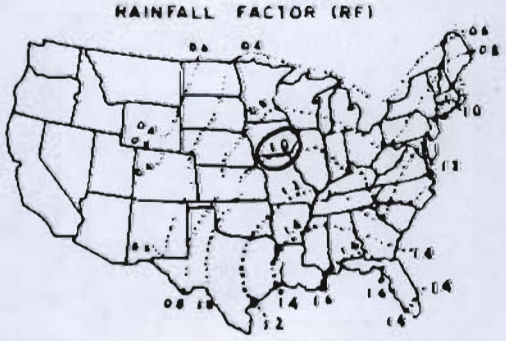
FREQUENCY FACTORS (FF)

FREQ. YEARS	5	10	25	50	75	100
FACTOR	0.6	0.8	1.0	1.2	1.4	1.6

6.0

0.10 Ac.

RAINFALL FACTOR (RF)



FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

1.0 x 0.8 x 1.0 x 6.0 = CFS

4.80 CFS

Timothy C. Howard

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED PROFESSIONAL ENGINEER

PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Road "C" Culvert @ Sta. 0+38

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	3.00	0.0240	4.00	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 12 inch pipe(s) required

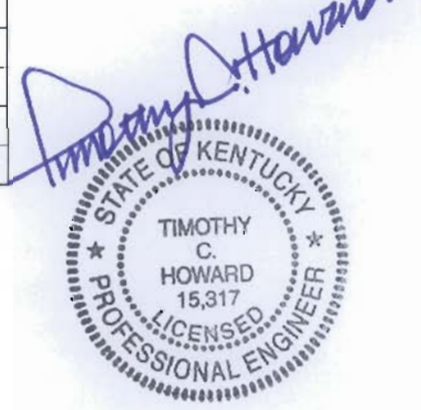
Detailed Performance Curves

Design Discharge = 4.80 cfs

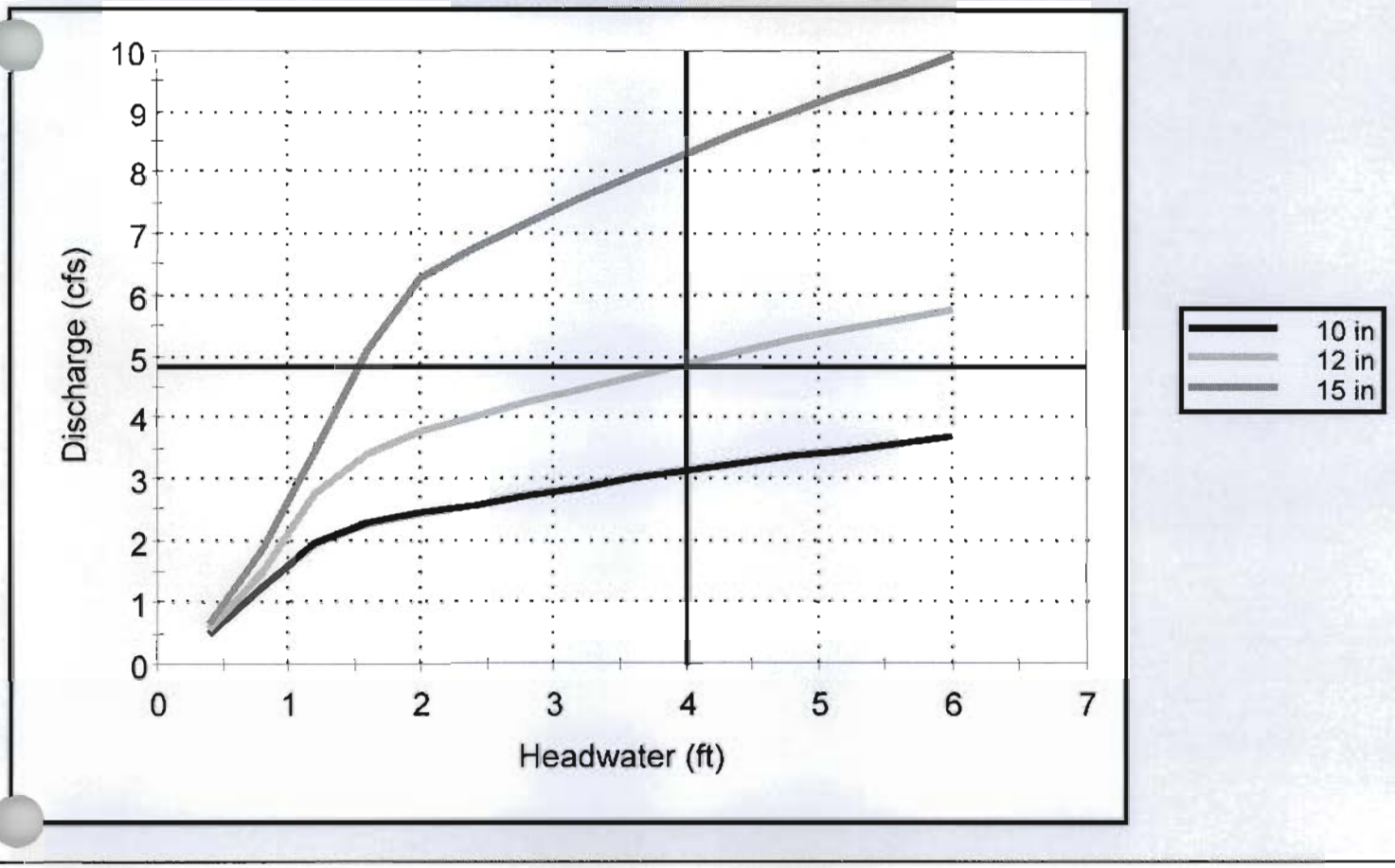
Maximum Headwater = 4.00 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (10 in)	**Discharge (cfs) (12 in)**	Discharge (cfs) (15 in)
0.40	0.47	**0.55**	0.67
0.80	1.25	**1.51**	1.88
1.20	1.93	**2.74**	3.44
1.60	2.26	**3.40**	5.11
2.00	2.41	**3.75**	6.28
2.40	2.57	**4.00**	6.76
2.80	2.72	**4.23**	7.18
3.20	2.85	**4.45**	7.57
3.60	2.98	**4.66**	7.95
4.00	3.11	**4.86**	8.31
4.40	3.23	**5.05**	8.65
4.80	3.34	**5.24**	8.98
5.20	3.45	**5.42**	9.30
5.60	3.56	**5.59**	9.61
6.00	3.67	**5.76**	9.91



Culvert Performance Curves - Structure # 0



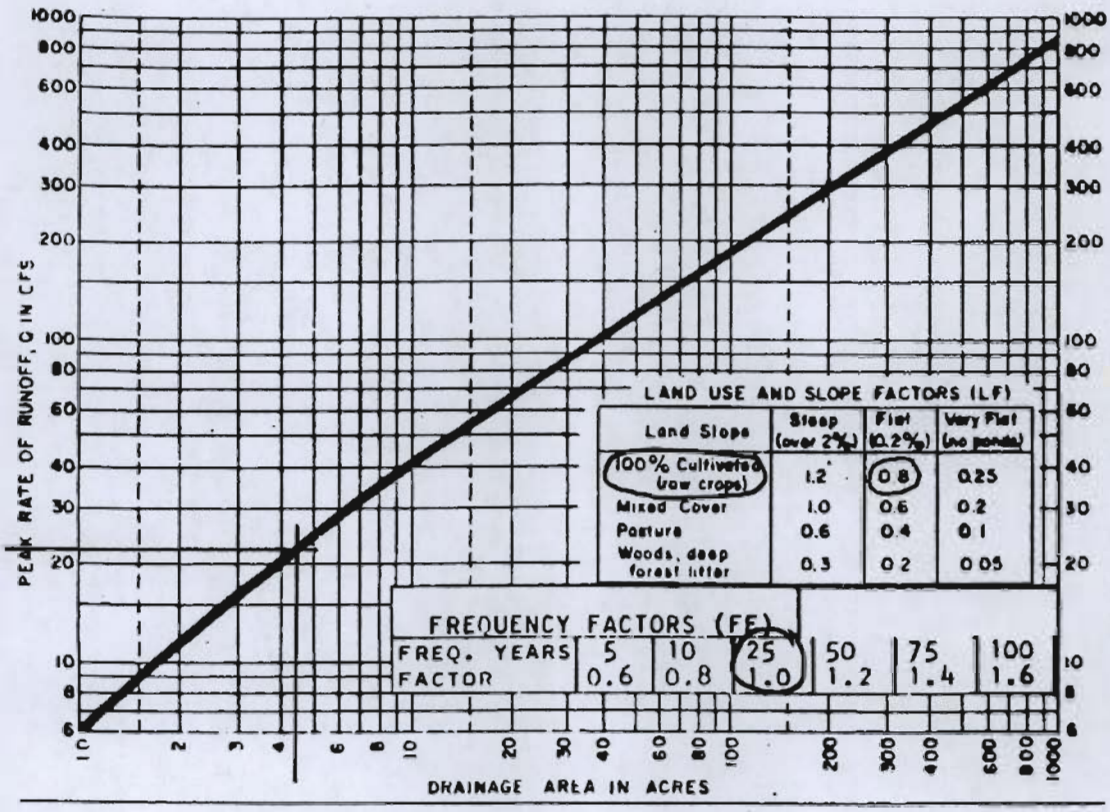
STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Company Name: Bell County Coal Corp.

Project: #807-5223, Road "C"

Culvert @ Sta. 2+35

Date: 8-12-08 Scale: None Dwn By: twm



22.00

LAND USE AND SLOPE FACTORS (LF)

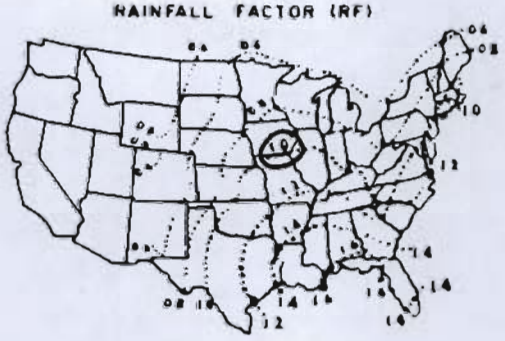
Land Slope	Steep (over 2%)	Flat (0.2%)	Very Flat (no ponds)
100% Cultivated (row crops)	1.2	0.8	0.25
Mixed Cover	1.0	0.6	0.2
Pasture	0.6	0.4	0.1
Woods, deep forest litter	0.3	0.2	0.05

FREQUENCY FACTORS (FF)

FREQ. YEARS	5	10	25	50	75	100
FACTOR	0.6	0.8	1.0	1.2	1.4	1.6

4.40 Ac.

RAINFALL FACTOR (RF)



FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

1.0 x 0.8 x 1.0 x 22 = 17.60

17.60 CFS

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317 LICENSED PROFESSIONAL ENGINEER

PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Road "C" Culvert @ Sta. 2+35

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	3.00	0.0240	5.00	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 21 inch pipe(s) required

Detailed Performance Curves

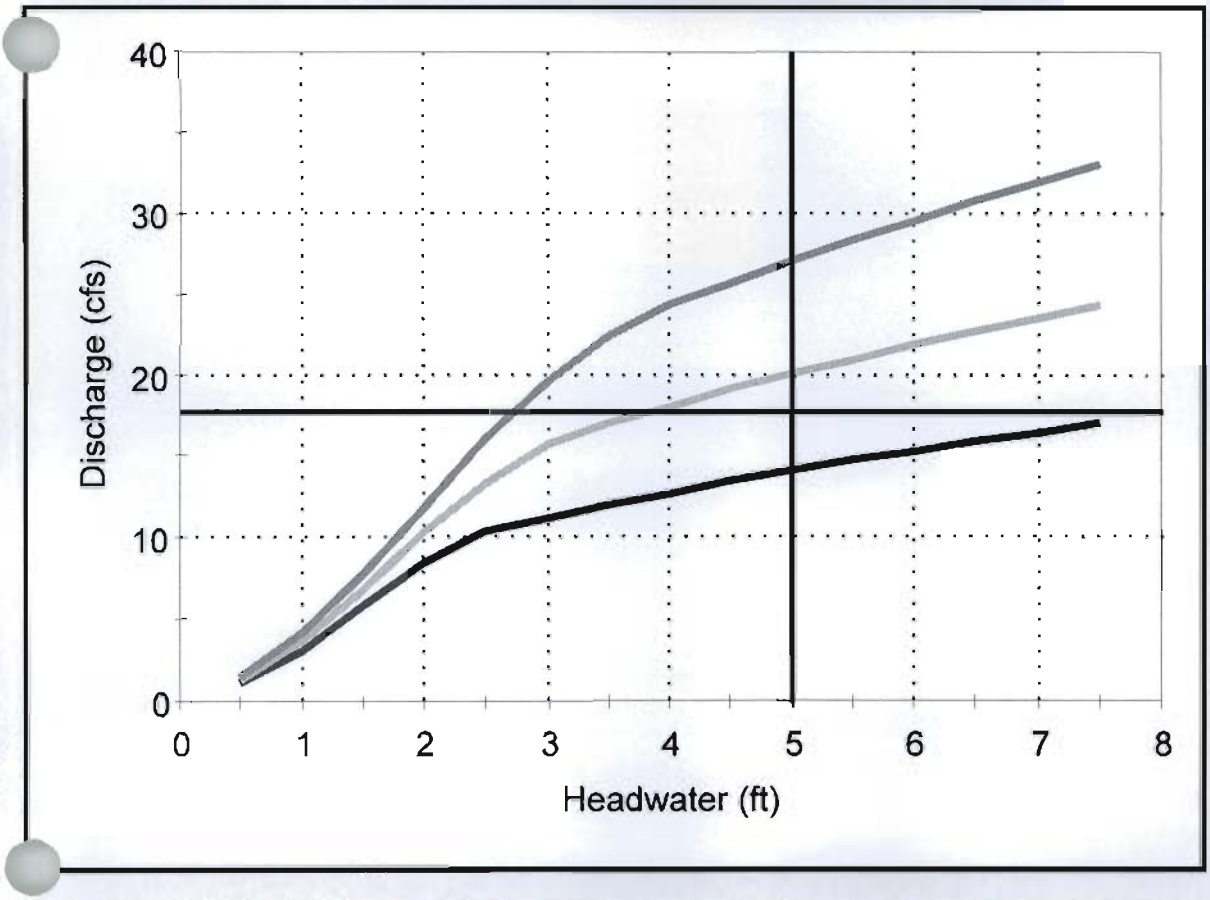
Design Discharge = 17.60 cfs

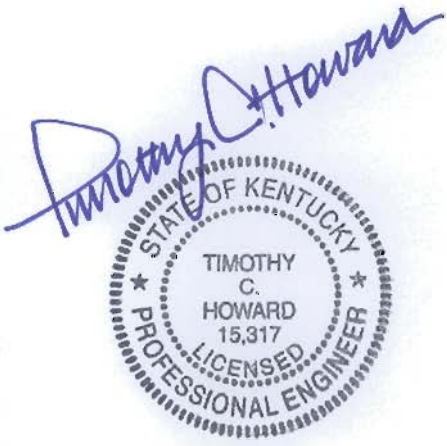
Maximum Headwater = 5.00 ft

(BOLD indicates design pipe size)

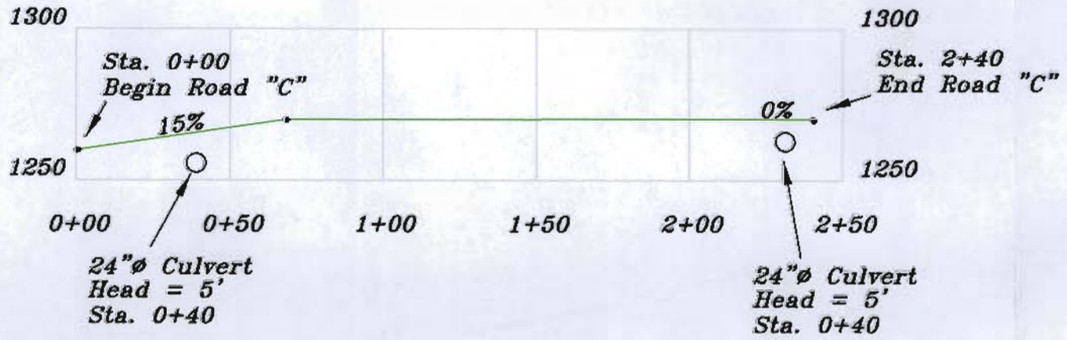
Headwater (ft)	Discharge (cfs) (18 in)	**Discharge (cfs) (21 in)**	Discharge (cfs) (24 in)
0.50	1.12	**1.30**	1.49
1.00	3.14	**3.66**	4.19
1.50	5.77	**6.73**	7.69
2.00	8.43	**10.33**	11.85
2.50	10.33	**13.32**	16.11
3.00	11.22	**15.63**	19.52
3.50	11.98	**16.96**	22.41
4.00	12.70	**18.04**	24.22
4.50	13.39	**19.05**	25.65
5.00	14.04	**20.02**	27.01
5.50	14.66	**20.94**	28.30
6.00	15.27	**21.82**	29.53
6.50	15.83	**22.67**	30.72
7.00	16.39	**23.49**	31.86
7.50	16.93	**24.28**	32.97

Culvert Performance Curves - Structure # 0

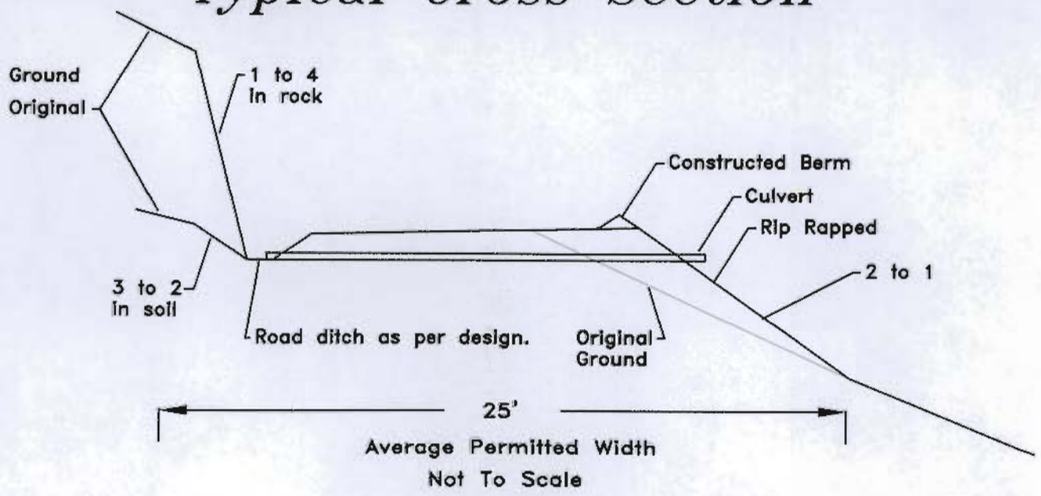




Road "C"



Typical Cross Section



I, Timothy C. Howard, P.E. No. 15,317

Date: 10/14/08

hereby certify in accordance with 405 KAR 7:040, Section10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

Permit #807-5223
Road "C"
Profile And Typical Cross Section
Attachment 33.1.A

Scale: 1" = 50'

Page No.

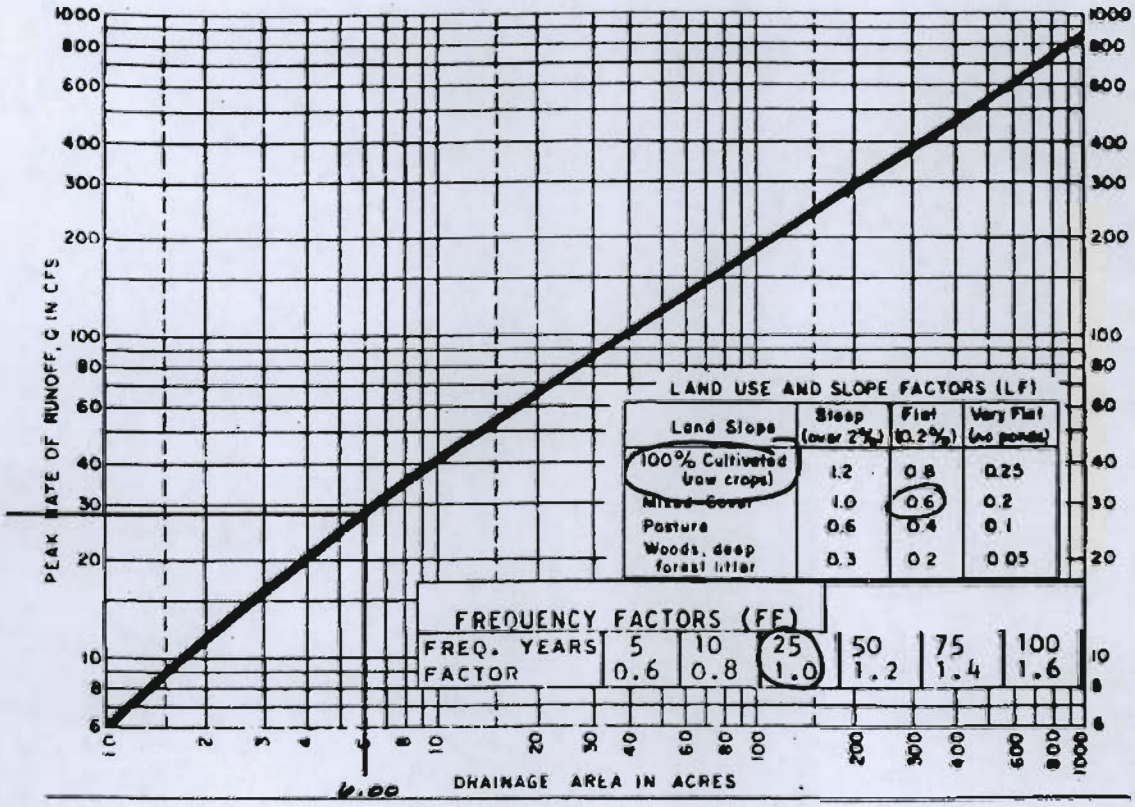
Prepared by:
Howard Engineering & Geology, Inc.

Company Name: Bell County Coal Corp.

Project: #807-5223, ROAD "C"

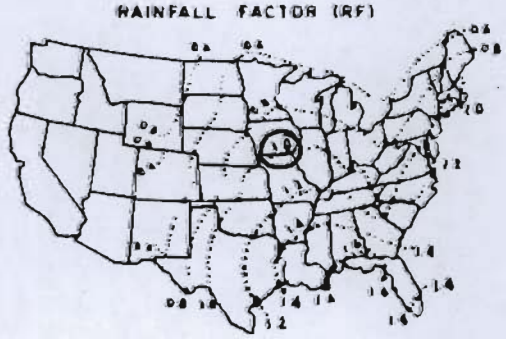
Culvert @ Sta. 0+40

Date: 10-13-08 Scale: None Dwn By: TWM



28

RAINFALL FACTOR (RF)



FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

$1.0 \times 1.0 \times 0.6 \times 28 = 16.80$

16.80 CFS

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15317
LICENSED PROFESSIONAL ENGINEER

PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Road "C" Culvert @ Sta. 0+40

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	1.00	0.0240	5.00	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 21 inch pipe(s) required

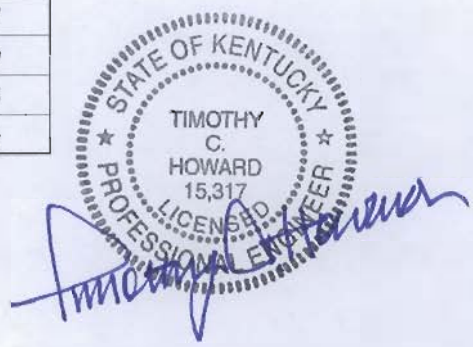
Detailed Performance Curves

Design Discharge = 16.80 cfs

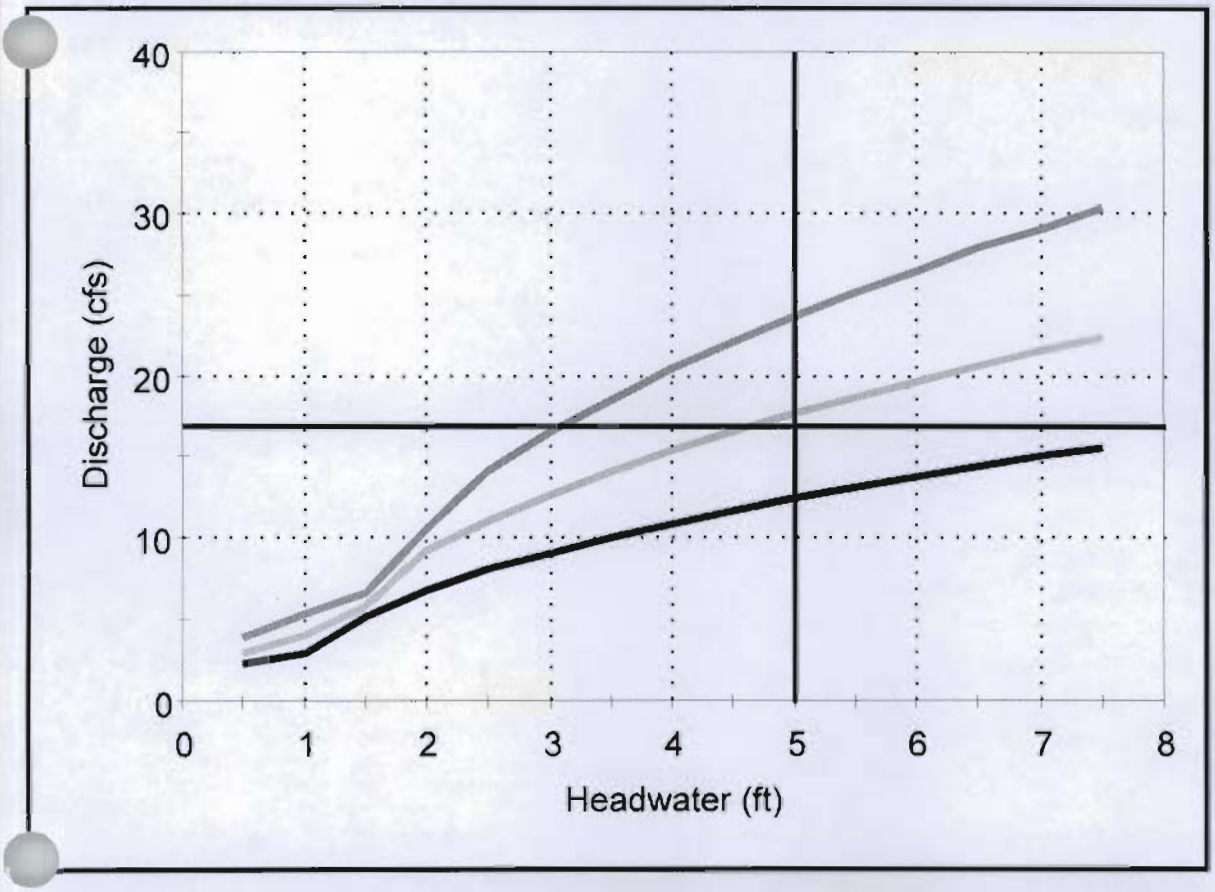
Maximum Headwater = 5.00 ft

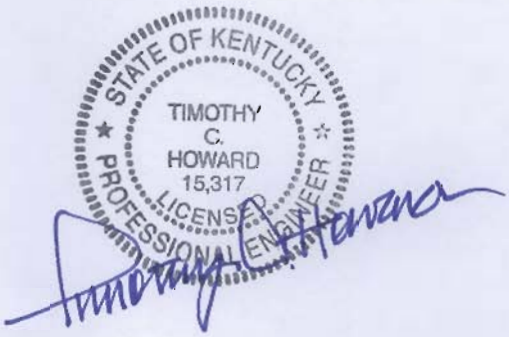
(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (18 in)	**Discharge (cfs) (21 in)**	Discharge (cfs) (24 in)
0.50	2.20	**2.98**	3.84
1.00	2.98	**4.04**	5.31
1.50	5.13	**5.89**	6.62
2.00	6.88	**9.20**	10.59
2.50	8.07	**11.02**	14.15
3.00	9.11	**12.62**	16.48
3.50	10.04	**14.04**	18.52
4.00	10.89	**15.32**	20.37
4.50	11.68	**16.50**	22.05
5.00	12.42	**17.61**	23.62
5.50	13.13	**18.65**	25.09
6.00	13.78	**19.64**	26.47
6.50	14.42	**20.57**	27.79
7.00	15.03	**21.47**	29.05
7.50	15.61	**22.34**	30.24



Culvert Performance Curves - Structure # 0

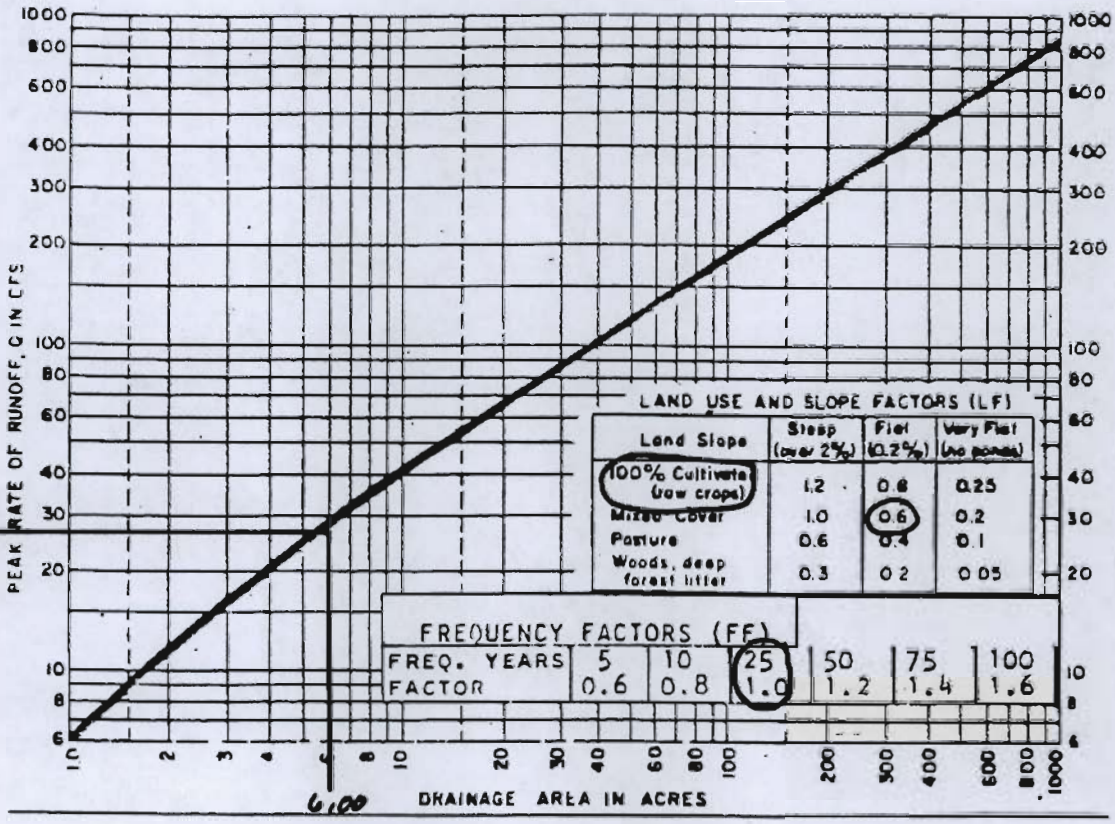




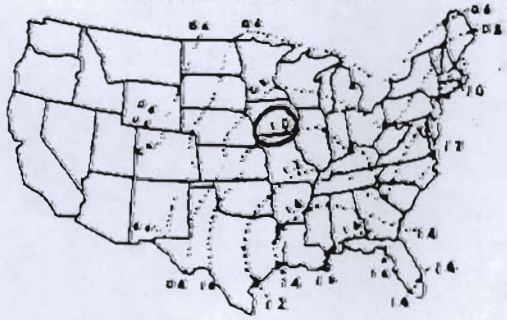
Howard Engineering & Geology, Inc.
P.O. Box 271
2550 W. Hwy. 72, Suite 1
Harlan, KY 40831

Company Name: Bell County Coal Corp.

Project: #807-5223, Road "C"
Culvert @ Sta. 27+35



RAINFALL FACTOR (RF)



FORMULA:

$Q_{design} = RF \times LF \times FF \times Q$

$1.0 \times 1.0 \times 0.6 \times 28 = 16.80$

16.80 cfs

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15,317
LICENSED PROFESSIONAL ENGINEER

PEAK RUNOFF METHOD FOR
WATERSHEDS UNDER 1,000 ACRES

Road "C" Culvert @ Sta. 2+35

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	1.00	0.0240	5.00	0.00	0.90

Culvert Results:

Minimum pipe diameter: 1 - 21 inch pipe(s) required

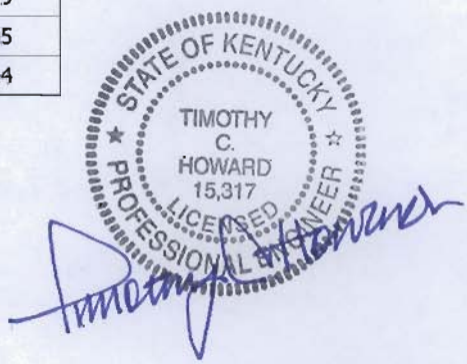
Detailed Performance Curves

Design Discharge = 16.80 cfs

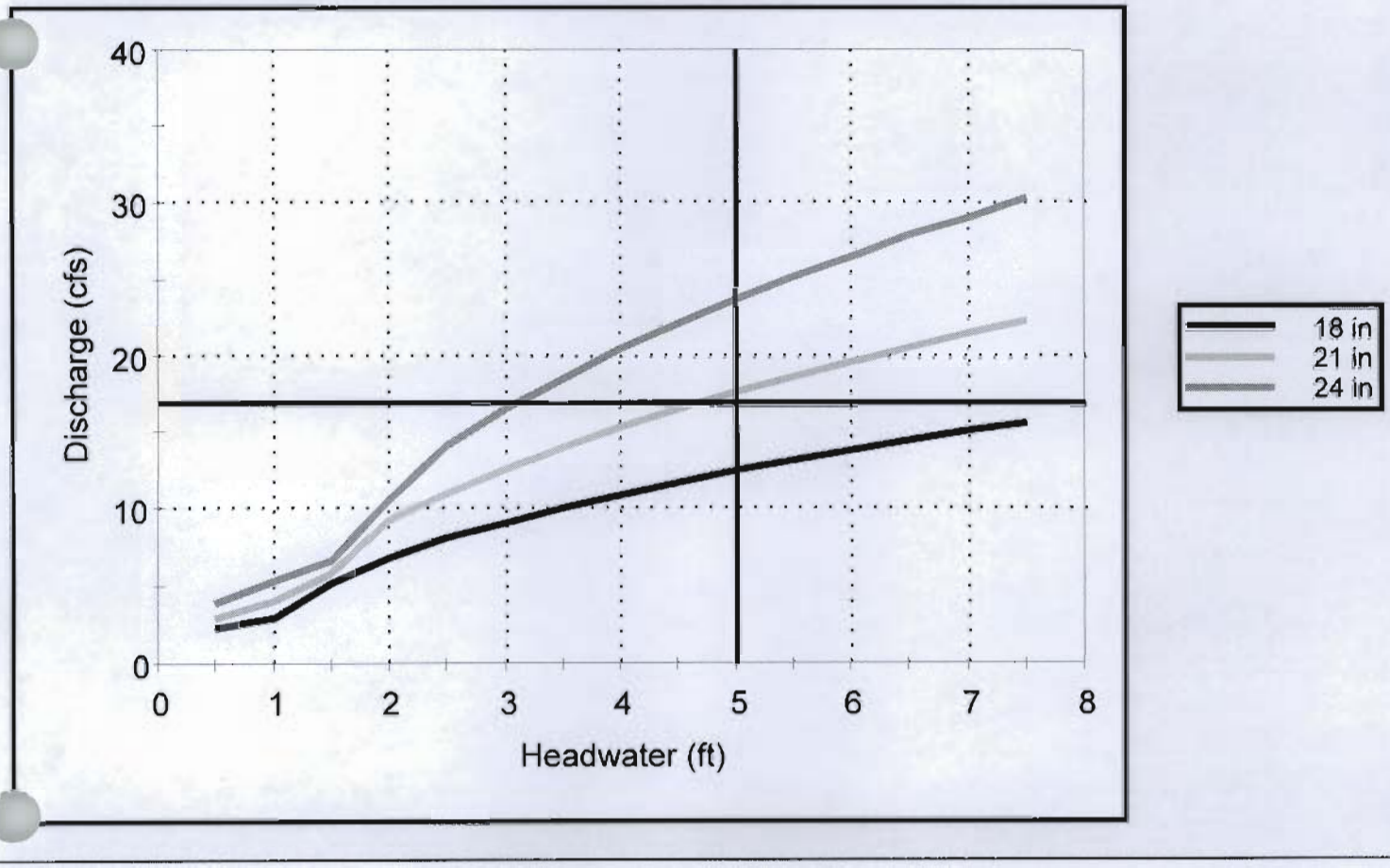
Maximum Headwater = 5.00 ft

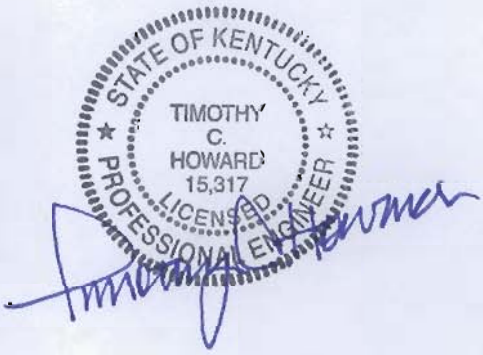
(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (18 in)	**Discharge (cfs) (21 in)**	Discharge (cfs) (24 in)
0.50	2.20	**2.98**	3.84
1.00	2.98	**4.04**	5.31
1.50	5.13	**5.89**	6.62
2.00	6.88	**9.20**	10.59
2.50	8.07	**11.02**	14.15
3.00	9.11	**12.62**	16.48
3.50	10.04	**14.04**	18.52
4.00	10.89	**15.32**	20.37
4.50	11.68	**16.50**	22.05
5.00	12.42	**17.61**	23.62
5.50	13.13	**18.65**	25.09
6.00	13.78	**19.64**	26.47
6.50	14.42	**20.57**	27.79
7.00	15.03	**21.47**	29.05
7.50	15.61	**22.34**	30.24

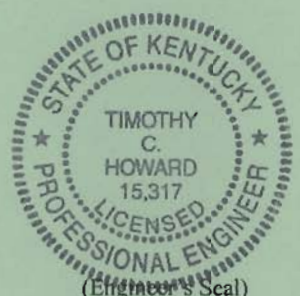


Culvert Performance Curves - Structure # 0





CERTIFICATION OF DESIGN

I, Timothy C. Howard , 

15,317 , 8/13/08 ,

(Signature) (Engineer's Seal) (Registration No.) (Date Certified)

hereby certify, in accordance with 405 KAR 7:040, Section 10, that the design of each of the following facilities, whose design is included in this application, Application # 807-5223 :

a) is in accordance with accepted engineering practices and recognized professional standards;
b) complies with the design requirements of KRS Chapter 350 and KAR Title 405; and
c) provided that the facility is properly constructed, operated and maintained, is adequate for the facility to meet the applicable performance standards of KRS Chapter 350 and KAR Title 405 insofar as such performance can reasonably be predicted by accepted engineering practices.

FACILITY TYPE: Permanent Roads A, B, and C
(One facility type only)

FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN	FACILITY ID #	HAZARD CLASS*	DATE OF DESIGN
"A"		04/28/08	"B"		04/28/08
"C"		04/28/08			

TYPES OF FACILITIES:

-- sedimentation pond
-- excess spoil disposal fill
-- temporary water impoundment
-- permanent water impoundment
-- coal processing waste impoundment
-- coal processing waste dam
-- coal processing waste bank
-- road
-- postmining land use plan
-- permanent ditches

* Show hazard class, if applicable.

ATTACHMENT 33.3.A

As a part of this application we are proposing to install a conveyor from the mine portal to the coal stockpile area. This conveyor will be used to belt the coal product directly from the mine portal to the coal stockpile. The proposed conveyor has been shown on the Mining and Reclamation Plan Map provided in this application. The conveyor will be constructed of angle iron with belt roller conveyors and approximately 5' belt line width. The belt conveyor will run from the belt line portal to the coal stockpile approximately 350' feet in length. Supports will be constructed in the a-frame manner as needed to support the belt conveyor structure. A belt head drive unit will be installed at the stockpile end of the conveyor to power the conveyor. The conveyor will be removed from the site after all mining activities have been completed.

Bell County Coal Corporation
#807-5223

ATTACHMENT 33.4.A

Alternate Road Specifications

As part of this application we are proposing to use alternate specifications for Road "A", Road "B" and Road "C". Roads "A" and "C" will be utilized for coal haulage/access on this permit. Road "B" will be used for access to the spoil storage area. Roads "A", "B" and "C" are proposed and located as shown on the attached MRP/ERI Map. The culverts to be installed on the proposed roads will provide adequate drainage as proposed. There is no danger to the public health or safety as a result of the size and number of culverts to be installed. These roads will be protected from access by unauthorized traffic with the installation of gates and/or a guard patrol during active mining of the permit area.

These roads are safe for use and will not pose any danger to the public health or safety as designed. The extents of the proposed roads are detailed on the MRP/ERI Map provided in this application.

Sincerely,

Timothy C. Howard, P.E.
Howard Engineering & Geology, Inc.

ATTACHMENT 33.5.A

As part of this application we are proposing to use roads "A", "B" and "C" for coal haulage. Road "A" and "C" begin at the edge of HGWY 186.

To insure that the public interest and public safety are protected the following measures will be implemented:

1) The access-haul road will be cleaned as needed to control dust in the area.
2) The public high-way will be cleared of any debris caused by the mining operation in a timely manner.
3) Should any clean out or reconstruction of the access-haul road be necessary near the junction with the public highway it will be done.
4) Permit signs will be placed at the access entrances identifying the road as an active mining permit as required by DSMRE regulations to prevent unauthorized access.
5) The public highway will also be cleaned if necessary.

35. Subsidence Control

35.1 If this is an application which includes underground or auger mining, provide as "Attachment 35.1.A", the information required to demonstrate compliance with 405 KAR 8:040, Section 26. ***See Attachment 35.1.A.***

35.2 Does the proposed method of operation include standard room and pillar mining? [XX] YES [ ] NO. If "YES", describe the thickness and engineering properties of clays and soft rock located immediately above and below the coal seam(s) to be mined. If none exists, briefly describe the stratum immediately above and below all coal seams to be mined with this method. Submit description and related information as "Attachment 35.2.A".
See Attachment 35.2.A

35.3 If this application is for a surface mine, indicate if any portion of the proposed permit area have been "undermined". [ ] YES [**XX**] NO. If "YES", provide a map showing the extent of the underground workings and describe the potential affects subsidence may have on structures such as dams, coal waste disposal areas, fills and other such structures. Submit this information as "Attachment 35.3.A".

36. Applicant/Authorized Agent Signature

36.1 The undersigned, being first duly sworn, states that he/she has read all the information provided in Form MPA-03 Technical Information for a Mining Permit, of this application and has found it to be true and correct. The undersigned further acknowledges that any information provided or omitted herein for the purpose of defrauding or misleading the Natural Resources and Environmental Protection Cabinet may result in criminal charges being instituted pursuant to applicable state laws.

Applicant Company Name ***BELL COUNTY COAL CORPORATION***

Name of Applicant or Agent
Whose Signature Appears Below ***B.J. Reynolds***

Signature of Applicant or Agent* Billy J Reynolds

Date of Signature 4-29-08

Subscribed and sworn to before me by ***B.J. Reynolds***

This the 29th Day of April, ***2008***.

Notary Public

My Commission Expires 2-13-10 State in which Commissioned ***Kentucky***

*NOTE: If signer is other than president or secretary of a corporation attach a notarized copy of power of attorney, or resolution of board of directors which grants signer the legal authority to represent the applicant in this application. (Does not apply to a single proprietorship or partnership.)

Subsidence Protection

The surface area overlying the underground mining areas included in this application have been delineated on the Mining and Reclamation Plan Map. A "Subsidence Survey" of this area has been made to determine if there are any structures or renewable resources located on any of these surface areas. The results of this survey are as follows:

1) A reconnaissance was made; there are no dwellings, commercial or public buildings, nor other facilities such as pipelines, oil or gas wells, etc., located on the surface area overlying the proposed underground workings. Portions of public road 186 are located above the proposed mining. The road surface has been inspected and is currently in poor condition from the existing truck traffic in the area. The road surface is broken and deteriorated in numerous locations.
2) A reconnaissance was made of the areas above the proposed underground workings. During this survey, it was determined that there were no aquifers located above the proposed underground mine workings that could be affected by subsidence.

As a result of our survey, there are no structures which could be affected by the mining activities in this application.

Type of Mining:

Room and Pillar with pillar removal.

The areas pertinent to subsidence protection for this application are the areas of Blue Line Streams overlying the proposed underground boundary. Mining in these areas will be limited to development mining only with no secondary mining in the limited recovery subsidence protection zones as shown on the MRP map.

Preventive Measures for Blue Line Streams:

Areas of 100 feet of cover and less above streams only are designated as no mining areas. Areas equal in elevation to fifty (50) times the seam height plus 100 feet extending to

the no-mining areas are designated as limited recovery subsidence protection zones resulting in a cover of approximately 320' feet from the surface to the mining zone.The approximate elevation cut-of the limited recovery area is 1560' in elevation as shown on the MRP map. Mining in these areas will be limited to development mining only with no secondary mining in the limited recovery subsidence protection zones as shown on the MRP map.

Areas of elevation which exceed the limited recovery zones will be 100% seam extraction.

MITIGATION PLAN

Upon determination by the Cabinet that a structure has been impacted by adverse impacts from subsidence of Bell County Coal Corporation, mitigation may include:

1. Filling of the mine void to prevent further subsidence.
2. Fill and Surface of road beds.
3. Grout and repair stream channels

The permittee may elect to purchase subsidence insurance or compensate the structure owner.

The roads in question in the second technical review are company owned roads and area gated and access to the public is restricted from these roads. These roads are specifically located in Cabin Hollow, Clear Fork, Martins Branch and Coal Creek.

Attachment 35.1.B

Sample Property Owner Notification

[*Property Owner Name*]

[*Address*]

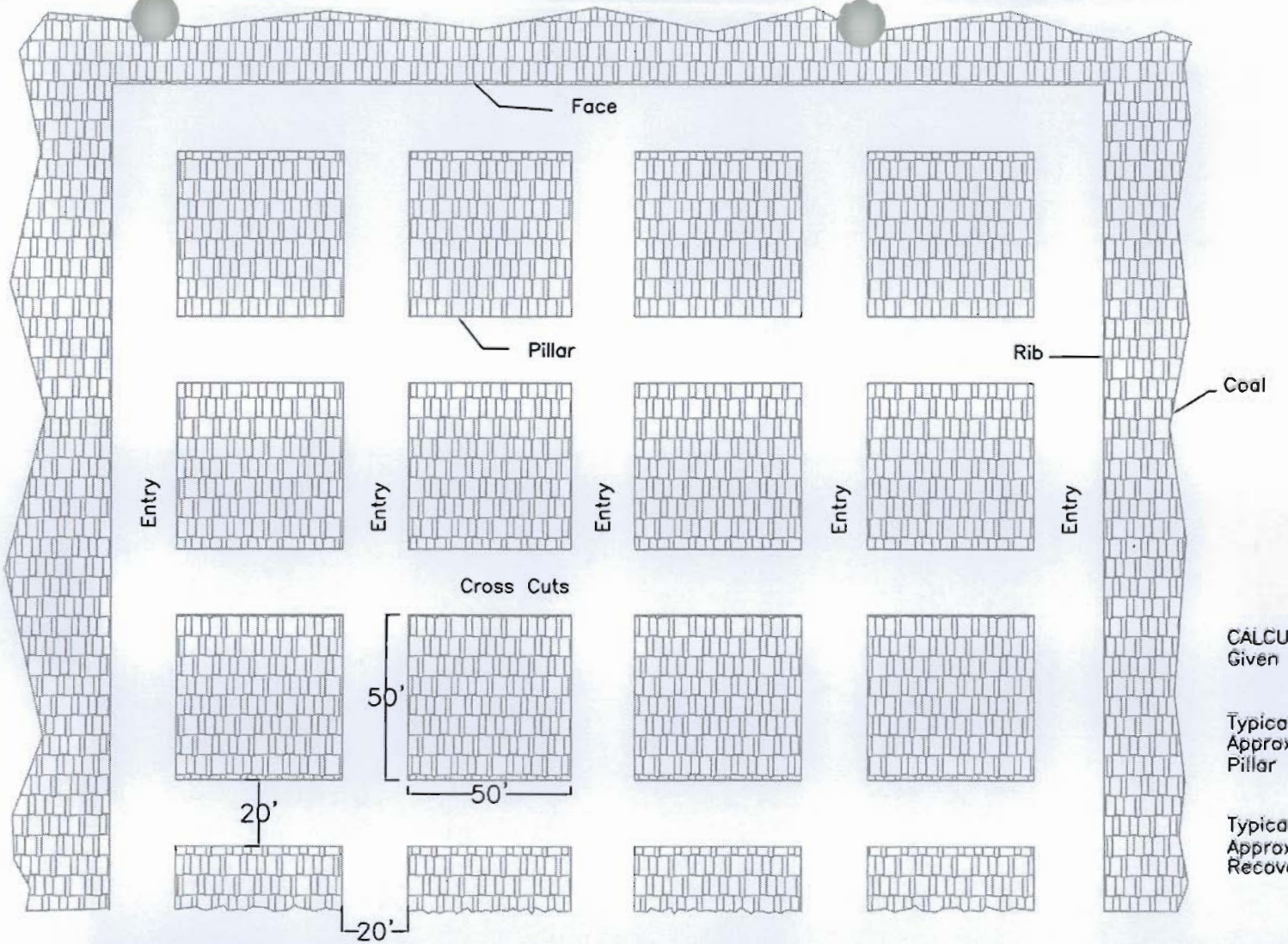
RE: Notification of Proposed Mining Permit 807-5223

Dear Landowner/Resident:

Please be informed that Bell County Coal Corporation will begin mining operations in the Jellicoa coal seam underlying your property located near Middlesboro in Bell County, Kentucky. Mining will begin on your property in _____, 200_____ but no less than thirty (30) days from the date of this notification. Should any questions or comments concerning this matter arise, please contact the company office at Rt. 1 box 290 Pruden Road, Middlesboro, Kentucky 40965. A complete copy of the subsidence protection plan can be viewed at the Department of Natural Resources Middlesboro Regional Office, 1804 Cumberland Avenue, Middlesboro, Kentucky 40965

Sincerely,

Bell County Coal Corporation



CALCULATION:
Given Area = 70' x 70'
= 4900 sq. ft.

Typical Approximate Pillar Area = 50' x 50'
= 2500 sq. ft.

Typical Approximate Recovery = 48.98%

Note: Pillar sizes, entry widths, etc. may vary from those depicted due to mining conditions or other unforeseen circumstances, but will be configured to remain within the limits recovery area.

I, Timothy C. Howard, P.E., No. 15,317

Date: 8/13/08

hereby certify in accordance with 405 KAR 7:040, Section 10, that this document is correct as determined by accepted engineering practices and includes all information required of it by Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD
15,317
LICENSED PROFESSIONAL ENGINEER

BELL COUNTY COAL CORPORATION

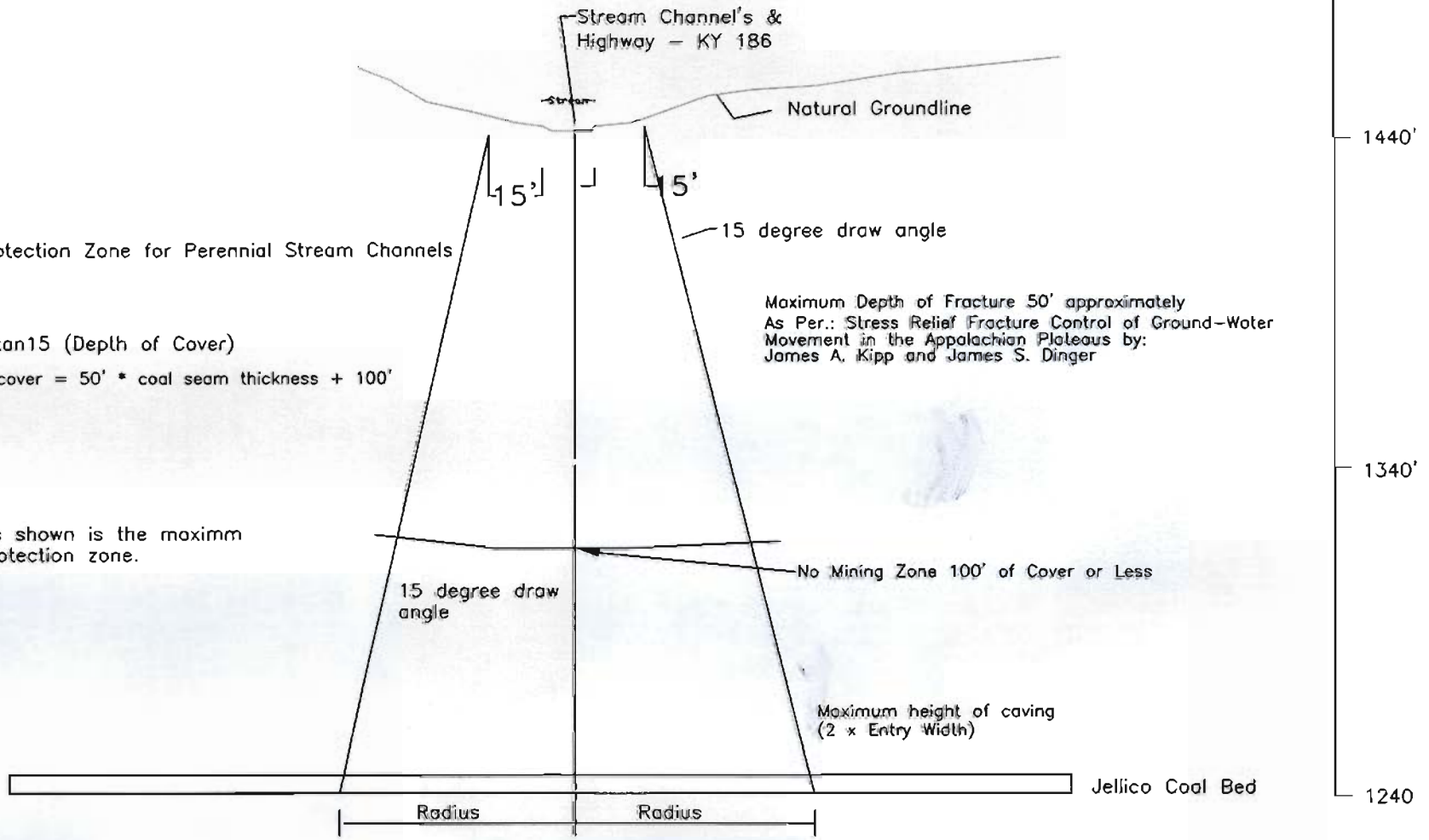
Permit No. 807-5223
Attachment 35.1.A, Subsidence Control Plan
Approximate Limited Recovery Mining Zone

SCALE: 1"=50'

PAGE NO._____

Prepared By:

HOWARD ENGINEERING AND GEOLOGY, INC.



Calculation for Protection Zone for Perennial Stream Channels

R = 2(15) + tan15 (Depth of Cover)

Maximum Depth of cover = 50' * coal seam thickness + 100'

Maximum Depth of Fracture 50' approximately
As Per.: Stress Relief Fracture Control of Ground-Water Movement in the Appalachian Plateaus by:
James A. Kipp and James S. Dinger

Note: This radius shown is the maximm radius for this protection zone.

I, Timothy C. Howard, P.E. No. 15,317

Date: 4/29/08

Hereby certify in accordance with 405 KAR 7:040, Section 10 that this document is correct as determined by accepted engineering practices and includes all information required of it by KRS Chapter 350 and KAR Title 405.

STATE OF KENTUCKY
TIMOTHY C. HOWARD 15317 LICENSED PROFESSIONAL ENGINEER

Bell County Coal Corporation

#807-5223, Attachment 35.1
Subsidence Protection Zone
Typical Size Calculation for
Stream's and Road's

Scale: None | Page No.

Prepared By:
Howard Engineering & Geology, Inc.

DESCRIPTION OF STRATA IMMEDIATELY ABOVE & BELOW THE POPLAR LICK SEAM

The Jellico seam is predominantly overlain and underlain by Gray Shales and Sandstones. The sampling sites utilized for gathering geologic data indicate that the thickness of the overlying and underlying strata generally exceed ten (10) feet in thickness.

COMBINATION ERI & MRP MAP

COMPANY: BELL COUNTY COAL CORPORATION
ADDRESS: RTE.1 BOX 290 PRUDEN ROAD., MIDDLESBORO, KY. 40965
APPLICATION NUMBER: 807-5223 TYPE OF APPLICATION: ORIGINAL MAP SCALE: 1" = 500'
LATITUDE: 36°35'45" LONGITUDE: 83°45'54"
COUNTY: BELL CONTOUR INTERVAL: 20' QUADRANGLE: KAYJAY & FORKRIDGE
NEAREST NAMED STREAM: BENNETTS FORK NEAREST PUBLIC ROAD INTERSECTION: 3.95 MILES SOUTHWEST TO KY. 186 JUNCTION WITH U.S. 25E.

LEGEND:

SLOPE IN DEGREES 27°
SURFACE & GROUNDWATER FLOW
CONTROLLED DRAINAGE
DIVERSION DITCH
OCCUPIED DWELLING
EXISTING STRUCTURE
NON-EXISTING STRUCTURE
EXPLOSIVE STORAGE AREA
MINE ADITS
MINERAL LEASE LINE
PROPERTY LINE
BELT CONVEYOR
PROCESSING FACILITY
WATER-SHED DESIGNATION B 168ac.
WATER-SHED BOUNDARY
EXISTING PERMIT 807-0305
Hignite Seam Underground Workings
Poplar Lick Seam Underground Workings
Mason Seam Underground Workings
Jellico Seam Underground Workings
SURFACE PERMIT BOUNDARY
UNDERGROUND PERMIT BOUNDARY
GROUNDWATER MONITORING POINT GW1
SURFACE WATER MONITORING POINT BF1
POWER LINE
CULVERTS
EXISTING DISTURBANCE PREVIOUSLY PERMITTED 848-7010 848-0209
BERM
TOPSOIL STORAGE
KPDES MONITORING POINT 1
SILT FENCE SF
GEOLOGIC SAMPLE SITE
CROSS-SECTION LOCATION A A'
CONVEYOR

MINE AREAS	SEAM / ELEV.	APPROX. AVERAGE WIDTH	APPROX. AVERAGE LENGTH	ACREAGE EXISTING	ACREAGE PROPOSED	ACREAGE TOTAL
	JELLICO SEAM / 1236'app.	290'	560'	–	4.00	4.00
		–	–	–	–	–
STORAGE AREAS						
	SPOIL STORAGE AREA 1			–	4.00	4.00
	–			–	–	–
	–			–	–	–
SILT STRUCTURES						
	DUG-OUT ON BENCH	–	–	–	2.00	2.00
	DUG-OUT	–	–	–	–	–
	EMBANKMENT	–	–	–	–	–
ROADS						
EXISTING		APPROX. WIDTH	APPROX. LENGTH			
				–		
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
				–		
PROPOSED	"A"	50'	1382'	–	1.59	1.59
	"B"	25'	360'		0.00*1	0.00*1
	"C"	25'	240'		0.00*1	0.00*1
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
		–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–

*1 = Road "B" & Road "C" acreage included in coal stockpile area acreage.

	EXISTING	PROPOSED	TOTAL
DIVERSION DITCH	–	1.53	1.53
MINE MANAGEMENT AREA	–	6.00	6.00
PROCESSING FACILITY	–	–	–
COAL STOCKPILE AREA	–	2.50	2.50
SURFACE AREA OVERLYING PROPOSED UNDERGROUND WORKINGS	–	6,500.00	6,500.00
NO MINING SUBSIDENCE PROTECTION ZONE			
LIMITED RECOVERY SUBSIDENCE PROTECTION ZONE			
TOTAL SURFACE AREA	–	21.62	21.62
TOTAL UNDERGROUND AREA	–	6,500.00	6,500.00
GRAND TOTAL	–	6,521.62	6,521.62

ACTIVE/ABANDONED AREA DISCLAIMER

The areas marked as "ACTIVE" and/or "ABANDONED" on this map were copied from a map purportedly prepared by a third-party. HEG affirmatively states that it has used its best engineering practice in utilizing the third party map information but, due to physical conditions, CANNOT VERIFY, OR REPRESENT OR WARRANT THE ACCURACY OR COMPLETENESS of the third party map information. HEG DISCLAIMS ALL REPRESENTATIONS AND/OR WARRANTIES whether express, implied or statutory including but not limited to, warranties of title, merchantability and fitness for a particular purpose or use, and it makes no representation as to any property rights and further disclaims all liability for any and all damages that may arise from the use of the third party map information by anyone. HEG specifically disclaims all liability for the consequences of decisions made by anyone on the basis of the third party map information and affirmatively states that it is the user's responsibility to review and understand the limitations of the information.

Property Lines and Owners Furnished by Others

Property lines shown on the map have not been traversed in the field by this engineer. Lines both interior and exterior have been plotted from old maps, through field interrogation, and from paper plotting and/or projection. No certification is intended for the accuracy of the property lines.

NOTES

There are no known cultural or historic resources listed or eligible for listing on the National Register of Historic Places within or adjacent to the proposed permit area. There are no known archaeological sites within or adjacent to the proposed permit area. There are no known wetlands within or adjacent to the proposed permit area. There are no National or State Parks, Forest Lands, Trails, Wild or Scenic Rivers, Recreation Areas or Wildlife Management Areas within or adjacent to the proposed permit area. There are no known threatened or endangered species within or adjacent to the proposed permit area.

I, Timothy C. Howard (ENGINEER), 15,317 (REGISTRATION No.), 10/14/08 DATE

HEREBY CONFIRM, IN ACCORDANCE WITH 405 KAR 7:040 E, SECTION 10 THAT THIS MAP IS CORRECT AS DETERMINED BY ACCEPTED ENGINEERING PRACTICES AND INCLUDES ALL INFORMATION REQUIRED OF IT BY KRS CHAPTER 350 KAR TITLE.

STATE OF KENTUCKY TIMOTHY C. HOWARD 15,317 LICENSED PROFESSIONAL ENGINEER

Prepared By
HOWARD HEG
Engineering and Geology, Inc.