

**HYDROLOGY STUDY FOR  
GLOBAL MET COAL CORP.**

**BLACK CREEK MINE  
P- \_\_\_\_\_  
JEFFERSON COUNTY, ALABAMA**

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

**DETAILED DESIGN PLANS  
BASIN 001P  
ATTACHMENT III-B-2(a)**

**NOVEMBER 12, 2012**



Telephone: (205) 384-5553  
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Web Address: [www.percengineering.com](http://www.percengineering.com)

November 12, 2012

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

RE: Global Met Coal Corp.  
Black Creek Mine  
P-

Dear Michael:

I hereby certify the attached detailed design plans for Basin 001P for the above referenced mine are in accordance with the Regulations of the Alabama Surface Mining Commission as adopted by Act 81-435 of December 18, 1981 and amended to date, and are true and correct to the best of my knowledge and belief.

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

Sincerely,  
PERC Engineering Co., Inc.

A handwritten signature in black ink that reads "Leslie G. Stephens".

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



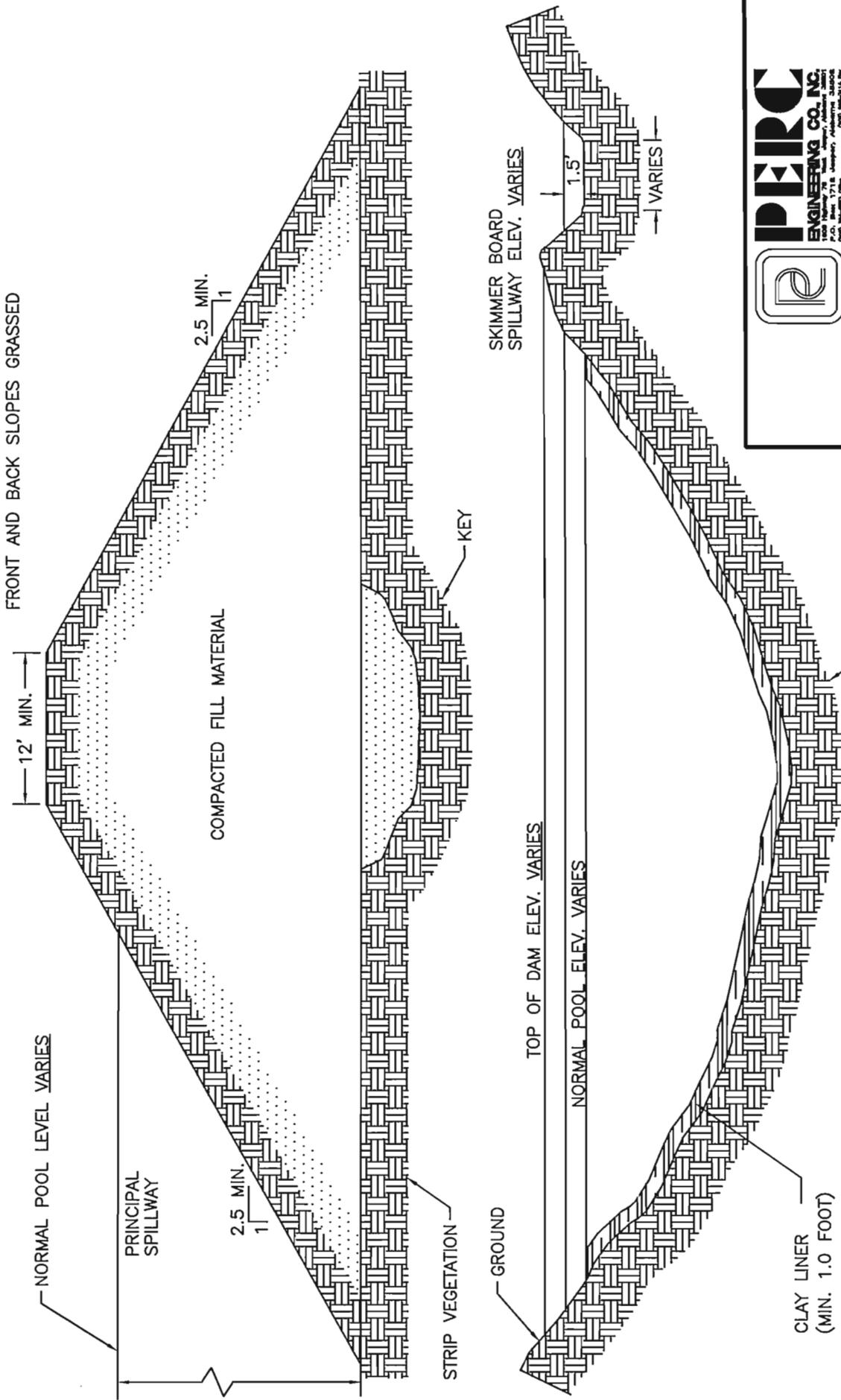
## Pond Construction Criteria

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

1. The top of the dam shall be no less than 12 feet wide.
2. See design sheet for maximum and minimum embankment slopes.
3. The foundation and abutments for the impounding structure shall be designed to be stable under all conditions of construction and operation of the impoundments, with a minimum static safety factor of 1.3 for the normal pool with steady seepage saturation conditions.
4. The dam shall be constructed with a cutoff trench based upon prudent engineering practices for the site. The cutoff shall be located on the dam centerline and be of sufficient depth to extend into a relatively impervious material from which the core of the dam shall also be constructed.
5. The embankment foundation area shall be cleared of all organic matter, all surfaces sloped to no steeper than 1v:1h, and the entire foundation surface scarified.
6. The entire embankment and cutoff trench shall be compacted to 95 percent density, based on standard proctor as outlined in ASTM.
7. The material placed in the embankment shall be free of sod, roots, stones over 6 inches in diameter, and other objectionable materials. The fill material shall be placed and spread over the entire fill area, starting at the lowest point of the foundation, in layers not to exceed 12 inches in thickness. Construction of the fill shall be undertaken only at such times that the moisture content of the fill material will permit satisfactory compaction in accordance with paragraph 5.
8. The pool area of the basin will be cleared of timber and large undergrowth.
9. The primary decant system when consisting of a pipe shall be installed according to Class C pipe installation for embankment bedding.
10. The primary decant system shall be equipped with a device, or constructed, such as to insure that subsurface withdrawal is accomplished to prevent discharge of floating solids. If a channel is used as the primary decant a skimmer shall be installed to prevent floating solids from discharging.
11. A splash pad or riprap may be required under the discharge of the primary decant system where necessary to insure that the discharge does not erode the embankment.

12. The combination primary and secondary decant system shall be designed to safely carry the expected peak flow from a 25 year - 6 hour storm. The entire emergency overflow spillway channel will be a stabilized channel and will be stabilized upon completion of construction as specified within the detailed design plans using prudent engineering measures. These measures may consist of lining the spillway with concrete or a durable rock riprap, or the spillway being constructed in consolidated non-erodible material and planted with a mixture or both annual and perennial grasses, or a combination of any or all of the above.
13. Sediment basins using a single spillway system shall be an open channel of non-erodible construction consisting of concrete, durable rock riprap or its being constructed in consolidated non-erodible material as specified in the detailed design plans.
14. The settled embankment for temporary impoundments shall be a minimum of 1.0 foot above the maximum water elevation for the runoff from a 25 year - 6 hour, or a 10 year - 24 hour precipitation event (whichever has the greatest runoff). The settled embankment for permanent impoundments shall be a minimum of 1.0 foot above the maximum water elevation for the runoff from a 25 year - 6 hour, or a 10 year - 24 hour precipitation event (whichever has the greatest runoff).
15. If basins are built in series, then the combined decant system for each shall be designed to accommodate the entire contributing drainage area.
16. The dam and all disturbed areas shall be seeded with both perennial and annual grasses, fertilized and mulched in order to insure erosion is minimized. Hay bales or riprap may be placed at the toe of the dam immediately upon completion of construction.
17. The constructed height of the dam shall be increased a minimum of 5 percent over the design height to allow for settlement over the life of the embankment.
18. Final graded slopes of the entire permanent water impoundment area shall not exceed 2.5H-1.0V to provide for adequate safety and access for proposed water users.
19. Prior to Phase II bond release, additional data concerning water quality, water quantity, depth, size, configuration, post mining land use, etc., for each proposed permanent water impoundment, shall be submitted to the Regulatory Authority for permanent water impoundment approval.
20. All sediment basins will be inspected for stability, erosion, etc. two (2) times a month until removal of the structure or release of the reclamation bond.
21. The embankment and spillway will be maintained by repairing any damage such

- as erosion, slope failure or spillway damage until removal of the structure or release of the performance bond.
22. All ponds shall be examined quarterly for structural weakness, instability, erosion, or other hazardous conditions and maintenance performed as necessary. Formal inspections shall be made on an annual basis, including any reports or modifications, in accordance with 880-X-10C-.20[l(j)] of the Alabama Surface Mining Commission Regulations.
  23. Sediment will be removed from each pond when the accumulated sediment reaches the sediment storage volume as shown on the detailed design sheet.
  24. Upon completion of mining, successful reclamation and effluent standards being met, each sediment basin not remaining as a permanent water impoundment will be dewatered in an environmentally safe manner (such as siphoning, pumping, etc.) and reclaimed to approximate original contours by the following procedure: A permanent diversion channel (designed for a 10 year - 24 hour precipitation event) shall be cut along the outer edge of the basin to re-route drainage around the basin and back through the stabilized spillway to allow reclamation of the sediment basin. The diversion channel shall be designed and grassed as per enclosed information. (See permanent diversion for basin disposal). Upon completion of the diversion channel the back slope of the dam shall be graded to a minimum 3H to 1V slope. The dewatered sediment basin area shall be seeded with some combination of the following: Fescue, bermuda, rye grass, canary grass and willows. After seeding the area shall be mulched. Any additional sediment or embankment material not used to meet original contour, if non-toxic, shall be spread in thin layers within the permit area and vegetated as stated in the approved reclamation plan. All toxic material encountered in the basin disposal shall be buried and covered with 4 feet of non-toxic material and vegetated as stated in the approved reclamation plan.
  25. A qualified registered professional engineer or other qualified professional specialist, under the direction of the professional engineer shall conduct regular inspections during construction and upon completion shall inspect each basin for certification purposes.
  26. Point source discharge embankments shall be constructed and abutments keyed into desirable material if at all possible. In the event that undesirable material is encountered, addition design and construction criteria shall be submitted prior to certification.



TYPICAL DAM DETAIL  
NO SCALE

Lined with 1.0 feet (minimum) of clay material with a permeability no greater than  $1 \times 10^{-6}$  cm/sec up to the emergency spillway elevation to minimize infiltration and to provide a stable pool level with the clay placed in 6" lifts compacted to 95% of standard proctor.



**PERC**  
ENGINEERING CO., INC.  
P.O. Box 1718, Jasper, Alabama 35060  
Phone 205-855-2222 Fax 205-855-2117

TYPICAL DAM DETAIL  
WITH CLAY LINER

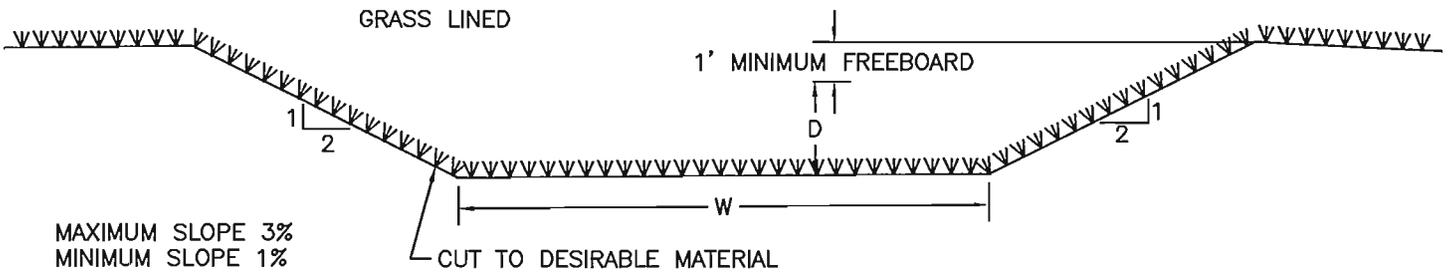
DRAWN BY: J.W.T.  
DWG. NAME: TYPICALS

DATE: 4/10/2009

APPROVED BY: L.G.S.

SCALE: NONE

ATTACHMENT III-B-2-A



$$Q = \frac{1.49}{N} A R^{2/3} S^{1/2}$$

$N(\text{LOOSE STONE OR GRASS LINED}) = 0.035$   
 $A = \text{AREA}$   
 $R = \text{AREA/WETTED PERIMETER}$   
 $S = \text{SLOPE}$

\* GRASS LINING: FESCUE, BERMUDA, RYE GRASS

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

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

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

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



## TYPICAL PERMANENT DIVERSION FOR BASIN DISPOSAL

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

## NOTES

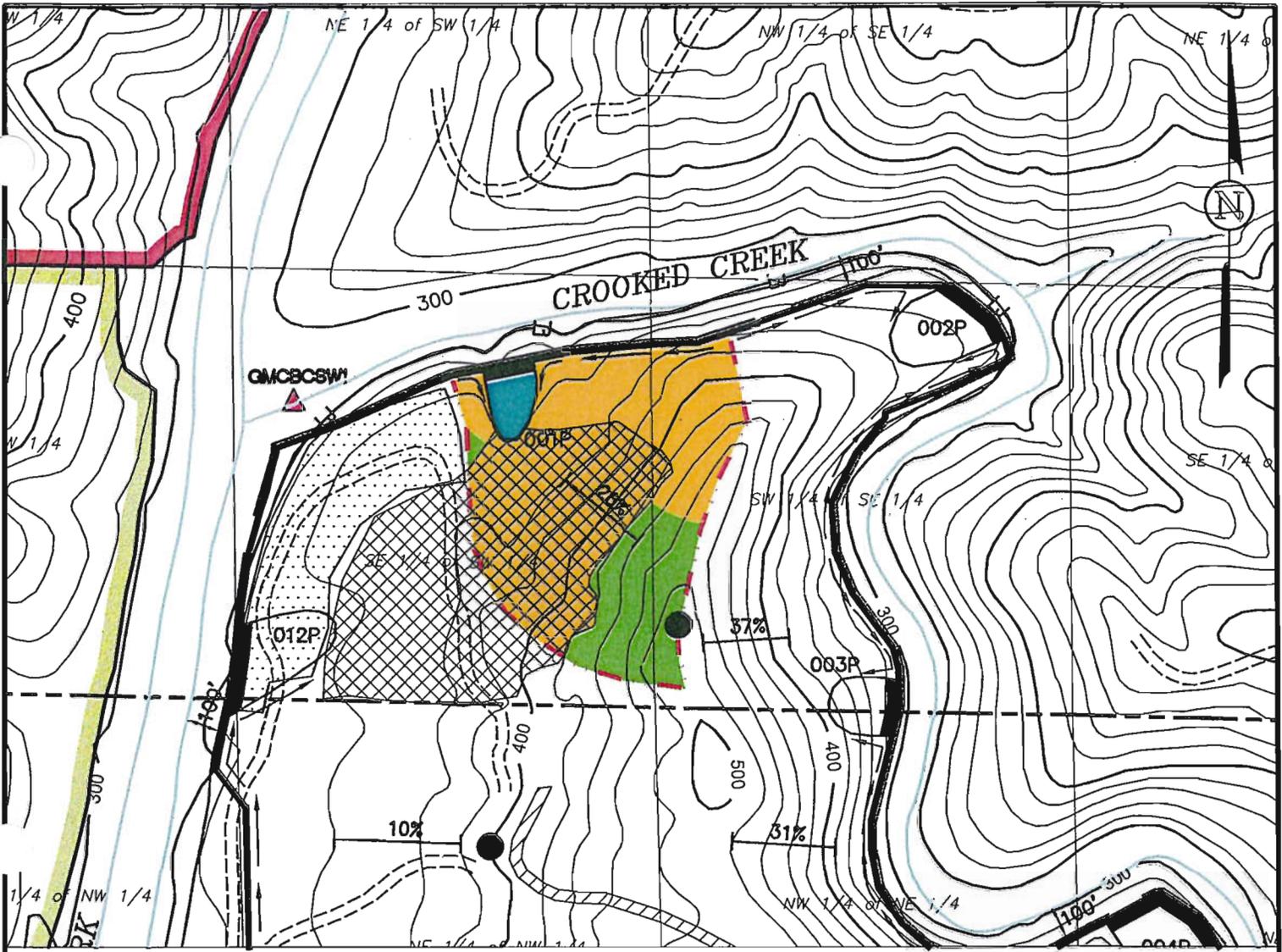
- 1) The primary spillway of Basin 001P will consist of an 8 foot wide open channel lined with 4 inches of concrete reinforced with 6X6-W2.9XW2.9 concrete reinforcement wire. The channel lining will extend back to the existing drainage course. A 10' X 10' X 4" concrete splash pad reinforced with 6X6-W2.9XW2.9 welded wire fabric will be located at the exit point of the tail section of the channel.
- 2) The dam and normal pool area of Basin 001P will be constructed in two phases.

### Phase I

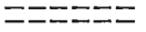
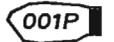
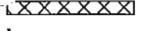
Phase I will consist of constructing the dam and spillway system of Basin 001P with a 50'x50'x5' sump to catch the rainfall runoff to be pumped to Basin 012P. Basin 001P is to be totally incised and given the existing/natural ground configuration the dam will be primarily excavated into virgin ground, except for the backslope which will have to be built up to reach a required slope of 2.5H:1V. Since there will be no significant fill, stability analysis has not been performed. (See Phase I Dam Details sheet in these Detailed Design Plans)

### Phase II

The proposed normal pool area of Basin 001P will be mined through prior to the construction of the normal pool area with the exception of the embankment and spillway system. As mining within the proposed normal pool area of Basin 001P is being performed all surface runoff will be pumped/routed into Basin 012P. Once mining has progressed beyond the proposed normal pool area of the basin and spoil placed to bring the basin to approximate finished grade, the normal pool area will be constructed and it will be lined with 1.0 feet (minimum) of clay material with a permeability of no greater than  $1 \times 10^{-6}$  cm/sec, up to the primary spillway elevation to minimize infiltration and to provide a stable pool level with the clay placed in 6" lifts compacted to 95% of standard proctor. (See Phase II Dam Details sheet in these Detailed Design Plans)



**LEGEND**

-  Permit Boundary
-  Previously Surfaced Mined By Others
-  Temporary Spoil Placement Area
-  Occupied Dwelling
-  Unoccupied Dwelling
-  Surface Contour
-  Intermittent Stream
-  Perennial Stream
-  Diversion Ditch
-  County Rd (Paved Unless Otherwise Designated)
-  Road (Private Unless Otherwise Shown)
-  Sediment Basin
-  Impounded Water
-  Slope Measurements
-  Haulroad
-  Ancillary Road
-  ASMC Permit No. P-3913
-  ASMC Permit No. P-3811
-  Drainage Divide

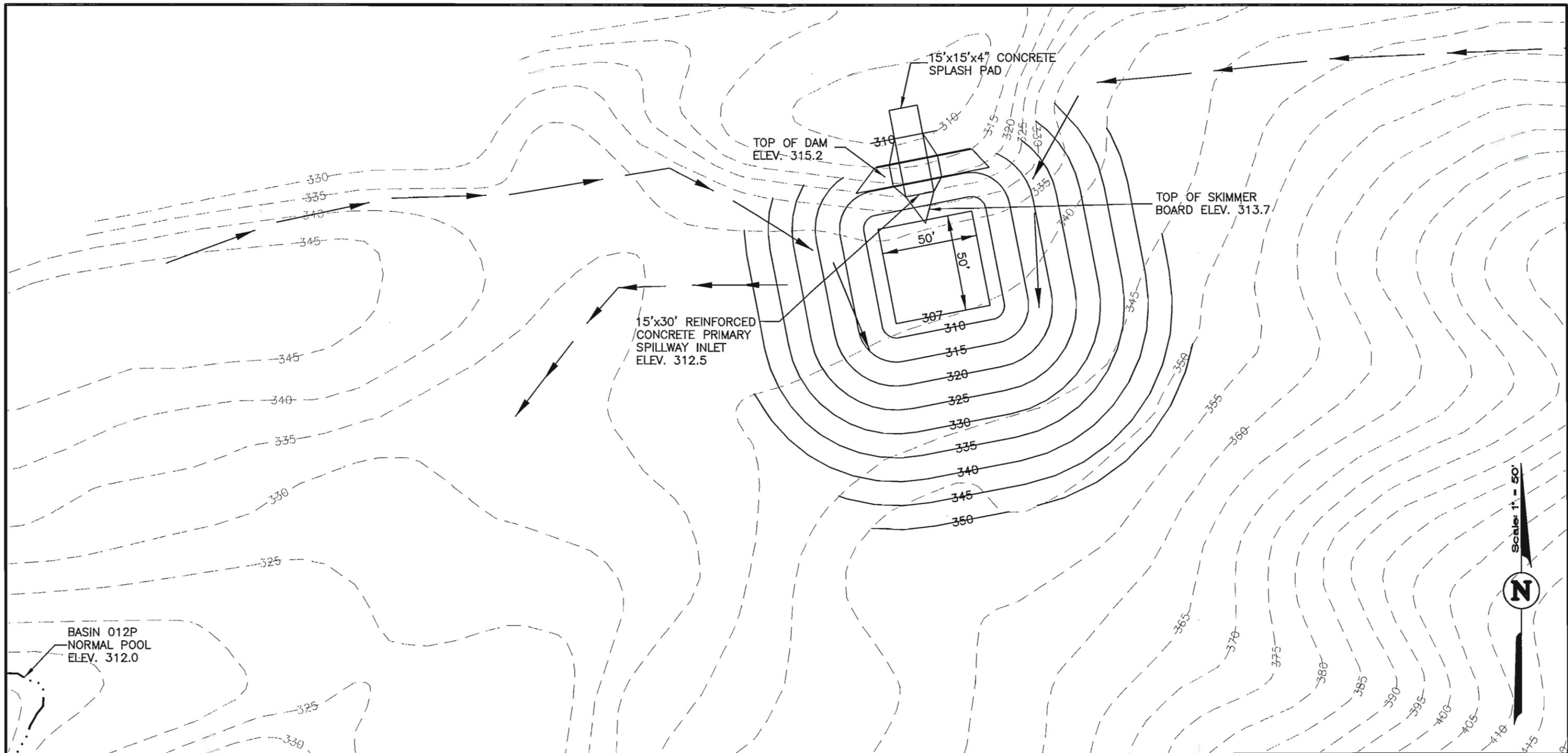
**LANDUSE & CURVE NUMBER INFORMATION**

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



GLOBAL MET COAL CORP.  
 BLACK CREEK MINE  
 P-  
 BASIN 001P PHASE I  
 ATTACHMENT III-B-2(a)

DRAWN BY: J.W.T.	DATE: 10/30/2012
DWG. NAME: BCB001WSM	
APPROVED BY: L.G.S.	SCALE: 1"=500'



**LEGEND**

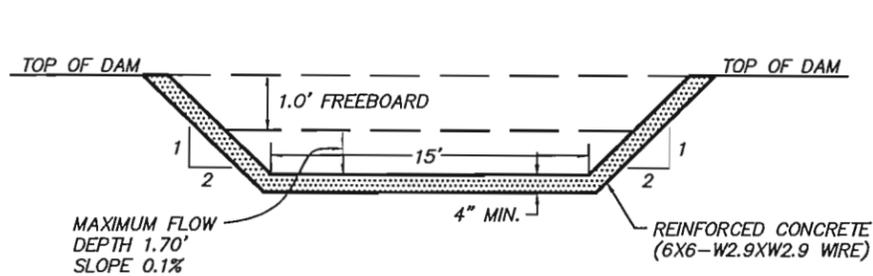
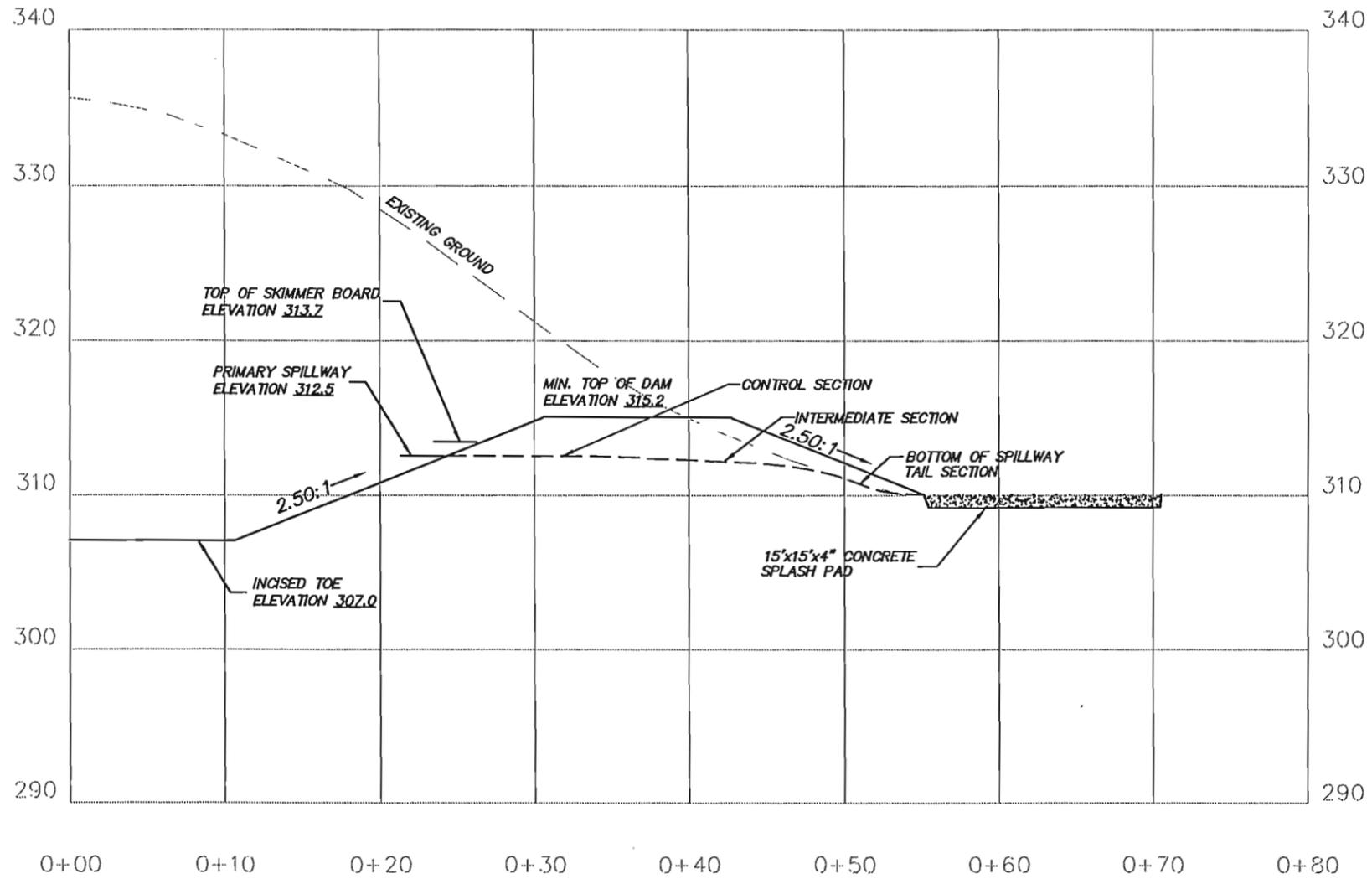
	MAJOR INFLOW/DIVERSION DITCH
	EXISTING CONTOURS
	PROPOSED FINISHED GRADE
	PUMP FLOW



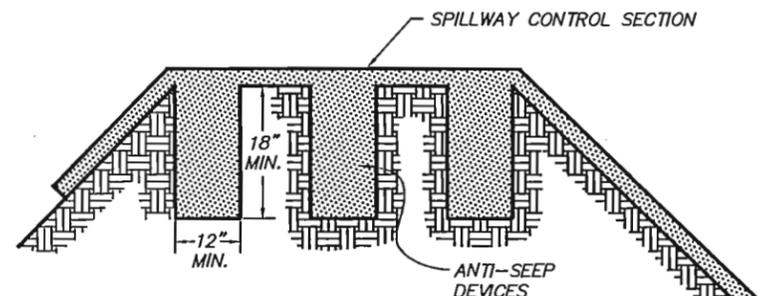
**Global Met Coal Corp.**  
**Black Creek Mine**  
**P-3973**  
**Basin 001P Sump Phase I**  
**Plan View Location Map**

DRAWN BY: J.W.T.	DATE: 01/10/2013
DWG. NAME: BCB001PV	
APPROVED BY: L.G.S.	SCALE: 1" = 50'

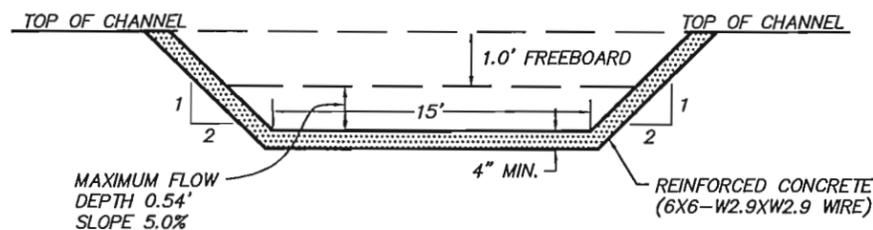




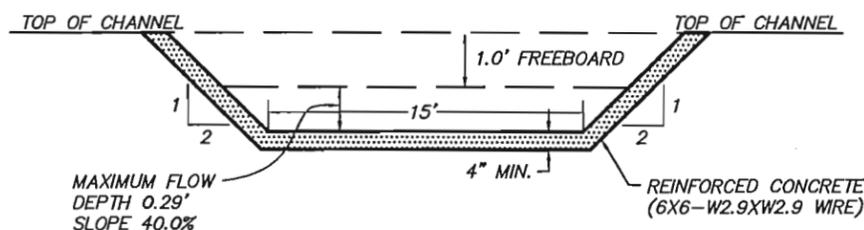
**SPILLWAY CONTROL SECTION TYPICAL**  
N.T.S.



**ANTI-SEEP DEVICE TYPICAL**  
N.T.S.



**SPILLWAY INTERMEDIATE SECTION TYPICAL**  
N.T.S.

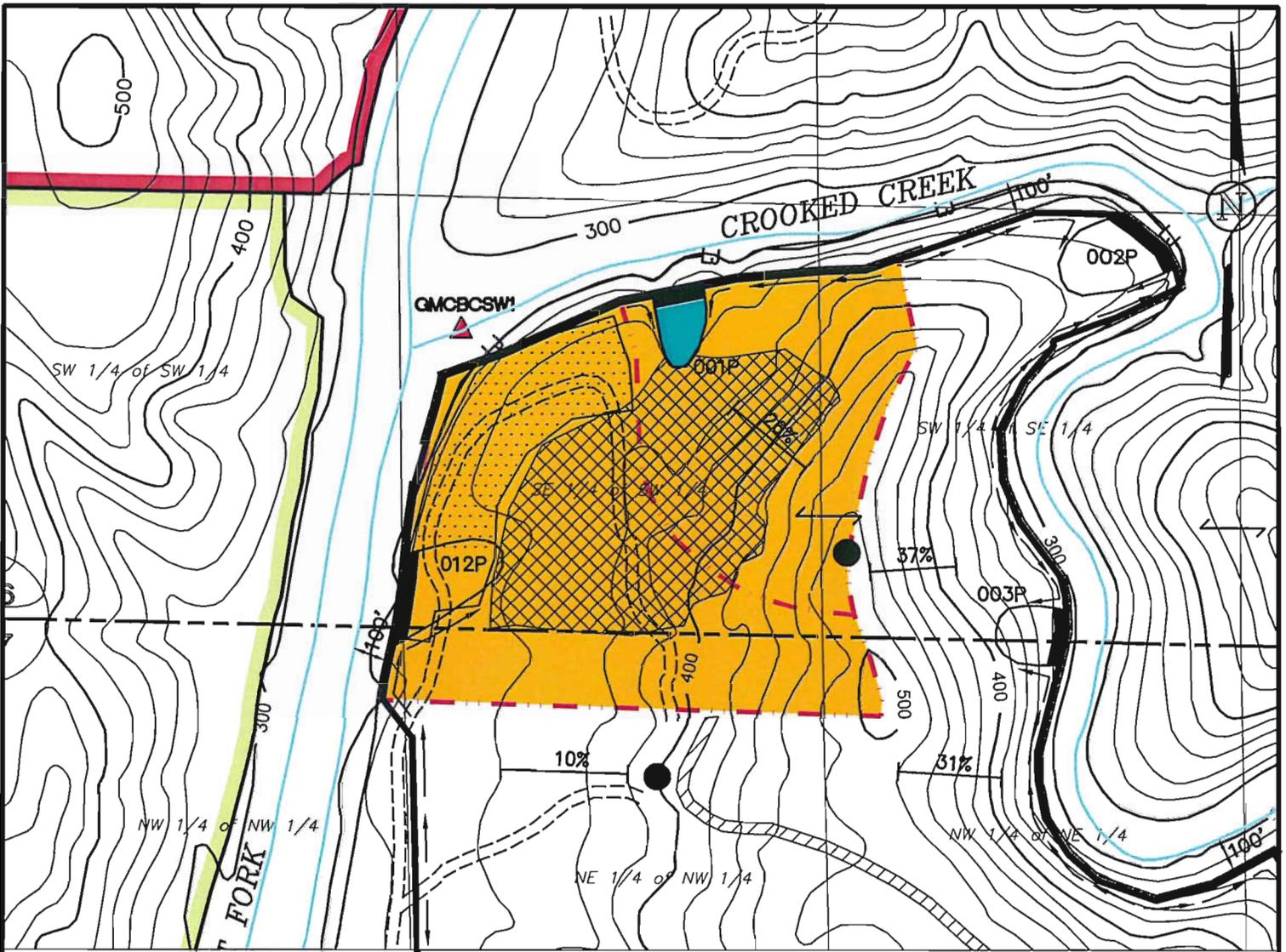


**SPILLWAY TAIL DITCH SECTION TYPICAL**  
N.T.S.

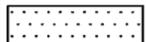
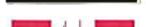


GLOBAL MET COAL CORP.  
BLACK CREEK MINE  
P-  
BASIN 001P PHASE I  
DAM DETAILS

DRAWN BY: J.W.T.	DATE: 01/11/2013
DWG. NAME: BCB001DD	
APPROVED BY: L.G.S.	SCALE: 1"=10'



**LEGEND**

-  Permit Boundary
-  Previously Surfaced Mined By Others
-  Temporary Spoil Placement Area
-  Occupied Dwelling
-  Unoccupied Dwelling
-  Surface Contour
-  Intermittent Stream
-  Perennial Stream
-  Diversion Ditch
-  County RI (Paved Unless Otherwise Designated)
-  Road (Private Unless Otherwise Shown)
-  Sediment Basin
-  Impounded Water
-  Slope Measurements
-  Haulroad
-  Ancillary Road
-  ASMC Permit No. P-3913
-  ASMC Permit No. P-3811
-  Drainage Divide

**LANDUSE & CURVE NUMBER INFORMATION**

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



GLOBAL MET COAL CORP.  
 BLACK CREEK MINE  
 P-  
 BASIN 001P PHASE II  
 ATTACHMENT III-B-2(a)

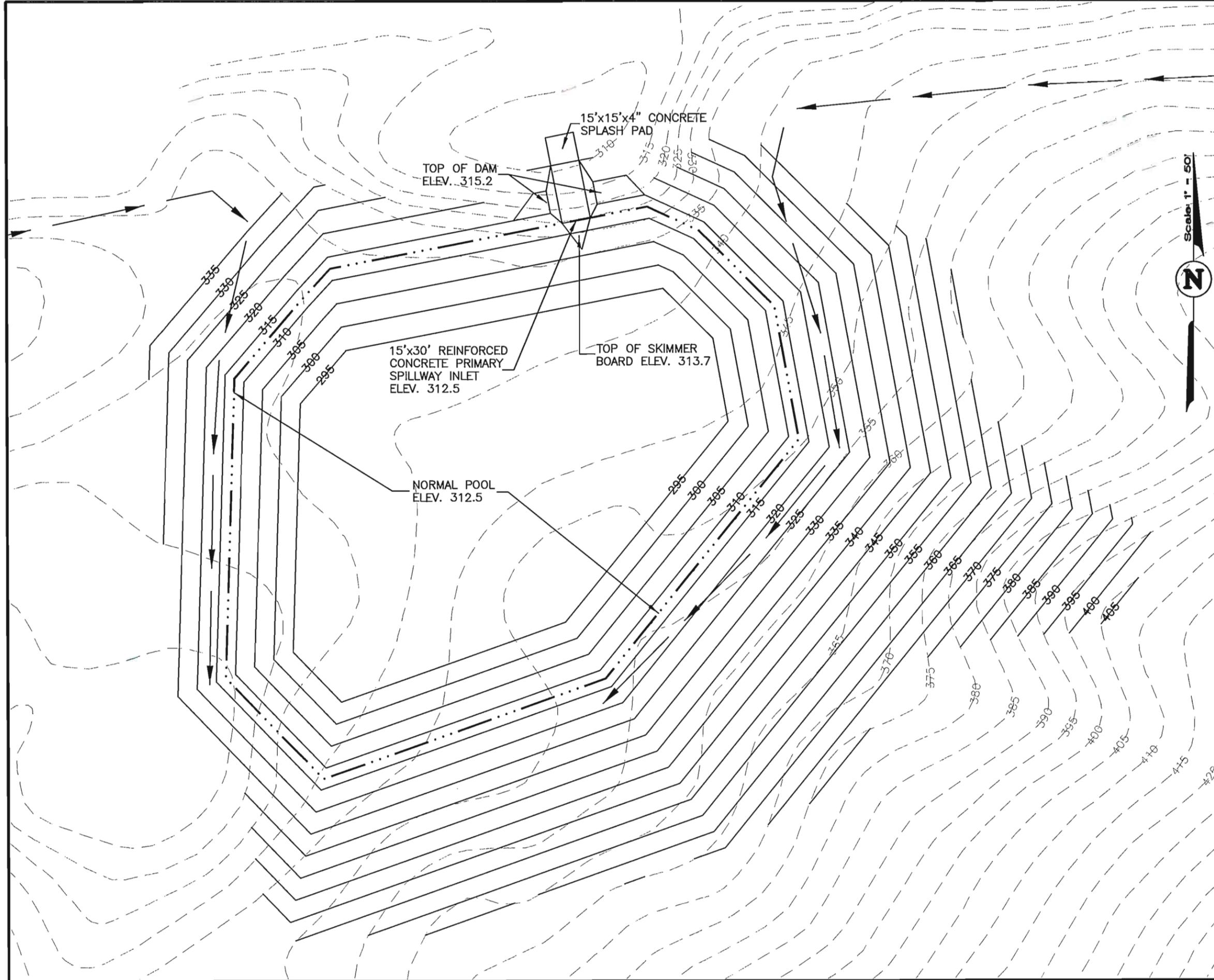
DRAWN BY: J.W.T.  
 DWG. NAME: BC001WSM2

DATE: 11/13/2012

APPROVED BY: L.G.S.

SCALE: 1"=500'

Due to the basin being constructed in spoil material, it will be lined with 1.0 feet (minimum) of clay material with a permeability of no greater than  $1 \times 10^{-6}$  cm/sec, up to the emergency spillway elevation to minimize infiltration and to provide a stable pool level with the clay placed in 6" lifts compacted to 95% of standard proctor.



Scale: 1" = 50'

**LEGEND**

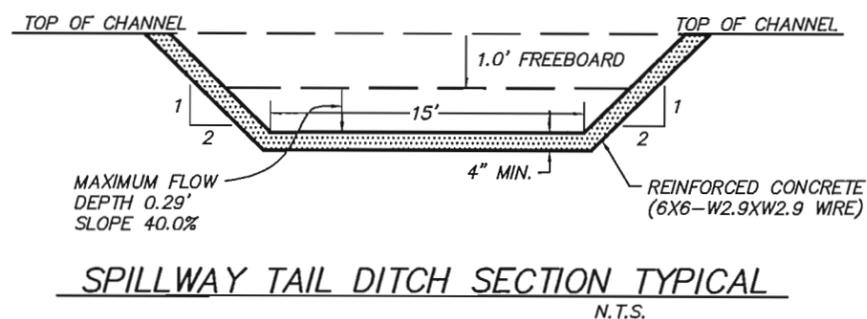
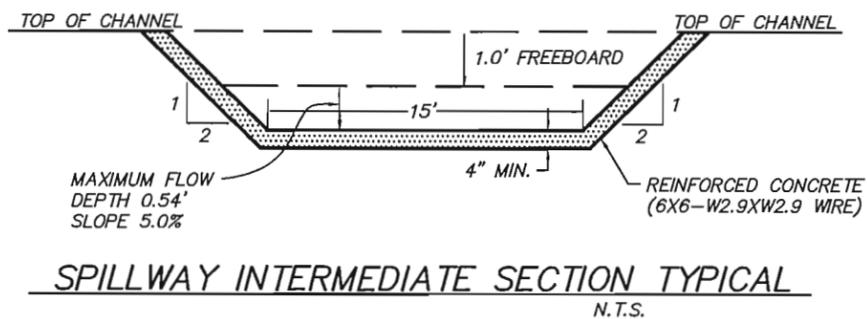
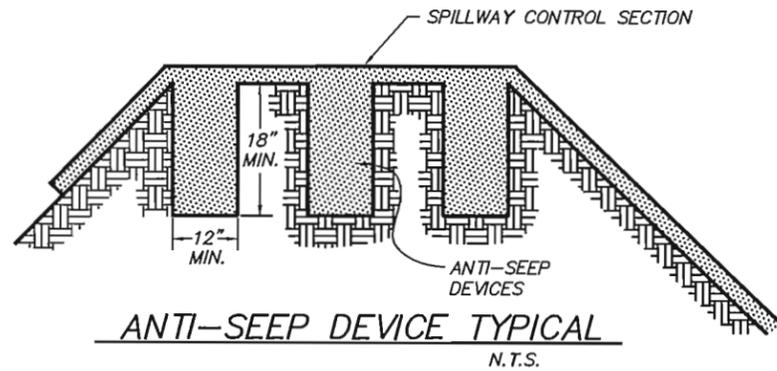
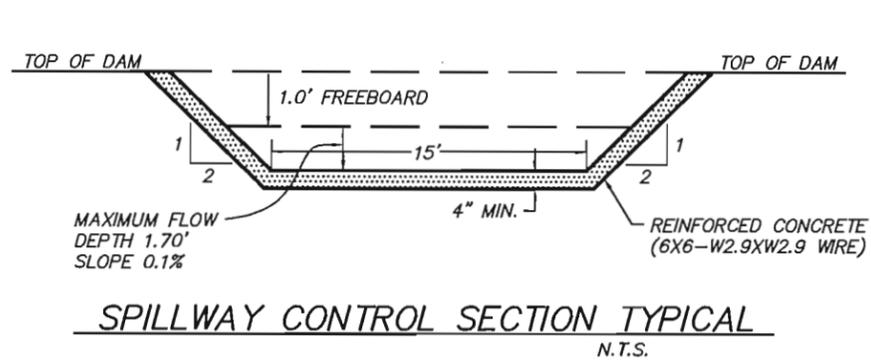
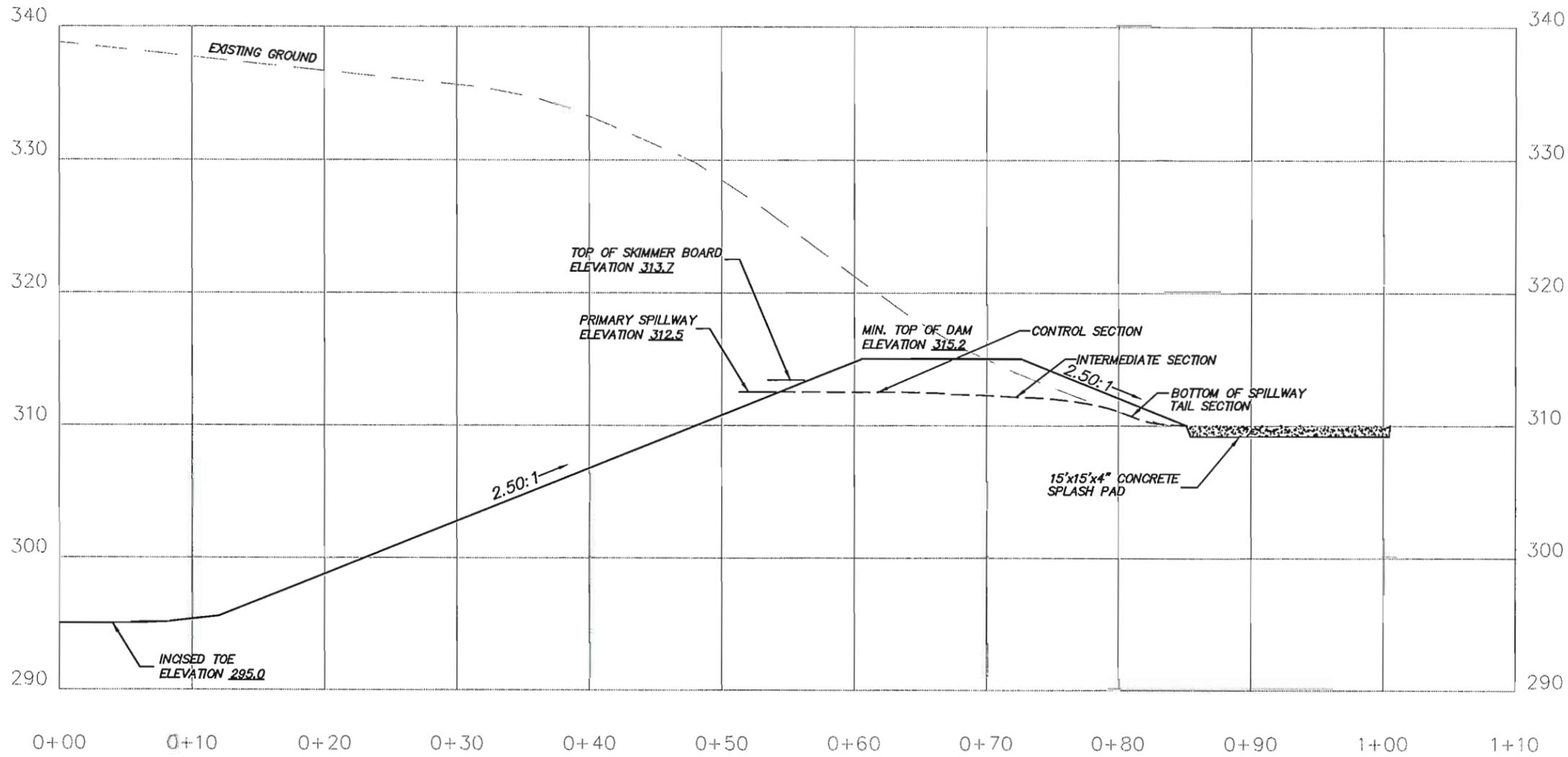
	MAJOR INFLOW/DIVERSION DITCH
	NORMAL POOL LEVEL ELEV. 312.5
	EXISTING CONTOURS
	PROPOSED FINISHED GRADE



**Global Met Coal Corp.**  
**Black Creek Mine**  
 P-  
**Basin 001P Phase II**  
**Plan View Location Map**

DRAWN BY: J.W.T.	DATE: 10/30/2012
DWG. NAME: BCB001PV2	
APPROVED BY: L.G.S.	SCALE: 1" = 50'





GLOBAL MET COAL CORP.  
BLACK CREEK MINE  
P-  
BASIN 001P PHASE II  
DAM DETAILS

DRAWN BY: J.W.T.	DATE: 11/06/2012
DWG. NAME: BCB001DD2	
APPROVED BY: L.G.S.	SCALE: 1"=10'

# **P- Basin 001P Spillway Control Section Phase II**

Material: Concrete, Rubble

*Trapezoidal Channel*

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

	w/o Freeboard	w/ Freeboard
Design Discharge:	82.89 cfs	
Depth:	1.70 ft	2.70 ft
Top Width:	21.79 ft	25.79 ft
Velocity:	2.66 fps	
X-Section Area:	31.20 sq ft	
Hydraulic Radius:	1.381 ft	
Froude Number:	0.39	

# **P- Basin 001P Spillway Intermediate Section Phase II**

Material: Concrete, Rubble

*Trapezoidal Channel*

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

	w/o Freeboard	w/ Freeboard
Design Discharge:	82.89 cfs	
Depth:	0.54 ft	1.54 ft
Top Width:	17.16 ft	21.16 ft
Velocity:	9.53 fps	
X-Section Area:	8.70 sq ft	
Hydraulic Radius:	0.499 ft	
Froude Number:	2.36	

# **P- Basin 001P Spillway Tail Ditch Section Phase II**

Material: Concrete, Rubble

*Trapezoidal Channel*

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

	w/o Freeboard	w/ Freeboard
Design Discharge:	82.89 cfs	
Depth:	0.29 ft	1.29 ft
Top Width:	16.17 ft	20.17 ft
Velocity:	18.26 fps	
X-Section Area:	4.54 sq ft	
Hydraulic Radius:	0.278 ft	
Froude Number:	6.07	

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**Global Met Coal Corp.**  
**Black Creek Mine**  
**P-**  
**Basin 001P Phase II**

***6.0 Inch, 10 Year-24 Hour***  
***DRN 58***

JWT

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

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

## ***General Information***

### ***Storm Information:***

Storm Type:	DRN58
Design Storm:	10 yr - 24 hr
Rainfall Depth:	6.000 inches

### ***Particle Size Distribution:***

Size (mm)	Topsoil	Spoil
3.0000	100.000%	100.000%
2.0000	97.660%	99.130%
1.0000	90.940%	95.270%
0.5000	87.580%	89.790%
0.3000	86.240%	82.090%
0.2000	67.140%	69.340%
0.1000	48.030%	53.840%
0.0500	38.480%	38.220%
0.0300	34.660%	30.900%
0.0200	26.600%	26.680%
0.0100	18.700%	18.980%
0.0050	14.710%	12.790%
0.0030	12.600%	9.080%
0.0010	7.390%	4.950%
0.0001	0.000%	0.000%

### ***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Basin 001P

#1 <i>Pond</i>
-------------------

***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1 In	39.500	39.500	51.72	13.05	4,602.2	390,890	249.03	146.45
Out			49.86	13.05	609.5	57,042	0.04	0.03

***Particle Size Distribution(s) at Each Structure***

***Structure #1:***

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	99.130%	100.000%
1.0000	95.270%	100.000%
0.5000	89.790%	100.000%
0.3000	82.090%	100.000%
0.2000	69.340%	100.000%
0.1000	53.840%	100.000%
0.0500	38.220%	100.000%
0.0300	30.900%	100.000%
0.0200	26.680%	100.000%
0.0100	18.980%	100.000%
0.0050	12.790%	96.573%
0.0030	9.080%	68.560%
0.0010	4.950%	37.376%
0.0001	0.000%	0.000%

## ***Structure Detail:***

### *Structure #1 (Pond)*

#### *Basin 001P*

#### Pond Inputs:

Initial Pool Elev:	312.50 ft
Initial Pool:	4.28 ac-ft
*Sediment Storage:	15.30 ac-ft
Dead Space:	20.00 %

*\*Sediment capacity was entered by user*

#### Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
312.50	12.00	2.00:1	2.00:1	15.00

#### Pond Results:

Peak Elevation:	313.61 ft
H'graph Detention Time:	1.27 hrs
Pond Model:	CSTRS
Dewater Time:	1.28 days
Trap Efficiency:	86.76 %

*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)
309.49	1.358	0.000	0.000	Top of Sed. Storage
309.50	1.359	0.012	0.000	
310.00	1.381	0.697	0.000	
310.50	1.402	1.393	0.000	
311.00	1.424	2.099	0.000	
311.50	1.446	2.817	0.000	
312.00	1.467	3.545	0.000	
312.50	1.489	4.284	0.000	Spillway #1
313.00	1.512	5.034	3.027	19.20
313.50	1.534	5.796	40.393	11.45
313.61	1.539	5.962	49.861	0.10 Peak Stage
314.00	1.556	6.568	84.486	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
314.50	1.579	7.352	139.844	
315.00	1.602	8.148	207.093	

## Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
309.49	0.000	0.000
309.50	0.000	0.000
310.00	0.000	0.000
310.50	0.000	0.000
311.00	0.000	0.000
311.50	0.000	0.000
312.00	0.000	0.000
312.50	0.000	0.000
313.00	3.027	3.027
313.50	40.393	40.393
314.00	84.486	84.486
314.50	139.844	139.844
315.00	207.093	207.093

***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	37.900	0.041	0.000	0.000	81.000	F	49.20	12.249
	2	1.600	0.001	0.000	0.000	100.000	F	2.52	0.799
	<b>Σ</b>	<b>39.500</b>						<b>51.72</b>	<b>13.048</b>

***Subwatershed Sedimentology Detail:***

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	200.00	23.50	0.9000	1.0000	2	4,602.2	407,616	259.69	155.05
	2	0.001	100.00	0.01	0.0010	1.0000	2	0.0	0	0.00	0.00
	<b>Σ</b>							<b>4,602.2</b>	<b>390,890</b>	<b>249.03</b>	<b>146.45</b>

***Subwatershed Time of Concentration Details:***

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	17.00	34.00	200.00	4.120	0.013
		8. Large gullies, diversions, and low flowing streams	11.72	125.00	1,067.00	10.260	0.028
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.041</b>

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**Global Met Coal Corp.**  
**Black Creek Mine**  
**P-**  
**Basin 001P Phase II**

*4.8 Inch, 25 Year-6 Hour*  
*SCS 6 Hour*

JWT

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

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

## ***General Information***

### ***Storm Information:***

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

*Peak 30-minute Intensity: 3.552 in/hr*

### ***Particle Size Distribution:***

Size (mm)	Topsoil	Spoil
3.0000	100.000%	100.000%
2.0000	97.660%	99.130%
1.0000	90.940%	95.270%
0.5000	87.580%	89.790%
0.3000	86.240%	82.090%
0.2000	67.140%	69.340%
0.1000	48.030%	53.840%
0.0500	38.480%	38.220%
0.0300	34.660%	30.900%
0.0200	26.600%	26.680%
0.0100	18.700%	18.980%
0.0050	14.710%	12.790%

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Size (mm)	Topsoil	Spoil
0.0030	12.600%	9.080%
0.0010	7.390%	4.950%
0.0001	0.000%	0.000%

***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	Basin 001P

#1  
Pond

***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1 In	39.500	39.500	107.18	9.46	5,756.8	570,866	363.70	236.13
Out			82.89	9.46	822.0	79,687	0.45	0.38

***Particle Size Distribution(s) at Each Structure***

***Structure #1:***

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	99.130%	100.000%
1.0000	95.270%	100.000%
0.5000	89.790%	100.000%
0.3000	82.090%	100.000%
0.2000	69.340%	100.000%
0.1000	53.840%	100.000%
0.0500	38.220%	100.000%
0.0300	30.900%	100.000%
0.0200	26.680%	100.000%
0.0100	18.980%	100.000%
0.0050	12.790%	89.572%
0.0030	9.080%	63.590%
0.0010	4.950%	34.666%
0.0001	0.000%	0.000%

### Structure Detail:

Structure #1 (Pond)

Basin 001P

Pond Inputs:

Initial Pool Elev:	312.50 ft
Initial Pool:	4.28 ac-ft
*Sediment Storage:	15.30 ac-ft
Dead Space:	20.00 %

*\*Sediment capacity was entered by user*

#### Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
312.50	12.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	313.98 ft
H'graph Detention Time:	0.79 hrs
Pond Model:	CSTRS
Dewater Time:	0.96 days
Trap Efficiency:	85.72 %

*Dewatering time is calculated from peak stage to lowest spillway*

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310.50	1.402	1.393	0.000	
311.00	1.424	2.099	0.000	
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312.50	1.489	4.284	0.000	Spillway #1
313.00	1.512	5.034	3.027	19.20
313.50	1.534	5.796	40.393	3.45
313.98	1.556	6.540	82.887	0.35 Peak Stage
314.00	1.556	6.568	84.486	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
314.50	1.579	7.352	139.844	
315.00	1.602	8.148	207.093	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
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311.50	0.000	0.000
312.00	0.000	0.000
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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	37.900	0.041	0.000	0.000	81.000	F	101.45	8.826
	2	1.600	0.001	0.000	0.000	100.000	F	5.73	0.638
	<b>Σ</b>	<b>39.500</b>						<b>107.18</b>	<b>9.464</b>

### Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	200.00	23.50	0.9000	1.0000	2	5,756.8	595,426	379.34	250.51
	2	0.001	100.00	0.01	0.0010	1.0000	2	0.0	0	0.00	0.00
	<b>Σ</b>							<b>5,756.8</b>	<b>570,866</b>	<b>363.70</b>	<b>236.13</b>

### Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	17.00	34.00	200.00	4.120	0.013
		8. Large gullies, diversions, and low flowing streams	11.72	125.00	1,067.00	10.260	0.028
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.041</b>