OAK GROVE RESOURCES, LLC

CONCORD PREPARATION PLANT, P-3233

DETAIL DESIGN PLANS

DIVERSION 1

ALABAMA SURFACE MINING COMMISSION

prepared by:

MCGEHEE ENGINEERING CORP.
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DIVERSION DITCH 1
DESIGN AND CONSTRUCTION SPECIFICATIONS

1) Temporary diversions will be designed and constructed to adequately carry the runoff from a 2 Year - 6 Hour precipitation event.

2) Permanent diversions will be designed and constructed to adequately carry the runoff from a 10 Year - 6 Hour precipitation event.

3) Permanent diversions will be designed and constructed with gently sloping banks stabilized with appropriate vegetation.

4) All diversions will be designed, constructed and maintained, using the best technology currently available, whereas additional contribution of suspended solids to stream-flow and to runoff outside the permit area is prevented.

5) Maintenance of appropriate gradient, channel lining, revegetation, roughness structures, detention basins, etc. will be used, when necessary, as sediment control measures for these diversions.

6) Diversions will not be constructed on existing land slides nor be located so as to increase the potential for land slides.

7) Channel linings, for diversions with slopes of five (5%) percent or less, will consist of a mixture of both annual and perennial grasses being predominantly fescue and bermuda. Channel linings, for diversions with slopes greater than five (5%) percent, will consist of riprap or other non-erodible material or cut into non-erodible material.

8) Adequate freeboard will be provided for protection for transition of flows and critical areas such as swales and curves along the entire diversion length.

9) At discharge points, where diversions intersect with natural streams or exit velocities of the diversion are greater than that of the receiving streams, energy dissipaters will be installed when deemed necessary.

10) Topsoil removed from the diversion area (if required) will be handled in accordance with Rules 880-X-10C-.07 thru 880-X-10C-.11.

11) Excess material excavated in the construction of the diversion, not needed for diversion channel geometry or the re-grading of the channel, will be disposed of in accordance with Rule 880-X-10C-.36.

DIVERSION DITCH 1
DESIGN AND CONSTRUCTION SPECIFICATIONS
(continued)

12) Diversions will not be designed or constructed to divert water into underground mines without written approval from the Regulatory Authority.

13) The entire area in which a diversion berm is proposed will be cleared and grubbed of all organic material, scarified, and no surface slopes will be left steeper than 1V:1H.

14) Diversion berms will be constructed with desirable material, free of sod, stones, roots, limbs, etc. over six (6") inches in diameter. This material will be spread in layers no greater than twelve (12") inches in thickness and compacted to ninety five (95%) percent of the standard proctor density, as outlined in ASTM, until the design height is reached.

15) Upon completion of construction of diversion ditches or diversion berms, all disturbed areas will be seeded with a mixture of both annual and perennial grasses, fertilized, and mulched in order to minimize erosion and ensure restabilization.

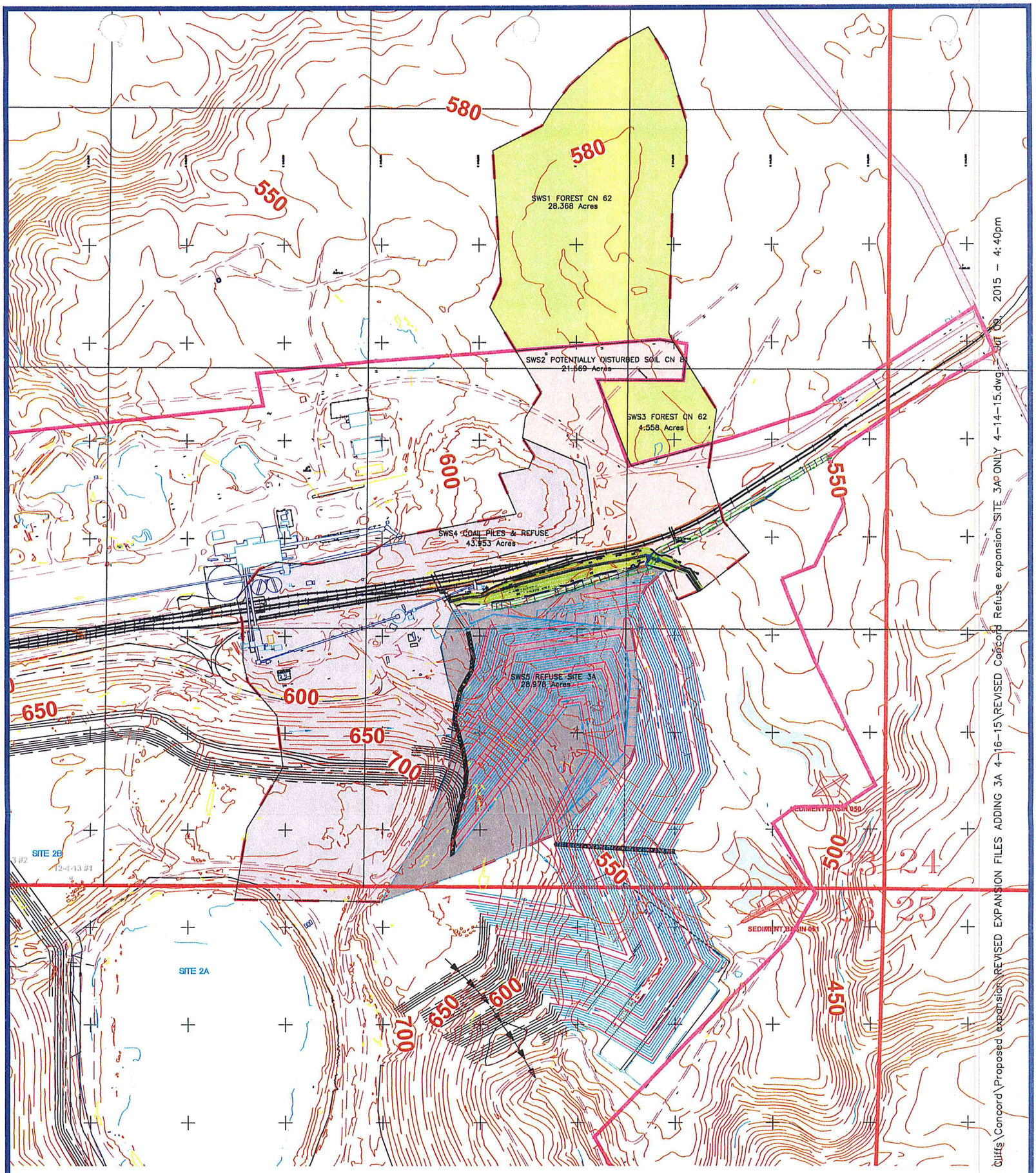
16) All diversions (berms or ditches) will be examined quarterly for erosion, instability, structural weakness, or other hazardous conditions and maintenance performed as necessary.

INDEX OF DRAWINGS

Diversion Watershed Map

Diversion Plan, Profile and Cross Section drawing

See attached **SedCad4** runs for the peak flow from the 10 year 6 hour event.



Bobby Usher-Z:\Mining\BASEMAPS\Cleveland Cliffs\Concord\Proposed expansion REVISED EXPANSION FILES ADDING 3A 4-16-15\REVISED Concord Refuse expansion SITE 3A ONLY 4-14-15.dwg - Oct 06, 2015 - 4:40pm

ASMC PERMIT BOUNDARY

WATERSHED BOUNDARY

SWS1FOREST CN 62

SWS2 POTENTIALLY DISTURBED AREA CN 81

SWS3 FOREST CN 81

SWS4 STOCKPILE AREA AND REFUSE

SWS5 NEW AREA 3A REFUSE

DIVERSION 1

COARSE REFUSE 3A 25' INDEX CONTOURS

COARSE REFUSE 3A 5' CONTOURS

N
W E
S

10 FOOT CONTOUR INTERVAL

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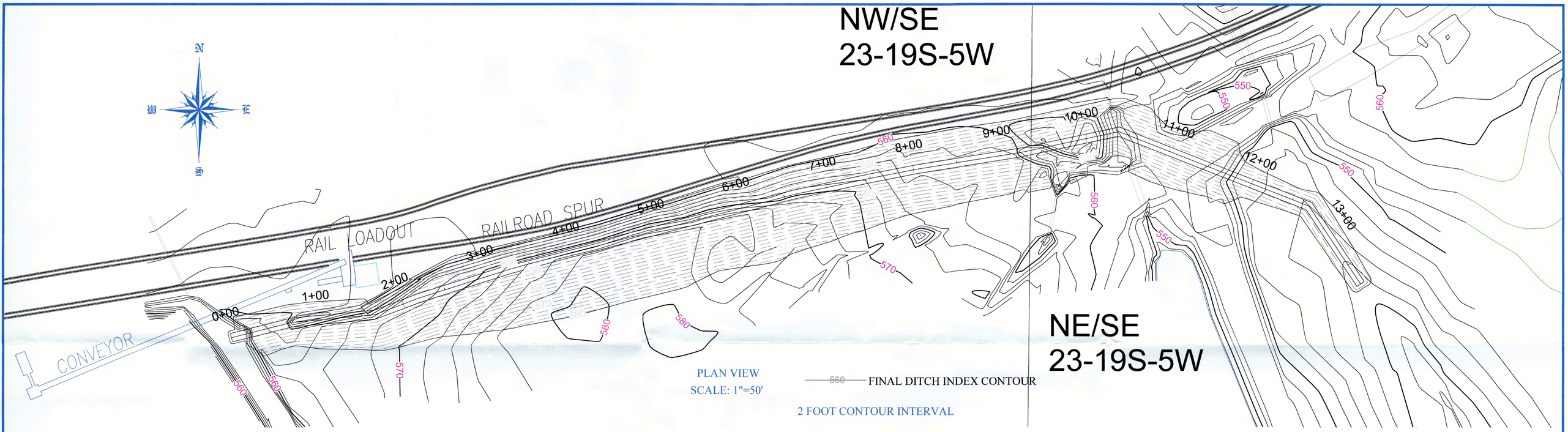
CLIFFS

CONCORD PREP PLANT
REFUSE PILE

DIVERSION 1
WATERSHED MAP

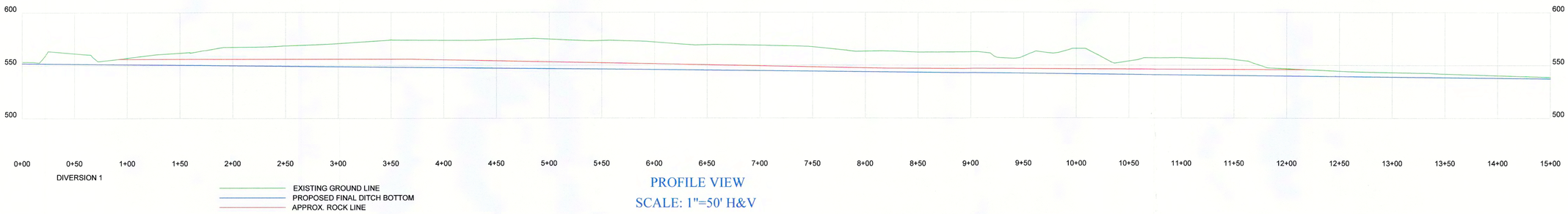
FILE:	SCALE: 1"=500'	JOB NO.:
APPROVED BY: R.W.U.	DATE: 7/09/15	SHEET NO.: 1 OF 1



PLAN VIEW
SCALE: 1"=50'

560 FINAL DITCH INDEX CONTOUR

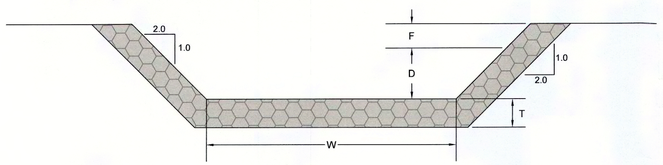
2 FOOT CONTOUR INTERVAL



PROFILE VIEW
SCALE: 1"=50' H&V

COMPANY: OAK GROVE MINING, LLC
MINE NAME: CONCORD PREPARATION PLANT
PERMIT #: P-3233
CHANNEL DESCRIPTION: DIVERSION 1

RIPRAP CHANNEL CROSS-SECTION



DISCHARGE: 176.66 CFS 10YR-6HR RAINFALL
CHANNEL BED SLOPE: 1.0%

CHANNEL WIDTH (W): 10 FT.
FLOW DEPTH (D): 2.24 FT.
FREEBOARD (F): 0.5 FT.
TOTAL CHANNEL DEPTH (D + F): 2.74FT.

RIPRAP CLASSIFICATION: CLASS 1 SANDSTONE OR LIMESTONE
MINIMUM LINER THICKNESS: 1.0 FT.

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COMPANY: OAK GROVE MINING, LLC
MINE NAME: CONCORD PREPARATION PLANT
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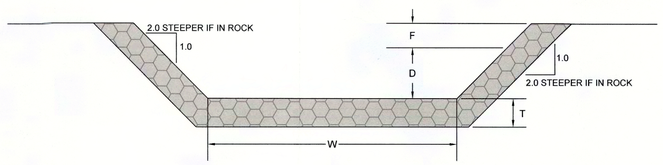
ROCK CUT CHANNEL CROSS-SECTION



DISCHARGE: 176.66 CFS 10YR-6HR RAINFALL
CHANNEL BED SLOPE: 1.0%

CHANNEL WIDTH (W): 10 FT.
FLOW DEPTH (D): 1.98 FT.
FREEBOARD (F): 0.5 FT.
TOTAL CHANNEL DEPTH (D + F): 2.48 FT.

IF CHANNEL IS CUT IN DURABLE ROCK.

MCGEHEE
ENGINEERING CORP.

TYPICAL CROSS SECTIONS
NOT TO SCALE

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Bobby Usher-Z:\Mining\BASEMAPS\Cleveland Cliffs\Concord\Proposed expansion\REVISED EXPANSION FILES ADDING 3A 4-16-15\DIVERSION 1 AND NEW ACCESS ROAD.dwg - Jul 09, 2015 - 4:56pm

CLIFFS

CONCORD PREP PLANT
P-3233

PROPOSED DIVERSION 1
PLAN, PROFILE AND CROSS SECTIONS

FILE:	SCALE: AS SHOWN	JOB NO.:
APPROVED BY: R.W.U.	DATE: 7/9/15	SHEET NO.: 1 OF 1

Concord Diversion 1

Material: Riprap

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	2.0:1	2.0:1	1.0	0.50		

Simons/OSM Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	176.66 cfs	
Depth:	2.24 ft	2.74 ft
Top Width:	18.95 ft	20.95 ft
Velocity:	5.46 fps	
X-Section Area:	32.38 sq ft	
Hydraulic Radius:	1.619 ft	
Froude Number:	0.74	
Manning's n:	0.0377	
Dmin:	2.00 in	
D50:	9.00 in	
Dmax:	12.00 in	

Concord Diversion 1

Material: Rock Cut

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)
10.00	2.0:1	2.0:1	1.0	0.0300	0.50		

	w/o Freeboard	w/ Freeboard
Design Discharge:	176.66 cfs	
Depth:	1.98 ft	2.48 ft
Top Width:	17.91 ft	19.91 ft
Velocity:	6.40 fps	
X-Section Area:	27.59 sq ft	
Hydraulic Radius:	1.464 ft	
Froude Number:	0.91	

OAK GROVE RESOURCES, LLC
Concord Preparation Plant
Diversion 1 Design Plans

10 yr, 6hr Event

Robert Usher, P.E.

General Information

Storm Information:

Storm Type:	SCS 6 Hr
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.250 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#4	==>	End	0.000	0.000	DIVERSION 1

#4
Null

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#4	127.500	127.500	176.66	19.16

Structure Detail:

Structure #4 (Null)

DIVERSION 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)
#4	1	28.400	0.850	0.157	0.279	62.000	S	5.68	1.580
	2	21.500	0.270	0.000	0.000	81.000	F	40.23	3.963
	3	4.600	0.125	0.000	0.000	62.000	S	1.94	0.258
	4	44.000	0.290	0.000	0.000	81.000	F	80.33	8.038
	5	29.000	0.280	0.000	0.000	81.000	F	53.62	5.323
	Σ	**127.500**						**176.66**	**19.164**