

**HYDROLOGY STUDY FOR  
OAK GROVE RESOURCES, LLC**

**CONCORD PREP. PLANT  
P-3233 R-21  
JEFFERSON COUNTY, ALABAMA**

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

**DETAILED DESIGN PLANS  
DIVERSION F-F'  
ATTACHMENT III-B-3**

**June 25, 2015**



Telephone: (205) 384-5553  
Facsimile: (205) 295-3114 - Main Building  
(205) 295-3115 - Water Lab  
Web Address: [www.percengineering.com](http://www.percengineering.com)

June 25, 2015

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

RE: Oak Grove Resources, LLC  
Concord Prep. Plant  
P-3233 Revision R-21

Dear Stephen:

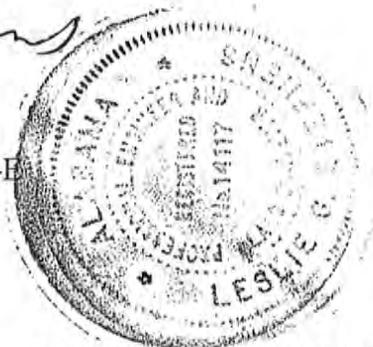
I hereby certify the attached detailed design plans for Diversion Ditch F-F' for the above referenced location are in accordance with the Regulations of the Alabama Surface Mining Commission as adopted by Act 81-435 of December 18, 1981 and amended to date, and are true and correct to the best of my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

If you have any questions or required additional information, please feel free to call me at 295-3127 or e-mail [lstephens@percengineering.com](mailto:lstephens@percengineering.com)

Sincerely,  
PERC Engineering Co., Inc.

A handwritten signature in cursive script that reads 'Leslie G. Stephens'.

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



SPECIFICATIONS FOR DIVERSION CHANNELS  
AND DIVERSION BERMS

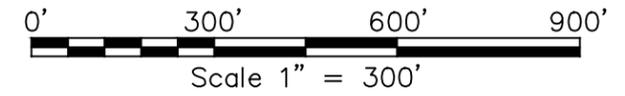
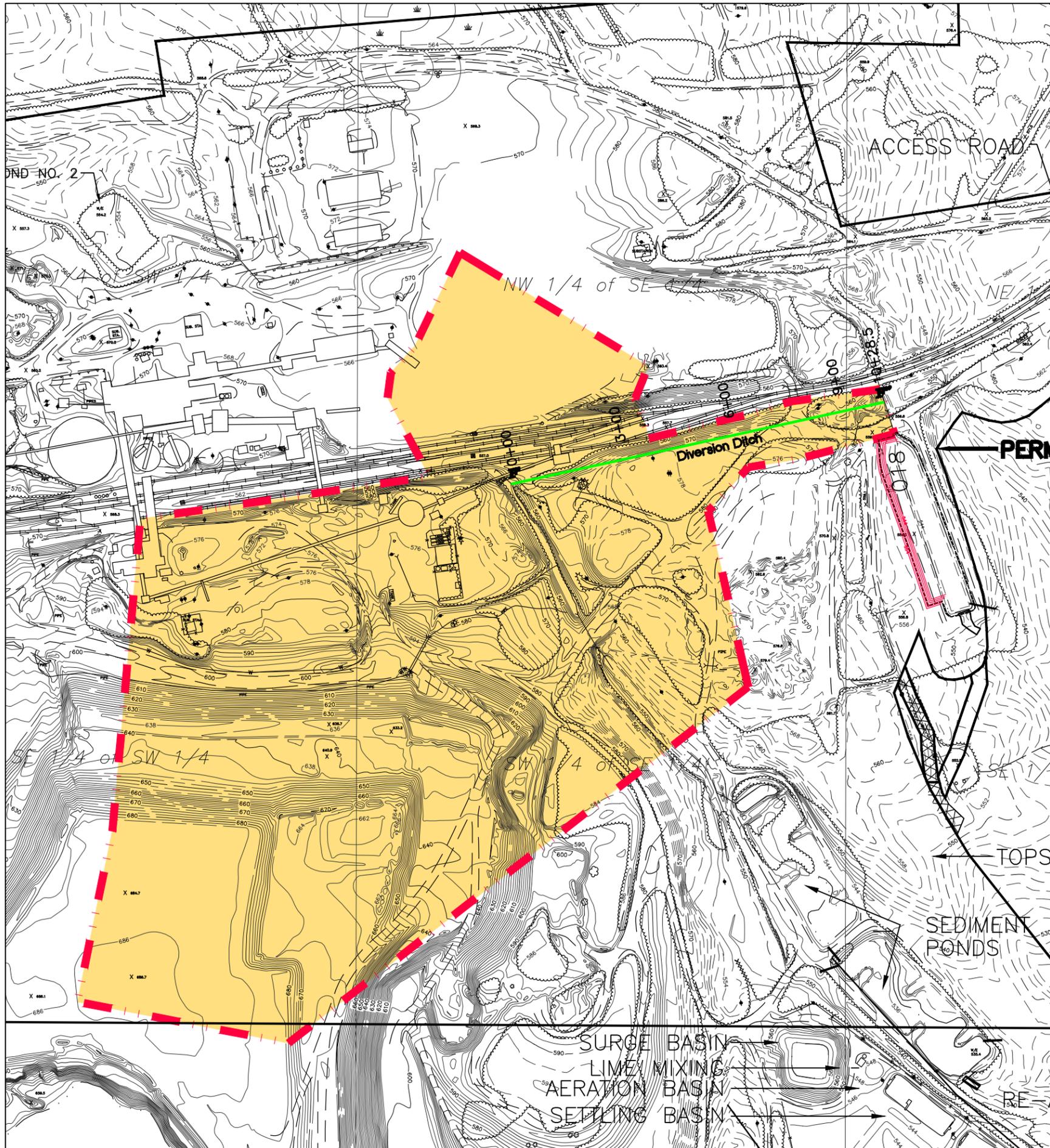
1. Temporary diversions shall be constructed to pass safely the peak runoff from a 2-year, 6-hour precipitation event.
2. To protect fills and property and to avoid danger to public health and safety, permanent diversions shall be constructed to pass safely the peak runoff from a 10-year, 6-hour precipitation event. Permanent diversions shall be constructed with gently sloping banks that are stabilized by vegetation.
3. Diversions shall be designed, constructed, and maintained in a manner which prevents additional contributions of suspended solids to stream flow and to runoff outside the permit area, to the extent possible, using the best technology currently available. Appropriate sediment control measures for these diversions may include, but not be limited to, maintenance of appropriate gradients, channel lining, revegetation, roughness structures, and detention basins.
4. No diversion shall be located so as to increase the potential for land slides and no diversion shall be constructed on existing land slides.

5. When no longer needed, each temporary diversion shall be removed and the affected land regraded, topsoiled, and revegetated in accordance with Rules 880-X-10C-.10, 880-X-10C-.11, 880-X-10C-.52 - 880-X-10C-.58, 880-X-10C-.60, and 880-X-10C-.62.
6. Channel linings, when slopes are between 1-3 percent shall consist of both perennial and annual grasses and when slopes are greater than 3 percent, shall consist of riprap or be cut into non-erodible material.
7. Freeboard shall provide protection for transition of flows and for critical areas such as swales and curves along the entire channel length.
8. Energy dissipators shall be installed, when necessary, at discharge points where natural streams and exit velocity of the diversion ditch flow is greater than that of the receiving stream.
9. Excess excavated material not necessary for diversion channel geometry or regrading of the channel shall be disposed of in accordance with Rule 880-X-10C-.36.
10. Topsoil removed from the diversion excavations shall be handled in accordance with Rule 880-X-10C-.07 through 880-X-10C-.11.
11. Diversions shall not be constructed or operated to divert water into underground mines.
12. The embankment or berm foundation area shall be cleared

of all organic matter, all surfaces sloped to no steeper than 1v:1h and the entire foundation surface scarified.

13. The entire embankment or berm shall be compacted to 95% density, based on standard proctor as outlined in ASTM.
14. The material placed in the berm 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 as the moisture content of the fill material will permit satisfactory compaction in accordance with paragraph 13.
15. The berm and all disturbed areas shall be seeded with both perennial and annual grasses in order to insure that erosion is minimized. Hay bales or riprap may be placed at the toe of the berm immediately upon completion of construction.
16. All berms shall be examined quarterly for structural weakness, instability, erosion, or other hazardous conditions and maintenance performed as necessary.
17. Any soil encountered in the excavation process will be stockpiled within the Permit Boundary to be used for cover material during the reclamation of the Coarse Refuse Disposal Area. Any rock material encountered in the excavation process will be used for compacted fill in the ditch area currently flowing to Basin 003A. It may be stockpiled temporarily prior to placement.





**LEGEND**

- PERMIT BOUNDARY
- 2' SURFACE CONTOUR INTERVAL
- WATERSHED BOUNDARY
- PROPOSED DIVERSION DITCH

**LANDUSE AND CURVE NUMBER INFORMATION**

- GRADED AND BARE, CURVE NUMBER, 81

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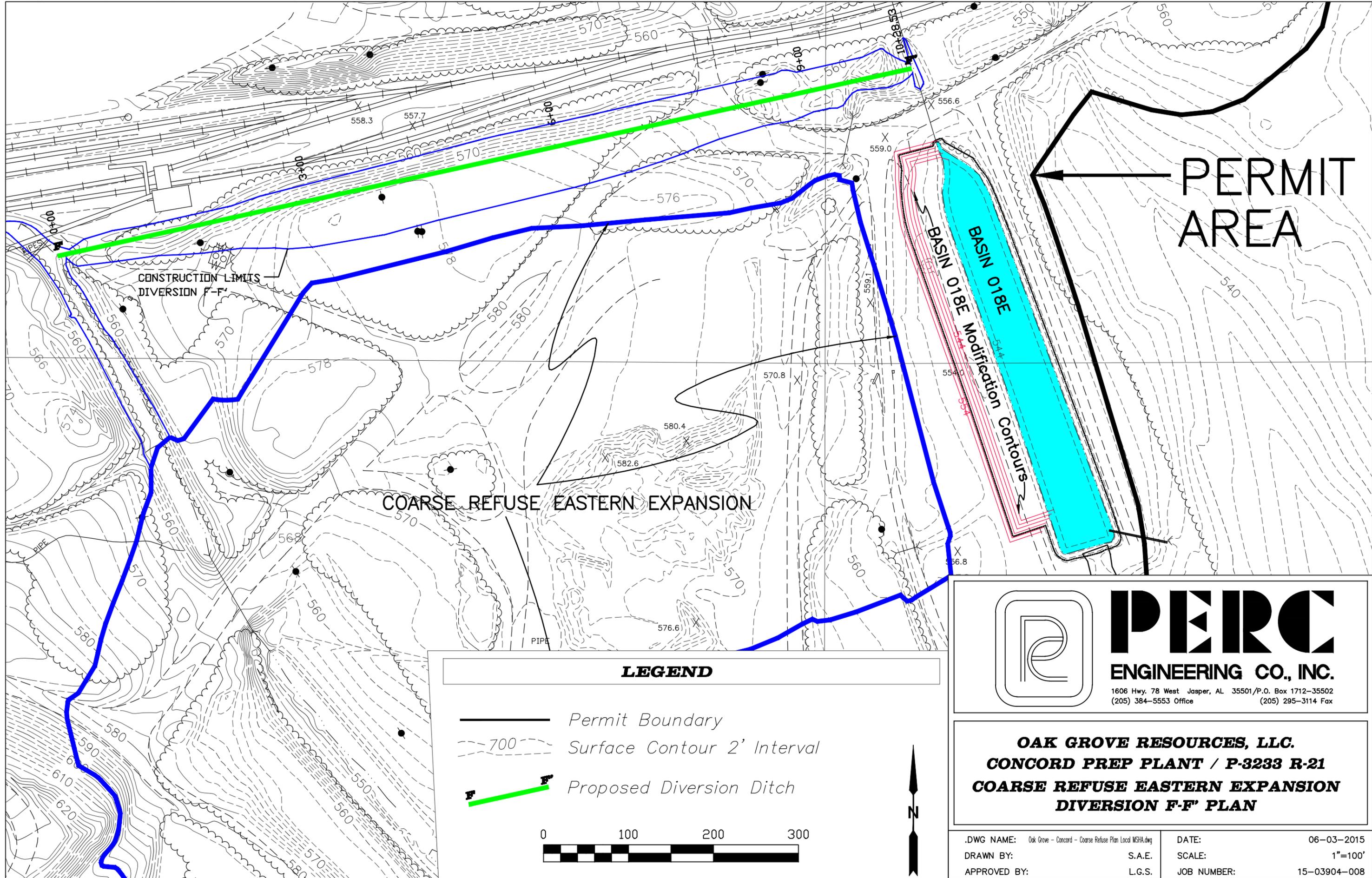


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(205) 384-5553 Office (205) 295-3114 Fax

**OAK GROVE RESOURCES, LLC.  
CONCORD PREP PLANT / P-3233 R-21  
ATTACHMENT III-B-2(a)  
DIVERSION F-F' WATERSHED MAP**

.DWG NAME: Oak Grove - Concord - Diversion Ditch - Watershed and Profile.	DATE:	07-10-2015
DRAWN BY:	S.A.E.	SCALE: 1"=300'
APPROVED BY:	L.G.S.	JOB NUMBER: 15-03904-008



PERMIT AREA

CONSTRUCTION LIMITS DIVERSION F-F

COARSE REFUSE EASTERN EXPANSION

BASIN 018E Modification Contours

**LEGEND**

-  Permit Boundary
-  Surface Contour 2' Interval
-  Proposed Diversion Ditch



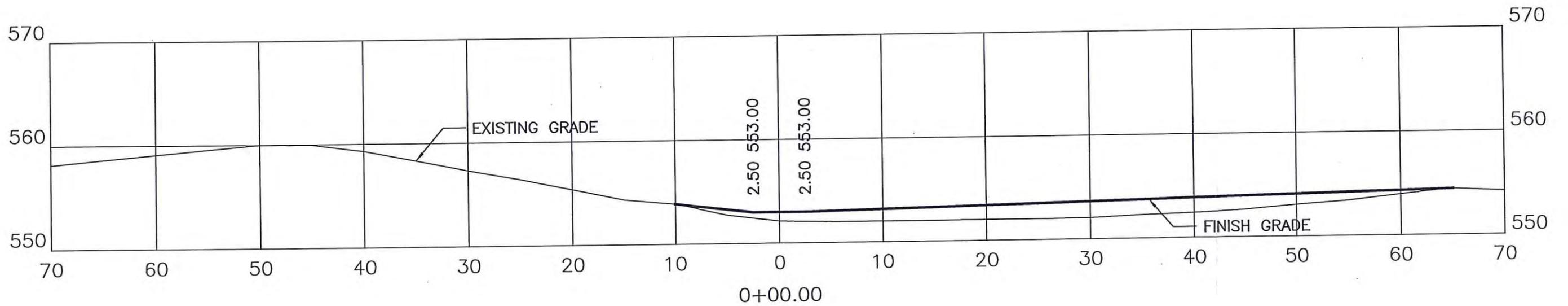
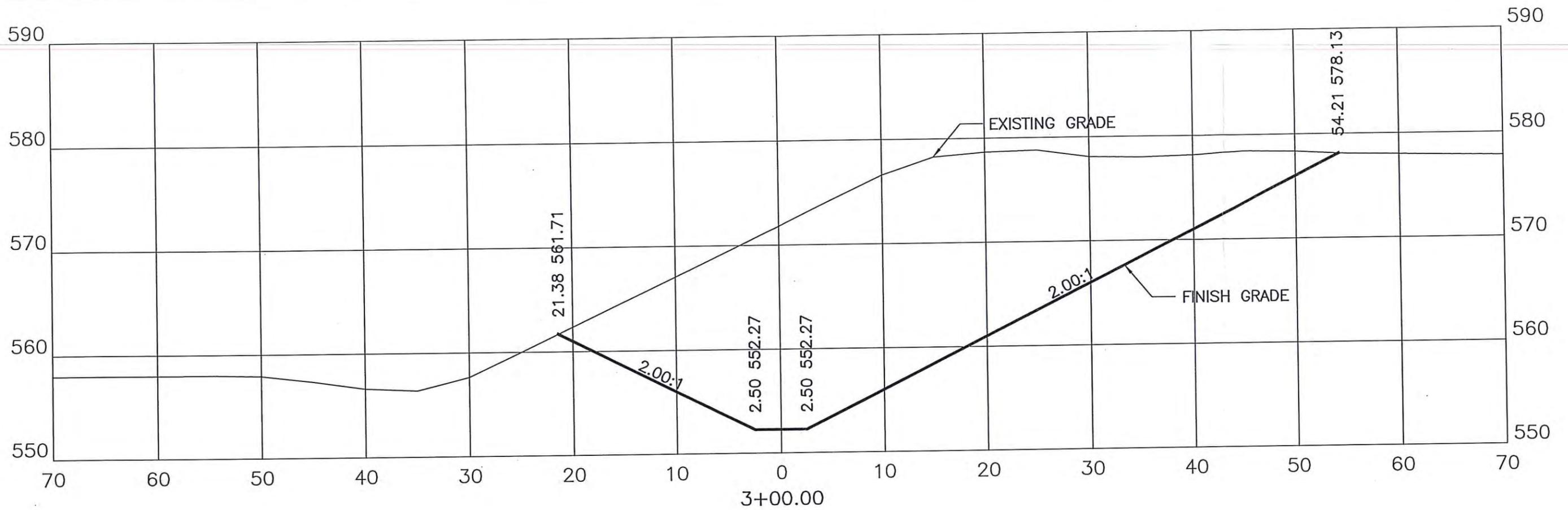
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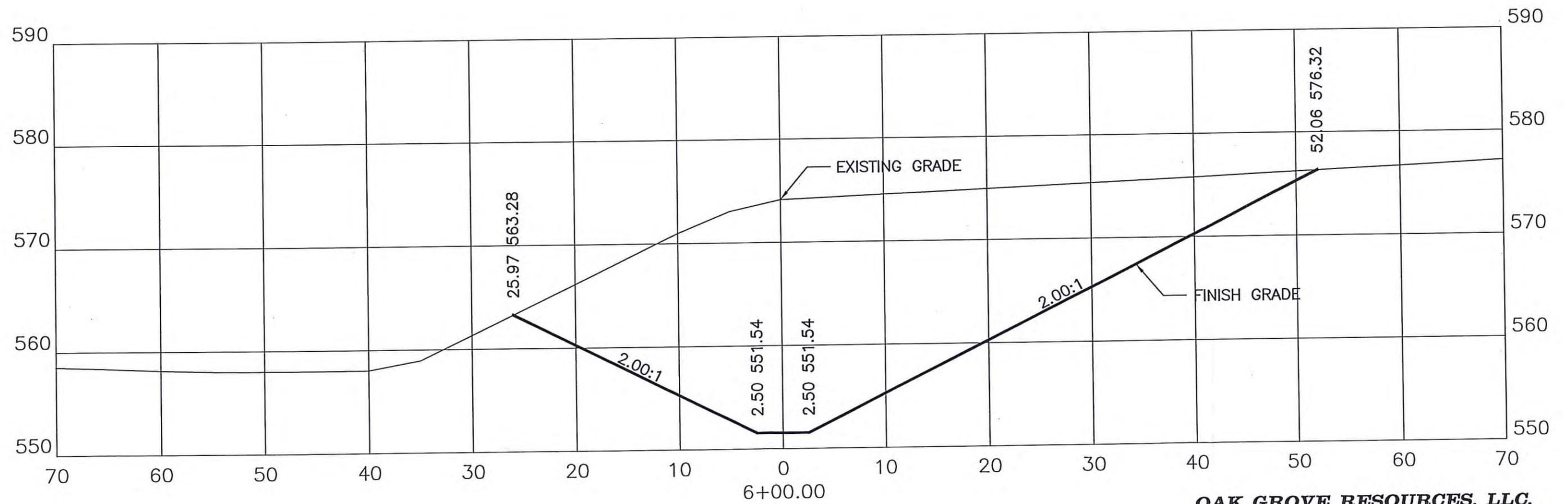
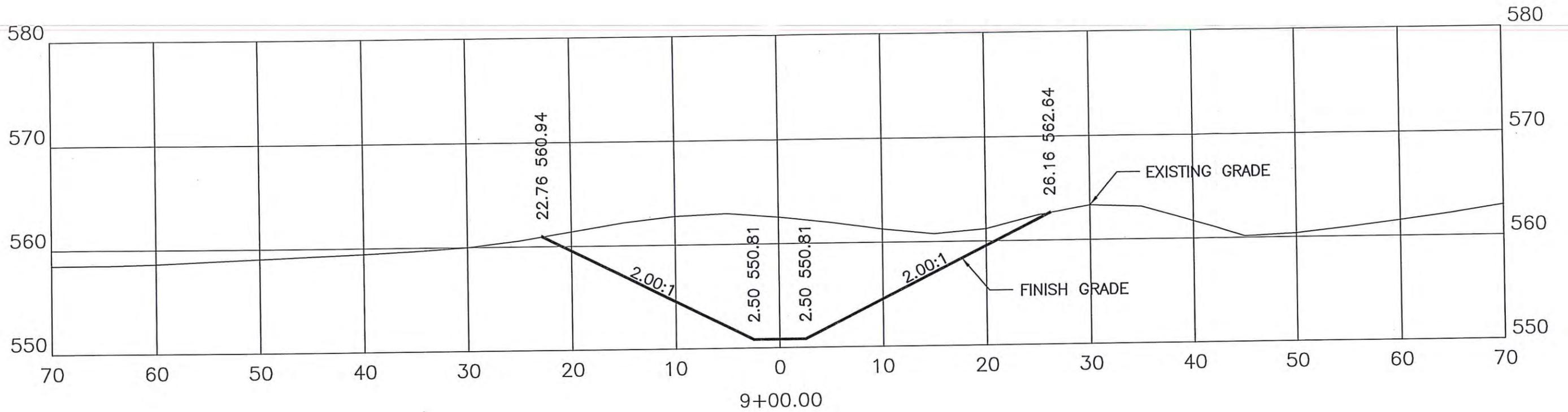
**OAK GROVE RESOURCES, LLC.  
CONCORD PREP PLANT / P-3233 R-21  
COARSE REFUSE EASTERN EXPANSION  
DIVERSION F-F' PLAN**

.DWG NAME: Oak Grove - Concord - Coarse Refuse Plan Local MSHA.dwg	DATE: 06-03-2015
DRAWN BY: S.A.E.	SCALE: 1"=100'
APPROVED BY: L.G.S.	JOB NUMBER: 15-03904-008



Horizontal Scale 10  
Vertical Scale 10

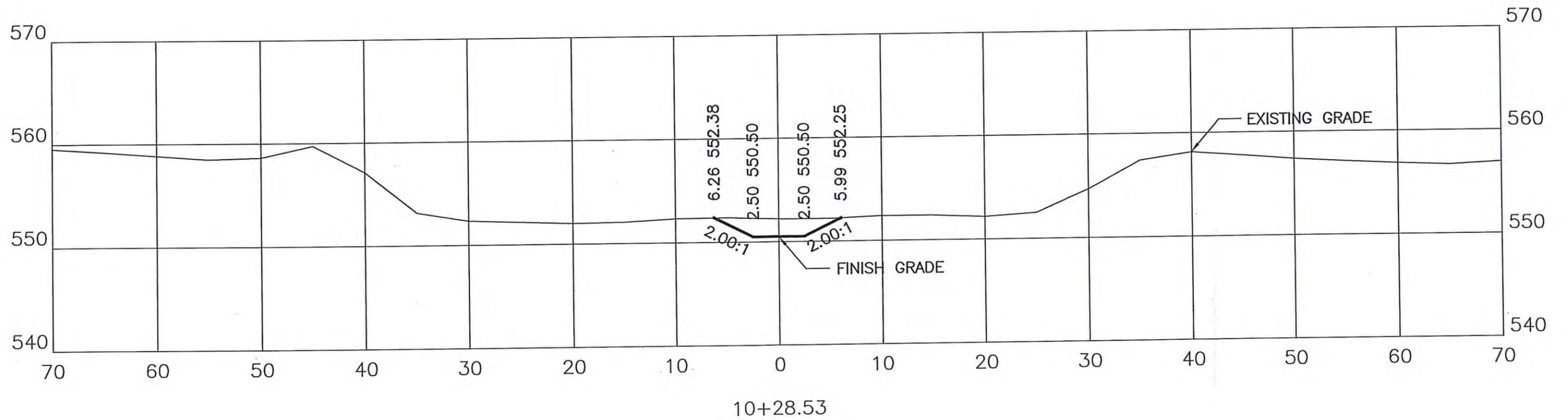
**OAK GROVE RESOURCES, LLC.**  
**CONCORD PREP PLANT / P-3233 R-21**  
**DIVERSION F-F' SECTIONS (SH 1 OF 3)**



**OAK GROVE RESOURCES, LLC.**  
**CONCORD PREP PLANT / P-3233 R-21**  
**DIVERSION F-F' SECTIONS (SH 2 OF 3)**

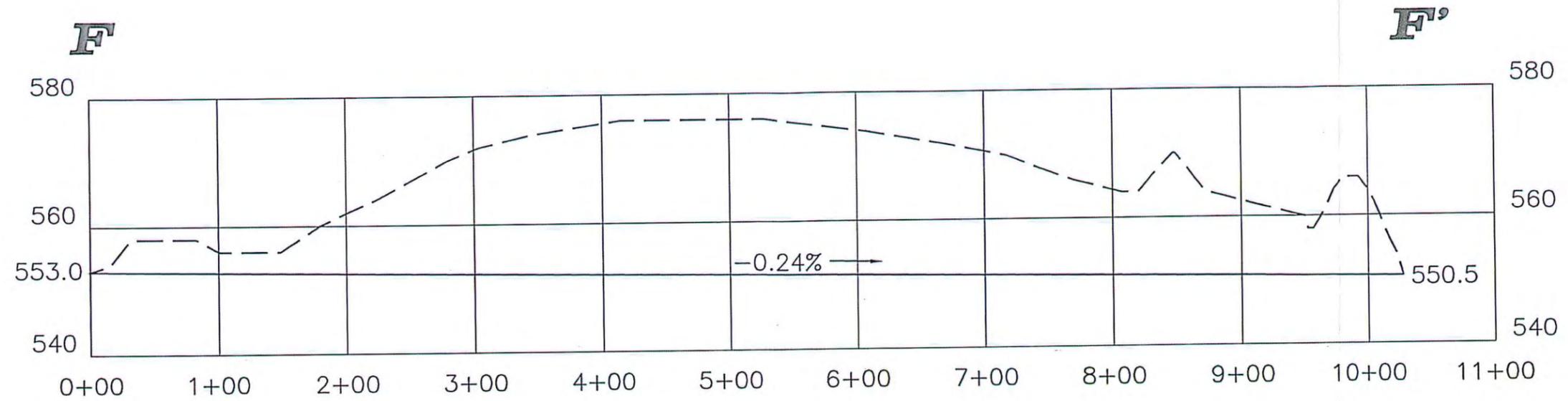
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 Vertical Scale 10

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Horizontal Scale 10  
Vertical Scale 10

**OAK GROVE RESOURCES, LLC.**  
**CONCORD PREP PLANT / P-3233 R-21**  
**DIVERSION F-F' SECTIONS (SH 3 OF 3)**



Vertical Scale: 1"=20'  
 Horizontal Scale: 1"=100'

**LEGEND**

- NATURAL GROUND PROFILE
- PROPOSED DIVERSION PROFILE/BOTTOM OF DITCH

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**OAK GROVE RESOURCES, LLC.**  
**CONCORD PREP PLANT / P-3233 R-21**  
**ATTACHMENT III-B-3(b)**  
**DIVERSION DITCH**

.DWG NAME: Oak Grove - Concord - Diversion Ditch - Watershed and Profile	DATE: 05-14-2015
DRAWN BY: S.A.E.	SCALE: As Shown
APPROVED BY: L.G.S.	JOB NUMBER: 15-03904-008

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**Oak Grove Resources LLC**  
**Concord Prep. Plant**  
**P-3233 Revision R-21**  
**Diversion F-F'**

***3.8 Inch, 10 Year-6 Hour***  
***NRCS Type II***

LGS

PERC ENGINEERING CO., INC.  
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1606 HIGHWAY 78 WEST  
JASPER ALABAMA 35502

Phone: 205-384-5553  
Email: LSTEPHENS@PERCENGINEERING.COM

***General Information***

***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	10 yr - 6 hr
Rainfall Depth:	3.800 inches

**Structure Networking:**

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion F-F'

#1  
Chan'

***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	53.000	53.000	125.61	8.21

**Structure Detail:**

Structure #1 (Vegetated Channel)

*Diversion F-F'*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
5.00	2.0:1	2.0:1	0.2	D, B	1.00			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	125.61 cfs		125.61 cfs	
Depth:	3.23 ft	4.23 ft	4.40 ft	5.40 ft
Top Width:	17.91 ft	21.91 ft	22.59 ft	26.59 ft
Velocity:	3.40 fps		2.07 fps	
X-Section Area:	36.96 sq ft		60.65 sq ft	
Hydraulic Radius:	1.902 ft		2.459 ft	
Froude Number:	0.42		0.22	
Roughness Coefficient:	0.0330		0.0642	

***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	53.000	0.240	0.000	0.000	81.000	F	125.61	8.214
$\Sigma$		53.000						125.61	8.214

***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	2.00	2.00	100.00	1.410	0.019
		8. Large gullies, diversions, and low flowing streams	13.64	150.00	1,100.00	11.070	0.027
		8. Large gullies, diversions, and low flowing streams	0.24	2.45	1,020.83	1.460	0.194
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.240</b>