

**CEDAR LAKE MINING, INC.  
LITTLE SPRING CREEK EAST, P-3968**

**DRAINAGE CONTROL BERM  
DIVERSION DITCH No. 1  
DIVERSION DITCH No. 2  
DIVERSION DITCH No. 3  
DIVERSION DITCH No. 4  
DIVERSION DITCH No. 5**

**DETAILED DESIGN PLANS**

Submitted by:  
**TASK Engineering Management Inc.**  
P. O. Box 660548  
Birmingham, Alabama 35266  
Telephone: (205) 978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

# TASK ENGINEERING MANAGEMENT INC.

PO Box 660548  
BIRMINGHAM, ALABAMA 35266  
(205) 978-5070

June 12, 2012

Mr. Gary J. Heaton, P.E.  
Alabama Surface Mining Commission  
PO Box 2390  
Jasper, Alabama 35502-2390

Re: Cedar Lakes Mining, Inc.  
Little Spring Creek East Mine - P-3968

Dear Mr. Heaton:

I hereby certify the enclosed detailed design plans for the Drainage Control Berm 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 as amended to date and that the information used in the enclosed diversion berm design plans is true and correct to the best of my knowledge and belief.

If you have any questions or need additional information, please do not hesitate to call us at (205) 978-5070 or email us at [jw-task@charter.net](mailto:jw-task@charter.net).

Sincerely,



Jerry W. Williams, P.E.  
Alabama Reg. No. 12739



## INTRODUCTION

For Little Spring Creek East, P-3968, drainage control during the mining of Increments No. 1 and No. 2 will be accomplished by the construction of a Drainage Control Berm and four (4) incised sedimentation basins that will utilize the said Drainage Control Berm as the basin embankment. The corresponding spillways for these basins will be constructed via concrete spillways that will cut the Drainage Control Berm at the proper design elevations as determined by the approved sedimentation basin designs. The Drainage Control Berm along with five (5) Diversion Ditches are designed to capture and convey any storm water run-off to the proposed sedimentation basins. These diversions, designated Diversion No. 1, No. 2, No. 3, No. 4 and No. 5 are necessary to ensure that all run-off from any disturbance of the mining process will not leave the mine site without proper treatment by an approved sedimentation basin. Diversions No. 1, No. 2, No. 3, No. 4 and No. 5 are proposed as temporary but were conservatively designed for a ten (10) year six (6) hour event as required for permanent diversions due to the length of time that these diversions must remain functional to convey water to the proposed sedimentation basins throughout the proposed life of the mining operation.

The Drainage Control Berm commences at the southwestern permit boundary in the SE/SE of Section 3, Township 13 South, Range 7 West and generally follows the permit boundary along the one hundred (100') foot setback from Little Spring Creek up to the common boundary of Increment No. 1 and Increment No. 3 where the berm is routed due north at Station 32+61.47' and continues to Station 35+15.77' where it ties to existing ground within the confines of Increment No. 1 in the SW/NE of Section 3, Township 13 South, Range 7 West. (See the attached [Plan/Profile, Drainage Control Berm Map](#) for the location/orientation of the drainage berm structure.)

This configuration will remain until completion of mining in Increments No. 1 and No. 2. Upon activation of Increment No. 3 and prior to any mining operations, the Drainage Control Berm will be cut at Station 32+61.47' and the berm will be continued from the said Station 32+61.47' due west/northwest until it ties to existing ground near the western boundary line of Increment No. 3. Simultaneously with the construction and the continuation of the drainage berm, Basin 005P will be designed, approved by the Regulatory Agency, constructed and certified prior to any active mining within Increment No. 3.

Diversions No. 1 through No. 5 will be constructed to convey drainage to the proposed sedimentation basins and will consist of a flat bottom drainage ditch, ten (10') feet in width and bounded by the drainage control berm and the toe of spoil from mining operations.

Diversion No. 1 is located within the SE/SE of Section 3, Township 13 South, Range 7 West, all in Walker County, Alabama. Diversion No. 1 runs from the southwest permit boundary down slope at -3.13% for approximately three hundred and five (305') feet to the north/northeast until it ends at Basin 001P.

Diversions No. 2 is located within the NE/SE & SE/SE of Section 3, Township 13 South, Range 7 West, all in Walker County, Alabama. Diversion No. 2 extends from the natural drainage break immediately south of Basin 002P and runs south/southeast down slope at -0.52% for approximately three hundred and twenty-seven (327') feet until it ends at Basin 001P.

Diversions No. 3 is located within the NE/SE of Section 3, Township 13 South, Range 7 West, all in Walker County, Alabama. Diversion No. 3 extends from the natural drainage break due southeast of Basin 003P and runs generally south down slope at -0.61% for approximately one thousand one hundred and sixty (1,160') until it ends at Basin 002P.

Diversions No. 4 is located within the NE/SE, NW/SE & SW/NE of Section 3 Township 13 South, Range 7 West, all in Walker County, Alabama. Diversion No. 4 extends from the natural drainage break immediately west of Basin 003P and runs due west then due north down slope at -0.48% for approximately one thousand and six (1,006') feet until it ends at Basin 004P.

Diversions No. 5 is located within the SW/NE & NW/SE of Section 3, Township 13 South, Range 7 West, all in Walker County, Alabama. Diversion No. 5 commences due east of the location where the proposed Drainage Control Berm ties to natural ground in Increment No. 1 in the SW/NE of Section 3, Township 13 South, Range 7 West and extends due south down slope at -0.97% for approximately eight hundred and twenty nine (829') feet until it ends at Basin 004P.

## **CONSTRUCTION AND CERTIFICATION REQUIREMENTS**

Due to low inherent surface slopes at the Little Spring Creek East mine site, the Drainage Control Berm and Sedimentation Basins 001P, 002P, 003P and 004P will be constructed prior to any surface coal mining operations are commenced. These facilities will allow for adequate spoil room for surface coal mining operations and will insure that all drainage resulting from natural flows and storm water will be routed through approved sedimentation basins for treatment prior to discharge into Little Spring Creek.

The Drainage Control Berm will be built, stabilized and certified in five hundred (500') foot sections and the previously referenced Sedimentation Basins 001P, 002P, 003P and 004P will be built by excavating the necessary basin volume below the existing ground elevation at each basin site. These incised basins will utilize the Drainage Control Berm as their basin embankment and spillways will be cut through the berm at the design elevation as approved by the Regulatory Authority. The spillways for each sedimentation basin will be constructed of concrete and will extend from the spillway base at the approved design elevation to the top of berm on a two (2') feet horizontal to one (1') foot vertical slope.

The Drainage Control Berm will be constructed of the best non-toxic, non-acid material resulting from the excavation of the proposed incised sedimentation basins and compacted to 95%, based

on standard proctor as outlined by ASTM. The construction materials will be free of sod, stones, roots, limbs, etc. over six (6") inches in diameter and spread in layers no greater than twelve (12") inches in thickness.

The foundation area of the berm structure will be cleared and grubbed of all organic matter such as trees and large bushes prior to construction and will be constructed at a minimum height of seven (7') feet above existing ground, will be fifteen (15') in width at the top and the sides will be sloped at two (2') feet horizontal to one (1') foot vertical. (See the attached [Typical Drainage Control Berm Section](#) for a typical details of the drainage berm structure and see the attached [Plan/Profile-Drainage Control Berm, Cross-Sections 1+30.33 to 12+00, Cross-Sections 12+50 to 23+50 and Cross-Sections 24+00 to 35+00](#) for the general plan view, top of berm and ground profiles and cross-sections showing ground elevation and top of berm elevations at the centerline of the proposed Drainage Control Berm.)

All areas disturbed in the construction of the berm structure will be seeded with a mixture of perennial and annual grasses, fertilized and mulched to prevent erosion and ensure restabilization. Silt fence will be installed where toe of the slope of the berm structure intersects natural ground. (See the attached [Silt Fence Detail and Silt Fence Specifications](#)).

The Drainage Control Berm will be constructed, stabilized and certified in intervals of five hundred (500') feet. Inspections will be conducted regularly during construction of the berm structure by a qualified registered engineer or other qualified person under the direction of a professional engineer. Upon completion of construction, the interval will be certified, by a qualified Registered Professional Engineer, to the Regulatory Authority as being constructed in accordance with the approved Detailed Design Plans.

**DIVERSION DITCH AND DIVERSION BERM  
DESIGN AND CONSTRUCTION SPECIFICATIONS**

- 1) Temporary diversions will be designed and constructed to adequately carry the runoff from a two (2) year - six (6) hour precipitation event.
- 2) Permanent diversions will be designed and constructed to adequately carry the runoff from a ten (10) year - six (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 landslides nor be located so as to increase the potential for landslides.
- 7) Temporary diversions will be removed and the affected area regraded, topsoiled (if required) and revegetated in accordance with Rules 880-X-10C-.10, 880-X-10C-.11, 880-X-10C-.52 thru 880-X-10C-.57 and 880-X-10C-.58, 880-X-10C-.60 and 880-X-10C-.62, when no longer needed.
- 8) Channel linings, for diversions with slopes of three (3%) 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 three (3%) percent, will consist of rip-rap or other non-erodible material or cut into non-erodible material.
- 9) Adequate freeboard will be provided for protection for transition of flows and critical areas such as swales and curves along the entire diversion length.
- 10) 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.
- 11) Topsoil removed from the diversion area (if required) will be handled in accordance with Rules 880-X-10C-.07 thru 880-X-10C-.11.
- 12) Excess material excavated in the construction of the diversion, not needed for diversion channel geometry or the regrading of the channel, will be disposed of in accordance with Rule 880-X-10C-.36.
- 13) Diversions will not be designed or constructed to divert water into underground mines without written approval from the Regulatory Authority.

- 14) 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 one (1) Vertical to one (1) Horizontal.
- 15) 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.
- 16) Upon completion 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.
- 17) All diversions (berms or ditches) will be examined quarterly for erosion, instability, structural weakness or other hazardous conditions and maintenance performed as necessary.
- 18) The diversion will be constructed and stabilized in 500 foot sections.

## **REMOVAL PLAN FOR DRAINAGE CONTROL BERM**

Berms associated with Diversion Ditches No. 1, No. 2, No. 3 and No. 4 will be removed after a Phase II bond release for the area draining to the diversions.

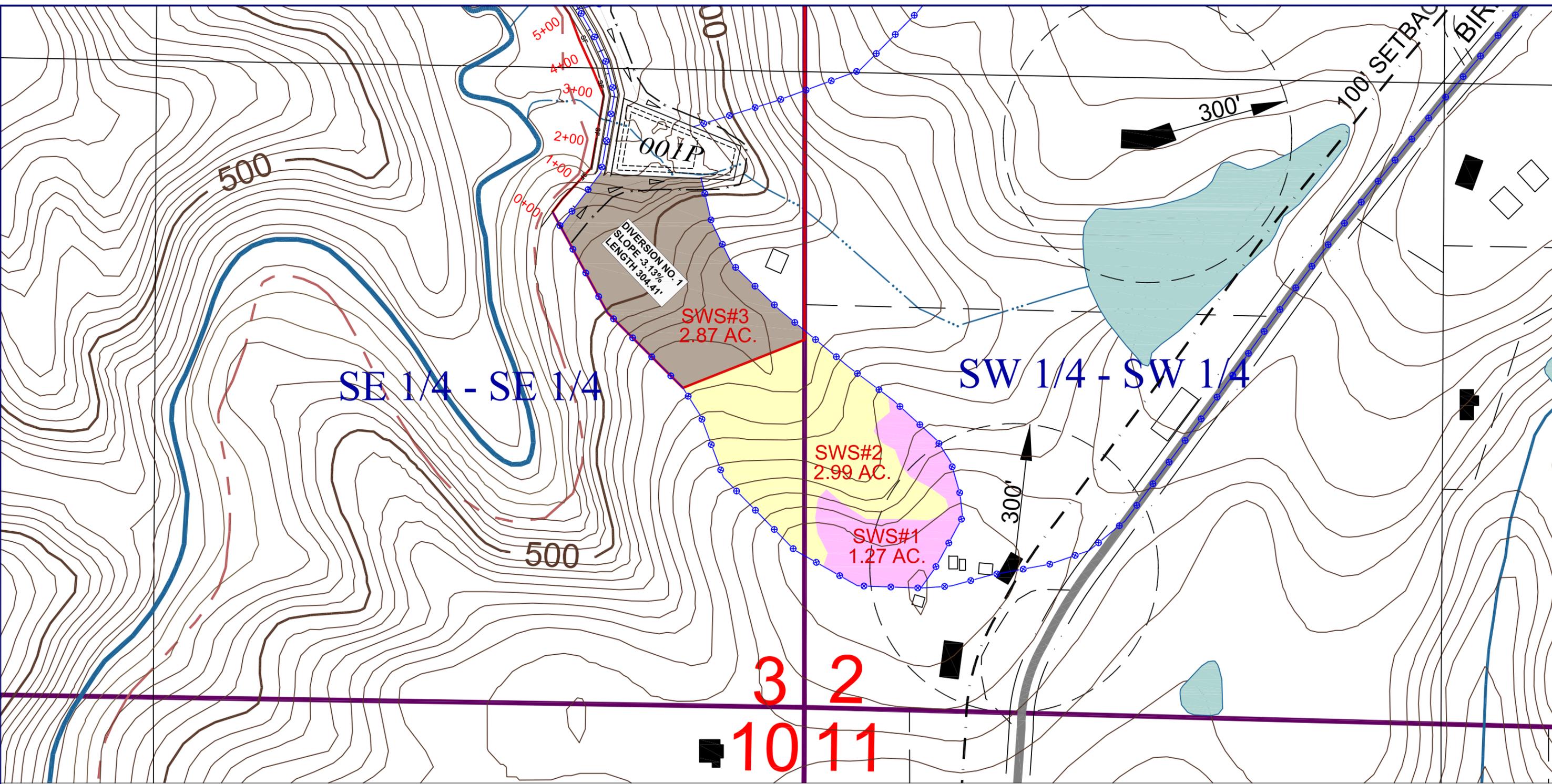
Prior to removal, silt fences will be installed along the outside edge of the berm to control runoff from the area disturbed. See Silt Fence Design and Construction Specifications and drawings for silt fence placement.

The berm will be removed by grading the material into the adjacent permit area that has been surface mined. The area will be sloped to comply with Part IV of the permit. As soon as grading is complete, the area will be scarified, seeded and mulched in accordance with the approved Part IV of the permit.

**DETAILED DESIGN PLANS  
DIVERSION DITCH No.1**

Submitted by:

**TASK Engineering Management Inc.**  
P. O. Box 660548  
Birmingham, Alabama 35266  
Telephone: (205) 978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

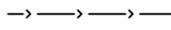
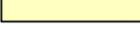


**TASK EMI**  
**CONSULTING ENGINEERS**  
 P.O. BOX 660548  
 BIRMINGHAM, ALABAMA 35266  
 (205)978-5070  
 email: jw-task@charter.net

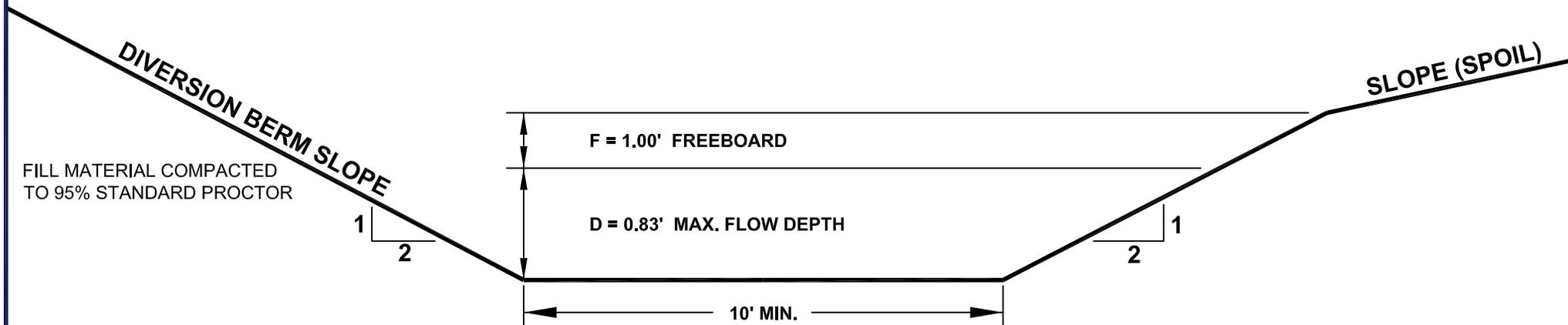


**CEDAR LAKE MINING, INC.**  
**LITTLE SPRING CREEK EAST, P-3968**  
**WATERSHED MAP**  
**SCALE: 1" = 200'**  
**CONTOUR INTERVAL: 5 FT.**  
**DIVERSION No. 1**

**LEGEND**

	PERMIT BOUNDARY		DRAINAGE DIVIDE
	PREVIOUSLY SURFACE MINED		ROADSIDE DITCH
	GRADED & BARE, C.N. 81		DIVERSION DITCH
	MOSTLY FOREST, GOOD COVER, C.N. 70		
	RESIDENTIAL AREAS/LAWNS, CN 70		

DIVERSION DITCH No. 1  
TYPICAL CROSS-SECTION  
TRAPEZOIDAL CONFIGURATION  
GRASS-LINED  
NTS



**SEDCAD OUTPUT PARAMETERS**

DISCHARGE: 13.00 cfs (max)  
 CHANNEL SLOPE: 3.13%  
 LIMITING VELOCITY: 5.0 fps

STABILITY CLASS D

CHANNEL TOP WIDTH (W): 15.84 ft  
 FLOW DEPTH (D): 0.46 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 1.46 ft  
 VELOCITY: 2.58 fps

CAPACITY CLASS B

CHANNEL TOP WIDTH (W): 17.32 ft  
 FLOW DEPTH (D): 0.83 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 1.83 ft  
 VELOCITY: 1.34 fps

**GENERAL SPECIFICATIONS**

DIVERSION/BERM PROTECTIVE LINER: GRASS MIXTURE  
 (FESCUE, BERMUDA AND RYE).

FLOW LIMITED BY MAXIMUM ALLOWABLE VELOCITY (5.0 FPS)

STORM TYPE: SCS 6 HOUR

DESIGN STORM: 10 yr - 6 hr

RAINFALL DEPTH: 4.160 inches



P.O. BOX 660548  
 BIRMINGHAM, ALABAMA 35266  
 (205)978-5070

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**Cedar Lake Mining, Inc.**  
**Little Spring Creek East Mine**  
**Diversion No. 1**

*10 Year 6 Hour Event*

Jerry W. Williams, P.E.

TASK Engineering Management Inc.  
P.O. Box 660548  
Birmingham, Alabama 35226

Phone: 205-978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

## ***General Information***

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

Storm Type:	SCS 6 HOUR
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.160 inches

***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion No. 1

#1 Chan'l
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***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	7.130	7.130	13.00	1.05

## Structure Detail:

### Structure #1 (Vegetated Channel)

*Diversion No. 1*

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)
10.00	2.0:1	2.0:1	3.1	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:	13.00 cfs		13.00 cfs	
Depth:	0.46 ft	1.46 ft	0.83 ft	1.83 ft
Top Width:	11.84 ft	15.84 ft	13.32 ft	17.32 ft
Velocity:	2.58 fps		1.34 fps	
X-Section Area:	5.04 sq ft		9.68 sq ft	
Hydraulic Radius:	0.417 ft		0.706 ft	
Froude Number:	0.70		0.28	
Roughness Coefficient:	0.0570		0.1555	

***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	1.270	0.069	0.029	0.417	70.000	M	1.78	0.151
	2	2.990	0.014	0.015	0.418	70.000	S	4.20	0.358
	3	2.870	0.015	0.000	0.000	81.000	F	7.02	0.539
	<b>Σ</b>	<b>7.130</b>						<b>13.00</b>	<b>1.049</b>

***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	5.99	9.18	153.30	0.610	0.069
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.069</b>
#1	2	8. Large gullies, diversions, and low flowing streams	7.89	34.59	438.60	8.420	0.014
<b>#1</b>	<b>2</b>	<b>Time of Concentration:</b>					<b>0.014</b>
#1	3	8. Large gullies, diversions, and low flowing streams	8.42	40.63	482.38	8.700	0.015
<b>#1</b>	<b>3</b>	<b>Time of Concentration:</b>					<b>0.015</b>

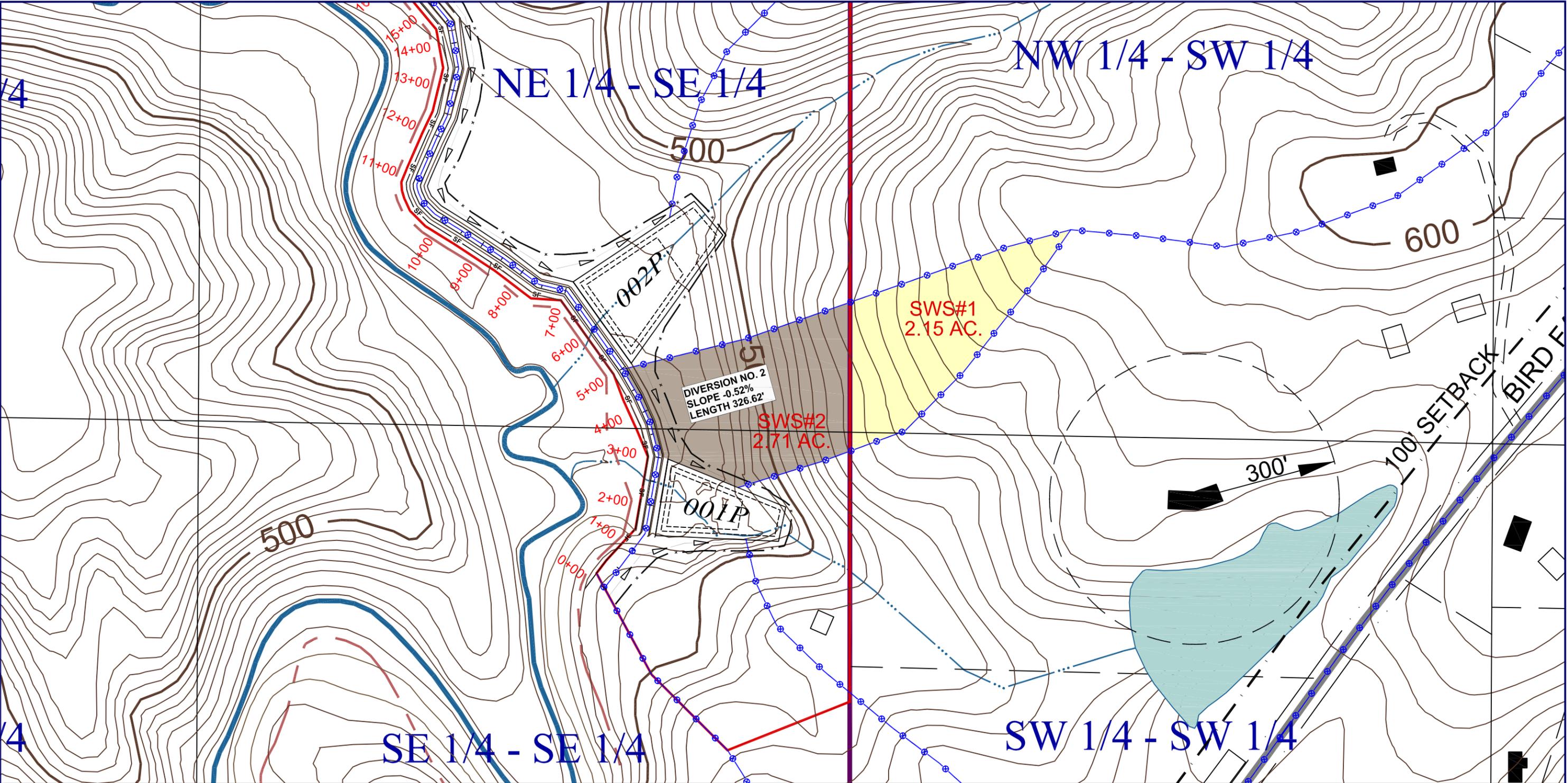
***Subwatershed Muskingum Routing Details:***

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	8.17	75.24	920.98	8.570	0.029
<b>#1</b>	<b>1</b>	<b>Muskingum K:</b>					<b>0.029</b>
#1	2	8. Large gullies, diversions, and low flowing streams	8.42	40.63	482.38	8.700	0.015
<b>#1</b>	<b>2</b>	<b>Muskingum K:</b>					<b>0.015</b>

**DETAILED DESIGN PLANS  
DIVERSION DITCH No.2**

Submitted by:

**TASK Engineering Management Inc.**  
P. O. Box 660548  
Birmingham, Alabama 35266  
Telephone: (205) 978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

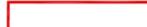
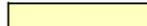
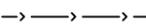


**CEDAR LAKE MINING, INC.  
LITTLE SPRING CREEK EAST, P-3968**

**WATERSHED MAP  
SCALE: 1" = 200'  
CONTOUR INTERVAL: 5 FT.**

**DIVERSION No. 2**

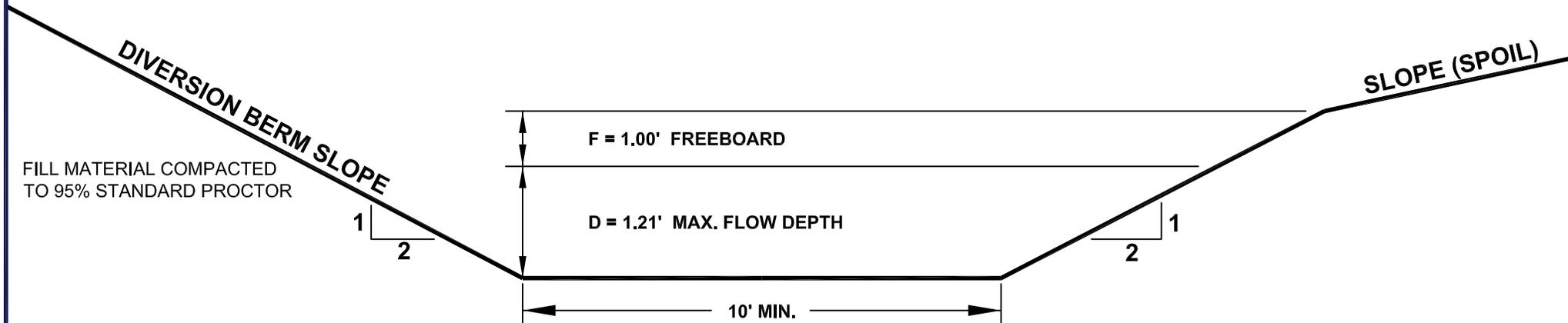
**LEGEND**

-  PERMIT BOUNDARY
-  PREVIOUSLY SURFACE MINED
-  GRADED & BARE, C.N. 81
-  MOSTLY FOREST, GOOD COVER, C.N. 70
-  DRAINAGE DIVIDE
-  ROADSIDE DITCH
-  DIVERSION DITCH



P.O. BOX 660548  
BIRMINGHAM, ALABAMA 35266  
(205)978-5070  
email: jw-task@charter.net

DIVERSION DITCH No. 2  
TYPICAL CROSS-SECTION  
TRAPEZOIDAL CONFIGURATION  
GRASS-LINED  
NTS



### SEDCAD OUTPUT PARAMETERS

DISCHARGE: 6.88 cfs (max)  
 CHANNEL SLOPE: 0.52%  
 LIMITING VELOCITY: 5.0 fps

#### STABILITY CLASS D

CHANNEL TOP WIDTH (W): 16.44 ft  
 FLOW DEPTH (D): 0.61 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 1.61 ft  
 VELOCITY: 1.01 fps

#### CAPACITY CLASS B

CHANNEL TOP WIDTH (W): 18.85 ft  
 FLOW DEPTH (D): 1.21 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 2.21 ft  
 VELOCITY: 0.46 fps

### GENERAL SPECIFICATIONS

DIVERSION/BERM PROTECTIVE LINER: GRASS MIXTURE  
 (FESCUE, BERMUDA AND RYE).

FLOW LIMITED BY MAXIMUM ALLOWABLE VELOCITY (5.0 FPS)

STORM TYPE: SCS 6 HOUR

DESIGN STORM: 10 yr - 6 hr

RAINFALL DEPTH: 4.160 inches



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**Cedar Lake Mining, Inc.**  
**Little Spring Creek East Mine**  
**Diversion No. 2**

*10 Year 6 Hour Event*

Jerry W. Williams, P.E.

TASK Engineering Management Inc.  
P.O. Box 660548  
Birmingham, Alabama 35226

Phone: 205-978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

## ***General Information***

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

Storm Type:	SCS 6 HOUR
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.160 inches

***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion No. 2

#1 Chan'l
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***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	4.860	4.860	6.88	0.68

## *Structure Detail:*

### Structure #1 (Vegetated Channel)

*Diversion No. 2*

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)
10.00	2.0:1	2.0:1	0.5	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:	6.88 cfs		6.88 cfs	
Depth:	0.61 ft	1.61 ft	1.21 ft	2.21 ft
Top Width:	12.44 ft	16.44 ft	14.85 ft	18.85 ft
Velocity:	1.01 fps		0.46 fps	
X-Section Area:	6.83 sq ft		15.06 sq ft	
Hydraulic Radius:	0.537 ft		0.977 ft	
Froude Number:	0.24		0.08	
Roughness Coefficient:	0.0703		0.2311	

***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	2.150	0.218	0.007	0.442	70.000	S	0.93	0.173
	2	2.710	0.007	0.000	0.000	81.000	F	6.63	0.509
	<b>Σ</b>	<b>4.860</b>						<b>6.88</b>	<b>0.682</b>

***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	8.05	45.06	559.63	0.710	0.218
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.218</b>
#1	2	8. Large gullies, diversions, and low flowing streams	18.51	68.41	369.52	12.900	0.007
<b>#1</b>	<b>2</b>	<b>Time of Concentration:</b>					<b>0.007</b>

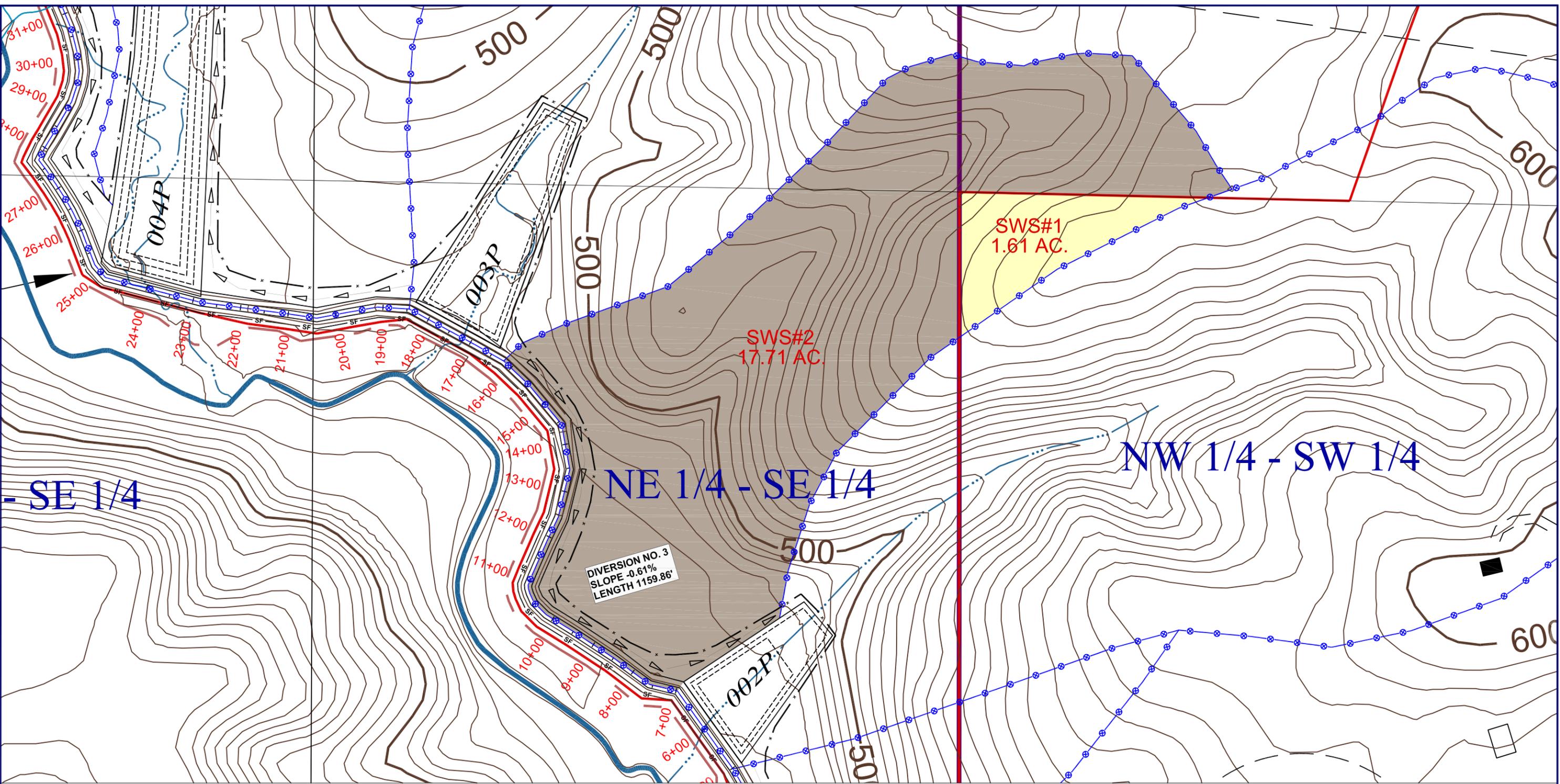
***Subwatershed Muskingum Routing Details:***

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	18.51	68.41	369.52	12.900	0.007
<b>#1</b>	<b>1</b>	<b>Muskingum K:</b>					<b>0.007</b>

**DETAILED DESIGN PLANS  
DIVERSION DITCH No.3**

Submitted by:

**TASK Engineering Management Inc.**  
P. O. Box 660548  
Birmingham, Alabama 35266  
Telephone: (205) 978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)



P.O. BOX 660548  
 BIRMINGHAM, ALABAMA 35266  
 (205)978-5070  
 email: jw-task@charter.net

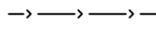
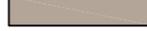
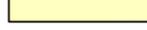


**CEDAR LAKE MINING, INC.**  
**LITTLE SPRING CREEK EAST, P-3968**

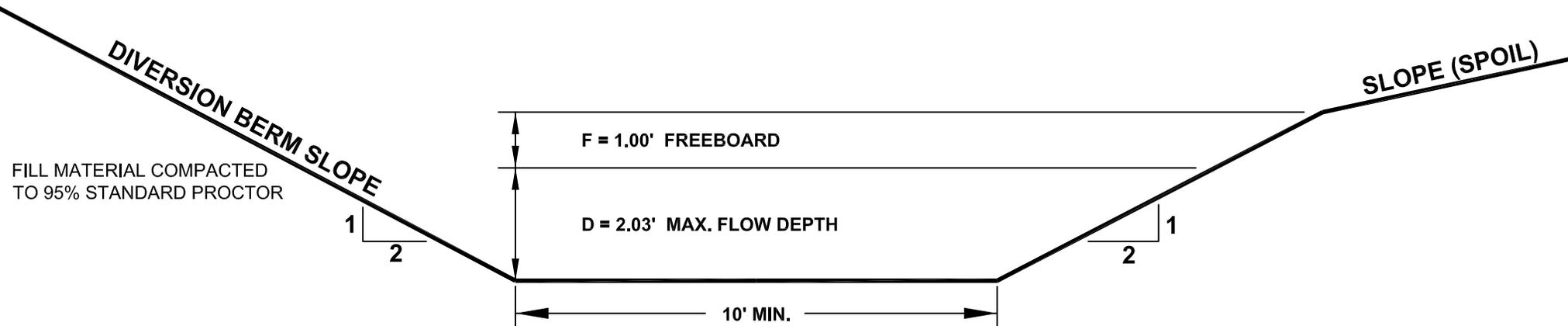
WATERSHED MAP  
 SCALE: 1" = 200'  
 CONTOUR INTERVAL: 5 FT.

**DIVERSION No. 3**

**LEGEND**

- |   |                                    |   |                 |
|---|------------------------------------|---|-----------------|
|  | PERMIT BOUNDARY                    |  | DRAINAGE DIVIDE |
|  | PREVIOUSLY SURFACE MINED           |  | ROADSIDE DITCH  |
|  | GRADED & BARE, C.N. 81             |  | DIVERSION DITCH |
|  | MOSTLY FOREST, GOOD COVER, C.N. 70 |   |                 |

DIVERSION DITCH No. 3  
TYPICAL CROSS-SECTION  
TRAPEZOIDAL CONFIGURATION  
GRASS-LINED  
NTS



**SEDCAD OUTPUT PARAMETERS**

DISCHARGE: 45.56 cfs (max)  
 CHANNEL SLOPE: 0.61%  
 LIMITING VELOCITY: 5.0 fps

STABILITY CLASS D

CHANNEL TOP WIDTH (W): 19.16 ft  
 FLOW DEPTH (D): 1.29 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 2.29 ft  
 VELOCITY: 2.81 fps

CAPACITY CLASS B

CHANNEL TOP WIDTH (W): 22.14 ft  
 FLOW DEPTH (D): 2.03 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 3.03 ft  
 VELOCITY: 1.59 fps

**GENERAL SPECIFICATIONS**

DIVERSION/BERM PROTECTIVE LINER: GRASS MIXTURE  
 (FESCUE, BERMUDA AND RYE).

FLOW LIMITED BY MAXIMUM ALLOWABLE VELOCITY (5.0 FPS)

STORM TYPE: SCS 6 HOUR

DESIGN STORM: 10 yr - 6 hr

RAINFALL DEPTH: 4.160 inches



P.O. BOX 660548  
 BIRMINGHAM, ALABAMA 35266  
 (205)978-5070

**Cedar Lake Mining, Inc.**  
**Little Spring Creek East Mine**  
**Diversion No. 3**

*10 Year 6 Hour Event*

Jerry W. Williams, P.E.

TASK Engineering Management Inc.  
P.O. Box 660548  
Birmingham, Alabama 35226

Phone: 205-978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

## ***General Information***

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

Storm Type:	SCS 6 HOUR
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.160 inches

***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion No. 3

#1 Chan'l
--------------

***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	19.320	19.320	45.56	3.52

## Structure Detail:

### Structure #1 (Vegetated Channel)

*Diversion No. 3*

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)
10.00	2.0:1	2.0:1	0.6	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:	45.56 cfs		45.56 cfs	
Depth:	1.29 ft	2.29 ft	2.03 ft	3.03 ft
Top Width:	15.16 ft	19.16 ft	18.14 ft	22.14 ft
Velocity:	2.81 fps		1.59 fps	
X-Section Area:	16.21 sq ft		28.61 sq ft	
Hydraulic Radius:	1.028 ft		1.498 ft	
Froude Number:	0.48		0.22	
Roughness Coefficient:	0.0422		0.0957	

***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	1.610	0.106	0.040	0.412	70.000	S	2.26	0.192
	2	17.710	0.057	0.000	0.000	81.000	F	43.30	3.330
	<b>Σ</b>	<b>19.320</b>						<b>45.56</b>	<b>3.522</b>

***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	9.55	28.64	300.00	0.780	0.106
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.106</b>
#1	2	8. Large gullies, diversions, and low flowing streams	6.53	103.24	1,580.00	7.660	0.057
<b>#1</b>	<b>2</b>	<b>Time of Concentration:</b>					<b>0.057</b>

***Subwatershed Muskingum Routing Details:***

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	6.96	80.00	1,150.00	7.910	0.040
<b>#1</b>	<b>1</b>	<b>Muskingum K:</b>					<b>0.040</b>

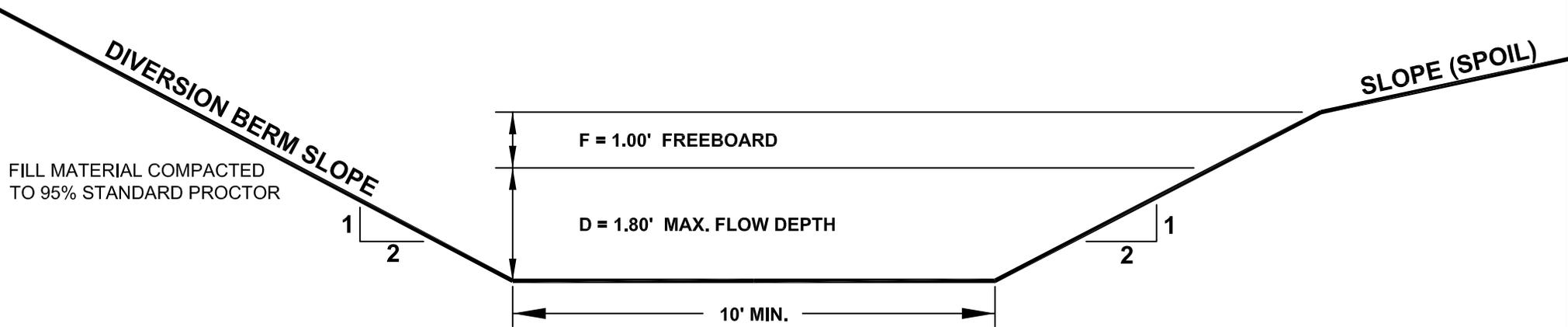
**DETAILED DESIGN PLANS  
DIVERSION DITCH No.4**

Submitted by:

**TASK Engineering Management Inc.**  
P. O. Box 660548  
Birmingham, Alabama 35266  
Telephone: (205) 978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)



DIVERSION DITCH No. 4  
TYPICAL CROSS-SECTION  
TRAPEZOIDAL CONFIGURATION  
GRASS-LINED  
NTS



**SEDCAD OUTPUT PARAMETERS**

DISCHARGE: 23.72 cfs (max)  
 CHANNEL SLOPE: 0.48%  
 LIMITING VELOCITY: 5.0 fps

STABILITY CLASS D

CHANNEL TOP WIDTH (W): 18.21 ft  
 FLOW DEPTH (D): 1.05 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 2.05 ft  
 VELOCITY: 1.86 fps

CAPACITY CLASS B

CHANNEL TOP WIDTH (W): 21.22 ft  
 FLOW DEPTH (D): 1.80 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 2.80 ft  
 VELOCITY: 0.97 fps

**GENERAL SPECIFICATIONS**

DIVERSION/BERM PROTECTIVE LINER: GRASS MIXTURE (FESCUE, BERMUDA AND RYE).

FLOW LIMITED BY MAXIMUM ALLOWABLE VELOCITY (5.0 FPS)

STORM TYPE: SCS 6 HOUR

DESIGN STORM: 10 yr - 6 hr

RAINFALL DEPTH: 4.160 inches



P.O. BOX 660548  
 BIRMINGHAM, ALABAMA 35266  
 (205)978-5070

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**Cedar Lake Mining Inc.**  
**Little Spring Creek East Mine**  
**Diversion No. 4**

*10 Year 6 Hour Event*

Jerry W. Williams, P.E.

TASK Engineering Management Inc.  
P.O. Box 660548  
Birmingham, Alabama 35226

Phone: 205-978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

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## ***General Information***

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

Storm Type:	SCS 6 HOUR
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.160 inches

***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion No. 4

#1 Chan'
-------------

***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	9.700	9.700	23.72	1.82

**Structure Detail:**

Structure #1 (Vegetated Channel)

Diversion No. 4

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)
10.00	2.0:1	2.0:1	0.5	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:	23.72 cfs		23.72 cfs	
Depth:	1.05 ft	2.05 ft	1.80 ft	2.80 ft
Top Width:	14.21 ft	18.21 ft	17.22 ft	21.22 ft
Velocity:	1.86 fps		0.97 fps	
X-Section Area:	12.75 sq ft		24.55 sq ft	
Hydraulic Radius:	0.867 ft		1.359 ft	
Froude Number:	0.35		0.14	
Roughness Coefficient:	0.0504		0.1310	

***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	9.700	0.024	0.000	0.000	81.000	F	23.72	1.823
<b>Σ</b>		<b>9.700</b>						<b>23.72</b>	<b>1.823</b>

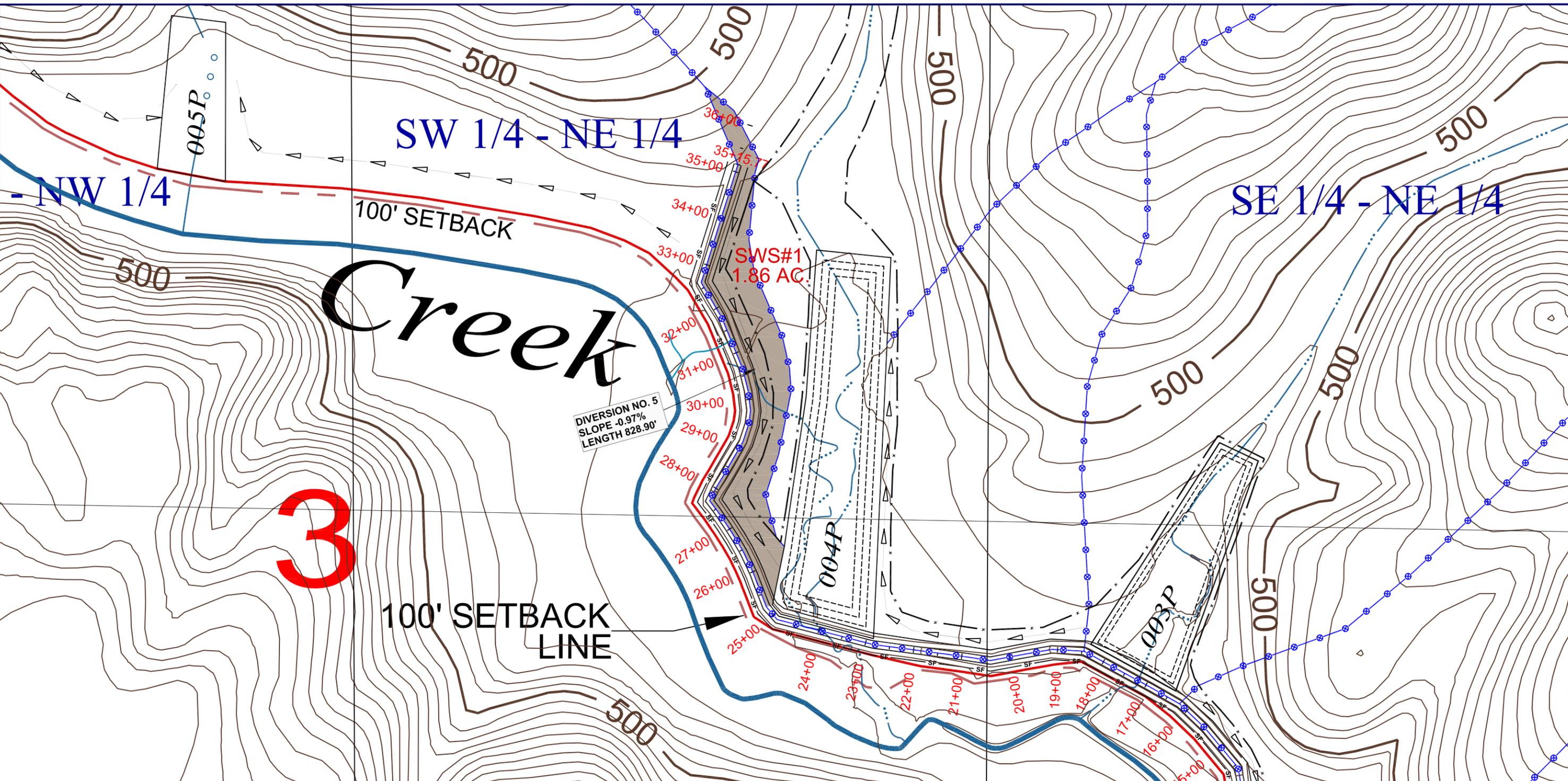
***Subwatershed Time of Concentration Details:***

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	5.40	32.93	610.21	6.960	0.024
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.024</b>

**DETAILED DESIGN PLANS  
DIVERSION DITCH No.5**

Submitted by:

**TASK Engineering Management Inc.**  
P. O. Box 660548  
Birmingham, Alabama 35266  
Telephone: (205) 978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)



P.O. BOX 660548  
 BIRMINGHAM, ALABAMA 35266  
 (205)978-5070  
 email: jw-task@charter.net



**CEDAR LAKE MINING, INC.**  
**LITTLE SPRING CREEK EAST, P-3968**

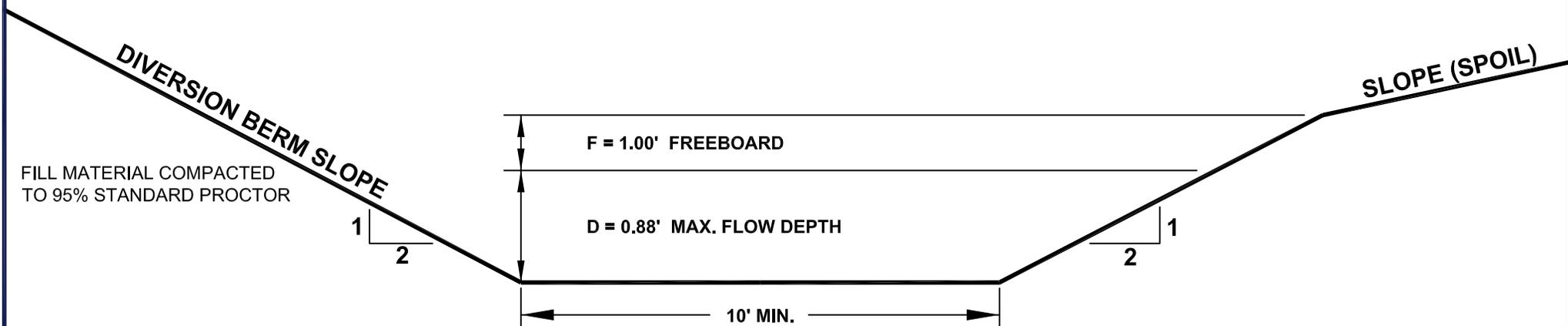
WATERSHED MAP  
 SCALE: 1" = 200'  
 CONTOUR INTERVAL: 5 FT.

**DIVERSION No. 5**

**LEGEND**

- PERMIT BOUNDARY
- PREVIOUSLY SURFACE MINED
- GRADED & BARE, C.N. 81
- MOSTLY FOREST, GOOD COVER, C.N. 70
- DRAINAGE DIVIDE
- ROADSIDE DITCH
- DIVERSION DITCH

DIVERSION DITCH No. 5  
TYPICAL CROSS-SECTION  
TRAPEZOIDAL CONFIGURATION  
GRASS-LINED  
NTS



**SEDCAD OUTPUT PARAMETERS**

DISCHARGE: 4.55 cfs (max)  
 CHANNEL SLOPE: 0.97%  
 LIMITING VELOCITY: 5.0 fps

STABILITY CLASS D

CHANNEL TOP WIDTH (W): 15.69 ft  
 FLOW DEPTH (D): 0.42 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 1.42 ft  
 VELOCITY: 0.99 fps

CAPACITY CLASS B

CHANNEL TOP WIDTH (W): 17.51 ft  
 FLOW DEPTH (D): 0.88 ft  
 FREEBOARD (F): 1.00 ft  
 TOTAL CHANNEL DEPTH (D+F): 1.88 ft  
 VELOCITY: 0.44 fps

**GENERAL SPECIFICATIONS**

DIVERSION/BERM PROTECTIVE LINER: GRASS MIXTURE (FESCUE, BERMUDA AND RYE).

FLOW LIMITED BY MAXIMUM ALLOWABLE VELOCITY (5.0 FPS)

STORM TYPE: SCS 6 HOUR

DESIGN STORM: 10 yr - 6 hr

RAINFALL DEPTH: 4.160 inches



P.O. BOX 660548  
 BIRMINGHAM, ALABAMA 35266  
 (205)978-5070

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**Cedar Lake Mining, Inc.**  
**Little Spring Creek East Mine**  
**Diversion No. 5**

*10 Year 6 Hour Event*

Jerry W. Williams, P.E.

TASK Engineering Management Inc.  
P.O. Box 660548  
Birmingham, Alabama 35226

Phone: 205-978-5070  
Email: [jw-task@charter.net](mailto:jw-task@charter.net)

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***General Information***

***Storm Information:***

Storm Type:	SCS 6 HOUR
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.160 inches

**Structure Networking:**

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	Diversion No. 5

#1 Chan'l
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***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	1.860	1.860	4.55	0.35

## Structure Detail:

### Structure #1 (Vegetated Channel)

*Diversion No. 5*

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)
10.00	2.0:1	2.0:1	1.0	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:	4.55 cfs		4.55 cfs	
Depth:	0.42 ft	1.42 ft	0.88 ft	1.88 ft
Top Width:	11.69 ft	15.69 ft	13.51 ft	17.51 ft
Velocity:	0.99 fps		0.44 fps	
X-Section Area:	4.59 sq ft		10.32 sq ft	
Hydraulic Radius:	0.386 ft		0.741 ft	
Froude Number:	0.28		0.09	
Roughness Coefficient:	0.0782		0.2724	

***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	1.860	0.003	0.000	0.000	81.000	F	4.55	0.350
	<b>Σ</b>	<b>1.860</b>						<b>4.55</b>	<b>0.350</b>

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

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	13.01	16.00	123.00	10.820	0.003
<b>#1</b>	<b>1</b>	<b>Time of Concentration:</b>					<b>0.003</b>