

CARBON OAK, INC.
THUNDER OAKS MINE, P-3976

DETAIL DESIGN FOR PRIMARY ROADS

ATTACHMENT III-B-5 (a)

Submitted by:

TASK Engineering Management Inc.

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March 15, 2013

Alabama Surface Mining Commission

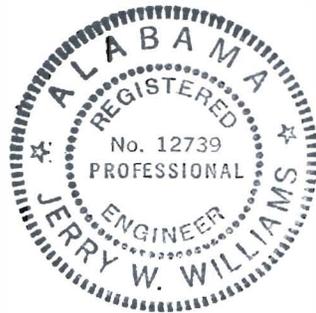
PO Box 2390
Jasper, Alabama 35502-2390

Re: Carbon Oak, Inc.
Thunder Oaks Mine - P-39__

Dear Sir:

I, Jerry W. Williams, a qualified registered professional engineer, hereby certify that the information, cross-sections, data, maps, etc. contained in the designs of Primary Roads PR-01 is true and accurate to the best of my knowledge and belief. I also hereby certify that these designs are in accordance with current, prudent mining engineering practices that meets or exceeds the applicable parts of 880-X-8F-.17, 880-X-10C-.67, and 880-X-10C-.68 pertaining to the construction, use, and/or maintenance of primary roads.

If you have any questions or need additional information, please do not hesitate to call us at (205) 978-5070.



Sincerely,

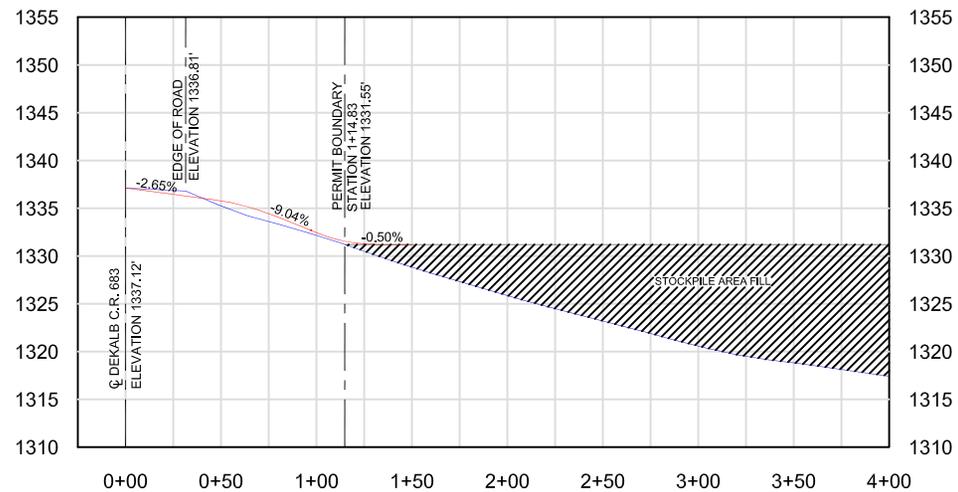
Jerry W. Williams, P.E.
Alabama Reg. No. 12739

INTRODUCTION

There is one (1) primary road proposed for the Carbon Oak, Inc., Thunder Oaks Mine. (See [Attached Primary Road Map](#) for the proposed location of PR-01). Primary Road PR-01 is proposed to be approximately one hundred and fourteen (114) in length and will be constructed to provide access to DeKalb County Road 683 from the proposed office, equipment storage and stockpile area of Increment No. 6. Primary road PR-01 will be constructed to allow for efficient coal haulage and will be surfaced in accordance with these design plans. A profile of the final road configuration has been developed that will result in a stable roadbed with positive drainage. Primary road PR-01 connects to DeKalb County Road 683 and continues up-slope from the proposed surface of the stockpile area at 9.04% and will transition upward to a slope of 2.65% at station 0+45 at elevation 1335.93'. From that point, the road will intersect with the centerline of DeKalb County Road 683 at station 0+00 at elevation 1337.12'. (See [Attached General Plan View - Primary Road PR-01 and Profile - Primary Road PR-01](#)).

TRAFFIC CONTROL SIGNS

1. At the entrance of any primary road that accesses a public road, a speed limit sign, SPEED LIMIT 15 MPH, shall be installed.
2. At the exit of any primary road that intersects into another road, a stop sign shall be installed to stop traffic before exiting that primary road.



PRIMARY ROAD PR-01
 HORZ. SCALE 1" = 100'
 VERT. SCALE 1" = 20'

CARBON OAK, INC.
THUNDER OAKS MINE, P-3976
PRIMARY ROAD PR-01 PROFILE

LEGEND

- EXISTING GROUND PROFILE
- PROPOSED ROAD PROFILE PR-01



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STABILITY ANALYSIS PROCEDURE

No stability analyses were required due to the fact that there are no fill sections proposed greater than eight (8') feet in height.

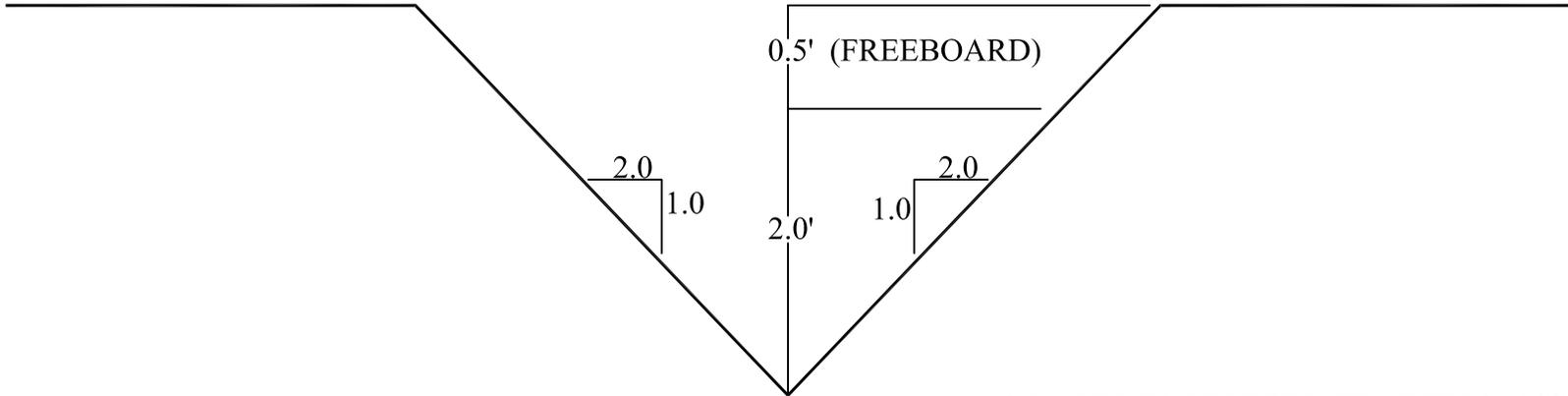
DRAINAGE CONTROL STRUCTURES

DRAINAGE DITCHES

Due to the primary road drainage ditches having small drainage area and an anticipated peak runoff of less than 3.0 C.F.S., one of the three (3) enclosed SEDCAD+CHANNEL DESIGN - TYPICAL ROAD DITCH will be more than adequate to safely pass the anticipated peak runoff from a 10-year, 6-hour precipitation event. Drainage ditch type will be selected and located by existing field conditions. There are three (3) options proposed for channel linings of the roadside ditches within these plans. See the three (3) SEDCAD+CHANNEL DESIGN - TYPICAL ROAD DITCH cross-sections. The following Channel Types (configuration and lining) may be used in areas where the grades are within the range specified as follows:

CHANNEL DESCRIPTION	CHANNEL GRADE
Triangular - Grass lined	0.5% - 10.0%
Triangular - Rip-rap lined	10.0% - 15.0%
Trapezoidal - Grass lined	10.0% - 15.0%

**TYPICAL ROAD DITCH 0.5% - 10.0%
VEGETATED CHANNEL
TRIANGULAR CROSS-SECTION**



Design Discharge: 3.0 cfs
Limiting Velocity: 5.0 fps

CHANNEL TO BE VEGETATED WITH GRASS MIXTURE, PREDOMINATELY BERMUDA AND FESCUE.

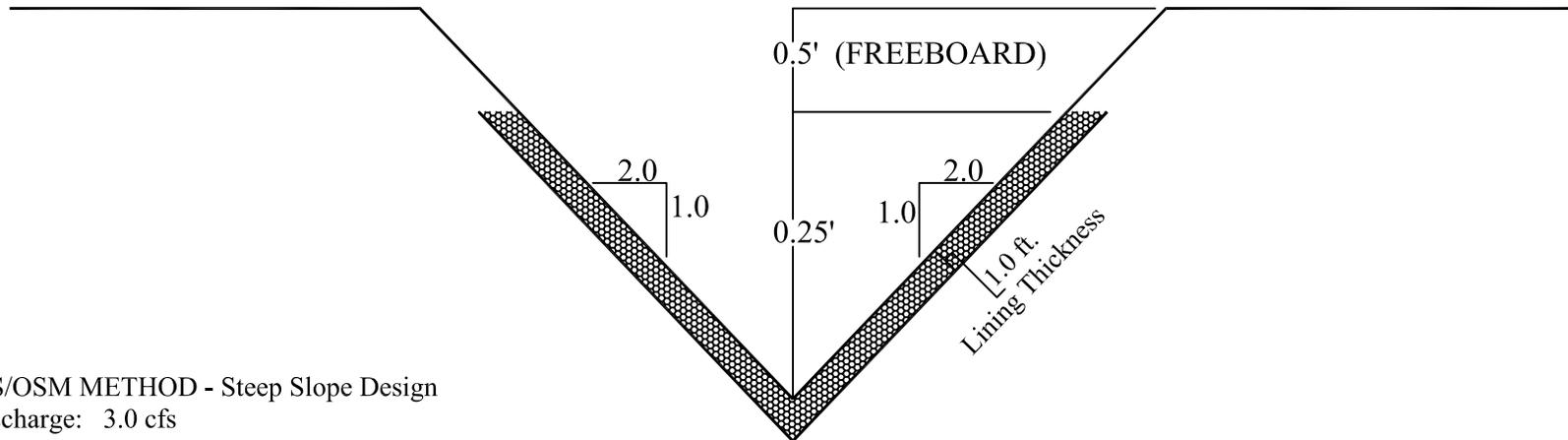
0.5% Slope

10.0% Slope

	0.5% Slope		10.0% Slope	
	STABILITY	CAPACITY	STABILITY	CAPACITY
Depth:	1.22 ft.	2.03 ft.	0.65 ft.	1.01 ft.
Depth w/ Freeboard:	1.72 ft.	2.53 ft.	1.15 ft.	1.51 ft.
Top Width:	4.89 ft.	8.11 ft.	2.59 ft.	4.03 ft.
Top Width w/ Freeboard:	6.89 ft.	10.11 ft.	4.59 ft.	6.03 ft.
VELOCITY:	1.00 fps	0.36 fps	3.57 fps	1.48 fps
X-SECTION AREA:	2.99 sq. ft.	8.23 sq. ft.	0.84 sq. ft.	2.03 sq. ft.
HYDRAULIC RADIUS:	0.546	0.907	0.290	0.451
FROUDE NUMBER:	0.23	0.06	1.11	0.37
ROUGHNESS COEFFICIENT:	0.0700	0.2706	0.0577	0.1873

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TYPICAL ROAD DITCH 10.0% - 15.0%
RIP-RAP CHANNEL
TRIANGULAR CROSS-SECTION



SIMMONS/OSM METHOD - Steep Slope Design
Design Discharge: 3.0 cfs

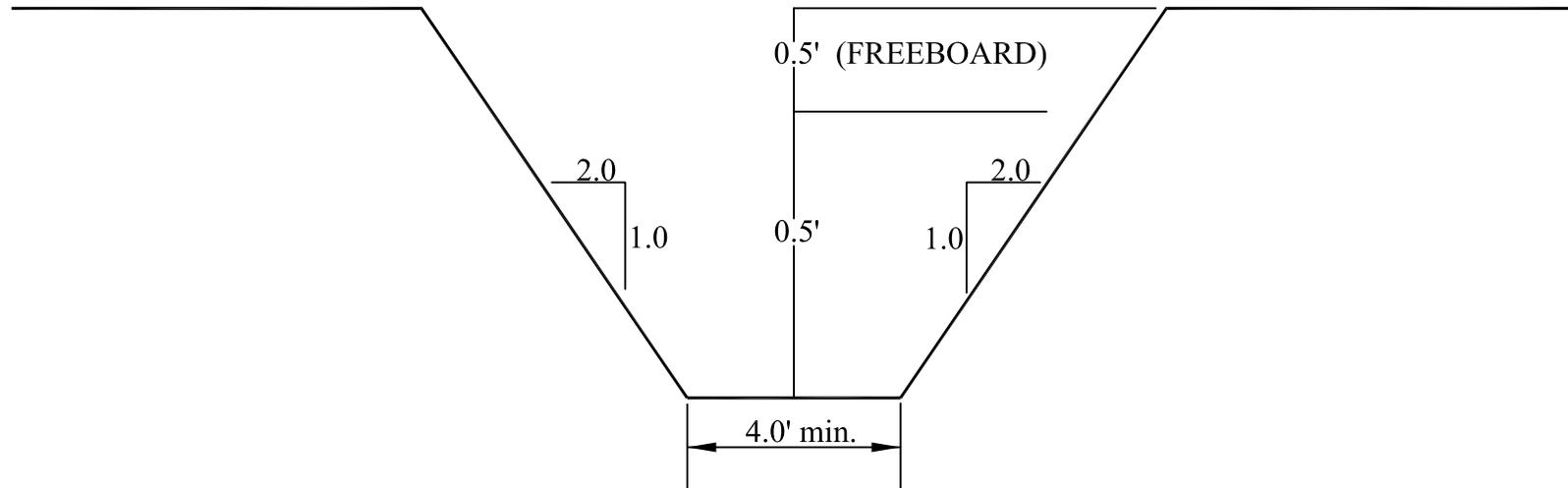
CHANNEL TO BE LINED WITH CLASS 2 RIP-RAP
SANDSTONE OR LIMESTONE

	10.0% Slope	15.0% Slope
Depth:	0.21 ft.	0.16 ft.
Depth w/ Freeboard:	0.71 ft.	0.66 ft.
Top Width:	0.82 ft.	0.64 ft.
Top Width w/ Freeboard:	2.82 ft.	10.11 ft.
VELOCITY:	**	**
X-SECTION AREA:	0.08 sq. ft.	0.05 sq. ft.
HYDRAULIC RADIUS:	0.092	0.072
FROUDE NUMBER:	**	**
MANNINGS N:	**	**
Dmin:	4.00 in.	4.00 in.
D50:	12.00 in	12.00 in.
Dmax:	15.00 in.	15.00 in.



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**TYPICAL ROAD DITCH 10.0% - 15.0%
VEGETATED CHANNEL
TRAPEZOIDALCROSS-SECTION**



Design Discharge: 3.0 cfs
Limiting Velocity: 5.0 fps

CHANNEL TO BE VEGETATED WITH GRASS
TALL FESCUE.

10.0% Slope

15.0% Slope

	10.0% Slope		15.0% Slope	
	STABILITY	CAPACITY	STABILITY	CAPACITY
Depth:	0.26 ft.	0.51 ft.	0.23 ft.	0.45 ft.
Depth w/ Freeboard:	0.76 ft.	1.01 ft.	0.73 ft.	0.95 ft.
Top Width:	5.04 ft.	6.05 ft.	4.92 ft.	5.80 ft.
Top Width w/ Freeboard:	7.04 ft.	8.05 ft.	6.92 ft.	7.80 ft.
VELOCITY:	2.54 fps	1.16 fps	2.92 fps	1.36 fps
X-SECTION AREA:	1.18 sq. ft.	2.58 sq. ft.	1.03 sq. ft.	2.21 sq. ft.
HYDRAULIC RADIUS:	0.228	0.410	0.204	0.367
FROUDE NUMBER:	0.93	0.31	1.13	0.39
ROUGHNESS COEFFICIENT:	0.0688	0.2233	0.0683	0.2180



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When rip-rap channel lining is necessary, the rip-rap shall be Class II rip-rap. All rip-rap will be limestone or sandstone material. When rip-rap liner is necessary, the entire section of each ditch to be lined with rip-rap will be underlain with Mirafi 500X or equivalent filter blanket. The location of all drainage ditches with respect to the primary road will be as shown on the enclosed Typical Drainage Ditch X-Section.

CULVERTS

No culverts were deemed necessary due to the orientation of proposed primary road PR-01. Drainage will naturally flow to the edge of the proposed fill area of the coal stockpile and will be routed to Sediment Basin 001 via sheet flow and/or diversion drains.

POST MINING LAND USE

All primary roads will remain permanently for landowner access.

**DESIGN, CONSTRUCTION, MAINTENANCE, AND
RECLAMATION SPECIFICATIONS FOR PRIMARY ROADS**

1. LOCATION

- A) Primary roads will be located on ridges or high areas or on the most stable available slopes so as to control and prevent erosion, siltation, flooding, and adverse impacts to fish and wildlife, or their habitat and related environmental values, to the extent possible.
- B) No part of any primary road will be located in the channel of an intermittent or perennial stream without written approval from the Regulatory Authority, in accordance with 880-X-10C-.12 through 880-X-10C-.14 and 880-X-10C-.28.
- C) If at all possible, all primary roads will be located upstream of sediment basins to prevent, control and minimize additional contributions of suspended solids to stream flow or runoff outside the permit area, the violation of applicable State or Federal water quality standards, seriously altering the normal flow of water in stream-beds or drainage channels, and damage to all public or private property.
- D) In instances where it is not possible to locate primary roads in the above manner, sediment control will be achieved by the use of silt fences, rock check dams, hay bale berms, etc.

2. DESIGN REQUIREMENTS

- A) Primary roads will be designed by or under the direct supervision of a qualified registered Professional Engineer experienced in the design and construction of roads, in accordance with the ASMC rules and regulations, and current, prudent engineering practices. No Primary Road grade will be steeper than seventeen (17) percent.
- B) All primary roadway embankments will be designed and constructed to be stable under normal construction and operating conditions, with a minimum static safety factor of 1.3.
- C) All primary roads will be designed, constructed, reconstructed and maintained to have adequate drainage control structures to safely pass the peak runoff anticipated from a 10 year, 6 hour precipitation event.

3. CONSTRUCTION REQUIREMENTS

- A) The foundation area of the roadbed will be cleared and grubbed of all organic material and the topsoil will be removed. The disturbed area will be kept to the minimum necessary to accommodate the roadbed and/or associated drainage ditch construction.
- B) The road construction material will be suitable subgrade material, free of sod, roots, stumps, etc., and will not contain rocks which exceed twelve (12) inches in diameter. The road construction material will be placed in layers (12 inch maximum thickness) and compacted to ninety five (95%) percent of the standard proctor density, as set forth in ASTM.
- C) The minimum top width of primary roads will under no circumstance be less than sixteen (16) feet and will be of maximum width necessary to facilitate the largest equipment using the road.
- D) All slopes (cut and fill) will be no steeper than 2 horizontal to 1 vertical, unless specified otherwise in the detailed design.
- E) Roadbeds will be cut into consolidated, non-erodible material or will be surfaced with durable, non-toxic, non-acid forming material. In most instances, durable sandstone overburden material from the mine site will be used for surfacing material. In instances where durable sandstone overburden material from the site is not available or suitable, then durable, non-toxic, non-acid forming material, such as chert, crushed limestone, redrock, and/or crushed sandstone will be hauled in from off site, placed and compacted on the roadbed surface a minimum depth of four (4) inches.
- F) Primary roads will be constructed with grades as shown on the Detailed Primary Road Design Plans. No Primary Road grade will be steeper than seventeen (17) percent.

4. DRAINAGE AND SEDIMENT CONTROL REQUIREMENTS

- A) Primary roads will be constructed, reconstructed, and maintained to have adequate drainage control, using structures such as, but not limited to bridges, culverts, drainage pipes, ditches, cross drains, and ditch relief drains designed to safely pass the peak runoff anticipated from a 10 year, 6 hour precipitation event. All drainage control structures will be designed and constructed in such a manner whereas, to allow a free and operating conditions to prevent, control, and minimize erosion at the inlets and outlets.
- B) Culverts and drainage pipes will be designed and installed to provide adequate support for the load of the largest equipment using the road. For design purposes, "H-20" (live load + impact) was used. All culverts or drainage pipes with diameters of forty-eight (48) inches or less will be covered with a minimum of one (1) foot and the maximum cover will not exceed fifty-seven (57) feet of desirable compacted material. All culverts or drainage pipes with diameters greater than forty-eight (48) inches will be covered with a minimum of two (2) feet and the maximum cover will not exceed forty-one (41) feet of desirable compacted material. See Detailed Primary Road Design Plans for actual depth of material proposed above each culvert or drainage pipe.
- C) Culverts and drainage pipes will be designed and installed to allow adequate freeboard to prevent overtopping of the embankment.
- D) Drainage ditches, cross drains, and ditch relief drains will be constructed and maintained to prevent uncontrolled surface drainage over the road surface and roadway embankment.
- E) Drainage ditches will be constructed with no sustained grades greater than five (5%) percent, unless unavoidable. If ditches must be constructed with grades in excess of five (5%) percent, drainage ditches will be lined as shown on the Primary Road Detailed Design Plans.
- F) Sediment control will be achieved by the use of silt fences, rock check dams, hay bale berms, etc. in strategic locations, to prevent excessive siltation to the receiving streams.
- G) Upon completion of construction of all roads, the side slopes of the roadway cut and fill sections, including all borrow areas formed in the construction, areas used for disposal of excess material, ditches, etc. will be seeded with a mixture of perennial and annual grasses, fertilized and mulched to prevent erosion and ensure restabilization. Grass mixtures will include, but not be limited to, fescue, bermuda, rye grass, browntop millet, clover and sericea.

5. INSPECTION AND MAINTENANCE REQUIREMENTS

- A) Routine inspections and maintenance (such as regrading, resurfacing, maintenance of sediment control structures, spot replanting, and dust control) will be conducted regularly during the life of each road to assure that each road continually meets design and performance standards.
- B) Dust control will be achieved by the periodic application of water, chemical binders and/or other dust suppressants.
- C) Any road damaged by a catastrophic event, such as a flood, or earthquake, will be repaired as soon as it is practicable after the damage has occurred.

6. CERTIFICATION REQUIREMENTS

- A) Primary roads will be designed by or under the direct supervision of a qualified registered Professional Engineer experienced in the design and construction of roads, in accordance with the ASMC rules and regulations, and current, prudent engineering practices. Each design will be certified by a registered Professional Engineer as being designed in accordance with the Regulations of the Alabama Surface Mining Commission, Chapter 880-X-10.
- B) Upon the completion of the construction of each section of the primary road, as set forth in the detailed design plans, the construction will be certified by a registered Professional Engineer, to the Alabama Surface Mining Commission, as being constructed in accordance with the approved detailed design plans.
- C) In the event that a primary road is mined through in the mining process and must be reconstructed, the newly constructed primary road will be reconstructed to the minimum design criteria within the detailed design plans and the construction will be certified by a registered Professional Engineer, to the Alabama Surface Mining Commission, as being constructed in accordance with the approved detailed design plans.

7. REMOVAL AND RECLAMATION REQUIREMENTS

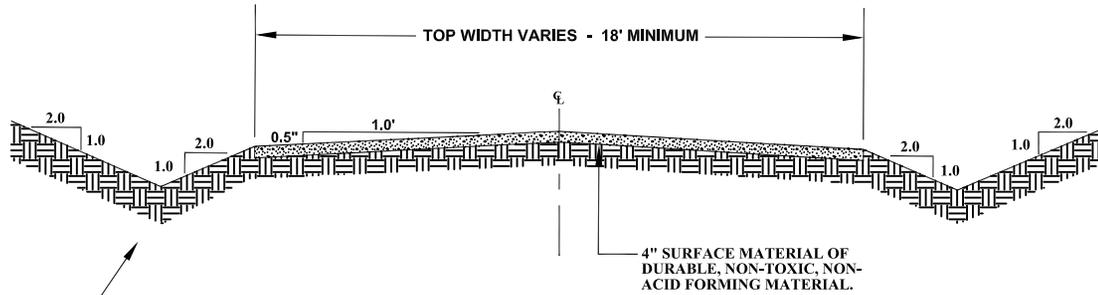
- A) All primary roads which are not mined through and remain after the completion of mining may be left as permanent roads for landowner access, if there is no opposition by said landowner.
- B) All primary roads which are not mined through and remain after the completion of mining which are not to be retained as permanent for landowner access will be removed and reclaimed in accordance with the approved grading and reclamation plans as soon as practicable after it is no longer needed for mining and reclamation purposes. This removal and reclamation will include:
 - 1. Closing the road to traffic;
 - 2. Removing all bridges, culverts, drainage pipes, and other drainage control structures, unless otherwise approved as part of the post mining land use;
 - 3. Removing and/or otherwise disposing of road surfacing materials, that are not compatible with the post mining land use and revegetation requirements, onsite or removed and stored for re-use;
 - 4. Reshaping and regrading cut and fill slopes as necessary to be compatible with the post mining land use and to compliment the natural drainage pattern of the surrounding terrain;
 - 5. Protecting the natural drainage patterns by installing dikes or cross drains as necessary to control surface runoff and erosion;
 - 6. Scarifying or ripping the roadbed, replacing topsoil or substitute material, and revegetating the entire disturbed area in accordance with the approved reclamation plan.

8. TYPICAL ROADBED CONFIGURATION

- A) See attached [Typical Primary Road Drawing](#), proposed road profiles, cross-sections, etc., for an illustration of the typical roadbed configurations.

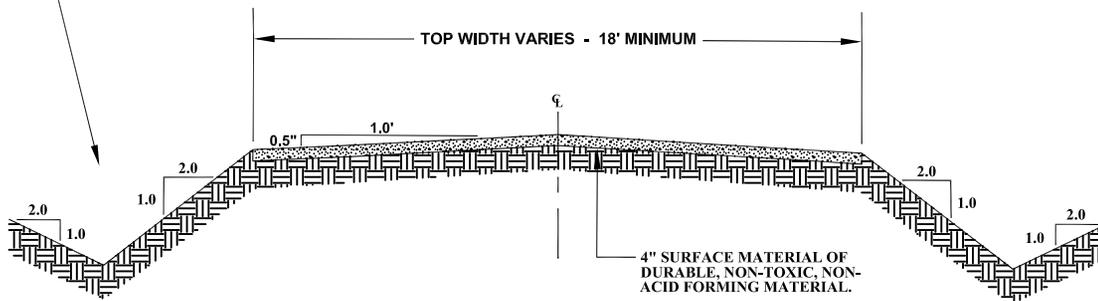
PRIMARY ROAD DETAIL

**PRIMARY ROAD
TYPICAL CUT SECTION**

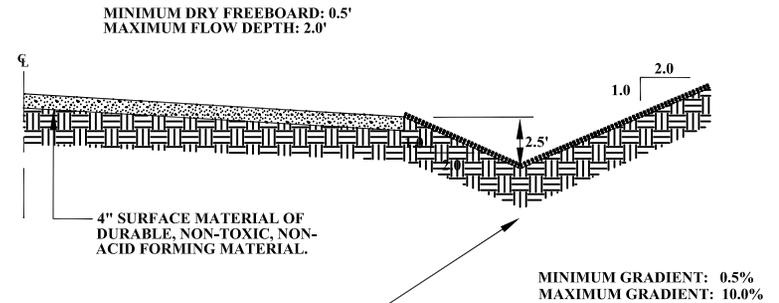


DRAINAGE DITCH TO BE LINED WITH GRASS MIXTURE. SEE SPECIFICATIONS, SEE DETAILED DESIGN PLANS FOR SPECIFIC DESIGN REQUIREMENTS.

**PRIMARY ROAD
TYPICAL FILL SECTION**



**PRIMARY ROAD
TYPICAL DRAINAGE DITCH CROSS-SECTION**



DRAINAGE DITCH TO BE LINED WITH GRASS MIXTURE. SEE SPECIFICATIONS, SEE DETAILED DESIGN PLANS FOR SPECIFIC DESIGN REQUIREMENTS.

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