

SECTION 40

ENVIRONMENTAL PROTECTION

TABLE OF CONTENTS

SECTION	SECTION TITLE	PAGE NUMBER
SECTION 40	ENVIRONMENTAL PROTECTION	1
40.1	Conformance of Surface Mining Activities with Land Use Plans, Policies, and Programs	1
40.2	Coal Recovery and Conservation	1
40.3	Signs and Markers	2
40.4	Stream Buffer Zone Protection.....	3
40.5	Protection of Public Parks and Historic Places.....	3
40.6	Public Roads Protection Plan.....	3
40.7	Utility Installation Disturbance Plan.....	4
40.8	Fugitive Dust Control Plan	5
40.9	Temporary Sealing of Bore Holes, Wells, and Other Underground Openings	5
40.10	Fish and Wildlife Protection Plan.....	5
40.11	Protection of Alluvial Valley Floors.....	6
40.11.1	Farming Activities on Alluvial Valley Floors	7
40.11.2	Material Damage to Waters Supplying Alluvial Valley Floors	7
40.11.3	Alluvial Valley Floor Protection Plan	7
40.12	Certification of Designs and Exhibits.....	7
	Personnel	7
	References	7

SECTION 40

ENVIRONMENTAL PROTECTION

LIST OF TABLES

**TABLE
NUMBER TABLE TITLE**

40.6-1	Burnham Road South Geometric Design Data
40.8-1	Fugitive Dust Control Measures

SECTION 40

ENVIRONMENTAL PROTECTION

LIST OF EXHIBITS

EXHIBIT NUMBER	EXHIBIT TITLE
<u>40.6-1</u>	Burnham South Road Design Cover Sheet and Sheet Index (Sheet 1 of 11)
<u>40.6-1</u>	Burnham South Road Design Site Plan, General Notes, Quantities and Curve Table (Sheet 2 of 11)
<u>40.6-1</u>	Plan and Profile Burnham South Road (Sheet 3 of 11)
<u>40.6-1</u>	Plan and Profile Burnham South Road (Sheet 4 of 11)
<u>40.6-1</u>	Plan and Profile Burnham South Road (Sheet 5 of 11)
<u>40.6-1</u>	Plan and Profile Burnham South Road (Sheet 6 of 11)
<u>40.6-1</u>	Plan and Profile Burnham South Road (Sheet 7 of 11)
<u>40.6-1</u>	Burnham South Road Design Typical Road Sections and Guardrail Table and Details (Sheet 8 of 11)
<u>40.6-1</u>	Burnham South Road Design Super Elevation Table and Details (Sheet 9 of 11)
<u>40.6-1</u>	Burnham South Road South Design Culvert Table & Drainage Details (Sheet 10 of 11)
<u>40.6-1</u>	Burnham South Road South Design Sign & Object Marker Table and Details (Sheet 11 of 11)

SECTION 40

ENVIRONMENTAL PROTECTION

LIST OF APPENDICES

APPENDIX

NUMBER APPENDIX TITLE

[40.A](#) Burnham South Road Supporting Design Data for Drainage Control Structures

SECTION 40

ENVIRONMENTAL PROTECTION

LIST OF REVISIONS DURING PERMIT TERM

REV.		DATE
NUMBER	REVISION DESCRIPTION	APPROVED

SECTION 40 ENVIRONMENTAL PROTECTION

This permit application package (PAP) section describes the consideration that was given to making the proposed surface mining and reclamation activities consistent with surface owner plans and applicable federal, tribal, state, and local land use policies, plans and programs and the measures to be used to maximize the use and conservation of the coal resource. Protection plans for perennial and intermittent streams, public parks and historic places, public roads, utility installations, fish and wildlife resources, and alluvial valley floors (AVF) are described below. This section also describes the measures to be taken to control and prevent air pollution attendant to erosion, and the measures to be taken to temporarily seal exploration holes, boreholes, wells, and other underground openings.

40.1 Conformance of Surface Mining Activities with Land Use Plans, Policies, and Programs

The post-mining land use (PMLU) for the Pinabete Mine Plan permit area (permit area) is grazing and wildlife habitat. These land uses are consistent with the pre-mine lands uses described in Section 10 (Land Use) and conform to the policies and plans of the Navajo Nation, Bureau of Indian Affairs (BIA), and the local Navajo Nation chapters. Further discussion on how the PMLU conform to the land use plans, policies, and programs is presented in Section 30 (Post-Reclamation Land Use).

40.2 Coal Recovery and Conservation

Surface mining operations will be conducted in a manner that maximizes the utilization and conservation of the coal resource, using the best appropriate technology currently available to maintain environmental integrity and minimize the potential for future surface mining operations to re-affect the land, in compliance with 30 CFR 816.59. BNCC will conduct surface mining operations in a manner that develops the coal resource within the permit area in compliance with commitments to the Navajo Nation contained in the BNCC coal lease agreement, described in Section 6 (Land Ownership and Control). BNCC will prepare and provide to the U.S. Department of the Interior - Bureau of Land Management a Resource Recovery and Protection Plan (R2P2) covering all surface mining and reclamation activities in compliance with 43 CFR 3482.1(b). Augering technology or *in-situ* processing activities will not be employed to maximize coal recovery and conservation, as described in Section 20 (Mining Operations).

BNCC maximizes coal recovery in the permit area by optimizing blasting, stripping, coal extraction, training, planning, and reclamation activities. These topics are presented in greater detail in Part 3 (Operations Plan) and Part 5 (Reclamation Plan) of this PAP. Overburden blast holes are managed in a way to minimize potential fracturing of the coal by overburden blasting and subsequent loss of loose coal during stripping. Coal blast holes are managed in a way to optimize fragmentation and reduce scatter. BNCC's equipment operators minimize gouging the coal seam with equipment buckets or blades during stripping. Special care is taken not to strip into the coal seam when stripping near a known fault. Loose coal is generally either pushed onto previously shot coal or wind-rowed to be recovered with mining. Coal

wedges are used to reduce spoil encroachment. Recovery of both coal wedges and fenders is maximized to the extent safely possible. BNCC implements a comprehensive training program for all equipment operators with resource recovery as an integral part of the program. It is during this training where the aforementioned techniques are first presented. This training aids in achieving the goal of maximum economic recovery. Follow-up reviews are continually performed to monitor operator proficiency and to identify further training needs. Planning also plays a major role in maximum economic recovery by attempting to identify all coal that is recoverable and then scheduling it into the production sequence. This planning includes consideration of marginal coal seams (i.e., thin, out-crop, or low-quality seams) and pit match-ups, as well as pit orientation and geometry (width and length). BNCC plans to reclaim to an approximate original contour that maximizes the backfilling of boxcut materials and leaves no excess spoil piles or highwall spoil piles. Detailed reclamation plans are provided in Part 5 (Reclamation Plan) of this PAP.

Although operations are engineered and planned to recover the maximum amount of coal, a small percent of coal is lost as boxcuts, coal wedges, coal ribs, and at the top and bottom of coal seams. Boxcut placement is dependent on such factors as coal extent (crop), coal quality, spatial relationship to the lease boundary, depth of the coal seams, quantity of spoil material rehandle, stockpiles, haulage ramp configuration, and haul ramp alignment. Coal recovery in the boxcuts is in the 80% to 95% range, with the variability due to the difficult stripping and mining conditions inherent to boxcut operations. Boxcutting represents only a small percentage of the total stripping in the permit area. There are a number of operational and safety-related conditions that necessitate limited coal losses. In general, two types of wedge losses occur: a wedge left on upper seams in multiple seam pits as a safety berm and a wedge left on spoil-encroached seams as a spoil barrier. A small percentage of coal may be lost on the top and bottom of the coal seam and as coal ribs due to the geologic condition of the coal and due to the equipment utilized in the stripping and mining sequences.

40.3 Signs and Markers

Signs identifying BNCC and BNCC's mailing address, phone number, the current Office of Surface Mining Reclamation and Enforcement (OSM) permit identification number, and blast warning signs will be posted at all points of public road access into the permit area. The signs shall be made of durable materials and maintained until the release of all bonded lands. Further discussion of information contained on the blast warning signs is provided in Section 20 (Mining Operations).

Soil stockpiles will be clearly marked to identify the type of material (e.g. topdressing or regolith) and the name of the stockpile. For more information on soil stockpiles see Section 22.9 and Section 36.3.1. Stream buffer zones will be marked along the perimeter of the buffer zone areas. All signs will be made of

durable materials, routinely checked, and maintained for the duration of the activity or facility to which they pertain.

Permit markers will be established around the perimeter of the permit area prior to commencing coal mining and reclamation activities. These markers will be maintained until the release of all bonded lands.

40.4 Stream Buffer Zone Protection

The intermittent streams identified within the permit area are Pinabete Arroyo and Cottonwood Arroyo, as described in Section 18 (Water Resources) of this PAP. The identified stream buffer zone area can be found in Exhibit 22.1-1.

In accordance with 30 CFR 816.57(b)(2), BNCC may utilize the exceptions described by the stream buffer zone area regulations to construct crossings to facilitate roads, railroads, conveyors, pipelines, utilities, or similar facilities across Cottonwood Arroyo.

The stream buffer zone will be marked with signs posted at distances measured 100 feet horizontally from the centerline of the arroyos. Signs will be placed along the length of the stream buffer zone for an appropriate distance to adequately delineate its extent.

40.5 Protection of Public Parks and Historic Places

There are no publicly owned parks within or adjacent to the permit area, therefore, there are no publicly owned parks that could be expected to be adversely affected by the surface coal mining operations. Surveys, testing, and mitigation of cultural resources and historic properties, presented in Section 11 (Cultural, Historic, and Archeological Resources), were completed for the permit area. Based on cultural resource work, 32 sites are recommended as eligible or potentially eligible for inclusion on the National Register of Historic Places (NRHP) within the permit area. The plans for preventing and minimizing adverse impacts and the mitigation and treatment measures to be taken to protect the historic places will be developed in accordance with the upcoming Pinabete Permit Programmatic Agreement and in consultation with OSM, the Navajo Nation, and other parties participating in the Section 106 consultation (Section 11, Cultural, Historic, and Archeological Resources).

40.6 Public Roads Protection Plan

BNCC proposes to realign ~~the a 2.8-mile~~ segment of the Burnham Road (BIA 3005 and Navajo Road N5082) through Area 4 South to accomplish maximum recovery of the coal resource. The realigned segment will extend 2.7 miles ~~alignment of the new road will be~~ within the BNCC lease area along the eastern boundary and will ~~reconnected~~ to the existing Burnham Road. The realignment will enhance the safety of the public using the road by relocating the road away from mining activities. Burnham Road,

[including the realigned portion, will remain as a permanent post-mine feature and continue to function as a public road under BIA's jurisdiction.](#) BNCC will follow the procedures described in 30 CFR 761.14 and obtain all the necessary approvals for construction of the road realignment. [BNCC will submit a ROW application for temporary road construction of the Burnham Road segment to BIA as planned mining activities approach the realignment area in approximately 2022. Once the construction is complete, the construction ROW will no longer be required and it will be terminated. OSM is evaluating the effects of the Burnham Road realignment 7in the Four Corners Power Plant and Navajo Mine Environmental Impact Statement.](#)

Preliminary construction plans have been developed by Geomat, Inc. of Farmington, New Mexico for the relocation of the existing Burnham Road. The preliminary road alignment travels northward through Area 4 South and into Area 4 North, where it connects with the previous relocation of the Burnham Road (OSM Project No. NM-0003-F-I-40). The preliminary construction plans are comprised of 11 sheets containing detailed plan and profile designs ([Exhibit 40.6-1](#), sheets 1 through 11). The proposed relocated road is 2.7 miles in length. The road geometrics were designed in general accordance with guidelines in *A Policy on Geometric Design of Highway and Streets* (commonly referred to as the Green Book) (American Association of State Highway and Transportation Officials 1990). The geometric design data are presented in [Table 40.6-1](#).

The road is comprised of two 12-foot lanes with 6-foot shoulders. The cut and fill slopes are 4 horizontal to 1 vertical (4h:1v) except at culvert locations with guardrail where the fill slopes behind the guardrail are 2h:1v to minimize the required amount of fill.

The road alignment intersects six drainages along its length. These drainage crossings are all comprised of crossings with corrugated metal pipes. The hydrology for the drainage basins was evaluated in accordance with the BIA's Navajo Area Roads Drainage Design Guide (1998), utilizing SEDCADTM software. The Federal Highway Administration's (FHWA) HY-8, Version 7.1 software was used to determine the size of culverts ([Appendix 40.A](#)). Either rock-filled gabion baskets or riprap are used for outflow protection at each crossing.

40.7 Utility Installation Disturbance Plan

There are no known oil or gas wells present within the permit area. There is one powerline within the permit boundary supplying residential electricity from Navajo Transmission Utility Authority. The location of the powerline is presented on Exhibit 10.1-2. BNCC will work with utility companies and residences and develop plans to consider any potential utility disturbance. Further information on pre-mine utilities is presented in Section 10 (Land Use). Various groundwater supply wells, used for stock watering, are present within the permit area. The location and description of these wells are presented in Section 18

(Water Resources). As mining progresses through the permit area, these wells will eventually be removed based on the long-term mine sequence provided in Section 20 (Mining Operations). The replacement of pre-mine water use is discussed in Section 41 (Probable Hydrologic Consequences) and Section 35 (Hydrologic Reclamation Plan).

Based on the discussion in Section 10 (Land Use) and Section 18 (Water Resources), there are no other additional utilities within the permit area.

40.8 Fugitive Dust Control Plan

BNCC employs a number of practices to control or minimize fugitive dust emissions from mining activities. These practices include both direct and indirect control measures. A direct control of one activity, such as haul road watering, may result in an indirect control of adjacent areas. The direct and indirect fugitive dust control practices for road use, coal handling, and mining activities for the permit area are described in [Table 40.8-1](#).

40.9 Temporary Sealing of Bore Holes, Wells, and Other Underground Openings

BNCC will take measures to backfill and seal exploration holes, boreholes, wells, and abandoned underground openings to protect public health and safety and the environment as described in Section 22 (Support Facilities) and Section 32 (Temporary Structures and Facilities Removal and Reclamation).

40.10 Fish and Wildlife Protection Plan

BNCC will implement various procedures to minimize or prevent impacts to wildlife during the operation of the Pinabete Mine Plan. These procedures include but are not limited to: 1) limiting the amount of vegetation and topography disturbed to only that necessary to conduct mining; 2) designing facilities, such as transmission lines, to prevent mortality of raptors; and 3) monitoring important wildlife habitat (such as rimrocks, raptor nests, and water sources) and species so appropriate plans to avoid significant undesirable impacts can be developed and implemented. Baseline wildlife species and habitats are presented in Section 16 (Fish and Wildlife). The wildlife species monitoring and mitigation plans are presented in Section 42 (Monitoring, Maintenance, Inspections, and Examinations).

Disturbance to the native vegetation, topography, and important wildlife habitats will be minimized to only those areas necessary to safely conduct mining activities. Buffer zones, which restrict mining and reclamation activities, will be established around active (occupied) raptor nests located on and adjacent to the permit area. These buffer zones will be established through consultation with the Navajo Nation Department of Fish and Wildlife (NNDFW) and/or the U.S. Fish and Wildlife Service (USFWS) on a site- and species-specific basis, as necessary. Mining and reclamation activities will be restricted from commencing within active nest buffer zones to prevent nest abandonment.

Location of important wildlife habitats will be considered when planning the placement of haul roads and ancillary support facilities so they can be avoided as much as practicable. To protect raptors from direct mortality due to electrocution, the design and construction of electric power lines and other transmission facilities on the permit area will meet the guidelines set forth by the Avian Power Line Interaction Committee (2006). Poles, frequently used by raptors, may be left in place or reestablished during reclamation to allow continued use of these sites (or other sites used frequently during the life of the mine).

In addition to limiting the disturbance areas and consideration during facility location and design, BNCC will monitor wildlife species and important wildlife habitats to protect them against adverse impacts relative to the mining operations. If raptors, sensitive species, or their habitats are affected by mining activity, BNCC will consult with NNDFW and/or the USFWS to develop plans to limit impacts. Such plans will be developed on a case-by-case basis. Any work involving the handling of raptors or sensitive species will require special permits and be closely coordinated with the NNDFW and USFWS. Further discussion on BNCC's monitoring and mitigation plans for raptors, sensitive species, and general wildlife is found in Section 42.54.

BNCC will comply with all applicable wildlife protection policies, guidelines, and regulations. Examples of these policies, guidelines, and regulations include but are not limited to: SMCRA, Endangered Species Act (ESA), NNDFW's Ferruginous Hawk Nest Protection Policy, Bald and Golden Eagle Protection Act, and New Mexico Department of Game and Fish's Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation.

Section 16 (Fish and Wildlife) indicates that there are no permanent water bodies capable of supporting year-round fish populations within the permit area. Measures to protect hydrologic features are presented in Section 8 (Compliance with Air and Water Quality Laws and Regulations) and Section 41 (Probable Hydrologic Consequences). BNCC will comply with all applicable Navajo Nation Environmental Protection Agency (NNEPA), U.S. Environmental Protection Agency (USEPA), and U.S. Army Corps of Engineers (USACE) regulatory requirements for compliance with applicable provisions of the Clean Water Act. Copies of the applicable Clean Water Act permits are available for review at the mine site.

40.11 Protection of Alluvial Valley Floors

There are no alluvial valley floors (AVF) present within or adjacent to the permit area. Therefore, this section is not applicable. Discussion on AVF and OSM's negative determination for AVF is provided in Section 19 (Alluvial Valley Floors).

40.11.1 Farming Activities on Alluvial Valley Floors

There is no farming, prime farmland or AVF present within or adjacent to the permit area. Consequently, there will be no interruption, discontinuance, or preclusion of farming on AVF within or adjacent to the permit area. Therefore, this section is not applicable.

40.11.2 Material Damage to Waters Supplying Alluvial Valley Floors

There are no AVF present within or adjacent to the permit area. Consequently, there will be no material damage to the quantity or quality of surface or groundwater supplied to AVF within or adjacent to the permit area. Therefore, this section is not applicable.

40.11.3 Alluvial Valley Floor Protection Plan

There are no AVF present within or adjacent to the permit area. Consequently, the surface coal mining and reclamation operations will not affect the essential hydrologic function of any AVF adjacent to or outside of the permit area. Therefore, this section is not applicable.

40.12 Certification of Designs and Exhibits

All certified exhibits for this permit application package section are available for review upon request at the BNCC offices or the OSM, Western Region, technical office in Denver, Colorado. Certified as-built drawings will be kept on file at the mine site and made available upon request.

Personnel

Persons or organizations responsible for data collection, analysis, and preparation of this permit application package section:

Kent Applegate	GEOMAT, Inc.
Ron Van Valkenburg	Farmington, NM
Vivie Melendez	
Matt Owens	
BHP Navajo Coal Company	

References

American Association of State Highway and Transportation Officials. 1990. A Policy on Geometric Design of Highway and Streets. 2nd Edition. American Association of State Highway and Transportation Officials. Washington, D.C.

Avian Power Line Interaction Committee. 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, Avian Power Line Interaction Committee, and the California Energy Commission. Washington D.C. and Sacramento, California.

Bureau of Indian Affairs. 1998. Navajo Area Roads Drainage Design Guide. Unpublished report. U.S. Department of Interior, Bureau of Indian Affairs, Navajo Region, Division of Transportation. Gallup, New Mexico.

Table 40.6-1 Burnham South Road Geometric Design Data

Average daily traffic	1,200 vehicles
Maximum superelevation	4%
Maximum gradient	4%
Minimum stopping distance	425 ft
Design speed limit	50 mph
Posted speed limit	35 mph
Minimum passing sight distance	1,800 ft

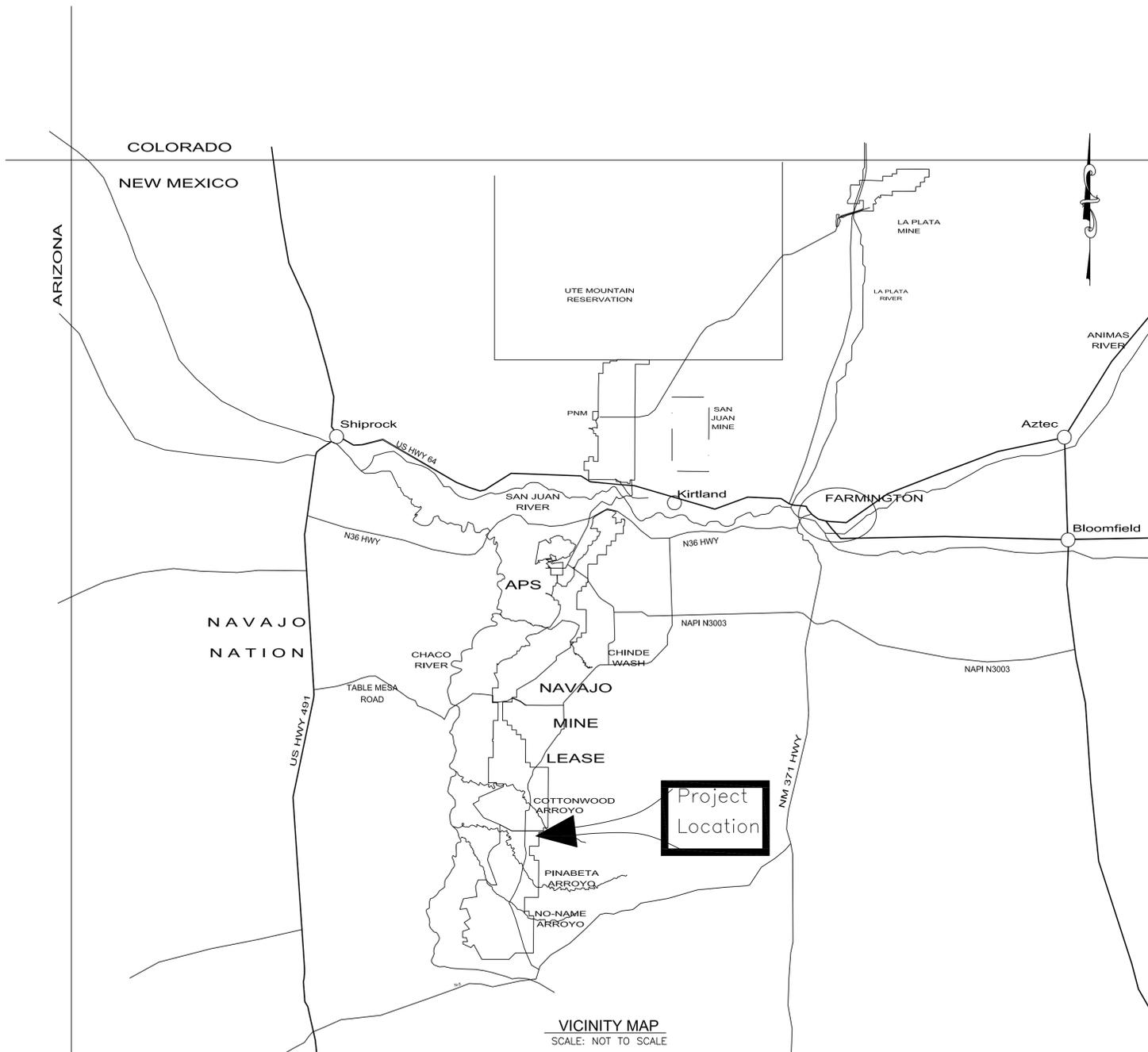
Table 40.8-1 Fugitive Dust Control Measures

	Control measure	Fugitive dust categories		
		Road	Coal	Mining
1	Unpaved haul roads and ancillary roads are watered with water trucks as needed to suppress dust.	D	I	I
2	Heavily traveled portions of unpaved primary roads may be stabilized with chemical suppressants, or watered as needed to suppress dust.	D	-	-
3	Haul roads are graded as necessary during hauling operations.	D	I	I
4	High-use routes of travel in mining areas are graded as necessary.	D	-	I
5	Maximum vehicle speed on paved and unpaved mine roads is limited to 45 mph within the permit area for all mine vehicles.	D	I	I
6	Travel of unauthorized vehicles on other than established roads is restricted.	D	-	I
7	The area of disturbed land is minimized. This includes the number and size of areas to be blasted at any one time.	I	-	D
8	Curtains are installed around the drill stems on overburden drills. Water sprays and/or vacuum dust suppression systems are used to help suppress fugitive dust emissions when drilling overburden material.	-	-	D
9	Regular inspections for coal fires are made throughout the mine area. If a coal fire ignites by spontaneous combustion, that portion of the coal is separated or buried to extinguish the fire where possible.	-	-	D
10	Coal placed at the field coal stockpiles is smoothed and compacted as necessary. Compaction of the coal reduces spontaneous fires and fugitive dust, and allows the coal trucks to operate on the stockpile as needed.	I	-	D
11	Dust control during construction of a soil stockpile (topdressing stockpile) is done as needed by spraying the working area with water from a water truck. Inactive stockpiles will be mulched and/or seeded as described in Section 22.9.	-	-	D
12	Haulage vehicles are inspected regularly for proper function, which includes inspection of the haulage vehicle container body and if necessary, repairs are conducted as soon as practicable.	I	I	I

D Direct impact by control measure on appropriate fugitive dust category.

I Indirect impact by control measure on appropriate fugitive dust category.

BURNHAM SOUTH ROAD DESIGN BIA N5082 PINABETE PERMIT BHP NAVAJO COAL COMPANY EXHIBIT 40.6-1

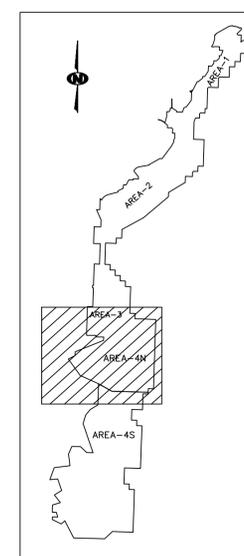


INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	COVER SHEET & SHEET INDEX
2	SITE PLAN, GENERAL NOTES, QUANTITIES AND CURVE TABLE
3	PLAN AND PROFILE: BURNHAM SOUTH ROAD STA 0+00 TO 29+00
4	PLAN AND PROFILE: BURNHAM SOUTH ROAD STA 29+00 TO 59+00
5	PLAN AND PROFILE: BURNHAM SOUTH ROAD STA 59+00 TO 88+00
6	PLAN AND PROFILE: BURNHAM SOUTH ROAD STA 88+00 TO 117+00
7	PLAN AND PROFILE: BURNHAM SOUTH ROAD STA 117+00 TO 143+77
8	TYPICAL ROAD SECTIONS AND GUARDRAIL TABLE & DETAILS
9	SUPER ELEVATION TABLE AND DETAILS
10	CULVERT TABLE AND DRAINAGE DETAILS
11	SIGN & OBJECT MARKER TABLE AND DETAILS

PROJECT LENGTH		
ROAD	LENGTH, ft.	LENGTH, miles
BURNHAM SOUTH ROAD		
BEGINNING STATION 0+00	14,377	2.72
ENDING STATION 143+77		

Design Data	
ADT	1,200 vpd
Max. Super Elevation	4 %
Maximum Gradient	4 %
Min. Stopping Sight Distance	425 ft
Design Speed Limit	50 mph
Posted Speed Limit	35 mph
Minimum Passing Sight Dist.	1800 ft

LEGEND	
	BURNHAM SOUTH ROAD
	EAST HAUL ROAD
	SERVICE ROAD & SERVICE ROAD LOOP
	PAVED ROAD
	DIRT ROAD
	TRAIL
	BUILDING
	FENCE
	IRRIGATION LINE
	CULVERT
	LOW SPOT ELEVATION
	DRAINAGE
	RAILROAD
	TREES
	POWERLINE
	SPOT ELEVATION
	INDEX CONTOUR
	INTERMEDIATE CONTOUR
	218 5422.45 HORIZ. & VERT. CONTROL
	L-30 LEASE CORNER
	LEASE BOUNDARY
	PERMIT BOUNDARY



CERTIFICATION STATEMENT
I, GEORGE A. MADRID, P.E., HEREBY CERTIFY THAT THIS DRAWING WAS REVIEWED BY ME AND THAT THE INFORMATION SHOWN IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.



GEOMAT inc.
915 Malta Avenue • Farmington, NM 87401 • (505) 327-7928

REV. NO.	DATE	REVISION
1	03-15-12	REVISED TITLE & TITLE BLOCK
0	02-07-12	INITIAL PERMIT SUBMITTAL

EXHIBIT 40.6-1



BHP Navajo Coal Company
P.O. Box 1717 Fruitland, New Mexico, 87416 Phone: 505-598-4200 Fax: 505-568-3361

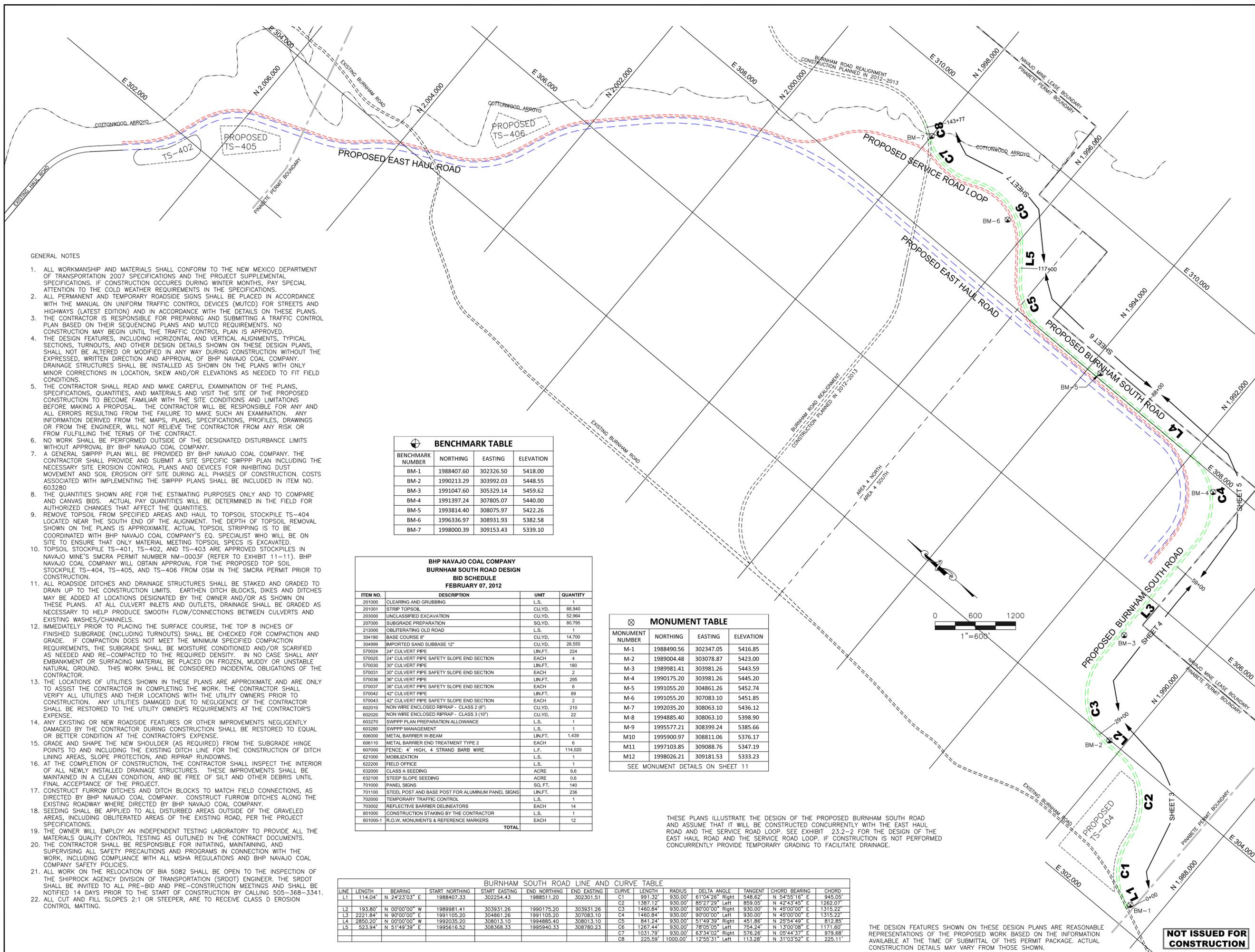
PINABETE PERMIT

BURNHAM SOUTH ROAD DESIGN
COVER SHEET & SHEET INDEX

SHEET: 1 OF 11		
PREPARED BY: BT&PR	DRAWN BY: BT&PR	SCALE: AS SHOWN
APPROVED BY: GM	DATE: 02-07-2012	
GEOMAT PROJECT NO. 112-1434		

THE DESIGN FEATURES SHOWN ON THESE DESIGN PLANS ARE REASONABLE REPRESENTATIONS OF THE PROPOSED WORK BASED ON THE INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL OF THIS PERMIT PACKAGE. ACTUAL CONSTRUCTION DETAILS MAY VARY FROM THOSE SHOWN.

NOT ISSUED FOR CONSTRUCTION



GENERAL NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE NEW MEXICO DEPARTMENT OF TRANSPORTATION 2007 SPECIFICATIONS AND THE PROJECT SUPPLEMENTAL SPECIFICATIONS. IF CONSTRUCTION OCCURS DURING WINTER MONTHS, PAY SPECIAL ATTENTION TO THE COLD WEATHER REQUIREMENTS IN THE SPECIFICATIONS.
2. ALL PERMANENT AND TEMPORARY ROADSIDE SIGNS SHALL BE PLACED IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR STREETS AND HIGHWAYS (LATEST EDITION) AND IN ACCORDANCE WITH THE DETAILS ON THESE PLANS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PREPARING AND SUBMITTING A TRAFFIC CONTROL PLAN BASED ON THEIR SEQUENCING PLANS AND MUTCD REQUIREMENTS. NO CONSTRUCTION MAY BEGIN UNTIL THE TRAFFIC CONTROL PLAN IS APPROVED.
4. THE DESIGN FEATURES, INCLUDING HORIZONTAL AND VERTICAL ALIGNMENTS, TYPICAL SECTIONS, TURNOUTS, AND OTHER DESIGN DETAILS SHOWN ON THESE DESIGN PLANS, SHALL NOT BE ALTERED OR MODIFIED IN ANY WAY DURING CONSTRUCTION WITHOUT THE EXPRESSED, WRITTEN DIRECTION AND APPROVAL OF BHP NAVAJO COAL COMPANY. DRAINAGE STRUCTURES SHALL BE INSTALLED AS SHOWN ON THE PLANS WITH ONLY MINOR CORRECTIONS IN LOCATION, SKEW AND/OR ELEVATIONS AS NEEDED TO FIT FIELD CONDITIONS.
5. THE CONTRACTOR SHALL READ AND MAKE CAREFUL EXAMINATION OF THE PLANS, SPECIFICATIONS, QUANTITIES, AND MATERIALS AND VISIT THE SITE OF THE PROPOSED CONSTRUCTION TO BECOME FAMILIAR WITH THE SITE CONDITIONS AND LIMITATIONS BEFORE MAKING A PROPOSAL. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY AND ALL ERRORS RESULTING FROM THE FAILURE TO MAKE SUCH AN EXAMINATION. ANY INFORMATION DERIVED FROM THE MAPS, PLANS, SPECIFICATIONS, PROFILES, DRAWINGS OR FROM THE ENGINEER, WILL NOT RELIEVE THE CONTRACTOR FROM ANY RISK OR FROM FULFILLING THE TERMS OF THE CONTRACT.
6. NO WORK SHALL BE PERFORMED OUTSIDE OF THE DESIGNATED DISTURBANCE LIMITS WITHOUT APPROVAL BY BHP NAVAJO COAL COMPANY.
7. A GENERAL SWPPP PLAN WILL BE PROVIDED BY BHP NAVAJO COAL COMPANY. THE CONTRACTOR SHALL PROVIDE AND SUBMIT A SITE SPECIFIC SWPPP PLAN INCLUDING THE NECESSARY SITE EROSION CONTROL PLANS AND DEVICES FOR INHIBITING DUST MOVEMENT AND SOIL EROSION OFF SITE DURING ALL PHASES OF CONSTRUCTION. COSTS ASSOCIATED WITH IMPLEMENTING THE SWPPP PLANS SHALL BE INCLUDED IN ITEM NO. 603280.
8. THE QUANTITIES SHOWN ARE FOR THE ESTIMATING PURPOSES ONLY AND TO COMPARE AND CANVAS BIDS. ACTUAL PAY QUANTITIES WILL BE DETERMINED IN THE FIELD FOR AUTHORIZED CHANGES THAT AFFECT THE QUANTITIES.
9. REMOVE TOPSOIL FROM SPECIFIED AREAS AND HAUL TO TOPSOIL STOCKPILE TS-404 LOCATED NEAR THE SOUTH END OF THE ALIGNMENT. THE DEPTH OF TOPSOIL REMOVAL SHOWN ON THE PLANS IS APPROXIMATE. ACTUAL TOPSOIL STRIPPING IS TO BE COORDINATED WITH BHP NAVAJO COAL COMPANY'S EQ. SPECIALIST WHO WILL BE ON SITE TO ENSURE THAT ONLY MATERIAL MEETING TOPSOIL SPECS IS EXCAVATED.
10. TOPSOIL STOCKPILE TS-401, TS-402, AND TS-403 ARE APPROVED STOCKPILES IN NAVAJO MINE'S SMCR PERMIT NUMBER NM-0003F (REFER TO EXHIBIT 11-11). BHP NAVAJO COAL COMPANY WILL OBTAIN APPROVAL FOR THE PROPOSED TOP SOIL STOCKPILE TS-404, TS-405, AND TS-406 FROM OSM IN THE SMCR PERMIT PRIOR TO CONSTRUCTION.
11. ALL ROADSIDE DITCHES AND DRAINAGE STRUCTURES SHALL BE STAKED AND GRADED TO DRAIN UP TO THE CONSTRUCTION LIMITS. EARTHEN DITCH BLOCKS, DIKES AND DITCHES MAY BE ADDED AT LOCATIONS DESIGNATED BY THE OWNER AND/OR AS SHOWN ON THESE PLANS. AT ALL CULVERT INLETS AND OUTLETS, DRAINAGE SHALL BE GRADED AS NECESSARY TO HELP PRODUCE SMOOTH FLOW/CONNECTIONS BETWEEN CULVERTS AND EXISTING WASHES/CHANNELS.
12. IMMEDIATELY PRIOR TO PLACING THE SURFACE COURSE, THE TOP 8 INCHES OF FINISHED SUBGRADE (INCLUDING TURNOUTS) SHALL BE CHECKED FOR COMPACTION AND GRADE. IF COMPACTION DOES NOT MEET THE MINIMUM SPECIFIED COMPACTION REQUIREMENTS, THE SUBGRADE SHALL BE MOISTURE CONDITIONED AND/OR SCARIFIED AS NEEDED AND RE-COMPACTED TO THE REQUIRED DENSITY. IN NO CASE SHALL ANY EMBANKMENT OR SURFACING MATERIAL BE PLACED ON FROZEN, MUDDY OR UNSTABLE NATURAL GROUND. THIS WORK SHALL BE CONSIDERED INCIDENTAL OBLIGATIONS OF THE CONTRACTOR.
13. THE LOCATIONS OF UTILITIES SHOWN IN THESE PLANS ARE APPROXIMATE AND ARE ONLY TO ASSIST THE CONTRACTOR IN COMPLETING THE WORK. THE CONTRACTOR SHALL VERIFY ALL UTILITIES AND THEIR LOCATIONS WITH THE UTILITY OWNERS PRIOR TO CONSTRUCTION. ANY UTILITIES DAMAGED DUE TO NEGLIGENCE OF THE CONTRACTOR SHALL BE RESTORED TO THE UTILITY OWNER'S REQUIREMENTS AT THE CONTRACTOR'S EXPENSE.
14. ANY EXISTING OR NEW ROADSIDE FEATURES OR OTHER IMPROVEMENTS NEGLIGENTLY DAMAGED BY THE CONTRACTOR DURING CONSTRUCTION SHALL BE RESTORED TO EQUAL OR BETTER CONDITION AT THE CONTRACTOR'S EXPENSE.
15. GRADE AND SHAPE THE NEW SHOULDER (AS REQUIRED) FROM THE SUBGRADE HINGE POINTS TO AND INCLUDING THE EXISTING DITCH LINE FOR THE CONSTRUCTION OF DITCH LINING AREAS, SLOPE PROTECTION, AND RIPRAP RUNDOWNS.
16. AT THE COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL INSPECT THE INTERIOR OF ALL NEWLY INSTALLED DRAINAGE STRUCTURES. THESE IMPROVEMENTS SHALL BE MAINTAINED IN A CLEAN CONDITION, AND BE FREE OF SILT AND OTHER DEBRIS UNTIL FINAL ACCEPTANCE OF THE PROJECT.
17. CONSTRUCT FURROW DITCHES AND DITCH BLOCKS TO MATCH FIELD CONNECTIONS, AS DIRECTED BY BHP NAVAJO COAL COMPANY. CONSTRUCT FURROW DITCHES ALONG THE EXISTING ROADWAY WHERE DIRECTED BY BHP NAVAJO COAL COMPANY.
18. SEEDING SHALL BE APPLIED TO ALL DISTURBED AREAS OUTSIDE OF THE GRAVELED AREAS, INCLUDING OBLITERATED AREAS OF THE EXISTING ROAD, PER THE PROJECT SPECIFICATIONS.
19. THE OWNER WILL EMPLOY AN INDEPENDENT TESTING LABORATORY TO PROVIDE ALL THE MATERIALS QUALITY CONTROL TESTING AS OUTLINED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, INCLUDING COMPLIANCE WITH ALL MSHA REGULATIONS AND BHP NAVAJO COAL COMPANY SAFETY POLICIES.
21. ALL WORK ON THE RELOCATION OF BIA 5082 SHALL BE OPEN TO THE INSPECTION OF THE SHIPROCK AGENCY DIVISION OF TRANSPORTATION (SRDOT) ENGINEER. THE SRDOT SHALL BE INVITED TO ALL PRE-BID AND PRE-CONSTRUCTION MEETINGS AND SHALL BE NOTIFIED 14 DAYS PRIOR TO THE START OF CONSTRUCTION BY CALLING 505-368-3341.
22. ALL CUT AND FILL SLOPES 2:1 OR STEEPER, ARE TO RECEIVE CLASS D EROSION CONTROL MATTING.

BENCHMARK TABLE			
BENCHMARK NUMBER	NORTHING	EASTING	ELEVATION
BM-1	1988407.60	302326.50	5418.00
BM-2	1990213.29	303992.03	5448.55
BM-3	1991047.60	305329.14	5459.62
BM-4	1991397.24	307805.07	5440.00
BM-5	1993814.40	308075.97	5422.26
BM-6	1996336.97	308931.93	5382.58
BM-7	1998000.39	309153.43	5339.10

BHP NAVAJO COAL COMPANY BURNHAM SOUTH ROAD DESIGN BID SCHEDULE FEBRUARY 07, 2012			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
201000	CLEARING AND GRUBBING	L.S.	1
201001	STRIP TOPSOIL	CU.YD.	66,940
203000	UNCLASSIFIED EXCAVATION	CU.YD.	52,964
207000	SUBGRADE PREPARATION	SQ.YD.	80,795
213000	OBLITERATING OLD ROAD	L.S.	1
304180	BASE COURSE 6"	CU.YD.	14,700
304999	IMPORTED SAND SUBBASE 12"	CU.YD.	26,555
570024	24" CULVERT PIPE	LN.FT.	224
570025	24" CULVERT PIPE SAFETY SLOPE END SECTION	EACH	4
570030	30" CULVERT PIPE	LN.FT.	180
570031	30" CULVERT PIPE SAFETY SLOPE END SECTION	EACH	2
570036	36" CULVERT PIPE	LN.FT.	295
570037	36" CULVERT PIPE SAFETY SLOPE END SECTION	EACH	6
570042	42" CULVERT PIPE	LN.FT.	89
570043	42" CULVERT PIPE SAFETY SLOPE END SECTION	EACH	2
602010	NON WIRE ENCLOSED RIPRAP - CLASS 2 (6")	CU.YD.	210
602020	NON WIRE ENCLOSED RIPRAP - CLASS 3 (10")	CU.YD.	22
603270	SWPPP PLAN PREPARATION ALLOWANCE	L.S.	1
603280	SWPPP MANAGEMENT	L.S.	1
606000	METAL BARRIER W-BEAM	LN.FT.	1,439
606110	METAL BARRIER END TREATMENT TYPE 2	EACH	6
607000	FENCE: 4' HIGH, 4 STRAND BARB WIRE	LF.	114,020
621000	MOBILIZATION	L.S.	1
622000	FIELD OFFICE	L.S.	1
632000	CLASS A SEEDING	ACRE	9.6
632100	STEEP SLOPE SEEDING	ACRE	0.6
701000	PANEL SIGNS	SQ. FT.	140
701100	STEEL POST AND BASE POST FOR ALUMINUM PANEL SIGNS	LN.FT.	236
702000	TEMPORARY TRAFFIC CONTROL	L.S.	1
703002	REFLECTIVE BARRIER DELINEATORS	EACH	14
801000	CONSTRUCTION STAKING BY THE CONTRACTOR	L.S.	1
801000-1	R.O.W. MONUMENTS & REFERENCE MARKERS	EACH	12
TOTAL			

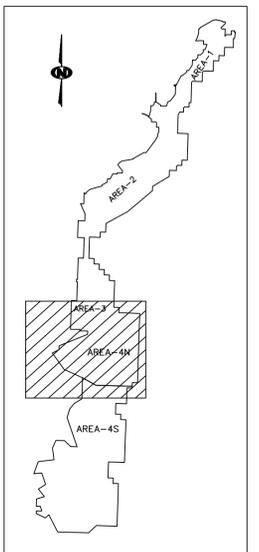
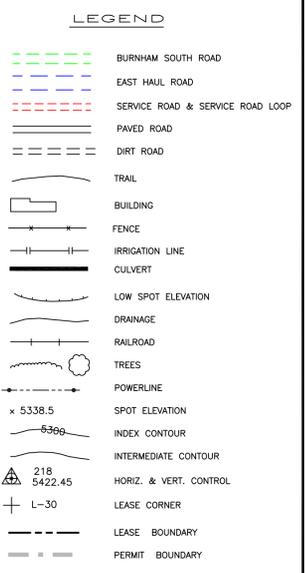
MONUMENT TABLE			
MONUMENT NUMBER	NORTHING	EASTING	ELEVATION
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M-2	1989004.48	303078.87	5423.00
M-3	1989981.41	303981.26	5443.59
M-4	1990175.20	303981.26	5445.20
M-5	1991055.20	304861.26	5452.74
M-6	1991055.20	307083.10	5451.85
M-7	1992035.20	308063.10	5436.12
M-8	1994885.40	308063.10	5398.90
M-9	1995577.21	308399.24	5385.66
M10	1995900.97	308811.06	5376.17
M11	1997103.85	309088.76	5347.19
M12	1998026.21	309181.53	5333.23

SEE MONUMENT DETAILS ON SHEET 11

BURNHAM SOUTH ROAD LINE AND CURVE TABLE													
LINE	LENGTH	BEARING	START NORTHING	START EASTING	END NORTHING	END EASTING	CURVE	LENGTH	RADIUS	DELTA ANGLE	TANGENT	CHORD BEARING	CHORD
L1	114.04'	N 24°23'03" E	1988407.33	302254.43	1988511.20	302301.51	C1	991.32'	930.00'	61°04'26" Right	548.62'	N 54°55'16" E	945.05'
L2	193.80'	N 07°00'00" W	1989981.41	303931.26	1990175.20	303931.26	C2	1387.12'	930.00'	85°27'29" Left	859.05'	N 42°43'45" E	1262.07'
L3	2221.84'	N 90°00'00" E	1991105.20	304861.26	1991105.20	307083.10	C3	1460.84'	930.00'	90°00'00" Right	930.00'	N 45°00'00" E	1315.22'
L4	2850.20'	N 07°00'00" W	1992035.20	308013.10	1994885.40	308013.10	C4	841.24'	930.00'	51°49'39" Right	451.86'	N 25°54'49" E	812.85'
L5	523.94'	N 51°49'39" E	1995616.52	308368.33	1995940.33	308780.23	C5	1267.44'	930.00'	78°05'05" Left	754.24'	N 13°00'08" E	1171.60'
							C6	1031.79'	930.00'	63°34'02" Right	576.26'	N 05°44'37" E	979.88'
							C7	225.59'	1000.00'	12°55'31" Left	113.28'	N 31°03'52" E	225.11'

THESE PLANS ILLUSTRATE THE DESIGN OF THE PROPOSED BURNHAM SOUTH ROAD AND ASSUME THAT IT WILL BE CONSTRUCTED CONCURRENTLY WITH THE EAST HAUL ROAD AND THE SERVICE ROAD LOOP. SEE EXHIBIT 23.2-2 FOR THE DESIGN OF THE EAST HAUL ROAD AND THE SERVICE ROAD LOOP. IF CONSTRUCTION IS NOT PERFORMED CONCURRENTLY PROVIDE TEMPORARY GRADING TO FACILITATE DRAINAGE.

THE DESIGN FEATURES SHOWN ON THESE DESIGN PLANS ARE REASONABLE REPRESENTATIONS OF THE PROPOSED WORK BASED ON THE INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL OF THIS PERMIT PACKAGE. ACTUAL CONSTRUCTION DETAILS MAY VARY FROM THOSE SHOWN.



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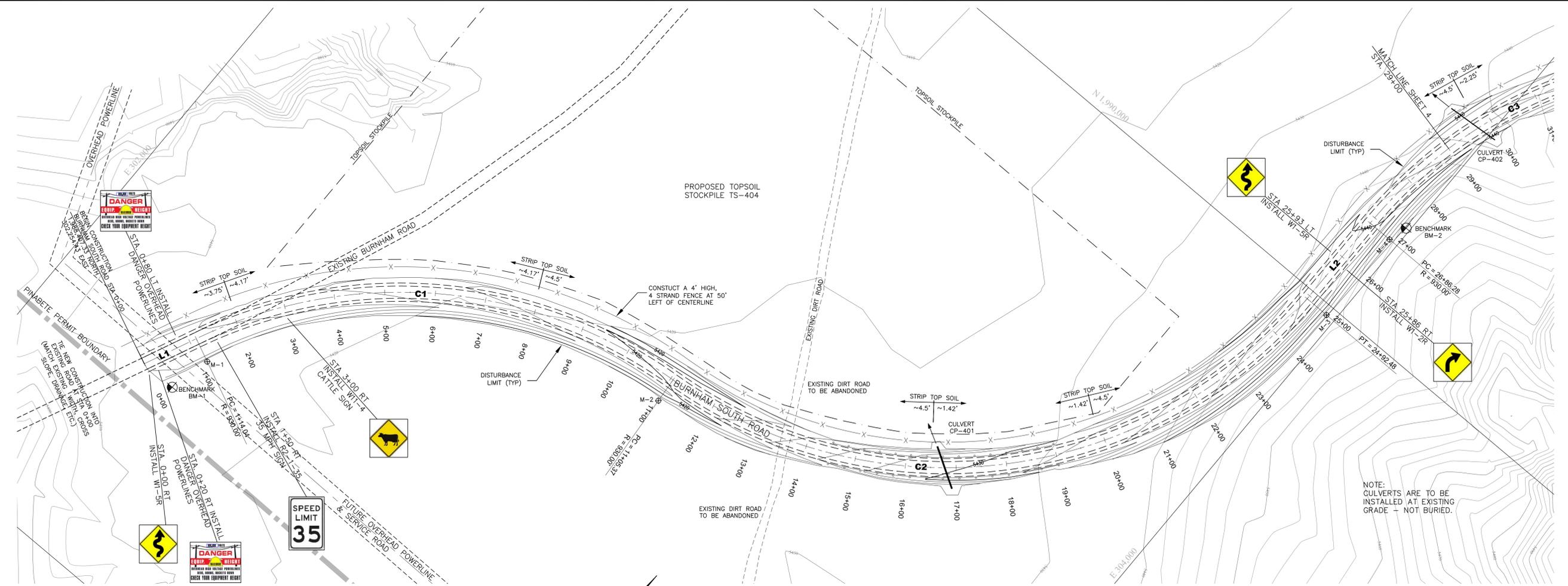
REV. NO.	DATE	DESCRIPTION
1	03-15-12	REVISED TITLE & TITLE BLOCK
0	02-07-12	INITIAL PERMIT SUBMITTAL

EXHIBIT 40.6-1

bhpbilliton
BHP Navajo Coal Company
P.O. Box 1717 • Fruittland, New Mexico, 87416 • Phone: 505-598-4200
Fax: 505-568-3361

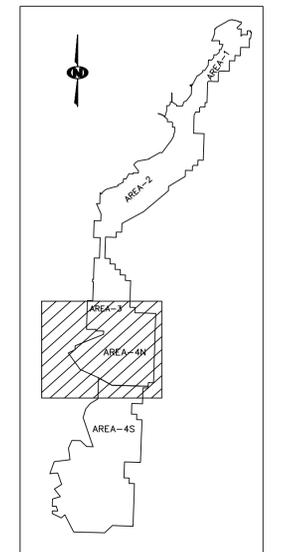
PINABETE PERMIT
BURNHAM SOUTH ROAD DESIGN
SITE PLAN, GENERAL NOTES,
QUANTITIES AND CURVE TABLE
SHEET: 2 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012
GEOMAT PROJECT NO. 112-1434

NOT ISSUED FOR CONSTRUCTION



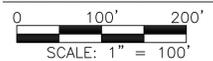
LEGEND

- BURNHAM SOUTH ROAD
- EAST HAUL ROAD
- SERVICE ROAD & SERVICE ROAD LOOP
- PAVED ROAD
- DIRT ROAD
- TRAIL
- BUILDING
- FENCE
- IRRIGATION LINE
- CULVERT
- LOW SPOT ELEVATION
- DRAINAGE
- RAILROAD
- TREES
- POWERLINE
- SPOT ELEVATION
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- 218 5422.45
- L-30
- LEASE CORNER
- LEASE BOUNDARY
- PERMIT BOUNDARY



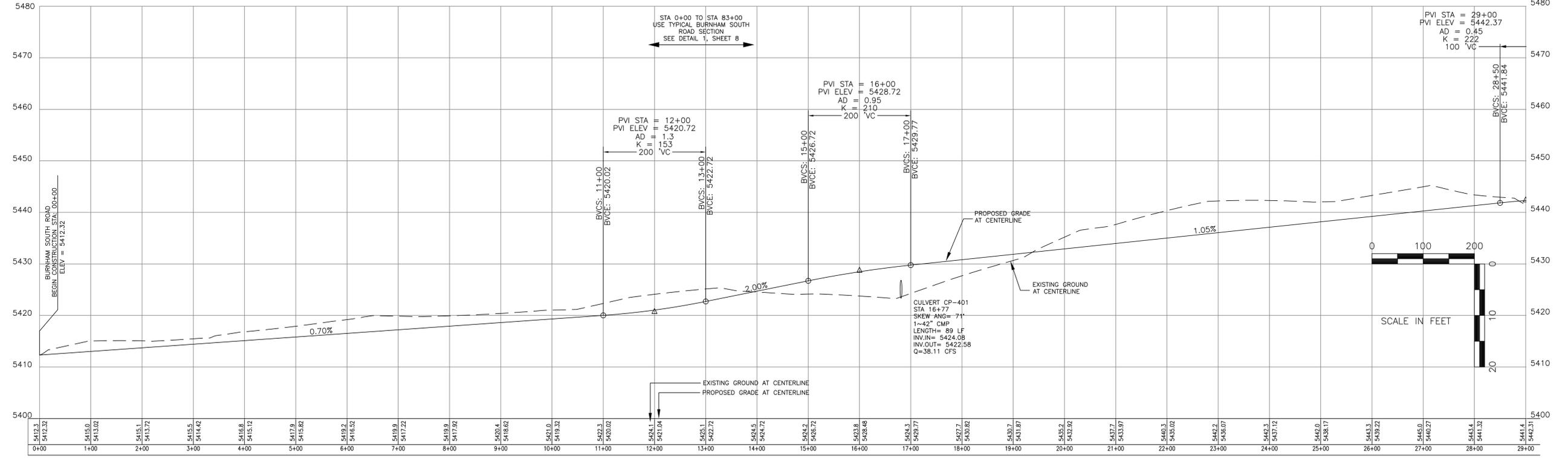
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BURNHAM SOUTH ROAD
STA 0+00 TO 29+00

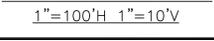


BURNHAM SOUTH ROAD LINE AND CURVE TABLE

LINE	LENGTH	BEARING	START NORTHING	START EASTING	END NORTHING	END EASTING	CURVE	LENGTH	RADIUS	DELTA ANGLE	TANGENT	CHORD BEARING	CHORD
L1	114.04'	N 24°23'03" E	1988407.33	302254.43	1988511.20	302301.51	C1	991.32'	930.00'	61°04'26" Right	548.62'	N 54°55'16" E	945.05'
L2	193.80'	N 00°00'00" W	1989981.41	303931.26	1990175.20	303931.26	C2	1387.12'	930.00'	85°27'29" Left	859.05'	N 42°43'45" E	1262.07'
L3	2221.84'	N 90°00'00" E	1991105.20	304861.26	1991105.20	307083.10	C3	1460.84'	930.00'	90°00'00" Right	930.00'	N 45°00'00" E	1315.22'
L4	2850.20'	N 00°00'00" W	1992035.20	308013.10	1994885.40	308013.10	C4	841.24'	930.00'	51°49'39" Right	451.86'	N 25°54'49" E	812.85'
L5	523.94'	N 51°49'39" E	19955616.52	308368.33	1995940.33	308780.23	C5	1267.44'	930.00'	78°05'05" Left	754.24'	N 13°00'08" E	1171.60'
							C6	1031.79'	930.00'	63°34'02" Right	576.26'	N 05°44'37" E	979.68'
							C7	225.59'	1000.00'	12°55'31" Left	113.28'	N 31°03'52" E	225.11'



BURNHAM SOUTH ROAD
STA 0+00 TO 29+00



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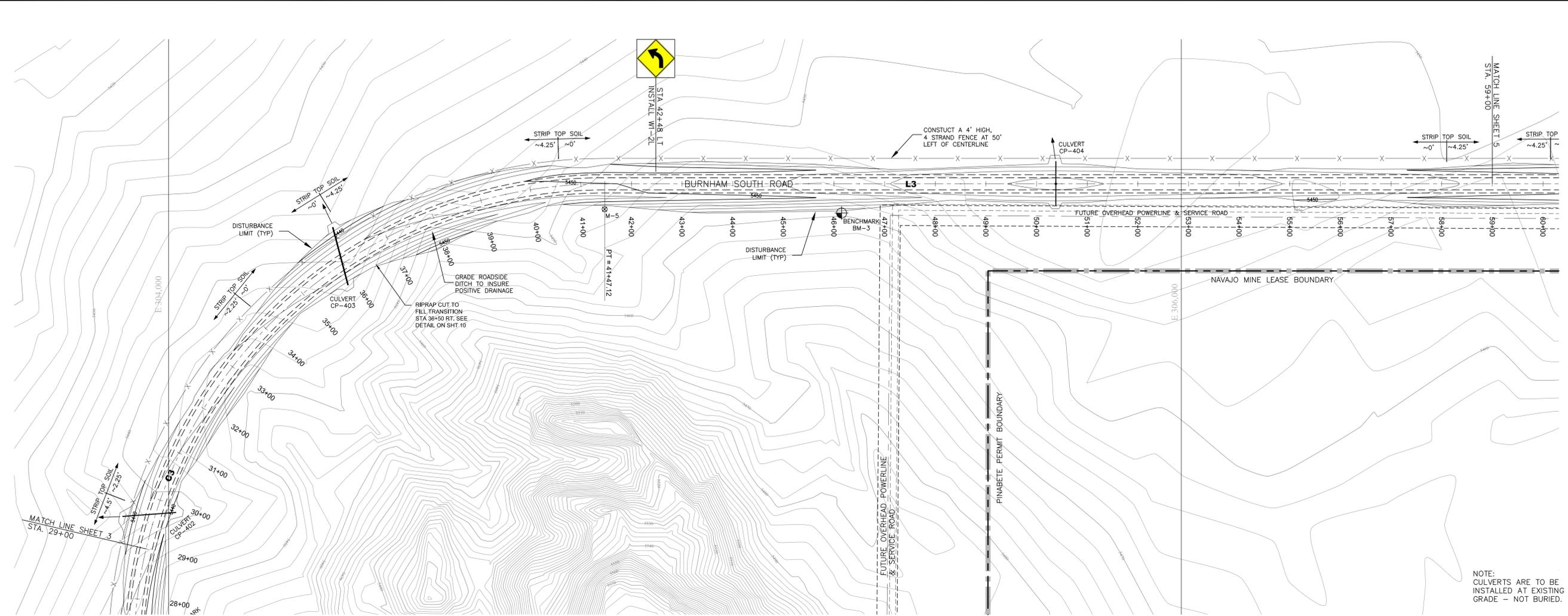


BHP Navajo Coal Company
P.O. Box 1717 • Fruita, New Mexico, 87416 • Phone: 505-598-4200
Fruita, New Mexico, 87416 • Fax: 505-568-3361

PINABETE PERMIT

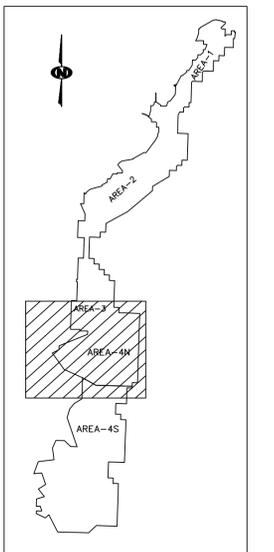
PLAN & PROFILE:
BURNHAM SOUTH ROAD
STA 0+00 TO 29+00

SHEET: 3 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012
GEOMAT PROJECT NO. 112-1434



LEGEND

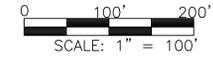
- BURNHAM SOUTH ROAD
- EAST HAUL ROAD
- SERVICE ROAD & SERVICE ROAD LOOP
- PAVED ROAD
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- TRAIL
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- + L-30 LEASE CORNER
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NOTE: CULVERTS ARE TO BE INSTALLED AT EXISTING GRADE - NOT BURIED.

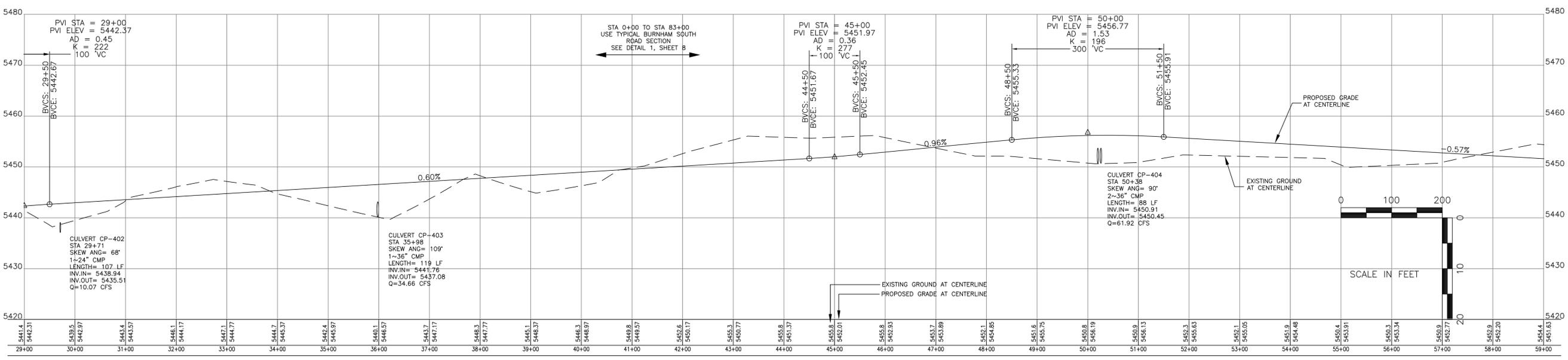
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BURNHAM SOUTH ROAD
STA 29+00 TO 59+00



BURNHAM SOUTH ROAD LINE AND CURVE TABLE

LINE	LENGTH	BEARING	START NORTHING	START EASTING	END NORTHING	END EASTING	CURVE	LENGTH	RADIUS	DELTA ANGLE	TANGENT	CHORD BEARING	CHORD
L1	114.04'	N 24°23'03" E	1988407.33	302254.43	1988511.20	302301.51	C1	991.32'	930.00'	61°04'26" Right	548.62'	N 54°55'16" E	945.05'
L2	193.80'	N 00°00'00" W	1989981.41	303931.26	1990175.20	303931.26	C3	1460.84'	930.00'	90°00'00" Right	930.00'	N 45°00'00" E	1315.22'
L3	2221.84'	N 90°00'00" E	1991105.20	304861.26	1991105.20	307083.10	C4	1460.84'	930.00'	90°00'00" Left	930.00'	N 45°00'00" E	1315.22'
L4	2850.20'	N 00°00'00" W	1992035.20	308013.10	1994885.40	308013.10	C5	847.24'	930.00'	51°49'39" Right	451.86'	N 25°54'49" E	812.85'
L5	523.94'	N 51°49'39" E	1995616.52	308368.33	1995940.33	308780.23	C6	1267.44'	930.00'	78°05'05" Left	754.24'	N 13°00'08" E	1171.60'
							C7	1031.79'	930.00'	63°34'02" Right	576.26'	N 05°44'37" E	979.68'
							C8	225.59'	1000.00'	12°55'31" Left	113.28'	N 31°03'52" E	225.11'



BURNHAM SOUTH ROAD
STA 29+00 TO 59+00

1"=100'H 1"=10'V

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EXHIBIT 40.6-1

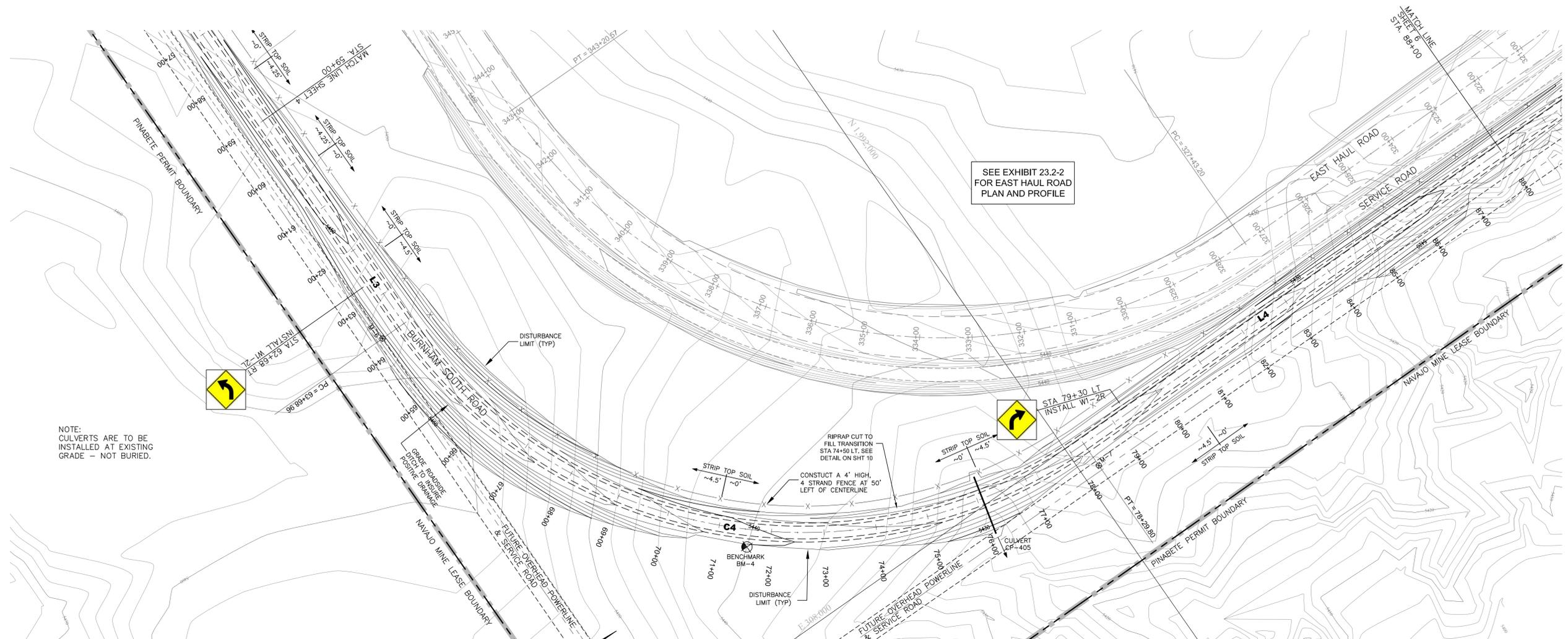


BHP Navajo Coal Company
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Fax: 505-568-3361

PINABETE PERMIT

PLAN & PROFILE:
BURNHAM SOUTH ROAD
STA 29+00 TO 59+00

SHEET: 4 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012
GEOMAT PROJECT NO. 112-1434



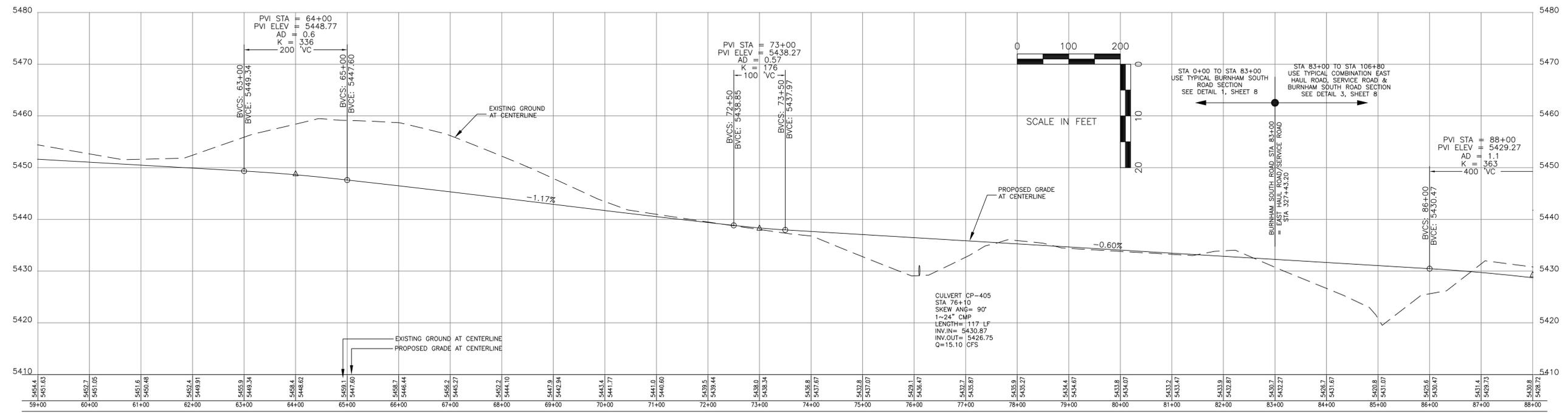
SEE EXHIBIT 23.2-2 FOR EAST HAUL ROAD PLAN AND PROFILE

NOTE: CULVERTS ARE TO BE INSTALLED AT EXISTING GRADE - NOT BURIED.

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BURNHAM SOUTH ROAD
STA 59+00 TO 88+00
SCALE: 1" = 100'

LINE	LENGTH	BEARING	START NORTHING	START EASTING	END NORTHING	END EASTING	CURVE	LENGTH	RADIUS	DELTA ANGLE	TANGENT	CHORD BEARING	CHORD
L1	114.04'	N 24°23'03" E	1988407.33	302254.43	1988511.20	302301.51	C1	991.32'	930.00'	61°04'26" Right	548.62'	N 54°55'16" E	945.03'
L2	193.80'	N 00°00'00" W	1989981.41	303931.26	1990175.20	303931.26	C2	1387.12'	930.00'	85°27'29" Left	859.05'	N 42°43'45" E	1262.07'
L3	2221.84'	N 90°00'00" E	1991105.20	304861.26	1991105.20	307083.10	C3	1460.84'	930.00'	90°00'00" Right	930.00'	N 45°00'00" E	1315.22'
L4	2850.20'	N 00°00'00" W	1992035.20	308013.10	1994885.40	308013.10	C4	841.24'	930.00'	51°49'39" Right	451.86'	N 25°54'49" E	812.85'
L5	523.94'	N 51°49'39" E	1995616.52	308368.33	1995940.33	308780.23	C5	1267.44'	930.00'	78°05'05" Left	754.24'	N 13°00'08" E	1171.60'
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							C7	225.59'	1000.00'	12°55'31" Left	113.28'	N 31°03'52" E	225.11'
							C8						

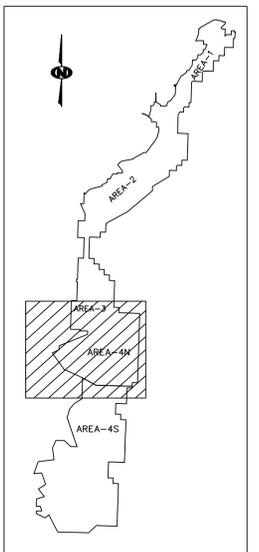


BURNHAM SOUTH ROAD
STA 59+00 TO 88+00
1"=100'H 1"=10'V

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NOT ISSUED FOR CONSTRUCTION

- LEGEND**
- BURNHAM SOUTH ROAD
 - EAST HAUL ROAD
 - SERVICE ROAD & SERVICE ROAD LOOP
 - PAVED ROAD
 - DIRT ROAD
 - - - TRAIL
 - ▭ BUILDING
 - - - FENCE
 - - - IRRIGATION LINE
 - - - CULVERT
 - - - LOW SPOT ELEVATION
 - - - DRAINAGE
 - - - RAILROAD
 - - - TREES
 - - - POWERLINE
 - x 5338.5 SPOT ELEVATION
 - 6566 INDEX CONTOUR
 - - - INTERMEDIATE CONTOUR
 - 218 5422.45 HORIZ. & VERT. CONTROL
 - + L-30 LEASE CORNER
 - - - LEASE BOUNDARY
 - - - PERMIT BOUNDARY



CERTIFICATION STATEMENT
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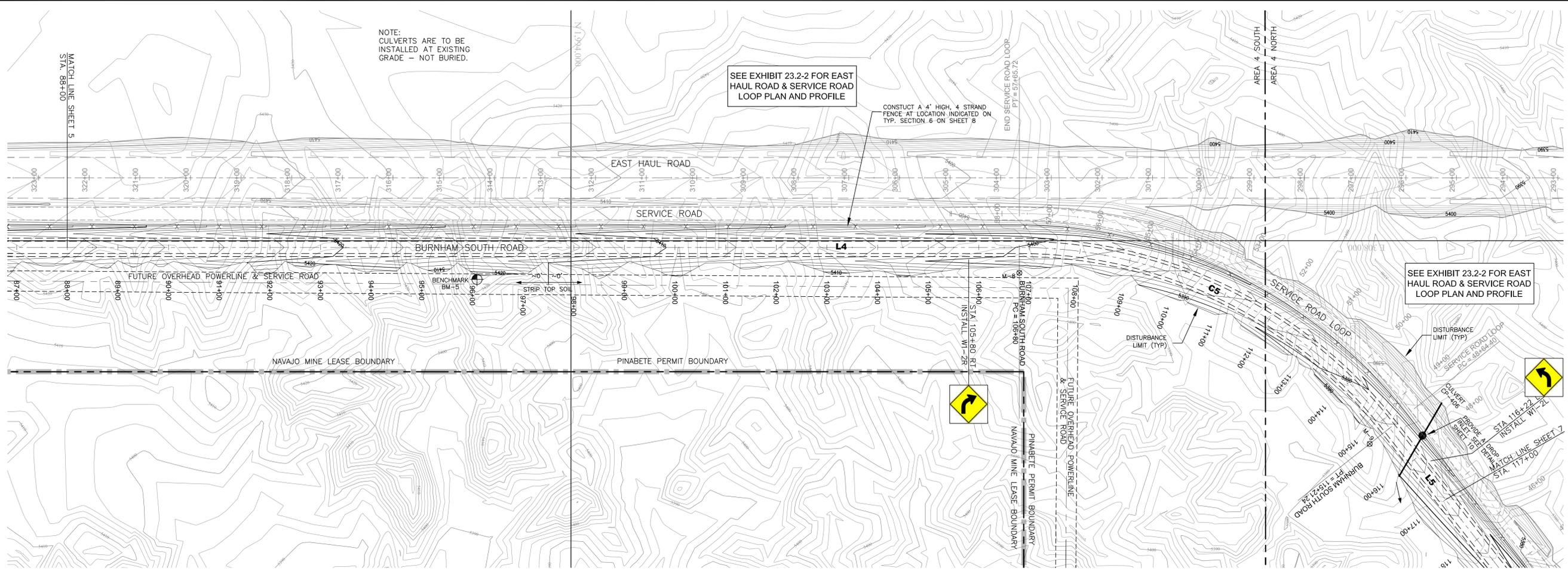
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REV. NO.	DATE	DESCRIPTION
1	03-15-12	REVISED TITLE & TITLE BLOCK
0	02-07-12	INITIAL PERMIT SUBMITTAL

EXHIBIT 40.6-1

bhpbilliton
BHP Navajo Coal Company
P.O. Box 1717 • Fruitland, New Mexico, 87416 • Phone: 505-598-4200
FruitaLand, New Mexico, 87416 • Fax: 505-568-3361

PINABETE PERMIT
PLAN & PROFILE:
BURNHAM SOUTH ROAD
STA 59+00 TO 88+00
SHEET: 5 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012
GEOMAT PROJECT NO. 112-1434



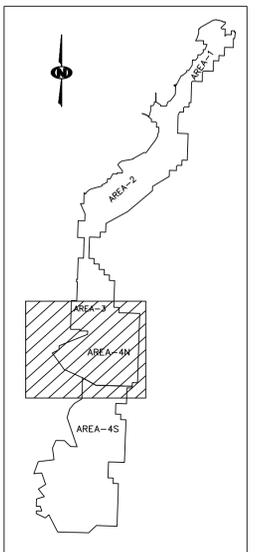
NOTE:
CULVERTS ARE TO BE
INSTALLED AT EXISTING
GRADE - NOT BURIED.

SEE EXHIBIT 23.2-2 FOR EAST
HAUL ROAD & SERVICE ROAD
LOOP PLAN AND PROFILE

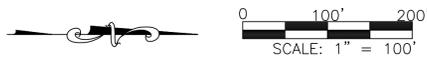
CONSTRUCT A 4' HIGH, 4 STRAND
FENCE AT LOCATION INDICATED ON
TYP. SECTION 6 ON SHEET 8

SEE EXHIBIT 23.2-2 FOR EAST
HAUL ROAD & SERVICE ROAD
LOOP PLAN AND PROFILE

- LEGEND**
- BURNHAM SOUTH ROAD
 - - - EAST HAUL ROAD
 - - - SERVICE ROAD & SERVICE ROAD LOOP
 - ==== PAVED ROAD
 - DIRT ROAD
 - TRAIL
 - ▭ BUILDING
 - FENCE
 - IRRIGATION LINE
 - CULVERT
 - LOW SPOT ELEVATION
 - DRAINAGE
 - RAILROAD
 - TREES
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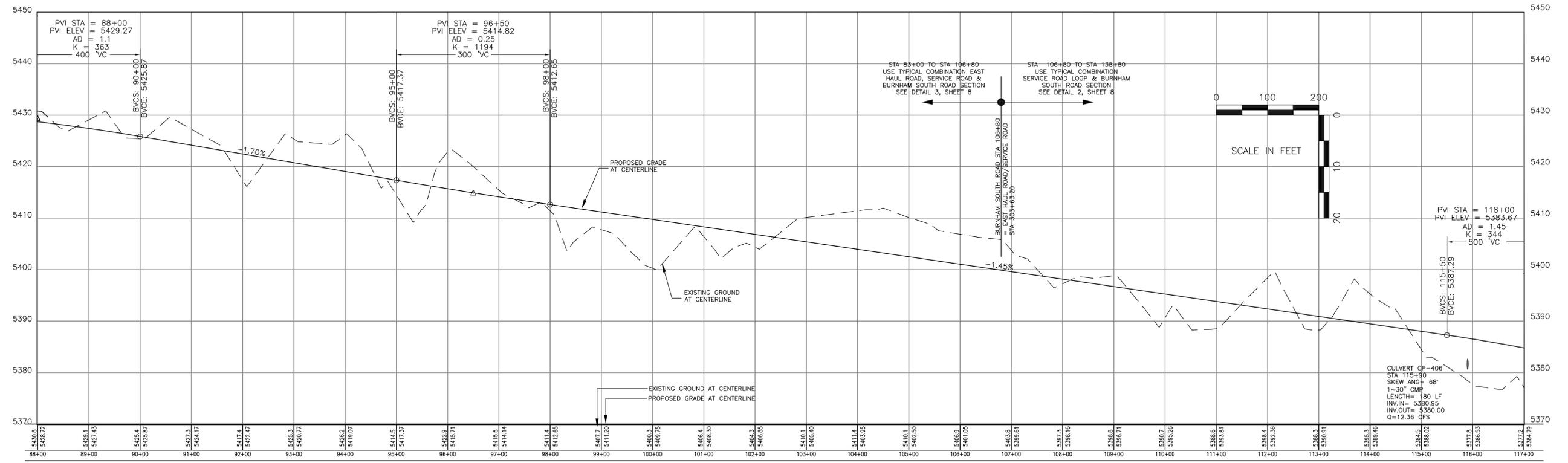


THESE PLANS ILLUSTRATE THE DESIGN OF THE PROPOSED BURNHAM SOUTH ROAD AND ASSUME THAT IT WILL BE CONSTRUCTED CONCURRENTLY WITH THE EAST HAUL ROAD AND THE SERVICE ROAD LOOP. SEE EXHIBIT 23.2-2 FOR THE DESIGN OF THE EAST HAUL ROAD AND THE SERVICE ROAD LOOP. IF CONSTRUCTION IS NOT PERFORMED CONCURRENTLY PROVIDE TEMPORARY GRADING TO FACILITATE DRAINAGE.



BURNHAM SOUTH ROAD
STA 88+00 TO 117+00

LINE	LENGTH	BEARING	START NORTHING	START EASTING	END NORTHING	END EASTING	CURVE	LENGTH	RADIUS	DELTA ANGLE	TANGENT	CHORD BEARING	CHORD
L1	114.04'	N 2°23'03" E	1988407.33	302254.43	1988511.20	302301.51	C1	991.32'	930.00'	61°04'26" Right	548.82'	N 54°55'16" E	845.05'
L2	193.80'	N 0°00'00" W	1989981.41	303931.26	1990175.20	303931.26	C3	1387.12'	930.00'	85°27'29" Left	859.05'	N 42°43'45" E	1262.07'
L3	2221.84'	N 90°00'00" E	1991105.20	304861.26	1991105.20	307883.10	C4	1460.84'	930.00'	90°00'00" Right	930.00'	N 45°00'00" E	1315.22'
L4	2850.20'	N 0°00'00" W	1992035.20	308013.10	1992035.20	308013.10	C5	841.24'	930.00'	51°49'39" Right	451.86'	N 25°54'49" E	812.85'
L5	523.94'	N 51°49'39" E	1995916.52	308368.33	1995940.33	308780.23	C6	1267.44'	930.00'	78°05'05" Left	754.24'	N 13°00'08" E	1171.60'
							C7	1031.79'	930.00'	63°34'02" Right	576.26'	N 05°44'37" E	979.68'
							C8	225.59'	1000.00'	12°55'31" Left	113.28'	N 31°03'52" E	225.11'



BURNHAM SOUTH ROAD
STA 88+00 TO 117+00
1"=100'H 1"=10'V

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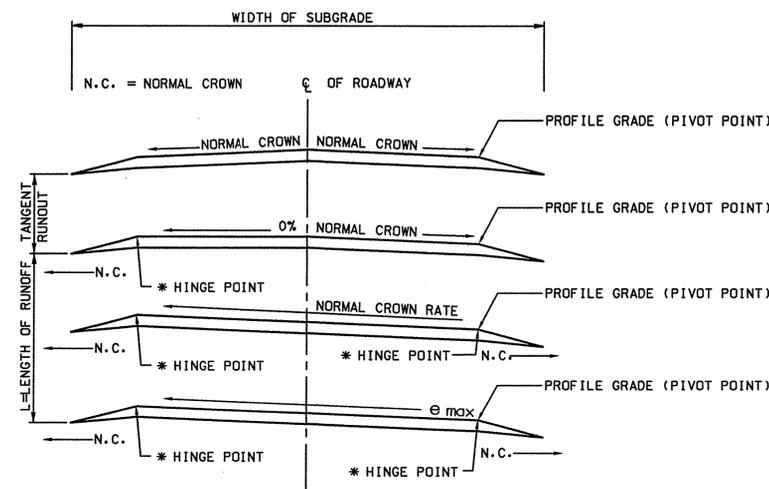
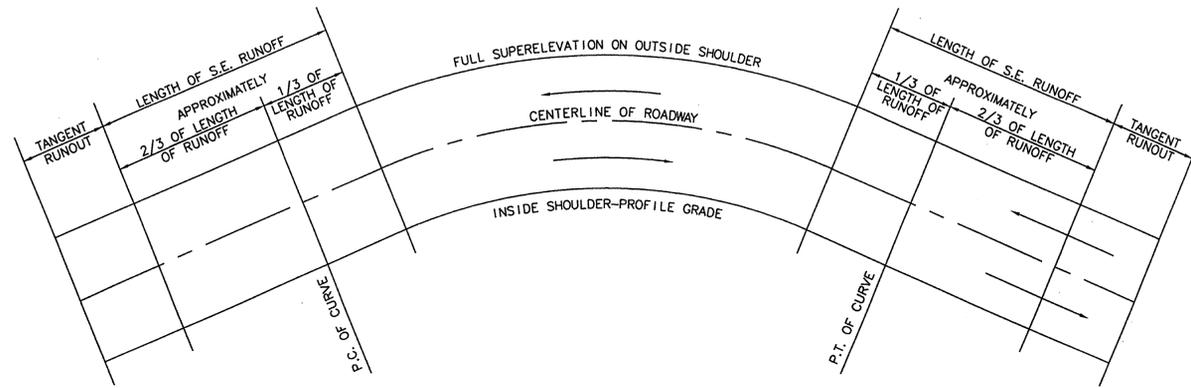
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EXHIBIT 40.6-1

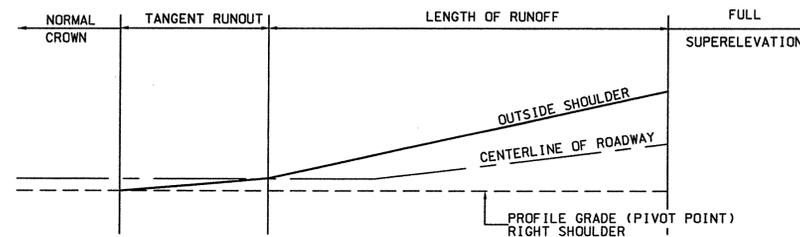


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PINABETE PERMIT
PLAN & PROFILE:
BURNHAM SOUTH ROAD
STA 88+00 TO 117+00
SHEET: 6 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012



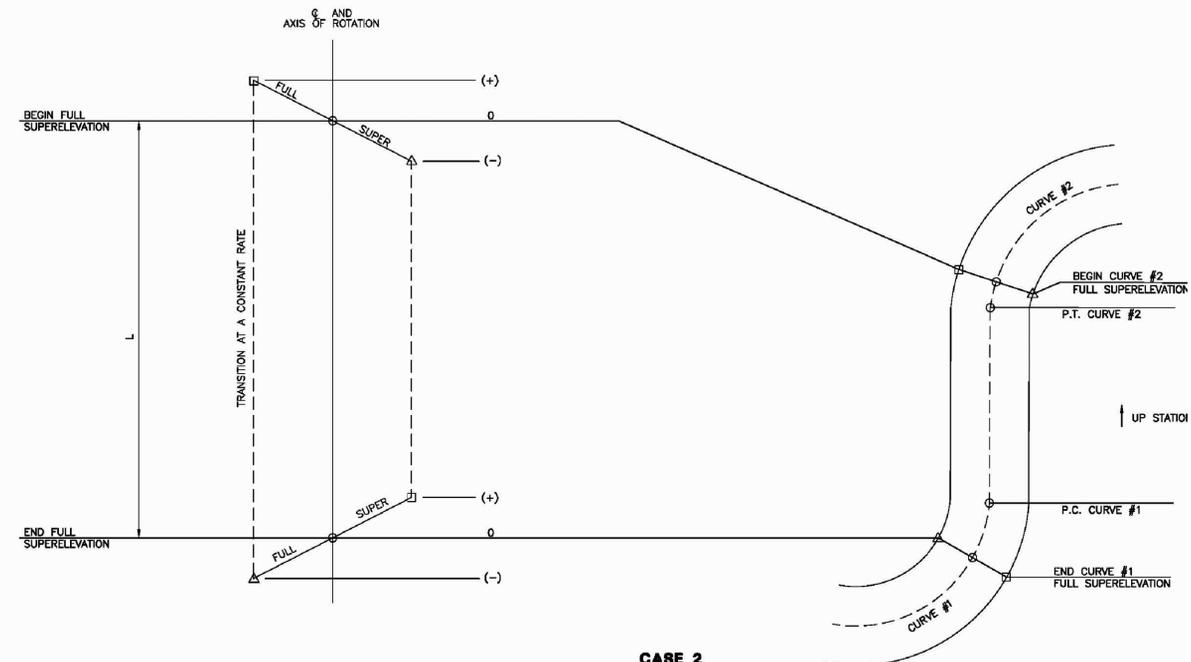
CASE I - TWO-LANE ROADWAY



CASE I - TWO-LANE ROADWAY

(CURVE TO RIGHT; CURVE TO LEFT OPPOSITE HAND)

NOTE: SEE PLANS FOR ACTUAL TYPICAL SECTION



CASE 2
SEE NOTE 1

NOTES

- CASE 2 EXISTS WHEN THE TANGENT LENGTH BETWEEN TWO CURVES IS SHORTER THAN THE TANGENT RUNOUT DISTANCE REQUIRED FOR TRANSITIONING BETWEEN SUPERELEVATIONS FOR THOSE CURVES. WHEN THIS CASE EXISTS, TRANSITION AT A CONSTANT RATE FROM ONE SUPERELEVATION TO THE NEXT AS SHOWN.
- BUILD SUPERELEVATION INTO SUBGRADE AND CARRY THROUGH SHOULDERS
- L IS THE TRANSITION LENGTH BETWEEN FULL SUPERELEVATION AND FULL SUPERELEVATION.

LEGEND

- CENTERLINE/POINT OF ROTATION
- ◻ INSIDE EDGE OF PAVEMENT
- ◻ OUTSIDE EDGE OF PAVEMENT

GENERAL NOTES

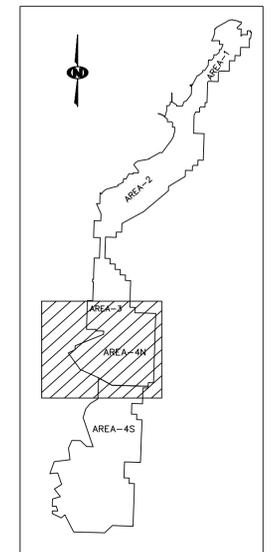
- TANGENT RUNOUT - LENGTH OF HIGHWAY NEEDED TO ACCOMPLISH THE CHANGE IN CROSS SLOPE FROM A NORMAL CROWN SECTION TO A SECTION WITH THE ADVERSE CROWN REMOVED OR VICE VERSA.
- SUPERELEVATION RUNOFF - LENGTH OF HIGHWAY NEEDED TO ACCOMPLISH THE CHANGE IN CROSS SLOPE FROM A SECTION WITH ADVERSE CROWN REMOVED TO A FULLY SUPERELEVATED SECTION OR VICE VERSA.
- THE MAXIMUM SUPERELEVATION RATE TO BE USED IS ESTABLISHED FOR EACH INDIVIDUAL CURVE AND IS SHOWN IN THE PLANS. ANY DEVIATION IN THE PLACEMENT OF S.E. RUNOFF AND TANGENT RUNOUT DUE TO REVERSE CURVES OR COMPOUND CURVES WILL BE SPECIFIED IN THE PLANS.
- CASE I: ON FINISHED GRADE AND SUBGRADE. (TANGENT RUNOUT) PIVOT SUPERELEVATION ABOUT CENTERLINE UNTIL RATE OF SLOPE EQUALS CROWN SLOPE THEN PIVOT ABOUT THE INSIDE SHOULDER.
- THE OUTSIDE DITCH ON SUPERELEVATION SECTIONS IS TO BE MODIFIED WHERE NECESSARY TO PROVIDE DRAINAGE. OTHERWISE THE DITCH SHALL CONFORM TO THE NORMAL DITCH SECTION SHOWN ON THE TYPICAL SECTION.
- CURVES SHALL BE WIDENED ACCORDING TO THE PAVEMENT WIDENING CHART IN THE AASHTO GUIDELINES. THE SUPERELEVATION RATE SHALL BE CONTINUOUS THROUGHOUT THE TOP WIDTH OF SURFACING.
- FOR MULTILANE DIVIDED HIGHWAYS WITH INDEPENDENT PROFILE CURVES AND/OR MEDIANS OVER 60 FT. THE SUPERELEVATION RATE FOR EACH ROADWAY SHALL BE DEVELOPED USING CASE I.
- REFER TO CURRENT AASHTO GUIDELINES FOR APPROPRIATE RUNOFF LENGTH. ADJUSTMENTS NEED TO BE MADE FOR ADDITIONAL LANES AS REQUIRED BY CURRENT AASHTO GUIDELINES.
- TANGENT RUNOUT = $L \left(\frac{NC}{2e - NC} \right)$ ROUND UP TO NEAREST 10 FT.
WHERE NC = NORMAL CROWN
e = MAX. SUPERELEVATION
L = LENGTH OF SUPERELEVATION RUNOFF

BURNHAM SOUTH ROAD - SUPER ELEVATION TABLE									
CURVE NO.	SUPER (e)	BEGIN TRANSITION STATION	ADVERSE CROWN STATION	REVERSE CROWN STATION	BEGIN FULL SUPER STATION	END FULL SUPER STATION	REVERSE CROWN STATION	ADVERSE CROWN STATION	END TRANSITION STATION
C1 (1)	4.00%	00+02.04	00+50.04	00+98.04	01+46.04	11+05.37	-	-	-
C2 (1,2)	4.00%	-	-	-	11+37.37	24+60.48	25+08.48	-	-
C3 (2)	4.00%	-	26+22.28	26+70.28	27+18.28	41+15.12	41+63.12	42+11.12	42+59.12
C4	4.00%	62+56.96	63+04.96	63+52.96	64+00.96	77+97.80	78+45.80	78+93.80	79+41.80
C5	4.00%	105+68.00	106+16.00	106+78.92	107+12.00	114+89.24	115+22.32	115+85.24	116+33.24
C6 (1)	4.00%	119+33.18	119+81.18	120+29.18	120+77.18	132+80.62	-	-	-
C7 (1)	4.00%	-	-	-	133+44.62	143+12.41	-	-	-
C8 (1)	4.00%	-	-	-	143+76.41	-	-	-	-

- COMPOUND CURVE
- REVERSE CURVE

LEGEND

- BURNHAM SOUTH ROAD
- EAST HAIL ROAD
- SERVICE ROAD & SERVICE ROAD LOOP
- PAVED ROAD
- DIRT ROAD
- TRAIL
- BUILDING
- FENCE
- IRRIGATION LINE
- CULVERT
- LOW SPOT ELEVATION
- DRAINAGE
- RAILROAD
- TREES
- POWERLINE
- SPOT ELEVATION
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- HORIZ. & VERT. CONTROL
- LEASE CORNER
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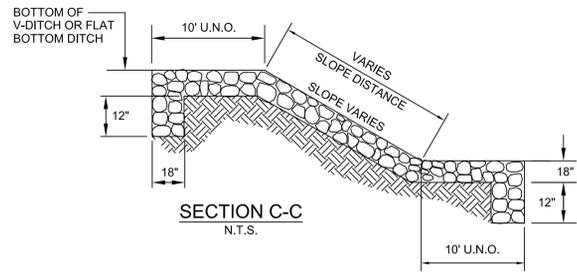
BURNHAM SOUTH ROAD DESIGN SUPER ELEVATION TABLE AND DETAILS

SHEET: 9 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012

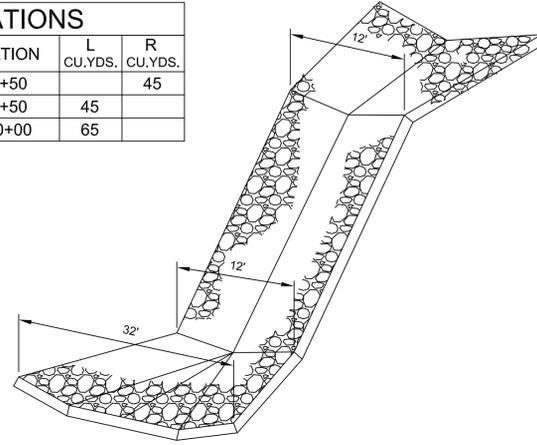
GEOMAT PROJECT NO. 112-1434

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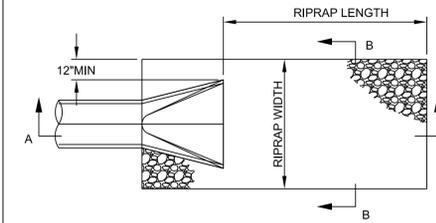
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TRANSITION LOCATIONS				
ROAD	STATION	L CU.YDS.	R	CU.YDS.
BURNHAM SOUTH ROAD	36+50			45
BURNHAM SOUTH ROAD	74+50	45		
BURNHAM SOUTH ROAD	140+00	65		



PERSPECTIVE VIEW
PLACED RIPRAP CUT-TO-FILL TRANSITION



PIPE OUTLET RIPRAP DETAIL
N.T.S.

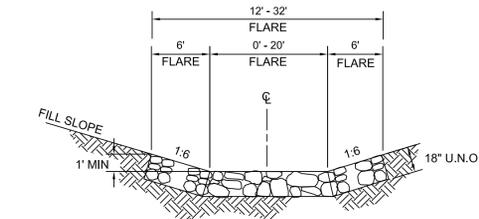
RIPRAP TABLE - CLASS 2 (6")					
Culvert No.	Road Station	Depth (ft)	Length (ft)	Width @ End (ft)	Riprap (cy)
CP-401	16+77	1.7	14	20	17.0
CP-402	29+71	1.7	8	11	5.5
CP-404	50+38	1.8	17	24	26.4
CP-405	76+10	1.7	8	11	5.5

RIPRAP TABLE - CLASS 3 (10")					
Culvert No.	Road Station	Depth (ft)	Length (ft)	Width @ End (ft)	Riprap (cy)
CP-403	35+98	2.0	15	19	21.1

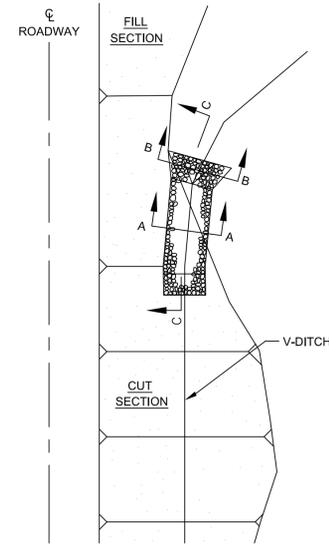
CENTER OF RIPRAP AT OUTLET TO BE 18" MIN BELOW OUTER EDGES. PLACE RIPRAP TO FILL CHANNEL BANKS WHERE POSSIBLE

SECTION B-B
N.T.S.

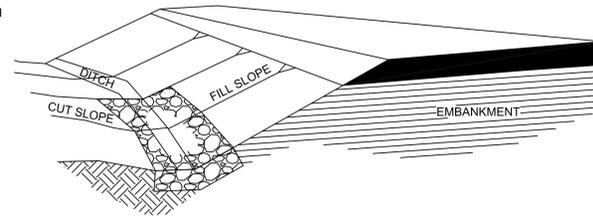
LEGEND	
---	BURNHAM SOUTH ROAD
---	EAST HAUL ROAD
---	SERVICE ROAD & SERVICE ROAD LOOP
---	PAVED ROAD
---	DIRT ROAD
---	TRAIL
---	BUILDING
---	FENCE
---	IRRIGATION LINE
---	CULVERT
---	LOW SPOT ELEVATION
---	DRAINAGE
---	RAILROAD
---	TREES
---	POWERLINE
---	SPOT ELEVATION
---	INDEX CONTOUR
---	INTERMEDIATE CONTOUR
---	HORIZ. & VERT. CONTROL
---	LEASE CORNER
---	LEASE BOUNDARY
---	PERMIT BOUNDARY



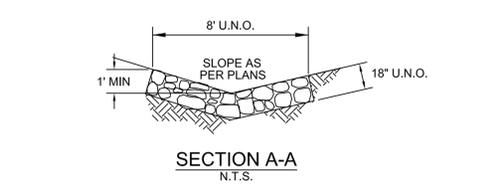
SECTION B-B
N.T.S.



PLAN VIEW
CUT-TO-FILL TRANSITION RIPRAP
N.T.S.



GENERAL OVERALL PERSPECTIVE VIEW
@ TOE OF EMBANKMENT



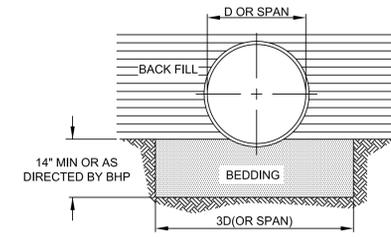
SECTION A-A
N.T.S.

- GENERAL NOTES:**
- RIPRAP TO BE PLACED ON ENGINEERING FABRIC WITH A MINIMUM UNIT WEIGHT OF 8 OZ/SF. STONE SHALL BE 6" MIN. DIMENSION.
 - THE TOP OF THE RIPRAP SHALL BE INSTALLED TO MATCH THE EXISTING OR FINISHED GROUND ELEVATIONS.
 - EXTEND DOWN DRAIN 10' BEYOND END OF FILL SECTION.

RIPRAP CUT-TO-FILL TRANSITION DETAILS
N.T.S.

CULVERT NOTES:

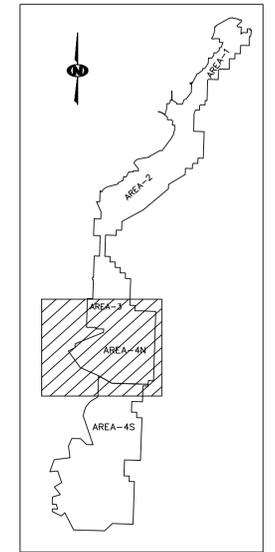
- ALL DRAINAGE STRUCTURES SHALL BE STAKED AND GRADED TO DRAIN TO THE CONSTRUCTION LIMITS. EARTHEN DITCH BLOCKS, DIKES AND DITCHES MAY BE ADDED AT LOCATIONS DESIGNATED BY BHP AND/OR AS SHOWN ON THESE PLANS.
- ALL CULVERTS ARE TO BE INSTALLED AT THE NATURAL FLOWLINE OF THE WASH, ARROYO OR DITCH. IF PLAN ELEVATIONS DO NOT MATCH FIELD CONDITIONS CONTACT BNCC FOR DIRECTION BEFORE PROCEEDINGS.
- SHAPE AND GRADE DRAINAGE CHANNELS AS NECESSARY TO PROVIDE A SMOOTH CONNECTION BETWEEN FORD OR CULVERT AND EXISTING FEATURE.
- ALL CULVERTS ARE TO INCLUDE FLARED END SECTIONS AT BOTH ENDS UNLESS OTHERWISE NOTED. CULVERTS 3'-0" AND SMALLER TO INCLUDE SAFETY SLOPE END SECTIONS AT BOTH ENDS.
- RIPRAP IS TO BE INSTALLED AT THE OUTLET END OF CULVERTS PER THE RIPRAP SCHEDULE IMMEDIATELY UPON COMPLETION OF CULVERT INSTALLATION.
- RIPRAP TO BE NON-ENCLOSED WITH MINIMUM DIMENSION AS SHOWN AND INSTALLED ON ENGINEERING FABRIC WITH A MINIMUM UNIT WEIGHT OF 8 OZ/SF. IN LIEU OF RIPRAP SHOWN CONTRACTOR MAY USE WIRE ENCLOSE RIPRAP CLASS A PER NMDOT STANDARD DRAWING 602-01-1/1.
- COST OF FABRIC, BEDDING AND BACKFILL TO BE CONSIDERED INCIDENTAL TO CULVERT INSTALLATION.



-THIS BEDDING DETAIL TO BE USED FOR ALL CULVERTS. MODIFY PER MANUFACTURE'S RECOMMENDATIONS FOR MULTIPLE BARRELS

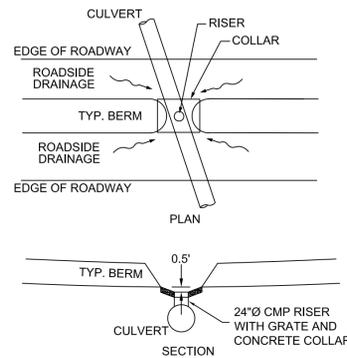
-BEDDING AND BACKFILL TO BE PROVIDED AND PLACED PER THE REQUIREMENTS OF NMDOT 206.

PIPE BEDDING DETAIL
N.T.S.



BURNHAM SOUTH ROAD - CULVERT TABLE

Culvert No.	Station	Area (Ac)	Discharge (cfs)	Size (ft-in)	Corrugation (in)	Corner Radius (in)	Gage	Minimum Cover (in)	Inlet Invert Elev.	Outlet Invert Elev.	Headwater Elev.	Barrels	Skew Angle	Run Length (ft)	Total Length (ft)	Outlet Velocity (ft/sec)	Outflow Protection
CP-401	16+77	23.948	38.11	3'-6"	2-2/3 X 1/2	N/A	16	24	5424.08	5422.58	5426.85	1	71	89	89	7.47	RIPRAP
CP-402	29+71	6.330	10.07	2	2-2/3 X 1/2	N/A	16	24	5438.94	5435.51	5440.59	1	68	107	107	6.84	RIPRAP
CP-403	35+98	21.778	34.66	3	2-2/3 X 1/2	N/A	16	24	5441.76	5437.08	5444.64	1	109	119	119	10.06	RIPRAP
CP-404	50+38	38.909	61.92	3	2-2/3 X 1/2	N/A	16	24	5450.91	5450.45	5453.97	2	90	88	176	6.98	RIPRAP
CP-405	76+10	9.491	15.10	2	2-2/3 X 1/2	N/A	16	24	5430.87	5426.75	5433.09	1	90	117	117	7.82	RIPRAP
CP-406	115+90	9.629	12.36	2'-6"	2-2/3 X 1/2	N/A	16	24	5380.95	5380.00	5382.89	1	68	180	180	5.42	N/A



TYP. DROP INLET
N.T.S.

- DROP INLET NOTES:**
- PROVIDE DROP INLETS AT LOCATIONS SHOWN ON THE PLANS.
 - REMOVE 10'+/- OF THE SAFETY BERM TO INSTALL THE DROP INLET. GRADE AREA TO DRAIN TO GRATE.
 - 24"Ø RISER TO BE FACTORY FABRICATED AS AN INTEGRAL PART OF THE CULVERT.
 - CONCRETE COLLAR TO BE 10' SQUARE x 8" THICK WITH #5 BARS AT 12" E.W. CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI @ 28 DAYS AND SHALL BE PLACED WITH AN AIR CONTENT OF 5-8% AND A MAX. SLUMP OF 4".

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PINABETE PERMIT

BURNHAM SOUTH ROAD DESIGN
CULVERT TABLE & DRAINAGE DETAILS
SHEET: 10 OF 11

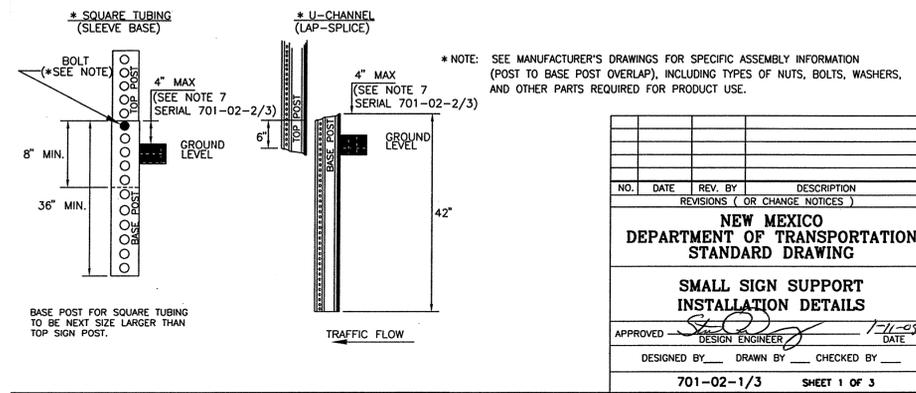
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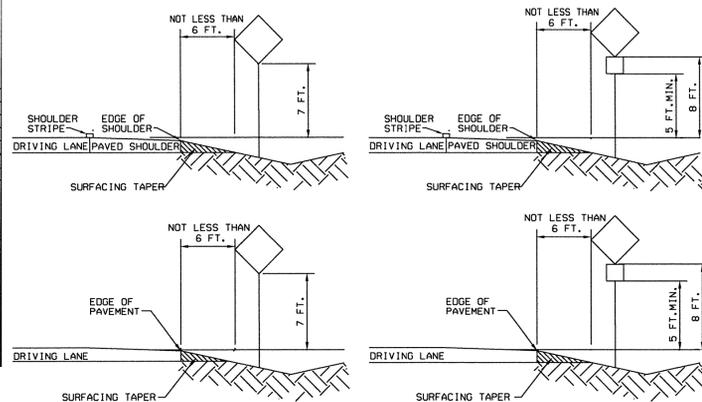
GEOMAT PROJECT NO. 112-1434

BASE POST INSTALLATION DETAILS FOR SQUARE TUBING AND U-CHANNEL SYSTEMS



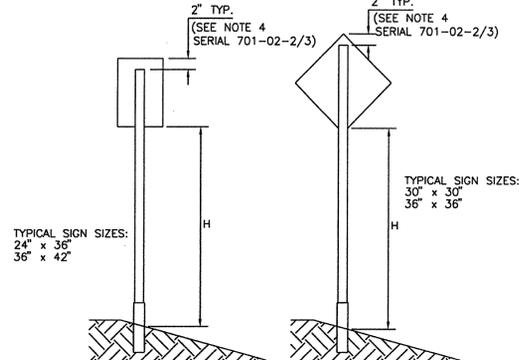
NO.	DATE	REV. BY	DESCRIPTION
REVISIONS (OR CHANGE NOTICES)			
NEW MEXICO DEPARTMENT OF TRANSPORTATION STANDARD DRAWING			
SMALL SIGN SUPPORT INSTALLATION DETAILS			
APPROVED: _____		DATE: _____	
DESIGNED BY: _____		DRAWN BY: _____	
CHECKED BY: _____		DATE: _____	
701-02-1/3 SHEET 1 OF 3			

HORIZONTAL AND VERTICAL CLEARANCES FREEWAYS/EXPRESSWAYS & RURAL AREAS



SINGLE POST INSTALLATION

(TOTAL SIGN AREA NOT TO EXCEED 10.5 SQ. FT.)



SIGN POST REQUIREMENTS

(SEE NOTES 1 & 3, SHT. 701-02-2/3)

POST TYPE	POST SIZE	MAX. CLEAR HEIGHT, H (FT.)	MAX. SIGN AREA (SQ. FT.)
SQUARE TUBING	1.75" X 1.75" (12 GA)	9	5
SQUARE TUBING	1.75" X 1.75" (12 GA)	8	5
SQUARE TUBING	1.75" X 1.75" (12 GA)	7	7
SQUARE TUBING	2.00" X 2.00" (12 GA)	8	9
SQUARE TUBING	2.00" X 2.00" (12 GA)	7	10
SQUARE TUBING	2.25" X 2.25" (12 GA)	9	10.5
SQUARE TUBING	2.25" X 2.25" (12 GA)	10	10.5

SUMMARY OF QUANTITIES - PERMANENT SIGNING

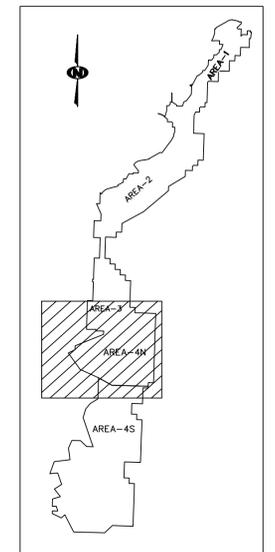
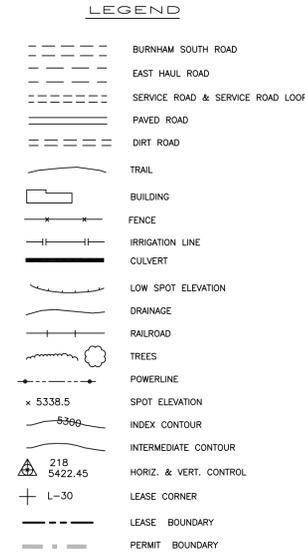
STATION	LOCATION - DIRECTION	WIDTH OF SIGN	LENGTH OF SIGN	SIGN CODE	NO. OF SIGNS	TOTAL SIGN AREA (SF)	POST LENGTH (LF)				MOUNTING REQUIREMENTS					BASE POST		
							LEFT	CENTER	RIGHT	TOTAL	U-CHANNEL	SQUARE TUBING (12 GAUGE)					NO.	TOTAL LENGTH (LF)
												4 LBS./LF	1.75	2.00	2.25	2.19		
000+00	RT - NBL	36	36	W1-SR (REVERSE CURVE RIGHT)	1	9		12				X or		X			1	3.5
000+20	RT - NBL	36	36	DANGER OVERHEAD POWERLINES	1	9		6				X or	X				1	3.5
000+80	LT - SBL	36	36	DANGER OVERHEAD POWERLINES	1	9		6				X or	X				1	3.5
001+50	RT - NBL	24	30	R2-1-35 (35 MPH)	1	5		12				X or	X				1	3.5
003+00	RT - NBL	36	36	W11-4, CATTLE	1	9		12				X or	X				1	3.5
025+86	RT - NBL	36	36	W1-2R	1	9		12				X or	X				1	3.5
025+93	LT - SBL	36	36	W1-SR (REVERSE CURVE LEFT)	1	9		12				X or	X				1	3.5
042+48	LT - WBL	36	36	W1-2L	1	9		12				X or	X				1	3.5
062+68	RT - EBL	36	36	W1-2L	1	9		12				X or	X				1	3.5
079+30	LT - SBL	36	36	W1-2R	1	9		12				X or	X				1	3.5
105+80	RT - NBL	36	36	W1-2R	1	9		12				X or	X				1	3.5
116+22	LT - SBL	36	36	W1-2L	1	9		12				X or	X				1	3.5
119+45	RT - NBL	36	36	W1-5L (REVERSE CURVE LEFT)	1	9		12				X or	X				1	3.5
139+50	LT - SBL	36	36	R2-1-35 (35 MPH)	1	9		12				X or	X				1	3.5
141+35	RT - NBL	36	36	DANGER OVERHEAD POWERLINES	1	9		12				X or	X				1	3.5
142+55	LT - SBL	36	36	DANGER OVERHEAD POWERLINES	1	9		12				X or	X				1	3.5
TOTAL						140 SF		180									56	
													TOTAL SIGN POST & BASE POST =	236 LF				

- NOTES:
 1. All signs shall be manufactured to conform with the most current editions of the MUTCD and Standard Highway Signs Book.
 2. Sign placement requirements for height and lateral location from roadway shall conform with the current edition of the MUTCD and NMDOT Standard Drawing 701-02.

GENERAL NOTES:

- ALL SQUARE TUBING SIGN POST REQUIREMENTS ARE BASED ON A 10 OR 12 GAUGE THICKNESS, ASTM A570 GRADE 50 STEEL, A MINIMUM YIELD STRENGTH OF 60,000 PSI AND A 70 MPH WIND LOAD. ALL U-CHANNEL SIGN POSTS REQUIREMENTS ARE BASED ON A MINIMUM YIELD STRENGTH OF 60,000 PSI AND 85 MPH WIND LOAD. SEE THE MUTCD & STANDARD HIGHWAY SIGNS MANUAL (CURRENT EDITION) FOR FURTHER GUIDANCE.
- FOR CONSTRUCTION SIGNING & PERMANENT SINGLE AND TRIPLE POST INSTALLATIONS, SMALLER POST CROSS SECTIONS MAY BE USED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND THE RECOMMENDATIONS DETAILED IN NOTE 1.
- TOP EDGE OF POSTS SHALL NOT EXTEND PAST TOP EDGE OF SIGN.
- STEEL POSTS, BASE POSTS, AND SLIP BASES FOR ALUMINUM PANEL SIGNS SHALL BE SELECTED FROM THE DEPARTMENT'S APPROVED PRODUCT LIST. ALL SIGNS MOUNTED WITHIN THE CLEAR ZONE SHALL BE MOUNTED ON A NEIGHBORING APPROVED SIGN POST/BASE POST BREAKAWAY SYSTEM UNLESS INSTALLATION IS LOCATED BEHIND A NON-GATING LONGITUDINAL BARRIER. OTHER INSTALLATIONS, CONFIGURATIONS OR SYSTEMS NOT SHOWN MAY BE USED AS RECOMMENDED BY THE MANUFACTURER WITH APPROVAL OF THE DISTRICT TRAFFIC ENGINEER.
- FOR INSTALLATIONS ON WEAK (SOFT) SOIL, SOIL PLATES SHALL BE USED AS RECOMMENDED BY THE MANUFACTURER. PAYMENT FOR SOIL PLATES SHALL BE INCIDENTAL TO THE SIGN INSTALLATION.
- BASE POSTS SHALL NOT EXTEND MORE THAN 4' ABOVE GROUND LEVEL AND SHALL BE OF THE SAME WEIGHT/GAUGE AND TYPE AS THE SIGN POST.
- INTERMIXING OF U-CHANNEL AND SQUARE TUBING POSTS, POSTS OF DIFFERENT WEIGHTS/GAUGES OR PRODUCT BRANDS IS NOT ALLOWED EXCEPT WHERE RECOMMENDED BY THE MANUFACTURER.
- HORIZONTAL CLEARANCES APPLY TO INSTALLATIONS ON LEFT AND RIGHT SIDE OF ROADWAY.
- SUPPLEMENTAL SIGNS SHALL NOT BE ATTACHED DIRECTLY TO PRIMARY PANELS ON EITHER PERMANENT OR CONSTRUCTION SIGNING INSTALLATIONS.
- SPACING BETWEEN SUPPLEMENTAL PANELS AND PRIMARY PANELS SHALL NOT EXCEED 6'.
- SIGN PANELS PLACED PARALLEL TO TRAFFIC SHALL BE MOUNTED ON A MULTI-DIRECTIONAL BREAKAWAY SYSTEM. (SEE SERIAL 701-02-3/3)

NOTE: ALL SIGNS TO BE EQUIPPED WITH BREAK-AWAY BASE. CONTRACTOR TO SUBMIT BREAK-AWAY DETAIL FOR APPROVAL PRIOR TO USE.



CERTIFICATION STATEMENT
 I, GEORGE A. MADRID, P.E., HEREBY CERTIFY THAT THIS DRAWING WAS REVIEWED BY ME AND THAT THE INFORMATION SHOWN IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.



GEOMAT INC.
 915 Malta Avenue • Farmington, NM 87401 • (505) 327-7928

REV. NO.	DATE	DESCRIPTION
1	03-15-12	REVISED TITLE & TITLE BLOCK
0	02-07-12	INITIAL PERMIT SUBMITTAL

EXHIBIT 40.6-1

bhpbilliton

BHP Navajo Coal Company

P.O. Box 1717 Fruittland, New Mexico, 87416 Phone: 505-598-4200 Fax: 505-568-3361

PINABETE PERMIT

BURNHAM SOUTH ROAD DESIGN SIGN & OBJECT MARKER TABLE AND DETAILS

SHEET: 11 OF 11

PREPARED BY: BT&P DRAWN BY: BT&P SCALE: AS SHOWN
 APPROVED BY: GM DATE: 02-07-2012

GEOMAT PROJECT NO. 112-1434

TRAFFIC MARKERS - OBJECT MARKERS

- ALL HARDWARE SHALL MEET FHWA CRASHWORTHINESS REQUIREMENTS AS PER NCHRP 350 GUIDELINES AND SHALL BE ON THE DEPARTMENT'S APPROVED PRODUCT LIST.
- SEE DEPARTMENT'S APPROVED PRODUCTS LIST FOR APPROVED U-CHANNEL & SQUARE TUBING, FLEXIBLE & TUBULAR TRAFFIC MARKER REFLECTOR MANUFACTURERS.
- DELINATOR POST & REFLECTOR UNIT COLOR SHALL CONFORM TO THE COLOR OF EDGE LINES.
- BREAKAWAY BASE POST SYSTEMS FOR TYPE 1, TYPE 3 & END OF ROAD OBJECT MARKERS REQUIRED. SEE APPROVED PRODUCT LIST FOR APPROVED SYSTEMS & MANUFACTURER'S RECOMMENDATIONS.
- STANDARD DELINEATORS ARE NOT TO CONFLICT WITH 1/10 MILE DELINEATORS. WHEN THE TWO COINCIDE, 1/10 MILE DELINEATORS WILL BE USED.
- SEE SECTION 703 OF THE NEW MEXICO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION FOR ADDITIONAL INFORMATION.
- FOR SQUARE TUBING WITH BREAKAWAY BASE POST SEE STANDARDS 701-02-1/3, 701-02-2/3 AND 701-02-3/3.
- 1/10 MILE DELINEATORS SHALL BE USED ON INTERSTATE ROADWAYS AND MAY BE USED ON HIGH SPEED 4-LANE DIVIDED ROADWAYS.

NOTE: USE FIBERGLASS POSTS FOR OBJECT/DELINATORS

REFLECTOR UNIT TYPES

REFLECTOR UNIT TYPE	QUANTITY
A1 SINGLE YELLOW REFLECTOR	1 EACH
A2 DOUBLE YELLOW REFLECTOR	1 EACH
A3 TRIPLE YELLOW REFLECTOR (TYPE 2 OBJECT MARKER)	1 EACH
C1 SINGLE WHITE REFLECTOR	1 EACH
C2 DOUBLE WHITE REFLECTOR	1 EACH
A1/A1 1 EACH	1 EACH
A1/C1 1 EACH	1 EACH
A1/R1 1 EACH	1 EACH
C1/C1 1 EACH	1 EACH
C1/R1 1 EACH	1 EACH
A2/A2 2 EACH	2 EACH
A2/C2 2 EACH	2 EACH
A2/R2 2 EACH	2 EACH
C2/C2 2 EACH	2 EACH
C2/R2 2 EACH	2 EACH
A3/A3 3 EACH	3 EACH

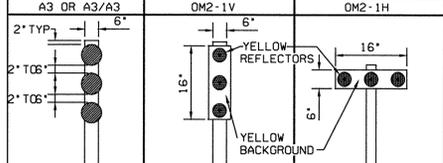
*BIDIRECTIONAL MOUNTING BRACKET REQUIRED TO ORIENT RED REFLECTOR

HAZARD MARKER TABLE TYPE 2 OBJECT MARKERS

STATION	LOCATION	NO.
016+60.00	RT	1
017+00.00	LT	1
029+50.00	RT	1
029+90.00	LT	1
035+80.00	RT & LT	2
036+20.00	LT	1
050+38.00	RT & LT	2
076+10.00	RT & LT	2
115+50.00	RT	1
116+20.00	LT	1
143+30.00	RT	1
143+77.00	LT	1
TOTAL NO. OF HAZARD MARKERS (EACH) = 14		

- NOTES:
 1. Type 2 Object Markers (A3/A3) shall be installed as per NMDOT Standard Drawing 703-01.
 2. Under minimum cover conditions for culverts, Type 2 Hazard Markers shall be placed on the culvert side to the approach nearest traffic.

TYPE 2



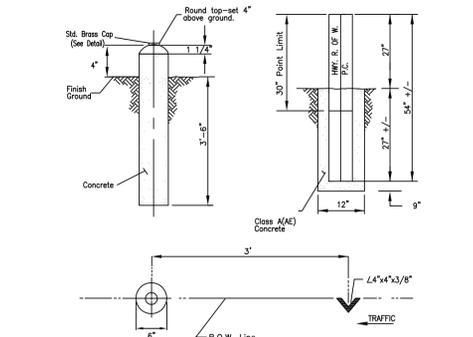
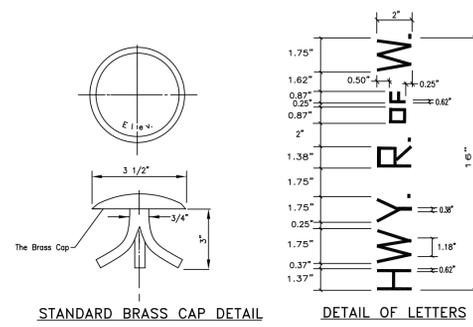
THE DETAILS SHOWN ARE FOR CONTRACTOR CONVENIENCE. REFER TO NMDOT, MUTCD AND STANDARD HIGHWAY SIGN BOOK FOR COMPLETE DETAILS

THE DESIGN FEATURES SHOWN ON THESE DESIGN PLANS ARE REASONABLE REPRESENTATIONS OF THE PROPOSED WORK BASED ON THE INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL OF THIS PERMIT PACKAGE. ACTUAL CONSTRUCTION DETAILS MAY VARY FROM THOSE SHOWN.

NOT ISSUED FOR CONSTRUCTION

R.O.W. - General Notes

- Survey Monuments and Reference markers shall be placed as shown on the plans or as directed by the BNCC Project Manager. The cost of supplying all materials and installation of Right-Of-Way Monuments and Reference Markers shall be included in the unit price bid under Item 801000-1.
- Brass caps for the monuments shall be supplied by the contractor conforming to the ASTM B-584 Specification and shall be considered incidental to Item 801000-1.
- All concrete shall conform to Section 601 of the FP-03. Furnishing and placing of concrete and rebar shall be considered incidental to Item 801000-1.
- State Plane Coordinates & Elevations shall be stamped on all brass caps by the BNCC Project Manager after installation.
- The contractor shall be required to paint the reference markers per Section 708 and Subsection 708.04 of FP-03:
 - The primer coat shall conform to Subsection 708.04(A) or (B) of FP-03.
 - The white finish coat of paint shall conform to Subsection 708.04(C), (D) or (E) of FP-03.
 - All letters, numerals, symbols, etc. shall be painted on the reference markers using the dimensions shown using lamp black paint conforming to ASTM D 209. The required information to be placed on the reference markers shall be furnished to the contractor by the C.O.R.
- The contractor has the option to use an approved state paint specification in lieu of that stated in Note 5 above. The contractor shall submit (in writing) the paint specifications and request for use on the project at least 14 days in advance of the paint use for review and approval. The contractor shall not be allowed to use any paint until the proper approval has been given by the contracting officer. Any painting performed by the contractor without proper approval shall be cause for the work to be rejected.



R.O.W. MONUMENTS TO BE INSTALLED AT ALL PC'S & PT'S AT 50' FROM CENTERLINE BY CONTRACTOR (See Location Table on Sheet 2)

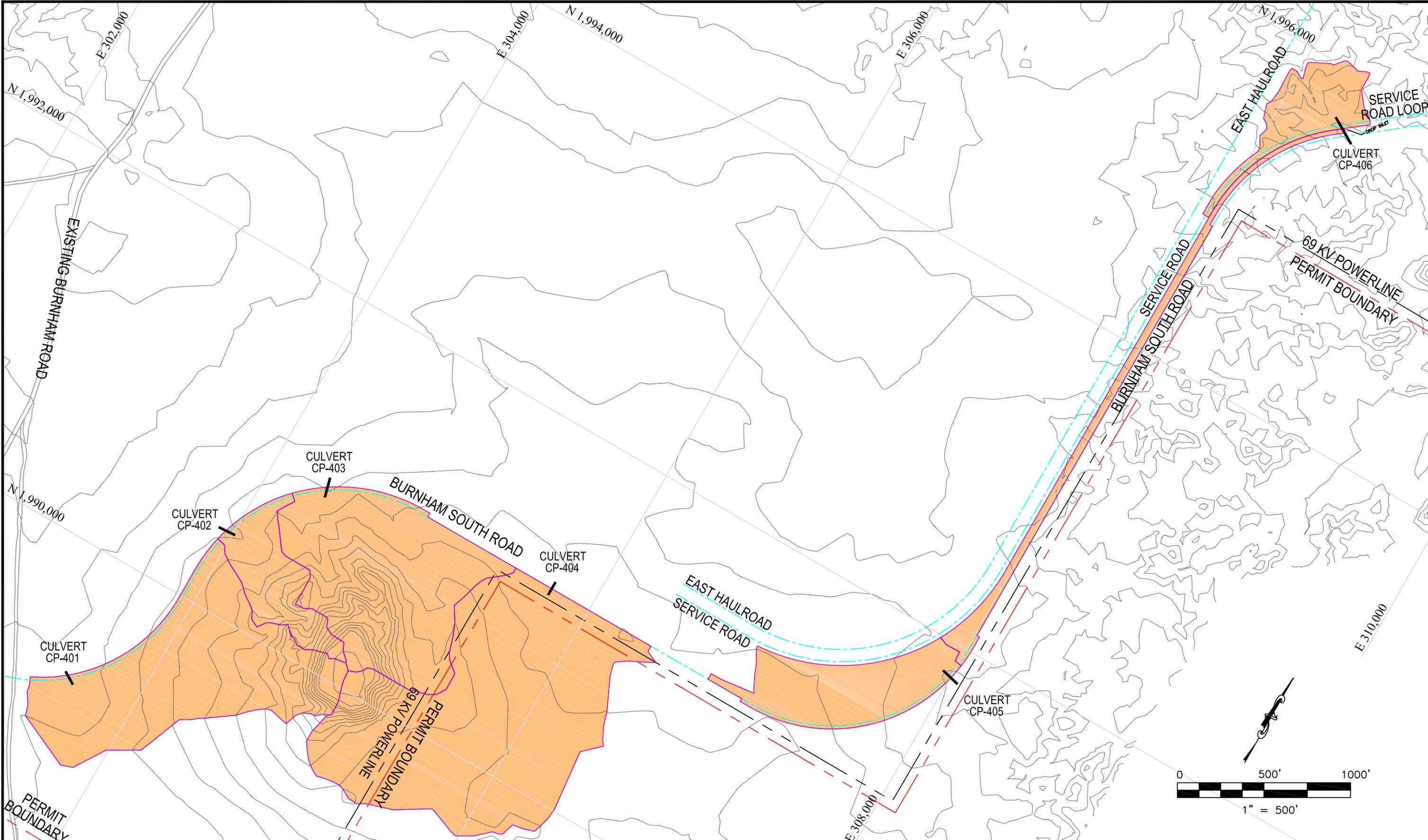
Appendix 40.A

Burnham South Road Supporting Design Data for Drainage Control Structures

AREA 4 ROADS ENGINEERING - BURNHAM SOUTH ROAD

CULVERT TABLE

Culvert No.	Road	Station	Area (Ac)	Discharge (cfs)	Size (ft-in)	Corrugation (in)	Corner Radius (in)	Gage	Minimum Cover (in)	Inlet Elev.	Outlet Elev.	Headwater Elev.	Barrels	Skew Angle	Run Length (ft)	Total Length (ft)	Outlet Velocity (ft/sec)	Outflow Protection
CP-401	B.S.R.	16+77	23.948	38.11	3 - 6	2-2/3 X 1/2	N/A	16	24	5424.08	5422.58	5426.85	1	71	89	89	7.47	RIPRAP
CP-402	B.S.R.	29+71	6.330	10.07	2	2-2/3 X 1/2	N/A	16	24	5438.94	5435.51	5440.59	1	68	107	107	6.84	RIPRAP
CP-403	B.S.R.	35+98	21.778	34.66	3	2-2/3 X 1/2	N/A	16	24	5441.76	5437.08	5444.64	1	109	119	119	10.06	RIPRAP
CP-404	B.S.R.	50+38	38.909	61.92	3	2-2/3 X 1/2	N/A	16	24	5450.91	5450.45	5453.97	2	90	88	176	6.98	RIPRAP
CP-405	B.S.R.	76+10	9.491	15.10	2	2-2/3 X 1/2	N/A	16	24	5430.87	5426.75	5433.09	1	90	117	117	7.82	RIPRAP
CP-406	B.S.R.	115+90	9.629	12.36	2 - 6	2-2/3 X 1/2	N/A	16	24	5380.95	5380.00	5382.89	1	68	180	180	5.42	N/A



BURNHAM SOUTH ROAD
25-YR 24-HR STORM

CULVERT CP-401

STATION 16+77

BHP Billiton

GEOMAT Inc.
915 Malta Avenue
Farmington, NM 87401

Phone: (505) 327-7928

General Information

Storm Information:

Storm Type:	Type II-70
Design Storm:	25 yr - 24 hr
Rainfall Depth:	2.060 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	CULVERT CP-401

#1 Null

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	23.948	23.948	38.11	1.46

Structure Detail:

Structure #1 (Null)

CULVERT CP-401

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	23.948	0.064	0.000	0.000	82.900	M	38.11	1.459
		Σ 23.948						38.11	1.459

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	8.04	159.66	1,985.05	8.500	0.064
#1	1	Time of Concentration:					0.064

HY-8 Culvert Analysis Report

CULVERT CP-401 - STATION 16+77

Culvert Data Summary - Culvert CP-401

Barrel Shape: Circular
Barrel Diameter: 3.50 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Inlet Type: Conventional
Inlet Edge Condition: Square Edge with Headwall
Inlet Depression: None

Site Data - Culvert CP-401

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 5424.08 ft
Outlet Station: 89.00 ft
Outlet Elevation: 5422.58 ft
Number of Barrels: 1

Table 1 - Culvert Summary Table: Culvert CP-401

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	5424.08	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.81	3.81	5424.86	0.777	0.0*	1-S2n	0.523	0.559	0.549	0.178	3.826	1.044
7.62	7.62	5425.20	1.122	0.0*	1-S2n	0.764	0.817	0.767	0.231	4.849	1.241
11.43	11.43	5425.47	1.393	0.0*	1-S2n	0.938	1.021	0.941	0.269	5.452	1.374
15.24	15.24	5425.70	1.622	0.0*	1-S2n	1.098	1.178	1.098	0.299	5.923	1.476
19.06	19.06	5425.92	1.836	0.0*	1-S2n	1.231	1.328	1.237	0.325	6.244	1.561
22.87	22.87	5426.12	2.041	0.0*	1-S2n	1.364	1.463	1.372	0.348	6.535	1.633
26.68	26.68	5426.32	2.237	0.0*	1-S2n	1.484	1.582	1.491	0.369	6.820	1.698
30.49	30.49	5426.51	2.426	0.0*	1-S2n	1.600	1.702	1.601	0.388	7.101	1.755
34.30	34.30	5426.69	2.609	0.0*	1-S2n	1.715	1.810	1.719	0.406	7.292	1.808
38.11	37.75	5426.85	2.772	0.0*	1-S2n	1.816	1.901	1.820	0.422	7.470	1.856

* theoretical depth is impractical. Depth reported is corrected.

 Inlet Elevation (invert): 5424.08 ft, Outlet Elevation (invert): 5422.58 ft
 Culvert Length: 89.00 ft, Culvert Slope: 0.0169

Roadway Data for Crossing: Culvert CP-401

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	50.00	5426.72
2	100.00	5427.66
3	150.00	5428.48
4	200.00	5429.18
5	300.00	5430.82

Roadway Surface: Gravel

Roadway Top Width: 36.00 ft

Table 2 - Downstream Channel Rating Curve (Crossing: Culvert CP-401)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	5422.58	0.00	0.00	0.00	0.00
3.81	5422.76	0.18	1.04	0.19	0.62
7.62	5422.81	0.23	1.24	0.24	0.64
11.43	5422.85	0.27	1.37	0.29	0.66
15.24	5422.88	0.30	1.48	0.32	0.67
19.06	5422.91	0.33	1.56	0.35	0.68
22.87	5422.93	0.35	1.63	0.37	0.69
26.68	5422.95	0.37	1.70	0.39	0.70
30.49	5422.97	0.39	1.76	0.41	0.70
34.30	5422.99	0.41	1.81	0.43	0.71
38.11	5423.00	0.42	1.86	0.45	0.71

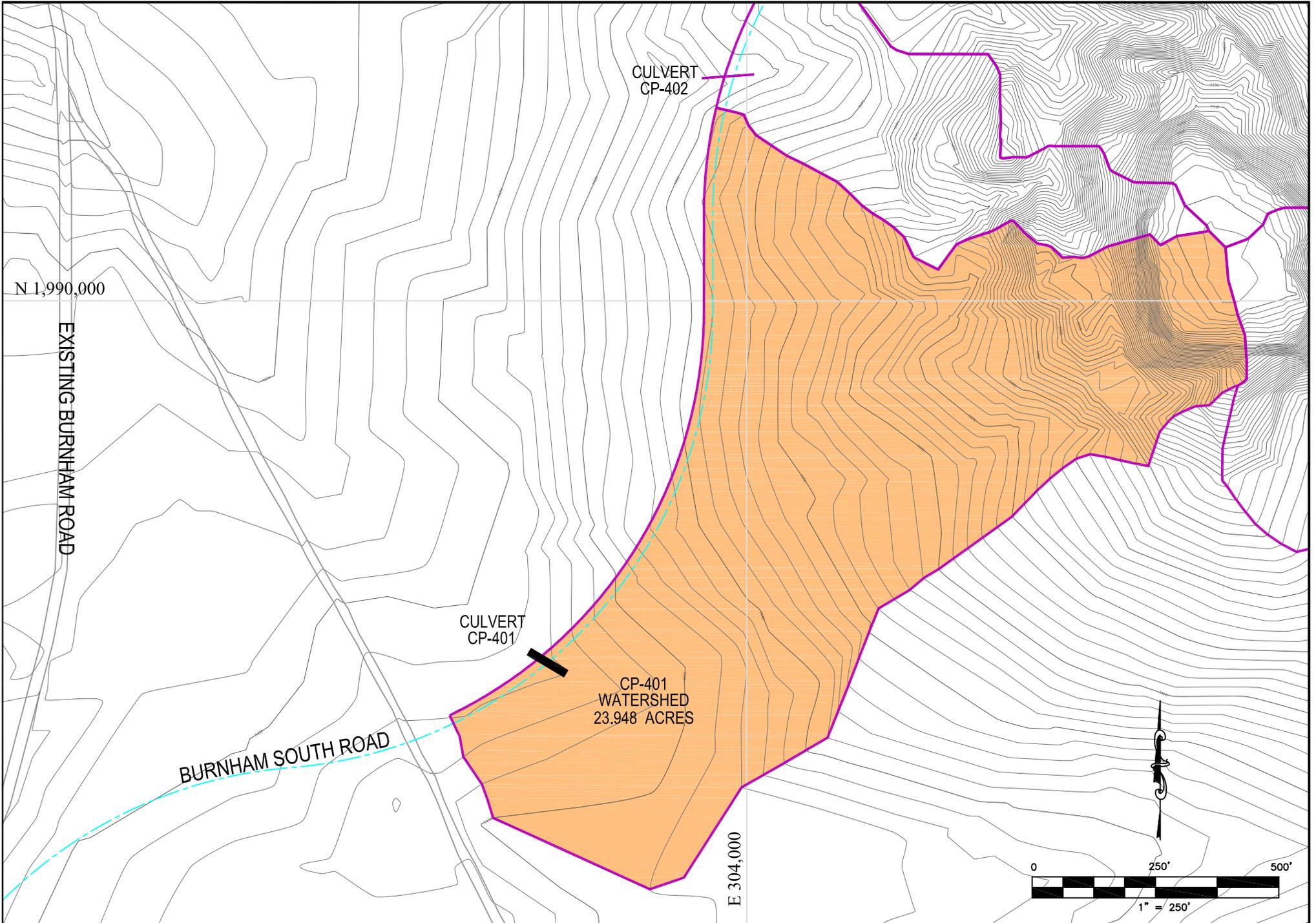
Tailwater Channel Data - Culvert CP-401

Tailwater Channel Option: Irregular Channel

Channel Slope: 0.0170

User Defined Channel Cross-Section:

Coord No.	Station (ft)	Elevation (ft)	Manning's n
1	0.00	5426.00	0.0370
2	52.62	5424.00	0.0370
3	69.06	5423.01	0.0370
4	150.00	5422.58	0.0370
5	209.45	5424.00	0.0370
6	265.40	5426.00	0.0370
7	300.00	5427.11	0.0000



BURNHAM SOUTH ROAD
25-YR 24-HR STORM

CULVERT CP-402

STATION 29+71

BHP Billiton

GEOMAT Inc.
915 Malta Avenue
Farmington, NM 87401

Phone: (505) 327-7928

General Information

Storm Information:

Storm Type:	Type II-70
Design Storm:	25 yr - 24 hr
Rainfall Depth:	2.060 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	CULVERT CP-402

#1 Null

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	6.330	6.330	10.07	0.39

Structure Detail:

Structure #1 (Null)

CULVERT CP-402

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	6.330	0.030	0.000	0.000	82.900	M	10.07	0.386
		Σ 6.330						10.07	0.386

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	12.61	145.89	1,157.02	10.650	0.030
#1	1	Time of Concentration:					0.030

HY-8 Culvert Analysis Report

CULVERT CP-402 - STATION 29+71

Culvert Data Summary - Culvert CP-402

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Inlet Type: Conventional
Inlet Edge Condition: Square Edge with Headwall
Inlet Depression: None

Site Data - Culvert CP-402

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 5438.94 ft
Outlet Station: 107.00 ft
Outlet Elevation: 5435.51 ft
Number of Barrels: 1

Table 1 - Culvert Summary Table: Culvert CP-402

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	5438.94	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.01	1.01	5439.39	0.454	0.0*	1-S2n	0.275	0.333	0.282	0.136	3.599	1.667
2.01	2.01	5439.59	0.655	0.0*	1-S2n	0.407	0.483	0.412	0.176	4.335	1.982
3.02	3.02	5439.75	0.815	0.0*	1-S2n	0.492	0.606	0.496	0.205	4.931	2.194
4.03	4.03	5439.89	0.948	0.0*	1-S2n	0.577	0.697	0.577	0.228	5.345	2.357
5.04	5.04	5440.02	1.076	0.0*	1-S2n	0.647	0.789	0.648	0.248	5.748	2.493
6.04	6.04	5440.14	1.199	0.0*	1-S2n	0.712	0.865	0.714	0.265	5.987	2.609
7.05	7.05	5440.26	1.317	0.0*	1-S2n	0.777	0.938	0.777	0.281	6.239	2.711
8.06	8.06	5440.37	1.430	0.0*	1-S2n	0.836	1.010	0.839	0.296	6.461	2.803
9.06	9.06	5440.48	1.541	0.0*	1-S2n	0.892	1.071	0.900	0.309	6.608	2.887
10.07	10.07	5440.59	1.650	0.0*	1-S2n	0.949	1.132	0.951	0.321	6.836	2.964

* theoretical depth is impractical. Depth reported is corrected.

 Inlet Elevation (invert): 5438.94 ft, Outlet Elevation (invert): 5435.51 ft
 Culvert Length: 107.00 ft, Culvert Slope: 0.0321

Roadway Data for Crossing: Culvert CP-402

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	5441.32
2	50.00	5441.84
3	100.00	5442.31
4	150.00	5442.67
5	300.00	5443.57

Roadway Surface: Gravel

Roadway Top Width: 36.00 ft

Table 2 - Downstream Channel Rating Curve (Crossing: Culvert CP-402)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	5435.52	0.00	0.00	0.00	0.00
1.01	5435.65	0.14	1.67	0.53	1.13
2.01	5435.69	0.18	1.98	0.68	1.18
3.02	5435.72	0.20	2.19	0.80	1.21
4.03	5435.74	0.23	2.36	0.89	1.23
5.04	5435.76	0.25	2.49	0.96	1.25
6.04	5435.78	0.27	2.61	1.03	1.26
7.05	5435.80	0.28	2.71	1.09	1.27
8.06	5435.81	0.30	2.80	1.15	1.29
9.06	5435.82	0.31	2.89	1.20	1.29
10.07	5435.84	0.32	2.96	1.25	1.30

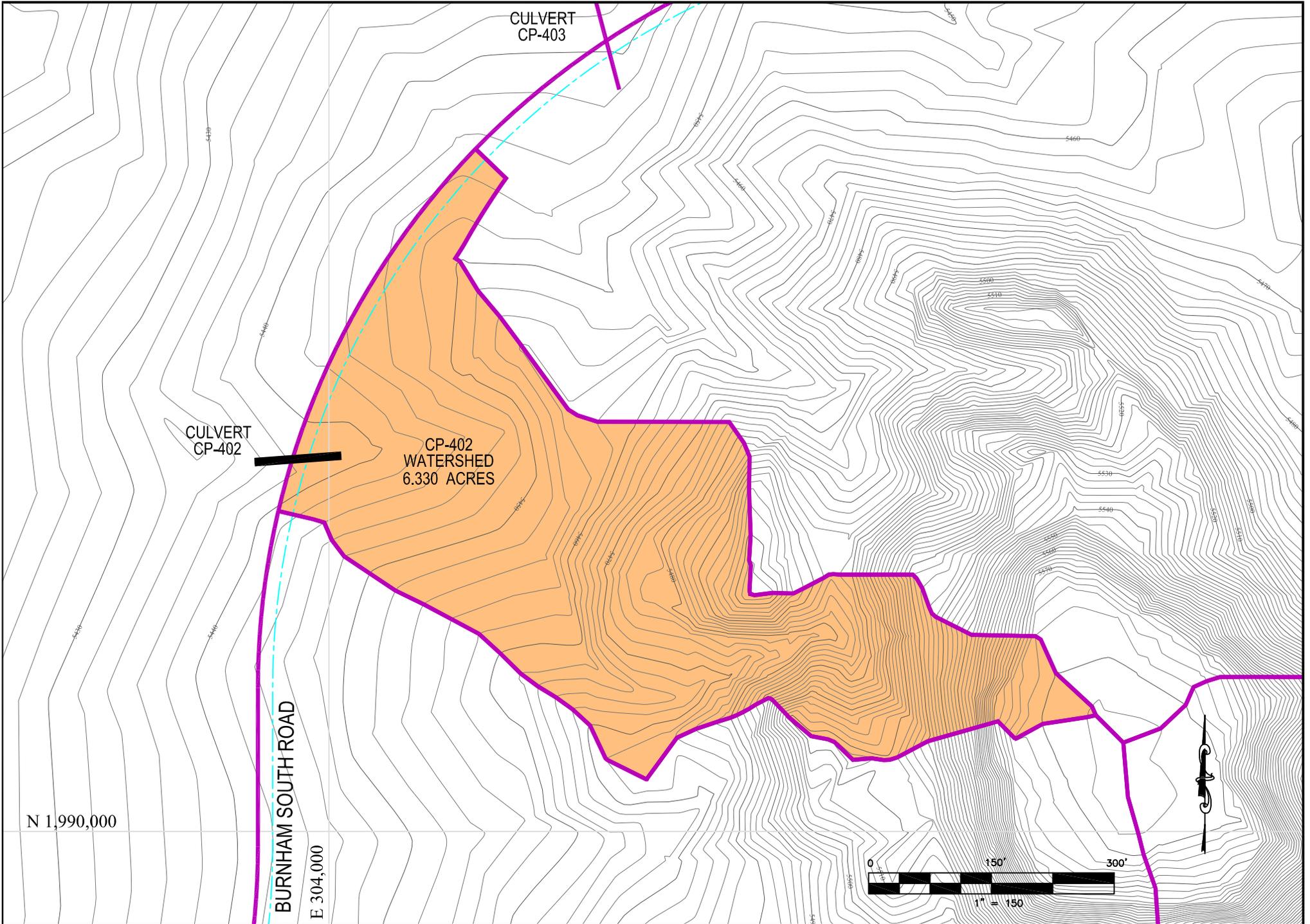
Tailwater Channel Data - Culvert CP-402

Tailwater Channel Option: Irregular Channel

Channel Slope: 0.0624

User Defined Channel Cross-Section:

Coord No.	Station (ft)	Elevation (ft)	Manning's n
1	0.00	5440.00	0.0370
2	98.78	5438.00	0.0370
3	130.34	5436.00	0.0370
4	150.00	5435.52	0.0370
5	162.24	5436.00	0.0370
6	198.91	5438.00	0.0370
7	248.77	5440.00	0.0370
8	300.00	5440.47	0.0000



BURNHAM SOUTH ROAD
25-YR 24-HR STORM

CULVERT CP-403

STATION 35+98

BHP Billiton

GEOMAT Inc.
915 Malta Avenue
Farmington, NM 87401

Phone: (505) 327-7928

General Information

Storm Information:

Storm Type:	Type II-70
Design Storm:	25 yr - 24 hr
Rainfall Depth:	2.060 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	CULVERT CP-403

#1 Null

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	21.778	21.778	34.66	1.33

Structure Detail:

Structure #1 (Null)

CULVERT CP-403

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	21.778	0.060	0.000	0.000	82.900	M	34.66	1.327
	Σ	21.778						34.66	1.327

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	7.79	142.85	1,834.09	8.370	0.060
#1	1	Time of Concentration:					0.060

HY-8 Culvert Analysis Report

CULVERT CP-403 - STATION 35+98

Culvert Data Summary - Culvert CP-403

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Inlet Type: Conventional
Inlet Edge Condition: Square Edge with Headwall
Inlet Depression: None

Site Data - Culvert CP-403

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 5441.76 ft
Outlet Station: 119.00 ft
Outlet Elevation: 5437.08 ft
Number of Barrels: 1

Table 1 - Culvert Summary Table: Culvert CP-403

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	5441.76	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
3.47	3.47	5442.53	0.765	0.0*	1-S2n	0.423	0.575	0.435	0.191	5.295	1.667
6.93	6.93	5442.86	1.098	0.0*	1-S2n	0.625	0.818	0.627	0.247	6.517	1.983
10.40	10.40	5443.12	1.364	0.0*	1-S2n	0.759	1.011	0.761	0.288	7.299	2.194
13.86	13.86	5443.36	1.602	0.0*	1-S2n	0.892	1.183	0.893	0.320	7.851	2.358
17.33	17.33	5443.59	1.832	0.0*	1-S2n	0.997	1.324	1.003	0.348	8.340	2.493
20.80	20.80	5443.81	2.049	0.0*	1-S2n	1.099	1.461	1.101	0.373	8.816	2.609
24.26	24.26	5444.02	2.258	0.0*	1-S2n	1.202	1.582	1.202	0.395	9.166	2.712
27.73	27.73	5444.22	2.464	0.0*	1-S2n	1.291	1.697	1.296	0.416	9.475	2.804
31.19	31.19	5444.43	2.669	0.0*	1-S2n	1.379	1.810	1.380	0.434	9.821	2.888
34.66	34.66	5444.64	2.878	0.0*	1-S2n	1.468	1.907	1.471	0.452	10.055	2.965

* theoretical depth is impractical. Depth reported is corrected.

 Inlet Elevation (invert): 5441.76 ft, Outlet Elevation (invert): 5437.08 ft
 Culvert Length: 119.00 ft, Culvert Slope: 0.0393

Roadway Data for Crossing: Culvert CP-403

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	5445.97
2	150.00	5446.87
3	300.00	5447.77

Roadway Surface: Gravel

Roadway Top Width: 36.00 ft

Table 2 - Downstream Channel Rating Curve (Crossing: Culvert CP-403)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	5437.08	0.00	0.00	0.00	0.00
3.47	5437.27	0.19	1.67	0.47	0.95
6.93	5437.33	0.25	1.98	0.61	0.99
10.40	5437.37	0.29	2.19	0.71	1.02
13.86	5437.40	0.32	2.36	0.79	1.04
17.33	5437.43	0.35	2.49	0.86	1.05
20.80	5437.45	0.37	2.61	0.92	1.06
24.26	5437.48	0.40	2.71	0.98	1.07
27.73	5437.50	0.42	2.80	1.03	1.08
31.19	5437.51	0.43	2.89	1.07	1.09
34.66	5437.53	0.45	2.96	1.12	1.10

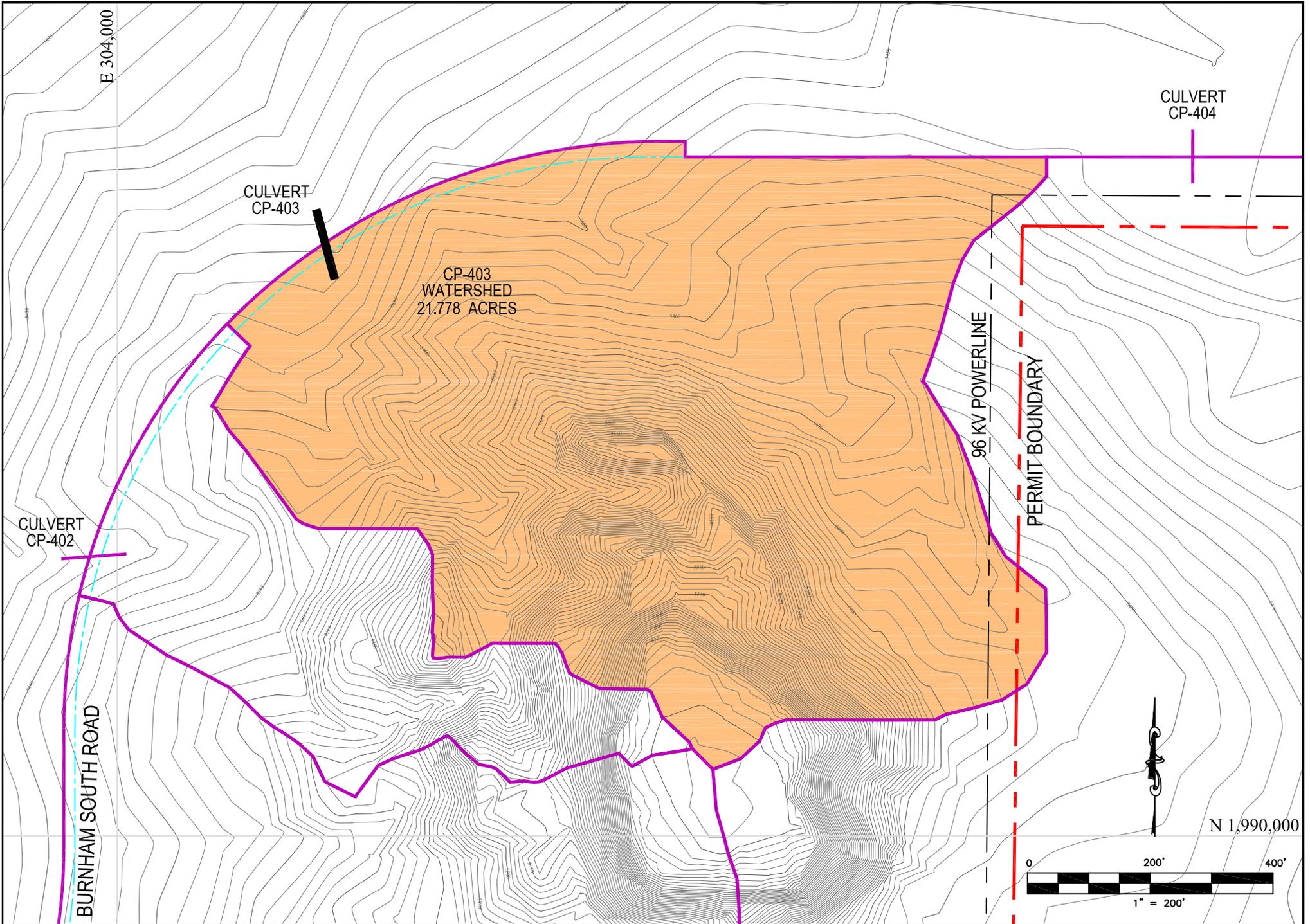
Tailwater Channel Data - Culvert CP-403

Tailwater Channel Option: Irregular Channel

Channel Slope: 0.0396

User Defined Channel Cross-Section:

Coord No.	Station (ft)	Elevation (ft)	Manning's n
1	0.00	5440.00	0.0370
2	97.80	5438.00	0.0370
3	150.00	5437.08	0.0370
4	203.14	5438.00	0.0370
5	275.05	5440.00	0.0370
6	300.00	5440.63	0.0370



CULVERT CP-402

CULVERT CP-403

CP-403
WATERSHED
21.778 ACRES

CULVERT CP-404

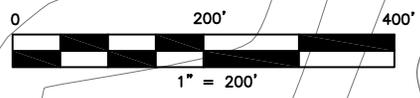
96 KV POWERLINE

PERMIT BOUNDARY

BURNHAM SOUTH ROAD

E 304,000

N 1,990,000



BURNHAM SOUTH ROAD
25-YR 24-HR STORM

CULVERT CP-404

STATION 50+38

BHP Billiton

GEOMAT Inc.
915 Malta Avenue
Farmington, NM 87401

Phone: (505) 327-7928

General Information

Storm Information:

Storm Type:	Type II-70
Design Storm:	25 yr - 24 hr
Rainfall Depth:	2.060 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	CULVERT CP-404

#1 Null

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	38.909	38.909	61.92	2.37

Structure Detail:

Structure #1 (Null)

CULVERT CP-404

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	38.909	0.118	0.000	0.000	82.900	M	61.92	2.370
Σ		38.909						61.92	2.370

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	4.75	132.28	2,783.03	6.540	0.118
#1	1	Time of Concentration:					0.118

HY-8 Culvert Analysis Report

CULVERT CP-404 - STATION 50+38

Culvert Data Summary - Culvert CP-404

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Inlet Type: Conventional
Inlet Edge Condition: Square Edge with Headwall
Inlet Depression: None

Site Data - Culvert CP-404

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 5450.91 ft
Outlet Station: 88.00 ft
Outlet Elevation: 5450.45 ft
Number of Barrels: 2

Table 1 - Culvert Summary Table: Culvert CP-404

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	5450.91	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
6.19	6.19	5451.75	0.741	0.837	2-M2c	0.685	0.534	0.548	0.311	3.504	0.753
12.38	12.38	5452.11	1.067	1.205	2-M2c	0.987	0.768	0.781	0.403	4.231	0.895
18.58	18.58	5452.41	1.326	1.498	2-M2c	1.233	0.956	0.963	0.469	4.745	0.990
24.77	24.77	5452.66	1.550	1.754	2-M2c	1.451	1.110	1.118	0.523	5.161	1.064
30.96	30.96	5452.90	1.762	1.989	2-M2c	1.660	1.251	1.255	0.569	5.525	1.125
37.15	37.15	5453.12	1.962	2.207	2-M2c	1.869	1.373	1.381	0.609	5.848	1.178
43.34	43.34	5453.33	2.154	2.421	2-M2c	2.083	1.496	1.497	0.645	6.149	1.224
49.54	49.54	5453.54	2.339	2.633	2-M2c	2.333	1.599	1.605	0.678	6.437	1.266
55.73	55.73	5453.76	2.523	2.845	2-M2c	2.696	1.702	1.707	0.709	6.709	1.303
61.92	61.92	5453.97	2.706	3.057	2-M2c	3.000	1.803	1.803	0.737	6.975	1.338

* theoretical depth is impractical. Depth reported is corrected.

 Inlet Elevation (invert): 5450.91 ft, Outlet Elevation (invert): 5450.45 ft
 Culvert Length: 88.00 ft, Culvert Slope: 0.0052

Roadway Data for Crossing: Culvert CP-404

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	5455.75
2	50.00	5456.03
3	100.00	5456.19
4	150.00	5456.23
5	200.00	5456.13
6	250.00	5455.91
7	300.00	5455.63

Roadway Surface: Gravel

Roadway Top Width: 36.00 ft

Table 2 - Downstream Channel Rating Curve (Crossing: Culvert CP-404)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	5450.45	0.00	0.00	0.00	0.00
6.19	5450.76	0.31	0.75	0.08	0.34
12.38	5450.85	0.40	0.89	0.11	0.35
18.58	5450.92	0.47	0.99	0.12	0.36
24.77	5450.97	0.52	1.06	0.14	0.37
30.96	5451.02	0.57	1.13	0.15	0.37
37.15	5451.06	0.61	1.18	0.16	0.38
43.34	5451.10	0.65	1.22	0.17	0.38
49.54	5451.13	0.68	1.27	0.18	0.38
55.73	5451.16	0.71	1.30	0.19	0.39
61.92	5451.19	0.74	1.34	0.19	0.39

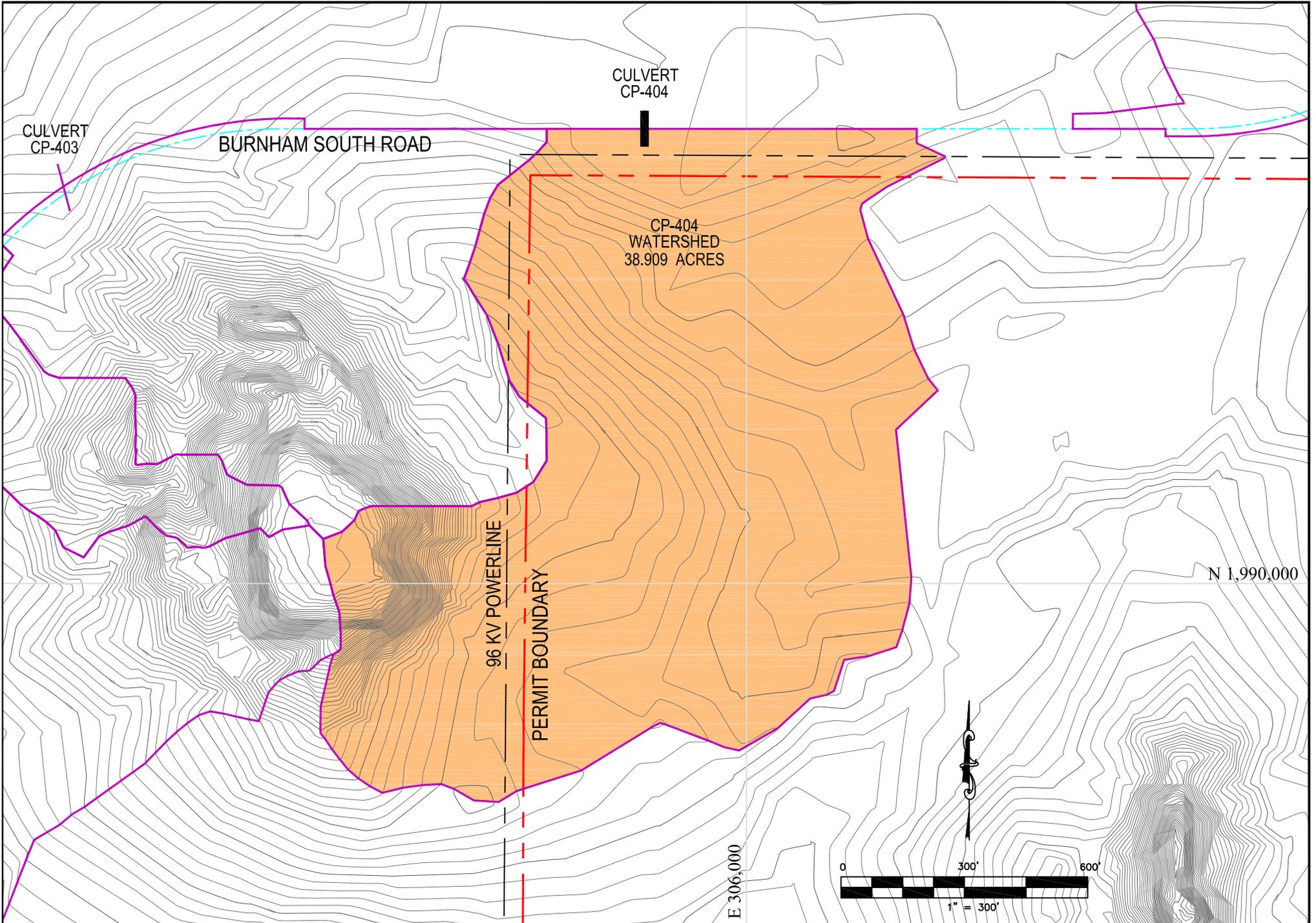
Tailwater Channel Data - Culvert CP-404

Tailwater Channel Option: Irregular Channel

Channel Slope: 0.0042

User Defined Channel Cross-Section:

Coord No.	Station (ft)	Elevation (ft)	Manning's n
1	0.00	5454.00	0.0370
2	20.37	5452.00	0.0370
3	100.00	5451.21	0.0370
4	150.00	5450.45	0.0370
5	250.00	5451.41	0.0370
6	279.89	5452.00	0.0370
7	300.00	5454.00	0.0370



BURNHAM SOUTH ROAD
25-YR 24-HR STORM

CULVERT CP-405

STATION 76+10

BHP Billiton

GEOMAT Inc.
915 Malta Avenue
Farmington, NM 87401

Phone: (505) 327-7928

General Information

Storm Information:

Storm Type:	Type II-70
Design Storm:	25 yr - 24 hr
Rainfall Depth:	2.060 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	CULVERT CP-405

#1 Null

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	9.491	9.491	15.10	0.58

Structure Detail:

Structure #1 (Null)

CULVERT CP-405

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	9.491	0.115	0.000	0.000	82.900	M	15.10	0.578
Σ		9.491						15.10	0.578

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	1.56	24.27	1,558.15	3.740	0.115
#1	1	Time of Concentration:					0.115

HY-8 Culvert Analysis Report

CULVERT CP-405 - STATION 76+10

Culvert Data Summary - Culvert CP-405

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Inlet Type: Conventional
Inlet Edge Condition: Square Edge with Headwall
Inlet Depression: None

Site Data - Culvert CP-405

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 5430.87 ft
Outlet Station: 117.00 ft
Outlet Elevation: 5426.75 ft
Number of Barrels: 1

Table 1 - Culvert Summary Table: Culvert CP-405

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	5430.87	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.51	1.51	5431.44	0.567	0.0*	1-S2n	0.334	0.421	0.340	0.192	4.173	1.065
3.02	3.02	5431.68	0.813	0.0*	1-S2n	0.480	0.606	0.485	0.249	5.089	1.266
4.53	4.53	5431.88	1.008	0.0*	1-S2n	0.601	0.743	0.602	0.290	5.687	1.402
6.04	6.04	5432.07	1.196	0.0*	1-S2n	0.694	0.865	0.699	0.323	6.161	1.506
7.55	7.55	5432.24	1.370	0.0*	1-S2n	0.787	0.975	0.788	0.351	6.566	1.593
9.06	9.06	5432.41	1.537	0.0*	1-S2n	0.869	1.070	0.869	0.376	6.908	1.667
10.57	10.57	5432.57	1.702	0.0*	1-S2n	0.949	1.162	0.952	0.398	7.162	1.732
12.08	12.08	5432.74	1.867	0.0*	1-S2n	1.028	1.246	1.028	0.419	7.423	1.791
13.59	13.59	5432.91	2.038	0.0*	5-S2n	1.105	1.323	1.107	0.438	7.620	1.845
15.10	15.10	5433.09	2.218	0.0*	5-S2n	1.181	1.400	1.181	0.455	7.818	1.894

* theoretical depth is impractical. Depth reported is corrected.

 Inlet Elevation (invert): 5430.87 ft, Outlet Elevation (invert): 5426.75 ft
 Culvert Length: 117.00 ft, Culvert Slope: 0.0352

Roadway Data for Crossing: Culvert CP-405

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	5435.57
2	150.00	5436.47
3	300.00	5437.37

Roadway Surface: Gravel

Roadway Top Width: 36.00 ft

Table 2 - Downstream Channel Rating Curve (Crossing: Culvert CP-405)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	5426.75	0.00	0.00	0.00	0.00
1.51	5426.94	0.19	1.06	0.19	0.61
3.02	5427.00	0.25	1.27	0.25	0.63
4.53	5427.04	0.29	1.40	0.29	0.65
6.04	5427.07	0.32	1.51	0.32	0.66
7.55	5427.10	0.35	1.59	0.35	0.67
9.06	5427.13	0.38	1.67	0.38	0.68
10.57	5427.15	0.40	1.73	0.40	0.68
12.08	5427.17	0.42	1.79	0.42	0.69
13.59	5427.19	0.44	1.84	0.44	0.69
15.10	5427.21	0.46	1.89	0.45	0.70

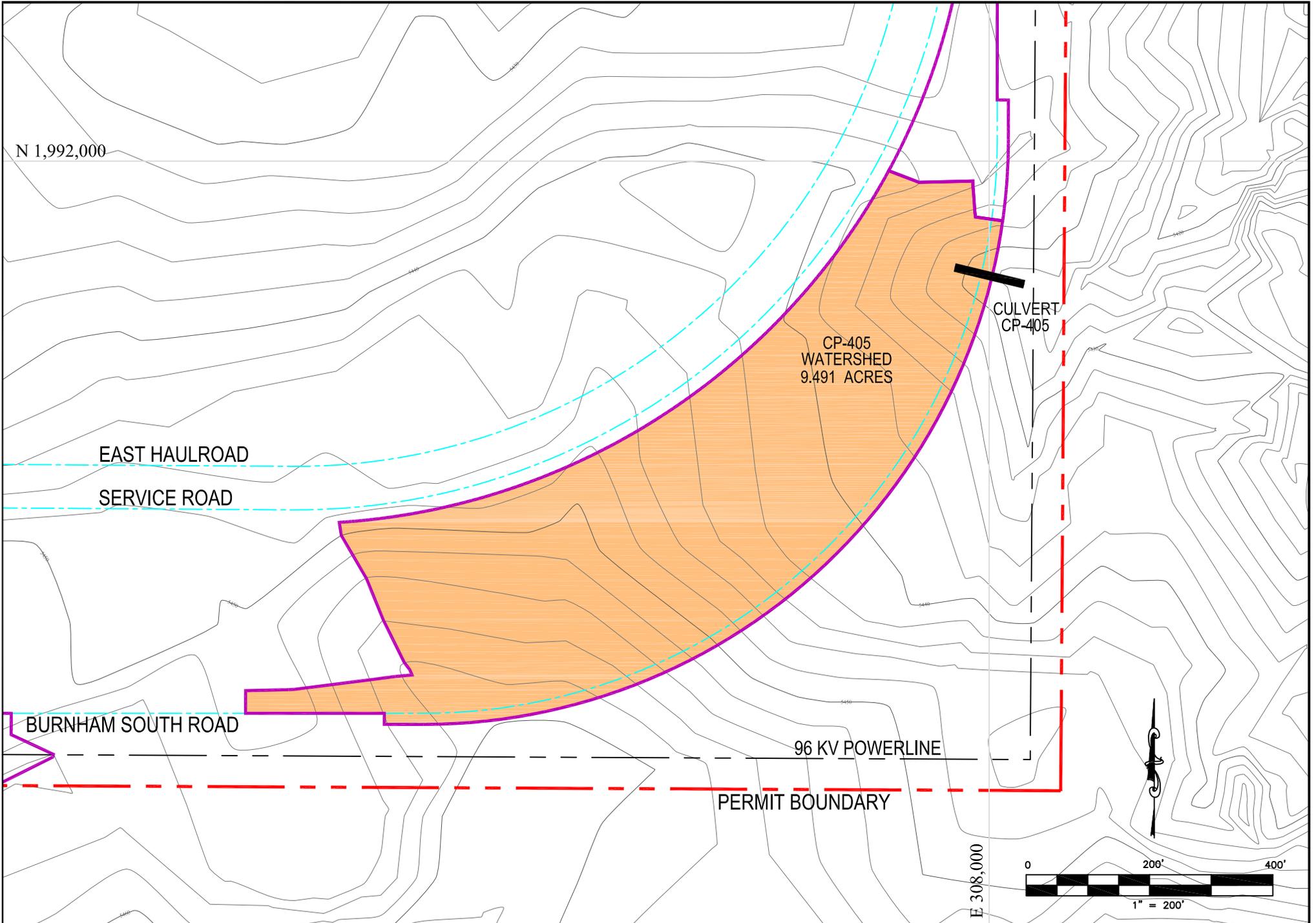
Tailwater Channel Data - Culvert CP-405

Tailwater Channel Option: Irregular Channel

Channel Slope: 0.0160

User Defined Channel Cross-Section:

Coord No.	Station (ft)	Elevation (ft)	Manning's n
1	0.00	5432.91	0.0370
2	42.40	5432.00	0.0370
3	91.30	5430.00	0.0370
4	124.48	5428.00	0.0370
5	150.00	5426.75	0.0370
6	220.43	5428.00	0.0370
7	300.00	5430.00	0.0000



N 1,992,000

CULVERT
CP-405

CP-405
WATERSHED
9.491 ACRES

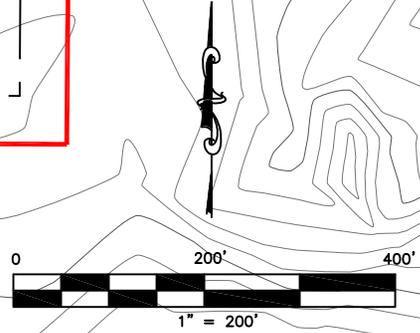
EAST HAULROAD
SERVICE ROAD

BURNHAM SOUTH ROAD

96 KV POWERLINE

PERMIT BOUNDARY

E 308,000



BURNHAM SOUTH ROAD
25-YR 24-HR STORM

CULVERT CP-406
STATION 115+90

BHP Billiton

GEOMAT Inc.
915 Malta Avenue
Farmington, NM 87401

Phone: (505) 327-7928

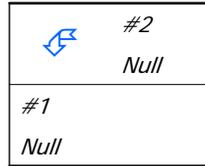
General Information

Storm Information:

Storm Type:	Type II-70
Design Storm:	25 yr - 24 hr
Rainfall Depth:	2.060 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	CULVERT CP-406
Null	#2	==>	#1	0.000	0.000	CP-406 DROP INLET



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#2	4.152	4.152	4.70	0.30
#1	5.477	9.629	12.36	0.63

Structure Detail:

Structure #2 (Null)

CP-406 DROP INLET

Structure #1 (Null)

CULVERT CP-406

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)
#2	1	4.152	0.303	0.000	0.000	89.000	M	4.70	0.298
	Σ	4.152						4.70	0.298
#1	1	5.477	0.066	0.000	0.000	82.900	M	8.72	0.334
	Σ	9.629						12.36	0.632

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	1.90	18.90	993.33	4.130	0.066
#1	1	Time of Concentration:					0.066
#2	1	8. Large gullies, diversions, and low flowing streams	1.48	58.80	3,978.57	3.640	0.303
#2	1	Time of Concentration:					0.303

HY-8 Culvert Analysis Report

CULVERT CP-406 – STATION 155+90

Culvert Data Summary - Culvert CP-406

Barrel Shape: Circular
Barrel Diameter: 2.50 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Inlet Type: Conventional
Inlet Edge Condition: Square Edge with Headwall
Inlet Depression: None

Site Data - Culvert CP-406

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 5380.95 ft
Outlet Station: 180.00 ft
Outlet Elevation: 5380.00 ft
Number of Barrels: 1

Table 1 - Culvert Summary Table: Culvert CP-406

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	5380.95	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.24	1.24	5381.50	0.483	0.553	2-M2c	0.458	0.341	0.361	0.280	2.830	2.715
2.47	2.47	5381.74	0.703	0.791	2-M2c	0.651	0.511	0.514	0.364	3.403	3.228
3.71	3.71	5381.93	0.863	0.983	2-M2c	0.809	0.621	0.632	0.423	3.802	3.573
4.94	4.94	5382.09	1.007	1.144	2-M2c	0.945	0.730	0.733	0.472	4.122	3.839
6.18	6.18	5382.24	1.134	1.292	2-M2c	1.069	0.816	0.823	0.513	4.392	4.059
7.42	7.42	5382.38	1.251	1.434	2-M2c	1.186	0.897	0.904	0.549	4.633	4.249
8.65	8.65	5382.51	1.365	1.562	2-M2c	1.301	0.977	0.980	0.582	4.851	4.416
9.89	9.89	5382.64	1.475	1.690	2-M2c	1.412	1.046	1.050	0.611	5.055	4.565
11.12	11.12	5382.76	1.581	1.814	2-M2c	1.524	1.111	1.117	0.639	5.243	4.702
12.36	12.36	5382.89	1.683	1.938	2-M2c	1.640	1.175	1.180	0.665	5.422	4.827

* theoretical depth is impractical. Depth reported is corrected.

 Inlet Elevation (invert): 5380.95 ft, Outlet Elevation (invert): 5380.00 ft
 Culvert Length: 180.00 ft, Culvert Slope: 0.0053

Roadway Data for Crossing: Culvert CP-406

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
1	0.00	5384.48
2	50.00	5385.59
3	100.00	5386.65
4	150.00	5387.64
5	200.00	5388.56

Roadway Surface: Gravel

Roadway Top Width: 97.00 ft

Table 2 - Downstream Channel Rating Curve (Crossing: Culvert CP-406)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	5280.00	0.00	0.00	0.00	0.00
1.24	5280.28	0.28	2.71	1.19	1.28
2.47	5280.36	0.36	3.23	1.55	1.33
3.71	5280.42	0.42	3.57	1.80	1.37
4.94	5280.47	0.47	3.84	2.01	1.39
6.18	5280.51	0.51	4.06	2.18	1.41
7.42	5280.55	0.55	4.25	2.34	1.43
8.65	5280.58	0.58	4.42	2.48	1.44
9.89	5280.61	0.61	4.57	2.61	1.46
11.12	5280.64	0.64	4.70	2.72	1.47
12.36	5280.66	0.66	4.83	2.83	1.48

Tailwater Channel Data - Culvert CP-406

Tailwater Channel Option: Irregular Channel

Channel Slope: 0.0683

User Defined Channel Cross-Section:

Coord No.	Station (ft)	Elevation (ft)	Manning's n
1	0.00	5384.00	0.0370
2	32.64	5382.00	0.0370
3	66.21	5380.00	0.0370
4	100.00	5280.00	0.0370
5	122.49	5282.00	0.0370
6	140.43	5284.00	0.0370
7	160.86	5286.00	0.0370
8	200.00	5387.64	0.0000

