

SECTION 40

ENVIRONMENTAL PROTECTION

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SECTION 40

ENVIRONMENTAL PROTECTION

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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) |
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| <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) |
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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 segment of the Burnham Road (BIA 3005 and Navajo Road N5082) through Area 4 South to accomplish maximum recovery of the coal resource. The alignment of the new road will be within the BNCC lease area along the eastern boundary and reconnected to the existing road. The realignment will enhance the safety of the public using the road by relocating the road away from mining

activities. BNCC will follow the procedures described in 30 CFR 761.14 and obtain all the necessary approvals for construction of the road realignment.

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 42.5.

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 |

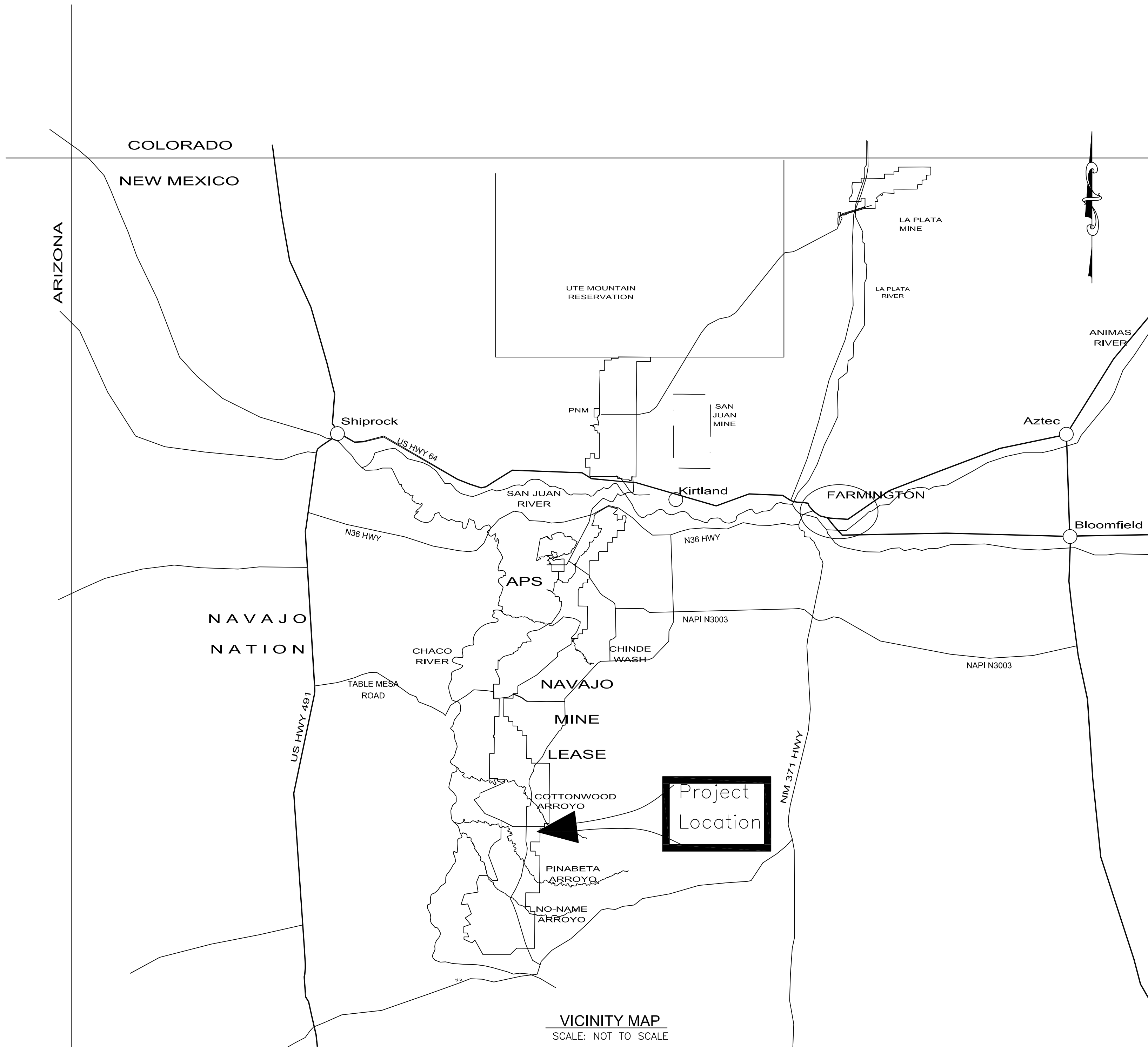
Table 40.8-1 Fugitive Dust Control Measures

| | 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

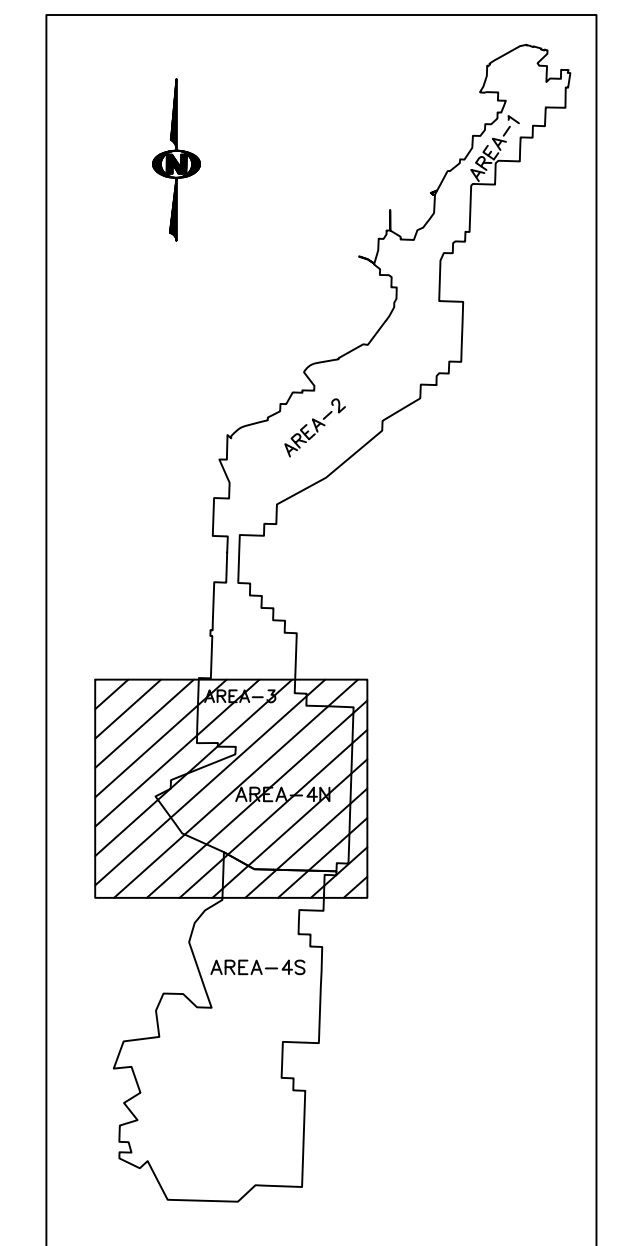


| INDEX OF SHEETS | |
|-----------------|---|
| SHEET NO. | DESCRIPTION |
| 1 | COVER SHEET & SHEET INDEX |
| 2 | SITE PLAN, GENERAL NOTES, QUANTITIES AND CURVE TABLE |
| 3 | PLAN AND PROFILE: BURNHAM SOUTH ROAD STA 0+00 TO 29+00 |
| 4 | PLAN AND PROFILE: BURNHAM SOUTH ROAD STA 29+00 TO 59+00 |
| 5 | 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 |
| | HORIZ. & VERT. CONTROL |
| | 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 | DESCRIPTION |
|----------|----------|-----------------------------|
| 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

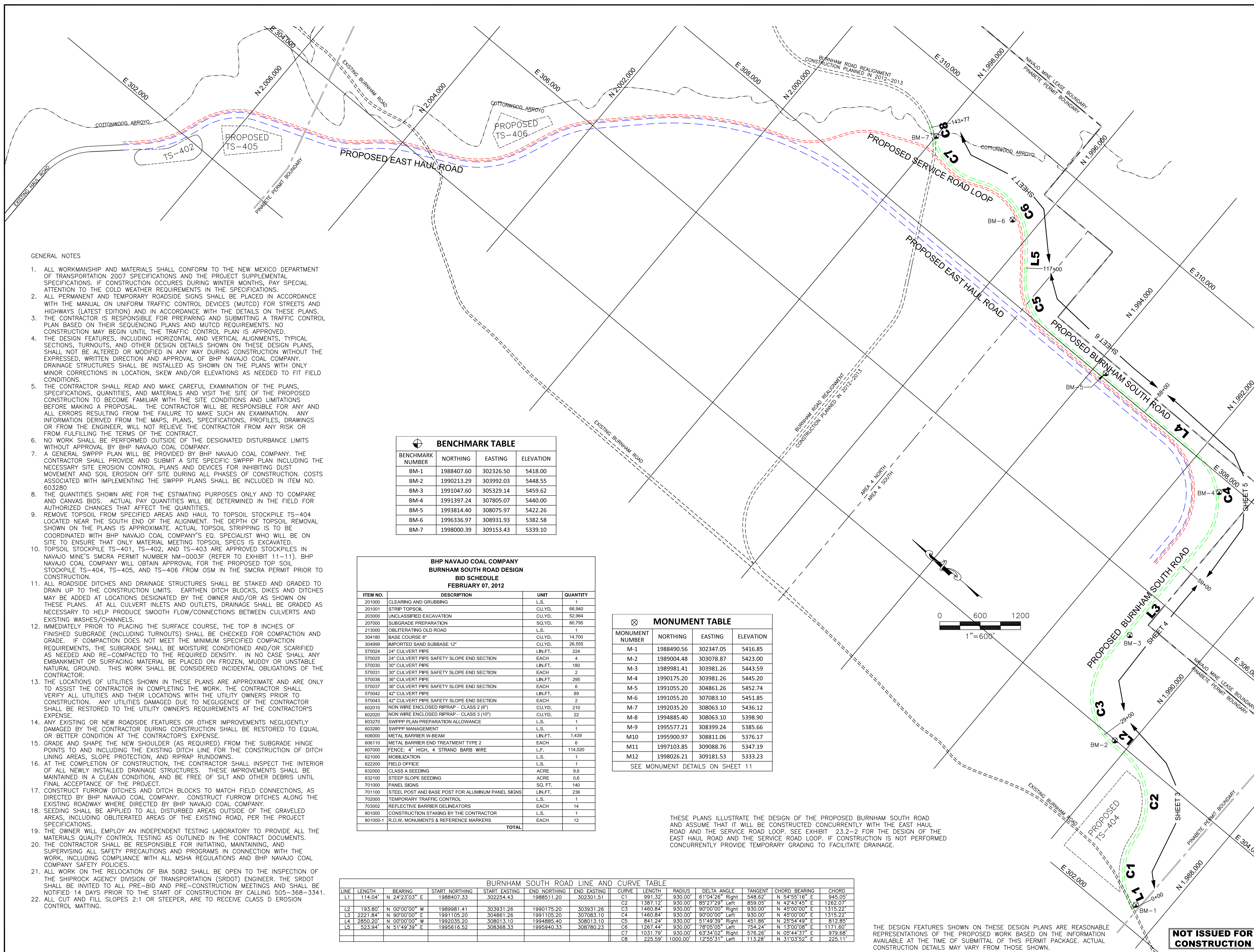
PINABETE PERMIT

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



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

- 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.
 20. 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 | SO.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 | LIN.FT. | 224 |
| 570025 | 24" CULVERT PIPE SAFETY SLOPE END SECTION | EACH | 4 |
| 570030 | 30" CULVERT PIPE | LIN.FT. | 180 |
| 570031 | 30" CULVERT PIPE SAFETY SLOPE END SECTION | EACH | 2 |
| 570036 | 36" CULVERT PIPE | LIN.FT. | 295 |
| 570037 | 36" CULVERT PIPE SAFETY SLOPE END SECTION | EACH | 6 |
| 570042 | 42" CULVERT PIPE | LIN.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 | LIN.FT. | 1,439 |
| 606110 | METAL BARRIER END TREATMENT TYPE 2 | EACH | 6 |
| 607000 | FENCE: 4" HIGH, 4 STRAND BARB WIRE | L.F. | 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 | SO. FT. | 140 |
| 701100 | STEEL POST AND BASE POST FOR ALUMINUM PANEL SIGNS | LIN.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

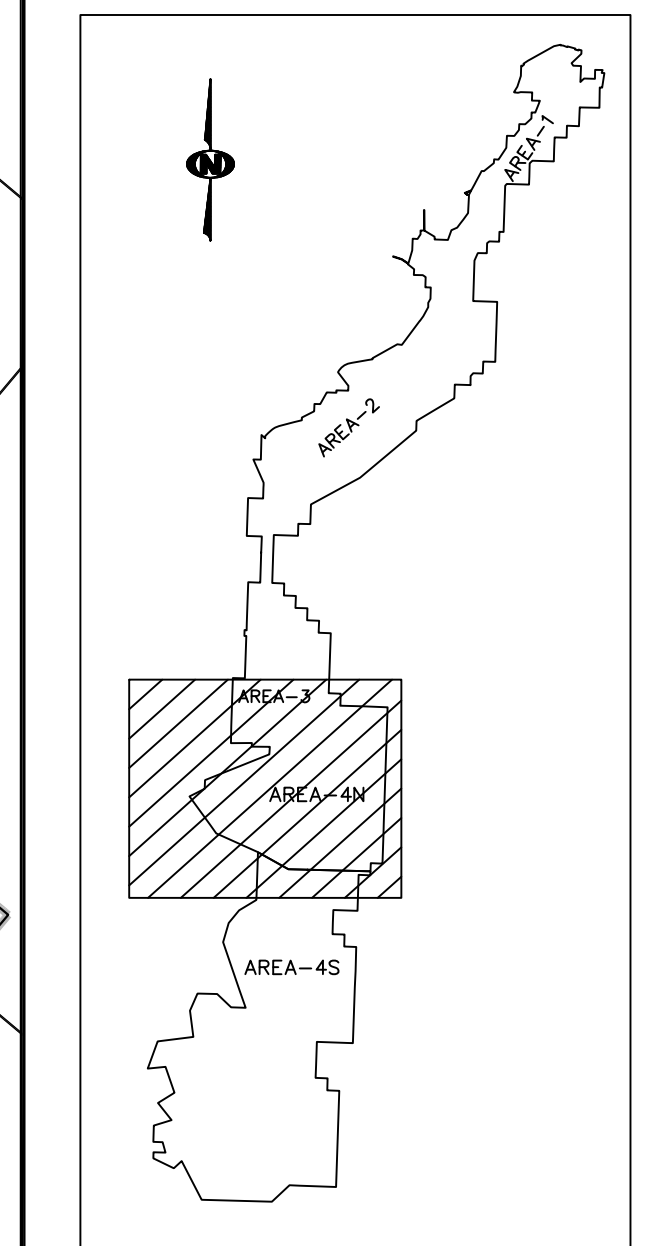
| MONUMENT NUMBER | NORTHING | EASTING | ELEVATION |
|-----------------|------------|-----------|-----------|
| M-1 | 1988490.56 | 302347.05 | 5416.85 |
| M-2 | 1989004.48 | 303078.87 | 5423.00 |
| M-3 | 1989981.41 | 303981.26 | 5443.59 |
| M-4 | 1990175.20 | 303981.26 | 5445.20 |
| M-5 | 1991055.20 | 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

| L/INE | 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 | 1450.84' | 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 | 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 | 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 | 979.88' |
| | | | | | | | C8 | 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.



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.



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|---|----------|-----------------------------|
| 1 | 03-15-12 | REVISED TITLE & TITLE BLOCK |
| 0 | 02-07-12 | INITIAL PERMIT SUBMITTAL |

EXHIBIT 40.6-1



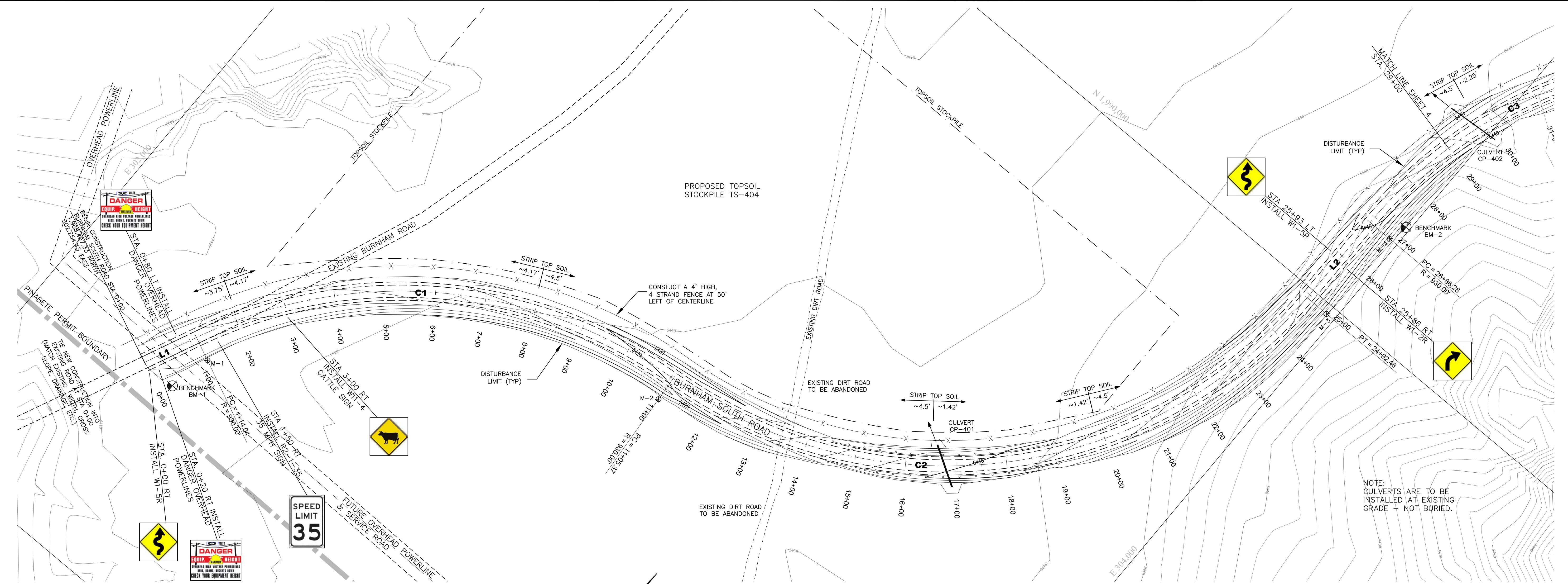
BHP Navajo Coal Company
P.O. Box 1717
Fruitland, New Mexico, 87416
Phone: 505-598-4200
Fax: 505-568-3361

PINABETE PERMIT

**BURNHAM SOUTH ROAD DESIGN
SITE PLAN, GENERAL NOTES,
QUANTITIES AND CURVE TABLE**

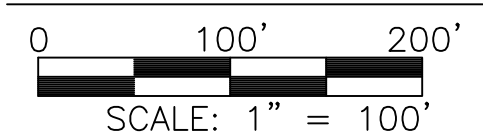
SHEET: 2 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012
GEOMAT PROJECT NO. 112-1434

NOT ISSUED FOR CONSTRUCTION

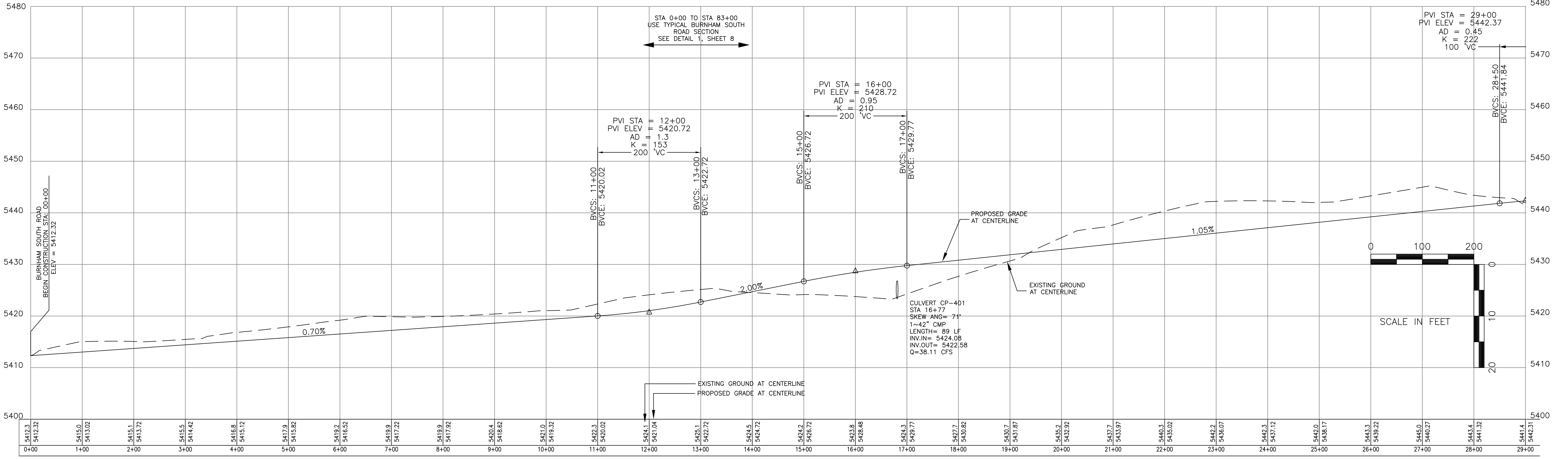


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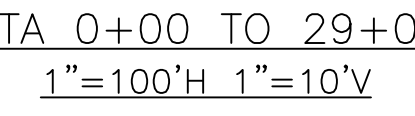
BURNHAM SOUTH ROAD
STA 0+00 TO 29+00



| LINE | LENGTH | BEARING | START NORTHING | START EASTING | END NORTHING | END EASTING | CURVE | LENGTH | RADIUS | DELTA ANGLE | TANGENT | CHORD BEARING | CHORD |
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BURNHAM SOUTH ROAD
STA 0+00 TO 29+00

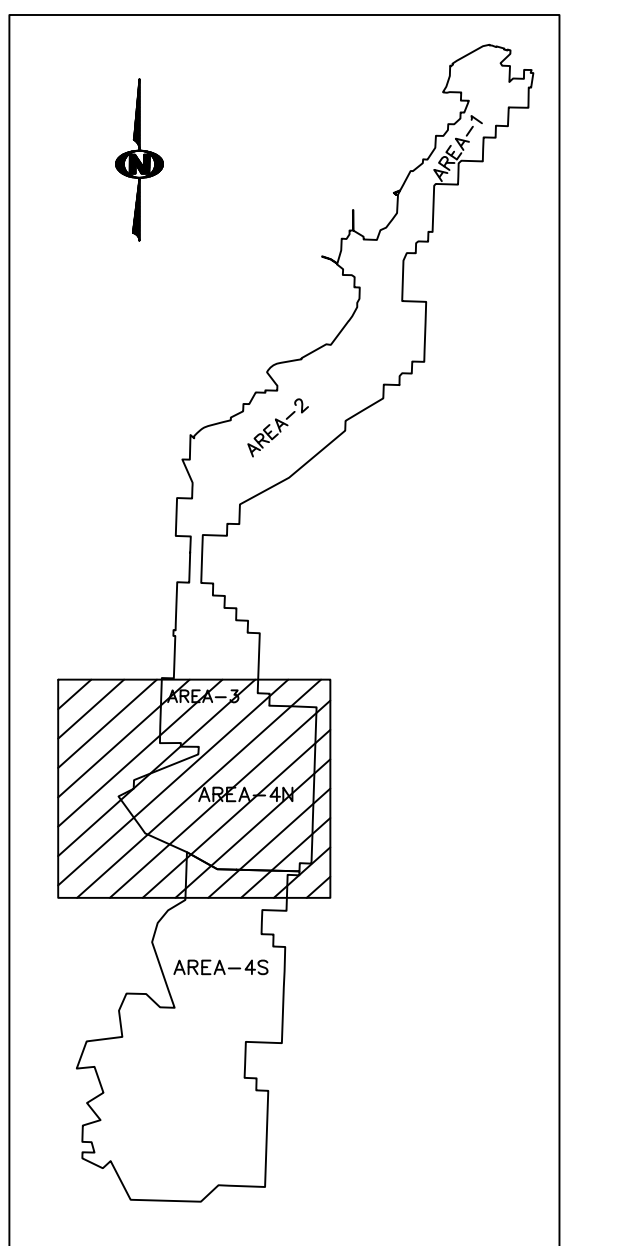


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NOT ISSUED FOR CONSTRUCTION

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
- SPOT ELEVATION
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- 218 5422.45
- L-30
- LEASE CORNER
- LEASE BOUNDARY
- PERMIT BOUNDARY



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EXHIBIT 40.6-1

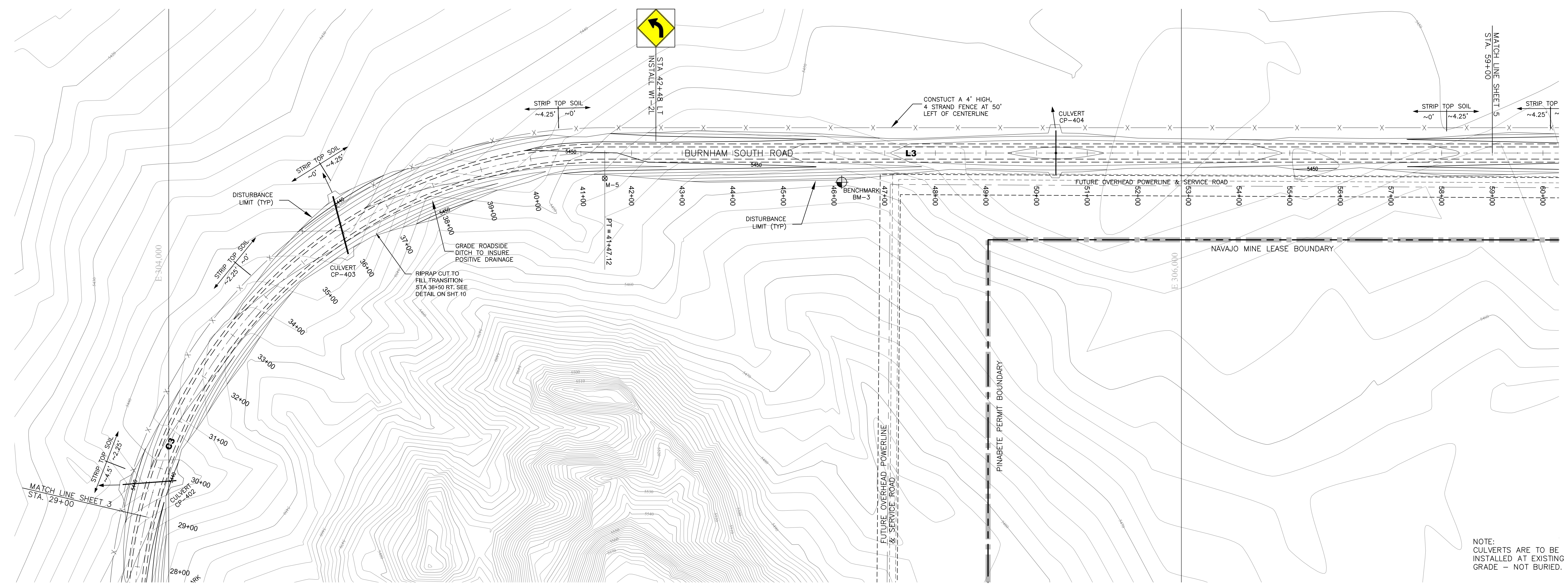


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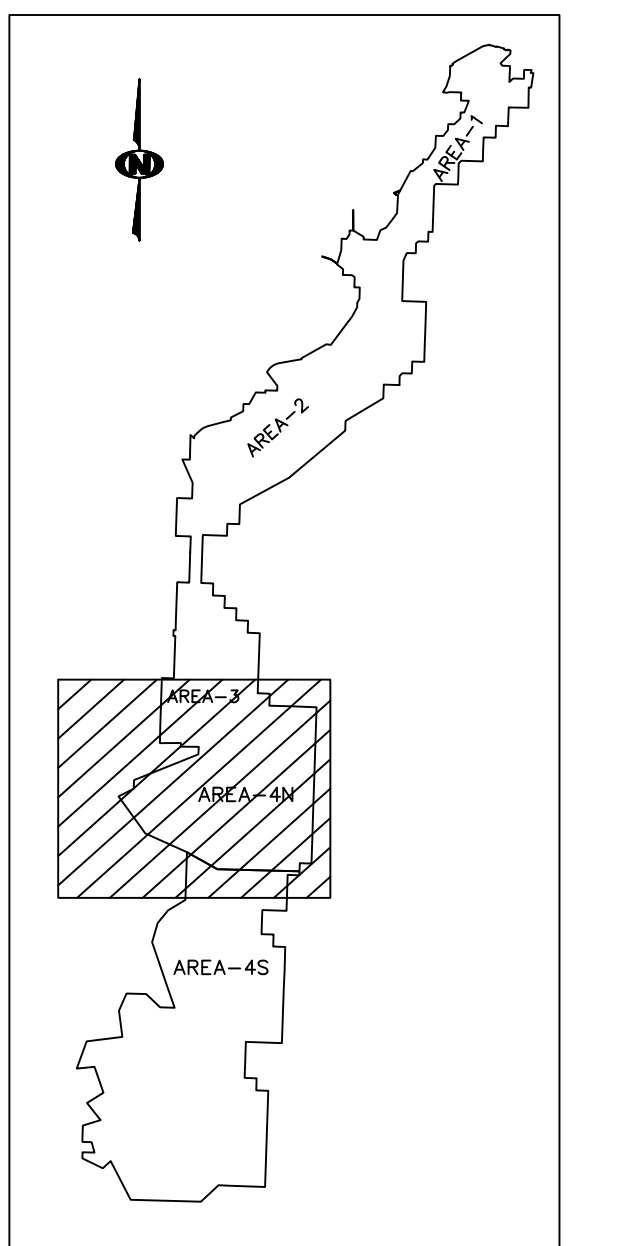
PINABETE PERMIT

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



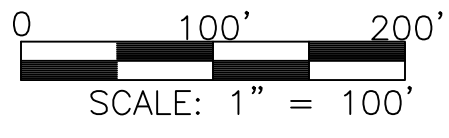
- LEGEND**
- BURNHAM SOUTH ROAD
 - EAST HAUL ROAD
 - SERVICE ROAD & SERVICE ROAD LOOP
 - PAVED ROAD
 - DIRT ROAD
 - TRAIL
 - BUILDING
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 - DRAINAGE
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 - TREES
 - POWERLINE
 - x 5338.5 SPOT ELEVATION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



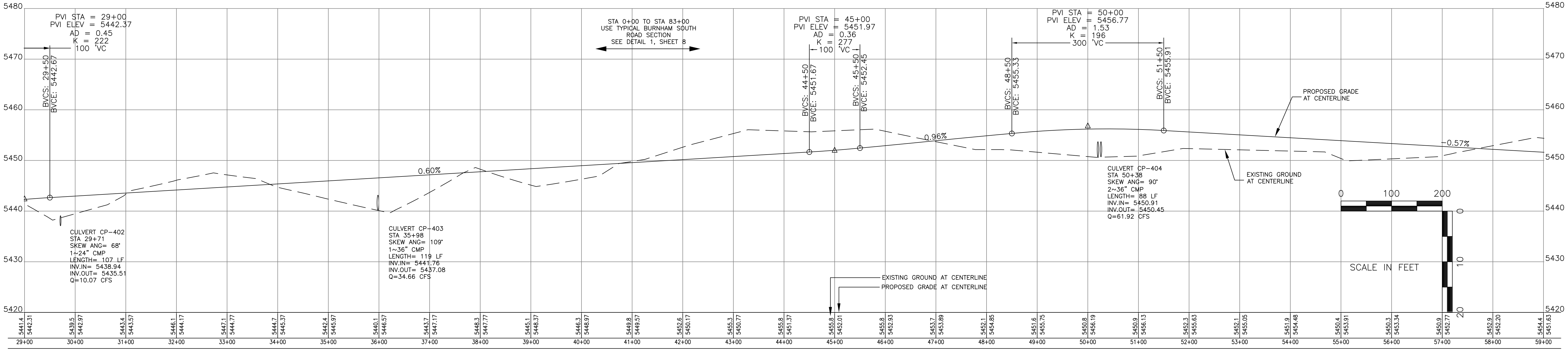
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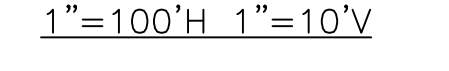
BURNHAM SOUTH ROAD
STA 29+00 TO 59+00



| LINE | LENGTH | BEARING | START NORTHING | START EASTING | END NORTHING | END EASTING | CURVE | LENGTH | RADIUS | DELTA ANGLE | TANGENT | CHORD BEARING | CHORD |
|------|----------|---------------|----------------|---------------|--------------|-------------|-------|----------|----------|-----------------|---------|---------------|----------|
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BURNHAM SOUTH ROAD
STA 29+00 TO 59+00



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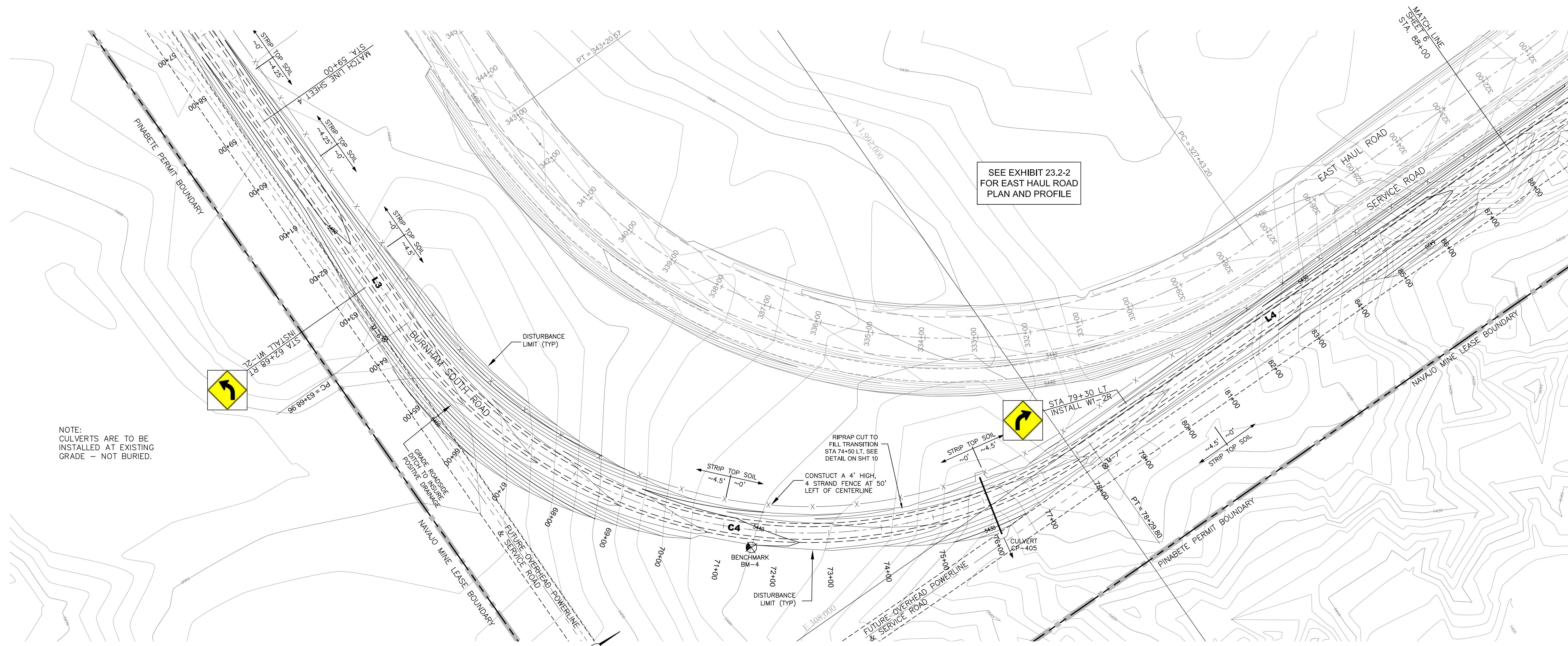


BHP Navajo Coal Company
P.O. Box 1717 • Fruitland, New Mexico, 87416 • Phone: 505-598-4200
Fruita@navajo.com • Fax: 505-568-3361

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

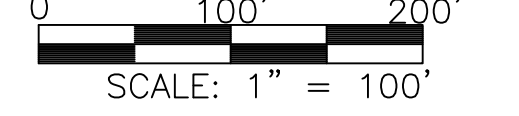


SEE EXHIBIT 23.2-2
FOR EAST HAUL ROAD
PLAN AND PROFILE

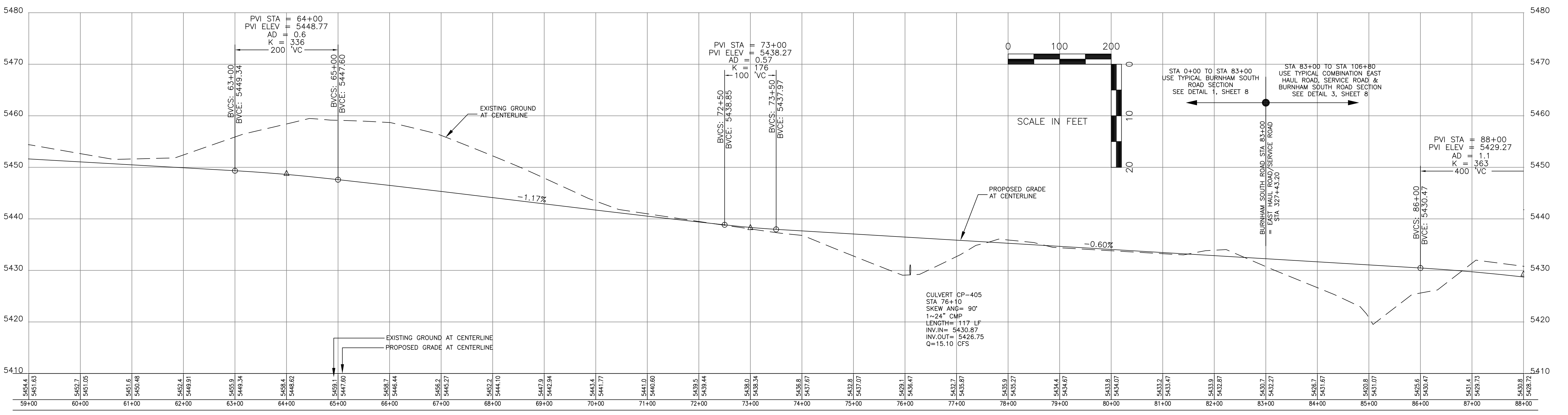
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BURNHAM SOUTH ROAD
STA 59+00 TO 88+00



| LINE | LENGTH | BEARING | START NORTHING | START EASTING | END NORTHING | END EASTING | CURVE | LENGTH | RADIUS | DELTA ANGLE | TANGENT | CHORD BEARING | CHORD |
|------|----------|---------------|----------------|---------------|--------------|-------------|-------|----------|----------|-----------------|---------|---------------|----------|
| L1 | 114.04' | N 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' |
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| L5 | 523.94' | N 51°49'39" E | 1995616.52 | 308368.33 | 1995940.33 | 308780.23 | C5 | 841.24' | 930.00' | 51°49'39" Right | 451.86' | N 25°54'49" E | 812.85' |
| | | | | | | | 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' |



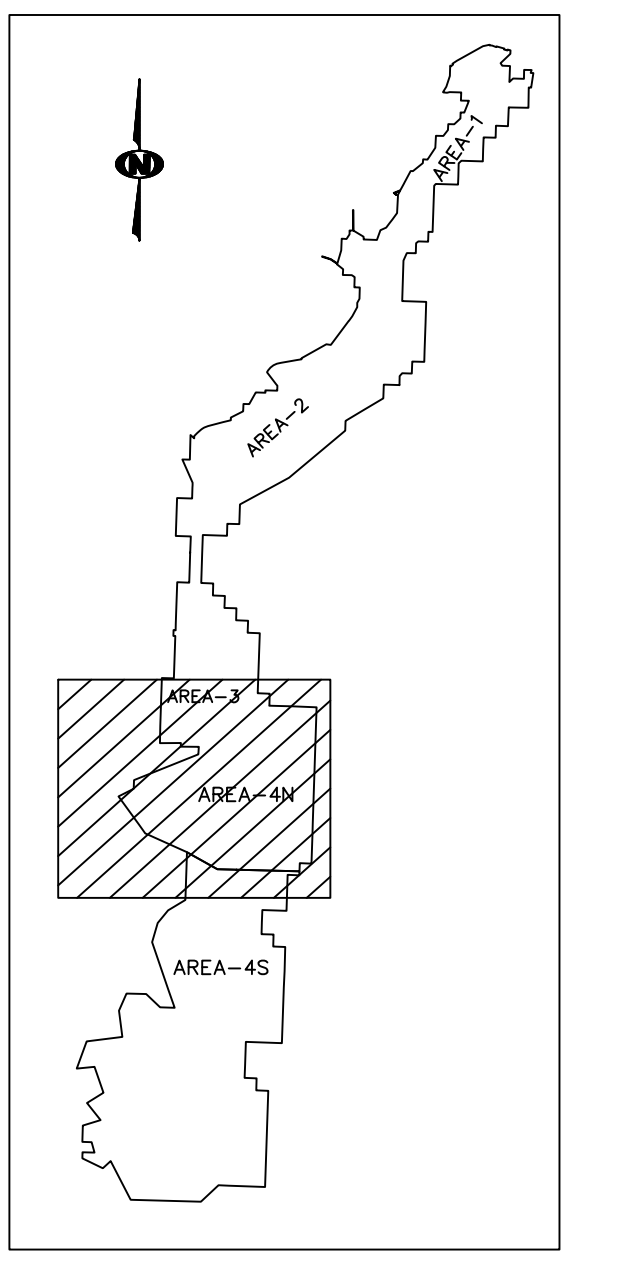
BURNHAM SOUTH ROAD
STA 59+00 TO 88+00
1"=100'H 1"=10'V

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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
- SPOT ELEVATION
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- 218 HORIZ. & VERT. CONTROL
- 5422.45
- 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.



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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

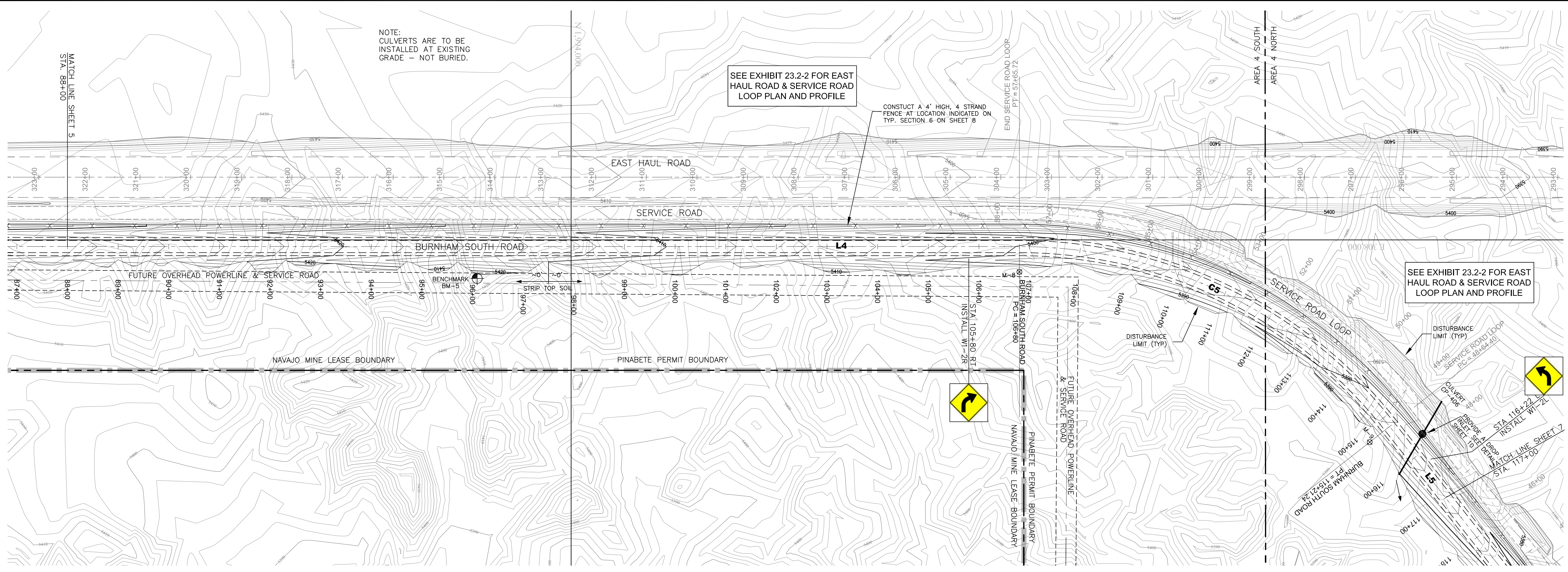
BHP Navajo Coal Company
P.O. Box 1717 • Fruittland, New Mexico, 87416 • Phone: 505-598-4200
Fax: 505-568-3361

PINABETE PERMIT

**PLAN & PROFILE:
BURNHAM SOUTH ROAD
STA 59+00 TO 88+00**

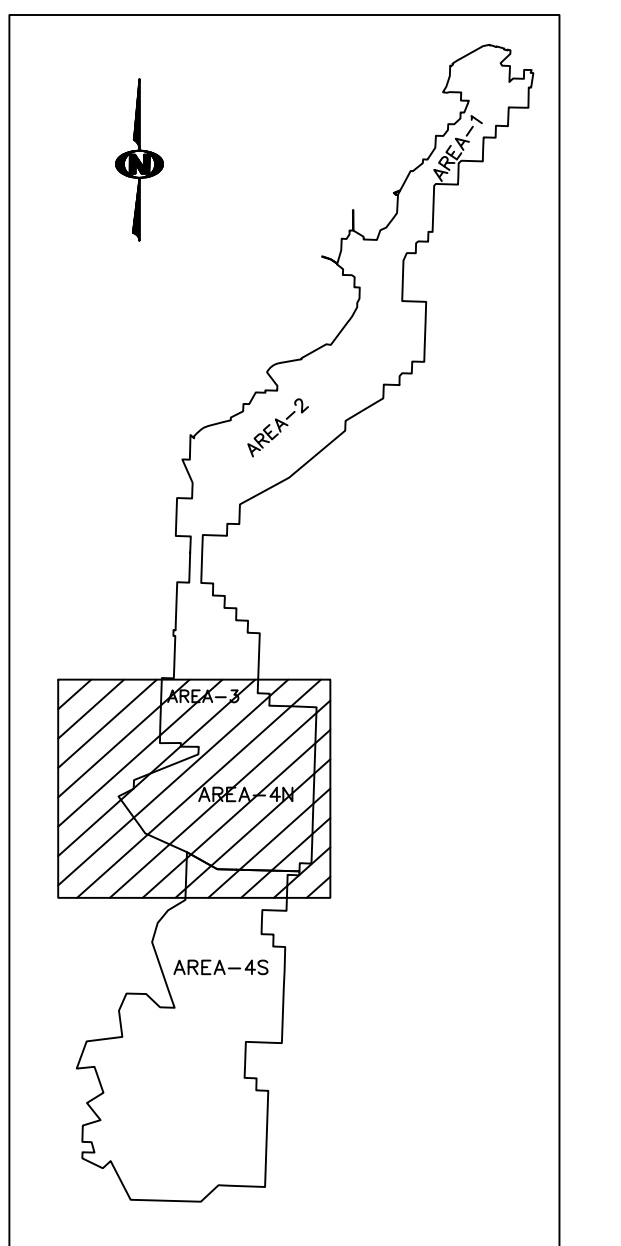
SHEET: 5 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012

GEOMAT PROJECT NO. 112-1434

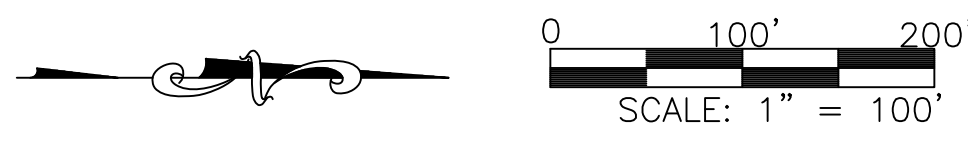


LEGEND

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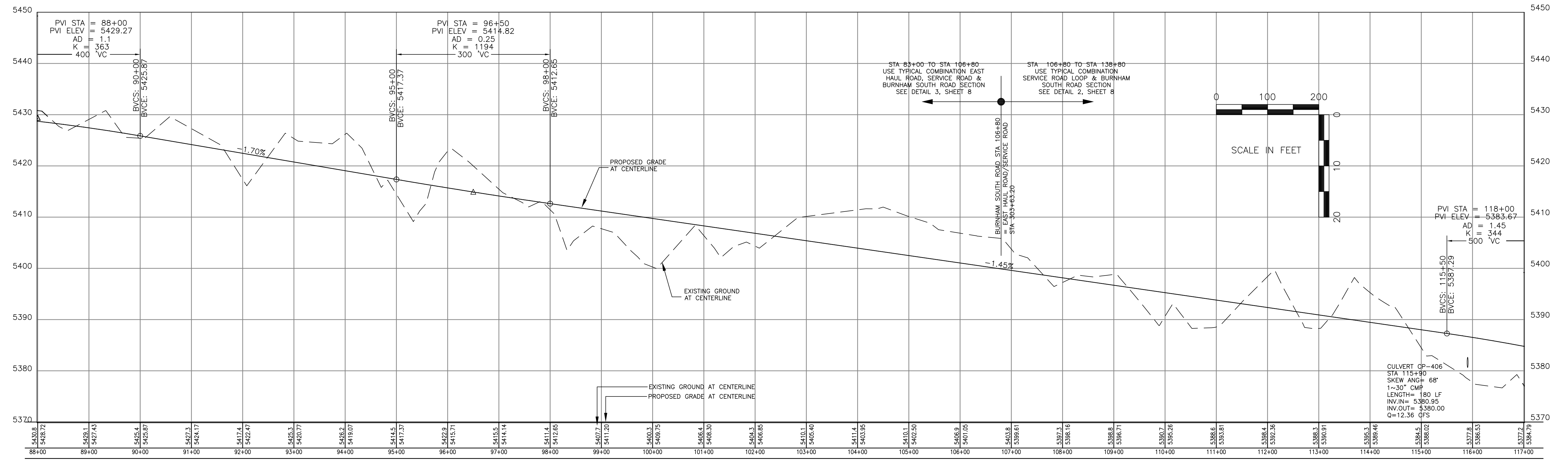
THESE PLANS ILLUSTRATE THE DESIGN OF THE PROPOSED BURNHAM SOUTH ROAD AND ASSUME THAT IT WILL BE CONSTRUCTED CONCURRENTLY WITH THE EAST HAUL ROAD AND THE SERVICE ROAD LOOP. SEE EXHIBIT 23.2-2 FOR THE DESIGN OF THE EAST HAUL ROAD AND THE SERVICE ROAD LOOP. IF CONSTRUCTION IS NOT PERFORMED CONCURRENTLY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



BURNHAM SOUTH ROAD
STA 88+00 TO 117+00

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

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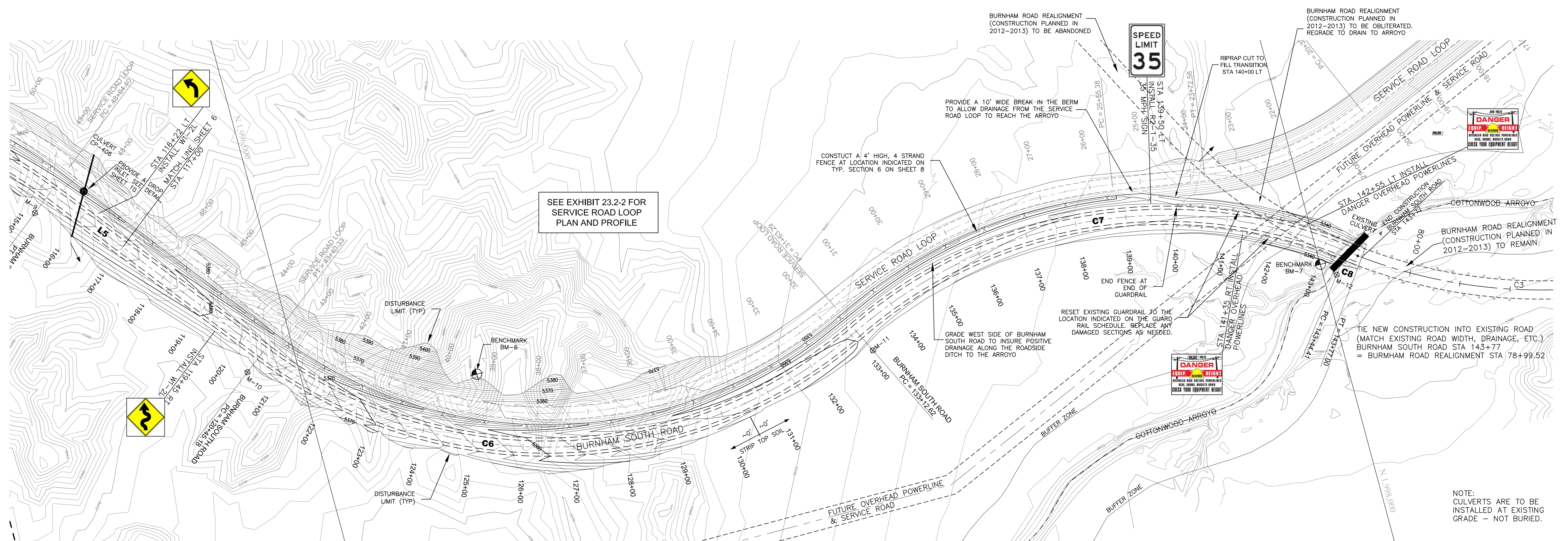
| | | |
|---|----------|-----------------------------|
| 1 | 03-15-12 | REVISED TITLE & TITLE BLOCK |
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EXHIBIT 40.6-1



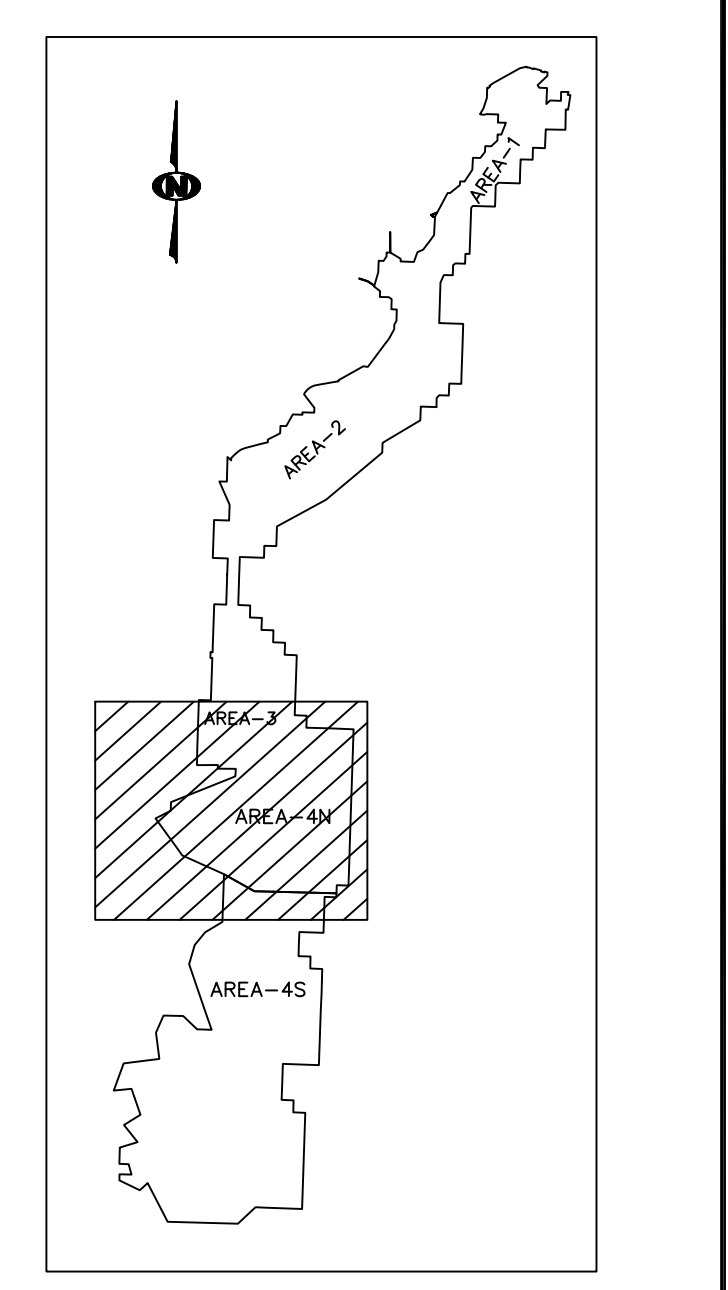
BHP Navajo Coal Company
P.O. Box 1717 • Phone: 505-598-4200
Fruita, New Mexico, 87416 • Fax: 505-568-3361

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
GEOMAT PROJECT NO. 112-1434



LEGEND

- BURNHAM SOUTH ROAD
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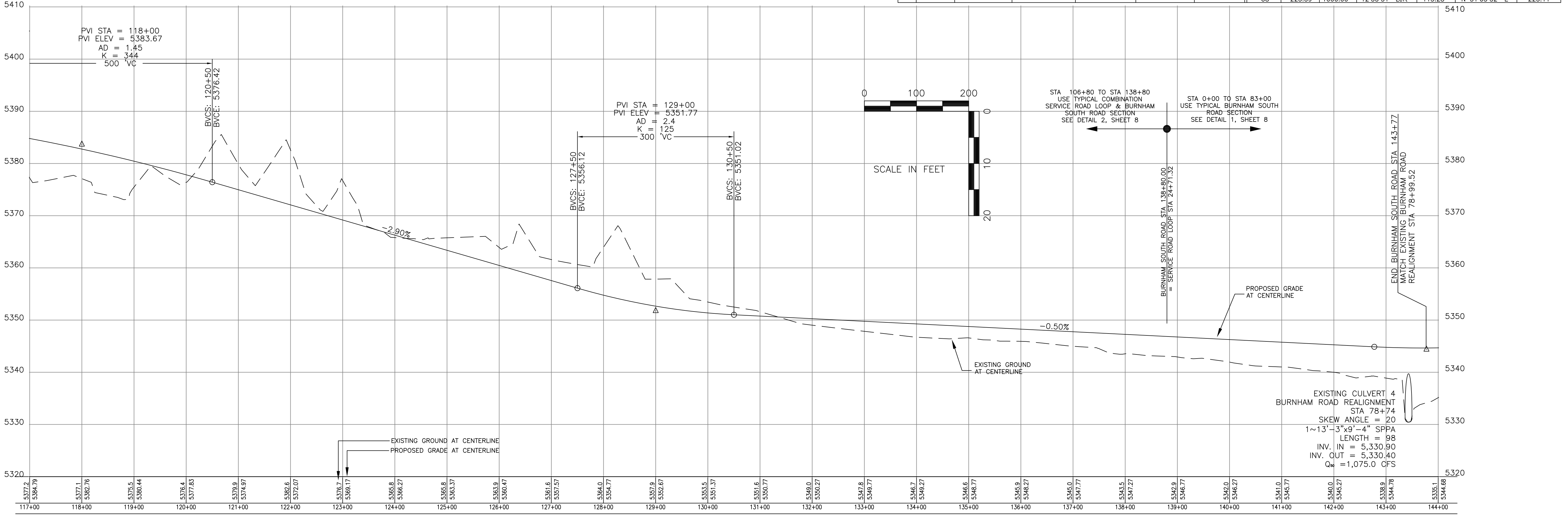
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BURNHAM SOUTH ROAD
 STA 117+00 TO 143+77

SCALE: 1" = 100'

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 |
|------|----------|---------------|----------------|---------------|--------------|-------------|-------|----------|----------|-----------------|---------|---------------|----------|
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BURNHAM SOUTH ROAD
 STA 117+00 TO 143+77

SCALE: 1" = 100' V, 1" = 10' H

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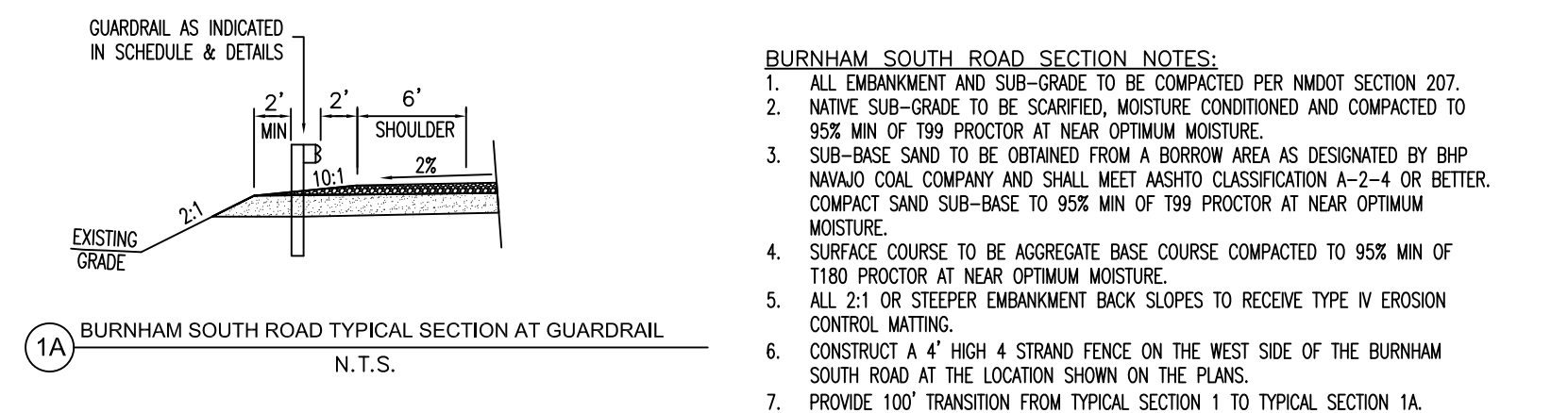
BHP Navajo Coal Company
 P.O. Box 1717, Fruitland, New Mexico, 87416 Phone: 505-598-4200 Fax: 505-568-3361

PINABETE PERMIT

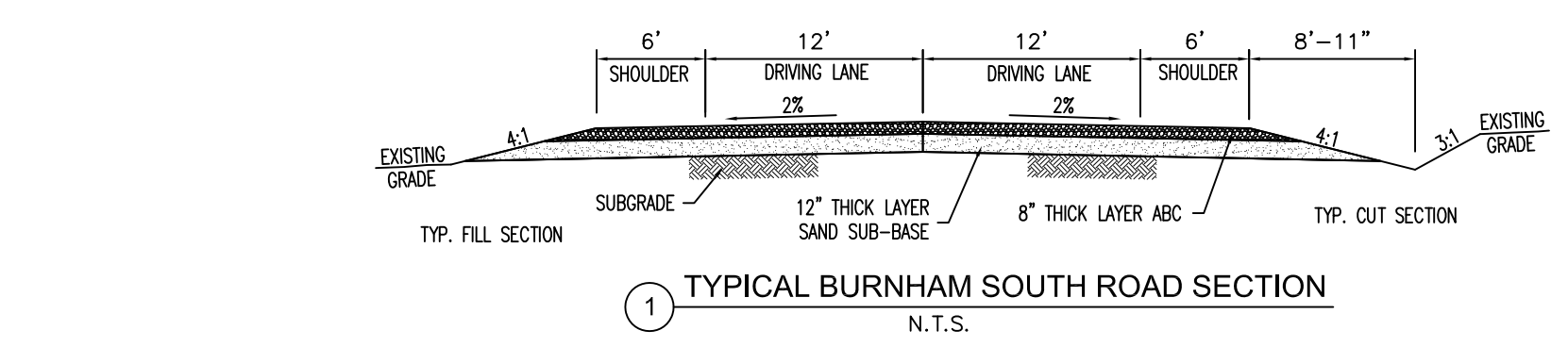
PLAN & PROFILE:
 BURNHAM SOUTH ROAD
 STA 117+00 TO 143+77

SHEET: 7 OF 11
 PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
 APPROVED BY: GM DATE: 02-07-2012

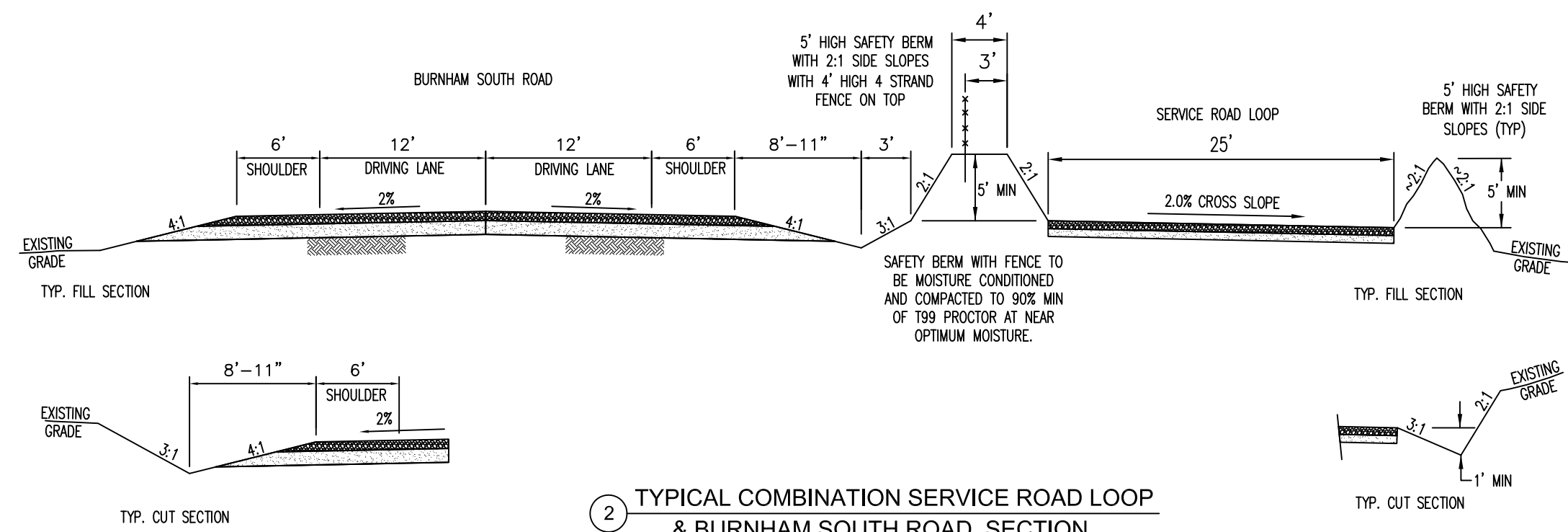
GEOMAT PROJECT NO. 112-1434



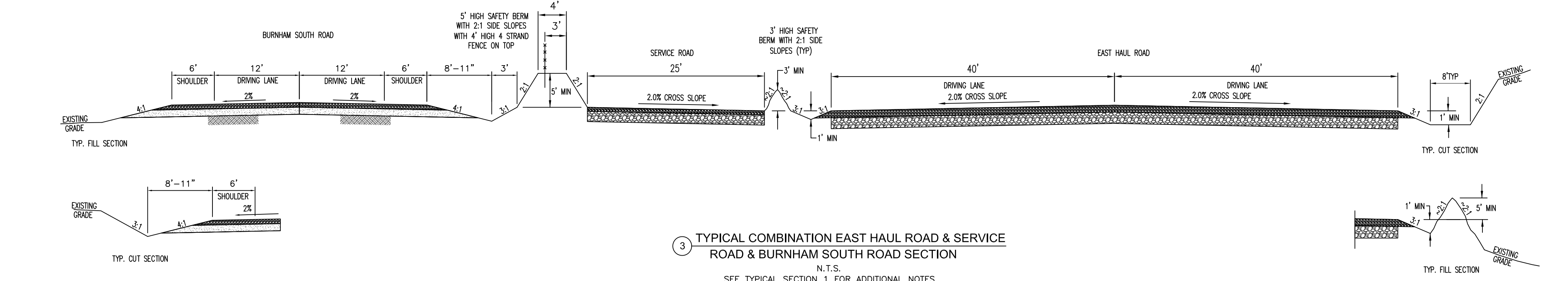
- BURNHAM SOUTH ROAD SECTION NOTES:**
1. ALL EMBANKMENT AND SUB-GRADE TO BE COMPACTED PER NMDOT SECTION 207. NATIVE SUB-GRADE TO BE SCARIFIED, MOISTURE CONDITIONED AND COMPACTED TO 95% MIN OF T99 PROCTOR AT NEAR OPTIMUM MOISTURE.
 2. SUB-BASE SAND TO BE OBTAINED FROM A BORROW AREA AS DESIGNATED BY BHP NAVAJO COAL COMPANY AND SHALL MEET ASHTO CLASSIFICATION A-2-4 OR BETTER. COMPACT SAND SUB-BASE TO 95% MIN OF T99 PROCTOR AT NEAR OPTIMUM MOISTURE.
 3. SURFACE COURSE TO BE AGGREGATE BASE COURSE COMPACTED TO 95% MIN OF T180 PROCTOR AT NEAR OPTIMUM MOISTURE.
 4. ALL 2:1 OR STEEPER EMBANKMENT BACK SLOPES TO RECEIVE TYPE IV EROSION CONTROL MATTING.
 5. CONSTRUCT A 4' HIGH 4 STRAND FENCE ON THE WEST SIDE OF THE BURNHAM SOUTH ROAD AT THE LOCATION SHOWN ON THE PLANS.
 6. PROVIDE 100' TRANSITION FROM TYPICAL SECTION 1 TO TYPICAL SECTION 1A.



1 TYPICAL BURNHAM SOUTH ROAD SECTION
N.T.S.



2 TYPICAL COMBINATION SERVICE ROAD LOOP & BURNHAM SOUTH ROAD SECTION
N.T.S.
SEE TYPICAL SECTION 1 FOR ADDITIONAL NOTES

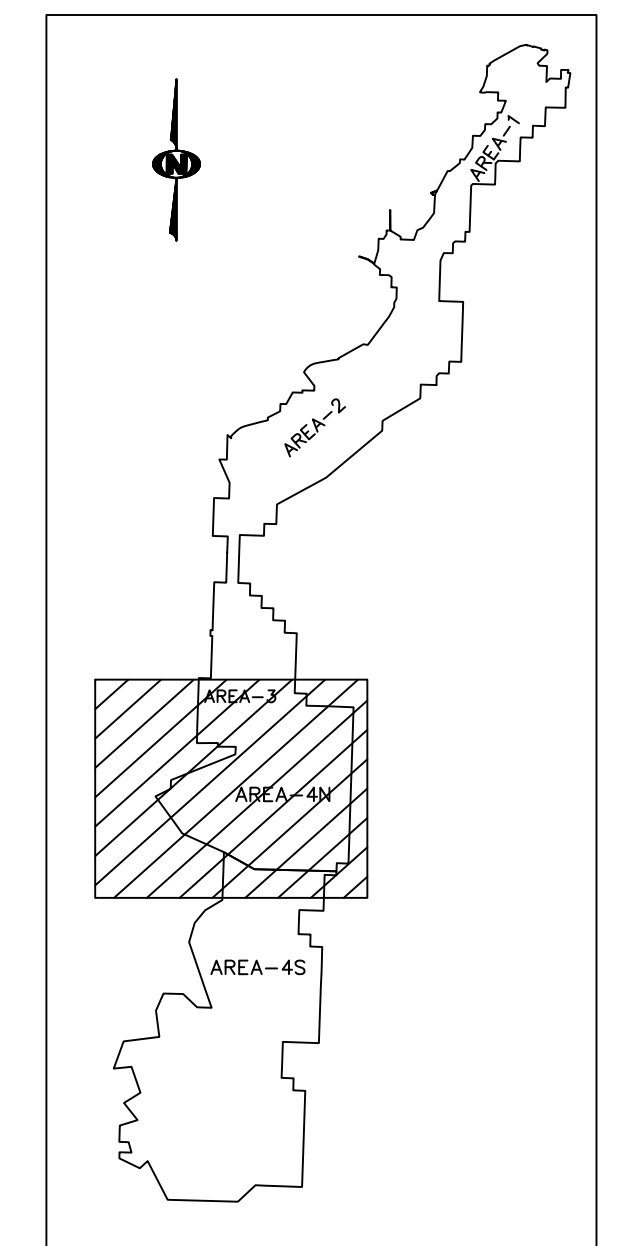
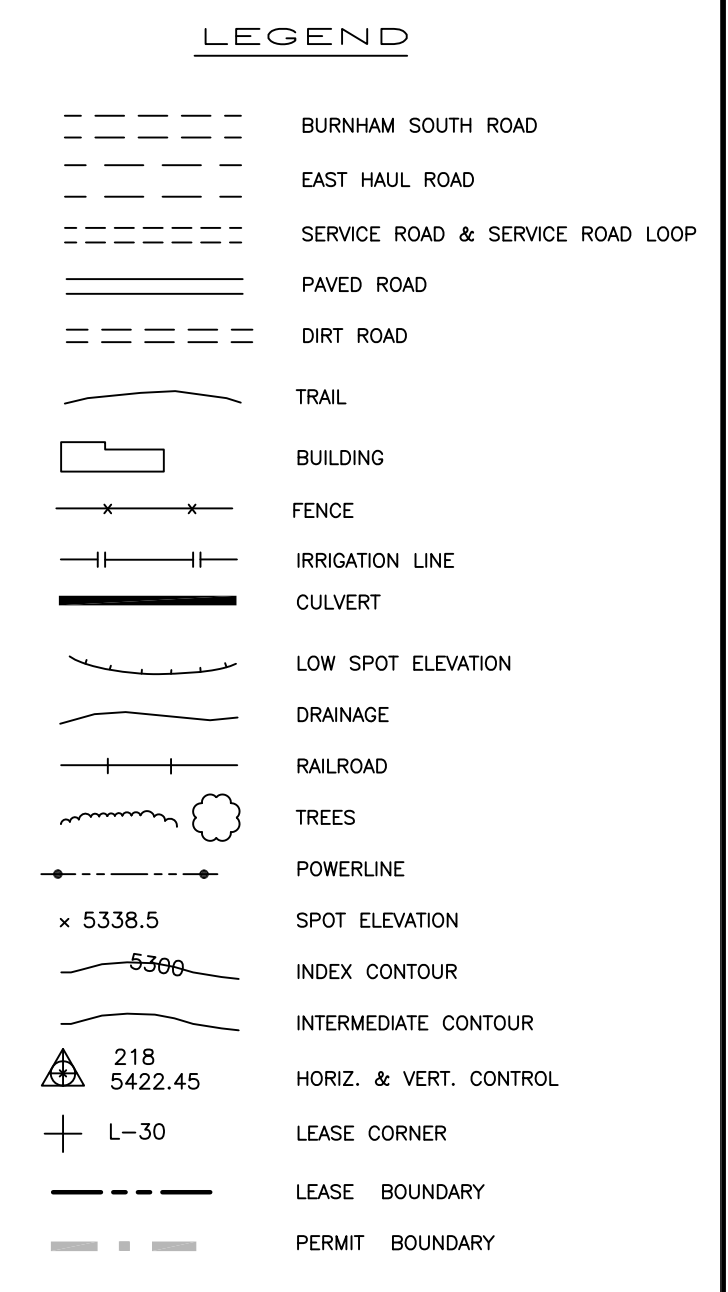


3 TYPICAL COMBINATION EAST HAUL ROAD & SERVICE ROAD & BURNHAM SOUTH ROAD SECTION
N.T.S.
SEE TYPICAL SECTION 1 FOR ADDITIONAL NOTES

GUARDRAIL TABLE

| GUARDRAIL | Schedule | Length | Rt or Lt of CL | |
|--|-----------|-----------|----------------|--------------|
| Station to Station | Item | X (ft) | | |
| 014+50.00 | 014+87.50 | Et Type 2 | 37.50 | rt approach |
| 014+87.50 | 018+62.50 | w-beam | 375.00 | rt |
| 018+62.50 | 019+00.00 | Et Type 2 | 37.50 | rt departure |
| 019+00.00 | 018+62.50 | Et Type 2 | 37.50 | lt approach |
| 018+62.50 | 014+87.50 | w-beam | 375.00 | lt |
| 014+87.50 | 014+50.00 | Et Type 2 | 37.50 | lt departure |
| 140+00.00 | 139+62.50 | Et Type 2 | 37.50 | rt approach |
| 139+62.50 | 143+44.41 | w-beam | 381.91 | rt |
| TIE INTO EXISTING BURNHAM SOUTH ROAD REALIGNMENT GUARDRAIL | | | | |
| TIE INTO EXISTING BURNHAM SOUTH ROAD REALIGNMENT GUARDRAIL | | | | |
| 143+44.41 | 140+37.50 | w-beam | 306.91 | lt |
| 140+37.50 | 140+00.00 | Et Type 2 | 37.50 | lt departure |
| | | W-beam | 1438.82 LF | |
| | | ET Type 2 | 6 EA | |

CONTRACTOR SHALL USE TYPE 2 ET-Plus OR EQUAL END TREATMENTS
ALL GUARDRAIL TO BE PER CURRENT NMDOT DETAILS



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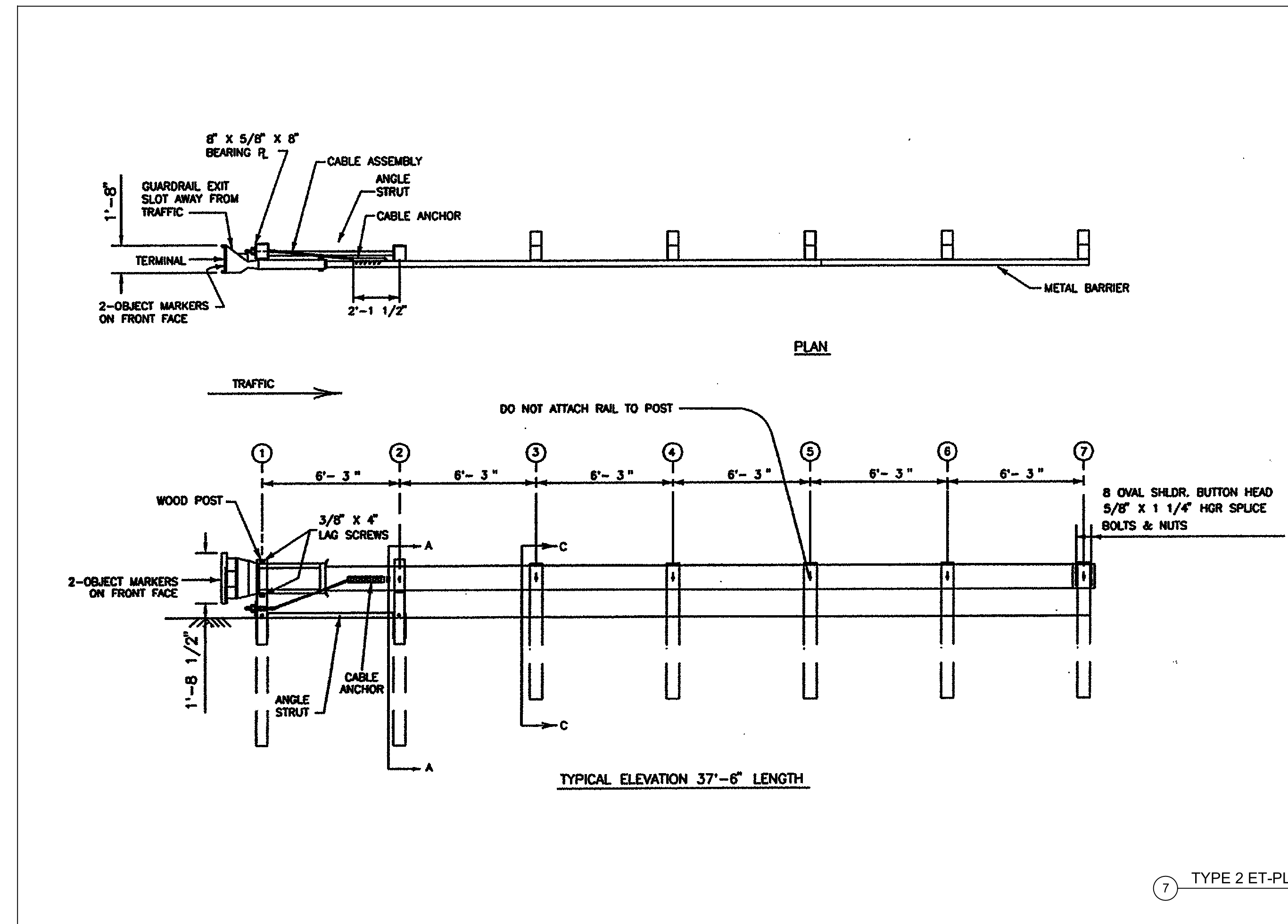
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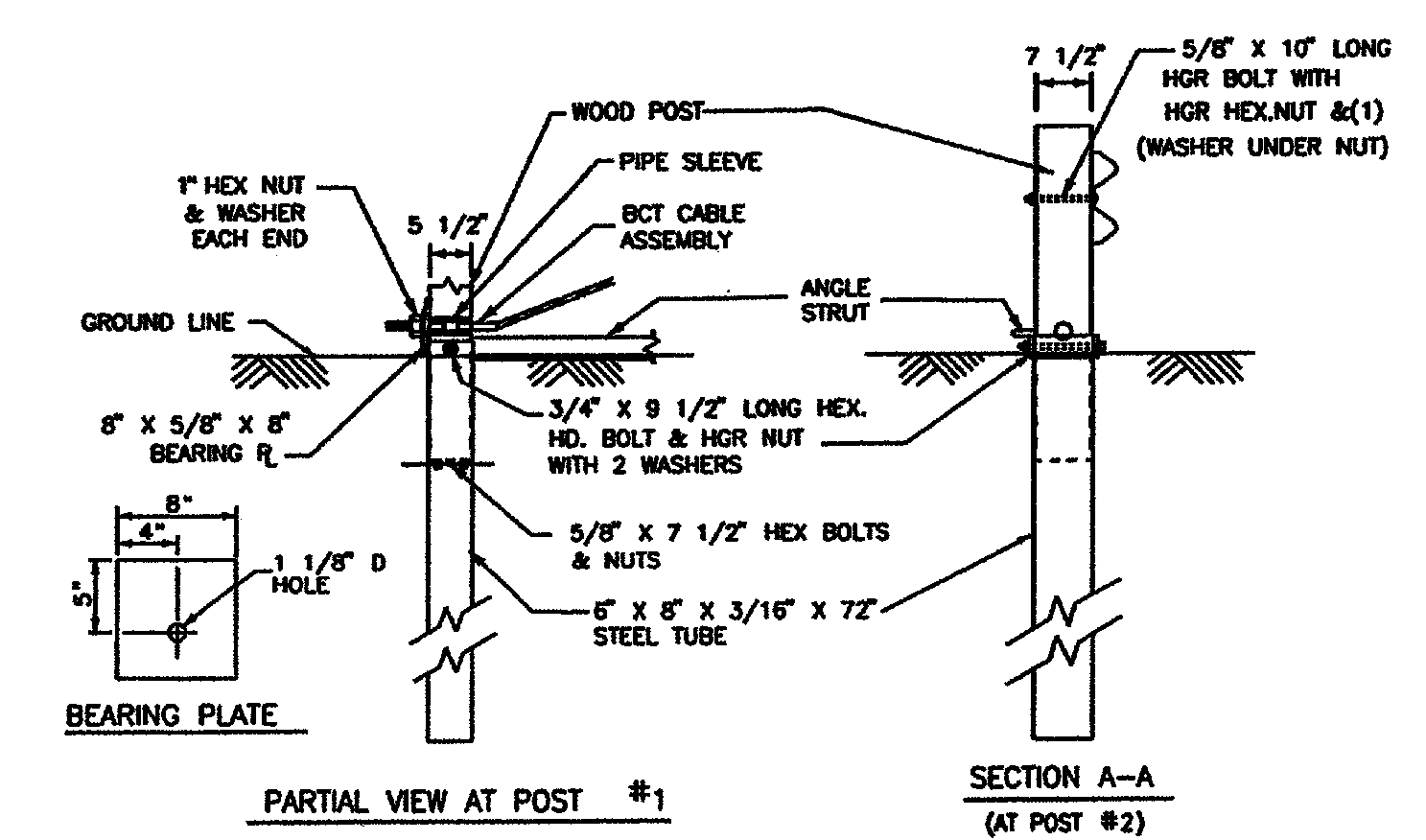
BURNHAM SOUTH ROAD DESIGN
TYPICAL ROAD SECTIONS AND
GUARDRAIL TABLE & DETAILS

SHEET: 8 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012

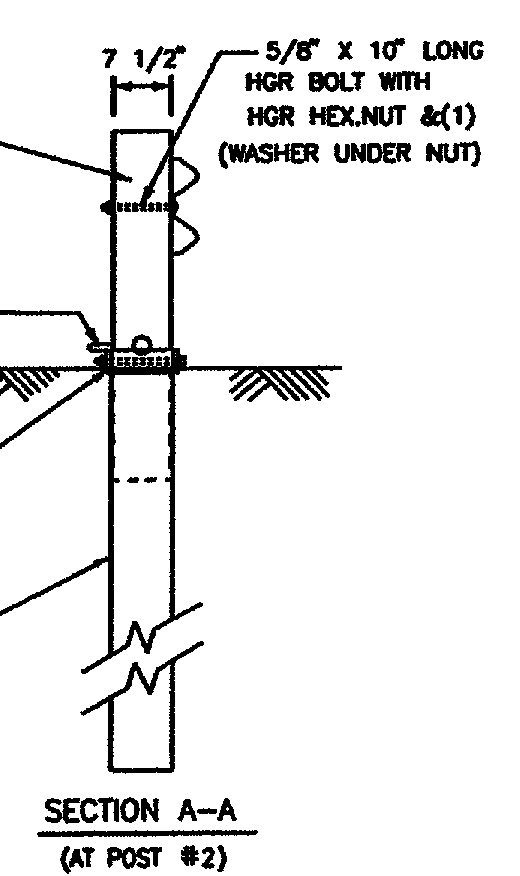
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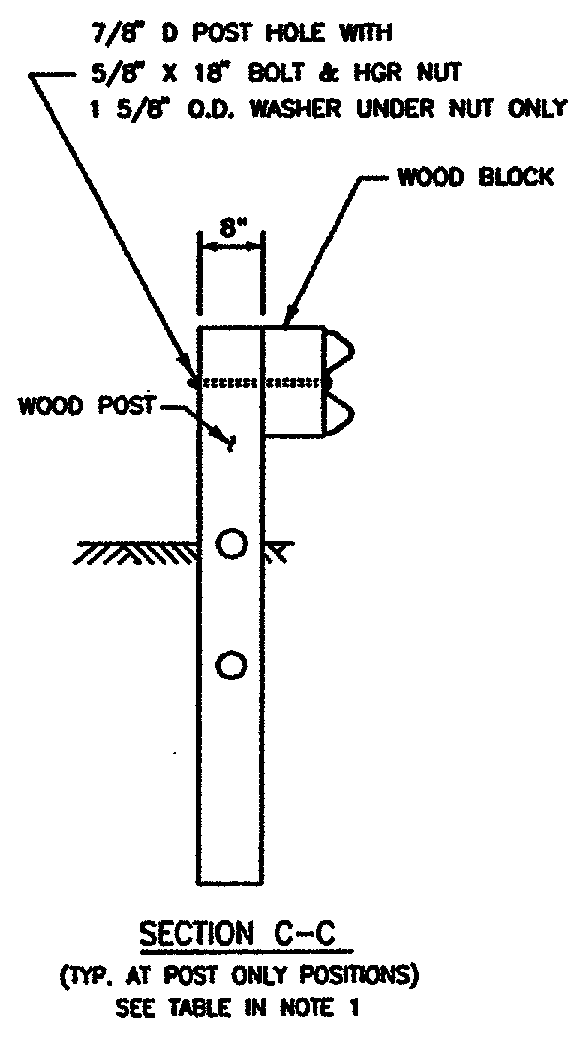
7 TYPE 2 ET-PLUS END SECTION
N.T.S.



PARTIAL VIEW AT POST #1



SECTION A-A
(AT POST #2)

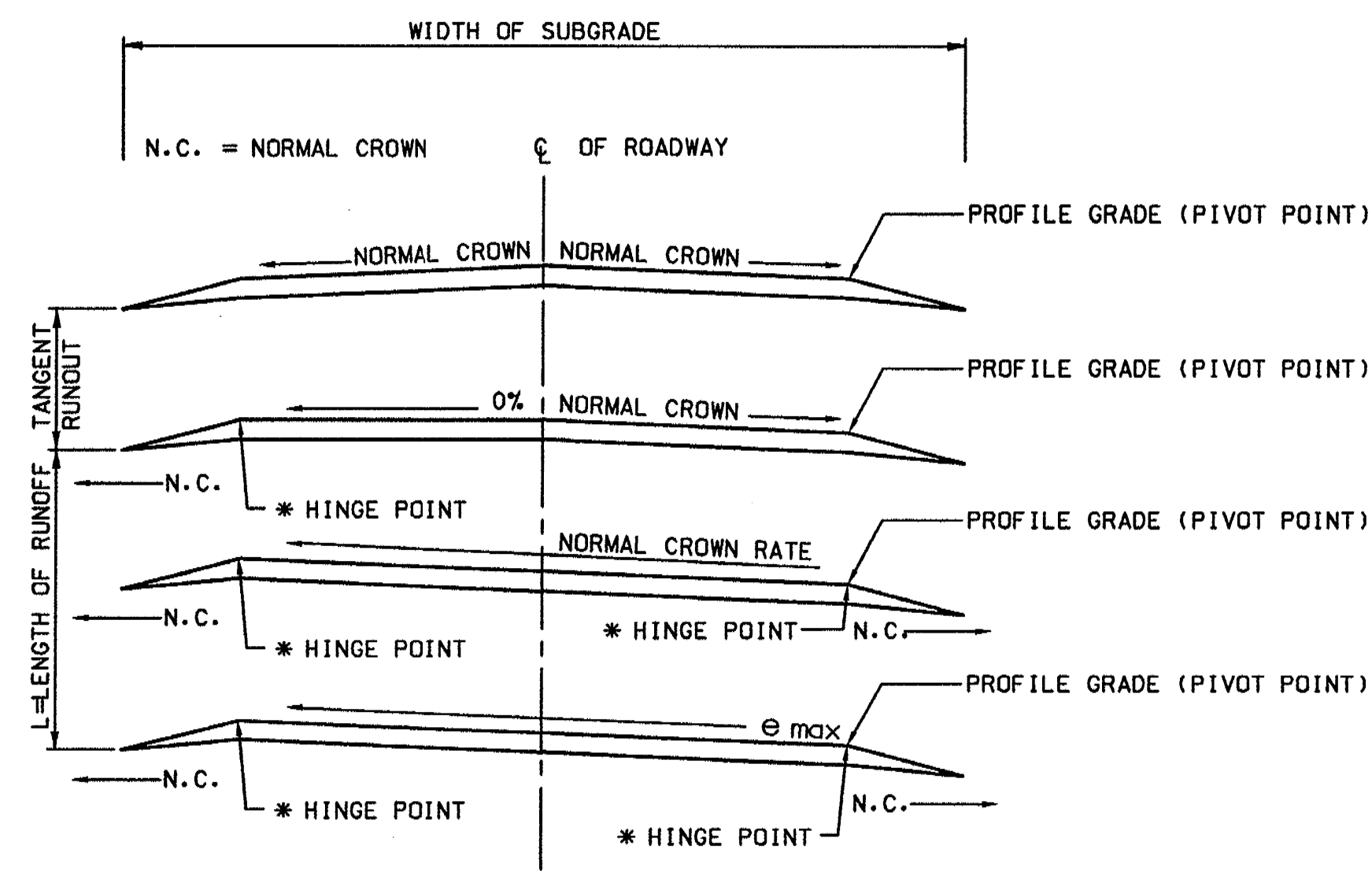
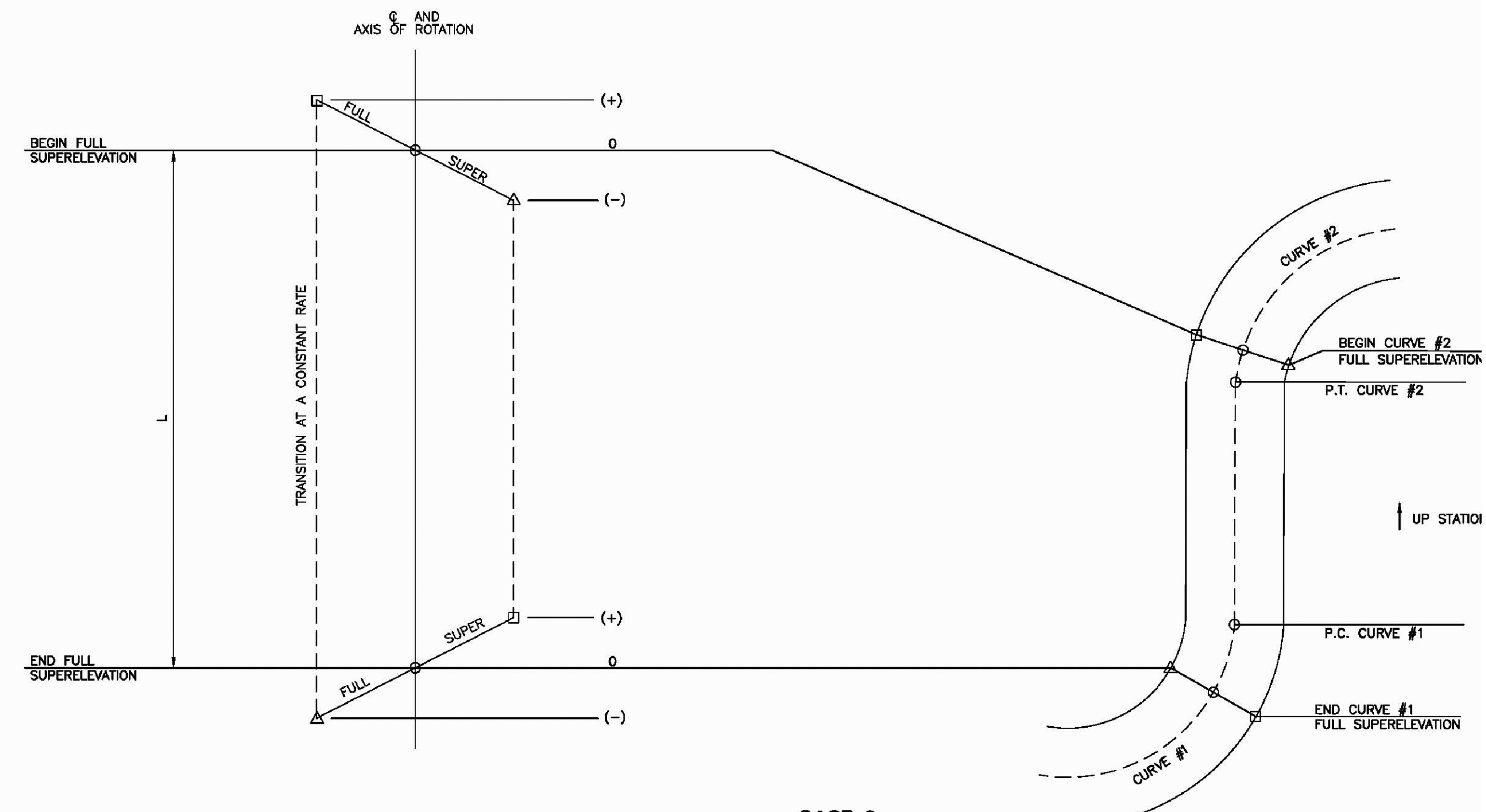
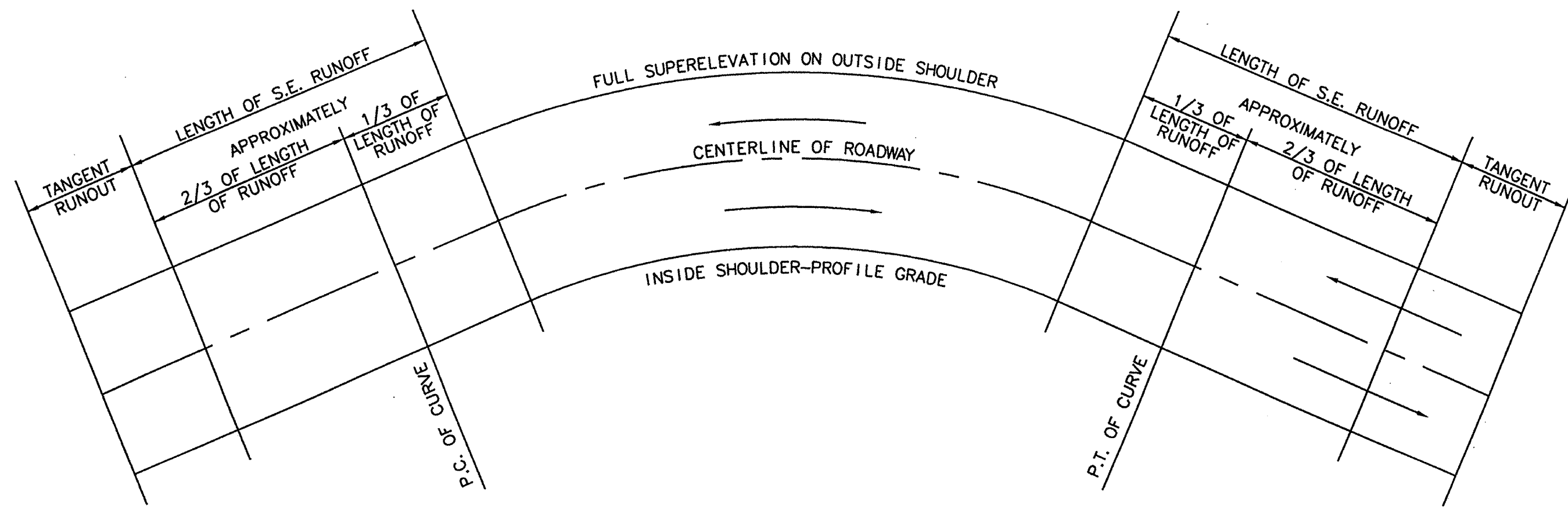


SECTION C-C
(TYP. AT POST ONLY POSITIONS)
SEE TABLE IN NOTE 1

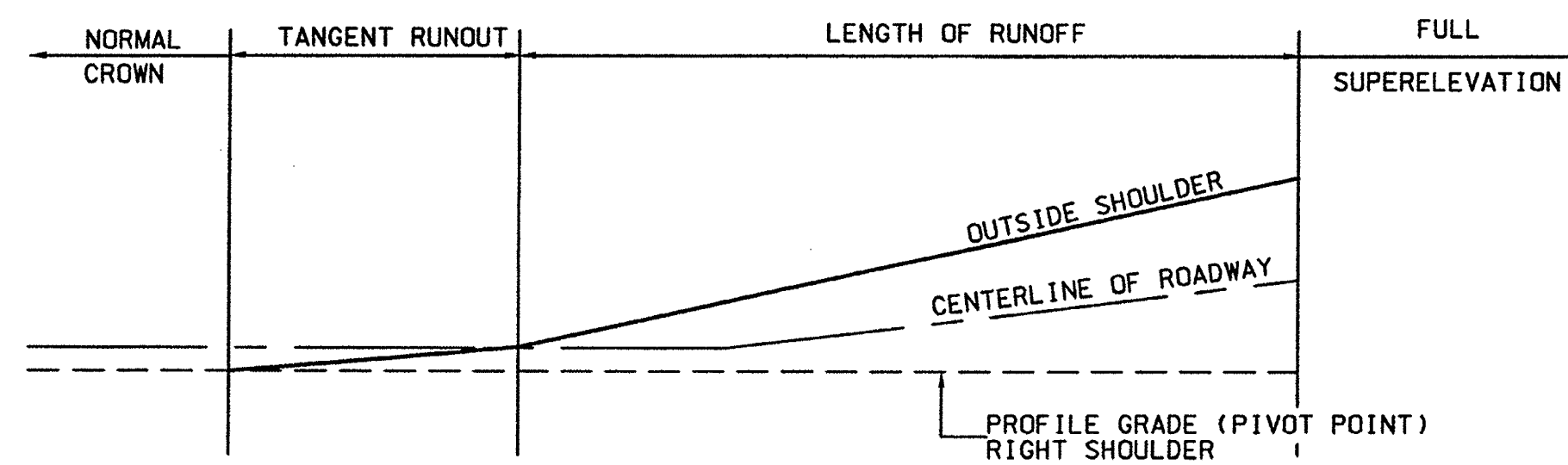
THE DETAILS SHOWN ARE FOR CONTRACTOR CONVENIENCE.
REFER TO NMDOT STANDARD DETAILS FOR COMPLETE DETAILS.

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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

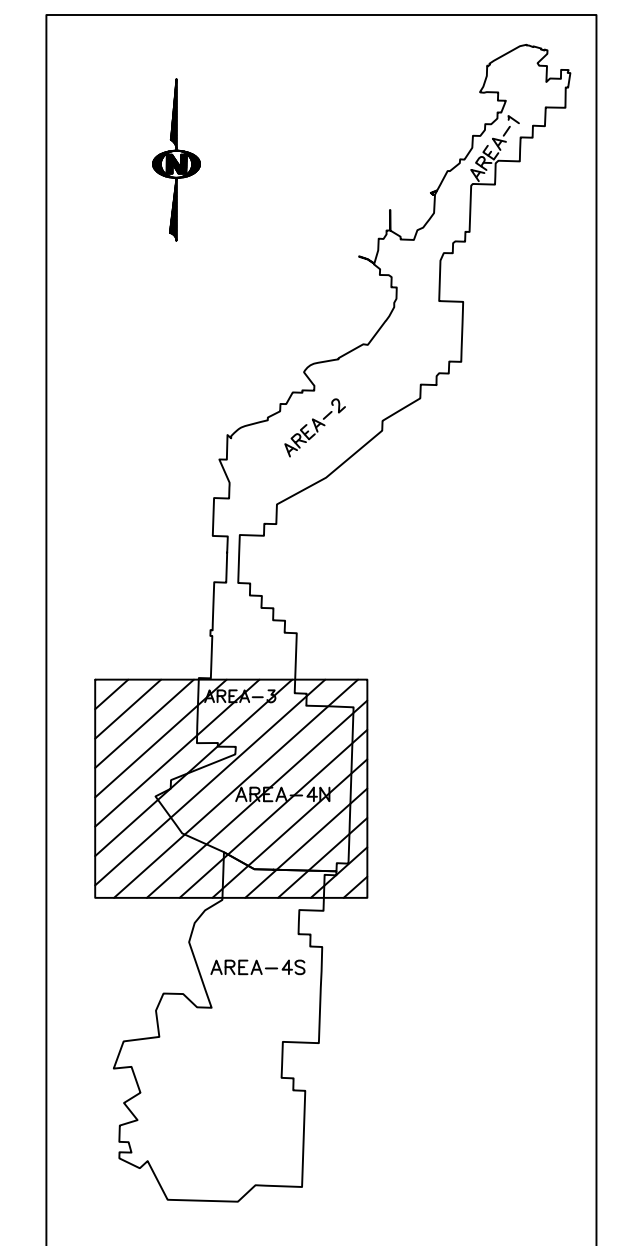
- TANGENT RUNOUT - LENGTH OF HIGHWAY NEEDED TO ACCOMPLISH THE CHANGE IN CROSS SLOPE FROM A NORMAL CROWN SECTION TO A SECTION WITH THE ADVERSE CROWN REMOVED OR VICE VERSA.
- SUPERELEVATION RUNOFF - LENGTH OF HIGHWAY NEEDED TO ACCOMPLISH THE CHANGE IN CROSS SLOPE FROM A SECTION WITH ADVERSE CROWN REMOVED 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
- 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.



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| | | |
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| 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 • Phone: 505-598-4200
Fruitland, New Mexico, 87416 • Fax: 505-568-3361

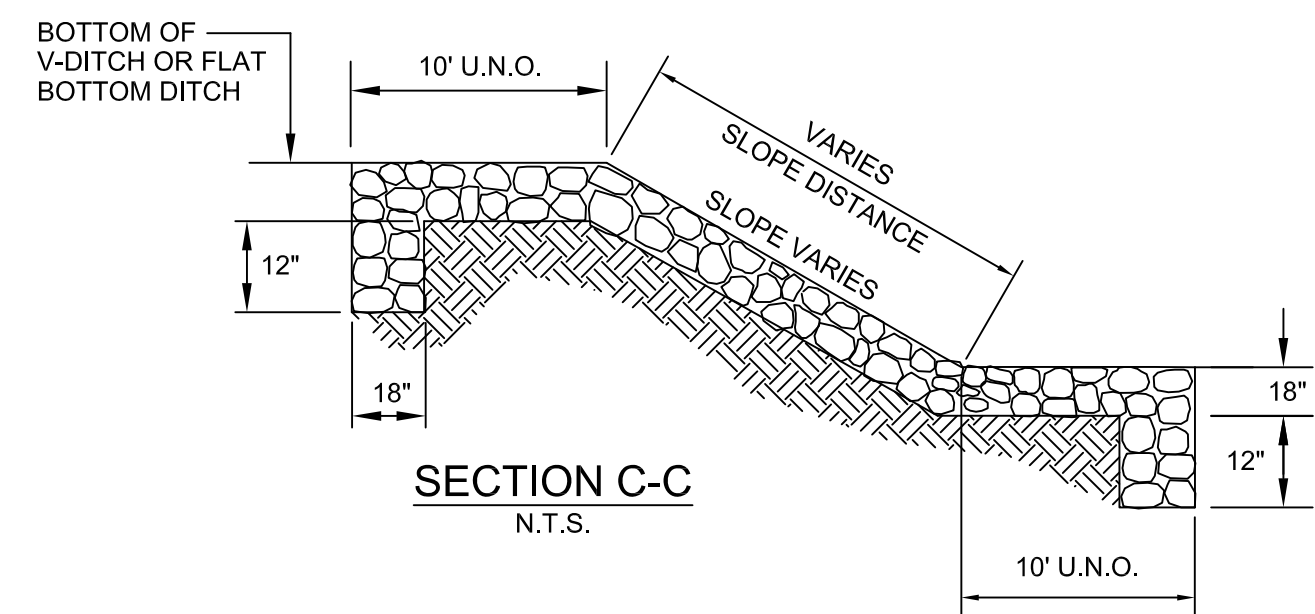
PINABETE PERMIT

BURNHAM SOUTH ROAD DESIGN
SUPER ELEVATION TABLE
AND DETAILS

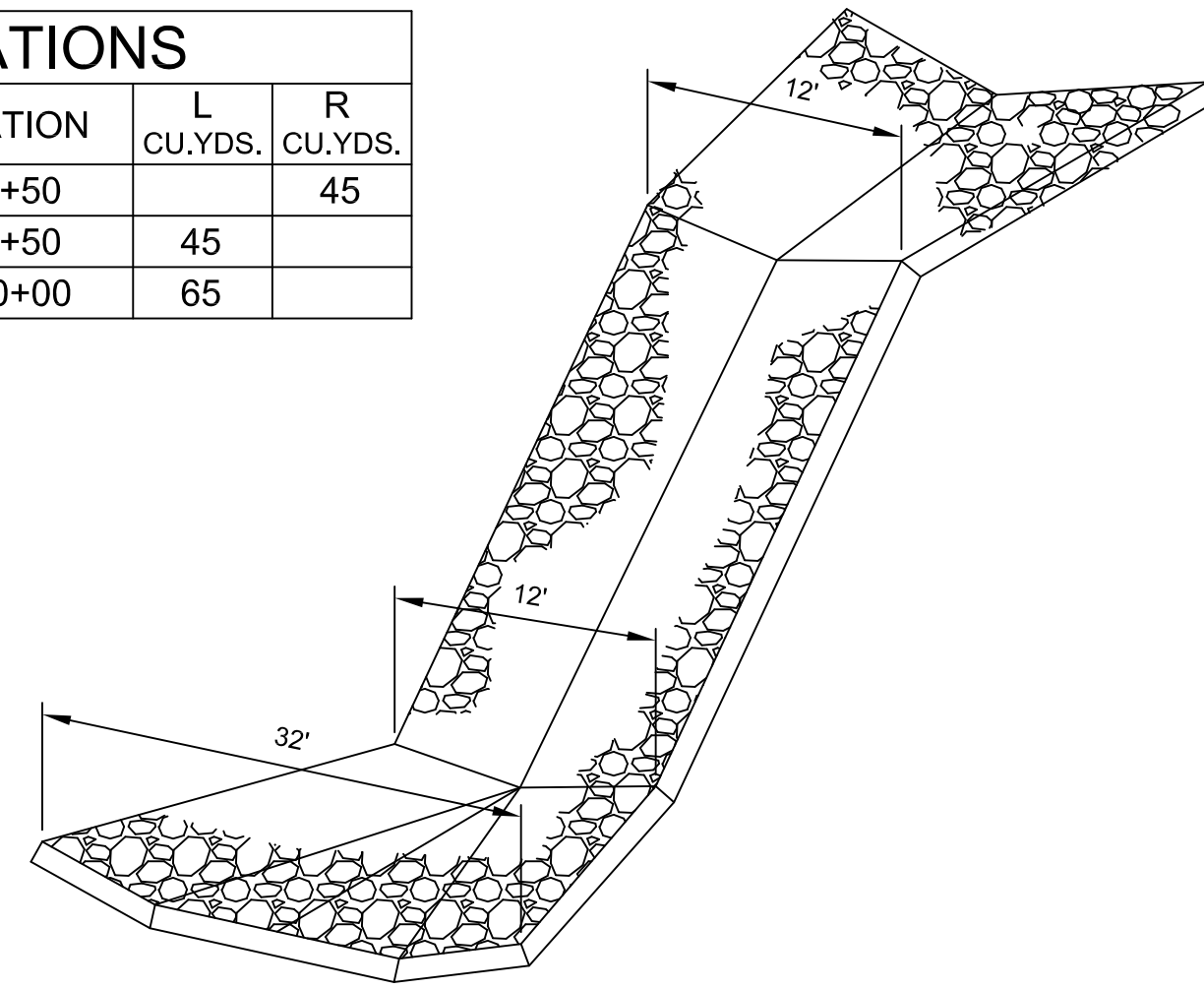
SHEET: 9 OF 11
PREPARED BY: BT&PR DRAWN BY: BT&PR SCALE: AS SHOWN
APPROVED BY: GM DATE: 02-07-2012
GEOMAT PROJECT NO. 112-1434

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.

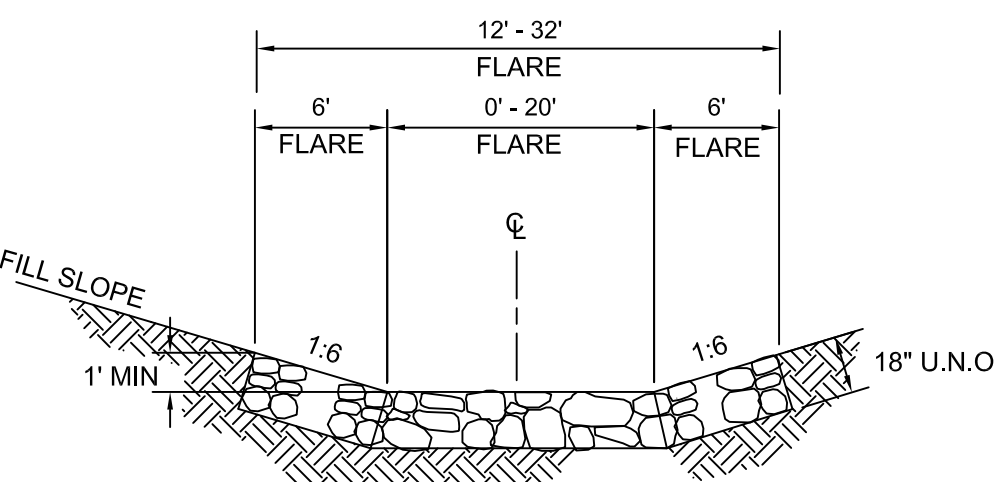
NOT ISSUED FOR CONSTRUCTION



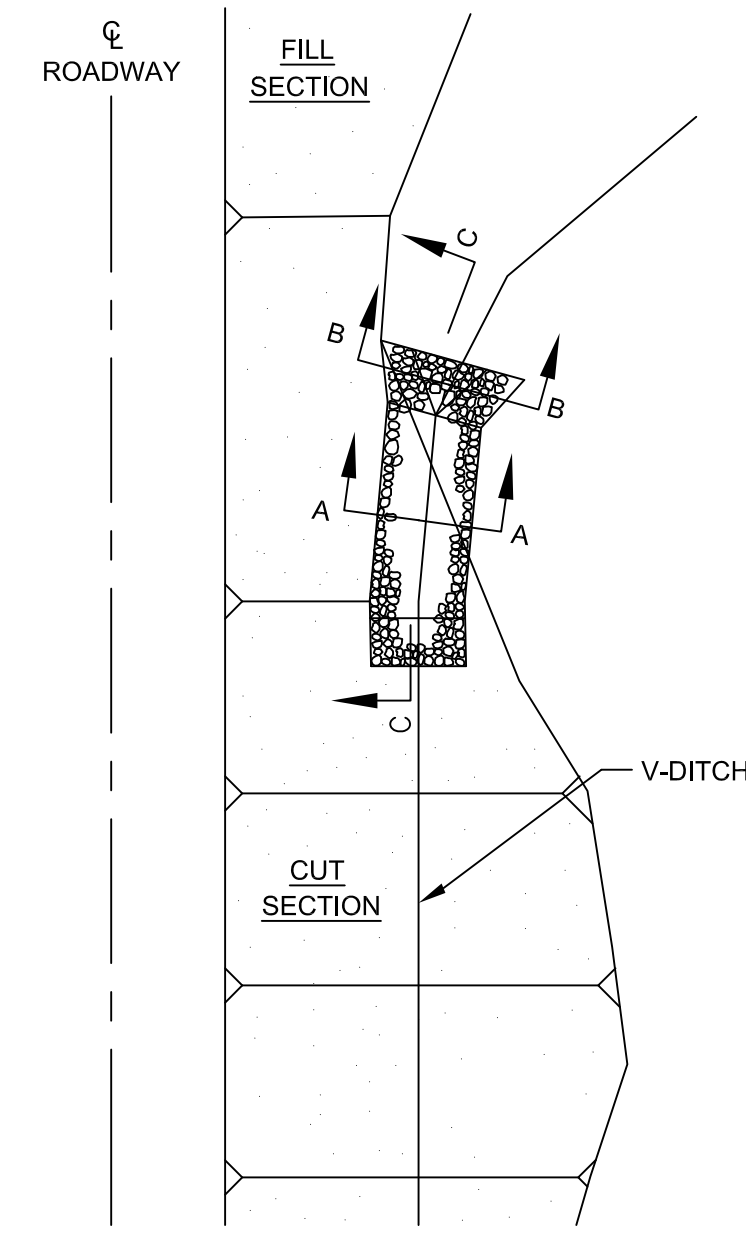
| TRANSITION LOCATIONS | | | | |
|----------------------|---------|-----------|---|---------|
| ROAD | STATION | L CU.YDS. | R | CU.YDS. |
| BURNHAM SOUTH ROAD | 36+50 | | | 45 |
| BURNHAM SOUTH ROAD | 74+50 | 45 | | |
| BURNHAM SOUTH ROAD | 140+00 | 65 | | |



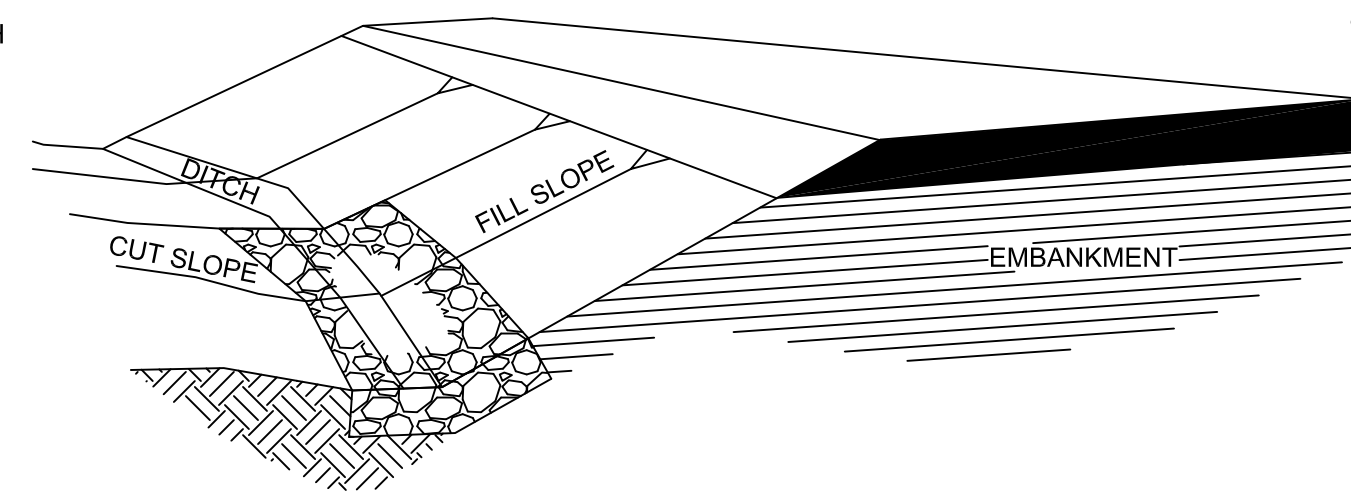
PERSPECTIVE VIEW
PLACED RIPRAP CUT-TO-FILL TRANSITION



SECTION B-B
N.T.S.



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



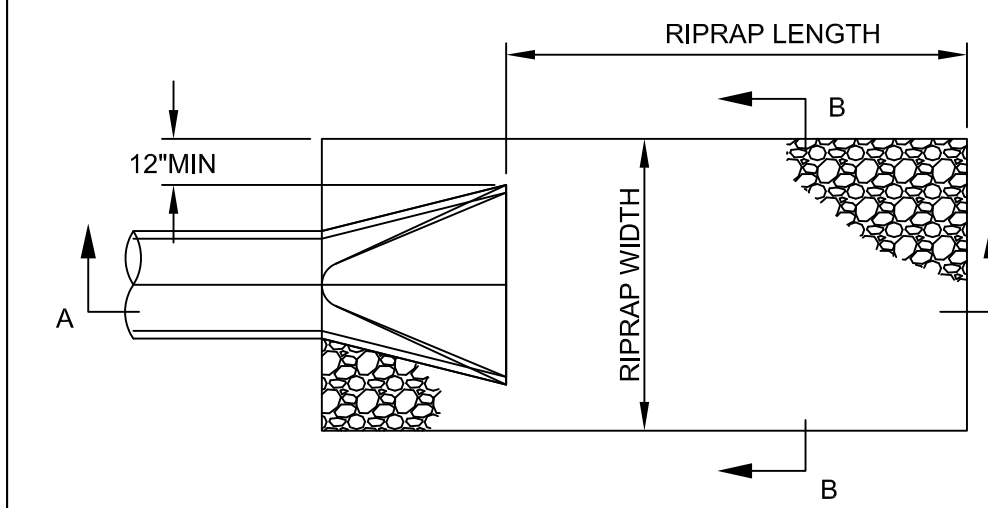
GENERAL OVERALL PERSPECTIVE VIEW
@ TOE OF EMBANKMENT



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.

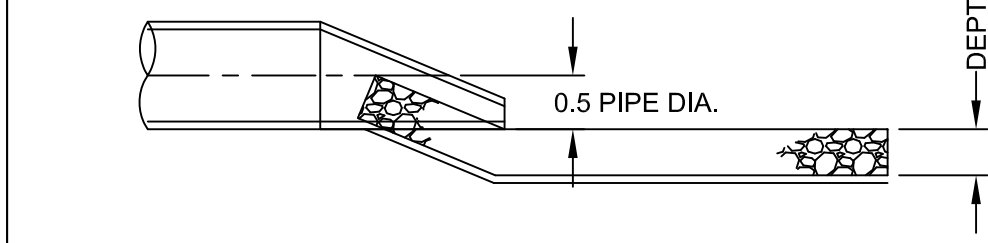
RIPRAP CUT-TO-FILL TRANSITION DETAILS
N.T.S.



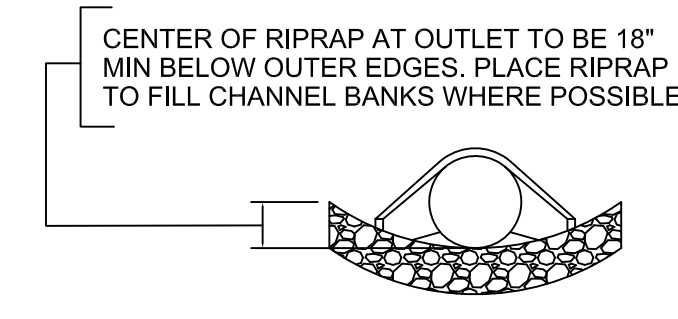
PIPE OUTLET RIPRAP DETAIL
N.T.S.

| 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 |

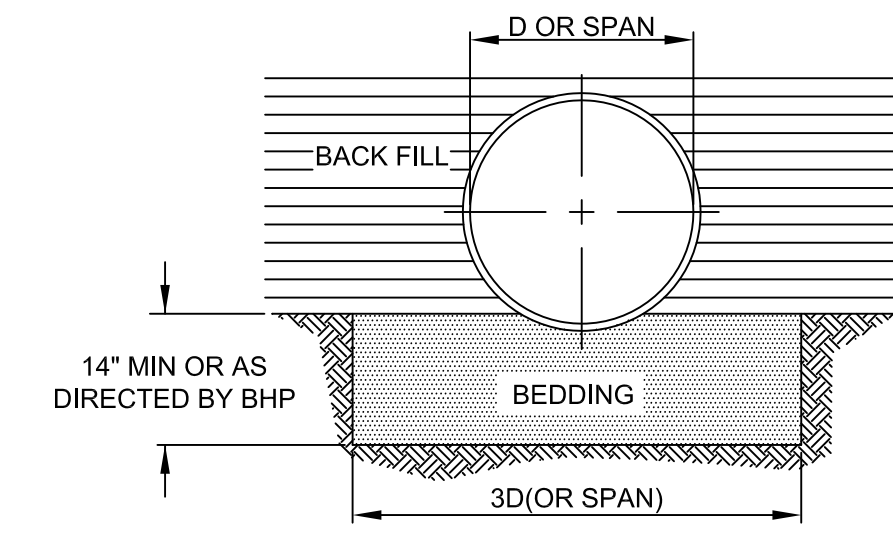


SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

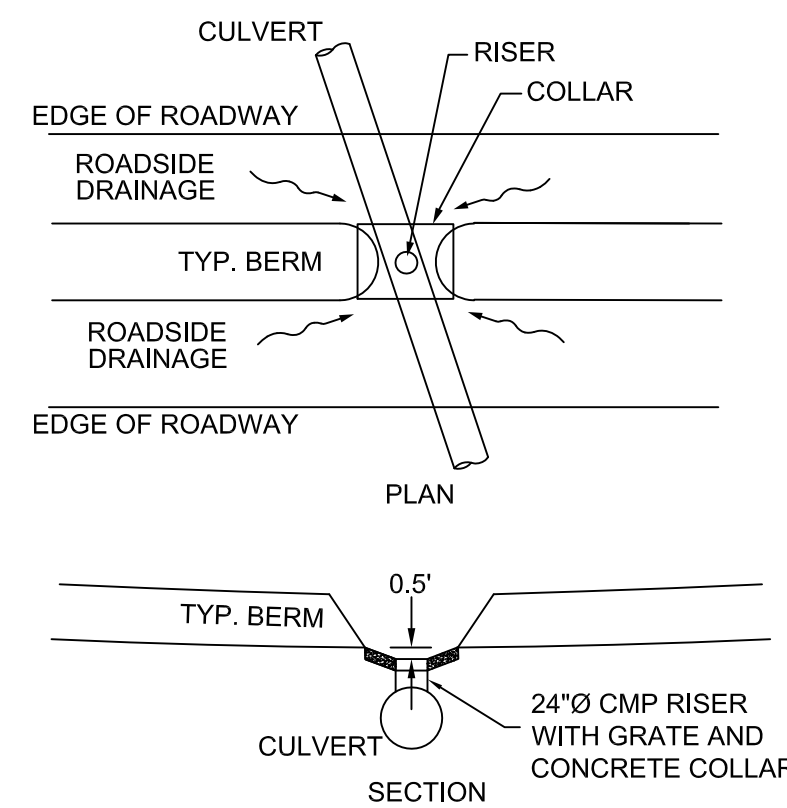
- CULVERT NOTES:**
- ALL DRAINAGE STRUCTURES SHALL BE STAKED AND GRADED TO DRAIN TO THE CONSTRUCTION LIMITS. EARTHEN DITCH BLOCKS, DIKES AND DITCHES MAY BE ADDED AT LOCATIONS DESIGNATED BY BHP AND/OR AS SHOWN ON THESE PLANS.
 - ALL CULVERTS ARE TO BE INSTALLED AT THE NATURAL FLOWLINE OF THE WASH, ARROYO 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/SY. 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.



PIPE BEDDING DETAIL
N.T.S.

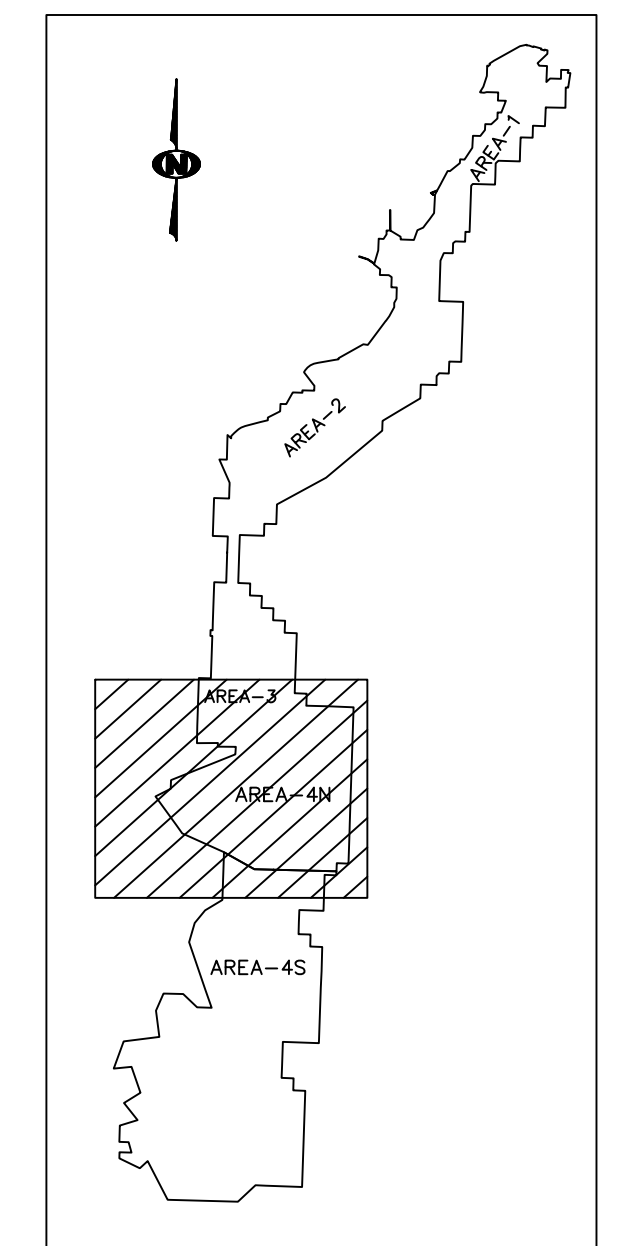
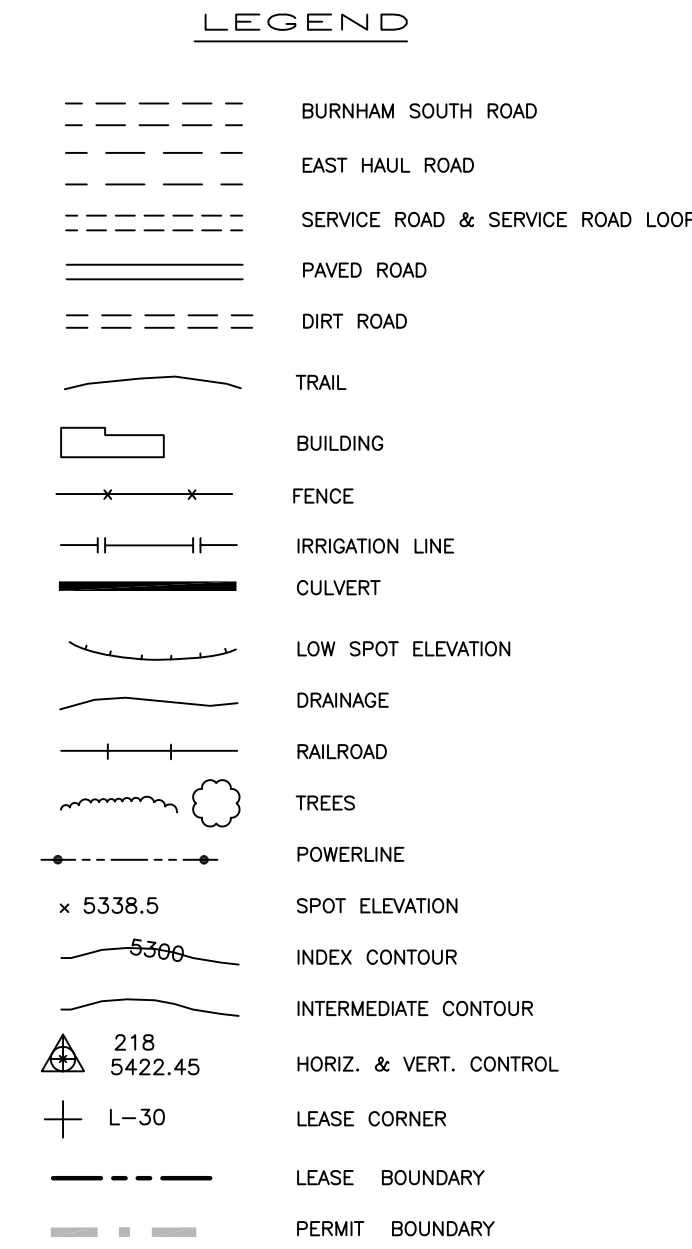
BURNHAM SOUTH ROAD - CULVERT TABLE

| 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".



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.



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| | | |
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| 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

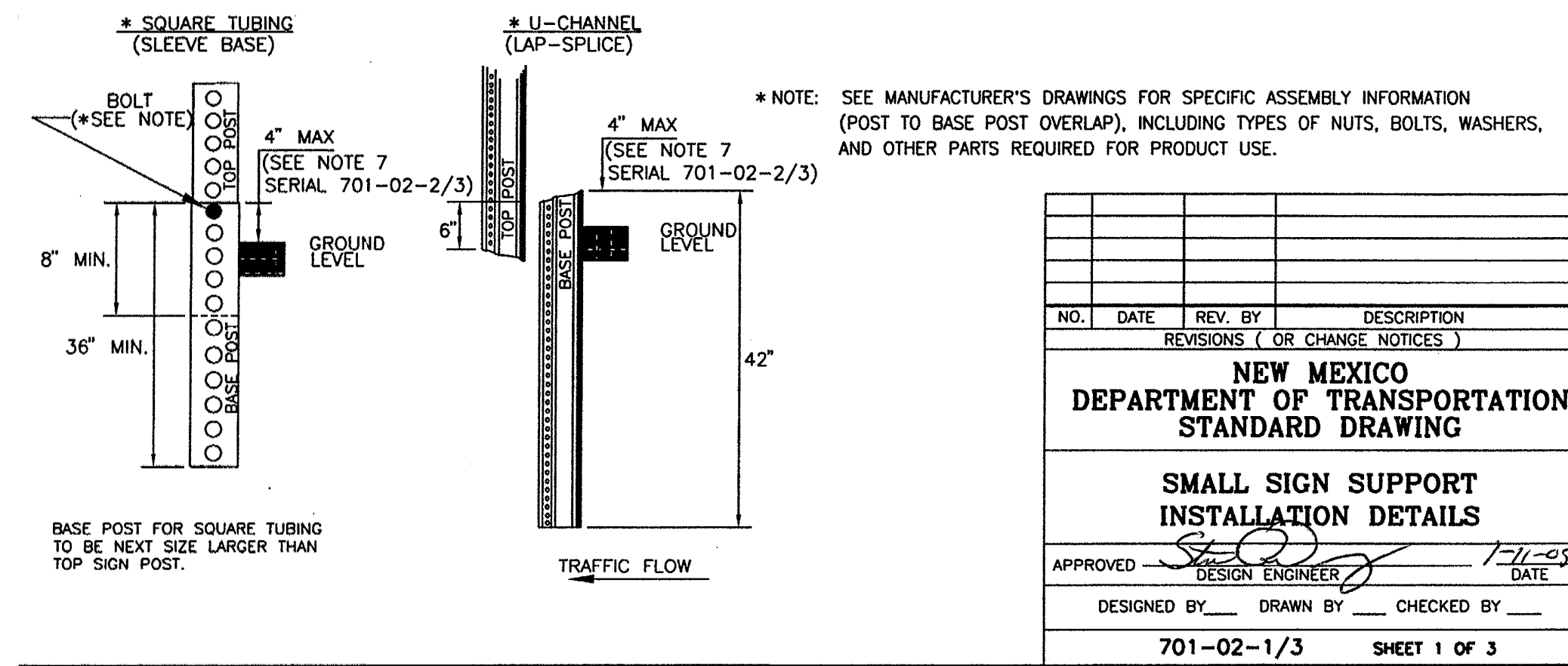
BURNHAM SOUTH ROAD DESIGN
CULVERT TABLE & DRAINAGE DETAILS

SHEET: 10 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.

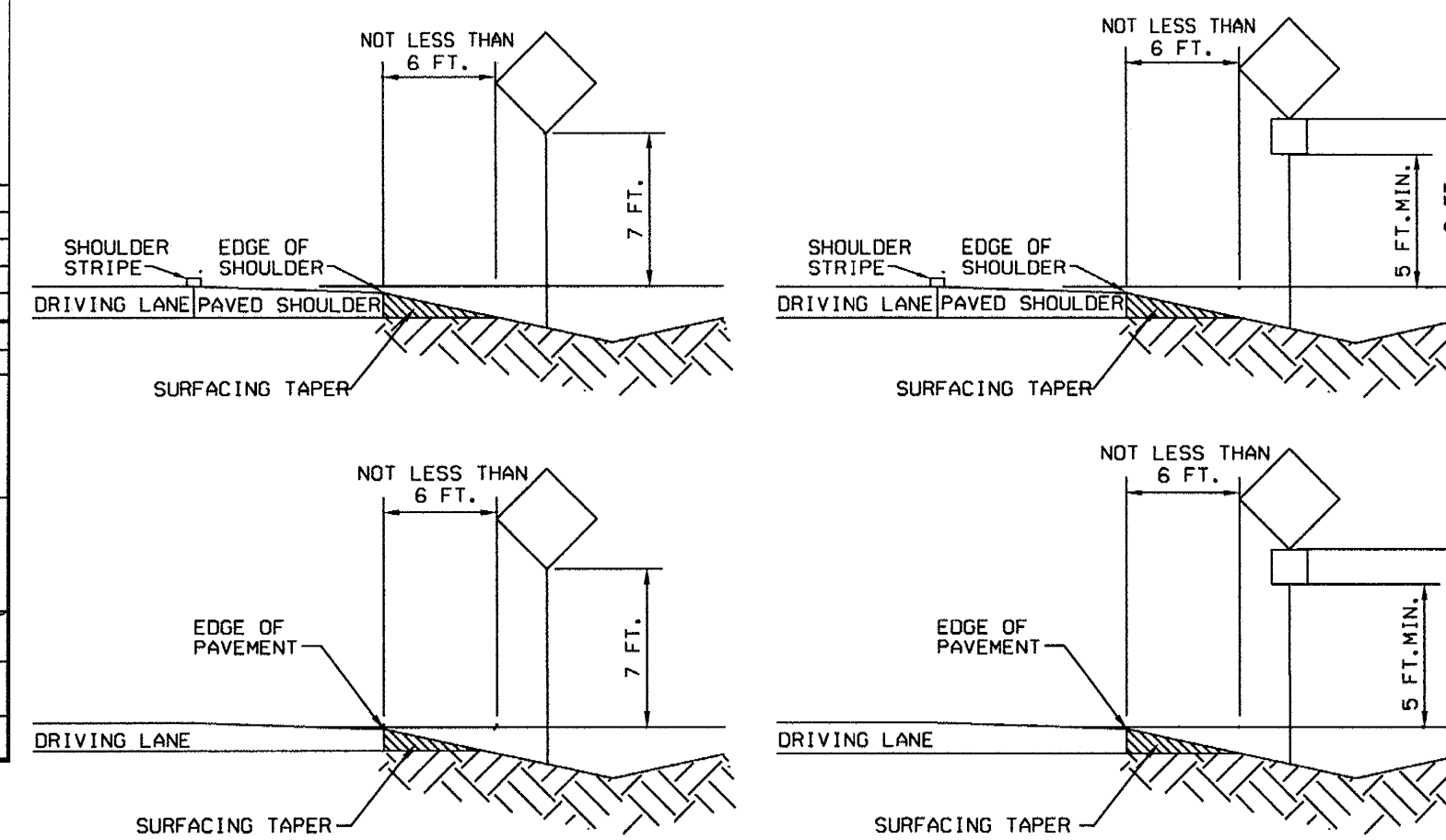
NOT ISSUED FOR CONSTRUCTION

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



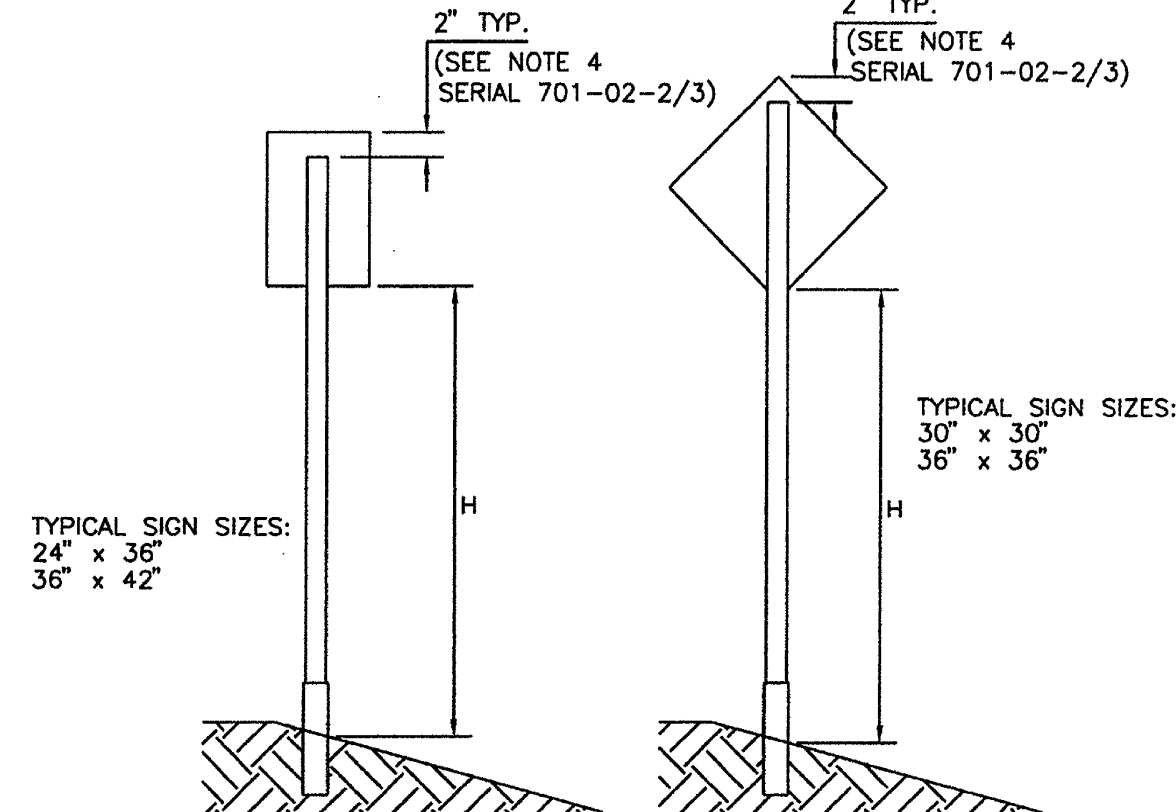
| NO. | DATE | REV. BY | DESCRIPTION |
|---|------|-----------------|-------------|
| REVISIONS (OR CHANGE NOTICES) | | | |
| NEW MEXICO DEPARTMENT OF TRANSPORTATION STANDARD DRAWING | | | |
| SMALL SIGN SUPPORT INSTALLATION DETAILS | | | |
| APPROVED | | DESIGN ENGINEER | DATE |
| DESIGNED BY | | DRAWN BY | CHECKED BY |
| 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

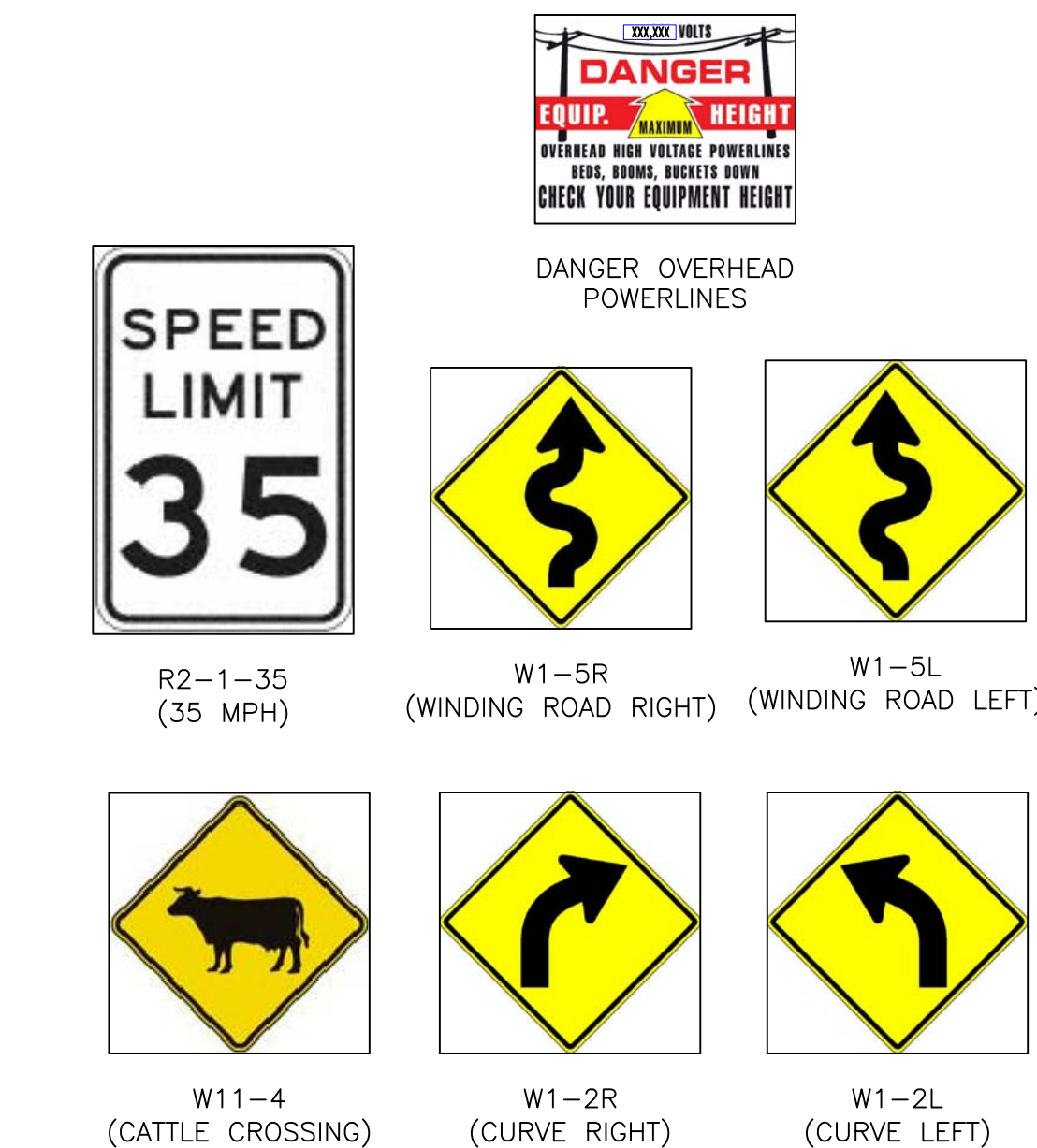
| STATION | LOCATION - DIRECTION | WIDTH OF SIGN | LENGTH OF SIGN | SIGN CODE | NO. OF SIGNS | TOTAL SIGN AREA (SF) | POST LENGTH (LF) | | | | MOUNTING REQUIREMENTS | | | | | BASE POST | | |
|--------------|----------------------|---------------|----------------|-----------------------------|--------------|----------------------|------------------|------------|-------|-------|------------------------|--------------------------|--|---------------|------|-----------|-----------|-------------------|
| | | | | | | | LEFT | CENTER | RIGHT | TOTAL | U-CHANNEL 4 LBS./LF | SQUARE TUBING (12 GAUGE) | | | | | NO. | TOTAL LENGTH (LF) |
| | | | | | | | | | | | | 1.75 | 2.00 | 2.25 | 2.19 | 2.5 | | |
| 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.

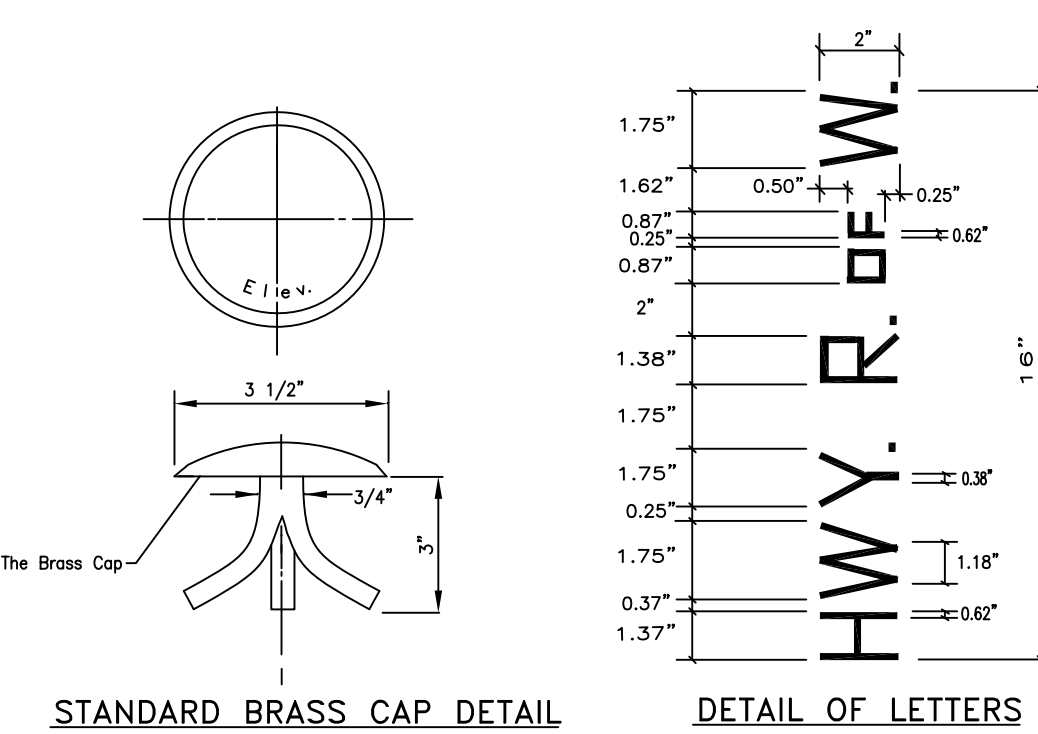
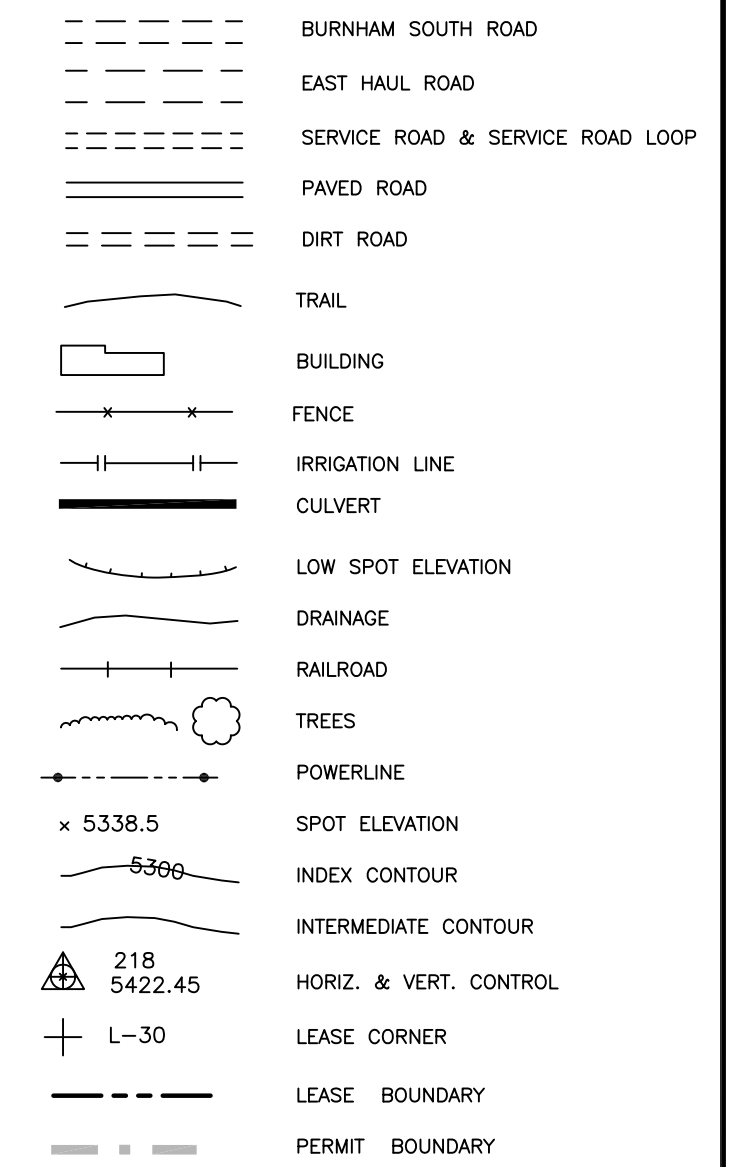
GENERAL NOTES:

- 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.



LEGEND



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 place 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.

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.

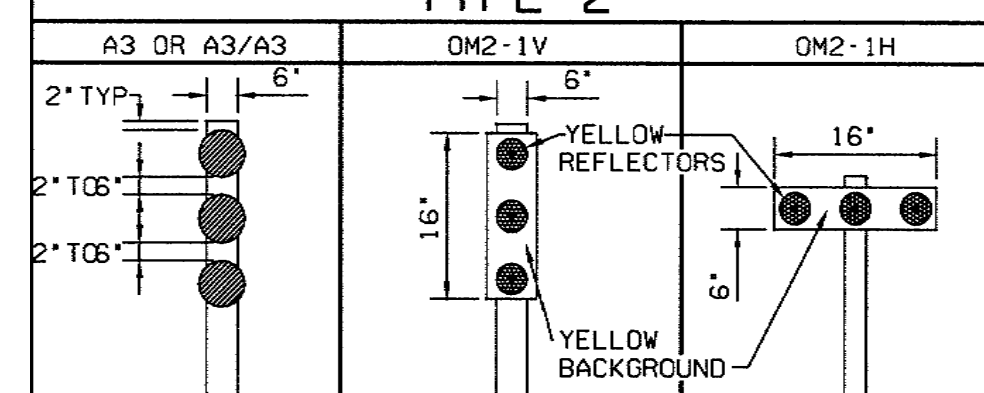
NOTE: USE FIBERGLASS POSTS FOR OBJECT/DELINATORS

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 (TYPE 2 OBJECT MARKER) | 3 EACH |

*BIDIRECTIONAL MOUNTING BRACKET REQUIRED TO ORIENT RED REFLECTOR

TYPE 2



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:

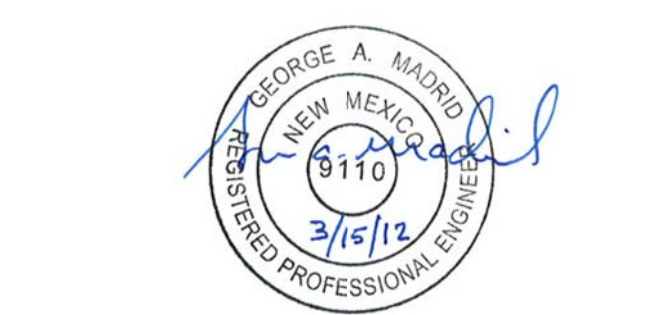
- Type 2 Object Markers (A3/A3) shall be installed as per NMDOT Standard Drawing 703-01.
- Under minimum cover conditions for culverts, Type 2 Hazard Markers shall be placed on the culvert side to the approach nearest traffic.

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

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

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

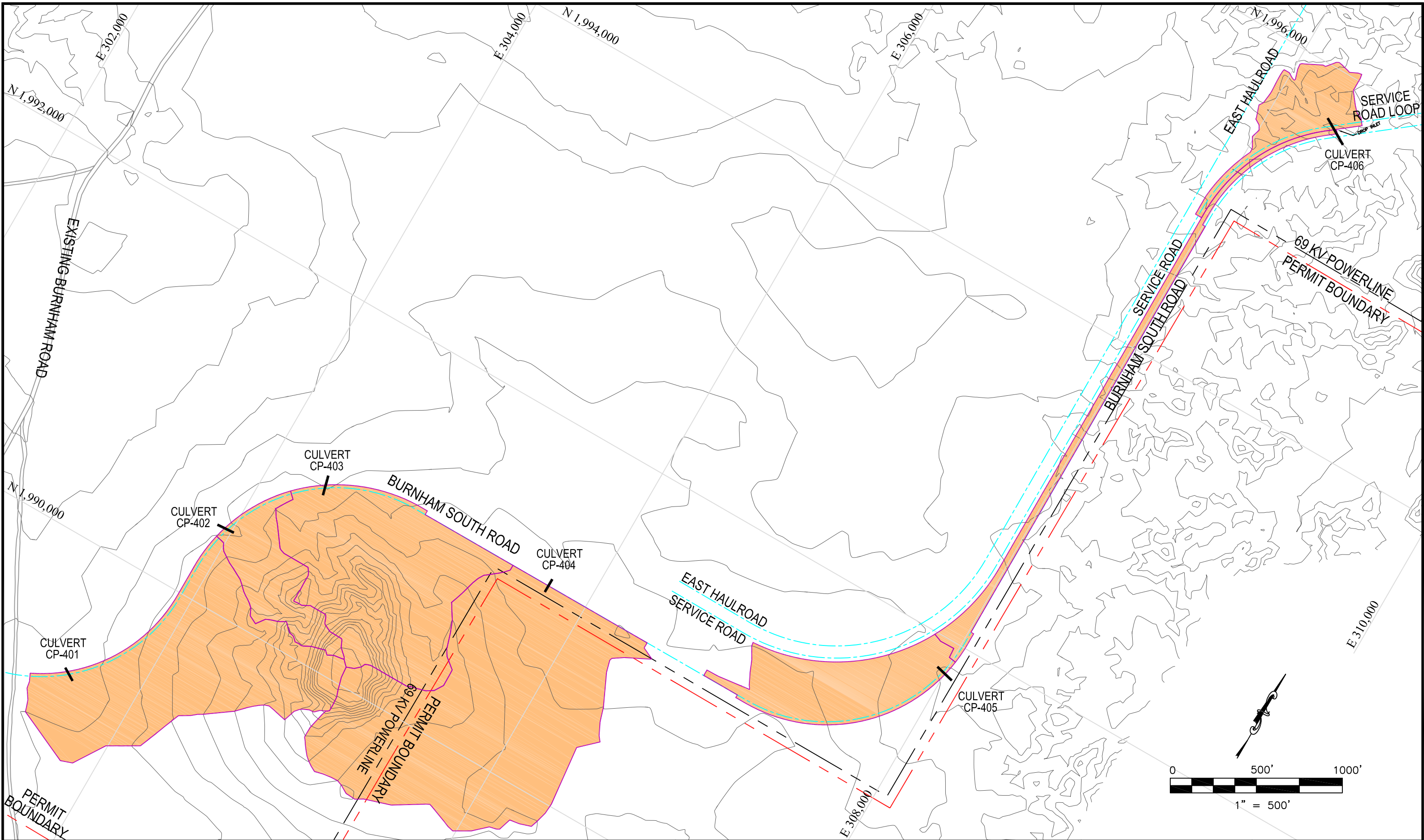
Appendix 40.A

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 |

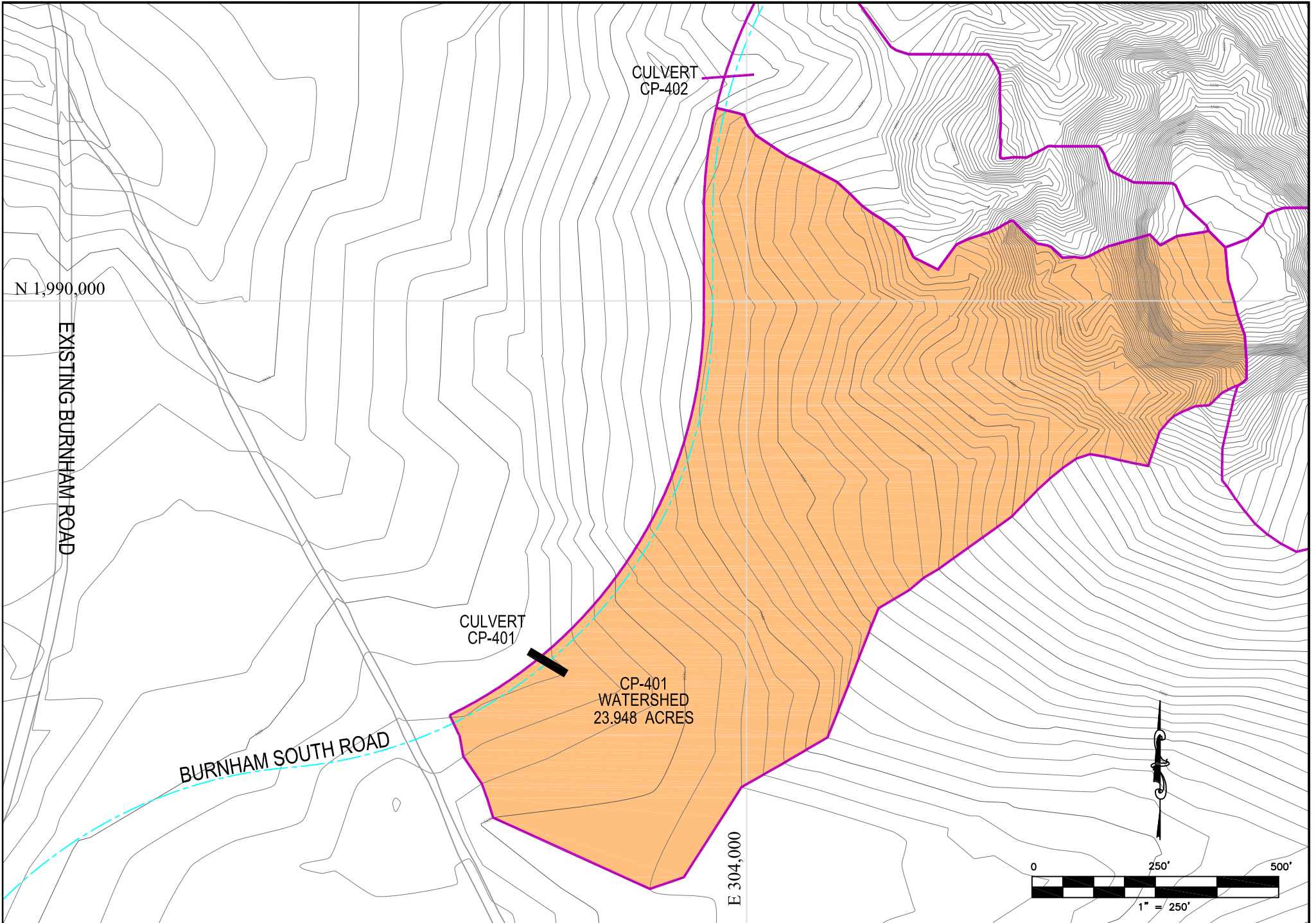
Tailwater Channel Data - Culvert CP-401

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 |

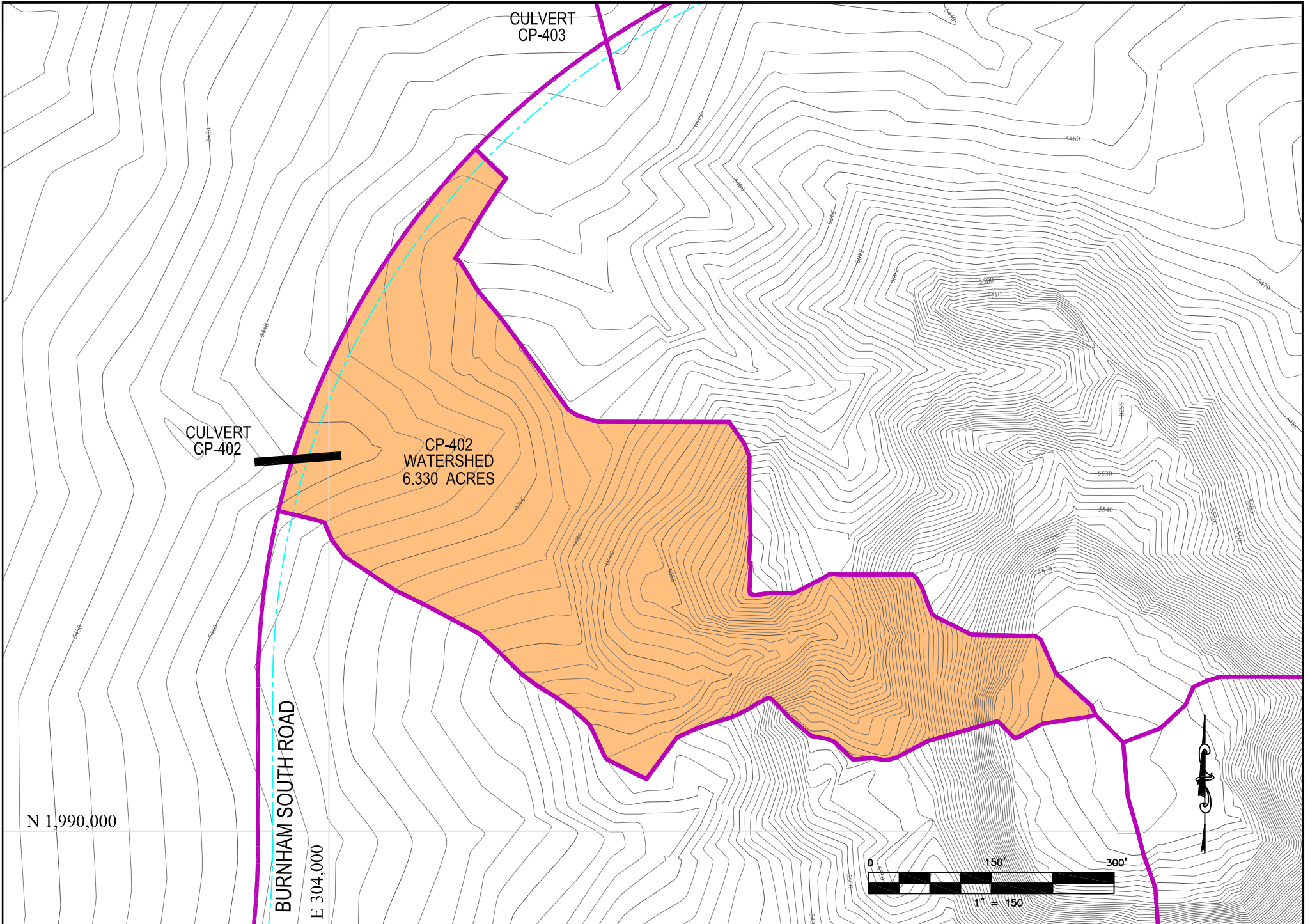
Tailwater Channel Data - Culvert CP-402

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 |

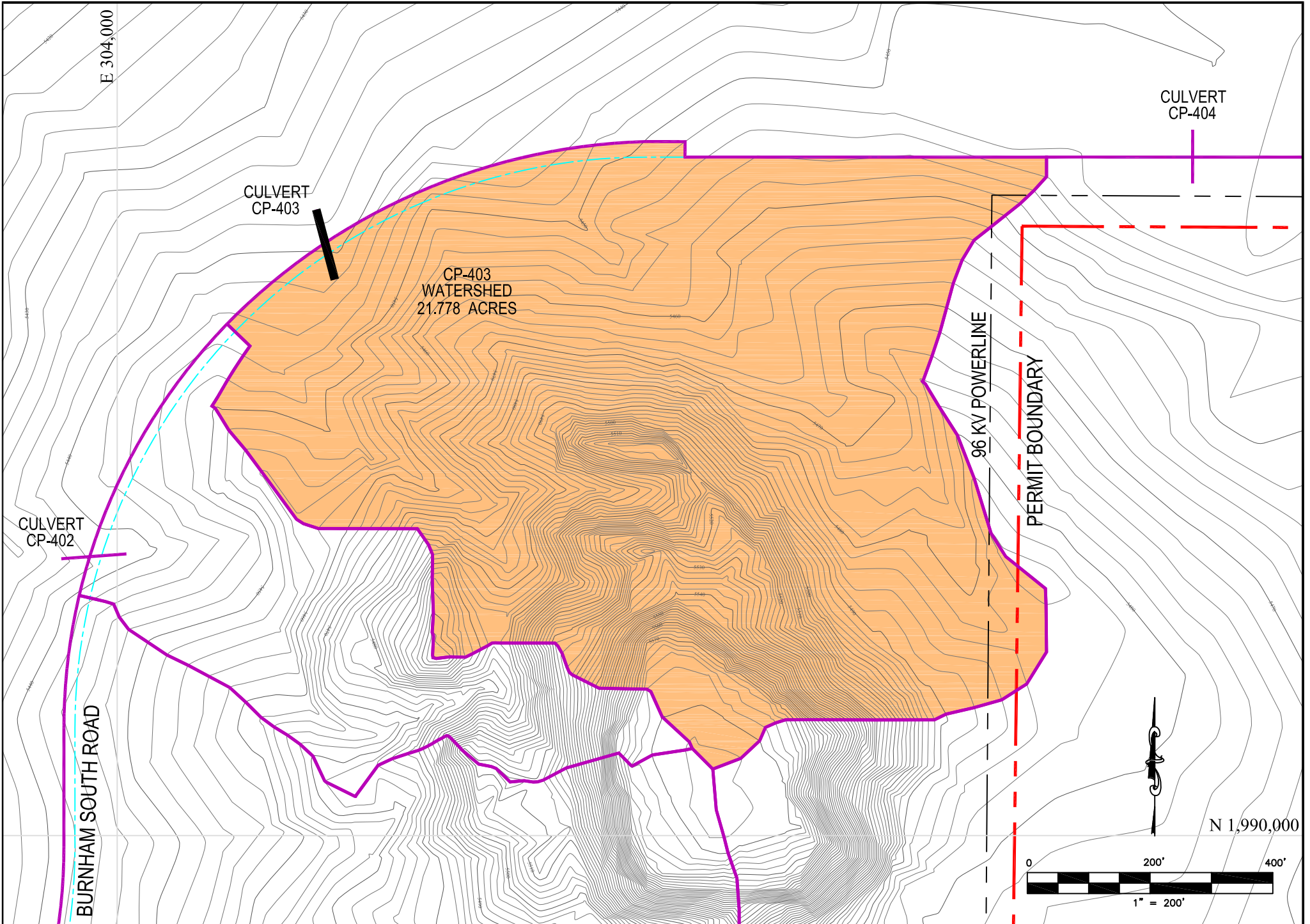
Tailwater Channel Data - Culvert CP-403

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

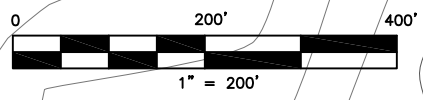
BURNHAM SOUTH ROAD

96 KV POWERLINE

PERMIT BOUNDARY



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 |

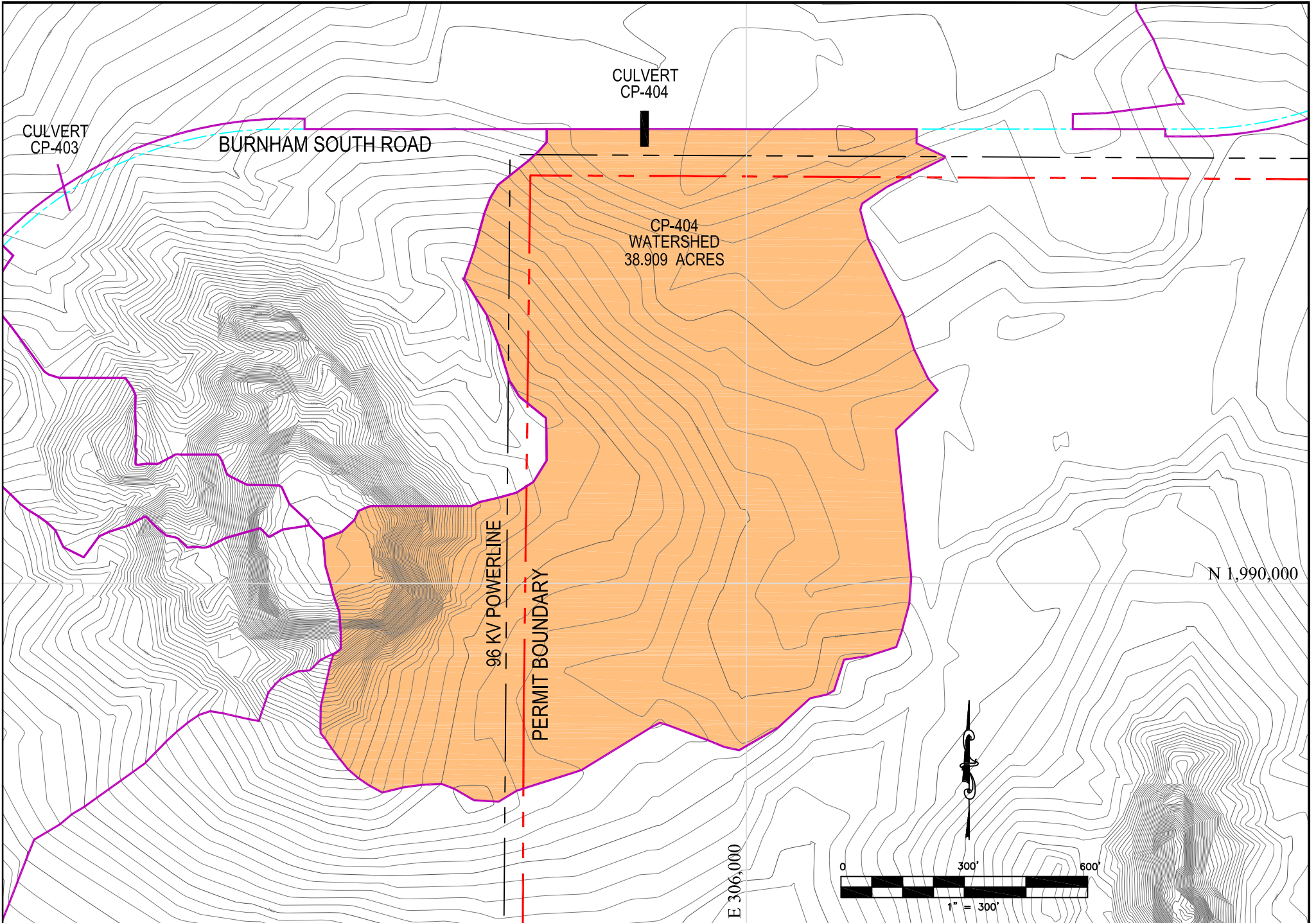
Tailwater Channel Data - Culvert CP-404

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 |

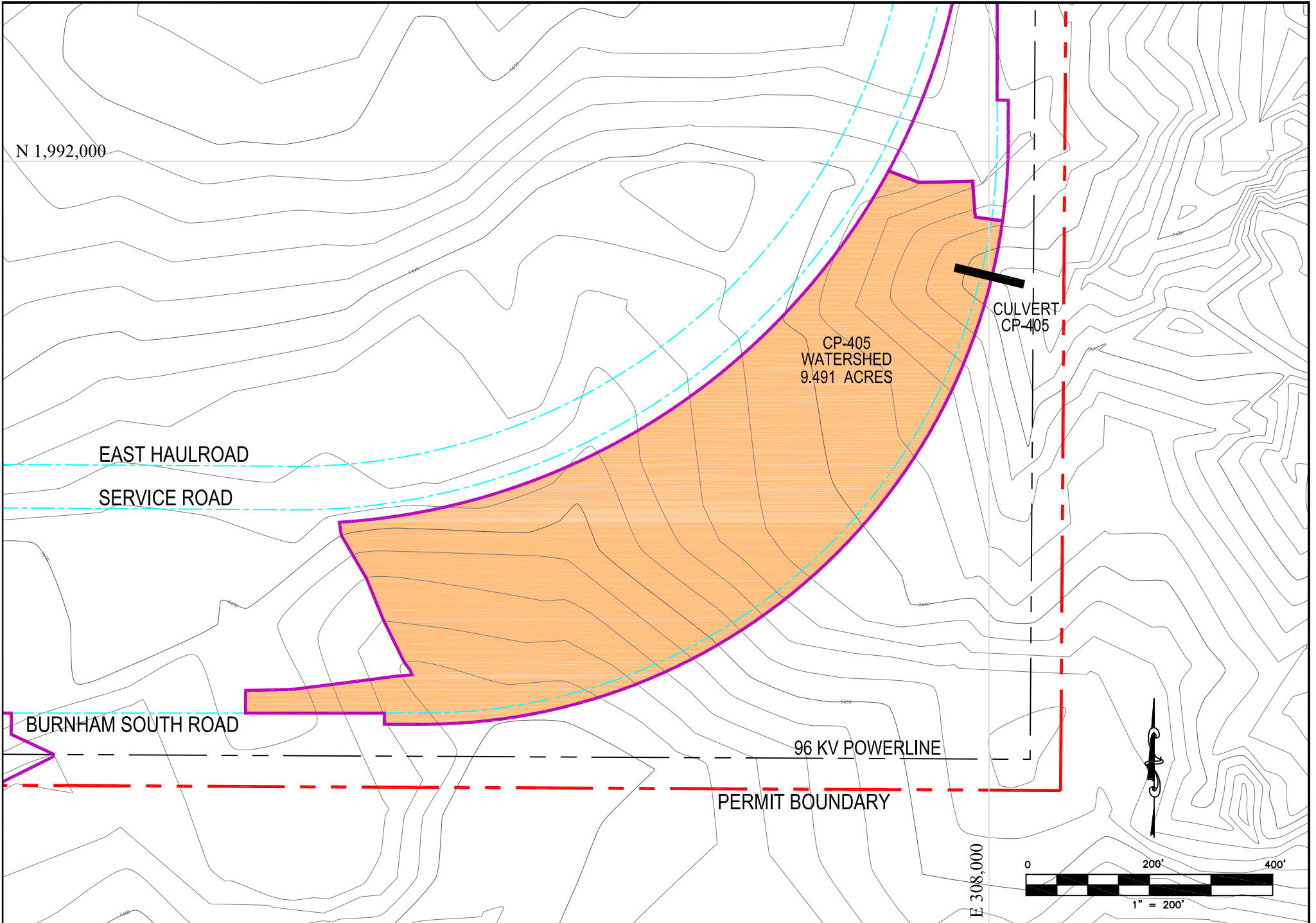
Tailwater Channel Data - Culvert CP-405

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

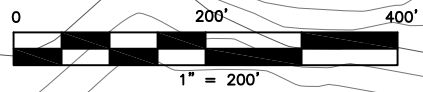
EAST HAULROAD
SERVICE ROAD

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

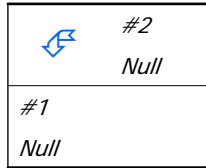
General Information

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 |

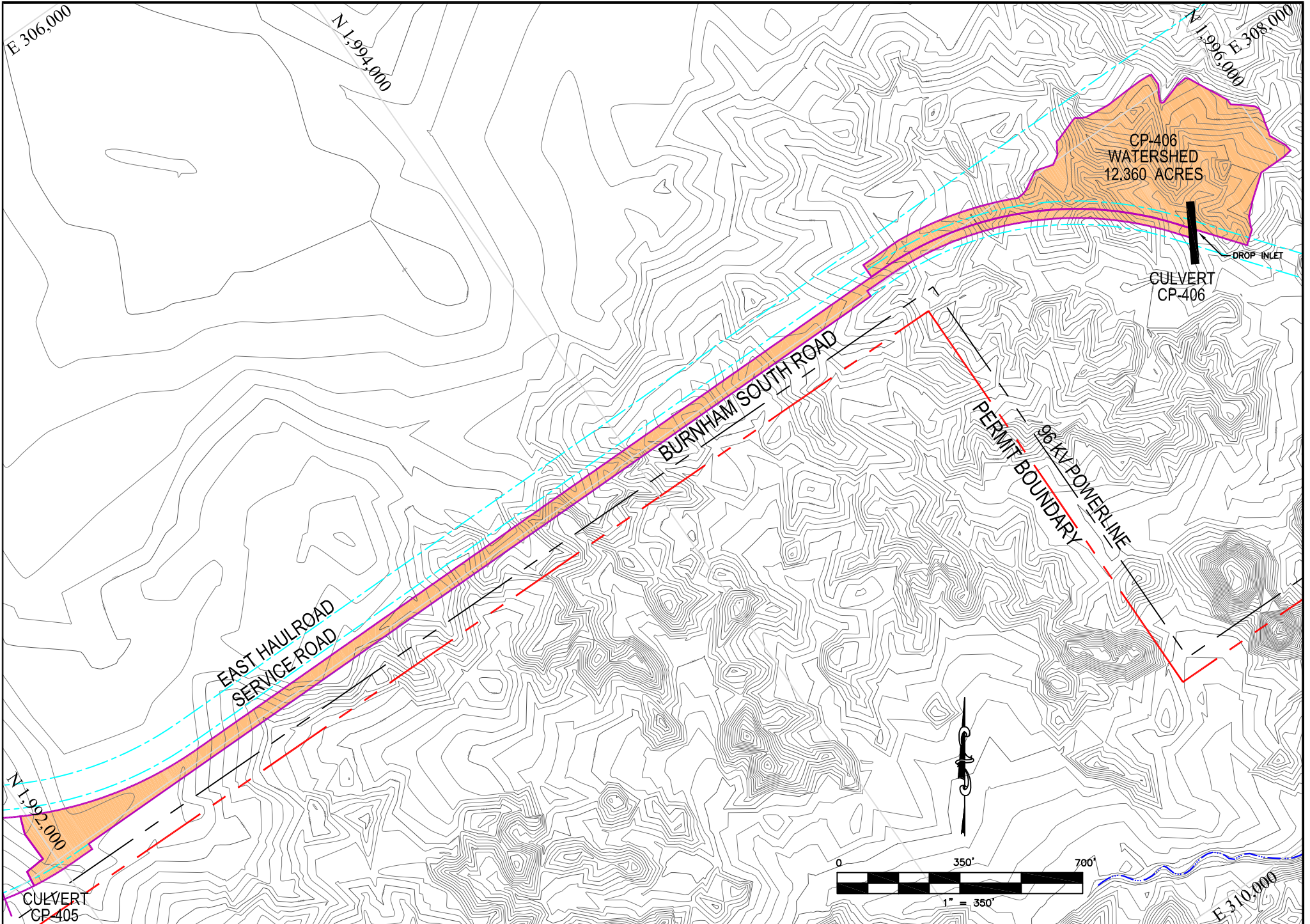
Tailwater Channel Data - Culvert CP-406

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 |



E 306,000

N 1,994,000

N 1,996,000
E 308,000

CP-406
WATERSHED
12.360 ACRES

DROP INLET
CULVERT
CP-406

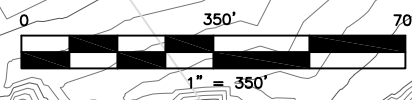
BURNHAM SOUTH ROAD

PERMIT BOUNDARY
96 kV POWERLINE

EAST HAUL ROAD
SERVICE ROAD

N 1,992,000

CULVERT
CP-405



E 310,000